The Playa lake in which the salt and borax occur is a desert mud plain of recent age covered during the summer months with a white saline efflorescence. The salt was recovered by solar evaporation. The saturated brine occurring about 20 feet below the surface was pumped into shallow excavated vats enclosed by low embankments. The vats were 50 feet wide and about 100 feet long and covered a considerable area. The saturated salt solution crystallized on the sides and bottoms of the vats, and, by successive evaporations, a layer of salt was formed that was thick enough to be hoed into piles and shipped without further refining. One acre of vats produced 10 tons of salt daily during good weather. The season lasted from June to October.

SAND SPRINGS DISTRICT

The Sand Springs district is 25 to 30 miles southeast of Fallon, the nearest railroad point. The Sand Springs salt marsh in this area is a playa lake covering nearly 40 square miles in Salt Springs Valley, known in the early days as Alkali Valley and recently as Four-Mile and Eight-Mile Flats. Salt production began in 1863; previous to 1870 considerable quantities of salt for the reduction of silver ores on the Comstock were produced. After 1870, salt for metallurgical purposes could be obtained more cheaply from the deposits in the Leete district because of better transportation facilities; therefore salt production at Sand Springs was discontinued temporarily. In recent years the Sand Springs salt field has been worked by small companies and individuals to supply salt for local dairy and table purposes.

Borax was discovered in the Sand Springs salt marsh about 1869, and the American Borax Co. erected a plant, which operated for several years.

The gold deposits of the Dan Tucker property and vicinity were first prospected in 1905 by C. W. Kinney. The production of metals, chiefly gold, has been about $30,000, most of which was from the Dan Tucker mine.

Dan Tucker Mine

The Dan Tucker mine comprises a group of 5 unpatented claims situated near the Lincoln Highway 31 miles southeast of Fallon, Nev., the nearest railroad station and supply center. Although the property was prospected by C. W. Kinney in 1905, very little work was done until 1912, when Leslie L. Leonard and C. W. Kinney sank a 100-foot shaft. The first production was made in 1919 by lessees, who shipped three carloads of ore yielding $215 to $300 per ton. The Dan Tucker Mining Co. was organized in 1925, and in the following year it leased the mine to Smith, Towle, and Young, who in 1927 erected a small amalgamation mill at Sand Springs in which 1,000 tons of ore was treated. In 1931 the property was acquired by another company, and in 1938 it was awarded to E. E. Tailleur, Fred Tailleur, and Dick Kemp on a labor lien. The owners proceeded to work the mine and shipped 10 carloads of rich ore. In the fall of the same year those connected with the Bralorne Mines, Ltd., of British Columbia, obtained a lease and bond and organized the Summit King Mines, Ltd., a subsidiary, to operate the Dan Tucker and other properties in the vicinity. In April 1939 the company had 12 men on development. Production from the Dan Tucker mine is reported to have been about $30,000, mostly shipping ore.

Workings comprise three shafts, the deepest of which is 200 feet, and subsidiary workings totaling approximately 1,000 feet. Equipment includes a gasoline hoist, a two-stage, air-cooled compressor, a blacksmith shop, and several camp buildings.

The formation is schist, limestone, and andesite. Free gold occurs in veins in a silicified zone striking east and west with a moderate dip to the south. The zone is traceable on the surface for several miles. The economic minerals are silver chloride and gold in a gangue of sugary quartz and crushed andesite.

Salt Deposits

The following data on the production of salt from the sand Springs marsh in the early days are from Browne:[12]

> The most productive salt bed at the present time is that of the Sand Spring Salt Mining Co., 75 miles east of Virginia City. The claim of this company, consisting of 1,600 acres, occupies a depression in the southeastern corner of an extensive alkali flat, the center of which for a space of several hundred acres is damp and marshy, and some portion of it is covered with a few inches of water. This damp surface is coated to a depth of two or three inches with a crystallized incrustation of salt with which the clayey strata below are charged. On removing this coating of salt, a thin body of fine white clay is exposed overlying a stratum of soft black clay, which in turn rests upon a seam of green and black clay containing coarse globules of salt. Beneath this seam occurs a deposit of crystallized salt, hard and massive but of unascertained thickness. In collecting the salt at this place, a tract embracing a score of acres or more is selected and divided into strips, from each of which, in regular order, it is scraped into large heaps with a broad wooden hoe. These heaps, after being exposed for a few days to drain and dry, are conveyed in wheelbarrows or cars running on wooden tracks laid down for the purpose of facilitating transportation over the soft ground, and thrown upon platforms or dumps, when the salt is ready for sacking and shipment to market. After one of the surface sections has been stripped of salt, the incrustation immediately begins to reform, and so rapidly do the secretions from the saliniferous clays below proceed, that a few weeks, and sometimes less, is sufficient to fully replace it, admitting the gathering of a fresh crop at least every month. As the masses of crystallized salt underlying these clayey strata are probably inexhaustible, it would seem as if this process of replenishment might go on forever.
>
> Prior to 1862, all the salt used in Nevada was brought from San Francisco, at an average cost, laid down in Virginia City, of about $150 per ton. During that year parties having imported a herd of camels

12/ Browne, J. Ross, Resources of the States and Territories West of the Rocky Mountains: U. S. Gov. Printing Office, Washington, 1869, pp. 310-311.

for the purpose began packing this commodity in from salt pools, 45 miles southeast of Walker Lake (Rhodes marsh in Mineral County), whereby the price was somewhat reduced. The following year, the Sand Springs Salt Co. having commenced operations, the price of salt suffered a further reduction, and for the past two years salt has been delivered to the mills about Virginia City at the uniform rate of $60 per ton, being considerably less than the average cost of freight from San Francisco. During the year 1865, this company disposed of about 150, and during the past year 250 tons of salt per month, most of which was consumed in the mills and reduction works, a little, also, after grinding, having been used for meat packing and culinary purposes, for which it is well adapted. The Sand Springs Salt Co. has over $100,000 invested in this business, and though owning several large teams, hire many others to haul the product of their salt fields to market, their freight bills amounting to from $10,000 to $15,000 per week. Large as is the amount of salt they are thus enabled to deliver, the supply is scarcely equal to the demand, some of the larger mills consuming between 35 and 40 tons per month.

Sand Springs salt marsh is a playa lake formed by the evaporation of a shallow body of water in an enclosed basin. During the winter months water collects on the surface of the basin, forming a sheet of brine perhaps 15 or 20 square miles in area, but during the summer this water evaporates, leaving a layer of salt several inches thick. The salines consist largely of sodium chloride, sodium sulfate, and sodium carbonate, with smaller amounts of sodium borate, potassium chloride, and calcium compounds. Magnesium salts are characteristically absent. This playa, as well as others in the Great Basin region, originated by repeated desiccations rather than by the singular evaporation of the deep lake, and in consequence the salts are considerably intermixed with clay and silt brought into the basin by surface drainage of the surrounding areas.

In recent years smaller quantities of salt have been collected annually from the surface of the marsh to supply the local demand for stock and dairy purposes. It is gathered by shoveling into trucks and does not undergo any refining process.

Borax Deposits

The recovery of borax from Sand Springs marsh was one of the pioneer projects of this nature in the Great Basin region. The borax plants at Sand Springs operated in 1870 and 1871 with a capacity of about 1 ton of borax per day. Production ceased in 1872 because of a drop in price of boracic acid from 30 cents to 9 cents per pound.

The most characteristic borate mineral of the playa-lake deposits, such as Sand Springs marsh, is ulexite, a hydrous borate of sodium and calcium, commonly referred to as cotton balls, occurring around the periphery of the marsh near the surface. The material worked in the early days contained about 10 percent borax, although some of it yielded as much as 30 percent.

The process for the recovery of borates from the saline deposits was simple; the cotton balls were either picked by hand from the shallow excavations in the mud, or the richest portion of the boraciferous mud was shoveled from the surface, and the material thus collected was hauled to semicircular iron pans set on a foundation of brick and fired from beneath with sagebrush or pinion. The pans were charged with water and crude borates and stirred with poles until the soluble salts dissolved, after which the liquor was drawn off into crystallizing vats wherein the borax was crystallized out on wires. In deposits where the soluble carbonates were not present in excess, sodium carbonate was added in the firing pans to break up the lime and boric acid as found in ulexite. The borax obtained by crystallization was again refined by a second crystallization in the same manner.