USBM (1938)

I.C. 6995

(143)

Item 5

4680 0004

SULPHUR DISTRICT

The Sulphur, also known as the Black Rock, district is on the northwest flank of the Kamma Mountains and on the southeast border of the Black Rock Desert. Sulphur, a station on the Western Pacific Railroad, is about 2 miles northwest. Sulphur deposits were discovered here by Indians, who showed them to white men in the seventies. According to Whitehill[19], the first locations were made in March 1875 by Messrs. McWorthy and Rover. Shortly after other locations were made in this area by Messrs. Hale and Wright who sold their claims to the Pacific Sulphur Co. This company erected a refinery and operated it for about 8 years, producing from 6 to 7 tons of sulphur per day. In 1900 the deposits were acquired by the Nevada Sulphur Co. of San Francisco, which operated for several years. Prior to 1911 the sulphur produced was hauled 35 miles to Humboldt, a station on the Southern Pacific Railroad, formerly Central Pacific Railroad. In 1911 the transportation cost was reduced by the completion of the Western Pacific Railroad, which passes within 1 1/2 miles of the sulphur deposits. In 1917 the deposits were purchased by the California Rex Spray Co.; this company and others were intermittently active up to 1929.

In 1908 rich silver ore was discovered by a man named Moonsey at the south end of the sulphur deposits. Silver ore was mined for a number of years, principally by lessees, who are reported to have produced shipping ore having a value of more than $100,000.

California Rex Spray Co.

The California Rex Spray Co. controls about 1,000 acres of patented sulphur-bearing ground. The principal owners are Frank B. McKevitt, Jr., Vacaville, Calif., Alexander S. Butler, Penryn, Calif., and S. H. Beetem of Benicia, Calif. After purchasing the property in 1917, the California Rex Spray Co. operated for 4 years, when it was leased to the Redwood Lumber Co. of Calif. The latter company operated for one year, and in 1924 the lease was taken over by the Humboldt Sulphur Co. This company operated until 1929, when it went into the hands of a receiver. Subsequently, the property was again leased to a company known as the Sierra Sulphur Co., Inc., which never operated, and in 1934 the property reverted to the present owners. In June 1937 all the mining, milling, and power equipment on the property was sold at auction. Statistics on the production of sulphur are not available, but, judging from the extent of the workings, the huge tailings pile, and some sketchy data on the early day activity, it is estimated roughly that at least 40,000 tons of sulphur have been produced. The sulphur was mined either by quarrying or by the room-and-pillar system.

The deposits are distributed over an area several miles long and 1 mile wide. The sulphur occurs as crystal masses on the walls of cavities and in disseminated form in a highly altered siliceous rock cemented by quartz and

19/ Whitehill, Henry R., Biennial Report of State Mineralogist, State of Nevada, 1875-1876: Carson City, Nev., p. 65.

chalcedony. In some of the cavities the sulphur is solid and appears to have flowed through the channels in the rocks in liquid form. A considerable amount of alunite, some gypsum, and a small amount of cinnabar is associated with the sulphur. Most of the sulphur mined in the past was obtained from shallow depths. The sulphur content of the material as mined varied from 15 to 85 percent.

Processes for Recovering Sulphur

Various processes have been employed by successive companies in recovering sulphur from the aforementioned deposits. A description of the process used in the seventies and eighties by the Pacific Sulphur Co. was as follows:20/

> The crude sulphur is melted in large oblong iron pans. It is run off from this first pan into another similar one, which is covered with perforated iron plates. These plates are covered with ordinary sacking material, through which the sulphur, when discharged from the first pan, is strained. A considerable portion of impurities still passes through the meshes of the sacking - indeed, the greater portion goes through with the melted sulphur, but it afterwards settles at the bottom of the pan. This straining process is not so much for the purpose of catching whatever impurities may be with the sulphur as it is to aid in the settling process that takes place in this second pan; for it seems that if this operation is omitted there will be no separation of the sulphur from the other elements that are in combination with it. A new set of sacking is used for each charge run out from the first pan, but several charges are deposited in the second pan before the purified sulphur is run off and the settlings are removed. A slow fire is kept up under the second pan to prevent the sulphur from congealing, so that the settling may take place. The pure sulphur is run off into cylindrical molds made of galvanized iron and a little larger at the top than at the bottom, so that the rolls of sulphur may be taken out the more easily when it is cooled. These rolls weigh about 150 pounds each and are, without any further process, ready for shipment. The capacity for refining at these works, which have two pans for the first operation and one for the second, is about 7 tons daily of refined sulphur. The cost of hauling the crude material from the mines to the refinery is $2.50 per ton; freight to the railroad is $10 per ton, and from there to San Francisco, $10 per ton. There is a market on the Pacific Coast for about 300 tons monthly.

In 1900 the Nevada Sulphur Co. recovered the sulphur by retorting. Two retorts, each having a capacity of 2 1/2 tons per charge, were employed. The retorts were made of cast iron, 10 feet high, the body of which was shaped like a frustum of a cone and having a semispherical bottom. The

20/ Whitehill, H. R., Work cited (footnote 19), p. 44.

retort was filled from the top and the charge was carried on a grate about 7 feet from the top. When the chamber was filled, the top and side doors (the latter used for discharging the waste) were sealed, and steam was turned into this retort at a pressure of 70 pounds to the square inch. The melted sulphur dropped through the grate into the kettlelike bottom of the retort, from which it was drawn off, together with the water resulting from the condensing steam, into a settling pan kept at a temperature sufficiently high so that the sulphur remained in the liquid state. From the settling pan the sulphur was run into cast-iron cone-shaped molds having a capacity of 250 pounds each. After hardening in the molds, the sulphur was broken up into small pieces, which were put through a crusher, which reduced it to pea size for marketing. Some of it was ground by buhrstones for flour sulphur and packed in sacks containing 110 pounds each.

A description of the process employed by the Humboldt Sulphur Co. in 1929 is given by Hazen21/. The crude ore was first crushed in gyratory and roll crushers to about 3/4 inch, then ground to 48 mesh in a Hardinge ball mill operating in closed circuit with a Dorr classifier. The ground pulp was elevated by a Wilfley sand pump to Kraut flotation cells, the concentrate from which was cleaned and recleaned in Forester type machines. The sand was removed from the flotation tailing by a Dorr classifier and sent to waste. The slime tailing was thickened in Dorr tanks and as much water as possible recovered. The flotation concentrate was thickened in a Dorr tank and then dewatered by an Oliver filter.

Many flotation re-agents were tried, but the best results were obtained with Aerofloat No. 15; about 0.05 pound of this re-agent alone were used per ton of ore. Recovery averaged about 85 percent of the sulphur originally in the ore. The concentrate averaged 77 percent sulphur, and mill heads, which were made up of half mine and half dump ore, about 15 percent sulphur.

The flotation concentrate was refined by the Hazen process (patented). In this process the sulphur was refined in a large retort having a capacity of 35 tons pure sulphur per 24 hours from a flotation concentrate analyzing 77 percent sulphur. The batch system was employed, and on an average the cycle produced 5 tons of pure sulphur in a little less than 3 1/2 hours. The sulphur produced was quite pure, the lowest-grade carload sold averaged 99.6 percent and the highest-grade carload 99.85 percent sulphur.

Alunite Deposits

Alunite veins occur in the vicinity of the sulphur deposits. Although the presence of the alunite was known as far back as 1900, it did not receive any attention until 1917, when a number of lode claims were located. The only production of alunite has been about 500 tons shipped in the crude state to the Pacific coast for use as fertilizer.

21/ Hazen, H. L., Recovering Sulphur From a Nevada Surface Deposit: Eng. & Min. Jour., vol. 127, May 25, 1929, pp. 830-831.

The alunite veins have been prospected by several short adits and shallow shafts totaling about 500 feet. There is no equipment on the ground.

A description of the deposits is given by Clark[22].

The alunite occurs in at least three parallel veins ranging from 2 to 15 feet in width and with a steep dip. The country rock is principally rhyolite breccia, which is covered in places by tuff and detrital material. The veins are traceable on the surface for a considerable distance. Where exposed to weathering, the alunite is soft and powdery but becomes harder with depth.

Three analyses made on the alunite, according to Clark, are as follows:

	Percent		
	No. 1	No. 2	No. 3
Insol (SiO_2)	0.09	1.6	2.0
Al_2O_3	37.4	37.52	37.9
Na_2O	2.31	2.36	2.27
K_2O	8.63	9.54	9.10

Silver Deposits

The silver deposits occur at the south end of the sulphur deposits a short distance from a place called the Devil's Corral, a natural amphitheater formed by highly colored rocks. The principal property in the early days was the Silver Camel mine, which is reported to have produced $100,000 in high-grade silver ore from 1908 to about 1912, principally by lessees. In recent years the only mining has been done by James Brown of Sulphur, Nev., on the Hornsilver claim.

Development consists of a number of trenches and shallow shafts totaling about 1,500 feet. The deepest shaft is 95 feet deep. There is no equipment on the ground, and all mining in former years was done by hand methods.

The silver occurs as cerargyrite (hornsilver) in narrow seams varying from a fraction of an inch up to 4 inches in width. No ore was found at a depth greater than 20 feet from the surface. An adit was driven 300 feet to tap the ore zone at depth, but it did not disclose anything of importance. The deposits are unusual in that the narrow seams of cerargyrite occur in a cemented conglomerate.

22/ Clark, I. C., Recently Recognized Alunite Deposits and Sulphur, Humboldt County, Nev.: Eng. & Min. Jour., vol. 106, pp. 159-163.