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WALTER RENTON INGALLS

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BORAX.

BY EDWIN HIGGINS.

The production of borax in the United States is confined almost entirely to Inyo, San Bernardino and Ventura counties, California. Although there is enough borax developed in these counties to supply the United States for many years to come, competing companies have paid good prices for proved deposits; consequently there was much activity in prospecting during 1907. Discoveries of borax were reported from various points in the State, but little importance is attached to most of them. The presence of ludwigite, a borate of iron and magnesia, associated with magnetite and manganese ores, was reported in the vicinity of Phillipsburg, Mont. The only important occurrence of this rare mineral, heretofore recorded, is at Morawitza, in the Banat, Hungary. The accompanying table shows the production of borax in the United States for a series of years.

PRODUCTION OF BORAX IN CALIFORNIA. (a)
(In tons of 2000 lb.)

Year.	Tons.	Value.	Year.	Tons.	Value.	Year.	Tons.	Value.
1896.....	6,754	\$ 675,400	1900.....	25,837	\$ 1,013,251	1904.....	45,547	(c) \$ 698,810
1897.....	8,000	1,090,000	1901.....	7,221	962,390	1905.....	46,334	1,019,158
1898.....	8,300	1,153,000	1902.....	(b) 17,202	2,234,994	1906.....	58,173	1,182,410
1899.....	20,357	1,139,882	1903.....	34,430	(e) 661,400	1907.....	.....	.....

(a) Reported by the California State Mining Bureau. (b) Mostly refined borax, whence the apparent discrepancy in value. Output of the other years is given as crude material. (c) Spot value.

The principal refiners of borax in the United States are: Pacific Coast Borax Company, operating a refinery at Bayonne, N. J., and one at Alameda, Cal.; Sterling Borax Company, operating refineries at San Francisco, Chicago and Pittsburg; Charles Pfizer & Co., Brooklyn, N. Y.; and M. Calm & Bro., Jersey City, N. J.

The Sterling Borax Company is a recent consolidation of the American Borax Company and the Frazier Borate Company, of California, the Stauffer Chemical Company, of San Francisco, Cal., the Thomas Thorkildsen Company, of Chicago, Ill., and the Brighton Chemical Company, of New Brighton, Penn.

A newly organized company, the Borax Properties Limited, has entered the California field. This company was organized to acquire and operate the properties of the Palm Borate Company, in San Bernardino county.

The crude mineral on this property is said to average 9.72 per cent. boric acid. It is the intention to build a refinery at the mine. The main office of the company is 68 Palmerston House, Old Broad street, London, E. C.

Industrial Conditions and Prices.—The bulk of the borax mined in California is shipped to Eastern points to be refined. The Pacific Coast Borax Company, which is the largest producer, treats 80 per cent. of its product at its refinery in Bayonne, N. J.; the remaining 20 per cent. is treated at its works in Alameda, Cal. Borax of commerce contains approximately 37 per cent. anhydrous boric acid, 47 per cent. water of crystallization and 16 per cent. soda. The crude material now shipped to Eastern points for treatment contains not less than 30 per cent. anhydrous boric acid, and when the freight charges across the country are considered, it is doubtful if there is much, if any, profit to be realized on material so handled, with refined borax as low as 4½ to 5c. per lb. The impurities to be met with in much of the California crude material are soluble and insoluble silica, iron, alumina and magnesia; with the exception of the soluble silica, these must be removed by special processes, which of course increase the cost of production. In this respect the borax of Asia and South America is far superior to the California product, containing little or no impurities and running high in anhydrous boric acid.

Under existing conditions, with respect to the attitude of the different companies and the price of the finished product, the independent owner of a borax property is placed in an unenviable position. He must either sell his property outright or build his own refinery, for there is no market for the crude mineral; the companies operating refineries are adequately supplied with crude material from their own properties. The great decline in the price of borax toward the end of 1907 was the result of a struggle for the control of the borax market. The strong competition which was developed also brought about many changes in the control and operation of both borax properties and refineries. The price of borax at New York and Chicago up to the end of August was steady around 7¼c. per lb. In September the quotation was 6½c. and in December 5¼c. per lb. The decline in price continued into 1908, the quotation in February and March being 4¼c. per pound. The prices are quoted on the basis of anhydrous boric acid.

BORAX IN CALIFORNIA.

The mineral colemanite (calcium borate), a white, crystalline substance with a vitreous luster, resembling gypsum somewhat but distinguished from it by a greater hardness, is the most important form in which borax occurs in California. However, other combinations of boric acid, lime and soda are of common occurrence.

Inyo County.—South of the Funeral range, on the Amargosa side of the mountain, occur immense deposits of calcium borate, conformable with the stratification of the country shales, clays, sandstones and thin sheets of gypsum. Borax is found as marsh deposits, and the Amargosa river, flowing southerly across the desert of the same name, is doubtless responsible for most of them.

For many years the Amargosa valley produced great quantities of borax, but now the chief source of supply of the mineral is the Lila C mine, 18 miles west of Greenwater in the foothills of the Funeral range of mountains. Eight miles to the east is Death Valley junction, from which point a spur of the Tonopah & Tidewater Railroad has been built to the mine. Here there is a deposit of calcium borate from 3 to 17 ft. thick, dipping 45 deg. easterly, which has been opened on the surface for about a mile. This property is operated through adit levels. The borax deposits of this locality are noted for their great size and high degree of purity. The completion of the Tonopah & Tidewater Railroad, which is now being constructed from Ludlow, on the Santa Fe, will greatly benefit the borax industry in this section.

SOME OF THE PRINCIPAL SUPPLIES OF BORAX PRODUCTS.

(In metric tons.)

Year.	Chile. (a)	Germany (b)	Italy.			United States. (d)	Total. (e)
			Borax Refined.	Boric Acid.			
				Crude.	Refined.		
1897....	3,154	198	990	2,704	290	7,257	14,563
1898....	7,028	230	702	2,650	166	7,529	18,305
1899....	14,951	183	709	2,674	129	18,466	37,112
1900....	13,177	232	858	2,491	283	23,437	40,478
1901....	11,457	184	544	2,558	347	6,550	21,640
1902....	14,327	196	.....	2,763	.....	15,512	32,798
1903....	16,879	159	.....	2,583	.....	31,282	50,853
1904....	16,733	135	569	2,624	314	41,407	61,782
1905....	19,612	183	(f)1,007	2,700	(f)749	42,036	66,287
1906....	(c)	161	1,062	2,561	562	52,774	57,120

(a) Prior to 1903, figures are for borate of lime exports. (b) Boracite. (c) Statistics not yet available. (d) Crude borax. (e) The total falls short of the World's supply, particularly because it fails to include the important production of Turkey. (f) Obtained by treating a part of the crude boric acid reported for 1905.

San Bernardino County.—In this county the principal deposits are found in the neighborhood of Daggett, but the supply from these mines has not kept pace with the demand. Here a great deal of the borax occurs in what is locally called the low-grade "muds." It is reported that the American Borax Company, of Daggett, has secured a new and extensive borax deposit in Soledad cañon, near Langs Station.

Ventura County.—There are at present two concerns mining borax on a large scale in the northeastern part of this county, the Columbus and the Frazier companies, each employing 65 men. The mineral, principally

colemanite, is mined and hauled by wagons to Bakersfield. The industry in this section is prosperous and gives promise of growing to larger proportions.

Tulare County.—Four borate claims were located on Deer creek, east of Porterville, and development is progressing.

USES OF BORAX.

Of late years borax has been extensively used in the manufacture of porcelain-coated ironware, tough grades of glass, pigments for staining glass, household soaps and preservatives for canned foods. When melted at a high temperature it has the property of dissolving metallic oxides and for this reason is used in assaying and also in soldering, brazing and welding metals. The borate of chromium makes a beautiful green pigment which is used in calico printing. Borate of manganese is sometimes used as a dryer in paints and oils. Borate of ammonia renders cotton goods unflammable to a certain extent.

Borax in solution is useful in the laundry and for toilet purposes; it is also a constituent of numerous cosmetics. It is effective in cleaning, softening and preventing the hair from falling out of woolen goods and furs.

In addition to the above, borax is extensively used in medicine and for various other purposes in manufacturing.