

# BARITE AND BARIUM PRODUCTS

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The strong demand for crude barite in 1937 resulted in greatly increased domestic production and sales, as well as a sharp rise in the average value of crude barite sold or used by producers. Imports of crude barite also were larger, although the average declared value remained the same as in 1936. Trends in sales of barium products were not uniform. The quantity of ground barite and blanc fixe sold or used by producers rose but that of lithopone dropped.

*Salient statistics of the barite and barium products industries in the United States, 1933-37*

	1933	1934	1935	1936	1937
<b>Crude barite:</b>					
Produced..... short tons..	146,402	178,361	218,075	274,062	360,877
Sold or used by producers:					
Short tons.....	167,880	209,850	225,111	283,160	355,888
Value: <sup>1</sup>					
Total.....	\$852,611	\$1,109,378	\$1,251,268	\$1,674,631	\$2,225,727
Average.....	\$5.08	\$5.29	\$5.56	\$5.91	\$6.25
Imports for consumption:					
Short tons.....	49,958	40,031	47,048	33,843	64,992
Value: <sup>2</sup>					
Total.....	\$216,955	\$174,937	\$246,254	\$170,316	\$327,224
Average.....	\$4.34	\$4.37	\$5.23	\$5.03	\$5.03
Apparent new supply <sup>3</sup> ..... short tons..	217,838	249,881	272,159	317,003	420,880
Domestic..... percent..	77.1	84.0	82.7	89.3	84.6
Reported consumption (total)..... short tons..	223,047	250,476	290,344	303,449	383,982
<b>Barium products:</b>					
Sold or used by producers:					
Short tons.....	215,525	228,796	268,652	263,810	332,185
Value.....	\$14,170,890	\$15,173,923	\$16,858,413	\$16,299,448	\$17,242,511
Imports for consumption:					
Short tons.....	12,236	9,459	11,672	11,078	14,397
Value.....	\$464,812	\$375,262	\$404,601	\$411,797	\$484,560
Exports of lithopone:					
Short tons.....	1,186	2,401	2,372	2,538	2,671
Value.....	\$107,923	\$199,508	\$221,611	\$229,942	\$231,622

<sup>1</sup> F. o. b. mine shipping point.

<sup>2</sup> Declared value f. o. b. foreign market.

<sup>3</sup> Barite sold or used by producers plus imports.

<sup>1</sup> Figures on imports and exports compiled by M. B. Price, of the Bureau of Mines, from records of the Bureau of Foreign and Domestic Commerce.

## CRUDE BARITE

*Production.*—Mine production of crude barite in 1937 totaled 360,877 short tons, 86,815 more than in 1936. Barite mining operations were under way in seven States—California, Georgia, Missouri, Nevada, Tennessee, Texas, and Virginia.

*Sales.*—Nearly 73,000 more tons of crude barite were sold or used by producers in the United States in 1937 than in 1936, with an increase in value of over \$500,000 (see fig. 1). The average value per ton rose from \$5.91 in 1936 to \$6.25 in 1937. Missouri, as usual, was the leading producing State, and its sales in 1937 increased to nearly 200,000 tons; those in Georgia almost doubled. Sales were reported by companies in the same six States as in 1936, as well as by one company in Texas.

Crude barite is sold for use in the ground barite, lithopone, and barium chemicals industries. Little crude barite is processed in the States in which it is produced, except in Missouri and California.

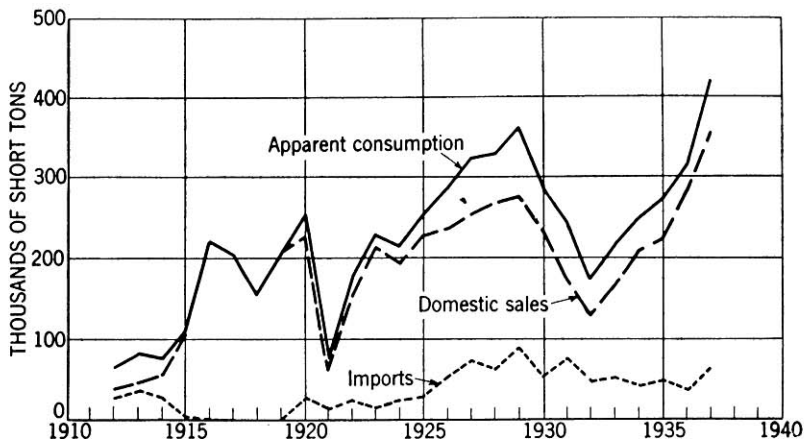


FIGURE 1.—Trends in domestic sales, imports, and apparent consumption of crude barite, 1912-37.

Some barite is ground in South Carolina and Georgia. Producers in the Southern States ship their crude barite largely to grinding and paint plants along the Atlantic coast, although some of it goes into Indiana and Illinois. Most of the Missouri barite is shipped to the St. Louis district, although plants in Illinois treat large quantities, and some is sent as far east as Pennsylvania. Virtually all the California and Nevada production is consumed or processed in California, almost entirely in plants at Modesto, Daggett, and Oakland, Calif.

*Crude barite sold or used by producers in the United States, 1936-37, by States*

State	1936		1937	
	Short tons	Value	Short tons	Value
Georgia.....	38,435	\$206,336	71,944	\$385,444
Missouri.....	160,866	1,008,528	198,101	1,430,397
Other States <sup>1</sup> .....	83,859	459,767	85,843	409,886
Total.....	283,160	1,674,631	355,888	2,225,727

<sup>1</sup> 1936: California, Nevada, Tennessee, and Virginia; 1937: California, Nevada, Tennessee, Texas, and Virginia.

*Grades.*—According to Weigel,<sup>2</sup>

“No standard tests or specifications for barite are in use. The most common specification used by a good part of the trade, however, is that the product shall contain 95 percent  $\text{BaSO}_4$  and not over 1 percent  $\text{Fe}_2\text{O}_3$ . A penalty is usually imposed if the ferric oxide exceeds 1 percent and a premium allowed if it is lower. A premium is sometimes specified for a barium sulphate content in excess of 95 percent. Purchase orders usually specify the size of the product and whether the barite is to be of the soft or hard variety. Barite for the glass trade is usually specified to contain not more than 0.1 percent  $\text{Fe}_2\text{O}_3$ , not less than 96 percent  $\text{BaSO}_4$ , and to be crushed to pass a 16-mesh screen with not more than 5 percent passing 100-mesh. This seems to be an arbitrary requirement, as some of the glass manufacturers are now asking for and taking a finely ground product.

Crude barite containing less than 90 percent  $\text{BaSO}_4$  is reported as commonly not acceptable to the chemical trade.

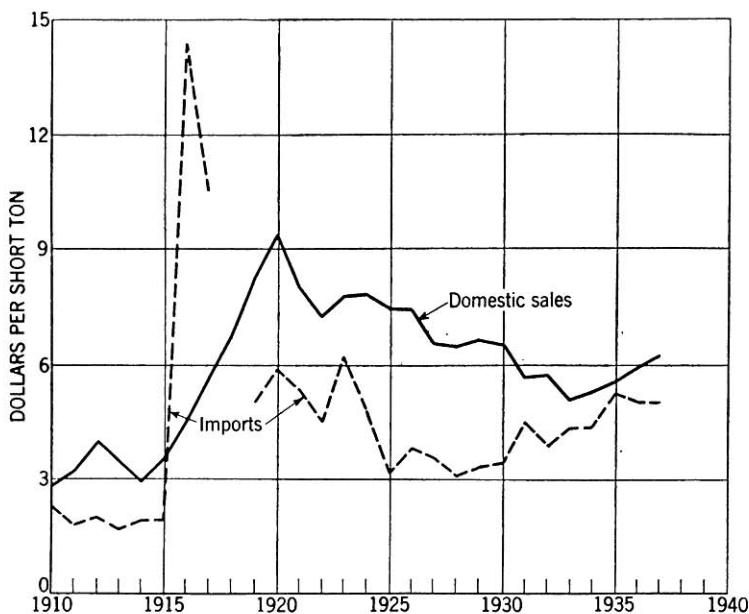


FIGURE 2.—Average value of domestic crude barite sold or used by producers and crude barite imported 1910-37.

*Prices.*—Crude barite is a relatively low priced commodity; the average annual value of domestic sales in the past 40 years has ranged from about \$2 to \$10 per ton. The World War had a drastic effect on the average value of domestic as well as imported crude barite (see fig. 2). In 1916, due to the scarcity of German barite, imports jumped suddenly in average value to \$14.41 per ton, and in 1918 they ceased. The demand for domestic barite, following the cutting off of imports, raised the average value of sales of domestic crude to a peak of \$9.30 per ton. An irregular decline in the average value of domestic sales has not yet brought the average value down to prewar levels.

The market quotation for crude barite from Georgia, f. o. b. mines, has remained unchanged at \$7 per short ton from 1935 to 1937, inclusive. The quotation for Missouri crude (95 percent barium

<sup>2</sup> Weigel, W. M., Barium Minerals: Am. Inst. Min. and Met. Eng., Industrial Minerals and Rocks, New York, 1937, pp. 97-110.

sulphate, less 1 percent iron) was the same as for Georgia barite during the first 4 months of the year, but only the quotation for the 93-percent grade is listed in *Engineering and Mining Journal*, *Metal and Mineral Markets*, for the last 8 months of the year. This grade was quoted at \$7.50 per short ton, an advance of \$0.50 per ton over the earlier quotation on the higher grade. The average value, f. o. b. mine shipping point, of crude barite for the entire United States, as calculated from reports by producers to the Bureau of Mines, increased from \$5.91 in 1936 to \$6.25 in 1937.

*Markets.*—Markets for crude barite lie in three general areas—the eastern, along and near the Atlantic coast and west to Ohio and West Virginia; the midwestern, extending from St. Louis to Chicago, with plants in Illinois, Kansas, and Missouri; and the western or Pacific coast region. The eastern and midwestern markets are by far the

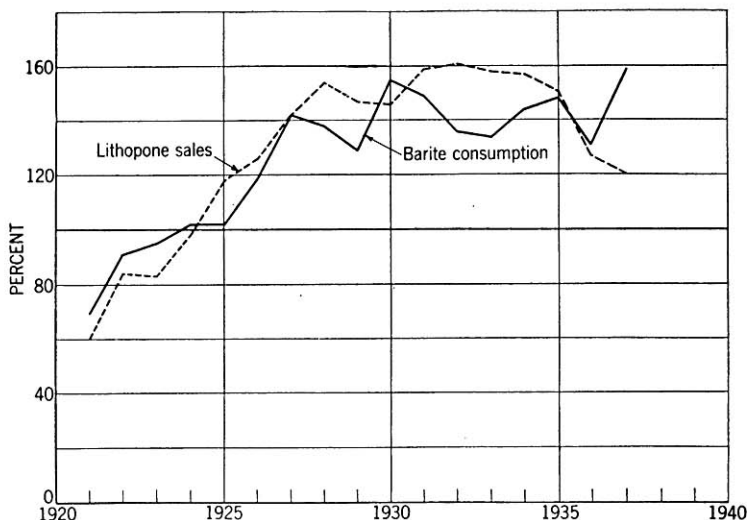


FIGURE 3.—Ratio of indexes of crude barite consumption and domestic lithopone sales (1923-25 average=100) to Federal Reserve Board index of industrial production (1923-25 average =100), 1921-37.

most important, each consuming 100,000 to 200,000 tons annually, whereas consumption in the western market was only 31,596 tons in 1937.

Imports into the United States are confined largely to the Atlantic seaboard.

*Consumption by uses.*—Manufacturers of barium products in the United States increased their consumption of crude barite (domestic and imported) about 80,000 short tons in 1937. This gain was due largely to increased consumption of crude barite in the manufacture of ground barite and barium chemicals. The general trend in the quantity of crude used in the production of ground barite has been upward since 1932, although there was a slight drop in 1936, and consumption in 1937—148,930 short tons—was much greater than ever before (see fig. 3). The quantity used in the production of barium chemicals was greater than in any year since 1931. Less crude barite was used in 1937 than in 1936 in the manufacture of lithopone.

*Crude barite (domestic and imported) used in the manufacture of barium products in the United States, 1933-37, in short tons*

Year	In manufacture of—			Total	Year	In manufacture of—			Total
	Ground barite	Lithopone	Barium chemicals			Ground barite	Lithopone	Barium chemicals	
1933.....	38, 026	131, 761	53, 260	223, 047	1936.....	83, 990	167, 014	52, 445	303, 449
1934.....	61, 123	140, 734	48, 619	250, 476	1937.....	148, 930	162, 681	72, 371	383, 982
1935.....	93, 692	146, 164	50, 488	290, 344					

*Consumption by States.*—Crude barite was processed in 12 States in 1937, the same as in 1936, but in 31 plants instead of 30, as in 1936. Of these plants, 14 were in the eastern market area, 11 in the mid-western, and 6 in the western.

*Crude barite (domestic and imported) used in the manufacture of barium products in the United States in 1937, by States*

State	Product manufactured	Plants <sup>1</sup>	Barite used (short tons)
Missouri.....	Ground barite and chemicals.....	4	114, 882
Delaware, New Jersey, and Pennsylvania.....	Lithopone and chemicals.....	5	99, 807
Illinois.....	Ground barite, lithopone and chemicals.....	6	59, 978
California.....	do.....	6	31, 596
West Virginia.....	Chemicals.....	2	
Maryland.....	Lithopone and chemicals.....	1	
Georgia.....	Ground barite and chemicals.....	2	77, 719
Kansas.....	Lithopone.....	1	
New York.....	Ground barite and chemicals.....	3	
South Carolina.....	Ground barite.....	1	
		31	383, 982

<sup>1</sup> A plant producing more than 1 product is counted but once in arriving at State totals.

*Foreign trade.*—The United States has ample reserves of barite and potential production to take care of all its needs, yet a considerable tonnage of crude is imported annually for consumption along the Atlantic coast because the delivered price is lower than that of domestic barite from the Georgia and Missouri fields.<sup>3</sup> Imports in 1937 nearly doubled those in 1936, both in quantity and value. Most of these imports originated in Germany. The sources of imports by countries in 1937 are shown in figure 4.

*Crude barite imported for consumption in the United States, 1936-37, by countries*

Country	1936		1937	
	Short tons	Value	Short tons	Value
China.....	1	\$14		
Cuba.....	183	894	1, 345	\$6, 298
France.....	5, 040	27, 000		
Germany.....	110	1, 305	16, 099	62, 605
Greece.....	560	2, 917	9, 026	52, 057
Italy.....	1, 213	4, 400	204	1, 832
Netherlands.....	26, 714	133, 671	38, 301	204, 298
Spain.....	22	115		
Yugoslavia.....			17	134
	33, 843	170, 316	64, 992	327, 224

<sup>3</sup> Weigel, W. M., work cited.

Exports of crude barite from the United States are not separately recorded.

*World production.*—World production of barium minerals—chiefly barite, but some witherite—has trended upward since 1933. For a long period Germany has been the largest producer of barite, although there have been times, as in 1932, when the United States has taken the lead. The United Kingdom, Italy, Greece, and France rank next in order of output.

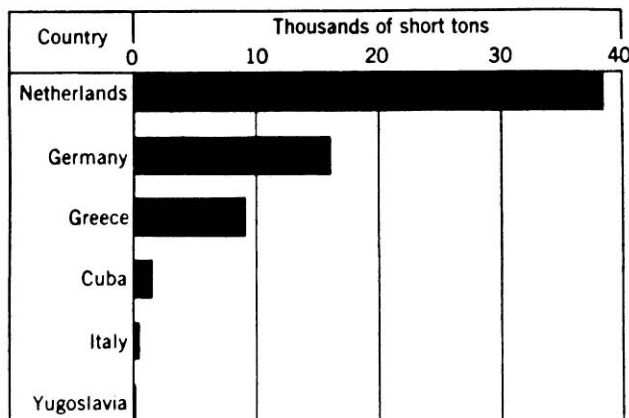


FIGURE 4.—Imports of crude barite into the United States in 1937, by countries.

*World production of barite, 1933-37, in metric tons*

[Compiled by M. T. Latus]

Country	1933	1934	1935	1936	1937
Algeria.....	10				2, 137
Australia:					
New South Wales.....	323	187	207	149	(1)
South Australia.....	1, 800	2, 345	2, 378	2, 009	(1)
Tasmania.....	5			34	(1)
Austria.....	1, 030	1, 025	797	1, 663	
Brazil.....	891	(1)	(1)	(1)	(1)
Canada.....	18				
China.....	3, 092	9, 500	(1)	(1)	(1)
Chosen.....	4, 969	5, 935	11, 027	5, 113	(1)
Cuba.....					3, 849
Czechoslovakia.....	(1)	2, 094	(1)	(1)	(1)
Egypt.....		50	85	30	(1)
France.....	13, 700	18, 350	16, 900	(1)	(1)
Germany:					
Baden.....	(1)	19, 681	12, 445	17, 800	} 442, 000
Bavaria.....	4, 146	8, 385	7, 073	11, 175	
Prussia <sup>1</sup> .....	143, 465	326, 318	326, 950	392, 103	
Saxony.....	130	484	222	467	
Thuringia.....	(1)	(1)	554	450	
Wurtemberg.....	(1)	(1)	(1)	1, 000	
Greece.....		7, 853	23, 091	31, 336	(1)
India, British.....	5, 742	3, 874	5, 581	5, 196	(1)
Indochina.....				40	(1)
Italy.....	23, 444	32, 408	41, 152	36, 671	(1)
Japan.....				3, 837	(1)
Norway.....				408	(1)
Portugal.....	2	1		10	(1)
Southern Rhodesia.....		14			(1)
Spain.....	4, 605	17, 528	(1)	(1)	(1)
Union of South Africa.....	(1)	1, 732	627	583	(1)
U. S. S. R.....	31, 000	74, 800	(1)	(1)	(1)
United Kingdom.....	67, 689	75, 182	79, 386	74, 242	73, 300
United States.....	132, 813	161, 806	197, 833	248, 624	327, 380

<sup>1</sup> Data not available.

<sup>2</sup> Official figures which, it is reported, cover only output of mines included under the mining law.

**BARIUM PRODUCTS**

*Preparation and uses.*—Ground barite is used as a heavy, white, inert filler in many products, such as paint, paper, rubber, oilcloth, linoleum, plastics, resins, and cloth. All grades are utilized, and more than half is reported to go into the rubber and paper industries. "Prime white" or "floated" barite is used in paper products that need a high finish and weight, such as bristolboard and playing cards. Ground barite is also employed in paint as an extender and as a pigment. It is also finding extensive use in the manufacture of glass. Of growing importance is its use as a heavy medium in mud in the drilling of deep oil wells where high gas pressures are encountered.

Barite,  $\text{BaSO}_4$ , is the only domestic barium mineral used for the manufacture of barium chemicals, although a small quantity of witherite,  $\text{BaCO}_3$ , imported from England, is also used. The first step in the production of most barium chemicals is the furnace reduction of barite with carbon to the soluble barium sulphide ("black ash"). The black ash, which contains about 70 percent barium sulphide, is usually dissolved and clarified in hot water in the preparation of other barium chemicals. The most important single chemical product made from barite is lithopone, an intimate mixture of zinc sulphide and barium sulphate prepared by coprecipitation by double decomposition of solutions of barium sulphide and zinc sulphate. It ordinarily contains approximately 70 percent barium sulphate and 30 percent zinc sulphide. Its main use is as a white pigment. The barium chemical next in importance is precipitated barium sulphate (blanc fixe), a white fine-grained product used as a filler and in paints. It is ordinarily prepared by precipitation from a solution of barium sulphide by means of sodium sulphate (salt cake), with sodium sulphide obtained as a byproduct. Precipitated barium carbonate, used in ceramics and for making barium dioxide, is obtained by precipitation from a barium sulphide solution with sodium carbonate (soda ash); sodium sulphide is recovered as a byproduct.

*Sales.*—Trends in the quantity and value of barium products sold or used by producers in 1937 were not uniform. Sales of ground barite and blanc fixe increased compared with 1936, but those of lithopone, artificial barium carbonate, and "other barium chemicals" decreased. Detailed statistics of sales during the past 5 years are given in the following table.

*Barium products sold or used by producers in the United States, 1933-37*<sup>1</sup>

Product	1933	1934	1935	1936	1937
Ground barite:					
Plants.....	13	13	11	13	12
Short tons.....	34,601	53,326	76,250	69,102	129,777
Value.....	\$683,432	\$1,006,905	\$1,407,787	\$1,217,818	\$2,249,612
Lithopone:					
Plants.....	11	11	11	11	11
Short tons.....	140,831	145,565	159,486	158,319	154,771
Value.....	\$11,751,500	\$12,235,624	\$13,470,274	\$12,976,754	\$12,069,790
Blanc fixe (precipitated barium sulphate):					
Plants.....	9	6	6	6	7
Short tons.....	30,744	18,115	18,067	16,149	28,250
Value.....	\$1,197,131	\$1,084,733	\$980,191	\$890,310	\$1,614,764
Artificial barium carbonate (chemically precipitated):					
Plants.....	4	4	3	3	3
Short tons.....	3,810	4,706	7,329	11,347	10,755
Value.....	\$181,857	\$245,315	\$357,585	\$515,624	\$511,357
Other barium chemicals: <sup>2</sup>					
Plants.....	9	7	5	7	6
Short tons.....	5,539	7,084	7,520	8,893	8,632
Value.....	\$356,970	\$601,346	\$642,576	\$698,942	\$796,988

<sup>1</sup> To avoid duplication, the barium chemicals reported here do not include the output of firms that make these chemicals from such products as barium chemicals and imported barite and witherite purchased in the open market; the total for barium chemicals is therefore not shown here.

<sup>2</sup> Figures cover chemicals, in order of value as follows: 1933: Chloride, sulphide, dioxide, and hydroxide; 1934-35: Chloride, dioxide, sulphide, and hydroxide; 1936: Chloride, dioxide, sulphide, hydroxide, and oxide; 1937: Chloride, dioxide, sulphide, and hydroxide.

Lithopone is used principally in the paint industry, which in turn depends upon new building construction as well as maintenance of buildings already constructed. Smaller quantities of lithopone are consumed by the floor covering, textile, and rubber industries. The amount of lithopone sold or used by producers for consumption in the paint industry in 1937 was slightly above that sold in 1936, correlating with a slight increase in building construction and paint sales. Sales for all other major uses decreased in 1937.

*Lithopone sold or used by producers, 1935-37, by consuming industries*

Industry	1935		1936		1937	
	Short tons	Percent of total	Short tons	Percent of total	Short tons	Percent of total
Paints, enamels, and lacquers.....	124,615	78.1	122,461	77.3	122,915	79.4
Floor coverings and textiles.....	19,440	12.2	23,085	14.6	20,194	13.1
Rubber.....	4,435	2.8	4,908	3.1	4,383	2.8
Other.....	10,996	6.9	7,865	5.0	7,279	4.7
Total.....	159,486	100.0	158,319	100.0	154,771	100.0

*Prices.*—Accompanying the increased apparent new supply of ground barite in the United States in 1937 was a slight shading of price, quotations declining from \$23 early in the year to \$22.85 a ton later. There had been no change in the quoted price for several years previously. Quotations for ground witherite remained unchanged. Lithopone quotations were only slightly changed, the upper limits for the varieties quoted being one-eighth cent lower than in 1936. Details are given in the following table.



Range of quotations on barium products, 1935-37<sup>1</sup>

	1935		1936		1937	
Ground barite, car lots, St. Louis.....short tons..		\$23.00		\$23.00	\$22.85	-\$23.00
Ground witherite, works <sup>2</sup> .....do.....	\$42.00	- 45.00	\$42.00	- 45.00	42.00	- 45.00
Lithopone:						
Domestic, ordinary, delivered, bags.....pound..	.04½-	.04¾	.04¼-	.04¾	.04¼-	.04½
Barrels.....do.....	.04¾-	.05	.04½-	.05	.04½-	.04¾
High strength, bags.....do.....	.06	- .06¼	.05¾-	.06¼	.05¾-	.06¼
High strength, barrels.....do.....	.06¼-	.06½	.06	- .06½	.06	- .06¾
Titanated, bags.....do.....	.06	- .06¼	.05¾-	.06¼	.05¾-	.06½
Titanated, barrels.....do.....	.06¼-	.06½	.06	- .06½	.06	- .06¾
Barium carbonate, 200-pound bags, works short tons..	56.50	- 61.00	56.50	- 61.00	52.50	- 62.50
Barium chlorate, 112-pound kegs, New York pound..	.14	- .17½	.15½-	.17½	.16½-	.17½
Barium chloride, barrels, divd. zone 1.....short tons..	72.00	- 74.00	72.00	- 74.00	74.00	- 92.00
Barium dioxide (binoxide or peroxide), 88 percent, 690-pound drums.....pound..	.11	- .12	.11	- .12	.11	- .12
Barium hydrate, 500-pound barrel.....do.....	.05½-	.06	.05¼-	.06	.04¾-	.05½
Barium nitrate, barrels.....do.....		.08¼	.07	- .08¼	.07	- .08¼
Barium sulphate, precipitated (blanc fixe), 400-pound barrel, works.....short tons..	\$42.50	- 70.00	\$42.50	- 70.00	\$40.00	- 75.00

<sup>1</sup> Chemical Industries (formerly Chemical Markets), New York (monthly); Metal and Mineral Markets, New York (weekly).

<sup>2</sup> 90 percent through 300-mesh.

<sup>3</sup> Lowest price for pulp grade, highest for high-grade precipitated.

*Foreign trade.*—Imports of ground barite, lithopone, witherite, barium oxide, barium chloride, and barium compounds not elsewhere specified increased in 1937 over 1936. Both the quantity and value of witherite imports nearly doubled those of 1936.

Barium compounds imported for consumption in the United States, 1933-37

[Value at port of shipment]

Year	Ground barite		Lithopone		Barium dioxide		Blanc fixe (precipitated barium sulphate)		Barium carbonate (precipitated)	
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value
1933.....	2,632	\$30,492	5,596	\$313,341	1	\$82	245	\$12,093	49	\$1,632
1934.....	1,863	16,916	3,927	219,752	(1)	58	459	26,156	-----	-----
1935.....	3,354	28,766	4,603	256,731	(2)	72	141	9,403	11	631
1936.....	2,873	28,397	4,781	273,571	(2)	223	123	6,971	30	889
1937.....	3,313	35,046	5,601	302,417	(2)	34	87	6,657	30	848

Year	Witherite, crude, unground		Barium chloride		Barium nitrate		Barium hydroxide		Barium oxide		Barium compounds (n. e. s.)	
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value
1933.....	2,949	\$47,324	6	\$526	359	\$31,140	281	\$15,542	110	\$9,416	8	\$3,224
1934.....	2,358	43,808	107	4,808	454	44,884	287	17,548	(3)	66	4	1,266
1935.....	2,634	48,551	392	17,170	258	24,412	271	16,987	(3)	26	8	1,852
1936.....	2,464	44,475	244	10,355	185	19,107	370	25,423	(7)	155	8	2,231
1937.....	4,556	82,341	315	13,761	157	15,836	310	21,004	(9)	161	28	6,455

<sup>1</sup> 370 pounds.

<sup>2</sup> 450 pounds.

<sup>3</sup> 1,392 pounds.

<sup>4</sup> 229 pounds.

<sup>5</sup> 132 pounds.

<sup>6</sup> 33 pounds.

<sup>7</sup> 287 pounds.

<sup>8</sup> 298 pounds.

Exports of lithopone in 1937 exceeded those of any year since 1932 in both quantity and value.

*Lithopone exported from the United States, 1933-37*

Year	Short tons	Value		Year	Short tons	Value	
		Total	Average			Total	Average
1933.....	1, 186	\$107, 923	\$91.00	1936.....	2, 538	\$229, 942	\$90. 60
1934.....	2, 401	199, 508	83.09	1937.....	2, 671	231, 622	86. 72
1935.....	2, 372	221, 611	93. 43				

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