

Barite

By Stanley K. Haines¹

Domestic production of barite reached an alltime high of 1.49 million tons in 1977, an increase of 21% over that of 1976. Nevada, with production of 1.16 million tons, was the leading producing State. Other principal producing States were Arkansas and Missouri. Imports of crude barite continued to

increase, reaching 955,000 tons in 1977. Oil- and gas-well drilling activity remained high and pushed total consumption of crushed and ground barite to 2.57 million tons, also a record high. Of the total crushed and ground barite, 91% was consumed in drilling muds.

Table 1.—Salient barite and barium-chemical statistics
(Thousand short tons and thousand dollars)

	1973	1974	1975	1976	1977
United States:					
Barite:					
Primary (sold or used by producers) -----	1,104	1,106	1,318	1,234	1,494
Value -----	\$16,688	\$16,822	\$21,200	\$28,689	\$30,264
Exports -----	68	61	57	41	50
Value -----	\$2,884	\$2,518	\$2,871	\$2,871	\$3,436
Imports for consumption -----	716	729	634	905	955
Value -----	\$7,596	\$8,680	\$8,541	\$17,677	\$18,055
Crushed and ground (sold or used by producers) -	1,571	1,637	1,807	2,204	2,593
Value -----	\$54,473	\$64,394	\$73,075	\$93,283	\$110,409
Barium chemicals (sold or used by producers) ----	62	56	43	52	56
Value -----	\$13,899	\$15,751	\$15,556	\$19,698	\$23,151
World: Production -----	4,945	5,109	5,419	5,666	5,892

¹Revised.

DOMESTIC PRODUCTION

U.S. production increased 21% in quantity and 5% in value to 1,494,000 tons of primary barite valued at \$30,264,000. This output was 13% higher than the previous record set in 1975. Primary barite is the first marketable product, and includes crude or run-of-mine barite, flotation concentrates, and other beneficiated material such as washer, jig, or magnetic separation concentrates.

Barite was produced at 30 mines: 13 in Nevada, 9 in Missouri, 2 each in Arkansas and Georgia, and 1 each in Idaho, Illinois,

Montana, and Tennessee. Nevada remained the leading producing State with 78% of the total quantity and 61% of the total value. The other producing States in descending order of production were Missouri, Arkansas, Georgia, Montana, Illinois, Idaho, and Tennessee.

Run-of-mine barite sold or used by producers represented 38% of total production, down from 48% in 1976; other beneficiated material was 57% compared with 44% in 1976; and flotation concentrate was 5% compared with 8% in 1976.

The leading producers of domestic barite for use in well drilling were (in alphabetical order) Baroid Div., NL Industries, Inc., with mines in Arkansas, Missouri, and Nevada; Dresser Minerals Div., Dresser Industries, Inc., with mines in Missouri, and Nevada; IMCO Services Div., Halliburton Co., with mines in Nevada; and Minerals Div., Milchem, Inc., with mines in Missouri and Nevada.

Barite for chemical, glass, and filler uses was sold by C. R. Wood Co., Inc.; Dresser Minerals Div., Dresser Industries, Inc.; Industrial Chemical Div., FMC Corp.; IMCO Services Div., Halliburton Co.; New Riverside Ochre Co.; De Lore Products, Industrial Chemicals Div., NL Industries, Inc.; Paga Mining Co.; Minerals, Pigments, and Metals Div., Pfizer, Inc.; and Standard Slag, Inc.

Imported and/or domestic barite was ground at 41 plants in 12 States. Texas with eight plants and Louisiana with seven had the heaviest concentration of grinding plants, due to the availability of port facilities for imported barite and the close proximity to areas of high drilling activity. Other States with grinding plants were Missouri, with six operations; Nevada and

Utah, five each; Arkansas, California, and Georgia, two each; and Alaska, Illinois, Montana, and Tennessee, one each.

In May 1977, IMCO Services dedicated a new barite beneficiation plant near Battle Mountain, Nev. The plant has a capacity of 225,000 tons per year of drilling-mud-grade barite. Ore comes from the Mountain Springs mine of FMC Corp. The beneficiation plant is the first in the United States to include three distinct concentration techniques—jigging, tabling, and flotation.

IMCO also initiated its mining plan for the Clipper mine and associated jigging plant south of Battle Mountain, Nev. The ore was mined by a contractor and fed through a plant containing three Bendelari three-cell jigs. The capacity of the Clipper plant is 150,000 tons per year. The barite will be ground in the grinding plant at Battle Mountain, Nev., or at Houston, Tex.²

Tom Norris, Inc., operating under contract to NL Baroid, completed assembly of a jigging plant at NL Baroid's Rossi mine outside of Battle Mountain, Nev. The two Bendelari jigs provide an upgraded feed for the flotation plant 30 miles away.³

Table 2.—Barite sold or used by producers in the United States, by State

(Thousand short tons and thousand dollars)

State	1976		1977	
	Quantity	Value	Quantity	Value
Missouri -----	124	3,860	117	4,061
Nevada -----	900	18,379	1,158	18,329
Other States ¹ -----	210	6,451	219	7,874
Total -----	1,234	28,689	1,494	30,264

¹Includes Arkansas, Georgia, Idaho, Illinois, Montana, and Tennessee.

²Data do not add to total shown because of independent rounding.

CONSUMPTION AND USES

Total consumption of barite in 1977 reached a record high of 2,592,000 tons, an increase of 18% over that of 1976. Barite for use as a weighting agent in oil- and gas-well drilling fluids continued as the dominant end use, accounting for 92% of total consumption or 2,372,000 tons. This was an

increase of 19% over 1976, and corresponds closely with the increase of 18% in total drilling footage from 181.7 million feet in 1976 to 215.0 million feet in 1977. The average depth drilled was 4,626 feet in 1977, with an average of 22 pounds of barite consumed per foot of drilling.

Barite for use in barium chemicals increased 4% to 81,000 tons in 1977. The largest increase in consumption was in the end use for other filler, from 14,000 tons in 1976 to 31,000 tons in 1977. Paint usage of barite remained about the same as in 1976, at 50,000. Other uses declined 22% to 59,000 tons and included filler in rubber and plastics; flux, oxidizer, and decolorizer in glass manufacture; and miscellaneous uses such as ballast for ships, heavy concrete aggregate, and other unspecified uses.

The data in table 3 are mainly for ground barite, but include the relatively small quantity of crushed barite used primarily in the barium-chemical industry. In 1977, apparent consumption was less than reported consumption. The heavy demands for drilling mud caused most producers to ship all the barite they could produce plus draw

down any stocks.

Barite is the principal raw material used in the production of barium chemicals. Producers of barium chemicals in 1977 were J. T. Baker Chemical Co., Phillipsburg, N.J.; Chemical Products Corp., Cartersville, Ga.; Industrial Chemical Div., FMC Corp., Modesto, Calif.; Mallinckrodt, Inc., St. Louis, Mo.; and Chemical Div., Sherwin-Williams Co., Coffeyville, Kans. Sherwin-Williams also produced lithopone. Total production of barium chemicals increased 8%. Sales of barium carbonate increased 2% to 35,700 tons in 1977. The average value was \$300.73 per ton in 1977 compared with \$138.82 per ton in 1976. Barium carbonate was used in the manufacture of television picture tubes (for screen control), in brick and tile, in barium ferrite manufacture, and for many other purposes.

Table 3.—Crushed and ground barite sold, by use¹

(Thousand short tons)

Use ²	1976		1977	
	Quantity	Percent of total	Quantity	Percent of total
Barium chemicals ³ -----	78	4	81	3
Filler or extender: -----				
Paint -----	50	2	50	2
Rubber -----	W	--	W	--
Other filler -----	14	1	31	1
Well drilling -----	1,986	90	2,372	92
Other uses -----	76	3	59	2
Total -----	2,204	100	2,593	100

W Withheld to avoid disclosing company proprietary data; included with "Other uses."

¹Includes imported barite.

²Uses reported by producers of ground and crushed barite, except for barium chemicals.

³Quantities reported by consumers.

Table 4.—Barium chemicals produced and sold by producers in the United States in 1977¹

Barium chemical	Plants ²	Production (short tons)	Sold by producers	
			Quantity (short tons)	Value (thousands)
Barium carbonate -----	4	35,300	35,700	\$10,736
Barium chloride -----	3	W	W	W
Barium hydroxide -----	3	W	W	W
Black ash -----	2	W	W	W
Blanc fixe -----	1	W	W	W
Other barium chemicals -----	4	29,600	20,400	12,415
Total -----	6	64,900	56,100	23,151

W Withheld to avoid disclosing company proprietary data; included with "Other barium chemicals."

¹Only data reported by barium-chemical plants that consume barite are included.

²A plant producing more than one product is counted only once.

PRICES

Prices for barite remained constant, according to the Engineering and Mining Journal. The prices listed in table 5 are from trade publications; they serve as a general guide but do not necessarily reflect actual transactions.

The average value per ton of crude barite was \$20.26, a decrease of \$2.99 per ton from

that of 1976. The drop in average value may be partially attributed to the continued increase in production of Nevada barite, which is cheaper to mine and process than ore of other areas. The average value per ton of crushed and ground barite was \$42.60, compared with \$42.56 in 1976.

Table 5.—Barite price quotations in 1977

Item	Price per short ton ¹
Barite:²	
Chemical, filler, glass grades, f.o.b. shipping point, carload lots:	
Handpicked, 95% BaSO ₄ , not over 1% Fe -----	\$46.50- \$55.00
Magnetic or flotation, 96% BaSO ₄ , not over 0.5% Fe -----	60.00- 70.00
Water-ground, 99.5% BaSO ₄ , 325 mesh, 50-pound bags -----	60.00- 80.00
Drilling-mud grade:	
Ground, 83%-93% BaSO ₄ , 3%-12% Fe, specific gravity 4.20-4.30, f.o.b. shipping point, carload lots -----	71.00- 78.00
Crude, imported, specific gravity 4.20-4.30, c.i.f. Gulf ports -----	19.00- 28.00
Barium chemicals:³	
Barium carbonate:	
Precip., bulk, carload lots, freight equalized -----	250.00- 275.00
Electronics grade, bags, same basis -----	255.00
Barium chloride:	
Purified cryst., 400 pound drums, at works (per pound) -----	1.24
Technical cryst., bags, carload lots works -----	300.00
Anhydrous, bags, carload lots, same basis -----	400.00
Barium sulfate:	
USP X-ray diagnosis grade, powder, 250-pound drums, 1,250-pound lots (per pound) -----	.25
Barium sulfide (black ash) drums, carload lots, works -----	115.00- 150.00

¹Unless otherwise noted.

²Engineering and Mining Journal. V. 178, No. 12, December 1977, pp. 46-47.

³Chemical Marketing Reporter. V. 213, No. 26, Dec. 26, 1977, p. 27.

FOREIGN TRADE

Exports of barite increased 21% to about 50,000 tons in 1977. The average value of the exports was \$69.34 per ton. Canada remained the leading recipient of these exports with 31,000 tons. Barite, primarily ground material, was shipped principally from the following customs districts: Seattle, Wash. (38%); Laredo, Tex. (19%); Detroit, Mich. (10%); New Orleans, La. (10%); and Great Falls, Mont. (10%).

Imports of crude barite increased 6% to 955,000 short tons valued at \$18.91 per ton. The principal source countries and the average values per ton were Peru, \$17.68; Ireland, \$12.60; and Mexico, \$17.69.

Most of the crude barite imported was drilling-mud-grade and entered the United States through the following customs districts: New Orleans, La. (47%); Laredo, Tex. (18%); Galveston, Tex. (17%); Houston, Tex. (11%); and Port Arthur, Tex. (7%).

Ground barite imports increased to 19,000 tons valued at \$121,000 in 1977. Mexico was the leading source country. Imports of natural ground witherite were 1,036,000 pounds valued at \$102,600 in 1977. These data are open to question since there has been no reported production of witherite since 1969. These imports, mainly from the Federal Republic of Germany, were probably precipitated (manufactured) barium carbonate.

Imports of barium chemicals increased 47% to 25,000 tons in 1977. Barium carbonate and blanc fixe, the major compounds imported increased 186% and 10%, respectively. The leading source country for lithopone, hydroxide, carbonate, and blanc fixe was the Federal Republic of Germany. The People's Republic of China was the leading source for chloride and nitrate.

The large increase in imports of barium carbonate was the indirect result of the

closing of Kaiser Industries' strontium carbonate plant in Canada. The FMC Corp. chemicals plant at Modesto, Calif., increased strontium carbonate production to meet the demand resulting from Kaiser's shutdown. Since barium and strontium chemi-

cals are made with the same equipment, FMC cut back on production of barium carbonate. U.S. consumers found the Federal Republic of Germany ready to supply their needs through exports to the United States.

Table 6.—U.S. exports of natural barium sulfate and carbonate

Country	1976		1977	
	Quantity (short tons)	Value (thousands)	Quantity (short tons)	Value (thousands)
Argentina	97	\$4	394	\$19
Australia	20	4	--	--
Belize	--	--	--	--
Brazil	287	21	500	44
Cameroon	--	--	146	15
Canada	--	--	600	61
Chile	26,382	1,875	31,485	1,782
Colombia	--	--	33	1
Costa Rica	212	9	--	--
Dominican Republic	34	1	--	--
El Salvador	--	--	28	1
France	123	17	--	--
Germany, Federal Republic of	57	3	51	11
Guatemala	9,064	543	--	--
Hong Kong	--	--	--	--
Israel	600	53	40	2
Italy	--	--	66	3
Jamaica	39	2	--	--
Japan	49	24	27	4
Korea, Republic of	--	--	148	6
Mexico	704	32	10,782	1,021
Netherlands	14	1	88	4
Netherlands Antilles	--	--	204	16
New Zealand	--	--	638	67
Paraguay	351	27	1,101	88
Peru	5	1	--	--
Philippines	174	11	33	7
South Africa, Republic of	130	6	79	6
Switzerland	44	2	--	--
Taiwan	52	2	147	6
Trinidad and Tobago	2,500	220	2,500	220
Venezuela	125	13	199	28
Zaire	--	--	262	24
Total	41,063	2,871	49,551	3,426

Table 7.—U.S. exports of lithopone

Year	Quantity (short tons)	Value (thousands)
1975	1,833	\$1,060
1976	779	937
1977	435	698

Table 8.—U.S. imports for consumption of barite, by country
(Thousand short tons and thousand dollars)

Country	1976		1977	
	Quantity	Value	Quantity	Value
Crude barite:				
Canada -----	62	861	78	1,429
Chile -----	12	283	27	770
France -----	27	1,079	--	--
German Democratic Republic -----	(¹)	1	--	--
Germany, Federal Republic of -----	4	77	--	--
Greece -----	17	385	17	242
Ireland -----	199	2,328	211	2,659
Malaysia -----	--	--	3	42
Mexico -----	106	1,605	115	2,034
Morocco -----	101	3,078	74	2,339
Mozambique -----	18	561	--	--
Peru -----	210	3,246	267	4,721
Thailand -----	--	--	75	1,266
Turkey -----	149	4,173	88	2,553
Total -----	905	17,677	955	18,055
Ground barite:				
Belgium-Luxembourg -----	--	--	(¹)	1
Canada -----	(¹)	7	(¹)	2
Colombia -----	(¹)	2	(¹)	1
Germany, Federal Republic of -----	(¹)	(¹)	(¹)	1
Mexico -----	13	143	19	116
Total -----	13	152	19	121

¹Less than 1/2 unit.

Table 9.—U.S. imports for consumption of barium chemicals

Year	Lithopone		Blanc fixe (precipitated barium sulfate)		Barium chloride		Barium hydroxide	
	Quantity (short tons)	Value (thou- sands)	Quantity (short tons)	Value (thou- sands)	Quantity (short tons)	Value (thou- sands)	Quantity (short tons)	Value (thou- sands)
1975 -----	15	\$6	5,443	\$2,047	1,199	\$358	2,595	\$1,492
1976 -----	69	25	7,971	2,643	3,425	690	2,422	1,090
1977 -----	65	27	8,723	3,069	5,384	1,170	2,448	1,222
	Barium nitrate		Barium carbonate precipitated		Other barium compounds			
	Quantity (short tons)	Value (thou- sands)	Quantity (short tons)	Value (thou- sands)	Quantity (short tons)	Value (thou- sands)		
1975 -----	593	\$233	681	\$111	411	\$196		
1976 -----	520	122	2,420	423	86	102		
1977 -----	899	197	6,911	1,391	395	286		

Table 10.—U.S. imports for consumption of crude, unground, and crushed or ground witherite

Year	Crude, unground		Crushed or ground	
	Quantity (short tons)	Value (thousands)	Quantity (short tons)	Value (thousands)
1975 -----	1	(¹)	84	\$44
1976 -----	6	\$5	278	56
1977 -----	--	--	518	103

¹Less than 1/2 unit.

WORLD REVIEW

World barite production for 1977 increased 4% to 5.9 million tons. U.S. production was 25.4% of the world total.

Japan.—Barite ore reserves were estimated at 8 million tons of 24% BaSO₄. The principal producers were Dowa Industry Co., with mines at Fukazawa and Kosaka and a total capacity of 5,000 short tons per month, and Sakoi Chemical, with a mine in Hokkaido and a capacity of 1,100 short tons per month. Most of the domestic production was used for well drilling, with the remainder used for barium chemicals. Japan also imported between 11,000 and 22,000 tons of barite from the People's Republic of China, Thailand, and India.⁴

India.—Mining commenced on a barite deposit located near Mangampet in the Cuddapah District of Andhra Pradesh; reserves were estimated at over 55 million tons. Andhra Pradesh Mining Corp. shipped 12,000 tons to Abu Dhabi during the year.⁵

Iran.—IMCO Services formed a new company, Doreen/IMCO, to develop a barite mine near Keshan, 155 miles south of Tehran. The processing plant is expected to have an annual capacity of 120,000 tons per year or 30% of Iran's requirements.⁶

Ireland.—Shetlands Barytes Co. Ltd. set up a barite grinding plant with a capacity of 40,000 tons per year. The plant was set up in Shetlands due to its function as a major supply point for North Sea drilling activity.⁷

IMCO Services began operation of a jiggling plant near Sligo to be operated by its Sligo Bay Barytes Co. subsidiary. The \$600,000 plant will have an annual capacity of 50,000 tons and the product will be drilling-grade barite.⁸

Thailand.—Most of Thailand's barite production came from three Provinces, Chiang

Mai in the north, Nakhon S. Thammarat in the south, and Loei in the northeast. In the north (435 miles from Bangkok), reserves of 6 million tons have been delineated. Production over the last 2 years has been depressed by the decline in drilling in Southeast Asia. About one-half of Thailand's barite is exported, with the majority going to Singapore and Indonesia.⁹

Endeavor Resources Ltd. of Australia sold its barite interests to NL Industries for about \$1.1 million. Plans for a 120,000-ton-per-year barite operation were announced by Pand S Barite Mining Co. The operation is to be in Nakhon Si Thammarat Province.¹⁰

U.S.S.R.—Barite production reached about 495,000 tons in 1977, about 60% of domestic consumption. Imports were chiefly from North Korea, Yugoslavia, and Bulgaria. Georgia, Kazakhstan, and West Siberia continued to be the principal source areas of barite. Construction continued on a 45,000-ton-per-year complex at Khaishi in Svanetia, Georgia.¹¹

¹Physical scientist, Division of Nonmetallic Minerals.

²Jackson, D. New Plants Move IMCO Services Into Front Ranks of Nevada Barite Producers. *Engineering and Mining Journal*, v. 178, No. 7, July 1977, pp. 73-75.

³White, L. Nevada Barite Output Up Sharply in 70's. *Engineering and Mining Journal*, v. 178, No. 6, June 1977, pp. 157-158.

⁴Harben, P. The Industrial Minerals of Japan, Part 2. *Industrial Minerals*, No. 119, August 1977, p. 32.

⁵Seshardi, G. R. India. *Min. Ann. Rev.*, June 1978, p. 437.

⁶Mining Engineering. *Industry Newswatch*, V. 29, No. 7, July 1977, p. 18.

⁷*Industrial Minerals (London)*, No. 117, June 1977, p. 14.

⁸*Engineering and Mining Journal. Exploration Roundup—In Europe*, V. 178, No. 10, October 1977, p. 154.

⁹*Industrial Minerals (London). The Industrial Minerals of Thailand*, No. 117, June 1977, pp. 15-16, 21.

¹⁰*Mining Annual Review. Thailand*, June 1978, p. 454.

¹¹*Mining Annual Review. U.S.S.R.* June 1978, pp. 576-577.

Table 11.—Barite: World production, by country

(Thousand short tons)

Country ¹	1975	1976	1977 ^P
North America:			
Canada	90	111	^e 139
Mexico	331	298	^e 309
United States ²	1,318	1,234	1,494
South America:			
Argentina	43	45	46
Brazil	59	56	^e 55
Chile	7	19	^e 22
Colombia	3	^e 3	^e 3
Peru	^e 255	365	^e 310
Europe:			
Austria	(³)	(³)	(³)
Czechoslovakia ^e	8	8	8
France	101	165	^e 165
German Democratic Republic ^e	34	34	34
Germany, Federal Republic of	273	289	^e 320
Greece ⁴	^r 96	48	43
Ireland	325	356	^e 330
Italy	235	197	150
Poland	59	89	^e 94
Portugal	3	(³)	1
Romania ^e	128	128	130
Spain	85	^e 85	^e 90
U.S.S.R. ^e	330	440	495
United Kingdom	56	55	^e 55
Yugoslavia	67	62	^e 65
Africa:			
Algeria	75	^r ^e 71	^e 72
Egypt	1	(³)	1
Kenya	(³)	^e (³)	(³)
Morocco	^r 151	152	^e 154
South Africa, Republic of	1	2	3
Swaziland	(³)	^e (³)	(³)
Tunisia	^r 16	26	18
Asia:			
Afghanistan ⁵	6	6	^e 6
Burma	17	15	17
China, People's Republic of ^e	275	300	330
India	193	215	347
Iran ⁵	161	^e 190	^e 190
Japan	41	59	62
Korea, North ^e	^r 130	130	130
Korea, Republic of	2	5	3
Malaysia	1	7	13
Philippines	5	10	^e 14
Pakistan	4	4	6
Thailand	285	167	^e 110
Turkey	^r 73	208	45
Oceania: Australia	26	12	13
Total	^r 5,419	5,666	5,892

^eEstimate. ^PPreliminary. ^rRevised.¹In addition to the countries listed, Bulgaria and Southern Rhodesia also produce barite, but available information is inadequate to make reliable estimates of output levels.²Sold or used by producers.³Less than 1/2 unit.⁴Barite concentrates.⁵Year beginning March 21 of that stated.