



2016 Minerals Yearbook

BARITE [ADVANCE RELEASE]

BARITE

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In 2016, primary U.S. barite production (sold or used by producers) was 240,000 metric tons (t) valued at an estimated \$23.4 million, and apparent consumption was 1.42 million metric tons (Mt). Imports for consumption were 1.26 Mt and exports were 78,000 t (table 1). World barite production was estimated to be 7.32 Mt.

The United States was the world's leading barite consumer. Domestic oil and natural gas drilling, the principal use of barite, decreased for the third consecutive year owing to increasing global petroleum inventories and decreasing oil prices. Drilling rig counts have historically been an effective barometer of barite consumption. In March 2016, the U.S. weekly average rig count reached its lowest level since the inception of the count in the 1940s, and it was thought that U.S. drilling activity may have been at its lowest levels since the 1860s (Zborowski, 2016). Furloughs, reductions in staff, and reduced operating hours were common throughout the domestic barite industry in 2016. Activity at many mines was minimal, although it is known that operations were temporarily suspended at only one mine and its associated grinding plant. That same mine, however, continued work on a planned mine expansion. Several companies continued to collect baseline information for new mining projects, and another small mining project to remove existing benches and stockpiles from an abandoned mine in Nevada continued in 2016.

Barite is the mineralogical name for barium sulfate. In commerce, the mineral is sometimes referred to as barytes. In this report, the term primary barite refers to the first marketable product, which includes crude barite that underwent simple beneficiation methods, such as jigging, tabling, and washing, or more complex methods, such as flotation, heavy-media separation, or magnetic separation. Most barite ores require some upgrading to minimum commercial purity or density levels. The primary use of barite is as a weighting agent in drilling muds.

Production

Domestic production and sales data for barite were derived from voluntary responses to the U.S. Geological Survey (USGS) canvass. Data were received from five of the six barite mines, representing approximately 89% of domestic barite sold or sent to company grinding mills. Data were received from 17 of the 21 grinding mills that operated during the year, representing 87% of the quantity of ground barite sold. Estimates for nonrespondents (mine and grinding mills) were made using prior year data and other industry data. Of the operating mines canvassed, five were in Nevada, and one was in Georgia.

In 2016, the leading companies that mined and ground barite in the United States were also major oil-service companies. Information on the mines and mills can be found in table 2. Crude barite production was estimated to be 240,000 t in 2016,

a 45% decrease compared with that of 2015. The bulk of mine production was from Nevada, and a small quantity was from Georgia. The estimated value of domestic production was \$23.4 million (table 1).

Reduced demand for barite in 2016 was attributed to continued low oil prices and significantly reduced investment in domestic oil and natural gas drilling operations, which began in the latter half of 2014. Barite mining and processing activity reflected reduced demand. Furloughs, reductions in staff, and reduced operating hours were common throughout the domestic barite industry. Mine production was at its lowest level since 1935. Halliburton Co.'s Rossi Mine suspended operations in October 2015 and remained idle in 2016. National Oilwell Varco, Inc.'s (NOV's) Big Ledge Mine, which often operates intermittently, remained idle in 2016.

Progressive Contracting, Inc. (PCI) mined barite in the Tuscarora Mountains in Elko County, NV, at the site of the former Coyote Mine, also known as the Patsy Ann Mine. The company planned to remove 54,000 t (60,000 short tons) of ore that was shot or broken up and left in place in the late 1970s and early 1980s and transport it to an offsite jig plant for processing. The original plan had been for PCI to complete the entire project during the summer of 2015. However, according to communication with the Bureau of Land Management, the project began in 2015, but work was suspended for the winter and resumed in the spring of 2016 (Bureau of Land Management, 2015, p. 5).

In June 2016, Bravada Gold Corp. announced that Baker Hughes Inc. submitted a plan of operations to the Bureau of Land Management for a permit to mine its Scruffy/Oz project. In a previous agreement, Baker Hughes had acquired the mineral rights to barite on Bravada's Shoshone Pediment property. The plan of operations specified mining of up to 300,000 metric tons per year (t/yr) from three open pits, two of which were located on Bravada's property, for up to 5 years. Barite was previously extracted from a similar deposit south of the property. Bravada would receive a royalty of \$1.00 per metric ton in excess of an initial 150,000 t (Bravada Gold Corp., 2016). Halliburton and NOV also continued to collect baseline information and develop mine plans of operations for their Pleasant View and Shasta projects, respectively.

Twenty-one grinding mills operated for all or part of the year. Most Nevada barite ore was ground at nearby company-owned grinding mills. In addition to the 4 grinding mills in Nevada, 12 grinding mills operated along the coast of the Gulf of Mexico (5 in Louisiana and 7 in Texas). These stand-alone grinding mills processed imported crude barite that was primarily ground to American Petroleum Institute (API) specifications for the oil and gas drilling market, although some was ground for other uses. An additional five grinding mills in the Midwest and Southeast ground barite for use as extenders, fillers, pigments,

and other uses and also produced API-grade barite for the oil and gas drilling market.

Environment

Common impurities in drilling-grade barite include quartz, chert, dolomite, siderite, and metallic oxide and sulfide compounds. These impurities are ordinarily insoluble and, as a result, standards limiting their concentrations have not been developed. In addition, the API standard does not address heavy-metal impurities, but barite derived from base-metal deposits can contain heavy metals, such as cadmium and mercury, and discharges of these are sometimes regulated by environmental laws. For example, U.S. environmental regulations on offshore drilling allow drilling waste discharges containing barite only if the barite contains less than 3 parts per million (ppm) cadmium and less than 1 ppm mercury (Drilling Waste Management Information System, undated).

Consumption

In 2016, domestic apparent consumption of barite decreased by 27% to 1.42 Mt (table 1). Sales of ground barite in all regions decreased by 30% to 1.42 Mt from 2.01 Mt in 2015. This decline followed a 41% decrease in 2015 and was the lowest level since 1999. Sales in Louisiana decreased by 14% to 540,000 t, those in Texas decreased by 40% to 408,000 t, and sales by mills in all other States combined decreased by 34% to 471,000 t (table 3). About 1.29 Mt, or 91%, of barite sales from domestic crushers and grinders was for oil and gas drilling markets, and the remaining 9% was for other industrial end uses (table 4). Sales of drilling-grade barite decreased by 32%, but sales of domestic and imported barite for other industrial uses increased by 9% to 131,000 t (table 4).

Barite's role in the well-drilling industry is primarily as a weighting agent in drilling muds to suppress high formation pressures and to prevent blowouts. Barite is a component of almost all drilling fluids and can account for approximately 10% of the composition of low-weighted, oil-based muds and up to more than 40% (by weight) of highly weighted, oil-based muds (Bosch, 2016). As a well is drilled, the drill bit passes through various formations, each with different characteristics. Deeper wells require a higher percentage of barite in the mud mix. Most barite must be ground to a small, uniform size, based on specifications set by the API, before use as a weighting agent in drilling mud.

The most essential characteristic of barite used in drilling mud is its specific gravity (SG). Until 2010, the API specification called for a minimum SG of 4.2. Because of concerns about dwindling reserves of 4.2-SG barite, the API issued a new edition of API Specification 13A, Specification for Drilling Fluids Materials, which added specifications for 4.1-SG barite (effective August 1, 2010). Except for SG, other specifications for 4.1-SG barite are the same as 4.2-SG barite. These specifications require barite ground finely enough that at least 97% of the material, by weight, passes through a 200-mesh (Tyler) [75-micrometer (μm)] screen and no more than 30% (by weight) can be less than 6 μm in effective diameter. The diameter is measured using sedimentation techniques. Lastly,

the ground barite may contain a maximum of no more than 250 ppm of water-soluble alkaline earth metals, such as calcium (American Petroleum Institute, 2010, p. 13–23, 83–96).

Since the adoption of the 4.1-SG specification, 4.1- and sub-4.1-SG barite have gained widespread acceptance in the U.S. drilling industry. Increasingly considered “premium” material, 4.2-SG barite is combined with lower SG barite to create blends tailored for specific applications (Newcaster, 2015). Within the barite industry, the term “grade” increasingly refers to barite of differing SG, as opposed to indicating purity, as is the case with many other mineral commodities. Although higher-SG barite typically contains a higher percentage of barite, the presence of certain impurities can also raise the SG of lower purity material. Because neither the USGS barite canvass nor the Harmonized Tariff Schedule of the United States, used to categorize trade data, differentiate between barite products of differing SGs, little information is available about the relative proportion of the differing SGs of barite used.

The color of barite used for drilling petroleum varies and can be black, blue, brown, buff, or gray. In addition to a high SG, other advantageous properties of barite include low abrasion, low oil absorption, chemical and physical inertness, nontoxicity, low solubility, and a relatively low cost when compared to alternatives. An additional benefit of barite is that it does not interfere with magnetic measurements taken in the borehole, either during logging-while-drilling or in separate drill-hole logging. Because of these properties, barite has been the leading choice for use as a weighting agent in oil and gas drilling, and available substitutes have not significantly displaced barite in this application.

Trends in domestic barite consumption typically change with trends in the number of drilling rigs operating in the United States (fig. 1). However, an examination of the ratio of barite consumption, as measured by domestic sales, to the number of operating domestic drilling rigs indicates that the rate of barite consumption has changed over time. From the mid-1970s to the mid-1980s, the ratio of barite consumption per operating rig was relatively constant but began increasing in the late 1980s. This ratio peaked in 1996 and plateaued for approximately 10 years before decreasing, but to levels still above those of the 1970s and 1980s. In 2011, the ratio began to increase again. This trend apparently continued in 2016, despite decreases in domestic barite consumption and annual average rig count.

Industrial end uses, such as barium chemicals, filler in paint and plastics, and powder coatings, require barite ground to a small, uniform size. The required size depends on the application, but for paint- and plastic-grade material, grain size averages about 2–3 μm . Barite-containing materials were used for sound reduction in engine compartments in automobiles, boats, and trucks. Barite was also used in the base coat of automobile finishes for smoothness and corrosion resistance and continued to be used in friction products for automobiles and trucks.

Barite used as an aggregate in “heavy” concrete, or radiation-shielding concrete, is crushed and screened to sizes ranging from 4.75 millimeters (0.187 inches) to 3.75 centimeters (1.5 inches) for the coarse grade. New Riverside Ochre Co., Inc. (Cartersville, GA) was the leading supplier of barite aggregate.

Prices

Because domestic barite-mining companies sold very little primary barite, value data for primary barite were largely estimated. The average unit value for primary barite from domestic mines and their associated beneficiation plants was estimated to have decreased by 17% to \$98 per metric ton from a revised \$118 in 2015 (table 1).

Value data for ground barite, as reported to the USGS, do not necessarily represent open market prices. Because oil-service companies own many of the U.S. barite grinding mills, barite is often sold to customers at a reduced price or at cost because the barite is merely a small part of the overall service contract. Taking this reduced cost into account when comparing prices with those from 2015, the average unit value for barite ground in Louisiana decreased by approximately \$12 to \$169 per metric ton, the average unit value for barite ground in Texas decreased by \$2 to \$190 per metric ton, and the unit value of barite ground in other States increased by \$1 to \$206 per metric ton (table 3). The smaller decrease in value in Texas and other States may be partially attributed to a higher percentage of barite sales being used for glass, paint, rubber, and other filler in 2015 and 2016, which tend to sell for a higher price than drilling-grade barite. The barite unit value for these end uses decreased by approximately \$39 to \$395 per ton in 2016. The average unit value for drilling-grade barite decreased by approximately \$12 to \$166 per metric ton (table 4).

According to yearend published price ranges for crude barite from major exporting countries, the yearend 2016 price for barite from China, API grade, 4.10 SG, lump, including cost, insurance, and freight (c.i.f.), Gulf Coast, was \$118 to \$130 per ton, a decrease from \$140 to \$155 per ton as reported in 2015. The import price for barite from India, API grade, 4.10 SG, lump, c.i.f., Gulf Coast was \$120 to \$130, a decrease from \$158 to \$171 per ton. Underground lump, API bulk, 4.2 SG, free-on-board barite from Morocco decreased to \$105 to \$115 compared with \$130 to \$140 per ton at yearend 2015. The import price of chemical-grade barite from China, c.i.f., Gulf Coast decreased to \$145 to \$162 from \$161 to \$180 per ton, and paint grade from China, lump, c.i.f., Gulf Coast decreased to \$215 to \$250 from \$260 to \$310 in 2015 (Industrial Minerals, 2015, 2016).

Foreign Trade

In 2016, barite exports (natural and precipitated barium sulfate) were 78,500 t (table 5), a 47% decrease compared with those in 2015. The average unit value of exported barite more than doubled since 2011, rising to \$383 per metric ton in 2016 from \$176 per metric ton in 2011. The leading recipients of barite exports from the United States were Canada (45%), the Marshall Islands (23%), Mexico (19%), and Guyana (8%).

Combined imports of barite (crude and ground natural barium sulfate, and precipitated barium sulfate) totaled 1.26 Mt, a decrease of 24% compared with those of 2015 (table 1). China was the lead supplier and accounted for 80% of total barite imported, followed by Mexico (11%), Morocco (4%), and India (3%), which made up most of the remaining imports. Imports of the several forms of barite reported under the Harmonized

Tariff Schedule nomenclature “Other sulfates of barium,” the chemically precipitated form of barite, were 20,900 t, an 18% decrease compared with those of 2015 (table 6).

The tariff on U.S. imports of crude barite was \$1.25 per metric ton, but imports of ground barite had no tariff. As a result, the major importers of crude barite applied for and received foreign trade zone (FTZ) status for many of their grinding mills in the United States. FTZ status allows the ground barite produced by these mills to be reported as imports for consumption and not as crude barite received from foreign suppliers. Grinding mills in FTZs are identified in table 2.

World Review

Because the United States is the world’s leading barite consumer, using approximately 30%–40% of world production annually, changes in domestic consumption strongly influence world production and trade patterns. A decrease in the U.S. consumption of barite and a 32% decrease in the worldwide rig count led to a decrease in world production. Estimated world barite production decreased by approximately 13% to 7.32 Mt in 2016, from a revised 8.39 Mt in 2015. China, Kazakhstan, Morocco, and the United States accounted for most of the decrease. India increased production by 50% (table 8).

China.—Effective January 1, 2016, the Government of China announced it would remove the 10% export tariff on ground barite administered under the trade code 2511.1000. The removal of the tariff was intended to improve the competitiveness of China’s barite industry, encourage investment in the downstream processing of barite products, and reduce costs for domestic exporters (Syrett, 2016).

Nigeria.—Chevron Nigeria Ltd. donated \$1.4 million worth of mining equipment and provided training on its use to the Association of Miners and Producers of Barite in Gboko, Benue State, Nigeria. The donation was intended to help increase the production and quality of locally supplied barite, reduce barite imports, and create jobs for the local community (Chevron Nigeria Ltd., 2017, p. 44–45).

United Kingdom.—In September 2016, M-I SWACO LLC’s proposal to develop the Duntanlich barite deposit located north of Aberfeldy in Perthshire, Scotland, was approved by the Perth and Kinross Council. The underground mine would replace the company’s nearby Foss Mine, which is currently the leading supplier of barite in the United Kingdom, producing approximately 42,000 t/yr. The operation would supply drilling operations in the North Sea and be expected to produce as much as 120,000 t/yr of barite during a mine life of 50 years. Production was expected to begin by the end of 2018 (Duntanlich Mine, 2016a, b).

Outlook

Significant increases in domestic drilling activity would likely lead to increased demand for barite. Although the U.S. monthly average rig count reached its lowest level in May 2016, it increased throughout the rest of the year. By December, the count averaged 634. The total worldwide average rig count showed a similar pattern (Baker Hughes, a GE company, LLC, 2017). By November 2016, the Permian basin, which

spans parts of western Texas and southeastern New Mexico, contained almost as many active drilling rigs as the rest of the United States and was expected to lead a recovery in U.S. oil and gas drilling activity (U.S. Energy Information Administration, 2016).

In November, the USGS released a new assessment of the Wolfcamp shale in the Midland basin portion of the Permian basin. The study indicated that the Wolfcamp shale contained an estimated 20 billion barrels of oil, 16 trillion cubic feet of associated natural gas, and 1.6 billion barrels of natural gas liquids, making it the largest estimate of continuous oil accumulation in the United States. Although the Wolfcamp shale has been in production since the 1980s, much of the oil had been produced using vertical well technology, but more recent advances in horizontal drilling and hydraulic fracturing have increased the technically recoverable amount of the resource (U.S. Geological Survey, 2016).

The U.S. Energy Information Administration indicated that increased drilling, coupled with evidence of increased merger and acquisition activity, particularly in the Permian basin, suggested the beginning of a recovery in domestic oil and gas development projects (U.S. Energy Information Administration, 2016). Several industry analysts further noted that the increased investment and drilling activity in shale and other continuous resources by major oil companies such as Chevron Corp., Exxon Mobil Corp., and Royal Dutch Shell Plc would likely result in increased drilling efficiency and lead to more economical oil and gas recovery. All of these factors are expected to contribute to domestic crude oil production exceeding 10 million barrels per day by the end of 2018, which would stimulate recovery in demand for barite (Blas, 2017).

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TABLE 1
SALIENT BARITE STATISTICS¹

(Thousand metric tons and thousand dollars)

	2012	2013	2014	2015	2016
United States:					
Barite, primary:					
Sold or used by producers:					
Quantity	666	826 ^r	663	439 ^r	240
Value ^c	74,500	92,800 ^r	74,500 ^r	51,800 ^r	23,400
Exports: ²					
Quantity	155 ^r	207 ^r	161 ^r	147 ^r	78
Value	44,400 ^r	62,300 ^r	45,300 ^r	54,800 ^r	30,100
Imports for consumption: ³					
Quantity	2,920	2,250	2,700	1,660	1,260
Value	430,000	352,000	386,000	247,000	192,000
Consumption, apparent ⁴	3,430	2,870 ^r	3,210	1,960	1,420
Crushed and ground, sold or used by processors: ⁵					
Quantity	3,310	3,550	3,410	2,010 ^r	1,420
Value	618,000	643,000 ^r	652,000 ^r	390,000 ^r	266,000
World, production	9,790 ^r	9,000 ^r	9,870 ^r	8,390 ^r	7,320

^cEstimated. ^rRevised.

¹Table includes data available through July 18, 2018. Data are rounded to no more than three significant digits.

²Exports include crude, ground, and other barite imports calculated from Harmonized Tariff Schedule B numbers 2511.10.1000 and 2833.27.0000.

³Imports include crude, ground, and other barite imports calculated from Harmonized Tariff Schedule codes 2511.10.1000, 2511.10.5000, and 2833.27.0000.

⁴Sold or used by producers, plus imports, minus exports.

⁵Includes domestically mined and imported crude barite.

TABLE 2
ACTIVE BARITE MINES AND GRINDING MILLS IN THE UNITED STATES IN 2016¹

State and operator (owner)	County or Parish	Mine or mill	Foreign Trade Zone
Mines:			
Georgia, New Riverside Ochre Co., Inc.	Bartow	New Riverside Ochre	
Nevada:			
Baker Hughes Drilling Fluids (Baker Hughes Inc.)	Lander	Argenta	
Do.	do.	Slaven Canyon Mine	
Halliburton Energy Services, Inc. (Halliburton Co.)	Elko	Rossi	
M-I L.L.C., operating as M-I SWACO (Schlumberger Ltd.)	Lander	Greystone	
Do.	do.	Mountain Springs Mine	
NOV Minerals LP (National Oilwell Varco, Inc.)	Elko	Big Ledge	
Grinding mills:			
Georgia, CIMBAR Performance Minerals	Murray	Chatsworth	
Illinois, J.M. Huber Engineered Minerals Division (J.M. Huber Corp.)	Adams	Quincy	
Indiana, CIMBAR Performance Minerals	Posey	Mt. Vernon	
Louisiana:			
Baker Hughes Drilling Fluids (Baker Hughes Inc.)	St. Mary	Morgan City	No. 124, Gramercy, LA.
Excalibar Minerals LLC (Newpark Resources, Inc.)	Iberia	New Iberia	Do.
Halliburton Energy Services, Inc. (Halliburton Co.)	Calcasieu	Lake Charles	No. 087, Lake Charles, LA.
Do.	Lafourche	Larose	No. 124, Gramercy, LA.
M-I L.L.C., operating as M-I SWACO (Schlumberger Ltd.)	St. Mary	Amelia	Do.
Nevada:			
Baker Hughes Drilling Fluids (Baker Hughes Inc.)	Lander	Barite Grinding Plant	
Halliburton Energy Services, Inc. (Halliburton Co.)	Eureka	Dunphy	
M-I L.L.C., operating as M-I SWACO (Schlumberger Ltd.)	Lander	Battle Mountain	
National Oilwell Varco, Inc.	Elko	Osino	
Ohio, CIMBAR Performance Minerals	Columbiana	Wellsville	
Tennessee, Excalibar Minerals LLC	Dyer	Dyersburg	
Texas:			
Baker Hughes Drilling Fluids (Baker Hughes Inc.)	Nueces	Corpus Christi	No. 122, Corpus Christi, TX.
CIMBAR Performance Minerals	Harris	Houston	
Excalibar Minerals LLC (Newpark Resources, Inc.)	do.	do.	
Do.	Nueces	Corpus Christi	No. 122, Corpus Christi, TX.
Halliburton Energy Services, Inc. (Halliburton Co.)	do.	do.	Do.
M-I L.L.C., operating as M-I SWACO (Schlumberger Ltd.)	Galveston	Galveston	No. 036, Galveston, TX.
Milwhite Inc. (Control MINAR, S.A. de C.V.)	Cameron	Brownsville	

Do., do. Ditto.

¹Table includes data available through July 18, 2018.

TABLE 3
CRUSHED AND GROUND BARITE SOLD OR USED BY PROCESSORS
IN THE UNITED STATES, BY STATE^{1,2}

State	2015			2016		
	Number of plants	Quantity (thousand metric tons)	Value (thousands)	Number of plants	Quantity (thousand metric tons)	Value (thousands)
Louisiana	5	626	\$113,000	5	540	\$91,100
Texas	7	677	130,000	7	408	77,700
Other ³	9	711 ^r	146,000 ^r	9	471	97,100
Total	21	2,010 ^r	390,000 ^r	21	1,420	266,000

^rRevised.

¹Table data includes available through July 18, 2018. Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes domestically mined and imported crude barite.

³Includes Georgia, Illinois, Indiana, Nevada, Ohio, and Tennessee.

TABLE 4
CRUSHED AND GROUND BARITE SOLD OR USED BY PROCESSORS
IN THE UNITED STATES, BY USE^{1,2}

(Thousand metric tons and thousand dollars)

Use	2015		2016	
	Quantity	Value	Quantity	Value
Barium chemicals, filler and (or) extender, glass	120	52,100	131	51,700
Well drilling	1,890 ^r	338,000 ^r	1,290	214,000
Total	2,010 ^r	390,000 ^r	1,420	266,000

^rRevised.

¹Table includes data available through July 18, 2018. Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes domestically mined and imported crude barite.

TABLE 5
U.S. EXPORTS OF NATURAL BARIUM SULFATE (BARITE), BY COUNTRY OR LOCALITY^{1,2}

Country or locality	2015		2016	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Argentina	378	\$40	--	--
Brazil	598 ^r	334 ^r	409	\$258
Cameroon	2,240	788	--	--
Canada	69,200 ^r	14,300 ^r	35,500	7,680
Guyana	2,970	1,270	5,930	7,920
Italy	1,140	445	102	80
Marshall Islands	--	--	18,000	4,680
Mexico	66,800 ^r	35,300 ^r	14,600	7,210
Netherlands	290	216	45	100
Norway	915	755	--	--
Pakistan	--	--	310	164
Saudi Arabia	14	8	691	344
Thailand	440	65	467	75
Trinidad and Tobago	1,240 ^r	648 ^r	1,820	725
Venezuela	452 ^r	119 ^r	--	--
Other ³	458 ^r	581 ^r	617	839
Total	147,000 ^r	54,800 ^r	78,500	30,100

^rRevised. -- Zero.

¹Table includes data available through July 18, 2018. Data are rounded to no more than three significant digits; may not add to totals shown.

²Imports calculated from Harmonized Tariff Schedule B numbers 2511.10.1000 and 2833.27.0000.

³Includes 35 countries and (or) localities with less than 100 metric tons each.

Source: U.S. Census Bureau.

TABLE 6
U.S. IMPORTS FOR CONSUMPTION OF BARITE, BY COUNTRY OR LOCALITY^{1,2}

Country or locality	2015		2016	
	Quantity (metric tons)	Value ³ (thousands)	Quantity (metric tons)	Value ³ (thousands)
Crude:				
China	347,000	\$54,700	205,000	\$35,300
Germany	2,230	\$100	--	--
India	36,400	4,610	97	11
Japan	261	7	--	--
Mexico	63,800	7,320	52,200	5,120
Morocco	65,800	8,660	11,700	3,620
Netherlands	--	--	224	5
Pakistan	5,590	639	--	--
Other [3 countries and (or) localities]	13	6	20	9
Total	521,000	76,100	270,000	44,100
Ground:				
China	891,000	117,000	801,000	94,300
Germany	1,350 ^r	1,290 ^r	1,550	1,510
India	61,400	6,230	37,500	5,020
Japan	1,530	304	2,680	452
Liberia	24,600	4,300	470	89
Mexico	66,900	8,600	82,300	11,500
Morocco	69,700	8,110	40,100	4,440
Netherlands	25	20	257	71
Other [2 countries and (or) localities]	107	56	74	21
Total	1,120,000	146,000	966,000	117,000
Other sulfates of barium:				
Argentina	--	--	2	3
Belgium	--	--	54	200
China	4,250	3,630 ^r	3,460	2,910
Finland	--	--	40	64
France	53	59	72	79
Germany	6,830 ^r	10,600 ^r	8,140	19,100
Hong Kong	114	75	--	--
Italy	4,540	6,420	4,540	5,780
Japan	843	2,040	769	1,570
Mexico	8,680	1,500	3,730	651
Netherlands	--	--	55	88
Switzerland	36 ^r	43	--	--
United Arab Emirates	--	--	20	13
United Kingdom	90	41	55	70
Total	25,400^r	24,400^r	20,900	30,500

^rRevised. -- Zero.

¹Table includes data available through July 18, 2018. Data are rounded to no more than three significant digits; may not add to totals shown.

²Imports calculated from Harmonized Tariff Schedule codes 2511.10.1000, 2511.10.5000, and 2833.27.0000.

³Cost, insurance, and freight value.

Source: U.S. Census Bureau.

TABLE 7
U.S. IMPORTS FOR CONSUMPTION OF BARIUM CHEMICALS^{1,2}

	2015		2016	
	Quantity (metric tons)	Value ³ (thousands)	Quantity (metric tons)	Value ³ (thousands)
Barium chloride	341	\$375	1,770	\$1,730
Barium oxide, hydroxide, peroxide	3,560	6,190	3,410	5,430
Barium carbonate, precipitated	1,670	1,980	1,560	2,270

¹Table includes data available through July 18, 2018. Data are rounded to no more than three significant digits; may not add to totals shown.

²Imports calculated from Harmonized Tariff Schedule codes 2816.40.2000, 2827.39.4500, and 2836.60.0000.

³Cost, insurance, and freight value.

Source: U.S. Census Bureau.

TABLE 8
BARITE: WORLD PRODUCTION, BY COUNTRY OR LOCALITY¹

(Metric tons)

Country or locality ²	2012	2013	2014	2015	2016
Algeria	36,211 ^r	30,245	56,829	20,000 ^{r,e}	10,000 ^e
Argentina	9,416	26,792	16,265	17,000	20,000 ^e
Australia	12,373	13,176	14,676	6,017	7,140
Bolivia ^{e,3}	22,000	31,000	26,000 ^r	47,000	22,000
Bosnia and Herzegovina	28	--	--	--	--
Brazil, beneficiated	3,025	--	--	--	--
Bulgaria ^{e,3}	--	--	20,000	60,000	50,000
Burma ⁴	21,539 ^r	31,295	23,060	2,616 ^r	2,000 ^e
Canada ^e	22,000	22,000	35,000	32,000	10,000
China ^e	4,200,000	3,200,000	3,900,000 ^r	3,300,000 ^r	2,800,000
Egypt	2,000 ^{r,e}	3,000 ^{r,e}	3,379 ^r	7,540 ^r	8,000 ^e
Germany	52,030	45,446	87,585	45,311 ^r	45,000 ^e
Guatemala	91	343	43	544	500 ^e
India	1,674,650 ^r	1,316,193 ^r	1,182,829 ^r	700,000 ^{e,3}	1,046,700
Iran	314,769 ⁴	435,798 ^r	440,741 ^r	405,038 ^r	480,000 ^e
Kazakhstan	531,000 ^r	507,000 ^r	590,000 ^r	607,000 ^r	482,000 ^e
Laos	21,900	10,500	30,610	95,000 ^{e,3}	80,000 ^e
Liberia ^e	16,000 ^r	36,000 ^r	48,000 ^r	--	--
Malaysia	--	500	14,456	16,624	17,000 ^e
Mexico	139,997	343,585	420,000 ^{e,3}	265,598	196,896
Morocco	1,021,400	1,094,470	1,006,600	1,212,130 ^r	668,500
Nigeria	16,174	17,784	18,000	17,000	17,000 ^e
Pakistan	109,415	87,165	153,808	121,575	107,224
Peru	79,451	52,491	106,071	28,407	7,953
Russia	380,000 ^{r,e}	360,000 ^{r,e}	360,000 ^{r,e}	361,000 ^r	434,000
Saudi Arabia	32,000	30,000	32,000	43,000	43,000 ^e
Slovakia	21,000 ^r	24,000 ^r	21,000 ^r	20,000	20,000 ^e
Thailand	64,499	107,437	134,961	170,621 ^r	223,101
Turkey, ground	187,111 ^r	257,116	320,754	209,097 ^r	170,000 ^e
Tunisia	11,000	5,300	9,800	10,000	10,000 ^e
United Kingdom	30,000	30,000	44,000	50,000 ^r	50,000 ^e
United States ⁵	666,000	826,000 ^r	663,000	439,000 ^r	240,000
Vietnam ^{e,3}	90,000 ^r	55,000 ^r	95,000 ^r	80,000 ^r	50,000
Total	9,790,000 ^r	9,000,000 ^r	9,870,000 ^r	8,390,000 ^r	7,320,000

^eEstimated. ^rRevised. -- Zero.

¹Table includes data available through August 30, 2017. All data are reported unless otherwise noted. Totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²In addition to the countries and (or) localities listed, Afghanistan, Italy, and some other countries and (or) localities may produce barite, but output data were not reported and available general information was inadequate to make reliable production estimates.

³Estimated based on trade data.

⁴Production is based on fiscal year, with starting dates as follows: Burma, April 1; and Iran, March 21.

⁵Crude barite sold or used by producers.

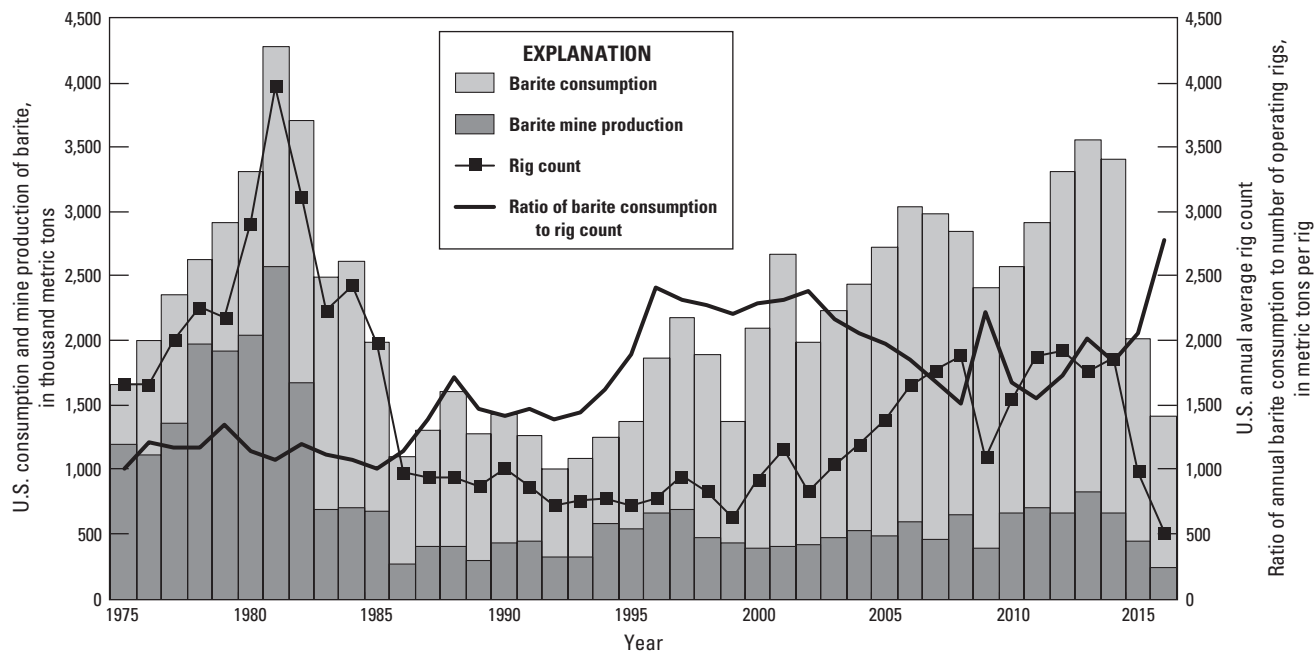


Figure 1. Annual consumption and mine production of barite, annual average rig count, and ratio of barite consumption to rig count in the United States from 1975 through 2016. The count of operating rigs has long been considered a good barometer of U.S. barite consumption. Although domestic consumption of barite generally follows changes in rig count, the above trend suggests a higher rate of barite use per rig beginning in the late 1980s. Sources: Baker Hughes Inc. and U.S. Geological Survey.