



2012 Minerals Yearbook

BARITE

BARITE

By M. Michael Miller

Domestic survey data and tables were prepared by Raymond I. Eldridge III, statistical assistant, and the world production table was prepared by Glenn J. Wallace, international data coordinator.

In 2012, primary U.S. barite production (sold or used by producers) totaled 666,000 metric tons (t) valued at an estimated \$74.5 million, and apparent consumption was 3.43 million metric tons (Mt). Imports were 2.92 Mt and exports were 151,000 t (table 1). World barite production increased by about 700,000 t to 9.2 Mt, mostly the result of estimated increased production from India and Morocco (table 8).

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 usually has undergone 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. Its primary use is as a weighting agent in drilling muds.

Global demand for barite remained strong in 2012, although there was a 6% decrease in the number of drill rigs drilling for oil or gas worldwide in December 2012 compared with the number operating in December 2011. This decrease was primarily the result of reduced drilling in North America, where 295 fewer rigs were operating in December 2012 than in December 2011 (Baker Hughes, 2013a). The continued strong demand for barite and large price increases from traditional exporters led to increased international exploration and development of barite resources, especially in Africa, Mexico, and parts of Asia.

Production

Domestic production and sales data for barite were derived from voluntary responses to the U.S. Geological Survey (USGS) canvass of 8 mines and 27 grinding plants. In 2012, data were received from four of the five operating barite mines, representing 99% of domestic barite sold or sent to company grinding mills. Data were received from 22 of the 24 grinding mills that operated during the year, representing 98% of the quantity of ground barite sold. Estimates for nonrespondents (mine and grinding mills) were made using company production estimates, prior year data, and other industry data. Of the canvassed operating mines, four were in Nevada, and one was in Georgia.

In 2012, 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 666,000 t in 2012, a decrease of 6% compared with that of 2011. The bulk of mine production was from Nevada, with a small amount from Georgia. The estimated value of domestic production was \$74.5 million (table 1). Only one of the Nevada barite producers sold crude or run-of-mine ore, making estimations of the value of the crude barite problematic.

Halliburton Energy Services Inc. has been engaged in the initial stages of a mine expansion program that began in 2010 when the U.S. Bureau of Land Management (BLM) approved Halliburton's Rossi Mine expansion project. The Rossi Mine consists of two open pit operations—the Sage Hen (Rossi) and the Queen. The project called for continued mining and expansion of the Sage Hen pit and expansion of the waste rock dump in the Sage Hen pit area. In addition, it called for continued mining and expansion of the Queen Pit, which included expansion of an existing waste rock dump and construction of a new dump. Surface exploration would continue around the pits to define the extent of the ore body (Harding, 2010; U.S. Bureau of Land Management, 2010, p. 6–8). This exploration has resulted in a substantial increase in reserves sufficient for a 23-year mine life at current production rates.

Halliburton also has applied to the BLM for authorization to conduct an exploratory drilling program on an area of approximately 282 hectares (698 acres) described as the Pleasant View Exploration Project (U.S. Bureau of Land Management, 2012, p. 1).

There were 24 grinding plants that ground barite all or part of the year. Most Nevada barite ore was ground at nearby company-owned grinding plants in Nevada, although most of the crude barite from NOV Minerals LP's Big Ledge Mine was shipped out of State to its grinding mill in Evanston, WY. In addition to ground production, some run-of-mine ore or crude barite from Nevada was shipped to Canada for grinding.

NOV Minerals constructed a new grinding mill in Osino, NV, which became operational in late 2012 and ground some material. The new grinding mill was constructed at the Northeastern Nevada Regional Railport allowing ground product to be shipped to markets in the East. The mill was constructed with two grinding circuits and with space for a third circuit. Initial production was anticipated to be about 54,000 metric tons per year (t/yr) with plans to eventually increase output to 181,000 t/yr (Harding, 2012, p. 67–69).

CIMBAR Performance Minerals announced that it had completed the renovation project on its Wellsville, OH, grinding facility, which the company acquired in 2011. The installation of a new milling circuit increased the plant's grinding capacity to 590,000 t/yr. In addition to barite, the mill will grind other mineral products such as brucite (magnesium hydroxide), calcium carbonate, and talc (CIMBAR Performance Minerals, undated). The mill's location in eastern Ohio provides it with access to drilling operations in the Marcellus Shale and the Utica Shale. These two formations underlie eastern Ohio, West Virginia, and substantial parts of New York and Pennsylvania and have become prime exploration targets for natural gas, natural gas liquids, and oil.

In 2012, in addition to the 4 grinding mills in Nevada and the 1 in Wyoming, 14 grinding mills operated along the coast

of the Gulf of Mexico (6 in Louisiana and 8 in Texas). These stand-alone grinding plants 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, and pigments, as well as producing API-grade barite for the oil and gas drilling market.

Consumption

In 2012, apparent consumption of barite increased by 17% to 3.43 Mt compared with that in 2011 (table 1). Ground barite sales increased by 14% to 3.31 Mt in 2012 from 2.91 Mt in 2011. In 2012, sales by grinding plants in Louisiana increased by about 28% to 1.18 Mt, grinding plant sales in Texas increased by 10% to 1.25 Mt, and sales by plants in all other States increased by 3% to 877,000 t (table 3). About 3.2 Mt, or 97%, of barite sales from domestic crushers and grinders was for petroleum well-drilling markets, and the remaining 3% was for industrial end uses (table 4).

The leading application for barite is as a weighting agent in natural gas and oil field drilling muds to suppress high formation pressures and prevent blowouts. As a well is drilled, the bit passes through various formations, each with different characteristics. The deeper the hole, the more barite is needed as a percentage of the total mud mix. 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.

Barite used for drilling petroleum wells can be black, blue, brown, buff, or gray depending on the ore body. Most barite needs to be ground to a small uniform size before it is used as a weighting agent in petroleum well-drilling mud based on specifications set by the API or the now defunct Oil Companies' Materials Association.

The most important characteristic of barite used in drilling mud is its specific gravity (SG), and until 2010 the API specification called for a minimum SG of 4.2. After concerns in the United States about dwindling reserves of 4.2 SG barite, the API issued a new edition of API Specification 13A, Specification for Drilling Fluids Materials (effective date, August 1, 2010). This new edition of Specification 13A added specifications for 4.1 SG barite, but also retained specifications for 4.2 SG barite.

The idea of using 4.1 SG barite was put forth in late 2006, and since then it has become widely adopted in the Western United States. Offshore drillers continue to use 4.2 SG barite as do onshore customers in other parts of the country that rely on imported barite.

Other barite specifications remain unchanged from the previous standard and are the same for 4.1 and 4.2 SG barite. They require that the barite be finely ground so that at least 97% of the material, by weight, can pass through a 200-mesh (Tyler) [75-micrometer (μm)] screen, and no more than 30%, by weight, can be less than 6 μm , effective diameter, which is measured using sedimentation techniques. Lastly, the ground barite may contain a maximum of no more than 250 milligrams

per kilogram of water-soluble alkaline earth metals such as calcium (American Petroleum Institute, 2010, p. 13–23, 83–96).

Common impurities in drilling-grade barite include quartz, chert, dolomite, siderite, and metallic oxide and sulfide compounds. These are normally 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 may contain heavy metals such as cadmium and mercury and discharges of these may be regulated under environmental law. For example, U.S. environmental regulations pertaining to offshore drilling allow drilling waste discharges containing barite only if the barite contains less than 3 parts per million (ppm) cadmium and 1 ppm mercury (Drilling Waste Management Information System, undated).

Oil and gas prices correlate directly with the amount of exploration drilling being performed (the higher the prices the more drill rigs operating and vice versa) and the quantities of barite being consumed. In 2012, the U.S. economy continued its slow recovery from the 2008–09 recession and exhibited a growth of 2.2% in gross domestic product compared with that of 2011. In 2012, the average monthly oil price (U.S. spot price) of \$94.11 per barrel was slightly lower compared with that of 2011 (U.S. Energy Information Administration, 2013a). The U.S. monthly average natural gas price (wellhead), however, decreased to a monthly average of \$2.66 per thousand cubic feet from \$3.95 per thousand cubic feet in 2011 (U.S. Energy Information Administration, 2013c). The decrease in natural gas prices was mainly the result of natural gas supplies in 2011 and 2012 exceeding consumption (U.S. Energy Information Administration, 2013b).

At yearend 2012, 244 fewer drill rigs were exploring for oil or gas in the United States than were operating at yearend 2011. With the surplus in natural gas supplies driving down the price of natural gas, more rigs were shifted to drilling for oil. The percentage of drill rigs exploring for oil accounted for 75% of the total at yearend 2012, up from 59% at yearend 2011 (Baker Hughes Inc., 2013b).

In 2012, sales of domestic and imported barite for industrial uses decreased by 32% to 107,000 t (table 4). Industrial end uses such as barium chemicals (the largest by volume is barium carbonate), filler in paint and plastics, and powder coatings all require the barite to be ground to a small uniform size. The size depends on the use, but for paint- and plastic-grade material, it averages about 2 to 3 μm . Barite-containing materials were used for sound reduction in engine compartments in automobile, boats, and trucks. Barite also was 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. (Cartersville, GA) is the leading supplier of barite aggregate.

Stocks

The USGS does not collect data on company stocks either at the mine or grinding plant. At yearend 2012, however, according

to industry contacts grinders that relied on imports had amassed substantial stocks.

Foreign Trade

In 2012, barite exports (table 5) were 151,000 t, although as much as two-thirds were likely re-exports of imported barite ground in the United States. Most exports of domestically mined barite went to Canada in the form of crude barite, which was ground in Canada and then consumed for oil and gas drilling in the Western Provinces of Alberta, British Columbia, and Saskatchewan.

Assignment of the correct harmonized tariff schedule (HTS) number by importers is sometimes problematic. As a result, in prior years, adjustments were made in an attempt to classify imports of crude natural barite, ground barite, and other sulfates of barium by type and use. These adjustments involved separating, by unit value, imports intended for use in drilling muds (crude and ground barite), and all other uses (other sulfates of barium). Beginning in 2008, this practice was discontinued and the data shown in table 5 for 2011 and 2012 are as reported by the U.S. Census Bureau.

Combined imports of barite (crude and ground) totaled 2.92 Mt, an increase of 26% compared with those of 2011. China accounted for 77% of the total, with India (14%), Morocco (5%), and Mexico (2%) making up most of the rest. Imports of the several forms of barite reported under the HTS nomenclature “Other sulfates of barium” were 18,100 t, which represents an increase of 19% compared with those of 2011 (table 6).

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

Transportation

In recent years, about 75% to 80% of U.S. barite consumption has been supplied by imports (primarily from China). Most barite imports are shipped in handymax-size bulk carriers (typically 35,000- to 60,000-t deadweight tonnage). After being ground to API specifications, barite is transferred directly to containers on barges docked in canals, lakes, and rivers near the grinding mills for bulk delivery to offshore drilling platforms. These nearshore barite staging locations also are convenient to the clusters of onshore areas with significant petroleum production in the Petroleum Administration for Defense (PAD) District 3. The PAD districts were World War II divisions of the oil-producing areas of the United States; these designations continue to be used.

Prices

Because very little primary barite was sold by domestic barite mining companies, value data for primary barite were to a large

extent estimated. The average estimated sales value for primary barite from mines and their associated beneficiation plants in the United States was \$112 per metric ton (table 1).

Value data for ground barite, as reported to the USGS, do not necessarily represent open market prices. Because many of the U.S. barite grinding mills are owned by oil service companies, barite often is sold to the customer at a reduced price or at cost because the barite is simply a small part of the overall service contract. Taking this into account, compared with those of 2011, the average unit value for barite ground in Louisiana increased by about \$9 per ton to \$183 per ton, while the sales value for drilling-grade barite ground in Texas increased slightly to \$170 per ton. The average value for all grades ground in Texas increased by \$20 per ton to \$193 per ton, while the sales value of barite ground in other States increased by \$25 per ton to \$183 per ton (table 3). Barite for barium chemicals, fillers and extenders, and glass increased by 34% to \$416 per ton in 2012 compared with that of 2011 (table 3).

The following is a discussion of yearend published price ranges for crude barite from major exporting countries. The yearend 2012 United States published import prices for barite from China, API grade, lump, including cost, insurance, and freight, U.S. Gulf Coast, increased to \$155 to \$160 per ton compared with \$136 to \$150 per ton at yearend 2011. The import price for Indian barite decreased to \$157 to \$171 per ton compared with \$165 to \$170 per ton at yearend 2011. The import price of chemical-grade barite from China increased to \$161 to \$180 per ton in December 2012 compared with \$135 to \$145 per ton at yearend 2011. Import prices for Moroccan barite were unavailable, but unground lump, API bulk, free-on-board Morocco increased to \$130 to \$140 per ton in December 2012 compared with \$108 to \$113 per ton at yearend 2011 (Industrial Minerals, 2012; 2013).

World Review

Fueled by the rapid expansion of the economies of developing countries such as Brazil, China, and India, the demand for oil and gas has risen rapidly. This increase in demand, plus improvements in technology, has resulted in a substantial increase in worldwide exploration for oil and gas and with it an increase in production and consumption of barite. Although the Baker Hughes international rotary rig count does not include rigs drilling in the Caspian region, onshore China, Cuba, Iran, North Korea, Russia, or Sudan, it is a good indicator of international oil and gas exploration trends. Internationally, the average monthly number of drill rigs operating in 2012 was 3,518, which was the highest number since 1985 (Baker Hughes Inc., 2013a).

In descending order of production, China, India, Morocco, and the United States were the leading producers of barite in 2012. These four countries accounted for 82% of estimated world barite production.

China.—In 2012, China exported 2.95 Mt of barite, which was a slight increase compared with that of 2011. China’s barite exports went to many countries, but the United States was by far its leading trading partner accounting for 64% of the total, with Saudi Arabia and Indonesia accounting for 10% and 5%, respectively. China’s barite exports remained substantially

below the peak of 3.88 Mt, which was the export total for 2008. China's barite exports have decreased in recent years owing to reduced mine output and increased domestic consumption.

Ireland.—Sunrise Resources plc announced the results of its scoping study on the Derryginagh barite deposit in southwest Ireland. The study indicated that, based on current cost estimates and barite prices, a substantial increase in reserves was needed to demonstrate financial viability of the project. The study, however, also concluded that the extent of the deposit was unknown and recommended that a drilling program and further metallurgical testing be pursued.

In addition, results of the metallurgical testing indicated that more complex milling would be required than originally thought. As a result, the company planned to discuss the project's future with potential customers and industry partners to determine if additional work on the project would be undertaken (Sunrise Resources plc, 2012).

Mexico.—Prodexa de Mexico S.A. de C.V. was developing a barite mining operation from a stratiform deposit in the Cobachi area of central Sonora. The project would operate under the name Anaconda Barite and produce drilling-grade barite for Mexican and export markets. Exports would target drilling markets in the Middle East, South America, and the United States. Ocean shipments would be through the port of Guaymas on the Gulf of California (Hughes, 2013; Anaconda Barite, undated.)

Near the Anaconda Barite project, Chemical Products Corp. (CPC) and Japanese trading house Sojitz Corp. also were developing a new barite mine, which would operate under the name CPC Minería S. de R.L. de C.V. The project involved the former Barita de Sonora Mine, which ceased production in the late 1990s and was subsequently acquired by CPC. The new mining operation would include a jig mill to produce API-grade barite for the drilling mud market and a flotation plant to produce higher-purity barite for barium carbonate production. Production startup was anticipated by yearend 2013 (Sojitz Corp., 2012; Ken Santini, Santini & Associates, oral commun., July 16, 2013).

Zimbabwe.—Through a series of acquisitions, Raptor Resources Holdings Inc. acquired the Dodge Mine located near the village of Shamva in Mashonaland Central Province. Mabwe Minerals Inc. was set up to mine and market the barite with production expected to begin in 2013. In 2012, a comprehensive gravity survey was conducted, which confirmed the presence of large deposits of barite that extended beyond the boundaries of the Dodge Mine mineral rights. As a result, the company increased its mineral rights holdings in the mine area. A core drilling program was planned to continue developing the proven reserves. In addition, Mabwe Minerals acquired 25% of a local contract miner to manage the mining operations and arranged rail transport to the Port of Beira in Mozambique. The deposits contained barite suitable for use in drilling muds and high-purity white barite suitable for use in high-value, nondrilling uses. Samples of drilling-grade and white barite tested in 2011 had specific gravities of 4.37 and 4.40, respectively. Mabwe Minerals announced that it had signed a long-term agreement with major gas and oilfield service company Baker Hughes

Inc. to supply 3 Mt of API-grade barite at a rate of 220,000 t/yr (Mabwe Minerals Inc., 2013).

Outlook

Global demand for barite is expected to remain strong during the next 3 to 5 years. The increased use of horizontal drilling and hydraulic fracturing technologies is likely to open large areas to exploration and development that previously could not be developed by traditional drilling techniques.

In the United States, drilling has been so successful that, in the case of natural gas, prices have been pushed downward to levels making it uneconomic in many cases to continue exploration. For natural gas prices to increase, domestic consumption must increase or production must decrease. The former solution is limited in a slowly growing economy and because, if consumption increases substantially and drives up prices, major consumers such as powerplants would likely switch to coal. Current natural gas surpluses would likely be reduced if the Federal Government approves the export of natural gas in liquefied form. Prices for natural gas in countries such as Japan (a major importer) are much higher than U.S. domestic prices, and being able to export a portion of U.S. natural gas production at these higher prices would reduce the supply of natural gas, which would likely result in higher domestic prices.

Demand for barite is likely to increase in the offshore drilling market of the Gulf of Mexico. According to some oil and gas analysts, the outer continental shelf region in the Gulf of Mexico is expected to undergo expanded exploration activities as companies continue the appraisal and development of deepwater Lower Tertiary and Miocene discoveries. The total number of rigs that operate offshore in the Gulf of Mexico is small in comparison to those operating onshore, but deepwater wells require much larger amounts of barite than most onshore wells because of deeper drilling and higher pressures.

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TABLE 1
SALIENT BARITE STATISTICS¹

(Thousand metric tons and thousand dollars)

	2008	2009	2010	2011	2012
United States:					
Barite, primary:					
Sold or used by producers:					
Quantity	648	396	662	710	666
Value ^c	47,300	31,800	51,000	61,200	74,500
Exports:					
Quantity	62	49	109	98	151
Value	10,500	10,200	17,800	17,300	42,200
Imports for consumption: ²					
Quantity	2,620	1,430	2,110	2,320	2,920
Value	208,000	129,000	196,000	245,000	430,000
Consumption, apparent ³	3,210	1,780	2,660	2,930	3,430
Crushed and ground, sold or used by processors: ⁴					
Quantity	2,840	2,410	2,570	2,910	3,310
Value	325,000	320,000	398,000	490,000	618,000
World, production ^c	8,720 ^r	6,670	7,950 ^r	8,510 ^r	9,200

^cEstimated. ^rRevised.

¹Data are rounded to no more than three significant digits.

²Includes crude, ground, and other barite imports.

³Sold or used plus imports minus exports.

⁴Includes imports.

TABLE 2
ACTIVE BARITE MINES AND GRINDING MILLS IN THE UNITED STATES IN 2012

State and operator (owner)	County/Parrish	Mine/Mill	Foreign Trade Zone
Mines:			
Georgia, New Riverside Ochre Co.	Bartow	New Riverside Ochre	
Nevada:			
Baker Hughes Drilling Fluids (Baker Hughes Inc.)	Lander	Argenta	
Halliburton Energy Services (Halliburton Co.)	Elko	Rossi	
M-I L.L.C., operating as MI-SWACO (Schumberger Ltd.)	Lander	Greystone	
NOV Minerals LP (National Oilwell Varco Inc.)	Elko	Big Ledge	
Grinding Mills:			
Georgia, CIMBAR Performance Minerals	Bartow	Chatworth	
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.
Halliburton Energy Services (Halliburton Co.)	Calcasieu	Lake Charles	No. 087, Lake Charles, LA.
Do.	Lafourche	Larose	No. 124, Gramercy, LA.
Excalibar Minerals L.L.C. (Newpark Resources, Inc.)	Iberia	New Iberia	Do.
M-I L.L.C., operating as MI-SWACO (Schumberger Ltd.)	St. Mary	Amelia	Do.
NOV Minerals LP (National Oilwell Varco, Inc.)	Terrebonne	Houma	
Nevada:			
Baker Hughes Drilling Fluids (Baker Hughes Inc.)	Lander	Barite Grinding Plant	
Halliburton Energy Services (Halliburton Co.)	Eureka	Dunphy	
M-I L.L.C., operating as MI-SWACO (Schumberger Ltd.)	Lander	Battle Mountain	
NOV Minerals LP (National Oilwell Varco, Inc.)	Elko	Osino	
Ohio, CIMBAR Performance Minerals	Columbiana	Wellsville	
Tennessee, Excalibar Minerals L.L.C. (Newpark Resources, Inc.)	Dyer	Dyersburg	
Texas:			
Baker Hughes Drilling Fluids (Baker Hughes Inc.)	Nueces	Corpus Christi	No. 122, Corpus Christi, TX.
Halliburton Energy Services (Halliburton Co.)	do.	do.	Do.
CIMBAR Performance Minerals	Harris	Houston	
Excalibar Minerals L.L.C. (Newpark Resources, Inc.)	do.	do.	
Do.	Nueces	Corpus Christi	No. 122, Corpus Christi, TX.
M-I L.L.C., operating as MI-SWACO (Schumberger Ltd.)	Cameron	Brownsville	
Do.	Galveston	Galveston	No. 036, Galveston, TX.
Milwhite Inc. (Control MINAR, S.A. de C.V.)	Cameron	Brownsville	
Wyoming, NOV Minerals LP (National Oilwell Varco Inc.)	Uinta	Evanston	

Do., do. Ditto.

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

State	2011			2012		
	Number of plants	Quantity (thousand metric tons)	Value (thousands)	Number of plants	Quantity (thousand metric tons)	Value (thousands)
Louisiana	6	928	\$160,000	6	1,180	\$217,000
Texas	8	1,130	196,000	8	1,250	241,000
Other ³	11	848	134,000	10	877	160,000
Total	25	2,910	490,000	24	3,310	618,000

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes imports.

³Includes Georgia, Illinois, Indiana, Missouri (2011), Nevada, Ohio, Tennessee, and Wyoming.

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	2011		2012	
	Quantity	Value	Quantity	Value
Barium chemicals, filler and (or) extender, glass	157	48,700	107	44,500
Well drilling	2,750	441,000	3,210	574,000
Total	2,910	490,000	3,310	618,000

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes imports.

TABLE 5
U.S. EXPORTS OF NATURAL BARIUM SULFATE (BARITE), BY COUNTRY¹

Country	2011		2012	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Angola	160	\$42	776	\$257
Brazil	1,470	1,380	673	697
Canada	85,600	10,400	90,600	13,600
Chile	--	--	550	192
Costa Rica	225	165	144	111
Denmark	--	--	1,740	728
Marshall Islands	--	--	2,130	2,250
Mexico	8,620	4,460	38,600	15,800
Mozambique	692	197	--	--
Oman	468	109	--	--
Trinidad and Tobago	306	97	129	38
United Kingdom	--	--	13,600	7,210
Venezuela	181	89	1,170	921
Other	519 ^r	352 ^r	325	455
Total	98,300	17,300	151,000	42,200

^rRevised. -- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 6
U.S. IMPORTS FOR CONSUMPTION OF BARITE, BY COUNTRY¹

Country	2011		2012	
	Quantity (metric tons)	Value ² (thousands)	Quantity (metric tons)	Value ² (thousands)
Crude:				
China	638,000	\$80,500	710,000	\$120,000
India	112,000	15,000	190,000	27,500
Japan	--	--	1	9
Malaysia	3,080	87	--	--
Mexico	37,100	3,080	41,500	4,410
Morocco	59,000	6,200	137,000	15,500
Pakistan	--	--	12,000	1,370
South Africa	--	--	15,200	1,820
Thailand	--	--	15	6
United Kingdom	--	--	1,340	95
Total	850,000	105,000	1,110,000	171,000
Ground:				
Canada	139	46	186	51
China	1,380,000	114,000	1,520,000	202,000
Egypt	--	--	11,000	2,390
Germany	1,200	669	1,210	878
India	55,200	5,070	207,000	24,800
Italy	1	3	3	4
Japan	2,010	373	2,710	469
Mexico	3,710	378	27,200	3,440
Morocco	11,600	1,070	22,300	2,370
Netherlands	18	24	76	52
Spain	19	8	--	--
Switzerland	2,870	290	--	--
Thailand	20	12	22	12
United Kingdom	18	14	--	--
Total	1,450,000	121,000	1,790,000	237,000
Other sulfates of barium:				
United Kingdom	1	6	--	--
China	5,050	3,900	5,270	4,440
Germany	6,960	10,600	8,740	13,800
Ghana	18	58	--	--
Israel	--	--	(3)	2
Italy	2,050	2,360	1,810	2,260
Japan	647	1,440	578	1,440
Mexico	401	90	1,630	370
Switzerland	20	18	54	58
Taiwan	2	5	--	--
Total	15,100	18,500	18,100	22,300

-- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Cost, insurance, and freight value.

³Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 7
U.S. IMPORTS FOR CONSUMPTION OF BARIUM CHEMICALS¹

	2011		2012	
	Quantity (metric tons)	Value ² (thousands)	Quantity (metric tons)	Value ² (thousands)
Barium chloride	609	\$725	2,650	\$2,410
Barium oxide, hydroxide, peroxide	3,740	5,030	3,120	5,720
Barium carbonate, precipitated	2,860	5,250	4,310	9,400

¹Data are rounded to no more than three significant digits.

²Cost, insurance, and freight value.

Source: U.S. Census Bureau.

TABLE 8
BARITE: WORLD PRODUCTION, BY COUNTRY^{1,2}

(Metric tons)

Country	2008	2009	2010	2011 ^c	2012 ^c
Afghanistan ^{e,3}	2,000	2,000	2,000	2,000	2,000
Algeria	60,088	38,000	42,000	40,000	40,000
Argentina	3,170	3,416	2,944	5,528 ^{r,4}	4,200
Australia ^c	17,000 ^r	12,000 ^r	12,000 ^r	-- ^r	--
Bolivia	10,900	2,069	7,845	21,297 ⁴	20,000
Brazil, beneficiated	23,276	49,847	41,385	49,081 ^{r,4}	41,500 ^p
Bulgaria ^c	40,000	14,300	350 ^r	120 ^r	--
Burma	5,679	7,623	8,975	30,000 ^r	30,000
Canada ^c	12,000 ⁴	15,000	22,000	25,000 ^r	25,000
China ^c	4,600,000	3,000,000	4,000,000	4,100,000	4,200,000
Egypt	1,556	1,100	3,600	4,000	4,000
Germany	78,941	45,606	55,887	55,342 ^{r,4}	55,000
India ^c	1,100,000	1,200,000	1,300,000	1,350,000	1,700,000
Iran ³	226,590	361,217	326,275 ^r	330,000 ^r	330,000
Italy ^c	5,000	3,500	3,500	3,500	3,500
Kazakhstan, marketable ^c	170,000	170,000	200,000	200,000	250,000
Laos ^c	29,000	29,000	17,500 ^{r,4}	12,400 ^{r,4}	12,000
Malaysia	4,372	22,390	1,000	--	--
Mexico	140,066	152,790 ^r	143,225	134,727 ^{r,4}	139,997 ⁴
Morocco	725,060	586,937	572,429	769,504 ^{r,4}	1,000,000
Nigeria ^{e,5}	5,000	19,400	19,000	19,000 ^r	20,000
Pakistan	56,500	56,333 ^r	49,038 ^r	50,000 ^r	52,000
Peru	45,199 ^r	27,881	52,275 ^r	86,790 ⁴	76,007 ⁴
Russia ^c	63,000	63,000	60,000	63,000 ^r	63,000
Slovakia, concentrate	12,950	8,000	13,000 ^{r,e}	14,000 ^r	14,000
Spain	11,100	2,814	2,050 ^r	3,000	3,000
Thailand	9,180	51,895	33,465	67,703 ^{r,4}	70,000
Turkey	482,740	213,187	172,618 ^r	250,786 ^{r,4}	260,000
United Kingdom	43,000 ^r	36,000 ^{r,e}	33,000 ^r	31,000 ^{r,4}	31,000
United States ⁶	648,000	396,000	662,000	710,000 ⁴	666,000 ⁴
Vietnam ^c	90,000	75,000	85,000	85,000	85,000
Other ⁷	1,150 ^r	1,610 ^r	622 ^r	613 ^r	628
Total ^c	8,720,000 ^r	6,670,000	7,950,000 ^r	8,510,000 ^r	9,200,000

^cEstimated. ^pPreliminary. ^rRevised. -- Zero.

¹World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²Table includes data available through January 14, 2014.

³Data are for fiscal year beginning March 21 of that stated.

⁴Reported figure.

⁵Considerably more barite is produced, but it is considered to be commercially unusable.

⁶Crude barite sold or used by producers.

⁷Includes Armenia, Bosnia and Herzegovina, Poland, and Portugal.