



2015 Minerals Yearbook

BARITE [ADVANCE RELEASE]

BARITE

By Michele E. McRae

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 2015, primary U.S. barite production (sold or used by producers) was 425,000 metric tons (t) valued at an estimated \$56 million, and apparent consumption was 1.96 million metric tons (Mt). Imports for consumption were 1.66 Mt and exports were 139,000 t (table 1). World barite production was estimated to be 7.41 Mt.

The United States was the world's fourth-ranked producer of barite and the leading consumer. Domestic oil and natural gas drilling activity, the leading use of barite, decreased markedly in 2015 owing to increasing global petroleum inventories and decreasing oil prices. In 2015, annual average rig counts, historically a good barometer of barite consumption, decreased by 21% worldwide, excluding the United States. The U.S. annual average rig count was 977, a decrease of 48% as compared with that of 2014 (Baker Hughes Inc., 2016). Despite decreased production and consumption in the United States, several barite development projects remained active.

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. 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 three of the seven barite mines, representing approximately 88% of domestic barite sold or sent to company grinding mills. Data were received from 16 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 company production estimates, prior-year data, and other industry data. Of the operating mines canvassed, six were in Nevada and one was in Georgia.

In 2015, 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 425,000 t in 2015, a 36% decrease compared with that of 2014. The bulk of mine production was from Nevada, with a small amount from Georgia. The estimated value of domestic production was \$56 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.

Low oil prices in the latter half of 2014 and 2015 and significantly reduced investment in domestic oil and natural gas drilling operations led to reduced demand for barite. Several mine operations were adversely affected. Baker Hughes Inc.'s Slaven Canyon Mine, which began operating in late 2014, was idled by the middle of 2015, and Halliburton Co.'s Rossi Mine suspended operations in October. National Oilwell Varco, Inc.'s (NOV's) Big Ledge Mine, which operates intermittently, remained idle in 2015.

Despite reduced production, several mine development projects in Nevada continued. M-I SWACO LLC's Mountain Springs Mine in Lander County began production in 2015. All mined barite remained onsite, but the company expected to transfer the stockpiles to its Battle Mountain grinding plant beginning in 2016. Halliburton's Rossi Mine continued plans for expansion. The Bureau of Land Management (BLM) issued a Notice of Intent to prepare an Environmental Impact Statement for the project and invited public comment. The expansion would add 490 hectares to the existing 369 hectares. Existing pits and waste dumps would be expanded and new ones added. The proposed work was expected to extend the mine's life by an additional 8 years (Bureau of Land Management, 2015b). The BLM's (2015a) Battle Mountain District Mid-Year Report stated that baseline data were being collected to support barite mining Plans of Operations for Baker Hughes Scruffy Oz project, Halliburton's Pleasant View Mine project, and NOV's Shasta project.

There were 21 grinding mills in operation all or part of the year. Most Nevada barite ore was ground at nearby company-owned grinding mills. Some run-of-mine ore or crude barite from Nevada was shipped to Canada for grinding.

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. Despite decreased demand for barite, only one grinding plant was known to have been idled in 2015.

Environment

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 laws. 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 less than 1 ppm mercury (Drilling Waste Management Information System, undated).

Consumption

In 2015, domestic apparent consumption of barite decreased by 39% to 1.96 Mt (table 1). Sales of ground barite in all regions decreased by 40% to 2.06 Mt from 3.41 Mt in 2014, the lowest level since 2002. Sales in Louisiana decreased by 40% to 626,000 t, those in Texas decreased by 46% to 677,000 t, and sales by mills in all other States decreased by 32% to 753,000 t (table 3). About 1.94 Mt, or 94%, of barite sales from domestic crushers and grinders was for oil and gas drilling markets, and the remaining 6% was for industrial end uses (table 4). Sales of drilling-grade barite decreased by 42%, but sales of domestic and imported barite for industrial uses increased by 30% to 120,000 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. As a well is drilled, the bit passes through various formations, each with different characteristics. Deeper wells require a higher percentage of barite in the mud mix. Most barite has to be ground to a small uniform size, based on specifications set by the API, before it is used as a weighting agent in drilling mud.

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. 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, adding 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. 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 that 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 no more than 250 ppm 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 common 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 SG, little

information is available about the relative proportion of differing SG of barite being used.

The color of barite used for drilling petroleum varies and can be black, blue, brown, buff, or gray. In addition to high SG, other advantageous properties of barite include low abrasion, low oil absorption, chemical and physical inertness, nontoxicity, low solubility, and relatively low cost in comparison 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 domestic operating drilling rigs indicates that the rate of barite consumption has changed through 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 seems to have continued in 2015, despite decreases in both domestic barite consumption and annual average rig count.

Industrial end uses, such as barium chemicals, filler in paint and plastics, and powder coatings, require that barite 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 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. (Cartersville, GA) was the leading supplier of barite aggregate.

Prices

Because very little primary barite was sold by domestic barite mining companies, value data for primary barite were to a large extent estimated. Despite a 36% decrease in mine production, the average value for primary barite from domestic mines and their associated beneficiation plants was estimated to have decreased slightly, to \$132 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 2014, the average unit value for barite ground in Louisiana decreased by

approximately \$10 per metric ton to \$181 per metric ton, whereas the average unit value for all grades ground in Texas increased by \$9 per metric ton to \$192 per metric ton and the unit value of barite ground in other States increased by \$14 per metric ton to \$213 per metric ton (table 3). The increased unit 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, which tend to sell for a higher price than drilling-grade barite. The barite unit value for these end uses decreased by approximately \$4 per metric ton in 2015, to \$434 per metric ton. Drilling-grade barite was valued at approximately \$182 per metric ton, unchanged from 2014 (table 4).

According to yearend published price ranges for crude barite from major exporting countries, the yearend 2015 price for barite from China, API grade, lump, including cost, insurance, and freight (c.i.f.), U.S. Gulf Coast, SG 4.2, was \$140 to \$155 per ton, a decrease from \$145 to \$160 per ton as reported in 2014. The import price for barite from India, API grade, lump, c.i.f., U.S. Gulf Coast remained mostly unchanged at \$158 to \$171 per ton. Unground lump, API bulk, SG 4.2, free-on-board barite from Morocco increased to \$130 to \$140 per ton compared with \$115 to \$127 per ton at yearend 2014. The import price of chemical-grade barite from China, c.i.f., U.S. Gulf Coast was unchanged at \$161 to \$180 per ton, and paint grade from China, lump, c.i.f., U.S. Gulf Coast increased to \$260 to \$310 per ton from \$235 to \$275 per ton in 2014 (Industrial Minerals, 2015).

Foreign Trade

In 2015, barite exports were 139,000 t, a 9% decrease compared with those in 2014 (table 5). The average unit value of exported barite more than doubled since 2011, to \$369 per metric ton in 2015 from \$176 per metric ton in 2011. Most exports were likely reexports of imported barite ground in the United States. Canada and Mexico combined accounted for 92% of exports. In the past 10 years, exports to Canada typically constituted more than 80% of total exports. Beginning in 2012, however, exports to Mexico increased sharply, and in 2015 Mexico was the leading recipient of U.S. exports, accounting for 48%.

Combined imports of barite (crude, ground, and other) totaled 1.66 Mt, a decrease of 39% compared with those of 2014 (table 1). China was the leading supplier, accounting for 75% of the total, with Mexico (8%), Morocco (8%), and India (6%) making up most of the rest. Imports of the several forms of barite reported under the Harmonized Tariff Schedule nomenclature "Other sulfates of barium" were 25,500 t, a 56% increase compared with those of 2014 (table 6). As with exports, the average unit value of barite imports have increased in recent years, to \$148 per metric ton in 2015 from \$106 per metric ton in 2011.

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 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% to 40% of world production annually, changes in domestic consumption strongly influence world production and trade patterns. The decrease in U.S. consumption of barite, as well as a 35% decrease in worldwide rig count, was likely to have negatively affected world production. Estimated world barite production decreased by approximately 12%, to 7.41 Mt in 2015 from 8.39 Mt in 2014. China, India, Mexico, and the United States accounted for most of the decrease. Despite decreased world production, barite development projects, particularly the construction of processing plants, continued in several countries.

Argentina.—Grupo Transmerquím Argentina S.A. was awarded a certificate to construct a barite processing plant in Zapala. The facility was intended to produce barite concentrate meeting API specifications for use in the development of the Vaca Muerta shale formation (Revista Petroquímica, 2015).

India.—Garuda Drilling Mud Chemicals Pvt. Ltd. began operations at a barite beneficiation facility using centrifugal separation. The 100,000-metric-ton-per-year (t/yr) plant was designed to upgrade 3.9-SG barite from the Andhra Pradesh Mineral Development Corp. Ltd.'s (APMDC's) Mangampet Mine to 4.2-SG barite for use in oil and gas drilling operations (O'Driscoll, 2015).

The APMDC and India's Oil and Natural Gas Corp. Ltd. signed a memorandum of understanding to establish a facility to upgrade low-grade barite from the Mangampet Mine. The proposed plant was expected to produce 500,000 to 700,000 t/yr of barite from approximately 5 Mt of existing unmarketable stocks (Hindu, The, 2015).

Iran.—Barite extraction at the Mehdiabad zinc and lead complex in central Yazd Province was expected to increase to 500,000 t/yr by March 2017. The mine, which received funding to resume zinc extraction and processing, also received a separate line of investment to construct a 1,000,000-t/yr barite processing plant (Financial Tribune, 2015; Thompson Reuters Zaway, 2015).

Kazakhstan.—Halliburton, in conjunction with the Kazakhstan company LLP Karazhal Operating, completed construction of a barite concentration plant in Karazhal in the Karaganda region. The facility, part of Kazakhstan's Industrialization Map program, was designed to process as much as 200,000 t/yr of barite mined from the Bestobe deposit. Approximately 30% of the barite produced is anticipated to be used in the domestic oil and gas industry, with the remainder exported to other Commonwealth of Independent States countries including Azerbaijan, Russia, Turkmenistan, and Uzbekistan, as well as to oil and gas companies operating in the North Sea (Kazinform International News Agency, 2015; Times of Central Asia, The, 2016).

United Kingdom.—M-I SWACO LLC submitted a planning application for development of the Duntanlich barite deposit located north of Aberfeldy in Perthshire County, Scotland. It would replace the company's nearby Foss Mine, currently the leading supplier of barite in the United Kingdom, producing approximately 42,000 t/yr. The Foss Mine has become less economically viable owing to decreasing ore quality and

the inability to mechanize mining because of the deposit's complex folded geologic structure. The Duntanlich ore body is a stratiform deposit composed of a single, subvertical layer varying from 5 to 13 meters thick. The proposed underground mine was expected to produce as much as 120,000 t/yr of barite with a mine life of 50 years. The operation was expected to supply barite to drilling operations in the North Sea (M-I SWACO LLC, 2014, p. 2–3; M-I SWACO LLC, 2015).

Outlook

Since the end of 2014, domestic drilling for oil and natural gas industry has declined owing to increasing petroleum inventories and low prices. The U.S. monthly average drilling rig count decreased throughout 2015. Some other countries, particularly Iran, Kuwait, Russia, and Saudi Arabia, increased production in an effort to capture market share, and barite demand in these countries has increased or remained strong. Domestic barite consumption is expected to decrease again in 2016, with increased demand not expected until 2017.

References Cited

- American Petroleum Institute, 2010, Specification for drilling fluids materials—ANSI/API Specification 13A (18th ed.): Washington, DC, American Petroleum Institute, 109 p.
- Baker Hughes Inc., 2016, Worldwide rig counts—Current & historical data: Houston, TX, Baker Hughes Inc., September 8. (Accessed September 13, 2016, via <http://phx.corporate-ir.net/phoenix.zhtml?c=79687&p=irol-rigcountsintl>.)
- Bureau of Land Management, [2015]a, Battle Mountain District Mid-Year Report: Bureau of Land Management. (Accessed September 20, 2016, at http://www.blm.gov/style/medialib/blm/nv/field_offices/battle_mountain_field.Par.51091.File.dat/2015-bmdo-mid-year-report.pdf.)
- Bureau of Land Management, 2015b, BLM seeks public input on proposed Rossi Mine expansion: Bureau of Land Management news release no. ELKO 2015-033, September 15. (Accessed September 16, 2016, at http://www.blm.gov/nv/st/en/info/newsroom/2015/september/blm_seeks_public_input.html.)
- Drilling Waste Management Information System, [undated], Fact sheet—Discharge to ocean: Argonne, IL, Argonne National Laboratory. (Accessed September 22, 2010, at <http://web.ead.anl.gov/dwm/techdesc/discharge/index.cfm>.)
- Financial Tribune, 2015, Plan to boost barite extraction: Financial Tribune [Tehran, Iran], May 18. (Accessed September 27, 2016, at <http://financialtribune.com/articles/economy-business-and-markets/17014/plan-boost-barite-extraction>.)
- Hindu, The, 2015, Record production of barytes in four years: The Hindu [Hyderabad, India], May 5. (Accessed September 29, 2016, at <http://www.thehindu.com/news/national/andhra-pradesh/record-production-of-barytes-in-four-years/article7171905.ece>.)
- Industrial Minerals, 2015, Prices: Industrial Minerals, December 18. (Accessed September 6, 2016, via <http://indmin.com>.)
- Kazinform International News Agency, 2015, Kazakhstan to produce barite concentrate and ground rock phosphate: Astana, Kazakhstan, Kazinform International News Agency, December 11. (Accessed September 29, 2016, at http://www.inform.kz/en/kazakhstan-to-produce-barite-concentrate-and-ground-rock-phosphate_a2849095.)

- M-I SWACO LLC, [2014], Duntanlich project plan: Aberfeldy, Scotland, M-I SWACO LLC, 24 p. (Accessed September 27, 2016, at http://duntanlich.com/wp-content/uploads/2014/12/DuntanlichProjectPlanDocument261114_EmailVersion1.pdf.)
- M-I SWACO LLC, 2015, Duntanlich Mine—Planning application lodged for barite mine in Scotland, delivering vital resource for the North Sea oil and gas industry: Aberfeldy, Scotland, M-I SWACO LLC news release, November 13. (Accessed September 27, 2016, at <http://duntanlich.com/planning-application-lodged-for-barite-mine-in-scotland-delivering-vital-resource-for-the-north-sea-oil-and-gas-industry/>.)
- Newcaster, John, 2015, Application of barite in drilling fluids past & future: IMFormed Oilfield Minerals & Markets Forum Houston 2015, Houston, TX, May 28, presentation.
- O'Driscoll, Mike, 2015, Indian barytes tender concluded—Garuda starts new barytes processing plant: IMFORMED Industrial Minerals Forums & Research Ltd., May 14. (Accessed September 27, 2016, at <http://imformed.com/indian-barytes-tender-concluded/>.)
- Revista Petroquímica, 2015, GTM anuncia construcción de planta de procesamiento de baritina en Neuquén: Revista Petroquímica [Buenos Aires, Argentina], April 22. (Accessed September 30, 2016, at <http://revistapetroquimica.com/gtm-anuncia-construccion-de-planta-de-procesamiento-de-baritina-en-neuquen/>.)
- Times of Central Asia, The, 2016, Halliburton—Kazakhstan's barite concentrates plant to reach design capacity in 2018: 4-traders, January 13. (Accessed September 27, 2016, at <http://www.4-traders.com/HALLIBURTON-COMPANY-12871/news/Halliburton-Kazakhstan-s-barite-concentrates-plant-to-reach-design-capacity-in-2018-21683150/>.)
- Thompson Reuters Zawya, 2015, Zinc project attracts \$1b: Thompson Reuters Zawya, May 17. (Accessed September 28, 2016, at https://www.zawya.com/story/Iran_Zinc_project_attracts_USD1bn-ZAWYA20150517060927/.)

GENERAL SOURCES OF INFORMATION

U.S. Geological Survey Publications

- Barite. Ch. in Mineral Commodity Summaries, annual.
- Barite. Ch. in United States Mineral Resources, Professional Paper 820, 1973.
- Historical Statistics for Mineral and Material Commodities in the United States. Data Series 140.

Other

- Barite. Ch. in Mineral Facts and Problems, U.S. Bureau of Mines Bulletin 675, 1985.
- Barium Minerals. Ch. in Industrial Minerals and Rocks (7th ed.), Society for Mining, Metallurgy, and Exploration, Inc., 2006.
- Barytes. British Geological Survey Mineral Profile, September 2005.
- Economics of Barytes, The (10th ed.). Roskill Information Services Ltd., 2006.

TABLE 1
SALIENT BARITE STATISTICS¹

(Thousand metric tons and thousand dollars)

	2011	2012	2013	2014	2015
United States:					
Barite, primary:					
Sold or used by producers:					
Quantity	710	666	723	663	425
Value ^e	61,200	74,500	81,900	88,600	56,300
Exports:					
Quantity	98	151	199	153	139
Value	17,300	42,200	58,900	41,800	51,300
Imports for consumption: ²					
Quantity	2,320	2,920	2,250	2,700	1,660
Value	245,000	430,000	352,000	386,000	247,000
Consumption, apparent ³	2,930	3,430	2,770	3,210	1,960
Crushed and ground, sold or used by processors: ⁴					
Quantity	2,910	3,310	3,550	3,410	2,060
Value	490,000	618,000	625,000	651,000	404,000
World, production	8,370 ^r	9,220 ^r	8,240 ^r	8,390 ^r	7,410 ^e

^eEstimated. ^rRevised.

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

²Includes crude, ground, and other barite imports.

³Sold or used by producers plus imports minus exports.

⁴Includes imports.

TABLE 2
ACTIVE BARITE MINES AND GRINDING MILLS IN THE UNITED STATES IN 2015

State and operator (owner)	County/Parish	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	
Do.	do.	Slaven Canyon Mine	
Halliburton Energy Services (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	Bartow	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.
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 M-I SWACO (Schlumberger Ltd.)	St. Mary	Amelia	Do.
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 M-I SWACO (Schlumberger 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	Do.
M-I L.L.C., operating as M-I SWACO (Schlumberger Ltd.)	Cameron	Brownsville	
Do.	Galveston	Galveston	No. 036, Galveston, TX.
Milwhite Inc. (Control MINAR, S.A. de C.V.)	Cameron	Brownsville	

Do., do. Ditto.

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

State	2014			2015		
	Number of plants	Quantity (thousand metric tons)	Value (thousands)	Number of plants	Quantity (thousand metric tons)	Value (thousands)
Louisiana	5	1,050	\$201,000	5	626	\$113,000
Texas	8	1,260	231,000	7	677	130,000
Other ³	9	1,100	219,000	9	753	161,000
Total	22	3,410	651,000	21	2,060	404,000

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

²Includes imports.

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	2014		2015	
	Quantity	Value	Quantity	Value
Barium chemicals, filler and (or) extender, glass	92	40,100	120	52,100
Well drilling	3,320	611,000	1,940	352,000
Total	3,410	651,000	2,060	404,000

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	2014		2015	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Argentina	--	--	378	\$40
Brazil	6,250	\$1,160	581	307
Cameroon	7,180	3,080	2,240	788
Canada	78,700	13,100	61,100	11,200
China	306	198	--	--
Colombia	5,090	934	69	42
Guyana	--	--	2,970	1,270
Honduras	187	49	--	--
Italy	99	62	1,140	445
Liberia	5,150	2,160	--	--
Mexico	46,800	19,000	66,700	35,100
Netherlands	113	89	290	216
Norway	1,860	1,530	915	755
Thailand	225	82	440	65
Trinidad and Tobago	49	14	1,220	630
Venezuela	774	199	684	176
Other ²	217 ^r	179 ^r	276	216
Total	153,000	41,800	139,000	51,300

^rRevised. -- Zero.

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

²Includes 23 countries with less than 100 metric tons each.

Source: U.S. Census Bureau.

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

Country	2014		2015	
	Quantity (metric tons)	Value ² (thousands)	Quantity (metric tons)	Value ² (thousands)
Crude:				
China	497,000	\$78,100	347,000	\$54,700
Germany	--	--	2,230	100
Guatemala	44	12	--	--
India	117,000	12,600	36,400	4,610
Japan	97	6	261	7
Liberia	1,570	279	--	--
Mexico	207,000 ^r	24,100 ^r	63,800	7,320
Morocco	147,000	19,400	65,800	8,660
Pakistan	--	--	5,590	639
United Kingdom	216	136	13	6
Total	971,000 ^r	135,000 ^r	521,000	76,100
Ground:				
China	1,160,000	160,000	891,000	117,000
Germany	1,140	845	1,240	1,190
Hong Kong	89	42	68	19
India	316,000	39,000	61,400	6,230
Japan	2,850	490	1,530	304
Liberia	10,700	1,530	24,600	4,300
Mexico	98,500	11,600	66,900	8,600
Morocco	129,000	13,700	69,700	8,110
Netherlands	--	--	25	20
United Kingdom	42	36	39	37
Total	1,720,000	228,000	1,120,000	146,000
Other sulfates of barium:				
China	6,310	5,530	4,250	3,610
Denmark	1	9	--	--
France	--	--	53	59
Germany	6,450	12,900	6,940	10,700
Hong Kong	68	19	114	75
Italy	2,900	3,990	4,540	6,420
Japan	581	1,510	843	2,040
Mexico	19	4	8,680	1,500
Switzerland	72	86	36	43
United Arab Emirates	20	17	--	--
United Kingdom	--	--	90	41
Total	16,400	24,100	25,500	24,500

^rRevised. -- Zero.

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

²Cost, insurance, and freight value.

Source: U.S. Census Bureau.

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

	2014		2015	
	Quantity (metric tons)	Value ² (thousands)	Quantity (metric tons)	Value ² (thousands)
Barium chloride	1,110	\$1,090	341	\$375
Barium oxide, hydroxide, peroxide	3,330	5,920	3,560	6,190
Barium carbonate, precipitated	2,870	4,300	1,670	1,980

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 ³	2011	2012	2013	2014	2015 ^e
Algeria	40,000	30,587	30,245	56,829	50,000
Argentina	5,528	9,416	26,792	16,265 ^r	17,000
Australia ⁴	10,569 ^r	12,373 ^r	13,176 ^r	14,676 ^r	6,017 ^s
Bolivia ^{e,6}	22,000	22,000	31,000	27,000	47,000
Brazil, beneficiated	7,039	3,025	--	--	--
Bulgaria ^{e,6}	120	--	--	20,000 ^r	60,000
Burma ⁷	30,000	15,339	31,295	23,060	23,000
Canada ^e	22,000	22,000	22,000	35,000	32,000
China ^e	4,100,000	4,200,000	3,200,000	3,108,300 ^{r,5}	3,000,000
Germany	55,342	52,030	45,446	70,665	70,000
India	1,350,000	1,670,000 ^r	1,320,000 ^r	1,183,000 ^r	700,000
Iran ^e	300,000	314,769 ^{s,8}	300,000	300,000	300,000
Kazakhstan ^e	200,000	250,000	250,000	300,000	300,000
Laos	2,500	21,900	10,500	30,610	95,000
Liberia ^{e,6}	--	-- ^r	-- ^r	13,000 ^r	25,000
Malaysia	--	--	500 ^r	14,456 ^r	16,624 ^{p,5}
Mexico	134,727	139,997	343,585	420,000 ^e	265,598 ^s
Morocco	769,504	1,021,400	1,094,470	1,006,600 ^r	1,000,000
Pakistan	35,959 ^r	109,415	87,165 ^r	153,808 ^r	121,575 ^s
Peru	87,848	79,451	52,491	106,071	28,407 ^s
Russia ^e	67,000 ^r	180,000 ^r	180,000 ^r	220,000 ^r	210,000
Slovakia ^{e,6}	8,000 ^s	8,000	11,000	11,000	10,000
Thailand	67,703	64,499	107,437	134,961	170,661 ^s
Turkey	175,532 ^r	187,111	257,116 ^r	320,754 ^r	300,000
United Kingdom	31,000	30,000	30,000	44,000	40,000 ^p
United States ⁹	710,000	666,000	723,000	663,000	425,000 ^s
Vietnam ^{e,6}	135,000	110,000	75,000	100,000	100,000
Other ^{e,10}	613	119	371	43	--
Total ^e	8,370,000 ^r	9,220,000 ^r	8,240,000 ^r	8,390,000 ^r	7,410,000

^eEstimated. ^pPreliminary. ^rRevised. -- Zero.

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

²Includes data available through September 29, 2016.

³In addition to the countries listed, Afghanistan, Egypt, Italy, Nigeria, and some other countries may produce barite, but output data are not reported and available general information is inadequate to formulate reliable production estimates.

⁴Estimated based on data reported by the government of South Australia.

⁵Reported figure.

⁶Estimated based on trade data.

⁷Data are for year beginning April 1 of that stated.

⁸Data are for fiscal year beginning March 21 of that stated.

⁹Crude barite sold or used by producers.

¹⁰Includes Armenia, Bosnia and Herzegovina, and Guatemala.

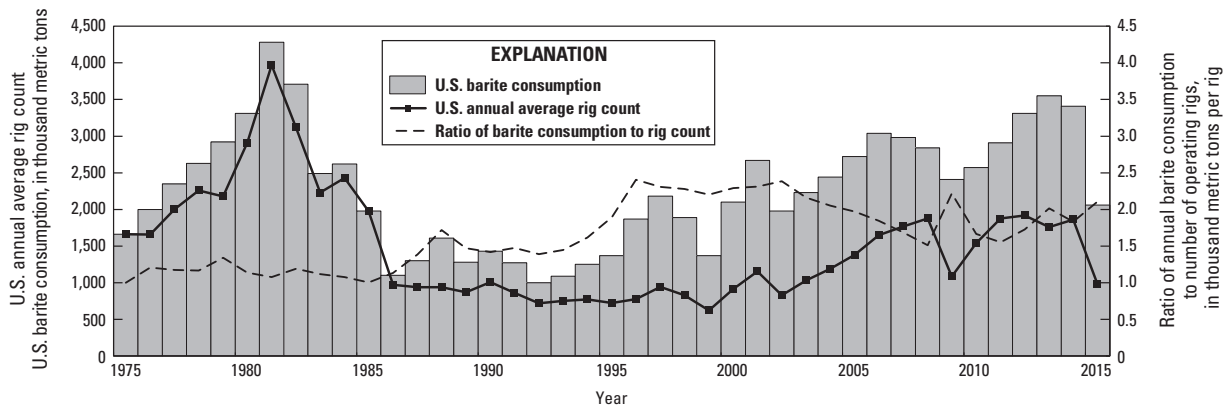


Figure 1. The U.S. count of operating rigs has long been considered a good barometer of U.S. barite consumption. Although domestic consumption of barite generally follows changes in rig count, the above trend suggests a higher rate of barite use per rig beginning in the late 1980s. Source: Baker Hughes Inc. and U.S. Geological Survey.