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2019 Minerals Yearbook

BARITE [ADVANCE RELEASE]

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Barite

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In 2019, primary U.S. barite production (sold or used by producers) was 414,000 metric tons (t) valued at an estimated $45.7 million. Apparent consumption increased by 6% to 2.93 million metric tons (Mt) compared with that in 2019, and ground barite sold or used by producers decreased slightly to 2.35 Mt. Imports for consumption were 2.55 Mt, and exports were 38,500 t. World barite production was 8.87 Mt (table 1).

The United States was the world's leading barite consumer. Barite's primary use is as a weighting agent in oil- and gas-drilling fluids and so trends in barite sales generally mirror trends in drilling rig counts (fig. 1). In 2019, the U.S. annual average count of active rigs decreased by 9% to 944 compared with 1,032 in 2018 (Baker Hughes Co., 2020).

Barite is the mineralogical name for barium sulfate ($BaSO_4$). 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 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 achieve minimum commercial purity or density levels.

Production

Domestic production and sales data for barite were derived from voluntary responses to a U.S. Geological Survey (USGS) canvass. Responses were received from seven mining operations, but only five had reportable production. This represented 100% of domestically mined barite sold or used at company grinding mills. Of the operating mines, four were in Nevada and one was in Georgia. Data were received from 19 of the 23 grinding mills that operated during the year, representing 85% of the quantity of ground barite sold. Estimates for nonrespondents were made using prior year and other industry data.

In 2019, most of the leading companies that mined and ground barite in the United States were also major oil-service companies. Information on active U.S. mines and grinding mills can be found in table 2. Crude barite production was 414,000 t in 2019, a 13% increase compared with 366,000 t in 2018. The bulk of mine production was from Nevada, and a small quantity was from Georgia. The estimated value of domestic production was $45.7 million (table 1).

Halliburton Energy Services, Inc.'s Rossi Mine had been in continuous operation since 1947 until it was idled in 2015 owing to a significant decrease in domestic consumption. Under existing permits and authorizations, mining operations at the facility's three open pits were scheduled to end in 2018. However, the company planned a mine expansion which would extend the life of the mine by 8 years. Halliburton's plan for the project included expansion of the existing operational area, three existing pits, and waste-rock facilities as well as development of an additional pit and waste-rock facilities. Supporting infrastructure would be expanded or improved and surface exploration would continue throughout the project area. Without approval for the expansion, reclamation activities would commence as outlined under the existing plan of operations (Bureau of Land Management, 2018, p. 1-1, 2-58). In September 2019, the Bureau of Land Management released a Record of Decision approving the expansion subject to certain modifications of the originally proposed waste rock disposal areas and maintenance of a corridor to accommodate mule deer migration (Silvey, 2019).

Constantine Metal Resources Ltd. continued exploration and test work at the Palmer project in southeast Alaska, a joint venture with Dowa Metals and Mining Co., Ltd. (49%) of Japan. The project was focused initially on base and precious metals including copper, gold, silver, and zinc in two separate volcanogenic massive sulfide deposits—the Palmer deposit and the AG Zone deposit. In 2018, the company concluded that it could produce a marketable barite concentrate, and, in 2019, released an updated technical report and prefeasibility study that included barite and finalized a marketing and logistics study for barite. The resource estimate of December 18, 2018, for the Palmer deposit (at a cutoff grade of $75 per metric ton net smelter return) was 4.7 Mt of indicated resources with a barite grade of 23.9% $BaSO_4$ and 5.3 Mt of inferred resources with a barite grade of 22% $BaSO_4$, and for the AG Zone deposit (at a cutoff grade of 5.0% zinc equivalent), 5.3 Mt of inferred resources with a barite grade of 34.8% $BaSO_4$. Combined total indicated and inferred resources contained 3.77 Mt of barite. Metallurgical testing yielded a 91.1% recovery rate for barite with a specific gravity (SG) of 4.44 that met the most commonly recommended specifications for drilling-grade barite, particularly those established by the U.S. Environmental Protection Agency and the American Petroleum Institute (API) specifications for weighting agents used in drilling fluids. Because barite would be recovered from copper and zinc flotation tailings, the company concluded that modifying the existing processing flowsheet to include barite was relatively simple, cost effective, and had an added economic benefit of reducing mine waste. Consequently, the only costs associated with barite included in the prefeasibility study were $132 per metric ton for the cost of transporting barite to market; processing costs were input as zero. The marketing and logistics study evaluated three oil- and gas-producing regions—Western Canada, the Williston Basin, and the North Slope of Alaska. All options involved transporting barite by truck from the mine to a terminal in Haines, AK, then barging the material to an intermodal port in Prince Rupert, British Columbia, Canada, the port in closest proximity to drilling regions in Western Canada and normal point of entry for barite into Alaskan drilling sites. Barite would be transported using bags, either palletized or

super sacks, or as bulk shipments using rail cars depending on destination. The company planned to continue developing infrastructure to facilitate underground exploration and complete feasibility-level engineering studies prior to finalizing its decision to develop a mine (Constantine Metal Resources Ltd., 2019, p. 11, 12, 17–23, 25; JDS Energy & Mining Inc., 2019, p. 1–19, 14–17, 22–4).

Twenty-three grinding mills operated for all or part of 2019. Most Nevada barite ore was ground at nearby company-owned grinding mills. In addition to the 4 grinding mills in Nevada, 13 grinding mills operated along the coast of the Gulf of Mexico (5 in Louisiana and 8 in Texas). These stand-alone grinding mills processed imported crude barite that was ground primarily to API specifications for the oil- and gas-drilling market, although some was ground for other uses. An additional six grinding mills in California, the Midwest, and the Southeast ground barite for use as extenders, fillers, pigments, and other uses and produced API-grade barite for the oil- and gas-drilling market.

CIMBAR Performance Minerals (Chatsworth, GA) operated a barite grinding plant in Wellsville, OH, that processed barite for the industrial and oilfield markets. In the prior 2 years, the company increased capacity to meet the needs of the oil- and gas-drilling market in Ohio, which it expected to grow, even though the main drilling areas had migrated south and west of the Wellsville plant. In 2019, CIMBAR began production at a new plant in Marietta, OH, with a production capacity of approximately 125,000 to 150,000 metric tons per year (t/yr) to better meet the service needs of its customers and reduce logistics costs (Ruiz, 2019, p. 24–26).

Environment

Common impurities in drilling-grade barite include chert, dolomite, quartz, 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 often 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 2019, domestic apparent consumption of barite increased by 6% to 2.93 Mt (table 1). Ground barite sold or used by producers in all regions increased slightly to 2.35 Mt. Sales in Louisiana increased by 7% to 568,000 t, those in Texas decreased by 4% to 1.13 Mt, and sales by mills in all other States combined decreased by 8% to 652,000 t (table 3). More than 90% of barite sales from domestic crushers and grinders was for oil- and gas-drilling markets, and the remainder was for other industrial end uses.

Drilling fluids, also known as muds, perform a number of functions in well drilling including controlling formation pressure, cooling and lubricating the drill bit, maintaining wellbore stability, removing formation cuttings, and transmitting hydraulic energy to the bit. Drilling fluids typically are made up of liquid and solid phases (Williamson, 2013). Barite's primary role in drilling fluids was as a weighting agent in its solid state. Barite was a component of almost all drilling fluids and accounted for approximately 10% of the composition of lightweight, oil-based muds and up to more than 40% (by weight) of heavyweight, oil-based muds (Bosch, 2016, p. 10). As a well is drilled, the drill bit passes through various formations, each with different characteristics. To maintain formation pressure, deeper wells require more heavily weighted muds, and therefore a higher percentage of barite or an alternative higher-SG weighting agent in the mud mix. Barite was 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 fluid is its specific gravity. Until 2010, the API specifications called for weighting agents with 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 weighting agents (effective August 1, 2010). Except for SG, specifications for 4.1-SG weighting agents are the same as those for 4.2 SG. These specifications require weighting agents to be 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, weighting agents 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 specifications, 4.1-SG 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 SGs, 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 also can raise the SG of lower purity material.

Since the adoption of the 4.1-SG specifications, two other trends in non-API-conforming barite have emerged—the use of sub-4.1-SG barite and the use of barite with a finer particle size. 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. However, The Barytes Association (2019, p. 8) estimated that in recent years 60% of barite sales in the United States were 4.1 SG, 30% did not meet the API specifications for SG, and 10% were 4.2 SG. Although the 4.1-SG specifications were initially proposed as a way to extend domestic barite resources, a subsequent study challenged

that assertion because the use of lower SG weighting materials affects fluid performance in a way that may ultimately require the use of more drilling fluid. This effect is less problematic for lower density fluids but is exacerbated as fluid density increases. As fluid circulates through the drilling system, it becomes contaminated with cuttings from the formation, contributing low-gravity solids which reduce fluid efficacy and decrease longevity. Because lower SG barite usually contains more impurities (typically quartz and other materials with a lower SG than barite), the impurities contribute to total low-gravity solids and inhibit the fluid's ability to incorporate drill solids. These were likely some of the reasons that the API was reportedly not considering additional specifications for weighting materials with a SG of less than 4.1 (Scott and Robinson, 2010; Miller, 2017, p. 10, 11; O'Driscoll, 2019).

Finer particle sized weighting materials were known to improve safety and maintain well control by reducing sag, preventing formation damage, and reducing equivalent circulating density, particularly in high-pressure, high-temperature, and deepwater wells. Consequently, numerous suppliers have begun offering barite in a variety of finer particle sizes than called for by the API specifications. In 2019, the API drilling fluids committee surveyed companies on materials in use with the goal of establishing nomenclature, specifications, and testing methods for nonstandard weighting agent particle sizes (Barytes Association, The, 2019, p. 12).

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 subsequent 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.

Industrial end uses, such as barium chemicals, filler in paint and plastics, and powder coatings, require barite be ground to a small, uniform size. The required size depended on the application, but for paint- and plastic-grade material, grain size was approximately 2 to 3 µm. Barite-containing materials were used for sound reduction in engine compartments in automobiles, 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 was crushed and screened to sizes ranging from 4.75 millimeters (0.187 inches) to 3.75 centimeters (1.5 inches).

Prices

Because domestic barite-mining companies sold very little crude barite, value data for crude barite were largely estimated. The average unit value for crude barite from domestic mines and their associated beneficiation plants was $111 per metric ton, essentially unchanged compared with that in 2018 (table 1).

Value data for ground barite, as reported to the USGS, do not necessarily represent open market prices. Because oil-service companies owned many of the U.S. barite grinding mills, barite was often sold to customers at a reduced price or at cost because the barite was merely a small part of the overall service contract. Taking this reduced cost into account when comparing prices with those from 2018, the average unit value for barite ground in Louisiana increased by $4 per metric ton to $171 per metric ton; the average unit value for barite ground in Texas increased by $11 per metric ton to $158 per metric ton; and the unit value of barite ground in other States decreased by $10 per metric ton to $222 per metric ton (table 3). The unit value of sales for barite used in chemicals, glass, paint, rubber, and other filler increased by $104 per metric ton to $483 per ton in 2019, which is likely related to paint sales more than doubling (the value of barite sold for paint was typically higher than almost all other barite end uses) (table 4). The average unit value for drilling-grade barite decreased by $3 per metric ton to $157 per metric ton.

According to yearend published price ranges for crude barite from major exporting countries, the yearend 2019 price for barite free-on-board (f.o.b.) from China, API grade 4.20 SG, unground lump was $89 to $93 per metric ton compared with $80 to $90 per metric ton at yearend 2018. The import price for f.o.b. barite from Chennai, India API grade 4.20 SG, unground lump was $88 to $92 per metric ton compared with $85 to $90 per metric ton at yearend 2018. The import price for f.o.b. barite from Morocco, API grade 4.20 SG, unground lump was $86 to $92 per metric ton compared with $86 to $95 per metric at yearend 2018 (Fastmarkets IM, 2019, 2020).

Foreign Trade

In 2019, barite exports (natural barium sulfate and other sulfates of barium, the chemically precipitated form of barite) were 38,500 t, a 43% decrease compared with that in 2018. The leading recipients of barite exports from the United States were Canada (74%), Mexico (14%), and the United Arab Emirates (6%) (table 5).

Combined imports of barite (crude and ground natural barium sulfate, and precipitated barium sulfate) totaled 2.55 Mt, an increase of 4% compared with those in 2018 (tables 1, 6). Imports from India increased by 45% to 829,000 t surpassing those from China. Imports from China, which had been the leading source of domestic imports since 1980, decreased by 38% to 755,000 t (Morse, 1981, p. 108). Morocco and Mexico accounted for 15% and 13% of imports, respectively, in 2019. Together, these four countries accounted for 90% of imports. Imports of the several forms of barite reported under the Harmonized Tariff Schedule of the United States nomenclature "Other sulfates of barium," the chemically precipitated form of barite, were 14,800 t, a 20% decrease compared with that in 2018 (table 6).

The normal duty rate on U.S. imports of crude barite was $1.25 per metric ton, but imports of ground barite were free from duty. 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

allowed 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

Estimated world barite production decreased slightly to 8.87 Mt in 2019 from 8.98 Mt (revised) in 2018 (table 8).

Canada.—Voyageur Pharmaceuticals Ltd. (formerly Voyageur Minerals Ltd.) (Calgary, Alberta) advanced plans to produce pharmaceutical-grade barite from its Frances Creek property in British Columbia by optimizing processing, applying for a permit to extract a 10,000-t bulk sample to be processed at a pilot plant, contracting a third-party company for the design of a pilot plant, and continuing to work on a prefeasibility study. The company's intent was to develop a fully integrated North American supply chain for the manufacturing of barium and iodine contrast products for medical imaging. Voyageur partnered with Chief Medical Supply Ltd. (Calgary, Alberta) to form a joint venture, ImagingX Pharmaceuticals Ltd., for manufacture of the contrast products, which would initially rely on barite sourced from third parties. By yearend 2019, ImagingX submitted three barite-containing contrast products to Health Canada for approval and planned to submit two additional products (Voyageur Minerals Ltd., 2019a, b).

China.—Estimated production in 2019 was 2.8 Mt, a 3% decrease compared with 2.9 Mt in 2018 (table 8). China was the world's leading barite producer, but production had been decreasing since 2014. Production in recent years had been adversely affected by domestic policy, particularly by increased regulation of the mining sector, which resulted in closure of 50% to 70% of the country's mines. Overall capacity, however, was less affected because many of the larger mines still in operation were able to offset production capacity lost from the closure of smaller operations. Conversely, Chinese domestic barite consumption had been increasing, particularly for industrial uses such as filler, which led to increased prices in the domestic market. These price increases incentivized leading producers to focus on the domestic market so that exports had decreased in recent years (Barytes Association, The, 2019, p. 15). These trends likely contributed to India becoming the leading source of United States imports in 2019.

India.—India was the second-ranked producer of barite after China (table 8). The Mangampet Mine, owned by the Andhra Pradesh Mineral Development Corp. Ltd. (APMDC), was the leading barite mine in the world and accounted for approximately 90% of the barite mined in India. APMDC sold its production to exporters and domestic processing plants through a bidding and tendering process according to the following classification—A grade met or exceeded SG of 4.2 with an average of 4.25 SG per lot; B grade had a minimum SG of 4.10; and C, D, and Waste (W) grades were low-density products with no guarantee of SG, although SG typically averaged more than 3.90. Stockpiles of low-grade material have accumulated over time. Although the Indian Bureau of Mines stopped publishing barite production statistics as of January 2015 (the last month that the Indian Bureau of Mines collected barite production statistics), there were 4.9 Mt in low-grade stocks. Numerous private companies have experimented with improved beneficiation techniques and (or) blending low-grade ore with higher grade ore to produce a marketable product (Indian Bureau of Mines, 2017, p. 3–6; John Newcaster, Principal, IMPACT Minerals LLC, written commun., February 21, 2020).

In February, APMDC invited companies to submit bids for its production of barite for the oil- and gas-drilling market in the following quantities: 1.0 Mt of A-grade barite, 200,000 t of B-grade barite, and 1.0 Mt of C-, D-, and W-grade lump barite. Participants were required to bid for a minimum of 100,000 t of A grade, 40,000 t of B grade, and (or) 100,000 t of C-, D-, and (or) W-grade lump barite, in any combination. A percentage of available barite would be awarded to successful bidders based on offered price, but all awardees were required to match the highest offered price for each grade. The terms of the tender would be in effect for 1 year, but the price would be evaluated and adjusted in accordance with market conditions after 6 months (Andhra Pradesh Mineral Development Corp. Ltd., 2019, p. 2).

Laos.—In 2019, the U.S. Census Bureau reported that the United States imported 143,000 t of barite from Laos and 67,500 t of barite from Vietnam (table 6). Laos historically had been a minor barite producer and, prior to 2018, ore had been sent to Thailand for processing. Beginning in 2018, a new mine in Laos began trucking ore to the Port of Cua Lo in Vietnam for export (Barytes Association, The, 2019, p. 17). According to the USGS barite canvass, United States grinding plants reported importing approximately 200,000 t of barite from Laos in 2019, and it is therefore likely that imports from Vietnam originated in Laos.

Mexico.—Mexico had a long history of barite production and, in recent years, production and exports to the United States had increased. In 2010, barite imports from Mexico totaled 18,100 t, which was less than 1% of all domestic imports (Miller, 2012, p. 9.7). In 2019, imports from Mexico had increased to 340,000 t, approximately 13% of domestic barite imports. The leading producing Mexican State continued to be Nuevo Leon, but production also increased in other States such as Chihuahua, Coahuila, and Sonora, which all border the United States. Although the SG of barite deposits in these States is typically lower than in States bordering the Gulf of Mexico, it was still suitable for much of the onshore drilling in the Permian Basin of the United States and is in closer proximity than the domestic mines in Nevada. More than 90% of Mexico's barite production was thought to be exported to the United States—primarily by truck, but also by ship and rail. Internal Mexican consumption, concentrated offshore in the Gulf of Mexico, was supplied primarily by imports and production in adjacent States (Barytes Association, The, 2019; Ruiz, 2019, p. 12, 13, 15).

In 2018, CIMBAR, a leading producer of ground barite in the United States with five barite grinding plants, announced that it entered into a joint venture with Minera Loma Negra, S.A. de C.V., which operated a barite mine in Muzquiz, Coahuila. CIMBAR intended to increase production capacity at the Mexican operation, targeting 400,000 t/yr of barite by 2020, as well as expand its ability to serve barite customers in the Permian Basin with additional trucks, trailers, and stock locations (Ruiz, 2019, p. 20, 21).

Outlook

Barite's properties, including high specific gravity, low abrasion, low oil absorption, chemical and physical inertness, nontoxicity, and low solubility, as well as it being less expensive than alternatives, have made it the leading choice for use as a weighting agent in oil and gas drilling. Available substitutes are not expected to significantly displace barite for the foreseeable future. Long-term barite consumption therefore is expected to be commensurate with trends in oil and gas production and consumption.

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TABLE 1
SALIENT BARITE STATISTICS[1]

(Thousand metric tons and thousand dollars)

	2015	2016	2017	2018	2019
United States:					
Barite, primary:					
Crude, sold or used by producers:					
Quantity	433	232	334	366	414
Value[e]	51,200	22,000	32,100	40,300	45,700
Exports:[2]					
Quantity	147	78	116	67	38
Value	54,800	30,100	29,700	20,100	12,800
Imports for consumption:[3]					
Quantity	1,660	1,260	2,470	2,460	2,550
Value	247,000	192,000	267,000	284,000	298,000
Consumption, apparent[4]	1,950	1,410	2,680	2,760	2,930
Crushed and ground, sold or used by producers:[5]					
Quantity	2,010	1,420	2,030	2,420	2,350
Value	390,000	266,000	364,000	426,000	420,000
World, production	8,930 [r]	7,730 [r]	8,520 [r]	8,980 [r]	8,870

[e]Estimated. [r]Revised.

[1]Table includes data available through July 14, 2020. Data are rounded to no more than three significant digits.

[2]Exports include crude, ground, and other barite exports calculated from Schedule B numbers 2511.10.1000 and 2833.27.0000.

[3]Imports include crude, ground, and other barite imports calculated from Harmonized Tariff Schedule of the United States codes 2511.10.1000, 2511.10.5000, and 2833.27.0000.

[4]Defined as primary barite sold or used by producers plus imports minus exports.

[5]From domestically mined and imported crude barite.

TABLE 2
ACTIVE BARITE MINES AND GRINDING MILLS IN THE UNITED STATES IN 2019[1]

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	
Halliburton Energy Services, Inc. (Halliburton Co.)	Elko	Rossi[2]	
M-I L.L.C., operating as M-I SWACO (Schlumberger Ltd.)	Lander	Greystone	
Do.	do.	Mountain Springs	
Progressive Contracting Inc.	Elko	Coyote	
Grinding mills:			
California, Industrial Minerals Co.	Sacramento	Florin	
Georgia, CIMBAR Performance Minerals	Murray	Chatsworth	
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	
Do.	Washington	Marietta	
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	
Superior Weighting Products, LLC (CES Energy Solutions Corp.)	Nueces	Corpus Christi	No. 122, Corpus Christi, TX.

Do., do. Ditto.
[1]Table includes data available through July 14, 2020.
[2]In temporary closure.

TABLE 3
CRUSHED AND GROUND BARITE SOLD OR USED BY PROCESSORS
IN THE UNITED STATES, BY STATE[1, 2]

	2018			2019		
State	Number of plants	Quantity (thousand metric tons)	Value (thousands)	Number of plants	Quantity (thousand metric tons)	Value (thousands)
Louisiana	5	530	$88,100	5	568	$96,900
Texas	8	1,180	173,000	8	1,130	179,000
Other[3]	9	707	164,000	10	652	145,000
Total	22	2,420	426,000	23	2,350	420,000

[1]Table includes data available through July 14, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]From domestically mined and imported crude barite.
[3]Includes California, Georgia, 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	2018		2019	
	Quantity	Value	Quantity	Value
Barium chemicals, filler and (or) extender, glass, paint, rubber	177	67,200	W	W
Well drilling	2,240	359,000	W	W
Total	2,410 r	426,000	2,350	420,000

rRevised. W Withheld to avoid disclosing company proprietary data.
[1]Table includes data available through July 14, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]From 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	2018		2019	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Brazil	951	$621	90	$72
Canada	44,200	8,400	28,400	6,030
China	144	167	113	167
Dominican Republic	--	--	262	144
Guyana	--	--	463	181
Jamaica	796	340	133	73
Kuwait	--	--	746	538
Liberia	171	181	--	--
Malaysia	192	97	--	--
Marshall Islands	11,600	3,790	--	--
Mexico	6,220	5,350	5,400	4,400
Saudi Arabia	505	222	20	15
Thailand	187	82	202	89
Trinidad and Tobago	1,750	250	28	29
United Arab Emirates	--	--	2,220	655
Other[3]	496 r	558 r	403	441
Total	67,300	20,100	38,500	12,800

rRevised. -- Zero.
[1]Table includes data available through May 19, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Imports calculated from Schedule B numbers 2511.10.1000 and 2833.27.0000.
[3]Includes 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	2018 Quantity (metric tons)	2018 Value[3] (thousands)	2019 Quantity (metric tons)	2019 Value[3] (thousands)
Crude:				
China	345,000	$47,600	174,000	$25,600
India	198,000	18,200	203,000	16,500
Laos	--	--	88,700	10,200
Mexico	80,200	8,230	134,000	12,400
Morocco	140,000	14,200	97,000	9,050
Pakistan	--	--	10,100	1,040
Switzerland	6,360	852	--	--
United Kingdom	4,460	140	4,540	134
Vietnam	11,900	1,490	36,800	4,600
Other [7 countries and (or) localities]	128	50	986	57
Total	786,000	90,800	749,000	79,600
Ground:				
China	859,000	78,800	576,000	55,600
Germany	1,920	1,850	2,070	2,000
India	373,000	34,400	625,000	68,200
Laos	--	--	54,200	5,560
Liberia	--	--	12,100	1,960
Mexico	212,000	28,300	206,000	27,200
Morocco	209,000	18,000	281,000	30,100
Vietnam	2,420	254	30,800	3,270
Other [11 countries and (or) localities]	435 r	216 r	899	224
Total	1,660,000	162,000	1,790,000	194,000
Other sulfates of barium:				
China	4,960	4,780	4,600	3,550
Germany	7,290	19,500	4,430	12,800
Hong Kong	204	147	72	44
Italy	4,440	4,520	4,420	4,940
Japan	1,270	2,540	1,040	2,340
Korea, Republic of	--	--	18	21
Mexico	82	60	14	30
Spain	4	25	21	46
Switzerland	144	179	126	152
United Kingdom	20	23	63	102
Other [5 countries and (or) localities]	65 r	69 r	13	18
Total	18,500	31,800	14,800	24,100
Grand total	2,460,000	284,000	2,550,000	298,000

rRevised. -- Zero.
[1]Table includes data available through May 19, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Imports calculated from Harmonized Tariff Schedule of the United States codes 2511.10.1000, 2511.10.5000, and 2833.27.0000.
[3]Cost, insurance, and freight value.

Source: U.S. Census Bureau.

TABLE 7
U.S. IMPORTS FOR CONSUMPTION OF BARIUM CHEMICALS[1, 2]

	2018		2019	
	Quantity (metric tons)	Value[3] (thousands)	Quantity (metric tons)	Value[3] (thousands)
Barium chloride	2,540	$2,390	1,740	$1,820
Barium oxide, hydroxide, peroxide	3,760	7,450	5,030	9,200
Barium carbonate, precipitated	2,540	2,970	1,930	3,020

[1]Table includes data available through May 19, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Imports calculated from Harmonized Tariff Schedule of the United States codes 2816.40.2000, 2827.39.4500, and 2836.60.0000.
[3]Cost, insurance, and freight value.

Source: U.S. Census Bureau.

TABLE 8
BARITE: WORLD PRODUCTION, BY COUNTRY OR LOCALITY[1]

(Metric tons)

Country or locality[2]	2015	2016	2017	2018	2019
Algeria, crude	44,000	52,000	29,159 r, 3	39,426 r, 3	40,000 e
Argentina	12,917	12,389	5,977	7,225 r	7,000 e
Australia	6,017	7,139	8,958	6,534	1,982
Bolivia	46,732	16,632	29,114 r	53,163 r	37,000 e
Bulgaria[e]	59,000	50,000	67,000	70,000	70,000
Burma	4,535 r	2,627 r	3,206 r	2,935 r	12,439
Canada[e]	42,000	20,000	50,000	40,000	40,000
China[e]	3,500,000	3,200,000	3,100,000	2,900,000	2,800,000
Ecuador	--	--	--	2,868	3,000 e
Egypt	7,540	7,500 e	7,500 e	7,500 e	7,500 e
Germany	45,311	49,374	34,177	39,218 r	40,000 e
Guatemala	544	500	43	63 r	60 e
India	1,225,006 r, 4	1,246,371 r, 4	2,038,915 r, 4	2,390,000 e	2,000,000 e
Iran	340,318 5	399,750 5	239,132 r, 5	201,721 r	202,000 e
Kazakhstan	674,500 r	685,100 r	569,900 r	597,000 r, e	597,000 e
Laos[e]	90,000	80,000	75,000	230,000 r	440,000
Liberia	--	--	--	--	12,000 e
Mexico	271,697 r	156,854 r	359,912 r	366,234 r	384,150
Morocco, crude	1,212,130	668,500	818,010	899,365 r	1,100,000 e
Nigeria	3,323	537	714	387 r	400 e
Pakistan	121,575	107,224	105,554 r	108,837 r	110,000 e
Peru	28,407	7,953	9,182	15,621	16,373
Russia	361,000	434,000	178,000	163,000	160,000 e
Slovakia	20,000	25,000	15,690 r	16,000 r, e	16,000 e
Thailand	38,995 r	65,070 r	41,391 r	13,149	13,000 e
Tunisia, crude[e]	10,000	10,000	10,000	10,000	10,000
Turkey, crude and ground	209,097 6	105,573 6	310,667 r	335,473 r	250,000 e
United Kingdom	50,000	56,000	55,000	55,000	55,000 e
United States, crude[7]	433,000	232,000	334,000	366,000	414,000
Vietnam[e]	76,000	30,000	26,000	41,000 r	36,000
Total	8,930,000 r	7,730,000 r	8,520,000 r	8,980,000 r	8,870,000

[e]Estimated. [r]Revised. -- Zero.
[1]Table includes data available through November 12, 2020. 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.
[2]In addition to the countries and (or) localities listed, Afghanistan, Italy, and some other countries may have produced barite, but available information was inadequate to make reliable estimates of output.
[3]Data as reported by the Algeria Office of National Statistics only included production from state-owned entities.
[4]Data are for year beginning April 1 of that stated.
[5]Data are for year beginning March 20 of that stated.
[6]Data as reported by the Turkish Statistical Institute included only ground production. Crude production numbers were withheld.
[7]Crude barite sold or used by producers.

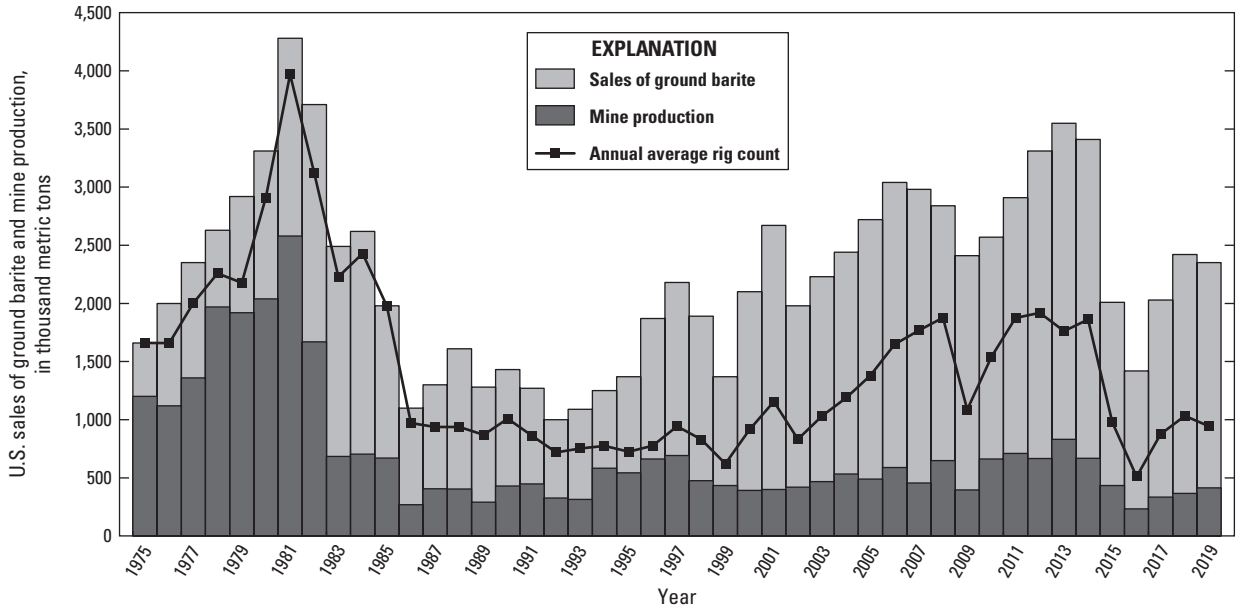

Figure 1. Historical trends in sales of ground barite, mine production of barite, and annual average rig count in the United States from 1975 through 2019. Sales of ground barite include domestically mined and imported crude barite. Sources: Baker Hughes Co. and U.S. Geological Survey.