

BARITE

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Barite, a name that was derived from the Greek word “barys” (heavy), is the mineralogical name for barium sulfate. In commerce, the mineral is sometimes referred to as “barytes.” As used in this report, the term “primary barite” refers to the first marketable product, which includes crude barite (run of mine) and the products of simple beneficiation methods, such as washing, jigging, heavy media separation, tabling, flotation, and magnetic separation. Most crude barite requires some upgrading to minimum purity or density. Barite that is used as an aggregate in a heavy cement is crushed and screened to a uniform size. Most barite is ground to a small uniform size before it is used as a filler or extender, an addition to industrial products, or a weighting agent in petroleum well-drilling mud [American Petroleum Institute (API) or Oil Companies’ Materials Association (OCMA)] specification barite. Barite used for drilling petroleum wells can be blue, black, buff, brown, or gray depending on the ore body. It must be finely ground so that at least 97% of the material, by weight, can pass through a 200-mesh (75-micrometer) (Tyler) screen, and no more than 30%, by weight, can be less than 6 micrometers in effective diameter, which is measured using sedimentation techniques. The ground barite also must be dense enough that its specific gravity is 4.2 or greater, soft enough to not damage the bearings of a tricone drill bit, and both chemically inert and containing no more than 250 milligrams per kilogram of soluble alkaline salts (American Petroleum Institute, 1993, p. 6-11). A small percentage of iron oxide is allowable. An additional

feature of barite is noninterference with magnetic measurements taken in the borehole, either during logging while drilling or in separate drill-hole logging. In offshore drilling, the U.S. Environmental Protection Agency limits the content of mercury to 1 milligram per kilogram of barite and that of cadmium to 3 milligrams per kilogram of barite (U.S. Environmental Protection Agency, 1997). Although barite contains a heavy metal (barium), it is not a toxic chemical under section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 because it is very insoluble.

Production

Domestic sales data for barite were derived from voluntary responses to a survey of U.S. operations and follow-up telephone calls by the U.S. Geological Survey. Barite production for 2000 was 392,000 metric tons (t), about 9% below that of 1999. Of the known 31 operations, 16 responded to survey forms, and 15 responded by telephone. Nine mines were included in the survey; six were producing, and three were idle. Of the producing mines, three were in Nevada, two were in Georgia, and one was in Tennessee; two idle mines were in Nevada, and one was in Missouri. There were 24 mills/grinding plants operating for the report year, and an additional plant was being refurbished. Three plants were in Nevada, all associated with mines (one mine was idle). Two grinding plants in Georgia were associated with mines, and two plants in Illinois

Barite in the 20th Century

At the beginning of the 20th century, barite was a mineral of minor importance to the United States. Its primary use was to extend lead oxide in white paint. Barite also added the special qualities of hiding power and flatness. Because white lead sometimes turns black or yellow and barite does not, ground barite became a pigment on its own merit. Barite was also converted to other barium chemicals. Barium chloride was added to bricks before firing to stop efflorescence when exposed to weather. Barium chemicals were used for refining sugar, enameling iron, making oilcloths and paper collars, and in the manufacture of paper, artificial ivory, rubber, and lithopone. Barium carbonate or nitrate adds luster and brilliance to glass. Lithopone became a major paint ingredient in the 1920s; its use lasted into the 1950s, peaking at 150,000 metric tons per year of barite in both 1937 and 1947 entering the manufacture of lithopone. Later in the century, however, titanium dioxide replaced lead oxide, barite, and zinc oxide in the coating industry. Another barite use was patented in 1926 by the oil well drilling industry.

During the later part of the century, barite was used in the drilling mud of oil and gas wells, particularly for wells deeper than 2,000 meters, and petroleum-well-drilling demand for barite became the mineral’s major end use during economic expansions after World War II and the subsequent increased use of oil and gas in the United States. The profitability of oil and gas production had a strong effect on the number of drill rigs, and the number of drill rigs had a strong effect on the consumption of barite. The United States was the leading petroleum well drilling country starting in 1970, reaching 4,530 drill rigs in December 1981, and was the largest consumer of barite. Record highs of about 2.6 million tons of barite produced and 4.3 million tons consumed in the United States were reported in 1981. Barite production and consumption declined since then to 400,000 tons produced, 2.1 million tons imported into the United States, and 6.2 million tons produced worldwide in 2000. Barite industrial end uses accounted for an estimated 78,000 tons per year in the United States.

used imported crude barite. One grinding plant in California was associated with a mine in Nevada, and one grinding plant in Missouri used material from a stockpile from a nearby idle mine. Five of the six active mines had grinding plants. There were 15 facilities on the Gulf of Mexico that produced API-grade barite in 2000; an additional plant was undergoing renovation in Morgan City, LA. These grinding plants received relatively low priced crude barite from China and India for grinding to petroleum-well-drilling specifications and small amounts for filler and extender markets. In Texas, there were two plants in Brownsville, three in Corpus Christi, one in Galveston, and two in Houston. In Louisiana, there was a grinding plant in Houma, two near Lake Charles, one in New Iberia, one near Morgan City, and two near New Orleans. At yearend, one plant in New Orleans was relocated to Morgan City. Baker Chemical, Inc., closed and sold its two plants.

The quantity of primary barite sold or used by producers fell by about 10% from that of 1999, and weighted average prices declined by about 5%. Less than 4% of barite sales from domestic producers were for industrial end uses. The remaining sales were for petroleum-well-drilling API-specification markets. None of the Nevada-mined ore was sent to the coast of the Gulf of Mexico for grinding. High quality lump barite entered the country for several filler and extender grinding plants in the Midwest United States.

Halliburton Co. owned the Baroid Drilling Fluids Division. A joint venture between Smith International Inc. and Schlumberger Ltd. owns M-I LLC, which owns M-I Drilling Fluids. The third major U.S. barite company was Baker Hughes Inteq, a division of Baker Hughes, Inc. These three companies mined barite in Nevada and in countries with collocated beneficiation plants (mills) and grinding plants, along with the above-mentioned grinding plants in Louisiana and Texas. Excaliber Minerals, Inc., a division of Newpark Resources Inc., has become significant in the imported barite grinding industry in Louisiana and Texas.

These four companies on the Gulf of Mexico received imported barite that was transported by ship to Louisiana and Texas shores. These Gulf of Mexico locations are closer to the large offshore drilling rigs in the Gulf of Mexico and the clusters of onshore areas of exploration and significant discoveries (plays) in the Petroleum Administration for Defense District 3 (where searching for gas and oil is most profitable).

The outputs of crushers and grinders in Louisiana increased by more than 34%, while the outputs of crushers and grinders in Texas increased by nearly 157% (table 2). Industrial end-use sales by crushers and grinders of domestic production and imported barite in 2000 was essentially unchanged (table 3).

These four producers and other smaller companies import and grind or crush barite for drilling mud. Two smaller companies mine and beneficiate barite for the filler and the extender and chemical industries in Georgia, and a small mine and a mill operate in Nevada and California for the same end use. Two companies import or purchase domestic barite for grinding in Illinois for the Midwest filler and extender and chemical industry markets. The Quincy, IL, grinding plant owner changed its name to Elementis Pigments Inc. from Harcros Pigment Inc.

Trade

Domestic exports were about 36,000 t, mostly to Canada (table 4). Imports of Chinese barite increased by nearly 200% above that of 1999 to equal about 93% of total barite imports of 2.1 million metric tons (Mt). Imports from India declined by more than 25% from those of 1999 to 101,000 t (table 5).

Consumption

Barite apparent consumption increased by about 91% compared with that of 1999 to less than 2.5 Mt. Ground barite sales climbed by about 53% to 2.1 Mt. Barite imports during 2000 were up by 140% to 2.1 Mt from 870,000 t.

Since 1975, about 90% of the consumption of barite has been used during the operation of drill rigs to explore for, discover, develop, and expand petroleum reserves. Often the demand for drill rigs to explore and develop petroleum reserves rises as the prices of oil and gas rise. For the oil-directed rigs, the average futures price of light sweet west Texas crude started the year at about \$26.30 per barrel for the last day of December 1999; rose to about \$32.10 per barrel, as reported for June 28; and declined to around \$29.00 per barrel, as reported for December 15, 2000 (Oil & Gas Journal, 2000-2001). Oil-directed drill rigs in the United States increased to around 205 rigs between April through late August from about 130 rigs in late January and then rose to about 245 rigs in mid-December. For the year, this increase was a mild increase, where the oil-directed rigs rose from about 18% of total rigs to about 21% of total rigs in response to the oil price increase. For the gas-directed rigs, the futures price for natural gas was about \$2.34 per million British thermal units on the last day of December 1999 and rose to \$8.18 per million British thermal units in mid-December 2000 (Oil & Gas Journal, 2000-2001). Gas-directed rigs in the United States increased to 862 rigs in mid-December 2000 from 624 rigs on the last day of December 1999. The gas-directed rig count change was also mild and declined slightly to about 79% of total rigs from 82% in response to the gas price increase (Oil & Gas Journal, 2000-2001).

The reason for the increase in the number of oil-directed rigs seems to have been that drilling for oil, in contrast to 1998, was once again a profitable investment, as described by the Herold 34th annual replacement reserve cost analysis (Cacchione and Johnson, 2001). According to the Herold study, proven oil reserves “of the top 50 companies based upon size of U.S. proved reserves (among public companies that have filed SEC¹ disclosures by April 13, 2000)” increased by 9.4% [1.5 billion barrels (Gbb)] from the beginning-of-the-year 15.9 Gbb by extensions and discoveries (drilling) at a cost of about \$5.17 per barrel of oil equivalent in 2000 (Cacchione and Johnson, 2001). This was a significant decrease from the \$13.04 per barrel of oil equivalent for 1998 that drove down the use of drill rigs and barite in 1999. The oil companies also “increased reserves by 22.6% or 3.6 Gbb by ‘purchase of reserves’,” which cost about \$4.73 per barrel of oil equivalent. The top 50 oil companies probably increased drilling, and there was also an increase in drilling from the smaller independents who had money to search for more oil reserves having sold their proven reserves to the larger, integrated companies.

¹Securities and Exchange Commission.

According to the Herold study, proven gas reserves for their 50 biggest companies increased for the year 2000 to 102 trillion cubic feet from 86.8 trillion cubic feet (Cacchione and Johnson, 2001). There was a 13% increase, 11.3 trillion cubic feet, in reserves from 86.8 trillion cubic feet at the beginning of the year by extensions and discoveries (drilling) and 16.8% or 14.6 trillion cubic feet from 86.8 trillion cubic feet by purchase of reserves. Production was 10.0 trillion cubic feet with end-of-year proven gas reserves of 102 trillion cubic feet. “For the first time in 5 years extensions and developments outpaced gas production” (Cacchione and Johnson, 2001). There was also 1.1 trillion cubic feet of improved recovery and 1.4 trillion cubic feet of [reserve] revisions. The same analysis reported that finding and development costs (drilling), not broken down by oil and gas, fell to \$5.17 per barrel of oil equivalent in 2000 from \$5.31 per barrel of oil equivalent in 1999 and \$13.04 per barrel of oil equivalent in 1998. Gas rigs continued to account for about 80% of the total rig count, staying between 74.6% and 82.6% for the year in the United States.

Drilling for oil and gas was more successful and continued to be rewarded by higher prices all through the year (Cacchione and Johnson, 2001). Results for individual companies varied widely, though. For example, BP Amoco, the biggest capital investor in the U.S. petroleum market for the year, spent \$3.5 billion in finding and development. At its oil operations, BP Amoco produced 251 million barrels (Mbbbl) of oil but revised its oil reserves downwards by 167 Mbbbl for a total reserve reduction of 418 Mbbbl for the year. At its gas operations, BP Amoco added 1.9 trillion cubic feet of natural gas reserves by extensions and discoveries, improved recovery, and reserve revisions, all products of drilling. BP Amoco also had a 0.4-trillion-cubic-foot final increase after gas reserve purchases of proven property, sales of property, and production of gas for the year. Not all companies had these results, but when summed, the top 50 petroleum companies achieved a 163% reserve replacement rate of oil production by drilling and a 138% reserve replacement rate of gas production by drilling.

Prices

The nominal average weighted sales price for primary barite from mines and associated beneficiation plants in the United States decreased slightly to about \$25.10 per ton in 2000. Nominal average prices for crushed and ground barite decreased by 4% to \$75.80 per ton compared with those of 1999. The weighted average prices of the production from “other” regions declined by about 11% while Louisiana and Texas prices were relatively unchanged.

According to Industrial Minerals (2000b), midyear international barite prices were as follows:

- API, lump, cost, insurance, and freight (c.i.f.) [U.S.] Gulf Coast, Chinese, \$43 to \$45 per ton; Indian, \$45 to \$48; Moroccan, \$50 to \$52.
- Underground, OCMA/API, bulk, specific gravity 4.2, free on board (f.o.b.) Morocco, \$39 to \$41 per ton.
- Ground, bagged, specific gravity 4.22, f.o.b. Morocco, \$75 to \$85 per ton.
- Ground, OCMA/API, big bags (1.5 tons) f.o.b. south Turkey, \$68 to \$70 per ton.
- Ground, OCMA, bulk, delivered Aberdeen [United

Kingdom], \$75.61 to \$83.17² [£50 to £55] per ton; delivered Great Yarmouth [United Kingdom], \$87.71 to \$98.29 [£58 to £65] per ton.

- Micronized, off-white, minimum 99%, less than 20 micrometers, delivered United Kingdom, \$211.71 to \$226.83 [£140 to £150] per ton.
- Ground, white, paint-grade, 96% to 98% barium sulfate (BaSO₄), 350 mesh, 1 to 5 tons delivered United Kingdom, \$294.88 to \$332.68 [£195 to £220] per ton.

World Review

Since 1975, about 90% of consumed barite has been used with drill rigs to explore for, discover, develop, and expand petroleum reserves. Often the demand for drill rigs to explore and develop petroleum reserves rises as the prices of oil and gas rise. On the last day of December 1999, the futures price of west Texas light sweet crude was about \$26.30 per barrel and Brent 38° crude was also about \$26.30 per barrel (Oil & Gas Journal, 2000-2001). Oil prices peaked in November 2000, with the west Texas light sweet crude at about \$35.25 per barrel and Brent 38° crude reaching about \$33.40 per barrel.

According to the world drill rig reports, which do not cover most of the former and present centrally planned economies, the world drill rig count (with Canadian onshore drill rigs subtracted because their operations are strongly seasonal) rose to about 1,810 rigs at the end of 2000 from about 1,340 at the beginning of 2000 and about 1,100 rigs in April 1999 [Oil & Gas Journal, 2000-2001 (the third issue of each month)]. It would seem that barite consumption around the world rose for the year but there is no confirming data at this time. In ascending order of rig count, the following regions had active drill rigs:

Africa.—The African active drill-rig count rose to about 49 rigs in December from about 39 rigs in January, primarily with offshore drill rigs. Barite consumption probably increased in that region.

Europe.—European drill rigs rose to 96 total rigs in October from 65 total rigs in January, reaching a peak in October of a 31 rig increase, primarily with offshore rigs, which increased to about 57 rigs in October from about 33 rigs in January. Barite consumption probably increased in that region.

Asia and the Pacific.—The drill-rig count in Asia and the Pacific rose to about 155 in October from about 130 in January and settled to about 145 in December. The onshore drill-rig count increased by about 15 rigs while the offshore drill-rig count increased by about 10 rigs. Barite consumption probably increased in that region.

Middle East.—The Middle Eastern drill-rig count rose to about 165 in December from about 140 in January, with onshore rigs increasing by about 20 rigs, and offshore rigs, by about 5 rigs. Barite consumption probably increased in that region.

Latin America.—Latin American rigs increased to about 265 rigs in October from about 185 rigs in January. There were about 210 rigs onshore and 55 rigs offshore in October in reaction to petroleum prices; then the rig counts decreased by about 3 rigs onshore and 5 rigs offshore by December. Barite consumption probably increased in that region.

²US\$1.00=£0.6613

Canada.—Canadian drill rig usage started the year at about 500 rigs in January, fell to a low of about 145 rigs in April, and recovered to about 410 active drill rigs in December. Canada went from a peak of 507 in February 1998 to a peak of 332 in February 1999 (and a low of 62 rigs in April), 544 in February 2000, and 562 in February 2001. Barite consumption probably increased in that region. Canada has a pattern of a high drill-rig count in the winter and a low drill-rig count in the spring in normal times. Canada is also an important gas supplier to the United States.

The major barite-producing countries, other than the United States, for which information was available were as follows:

China.—The producing mines are clustered in the south of China in Guangxi Province with 53% of production, which includes Nanning City; Hunan Province with 13% of production, which is north-by-northeast of Guangxi; and Guizhou Province with 13% of production, west of Hunan, and north-by-northwest of Guangxi (Newcaster, 2000). Guangdong Province, with 9% of production, is east and up the southern coast of China and includes Hong Kong. Fujian Province, with 8% of production, is also on the coast to the northeast of Guangdong Province and includes Fuzhou City. In 1997, a duopoly of “[t]he large two government owned” sellers forced up the price of barite in China, and in early 1998, when the demand for drilling started to falter due to low oil and gas prices in the United States and elsewhere, the duopoly kept mining and sending undergrade ore to the ports. In 1999, mining stopped, and port traders were caught with undergrade ore and no market (Newcaster, 2000). A new, more workable relationship with “[a]t least a dozen potential producers [who] are seeking direct supply agreements” was formed in 2000, when demand reawoke and barite grinders needed ore that met grade specifications.

Mexico.—“Chemical Products Corp. (CPC) of Cartersville, GA, owns the barytes producer Minas de Barita, which purchased Barita de Sonora S.A. at the end of 1997. Barita de Sonora is still not in production but CPC is carrying out feasibility studies to confirm the potential for chemical grade barytes production. No drilling grades will be produced” (Crossley, 2000, p. 70).

India.—A state entity controls the largest Indian barite source in Andhra Pradesh Province by annually leasing the mine source to the highest bidder (Newcaster, 2000). In fiscal year 1997-98, the successful bidder won with a bid that was too high for a market clearing price, and little barite left the country. In fiscal year 1998-99, India shipped barite to the United States with competitive prices. In fiscal year 1999-2000, Indian production was slowed down owing to government/trader/management disagreements and labor strikes.

Russia.—A new mine was opened in the Vorkuta district of the Komi Republic and was named the Khoilinsky deposit (Industrial Minerals, 2000a). The mine was reported to be near the eastern Siberian oil/natural-gas provinces with ores of more than 90% barite and enough reserves for 120,000-metric-ton-per-year production for more than 20 years. There was no mention of color or heavy metal occurrence or lack thereof.

Thailand.—Minerals traders in Thailand have started to

deliver barite to the world market, reportedly using Thailand and Laotian material (Newcaster, 2000).

Outlook

In the United States, the gas industry looks more viable and profitable in the exploration and development departments and could be a market for barite consumption for many years. The amount of imported natural gas or substitute will indicate the health of this market in the future. The oil industry has returned to profitability with oil reserves that were found, as finding and developing costs per barrel of oil equivalent contracted down to normal levels. However, it may be that the barite-for-drilling-mud market will slowly move away from the United States over the long term as more petroleum fuel is imported into the United States and less is produced or as some other energy source replaces petroleum products in some end uses. The four barite suppliers will continue to support drilling activity as those centers of activity move to Africa, the Asia-Pacific region, and the former Soviet Union.

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TABLE 1
SALIENT BARITE STATISTICS 1/ 2/

(Thousand metric tons and thousand dollars)

	1996	1997	1998	1999	2000
United States:					
Barite, primary:					
Sold or used by producers	662	692	476	434	392
Value	\$14,700	\$15,500	\$11,400	\$11,100	\$9,840
Exports	31	22	15	22	36
Value	\$3,190	\$2,430	\$2,310	\$2,750	\$4,180
Imports for consumption 3/	1,550	2,260	1,890	871	2,100
Value	\$94,600	\$136,000	\$122,000	\$59,000	\$108,000
Consumption (apparent) 4/	2,180	2,930	2,350	1,280	2,460
Crushed and ground (sold or used by processors) 5/	1,870	2,180	1,890	1,370	2,100
Value	\$141,000	\$173,000	\$146,000	\$108,000	\$159,000
World production	6,090	6,780 r/	6,460 r/	6,360 r/	6,200 e/

e/ Estimated. r/ Revised.

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

2/ Barium chemicals data withheld to avoid disclosing company proprietary data.

3/ Includes crude and ground.

4/ Sold or used plus imports minus exports.

5/ Includes imports.

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

State	1999			2000		
	Number of plants	Quantity (thousand metric tons)	Value (thousands)	Number of plants	Quantity (thousand metric tons)	Value (thousands)
Louisiana	7	835	\$63,900	7	1,120	\$85,200
Texas	4	215	16,700	8	574	43,400
Other 3/	8	322	27,500	9	408	30,800
Total	19	1,370	108,000	24	2,100	159,000

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

2/ Includes imports.

3/ Includes California, Georgia, Illinois, Missouri (2000), and Nevada.

TABLE 3
CRUSHED AND GROUND BARITE SOLD OR USED BY PROCESSORS IN
THE UNITED STATES, BY USE 1/ 2/

(Thousand metric tons and thousand dollars)

Use	1999		2000	
	Quantity	Value	Quantity	Value
Barium chemicals, filler and/or extender, glass	78	13,500	77	18,000
Well drilling	1,290	94,600	2,030	141,000
Total	1,370	108,000	2,100	159,000

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

2/ Includes imports.

TABLE 4
U.S. EXPORTS OF NATURAL BARIUM SULFATE (BARITE), BY COUNTRY 1/

Country	1999		2000	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Argentina	131	\$35	38	\$10
Australia	--	--	17	9
Belgium	1	3	--	--
Canada	19,200	1,640	32,500	2,630
Chile	10	6	--	--
China	19	13	67	164
Colombia	17	8	2	9
Costa Rica	62	15	147	42
El Salvador	--	--	19	4
Guatemala	4	12	--	--
Hong Kong	--	--	16	5
India	--	--	7	15
Italy	--	--	260	58
Japan	61	109	234	61
Korea, Republic of	71	150	17	24
Mexico	2,220	721	2,890	959
Netherlands	--	--	4	20
Oman	5	18	11	47
Saudi Arabia	--	--	6	56
Singapore	1	3	--	--
South Africa	--	--	13	4
United Arab Emirates	9	21	--	--
Venezuela	--	--	82	63
Total	21,800	2,750	36,300	4,180

-- Zero.

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

Source: U.S. Census Bureau.

TABLE 5
U.S. IMPORTS FOR CONSUMPTION OF BARITE, BY COUNTRY 1/

Country	1999		2000	
	Quantity (metric tons)	Value 2/ (thousands)	Quantity (metric tons)	Value 2/ (thousands)
Barite, crude:				
Australia	57	\$17	--	--
Canada	14,100	3,060	9,930	\$2,080
China	654,000	32,600	1,950,000	84,000
Germany	2,700	205	3,340	158
India	136,000	5,990	101,000	5,950
Japan	91	7	--	--
Mexico	2,320	139	2,340	195
Thailand	26,500	1,410	--	--
United Kingdom	--	--	290	23
Total	836,000	43,500	2,070,000	92,400
Barite, ground:				
China	17,200	1,250	15,000	1,540
Mexico	--	--	1,190	120
Total	17,200	1,250	16,200	1,660
Barite, other sulfates of:				
Belgium	12	9	--	--
Canada	636	641	623	533
China	304	122	298	107
Germany	8,350	9,210	8,800	8,890
Italy	4,360	2,620	4,650	2,680
Japan	465	1,260	742	1,540
Mexico	3,280	371	--	--
Netherlands	117	46	147	96
Spain	--	--	40	49
Switzerland	--	--	20	28
Thailand	1	9	1	10
Turkey	13	23	5	8
United Kingdom	--	--	33	48
Total	17,500	14,300	15,400	14,000

-- Zero.

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

2/ C.i.f. value.

Source: U.S. Census Bureau, as adjusted by the U.S. Geological Survey.

TABLE 6
U.S. IMPORTS FOR CONSUMPTION OF BARIUM CHEMICALS 1/

Chemicals	1999		2000	
	Quantity (metric tons)	Value 2/ (thousands)	Quantity (metric tons)	Value 2/ (thousands)
Barium chloride	1,990	\$1,510	1,240	\$752
Barium oxide, hydroxide, peroxide	4,310	4,460	5,290	4,770
Barium nitrate	3,940	3,320	4,930	4,540
Barium carbonate, precipitated	25,400	14,400	26,200	14,300
Other barium compounds	13,200	13,100	14,100	13,100

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

2/ C.i.f. value.

Source: U.S. Census Bureau.

TABLE 7
BARITE: WORLD PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons)

Country 3/	1996	1997	1998	1999	2000 e/
Afghanistan e/ 4/	2,000	2,000	2,000	2,000	2,000
Algeria	31,348	39,140 r/	37,006 r/	50,150 r/	50,000
Argentina	14,038	13,121 r/	13,500 r/	4,365 r/	4,400
Australia e/	12,000	15,000	13,000	18,000	20,000
Belgium e/	30,000	30,000	40,000	30,000	30,000
Bulgaria e/ 5/	120,000 6/	120,000	100,000	120,000 r/	120,000
Bolivia	4,745	4,402	2,500	6,005	6,000
Bosnia and Herzegovina e/ 7/	500	2,000	2,000	2,000	2,000
Brazil (beneficiated)	39,662	51,961	46,632	44,906 r/	45,000
Burma	24,679	17,111	22,004	24,651	29,200
Canada	58,000	77,000	90,000	67,000 r/	20,000 p/
Chile	2,559	2,654	1,430	823 r/	900
China e/	2,800,000	3,500,000	3,300,000	3,500,000 r/	3,500,000
Colombia e/	6,800 6/	600	600	600	600
France e/	75,000	75,000	75,000	75,000 r/	75,000
Georgia e/	20,000	20,000	20,000	15,000	15,000
Germany (marketable Ba ₂ SO ₄)	121,476	118,698	120,000 e/	120,000	120,000
Greece (crude ore)	671	905 r/	800 r/	800 r/	800
Guatemala e/	2,776 r/ 6/	2,800 r/	2,800 r/	2,800 r/	2,800
India	369,500	409,498	749,412	600,000	550,000
Iran 4/	150,000 e/	181,174	187,677 r/	183,850 r/	185,000
Italy	80,463	26,300	30,000 e/	25,000 e/	25,000
Kazakhstan 7/	50,000 e/	38,000 e/	9,000	13,300	14,000
Kenya e/	20	20	10	10	10
Korea, North e/	110,000	120,000	100,000	70,000	70,000
Korea, Republic of	80	105 e/	--	--	--
Laos e/	6,000	8,000	9,050	6,600	9,000
Malaysia	17,458	2,608	1,580 e/	13,506 r/	13,500
Mexico	470,028	236,606	161,555 r/	157,953 r/	127,688 p/
Morocco	288,308	343,314	353,438	350,000 r/	350,000
Nigeria e/	--	4,000	5,000	5,000	5,000
Pakistan	18,582	23,390	20,657	20,505 r/	21,234 6/
Peru	37,103	63,727 r/	7,506 r/	3,512 r/	11,403 p/ 6/
Poland	21,700	3,400	--	--	--
Romania e/	12,541 6/	12,000	15,000 r/	15,000 r/	15,000
Russia e/	70,000 6/	60,000	60,000	60,000	60,000
Saudi Arabia e/	8,000	8,000	8,000	7,000	8,000
Slovakia (concentrate)	45,000	62,000	15,000	16,000 r/	15,000
South Africa	7,428	2,071	610 e/	2,844 r/	1,628 6/
Spain e/	28,000	28,000	28,000	26,000	26,000
Thailand	48,074	54,817	96,241 r/	68,012 r/	49,220 6/
Tunisia	15,360	12,841	8,011	530 r/	3,702 6/
Turkey (run-of-mine)	104,872	226,594	160,042	130,000	130,000
United Kingdom	102,000	74,000	70,000 r/	68,000 r/	70,000
United States 8/	662,000	692,000	476,000	434,000	392,000
Total	6,090,000	6,780,000 r/	6,460,000 r/	6,360,000 r/	6,200,000

e/ Estimated. p/ Preliminary. r/ Revised. -- Zero.

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

2/ Table includes data available through June 8, 2001.

3/ In addition to the countries listed, Bulgaria also produces barite, but available information is inadequate to make reliable estimates of output levels.

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

5/ Based on an estimated 70% recovery factor.

6/ Reported figure.

7/ Barite concentrates.

8/ Sold or used by producers.