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ANNUAL REPORT

BARITE

By James P. Searls

1993

U.S. DEPARTMENT OF THE INTERIOR

BUREAU OF MINES

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Bruce Babbitt
Secretary

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COVER PHOTO:
The reopened Rossi barite surface mine in Elko County, NV. (Photo courtesy of Baroid Drilling Fluids, Inc.)

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BARITE

By James P. Searls

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- Domestic sales of barite as reported decreased 3% to 315,000 metric tons. Apparent consumption, as reported, increased 67% to about 1.1 million tons. A different measure of domestic consumption, which is referred to as "shipments from crushers and grinders" of both domestically produced and imported barite, indicated a much smaller trend. These operations reported an increase in sales of 4% to 1.0 million tons. Exports were 18,000 tons while imports rose strongly to 766,000 tons.

DOMESTIC DATA COVERAGE

Domestic production data for barite are developed by the U.S. Bureau of Mines (USBM) from a voluntary survey of U.S. operations. Of the 37 operations to which a survey request was sent, 4 had closed, 5 were idle, 11 were estimated, and 17 reported data. Reported data represented 51% of "sold or used by producers" and 48% of "crushed and ground (sold or used by processors)" shown in table 1. *(See table 1.)*

BACKGROUND

Definitions and Specifications

The term "primary barite," as used in this report, refers to the first marketable product and includes crude barite, flotation concentrate, and other beneficiated material such as washer, jig, heavy media, table, or magnetic separation concentrate. Most primary barite requires fine grinding before it is used for drilling muds, the principal end use. This grinding may or may not be done at the mine site.

Barite is the mineralogical name for barium sulfate and was derived from the Greek word "barus," meaning heavy. In commerce, the mineral is sometimes referred to as "heavy spar" or "barytes." "Spar" means almost any transparent or translucent, readily cleavable, crystalline mineral having a vitreous luster.[1] One domestic barite producer has commenced naming its white, technical-grade barite as "baryte" to separate it from the American Petroleum Institute (API) barite. API barite can be blue, black, brown, or gray depending on the ore body. Few mines in the United States produce a "spar-grade" barite.

Specifications for barite vary according to different uses. Material for weighing muds must only be finely ground, dense, and chemically inert; consequently, barite for this purpose must have a specific gravity of 4.2 or higher, it must be free of soluble salts, and 90% to 95% of the material must pass through a 325-mesh screen. A small percentage of iron oxide is not objectionable. Technical-grade barite, "barytes" to some, is also graded on reflectivity (e.g., 90%) and color. In chemical manufacturing, purity is the principal concern, and a maximum of 1% each of ferric oxide (Fe_2O_3) and strontium sulfate ($SrSO_4$) and a trace of fluorine usually are specified, with a minimum of 94% barium sulfate ($BaSO_4$). If the mineral is to be used in the production of lithopone, the $SrSO_4$ content may be somewhat higher. Mesh size is important to chemical manufacturers; if the material is too fine, dust is lost, and if it is too coarse, mixing with carbonaceous material is poor. Most chemical manufacturers specify a size range of 4 to 20 mesh; some purchase lump barite and grind it to their own needs.

Products for Trade and Industry

The principal use for barite, as a weighing material in well-drilling muds, accounted for 90% of total U.S. consumption in 1993 using "Crushed and ground (sold or used by processors)" data. Drilling muds have five main functions: (1) transport drill cuttings to the surface; (2) control formation pressures; (3) maintain bore hole stability; (4) protect producing zones; and (5) cool and lubricate the bit and drill string. Barite's lack of hardness (Mohs scale 2 to 3.5) is a plus in this application. The principal function of the barite constituent is as a weighing agent to suppress high formation pressures and prevent blowouts. The deeper the hole, the more barite is needed as a percentage of the total mud mix because hydrocarbon pressures rise strongly with increasing depth after about 2,130 meters (7,000 ft) of depth. The added weight of the barite in the column of mud in the drill string is used to counteract the dangerous pressures when deep reservoirs of hydrocarbons are encountered. High pressure hydrocarbons, if uncontrolled, can cause extremely dangerous pressure releases and/or fires at the drilling rig.

The use of barite as a filler or extender and other uses accounted for about 10% of total U.S. consumption in 1993. Barite has a high specific gravity, low oil absorption, easy wettability by oils, and good sanding qualities. Unbleached barite may be substituted for

bleached barite when brightness is not a factor. In painting automobiles, barite is used as a filler for the primer coat where the barite contributes to the gloss of the topcoat and inertness to chemical attack. When the primers are applied by the electrodeposition process, the body structure is dipped into a tank containing water and paint primer. The method eliminates one of the primary coats, thus reducing the quantity of barite used.

Barite also is used as a filler or extender in some plastic and rubber products. Processors of polyurethane foam use barite in manufacturing such products as floormats and carpet-backings to add weight and improve processing qualities. Barite is used in white sidewalls for tires; sidewalls consist mainly of rubber, zinc oxide, and a small quantity of barite.

Other industries use small quantities of barite fillers. In the paper industry, the white and dense barite coatings serve as a base for the sensitized layers in photographic prints. In the printing industry, barite is used in inks.

In glassmaking, barite is added to the glass melt to reduce the heat-insulating froth that forms on the melt surface, thus saving fuel, and to act as an oxidizer and decolorizer, making the glass more workable and increasing its brilliance. Glass manufacturers usually require a minimum of 95% $BaSO_4$ with a maximum of 2.5% silicon dioxide (SiO_2) and 0.15% Fe_2O_3. The particle-size range generally preferred is -30 to +140 mesh. Finely ground barite can be substituted when crushed material is not available. In glass manufacture, barite reduces seeds and annealing time and increases toughness and brilliancy.

Minor uses include ballast for ships, heavy concrete aggregate for radiation shielding and pipeline-weighing in swampy or aquatic areas, friction products, and applications in foundries.

Barite is also a raw material for barium chemical manufacturing. Barite is the leading commercial source of barium and barium compounds in the United States. About 200 tons of witherite ($BaCO_3$) was imported from Canada, China, and Japan in 1993 and may be a starting point for barium chemical end uses. The major barium chemicals are the manufactured carbonate, chloride, hydroxide, nitrate, oxide, peroxide, and sulfate.

The most important barium chemical is precipitated barium carbonate, which is a raw material for production of many of the other compounds. It is also used in brick and tile manufacturing to control scum caused by gypsum or magnesium sulfate in the clay (the barium combines with the sulfate to form the insoluble barium sulfate) and to diminish porosity and prevent discoloration in brick. Other uses are in television picture tubes as a radiation barrier, optical glass, ceramic glazes, porcelain enamel, ferrites, and miscellaneous ceramic products. Barium-base glass (using barium carbonate) is considered to be more brilliant than lime glass and more durable than lead glass. Barium carbonate is replacing lead oxide in television tube faceplates to stop X-ray radiation. The same amount of strontium carbonate will be used with the barium as was used with the lead. The X-rays occur when the high voltage electrons from the "gun" that excite the phosphors have been stopped quickly at the faceplate.

Blanc fixe, chemically precipitated barium sulfate, is used as a white filler in paints, rubber, inks, and other material where a degree of purity higher than natural barite is required. Barium chloride is used in case-hardening and heat-treating baths, in leather and cloth, in making magnesium metal, in water treatment, and as a laboratory reagent. Fused barium chloride may be electrolyzed to produce barium metal.

Barium metal also is produced by reduction of barium oxide. The metal is used as a "getter" to remove traces of gas from vacuum tubes, or in alloys for spark plugs and electronic emission elements in electronic tubes.

Barium nitrate is used in green signal flares, tracer bullets, primers and detonators, and enamels. Barium oxide is used in electric furnace ferrous metallurgy to increase the life of acid furnace linings, to give a quieter and steadier arc, to reduce the sulfur content of the iron, and to lower the slag viscosity.

Barium hydroxide us used to prevent scumming in ceramics, to make soap for lubricating oils and greases, and to recover sugar from molasses by the barium saccharate process. Barium titanate finds use in miniature electronic and communication equipment.

Industry Structure

Currently, much of the barite that is supplied to the drilling mud industry is supplied by barite from China and India. The domestic industry is undergoing changes with downsizing in the United States and movement toward Asia and countries in and around the former U.S.S.R. Several U.S. firms import barite and grind the barite to size in plants along the gulf coast instead of producing from U.S. mines owing to the lower cost of the imported barite delivered at the grinding plant. A Nevada mine reopened during 1992 owing to transportation cost reductions. Seven mining firms, operating 10 mines, continue to compete in the industry. One U.S. mine is owned by a Canadian company and one mine is owned by a French company. Only one barium chemical firm competes in the barium chemical industry using its domestically mined barite from another division, mixed with imported barite, as feedstock.

Geology

Pure barite has a specific gravity of 4.5. Barite varies considerably in appearance depending on source and treatment. It is a moderately soft crystalline material with a Mohs hardness between 3 and 3.5. In residual deposits, it ranges in size from large boulders to fines. Shades of white to dark gray and black, depending on impurities and surficial coating, are common in commercial deposits.

Vein and cavity-filling deposits are those in which barite occurs along faults, joints, bedding planes, and other solution channels or sink structures. These deposits are found most often in

limestone. Most of the vein deposits are believed to be of hydrothermal origin.

In central Missouri, barite occurs in circular deposits in karst or collapse and sink structures. These ores are rich, but the deposits are generally small in overall extent. These deposits are also important as the source of the residual ore upon weathering.

Residual barite deposits are formed by weathering of preexisting deposits. The principal residual deposits are found in southeastern Missouri; the Appalachian region; Sweetwater, TN; Cartersville, GA; and in the Rio Grande area of Texas. A concentration of at least 60 to 180 kilograms of barite per cubic meter is required in a commercial deposit. In Washington County, MO, the residuum is 3 to 4.6 meters thick, while in Cartersville, GA, the ore is 45 meters thick in some areas. This form of deposit has been of considerable economic significance.

The most important commercial deposits are of bedded barite. These are principally in Arkansas, California, and Nevada. The barite in these areas is generally dark gray to black and has a characteristic fetid odor when struck with a hammer. The beds, which vary in thickness from 5 centimeters to more than 15 meters, occur interbedded with dark chert and siliceous siltstone and shale. In most of the deposits, the barite is laminated. In some areas, barite nodules and rosettes make up a large part of the beds. Many of the beds contain 50% to 95% barite. Originally, it was thought that these deposits were the result of the replacement of carbonate rocks; however, current thought is that the deposits are of sedimentary origin. The actual environment of deposition has not been established, but theories range from submarine volcanic emissions to hydrothermal solutions to recycling of barite from preexisting rocks.

ANNUAL REVIEW

Legislation and Government Programs

The antidumping duty on barium carbonate from Germany continued for another year. The proposed exemption of barium sulfate from reporting requirements of the category "barium compounds" of the list of toxic chemicals under section 313 of the Emergency Planning Act of 1986 (EPCRA) was announced for comment but not completed in 1993.

Producers

Dresser Industries Inc., an equipment manufacurer (through M.W. Kellog) for refineries, petrochemicals, and liquefied natural gas production, announced its intention to buy Baroid Corp. in September. The purchase was not completed by the end of the year due to the Justice Department's concerns for: (1) Dresser's partial (64%) ownership of M-I Drilling Fluids, and (2) Baroid's diamond drill bit subsidiary DBS. Dresser was expected to sell its portion of M-I Drilling Fluids. Halliburton maintained its ownership of the 36% of M-I Drilling Fluids. Milpark Drilling Fluids became part of Baker Hughes Inteq, a drilling equipment company, in March 1993. It would appear that the oil-well drilling fluids companies went through a consolidation phase in the early 1980's as consumption dropped and recently have been drawn into vertically integrated companies that have drilling equipment, drill bits, drilling fluids, other equipment, and services.

Of the 37 operations that were surveyed, 23 were mills (processing or beneficiating plants, and crushing and grinding operations) and 14 were mines. Seventeen mills were operating, two mills were idle during the year, and four mills had closed. Eleven mines were operating and three mines were idle. Only one mine reported run-of-mine ore sales, therefore run-of-mine ore was not included in table 1. The recently reopened mine was not surveyed and did not verbally report until after the USBM data entry window had closed and therefore was estimated.

Sales

For 1993, beneficiated product was 100% of reported sales because the small amount of run-of-mine ore sales was withheld. *(See table 1.)* For 1993, "Sold or used by producers" is incorrect and should be 100,000 to 125,000 tons more, which would also increase apparent consumption figure by the same amount. *(See tables 2 and 3.)*

Consumption and Uses

The consumption of crushed and ground barite, as reported in table 1, increased about 4% from 1 million tons in 1992. Apparent consumption, as calculated by "Sold or used by producers" minus exports plus imports, rose by 67% as reported in the table. The oil- and gas-well-drilling industry was estimated to have completed more than 24,900 wells and drilled nearly 42.3 million meters (139 million feet) of hole.[2] This is 4% above 1992's revised number of holes and more than 9% above 1992's revised total distance. From a table reporting oil, gas, and dry well completions, total oil wells for 1993 were estimated to be 8,274, a more than 7% drop from 8,943 wells in 1992 and much less than the 11,916 wells in 1991. Gas wells in 1993 rose more than 16% from the 1992 total gas wells. The first three quarters of 1992 averaged 1,762 gas well completions per quarter, the last quarter of 1992 and the first quarter of 1993 averaged 3,087 gas wells per quarter, and the final three quarters of 1993 were estimated to have averaged 2,187 gas wells per quarters. This would seem to support the renewed interest in natural gas production in the United States that caused some increase in barite consumption. *(See table 4.)* For end of year 1993 (week ending December 24), the week-average-oil-futures price for light sweet crude oil had fallen by 27.5% from $19.92 in the same week of 1992 while the natural gas price had fallen by about 1.1% on the same basis.[3] The future price for light sweet crude in the week ending July 9, 1993, was $18 per barrel, so the decrease in oil futures price occurred later in the year.

At the beginning of the year, the Baker Hughes' monthly average active U.S. rig

count reported that there were 922 drilling rigs with 368 directed toward oil prospects or developments and 527 rigs directed toward gas prospects or developments. At midyear, there were 353 oil rigs and 346 gas rigs. At the end of the year, there were 385 oil rigs and 423 gas rigs for a total of 814 rigs, down 12% from 922 rigs at the beginning of the year.

Prices

Price quotation in Industrial Minerals Magazine for API grade on the U.S. gulf coast was $85 per ton through March when the series switched to prices paid by grinders for Chinese and Indian lump barite.

The reported average value per ton of domestic barite, based on reported value of direct-ship, beneficiated, and floated material, increased slightly, f.o.b. plant, from $60.22 to $61.16. The average value of crushed or ground barite, sold or used by processors, was $74.16, a 12% decline from $84.49 per ton reported in 1992. Within this group, the average value of barite for well-drilling end use was $64.26, down 14% from $75.55 per ton, while the average value for barium chemicals, filler and extender, and glass was essentially unchanged at $163.10 per ton. The average c.i.f. value of imported crude barite was $37.72 per ton, while the c.i.f. value of imported ground barite was $139.78 per ton.

Foreign Trade

Exports of natural barium sulfate or barite rose by 50% to 18,500 tons but was still well under the 1991 figure of 43,000 tons. Export data provided by the Bureau of the Census did not indicate the grades of barite traded; however, based only on the per-ton value of individual shipments, which varies from about $40 to nearly $2,000 per ton, drilling-, filler-, glass-, chemical-, and pharmaceutical-grade were all exported. *(See table 5.)*

Imports for consumption of crude barite rose sharply (137%) from 1992 to nearly 766,000 tons. The principal source countries, in descending order, were China, India, and Mexico. The shipment listed from Switzerland was probably from India, according to its price. The higher priced material was chiefly crude filler and extender-quality barite. Most of the crude barite entered through customs districts along the gulf coast for delivery to grinding plants in the area. *(See tables 6 and 7.)*

World Review

Little change in overall barite production occurred around the world because production has moved closer to the areas of petroleum drilling. The former U.S.S.R. and Asia are the areas of present and future petroleum exploration and development. It is less likely that barite will be hauled long distances to these areas, given barite's worldwide distribution. Some areas, such as Turkey and Kazakhstan, will produce more barite in the near future for drilling in nearby countries, and some countries, probably including the United States, will produce less barite as drilling profits decline. The forecast for the United States is not perfectly clear as gas exploration may be profitable due to the environmental friendliness of gas consumption according to the new administration.

The Ballynoe Mine, owned by Magcobar (Ireland) Ltd., closed permanently in October. *(See table 8.)*

OUTLOOK

With several countries moving away from socialist beliefs and toward greater acceptance of international development of petroleum resources for expertise and financial backing, the petroleum exploration and development effort has moved away from North America and into the former U.S.S.R. and countries in the Pacific Basin. The large volumes of barite that will be needed for the exploration will be more likely to be supplied from mines and mills nearby to those regions and not from the United States. Drilling will continue in the United States, albeit at a slower pace, and for gas.

The domestic barite industry may change its production away from drilling mud barite, dominated by China and India, and toward higher valued products, planning to displace imports from several countries.

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[1]Thrush, P. W. (ed.) A Dictionary of Mining, Mineral, and Related Terms (Dep. of Interior), U.S. GPO, Washington, DC, 1968, p. 1049.

[2]American Petroleum Institute, Quarterly Completion Report, 4th Quarter. V. IX, No. 4, Jan. 1994, pp. 4,7.

[3]The Oil and Gas Journal. V. 91, No. 29, PennWell Publ., Tulsa, OK, July 19, 1993, p. 3.

TABLE 1
SALIENT BARITE AND BARIUM CHEMICAL STATISTICS

(Thousand metric tons and thousand dollars)

	1989	1990	1991	1992	1993
United States:					
Barite, primary:					
Sold or used by producers	290	430	448	326	[1]315
Value	$12,625	$16,000	$21,310	$19,633	[1]$19,265
Exports	10	9	43	12	18
Value	$1,622	$1,675	$3,304	$1,806	$2,608
Imports for consumption (crude)	987	988	841	323	766
Value	$39,768	$40,103	$35,883	$12,941	$28,894
Consumption (apparent)[2]	1,267	1,409	1,246	637	1,063
Crushed and ground (sold or used by processors)[3]	1,277	1,434	1,267	999	1,038
Value	$103,759	$99,562	$102,934	$84,404	$76,981
Barium chemicals (sold or used by processors)	e30	W	W	W	W
Value	e$17,000	W	W	W	W
World: Production	r5,740	r5,763	r5,712	r5,118	e4,890

eEstimated. rRevised. W Withheld to avoid disclosing company proprietary data.
[1]Data exclude run of mine.
[2]Sold or used plus imports minus exports.
[3]Includes imports.

TABLE 2
U.S. PRIMARY BARITE SOLD OR USED BY PRODUCERS, BY STATE

State	Number of operations	Run of mine		Beneficiated material[1]		Total	
		Quantity (thousand metric tons)	Value (thousands)	Quantity (thousand metric tons)	Value (thousands)	Quantity (thousand metric tons)	Value (thousands)
1992:							
Nevada	4	W	W	229	$8,120	[2]229	[2]$8,120
Other States	5	W	W	85	10,850	[2]85	[2]10,852
Total	9	12	$664	314	18,970	326	[3]19,633
1993:							
Nevada	4	W	W	242	9,100	[2]242	[2]9,100
Other States	5	—	—	73	10,165	[2]73	[2]10,165
Total	9	W	W	315	19,265	315	19,265

W Withheld to avoid disclosing company proprietary data; included in totals.
[1]Includes flotation concentrate.
[2]Data exclude run of mine.
[3]Data do not add to total shown because of independent rounding.

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

State	1992			1993		
	Number of plants	Quantity (thousand metric tons)	Value (thousands)	Number of plants	Quantity (thousand metric tons)	Value (thousands)
Louisiana	7	516	$39,618	7	534	$36,965
Nevada	3	180	12,427	4	163	7,125
Texas	4	185	13,684	4	W	W
Other[2]	12	118	18,675	9	341	32,891
Total	26	999	84,404	24	1,038	76,981

W Withheld to avoid disclosing company proprietary data.
[1]Includes imports.
[2]Includes California, Georgia, Illinois, Missouri, Oklahoma, Texas (1993), and Utah.

TABLE 4
CRUSHED AND GROUND BARITE[1] SOLD OR USED BY PROCESSORS IN THE UNITED STATES, BY USE

(Thousand metric tons and thousand dollars)

Use	1992		1993	
	Quantity	Value	Quantity	Value
Barium chemicals, filler and/or extender, glass	112	18,281	104	16,962
Well drilling	887	66,123	934	60,019
Total	999	84,404	1,038	76,981

[1]Includes imports.

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

Country	1992		1993	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Angola	103	$12	—	—
Argentina	7	5	—	—
Australia	20	5	—	—
Canada	7,025	912	9,118	$1,183
China	5	6	—	—
Cote d'Ivoire	6	12	—	—
Equatorial Guinea	1,688	200	—	—
Honduras	—	—	3	3
Italy	1	10	14	3
Japan	207	162	118	604
Korea, Republic of	—	—	6	13
Mexico	305	78	1,042	262
Panama	—	—	150	20
Spain	—	—	20	65
Trinidad and Tobago	—	—	9	4
Tunisia	—	—	3	35
United Kingdom	—	—	2	4
Venezuela	3,102	402	8,001	412
Total	12,469	[1]1,806	18,486	2,608

[1]Data do not add to total shown because of independent rounding.

Source: Bureau of the Census.

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

Country	1992		1993	
	Quantity (metric tons)	Value[1] (thousands)	Quantity (metric tons)	Value[1] (thousands)
Crude barite:				
Canada	5,901	$224	144	$24
China	216,826	9,450	419,484	17,129
India	100,031	3,252	270,917	8,915
Japan	1	2	—	—
Mexico	20	6	36,006	1,371
Netherlands	18	7	—	—
Switzerland	—	—	39,398	1,454
Total[2]	322,797	12,941	765,949	28,894
Ground barite:				
Canada	10,994	2,819	10,239	2,725
Germany	162	76	147	69
Japan	36	37	8	21
Mexico	19,649	1,437	27,394	2,456
Netherlands	27	14	24	12
Total[2]	30,868	4,383	37,817	5,286

[1]C.i.f. value.
[2]Data may not add to totals shown because of independent rounding.

Source: Bureau of the Census.

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

Year	Blanc fixe (precipitated barium sulfate)		Barium choride		Barium oxide, hydroxide, and peroxide	
	Quantity (metric tons)	Value[1] (thousands)	Quantity (metric tons)	Value[1] (thousands)	Quantity (metric tons)	Value[1] (thousands)
1989	10,638	$8,945	1,477	$702	4,644	$5,335
1990	10,354	8,675	1,510	783	4,186	5,275
1991	9,707	8,384	584	354	4,597	5,812
1992	—	—	550	277	4,730	5,076
1993	—	—	487	275	4,585	5,017
	Barium nitrate		Barium carbonate, precipitated		Other barium compounds	
	Quantity (metric tons)	Value[1] (thousands)	Quantity (metric tons)	Value[1] (thousands)	Quantity (metric tons)	Value[1] (thousands)
1989	1,477	$1,012	14,401	$8,047	—	—
1990	1,178	1,394	11,201	6,038	—	—
1991	2,180	1,912	12,314	6,089	—	—
1992	2,413	2,326	12,891	6,608	11,589	$10,035
1993	2,172	2,149	10,859	6,369	12,244	10,710

[1]C.i.f. value.

Source: Bureau of the Census.

TABLE 8

BARITE: WORLD PRODUCTION, BY COUNTRY[1]

(Metric tons)

Country[2]	1989	1990	1991	1992	1993[e]
Afghanistan[e 3]	2,000	2,000	2,000	2,000	2,000
Algeria	49,000	53,078	44,361	r45,000	45,000
Argentina	57,558	r36,597	r61,094	r44,170	44,000
Australia[e]	11,000	11,000	11,000	11,000	11,000
Belgium[e]	40,000	35,000	35,000	30,000	30,000
Bolivia	—	300	1,277	r368	—
Bosnia and Herzegovina[4 3]	—	—	—	r,e3,000	2,000
Brazil (beneficiated)	51,407	55,576	46,784	r54,490	47,000
Burma[6]	11,278	9,468	e9,000	e10,000	10,000
Canada	r47,000	r41,000	50,000	r37,000	59,000
Chile	59,873	3,038	r3,183	r2,434	1,800
China[e]	1,750,000	1,750,000	1,800,000	1,800,000	1,900,000
Colombia	5,460	5,380	r9,288	r9,380	9,400
Croatia[5]	—	—	—	e1,500	1,500
Czechoslovakia[7]	r52,600	r88,000	r,e86,000	r31,313	—
Egypt	7,295	6,197	5,943	e5,900	5,900
Finland	1,614	—	—	—	—
France	111,800	92,500	e90,000	r96,200	96,000
Georgia[8]	—	—	—	e40,000	30,000
Germany:					
Eastern states	89,400	r61,433	—	—	—
Western states	144,106	r147,836	—	—	—
Total	233,506	r209,269	163,691	r157,014	155,000
Greece (crude ore)	1,247	1,617	1,309	e1,000	1,000
Guatemala	3,995	r421	--	r1,723	1,500
India	548,103	633,000	615,000	e620,000	400,000
Iran[3]	59,660	77,423	191,238	r181,174	200,000
Ireland	82,000	101,000	r94,300	r70,600	55,000
Italy	60,331	44,345	88,486	r74,884	75,000
Kazakhstan[8]	—	—	—	e200,000	200,000
Kenya	210	105	e100	e100	100
Korea, Republic of	3,735	2,923	1,014	r40	50
Malaysia	36,526	48,291	16,600	r10,525	14,000
Mexico	324,739	r305,716	r191,962	r187,730	e193,000
Morocco	370,000	363,580	433,325	r401,000	e325,200
Pakistan	29,718	23,329	28,751	r32,432	15,000
Peru	e150,000	r,e130,000	150,200	r16,579	16,600
Philippines[e]	e348	500	500	500	500
Poland	57,900	25,316	r18,300	r15,700	16,000
Portugal[e]	e1,729	1,220	1,400	1,200	1,200
Romania	25,250	r,e65,000	r,e70,000	r118,100	115,000
Slovakia[10]	—	—	—	—	30,000
South Africa, Republic of	8,570	2,490	4,790	3,570	1,200
Spain	6,745	11,285	e9,000	r,e10,000	10,000
Thailand	r87,052	107,707	e100,000	r46,328	50,000
Tunisia	33,104	30,885	22,366	r30,179	30,000
Turkey (run-of-mine)	425,519	r366,995	r250,579	r311,335	300,000
U.S.S.R.[e 11]	540,000	500,000	450,000	r—	—

See footnotes at end of table.

TABLE 8—Continued

BARITE: WORLD PRODUCTION, BY COUNTRY[1]

(Metric tons)

Country[2]	1989	1990	1991	1992	1993[e]
United Kingdom	70,026	67,551	85,505	r76,723	75,000
United States[12]	290,000	r430,000	448,000	r326,000	p315,000
Yugoslavia[4 5 13]	30,509	23,601	e20,000	—	—
Zimbabwe	1,900	320	866	r232	300
Total	r5,740,307	r5,763,023	r5,712,212	r5,118,423	4,890,250

[e]Estimated. [r]Revised.

[1]Table includes data available through June 21, 1994.

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

[3]Data are for fiscal year beginning Mar. 21 of that stated.

[4]All production in Yugoslavia from 1989-91 came from Bosnia and Herzegovina.

[5]Barite concentrates.

[6]Data are for fiscal year beginning Apr. 1 of that stated.

[7]Dissolved on Dec. 31, 1992. Production in Czechoslovakia from 1989-91 came from the Czech Republic and Slovakia; all production for 1992 came from Slovakia.

[8]Formerly part of the U.S.S.R.; data were not reported separately until 1992.

[9]Reported figure.

[10]Formerly part of Czechoslovakia; data were not reported separately until 1993.

[11]Dissolved in Dec. 1991.

[12]Sold or used by producers.

[13]Dissolved in Apr. 1992.