

CLAYS

By Robert L. Virta

The amount of clay sold or used by domestic producers increased to 42.2 million metric tons valued at \$1.6 billion. Production of ball clay, bentonite, common clay, and fuller's earth increased in 1994. Common clays accounted for 61% of the tonnage. Kaolin accounted for 64% of the value of clays produced in 1994. Imports decreased to 36,000 tons valued at \$14.9 million. Exports increased to 4.62 million tons valued at \$739 million. (See table 1.)

Domestic production data for clays are developed by the U.S. Bureau of Mines (USBM) from one voluntary survey of U.S. operations. Of the 594 operations covered by the survey, 420 responded, representing 71% of the total clay and shale production sold or used shown in table 1. Production data for the nonrespondents were estimated from reported prior-year production levels adjusted by trends in the industry and other guidelines.

Legislation and Government Programs

Clay mining has an environmental impact because of the disturbance to the land. Overburden is moved and clays are removed, leaving a depression or pit. State laws usually require leveling or recontouring of the disturbed area and planting trees or grasses to prevent or minimize erosion. For processing, the impoundment of slimes and dust control are usually required. The rules for disposal of coarse tailings are similar to or included with those laws governing reclamation of the mined area.

Production

An estimated 293 companies operating 983 clay pits or mines reported production in 1994; of these, 90 companies, most with multiple operations, accounted for approximately 25% of the tonnage and 44% of the value for all types of clay produced and sold or used. Clay production was reported in most States and Puerto Rico except Alaska, Delaware, Hawaii, Idaho, Rhode Island, Vermont, Wisconsin, and the District of Columbia.

The 10 leading producer States, in descending order, were Georgia, North Carolina, Wyoming, Alabama, Texas, Ohio, California, South Carolina, Missouri, and

Tennessee. (See table 2.)

Most of the clay is mined by open pit methods. Less than 1% of U.S. clay output was from underground mines in 1994. Most of the underground production was in Pennsylvania, Ohio, and West Virginia, where the clays are mainly underclays associated with coal and suitable for refractory uses.

Ball Clay.—The ball clay industry was small, with 6 producers operating 26 mines in 5 States in 1994. Three of the producers were large, diversified firms with widespread foreign and domestic mineral interests.

Production of domestic ball clay increased to 1.05 million tons valued at \$45.6 million. Tennessee supplied 63% of the Nation's output, followed by, in descending order of production, Texas, Kentucky, Indiana, Mississippi, and Ohio. Production increased in all States except Kentucky. Water-slurried ball clay was produced in Kentucky and Tennessee. Air-float ball clay was produced in Indiana, Kentucky, Mississippi, and Tennessee. (See table 3.)

Bentonite.—Twenty-two firms producing bentonite operated 68 mines in 14 States. Four producers were large, diversified firms with international mineral operations; three of the firms had interests in other types of clay in the United States.

The quantity and value of all varieties of bentonite sold or used increased to 3.29 million tons valued at \$136 million. Mississippi led all States in the production of nonswelling bentonite, followed by California, Alabama, Utah, Texas, Arizona, Oregon, Colorado, Nevada, and Montana. Production increased in Arizona, Colorado, Texas, and Utah and was unchanged in California, Montana, and Oregon.

Wyoming led all States in the production of swelling bentonite, followed by Montana, California, Oregon, Texas, Nevada, and Tennessee. Production increased in California, Montana, Nevada, Oregon, and Wyoming and was unchanged in Texas. (See table 5.)

Smith International purchased 64% of the shares of M-I Drilling Fluids Co. from Dresser Industries Inc. The sale was made after Dresser Industries purchased Baroid Drilling Fluids Inc. earlier in the year.¹ Colloid Environmental Technologies Co. (CETCO), a subsidiary of American Colloid Co., purchased a facility for manufacturing bentonite liners from Mary Ann Industries. CETCO announced plans to build

facilities for producing bentonite liners in Wyoming and England.² CETCO also purchased Hydron Inc. Hydron specializes in water treatment technologies and held a patent on a method for using bentonite clay flocculants to treat waste streams.³

Common Clay and Shale.—Two hundred eighteen firms producing common clay and shale in 1994 were manufacturers of structural clay products such as clay pipe, sewer pipe, lightweight aggregates, and cement. Most companies mined the clays used in making products. Less than 10% of the total output usually is sold. Some companies owned and operated several clay pits and plants to cover a large market area. The economic radius for shipment of common clay or shale products was usually 320 kilometers or less. The high cost of transport promoted the development of local ownership companies, or in the case of a large firm, the ownership and operation of several strategically located pits and associated fabricating plants.

Domestic sales or use of common clay and shale increased to 25.9 million tons valued at \$142 million. The major producing States were North Carolina, Texas, Alabama, Ohio, Georgia, California, Michigan, South Carolina, Missouri, and Arkansas, in descending order of tonnage. The largest increases in production were observed in Indiana, North Carolina, and South Carolina. The largest decreases were observed in California and Michigan. (See table 7.)

Fire Clay.—Fireclay producers were mostly refractories manufacturers that used the clays in firebrick and other refractories. Seventy-two mines were operated in 1994 by 20 firms in 12 States.

Fire clay sold or used by domestic producers decreased to 458,000 tons valued at \$11.7 million. Missouri, was the leading producing State, followed by Ohio, Alabama, Arkansas, Georgia, Washington, New Mexico, Colorado, and Montana. The largest increase in production was in Missouri and Washington, while Georgia experienced the largest decline in production. (See table 9.)

Fuller's Earth.—Eighteen companies produced fuller's earth from 32 mines in 11 States. Seven of the mines were in the attapulgite-fuller's earth areas of Florida and Georgia; these two States accounted for most of

the domestic attapulgite production. Most producers were small, independent firms, but three were large, diversified corporations with international mineral interests.

Production of fuller's earth increased to 2.64 million tons valued at \$244 million. Production of attapulgite-type fuller's earth was 901,000 tons valued at \$125 million in 1994. Over one-half of this production came from Georgia, followed by Florida, and Nevada. Production in Nevada was of sepiolite-type fuller's earth. Production increased slightly in Georgia and Nevada.

Production of montmorillonite-type fuller's earth was 1.74 million tons valued at \$119 million. Mississippi led all States in production, followed by Illinois, Missouri, California, Florida, Tennessee, Georgia, Virginia, Kansas, and Texas, in decreasing order of production. The greatest increases in production were in Missouri and Tennessee. Slight increases were observed in the other States. (See table 11.)

Engelhard Corp. announced plans to purchase portions of Floridan Co.'s specialty minerals operations in Florida. Floridan mines and processes attapulgite for agricultural products, caulks, coatings, paints, and pet litter.⁴ American Colloid Co. indicated that it would increase its capacity at Paris, TN, for its agricultural carriers and scoopable cat litter products. Capacity will be 60,000 tons for agricultural carriers and 40,000 tons for cat litter.⁵

Kaolin.—Thirty-four firms operated 134 kaolin mines in 14 States. In 1994, three large, diversified firms accounted for about 60% of total domestic kaolin output. The kaolin operations were concentrated in Georgia.

Domestic production of kaolin was 8.77 million tons valued at \$1.02 billion. Georgia was the largest kaolin producer, followed by South Carolina, Alabama, Arkansas, California, Nevada, North Carolina, Texas, Florida, Minnesota, Pennsylvania, and Colorado, in decreasing order of production. Production increased in Colorado, Georgia, Pennsylvania, and Texas. Production remained the same or declined in the other producing States. (See table 13.)

Approximately 48% of the kaolin produced was water-washed; followed by calcined, 17%; delaminated, 15%; air-floated, 14%; and unprocessed, 6%. (See table 14.) These percentages were essentially unchanged from 1993.

Production of high-temperature calcined kaolin declined in 1994 and production of low-temperature calcined kaolin increased. (See table 15.)

Production in Georgia was 7.57 million tons

valued at \$962 million. Over one-half of the production was water-washed kaolin. (See table 16.) Production in South Carolina decreased slightly. The actual decrease is not as large as shown in Table 18. The tonnage for unprocessed kaolin was concealed to avoid revealing company proprietary data. (See table 18.) Unprocessed kaolin was sold or used in most States in what may be considered to be common clay applications (i.e., brick, cement, pottery, etc.).

Theile Kaolin Co. contracted for the installation of a high-capacity super-conducting separator in Wrens, GA. The company also began an expansion program that will increase production capacity to more the 1.5 million tons.⁶ Engelhard Corp. installed a new calciner to meet increasing demands for calcined kaolin by the paper industry.⁷ M & M Clays Co. began operating a slurry plant. The slurried kaolin will be sold for ceramics applications.⁸

Consumption

Ball Clay.—The principal domestic ball clay markets were floor and wall tile, pottery, and sanitaryware. (See table 4.) Consumption increased in 1994. The largest increases were in sales to fillers and extenders, floor and wall tile, and sanitaryware applications. Most of the increase reported for filler and extender applications was accounted for by animal feed applications. Increased sales to the floor and wall tile and sanitaryware industries were attributed largely to improved conditions in the building and construction industries. Sales for other applications remained essentially unchanged.

Bentonite.—Major markets for bentonite were drilling mud, foundry sand, iron ore pelletizing, and pet waste absorbents. Consumption increased for drilling muds, civil engineering and sealing applications, iron ore pelletizing, and pet waste absorbents. (See table 6.)

Sales of swelling bentonite for pet waste absorbents continued its rapid growth due to the marketing success of clumping kitty litters. Sales to the drilling mud industry were reported to have increased significantly in 1994. This is inconsistent with industry trends. Actual consumption is estimated to be approximately 500,000 tons. There was a slight decline in the sales of bentonite for foundry sand applications while sales for use in pelletizing iron ore increased. An estimated 100,000 tons of the bentonite reported under domestic consumption was exported to the Canadian iron ore industry. (See table 6.) Sales of bentonite for use in civil engineering, sealing, and waterproofing

increased in response to stricter environmental regulation of landfill and other waste sites.

With regard to the sales of swelling versus nonswelling bentonite, most of the data was concealed to avoid disclosing company proprietary data. Over one-half of the bentonite sold for pet waste, oil, and grease absorbent applications was swelling bentonite; for animal feeds, 82% was swelling bentonite. The bulk of the bentonite sold for ceramics was nonswelling and approximately 99% of the bentonite sold for drilling mud applications was swelling bentonite. Over one-half of the bentonite sold for foundry sand applications was swelling bentonite and for filtering, clarifying, and decolorizing applications, over one-half was nonswelling bentonite. Bentonite sold for pelletizing iron ore was exclusively swelling bentonite. Most of the refractory-grade bentonite was of the swelling variety and over one-half of the bentonite used for civil engineering, waterproofing and sealing was swelling bentonite.

The major uses for swelling bentonite were drilling mud, foundry sand, iron ore pelletizing, pet waste absorbent, and civil engineering and sealing, in decreasing order of consumption. The major uses for nonswelling bentonite were foundry sand, pet waste absorbent, oil and grease absorbent, waterproofing and sealing, and pottery, in decreasing order of consumption.

Common Clay and Shale.—Common clay was used most frequently in the manufacture of heavy clay products, including (1) building brick; flue linings, sewer pipe, drain tile, structural tile, and terra cotta; (2) portland cement clinker; and (3) lightweight aggregate. Sales for civil engineering and sealing applications increased significantly because of the increased emphasis on controlling effluents from landfill and other waste sites. Sales of common clay and shale for brick and other heavy clay products and lightweight aggregate increased in response to improved conditions in the construction and housing industries. Producers reported decreased sales to the portland cement industry. Sales on the order of 7.6 to 7.8 million tons for cement production would be more consistent with industry trends. (See table 8.)

Fire Clay.—Fire clays were used in refractory products such as firebrick and block, grogs and calcines, high-alumina brick and specialties, saggars, refractory mortars and mixes, and ramming and gunning mixes. Fire clays also were used to produce such items as lightweight aggregates, portland cement, and pottery.

Consumption of fire clay decreased slightly as reported by domestic producers. Major

markets for fireclay were firebrick, followed by grogs and calcines, high alumina brick, mortar and cement, portland cement, pottery, and foundry sand. (See table 10.) The largest reported decrease was in firebrick applications, from 236,000 tons in 1993 to 160,000 in 1994. The 236,000 tons reported by producers was inconsistent with historical trends concerning the sales of fireclay for firebrick production and the use of firebrick in refractory applications. Sales of 200,000 tons or less would have been expected in 1993, making the decline in consumption between 1993 and 1994 less than is shown in table 10. The tonnage sold for brick and portland cement production increased in 1994, consistent with trends in the building industry.

Fuller's Earth.—The major uses for attapulgite-type and montmorillonite-type of the fuller's earths were as pet waste absorbents; pesticide carriers; and oil and grease absorbents, in decreasing order of consumption. (See table 12.) Consumption of both types of fuller's earth increased in 1994 with sales of montmorillonite-type fuller's earth increasing more than those for the attapulgite-type fuller's earth.

The largest reported increases in consumption were for pesticide and pet waste applications. The increase in pet waste applications is consistent with trends in sales of clay-type pet litter. Reported sales of attapulgite-type and montmorillonite-type fuller's earth for pesticide applications increased in 1994, following the trend for the past few years. Consumption of fuller's earth in animal feed decreased. All of the decrease in animal feed sales was absorbed by the montmorillonite-type fuller's earth category. Sales of attapulgite for drilling mud applications and filtering, clarifying, and decolorizing oils and greases declined in 1994. The decrease in sales in the fertilizer market was absorbed almost entirely by the montmorillonite-type fuller's earth. The large increase in the filler and extenders category was accounted for by increased sales of montmorillonite-type fuller's earth for asphalt tile applications. (See table 12.) With regard to the sales of attapulgite-type fuller's earth versus montmorillonite-type fuller's earth, most of the data was concealed to avoid disclosing company proprietary data. Approximately 135,000 tons of attapulgite was sold for oil and grease absorbents and 304,000 tons was sold for pet waste absorbents. Only attapulgite was sold for animal feed and drilling mud applications. Over 50% of the fuller's earth sold for fertilizer applications was attapulgite. Attapulgite was used to decolorize or clarify mineral oils and greases while montmorillonite was used to decolorize or clarify animal oils.

Over one-half of the fuller's earth used as pesticide carriers was montmorillonite. Montmorillonite also was used in asphalt tile, electrical porcelain, and refractories.

The major uses for montmorillonite-type fuller's earth was pet waste absorbents, pesticide carriers, oil and grease absorbents, and asphalt tile, in decreasing order of consumption. The major uses for attapulgite was in pet waste absorbents, oil and grease absorbents, pesticide carriers, and fertilizer carriers, in decreasing order of consumption.

Kaolin.—Producers reported a slight decrease in sales in 1994. The major markets were in paper coating, paper filler, high alumina refractory brick, fiber glass, grogs, paint, rubber, and catalysts, in decreasing order of consumption. (See table 20.) The largest increase in consumption was for high alumina specialties. The increase resulted because producers shifted a large portion of their sales from grogs to high alumina specialties. A large increase also was reported for sales of kaolin to the paper coating and filler applications, corresponding to improvements in the paper market. Sales to the portland cement market decreased despite a strong building industry. The decline affected only a few producers. Only small changes were reported in other markets.

Major domestic markets for kaolin from Georgia were paper coating, paper filling, refractories, fiberglass, paint, and catalysts, in decreasing order of consumption. Sales to the fiber glass, high alumina specialties, paint, and paper markets increased. Sales to the adhesive, grog, and rubber markets decreased. Other markets were relatively unchanged. The major market for kaolin from South Carolina was in rubber. Other significant markets were fiber glass, catalyst, adhesives, and roofing granules, in decreasing order of consumption. Sales for asphalt emulsion, firebrick, and catalyst applications decreased while sales for roofing granules increased. No major changes were reported for other end use categories. (See tables 17 and 19.)

Absorbent Uses.—Absorbent uses for clays accounted for about 2.44 million tons. Pet waste absorbents accounted for approximately 82% of absorbent consumption, followed by oil and grease absorbents (15%), and miscellaneous absorbent applications (3%). Demand for absorbents increased in 1994 corresponding to the growth in the pet litter market. Fuller's earth was the principal clay used for absorbent purposes, followed by bentonite. (See tables 6 and 12.) Small amounts of ball clay and kaolin also were used for absorbent applications.

Ceramics.—All varieties of clays were used

in ceramics. Total demand for clay in the manufacture of ceramics, ranging from china to sanitaryware to tile to roofing granules, was approximately 1.67 million tons. The largest ceramics market for clays was in ceramic floor and wall tile, followed by sanitaryware, catalysts, pottery, and roofing granules. Ball clay accounted for 38% of the clay used in ceramics, followed by kaolin (31%) and common clay and shale (25%). Small amounts of bentonite, fire clay, and fuller's earth also were used in the manufacture of ceramics. With regard to individual ceramics markets, ball clay dominated the glazing, pottery, and sanitaryware markets. Common clay and shale was the predominant clay used in roofing granules, abrasives, and quarry tile. Kaolin dominated the catalyst, crockery, and fine china markets. Common clay and shale and ball clay were the predominant clays used in floor and wall tile manufacture. (See tables 4, 8, 10, and 20.)

Construction.—Common clays and shales were used to manufacture a wide variety of construction materials such as expanded aggregates, hydraulic cement, and structural clay products.

Expanded Clay and Shale.—Approximately 3.75 million tons of clays was used in the production of lightweight aggregate. Nearly all of the clay used to manufacture lightweight aggregate was common clay and shale. Lightweight aggregates were used in concrete block, structural concrete, and highway surfacing, in decreasing order of consumption. (See tables 8 and 21.)

Hydraulic Cement.—Clays provide the alumina and silica required to manufacture hydraulic cements. Common clays, kaolin, fire clay, fuller's earth, and bentonite, in decreasing order of consumption, were used in cement products. Approximately 98% of the clay consumed by the cement industry was common clay and shale. (See tables 8 and 20.)

Structural Clay Products.—Approximately 14.3 million tons of clays was used in the manufacture of structural clay products such as building brick, drain tile, flue linings, roofing tile, sewer pipe, and terra cotta. Common and face brick accounted for 93% of this total. Other markets, in decreasing order of consumption, were terra cotta, sewer pipe, flue linings, structural tile, flower pots, drain tile, and roofing tile. Approximately 98% of the clay used in these applications was common clay and shale. (See tables 8, 20, and 22.)

The Bureau of the Census reported shipments of building and face brick to be 7.15 billion bricks valued at \$1.09 billion, an increase from 1993. Shipments of clay floor and wall tile increased to almost 56 million

square meters valued at \$724 million. Shipments of vitrified clay and sewer pipe fittings increased to 125,000 tons valued at \$32.6 million.

Drilling Mud.—Reported demand for clays in drilling muds was 609,000 tons. This exceeds industry trends, which would place consumption at about 500,000 tons. Swelling-type bentonite remained the principal clay used in drilling mud mixes, although fuller's earth, used mostly in saltwater drilling techniques, also was used. (See tables 6 and 12.)

Filler.—Approximately 5.08 million tons of clays was used as fillers and extenders. Clays are used as binders, extenders, and fillers in a wide variety of products, ranging from adhesives to flooring products to paint to paper to rubber. Paper coating and filling accounted for 70% of the filler and extender market consumption, followed by pesticides (6%), paint (5%), rubber (5%), animal feed (4%), and asphalt emulsion (2%).

Kaolin accounted for approximately 83% of the clay used in filler and extender applications, followed by fuller's earth (10%), ball clay (3%), bentonite (2%), common clay and shale (2%), and minor amounts of fire clay. (See tables 4, 6, 12, and 20.) For specific end uses, common clay and shale dominated in the wallboard market. Fuller's earth was predominant in asphalt tile and pesticide applications. Kaolin dominated the adhesive, paint, paper, and rubber markets.

Glass.—Approximately 364,000 tons of kaolin was used in fiberglass. A small amount of bentonite was used as a raw material feed for manufacturing mineral wool. (See table 20.)

Iron Ore Pelletizing.—Demand increased to 564,000 tons in 1994. Almost all of the clay used in pelletizing was bentonite. (See table 6.) Small amounts of common clay and shale also were used.

Paper Products.—Kaolin accounted for essentially all of the clay used for paper coating (2.63 million tons) and 99% of the clay used for paper filling (929,000 tons). (See table 20.) Small amounts of ball clay were used in paper-filling applications and a small amount of bentonite was used for paper coating.

Refractories.—Approximately 2.28 million tons of clays was used for the manufacture of refractories. The largest markets were foundry sand (32%), high alumina specialties (23%), firebrick (15%), and grogs and calcines (13%). Ball clay, bentonite, common clay and shale, fire clay, and kaolin accounted for 2%, 33%, 13%, 14%, and 38%, respectively, of the refractories markets. Ball clay, common clay and shale, and fire clay were the most commonly used clays for firebrick; bentonite for

foundry sand; and kaolin for grogs, calcines, and high alumina specialties. (See tables 4, 6, 8, 10, and 20.)

Prices

Ball Clay.—The average value for ball clay reported by domestic producers was \$43.43 per ton. The average value of imported ball clay was \$336.12. The average value of exported ball clay was \$42.84 per ton.

Bentonite.—The average value reported by domestic producers for nonswelling bentonite was \$50.68 per ton. The average value for swelling bentonite was \$39.57 per ton. The average value for all types of bentonite was \$41.34 per ton. The average value of imported bentonite was \$381.46 per ton. The average value of exported bentonite was \$90.49 per ton.

Common Clay and Shale.—The average value for all common clay and shale produced in the United States and Puerto Rico was \$5.48 per ton. The average value of clay and shale used in lightweight aggregate was \$10.43 per ton.

Fire Clay.—The average value for fire clay reported by domestic producers was \$25.55 per ton. The average of imported fire clay was \$450.49 per ton. The average value of exported fire clay was \$108.00 per ton.

Fuller's Earth.—The average value of attapulgite-fuller's earth reported by domestic producers was \$138.76 per ton. The average value of montmorillonite-fuller's earth was \$68.54 per ton. The average average value of all types of fuller's earth was \$92.51 per ton. The average value of imported fuller's earth was \$45.14 per ton. The average value of exported fuller's earth was \$132.72 per ton.

Kaolin.—The average value of kaolin was \$116.31 per ton for all kaolin grades. The average value for air-float kaolin was \$56.69 per ton; for high-temperature calcined kaolin, \$172.26; for low-temperature calcined kaolin, \$167.38; for all types of calcined kaolin, \$172.19 per ton; for delaminated kaolin, \$123.44 per ton; for water-washed kaolin, \$122.64 per ton; and for unprocessed kaolin, \$23.47 per ton. The average value of the imported kaolin was \$373.15 per ton. The average value of exported kaolin was \$167.30 per ton.

The average value for low-temperature calcined kaolin decreased significantly in 1994. The reason was that a large percentage of the low-temperature calcined kaolin was used in chemical manufacture rather than pigment applications. The average value for low-temperature calcined kaolin used for pigment applications was greater than that reported in

1993, which was \$334.39 per ton.

Foreign Trade

Ball Clay.—Ball clay exports increased to 81,000 tons valued at \$3.47 million, according to the Bureau of the Census. Shipments were made to 20 countries. (See table 23.) Domestic ball clay producers reported that 116,085 tons of ball clay was exported in 1994. The exports were used mainly for floor and wall tile production and sanitaryware production. Other major uses are asphalt emulsions, china, dinnerware, and filler and extender applications.

Discrepancies were observed between the export tonnage reported by the Bureau of the Census and that reported by producers. A major reason is that the producers may not control the final sale and movement of the clays, as when a mineral broker is involved. Some clays originally destined for export may be sold domestically and vice-versa without the knowledge of the producer.

Imports in 1994 were 836 tons of ball clay valued at \$281,000. (See table 24.)

Bentonite.—Bentonite exports increased to 768,000 tons valued at \$69.5 million. Bentonite was exported to 63 countries. Domestic bentonite producers reported exports of 431,241 tons. This discrepancy is partially explained by the inclusion of an estimated 100,000 tons of bentonite for Canadian iron ore pelletizing under domestic sales. Also see the discussion under ball clay concerning discrepancies between export data reported by producers and those reported by the Bureau of the Census. The largest market for exported bentonite was foundry sand. Other major markets were drilling mud, grogs and calcines, and paint. (See tables 6 and 23.)

Bentonite imports consisted mainly of untreated bentonite clay and chemically or artificially activated materials. Imports of untreated bentonite were 2,052 tons valued at \$782,000. Imports of chemically activated material decreased to 12,900 tons valued at \$7.78 million. (See table 24.)

Fire Clay.—Exports of fire clay were 225,000 tons valued at \$24.3 million. Fire clay was exported to 38 countries. According to the Bureau of the Census, 1,030 tons valued at \$464,000 was imported in 1994. (See tables 23 and 24.)

Fuller's Earth.—Approximately 74,000 tons of fuller's earth valued at \$9.82 million, were exported. Fuller's earth was exported to 44 countries. Domestic producers reported more than 161,000 tons exports in 1994. Discrepancies between producers' and Bureau

of the Census reports for exports are similar to the situation with ball clay. Also, some of the exports reported by producers may have been classified as pet litter by the Bureau of the Census rather than as fuller's earth. (See table 12.) The major market for exported fuller's earth was pet waste absorbents. Other markets were ceramic tile, foundry sand, cosmetics, oil and grease absorbents, paint, and pesticide carriers. Approximately 1,440 tons of decolorizing and fuller's earth valued at \$65 million were imported in 1994. (See tables 12, 23, and 24.)

Kaolin.—The Bureau of the Census reported that 3.18 million tons of kaolin, valued at \$532 million were exported in 1994. Kaolin was exported to 67 countries. Producers reported exports of 2.27 million tons. Discrepancies between producers' and Bureau of the Census reports for exports are similar to the situation with ball clay. Major export markets reported by producers were paper coating (76%) and paper filling (13%). (See tables 20 and 23.) Other major export markets for exported kaolin were in paint and rubber.

Kaolin imports increased to 10,800 tons valued at \$4.03 million. (See table 24.)

World Review

World production of bentonite was 7.58 million tons, fuller's earth production was 3.82 million tons, and kaolin production was 30.4 million tons. (See tables 25, 26, and 27, respectively.)

Australia.—Comalco Ltd. continued its expansion of its processing plants near Weipa. The company planned to expand capacity of coating grade kaolin to 200,000 tons per year.

Belgium.—Caulim da Amazonia SA installed a slurry plant at its kaolin handling facilities in Antwerp.

Brazil.—Progress on the kaolin project at Rio Capim Quimica was slowed because of challenges being made to the environmental impact studies. The project is a cooperative effort between Companhia Vale do Rio Doce and Caulim da Amazonia.

The joint venture between Mendes Junior and Amberger Kaolinwerke Eduard Kick GmbH obtained permission to develop a kaolin mine in Rio Capim. Work began at the mine site and equipment for the mill was ordered. The companies anticipate an initial production rate of 500,000 tons per year.

France.—Groupe Mineral Harwanne purchased the mines and mills of Kaolins du Finistere SA. Kaolins du Finistere was owned by ECC International and supplied kaolin to the ceramic and glass markets.

Japan.—Engelhard Corp. opened a new distribution center for its paper grade kaolin. The distribution will be near paper mills and give the company increased storage space and more flexibility in its product packaging.

Mexico.—Kentucky-Tennessee Clay Co. opened a processing plant near Monterrey. The \$6.5 million plant will produce ball clay and kaolin slurries for the ceramics industries.

Outlook

U.S. clay demand between 1982 and 1994 has rebounded slowly from 32 million tons to 43 million tons. Fueling the increase are the generally improved building and construction industry (for brick, cement, ceramics, etc.), growing paper industry (paper coating and filler), growth in the pet litter market (pet waste absorbents), and concerns over seepage from landfills and waste dumps (civil engineering and sealing applications). Most of these markets can be expected to grow over the next few years. The possible exception is with the building construction industry which is predicted to temporarily level off in 1995.

¹Industrial Minerals (London). Dresser Sells M-I Drilling. No. 319, Apr. 1994, p. 22.

²Chemical Marketing Reporter. American Colloid Units Expand Bentonite Product Output. V. 246, No. 10, Sept. 5, 1994, p. 15.

³_____. American Colloid Grows. V. 245, No. 25, June 20, 1994, p. 7.

⁴_____. Engelhard Acquires Attapulgit Producer. V. 245, No. 24, June 13, 1994, p. 13.

⁵Industrial Minerals (London). American Colloid Expands Paris Facility. No. 320, May 1994, p. 21.

⁶Mining Magazine. Cryofilter HGMS for Georgia Kaolin. Jan. 1994, p. 38.

Industrial Minerals (London). Theile Kaolin Expands in Georgia. No. 321, June 1994, p. 15.

⁷Engelhard Corporation 1994 Annual Review.

⁸Ceramic Industry. Slurry Plant Opens in Georgia. V. 143, No. 6, Nov. 1994, p. 13.

OTHER SOURCES OF INFORMATION

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TABLE 1
SALIENT U.S. CLAY STATISTICS 1/ 2/

(Thousand metric tons and thousand dollars)

	1990	1991	1992	1993	1994
<u>Domestic clays sold or used by producers:</u>					
Quantity	42,900	41,000	40,200	40,700 r/	42,200
Value	\$1,620,000	\$1,460,000	\$1,470,000	\$1,470,000 r/	\$1,600,000
<u>Exports:</u>					
Quantity	4,120	4,000	4,160	4,150	4,620
Value	\$584,000	\$590,000	\$663,000	\$670,000	\$739,000
<u>Imports for consumption:</u>					
Quantity	30	35	41	39	36
Value	\$12,000	\$13,200	\$15,500	\$17,600	\$14,900

r/ Revised.

1/ Excludes Puerto Rico.

2/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits.

TABLE 2
CLAYS SOLD OR USED BY PRODUCERS IN THE UNITED STATES 1/ 2/ IN 1994, BY STATE

(Thousand metric tons and thousand dollars)

State	Ball clay	Bentonite	Common clay and shale	Fire clay	Fuller's earth	Kaolin	Total	Total value
Alabama	--	W	2,010	72	--	199	2,280	25,400
Arizona	--	W	98	--	--	--	98	452
Arkansas	--	--	883	W	--	W	883	2,440
California	--	144	1,420	--	W	W	1,570	20,600
Colorado	--	1	288	(3/)	--	2	292	2,320
Connecticut	--	--	W	--	--	--	W	W
Florida	--	--	W	--	395	35	430	55,000
Georgia	--	--	1,710	W	680	7,570	9,960	1,060,000
Illinois	--	--	494	--	W	--	494	1,170
Indiana	W	--	774	--	--	--	774	2,540
Iowa	--	--	384	--	--	--	384	1,520
Kansas	--	--	556	--	W	--	556	2,150
Kentucky	W	--	820	--	--	--	820	3,460
Louisiana	--	--	371	--	--	--	371	3,280
Maine	--	--	W	--	--	--	W	W
Maryland	--	--	293	--	--	--	293	946
Massachusetts	--	--	W	--	--	--	W	W
Michigan	--	--	1,150	--	--	--	1,150	3,370
Minnesota	--	--	W	--	--	W	W	W
Mississippi	W	139	645	--	410	--	1,190	40,500
Missouri	--	--	1,040	213	W	--	1,250	7,910
Montana	--	W	28	W	--	--	28	W
Nebraska	--	--	206	--	--	--	206	867
Nevada	--	7	--	--	W	W	7	2,860
New Hampshire	--	--	3	--	--	--	3	16
New Jersey	--	--	W	--	--	--	W	W
New Mexico	--	--	127	W	--	--	127	269
New York	--	--	507	--	--	--	507	9,270
North Carolina	--	--	2,530	--	--	W	2,530	12,500
North Dakota	--	--	59	--	--	--	59	W
Ohio	W	--	1,940	142	--	--	2,080	12,500
Oklahoma	--	--	771	--	--	--	771	3,910
Oregon	--	25	215	--	--	--	241	1,560
Pennsylvania	--	--	797	--	--	14	811	4,040
South Carolina	--	--	1,130	--	--	388 4/	1,520	30,400 4/
South Dakota	--	--	W	--	--	--	W	W
Tennessee	665	W	W	--	W	--	665	28,600
Texas	W	W	2,190	--	W	W	2,190	13,700
Utah	--	W	243	--	--	W	243	3,410
Virginia	--	--	870	--	W	--	870	3,250
Washington	--	--	246	W	--	--	246	1,140
West Virginia	--	--	138	--	--	--	138	291
Wyoming	--	2,530	W	--	--	--	2,530	91,300
Undistributed	385	449	1,010	32	1,150	563	3,600	148,000
Total	1,050	3,290	25,900	458	2,640	8,770	42,200	1,600,000

W Withheld to avoid disclosing company proprietary data; included with "Undistributed."

1/ Excludes Puerto Rico.

2/ Data rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

3/ Less than 1/2 unit.

4/ Unprocessed kaolin withheld to avoid disclosing company proprietary data; included in "Undistributed."

TABLE 3
BALL CLAY SOLD OR USED BY PRODUCERS IN THE UNITED STATES, BY STATE 1/

(Thousand metric tons and thousand dollars)

State	Airfloat		Water-slurried		Unprocessed		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
1993 e/								
Tennessee	232	12,200	138	5,860	236	7,660	607	25,700
Other 2/	127 r/	6,860 r/	--	--	176	5,950	305 r/	12,800 r/
Total	360 r/	19,000 r/	138	5,860	412	13,600	911 r/	38,500 r/
1994								
Tennessee	263	14,100	163	6,810	239	7,660	665	28,600
Other 2/	210	10,800	(3/)	(3/)	175	6,250	385	17,000
Total	473	24,900	163	6,810	413	13,900	1,050	45,600

e/ Estimated. r/ Revised.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Includes Indiana, Kentucky, Mississippi, Ohio, and Texas.

3/ Included with "Unprocessed."

TABLE 4
BALL CLAY SOLD OR USED BY PRODUCERS
IN THE UNITED STATES, BY USE 1/

(Metric tons)

Use	1993	1994
Filler, extenders, and binders 2/	138,000 r/	166,000
Floor and wall tile	205,000	270,000
Miscellaneous ceramics 3/	39,800	36,100
Pottery	116,000	117,000
Refractories 4/	42,000	43,100
Sanitaryware	185,000	217,000
Miscellaneous 5/	69,200 r/	73,300
Exports 6/	116,000	127,000
Total	911,000 r/	1,050,000

r/ Revised.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Includes adhesives, animal feed, asphalt emulsions, asphalt tile, cosmetics, gypsum products, paper filling, pesticides, paint, plastics, rubber, wallboard, and other filler, extenders and binders.

3/ Includes electrical porcelain, fine china/dinnerware, glazes, and miscellaneous ceramics.

4/ Includes firebrick, blocks, and shape, high-alumina brick and specialties, and kiln furniture.

5/ Includes absorbents, brick (common), flue lining, glazes, waterproofing seals, drilling mud, and other uses unknown.

6/ Includes ceramics and glass, fillers, extenders and binders, floor and wall tile, refractories, and other uses unknown.

TABLE 5
BENTONITE SOLD OR USED BY PRODUCERS IN THE UNITED STATES, BY STATE 1/

(Thousand metric tons and thousand dollars)

State	Nonswelling		Swelling		Total	
	Quantity	Value	Quantity	Value	Quantity	Value
1993						
California	W	W	W	W	140	13,100
Colorado	(2/)	6	--	--	(2/)	6
Mississippi	152	5,310	--	--	152	5,310
Nevada	W	W	W	W	16	3,430
Oregon	W	W	W	W	24	1,110
Wyoming	--	--	2,180 r/	63,300 r/	2,180 r/	63,300 r/
Other 3/	321	17,600	212	16,000	353 r/	16,000
Total	473	22,900	2,400 r/	79,300 r/	2,870 r/	102,000 r/
1994						
California	W	W	W	W	144	13,700
Colorado	1	12	--	--	1	12
Mississippi	139	4,980	--	--	139	4,980
Nevada	W	W	W	W	7	2,860
Oregon	W	W	W	W	25	1,150
Wyoming	--	--	2,530	91,300	2,530	91,300
Other 3/	375	21,100	250	18,900	449	22,300
Total	515	26,100	2,780	110,000	3,290	136,000

r/ Revised. W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Less than 1/2 unit.

3/ Includes Alabama, Arizona, Montana, Tennessee, Texas, Utah, Virginia (1993), and items indicated by symbol W.

TABLE 6
BENTONITE SOLD OR USED BY PRODUCERS
IN THE UNITED STATES, BY USE 1/

(Metric tons)

Use	1993	1994
Domestic:		
Absorbents:		
Pet waste absorbents	302,000	455,000
Other absorbents	66,400	91,000
Adhesives	W	W
Animal feed	78,300 r/	96,900
Ceramics (except refractories) 2/	24,100 r/	W
Drilling mud	476,000 r/	586,000
Filler and extender applications 3/	30,600 r/	30,000
Filtering, clarifying, decolorizing:		
Animal oils, minerals oils and greases, and vegetable oils	13,000 r/	W
Foundry sand	733,000 r/	712,000
Pelletizing (iron ore)	466,000 r/	509,000
Miscellaneous refractories and kiln furniture 4/	58,000 r/	32,200
Miscellaneous 5/	2,340 r/	55,400
Waterproofing and sealing	213,000 r/	287,000
Total	2,460,000 r/	2,850,000
Exports:		
Drilling mud	90,400	34,200
Foundry sand	243,000 r/	321,000
Other 6/	72,000 r/	80,500
Total	405,000 r/	436,000
Grand total	2,870,000 r/	3,290,000

r/ Revised. W Withheld to avoid disclosing company proprietary data; included with "Miscellaneous."

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Includes catalysts (oil-refinings), mineral wools and insulation, floor and wall tile, and pottery.

3/ Includes medical, pharmaceutical, and cosmetics, paint, paper coating, pesticides and related products, plastics, asphalt emulsions, ink, and miscellaneous fillers and extenders applications.

4/ Includes firebrick, blocks, and shapes, plugs, taps, wads, and miscellaneous refractories.

5/ Includes waterproofing seals, chemical manufacturing, oil well sealings, filtering and clarifying oils, heavy clay products, lightweight aggregate, desiccants, and other uses unknown.

6/ Includes absorbents, ceramics, waterproofing and sealing, fillers and extenders, filtering and clarifying oils, and pelletizing refractories.

TABLE 7
COMMON CLAY AND SHALE SOLD OR USED BY PRODUCERS
IN THE UNITED STATES, BY STATE 1/

(Thousand metric tons and thousand dollars)

State	1993		1994 2/	
	Quantity	Value	Quantity	Value
Alabama	2,110	15,700	2,010	18,900
Arkansas	796	2,360	883	2,440
California	1,690	8,430	1,420	6,910
Georgia	1,680	11,600	1,710	11,200
Indiana	600	2,540	774	2,540
Kansas	513	1,970	556	2,150
Kentucky	768	3,060	820	3,460
Michigan	1,230	4,850	1,150	3,370
Mississippi	537	4,480	594	5,960
Missouri	976	3,820	1,040	4,630
New York	508	9,250	507	9,270
North Carolina	2,380	11,200	2,530	12,500
Ohio	2,020	7,890	1,940	7,950
Oklahoma	613	2,940	771	3,910
Pennsylvania	754	3,120	797	3,230
South Carolina	1,010	4,500	1,130	4,670
Texas	2,180	17,400	2,190	13,700
Virginia	775	2,950	870	3,250
Other 3/	4,150 r/	18,900 r/	4,260	21,600
Total	25,300	137,000	25,900	142,000

r/ Revised.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not to totals shown.

2/ Excludes Puerto Rico.

3/ Includes all other States except; Alaska, Delaware, Hawaii, Idaho, Nevada, Rhode Island, Vermont, and Wisconsin.

TABLE 8
COMMON CLAY AND SHALE SOLD OR USED BY PRODUCERS
IN THE UNITED STATES, BY USE 1/

(Metric tons)

Use	1993	1994 2/
Ceramics and glass 3/	159,000	136,000
Civil engineering and sealing	84,200	177,000
Floor and wall tile:		
Ceramic	274,000	283,000
Other 4/	100,000	45,100
Heavy clay products:		
Brick, extruded	10,900,000	11,400,000
Brick, other	1,450,000	1,620,000
Drain tile and sewer pipe	142,000	140,000
Flowerpots	35,700	35,800
Flue linings	55,300	60,600
Structural tile	35,000	37,100
Other 5/	582,000	710,000
Lightweight aggregate:		
Concrete block	2,210,000	2,400,000
Highway surfacing	243,000	247,000
Structural concrete	787,000	801,000
Miscellaneous 6/	286,000	305,000
Portland and other cements	7,540,000	6,920,000
Refractories 7/	153,000	303,000
Miscellaneous 8/	231,000	311,000
Total	25,300,000	25,900,000

1/ Previously published and 1994 data are rounded by the U. S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Excludes Puerto Rico.

3/ Includes crockery/earthenware, pottery, roofing granules, and abrasives.

4/ Includes quarry tile and miscellaneous floor and wall tiles.

5/ Includes roofing tile, sewer pipe, terra cotta, and miscellaneous clay products.

6/ Includes miscellaneous lightweight aggregates.

7/ Includes firebrick, blocks and shapes, mortar and cement, and miscellaneous refractories.

8/ Includes asphalt emulsions, wall board, pelletizing (iron ore), exports, and other uses unknown.

TABLE 9
FIRE CLAY 1/ 2/ SOLD OR USED BY PRODUCERS
IN THE UNITED STATES, BY STATE

(Thousand metric tons and thousand dollars)

State	1993		1994	
	Quantity	Value	Quantity	Value
Alabama	71	2,860	72	3,190
Missouri	208	3,920	213	3,280
Ohio	142	4,140	142	4,550
Other 3/	37	621	31	655
Total	459	11,500	458	11,700

1/ Refractory uses only.

2/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

3/ Includes Arkansas, Colorado, Georgia, Montana, New Jersey (1993), New Mexico, and Washington.

TABLE 10
FIRE CLAY SOLD OR USED BY PRODUCERS 1/
IN THE UNITED STATES, BY USE

(Metric tons)

Use	1993	1994
Ceramics and glass 2/	19,100	W
Heavy clay products and lightweight aggregates 3/	43,700	41,400
Refractories:		
Firebrick, block and shapes	236,000	160,000
Other refractories 4/	130,000	155,000
Miscellaneous	31,100	102,000
Exports	W	W
Total	459,000	458,000

W Withheld to avoid disclosing company proprietary data; included in "Miscellaneous."

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Includes pottery.

3/ Includes portland cement, terra cotta, and other uses unknown.

4/ Includes foundry sand, grogs and calcines, high-alumina brick and specialties, mortar and cement, plug, tap and wad, and other uses unknown.

TABLE 11
FULLER'S EARTH SOLD OR USED BY PRODUCERS
IN THE UNITED STATES, BY STATE 1/

(Thousand metric tons and thousand dollars)

State	Attapulgit		Montmorillonite		Total	
	Quantity	Value	Quantity	Value	Quantity	Value
1993						
Florida	407	52,700	(2/)	(2/)	407	52,700
Georgia	641	79,100	(2/)	(2/)	641	79,100
Southern States 3/	--	--	472	34,200	472	34,200
Western States 4/	(5/)	(5/)	963	63,700	963	63,700
Total	1,050	132,000	1,440	97,800	2,480	230,000
1994						
Florida	395	51,500	(2/)	(2/)	395	51,500
Georgia	680	83,700	(2/)	(2/)	680	83,700
Southern States 3/	--	--	570	41,000	570	41,000
Western States 4/	(5/)	(5/)	993	67,900	993	67,900
Total	1,080	135,000	1,560	109,000	2,640	244,000

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Included with "Attapulgit."

3/ Includes Mississippi, Tennessee, and Virginia.

4/ Includes California, Illinois, Kansas, Missouri, Nevada, Texas, and Utah (1993).

5/ Included with "Montmorillonite."

TABLE 12
FULLER'S EARTH SOLD OR USED BY PRODUCERS
IN THE UNITED STATES, BY USE 1/

(Metric tons)

Use	1993	1994
Absorbents:		
Oil and grease absorbent	259,000	296,000
Pet waste absorbent	1,470,000	1,550,000
Miscellaneous absorbent	42,700	W
Animal feed	90,500	17,800
Drilling mud	30,100	22,600
Fertilizers	89,700	59,600
Fillers, extenders, binders 2/	70,800	119,000
Filtering, clarifying, decolorizing:		
Animal, mineral, and vegetable oils, and greases	35,100	12,700
Pesticides and related products	191,000	305,000
Miscellaneous 3/	68,000	89,600
Exports 4/	138,000	161,000
Total	2,480,000	2,640,000

W Withheld to avoid disclosing company proprietary data; included with "Miscellaneous."

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Includes adhesives, asphalt tiles, gypsum products, medical, pharmaceutical and cosmetics, paint, plastics, asphalt emulsions, and other uses unknown.

3/ Includes catalysts (oil-refining), electrical porcelain, roofing granules, chemical manufacturing, portland cement, lightweight aggregates, refractories, and other uses unknown.

4/ Includes absorbents, fillers, extenders and binders, floor and wall tiles, refractories, and other uses unknown.

TABLE 13
KAOLIN SOLD OR USED BY PRODUCERS
IN THE UNITED STATES, BY STATE 1/

(Thousand metric tons and thousand dollars)

State	1993		1994	
	Quantity	Value	Quantity	Value
Arkansas	230	W	W	W
California	104 r/	4,780 r/	W	W
Florida	W	W	35	3,470
Georgia	7,340 r/	903,000 r/	7,570	962,000
South Carolina	534	26,800	388 2/	25,700 2/
Other 3/	619	21,800	779	27,100
Total	8,830 r/	957,000 r/	8,770	1,020,000

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Other."

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Unprocessed Kaolin withheld to avoid disclosing company proprietary data; included in "Other."

3/ Includes Alabama, Colorado, Minnesota, Nevada, North Carolina, Pennsylvania, Texas, and items indicated by symbol W.

TABLE 14
KAOLIN SOLD OR USED BY PRODUCERS
IN THE UNITED STATES, BY KIND 1/

(Thousand metric tons and thousand dollars)

Kind	1993		1994	
	Quantity	Value	Quantity	Value
Airfloat	1,180	67,100	1,210	68,600
Calcined 2/	1,570	248,000	1,510	260,000
Delaminated	1,230	140,000	1,280	158,000
Unprocessed	755 r/	13,200 r/	524	12,300
Water-washed	4,100 r/	488,000 r/	4,240	520,000
Total	8,830 r/	957,000 r/	8,770	1,020,000

r/ Revised.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Includes both low-temperature filler and high-temperature refractory grades.

TABLE 15
CALCINED KAOLIN SOLD OR USED BY PRODUCERS
IN THE UNITED STATES, BY STATE 1/

(Thousand metric tons and thousand dollars)

State	High-temperature		Low-temperature	
	Quantity	Value	Quantity	Value
1993				
Alabama and Georgia	1,250	215,000	W	W
Other 2/	238	5,680	83	27,800
Total	1,490	221,000	83	27,800
1994				
Alabama and Georgia	1,160	221,000	W	W
Other 2/	203	15,000	141	23,600
Total	1,370	236,000	141	23,600

W Withheld to avoid disclosing company proprietary data; included in "Other."

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Includes Arkansas, California, Pennsylvania, South Carolina, and items indicated by symbol W.

TABLE 16
GEORGIA KAOLIN SOLD OR USED
BY PRODUCERS, BY KIND 1/

(Thousand metric tons and thousand dollars)

Kind	1993		1994	
	Quantity	Value	Quantity	Value
Airfloat	720	35,400	758	37,100
Calcined 2/	1,090	234,000	1,110	241,000
Delaminated	1,230	140,000	1,280	158,000
Unprocessed	249	7,840	216	7,730
Water-washed	4,060 r/	486,000 r/	4,200	519,000
Total	7,340 r/	903,000 r/	7,570	962,000

r/ Revised.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Includes both low-temperature filler and high-temperature refractory grades.

TABLE 17
 GEORGIA KAOLIN 1/ 2/ SOLD OR USED BY PRODUCERS, BY USE

(Metric tons)

Use	1993	1994
Domestic:		
Ceramics and glass:		
Catalysts (oil-refining)	152,000 r/	154,000
Electrical porcelain	10,600	11,000
Fiber glass	256,000	271,000
Roofing granules	11,800	22,600
Sanitaryware	46,500	48,500
Other 3/	80,300	85,300
Fillers, extenders, and binder:		
Adhesives	56,600	42,400
Paint	211,000	228,000
Paper coating	2,510,000	2,630,000
Paper filling	872,000 r/	910,000
Plastic	28,200	26,900
Rubber	78,000	60,900
Other 4/	47,000 r/	42,200
Heavy clay products 5/	58,000 r/	47,900
Refractories 6/	570,000	570,000
Undistributed 7/	203,000	205,000
Total	5,190,000 r/	5,350,000
Exports:		
Paint	75,000	74,900
Paper coating	1,680,000	1,730,000
Paper filling	262,000 r/	259,000
Rubber	4,500	7,280
Undistributed 8/	127,000	150,000
Total	2,150,000 r/	2,220,000
Grand total	7,340,000 r/	7,570,000

r/ Revised.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Includes high-temperature calcined, low-temperature calcined, and delaminated.

3/ Includes crockery/earthenware, fine china/dinnerware, glazes, glass, and enamels, pottery, and miscellaneous ceramics.

4/ Includes asphalt emulsion, asphalt tile, fertilizers, gypsum products, medical, pharmaceutical and cosmetics, pesticides and related products, textiles and miscellaneous fillers, extenders and binders, and ink.

5/ Includes brick (common and face), portland cement, and miscellaneous clay products.

6/ Includes firebrick, blocks and shapes, grogs and calcines, high-alumina specialties, kiln furniture, and miscellaneous refractories.

7/ Includes chemical manufacturing, civil engineering and sealings, drilling mud, filtering, clarifying, and decolorizing, floor and wall tiles, and other uses unknown.

8/ Includes fiber glass, sanitaryware, ink, miscellaneous fillers, extenders and binders, and other uses unknown.

TABLE 18
 SOUTH CAROLINA KAOLIN SOLD OR USED BY PRODUCERS,
 BY KIND 1/

(Thousand metric tons and thousand dollars)

Kind	1993		1994	
	Quantity	Value	Quantity	Value
Airfloat	391	25,900	388	25,700
Unprocessed	143	902	W	W
Total	534	26,800	388	25,700

W Withheld to avoid disclosing company proprietary data.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

TABLE 19
SOUTH CAROLINA KAOLIN SOLD OR USED
BY PRODUCERS, BY KIND AND USE 1/

(Metric tons)

Kind and use	1993	1994
Airfloat:		
Adhesives	W	W
Animal feed and pet waste absorbent	W	W
Ceramics 2/	3,440	13,400
Fertilizers, pesticides and related products	6,820	6,780
Fiber glass	W	W
Paint	W	W
Paper coating and filling	W	W
Plastics	W	W
Rubber	165,000	168,000
Refractories 3/	W	W
Other uses 4/	185,000	16,400
Exports 5/	30,600	31,300
Total	391,000	388,000
Unprocessed: Face brick and other uses	143,000	(6/)
Grand total	534,000	388,000

W Withheld to avoid disclosing company proprietary data; included with "Other uses."

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2 Includes crockery and earthenware, fine china/dinnerware, floor and wall tile, pottery, and roofing granules.

3/ Includes refractory calcines and grogs, firebrick, blocks and shapes, refractory mortar and cement, and high-alumina refractories.

4/ Includes catalysts (oil refining), asphalt emulsion, gypsum products, and unknown uses.

5/ Includes paint, paper filling, and rubber.

6/ Withheld to avoid disclosing company proprietary data.

TABLE 20
KAOLIN 1/ SOLD OR USED BY PRODUCERS IN THE UNITED STATES, BY USE

(Metric tons)

Use	1993	1994
Domestic:		
Ceramics:		
Catalyst (oil and gas refining)	221,000 r/	213,000
Electrical porcelain	16,800	17,000
Fine china and dinnerware	10,400	20,700
Floor and wall tile	11,800	11,900
Pottery	24,100	22,500
Roofing granules	12,200	34,000
Sanitaryware	48,300	50,200
Miscellaneous	158,000	131,000
Chemical manufacture	146,000	167,000
Civil engineering	20,500	22,100
Glass fiber, mineral wool	347,000	364,000
Filler, extender, and binder:		
Adhesive	69,200	55,800
Fertilizer	W	W
Medical, pharmaceutical cosmetic	1	14
Paint	242,000	253,000
Paper coating	2,510,000	2,630,000
Paper filling	878,000 r/	917,000
Pesticide	15,800	12,900
Plastic	28,200	32,000
Rubber	243,000	240,000
Miscellaneous	56,500 r/	56,200
Heavy clay products:		
Brick, common and face	223,000	204,000
Miscellaneous	6,530	W
Portland cement	207,000	82,900
Refractories:		
Firebrick, block and shapes	21,400 r/	19,600
Grogs	938,000	260,000
High alumina brick, specialties, and kiln furniture	34,500	530,000
Foundry sand, mortar, cement, and miscellaneous refractories	67,500	63,000
Miscellaneous applications	72,100	95,900
Total	6,630,000 r/	6,500,000
Exports:		
Ceramics	63,900	79,500
Foundry sand, grogs and calcines; other refractories	W	W
Paint	75,100	75,100
Paper coating	1,680,000	1,730,000
Paper filling	262,000 r/	259,000
Rubber	35,100	38,600
Miscellaneous	82,200	89,200
Total	2,200,000 r/	2,270,000
Grand total	8,830,000 r/	8,770,000

r/ Revised. W Withheld to avoid disclosing proprietary data; included with "Miscellaneous applications" or "Miscellaneous."

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

TABLE 21
COMMON CLAY AND SHALE USED IN LIGHTWEIGHT AGGREGATE PRODUCTION IN THE UNITED STATES BY STATE 1/

(Thousand metric tons and thousand dollars)

State	Concrete block	Structural oncrete	Highway surfacing	Other	Total	Total value e/
1993						
Alabama and Arkansas	751	77	17	1	846	11,300
California	76	102	--	45	223	755
Florida and Indiana	125	34	--	--	159	1,500
Kansas, Kentucky, and Louisiana	295	128	--	70	493	1,120
Mississippi and Missouri	15	1	2	90	109	1,220
New York and Montana	192	182	--	--	374	8,480
North Carolina	301	52	--	8	360	4,050
Ohio, Oklahoma, and Pennsylvania	162	31	--	--	193	1,350
Texas	49	157	222	31	459	2,520
Utah and Virginia	251	22	2	42	316	3,830
Total	2,220	787	243	286	3,530	36,100
1994						
Alabama and Arkansas	857	101	20	75	1,050	14,500
California	76	102	--	45	223	755
Florida and Indiana	125	34	--	--	159	1,500
Kansas, Kentucky, and Louisiana	361	128	--	17	505	1,150
Mississippi and Missouri	15	1	2	127	145	1,700
New York and Montana	192	182	--	--	374	8,480
North Carolina	301	52	--	9	361	4,050
Ohio, Oklahoma, and Pennsylvania	162	31	--	(2/)	193	1,350
Texas	49	157	222	32	460	2,550
Utah and Virginia	264	13	2	--	279	3,010
Total	2,400	801	247	305	3,750	39,100

e/ Estimated.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Less than 1/2 unit.

TABLE 22
COMMON CLAY AND SHALE USED IN BUILDING BRICK PRODUCTION IN THE UNITED STATES, BY STATE 1/ 2/

(Thousand metric tons and thousand dollars)

State	1993		1994	
	Quantity	Value e/	Quantity	Value e/
Alabama	798	2,720	715	2,960
Arkansas	423	888	459	919
California	313	1,720 r/	300	1,420
Colorado	260	2,060	272	2,110
Connecticut, New Jersey 3/, and New York 3/	329	3,010	300	2,780
Georgia	1,200	9,000	1,260	8,890
Illinois	437	546	454	633
Indiana and Iowa	263	1,480	296	1,580
Kentucky 3/ and Tennessee 3/	790	1,920	814	2,130
Maine, Massachusetts 3/, and New Hampshire 3/	W	W	W	W
Maryland and West Virginia 4/	289	612	271	792
Mississippi and Missouri	486	1,760 r/	496	1,870
North Carolina	1,930	6,030	2,080	7,370
Ohio	911	4,370 r/	863	4,140
Oklahoma	290	1,460	427	2,130
Pennsylvania	637	2,460	626	2,100
South Carolina	599	3,410	731	3,450
Texas	1,040	7,440 r/	1,050	4,800
Virginia	562	1,770	658	2,070
Other 5/	779	3,520	883	3,440
Total	12,300	56,200 r/	13,000	55,600

e/ Estimated. r/ Revised. W Withheld to avoid disclosing company proprietary data.

1/ Includes extruded and other brick.

2/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

3/ Extruded brick only.

4/ Includes other brick only.

5/ Includes Arizona, Minnesota, New Mexico, North Dakota, and Wyoming.

TABLE 23
U.S. EXPORTS OF CLAYS IN 1994, BY COUNTRY 1/

(Thousand metric tons and thousand dollars)

Country	Ball clay		Bentonite		Fire clay		Fuller's earth	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Argentina	--	--	(2/)	67	(2/)	14	(2/)	9
Australia	1	26	25	1,040	21	1,830	--	--
Belgium	--	--	9	3,320	--	--	(2/)	26
Brazil	(2/)	20	(2/)	199	(2/)	13	--	--
Canada	--	--	206	15,200	7	1,220	9	1,110
Finland	(2/)	13	(2/)	152	--	--	--	--
France	--	--	40	2,820	1	142	(2/)	36
Germany	1	34	4	1,040	1	172	(2/)	18
Indonesia	--	--	8	558	1	166	(2/)	29
Italy	--	--	2	1,010	(2/)	13	3	723
Japan	29	836	275	18,300	46	4,750	1	61
Korea, Republic of	(2/)	16	16	2,500	5	1,470	(2/)	10
Malaysia	--	--	24	1,400	(2/)	7	14	2,280
Mexico	43	1,790	9	978	52	4,330	9	684
Netherlands	(2/)	20	1	536	75	7,920	21	2,020
Singapore	(2/)	4	10	1,180	--	--	1	229
South Africa, Republic of	(2/)	12	1	244	(2/)	43	2	402
Sweden	--	--	(2/)	175	(2/)	14	(2/)	9
Taiwan	(2/)	20	35	4,240	6	814	--	--
Thailand	--	--	10	1,140	(2/)	63	(2/)	10
United Kingdom	(2/)	3	8	2,400	1	98	6	561
Venezuela	(2/)	45	25	1,410	1	478	(2/)	111
Other	7	637	60	2,490	8	792	8	1,510
Total	81	3,470	768	69,500	225	24,300	74	9,820
	Kaolin		Clays, n.e.c. 3/		Total			
	Quantity	Value	Quantity	Value	Quantity	Value		
Argentina	13	2,120	1	485	14	2,700		
Australia	31	10,600	1	2,190	78	15,700		
Belgium	35	9,440	1	2,320	46	15,100		
Brazil	2	1,170	1	3,310	4	4,720		
Canada	606	74,800	165	28,600	994	121,000		
Finland	457	67,600	1	251	458	68,000		
France	6	1,350	3	1,270	50	5,620		
Germany	60	12,600	4	3,180	71	17,000		
Indonesia	44	8,790	1	987	54	10,500		
Italy	165	24,300	1	568	171	26,600		
Japan	777	145,000	5	6,300	1,130	175,000		
Korea, Republic of	139	29,500	4	4,040	165	37,500		
Malaysia	2	640	3	889	43	5,210		
Mexico	184	23,400	9	2,060	305	33,200		
Netherlands	146	22,200	13	4,820	256	37,500		
Singapore	3	872	7	2,740	21	5,020		
South Africa, Republic of	21	4,010	2	1,200	26	5,910		
Sweden	115	23,900	15	2,510	131	26,600		
Taiwan	121	20,200	5	2,170	167	27,500		
Thailand	21	6,310	(2/)	763	32	8,290		
United Kingdom	110	13,400	15	12,400	140	28,800		
Venezuela	22	3,410	7	2,630	56	8,080		
Other	95	26,500	31	14,300	205	53,300		
Total	3,180	532,000	295	100,000	4,620	739,000		

1/ Data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Less than 1/2 unit.

3/ Also includes chamotte or dinas earth, activated clays and earths, and artificially activated clays.

Source: Bureau of the Census.

TABLE 24
U.S. IMPORTS FOR CONSUMPTION OF CLAY IN 1994, BY KIND 1/

Kind	Quantity (metric tons)	Value (thousands)
China clay or kaolin:		
Canada	1	\$2
China	5,120	620
New Zealand	1,250	730
United Kingdom	3,970	2,390
Other	453	289
Total	10,800	4,030
Fire clay:		
Canada	187	35
Netherlands	263	122
Philippines	2	7
United Kingdom	539	288
Other	36	12
Total	1,030	464
Decolorizing earths and fuller's earth:		
Canada	47	10
France	22	9
Germany	56	15
Japan	1,320	31
Total	1,440	65
Bentonite:		
Canada	647	232
Japan	230	39
Mexico	390	81
United Kingdom	580	324
Other	205	106
Total	2,050	782
Common blue clay and other ball clay:		
Netherlands	40	7
United Kingdom	796	274
Total	836	281
Other clay:		
Canada	212	331
Germany	54	66
Italy	3	7
South Africa, Republic of	180	177
United Kingdom	1,020	396
Other	161	237
Total	1,630	1,210
Chamotte or dina's earth:		
China	4,870	267
Taiwan	2	2
Total	4,870	269
Artificially activated clay and activated earth:		
Canada	562	322
Germany	1,820	3,640
Mexico	10,000	2,930
Other	439	885
Total	12,900	7,780
Grand total	35,500	14,900

1/ Data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

Source: Bureau of the Census.

TABLE 25
BENTONITE: WORLD PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons)

Country 3/	1990	1991	1992	1993	1994 e/
Algeria 4/	33,700	25,800	31,000 r/	30,000 e/	30,000
Argentina	107,000 r/	108,000 r/	97,500 r/	96,700 r/	97,000
Australia e/ 4/	35,000	35,000	35,000	35,000	35,000
Bosnia and Herzegovina e/	XX	XX	1,000	800	1,000
Brazil (beneficiated)	180,000	130,000	131,000 r/	113,000 r/	130,000
Burma	416	684 r/	693 r/	200 r/	300
Chile	1,210	1,050	1,080 r/	989 r/	1,000
Croatia e/	XX	XX	10,000	10,000	10,000
Cyprus	82,000	58,500	58,800	60,000 e/	50,000
Egypt e/	4,900 5/	4,900	4,900	4,900	4,900
France e/	10,000	10,000	6,000 5/	6,000 r/	7,000
Germany: Western states	577,000	583,000	581,000	473,000 r/	475,000
Greece	593,000	600,000	600,000 e/	600,000 e/	500,000
Guatemala e/	9,000	12,000	12,600	12,300	4,410 5/
Hungary	36,600	18,100	23,000	25,000 e/	25,000
Indonesia	5,910	21,500	18,000	13,700 r/	14,000
Iran 6/	51,100	40,500	47,700	85,000 r/	84,000 5/
Italy	228,000	385,000	150,000 r/	-- r/	--
Japan	549,000	554,000	534,000	517,000 r/	484,000 5/
Macedonia e/	XX	XX	40,000	35,000	30,000
Mexico	145,000	145,000	136,000	94,600 r/	100,000
Morocco	4,000 e/	9,230	8,140	10,200 r/	10,200
Mozambique	--	664	20	100 e/	3,350 5/
New Zealand (processed)	1,390	--	--	1,610 r/	1,500
Pakistan	3,240	5,110	6,060	7,990 r/	8,000
Peru	45,000 e/	55,300	14,500	14,500	14,500
Philippines	14,600 r/	42,100	31,900	5,050 r/	25,000
Poland	69,000	38,000	40,000 e/	40,000 e/	40,000
Romania e/	150,000	150,000	120,000	120,000	110,000
Serbia and Montenegro e/	XX	XX	5,000	5,000	5,000
South Africa, Republic of 7/	66,100	64,600	44,000	50,400 r/	71,800 5/
Spain e/	151,000 5/	150,000	150,000	150,000	150,000
Tanzania e/	75	75	70	70	70
Turkey	97,500	124,000	124,000	382,000 r/	300,000
U.S.S.R. e/ 8/	2,700,000	2,400,000	2,000,000	1,600,000	1,300,000
United States	3,470,000	3,430,000	2,950,000	2,870,000 r/	3,290,000 5/
Yugoslavia 9/	103,000	85,000 e/	XX	XX	XX
Zimbabwe 7/	99,900	99,900	83,000	83,000 e/	169,000 5/
Total	9,620,000 r/	9,390,000 r/	810,000 r/	7,550,000 r/	7,580,000

e/ Estimated. r/ Revised. XX Not applicable.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Table includes data available through July 12, 1995.

3/ In addition to the countries listed, Canada and China are believed to produce bentonite, but output is not reported, and available information is inadequate to make reliable estimates of output levels.

4/ Includes bentonitic clays.

5/ Reported figure.

6/ Year beginning Mar. 21 of that stated.

7/ May include other clays.

8/ Dissolved in Dec. 1991; however, information is inadequate to formulate reliable estimates for individual countries.

9/ Dissolved in Apr. 1992.

TABLE 26
FULLER'S EARTH: WORLD PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons)

Country 3/	1990	1991	1992	1993	1994 e/
Algeria	7,840 r/	4,530	3,660 r/	3,230 r/	3,250
Argentina e/	2,000	2,000	1,500	1,600	1,600
Australia (attapulgit) e/	20,000	15,000	15,000	15,000	15,000
Germany: Western states (unprocessed)	653,000	708,000	673,000	670,000 e/	650,000
Italy	45,800	23,400 r/	30,000 r/	30,000 e/	30,000
Mexico	29,900	41,100	41,100	36,100 r/	36,100 4/
Morocco (smectite)	45,200	37,600	38,100 r/	38,700 r/	22,800 4/
Pakistan	16,500	22,100	22,000	20,900 r/	21,000
Senegal (attapulgit)	115,000	129,000	112,000	112,000 e/	112,000
South Africa, Republic of (attapulgit)	7,630	8,110	8,240	7,030 r/	10,100 4/
Spain (attapulgit) e/	53,900 r/	72,900 r/	87,300 r/	85,000 r/	85,000
United Kingdom 5/	205,000 r/	189,000	189,000 r/	187,000 r/	190,000
United States 6/	2,310,000	2,740,000	2,410,000	2,450,000	2,640,000 4/
Total	3,510,000 r/	3,990,000 r/	3,640,000 r/	3,660,000 r/	3,820,000

e/ Estimated. r/ Revised.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits may not add to totals shown.

2/ Excludes centrally planned economy countries and former such countries, some of which presumably produce fuller's earth, but for which no information is available. Table includes data available through July 12, 1995.

3/ In addition to the market economy countries listed, France, India, Iran, Japan, and Turkey have reportedly produced fuller's earth in the past and may continue to do so, but output is not reported, and available information is inadequate to make reliable estimates of output levels.

4/ Reported figure.

5/ Salable product.

6/ Sold or used by producers.

TABLE 27
KAOLIN: WORLD PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons)

Country 3/	1990	1991	1992	1993	1994 e/
Algeria	18,000	21,500	21,500	21,500	21,500
Argentina	33,900 r/	47,100 r/	43,700 r/	42,100 r/	43,000
Australia (includes ball clay) e/	200,000	190,000	180,000	180,000	200,000
Austria (marketable)	81,300	72,400 r/	64,700 r/	64,400 r/	87,000
Bangladesh 4/	7,220	7,340	7,300 e/	7,500	7,500
Belgium e/	175,000	260,000 5/	325,000	300,000	300,000
Bosnia and Herzegovina e/	XX	XX	3,000	3,000	3,000
Brazil (beneficiated)	659,000	746,000	790,000 r/	750,000	760,000
Bulgaria	186,000	106,000	104,000 r/	110,000 e/	110,000
Burundi	5,280	6,680	9,690	5,000 e/	5,000
Chile	32,400	63,100	59,100 r/	66,900 r/	67,000
Colombia (includes common clay) e/	1,920,000 r/	1,980,000 r/	2,050,000 r/	2,100,000 r/	6,700,000 5/
Czech Republic	XX	XX	XX	2,340,000 r/	2,710,000 5/
Czechoslovakia (marketable) 6/	872,000	705,000	700,000 e/	XX	XX
Denmark (sales)	17,400	17,100	3,500	3,500 e/	3,500
Ecuador	7,880	4,050 r/	3,920 r/	1,940 r/	2,000
Egypt	49,000	193,000	190,000 e/	157,000 r/	157,000
Ethiopia e/ 7/	670	370	420	500	400
France (marketable)	370,000 r/	344,000 r/	334,000	295,000 r/ e/	300,000
Germany:					
Eastern states (marketable) e/	200,000	XX	XX	XX	XX
Western states (marketable)	684,000	XX	XX	XX	XX
Total e/	884,000	684,000	1,190,000 r/	981,000 r/	1,000,000
Greece	170,000	189,000	200,000 r/ e/	200,000 r/ e/	200,000
Guatemala	2,050	3,280	2,860	3,000 e/	3,000
Hungary (processed)	28,600	14,100	7,000 r/	15,000 r/	15,000 5/
India:					
Saleable crude	631,000	628,000	625,000 e/	519,000 r/	550,000
Processed	104,000	113,000	110,000 e/	129,000 r/	150,000
Indonesia	160,000	140,000	231,000	42,400 r/	45,000
Iran	150,000 e/	150,000	264,000	452,000 r/	450,000
Israel e/	42,200 5/	53,000	53,000	53,000	53,000
Italy:					
Crude	67,300	57,900 r/	33,000 r/	-- r/	--
Kaolinitic earth	17,900	16,000	15,000 e/	10,000 r/ e/	10,000
Japan	165,000 r/	130,000	123,000	110,000	114,000 5/
Korea, Republic of	1,450,000	1,760,000	1,860,000	2,330,000 r/	2,600,000
Madagascar	485	496	756	700 e/	700
Malaysia	153,000	187,000	245,000	250,000	253,000 5/
Mexico	156,000	167,000	144,000	216,000 r/	216,000 5/
New Zealand	25,400	21,300	27,500 r/	26,500 r/	28,000
Nigeria e/	1,360 5/	1,300	1,300	1,300	1,300
Pakistan	61,600	44,700	37,400	37,200 r/	38,000
Paraguay e/	74,000	74,000	74,000	74,000	74,000
Peru e/	8,000	7,100	5,500	5,500	5,500
Poland	48,100 r/	44,100 r/	42,400 r/	44,000 r/ e/	44,000
Portugal	108,000 r/	150,000 r/	100,000 r/ e/	75,000 r/ e/	75,000
Romania e/	250,000	250,000	200,000	200,000	200,000
Serbia and Montenegro:					
Crude	XX	XX	112,000 r/	36,600 r/	50,000
Washed	XX	XX	9,300 r/	4,800 r/	5,000
Slovakia	XX	XX	--	25,000	25,000
Slovenia: e/					
Crude	XX	XX	15,000	10,000	10,000
Washed	XX	XX	5,000	4,000	4,000
South Africa, Republic of	132,000	134,000	132,000	147,000 r/	131,000 5/
Spain (marketable): 8/					
Crude e/	125,000	125,000	74,500 r/ 5/	75,000 r/	75,000
Washed	423,000	413,000 e/	305,000 r/	150,000 r/ e/	75,000
Sri Lanka	7,730	7,740	6,760	7,000 e/	7,500
Sweden e/	108 5/	100	100	100	100
Taiwan	105,000	93,000	100,000 e/	100,000 e/	100,000
Tanzania	2,020	1,740	1,700 e/	1,700 e/	1,700
Thailand (beneficiated)	208,000	256,000	301,000	397,000 r/	415,000

See footnotes at end of table.

TABLE 27--Continued
KAOLIN: WORLD PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons)

Country 3/	1990	1991	1992	1993	1994 e/
Turkey	251,000	187,000	134,000	139,000 r/	150,000
U.S.S.R. e/ 9/	1,800,000	1,600,000	1,300,000	1,000,000	800,000
United Kingdom (sales)	3,040,000	2,910,000	2,500,000 r/ 10/	2,580,000 r/ 10/	2,600,000
United States 11/	9,760,000	9,570,000	8,740,000	8,830,000 r/	8,320,000
Venezuela	12,000	39,000	37,000	22,000 r/	25,000
Vietnam e/	750	800	800	800	1,000
Yugoslavia 12/	199,000	170,000 e/	XX	XX	XX
Zimbabwe	--	65	83	90 e/	462
Total	25,500,000 r/	25,200,000 r/	24,200,000 r/	25,700,000 r/	30,400,000

e/ Estimated. r/ Revised. XX Not Applicable.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Table includes data available through July 12, 1995.

3/ In addition to the countries listed, China, Lebanon, Morocco, and Suriname may also have produced kaolin, but information is inadequate to make reliable estimates of output levels.

4/ Data for year ending June 30 of that stated.

5/ Reported figure.

6/ Dissolved in Dec. 1992.

7/ Data for year ending July 7 of that stated.

8/ Includes crude and washed kaolin and refractory clays not further described.

9/ Dissolved in Dec. 1991. This commodity is believed to be produced mainly in Uzbekistan and Ukraine; however, information is inadequate to formulate reliable estimates of individual country production.

10/ Dry weight.

11/ Kaolin sold or used by producers.

12/ Dissolved in Apr. 1992.