

# CLAYS

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The amount of clay sold or used by domestic producers increased to 43.1 million metric tons valued at \$1.73 billion. Production of bentonite, fire clay, and kaolin increased in 1995. Production of fuller's earth was essentially unchanged. Common clays accounted for 59% of the tonnage. Kaolin accounted for 64% of the value of clays produced in 1995. Imports decreased to 35,000 tons valued at \$16 million. Exports increased to 4.68 million tons valued at \$812 million. (See table 1.)

## 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 is 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 284 companies operating 823 clay pits or mines reported production in 1995; of these, 90 companies, most with multiple operations, accounted for approximately 83% of the tonnage and 90% 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, Rhode Island, Vermont, Wisconsin, and the District of Columbia.

The 10 leading producer States, in descending order, were Georgia, Wyoming, Alabama, Texas, North Carolina, Ohio, California, South Carolina, Missouri, and Tennessee. (See table 2.)

Most of the clay was mined by open pit methods. Less than 1% of U.S. clay output was from underground mines in 1995. 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.

Domestic production data for clays were developed by the U.S. Geological Survey (USGS) from a voluntary survey of U.S. operations. Of the 499 operations covered by the survey, 416 responded, representing 83% 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.

**Ball Clay.**—The ball clay industry was small, with 4 producers operating 38 mines in 5 States in 1995. Three of the producers were large, diversified firms with widespread foreign and domestic mineral interests.

Production of domestic ball clay decreased 3% to 993,000 thousand tons valued at \$45.5 million. Tennessee supplied 67% of the Nation's output, followed by, in descending order of production, Kentucky, Texas, Mississippi, and Indiana. Production increased in Kentucky (21%), Mississippi (2%), and Texas (2%). Production decreased slightly in Tennessee and was unchanged in Indiana. Water-slurried ball clay was produced in Kentucky and Tennessee. Production decreased 5% in 1995. Air-float ball clay was produced in Indiana, Kentucky, Mississippi, and Tennessee. Air-float production increased 6% with the largest increase being in Kentucky. Sales of unprocessed ball clay declined 12% in 1995. (See table 3.)

H. C. Spinks Clay Co. Inc. announced plans for an expansion of its wet processing facility at Gleason, TN. The expansion will double the capacity of its Flo-Tech plant and allow H. C. Spinks to expand its product line.<sup>1</sup>

**Bentonite.**—Twenty-one firms producing bentonite operated 114 mines in 11 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 3.82 million tons valued at \$138 million. Production of nonswelling bentonite decreased slightly to 510,000 tons valued at \$27.6 million. Mississippi led all States in the production of nonswelling bentonite, followed closely by Alabama and then California, Texas, Arizona, Oregon, Colorado, Nevada, and Montana. Of the major producing States, production increased in Alabama (21%) and Mississippi (18%). In both States, a single producer accounted for most of the increase. Increases also occurred in Texas. Production decreased in Arizona and Colorado. Production was unchanged in California, Montana, Nevada, and Oregon. No production of nonswelling bentonite was reported in Utah in 1995.

Production of swelling bentonite increased 16% to 3.31 million tons valued at \$111 million. Wyoming led all States in the production of swelling bentonite, followed by Montana, Utah, California, Oregon, Texas, and Nevada. Of the major producing States, production increased in Wyoming (6%) and Montana (16%). In Wyoming, three producers reported large increases in production while in Montana, one company accounted for most of the increase. Significantly smaller increases also were reported in California, Texas, and Utah. Production in Nevada and Oregon declined. No production was reported in Tennessee in 1995. (See table 5.)

Bentonite Corp. reopened its Lovell, WY plant which had

been idle since 1986. The company installed a new fine granular grinding circuit and began producing three of Bentonite Corp.'s products.<sup>2</sup>

Cimbar, a division of Baroid Drilling Fluids Inc., began marketing bentonite for Bentonite Corp. The products were modified and targeted for the paint and coatings market. Bentonite Corp. was purchased by Baroid Drilling Fluids in 1993.<sup>3</sup>

American Colloid Co. announced plans to construct a blending plant for foundry compounds near Lufkin, TX. The company also approved the formation of Nanacor Inc. that will produce and sell chemically modified clays to the plastic industry.<sup>4</sup>

**Common Clay and Shale.**—Two hundred and eight firms producing common clay and shale in 1995 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 decreased slightly to 25.6 million tons valued at \$151 million. The major producing States were North Carolina, Texas, Alabama, Ohio, Georgia, California, South Carolina, Arkansas, and Missouri, in descending order of tonnage. The largest increases in production, with respect to tonnages, were in Alabama (3%); Arkansas (10%); California (7%); Indiana (13%); New York (11%); South Carolina (8%); Texas (6%); and Utah (59%). The largest decreases, with respect to tonnages, were in Georgia (3%); Michigan (46%); North Carolina (4%); Ohio (5%); and Oklahoma (13%). (See table 7.)

**Fire Clay.**—Fire clay producers were mostly refractories manufacturers that used the clays in firebrick and other refractories. Forty-six mines were operated in 1995 by 20 firms in 8 States.

Fire clay sold or used by domestic producers increased 28% to 583,000 tons valued at \$12.8 million. Missouri, was the leading producing State, followed by Ohio, Alabama, South Carolina, Arkansas, California, New Mexico, and Montana. The largest increase in production, with respect to tonnage, was in Missouri (69%). Most companies in Missouri reported large increases in production. Production declined in Ohio (63%) and was unchanged in Arkansas, Missouri, and New Mexico. In Ohio, two companies accounted for the decline. No production was reported in Colorado, Georgia, and Washington in 1995. (See table 9.)

**Fuller's Earth.**—Seventeen companies produced fuller's earth from 30 mines in 11 States. Nine of the mines were in the attapulgite-type 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 remained essentially unchanged at 2.64 million tons valued at \$269 million. Production of attapulgite-type fuller's earth was 967,000 tons valued at \$131 million in 1995. 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 by 11% in tonnage in Georgia and by 6% in Nevada. Two companies in Georgia accounted for most of the increase in domestic production of attapulgite.

Production of montmorillonite-type fuller's earth was 1.67 million tons valued at \$137 million. Mississippi led all States in production, followed closely by Illinois and Missouri. These States were followed by California, Florida, Tennessee, Georgia, Kansas, Virginia, and Texas, in decreasing order of production. The greatest changes in production were in Illinois and Mississippi, where production decreased 9% and 8%, respectively. One company in Illinois and three companies in Mississippi accounted for most of the declines in these two States. Production in other States was essentially unchanged. (See table 11.)

U.S. Silica announced plans to sell its subsidiary, Floridin Corp. Floridin was producing attapulgite for absorbent, agricultural, fertilizer, and filler and extender applications. A proposal by Engelhard Corp. to purchase Floridin was still undergoing review by the courts.<sup>5</sup>

**Kaolin.**—Thirty-three firms operated 154 kaolin mines in 14 States. In 1995, four firms accounted for approximately 56% of total domestic kaolin output. The kaolin operations were concentrated in Georgia.

Domestic production of kaolin was 9.48 million tons valued at \$1.11 billion. Georgia was the largest kaolin producer with 87% of domestic production, followed by South Carolina, Alabama, Arkansas, California, Nevada, North Carolina, Texas, Florida, Minnesota, Pennsylvania, Colorado, and Tennessee in decreasing order of production. With respect to tonnage, the largest change was in Georgia where production increased about 9% or 670,000 tons. In Georgia, three producers accounted for most of the increase, reporting increases in air-float, delaminated, water-washed, and low-temperature calcined (or pigment-grade) kaolin. Production for 1994 was estimated to be 8.07 million tons rather than the 7.57 million reported in table 13. Production also increased in Alabama (87%), California (23%), Colorado (256%), and Minnesota (5%). In Alabama, one producer accounted for the significant increase in production. Production remained the same or declined in the other producing States. In South Carolina, two producers reported decreased production of air-float kaolin. (See table 13.)

Approximately 46% of the kaolin produced was water-washed; followed by calcined, 20%; delaminated, 17%; air-floated, 13%; and unprocessed, 4%. (See table 14.) These relative percentages were essentially unchanged from 1994. Air-float kaolin increased 2% and water-washed kaolin increased 3%. The increase in calcined kaolin (23%) and

delaminated kaolin (23%) probably was lower than reported. The increase for both types was estimated to be approximately 6% rather than 23% based on revised data for 1994 received from a major producer.

Production of low-temperature calcined kaolin increased in 1995. (See table 15.) The increase, however, was not as great as reported. In 1994, some low-temperature (pigment/filler-grades) kaolin was incorrectly classified under the high-temperature calcined kaolin category. Based on revised data, the increase was estimated to be approximately 12% for high-temperature calcined kaolin and 10% for low-temperature calcined kaolin. Total U.S. sales of low-temperature calcined kaolin were estimated to be between 580,000 and 600,000 tons, and high-temperature calcined kaolin sales were estimated to be between 1,050,000 and 1,100,000 tons in 1994.

Production in Georgia was 8.24 million tons valued at \$1.06 billion. Over one-half of the production was water-washed kaolin. (See table 16.) Air float, delaminated, and water-washed kaolin production were estimated to have increased around 5% based on revised producer data for 1994. Production in South Carolina decreased slightly. The actual decrease is larger than shown in table 18 because the tonnage for unprocessed kaolin was concealed to avoid revealing company proprietary data in 1994. Two producers in South Carolina reported large decreases in production of air float kaolin. (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.).

Kentucky-Tennessee (K-T) Clay Co., a subsidiary of Hecla Mining Co., acquired J. M. Huber's kaolin operation in Langley, SC. The purchase will enhance the company's ability to produce filler-grade kaolin for paint, rubber, and plastics. K-T Clay will close its mill at Aiken, SC and process kaolin from the Aiken and Langley mines at Langley.<sup>6</sup> Engelhard Corp. announced plans to expand its operations in Georgia. A new calciner will be added. The \$40 million expansion will increase production of two of its calcined products.<sup>7</sup> Evans Clay Co. installed a new roller mill which increased the companies milling capacity by 130,000 tons per year.<sup>8</sup>

## Consumption

**Ball Clay.**—The principal domestic ball clay markets were floor and wall tile, pottery, and sanitaryware. (See table 4.) Consumption decreased in 1995. Increases occurred in sales for miscellaneous ceramics (electrical porcelain, china, glazes, fiber glass, etc.), pottery, and refractories (firebrick, blocks and shapes; high-alumina brick; kiln furniture; grogs and calcines; and miscellaneous refractories). Under miscellaneous ceramics, the greatest sales increase occurred for fiber glass and glazes. Under refractories, the miscellaneous refractories category increased the most. Sales declined in the other major end-use categories. The declines were distributed among the producers with no single producer or State accounting for a large percentage of the decline.

**Bentonite.**—Major markets for bentonite were drilling mud,

foundry sand, iron ore pelletizing, and pet waste absorbents. Consumption increased for each of these major markets as well as for adhesive, animal feed, filler and extender, and miscellaneous refractories applications. (See table 6.)

Sales of swelling bentonite for pet waste absorbents continued its rapid growth due to the marketing success of clumping kitty litters. Wyoming accounted for most of this increase. Wyoming also accounted for the increased sales to the drilling mud, pelletizing, and miscellaneous refractories markets. Texas accounted for the bulk of the increase for fillers and extenders, while increased sales of foundry sand were attributed principally to Montana and Alabama. Foundry sand sales in Wyoming declined in 1995. Wyoming also accounted for most of the decline in sales for waterproofing and sealing. As in previous years, it was estimated that about 100,000 tons of the bentonite reported under domestic consumption was exported to the Canadian iron ore industry. (See table 6.)

With regard to the sales of swelling versus nonswelling bentonite, most of the data was concealed to avoid disclosing company proprietary data. Well over two-thirds of the bentonite sold for pet waste absorbent applications was swelling bentonite, while all of the bentonite sold for oil and grease absorbent applications was the nonswelling variety. Only swelling bentonite was sold for adhesives applications. For animal feed applications, 77% of bentonite sold was the swelling variety. The bulk of the bentonite sold for ceramics was swelling bentonite and essentially all of the bentonite used in drilling mud applications was the swelling variety. Only swelling bentonite was sold for filler and extender applications. Well over two-thirds of the bentonite sold for foundry sand applications was swelling bentonite while over two-thirds of the bentonite sold for filtering, clarifying, and decolorizing applications was nonswelling. Bentonite sold for pelletizing iron ore was exclusively swelling bentonite. All of the refractory-grade bentonite was of the swelling variety. Over 98% of the bentonite used for civil engineering, waterproofing, and sealing was swelling bentonite. The major uses for swelling bentonite were in iron ore pelletizing, drilling mud, foundry sand, pet waste absorbent, waterproofing and sealing, animal feed, and paint, in decreasing order of consumption. The major uses for nonswelling bentonite were in pet waste absorbent, oil and grease absorbent, foundry sand, miscellaneous absorbents, filtering and clarification of vegetable oil, and animal feed, 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 of common clay and shale for ceramics and glass, civil engineering and sealing, floor and wall tile, flowerpots, concrete lightweight aggregate, and refractories increased in 1995. Sales of common clay and shale for extruded brick declined slightly as did sales for drain tile, sewer pipe, flue linings, structural tile, and portland cements. The largest decline was for portland cement applications while the largest gains were made in sales for lightweight aggregate and

refractories. (See table 8.) Much of the mortar and cement reported under refractories, however, probably should be placed under portland cement, thereby reducing the decline in sales for portland cement and increase in sales for refractories to expected levels.

**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 increased in 1995 as reported by domestic producers. Major markets for fire clay were firebrick, followed by grogs and calcines, portland cement, refractory mortar and cement, common brick, pottery, high-alumina brick, drain tile, and waterproofing and sealing, in decreasing order of consumption. (See table 10.) Firebrick (168,000 tons) and grogs and calcines (147,000 tons) were the major uses for fire clay.

Sales of fire clay for heavy clay products and lightweight aggregates increased in 1995. Most of the increase was accounted for by Alabama and Missouri. In Missouri, sales for portland cement increased; in Alabama and Ohio, sales for drain tile increased, in California, sales for unspecified heavy clay products increased, and in South Carolina, sales production for brick increased. Overall sales for firebrick increased slightly with increased sales for firebrick applications in Missouri offsetting a sizable decline in sales in Ohio. Sales for “Other refractories” applications also increased. Under this category, sales for grog and calcine, miscellaneous refractory, and refractory mortar and cement applications increased in Missouri. Sales of miscellaneous refractories declined in Alabama and sales for foundry sand and refractory mortar and cement applications declined in Ohio. Sales for grog and calcine applications accounted for most of the increase in the “Other refractories” category.

**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.) Overall consumption of fuller's earth was unchanged in 1995. However, sales of attapulgite-type fuller's earth increased while those of montmorillonite-type fuller's earth decreased a corresponding amount.

Consumption declined slightly for the major end uses. Declines also were observed for all of the minor end uses except animal feed and drilling mud applications. Mississippi accounted for most of the decline in sales for pet waste absorbent applications, while Illinois accounted for most of the decline in sales for oil and grease absorbent applications. In both cases, the decline was in sales of montmorillonite-type fuller's earth. Sales for animal feed applications increased while sales for filler and extender applications decreased. This change occurred because a single producer of montmorillonite-type fuller's earths shifted its sales from the asphalt tile market to the animal feed market. Decreased sales of montmorillonite,

particularly in Florida, accounted for much of the decline in the filtering, clarifying, and decolorizing category.

With regard to the sales of attapulgite-type fuller's earth versus montmorillonite-type fuller's earth, most of the data were concealed to avoid disclosing company proprietary data. Approximately 139,000 tons of attapulgite was sold for oil and grease absorbents and 367,000 tons was sold for pet waste absorbents, accounting for 14% and 38% of the total attapulgite market, respectively. Smaller markets were miscellaneous absorbent, fertilizer, portland cement, gypsum products (primarily joint compound), drilling mud, animal feed, pesticide, roofing granule, adhesive, and chemical manufacturing applications, in decreasing order of consumption.

Attapulgite accounted for the bulk of the sales for miscellaneous absorbents, less than 25% of animal feed sales, over 75% of the drilling mud sales, and over 50% of the fertilizer sales. Only attapulgite was used to decolorize or clarify mineral oils and greases while only montmorillonite was used to decolorize or clarify animal oils. Over one-half of the fuller's earth sold or used for decolorizing, clarifying, and filtering was used for processing animal oils. Over one-half of the fuller's earth used as pesticide carriers was montmorillonite. Within the filler and extender category, attapulgite dominated the gypsum product, asphalt emulsion, and miscellaneous categories. Over one-half of the fuller's earth sold for adhesive and asphalt tile applications was montmorillonite. Under the “Miscellaneous” category, most of the fuller's earth sold was used for catalyst, roofing granule, chemical manufacture, and floor and wall tile was attapulgite.

The major uses for montmorillonite-type fuller's earth were pet waste absorbents, pesticide carriers, oil and grease absorbents, and animal feed, in decreasing order of consumption.

**Kaolin.**—Producers reported an increase in sales in 1995. The major markets were in paper coating, paper filler, high alumina specialties, fiber glass, paint, rubber, grogs and calcines, common brick, high alumina refractory brick, and pet waste absorbent applications, in decreasing order of consumption. (See table 20.)

The greatest changes in end uses were in paper coating and high alumina brick, specialties, and kiln furniture applications. While sales for paper coating increased in 1995, the increase was believed to be less than shown in table 20. Revised data indicate that the 1994 data were under reported. Although a large decrease in sales for catalyst (oil and gas refining) applications is shown in table 20, revised data indicated sales were 213,000 tons in 1995. The increase in sales to the high alumina brick, specialties, and kiln furniture was accounted for by producers in Alabama and Georgia. The bulk of the changes in sales for electrical porcelain, fine china, tile, roofing granules, and sanitaryware was attributed to changes in sales by producers in Georgia. Arkansas accounted for most of the decline in sales for chemical manufacturing, while improved sales in Georgia accounted for the increase in sales for fiberglass and mineral wool. Changes in markets by producers in Georgia accounted for most changes in filler, extender, and binder categories except

for medical, pharmaceutical, and cosmetics. In this market, sales declined in Arkansas while increasing in Texas. Changes in markets for producers in Alabama and Georgia accounted for all changes under the "Refractories" category.

Major domestic markets for kaolin from Georgia were paper coating, paper filling, refractories, fiberglass, paint, catalyst, and rubber applications, in decreasing order of consumption. Sales for most uses increased. The exceptions were roofing granule, paper filling, and heavy clay product applications. Besides improved sales in the United States, sales for export also increased significantly with Georgia dominating the kaolin exports.

The major market for kaolin from South Carolina was brick manufacture, followed by rubber, catalyst, fiber glass, roofing granules, sanitaryware, pesticide, paper coating, paper filling, and plastics, in decreasing order of consumption. Sales for fiberglass, adhesive, fertilizer, paint, plastic, and rubber applications decreased while sales for brick manufacture, paper coating, and roofing granule applications increased. No major changes were reported for other end-use categories. A large decrease was reported for kaolin exports, most of which was accounted for by a loss in sales for rubber applications. (See tables 17 and 19.)

**Absorbent Uses.**—Absorbent uses for clays accounted for about 2.51 million tons. Pet waste absorbents accounted for approximately 84% of absorbent consumption, followed by oil and grease absorbents (14%), and miscellaneous absorbent applications (2%). Demand for absorbents increased in 1995 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.)

**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 1.72 million tons. The largest ceramics market was in ceramic floor and wall tile, followed by sanitaryware, catalyst, pottery, roofing granule, quarry tile, fine china, electrical porcelain, and glaze application. Ball clay accounted for 37% of the clay used in ceramics, followed by kaolin (32%) and common clay and shale (30%). 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 electrical porcelain, glazing, pottery, and sanitaryware markets. Common clay and shale was the predominant clay used in roofing granules and wall 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 4.17 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. Approximately 6.71 million tons of clays was consumed. 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 13.9 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 94% of this total. Other markets, in decreasing order of consumption, were sewer pipe, flue linings, flower pots, structural tile, drain tile, roofing tile, and terra cotta. 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 6.94 billion bricks valued at \$1.04 billion, a decrease from 1994. Shipments of clay floor and wall tile increased to 53.2 million square meters valued at \$669 million in 1995. Shipments of vitrified clay and sewer pipe fittings increased to 125,000 tons valued at \$37.7 million.

**Drilling Mud.**—Reported demand for clays in drilling muds was 663,000 tons. Swelling-type bentonite remained the principal clay used in drilling mud mixes (95%). Fuller's earth, used mostly in saltwater drilling techniques, accounted for 4% of the total. Some ball clay and kaolin also was used. (See tables 6 and 12.)

**Filler.**—Approximately 5.59 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 71% of the filler and extender market consumption, followed by pesticides (6%), paint (6%), rubber (4%), and animal feed (4%).

Kaolin accounted for approximately 85% of the clay used in filler and extender applications, followed by fuller's earth (9%), bentonite (3%), ball clay (2%), common clay and shale (1%), and minor amounts of fire clay. (See tables 4, 6, 12, and 20.) Ball clay dominated the asphalt emulsion market. Bentonite was the predominant clay used for ink applications. Fuller's earth was the predominant clays used in asphalt tile, fertilizer, gypsum product, and pesticide applications. Kaolin dominated the adhesive, linoleum, medical (and pharmaceutical and cosmetic), paint, paper, plastic, and rubber markets.

**Glass.**—Approximately 402,000 tons of kaolin was used in fiberglass and mineral wool. A small amount of bentonite also was used as a raw material feed for manufacturing fiberglass. (See table 20.)

**Iron Ore Pelletizing.**—Demand increased to 657,000 tons in 1995. 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 (2.80 million tons) and all of the clay used for paper filling (853,000 tons). (See table 20.) Small amounts of bentonite were used in paper coating applications.

**Refractories.**—Approximately 2.87 million tons of clays was used for the manufacture of refractories. The largest markets were foundry sand (26%), high alumina specialties (26%), grogs and calcines (13%), firebrick (9%), refractory mortar and cement (7%), and high alumina brick (6%). Ball clay, bentonite, common clay and shale, fire clay, and kaolin accounted for 2%, 27%, 16%, 14%, and 41%, respectively, of the refractories markets. Fire clay dominated the firebrick market, bentonite dominated the foundry sand market, and kaolin dominated the grog, calcine, and high alumina brick and specialties markets. (See tables 4, 6, 8, 10, and 20.)

The Bureau of the Census reported shipments of clay refractories to be valued at \$929,000 in 1995, an increase of 3% from 1994. Shipments of fire clay brick and shapes were 869,000 tons (302,000 bricks) valued at \$565,000 in 1995; high alumina brick and shapes, 430,000 tons (104,000 bricks) valued at \$294,000; and insulating brick and shapes, 55,000 tons valued at \$59,000. Shipments of unshaped clay refractories included refractory bonding mortars, 600,000 tons valued at \$320,000; and plastic refractories, 154,000 tons valued at \$82,700. Shipments of castable refractories were 285,000 tons valued at \$162,000. Shipments of fire clay gunning mixes were 114,000 tons valued at \$46,600.

## Prices

**Ball Clay.**—The average value for ball clay reported by domestic producers was \$45.82 per ton. The average value of imported ball clay was \$156.35 per ton. The average value of exported ball clay was \$62.81 per ton.

**Bentonite.**—The average value reported by domestic producers for nonswelling bentonite was \$54.12 per ton. The average value for swelling bentonite was \$33.53 per ton. The average value for all types of bentonite was \$36.13 per ton. The average value of imported bentonite was \$271.06 per ton. The average value of exported bentonite was \$102.38 per ton.

**Common Clay and Shale.**—The average value for all common clay and shale produced in the United States and Puerto Rico was \$5.90 per ton. The average value of clay and shale used in lightweight aggregate was \$12.11 per ton.

**Fire Clay.**—The average value for fire clay reported by domestic producers was \$21.96 per ton. The average of imported fire clay was \$456.77 per ton. The average value of exported fire clay was \$102.60 per ton.

**Fuller's Earth.**—The average value of attapulgite-fuller's earth reported by domestic producers was \$124.78 per ton. The average value of montmorillonite-fuller's earth was \$84.76 per ton. The average value of all types of fuller's earth was \$101.89 per ton. The average value of imported fuller's earth was \$344.39 per ton. The average value of exported fuller's earth was \$143.63 per ton.

**Kaolin.**—The average value of kaolin was \$110.84 per ton for all kaolin grades. The average value for air-float kaolin was \$55.45 per ton; for high-temperature calcined kaolin, \$105.67; for low-temperature calcined kaolin, \$270.33; for all types of calcined kaolin, \$130.91 per ton; for delaminated kaolin, \$118.57 per ton; for water-washed kaolin, \$123.89 per ton; and for unprocessed kaolin, \$22.76 per ton. The average value of the imported kaolin was \$239.14 per ton. The average value of exported kaolin was \$172.27 per ton.

## Foreign Trade

**Ball Clay.**—Ball clay exports decreased 65% to 28,300 tons valued at \$1.78 million, according to the Bureau of the Census. (See table 23.) Most of the decline resulted from decreased shipments to Japan and Mexico. Domestic ball clay producers reported that 110,000 tons of ball clay was exported in 1995. 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. One 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. Another reason is that some clay may be exported under an export code other than that corresponding to ball clay, such as kaolin.

Imports in 1995 were 1,370 tons of ball clay valued at \$338,000. (See table 24.)

**Bentonite.**—Bentonite exports decreased slightly to 733,000 tons valued at \$75 million. Domestic bentonite producers reported exports of 431,000 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 3,110 tons valued at \$962,000. Imports of chemically activated material were 15,200 tons valued at \$8.36 million. (See table 24.)

**Fire Clay.**—Exports of fire clay were 281,000 tons valued at \$28.8 million. According to the Bureau of the Census, 1,350 tons valued at \$831,000 was imported in 1995. (See tables 23 and 24.)

**Fuller's Earth.**—Approximately 63,000 tons of fuller's earth valued at \$8.98 million was exported. Domestic producers reported more than 130,000 tons exports in 1995. 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 100 tons of decolorizing and fuller's earth valued at \$45,000 was imported in 1995. (See tables 12, 23, and 24.)

**Kaolin.**—The Bureau of the Census reported that 3.24 million tons of kaolin valued at \$560 million was exported in 1995. Producers reported exports of 2.51 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 12,000 tons valued at \$3.90 million. (See table 24.)

## World Review

World production of bentonite was 8.86 million tons, fuller's earth production was 3.58 million tons, and kaolin production was 36.6 million tons. The United States continued to be the leading producer of all three clay types, followed by the former Soviet Union for bentonite, Germany for fuller's earth, and Uzbekistan for kaolin. (See tables 25, 26, and 27.)

**Brazil.**—Mendes Junior Participacoes, a Brazilian investment group, sold its share in Rio Capim Caulim to private interests and Amberger Kaolinwerke GmbH (AKW). The sale was not expected to affect the development plans.<sup>9</sup> Three superconducting magnetic separators were purchased by Brazilian kaolin producers. Two were sold to Para Pigmentos SA and Rio Capim Caulim, both of who were constructing new plants.<sup>10</sup>

**Canada.**—Bruneau Minerals Inc. continued its study of a kaolin deposit in Quebec. Reserves were estimated to exceed 5.4 million tons with an average content of 50% kaolin.<sup>11</sup>

**Turkey.**—Anadolu Endustri Mineralleri Ltd. obtained mining rights to two sepiolite deposits in central Anatolia. The deposits have proven reserves of 800,000 tons and estimated reserves of more than 30 million tons. The sepiolite content of the deposits range from 50% to more than 95%.<sup>12</sup>

**United Kingdom.**—Goonvean and Rostowrack China Clay Co. Ltd. announced its intention to purchase the kaolin mines of Redland plc. Redland acquired its Bodelva and Greensplatt kaolin operations when it took over the operations of Steetley Minerals Ltd.<sup>13</sup>

Laporte Absorbents purchased Perchem, a producer of organoclays, from Akzo Nobel Chemicals Ltd. Akzo will continue producing organoclays at its Littleborough facility but will market the clay under the Laporte trade name.<sup>14</sup>

## Outlook

U.S. clay demand between 1982 and 1995 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.

<sup>1</sup>Ceramic Industry. H. C. Spinks Announces Expansion. Sept. 1995, p. 15.

<sup>2</sup>Industrial Minerals (London). Bentonite Corp. Reopens Lovell Plant. No. 332, May 1995, p. 15.

<sup>3</sup>North American Minerals News. Cimbar Big on Barite. Issue 3, Aug. 1995, p. 8.

<sup>4</sup>\_\_\_\_\_. American Colloid to Build New Blending Plant. Issue 5, Oct. 1995, p. 4.

<sup>5</sup>\_\_\_\_\_. U.S. Silica and Floridin For Sale. May 1995, p. 1  
Chemical Marketing Reporter. Justice to Block Engelhard Purchase. V. 247, No. 25, June 19, 1995, p. 3.

<sup>6</sup>Hecla Mining Company News Release. Hecla Acquires Kaolin Mines and Plant in South Carolina. June 5, 1995, p. 1.

<sup>7</sup>Industrial Minerals (London). Engelhard Increases Kaolin Pigment Capacity. No. 328, Jan. 1995, p. 20.

<sup>8</sup>North American Minerals News. Evans Clay Adds Kaolin Capacity. Issue 5, Oct. 1995, p. 3.

<sup>9</sup>Industrial Minerals (London). AKW Buys into Rio Capim Kaolin Project. No. 333, June 1995, p. 9.

<sup>10</sup>Mining Journal (London). Cryofilters to Treat Kaolin at Three Plants. V. 324, No. 8308, Jan. 6, 1995, p. 8.

<sup>11</sup>Industrial Minerals (London). New Kaolin Deposit Looks Promising. No. 334, July 1995, p. 10.

<sup>12</sup>\_\_\_\_\_. AEM Acquires Sepiolite Concessions. No. 334, July 1995, p. 16.

<sup>13</sup>\_\_\_\_\_. Goonvean to Acquire Redland's Kaolin. No. 335, Aug. 1995, p. 14.

<sup>14</sup>\_\_\_\_\_. Laporte Absorbs Perchem Organoclays. No. 328, Jan. 1995, p. 15.

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

(Thousand metric tons and thousand dollars)

	1991	1992	1993	1994	1995
<u>Domestic clays sold or used by producers:</u>					
Quantity	41,000	40,200	40,700	42,000 r/	43,100
Value	\$1,460,000	\$1,470,000	\$1,470,000	\$1,590,000 r/	\$1,730,000
<u>Exports:</u>					
Quantity	4,000	4,160	4,150	4,620	4,680
Value	\$590,000	\$663,000	\$670,000	\$739,000	\$812,000
<u>Imports for consumption:</u>					
Quantity	35	41	39	36	35
Value	\$13,200	\$15,500	\$17,600	\$14,900	\$16,000

r/ Revised.

1/ Excludes Puerto Rico.

2/ Data are rounded to three significant digits.



TABLE 2  
CLAYS SOLD OR USED BY PRODUCERS IN THE UNITED STATES IN 1995, BY STATE 1/ 2/

(Thousand metric tons and thousand dollars)

State	Ball clay	Bentonite	Common clay and shale	Fire clay	Fuller's earth	Kaolin	Total	Total value
Alabama	--	154	2,080	80	--	373	2,690	33,700
Arizona	--	21	98	--	--	--	119	449
Arkansas	--	--	973	W	--	182	1,160	7,810
California	--	149	1,430	11	224	W	1,810	28,800
Colorado	--	(3/)	288	--	--	6	294	2,050
Connecticut	--	--	W	--	--	--	W	W
Florida	--	--	W	--	388	33	421	54,300
Georgia	--	--	1,660	--	744	8,240	10,600	1,160,000
Idaho	--	--	--	--	--	1	1	10
Illinois	--	--	503	--	332	--	835	1,220
Indiana	38	--	877	--	--	--	915	3,350
Iowa	--	--	322	--	--	--	322	1,590
Kansas	--	--	573	--	48	--	620	2,390
Kentucky	117	--	786	--	--	--	904	3,430
Louisiana	--	--	384	--	--	--	384	548
Maine	--	--	W	--	--	--	W	W
Maryland	--	--	278	--	--	--	278	943
Massachusetts	--	--	31	--	--	--	31	W
Michigan	--	--	623	--	--	--	623	3,430
Minnesota	--	--	27	--	--	21	48	W
Mississippi	73	164	616	--	378	--	1,230	44,000
Missouri	--	--	972	359	283	--	1,610	10,300
Montana	--	W	33	W	--	--	33	90
Nebraska	--	--	232	--	--	--	232	1,130
Nevada	--	6	--	--	W	W	6	477
New Hampshire	--	--	3	--	--	--	3	16
New Jersey	--	--	82	--	--	--	82	135
New Mexico	--	--	127	W	--	--	127	274
New York	--	--	563	--	--	--	563	12,500
North Carolina	--	--	2,430	--	--	W	2,430	12,500
North Dakota	--	--	59	--	--	--	59	W
Ohio	--	--	1,840	89	--	--	1,930	10,700
Oklahoma	--	--	674	--	--	--	674	3,580
Oregon	--	17	222	--	--	--	240	1,270
Pennsylvania	--	--	736	--	--	14	750	3,250
South Carolina	--	--	1,220	24	--	373	1,620	21,700
South Dakota	--	--	136	--	--	--	136	W
Tennessee	663	--	W	--	W	1	664	29,000
Texas	101	W	2,320	--	W	36	2,450	26,000
Utah	--	38	386	--	--	--	424	4,280
Virginia	--	--	844	--	46	--	891	3,200
Washington	--	--	220	--	--	--	220	1,040
West Virginia	--	--	184	--	--	--	184	365
Wyoming	--	2,940	29	--	--	--	2,970	89,900
Total	993	3,820	25,600	583	2,640	9,480	43,100	1,730,000

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

1/ Excludes Puerto Rico.

2/ Data are rounded to three significant digits; may not add to totals shown.

3/ Less than 1/2 unit.

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
1994:								
Tennessee	285 r/	15,200 r/	163	6,810	228 r/	7,170 r/	678 r/	29,200 r/
Other 2/	172 r/	9,500 r/	(3/)	(3/)	175	6,250	347 r/	15,800 r/
Total	457 r/	24,700 r/	163	6,810	401 r/	13,300 r/	1,020 r/	44,900 r/
1995:								
Tennessee	291	15,600	156	6,930	217	6,410	663	29,000
Other 2/	192	10,700	(3/)	(3/)	137	5,830	329	16,600
Total	483	26,300	156	6,930	354	12,200	993	45,500

r/ Revised.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes Indiana, Kentucky, Mississippi, Ohio (1994), 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	1994	1995
Filler, extenders, and binders 2/	125,000 r/	114,000
Floor and wall tile	269,000 r/	251,000
Miscellaneous ceramics 3/	37,300 r/	62,200
Pottery	123,000 r/	128,000
Refractories 4/	43,300 r/	70,800
Sanitaryware	228,000 r/	208,000
Miscellaneous 5/	70,100 r/	48,900
Exports 6/	127,000	110,000
Total	1,020,000 r/	993,000

r/ Revised.

1/ Data are rounded to three significant digits, may not add to totals shown.

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

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

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

5/ Includes absorbents, brick (common), 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
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 2/	246 r/	9,990 r/	203 r/	12,300 r/	449	22,300
Total	515	26,100	2,780	110,000	3,290	136,000
1995:						
California	W	W	W	W	149	14,000
Colorado	(3/)	9	--	--	(3/)	9
Mississippi	164	6,510	--	--	164	6,510
Nevada	W	W	W	W	6	477
Oregon	W	W	W	W	17	917
Wyoming	--	--	2,940	89,900	2,940	89,900
Other 2/	216	10,000	324	16,300	540	26,300
Total	510	27,600	3,310	111,000	3,820	138,000

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

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes Alabama, Arizona, Montana, Tennessee (1994), Texas, and Utah.

3/ Less than 1/2 unit.

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

(Metric tons)

Use	1994	1995
Domestic:		
Absorbents:		
Pet waste absorbents	455,000	574,000
Other absorbents	91,000	88,400
Adhesives	W	W
Animal feed	96,900	97,800
Ceramics (except refractories) 2/	W	W
Drilling mud	586,000	627,000
Filler and extender applications 3/	30,000	69,900
Filtering, clarifying, decolorizing:		
Animal oils, minerals oils and greases, and vegetable oils	W	W
Foundry sand	712,000	745,000
Pelletizing (iron ore)	509,000	646,000
Miscellaneous refractories and kiln furniture 4/	32,200	214,000
Miscellaneous 5/	55,400	94,900
Waterproofing and sealing	287,000	228,000
Total	2,850,000	3,390,000
Exports:		
Drilling mud	34,200	86,500
Foundry sand	321,000	256,000
Other 6/	80,500	89,100
Total	436,000	431,000
Grand total	3,290,000	3,820,000

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

1/ Data are rounded to three significant digits; may not add to totals shown.

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

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

4/ Includes kiln furniture, and shapes, plugs, wads, and miscellaneous refractories.

5/ Includes waterproofing seals, chemical manufacturing, filtering and clarifying oils, heavy clay products, lightweight aggregate, water treatment and filtering, 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/ 2/

(Thousand metric tons and thousand dollars)

State	1994		1995	
	Quantity	Value	Quantity	Value
Alabama	2,010	18,900	2,080	18,600
Arkansas	883	2,440	973	2,920
California	1,330 r/	5,510 r/	1,430	14,500
Georgia	1,710	11,200	1,660	11,200
Indiana	774	2,540	877	3,350
Kansas	556	2,150	573	2,390
Kentucky	820	3,460	786	3,430
Michigan	1,150	3,370	623	3,430
Mississippi	644 r/	6,190 r/	616	6,080
Missouri	1,040	4,630	972	4,810
New York	507	9,270	563	12,500
North Carolina	2,530	12,500	2,430	12,500
Ohio	1,940	7,950	1,840	7,560
Oklahoma	771	3,910	674	3,580
Pennsylvania	724 r/	2,660 r/	736	2,430
South Carolina	1,130	4,670	1,220	4,910
Texas	2,190	13,700	2,320	15,500
Virginia	870	3,250	844	3,200
Other 3/	4,200 r/	18,600 r/	4,350	18,300
Total	25,800 r/	137,000 r/	25,600	151,000

r/ Revised.

1/ Data are rounded 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/ 2/

(Metric tons)

Use	1994	1995
Ceramics and glass 3/	136,000	139,000
Civil engineering and sealing	134,000 r/	180,000
Floor and wall tile:		
Ceramic	283,000	301,000
Other 4/	45,100	73,000
Heavy clay products:		
Brick, extruded	11,400,000	11,200,000
Brick, other	1,620,000	1,640,000
Drain tile and sewer pipe	140,000	136,000
Flowerpots	35,800	48,600
Flue linings	60,600	59,800
Structural tile	37,100	21,500
Other 5/	676,000 r/	503,000
Lightweight aggregate:		
Concrete block	2,400,000	2,530,000
Highway surfacing	247,000	248,000
Structural concrete	801,000	869,000
Miscellaneous 6/	305,000	521,000
Portland and other cements	6,900,000 r/	6,400,000
Refractories 7/	215,000 r/	459,000
Miscellaneous 8/	339,000 r/	268,000
Total	25,800,000 r/	25,600,000

r/ Revised.

1/ Excludes Puerto Rico.

2/ Data are rounded to three significant digits; may not add to totals shown.

3/ Includes pottery and roofing granules.

4/ Includes quarry tile.

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

6/ Includes miscellaneous lightweight aggregates.

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

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

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

(Thousand metric tons and thousand dollars)

State	1994		1995	
	Quantity	Value	Quantity	Value
Alabama	72	3,190	80	3,120
Missouri	213	3,280	359	5,480
Ohio	142	4,550	89	3,140
Other 3/	29 r/	597 r/	56	1,060
Total	456 r/	11,600 r/	583	12,800

r/ Revised.

1/ Refractory uses only.

2/ Data are rounded to three significant digits; may not add to totals shown.

3/ Includes Arkansas, California (1995), Colorado (1994), Georgia (1994), Montana, New Mexico, South Carolina (1995), and Washington (1994).

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

(Metric tons)

Use	1994	1995
Ceramics and glass 2/	W	W
Heavy clay products and lightweight aggregates 3/	42,700 r/	104,000
Refractories:		
Firebrick, block, and shapes	160,000	168,000
Other refractories 4/	153,000 r/	232,000
Miscellaneous	100,000 r/	78,400
Exports	W	--
Total	456,000 r/	583,000

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

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes pottery.

3/ Includes common brick, drain tile, portland cement, terra cotta, and other uses unknown.

4/ Includes 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
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
1995:						
Florida	388	50,800	(2/)	(2/)	388	50,800
Georgia	744	90,100	(2/)	(2/)	744	90,100
Southern States 3/	--	--	542	37,800	542	37,800
Western States 4/	(5/)	(5/)	964	89,900	964	89,900
Total	1,130	141,000	1,510	128,000	2,640	269,000

1/ Data are rounded 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, and Texas.

5/ Included with "Montmorillonite."

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

(Metric tons)

Use	1994	1995
Absorbents:		
Oil and grease absorbent	296,000	285,000
Pet waste absorbent	1,550,000	1,530,000
Miscellaneous absorbent	W	W
Animal feed	17,800	72,700
Drilling mud	22,600	23,200
Fertilizers	59,600	50,800
Fillers, extenders, binders 2/	119,000	75,000
Filtering, clarifying, decolorizing:		
Animal, mineral, and vegetable oils, and greases	12,700	9,070
Pesticides and related products	305,000	302,000
Miscellaneous 3/	89,600	130,000
Exports 4/	161,000	161,000
Total	2,640,000	2,640,000

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

1/ Data are rounded 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, textiles, and other uses unknown.

3/ Includes catalysts (oil-refining), electrical porcelain, roofing granules, chemical manufacturing, floor and wall tile, portland cement, 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	1994		1995	
	Quantity	Value	Quantity	Value
Arkansas	W	W	182	4,890
California	W	W	W	W
Florida	35	3,470	33	3,510
Georgia	7,570	962,000	8,240	1,060,000
South Carolina	388 2/	25,700 2/	373	16,800
Other 3/	779	27,100	657	23,700
Total	8,770	1,020,000	9,480	1,110,000

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

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Unprocessed kaolin withheld to avoid disclosing company proprietary data; included with "Other."

3/ Includes Alabama, Colorado, Idaho (1995), Minnesota, Nevada, North Carolina, Pennsylvania, Tennessee (1995), 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	1994		1995	
	Quantity	Value	Quantity	Value
Airfloat	1,210	68,600	1,240	68,500
Calcined 2/	1,510	260,000	1,850	296,000
Delaminated	1,280	158,000	1,570	187,000
Unprocessed	524	12,300	457	10,400
Water-washed	4,240	520,000	4,380	547,000
Total	8,770	1,020,000	9,480	1,110,000

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes both pigment/filler and 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 2/		Low-temperature 3/	
	Quantity	Value	Quantity	Value
1994:				
Alabama and Georgia	1,160	221,000	W	W
Other 4/	203	15,000	141	23,600
Total	1,370	236,000	141	23,600
1995:				
Alabama and Georgia	1,090	55,300	542	226,000
Other 4/	112	6,140	105	8,880
Total	1,200	61,400	648	235,000

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

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Calcined kaolin for refractory applications.

3/ Calcined kaolin for pigment/filler applications.

4/ 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	1994		1995	
	Quantity	Value	Quantity	Value
Airfloat	758	37,100	953	47,700
Calcined 2/	1,110	241,000	1,260	274,000
Delaminated	1,280	158,000	1,540	187,000
Unprocessed	216	7,730	154	6,250
Water-washed	4,200	519,000	4,330	545,000
Total	7,570	962,000	8,240	1,060,000

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes both pigment/filler and refractory grades.

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

(Metric tons)

Use	1994	1995
<b>Domestic:</b>		
<b>Ceramics and glass:</b>		
Catalysts (oil-refining)	154,000	W
Electrical porcelain	11,000	W
Fiber glass	271,000	292,000
Roofing granules	22,600	13,800
Sanitaryware	48,500	60,000
Other 3/	85,300	213,000
<b>Fillers, extenders, and binder:</b>		
Adhesives	42,400	61,500
Paint	228,000	267,000
Paper coating	2,630,000	2,790,000
Paper filling	910,000	846,000
Plastic	26,900	36,900
Rubber	60,900	103,000
Other 4/	42,200	117,000
Heavy clay products 5/	47,900	21,800
Refractories 6/	570,000	677,000
Undistributed 7/	205,000	262,000
<b>Total</b>	<b>5,350,000</b>	<b>5,760,000</b>
<b>Exports:</b>		
Paint	74,900	67,700
Paper coating	1,730,000	2,040,000
Paper filling	259,000	145,000
Rubber	7,280	17,700
Undistributed 8/	150,000	209,000
<b>Total</b>	<b>2,220,000</b>	<b>2,480,000</b>
<b>Grand total</b>	<b>7,570,000</b>	<b>8,240,000</b>

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

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

2/ Data are rounded to three significant digits; may not add to totals shown.

3/ Includes crockery/earthenware, fine china/dinnerware, glazes, glass, enamels, pottery, mineral wool, 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	1994		1995	
	Quantity	Value	Quantity	Value
Airfloat	388	25,700	219	14,900
Unprocessed	W	W	153 2/	1,870 2/
<b>Total</b>	<b>388</b>	<b>25,700</b>	<b>373</b>	<b>16,800</b>

W Withheld to avoid disclosing company proprietary data.

1/ Data are rounded to three significant digits; may not add to totals shown.

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



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

(Metric tons)

Kind and use	1994	1995 2/
Airfloat:		
Adhesives	W	W
Animal feed and pet waste absorbent	W	W
Ceramics 3/	13,400	12,200
Fertilizers, pesticides and related products	6,780	5,140
Fiber glass	W	W
Paint	W	--
Paper coating and filling	W	8,290
Plastics	W	W
Rubber	171,000 r/	91,100
Refractories 4/	W	W
Other uses 5/	150,000 r/	237,000
Exports 6/	31,300	18,700
Total	388,000	373,000
Unprocessed: Face brick and other uses	(7/)	W
Grand total	388,000	373,000

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

1/ Data are rounded to three significant digits; may not add to totals shown.

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

3/ Includes floor and wall tiles and roofing granules.

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

5/ Includes catalysts (oil refining) and unknown uses.

6/ Includes paint, paper filling, and rubber.

7/ Withheld to avoid disclosing company proprietary data.

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

(Metric tons)

Use	1994	1995
<b>Domestic:</b>		
Ceramics:		
Catalyst (oil and gas refining)	213,000	93,200
Electrical porcelain	17,000	7,600
Fine china and dinnerware	20,700	26,400
Floor and wall tile	11,900	38,300
Pottery	22,500	20,600
Roofing granules	34,000	24,900
Sanitaryware	50,200	67,900
Miscellaneous	143,000 r/	152,000
Chemical manufacture	167,000	130,000
Civil engineering	22,100	W
Glass fiber, mineral wool	364,000	402,000
Filler, extender, and binder:		
Adhesive	55,800	71,600
Fertilizer	W	W
Medical, pharmaceutical, cosmetic	13,500 r/	W
Paint	253,000	270,000
Paper coating	2,630,000	2,800,000
Paper filling	917,000	853,000
Pesticide	12,900	11,200
Plastic	32,000	39,500
Rubber	240,000	194,000
Miscellaneous	43,000 r/	156,000
Heavy clay products:		
Brick, common and face	204,000	230,000
Portland cement	82,900	W
Miscellaneous	W	--
Refractories:		
Firebrick, block and shapes	19,600	26,800
Groggs	260,000	190,000
High alumina brick, specialties, and kiln furniture	530,000	885,000
Foundry sand, mortar, cement, and miscellaneous refractories	63,000	145,000
Miscellaneous applications	84,000 r/	138,000
Total	6,500,000	6,970,000
<b>Exports:</b>		
Ceramics	79,500	187,000
Foundry sand, grogs and calcines; other refractories	W	20,700
Paint	75,100	67,700
Paper coating	1,730,000	2,040,000
Paper filling	259,000	145,000
Rubber	38,600	36,300
Miscellaneous	89,200	20,900
Total	2,270,000	2,510,000
Grand total	8,770,000	9,480,000

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

1/ Data are rounded 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 concrete	Highway surfacing	Other	Total	Total value e/
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, 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, 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
1995:						
Alabama and Arkansas	857	115	23	72	1,070	14,200
California	141	104	--	76	321	7,540
Florida and Indiana	153	36	--	60	249	1,650
Kansas, Kentucky, Louisiana	295	128	--	95	518	1,180
Mississippi and Missouri	15	1	2	126	145	1,690
New York and Montana	238	201	--	--	440	11,700
North Carolina	301	52	--	8	361	4,050
Ohio, Oklahoma, Pennsylvania	187	26	--	(2/)	214	1,430
Texas	49	157	222	31	459	2,520
Utah and Virginia	298	48	1	52	399	4,570
Total	2,530	869	248	521	4,170	50,500

e/ Estimated.

1/ Data are rounded 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 1/  
PRODUCTION IN THE UNITED STATES, BY STATE 2/

(Thousand metric tons and thousand dollars)

State	1994		1995	
	Quantity	Value e/	Quantity	Value
Alabama	715	2,980 r/	646	2,690
Arkansas	459	919	449	893
California	300	1,420	318	1,460
Colorado	272	2,110	261	1,930
Connecticut, New Jersey, 3/ New York 3/	300	2,780	280	1,160
Georgia	1,260	8,890	1,210	8,920
Illinois	454	633	469	685
Indiana and Iowa	296	1,580	364	1,720
Kentucky 3/ and Tennessee 3/	814	2,130	752	2,030
Maryland and West Virginia 4/	271	792	264	817
Mississippi and Missouri	547 r/	2,100 r/	521	2,010
North Carolina	2,080	7,150 r/	1,990	7,370
Ohio	863	4,160 r/	874	4,140
Oklahoma	427	2,130	330	1,790
Pennsylvania	626	3,260 r/	602	1,790
South Carolina	731	3,450	789	3,450
Texas	1,050	4,880 r/	1,090	7,090
Virginia	658	2,070	632	2,010
Other 5/	913 r/	5,050 r/	948	3,910
Total	13,000	58,500 r/	12,800	55,900

e/ Estimated. r/ Revised.

1/ Includes extruded and other brick.

2/ Data are rounded to three significant digits; may not add to totals shown.

3/ Extruded brick only.

4/ Includes other brick only.

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

TABLE 23  
U.S. EXPORTS OF CLAYS IN 1995, 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/)	3	(2/)	201	(2/)	10	(2/)	41
Australia	(2/)	6	8	1,200	21	2,210	--	--
Belgium	--	--	8	1,870	--	--	--	--
Brazil	(2/)	17	3	723	(2/)	58	--	--
Canada	--	--	193	14,900	7	1,170	10	1,310
Finland	1	56	(2/)	236	--	--	(2/)	10
France	--	--	43	2,800	(2/)	24	(2/)	25
Germany	(2/)	3	2	1,100	(2/)	88	(2/)	18
Indonesia	(2/)	3	3	815	(2/)	50	(2/)	18
Italy	(2/)	5	2	1,020	7	736	3	678
Japan	2	121	211	17,400	63	6,310	(2/)	20
Korea	(2/)	16	10	2,970	2	1,290	(2/)	28
Malaysia	--	--	7	617	--	--	11	1,290
Mexico	15	680	17	1,560	55	4,950	1	174
Netherlands	(2/)	19	20	2,130	96	8,890	22	1,870
Singapore	(2/)	3	24	2,660	(2/)	8	1	189
South Africa	(2/)	4	1	164	(2/)	248	2	330
Sweden	(2/)	76	(2/)	135	--	--	--	--
Taiwan	1	37	33	3,950	11	818	(2/)	51
Thailand	--	--	19	2,060	--	--	(2/)	17
United Kingdom	(2/)	10	57	5,180	4	206	1	211
Venezuela	3	181	29	2,970	(2/)	93	(2/)	102
Other	6	537	43	8,330	15	1,640	12	2,600
Total	28	1,780	733	75,000	281	28,800	63	8,980
	Kaolin		Clays, n.e.c. 3/		Total			
	Quantity	Value	Quantity	Value	Quantity	Value		
Argentina	23	4,600	1	1,210	24	6,060		
Australia	19	11,000	4	4,120	52	18,600		
Belgium	64	16,400	2	2,600	74	20,900		
Brazil	13	2,410	2	3,540	18	6,740		
Canada	620	77,600	169	30,800	998	126,000		
Finland	441	66,800	1	378	443	67,500		
France	3	742	3	1,630	49	5,220		
Germany	69	15,300	7	4,560	78	21,000		
Indonesia	57	11,000	1	1,410	61	13,300		
Italy	169	24,700	1	791	182	27,900		
Japan	846	149,000	19	16,300	1,140	190,000		
Korea	138	30,000	10	7,150	160	41,400		
Malaysia	3	731	2	1,130	23	3,770		
Mexico	134	22,300	11	2,560	234	32,200		
Netherlands	205	28,600	18	5,920	361	47,500		
Singapore	9	1,980	4	3,530	38	8,370		
South Africa	22	6,870	2	1,210	27	8,840		
Sweden	122	26,500	9	2,200	132	28,900		
Taiwan	134	20,400	6	3,220	185	28,500		
Thailand	14	4,320	1	1,400	34	7,810		
United Kingdom	5	1,610	19	18,800	86	26,000		
Venezuela	23	3,840	12	3,850	67	11,000		
Other	108	32,500	34	19,700	216	65,300		
Total	3,240	560,000	338	138,000	4,680	812,000		

1/ Data are rounded 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 1995, BY KIND 1/

Kind	Quantity (metric tons)	Value (thousands)
<b>China clay or kaolin:</b>		
Canada	517	\$352
China	221	107
New Zealand	1,060	622
United Kingdom	9,850	2,600
Other	365	224
Total	12,000	3,900
<b>Fire clay:</b>		
Canada	36	9
Spain	324	309
United Kingdom	900	491
Other	91	22
Total	1,350	831
<b>Decolorizing earths and fuller's earth:</b>		
France	64	29
Germany	36	16
Total	100	45
<b>Bentonite:</b>		
Canada	1,180	364
Japan	501	92
Mexico	516	58
United Kingdom	800	338
Other	110	110
Total	3,110	962
<b>Common blue clay and other ball clay:</b>		
Canada	10	7
United Kingdom	1,360	331
Total	1,370	338
<b>Other clay:</b>		
Canada	349	434
Germany	37	80
Italy	2	4
South Africa	102	104
United Kingdom	1,100	599
Other	282	359
Total	1,870	1,580
<b>Chamotte or dina's earth:</b>		
France	1	4
<b>Artificially activated clay and activated earth:</b>		
Canada	350	220
Germany	1,710	2,710
Mexico	12,000	3,220
Other	1,150	2,210
Total	15,200	8,360
Grand total	35,000	16,000

1/ Data are rounded 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/	1991	1992	1993	1994	1995 e/
Algeria 4/	25,803	31,019	20,833 r/	20,215 r/	20,000
Argentina	107,782	97,531	96,706	97,000 e/	97,000
Australia e/ 4/	35,000	35,000	35,000	35,000	35,000
Bosnia and Herzegovina e/ 5/	XX	1,000	800	800 r/	800
Brazil (beneficiated)	130,000	131,180	113,215	140,000 r/	140,000
Burma	684	693	200	795 r/	500
Chile	1,054	1,081	989	1,210 r/	1,200
Croatia e/ 5/	XX	10,000	10,000	10,000	10,000
Cyprus	58,500	58,840	51,689 r/	46,530 r/	50,000
Egypt	5,916 r/	4,215 r/	6,013 r/	2,379 r/	2,500
France e/	10,000	6,000 6/	6,000	7,000	6,000
Germany	582,618	581,169	473,102	475,000 e/	500,000
Greece	600,286	600,083	677,578 r/	697,773 r/	650,000
Guatemala e/	12,000	12,600	12,300	4,408 6/	12,100
Hungary	18,097	23,000	9,404 r/	14,700 r/	15,000
Indonesia	21,512	17,960	13,707	14,409 r/	26,057 6/
Iran 7/	40,452	47,659	85,000	84,000	85,000
Italy	402,000 r/	150,503 r/	327,000 r/	386,000 r/	400,000
Japan	554,325	534,472	517,389	484,115	478,058 6/
Macedonia e/ 5/	XX	40,000	35,000	30,000	30,000
Mexico	145,347	135,993	94,600	100,000 e/	92,432 6/
Morocco	9,228	8,137	10,811 r/	24,919 r/	25,000
Mozambique	664	20	100 e/	3,349	3,000
New Zealand (processed)	--	--	1,613	1,500 e/	1,500
Pakistan	5,106	6,057	7,991	11,180 r/	5,759 6/
Peru	14,600 r/	14,210 r/	10,250 r/	27,682 r/	26,372 6/
Philippines	42,066	7,428 r/	5,050	25,000 e/	20,000
Poland	35,000 r/	18,000 r/	9,000 r/	21,000 r/	20,000
Romania e/	150,000	120,000	120,000	100,000 r/	100,000
Serbia and Montenegro e/ 5/	XX	260 r/	200 r/	110 r/	100
South Africa 8/	64,600	43,977	50,441	71,773	70,927 6/
Spain e/	150,000	150,000	150,000	150,000	150,000
Tanzania e/	75	70	70	70	70
Turkey	123,928	123,516	456,597 r/	516,187 r/	500,000
U.S.S.R. e/ 9/	2,400,000	2,000,000	1,600,000	1,300,000	1,300,000
United States	3,430,000	2,950,000	2,870,000 r/	3,290,000	3,820,000 6/
Yugoslavia 10/	85,000 e/	XX	XX	XX	XX
Zimbabwe 8/	99,900	82,956	83,000 e/	169,097	170,000
Total	9,360,000 r/	8,050,000 r/	7,960,000 r/	8,360,000 r/	8,860,000

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

1/ World totals, U.S. data, and estimated data are rounded to three significant digits; may not add to totals shown.

2/ Table includes data available through Aug. 8, 1996.

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/ Formerly part of Yugoslavia; data were not reported separately until 1992.

6/ Reported figure.

7/ Year beginning Mar. 21 of that stated.

8/ May include other clays.

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

10/ Dissolved in Apr. 1992.

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

(Metric tons)

Country 3/	1991	1992	1993	1994	1995 e/
Algeria	4,526	3,656	3,229	4,550 r/	4,500
Argentina e/	2,000	1,500	1,600	1,600	1,600
Australia (attapulgit) e/	15,000	15,000	15,000	15,000	15,000
Germany (unprocessed)	708,000	673,000	670,000 e/	498,000 r/	500,000
Italy	23,400	28,000 r/	30,000 e/	30,000 e/	30,000
Mexico	41,078	41,111	36,068	21,377 r/	21,377 4/
Morocco (smectite)	37,552	38,098	38,680	22,782	23,000
Pakistan	22,075	22,042	20,941	15,335 r/	12,862 4/
Senegal (attapulgit)	129,403	112,336	119,000 r/ e/	119,000 r/ e/	120,000
South Africa (attapulgit)	8,109	8,235	7,030	10,230 r/	8,049 4/
Spain (attapulgit) e/	72,900	87,300	85,000	85,000	80,000
United Kingdom 5/	188,800	189,400	187,100	134,000 r/	130,000
United States 6/	2,740,000	2,410,000	2,450,000	2,640,000	2,640,000 4/
Total	3,990,000	3,630,000 r/	3,670,000 r/	3,600,000 r/	3,580,000

e/ Estimated. r/ Revised.

1/ World totals, U.S. data, and estimated data are rounded 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 Aug. 8, 1996.

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/ Saleable product.

6/ Sold or used by producers.

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

(Metric tons)

Country 3/	1991	1992	1993	1994	1995 e/
Algeria	21,460	20,844 r/	12,586 r/	16,984 r/	24,068 4/
Argentina	47,115	43,722	42,052	43,000 e/	42,000
Australia (includes ball clay) e/	190,000	180,000	180,000	200,000	210,000
Austria (marketable)	72,361	64,733	64,381	87,000 e/	75,000
Bangladesh 5/	7,338	7,300 e/	7,500	7,500 e/	7,500
Belgium e/	260,000 4/	325,000	300,000	300,000	300,000
Bosnia and Herzegovina e/ 6/	XX	3,000	3,000	3,000	3,000
Brazil (beneficiated)	746,000	790,000	750,000	760,000 e/	760,000
Bulgaria	106,000	104,000	111,000 r/	115,000 r/	115,000
Burundi	6,682	9,688	5,000 e/	5,000 e/	1,000
Chile	63,083	59,083	66,939	73,081 r/	70,000
Colombia (includes common clay)	1,984,000 e/	2,050,000 e/	2,097,491	6,700,000	7,300,000 4/
Czech Republic 7/	XX	XX	2,336,000	2,706,000	2,800,000 4/
Czechoslovakia (marketable) 8/	705,000	700,000 e/	XX	XX	XX
Denmark (sales)	17,057	3,503	3,500 e/	3,500 e/	3,500
Ecuador	12,000 r/	6,380 r/	12,000 r/	6,883 r/	6,000
Egypt	192,870	203,473 r/	184,004 r/	180,000 r/ e/	180,000
Eritrea	XX	XX	XX	5,231	1,328
Ethiopia e/ 9/	370	420	500	-- r/	--
France (marketable)	343,800	334,000	295,000 e/	327,000 r/	300,000
Germany	683,505	1,185,000 e/	981,000 e/	1,631,000 r/	1,500,000
Greece	189,235	201,705 r/	200,000 e/	117,254 r/	125,000
Guatemala	3,280	2,860	3,000 e/	3,000 e/	3,100
Hungary (processed)	14,127	7,000	15,000	15,000	15,000
India:					
Processed	113,000	124,000 r/	129,271	134,000 r/	150,000
Saleable crude	628,000	514,000 r/	518,629	548,000 r/	550,000
Indonesia	139,915	230,550	42,365	53,236 r/	14,000
Iran	150,473	264,083	254,413 r/	250,000 r/ e/	250,000
Israel e/	53,000	53,000	40,000 r/ 4/	40,000 r/	40,000

See footnotes at end of table.

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

(Metric tons)

Country 3/	1991	1992	1993	1994	1995 e/
Italy:					
Crude	57,871	33,017	--	--	--
Kaolinitic earth e/	16,000 4/	15,000	15,000 r/	10,000	10,000
Japan	129,942	122,948	110,318	138,412 r/	166,338 4/
Korea, Republic of	1,755,225	1,856,157	2,328,921	2,675,485 r/	2,700,000
Madagascar	496	756	700 e/	700 e/	700
Malaysia	186,699	244,573	249,852	252,628	211,182 4/
Mexico	167,238	144,121	216,000	193,034 r/	188,640 4/
New Zealand	21,338	27,520	26,543	28,000 e/	30,000
Nigeria e/	1,300	1,300	1,300	105,000 r/	100,000
Pakistan	44,738	37,444	37,200	47,894 r/	30,746
Paraguay e/	74,000	74,000	74,000	74,000	74,000
Peru e/	7,100	5,500	5,500	5,500	5,500
Poland	44,100	42,400	48,000 r/	48,000 r/	50,000
Portugal e/	149,788 4/	125,000 r/	75,000	75,000	75,000
Romania e/	250,000	200,000	200,000	200,000	150,000
Serbia and Montenegro: 6/					
Crude	XX	111,782	37,627 r/	50,000 e/	50,000
Washed	XX	9,300	4,800	5,000 e/	5,000
Slovakia 7/	XX	--	25,000	40,000 r/ e/	40,000
Slovenia: e/ 6/					
Crude	XX	15,000	10,000	10,000	10,000
Washed	XX	5,000	4,000	4,000	4,000
South Africa	134,485	131,765	147,349	131,863 r/	146,587 4/
Spain (marketable): e/ 10/					
Crude	125,000	74,489 4/	75,000	75,000	75,000
Washed	413,000	305,102 4/	150,000	75,000	75,000
Sri Lanka	7,737	6,759	7,000 e/	7,500 e/	7,500
Sweden e/	100	100	100	100	100
Taiwan e/	92,970 4/	100,000	100,000	100,000	100,000
Tanzania e/	1,739 4/	1,360 r/	1,300 r/	1,300 r/	1,300
Thailand (beneficiated)	255,543	301,035	397,330	417,064 r/	460,629 4/
Turkey	186,517	134,416	210,356 r/	179,775 r/	180,000
U.S.S.R. e/ 11/	9,000,000 r/	XX	XX	XX	XX
Ukraine e/ 12/	XX	1,200,000	1,100,000	1,015,000 4/	950,000 4/
United Kingdom (sales)	2,911,484	2,502,224 13/	2,577,160 13/	2,530,000 r/	2,650,000
United States 14/	9,570,000	8,740,000	8,830,000	8,770,000 r/	9,480,000 4/
Uzbekistan e/ 12/	XX	7,000,000	5,500,000	4,500,000	3,700,000
Venezuela	39,000	37,000	22,000	10,345 r/	3,020 4/
Vietnam e/	800	800	800	1,000	1,000
Yugoslavia 15/	170,000 e/	XX	XX	XX	XX
Zimbabwe	65	83	90 e/	462	500
Total	32,600,000 r/	31,100,000 r/	31,200,000 r/	36,100,000 r/	36,600,000

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

1/ World totals, U.S. data, and estimated data are rounded to three significant digits; may not add to totals shown.

2/ Table includes data available through Aug. 8, 1996.

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

4/ Reported figure.

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

6/ Formerly part of Yugoslavia; data were not reported separately until 1992.

7/ Formerly part of Czechoslovakia; data were not reported separately until 1993.

8/ Dissolved in Dec. 1992.

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

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

11/ Dissolved in Dec. 1991. This commodity is believed to be produced mainly in Ukraine and Uzbekistan.

12/ Formerly part of the U.S.S.R.; data were not reported separately until 1992.

13/ Dry weight.

14/ Kaolin sold or used by producers.

15/ Dissolved in Apr. 1992.