MICA

By James B. Hedrick

Domestic survey data and tables were prepared by Raymond I. Eldridge III, statistical assistant, and the world production table was prepared by Linder Roberts, international data coordinator.

In 2004, about 99,200 metric tons (t) of scrap and flake mica was produced in the United States; this was 26.2% greater than that of 2003 (tables 1, 3). Ground mica sales totaled 98,100 t valued at $27.2 million, an increase in quantity and a decrease in value compared with 2003 (tables 1, 4). Essentially all sheet mica used in the United States was imported, and India was the major supplier (table 10). Consumption of muscovite block mica decreased to 1.81 t valued at $114,000 in 2004 from 1.84 t valued at $120,000 in 2003 (tables 1, 5). Consumption of mica splittings decreased to 668 t in 2004 from 669 t in 2003. Worked and unworked sheet mica exports increased to 964 t in 2004 from 854 t in 2003, and the value decreased to $11.2 million in 2004 from $12.4 million in 2003 (table 13). U.S. imports of worked and unworked sheet mica increased to 1,400 t in 2004 from 1,130 t in 2003, and the value increased to $12.2 million in 2004 from $11.5 million in 2003.

The mica group represents 37 phyllosilicate minerals that have a layered or platy texture (Rieder and others, 1998). Phyllo is derived from the Greek word "phyllon," which means leaf. The commercially important micas are muscovite and phlogopite, which are used in a variety of applications.

Mica is a valuable mineral because of its unique physical properties. The crystalline structure of mica forms layers that can be split or delaminated into thin sheets. These sheets are chemically inert, dielectric, elastic, flexible, hydrophilic, insulating, lightweight, platy, reflective, refractive, resilient, and transparent to opaque. Mica is stable when exposed to electricity, light, moisture, and extreme temperatures. Based on its abundance and superior electrical properties, muscovite is the principal mica used by industry. Phlogopite mica remains stable at higher temperatures and is used in applications in which a combination of high-heat stability and electrical properties is required. Muscovite and phlogopite are used in sheet and ground forms.

Legislation and Government Programs

The Bob Stump National Defense Authorization Act for Fiscal Year 2004 (Public Law 108-136) was enacted on November 24, 2003. Excess FY 2004 National Defense Stockpile (NDS) mica stocks authorized for disposal were 7,113 kilograms (kg) (15,681 pounds) of muscovite block (stained and better), 506 kg (1,115 pounds) of muscovite film (first and second qualities), 1,290,776 kg (2,845,673 pounds) of muscovite splittings that have all been sold (committed inventory), and 12,226 kg (26,954 pounds) of phlogopite splittings. Excess FY 2004 NDS mica stocks were 10,144 kg (22,363 pounds) of muscovite block (stained and better), 506 kg (1,115 pounds) of muscovite film (first and second qualities), and 12,230 kg (26,963 pounds) of phlogopite splittings (table 2). All remaining NDS stocks of phlogopite block were shipped in FY 2003 (table 2).

The Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005 (Public Law 108-375) was enacted on October 28, 2004. The Annual Material Plan for Fiscal Year 2005 authorized the disposal of the remaining inventory of mica (all types) from the NDS classified as excess to goal. Stocks of mica classified as excess to goal at the end of FY 2004 were all subject to no disposal limits. At the end of FY 2004, NDS mica stocks were 883 kg (1,947 pounds) of muscovite block (stained and better), and 1,467 kg (3,325 pounds) of phlogopite splittings, and stocks of muscovite film (first and second qualities) were sold out. Inventory of mica in the NDS that was sold but not shipped at the end of FY 2004 was 7,195 kg (15,863 pounds) of muscovite block, 120,519 kg (265,700 pounds) of muscovite splittings, and 16,991 kg (37,459 pounds) of phlogopite block. Yearend stocks of mica in the NDS, as of December 31, 2004, are listed in table 2.

Production

Domestic mine production data for mica are developed by the U.S. Geological Survey from four separate voluntary surveys. Of the 17 operations to which the "Crude Scrap and Flake Mica Production" (including sericite production) form was sent, 12 operations responded. Of the 14 operations to which the "Ground Mica" (excluding low-grade ground sericite production) form was sent, 9 operations responded. Of the six surveyed operations to which the "Mica Block and Film Consumption" form was sent, four operations responded. Of the nine surveyed operations to which the "Mica Splittings Consumption" form was sent, four operations responded. Consumption for the nonrespondents was estimated by using prior-year production data. Individual company production and consumption data are withheld to avoid disclosing company proprietary data.

Georgia Industrial Minerals, Inc. (GIM) produced eight grades of wet-ground mica. The muscovite mica products range in size from 8 to 54 microns and are all suitable for use in pearlescent pigments. GIM mica is also used in asbestos replacement (such as brake linings and insulation), asphalt products, engineered plastics, exterior coatings, foundry coatings, gaskets, high-temperature coatings, industrial primers, marine coatings, mold release compounds, and wire and cable insulation (Georgia Industrial Minerals, Inc., undated§[1]).

Oglebay Norton Co. announced that its company and wholly owned subsidiaries had voluntarily filed for restructuring under Chapter 11 of the U.S. Bankruptcy Code, including Oglebay Norton's mica operations at Kings Mountain, NC, and Verlarde,

[1]A reference that includes a section mark (§) is found in the Internet Reference Cited section.

NM (Oglebay Norton Co., 2004). Oglebay Norton began to incur significant debt in 1998 through several acquisitions including the mica operations of Franklin Industrial Minerals (a division of Franklin Industries Inc.) in North Carolina and New Mexico. The financial problems were exacerbated by operating loses since 2001. At yearend 2003, the company had $422 million in outstanding debt and operating revenues of $404 million.

Scrap and Flake Mica.—In 2004, eight domestic companies with nine mines in five States produced scrap and flake mica, excluding low-grade sericite. The United States was one of the world's primary producers with production of 99,200 t (tables 1, 3, 14). North Carolina remained the major producing State with 40% of domestic production, and the remainder was produced in Georgia, New Mexico, South Carolina, and South Dakota. Mica was recovered from mica schist, high-quality sericite schist, weathered pegmatites, a gemstone pegmatite, and as a coproduct of feldspar and kaolin mining and processing operations. Mining, which was suspended at Velarde throughout 2002, resumed in 2003.

The scrap and flake mica producers in 2004 were Engelhard Corp., Hartwell, GA; The Feldspar Corporation (a ZIM company) (two mines), Spruce Pine, NC; Georgia Industrial Minerals, Deepstep, GA; K-T Feldspar Corp., Spruce Pine; The Mineral Mining Co. Inc., Kershaw, SC; Oglebay Norton, Kings Mountain; Pacer Corp., Custer, SD; and Unimin Corp., Spruce Pine.

Ground Mica.—In 2004, 8 companies operated 12 grinding plants in 5 States; 9 plants produced dry-ground mica, and 3, wet-ground mica. The four leading ground-mica companies, which included one company with four plants, accounted for 57% of the total of 98,200 t of ground mica produced in the United States (table 4).

Dry-ground mica producers were Asheville Mica Co., Asheville, NC; Georgia Industrial Minerals, Deepstep; K-T Feldspar, Spruce Pine; The Mineral Mining Co., Kershaw; Oglebay Norton (two plants), Kings Mountain and Velarde; Pacer, Custer; Piedmont Minerals Corp., Hillsborough, NC; and United States Gypsum Co. (a subsidiary of USG Corp.), Spruce Pine.

Wet-ground mica producers were Engelhard, Hartwell; Georgia Industrial Minerals, Sandersville, GA; and Oglebay Norton Specialty Minerals, Kings Mountain.

Sheet Mica.—Small quantities of muscovite sheet and scrap mica were produced as a byproduct by Morefield Gem Mine, Inc. in Amelia County, VA. The pegmatite was mined primarily for gemstones and mineral specimens using underground methods. The mine also produced biotite and zinnwaldite mica.

Consumption

Ground Mica.—The leading domestic use of dry-ground mica was in joint compound for filling and finishing seams and blemishes in gypsum wallboard (drywall) (table 4). The mica acts as a filler and extender, provides a smooth consistency, improves the workability of the compound, and provides resistance to cracking. In 2004, joint compound accounted for 55% of dry-ground mica consumption.

In the paint industry, ground mica is used as a pigment extender that also facilitates suspension, reduces chalking, prevents shrinking and shearing of the paint film, increases resistance of the paint film to water penetration and weathering, and brightens the tone of colored pigments. Mica also promotes paint adhesion in aqueous and oleoresinous formulations. Consumption of dry-ground mica in paint, the second ranked use, accounted for 18% of the dry-ground mica used in 2004.

Ground mica is used in the well-drilling industry as an additive to drilling muds. The coarsely ground mica flakes help prevent the loss of circulation by sealing porous sections of the drill hole. Well drilling muds accounted for less than 1% of dry-ground mica use.

The plastics industry uses dry-ground mica as an extender and filler, especially in parts for automobiles for lightweight insulation to suppress sound and vibration. Mica is used in plastic automobile fascia and fenders as a reinforcing material, providing improved mechanical properties and increased strength, stiffness, and dimensional stability. Mica-reinforced plastics also have high-heat dimensional stability, reduced warpage, and the best surface properties of any filled plastic composite. In 2004, consumption of dry-ground mica in plastic applications accounted for 5.1% of the market.

The rubber industry uses ground mica as an inert filler and a mold release compound in the manufacture of molded rubber products, such as tires and roofing. The platy texture acts as an antiblocking, antisticking agent. Rubber mold lubricant accounted for about 2.6% of the dry-ground mica used in 2004.

Dry-ground mica is used in the production of rolled roofing and asphalt shingles where it serves as a surface coating to prevent sticking of adjacent surfaces. The coating is not absorbed by freshly manufactured roofing because mica's platy structure is unaffected by the acid in asphalt or by weathering conditions. As a rubber additive, mica reduces gas permeation and improves resiliency.

Mica is used in decorative coatings on wallpaper, concrete, stucco, and tile surfaces. It also is used as an ingredient in flux coatings on welding rods, in some special greases, and as coatings for core and mold release compounds, facing agents, and mold washes in foundry applications.

Dry-ground phlogopite mica is used in automotive brake linings and clutch plates to reduce noise and vibrations (asbestos substitute); as sound-absorbing insulation for coatings and polymer systems; reinforcing additives for polymers to increase strength and stiffness and to improve stability to heat, chemicals, and ultraviolet (UV) radiation; heat shields and temperature insulation; industrial coating additive to decrease the permeability of moisture and hydrocarbons; and in polar polymer formulations to increase the strength of epoxies, nylons, and polyesters.

Wet-ground mica, which retains the brilliancy of its cleavage faces, was used primarily in pearlescent paints by the automotive industry. In the cosmetics industry, its reflective and refractive properties made mica an important ingredient in blushes, eyeliner, eyeshadow, foundation, hair and body glitter, lipstick, lip gloss, mascara, moisturizing lotions, and nail polish. Mica is added to latex balloons to provide a colored shiny surface.

Built-Up Mica.—Muscovite and phlogopite splittings were fabricated into various built-up mica products by nine companies that operated nine plants in seven States. Produced by mechanized or hand setting of overlapping splittings and alternate layers of binders and splittings, built-up mica

is primarily used as an electrical insulation material. Mica insulation is used in high-temperature and fire-resistant power cable used in aluminum plants, blast furnaces, critical wiring circuits (for example, defense systems, fire and security alarm systems, surveillance systems) heaters and boilers, lumber kilns, and metal smelters, and tanks and furnace wiring. Specific high-temperature mica-insulated wire and cable is rated to work for up to 15 minutes in molten aluminum, glass, and steel. Major products are bonding materials; flexible, heater, molding, and segment plates; mica paper; and tape (table 7).

Flexible plate (cold) is used in electric motor and generator armatures, field coil insulation, and magnet and commutator core insulation. Mica consumption in flexible plate in 2004 was 73 t, essentially unchanged from 2003 (table 7).

Heater plate is used where high-temperature insulation is required. Consumption data for mica in heater plate are withheld to avoid disclosing company proprietary information. Consumption of heater plate mica decreased in 2004 compared with that of 2003.

Molding plate is sheet mica from which V-rings are cut and stamped for use in insulating the copper segments from the steel shaft ends at the end of a commutator. Molding plate also is fabricated into tubes and rings for insulation in transformers, armatures, and motor starters. Consumption of molding plate in 2004 was 185 t, unchanged from the previous year.

Segment plate acts as insulation between the copper commutator segments of direct-current universal motors and generators. Phlogopite built-up mica is preferred because it will wear at the same rate as the copper segments. Although muscovite has a greater resistance to wear, it causes uneven ridges that may interfere with the operation of a motor or generator. Consumption of segment plate was 220 t in 2004.

Some types of built-up mica have the bonded splittings reinforced with cloth, glass, linen, muslin, plastic, silk, or special paper. These products are very flexible and are produced in wide, continuous sheets that are either shipped rolled or cut into ribbons, tapes, or trimmed to specified dimensions. Built-up mica products also maybe corrugated or reinforced by multiple layering.

The total amount of built-up mica that was consumed or shipped was 559 t, essentially the same level as the revised amount for 2003, 560 t. In 2004, molding plate and segment plate were the major end products and accounted for 33% and 39% of the total, respectively.

Mica Paper (Reconstituted Mica).—Primary uses for mica paper are the same as those for built-up mica. Three companies consumed scrap mica to produce mica paper for electrical applications. The principal source of the scrap was India. In 2004, the manufacturing companies were Asheville-Schoonmaker Mica Co., Newport News, VA; Corona Films Inc., West Townsend, MA; and Isovolta Inc./US Samica Corp., Rutland, VT.

Sheet Mica.—Sheet mica is used principally in the electronic and electrical industries. Its usefulness in these applications is derived from its unique electrical and thermal insulating properties and its mechanical properties, which allow it to be cut, punched, stamped, and machined to close tolerances.

The leading use of block mica is as an electrical insulator in electronic equipment. High-quality block mica is processed to line the gauge glasses of high-pressure steam boilers because of its flexibility, transparency, and resistance to heat and chemical attack. Other uses include diaphragms for oxygen-breathing equipment, marker dials for navigation compasses, optical filters, pyrometers, retardation plates in helium-neon lasers, thermal regulators, and stove and kerosene heater windows. Specialized applications for sheet mica are found in aerospace components in ground- and air-launched missile systems, laser devices, medical electronics, optical instrumentation, radar systems, and for radiation treatment.

Only high-quality muscovite film mica, which is variously called India ruby mica or ruby muscovite mica, is used as a dielectric in capacitors. The highest quality film is used to manufacture capacitors for calibration standards. The next lower grade is used in transmitting capacitors. Receiving capacitors use a slightly lower grade of high-quality muscovite.

In 2004, consumption of ruby and nonruby muscovite block totaled 1.81 t, a decrease from the 1.84 t consumed in 2003 (table 5). Stained and lower-than-stained quality remained in greatest demand and accounted for about 71% of consumption of ruby and nonruby mica block. Consumption of nonruby mica block was 63% for stained and lower-than-stained quality and 37% for good quality.

In 2004, five companies consumed muscovite block and film at five plants in four States—two in North Carolina and one each in New Jersey, Ohio, and Virginia.

In 2004, mica splittings represented the largest part of the sheet mica industry in the United States. Consumption of muscovite and phlogopite splittings was essentially the same as the previous year at 668 t in 2004 compared with 669 t in 2003 (table 6). Muscovite splittings from India accounted for essentially all domestic consumption. The remainder of consumption was primarily phlogopite splittings imported from Madagascar.

Stocks

Reported yearend industry stocks of muscovite mica block (ruby and nonruby) decreased slightly to 17.3 t in 2004 from 17.6 t in 2003. Industry stocks of muscovite and phlogopite mica splittings increased to 416 t at yearend 2004 from 404 t at yearend 2003 (table 6).

Prices

Sheet mica prices vary with grade and can range from less than $1 per kilogram for low-quality mica to more than $2,000 per kilogram for the highest quality. The average values of muscovite sheet mica consumed in the United States in 2004 compared with the previous year were as follows: muscovite block (ruby and nonruby) decreased to $63 per kilogram in 2004 from $66 per kilogram in 2003, muscovite and phlogopite splittings decreased to $1.73 per kilogram from $1.74 per kilogram in 2003, and muscovite and phlogopite block was $67 per kilogram in 2004, unchanged from the 2003 price (tables 1, 6).

The average value of phlogopite block increased to $98 per kilogram in 2004 from $77 per kilogram in 2003. The average value of phlogopite splittings decreased slightly to $4.63 in 2004 from $4.89 per kilogram in 2003.

In 2004, the average U.S. value of scrap and flake mica, which included high-quality sericite, decreased to $155 per metric ton (table 3). The average value for North Carolina flake mica decreased to $239 per ton in 2004. The value of dry-ground mica increased to an average $289 per ton (table 1).

Foreign Trade

The value of U.S. exports of mica decreased by 9.3% to $16.7 million, and the quantity decreased by 3.0% to 10,900 t (tables 1, 13). U.S. exports of mica, excluding unworked mica scrap, decreased by 9.3% in value from 2003 to $16.3 million, while the quantity decreased by 7.0% to 9,600 t (table 13).

Domestic ground mica (powder) exports decreased to 7,200 t, a decrease of 819 t from that of 2003 (tables 8, 13). Exports of crude and rifted mica increased to 1,310 t; this was up from the 923 t exported in 2003. In 2004, exports of worked mica increased by 13.9% to 935 t from 821 t in 2003. The value of U.S. exports of worked mica increased by 6.3% to $11.8 million in 2004 from 11.1 million in 2003 (table 13).

The value of U.S. imports of all mica increased by 7.5% to $27.3 million, while the quantity increased by 21.7% to 43,800 t. U.S. imports of mica, excluding unworked mica scrap (less than $1.00 per kilogram), increased by 4.9% in value from 2003 to $23.6 million, while the quantity increased 11.3% from 2003 at 25,100 t.

India continued to supply the United States with essentially all its supply of sheet and paper-quality scrap micas. Total imports for consumption of unworked split block, film, splittings, and mica sheet categorized as "Other" totaled about 18,700 t in 2004 (table 10). Imports of unworked low-value scrap mica (less than $1.00 per kilogram) increased to 18,700 t in 2004 compared with 13,400 t in 2003 (table 10). Demand continued strong for the low-value mica for use as a dry-ground additive for drywall compound, fillers, and paints.

In 2004, about 22,300 t of powder mica was imported, mostly from Canada, about 1,700 t more than in 2003 (table 11). Worked mica imports were 1,280 t; this was 27.6% higher than those of 2003 (table 12).

Outlook

The outlook for ground mica is for production growth of 1% to 3% per year for the next decade. The major markets for ground mica—drywall, joint compounds, and paints—are mature and relatively stable with growth tied to new housing starts and interest rates. To a lesser extent, widespread natural disasters, such as hurricanes and flooding, also affect the market by creating immediate demand for residential building materials. Demand also is affected by automobile production because interior and exterior parts typically contain dry-ground mica or engineered mica composites and exterior surfaces are painted with wet-ground pearlescent pigments and mica-containing coatings.

In 2005 and 2006, domestic demand for crude and ground mica is expected to grow slowly. Demand for wet-ground mica used in pearlescent automotive coatings and dry-ground mica used in automotive fillers and plastics also is expected to increase slowly. Demand for the smaller specialty markets for ground mica in cosmetics, nylon and polyester resins, coated micas, and polypropylene composites is expected to increase at a rate slightly higher than the 1% to 3% production rate. Consumption of dry-ground mica is forecast to increase by as much as 2% to 3% per year through 2006 unless higher interest rates and significantly higher home prices slow the increase in demand for new housing. Increasing fuel prices were expected to reduce demand for automobiles. Wet-ground mica is expected to show a moderate 2% to 3% growth through 2020 as demand from the automotive industry increases in response to population growth and increased use of pearlescent paints and engineered mica-bearing plastics and composites.

Demand for block mica is expected to increase slowly at about 1% during the next several years with demand increasing in a few specialty markets such as electronics. A shortage of high-quality block mica is expected to continue because of the generally low percentage of high-quality mica in currently mined deposits, mostly pegmatites.

Consumption of mica splittings, which is the principal type of sheet mica consumed in the United States, has been in the range of 700 to 1,000 metric tons per year (t/yr). With no potential new uses apparent and many substitute materials being used, no substantial growth is expected. Consumption of mica splittings is expected to remain in the range of 500 to 900 t/yr in the near future.

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TABLE 1
SALIENT MICA STATISTICS[1]

		2000	2001	2002	2003	2004
United States:						
Production, sold or used by producers:						
Scrap and flake mica:						
Quantity	thousand metric tons	101	98	81	79	99
Value	thousands	$14,800	$7,990	$7,370	$16,700	$15,400
Ground mica:						
Quantity	thousand metric tons	112	89	99 r	94	98
Value	thousands	$37,500	$28,100	$29,600	$28,600	$27,200
Prices:						
Scrap and flake mica	dollars per metric ton	136	82	90 r	213	155
Ground:						
Wet	do.	751	771	960	938	NA
Dry	do.	169	147	180	205	269
Sheet, muscovite and phlogopite:						
Block	dollars per kilogram	23	55	67	67	67
Splittings	do.	1.81	1.67	1.82	1.74	1.73
Consumption:						
Block, muscovite:						
Quantity	metric tons	6	3	2	2	2
Value	thousands	$132	$129	$134	$120	$114
Splittings, all types						
Quantity	metric tons	583	742	573	669	668
Value	thousands	$1,060	$1,240	$1,040	$1,160	$1,150
Exports	metric tons	11,500	10,500	10,500	11,200	10,900
Imports	do.	34,000	36,600	36,400	36,000	43,800
World, production	do.	328,000 r	368,000 r	269,000 r	267,000 r, e	288,000 e

eEstimated. rRevised. NA Not available.

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

TABLE 2
STOCKPILE STATUS AND GOVERNMENT INVENTORIES FOR MICA, DECEMBER 31, 2004

(Metric tons)

	Inventory, uncommitted			
Material	Stockpile grade	Nonstockpile grade	Available for disposal	Fiscal year 2003 sales
Block:				
Muscovite, stained and better	--	201	(1)	--
Muscovite, stained and lower	--	2,040	(1)	--
Phlogopite	--	--	(1)	--
Film, muscovite (first and second qualities)	1,120	--	(1)	--
Splittings:				
Muscovite	--	--	(1)	--
Phlogopite	23,600	--	(1)	17

-- Zero.

[1]The total disposal plan for all categories of mica in the national stockpile is undifferentiated at 2.267 metric tons (5 thousand pounds).

TABLE 3
SCRAP AND FLAKE MICA SOLD OR USED BY
PRODUCERS IN THE UNITED STATES, BY STATE[1, 2]

(Thousand metric tons and thousand dollars)

State	2003		2004	
	Quantity	Value	Quantity	Value
North Carolina	39	9,580	40	9,600
Other[3]	39	7,130	59	5,750
Total	79	16,700	99	15,400

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

[2]Includes finely divided mica recovered from mica schist and high-quality sericite schist, and mica that is a byproduct of feldspar and kaolin beneficiation.

[3]Includes Georgia, New Mexico, South Carolina, and South Dakota.

TABLE 4
GROUND MICA SOLD OR USED BY PRODUCERS IN THE UNITED STATES, BY END USE
AND METHOD OF GRINDING[1, 2]

	2003			2004		
	Quantity (thousand metric tons)	Value (thousands)	Unit value	Quantity (thousand metric tons)	Value (thousands)	Unit value
End use:						
Joint cement	61	$12,100	$200	53	$11,600	$219
Paint	13	3,060	233	18	8,370	453
Plastics	5	2,570	522	5	2,470	463
Well-drilling mud	(3)	(3)	146	(3)	(3)	413
Other[4]	15	10,800	708	21	4,720	220
Total	94	28,600	304	98	27,200	276
Method of grinding:						
Dry	W	W	186	W	W	269
Wet	W	W	851	W	W	NA

W Withheld to avoid disclosing company proprietary data. NA Not available.

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

[2]Domestic and some imported scrap. Low-quality sericite is not included.

[3]Withheld to avoid disclosing company proprietary data; included in "Other."

[4]Includes mica used for molded electrical insulation, roofing, rubber, textile and decorative coatings, welding rods, and miscellaneous.

TABLE 5
FABRICATION OF MUSCOVITE BLOCK MICA
IN THE UNITED STATES, BY QUALITY[1]

(Metric tons)

	2003	2004
Good stained or better	0.50	0.48
Stained or lower than stained[2]	1.34	1.33
Total	1.84	1.81

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

[2]Includes punch mica.

TABLE 6
CONSUMPTION AND STOCKS OF MICA SPLITTINGS
IN THE UNITED STATES[1]

Year	Consumption		Stocks on December 31
	Quantity (metric tons)	Value (thousands)	(metric tons)
2003	669	$1,160	404
2004	668	1,150	416

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

TABLE 7
BUILT-UP MICA SOLD OR USED IN THE UNITED STATES, BY PRODUCT[1, 2]

	2003		2004	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Flexible plate (cold)	73	$363	73	$354
Heater plate	W	W	W	W
Molding plate	185	1,330	185	1,330
Segment plate	220	1,140	220	1,140
Tape	W	W	W	W
Other	82 r	542 r	81	557
Total	559	3,370	559	3,380

rRevised. W Withheld to avoid disclosing company proprietary data; included in "Other."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Consists of alternating layers of binder and irregularly arranged and partly overlapped splittings.

TABLE 8
U.S. EXPORTS OF CRUDE AND RIFTED MICA, MICA POWDER, AND WASTE IN 2004, BY COUNTRY[1]

Country	Crude and rifted				Powder		Waste	
	Less than $1 per kilogram		More than $1 per kilogram					
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Argentina	--	--	--	--	6	$8	--	--
Australia	--	--	--	--	97	78	--	--
Barbados	--	--	--	--	41	42	--	--
Belgium	--	--	--	--	206	391	--	--
Brazil	11	$4	--	--	--	--	--	--
Canada	59	16	--	--	3,700	1,570	1,310	$305
Chile	9	6	--	--	--	--	--	--
China	--	--	--	--	332	196	--	--
Colombia	--	--	--	--	68	117	--	--
Costa Rica	--	--	--	--	5	3	--	--
Demark	43	15	--	--	--	--	--	--
Dominica	--	--	--	--	21	16	--	--
Dominican Republic	--	--	--	--	21	15	4	6
Ecuador	--	--	--	--	1	7	--	--
El Salvador	10	4	--	--	9	4	--	--
France	--	--	--	--	182	196	82	18
Germany	68	24	--	--	447	316	--	--
Greece	--	--	1	$6	--	--	--	--
Guatemala	--	--	--	--	(2)	3	--	--
Hong Kong	--	--	--	--	29	98	--	--

See footnotes at end of table.

TABLE 8—Continued

U.S. EXPORTS OF CRUDE AND RIFTED MICA, MICA POWDER, AND WASTE IN 2004, BY COUNTRY[1]

	Crude and rifted							
	Less than $1 per kilogram		More than $1 per kilogram		Powder		Waste	
Country	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
India	714	$96	--	--	15	$11	--	--
Indonesia	--	--	--	--	19	20	--	--
Ireland	--	--	--	--	16	4	--	--
Israel	27	10	--	--	4	8	--	--
Italy	--	--	--	--	81	24	--	--
Japan	--	--	(2)	$4	461	371	--	--
Korea, Republic of	--	--	--	--	257	165	--	--
Malaysia	--	--	--	--	6	16	--	--
Mexico	--	--	27	32	739	342	21	$4
Netherlands	112	72	--	--	142	408	20	13
Pakistan	--	--	--	--	15	17	--	--
Saudi Arabia	--	--	--	--	34	16	--	--
Singapore	--	--	1	15	--	--	--	--
South Africa	--	--	--	--	35	11	--	--
St. Lucia	--	--	--	--	8	7	--	--
Taiwan	--	--	--	--	40	109	--	--
Thailand	233	135	--	--	1	11	--	--
United Arab Emirites	--	--	--	--	42	26	--	--
United Kingdom	--	--	--	--	76	100	--	--
Venezuela	--	--	--	--	38	42	--	--
Total	1,290	380	29	58	7,200	4,780	1,440	351

-- Zero.

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

[2]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 9

U.S. EXPORTS OF WORKED MICA IN 2004, BY COUNTRY[1]

	Plates, sheets		Other	
Country	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Argentina	10	$69	--	--
Australia	106	524	3	$23
Austria	1	17	137	871
Bahamas, The	1	7	1	3
Brazil	53	841	5	135
Canada	134	3,150	63	1,280
Cayman Islands	1	5	1	25
Chile	2	5	--	--
China	2	49	(2)	9
Colombia	2	83	(2)	9
Costa Rica	1	14	--	--
Czech Republic	2	23	--	--
Denmark	--	--	(2)	7
Ecuador	2	5	3	35
France	4	54	(2)	8
French Guiana	--	--	(2)	6
French Polynesia	2	11	--	--
Germany	16	139	--	--

See footnotes at end of table.

TABLE 9—Continued

U.S. EXPORTS OF WORKED MICA IN 2004, BY COUNTRY[1]

Country	Plates, sheets		Other	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Guatemala	(2)	$10	1	$5
Guyana	--	--	1	3
Honduras	14	30	--	--
Hong Kong	1	8	(2)	9
Iceland	--	--	(2)	3
India	1	12	--	--
Israel	22	80	--	--
Italy	32	566	(2)	6
Jamaica	9	42	--	--
Japan	7	70	33	262
Korea, Republic of	75	586	(2)	12
Kuwait	--	--	(2)	9
Malaysia	1	12	--	--
Mexico	22	446	2	59
Netherlands	2	28	--	--
New Zealand	(2)	11	6	189
Panama	(2)	9	--	--
Poland	--	--	(2)	4
Romania	--	--	(2)	4
Russia	5	140	--	--
Singapore	7	53	11	38
South Africa	5	65	--	--
Sri Lanka	1	3	--	--
Switzerland	(2)	13	--	--
Taiwan	98	426	13	263
Thailand	(2)	7	--	--
United Arab Emirates	1	7	--	--
United Kingdom	11	199	(2)	7
Venezuela	1	20	--	--
Total	654	7,840	282	3,280

-- Zero.

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

[2]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 10

U.S. IMPORTS FOR CONSUMPTION OF CRUDE AND RIFTED MICA IN 2004, BY COUNTRY[1]

Country	Split block		Splittings		Other			
					Less than $1 per kilogram		More than $1 per kilogram	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Canada	--	--	--	--	24	$6	--	--
China	--	--	--	--	7,050	879	11	$140
Finland	--	--	--	--	2,720	857	1	72
Hong Kong	--	--	--	--	--	--	4	68
India	72	$77	37	$46	8,900	1,940	(2)	26
Total	72	77	37	46	18,700	3,750	15	234

-- Zero.

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

[2]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 11
U.S. IMPORTS FOR CONSUMPTION OF MICA POWDER AND WASTE
IN 2004, BY COUNTRY[1]

	Powder		Waste	
Country	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Argentina	835	$650	--	--
Belgium	2	16	--	--
Brazil	--	--	52	$25
Canada	15,000	5,160	111	39
China	5,240	1,560	--	--
France	2	39	6	52
Germany	42	115	--	--
India	448	131	1,220	529
Japan	457	2,930	--	--
Netherlands	33	18	--	--
Norway	192	118	--	--
Sri Lanka	--	--	35	12
Switzerland	(2)	4	--	--
Turkey	--	--	(2)	2
United Kingdom	5	23	--	--
Total	22,300	10,800	1,420	659

-- Zero.

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

[2]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 12
U.S. IMPORTS FOR CONSUMPTION OF WORKED MICA IN 2004, BY COUNTRY[1]

	Plates, sheets		Other	
Country	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Austria	70	$1,510	9	$285
Belgium	326	3,760	23	62
Brazil	170	467	--	--
Canada	5	92	--	--
China	170	428	46	300
Czech Republic	--	--	(2)	4
France	41	272	2	86
Germany	2	52	2	73
Hong Kong	--	--	24	162
India	60	1,010	165	996
Japan	7	118	17	203
Korea, Republic of	3	41	22	31
Netherlands	(2)	3	--	--
Switzerland	39	683	(2)	9
United Kingdom	35	638	17	493
Vietnam	--	--	21	21
Total	928	9,070	349	2,730

-- Zero.

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

[2]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 13
SUMMATION OF U.S. MICA TRADE DATA[1]

	Scrap and flake mica				Sheet mica			
	Powder		Waste		Unworked		Worked	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Exports:								
2003	8,010 r	$5,190	2,350	$794	33 r	$99	821	$12,300
2004	7,200	4,780	2,730	731	29	58	935	11,100
Imports for consumption:								
2003	20,600	10,600	14,300	3,360 r	134 2	351 r, 2	1,000	11,100
2004	22,300	10,800	20,100	4,410	124 2	358 2	1,280	11,800

rRevised.

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

[2]Excludes unworked sheet mica valued at less than $1 per kilogram.

Source: U.S. Census Bureau.

TABLE 14
MICA: WORLD PRODUCTION, BY COUNTRY[1, 2]

(Metric tons)

Country[3]	2000	2001	2002	2003	2004e
Argentina, all grades	4,665	2,120	1,770	1,894	2,000 p
Brazil[e]	4,000 r, 4	4,000 r	4,000 r	4,000 r	4,000
Canada[e]	17,500	17,500	17,500	17,500	17,500
France[e]	10,000	10,000	10,000	10,000	10,000
India:					
Crude	1,500 e	1,300	1,500	1,600 e	1,600
Scrap and waste	950 e	1,100	2,000	2,000 e	2,000
Total	2,450 e	2,400	3,500	3,600 e	3,600
Iran[5]	2,000 e	3,255	2,845	3,000 e	3,000
Korea, Republic of, all grades	65,249	109,339	29,870	33,645 r	34,000
Madagascar, phlogopite	66	90	60	70 e	70
Malaysia	3,835	4,107	3,669	3,609 r	3,600
Mexico, all grades	1,658	648	456	506 r	500
Morocco	1,897	-- e	--	-- e	--
Norway, flake[e]	2,500	2,500	2,600	2,600	2,600
Russia[e]	100,000	100,000	100,000	100,000	100,000
Serbia and Montenegro[e]	100	100	100	100	100
South Africa, ground and scrap	708	937	821	1,003	901 4
Spain[e]	2,500	2,500	2,500	2,500	2,500
Sri Lanka, scrap	1,491	1,161	1,161	1,174 r	1,200
Taiwan	6,862	9,733	6,595	3,237	2,979 4
United States, scrap and flake[6]	101,000	97,800	81,100	78,600	99,200 4
Grand total	328,000 r	368,000 r	269,000 r	267,000 r, e	288,000

eEstimated. pPreliminary. rRevised. -- Zero.

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

[2]Table includes data available through May 30, 2005.

[3]In addition to the countries listed, China, Pakistan, Romania, and Sweden are known to produce mica, but available information is inadequate to make reliable estimates of output levels.

[4]Reported figure.

[5]Year beginning March 21 of that stated.

[6]Excludes, if any, U.S. production of low-quality sercite and sheet mica.