MICA

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The mica group currently (2001) 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.

In 2001, about 97,800 metric tons (t) of scrap and flake mica was produced in the United States; this was 4% less than that of 2000 (tables 1, 3). Ground mica sales totaled 89,500 t, a decrease of 20% compared with 2000, and valued at $28.1 million. Essentially, all sheet mica used in the United States was imported; India was the major supplier. Consumption of muscovite block mica decreased to 2.5 t valued at $129,000. Consumption of mica splittings increased to 742 t in 2001 from 583 t in 2000. Worked and unworked sheet mica exports increased to 1,310 t in 2001 from 1,280 t in 2000, and the value decreased by 3% to $16.9 million. U.S. imports of worked and unworked sheet mica decreased to 4,290 t in 2001 from 5,430 t in 2000, and the value increased by 1% to $13.6 million.

The value of mica is in 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 greater abundance and superior electrical properties, muscovite is the principal mica used by industry. Phlogopite 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.

The mica group minerals, which comprise tetrahedral-octahedral-tetrahedral layers, are characterized by partial substitution of aluminum for silicon in the silicate tetrahedron. This substitution in the laminar structure provides charges to bind interlayer univalent and divalent cations, typically potassium, magnesium, calcium, and sodium. Layering in the univalent (potassium and sodium), or true, micas imparts perfect basal cleavage, which allow crystals to be split into very thin sheets that are tough and flexible. Layering in the divalent, or brittle, micas also results in perfect basal cleavage; the greater bond strengths, however, make them more brittle and less flexible.

Legislation and Government Programs

The Floyd D. Spence National Defense Authorization Act for Fiscal Year 2001 (Public Law 106-398), which was enacted on October 30, 2000, continued the funding of $150 million ($50 million each) of the operation and maintenance accounts of the Army, Navy, and Air Force by the National Defense Stockpile (NDS) Transaction Fund. Stocks of mica classified as excess to goal at the end of fiscal year 2000 (September 30, 2000) were all subject to no disposal limits or were below the disposal limits previously specified. Excess fiscal year 2001 NDS mica stocks were 51,836 kilograms (kg) (114,279 pounds) of muscovite block (stained and better), 674 kg (1,485 pounds) of muscovite film (first and second qualities), 4,168,229 kg (9,189,371 pounds) of muscovite splittings, 232,554 kg (512,693 pounds) of phlogopite splittings, and 15,902 kg (35,058 pounds) of phlogopite block. The law obligated no more than $71 million of the NDS Transaction Fund for the operation of the NDS program, which included disposal of hazardous materials that are environmentally sensitive; this was a decrease of $7.7 million from the previous fiscal year.

The Defense Authorization Act for Fiscal Year 2002 (Public Law 107-107), which was enacted into law December 28, 2001, continued the funding of $150 million ($50 million each) of the operation and maintenance accounts of the Army, Navy, and Air Force by the NDS Transaction Fund. The revised Annual Materials Plan for fiscal year (FY) 2002 authorized the disposal of 1,814,369 kg (4,000,000 pounds) of mica (all types) from the NDS classified as excess to goal. Stocks of mica classified as excess to goal at the end of fiscal year 2001 (September 30, 2001) were subject to no disposal limits. Excess FY 2002 NDS mica stocks were 8,433 kg (18,592 pounds) of muscovite block (stained and better), 557 kg (1,229 pounds) of muscovite film (first and second qualities), 3,555,301 kg (7,838,096 pounds) of muscovite splittings, 230,467 kg (508,092 pounds) of phlogopite splittings, and 80 kg (176 pounds) of phlogopite block (table 2).

Production

Domestic mine production data for mica are developed by the U.S. Geological Survey from four separate voluntary surveys. Of the 16 operations to which the "Crude Scrap and Flake Mica Production" form (including sericite production) was sent, 11 operations responded. Of the 13 operations to which the "Ground Mica" form was sent, 8 operations responded, and 1 had not started grinding (excludes low-grade ground sericite production). Of the six surveyed operations to which the "Mica Block and Film Consumption" form was sent, six operations responded. Of the nine surveyed operations to which the "Mica Splittings Consumption" form was sent, five 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., expanded its Deepstep, GA, operations to process 36,000 metric tons per year (t/yr) of mica. The placer operation grades from 2% to 25% mica in the ore and has reserves in excess of 500,000 t of mica. The deposit is located in the Coastal Plain and consists of sedimentary micaceous sands of late Cretaceous age. Deposition at Deepstep was in near-shore environments, and the ore body exhibits grading from coarse gravel to pure kaolin

clay (Georgia Industrial Minerals Inc., [undated]§[1]).

AZCO Mining Inc. announced it had signed an agreement with Certech, L.L.C., that allows Certech exclusive rights to purchase all the feldspathic sands produced as a byproduct of AZCO's mica production. Certech, which was based in Phoenix, AZ, was a producer of lightweight roofing tiles. AZCO also entered into an agreement with Presperse Inc. to supply wet-ground mica for cosmetics. Presperse, which was based in Piscataway, NJ, was a supplier of value-added products to the cosmetic industry (AZCO Mining, Inc., 2001).

AZCO raised $3 million in a sale leaseback of its property in Glendale, AZ. Under the agreement, AZCO sold 40% of its property and leased it back for an initial period of 10 years with a repurchase option of 120% after the second year. Each year following, the repurchase price will increase by 10% up to a maximum of 150% of the original amount (AZCO Mining Inc, 2002).

Zemex Industrial Minerals Inc. (ZIM) (a subsidiary of Zemex Corporation) announced it had terminated its contract to purchase Kentucky-Tennessee Clay Co. (K-T Clay) (a subsidiary of Hecla Mining Company). Those operations would have included the mica and feldspar production facilities of K-T Feldspar Corp. in Spruce Pine, NC. The contract was terminated by ZIM reportedly because of a material adverse change in the business of K-T Clay (Zemex Corporation, 2001).

Oglebay Norton Specialty Minerals, Inc. (a subsidiary of Oglebay Norton Company), produced dry and wet-ground mica from its mining and processing operations near Kings Mountain, NC, and Velarde, NM. Oglebay Norton, which acquired Franklin Industries' mica business in 1999, increased its earnings because demand was strong for mica products in 2000 (Oglebay Norton Company, 2001).

Scrap and Flake Mica.—In 2001, eight domestic companies with eight mines in five States produced scrap and flake mica, which excluded low-grade sericite. The United States was one of the world's primary producers with 97,800 t (tables 1, 3). North Carolina remained the major producing State with 52% 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, and a gemstone pegmatite and as a coproduct of feldspar and kaolin.

The scrap and flake mica producers were Engelhard Corp., Hartwell, GA; The Feldspar Corporation (a ZIM company) (two mines), Spruce Pine, NC; K-T Feldspar Corp., Spruce Pine, NC; Oglebay Norton Specialty Minerals, Inc., (two mines) Kings Mountain, NC, and Velarde, NM; The Mineral Mining Co. Inc., Kershaw, SC; Pacer Corp., Custer, SD; Tinton Enterprises, Spearfish, SD; Unimin Corp., Spruce Pine, NC; and Zemex Mica Corp. (a ZIM company), Micaville, NC.

Ground Mica.—In 2001, 9 companies operated 13 grinding plants in 6 States; 9 plants produced dry-ground mica, and 4, wet-ground mica. The four largest ground mica companies, which included one company with four plants, accounted for 74% of the total of 89,500 t of mica produced in the United States (table 4).

Dry-ground mica producers were Asheville Mica Co., Asheville, NC; Georgia Industrial Minerals, Inc., Deepstep, GA; AZCO Mining Inc., Glendale, AZ; The Mineral Mining Co. Inc., Kershaw, SC; Oglebay Norton Specialty Minerals Inc. (two plants), Kings Mountain, NC, and Velarde, NM; Pacer Corp., Custer, SD; Piedmont Minerals Corp., Hillsborough, NC; United States Gypsum Co. (a subsidiary of USG Corp.), Spruce Pine, NC; and Zemex Mica Corp. (a ZIM company), Spruce Pine, NC.

Wet-ground mica producers, in alphabetical order, were AZCO Mining Inc., Glendale, AZ; Engelhard Corp., Hartwell, GA; Oglebay Norton Specialty Minerals Inc., Kings Mountain, NC; and Zemex Mica Corp. (a ZIM company), Bakersville, NC.

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 by using underground methods. The mine also produced biotite and zinnwaldite mica.

Consumption

Statistics on domestic mica consumption are developed by surveying various processors and manufacturers, evaluating import-export data, and analyzing Government stockpile shipments.

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 largest 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, retardation plates in helium-neon lasers, pyrometers, 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 grade down is used in transmitting capacitors. Receiving capacitors use a slightly lower grade of high-quality muscovite.

In 2001, consumption of ruby and nonruby muscovite block totaled 2,510 kg; this was a 58% decrease compared with that of 2000 (table 5). Stained and lower-than-stained quality remained in greatest demand and accounted for 82.6% of ruby mica block. Consumption of nonruby mica block was split 78% for stained quality and 22% for good quality. The use of block mica was lower because demand decreased in electronic and nonelectronic applications.

In 2001, five companies consumed muscovite block and film in five plants in four States—two in North Carolina and one each in New Jersey, Ohio, and Virginia.

In 2001, mica splittings represented the largest part of the sheet mica industry in the United States. Consumption of muscovite and phlogopite splittings increased by 27% to 742 t in 2001 from 583 t in 2000 (table 6). Muscovite splittings from India accounted for essentially all domestic consumption. The

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

remainder of consumption was primarily phlogopite splittings imported from Madagascar. Muscovite and phlogopite splittings were fabricated into various built-up mica products by nine companies that operated nine plants in seven States.

Built-Up Mica.—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. 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 increased to 77 t in 2001 from 61 t in 2000 (table 7).

Heater plate is used where high-temperature insulation is required. Consumption of mica in heater plate decreased by 33% in 2001 compared with that of 2000.

Molding plate is sheet 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 is also fabricated into tubes and rings for insulation in transformers, armatures, and motor starters. Consumption of molding plate was essentially unchanged at 195 t in 2001 compared with 194 t in 2000 (table 7).

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 48 t in 2001 (table 7).

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 are also corrugated or reinforced by multiple layering.

The total amount of built-up mica that was consumed or shipped was 411 t; this was an increase of 14.8% compared with that of 2000 (table 7). In 2001, flexible (cold) and molding plates were the major end products and accounted for 19% and 47% 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. The principal source of the scrap was India. In 2001, the manufacturing companies were Corona Films Inc., West Townsend, MA; General Electric Co., Coshocton, OH; and U.S. Samica Corp., Rutland, VT.

Ground Mica.—The largest 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 2001, joint compound accounted for 51% 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, which was its second largest use, accounted for 22% of the 2001 total.

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.

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 3.9% of the dry-ground mica used in 2001.

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, thus 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 2001, consumption of dry-ground mica in plastic applications accounted for 3.7% of the market, which was lower than the 4.4% consumed in 2000 (table 4).

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

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, eye shadow, body and hair glitter, nail polish, and foundation.

Stocks

Government stocks of mica in the NDS comprised stockpile-grade muscovite block, stained and better; first and second qualities muscovite film; muscovite splittings; phlogopite block; and phlogopite splittings. NDS stocks of muscovite block, muscovite film, and muscovite and phlogopite splittings were available for sale from the Defense National Stockpile Center, Fort Belvoir, VA. Yearend 2001 stocks of various types of mica in the NDS are listed in table 2.

Reported yearend industry stocks of muscovite mica block (ruby and nonruby) increased to 19.0 t in 2001 from 17.8 t in 2000. Industry stocks of muscovite and phlogopite mica splittings increased to 418 t at yearend 2001 from 404 t at yearend 2000 (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 2001 compared with the previous year were as follows: block (ruby and nonruby) increased to $52 per kilogram in 2001 from $22 per kilogram in 2000 and muscovite splittings decreased to $1.50 per kilogram from $1.60 per kilogram in 2000. The substantial increase in the prices of ruby and nonruby block was the result of multiple price increases during the year by Indian mica suppliers.

The average value of phlogopite block increased to $79.11 per kilogram in 2001 from $14.95 per kilogram in 2000. The average value of phlogopite splittings increased to $4.91 per kilogram in 2001 from $4.89 per kilogram in 2000.

In 2001, the average U.S. value of crude flake mica, which included high-quality sericite, decreased to $82 per metric ton. The average value for North Carolina flake mica decreased to $77 per ton in 2001. The value of dry-ground mica decreased by 13% to average $147 per ton, and wet-ground mica increased by 3% to $771 per ton in 2001 (table 1).

Foreign Trade

Demand for mica decreased in U.S. and foreign markets in 2001. U.S. foreign trade decreased for both imports and exports of ground mica and worked and unworked sheet. The value of U.S. exports of mica declined by 5% to $21.3 million, while the quantity decreased by 9% to 10,500 t. Imports of mica decreased with the value of U.S. imports of mica, which excluded mica scrap, decreasing by 11% to $23.6 million and the quantity decreasing by 17% to 23,200 t (table 13).

Domestic ground mica exports decreased to 7,410 t, down by 1,470 t from that of 2000 (table 8). Exports of crude and rifted mica increased to 698 t; this was up from the 651 t exported in 2000. Exports of worked mica sheet in 2001 increased by 4% to 1,100 t (table 9). The value of U.S. exports of worked mica sheet, however, decreased to $16.6 million; this was 3.1% lower than that of 2000.

India continued to supply the United States with essentially all its supply of sheet and paper-quality scrap micas. Imports for consumption of unworked split block, film, splittings, and mica sheet categorized as “Other” totaled about 13,400 t; this total was 137% higher than that of 2000 (table 10). The large increase in imports of low-value scrap mica was the result of higher demand for dry-ground mica for drywall compound, fillers, and paints.

In 2001, about 17,700 t of ground mica was imported, mostly from Canada (table 11). Worked mica imports were 1,100 t; this was 15% lower than those of 2000 (table 12).

Outlook

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

In 2002 and 2003, domestic demand for crude and ground mica is expected to increase slightly. Demand for wet-ground mica is expected to increase significantly, as much as twice the rate of dry-ground mica, in the short term to meet increasing demand for cosmetics, nylon and polyester resins, pearlescent paints, plastic reinforcement fillers, and polypropylene composites. Markets for dry-ground mica are forecast to grow by as much as 3% per year through the year 2005 unless higher interest rates and significantly higher home prices slow demand for new housing and automobiles. Wet-ground mica is expected to show moderate growth in the long term because demand from the cyclical automotive industry should increase with the increased amounts of pearlescent paint and engineered mica-bearing plastics being used.

Demand for block mica is expected to grow slowly during the next several years with demand increasing in a few specialty markets. A shortage of high-quality block mica is expected to continue because of the generally low percentage of high-quality mica in currently [2001] mined deposits, mostly pegmatites.

Consumption of mica splittings, which is the principal type of sheet mica consumed in the United States, decreased sharply throughout the 1960s and 1970s and leveled off in the 1980s and 1990s in the range of from 700 to 1,000 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 from 500 to 900 t/yr in the 2000s.

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TABLE 1
SALIENT MICA STATISTICS 1/

		1997	1998	1999	2000	2001
United States:						
Production, sold or used by producers:						
Scrap and flake mica	thousand metric tons	112	87	95	101	98
Value	thousands	$9,880	$7,980	$14,700	$14,800	$7,990
Ground mica	thousand metric tons	110	104	111	112	89
Value	thousands	$37,000	$31,200	$36,700	$37,500	$28,100
Prices:						
Scrap and flake mica	dollars per metric ton	$83	$87	$148	$136	$82
Ground:						
Wet	do.	$1,080	$909	$849	$751	$771
Dry	do.	$176	$179	$192	$169	$147
Sheets, muscovite and phlogopite:						
Block	dollars per kilogram	$28	$26	$20	$23	$55
Splittings	do.	$1.69	$1.67	$1.67	$1.81	$1.67
Consumption:						
Block, muscovite	metric tons	8	7	7	6	3
Value	thousands	$249	$203	$139	$132	$129
Splittings, all types	metric tons	736	763	786	583	742
Value	thousands	$1,240	$1,270	$1,310	$1,060	$1,240
Exports	metric tons	9,210	8,900	12,600	11,500	10,500
Imports	do.	28,900	27,400	30,200	34,000	36,600
World, production	do.	309,000 r/	289,000 r/	278,000 r/	328,000 r/	301,000 e/

r/ Revised. e/ Estimated.
1/ Data are rounded to no more than three significant digits.

TABLE 2
STOCKPILE STATUS AND GOVERNMENT INVENTORIES FOR MICA, DECEMBER 31, 2001 1/

(Metric tons)

Material	Inventory, uncommitted		Available for disposal	Fiscal year 2000 sales
	Stockpile grade	Nonstockpile grade		
Block:				
Muscovite, stained and better	42	1	43	25
Phlogopite	1	11	12	10
Film, muscovite, 1st and 2d qualities	--	--	--	--
Splittings:				
Muscovite	897	--	897	--
Phlogopite	101	--	101	--

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

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	2000		2001	
	Quantity	Value	Quantity	Value
North Carolina	47	4,550	51	3,890
Other 3/	54	10,200	47	4,100
Total	101	14,800	98	7,990

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, kaolin, and lithium 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/

	2000			2001		
	Quantity (thousand metric tons)	Value (thousands)	Unit value	Quantity (thousand metric tons)	Value (thousands)	Unit value
End use:						
Joint cement	50	$8,670	$186	46	$8,100	$178
Paint	33	11,100	334	20	8,030	407
Plastics	5	2,140	436	3	947	290
Well-drilling mud	6	1,110	180	4	422	102
Other 3/	18	14,500	786	17	10,600	629
Total	112	37,500	333	89	28,100	314
Method of grinding:						
Dry	W	W	169	W	W	147
Wet	W	W	751	W	W	771

W Withheld to avoid disclosing company proprietary data.
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/ 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)

	2000	2001
Good stained or better	0.32	0.44
Stained or lower 2/	5.62	2.07
Total	5.94	2.51

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/

	Consumption		Stocks on
Year	Quantity (metric tons)	Value (thousands)	December 31 (metric tons)
2000	583	$1,060	404
2001	742	1,240	418

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/

	2000		2001	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Flexible plate, cold	61	$363	77	$693
Heater plate	W	W	W	W
Molding plate	194	1,560	195	1,700
Segment plate	10	1,040	48	1,780
Tape	W	W	W	W
Other	72	508	71	1,150
Total	358	3,670	411	5,680

W Withheld to avoid disclosing company proprietary data; included in "Total."
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 2001, 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)
Angola	--	--	--	--	18	$6	--	--
Argentina	--	--	--	--	5	4	--	--
Australia	--	--	--	--	15	5	--	--
Bahamas, The	--	--	4	$3	--	--	--	--
Barbados	--	--	--	--	35	31	--	--
Belgium	11	$4	--	--	60	13	--	--
Brazil	--	--	--	--	37	28	--	--
Canada	13	4	--	--	4,610	1,540	1,070	$245
Chile	--	--	4	9	--	--	--	--
China	--	--	--	--	3	20	--	--
Colombia	--	--	7	7	131	57	--	--
Costa Rica	25	9	--	--	6	5	--	--
Dominica	--	--	--	--	15	12	--	--
Ecuador	--	--	--	--	17	10	--	--
France	16	6	--	--	35	41	83	17
Georgia	--	--	43	38	--	--	--	--
Germany	141	59	27	82	161	134	--	--
Haiti	--	--	3	8	--	--	--	--
Hong Kong	--	--	--	--	82	52	--	--
India	9	5	28	48	175	243	--	--
Indonesia	--	--	--	--	53	37	--	--
Italy	--	--	--	--	39	7	--	--
Japan	152	53	73	87	428	574	--	--
Korea, Republic of	--	--	--	--	252	186	--	--
Malaysia	--	--	--	--	114	41	--	--
Mexico	--	--	1	19	607	365	98	89
Netherlands	--	--	--	--	57	130	--	--
Norway	14	5	--	--	--	--	--	--
Pakistan	--	--	--	--	11	13	--	--
Philippines	--	--	--	--	5	3	--	--
Poland	--	--	--	--	10	3	--	--
Romania	117	41	--	--	--	--	--	--
Saudi Arabia	--	--	--	--	35	16	--	--
Singapore	17	6	--	--	--	--	--	--
South Africa	--	--	--	--	23	11	--	--
Spain	--	--	--	--	27	16	--	--
Sweden	--	--	--	--	30	18	--	--
Switzerland	--	--	(2/)	5	--	--	--	--
Taiwan	--	--	--	--	55	48	--	--
United Kingdom	37	13	(2/)	3	123	154	--	--
Venezuela	--	--	9	14	133	75	--	--
Total	499	186	199	324	7,410	3,900	1,250	351

-- Zero.

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

2/ Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 9
U.S. EXPORTS OF WORKED MICA IN 2001, BY COUNTRY 1/

Country	Plates, sheets		Other	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Anguilla	(2/)	$12	--	--
Aruba	2	5	--	--
Australia	2	67	(2/)	$28
Bahamas, The	1	21	4	15
Bangladesh	1	39	--	--
Belgium	190	1,290	--	--
Brazil	94	2,020	--	--
Canada	113	3,150	67	1,680
Czech Republic	--	--	(2/)	5
Chile	7	63	--	--
China	1	22	2	30
Colombia	11	199	(2/)	17
Costa Rica	--	--	2	40
Dominican Republic	--	--	(2/)	4
Ecuador	--	--	(2/)	10
France	11	241	(2/)	10
Germany	4	97	(2/)	6
Guatemala	(2/)	3	--	--
Honduras	9	18	--	--
Hong Kong	(2/)	27	6	210
India	17	275	15	176
Ireland	20	50	--	--
Israel	6	113	7	80
Italy	32	667	(2/)	3
Japan	2	43	1	60
Korea, Republic of	1	20	4	49
Luxemburg	(2/)	3	--	--
Malaysia	1	23	--	--
Mexico	86	1,150	5	137
Netherlands	60	392	--	--
Panama	1	20	--	--
Philippines	(2/)	5	--	--
Poland	1	4	--	--
Romania	19	530	--	--
Saudi Arabia	1	4	--	--
Singapore	2	9	1	6
South Africa	(2/)	17	--	--
Switzerland	20	141	1	17
Taiwan	17	322	14	231
Trinidad and Tobago	(2/)	4	--	--
Tunisia	1	19	--	--
Turkey	(2/)	5	--	--
Turks and Caicos Islands	61	122	--	--
United Arab Emirates	2	8	--	--
United Kingdom	172	2,360	6	125
Venezuela	(2/)	6	(2/)	11
Yemen	1	9	--	--
Total	969	13,600	136	2,960

-- Zero.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 10
U.S. IMPORTS FOR CONSUMPTION OF CRUDE AND RIFTED MICA IN 2001, BY COUNTRY 1/

	Split block		Splittings		Other			
					Less than $1 per kilogram		More than $1 per kilogram	
Country	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Brazil	--	--	--	--	--	--	(2/)	$2
Canada	--	--	17	$2	--	--	--	--
China	--	--	--	--	3,830	$504	4	12
Finland	--	--	--	--	316	72	13	285
Germany	--	--	322	93	--	--	--	--
India	405	$267	2,430	965	9,250	1,730	(2/)	9
Mexico	--	--	--	--	--	--	(2/)	77
Total	405	267	2,770	1,060	13,400	2,300	17	386

-- Zero.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 11
U.S. IMPORTS FOR CONSUMPTION OF MICA POWDER AND WASTE IN 2001, BY COUNTRY 1/

	Powder		Waste	
Country	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Argentina	612	$1,140	--	--
Brazil	--	--	180	$67
Canada	16,100	5,870	(2/)	7
China	330	73	--	--
France	--	--	126	78
Germany	8	54	--	--
Hong Kong	(2/)	7	--	--
India	60	35	934	458
Japan	528	2,110	--	--
Norway	44	31	--	--
Switzerland	2	20	--	--
Taiwan	1	9	--	--
United Kingdom	4	15	--	--
Total	17,700	9,370	1,240	610

-- Zero.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 12
U.S. IMPORTS FOR CONSUMPTION OF WORKED MICA IN 2001, BY COUNTRY 1/

Country	Plates, sheets		Other	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Austria	110	$2,430	2	$41
Belgium	371	4,800	(2/)	8
Brazil	--	--	1	9
Canada	2	34	--	--
China	100	213	33	283
Denmark	537	582	--	--
France	16	107	2	66
Germany	16	298	1	41
Hong Kong	--	--	9	96
India	62	722	35	535
Japan	8	131	4	213
Korea, Republic of	13	78	28	62
Madagascar	(2/)	6	(2/)	5
Mexico	--	--	(2/)	2
Netherlands	(2/)	8	--	--
Spain	--	--	(2/)	10
Sweden	1	5	--	--
Switzerland	39	854	--	--
United Kingdom	2	62	13	174
Vietnam	--	--	(2/)	2
Total	975	10,300	129	1,550

-- Zero.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Less than 1/2 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:								
2000	8,880	$4,610	1,380	$383	209	$343	1,070	$17,100
2001	7,410	3,900	4,400	537	199	324	1,110	16,600
Imports for consumption:								
2000	22,100	12,800	6,180	1,290	4,400	2,040	1,310	12,000
2001	17,700	9,370	1,240	610	3,200	1,710	1,100	11,900

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

Source: U.S. Census Bureau.

TABLE 14
MICA: WORLD PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons)

Country 3/	1997	1998	1999	2000	2001 e/
Argentina:					
Sheet e/	-- r/	-- r/	-- r/	-- r/	--
All grades	2,792 r/	3,480 r/	3,097	3,100 e/	3,100
Brazil	4,000	4,000	3,000 r/	4,000 r/	4,000
Canada e/	17,500	17,500	17,500	17,500	17,500
France e/	8,000	10,000	10,000	10,000	10,000
India:					
Crude	1,794	1,489	1,500 e/	1,500 e/	1,300
Scrap and waste	1,128	966	1,000 e/	950 e/	1,100
Total	2,922	2,455	2,500 e/	2,450 e/	2,400
Iran 4/	1,086 r/	1,084	1,425	2,000 e/	2,000
Korea, Republic of, all grades	34,489	38,459	24,733	65,249 r/	40,000
Madagascar, phlogopite	1,529 r/	1,232 r/	54 r/	66 r/	70
Malaysia	5,708	3,642	3,675	3,835 r/	4,000
Mexico, all grades	975	890	971	1,058	100
Morocco	600 r/ e/	600 r/ e/	210 r/	1,897 r/	2,000
Norway, flake e/	2,500	2,500	2,500	2,500	2,500
Peru e/	-- r/	-- r/	-- r/	-- r/	--
Russia e/	100,000	100,000	100,000	100,000	100,000
Serbia and Montenegro e/	200	150	50	100	100
South Africa, ground and scrap	1,423	1,556	1,010	707	1,044 5/
Spain e/	2,500	2,500	2,500	2,500	2,500
Sri Lanka, scrap	3,700	2,800	1,425	1,491 r/	1,500
Taiwan	7,806	7,750	6,966 r/	6,862 r/	9,733 5/
United States, scrap and flake 6/	112,000	87,000	95,400	101,000	97,800 5/
Zimbabwe	30	1,309	1,300 e/	1,300 e/	900
Grand total	309,000 r/	289,000 r/	278,000 r/	328,000 r/	301,000

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

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

2/ Table includes data available through May 30, 2002.

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/ Year beginning March 21 of that stated.

5/ Reported figure.

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