

# MICA

By James B. Hedrick

**Domestic survey data and tables were prepared by Linder Roberts, statistical assistant, and the world production table was prepared by Glenn J. Wallace, international data coordinator.**

The mica group currently represents 37 phyllosilicate minerals that have a layered or platy texture (Rieder and others, 1998). (Phyllo is derived from the Greek word *phyllon*, meaning leaf.) The commercially important micas are muscovite and phlogopite.

The value of mica is in its unique physical properties. The crystalline structure of mica forms mineral layers that can be split or delaminated into thin sheets. These sheets are flexible, elastic, platy, transparent to opaque, resilient, reflective, refractive, dielectric, chemically inert, insulating, lightweight, and hydrophilic. Mica also 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 where a combination of high-heat stability and electrical properties is required. Muscovite and phlogopite are used in sheet and ground forms.

In 1999, about 104,000 metric tons of scrap and flake mica was produced in the United States, 20% more than that of 1998 (tables 1, 3). Ground mica sales were 111,000 tons, an increase in tonnage of 6.7%, valued at \$36.7 million. Essentially all sheet mica used in the United States was imported, primarily from India. Consumption of muscovite block mica decreased to 6.6 tons valued at \$139,000. Consumption of mica splittings increased to 786 tons in 1999 from 763 tons in 1998. Worked and unworked sheet mica exports increased by 51% to 1,290 tons, and the value increased by 55% to \$16.6 million. U.S. imports of worked and unworked sheet mica decreased by 2.7% to 4,547 tons valued at \$12.8 million.

## Legislation and Government Programs

The calendar year 1999 included parts of the U.S. Government fiscal years (October 1 to September 30) 1999 and 2000. The Strom Thurmond National Defense Authorization Act for Fiscal Year 1999, Public Law 105-261, enacted on October 17, 1998, did not change the previous authorizations for disposal of specific mica stocks. Public Law 106-65, also known as the Strategic and Critical Stock Piling Act, was enacted on October 5, 1999. It eliminated the disposal restrictions under Section 3303 that had been in effect since the National Defense Authorizations Act for Fiscal Year 1996 (Public Law 104-106; 110 Stat 629).

Stocks of mica classified as excess to goal at the end of fiscal year 1999 (September 30, 1999) and subject to the no limitations, totaled 283,322 kilograms (624,619 pounds) of muscovite block (stained and better), 702 kilograms (1,548

pounds) of muscovite film (1st and 2nd qualities), 5,232,975 kilograms (11,536,734 pounds) of muscovite splittings, 234,345 kilograms (516,643 pounds) of phlogopite splittings, and 53,498 kilograms (117,942 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 13 operations to which the *Crude Scrap and Flake Mica* production form (including sericite production) was sent, 7 operations responded. Of the 16 operations to which the *Ground Mica* form was sent, 7 operations responded and 1 had not started grinding (excludes low-grade ground sericite production). Of the five surveyed operations to which the *Mica Block and Film* consumption form was sent, two 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.

AZCO Mining Inc. commenced mica production from its Black Canyon Mine in Arizona. The 10,000-metric-ton-per-year facility's initial production was from a 7,000-ton stockpile of high-grade muscovite ore. The mine will produce muscovite from a swarm of pegmatite dikes that occur over a distance of 1,524 meters with widths varying from 3 to 18 meters (Industrial Minerals, 1999a).

U.S. mica processor, Polar Minerals Inc., completed a 75,000-ton facility in Wellsville, OH. The \$6 million plant, which includes mica processing, provides a barge unloading terminal, ore storage facilities, railroad access, and warehouse storage. In addition to mica, Polar Minerals' plant will process barite, calcium carbonate, and talc for the plastics, paint, and rubber industries. The new plant adds to Polar Minerals similar 100,000-ton-per-year facility at Mount Vernon, IN (Industrial Minerals, 1999b).

***Scrap and Flake Mica.***—In 1999, 10 domestic companies with 13 mines in 6 States produced scrap and flake mica (excluding low-grade sericite). The United States was one of the world's primary producers with 104,000 tons (tables 1 and 3). North Carolina remained the major producing State, with 45% of domestic production, and the remainder was produced in Arizona, Georgia, New Mexico, South Carolina, and South Dakota. Mica was recovered from mica schist, high-quality sericite schist, weathered pegmatites, a placer deposit, and as a

coproduct of feldspar and kaolin.

The scrap and flake mica producers, in alphabetical order, were AZCO Mining Inc., Glendale, AZ; Engelhard Corp., Hartwell, GA; The Feldspar Corporation., a Zemex Industrial Minerals company, (2 mines) Spruce Pine, NC; Georgia Industrial Minerals, Inc., Deep Step, GA; K-T Feldspar Corp., Spruce Pine, NC; Oglebay Norton Specialty Minerals, Inc. (formerly Franklin Industrial Minerals, a division of Franklin Industries Inc.), 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 Zemex Industrial Minerals company, Micaville, NC.

**Ground Mica.**—In 1999, 11 companies operated 16 grinding plants in 6 States—11 plants produced dry-ground mica, and 5 wet-ground mica. The four largest ground mica companies, including one company with four plants, accounted for 64% of the total of 111,000 tons (table 4).

Dry-ground mica producers, in alphabetical order, were Asheville Mica Co., Asheville, NC; Georgia Industrial Minerals, Inc., Deep Step, GA; The Mineral Mining Co. Inc., Kershaw, SC; Oglebay Norton Specialty Minerals Inc. (2 plants) (formerly Franklin Industrial Minerals, a division of Franklin Industries Inc.), Kings Mountain, NC, and Velarde, NM; Pacer Corp., Custer, SD; Piedmont Minerals Corp., Hillsborough, NC; Spartan Minerals Corp., a subsidiary of FMC Corp. (closed), Lithium Division, Pacolet, SC; USG Corp., Spruce Pine, NC; and Zemex Mica Corp., a Zemex Industrial Minerals company, Spruce Pine, NC. Wet-ground mica producers, in alphabetical order, were: Engelhard Corp., Hartwell, GA; Georgia Industrial Minerals Inc., Deep Step, GA; Oglebay Norton Specialty Minerals Inc., Kings Mountain, NC; and Zemex Mica Corp., a Zemex Industrial Minerals company, Bakersville, NC.

**Sheet Mica.**—Small quantities of muscovite were produced as a byproduct by the Morefield Gem Mine, Inc., in Amelia Co., VA. The pegmatite was mined primarily for gemstones and mineral samples 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 transparency, flexibility, 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, optical instrumentation, laser devices, medical electronics for radiation treatment, and radar systems.

Only high-quality muscovite film 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 1999, consumption of muscovite block (ruby and nonruby) totaled 6,620 kilograms, a 9% decrease compared with that of 1998 (table 5). Stained and lower-than-stained quality remained in greatest demand, accounting for 95.3% of ruby mica block. Consumption of nonruby mica block was split—91% for stained quality and 9% for good quality. The use of block mica was lower as demand decreased in electronic and nonelectronic applications.

In 1999, five companies continued to consume muscovite block and film in five plants in four States—two in North Carolina and one each in New Jersey, Ohio, and Virginia.

In 1999, mica splittings represented the largest part of the sheet mica industry in the United States. Consumption of muscovite and phlogopite splittings increased by 3% to 786 tons (table 6). Muscovite splittings from India accounted for essentially all the domestic consumption. The 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 operating nine plants in seven States.

**Built-Up Mica.**—Produced by mechanical 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 plate, heater plate, mica paper, molding plate, segment plate, and tape (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 50 tons in 1999 (table 7).

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 decreased less than 2% to 175 tons in 1999 from 178 tons in 1998 (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 decreased slightly to 125 tons in 1999 from 127 tons in 1998 (table 7).

Heater plate is used where high-temperature insulation is required. Consumption of mica in heater plate increased by almost 3% in 1999 compared with that of 1998.

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 532 tons, a decrease of 19.6% compared with that of 1998 (table 7). In 1999, molding plate and flexible plate (cold) were the major end products and accounted for 33% and 24% 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 1999, manufacturing companies, in alphabetical order 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 1999, joint compound accounted for 45% 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, its second largest use, accounted for 30% of the 1999 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 3.6% of dry-ground mica use in 1999.

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, 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 1999, consumption of dry-ground mica in plastic applications accounted for 2.9% of the market, slightly lower than the 3.0% in 1998 (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 in some special greases, as a flux coating on welding rods, and in foundry applications as coatings for core and mold release compounds, mold washes, and facing agents.

Wet-ground mica, which retains the brilliancy of its cleavage faces, was used primarily in pearlescent paints by the automotive industry. Its reflective and refractive properties were also used in cosmetics where it was used as an ingredient in eye shadow, body and hair glitter, face makeup, and fingernail polish.

## Stocks

Government stocks of mica in the National Defense Stockpile (NDS) comprised stockpile-grade muscovite block, stained and better; muscovite film, 1st and 2nd qualities; 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 1999 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 19.3 tons in 1999 from 16.8 tons in 1998. Industry stocks of muscovite and phlogopite mica splittings decreased to 411 tons at yearend 1999 from 424 tons at yearend 1998 (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 1999 compared with 1998 were as follows: block (ruby and nonruby) decreased by 25% to \$21 per kilogram and muscovite splittings were unchanged at \$1.51 per kilogram.

The average value of phlogopite block decreased to \$12.82 per kilogram in 1999 from \$17.95 per kilogram in 1998. The average value of phlogopite splittings were unchanged at \$4.69 per kilogram in 1999.

In 1998, the average U.S. value of crude flake mica, including high-quality sericite, increased to \$95 per metric ton (table 1). The average value for North Carolina flake mica increased to \$104 per ton in 1999. The value of dry-ground mica increased 7.3% to average \$192 per ton, and wet-ground mica decreased to average \$849 per ton (table 1).

## Foreign Trade

Demand for mica increased in U.S. and foreign markets in 1999. Foreign trade was mixed, with the value of U.S. exports of mica increasing by 49% to \$24.1 million as the quantity increased by 76% to 12,600 tons. Imports of mica also increased with the value of U.S. imports of mica increasing by

8.3% to \$26.8 million and the quantity increasing by 10% to 30,200 tons (table 13).

Domestic ground mica exports increased to 7,320 tons, up 680 tons from that of 1998 (table 8). Exports of crude and rifted mica increased to 3,340 tons, primarily the result of sheet mica sales from the NDS. Exports of worked mica sheet in 1999 increased by 25.2% to 840 tons (table 9). The value of U.S. exports of worked mica sheet increased to \$16.6 million, 55.1% higher than that of 1998.

The United States continued to rely on imports, primarily from India, for 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," were about 7,119 tons, 22% less than that of 1998 (table 10).

About 20,600 tons of ground mica was imported in 1999, mostly from Canada (table 11). Worked mica imports were 1,780 tons, 10% higher than those of 1998 (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, 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 2000 and 2001, domestic demand for crude and ground mica is expected to increase slightly. Demand for wet-ground micas is expected to improve in the short term to meet increasing demand for pearlescent paints and cosmetics. Markets for dry-ground mica are forecast to grow by as much as 3% per year through the year 2005, unless interest rates and prices rise sufficiently to slow demand for new housing and automobiles. Wet-ground mica is also expected to show moderate growth in the long-term as demand from the cyclical automotive industry uses increasing amounts of pearlescent paint.

Demand for block mica is expected to grow slowly through over the next several years as demand increases 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 (1999) mined deposits (pegmatites).

Consumption of mica splittings, the principal type of sheet mica consumed in the United States, decreased sharply throughout the 1960's and 1970's and leveled off in the 1980's and 1990's in the range of 700 to 1,000 tons per year. With no new uses and many substitute materials, no substantial growth is expected. Consumption of mica splittings is expected to remain in the range of 600 to 900 tons per year.

## References Cited

- Industrial Minerals, 1999a, Azco begins mica production at Black Canyon: World of Minerals, no. 384, September, p. 18.  
———1999b, Polar Minerals builds new \$6m. plant: World of Minerals, no. 385, October, p. 12-15.  
Rieder, Milan, and others, 1998, Nomenclature of the micas: American Mineralogist, IMA Mica Report, November-December, p. 1366-1371.

## GENERAL SOURCES OF INFORMATION

### U.S. Geological Survey Publications

- Mica. Mineral Industry Surveys, annual.<sup>1</sup>  
Mica (natural), scrap and flake. Ch. in Mineral Commodity Summaries, annual.<sup>1</sup>  
Mica (natural), sheet. Ch. in Mineral Commodity Summaries, annual.<sup>1</sup>  
Mica. Ch. in United States Mineral Resources, Professional Paper 820, 1973.

### Other

- Mica. Ch. in Mineral Facts and Problems, U.S. Bureau of Mines Bulletin 675, 1985.  
Roskill Information Services Ltd. (London). The Economics of Mica (7th ed.), 1991.

---

<sup>1</sup>Prior to January 1996, published by the U.S. Bureau of Mines.

TABLE 1  
SALIENT MICA STATISTICS 1/

		1995	1996	1997	1998	1999
United States:						
Production (sold or used by producers):						
Scrap and flake mica	thousand metric tons	108	97	114	87	104
Value	thousands	\$5,630	\$7,820	\$9,400	\$7,550	\$15,300
Ground mica	thousand metric tons	98	103	110	104	111
Value	thousands	\$24,800	\$33,600	\$37,000	\$31,200	\$36,700
Prices, dollars per metric ton:						
Scrap and flake mica		\$52	\$81	\$83	\$87	\$95
Ground:						
Wet		\$974	\$1,030	\$1,080	\$909	\$849
Dry		\$174	\$182	\$176	\$179	\$192
Sheets, dollars per kilogram, muscovite and phlogopite:						
Block		\$73	\$55 r/	\$28 r/	\$26	\$20
Splittings		\$1.86	\$1.75	\$1.69	\$1.67	\$1.67
Consumption:						
Block, muscovite	metric tons	6	6	8	7	7
Value	thousands	\$407	\$383	\$249	\$203	\$139
Splittings, all types	metric tons	713	859	736	763	786
Value	thousands	\$1,320	\$1,510	\$1,240	\$1,270	\$1,310
Exports	metric tons	8,160	8,380	9,210	8,900	12,600
Imports	do.	26,200	24,700	28,900	27,400	30,200
World, production	do.	327,000	298,000 r/	307,000 r/	288,000	304,000 e/

e/ Estimated. r/ Revised.

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

TABLE 2  
STOCKPILE STATUS AND GOVERNMENT INVENTORIES FOR MICA, DECEMBER 31, 1999 1/

(Metric tons)

Material	Inventory (uncommitted)		Available for disposal	Fiscal year 1998 sales
	Stockpile grade	Nonstockpile grade		
Block:				
Muscovite, stained and better	380	5	380	375
Phlogopite	11	43	11	--
Film, muscovite (1st and 2nd qualities)	1	--	1	7
Splittings:				
Muscovite	5,280	--	5,280	93
Phlogopite	234	--	234	--

-- 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	1998		1999	
	Quantity	Value	Quantity	Value
North Carolina	47	4,560	47	4,550
Other States 3/	40	2,990	57	10,800
Total	87	7,550	104	15,300

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 Arizona, 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/

	1998			1999		
	Quantity (thousand metric tons)	Value (thousand)	Unit value	Quantity (thousand metric tons)	Value (thousand)	Unit value
<b>End use:</b>						
Joint cement	48	\$9,120	\$190	50	\$9,760	\$194
Paint	30	8,910	297	33	10,700	324
Plastics	3	1,440	480	3	1,460	450
Well-drilling mud	5	895	179	5	926	189
Other 3/	18	10,800	602	20	13,900	693
Total	104	31,200	300	111	36,700	329
<b>Method of grinding:</b>						
Dry	W	W	179	W	W	192
Wet	W	W	909	W	W	849

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)

	1998	1999
Good stained or better	0.681 r/	0.394
Stained or lower 2/	6.620	6.230
Total	7.300	6.620

r/ Revised.

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 (metric tons)
	Quantity (metric tons)	Value (thousands)	
1998	763	1,270	424
1999	786	1,310	411

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/

	1998		1999	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Flexible plate (cold)	127	1,160	125	875
Heater plate	W	W	W	W
Molding plate	178	1,670	175	1,630
Segment plate	134	1,340	50	1,810
Tape	W	W	W	W
Other	203	2,500	157	1,890
Total	662	6,870	532	6,620

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 1999, BY COUNTRY 1/

Country	Crude and rifted							
	Less than one dollar per kilogram		More than one dollar per kilogram		Powder		Waste	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Argentina	--	--	--	--	29	\$21	12	\$9
Australia	--	--	(2/)	\$9	292	163	--	--
Barbados	--	--	--	--	18	15	--	--
Belgium	43	\$15	1	14	31	47	--	--
Brazil	--	--	--	--	7	6	--	--
Canada	13	4	--	--	3,550	1,240	991	230
Chile	--	--	--	--	7	18	--	--
China	--	--	--	--	19	34	--	--
Colombia	--	--	--	--	108	47	--	--
Costa Rica	--	--	5	28	11	27	--	--
Cote d'Ivoire	--	--	--	--	37	22	--	--
Dominica	--	--	--	--	14	12	--	--
France	--	--	3	39	60	71	--	--
Germany	18	6	24	86	208	89	--	--
Hong Kong	23	8	--	--	(2/)	7	--	--
India	--	--	45	70	323	192	--	--
Indonesia	14	5	--	--	36	32	--	--
Israel	--	--	--	--	54	17	--	--
Italy	24	8	--	--	122	22	--	--
Jamaica	--	--	--	--	11	85	--	--
Japan	26	9	135	258	403	263	--	--
Korea, Republic of	71	30	--	--	214	192	--	--
Malaysia	--	--	--	--	164	61	--	--
Mexico	2,370	837	214	1,530	596	414	--	--
Netherlands	57	15	--	--	114	123	39	24
New Zealand	--	--	2	8	117	53	--	--
Norway	15	5	--	--	--	--	--	--
Pakistan	--	--	--	--	11	11	--	--
Peru	--	--	--	--	16	6	--	--
Philippines	--	--	--	--	8	3	--	--
Poland	8	3	--	--	--	--	--	--
Saudi Arabia	--	--	--	--	55	24	--	--
Singapore	--	--	1	10	--	--	--	--
Spain	--	--	--	--	(2/)	3	--	--
Suriname	--	--	--	--	(2/)	4	--	--
Switzerland	9	3	--	--	--	--	--	--
Taiwan	15	5	1	17	300	274	--	--
Thailand	--	--	--	--	14	34	--	--
Trinidad and Tobago	--	--	--	--	(2/)	4	--	--
United Kingdom	182	64	20	75	295	277	21	8
Uruguay	--	--	--	--	5	8	--	--
Venezuela	15	5	--	--	67	90	--	--
Total	2,890	1,020	452	2,150	7,320	4,010	1,060	272

-- 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 1999, BY COUNTRY 1/

Country	Plates, sheets		Other	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Antigua and Barbuda	--	--	1	12
Argentina	4	47	(2/)	4
Aruba	(2/)	3	--	--
Australia	38	740	(2/)	3
Austria	3	109	--	--
Bahamas, The	1	19	2	15
Barbados	3	14	--	--
Belgium	1	13	(2/)	13
Belize	1	3	--	--
Brazil	21	620	10	260
Canada	120	3,180	69	1,830
Chile	1	29	--	--
China	50	130	(2/)	5
Czech Republic	6	18	--	--
Colombia	6	179	1	10
Costa Rica	8	52	--	--
Dominican Republic	(2/)	3	--	--
Finland	3	53	1	4
France	5	113	11	188
Germany	8	188	3	69
Ghana	(2/)	4	--	--
Honduras	1	34	4	106
Hong Kong	(2/)	17	(2/)	6
India	23	617	(2/)	8
Ireland	--	--	(2/)	10
Israel	43	220	12	170
Italy	28	729	(2/)	6
Jamaica	31	183	--	--
Japan	1	45	2	79
Korea, Republic of	2	25	9	98
Malaysia	(2/)	3	4	29
Mexico	188	4,760	5	231
Netherlands	--	--	(2/)	7
Netherlands Antilles	2	13	--	--
Nicaragua	1	15	--	--
Norway	--	--	(2/)	9
Pakistan	1	12	--	--
Panama	5	20	--	--
Philippines	(2/)	5	--	--
Poland	(2/)	10	--	--
Portugal	(2/)	7	--	--
Saudi Arabia	2	62	--	--
Singapore	--	--	(2/)	20
South Africa	(2/)	21	--	--
St. Kitts and Nevis	--	--	1	7
St. Lucia	(2/)	3	--	--
Sweden	(2/)	8	--	--
Switzerland	12	155	(2/)	4
Taiwan	15	265	3	52
Tajikistan	1	18	--	--
Trinidad and Tobago	1	3	--	--
Turks and Caicos Islands	19	46	--	--
United Kingdom	2	69	39	461
Venezuela	1	16	--	--
Total	660	12,900	180	3,720

-- Zero

1/ Data are rounded to no more than three significant digits; may 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 1999, BY COUNTRY 1/

Country	Split block		Splittings		Less than one dollar per kilogram		Other More than one dollar per kilogram	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	(metric tons)	(thousands)	(metric tons)	(thousands)	(metric tons)	(thousands)	(metric tons)	(thousands)
Canada	--	--	--	--	56	\$9	(2/)	\$2
Finland	--	--	--	--	1,370	266	1	98
India	36	\$39	2,650	\$988	2,930	465	70	292
Japan	--	--	15	54	--	--	--	--
Madagascar	1	9	--	--	--	--	--	--
United Kingdom	1	26	--	--	--	--	2	14
Total	37	73	2,660	1,040	4,350	740	72	407
-- Zero.						0		

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 1999,  
BY COUNTRY 1/

Country	Powder		Waste	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Argentina	745	\$1,050	--	--
Austria	2	3	--	--
Canada	18,700	7,060	(2/)	\$8
China	42	10	--	--
Finland	608	126	--	--
France	(2/)	6	--	--
Germany	35	189	--	--
India	40	9	716	402
Japan	367	2,610	--	--
Malaysia	36	106	--	--
United Kingdom	1	4	--	--
Zimbabwe	42	83	--	--
Total	20,600	11,300	716	410

-- 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 1999  
BY COUNTRY 1/

Country	Plates, sheets		Other	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Australia	1	32	--	--
Austria	--	--	11	232
Belgium	840	7,240	--	--
Brazil	209	203	89	225
Canada	2	11	2	35
China	172	475	15	145
Denmark	36	122	1	2
France	(2/)	7	1	25
Germany	(2/)	9	1	43
Hong Kong	--	--	12	98
India	164	848	58	589
Japan	2	80	29	327
Korea, Republic of	12	72	13	15
Mexico	--	--	2	13
Netherlands	20	229	--	--
Philippines	--	--	(2/)	2
Sweden	--	--	(2/)	3
Switzerland	78	1,460	--	--
Taiwan	(2/)	3	--	--
United Kingdom	9	229	(2/)	2
Total	1,550	11,000	234	1,760

-- Zero.

1/ Data are rounded to no more than three significant digits; may 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:								
1998	6,640	3,300	1,410	464	182 r/	1,660 r/	671	10,700
1999	7,320	4,010	3,950	1,290	452	2,150	840	16,600
Imports for consumption:								
1998	15,500	9,120	7,280	1,930	3,060 r/	1,470 r/	1,610	12,200
1999	20,600	11,300	5,070	1,150	2,770	1,520	1,780	12,800

r/ Revised.

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/	1995	1996	1997	1998	1999 e/
Argentina:					
Sheet e/	700	297 4/	300	300	300
Waste, scrap, etc.	2,643 r/	1,840 r/	3,228 r/	3,200 r/ e/	3,000
Brazil	5,200	7,000	4,000	2,163 r/	2,000
Canada e/	17,500	17,500	17,500	17,500	17,500
France e/	10,000	8,000	8,000	10,000	10,000
India:					
Crude	1,728	1,894	1,794 r/	1,489 r/	1,500
Scrap and waste	1,013	1,413	1,128 r/	966 r/	1,000
Total	2,741	3,307	2,922 r/	2,455 r/	2,500
Iran e/ 5/	3,000	3,000	3,000	3,000	3,000
Korea, Republic of (all grades)	43,709	35,923	34,489	38,459	39,000
Madagascar (phlogopite)	432	450 e/	603 r/	600 r/ e/	600
Malaysia	5,848	5,501	5,708	3,642 r/	3,800
Mexico (all grades)	5,028	4,273	975	890	1,000
Morocco e/	564 4/	600	600	600	600
Peru e/	100	100	100	100	100
Russia e/	100,000	100,000	100,000	100,000	100,000
Serbia and Montenegro e/	199 4/	200	200	150	50
South Africa (scrap)	2,137	1,515	1,423	1,556 r/	1,016 4/
Spain	2,628 r/	2,507 r/	2,500 r/ e/	2,500 r/ e/	2,500
Sri Lanka (scrap)	6,350	2,400	3,500	4,500 e/	4,000
Taiwan	9,792	8,510	7,806	7,750 r/	7,800
United States (scrap and flake) 6/	108,000	96,600	114,000	87,100	104,000 4/
Zimbabwe	1,040	1,500 e/	30	1,309	1,300
Grand total	328,000 r/	301,000 r/	311,000 r/	288,000	304,000

e/ Estimated. r/ Revised.

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 June 2, 2000.

3/ In addition to the countries listed, China, Norway, 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 U.S. production of low-quality sercite and sheet mica, if any.