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 represents 34 phyllosilicate minerals that have a layered or platy texture. (Phyllo is derived from the Greek word *phyllon*, meaning leaf.) The commercially important micas are muscovite and phlogopite. Composed of tetrahedral-octahedral-tetrahedral layers, the mica group minerals 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, sodium), or true, micas imparts perfect basal cleavage, allowing 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.

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 1998, about 87,000 metric tons of scrap and flake mica was produced in the United States, 24% less than that of 1997 (tables 1 and 3). Ground mica sales were 104,000 tons, a decrease in tonnage of 5.4%, valued at $31.2 million. Essentially all sheet mica used in the United States was imported, primarily from India. Consumption of muscovite block mica decreased to 7.3 tons valued at $203,000. Consumption of mica splittings increased to 763 tons in 1998 from 736 tons in 1997. Worked and unworked sheet mica exports increased by 21% to 1,280 tons, and the value declined by 5.7% to $12.5 million. U.S. imports of worked and unworked sheet mica decreased by 24% to 4,380 tons valued at $13.7 million.

Legislation and Government Programs

The National Defense Authorization Act for Fiscal Year 1998, Public Law 105-85, enacted on November 18, 1997, did not change the previous authorizations for disposal of specific mica stocks. The Strom Thurmond National Defense Authorization Act for Fiscal Year 1999, Public Law 105-261; also known as the Strategic and Critical Stock Piling Act was enacted on October 17, 1998. Section 3303 of the Act, Authority to Dispose of Certain Materials in National Defense Stockpile, limited the disposal quantity of muscovite block mica to 136,531 kilograms (301,000 pounds) and phlogopite block mica to 59,305 kilograms (130,745 pounds).

Stocks of mica classified as excess to goal at the end of fiscal year 1998 (September 30, 1998) and subject to the limitations above, totaled 718,447 kilograms (1,583,904 pounds) of muscovite block (stained and better), 9,202 kilograms (20,288 pounds) of muscovite film (first and second qualities), 5,549,810 kilograms (12,235,237 pounds) of muscovite splittings, 263,549 kilograms (581,027 pounds) of phlogopite splittings, and 59,305 kilograms (130,745 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 17 operations to which the *Crude Scrap and Flake Mica* production form (including sericite production) was sent, 12 operations responded. Of the 15 operations to which the *Ground Mica* form was sent (excludes low-grade ground sericite production), 5 operations responded. Of the five surveyed operations to which the *Mica Block and Film* consumption form was sent, three operations responded. Of the eight 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. acquired the Black Canyon mica project through a merger of Sanchez Mining Inc., it's subsidiary, with Arizona Mica Properties, Inc. Located near Phoenix, AZ, the Black Canyon muscovite mica deposit is a swarm of pegmatite dikes with a strike length of 1,524 meters and a width of 3 to 18 meters. Mineralization of the mica-bearing pegmatites reportedly extends 152 meters (AZCO Mining Inc., 1999).

Polar Minerals Inc. announced an expansion of its phlogopite-mica-processing capacity from 6,000 to 16,000 tons per year. The expansion was scheduled for completion before yearend 1998 at Polar's plant in Mount Vernon, IN (Industrial Minerals, 1998b).

In 1998, FMC Corporation closed its lithium-feldspar-mica operations at Bessemer City, NC, on February 28, following the closure of its mine in January. Lower cost foreign lithium deposits were the primary reason for the scheduled closure.

Byproduct mica produced during the processing of the spodumene ore was dry ground at FMC's Spartan Minerals Corp. mica and feldspathic sand plant in Pacolet, SC (James Hawkins, FMC Corporation, oral commun., 1998).

Zemex Industrial Minerals (ZIM), a Zemex Corp. group, purchased the mining operations of Aspect Minerals, Inc., in western North Carolina for $2.2 million. Zemex's Aspect Minerals acquisition was incorporated under the new name, Zemex Mica Corp. The purchase added a muscovite mine at Micaville, NC, and wet- and dry-grinding plants at Bakersville and Spruce Pine, NC, to ZIM's holdings. Other holdings in North Carolina included the Feldspar Corp. alaskite and mica mines and processing plant in Spruce Pine (Industrial Minerals, 1998c).

Scrap and Flake.—In 1998, 9 domestic companies with 12 mines in 5 States produced scrap and flake mica (excluding low-grade sericite). The United States was one of the world's primary producers with 87,000 tons (tables 1 and 3). North Carolina remained the major producing State, with 54% 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 placer deposit, and as a coproduct of feldspar and kaolin.

The scrap and flake mica producers, in alphabetical order, were Engelhard Corp., Hartwell, GA; Feldspar Corp., a Zemex Industrial Minerals company, Spruce Pine, NC; FMC, Lithium Division, Bessemer City, NC; Georgia Industrial Minerals Inc., Deep Step, GA; Franklin Industrial Minerals, a division of Franklin Industries Inc., Kings Mountain, NC, and Velarde, NM; K-T Feldspar Corp., Spruce Pine, NC; Mineral Mining Co., Inc., Kershaw, SC; Pacer Corp., Custer, SD; Tinton Enterprises, Spearfish, SD; Unimin Corp., Spruce Pine, NC; and Zemex Mica Corp., Micaville, NC.

Ground.—In 1998, 10 companies operated 16 grinding plants in 5 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 69% of the total of 104,000 tons (table 4).

Dry-ground mica producers, in alphabetical order, were Asheville Mica Co., Asheville, NC; Georgia Industrial Minerals, Deep Step, GA; Franklin Industrial Minerals, Kings Mountain, NC, and Velarde, NM; the Mineral Mining Co. Inc., Kershaw, SC; Pacer Corp., Custer, SD; Piedmont Minerals Co., Hillsborough, NC; Spartan Minerals, a subsidiary of FMC Corporation, Lithium Division, Pacolet, SC; USG Corp., Spruce Pine, NC, and Zemex Mica, Spruce Pine, NC. Wet-ground mica producers, in alphabetical order, were: Engelhard, Hartwell, GA; Georgia Industrial Minerals, Deep Step, GA; KMG Minerals Division of Franklin Industries, Kings Mountain, NC; and Zemex Mica, Bakersville, NC.

Consumption

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

Sheet.—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, 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 1998, consumption of muscovite block (ruby and nonruby) totaled 7,300 kilograms, an 11% decrease compared with that of 1997 (table 5). Stained and lower-than-stained quality remained in greatest demand, accounting for 92.4% of ruby mica block. Consumption of nonruby mica block was split—86% for stained quality and 14% for good quality. The use of block mica was lower as demand decreased in electronic and nonelectronic applications.

In 1998, 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 1998, mica splittings represented the largest part of the sheet mica industry in the United States. Consumption of muscovite and phlogopite splittings increased by 4% to 763 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.—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 134 tons in 1998, essentially the same as that of 1997 (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 increased by 1% to 178 tons in 1998 from 176 tons in 1997 (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 by 15% to 127 tons in 1998 from 110 tons in 1997 (table 7).

Heater plate is used where high-temperature insulation is required. Consumption of mica in heater plate increased by almost 15% in 1998 compared with that of 1997.

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 662 tons, an increase of 16.7% compared with that of 1997 (table 7). In 1998, molding plate and segment plate were the major end products and accounted for 20% and 27% of the total, respectively.

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 1998, 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.—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 1998, joint compound accounted for 46% 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 29% of the 1998 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 4.3% of dry-ground mica use in 1998.

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 1998, consumption of dry-ground mica in plastic applications accounted for 3.0% of the market, slightly lower than the 3.3% in 1997 (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.

Stocks

Government stocks of mica in the National Defense Stockpile (NDS) comprised stockpile-grade muscovite block, stained and better; muscovite film, first and second qualities muscovite splittings; phlogopite block; and phlogopite splittings. NDS stocks of muscovite block, muscovite film, muscovite and phlogopite splittings were available for sale from the Defense National Stockpile Center, Fort Belvoir, VA. Yearend 1998 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) decreased to 16.8 tons in 1998 from 21.2 tons in 1997. Industry stocks of muscovite and phlogopite mica splittings decreased to 424 tons at yearend 1998 from 445 tons at yearend 1997 (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 1998 compared with 1997 were as follows: block (ruby and nonruby) decreased by 9% to $28 per kilogram and muscovite splittings were unchanged at $1.51 per kilogram.

The average value of phlogopite block decreased to $17.95 per kilogram in 1998 from $18.21 per kilogram in 1997. The average value of phlogopite splittings decreased to $4.69 per kilogram in 1998 from $4.96 per kilogram in 1997.

In 1998, the average U.S. value of crude flake mica, including high-quality sericite, increased to $87 per metric ton (table 1). The average value for North Carolina flake mica increased to $97 per ton in 1998. The value of dry-ground mica increased slightly to average $179 per ton, and wet-ground mica decreased to average $909 per ton (table 1).

Foreign Trade

Demand for mica decreased in U.S. and foreign markets in 1998. Foreign trade was mixed, with the value of U.S. exports of mica decreasing by 8.3% to $16.3 million as the quantity

increased by 1.5% to 9,335 tons. Imports of mica declined with the value of U.S. imports of mica decreasing by 0.84% to $24.7 million and the quantity decreasing by 6.3% to 27,200 tons (table 13).

Domestic ground mica exports increased to 6,640 tons, up 330 tons from that of 1997 (table 8). Exports of crude and rifted mica decreased, by 60% to 613 tons, primarily the result of sheet mica sales from the NDS. Exports of worked mica sheet in 1998 increased by 18.7% to 671 tons (table 9). The value of U.S. exports of worked mica sheet, however, decreased to $10.7 million, 8.6% lower than that of 1997.

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 catagorized as "Other," were about 9,170 tons, 32% less than that of 1997 (table 10).

About 15,500 tons of ground mica was imported in 1998, mostly from Canada (table 11). Worked mica imports were 1,610 tons, 4.5% higher than those of 1997 (table 12).

World Review

Australia.—Minerals Corporation Limited of Ingleburn, New South Wales, was seeking investors for its muscovite-bearing alaskite deposit near Oberon, New South Wales. The deposit has measured resources of 1.6 million tons of alaskite, a plutonic rock containing orthoclase and microcline feldspar, and lesser quantities of quartz and few or no mafic constituents. The Oberon alaskite deposit analyzed 32% albite, 28.5% quartz, 26% sodic microcline, 12% muscovite, and 1.5% accessory minerals. The proposed mining project would produce three marketable products—feldspar, mica, and silica (Industrial Minerals, 1998a). Alaskite is mined for similar products in the United States at Spruce Pine.

Canada.—Zemex Corp. (Toronto) acquired the mica operations of Aspect Minerals, in North Carolina, for around $2.2 million plus the assumption of current debt. Zemex Industrial Minerals, Zemex Corp. wholly owned subsidiary, announced on January 28, 1998, that it would operate the mine and processing plants under the name Zemex Mica. Zemex Industrial Minerals already operated three other companies—The Feldspar Corporation, Suzorite Minerals Products Inc., and Suzorite Mica Products Inc. (Zemex Corp., January 28, 1998, acquisition of muscovite mica business, accessed February 17, 1998, at URL http://www.zemex.com/zemex/newsmica.html).

Outlook

Based on various economic factors, the outlook for ground mica is for average 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 1999 and 2000, domestic demand for crude and ground mica is expected to increase slightly. Demand for dry- and 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 as demand from the cyclical automotive industry uses increasing amounts of pearlescent paint pigments.

Demand for block mica is expected to grow slowly through the end of the century 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 (1998) mined deposits (pegmatites).

Consumption of mica splittings, the major 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 800 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

AZCO Mining Inc., 1999, AZCO Mining Inc. announces the acquisition of the Black Canyon mica project: Ferndale, WA, AZCO Mining Inc. news release, March 10, 1 p.

Industrial Minerals, 1998a, Investors sought for alaskite project: Industrial Minerals, no. 372, September, p. 9.

———1998b, Polar Minerals expands mica plant: Industrial Minerals, no. 371, August, p. 15-19.

———1998c, Zemex talc j-v with IMI-Fabi & mica acquisition: Industrial Minerals, no. 367, April, p. 35.

SOURCES OF INFORMATION

U.S. Geological Survey Publications

Mica. Mineral Industry Surveys, annual.[1]

Mica (natural), scrap and flake. Ch. in Mineral Commodity Summaries, annual.[1]

Mica (natural), sheet. Ch. in Mineral Commodity Summaries, annual.[1]

Mica. Ch. in United States mineral resources, U.S. Geological Survey Professional Paper 820, 1973.

Other

Mica. Ch. in Mineral facts and problems, U.S. Bureau of Mines Bulletin 675, 1985.

Roskill Information Service Ltd. (London). The Economics of Mica (7th ed.), 1991.

[1]Prior to January 1996, published by the U.S. Bureau of Mines.

TABLE 1
SALIENT MICA STATISTICS 1/

		1994	1995	1996	1997	1998
United States:						
Production (sold or used by producers):						
Scrap and flake mica	thousand metric tons	109	108	97	114	87
Value	thousands	$5,780	$5,630	$7,820	$9,400	$7,550
Ground mica	thousand metric tons	95	98	103	110	104
Value	thousands	$28,700	$24,800	$33,600	$37,000	$31,200
Prices, dollars per metric ton:						
Scrap and flake mica		$53	$52	$81	$83	$87
Ground:						
Wet		$1,010	$974	$1,030	$1,080	$909
Dry		$151	$174	$182	$176	$179
Sheets, muscovite and phlogopite (dollars per kilogram):						
Block		$66	$73	$55 r/	$28 r/	$26
Splittings		$1.72	$1.86	$1.75	$1.69	$1.67
Consumption:						
Block, muscovite	metric tons	6	6	6	8	7
Value	thousands	$432	$407	$383	$249	$203
Splittings, all types	metric tons	857	713	859	736	763
Value	thousands	$1,470	$1,320	$1,510	$1,240	$1,270
Exports	metric tons	7,520	8,160	8,380	9,210	8,900
Imports	do.	25,200	26,200	24,700	28,900	27,400
World: Production	do.	313,000 r/	327,000	298,000 r/	307,000 r/	288,000 e/

e/ Estimated. r/ Revised.
1/ Data are rounded to three significant digits.

TABLE 2
STOCKPILE STATUS AND GOVERNMENT INVENTORIES FOR MICA, DECEMBER 31, 1998 1/

(Metric tons)

	Inventory (uncommitted)			Fiscal year 1997
Material	Stockpile grade	Nonstockpile grade	Available for disposal	sales
Block:				
Muscovite, stained and better	681	10	137	453
Phlogopite	8	--	8	--
Film, muscovite, 1st and 2d qualities	3	--	3	9
Splittings:				
Muscovite	5,470	--	5,470	93
Phlogopite	264	--	264	1

1/ Data are rounded to 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)

	1997		1998	
State	Quantity	Value	Quantity	Value
North Carolina	66	5,210	47	4,560
Other States 3/	48	4,190	40	2,990
Total	114	9,400	87	7,550

1/ Data are rounded to 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/

	1997			1998		
	Quantity (thousand metric tons)	Value (thousand dollars)	Unit value	Quantity (thousand metric tons)	Value (thousand dollars)	Unit value
End use:						
Joint cement	47	7,880	$168	48	9,120	$190
Paint	38	21,900	576	30	8,910	297
Plastics	4	1,820	455	3	1,440	480
Well-drilling mud	3	757	252	5	895	179
Other 3/	19	4,690	247	18	10,800	602
Total	110	37,000	337	104	31,200	300
Method of grinding:						
Dry	W	W	176	W	W	179
Wet	W	W	1,080	W	W	909

W Withheld to avoid disclosing company proprietary data.
1/ Data are rounded to 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)

Quantity	1997 r/	1998
Good stained or better	0.590	0.680
Stained or lower 2/	7.590	6.620
Total	8.180	7.300

r/ Revised.
1/ Data are rounded to 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)
1997	736	$1,240	445
1998	763	1,270	424

1/ Data are rounded to three significant digits.

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

	1997		1998	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Flexible plate (cold)	110	$646	127	$1,160
Heater plate	W	W	W	W
Molding plate	176	1,490	178	1,670
Segment plate	133	1,270	134	1,340
Tape	W	W	W	W
Other	130	1,940	203	2,500
Total	567	5,540	662	68,700

W Withheld to avoid disclosing company proprietary data; included in "Total."
1/ Data are rounded to three significant digits; may not add to totals shown.
2/ 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 1998, BY COUNTRY 1/

Country	Crude and rifted: Less than $0.55 per kilogram		Crude and rifted: More than $0.55 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	11	$4	--	--	45	$30	--	--
Australia	--	--	(2/)	$9	339	168	--	--
Barbados	--	--	--	--	20	17	--	--
Belgium	--	--	--	--	84	44	--	--
Brazil	--	--	--	--	61	39	2	$3
Canada	--	--	--	--	3,630	1,230	884	189
Chile	--	--	--	--	17	12	--	--
China	--	--	--	--	19	12	--	--
Colombia	--	--	--	--	25	14	--	--
Congo	--	--	--	--	11	10	--	--
Cote d'Ivoire	--	--	--	--	(2/)	5	--	--
Dominica	--	--	--	--	9	8	--	--
Dominican Republic	--	--	--	--	9	7	--	--
El Salvador	--	--	--	--	1	5	--	--
France	--	--	--	--	40	65	--	--
Germany	9	3	--	--	107	78	--	--
Hong Kong	28	10	--	--	2	8	--	--
India	--	--	64	253	125	136	71	70
Indonesia	8	3	--	--	--	--	--	--
Ireland	--	--	--	--	16	4	--	--
Israel	--	--	--	--	43	14	--	--
Italy	--	--	--	--	81	14	--	--
Japan	53	19	66	449	229	136	--	--
Kenya	--	--	--	--	5	3	--	--
Korea, Republic of	20	8	--	--	160	134	--	--
Malaysia	--	--	--	--	101	17	--	--
Mexico	110	53	44	783	608	346	--	--
Netherlands	11	5	--	--	176	362	--	--
New Zealand	--	--	--	--	320	79	--	--
Niger	--	--	--	--	11	24	--	--
Peru	--	--	--	--	6	6	--	--
Philippines	--	--	6	108	5	3	--	--
Poland	--	--	--	--	16	7	--	--
Saudi Arabia	--	--	--	--	34	18	--	--
Singapore	--	--	2	44	16	6	--	--
Spain	97	34	--	--	--	--	--	--
Sweden	--	--	--	--	56	22	--	--
Taiwan	9	3	(2/)	5	69	92	--	--
Thailand	--	--	--	--	3	22	--	--
United Kingdom	62	22	(2/)	9	28	31	--	--
Uruguay	--	--	--	--	--	--	5	9
Venezuela	15	5	--	--	117	71	15	27
Total	431	167	182	1,660	6,640	3,300	976	297

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

2/ Less than 1/2 unit.

Source: Bureau of the Census.

TABLE 9
U.S. EXPORTS OF WORKED MICA IN 1998, BY COUNTRY 1/

Country	Plates, sheets		Other	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Argentina	1	$33	56	$153
Australia	6	200	3	56
Bahamas, The	(2/)	7	1	7
Barbados	1	6	--	--
Belgium	9	68	--	--
Brazil	45	502	3	104
Canada	109	2,760	63	1,780
Chile	(2/)	22	--	--
China	15	147	(2/)	15
Cocos (Keeling) Islands	1	118	--	--
Colombia	3	60	--	--
Costa Rica	33	154	--	--
Czech Republic	8	25	--	--
Denmark	--	--	(2/)	5
Dominican Republic	1	4	--	--
Ecuador	1	10	--	--
El Salvador	--	--	(2/)	3
France	12	247	4	45
Germany	2	65	4	141
Honduras	--	--	2	61
Hong Kong	--	--	3	86
India	--	--	3	109
Ireland	5	39	(2/)	3
Israel	1	17	--	--
Italy	23	585	(2/)	5
Jamaica	19	104	--	--
Japan	(2/)	4	3	62
Korea, Republic of	1	11	1	42
Kuwait	--	--	(2/)	3
Malaysia	--	--	1	19
Mexico	51	1,140	24	203
Netherlands	19	68	3	19
Nicaragua	5	17	--	--
Norway	--	--	1	43
Pakistan	--	--	(2/)	4
Peru	--	--	(2/)	14
Philippines	1	8	--	--
Saudi Arabia	42	172	(2/)	8
Singapore	45	377	--	--
South Africa	1	34	1	7
Spain	--	--	(2/)	8
Sweden	--	--	(2/)	6
Switzerland	6	99	(2/)	11
Taiwan	3	57	2	49
Trinidad and Tobago	2	10	--	--
Turkey	(2/)	3	--	--
United Arab Emirates	8	212	--	--
United Kingdom	5	106	5	113
Uruguay	(2/)	11	--	--
Venezuela	3	14	(2/)	5
Total	487	7,520	184	3,190

1/ Data are rounded to three significant digits; may add to totals shown.
2/ Less than 1/2 unit.

Source: Bureau of the Census.

TABLE 10
U.S. IMPORTS FOR CONSUMPTION OF CRUDE AND RIFTED MICA IN 1998, BY COUNTRY 1/

Country	Split block		Splittings		Other			
					Less than $0.55 per kilogram		More than $0.55 per kilogram	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Canada	--	--	--	--	100	$14	--	--
China	--	--	--	--	--	--	60	$140
Finland	--	--	--	--	1,600	353	--	--
Germany	--	--	720	$171	--	--	--	--
India	73	$76	1,900	1,030	4,410	911	300	212
Madagascar	--	--	13	42	--	--	--	--
United Kingdom	--	--	--	--	--	--	(2/)	2
Total	73	76	2,630	1,240	6,110	1,280	360	353

1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Less than 1/2 unit.

Source: Bureau of the Census.

TABLE 11
U.S. IMPORTS FOR CONSUMPTION OF MICA POWDER AND WASTE IN 1998, BY COUNTRY 1/

Country	Powder		Waste	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Argentina	559	$783	--	--
Austria	1	1	--	--
Brazil	20	8	--	--
Canada	14,300	5,800	(2/)	$4
China	145	30	--	--
Germany	27	122	--	--
India	45	39	1,060	531
Japan	249	2,050	--	--
Madagascar	--	--	108	111
Malaysia	60	199	--	--
Mexico	1	16	--	--
New Zealand	(2/)	2	--	--
Norway	80	53	--	--
United Kingdom	4	10	--	--
Total	15,500	9,120	1,160	646

1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Less than 1/2 unit.

Source: Bureau of the Census.

TABLE 12
U.S. IMPORTS FOR CONSUMPTION OF WORKED MICA IN 1998
BY COUNTRY 1/

Country	Plates, sheets		Other	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Australia	(2/)	$10	(2/)	$9
Austria	(2/)	3	3	88
Belgium	706	6,130	--	--
Brazil	148	493	74	200
Canada	8	51	10	39
China	203	483	12	116
Czech Republic	--	--	2	17
France	27	204	1	17
Germany	(2/)	17	(2/)	17
Hong Kong	3	12	6	37
India	75	949	169	1,370
Italy	38	78	--	--
Japan	15	207	7	154
Korea, Republic of	13	72	22	51
Philippines	--	--	(2/)	3
Sweden	--	--	1	23
Switzerland	61	1,230	--	--
Taiwan	1	7	--	--
Thailand	1	2	--	--
United Kingdom	4	69	(2/)	13
Total	1,300	10,000	309	2,150

1/ Data are rounded to three significant digits; may add to totals shown.
2/ Less than 1/2 unit.

Source: Bureau of the Census.

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:								
1997	6,310	$4,010	1,820	$471	500	$1,580	565	$11,700
1998	6,640	3,300	1,410	464	614	1,830	671	10,700
Imports for consumption:								
1997	13,000	8,080	10,200	2,260	4,220	2,310	1,540	12,300
1998	15,500	9,120	7,280	1,930	2,760	1,490	1,610	12,200

1/ Data are rounded to three significant digits.

Source: Bureau of the Census.

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

(Metric tons)

Country 3/	1994	1995	1996	1997	1998 e/
Argentina:					
Sheet e/	720	700	297 4/	300	300
Waste, scrap, etc.	1,104	4,341	1,543 r/	1,353 r/	1,400
Brazil	6,700	5,200	7,000	4,000 r/	4,000
Canada e/	17,500	17,500	17,500	17,500	17,500
Finland	5,591	--	--	-- e/	--
France e/	8,000	10,000	8,000	8,000	10,000
India:					
Crude	2,055	1,728	1,894	2,000 e/	1,800
Scrap and waste	719	1,013	1,413	1,400 e/	1,300
Total	2,774	2,741	3,307	3,400 e/	3,100
Iran e/ 5/	3,000 r/	3,000 r/	3,000 r/	3,000 r/	3,000
Korea, Republic of (all grades)	37,470	43,709	35,923	34,489	38,459 4/
Madagascar (phlogopite) e/	774	432 4/	450	450	450
Malaysia	4,993	5,848	5,501	5,708	5,700
Mexico (all grades)	5,753	5,028	4,273	975	890 4/
Morocco e/	800 r/	564 r/ 4/	600 r/	600 r/	600
Peru e/	100	100	100	100	100
Russia e/	100,000	100,000	100,000	100,000	100,000
Serbia and Montenegro	158	199	200 e/	200 e/	150
South Africa (scrap)	1,973	2,137	1,515 r/	1,423 r/	1,400
Spain e/	200	200	200	200	150
Sri Lanka (scrap)	200 e/	6,350 r/	2,400 r/	3,500 r/	4,500
Taiwan	5,220	9,792	8,510	7,806 r/	7,500
United States (scrap and flake) 6/	109,000	108,000	96,600	114,000	87,100 4/
Zimbabwe	213	1,040	1,500 e/	30 r/	1,309 4/
Grand total	313,000 r/	327,000	298,000 r/	307,000 r/	288,000

e/ Estimated. r/ Revised.

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

2/ Table includes data available through July 22, 1999.

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 sericite and sheet mica, if any.