MICA

By James B. Hedrick

Mica is a group of phyllosilicate minerals that have a layered or platy texture. The commercially important micas are muscovite and phlogopite. Composed of tetrahedral-octahedral-tetrahedral layers, the mica group is 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 imparts perfect basal cleavage, however the greater bond strengths make them more brittle and less flexible.

The value of mica is in its unique physical properties. The crystalline structure of mica forms minerals that can be split or delaminated into thin sheets that are platy, flexible, elastic, transparent to opaque, resilient, reflective, dielectric, chemically inert, insulating, lightweight, hydrophilic, nonconductive to heat and electricity, and stable to temperature extremes, electricity, light, and moisture. Muscovite is the principal mica used based on its greater abundance and superior electrical properties. 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 both sheet and ground forms.

In 1995, about 108,000 metric tons of scrap and flake mica was produced in the United States, essentially the same as in 1994. (*See table 1*.) Ground mica sales were 98,000 tons valued at $24.8 million, an increase in tonnage of 3%. Essentially all of the sheet mica used in the United States was imported, primarily from India. Consumption of muscovite block mica decreased 29% to 4.6 tons, valued at $407,000. Consumption of mica splittings also decreased from 857 tons in 1994 to 713 tons in 1995. After a 33% gain in 1994, worked and unworked sheet mica exports decreased 7% to 935 tons while the value declined 5% to $12.1 million. The value of imports for consumption of sheet mica decreased 14% to $12.7 million.

Legislation and Government Programs

The calendar year 1995 included the U.S. Government fiscal years for 1995 and 1996. Public Law 103-337, the National Defense Authorization Act for Fiscal Year 1995, was enacted on October 5, 1994, and covered the year 1995 through September 30. It continued specific previous authorizations for disposal of mica stocks in the National Defense Stockpile (NDS). The National Defense Authorization Act for Fiscal Year 1996, Public Law 104-106, was not enacted until February 10, 1996, because of significant delays in the Congressional budget process. It did not change previous authorizations for the disposal of specific mica stocks.

Stocks of mica classified as excess to goal at the end of fiscal year 1995 included 1,677,792 kilograms of muscovite block (stained and better), 337,041 kilograms of muscovite film (first and second qualities), 6,234,453 kilograms of muscovite splittings, and 545,754 kilograms of phlogopite splittings. Phlogopite block in the stockpile is 84,265 kilograms below the goal of 143,570 kilograms. No phlogopite block was purchased during fiscal year 1995. (See table 2.)

Public Law 104-106 also legislated that the Secretary of Energy, in consultation with the Secretary of Defense, shall transfer to the NDS those materials in the Department of Energy's stockpile which are classified for the production of defense-related items and are considered excess, uncontaminated, and determined suitable for transfer.

In fiscal year 1996, the NDS Manager was authorized to obligate up to $77.1 million in the U.S. Treasury's NDS Fund for authorized uses of such funds under section 9(b)(2) of the Strategic and Critical Materials Stock Piling Act (50 U.S.C. 98h(b)(2).

Production

Domestic mine production data for mica are developed by the U.S. Geological Survey from three separate, voluntary surveys and one mandatory survey. Of the 12 operations to which the *Crude Scrap and Flake Mica* production form was sent (excludes low-grade sericite production), 8 operations, or 66% responded, representing 78% of the production shown in table 1. Of the 17 operations to which the *Ground Mica* form was sent, 14 operations, or 82% responded, representing 79% of the domestic ground mica production noted in table 1 (excludes low-grade ground sericite production). Of the five surveyed operations to which the *Mica Block and Film* consumption form was sent, three operations, or 60% responded. Of the nine surveyed operations to which the *Mica Splittings* consumption form was sent, seven operations, or 77% responded, representing 51% of the splittings consumption presented in table 1. Consumption for the nonrespondents was estimated using prior-year production data. Individual company production and consumption data are withheld to avoid disclosing company proprietary data.

***Scrap and Flake Mica.*—**Nine domestic companies with 12 mines in 5 States, produced scrap and flake mica in 1995. The United States was the world's largest producer with 108,000 tons. North Carolina remained the major producing State, with 68% of domestic production. The remainder was produced in

Georgia, New Mexico, South Carolina, and South Dakota. Most mica was recovered from mica schist, high-quality sericite schist, weathered pegmatites, and as a byproduct of feldspar, kaolin, and lithium. *(See table 3.)*

The scrap and flake mica producers, in alphabetical order, were Aspect Mineral, Micaville, NC. The Feldspar Corp., Spruce Pine, NC; FMC Corp. Lithium Division, Bessemer City, NC; FMP Division of The Mearl Corp., Hartwell, GA; KMG Minerals Division of Franklin Industries Inc., Kings Mountain, NC, and Velarde, NM; K-T Feldspar Corp., Spruce Pine, NC; The Mineral Mining Co., Kershaw, SC; Pacer Corp., Custer, SD; and Unimin Corp., Spruce Pine, NC.

Ground Mica.—Nine companies operated 13 grinding plants in 5 States. Nine plants produced dry-ground mica and four plants produced wet-ground mica. The four largest ground mica companies, including one company with four plants, accounted for 78% of the total of 97.7 tons. *(See table 4.)*

Dry ground mica producers, in alphabetical order, were: Asheville Mica Co., Asheville, NC; KMG Minerals Division of Franklin Industries Inc., Kings Mountain, NC, and Velarde, NM; Mineral Mining Co. Inc., Kershaw, SC; Pacer Corp., Custer, SD; Piedmont Minerals, Hillsborough, NC; Spartan Minerals Corp., a subsidiary of FMC Corp. Lithium Division, Pacolet, SC; and USG Corp., Spruce Pine, NC. Wet ground mica producers, in alphabetical order, were: Aspect Mineral, Bakersville, NC; the FMP Division of The Mearl Corp., Hartwell, GA, and Franklin, NC; and KMG Minerals Division of Franklin Industries Inc., Kings Mountain, 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 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 mica is also used 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 ground and air-launched missile systems, optical instrumentation, laser devices, medical electronics for radiation treatment, radar systems, and aerospace components.

Muscovite film mica is used as a dielectric in capacitors. Only high-quality mica is used in this application. The highest grade film is used in capacitors that are manufactured as calibration standards. The next grade down is used in transmitting capacitors. Receiving capacitors use a slightly lower grade of high-quality muscovite.

Consumption of muscovite block (ruby and nonruby) totaled 5,062 kilograms, a 22% decrease from that of 1994. Stained and lower-than-stained quality remained in greatest demand, accounting for 91% of ruby mica block. Consumption of nonruby mica block was spilt 50/50 between good quality and stained quality. Block mica use in 1995 was generally lower than in 1994.

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.

Mica splittings represents the largest part of the sheet mica industry in the United States. Muscovite and phlogopite splittings are used to make built-up mica. Consumption of muscovite and phlogopite splittings decreased 16.9% in 1995 to 713 tons. *(See table 6.)* Muscovite splittings from India accounted for over 90% of domestic consumption. The remainder of consumption was primarily phlogopite splittings imported from Madagascar and muscovite from other countries. The splittings were fabricated into various built-up mica products by nine companies operating nine plants in six 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 molding plate, segment plate, flexible plate, tape, heater plate, mica paper, and bonding materials. *(See 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. Muscovite has a greater resistance to wear, causing uneven ridges that may interfere with the operation of a motor or generator. Consumption of segment plate was 172 tons in 1995.

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 ends 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 to 181 tons in 1995.

Flexible plate is used in electric motor and generator armatures, field coil insulation, and magnet and commutator core insulation. Mica consumption in flexible plate was 107 tons in 1995, slightly lower than the 109 tons consumed in 1994.

Heater plate is used where high-temperature insulation is required. Consumption of mica in heater plate declined slightly from 21 tons in 1994 to 20 tons in 1995. Tape, powdered mica paper, and silicone and other bonding materials consumption was 134 tons, 17.5% less than in 1994.

Some types of built-up mica have the bonded splittings reinforced with special paper, silk, linen, muslin, glass, cloth, or plastic. 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.

Total consumption of built-up mica that was consumed or shipped was 614 tons, a decrease of 15% from the 1994 level. Segment plate and molding plate were the major end products and accounted for 29% and 28% of the total, respectively.

Reconstituted Mica (Mica Paper).—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. Manufacturing companies in 1995 were: Corona Films Inc., West Towsend, 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 wall board (drywall). The mica acts as a filler and extender, provides a smooth consistency, improves the workability of the compound, and imparts resistance to cracking. Joint compound accounted for 46.2% 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 both aqueous and oleoresinous formulations. Consumption of dry ground mica in paint, its second largest use, accounted for 19.5% of the 1995 total.

Ground mica is used in the well-drilling industry as an additive to drilling muds. The coarsely ground mica flakes help prevent loss of circulation by sealing porous sections of the drill hole.

The rubber industry uses ground mica as an inert filler and as 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 6.1% of ground mica use in 1995.

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. Consumption of dry ground mica in plastic applications accounted for 3.7% of the market in 1995, about double 1994's level.

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.

Other uses include 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 NDS is comprised of stockpile grade muscovite block, stained and better; muscovite film, first and second quality; 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 1995 stocks of various types of mica in the NDS are shown in table 2.

Reported yearend industry stocks of muscovite mica block (ruby and nonruby) increased from 24.7 tons in 1994 to 26.4 tons in 1995. Industry stocks of muscovite and phlogopite mica splittings decreased from 480 tons at yearend 1994 to 466 tons at yearend 1995. *(See 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 1995 compared with 1994 were as follows: block (ruby and nonruby) increased 10% to $73 per kilogram and muscovite splittings increased 7% to $1.70 per kilogram.

The average value of phlogopite block was essentially the same at $23.15 per kilogram, while the average value of phlogopite splittings was unchanged at $4.45 per kilogram. The changes in average value are more a reflection of the quality of sheet mica consumed during the year than actual changes in prices.

The average value of crude flake mica, including high-quality sericite, decreased to $52 per ton. The average value for North Carolina flake mica, primarily a flotation product, stabilized at $47 per ton in 1995, the same as 1994.

In 1995, the value of dry ground mica increased slightly to average $174 per ton, while wet ground mica decreased slightly to average $974 per ton.

Foreign Trade

Following an excellent year in 1994, the mica market in the United States pulled back and stabilized in 1995. Foreign trade was mixed with the value of U.S. exports of mica declining 2.5% to $15.5 million as the quantity increased 8.7% to 8,160 tons. The value of U.S. imports of mica declined 12.1% in 1995 as the quantity increased 3.6% to 26,200 tons. *(See table 13.)*

Exports of crude and rifted mica increased, 3.2% to 706 tons. *(See table 8.)* Exports of worked mica sheet in 1995 declined 1.3% to 737 tons. *(See table 9.)* The value of U.S. exports of worked mica sheet decreased to $11.7 million. Domestic

ground mica imports increased 440 tons from the 1994 level to 6,280 tons.

The United States continued to rely on imports, primarily from India, for essentially all of its supply of sheet mica and paper-quality scrap mica. Imports for consumption of unmanufactured split block, film and splittings were about 2,809 tons, 170% more than in 1994, but unchanged from the 1993 level. *(See table 10.)*

About 14,200 tons of ground mica was imported in 1995, mostly from Canada. *(See table 11.)* Worked mica imports of 1,150 tons were 21% lower than in 1994. *(See table 12.)*

Outlook

The outlook for mica is for average growth based on various economic factors. The major markets for ground mica, joint compounds and paints, are mature and relatively stable with growth tied to new housing starts and interest rates. To a lesser extent, widespread natural disasters also effect the market, creating immediate demand for residential building materials. Demand is also responsive to automobile production since interior and exterior parts typically contain dry ground mica, while exterior surfaces are painted with wet-ground pearlescent pigments and mica-containing coatings.

In 1996 and 1997, domestic demand for crude and ground mica is expected to increase as a result of hurricane and flood damage in the southeastern United States. Demand for dry and wet ground micas is expected to improve in the short-term to meet increasing demand. Markets for dry ground mica are forecast to grow through the year 2000, unless interest rates rise sufficiently to slow demand for new housing and automobiles. Wet ground mica is also expected to show moderate growth as demand from the automotive industry utilizes 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 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 and 1,000 tons per year. With no new uses and many substitute materials, no growth is expected. Consumption of mica splittings is expected to be in the range of 600 to 900 tons.

OTHER SOURCES OF INFORMATION

U.S. Geological Survey and U.S. Bureau of Mines Publications

Lesure, Frank G., Mica, ed. by, D. A. Brobst and W. P. Pratt. United States Mineral Resources, U.S. Geol. Surv. Prof. Paper 820, 1973 pp. 415-423.
Mineral Commodity Summaries 1996.
Bureau of Mines Annual Industry Surveys.
Bureau of Mines Annual Reports.
Bureau of Mines Information Circulars.
Bureau of Mines Minerals Yearbook
Bureau of Mines Mineral Facts and Problems.

TABLE 1
SALIENT MICA STATISTICS 1/

		1991	1992	1993	1994	1995
United States:						
Production (sold or used by producers):						
Scrap and flake mica	thousand metric tons	103	85	88	109 r/	108
Value	thousands	$5,540	$4,640	$4,450	$5,780 r/	$5,630
Ground mica	thousand metric tons	75	84	92	95	98
Value	thousands	$17,300	$21,800	$27,000	$28,700	$24,800
Prices, dollars per metric ton:						
Scrap and flake mica		$54	$55 r/	$51	$53 r/	$52
Ground:						
Wet		$640	$745	$838	$1,010	$1,000
Dry		$150	$168	$152	$151	$150
Sheets, dollars per kilogram:						
Block		$85	$80	$95	$56	$80
Splittings		$1.54	$1.53	$1.55	$1.53	$1.60
Consumption:						
Block, muscovite	metric tons	6	6	5	6	5
Value	thousands	$502	$447	$509	$432	$407
Splittings	metric tons	854	836	826	857	713
Value	thousands	$1,430	$1,390	$1,390	$1,470	$1,320
Exports	metric tons	4,900	5,040	5,860	7,520	8,160
Imports	do.	15,700	18,800	22,200	25,200	26,200
World: Production	do.	211,000	205,000 r/	197,000 r/	238,000 r/	245,000 e/

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

TABLE 2
STOCKPILE STATUS AND GOVERNMENT INVENTORIES FOR MICA, DECEMBER 31, 1995 1/

(Metric tons)

	Inventory			
Material	Stockpile grade	Nonstockpile grade	Available for disposal	1995 sales
Block:				
Muscovite, stained and better	1,770	88	1,860	296
Phlogopite	8	52	--	--
Film: Muscovite, 1st and 2d qualities	391	(2/)	391	74
Splittings:				
Muscovite	6,240	--	6,240	92
Phlogopite	533	--	533	50

1/ Data are rounded to three significant digits.
2/ Less than 1/2 unit.

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)

	1994		1995	
State	Quantity	Value	Quantity	Value
North Carolina	68	3,270	74	3,690
Other States 3/	42	2,500 r/	34	1,940
Total	109	5,780 r/	108	5,630

r/ Revised.
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 benefication.
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/

	1994			1995		
	Quantity (thousand metric tons)	Value (thousand dollars)	Unit value	Quantity (thousand metric tons)	Value (thousand dollars)	Unit value
End use:						
Joint cement	42	8,110	$193	45	6,420	$142
Paint	26	4,790	184	19	3,780	198
Plastics	2	509	255	4	1,380	344
Well-drilling mud	3	556	185	5	582	116
Other 3/	22	14,700	639	25	12,700	506
Total	95	28,700	302	98	24,800	253
Method of grinding:						
Dry	W	W	151	W	W	158
Wet	W	W	985	W	W	884

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	1994	1995
Good stained or better	0.807	0.692
Stained or lower 2/	5.690	3.910
Total	6.500	4.600

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
	Quantity	Value	Dec. 31
Year	(metric tons)	(thousands)	(metric tons)
1994	857	$1,470	480
1995	713	1,320	466

1/ Data are rounded to three significant digits.

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

	1994		1995	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Flexible (cold)	109	$628 r/	107	$566
Heater plate	W	W	W	W
Molding plate	198	1,520	181	1,590
Segment plate	246	1,620	172	1,360
Tape	W	W	W	W
Other	126	1,200	125	943
Total	719 r/	5,350 r/	614	4,890

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total."
1/ Data are rounded to three significant digits; may not add to totals shown.
2/ 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 1995, 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	--	--	--	--	4	$3	--	--
Australia	--	--	5	$3	676	252	--	--
Barbados	--	--	--	--	28	27	--	--
Belgium	--	--	--	--	17	45	--	--
Brazil	--	--	104	78	19	25	--	--
Canada	26	$7	--	--	2,880	1,240	406	$100
Chile	--	--	1	7	20	25	--	--
Colombia	--	--	--	--	86	66	--	--
Dominica	--	--	--	--	5	3	--	--
Dominican Republic	--	--	--	--	4	4	--	--
France	8	3	--	--	208	270	1	6
Germany	263	65	--	--	45	31	--	--
Hong Kong	14	5	--	--	7	4	--	--
India	--	--	41	89	--	--	--	--
Ireland	--	--	--	--	31	7	--	--
Israel	--	--	--	--	10	5	--	--
Italy	--	--	--	--	61	11	21	4
Jamaica	--	--	--	--	9	9	--	--
Japan	--	--	1	9	593	347	--	--
Kenya	--	--	--	--	5	3	--	--
Korea, Republic of	169	65	--	--	280	237	--	--
Malaysia	--	--	--	--	152	19	--	--
Mexico	--	--	--	--	292	158	16	29
Netherlands	11	4	41	173	4	5	--	--
New Zealand	--	--	--	--	276	80	--	--
Pakistan	--	--	--	--	11	11	--	--
Philippines	--	--	--	--	9	8	--	--
Portugal	9	3	--	--	--	--	--	--
St. Lucia	--	--	--	--	5	4	--	--
Saudi Arabia	--	--	4	6	--	--	--	--
Singapore	--	--	--	--	24	3	--	--
Spain	--	--	--	--	1	8	--	--
Sweden	--	--	--	--	16	10	--	--
Switzerland	--	--	--	--	4	7	--	--
Taiwan	--	--	--	--	138	61	--	--
Thailand	--	--	--	--	123	78	--	--
Turkey	8	3	--	--	--	--	--	--
United Kingdom	--	--	--	--	6	10	--	--
Venezuela	--	--	1	24	222	77	--	--
Total	508	155	198	389	6,280	3,160	444	139

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

Source: Bureau of the Census.

TABLE 9
U.S. EXPORTS OF WORKED MICA IN 1995, BY COUNTRY 1/

Country	Plates, sheets		Other	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Antigua and Barbuba	--	--	1	$4
Argentina	--	--	(2/)	5
Australia	49	$140	2	26
Bahamas, The	4	20	6	21
Barbados	9	23	7	27
Belgium	30	714	(2/)	4
Belize	1	8	--	--
Brazil	18	538	1	36
British Virgin Islands	(2/)	3	--	--
Canada	118	2,770	59	1,290
Cayman Islands	--	--	3	11
China	(2/)	3	6	149
Colombia	6	29	1	16
Costa Rica	6	51	1	6
Ecuador	--	--	6	20
El Salvador	(2/)	3	--	--
France	4	184	1	16
Germany	4	95	2	79
Guatemala	--	--	5	23
Honduras	--	--	(2/)	3
Hong Kong	6	48	3	43
India	4	117	4	88
Indonesia	(2/)	7	(2/)	6
Ireland	--	--	(2/)	6
Israel	(2/)	4	--	--
Italy	24	528	1	32
Jamaica	20	60	11	200
Japan	7	152	99	349
Korea, Republic of	1	15	3	70
Kuwait	--	--	4	16
Mexico	35	901	43	953
Micronesia	(2/)	8	--	--
Netherlands	2	24	2	24
Netherlands Antilles	1	3	3	19
Nicaragua	1	3	--	--
Norway	(2/)	29	--	--
Philippines	1	14	--	--
Russia	--	--	5	25
St. Lucia	4	7	--	--
Saudi Arabia	--	--	1	4
Singapore	--	--	(2/)	7
South Africa	22	68	1	7
Switzerland	16	447	7	200
Taiwan	1	16	4	92
Thailand	--	--	(2/)	10
Turkey	1	92	--	--
Turks and Caicos Island	--	--	(2/)	3
United Kingdom	19	153	21	481
Venezuela	8	47	--	--
Total 2/	423	7,330	314	4,370

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 1995, 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	--	--	--	--	36	$7	--	--
China	--	--	--	--	--	--	84	$203
Finland	--	--	--	--	279	60	--	--
France	1	$15	(2/)	$2	--	--	(2/)	2
Hong Kong	--	--	--	--	--	--	10	21
India	128	193	2,660	1,250	5,550	957	102	102
Japan	--	--	--	--	--	--	3	58
Madagascar	--	--	--	--	--	--	72	74
Singapore	--	--	18	27	109	17	--	--
United Kingdom	(2/)	2	--	--	--	--	(2/)	2
Total	129	209	2,680	1,280	5,970	1,040	272	462

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 1995, BY COUNTRY 1/

Country	Powder		Waste	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Austria	5	$4	--	--
Canada	13,200	5,410	(2/)	$9
China	2	3	--	--
Finland	--	--	350	137
France	--	--	36	37
Germany	292	243	--	--
India	46	7	1,330	612
Japan	411	3,400	1	5
Madagascar	--	--	36	37
Malaysia	19	28	--	--
Netherlands	24	13	--	--
Norway	186	134	--	--
United Kingdom	3	32	--	--
Total	14,200	9,280	1,760	838

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 1995,
BY COUNTRY 1/

Country	Plates, sheets		Other	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Austria	--	--	(2/)	$2
Belgium	605	$5,370	--	--
Brazil	55	442	44	113
Canada	5	44	(2/)	10
China	115	301	6	65
France	40	307	--	--
Germany	12	446	8	370
India	51	570	98	872
Italy	--	--	2	93
Japan	11	110	16	275
Korea, Republic of	3	17	27	49
Switzerland	46	1,010	--	--
Taiwan	1	7	--	--
United Kingdom	9	213	1	24
Total	952	8,830	201	1,870

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 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:								
1994	5,840	$3,040	672	$194	256	$410	747	$12,300
1995	6,280	3,160	952	294	198	389	737	11,700
Imports for consuption:					—	—		
1994	16,300	10,600	6,330	1,840	1,150	1,740	1,460	12,900
1995	14,200	9,280	7,730	1,880	3,080	1,950	1,150	10,700

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/	1991	1992	1993	1994	1995 e/
Argentina:					
Sheet	610	373	720	720 e/	700
Waste, scrap, etc.	1,038	635	1,226	1,230 e/	1,220
Brazil e/	5,080	7,000	7,000 r/	7,000 r/	7,000
Canada e/	17,000	17,500	17,500	17,500	17,500
France e/	6,000	12,000 4/	8,000	8,000	10,000
India:					
Crude	3,607	2,742 r/	2,082	2,041 r/	2,100
Scrap and waste	1,922	1,522 r/	1,187 r/	703 r/	900
Total	5,529	4,264 r/	3,269 r/	2,744 r/	3,000
Iran 5/	4,135	7,846	8,000 e/	8,000 e/	8,000
Korea, Republic of (all grades)	5,127	7,732	7,500 e/	37,470 r/	43,704 4/
Madagascar (phlogopite)	680	798	774 e/	774 e/	700
Malaysia	3,517	4,754	4,659	4,993	5,848 4/
Mexico (all grades)	5,587	5,866	6,440	5,753 r/	5,142 4/
Morocco e/	1,500	1,500	1,500	1,500	1,500
Peru e/	100	100	100	100	100
Russia e/	XX	35,000	30,000	25,000	25,000
Serbia and Montenegro	XX	281	68	75 e/	75
South Africa (scrap)	1,883	2,079	1,991	1,973	2,137 4/
Spain e/	300	200	250	200	200
Sri Lanka (scrap) e/	200	200	200	200	200
Taiwan	8,596	11,038	9,751	5,220 r/	5,000
Tanzania (sheet)	-- r/	-- r/	-- r/	-- r/	--
U.S.S.R. (all grades) 6/	40,000 e/	XX	XX	XX	XX
United States (scrap and flake) 7/	103,000	85,300	87,900	109,000	108,000 4/
Yugoslavia 8/	800	XX	XX	XX	XX
Zimbabwe	506	495	500	213 e/	200
Total	211,000	205,000 r/	197,000 r/	238,000 r/	245,000

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

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 Aug. 22, 1996.

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 Mar. 21 of that stated.

6/ Dissolved in Dec. 1991.

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

8/ Dissolved in Apr. 1992.