



2009 Minerals Yearbook

MICA

MICA

By M. Michael Miller

Domestic survey data and tables were prepared by Hoa P. Phamdang, statistical assistant, and the world production table was prepared by Lisa D. Miller, international data coordinator.

Mica production decreased in 2009 compared with that of 2008. In 2009, production of scrap and flake mica in the United States decreased to 50,000 metric tons (t); this was 40% lower than that of 2008 (tables 1, 2). The quantity of ground mica sold or used by producers decreased by 21% to about 77,000 t valued at \$23.2 million (tables 1, 3). Essentially all sheet mica used in the United States was imported, and Brazil, China, Belgium, Austria, and France, in decreasing order by quantity, were the major suppliers (table 11). Consumption of muscovite block mica in 2009 remained unchanged from that of 2008 at 1.0 t, although the value increased to \$131,000 in 2009 from \$127,000 in 2008 (tables 1, 4). Consumption of mica splittings decreased to an estimated 276 t in 2009 from 308 t in 2008 (tables 1, 5). Worked and unworked sheet mica exports decreased to 1,120 t in 2009 from 2,020 t in 2008, and the value decreased to \$15.7 million in 2009 from \$18.8 million in 2008 (table 8). U.S. imports of worked and unworked sheet mica decreased to 1,040 t in 2009 from 1,880 t in 2008, and the value decreased to \$14.5 million in 2009 from \$18.4 million in 2008 (table 12).

The mica group represents 37 phyllosilicate minerals that have a layered or platy texture (Rieder and others, 1998, p. 43–45). The commercially important micas are muscovite and phlogopite, which are used in a variety of applications. Mica's value is based on several of its unique physical properties. The crystalline structure of mica forms layers that can be split or delaminated into thin sheets. These sheets are chemically inert, dielectric, elastic, flexible, hydrophilic, insulating, lightweight, platy, reflective, refractive, resilient, and range in opacity from transparent to opaque. Mica is stable when exposed to electricity, light, moisture, and extreme temperatures. Mica has superior electrical properties as an insulator and as a dielectric. It can support an electrostatic field while dissipating minimal energy in the form of heat, can be split very thin (0.025 to 0.125 millimeters or thinner) while maintaining its electrical properties, has a high dielectric breakdown, is thermally stable to 500° C, and has corona resistance. Muscovite is the principal mica used by the electrical industry and is used in capacitors that are ideal for high frequency and radio frequency. Phlogopite mica remains stable at higher temperatures (to 900° C) and is used in applications in which a combination of high-heat stability and electrical properties are required. Muscovite and phlogopite are used in sheet and ground forms.

Production

Domestic mine production data for mica are developed by the U.S. Geological Survey from four separate voluntary surveys. Of the 12 operations to which the “Crude Scrap and Flake Mica Production” (including sericite production) survey form was sent, 6 operations responded and 1 was closed. Of the 11 operations to which the “Ground Mica” (excluding low-

grade ground sericite production) form was sent, 2 operations responded and 1 was closed. 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, three operations responded. 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.—In 2009, eight companies with eight mines in four States produced scrap and flake mica, excluding low-grade sericite. The United States was one of the world's primary producers, with production of about 50,000 t (tables 1, 2, and 13). The major producing States were, in descending order, South Dakota, North Carolina, and Georgia. Alabama also produced mica. Mica was recovered from mica schist, high-quality sericite schist, weathered pegmatites, gemstone pegmatite (sheet only), and as a coproduct of feldspar and kaolin mining and processing operations.

In 2009, the scrap and flake mica producers were BASF Corp., Hartwell, GA; The Feldspar Corp. (an Imerys S.A. company) (two mines), Spruce Pine, NC; Georgia Industrial Minerals, Inc., Deepstep, GA; K-T Feldspar Corp., Spruce Pine; Kings Mountain Mining LLC (an Imerys S.A. company), Kings Mountain, NC; Pacer Corp., Custer, SD; Tinton Enterprises, Ltd., Spearfish, SD; and Unimin Corp., Spruce Pine.

Ground Mica.—In 2009, six companies operated nine grinding plants in three States; six plants produced dry-ground mica, and three produced wet-ground mica.

Dry-ground mica producers were Georgia Industrial Minerals, Inc., Deepstep; Kings Mountain Mining LLC; Pacer Corp.; Piedmont Minerals Corp., Hillsborough, NC; and United States Gypsum Co. (a subsidiary of USG Corp.), Spruce Pine.

Wet-ground mica producers were BASF Corp; Georgia Industrial Minerals, Inc., Sandersville, GA; and Kings Mountain Mining LLC.

Sheet Mica.—Sheet mica was produced as a byproduct from one mine in 2009. Small quantities of muscovite sheet and scrap mica were produced as a byproduct by Morefield Gem Mine, Inc. in Amelia County, VA. The pegmatite was mined primarily for gemstones and mineral specimens using underground methods. The mine also produced biotite and zinnwaldite mica for collectors.

Consumption

Ground Mica.—The leading domestic use of dry-ground mica was in joint compound for filling and finishing seams and blemishes in gypsum wallboard (drywall) (table 3). The mica acts as a filler and extender, provides smooth consistency, improves the workability of the compound, and provides

resistance to cracking. In 2009, joint compound accounted for 62% of dry-ground mica consumption.

In the paint industry, ground mica is used as a pigment extender that also facilitates suspension, reduces chalking, prevents shrinking and shearing of the paint film, increases resistance of the paint film to water penetration and weathering, and brightens the tone of colored pigments. Mica also promotes paint adhesion in aqueous and oleoresinous formulations. Consumption of dry-ground mica in paint, the second ranked use, accounted for 22% of the dry-ground mica used in 2009.

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 sharp decrease in oil and gas prices in 2009 discouraged exploration. The monthly U.S. drill rig count in 2009 hit a low of 876 in late summer before recovering to 1,189 at yearend. This was still significantly lower than the 2008 yearend count of 1,721. The average monthly drill rig count for 2009 was 1,089 or nearly 800 operating rigs less than that of 2008 (Baker Hughes, 2010). These factors resulted in a sharp decrease in mica consumption in 2009 compared with that of 2008. Well drilling muds accounted for 6% of dry-ground mica use in 2009, a decrease from 15% the previous year.

The plastics industry used dry-ground mica as an extender and filler, especially in parts for automobiles as lightweight insulation to suppress sound and vibration. Mica is used in plastic automobile fascia and fenders as a reinforcing material, providing improved mechanical properties and increased dimensional stability, stiffness, and strength. Mica-reinforced plastics also have high-heat dimensional stability, reduced warpage, and the best surface properties of any filled plastic composite. In 2009, consumption of dry-ground mica in plastic applications accounted for 3% of the market.

The rubber industry used ground mica as an inert filler and mold release compound in the manufacture of molded rubber products, such as tires and roofing. The platy texture acts as an antiblocking, antisticking agent. As a rubber additive, mica reduces gas permeation and improves resiliency.

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

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

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

Natural mica is used by the Taos and Picuris Pueblos Indians in north-central New Mexico to make pottery. The pottery is made from weathered pre-Cambrian mica schist and has flecks of mica throughout the vessels. Tewa Pueblo pottery is made by coating the clay with mica to provide a dense-glittery micaceous finish over the entire object.

Built-Up Mica.—Muscovite and phlogopite splittings were fabricated into various built-up mica products by seven companies that operated seven plants in five States. Produced by mechanized or hand setting of overlapping splittings and alternate layers of binders and splittings, built-up mica is used primarily as an electrical insulation material. Mica insulation is used in high-temperature and fire-resistant power cable in aluminum plants, blast furnaces, critical wiring circuits (for example, defense systems, fire and security alarm systems, and surveillance systems), heaters and boilers, lumber kilns, metal smelters, and tanks and furnace wiring. Specific high-temperature mica-insulated wire and cable is rated to work for up to 15 minutes in molten aluminum, glass, and steel. Major products are bonding materials; flexible, heater, molding, and segment plates; mica paper; and tape (table 6).

Flexible plate (cold) is used in electric motor and generator armatures, field coil insulation, and magnet and commutator core insulation. In 2009, mica consumption in flexible plate was an estimated 18 t, or a decrease of 14% compared with that of 2008.

Heater plate is used where high-temperature insulation is required. Consumption data for mica in heater plate are withheld to avoid disclosing company proprietary information. Consumption of heater plate mica decreased by 85% in 2009 compared with that of 2008.

Molding plate is sheet mica from which V-rings are cut and stamped for use in insulating the copper segments from the steel shaft ends of a commutator. Molding plate is also fabricated into tubes and rings for insulation in armatures, motor starters, and transformers. Consumption for molding plate decreased by nearly 34% to an estimated 43 t in 2009.

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 wears 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 estimated to be about 147 t in 2009, although this estimate may be high.

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 or tapes, or trimmed to specified dimensions.

Built-up mica products may also be corrugated or reinforced by multiple layering.

In 2009, the total amount of built-up mica that was consumed or shipped was estimated to be about 278 t. Segment plate and molding plate were the major end products and accounted for 53% and 16% of the total, respectively.

Mica Paper (Reconstituted Mica).—Primary uses for mica paper are the same as those for built-up mica. Five companies consumed scrap mica to produce mica paper for electrical and insulation applications. The principal source of the scrap was India. In 2009, the manufacturing companies were Asheville-Schoonmaker Mica Co., Newport News, VA; Corona Films Inc., West Townsend, MA; Isovolta Inc./US Samica Corp., Rutland, VT; Spruce Pine Mica Co., Spruce Pine; and Tar Heel Mica Co., Inc., Plumbtree, NC.

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

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

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

In 2009, fabrication of ruby and nonruby muscovite block consumed 1.08 t, about a 4% increase from that consumed in 2008 (table 4). Stained and lower-than-stained quality remained in greatest demand and accounted for about 62% of consumption of ruby and nonruby mica block. Consumption of nonruby mica block was 59% for stained and lower-than-stained quality and 41% for good quality.

In 2009, five companies consumed muscovite block and film at five plants in four States—two in North Carolina and one each in New Jersey, Ohio, and Virginia.

In 2009, mica splittings represented the largest part of the sheet mica industry in the United States. Consumption of muscovite and phlogopite splittings was an estimated 276 t in 2009 (table 5). Muscovite splittings from India accounted for essentially all domestic consumption. The remainder was primarily imported from Madagascar.

Stocks

In 2009, reported yearend industry stocks of muscovite mica block (ruby and nonruby) were unchanged at 14.3 t. Industry stocks of muscovite and phlogopite mica splittings at an estimated 83 t were about 3% less than the previous year's level (table 5).

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 estimated average values of mica block and splittings consumed in the United States in 2009 were as follows—muscovite block (ruby and nonruby) was \$120 per kilogram and muscovite and phlogopite splittings were \$1.60 per kilogram (tables 1, 5). Phlogopite block was \$115 per kilogram and phlogopite splittings were \$21 per kilogram.

In 2009, the average U.S. value of scrap and flake mica, which included high-quality sericite, was estimated to be \$140 per metric ton (table 2). The average value for North Carolina flake mica was estimated to be \$277 per ton. The average value of dry-ground mica was estimated to be \$284 per ton, and the average value of wet-ground mica was estimated to be \$651 per ton (table 1).

Foreign Trade

The value of U.S. exports of mica decreased by 4% to \$26.2 million, and the quantity decreased by 18% to 9,150 t (table 12). U.S. exports of mica excluding unworked sheet mica decreased by 5% in value from those of 2008 to \$25.8 million, while the quantity decreased by 18% to 9,050 t.

Domestic ground mica (powder) exports decreased to 5,940 t, a decrease of 690 t from that of 2008 (tables 7, 12). Ground mica exports increased in value to \$8.85 million in 2009 from \$7.81 million in 2008. Exports of crude and rifted mica increased by 40% to 688 t in 2009 from 490 t in 2008. The value of these exports increased even more dramatically (up nearly 240%) to \$1.48 million in 2009 from \$436,000 in 2008 (table 7).

U.S. imports of all mica totaled 21,000 t valued at \$25.8 million, decreases of 26% and 20%, respectively, compared with those of 2008. U.S. imports of mica excluding unworked mica scrap (less than \$1.00 per kilogram) decreased by 26% in quantity to 19,500 t and decreased by 21% in value to \$24.8 million from those of 2008.

In 2009, total imports for consumption of unworked split block, film, splittings, and mica sheet categorized as "Other" decreased by nearly 16% to about 1,900 t, almost all of which was comprised of unworked low-value scrap mica (less than \$1.00 per kilogram) (table 9). Demand weakened for the low-value mica used as a dry-ground additive for drywall compound, fillers, and paints.

In 2009, 16,900 t of powder mica was imported, mostly from Canada and China, about 6,500 t less than in 2008 (table 10).

Worked mica imports were 1,480 t, a 42% decrease from those of 2008 (table 11).

World Review

World production of mica was estimated to have decreased to 315,000 t in 2009 from 379,000 t in 2008. Countries for which reported data were available all reported decreases in production in 2009 compared with that of 2008. Data were unavailable for the two leading producers—Finland and Russia—but the Republic of Korea, which accounted for 13% of production in 2008, reported a decrease in production of 45% in 2009 (table 13).

Outlook

The major markets for ground mica—drywall joint compounds and paints—are mature and relatively stable, with growth tied to new housing starts and interest rates. When the housing market recovers, the long-term outlook for ground mica is for an expected production growth of 1% to 3% per year. Demand is also affected by automobile production because interior and exterior parts typically contain dry-ground mica or engineered mica composites, and exterior surfaces are painted with wet-ground pearlescent pigments and mica-containing coatings. The North American automobile industry rebounded much quicker than housing, and vehicle production was forecast to grow at about 7% in 2011 (Thomson Reuters, 2011).

As the economy recovers, demand for ground mica in smaller specialty markets such as coated micas, cosmetics, nylon and polyester resins, and polypropylene composites was expected to resume annual growth at a rate slightly higher than the rate for the entire ground mica industry during the next decade.

Demand for block mica was expected to increase slowly at about 1% per year during the next several years as demand increases in a few specialty markets, such as electronics. A shortage of high-quality block mica was expected to continue

because of the generally low percentage of high-quality mica in deposits currently being mined, mostly pegmatites.

Consumption of mica splittings, which is the principal type of sheet mica consumed in the United States, has been in the range of 300 to 400 metric tons per year (t/yr) in recent years, although it was estimated to have dipped below 300 t/yr in 2009. With no potential new uses apparent and many substitute materials being used, substantial growth is not expected.

References Cited

- Baker Hughes Inc., 2010, Rig count: Houston, TX, Baker Hughes Inc. (Accessed September 21, 2010, via <http://www.bakerhughes.com/rig-count>.)
- Rieder, Milan, Cavazzini, Giancarlo, D'yakonov, Y.S., Frank-Kamenetskii, V.A., Gottardi, Glauco, Guggenheim, Stephen, Koval, P.V., Mueller, Georg, Neiva, A.M.R., Radoslovich, E.W., Robert, Jean-Louis, Sassi, F.P., Takeda, Hiroshi, Weiss, Zdenek, and Wones, D.R., 1998, Nomenclature of the micas: Chantilly, VA, American Mineralogist IMA Mica Report, v. 83, no. 11–12, part 1, November–December, 1385 p.
- Thomson Reuters, 2011, Update 1—JD Power raises 2011 U.S. auto sales forecast: Thomson Reuters, January 21. (Accessed January 24, 2011, at <http://www.reuters.com/article/idUSN2115073620110121>.)

GENERAL SOURCES OF INFORMATION

U.S. Geological Survey Publications

- Mica (Natural), Scrap and Flake. Ch. in Mineral Commodity Summaries, annual.
- Mica (Natural), Sheet. Ch. in Mineral Commodity Summaries, annual.
- Mica. Ch. in United States Mineral Resources, Professional Paper 820, 1973.

Other

- Economics of Mica, The (8th ed.). Roskill Information Services Ltd., 1997.
- Mica. Ch. in Mineral Facts and Problems, U.S. Bureau of Mines Bulletin 675, 1985.

TABLE 1
SALIENT MICA STATISTICS¹

		2005	2006	2007	2008	2009
United States:						
Production, sold or used by producers:						
Scrap and flake mica:						
Quantity	thousand metric tons	78	110	97	84	50
Value	thousands	\$19,300	\$22,400	\$14,400	\$12,000 ^r	\$7,040
Ground mica:						
Quantity	thousand metric tons	120	123	99	98	77
Value	thousands	\$47,200	\$49,000	\$26,400	\$26,500	\$23,200
Prices:						
Scrap and flake mica	dollars per metric ton	248	204	149	143	140
Ground:						
Dry	do.	226	237	243	251	284
Wet	do.	776	784	683	651	651
Sheet, muscovite and phlogopite:						
Block	dollars per kilogram	125	130	132	122	120
Splittings	do.	1.56	1.53	1.57	1.53 ^e	1.60 ^e
Consumption:						
Block, muscovite:						
Quantity	metric tons	1	1	1	1	1
Value	thousands	\$134	\$146	\$139	\$127	\$131
Splittings, all types						
Quantity	metric tons	402	310	310	308 ^e	276 ^e
Value	thousands	\$626	\$475	\$475	\$471 ^e	\$442 ^e
Exports	metric tons	10,800	8,620	9,010	11,100	9,150
Imports	do.	38,800	46,900	43,000	28,800	21,400
World, production	do.	359,000	385,000 ^r	387,000 ^{r,e}	379,000 ^{r,e}	315,000 ^e

^eEstimated. ^rRevised. do. Ditto.

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

TABLE 2
SCRAP AND FLAKE MICA SOLD OR USED BY
PRODUCERS IN THE UNITED STATES, BY STATE^{1,2}

(Thousand metric tons and thousand dollars)

State	2008		2009	
	Quantity	Value	Quantity	Value
North Carolina	22	4,580	16	4,430
Other ³	62	7,430 ^r	34	2,610
Total	84	12,000 ^r	50	7,040

^rRevised.

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

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

³Includes Alabama, Georgia, and South Dakota.

TABLE 3
GROUND MICA SOLD OR USED BY PRODUCERS IN THE UNITED STATES, BY END USE
AND METHOD OF GRINDING^{1,2}

	2008			2009		
	Quantity (thousand metric tons)	Value (thousands)	Unit value	Quantity (thousand metric tons)	Value (thousands)	Unit value
End use:						
Joint compound	53	\$12,800	\$246	47	\$12,200	\$256
Paint	22	7,180	324	17	6,440	384
Plastics	2	1,390	697	2	1,360	642
Well-drilling mud	15	2,790	181	5	943	191
Other ³	6	2,320	386	6	2,290	381
Total	98	26,500	271	77	23,200	301
Method of grinding:						
Dry	W	W	251	W	W	284
Wet	W	W	651	W	W	651

W Withheld to avoid disclosing company proprietary data.

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

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

³Includes mica used for molded electrical insulation, roofing, rubber, textile and decorative coatings, welding rods, and miscellaneous.

TABLE 4
FABRICATION OF MUSCOVITE BLOCK MICA
IN THE UNITED STATES, BY QUALITY¹

(Kilograms)

	2008	2009
Good stained or better	420	416
Stained or lower than stained ²	624	665
Total	1,040	1,080

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

²Includes punch mica.

TABLE 5
ESTIMATED CONSUMPTION AND STOCKS OF MICA SPLITTINGS
IN THE UNITED STATES

Year	Consumption		Stocks on December 31 (metric tons)
	Quantity (metric tons)	Value (thousands)	
2008	308	\$471	86
2009	276	442	83

TABLE 6
ESTIMATED BUILT-UP MICA SOLD OR USED IN THE UNITED STATES, BY PRODUCT^{1,2}

	2008		2009	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Flexible plate (cold)	21	\$173	18	\$150
Heater plate	W	W	W	W
Molding plate	65	431	43	313
Segment plate	149	288	147	278
Tape	W	W	W	W
Other	116	539	70	248
Total	351	1,430	278	989

W Withheld to avoid disclosing company proprietary data; included in "Other."

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

²Consists of alternating layers of binder and irregularly arranged and partly overlapped splittings.

TABLE 7
U.S. EXPORTS OF CRUDE AND RIFTED MICA, MICA POWDER, AND WASTE IN 2009, BY COUNTRY¹

Country	Crude and rifted							
	Less than \$1 per kilogram		More than \$1 per kilogram		Powder		Waste	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Albania	--	--	(2)	\$7	--	--	--	--
Algeria	--	--	--	--	313	\$180	--	--
Argentina	--	--	--	--	22	151	--	--
Australia	--	--	--	--	(2)	3	--	--
Bahamas, The	307	\$67	8	26	--	--	--	--
Barbados	9	7	--	--	4	13	--	--
Belgium	--	--	--	--	490	933	--	--
Belize	--	--	--	--	12	28	--	--
Brazil	--	--	--	--	103	438	--	--
British Virgin Islands	--	--	1	5	--	--	--	--
Canada	8	3	--	--	1,260	1,370	1,470	\$460
China	--	--	7	33	123	190	--	--
Colombia	--	--	1	15	393	732	--	--
Costa Rica	--	--	--	--	5	15	--	--
Czech Republic	--	--	--	--	2	9	--	--
Dominica	--	--	--	--	12	16	--	--
Dominican Republic	--	--	--	--	20	3	--	--
El Salvador	--	--	--	--	11	5	--	--
Finland	--	--	--	--	7	35	--	--
France	--	--	--	--	86	386	20	5
Germany	--	--	21	33	126	513	--	--
Guatemala	--	--	--	--	13	11	--	--
Honduras	--	--	--	--	2	30	--	--
Hong Kong	--	--	--	--	10	44	--	--
Indonesia	--	--	--	--	28	40	--	--
Ireland	--	--	--	--	8	17	--	--
Italy	--	--	3	9	59	32	7	100
Japan	--	--	32	89	156	311	--	--
Korea, Republic of	20	9	--	--	607	500	--	--
Malaysia	--	--	--	--	9	19	--	--
Mexico	5	3	--	--	1,480	853	--	--
Montenegro	--	--	--	--	16	9	--	--
Netherlands	--	--	--	--	156	559	--	--
New Zealand	--	--	--	--	23	11	(2)	4
Pakistan	--	--	--	--	15	66	--	--
Peru	--	--	--	--	6	78	--	--
Philippines	--	--	--	--	88	66	--	--
Poland	--	--	--	--	19	20	--	--
Saint Lucia	--	--	--	--	3	6	--	--
Saudi Arabia	--	--	--	--	87	123	--	--
Singapore	--	--	--	--	27	78	--	--
South Africa	--	--	--	--	54	8	--	--
Spain	--	--	--	--	17	20	--	--
Taiwan	--	--	1	3	6	51	--	--
Thailand	20	16	--	--	--	--	--	--
Trinidad and Tobago	--	--	236	1,080	--	--	--	--
United Kingdom	--	--	9	65	49	264	--	--
Uruguay	--	--	--	--	1	3	--	--
Venezuela	--	--	--	--	16	608	--	--
Total	369	105	319	1,370	5,940	8,850	1,500	569

-- Zero.

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

²Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 8
U.S. EXPORTS OF WORKED MICA IN 2009, BY COUNTRY¹

Country	Plates, sheets		Other	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Afghanistan	9	\$43	--	--
Australia	3	93	1	\$44
Austria	1	15	270	1,700
Bahamas, The	1	9	1	5
Bahrain	--	--	(2)	3
Belgium	4	105	(2)	30
Brazil	19	391	4	147
Canada	70	2,280	62	1,650
Chile	(2)	18	--	--
China	8	244	31	670
Colombia	25	541	2	42
Costa Rica	--	--	(2)	3
Czech Republic	(2)	11	--	--
Dominican Republic	5	39	(2)	7
Ecuador	3	11	--	--
El Salvador	2	12	--	--
France	44	1,910	2	69
Germany	19	251	(2)	8
Guatemala	1	29	--	--
Honduras	2	6	--	--
Hong Kong	(2)	4	(2)	7
India	13	391	2	54
Israel	202	512	--	--
Italy	19	270	3	86
Jamaica	7	42	--	--
Japan	3	30	1	33
Korea, Republic of	14	151	(2)	7
Malaysia	(2)	4	(2)	3
Mexico	26	572	16	631
Morocco	--	--	1	29
Namibia	--	--	(2)	11
Netherlands	1	25	--	--
Netherlands Antilles	2	8	--	--
Nicaragua	--	--	(2)	11
Pakistan	--	--	(2)	4
Peru	4	17	--	--
Philippines	--	--	(2)	12
Poland	--	--	(2)	25
Qatar	--	--	(2)	11
Saint Lucia	1	5	--	--
Saudi Arabia	13	51	4	40
Singapore	(2)	4	1	19
South Africa	(2)	4	1	23
Spain	(2)	14	(2)	7
Sri Lanka	3	9	--	--
Switzerland	4	92	(2)	21
Taiwan	25	438	10	833
Thailand	(2)	6	(2)	8
Trinidad and Tobago	9	33	--	--
Turkey	1	3	(2)	7
United Arab Emirates	2	41	--	--
United Kingdom	30	175	1	38
Uruguay	1	16	--	--

See footnotes at end of table.

TABLE 8—Continued
U.S. EXPORTS OF WORKED MICA IN 2009, BY COUNTRY¹

Venezuela	3	82	(2)	3
Vietnam	--	--	1	8
Other	6	(2)	3	(2)
Total	601	9,000	417	6,310

-- Zero.

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

²Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 9
U.S. IMPORTS FOR CONSUMPTION OF CRUDE AND RIFTED MICA IN 2009, BY COUNTRY¹

Country	Split block		Splittings		Other			
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Less than \$1 per kilogram		More than \$1 per kilogram	
					Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Belgium	--	--	--	--	--	--	(2)	\$23
Canada	(2)	\$3	--	--	--	--	--	--
China	--	--	--	--	--	--	2	10
India	(2)	14	20	\$67	1,810	\$999	--	--
Turkey	--	--	--	--	96	33	--	--
Total	(2)	17	20	67	1,900	1,030	2	33

-- Zero.

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

²Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 10
U.S. IMPORTS FOR CONSUMPTION OF MICA POWDER AND WASTE
IN 2009, BY COUNTRY¹

Country	Powder		Waste	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Argentina	23	\$10	--	--
Canada	7,840	3,190	(2)	\$6
China	6,650	1,270	18	11
Finland	1,340	343	--	--
France	31	34	--	--
Germany	126	242	--	--
India	173	158	1,070	645
Italy	1	38	--	--
Japan	617	4,030	--	--
Korea, Republic of	1	11	--	--
Malaysia	32	82	--	--
Mexico	33	26	--	--
Norway	64	68	--	--
South Africa	1	2	--	--
United Kingdom	12	38	--	--
Total	16,900	9,540	1,090	662

-- Zero.

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

²Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 11
U.S. IMPORTS FOR CONSUMPTION OF WORKED MICA IN 2009, BY COUNTRY¹

Country	Plates, sheets		Other	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Australia	2	\$62	(2)	\$3
Austria	128	2,940	30	893
Belgium	200	2,580	--	--
Brazil	216	1,020	238	423
Canada	(2)	24	--	--
China	288	1,710	26	207
Czech Republic	(2)	3	--	--
France	96	891	(2)	9
Germany	66	1,150	2	127
Hong Kong	10	60	(2)	3
India	51	331	74	586
Italy	--	--	9	23
Japan	10	457	(2)	49
Korea, Republic of	2	33	--	--
Mexico	(2)	15	--	--
Philippines	--	--	(2)	2
South Africa	(2)	7	--	--
Sweden	--	--	(2)	14
Switzerland	11	299	(2)	6
Taiwan	--	--	3	23
United Kingdom	15	403	2	84
Total	1,100	12,000	385	2,450

-- Zero.

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

²Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 12
SUMMATION OF U.S. MICA TRADE DATA¹

	Scrap and flake mica				Sheet mica			
	Powder		Waste		Unworked		Worked	
	Quantity (metric tons)	Value (thousands)						
Exports:								
2008	6,630	\$7,810	2,430	\$731	105	\$238	1,920	\$18,600
2009	5,940	8,850	2,090	1,600	96	437	1,020	15,300
Imports for consumption:								
2008	23,400	12,300	3,560	1,470	130	465	1,750	17,900
2009	16,900	9,540	2,990	1,670	23	142	1,020	14,400

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

Source: U.S. Census Bureau.

TABLE 13
MICA: WORLD PRODUCTION, BY COUNTRY^{1,2}

(Metric tons)

Country ³	2005	2006	2007 ^c	2008 ^c	2009 ^c
Argentina, all grades	4,101	6,233	10,171 ⁴	8,790 ^{r,4}	8,668 ⁴
Brazil ^c	4,000	4,000	4,000	4,000	4,000
Canada ^c	17,500	17,500	18,000	17,000	15,000
Finland:					
Concentrate	9,473	8,097	8,000	8,000	8,000
Biotite	59,381	62,959	60,000	60,000	60,000
Total	68,854	71,056	68,000	68,000	68,000
France ^c	10,000	20,000	20,000	20,000	20,000
India: ^c					
Crude	1,600	1,700	1,700	1,700	1,800
Scrap and waste	2,100	2,200	2,200	2,300	2,300
Total	3,700	3,900	3,900	4,000	4,100
Iran ^{e,5}	7,000	-- ^r	1,800 ^r	1,800 ^r	1,800
Korea, Republic of, all grades	36,623	30,356	42,385 ⁴	49,474 ^r	27,078 ⁴
Madagascar, phlogopite	546 ^r	1,071 ^r	1,349 ⁴	1,233 ^{r,4}	358 ⁴
Malaysia	4,542	5,152	6,118 ⁴	5,593 ^{r,4}	4,323 ⁴
Mexico, all grades	120	150	150	150	150
Norway, flake ^e	2,700	2,600	2,600	2,600	2,600
Peru	51	61	60	91 ⁴	84 ⁴
Russia ^c	100,000	100,000	100,000	100,000	100,000
Serbia	200 ⁶	200 ^e	200	200	200
South Africa, ground and scrap	922	828	437 ⁴	393 ^{r,4}	299 ⁴
Spain	10,000	4,496	4,500	4,500	4,500
Sri Lanka, scrap ^c	1,700	2,600 ^{r,4}	3,224 ^{r,4}	3,600 ^r	3,500
Taiwan	8,608	4,841	3,387 ⁴	3,179 ⁴	557 ⁴
United States, scrap and flake ⁷	78,100	110,000	96,600 ⁴	84,000 ⁴	50,100 ⁴
Grand total	359,000	385,000 ^r	387,000 ^r	379,000 ^r	315,000

^cEstimated. ^rRevised. -- Zero.

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

²Table includes data available through January 12, 2011.

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

⁴Reported figure.

⁵Year beginning March 21 of that stated.

⁶Montenegro and Serbia formally declared independence in June 2006 from each other and dissolved their union.

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