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MICA

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Mica

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Mica production decreased in 2011 compared with that of 2010. In 2011, production of scrap and flake mica in the United States decreased to an estimated 50,000 metric tons (t); this was more than 5% lower than that of 2010 (table 1). The quantity of ground mica sold or used by producers increased to 80,400 t valued at $24.0 million (tables 1, 2). Essentially all sheet mica used in the United States was imported, and China, Belgium, Brazil, and Austria were, in decreasing order by quantity, the major suppliers (table 10). In 2011, consumption of muscovite block mica in the United States was 0.89 t, a slight decrease compared with that of 2010 (tables 1, 3). Consumption of mica splittings decreased slightly to 271 t in 2011 from 275 t in 2010 (tables 1, 4). Worked and unworked sheet mica exports increased to 1,040 t in 2011 from 932 t in 2010, and the value increased to $18.1 million in 2011 from $16.1 million in 2010 (table 11). U.S. imports of worked and unworked sheet mica increased to 2,190 t in 2011 from 1,980 t in 2010, and the value increased to $19.9 million in 2010 from $16.4 million in 2010.

The mica group represents 37 phyllosilicate minerals that have a layered or platy texture. 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 millimeter) 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 (Rieder and others, 1998, p. 43–45).

Production

Domestic mine production data for mica are developed by the U.S. Geological Survey from four separate voluntary surveys. 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 2011, eight companies produced scrap and flake mica in five States with the largest amount produced in South Dakota. The United States was one of the world's principal producers, with production of about 50,000 t (table 1). These same companies produced 80,000 t of ground mica at nine grinding plants in three States; six plants produced dry-ground mica, and three produced wet-ground mica.

Sheet mica was produced as a byproduct from one mine in 2011. 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 2). The mica acts as a filler and extender, provides smooth consistency, improves the workability of the compound, and provides resistance to cracking. In 2011, joint compound accounted for 69% 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 in paint accounted for 2.5% of the dry-ground mica used in 2011.

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 monthly U.S. drill rig count increased 27 out of 30 months since June 2009. Slight decreases were reported in the final months of 2012. The average monthly drill rig count for 2011 was 1,875 or 335 operating rigs more than the average of 2010 and only 5 fewer than the record high of 2008 (Baker Hughes Inc., 2012). Well drilling muds accounted for more than 17% of dry-ground mica use in 2011, a 55% increase compared with that of 2010.

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, improving mechanical properties and increasing 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 2011, consumption of dry-ground mica in plastic applications accounted for about 3% of the total.

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 additives 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 5).

In 2011, the total amount of built-up mica that was consumed or shipped was estimated to be about 288 t. Segment plate and molding plate were the major end products and accounted for 51% and 16% of the total, respectively.

Flexible plate (cold) is used in electric motor and generator armatures, field coil insulation, and magnet and commutator core insulation. In 2011, mica consumption in flexible plate was an estimated 18 t, an increase of 12% compared with that of 2010.

Heater plate is used where high-temperature insulation is required. Consumption of heater plate mica increased by 16% in 2011 compared with that of 2010.

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 increased slightly to an estimated 46 t in 2011.

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 2011, the same as that in 2010.

Some types of built-up mica have the bonded splittings reinforced with 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.

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.

Sheet Mica.—Sheet mica is used principally in the electronics 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 electronics 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 2011, fabrication of ruby and nonruby muscovite block consumed 0.89 t, a slight decrease from that consumed in 2010 (table 3). One producer reported that the majority of insulators, RT washers, stove mica, and all film parts were from India.

Stained and lower-than-stained quality muscovite remained in greatest demand and accounted for about 58% of the consumption of ruby and nonruby mica block. Consumption of nonruby mica block was 55% for stained and lower-than-stained quality and 45% for good quality.

Mica splittings represented the largest part of the sheet mica industry in the United States. Consumption of muscovite and phlogopite splittings decreased slightly to an estimated 271 t in 2011 (table 4). Muscovite splittings from India accounted for essentially all domestic consumption.

Stocks

In 2011, the reported yearend industry stocks of muscovite mica block (ruby and nonruby) decreased by 7% to 12.0 t from 12.8 t in 2010. Industry stocks of muscovite and phlogopite mica splittings, at an estimated 81 t, were slightly higher than those in 2010 (table 4).

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 2011 were muscovite block (ruby and nonruby), $152 per kilogram; muscovite and phlogopite splittings, $1.63 per kilogram; phlogopite block, $135 per kilogram; and phlogopite splittings, $15 per kilogram.

In 2011, the average U.S. value of scrap and flake mica, which included high-quality sericite, was estimated to be $122 per metric ton. The average value of dry-ground mica was estimated to be $281 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 increased by 9% to $26.9 million, and the quantity decreased by 7% to 6,910 t (table 1). Domestic ground mica (powder) exports increased to 5,800 t, an increase of 5% from that of 2010 (table 11). Ground mica exports increased in value to $8.7 million in 2011 from $8.2 million in 2010. Exports of crude and rifted mica decreased by 56% to 128 t in 2011 from 291 t in 2010 (table 6). The value of crude and rifted mica exports decreased by 14% in 2011 compared with that of 2010.

U.S. imports of all mica totaled 29,700 t and were valued at $36.8 million, increases of 5% and 3%, respectively, compared with those of 2010 (table 1). In 2011, total imports for consumption of unworked split block, film, splittings, and mica sheet categorized as “Other” decreased by 32% to 2,590 t, almost all of which was comprised of unworked low-value scrap mica (less than $1.00 per kilogram) (table 8). Demand increased for the low-value mica used as a dry-ground additive for drywall compound, fillers, and paints. In 2011, 24,300 t of powder mica was imported, mostly from Canada, China, and Finland, about 10% more than that in 2010 (table 9). Worked mica imports were 2,020 t, a 5% increase from those of 2010 (table 10).

World Review

World production of mica was estimated to have increased slightly to 1.09 million metric tons (Mt) in 2011 (table 12). Top producing countries were, in decreasing quantity, China, Russia, Finland, the United States, and the Republic of Korea.

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. Along with large increases in new home starts, producers of other construction materials reported increases in production during the first quarter of 2012, which could lead to a short-term increase in demand for mica. As the domestic housing market recovers from the 2008–09 recession, 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 may be painted with wet-ground pearlescent pigments and mica-containing coatings. The North American automobile industry rebounded more quickly than housing, and vehicle production was forecast to increase by about 7% in 2012 (J.D. Power and Associates, 2012).

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 an annual growth rate slightly higher than that of the entire ground mica industry.

Demand for block mica was expected to increase slowly at about 1% per year 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 from 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 2010. With no potential new uses apparent and many substitute materials being used, substantial growth is not expected.

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TABLE 1
SALIENT MICA STATISTICS[1]

		2007	2008	2009	2010	2011
United States:						
Production, sold or used by producers:						
Scrap and flake mica:						
Quantity	thousand metric tons	97	85	51	53	50
Value	thousands	$14,400	$10,200	$6,530	$7,240	$6,110
Ground mica:						
Quantity	thousand metric tons	99	98	77	76	80
Value	thousands	$26,400	$26,500	$23,200	$22,800	$24,000
Prices:						
Scrap and flake mica	dollars per metric ton	149	120	128	137	122
Ground:						
Dry	do.	243	251	284	285	281
Wet	do.	683	651	651	651 r	651
Sheet, muscovite and phlogopite:						
Block	dollars per kilogram	132	122	121	130	152
Splittings	do.	1.57	1.53	1.66	1.53	1.63
Consumption:						
Block, muscovite:						
Quantity	metric tons	1	1	1	1	1
Value	thousands	$139	$127	$131	$117	$135
Splittings, all types						
Quantity	metric tons	310	308	266	275	271
Value	thousands	$475	$471	$440	$421	$444
Exports	metric tons	9,010	11,100	9,150	7,410	6,910
Imports	do.	43,000	28,800	21,400	28,400	29,700
World, production	do.	1,120,000	1,130,000 r	1,020,000	1,080,000 r	1,090,000 e

eEstimated. rRevised. do. Ditto.

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

TABLE 2
GROUND MICA SOLD OR USED BY PRODUCERS IN THE UNITED STATES, BY END USE AND METHOD OF GRINDING[1, 2]

	2010			2011		
	Quantity (thousand metric tons)	Value (thousands)	Unit value	Quantity (thousand metric tons)	Value (thousands)	Unit value
End use:						
Joint compound	44	$11,200	$256	45	$11,600	$258
Paint	17	6,440	384	17	6,440	384
Plastics	2	1,370	660	2	1,310	640
Other[3]	13	3,820	295	17	4,590	277
Total	76	22,800	302	80	24,000	298
Method of grinding:						
Dry	W	W	285	W	W	281
Wet	W	W	700	W	W	651

W Withheld to avoid disclosing company proprietary data.

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

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

[3]Includes mica used for molded electrical insulation, roofing, rubber, textile and decorative coatings, welding rods, and well-drilling mud.

TABLE 3
FABRICATION OF MUSCOVITE BLOCK MICA IN THE UNITED STATES, BY QUALITY[1]

(Kilograms)

	2010	2011
Good stained or better	370	374
Stained or lower than stained[2]	536	518
Total	906	893

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

[2]Includes punch mica.

TABLE 4
ESTIMATED CONSUMPTION AND STOCKS OF MICA SPLITTINGS
IN THE UNITED STATES

Year	Consumption		Stocks on December 31
	Quantity (metric tons)	Value (thousands)	(metric tons)
2010	275	$421	79
2011	271	444	81

TABLE 5
ESTIMATED BUILT-UP MICA SOLD OR USED IN THE UNITED STATES, BY PRODUCT[1, 2]

	2010		2011	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Flexible plate (cold)	16	$132	18	$238
Heater plate	1	35	2	18
Molding plate	45	333	46	384
Segment plate	147	279	147	282
Other[3]	72	314	76	358
Total	283	1,090	288	1,280

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

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

[3]Includes mica used in tape and miscellaneous products.

TABLE 6

U.S. EXPORTS OF CRUDE AND RIFTED MICA, MICA POWDER, AND WASTE, BY COUNTRY[1]

	Crude and rifted							
	Less than $1 per kilogram		More than $1 per kilogram		Powder		Waste	
Country	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
2010	214	$107	77	$255	5,550	$8,190	697	$270
2011:								
Algeria	--	--	--	--	171	94	--	--
Angola	--	--	--	--	26	11	--	--
Argentina	--	--	--	--	27	231	--	--
Bahamas, The	--	--	12	78	--	--	--	--
Barbados	--	--	--	--	20	31	--	--
Belgium	--	--	--	--	96	676	--	--
Brazil	--	--	--	--	298	574	--	--
Canada	20	8	--	--	773	1,210	--	--
Chile	--	--	6	18	2	8	--	--
China	--	--	--	--	90	356	--	--
Colombia	--	--	--	--	262	450	--	--
El Salvador	--	--	3	9	25	62	--	--
France	--	--	--	--	51	291	--	--
Germany	--	--	11	25	145	346	--	--
Indonesia	--	--	--	--	30	54	--	--
Japan	--	--	--	--	451	723	--	--
Korea, Republic of	--	--	--	--	521	485	--	--
Mexico	19	12	9	11	2,070	1,290	--	--
Netherlands	19	4	--	--	329	888	--	--
Peru	--	--	--	--	53	54	--	--
Saudi Arabia	--	--	--	--	66	88	--	--
Thailand	--	--	3	9	14	52	--	--
United Arab Emirates	--	--	--	--	36	23	--	--
United Kingdom	--	--	21	124	3	21	--	--
Other	--	--	4	12	239	697	--	--
Total	58	24	70	286	5,800	8,700	--	--

-- Zero.

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

Source: U.S. Census Bureau.

TABLE 7
U.S. EXPORTS OF WORKED MICA, BY COUNTRY[1]

Country	Plates, sheets		Other	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
2010	419	$9,270	460	$6,660
2011:				
Austria	--	--	250	1,520
Brazil	48	1,290	22	670
Canada	123	2,940	65	2,170
China	17	523	38	333
Colombia	7	282	3	102
Dominican Republic	1	14	18	42
El Salvador	10	39	--	--
France	17	713	2	99
Hong Kong	17	113	(2)	71
Israel	30	112	--	--
Japan	6	208	33	290
Mexico	83	2,480	59	1,000
Netherlands	15	88	--	--
Switzerland	24	574	(2)	3
Taiwan	23	470	6	163
United Kingdom	6	178	1	38
Other	41	994	11	355
Total	470	11,000	508	6,850

-- Zero.

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

[2]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 8

U.S. IMPORTS FOR CONSUMPTION OF CRUDE AND RIFTED MICA, BY COUNTRY[1]

	Split block		Splittings		Other			
					Less than $1 per kilogram		More than $1 per kilogram	
Country	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
2010	--	--	39	$89	3,770	$1,790	16	$158
2011:								
Belgium	--	--	--	--	--	--	(2)	20
Canada	(2)	4	--	--	34	8	--	--
China	--	--	--	--	--	--	5	15
Germany	--	--	--	--	60	35	6	44
Hong Kong	--	--	(2)	2	--	--	--	--
India	(2)	6	100	128	2,380	1,190	9	62
Total	(2)	10	100	230	2,470	1,230	21	141

-- Zero.

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

[2]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 9

U.S. IMPORTS FOR CONSUMPTION OF MICA POWDER AND WASTE, BY COUNTRY[1]

	Powder		Waste	
Country	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
2010	22,000	$16,900	623	$525
2011:				
Canada	12,000	5,960	23	17
China	6,210	1,400	--	--
Finland	4,510	1,410	--	--
Germany	84	136	--	--
India	135	375	761	537
Japan	874	5,040	--	--
Malaysia	75	191	--	--
Norway	144	173	--	--
United Kingdom	157	240	--	--
Other	96	135	--	--
Total	24,300	15,100	785	554

-- Zero.

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

Source: U.S. Census Bureau.

TABLE 10

U.S. IMPORTS FOR CONSUMPTION OF WORKED MICA, BY COUNTRY[1]

Country	Plates, sheets		Other	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
2010	1,360	$13,100	572	$3,150
2011:				
Austria	135	3,570	10	265
Belgium	354	3,590	--	--
Brazil	266	1,610	291	544
Canada	4	150	1	63
China	529	2,550	65	490
France	77	752	1	47
Germany	78	1,600	(2)	17
India	26	537	16	608
Italy	(2)	2	44	83
Japan	9	646	1	215
Korea, Republic of	3	74	4	10
Switzerland	15	397	(2)	4
United Kingdom	71	1,300	13	365
Other	4	77	2	94
Total	1,570	16,900	449	2,800

-- Zero.

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

[2]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 11

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:								
2010	5,550	$8,190	935	$468	53	$163	879	$15,900
2011	5,800	8,700	68	35	60	275	978	17,900
Imports for consumption:								
2010	22,000	16,900	4,400	2,390	51	180	1,930	16,200
2011	24,300	15,100	3,200	1,810	172	254	2,020	19,700

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

Source: U.S. Census Bureau.

TABLE 12

MICA: WORLD PRODUCTION, BY COUNTRY[1, 2]

(Metric tons)

Country[3]	2007	2008	2009	2010	2011[e]
Argentina, all grades	10,171	8,790	8,668	9,638 [r]	9,500
Brazil[e]	4,000	4,000	4,000	4,000	4,000
Canada[e]	18,000	17,000	15,000	15,000	14,000
China	720,000	750,000	700,000	750,000	760,000
Finland					
Concentrate	11,449	10,706	10,000 [e]	10,000 [e]	10,000
Biotite	58,000	57,000	60,000	60,000 [e]	60,000
Total	69,449	67,706	70,000	70,000 [e]	70,000
France[e]	20,000	20,000	20,000	20,000	20,000
India:					
Crude	3,790	2,050	2,000	2,100	2,400
Scrap and waste	3,420	4,470	4,500	4,700	4,900
Total	7,210	6,520	6,500	6,800	7,300
Iran[e, 4]	1,800	1,510 [5]	1,500	1,500	1,400
Korea, Republic of, all grades	42,385	49,474	27,078	36,486 [r]	35,000
Madagascar, phlogopite	1,349 [6]	1,233 [6]	358 [6]	2,069 [r, 6]	2,100
Malaysia	6,118	5,593	4,323	4,515 [r]	4,246 [5]
Mexico, all grades	9,600	5,000	5,000	160	160
Norway, flake[e]	2,600	2,600	2,600	2,500	2,500
Peru	60 [e]	91	84	85 [e]	90 [5]
Russia[e]	100,000	100,000	100,000	100,000	100,000
Serbia[e]	-- [r]	-- [r]	-- [r]	-- [r]	--
South Africa, ground and scrap	437	426 [r]	572 [r]	904 [r]	730
Spain	5,569	4,254	4,000 [e]	4,000 [r, e]	4,000
Sri Lanka, scrap	3,224	2,364	2,347 [r]	2,095 [r]	2,100
Taiwan	3,387	3,179	557	--	1,455 [5]
United States, scrap and flake[e, 7]	96,600 [r]	85,200 [r]	51,100 [r]	52,800	50,000
Grand total	1,120,000	1,130,000 [r]	1,020,000	1,080,000 [r]	1,090,000

[e]Estimated. [r]Revised. -- Zero.

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

[2]Table includes data available through June 8, 2012.

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

[4]Year beginning March 21 of that stated.

[5]Reported figure.

[6]Reported exports.

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