



# 2015 Minerals Yearbook

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MICA [ADVANCE RELEASE]

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# MICA

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Domestic mica production and consumption decreased in 2015 after experiencing slight increases in 2013 and 2014. The United States remained one of the world's leading producers, with production of scrap and flake mica estimated to be 32,600 metric tons (t); this was a decrease of 32% compared with that of 2014 (tables 1, 12). The quantity of ground mica sold or used by producers decreased to 53,700 t valued at \$16.7 million (tables 1, 2). Essentially all sheet mica used in the United States was imported. China, Brazil, Belgium, France, and the United Kingdom were, in decreasing order by quantity, the major suppliers (table 10). In 2015, consumption of muscovite block mica in the United States was 0.86 t, a decrease of 5% compared with that of 2014 (tables 1, 3). Consumption of mica splittings decreased to 260 t in 2015 from 268 t in 2014 (tables 1, 4). Worked and unworked sheet mica exports decreased to 968 t in 2015 from 1,040 t in 2014, and the value increased to \$20.7 million in 2015 from \$19.3 million in 2014 (table 11). U.S. imports of worked and unworked sheet mica decreased to 2,130 t in 2015 from 2,470 t in 2014, and the value decreased to \$16.8 million in 2015 from \$20.1 million in 2014. World production of mica was estimated to have decreased slightly to 1.13 million metric tons (Mt) in 2015 (table 12).

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. 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. Muscovite is the principal mica used by the electrical industry to make mica-based capacitors that can operate in environments with temperatures and (or) frequencies that are too high for polypropylene capacitors. Phlogopite mica is used in plastic composites for automotive applications because of its dimensional stability, increased stiffness, and improved heat distortion temperature. Muscovite and phlogopite are used in sheet and ground forms (Rieder and others, 1998, p. 43–45).

## Production

Domestic mine production data for mica were 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 mica only), and as a coproduct of feldspar and kaolin mining and processing operations. In 2015, seven companies produced scrap and flake mica in four States with the largest

quantity produced in Georgia. Production of scrap and flake mica in the United States decreased to an estimated 32,600 t; this was 32% less than that of 2014 (tables 1, 12). These same companies produced 53,700 t of ground mica from domestic and imported scrap and flake mica at nine grinding plants in three States; six plants produced dry-ground mica, and three produced wet-ground mica.

Small quantities of muscovite sheet and scrap mica were produced as 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 ground mica was in joint compound for filling and finishing seams and blemishes in gypsum wallboard (drywall), which accounted for 54% of ground mica sold or used by producers in 2015 (table 2). The mica acts as a filler and extender, provides smooth consistency, improves the workability of the compound, and provides resistance to cracking.

The second-leading use of ground mica was other, which included mica used as an additive to drilling muds by the well-drilling industry. Coarsely ground mica flakes help prevent the loss of circulation by sealing porous sections of the drill hole. During 2015, the number of drill rigs operating in the United States ranged from 1,811 rigs in January to 698 at the end of December. The average weekly drill rig count for 2015 was 978 operating rigs, 884 less than the average for 2014 (Baker Hughes Inc., 2016). This is a reflection of the downturn in domestic oil and natural gas drilling caused by excess supply. Oil and natural gas prices decreased significantly in 2015 (Egan, 2016).

Consumption in paint accounted for approximately 21% of the ground mica used in 2015. 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.

The plastics industry used ground mica as an extender and filler, especially in parts for automobiles as lightweight insulation to suppress sound and vibration. In 2015, consumption of ground mica in plastic applications accounted for about 3% of the total. 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 good surface properties.

Other uses for ground mica are in the rubber industry as an inert filler and mold release compound. As a rubber additive, mica reduces gas permeability and improves resiliency. The platy nature of mica enhances release performance in the manufacture of molded rubber products. As a surface coating in the production of rolled roofing and asphalt shingles, mica prevents the sticking of adjacent surfaces. 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 in coatings for core and mold release compounds, facing agents, and mold washes in foundry applications (MICAMAFCO, undated).

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 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 (Imerys, undated).

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 Precambrian 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.**—In 2015, the total quantity of built-up mica that was consumed or shipped was estimated to be about 269 t (table 5). Segment plate and molding plate were the major end products and accounted for 53% and 17% of the total, respectively.

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.

Flexible plate (cold) is used in electric motor and generator armatures, field coil insulation, and magnet and commutator core insulation. In 2015, mica consumption in flexible plate was an estimated 13.9 t valued at \$160,000.

Heater plate is used where high-temperature insulation is required. Consumption of built-up mica used in making heater plates decreased slightly to an estimated 2.3 t valued at \$26,000.

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 3% to an estimated 45 t in 2015 valued at \$461,000.

Segment plate acts as insulation between the copper commutator segments of direct-current universal motors and generators. Consumption of mica in the production of segment plate was estimated to be about 142 t in 2015. 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.

Some types of built-up mica have 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 used as is, rolled, 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 were 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 was 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.

Mica splittings represented the largest part of the sheet mica industry in the United States. Consumption of muscovite and phlogopite splittings was 260 t in 2015 down from 268 t in 2014 (table 4). Muscovite splittings from India accounted for essentially all domestic consumption.

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 2015, consumption of ruby and nonruby muscovite block totaled 0.86 t, a decrease of 5% from that consumed in 2014 (table 3). One producer reported that the majority of all film parts, insulators, stove mica, and washers were from India. Stained and lower-than-stained quality muscovite remained in greatest demand and accounted for about 60% of the consumption of ruby and nonruby mica block. Consumption of nonruby mica block was 58% for stained and lower-than-stained quality and 42% for good stained or better.

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 laser devices, in medical electronics, in missile systems, in optical instrumentation, in radar systems, and for radiation detector windows that are transparent to alpha emissions (Geiger-Mueller tubes).

## Stocks

In 2015, the estimated yearend industry stocks of muscovite block (ruby and nonruby) decreased to 10.8 t from 11.1 t in 2014. Industry stocks of muscovite and phlogopite mica splittings, at an estimated 75 t, were 3% less than those in 2014 (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 2015 were muscovite block (ruby and nonruby), \$154 per kilogram; muscovite and phlogopite splittings, \$1.76 per kilogram; phlogopite block, \$276 per kilogram; and phlogopite splittings, \$15 per kilogram.

In 2015, the average U.S. value of scrap and flake mica, which included high-quality sericite, was estimated to be \$142 per metric ton (table 1). The average value of dry-ground mica was estimated to be \$290 per metric ton, and the average value of wet-ground mica was estimated to be \$375 per metric ton (tables 1, 2).

## Foreign Trade

According to data from the U.S. Census Bureau, the value of U.S. exports of mica decreased to \$30.4 million, and the quantity also decreased to 8,350 t (table 11). Domestic ground mica (powder) exports decreased by 10% compared with those of 2014 to 7,100 t in 2015. Ground mica exports decreased in value to \$9.6 million in 2015 from \$11.6 million in 2014. Exports of crude and rifted mica increased by 46% to 330 t in 2015 from 226 t in 2014 (table 6); the value of crude and rifted mica exports decreased by 46% in 2014. Canada accounted for all of the exports of low-value crude and rifted mica in 2015 compared with no exports of crude and rifted mica to Canada in 2014.

U.S. imports of all mica totaled 35,300 t and were valued at \$37.3 million (table 11). In 2015, total imports for consumption of unworked split block, film, splittings, and mica sheet categorized as “Other” increased by 11% to 4,630 t, almost all of which consisted of unworked low-value scrap mica (less than \$1.00 per kilogram) (table 8). The low-value mica is used as a dry-ground additive for drywall compound, fillers, and paints. In 2015, 28,100 t of powder mica was imported, mostly from Canada, China, Finland, and Japan, slightly more than that in 2014 (table 9). Worked mica imports were 2,010 t, a 15% decrease from those of 2014 (table 10).

## World Review

World production of mica was estimated to be 1.13 Mt, down slightly compared with that of 2014 (table 12). China continued to be the leading producer of mica, followed by Russia, Finland, the United States, Turkey, and the Republic of Korea. In 2015, Canada was the leading supplier of mica to the United States, followed by China, India, and Brazil. It was estimated that two-thirds of mica produced in Canada was exported to the United States.

## Outlook

The major markets for ground mica—drywall joint compounds and paints—are mature and relatively stable, with growth tied to housing construction and interest rates. As the domestic housing market recovers from the 2008–09 recession, the long-term outlook for ground mica is an expected production increase 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. North American automobile production is forecast to increase by about 1%, or about 150,000 units, in 2016 (J.D. Power and Associates, 2016).

As the economy continues to recover, demand for ground mica in smaller specialty markets, such as coated micas, cosmetics, nylon and polyester resins, and polypropylene composites, is expected to resume an annual growth rate slightly higher than that of the entire ground mica industry.

Consumption of block mica is 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 is 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 200 to 300 metric tons per year in recent years. With no potential new uses apparent and many substitute materials being used, substantial growth is not expected.

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## GENERAL SOURCES OF INFORMATION

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TABLE 1  
 SALIENT MICA STATISTICS<sup>1</sup>

		2011	2012	2013	2014	2015
United States:						
Production, sold or used by producers:						
Scrap and flake mica:						
Quantity	metric tons	52,000	47,500	48,100	48,200 <sup>r</sup>	32,600
Value	thousands	\$6,890	\$6,070	\$5,940	\$5,640 <sup>r</sup>	\$4,640
Ground mica:						
Quantity	metric tons	80,400	78,500	79,200	79,400 <sup>r</sup>	53,700
Value	thousands	\$24,000	\$23,500	\$23,600	\$24,300 <sup>r</sup>	\$16,700
Prices:						
Scrap and flake mica	dollars per metric ton	133	128	124	117 <sup>r</sup>	142
Ground:						
Dry	do.	281	281	279	285	290
Wet	do.	360	360	360	369	375
Sheet, muscovite and phlogopite:						
Block	dollars per kilogram	152	145	129	148	133
Splittings	do.	1.63	1.72	1.72	1.70	1.76
Consumption:						
Block, muscovite:						
Quantity	metric tons	1	1	1	1	1
Value	thousands	\$135	\$160	\$152	\$162	\$154
Splittings, all types:						
Quantity	metric tons	271	285	269	268	260
Value	thousands	\$444	\$490	\$463	\$455	\$457
Exports	metric tons	6,910	7,560	7,530	9,110	8,350
Imports	do.	29,700	29,600	32,800	35,200	35,400
World, production	do.	1,100,000	1,080,000	1,130,000	1,140,000 <sup>r,e</sup>	1,130,000 <sup>e</sup>

<sup>e</sup>Estimated. <sup>r</sup>Revised. do. Ditto.

<sup>1</sup>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<sup>1,2</sup>

	2014			2015		
	Quantity (metric tons)	Value (thousands)	Unit value	Quantity (metric tons)	Value (thousands)	Unit value
End use:						
Joint compound	42,800 <sup>r</sup>	\$11,300 <sup>r</sup>	\$264	28,900	\$7,750	\$268
Paint	16,800 <sup>r</sup>	6,620 <sup>r</sup>	394	11,400	4,540	400
Plastics	2,110 <sup>r</sup>	1,380 <sup>r</sup>	653	1,430	946	662
Other <sup>3</sup>	17,700 <sup>r</sup>	4,980 <sup>r</sup>	281	12,000	3,420	285
Total	79,400 <sup>r</sup>	24,300 <sup>r</sup>	306	53,700	16,700	310
Method of grinding:						
Dry	W	W	285	W	W	290
Wet	W	W	369	W	W	375

<sup>r</sup>Revised. W Withheld to avoid disclosing company proprietary data.

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

<sup>2</sup>Domestic and some imported scrap. Low-quality sericite is not included.

<sup>3</sup>Includes mica used for molded electrical insulation, roofing, rubber, textile and decorative coatings, welding rods, well drilling mud, and miscellaneous.

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

(Kilograms)

	2014	2015
Good stained or better	397	346
Stained or lower than stained <sup>1</sup>	515	517
Total	912	862

<sup>1</sup>Includes punch mica.

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

Year	Consumption		Stocks on December 31 (metric tons)
	Quantity (metric tons)	Value (thousands)	
2014	268	\$455	77
2015	260	457	75

TABLE 5  
ESTIMATED BUILT-UP MICA SOLD OR USED IN THE UNITED STATES, BY PRODUCT<sup>1,2</sup>

	2014		2015	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Flexible plate (cold)	14	\$154	14	\$160
Heater plate	2	25	2	26
Molding plate	47	446	45	461
Segment plate	147	274	142	284
Other	67	295	65	305
Total	277	1,190	269	1,240

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

<sup>2</sup>Consists of alternating layers of binder and irregularly arranged and partly overlapped splittings.

TABLE 6  
U.S. EXPORTS OF CRUDE AND RIFTED MICA, MICA POWDER, AND WASTE, BY COUNTRY<sup>1</sup>

Country	Crude and rifted				Powder		Waste	
	Less than \$1 per kilogram		More than \$1 per kilogram		Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)				
2014	58	\$41	168	\$575	7,860 <sup>r</sup>	\$11,600 <sup>r</sup>	--	--
2015:								
Algeria	--	--	--	--	244	149	--	--
Bahamas, The	--	--	31	165	--	--	--	--
Barbados	--	--	--	--	33	52	--	--
Belgium	--	--	--	--	164	1,120	--	--
Brazil	--	--	--	--	500	413	--	--
Canada	273	81	--	--	911	1,210	--	--
China	--	--	6	17	117	335	--	--
Colombia	--	--	--	--	613	400	--	--
Costa Rica	--	--	4	12	40	29	--	--
Dominican Republic	--	--	--	--	76	86	--	--
France	--	--	--	--	58	799	--	--
Germany	--	--	3	8	383	818	--	--
Guatemala	--	--	--	--	22	38	--	--
Haiti	--	--	3	18	--	--	--	--
India	--	--	--	--	34	38	--	--
Indonesia	--	--	--	--	1	14	4	5
Japan	--	--	--	--	329	604	--	--
Korea, Republic of	--	--	(2)	3	351	397	--	--
Mexico	--	--	6	13	2,860	1,800	3	3
Netherlands	--	--	--	--	104	123	--	--
Philippines	--	--	3	9	(2)	8	--	--
Saudi Arabia	--	--	(2)	3	--	--	--	--
Singapore	--	--	--	--	23	64	--	--
Taiwan	--	--	(2)	5	56	603	--	--
United Kingdom	--	--	--	--	43	133	--	--
Other	--	--	--	--	138	341	--	--
Total	273	81	57	253	7,100	9,570	6	8

<sup>r</sup>Revised. -- Zero.

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

<sup>2</sup>Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 7  
U.S. EXPORTS OF WORKED MICA, BY COUNTRY<sup>1</sup>

Country	Plates, sheets		Other	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
2014	456 <sup>r</sup>	\$12,900 <sup>r</sup>	410 <sup>r</sup>	\$5,780 <sup>r</sup>
2015:				
Austria	--	--	111	635
Bahamas, The	5	10	(2)	5
Brazil	65	1,790	15	495
Canada	89	2,550	34	869
China	8	286	54	355
Colombia	4	157	--	--
Dominican Republic	1	13	9	38
Germany	4	147	49	276
Japan	7	218	38	370
Korea, Republic of	40	1,880	1	21
Mexico	199	5,830	18	680
Russia	5	122	1	33
Saudi Arabia	2	152	2	66
Spain	14	451	(2)	21
Switzerland	48	1,220	1	26
Taiwan	4	94	8	147
Thailand	(2)	10	2	57
Trinidad and Tobago	24	46	--	--
United Kingdom	4	85	(2)	11
Other	10	294	35	994
Total	532	15,400	378	5,100

<sup>r</sup>Revised. -- Zero.

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

<sup>2</sup>Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 8  
U.S. IMPORTS FOR CONSUMPTION OF CRUDE AND RIFTED MICA, BY COUNTRY<sup>1</sup>

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)
2014	27	\$37	76	\$122	4,070 <sup>r</sup>	\$2,150 <sup>r</sup>	6 <sup>r</sup>	\$16 <sup>r</sup>
2015:								
Brazil	--	--	--	--	800	363	--	--
China	--	--	--	--	--	--	27	210
India	17	85	67	142	3,710	2,010	--	--
Total	17	85	67	142	4,510	2,370	27	210

<sup>r</sup>Revised. -- Zero.

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

<sup>2</sup>Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 9  
U.S. IMPORTS FOR CONSUMPTION OF MICA POWDER AND WASTE, BY COUNTRY<sup>1</sup>

Country	Powder		Waste	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
2014	28,600 <sup>†</sup>	\$19,400	784	\$555
2015:				
Austria	11	9	--	--
Brazil	14	29	--	--
Canada	14,200	8,120	--	--
China	10,600	2,550	--	--
Finland	1,100	575	--	--
France	28	91	--	--
Germany	27	23	--	--
Hungary	(2)	8	--	--
India	610	683	659	487
Italy	4	12	--	--
Japan	845	4,200	--	--
Korea, Republic of	25	286	--	--
Malaysia	167	456	--	--
Netherlands	12	8	--	--
Norway	31	38	--	--
Spain	5	79	--	--
United Kingdom	310	413	(2)	3
Total	28,000	17,600	659	490

<sup>†</sup>Revised. -- Zero.

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

<sup>2</sup>Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 10  
U.S. IMPORTS FOR CONSUMPTION OF WORKED MICA, BY COUNTRY<sup>1</sup>

Country	Plates, sheets		Other	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
2014	1,790	\$15,500	571	\$4,410 <sup>†</sup>
2015:				
Austria	7	196	114	2,650
Belgium	168	2,090	1	8
Brazil	281	1,830	209	359
Canada	8	158	7	31
China	804	3,100	131	523
Czech Republic	13	233	--	--
France	77	597	2	51
Germany	5	80	20	477
Japan	22	699	35	251
Malaysia	11	214	--	--
Switzerland	15	352	6	94
United Kingdom	39	703	26	697
Other	11	328	5	691
Total	1,460	10,600	554	5,830

<sup>†</sup>Revised. -- Zero.

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

Source: U.S. Census Bureau.

TABLE 11  
SUMMATION OF U.S. MICA TRADE DATA<sup>1</sup>

	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)
<b>Exports:</b>								
2014	7,860 <sup>r</sup>	\$11,600 <sup>r</sup>	58	\$41	168	\$575	867 <sup>r</sup>	\$18,700
2015	7,100	9,570	279	89	57	253	911	20,500
<b>Imports for consumption:</b>								
2014	28,600 <sup>r</sup>	19,400	4,850	2,700	109	175	2,360	19,900
2015	28,000	17,600	5,170	2,860	112	437	2,010	16,400

<sup>r</sup>Revised.

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

Source: U.S. Census Bureau.

TABLE 12  
MICA: WORLD PRODUCTION, BY COUNTRY<sup>1,2</sup>

(Metric tons)

Country <sup>3</sup>	2011	2012	2013	2014	2015 <sup>e</sup>
Argentina, all grades	10,226	5,785	7,500 <sup>e</sup>	5,000 <sup>r,e</sup>	5,000
Brazil	6,193	522	11,520	10,313 <sup>r</sup>	10,000
Canada <sup>e</sup>	21,000	22,000	22,000	22,000	22,000
China <sup>e</sup>	760,000	770,000	780,000	785,000 <sup>r</sup>	785,000
Finland					
Biotite	31,504	27,493	42,150	41,997	42,000
Concentrate	12,896	12,112	11,244	11,973	12,000
Total	44,400	39,605	53,394	53,970	54,000
France <sup>e</sup>	20,000	20,000	20,000	20,000	20,000
India:					
Crude	1,698 <sup>r</sup>	1,486 <sup>r</sup>	1,555 <sup>r</sup>	595 <sup>r</sup>	600
Scrap and waste	13,476 <sup>r</sup>	13,493 <sup>r</sup>	20,361 <sup>r</sup>	12,218 <sup>r</sup>	12,300
Total	15,174 <sup>r</sup>	14,979 <sup>r</sup>	21,916 <sup>r</sup>	12,813 <sup>r</sup>	12,900
Iran <sup>e,4</sup>	7,130	7,000	7,000 <sup>r</sup>	7,000 <sup>r</sup>	7,000
Korea, Republic of, all grades	31,260	25,594	25,143 <sup>r</sup>	25,000 <sup>r,e</sup>	25,000
Madagascar, phlogopite	3,411 <sup>5</sup>	12,532 <sup>5</sup>	10,779 <sup>r</sup>	9,400 <sup>r,e</sup>	19,000
Malaysia	4,245	3,967	4,242 <sup>r</sup>	4,000 <sup>r,e</sup>	4,000
Mexico, all grades <sup>e</sup>	--	160	160	160	160
Peru	90	99	156	109	115
Russia <sup>e</sup>	100,000	100,000	100,000	100,000	100,000
South Africa, ground and scrap	633	400	309	83 <sup>r</sup>	80
Spain	3,609 <sup>r</sup>	3,518	3,462	3,400 <sup>r,e</sup>	3,400
Sri Lanka, scrap	2,927	1,260 <sup>r</sup>	1,493 <sup>r</sup>	1,500 <sup>r,e</sup>	1,500
Sudan	378	324	500	-- <sup>r,e</sup>	--
Taiwan	1,455	6,844	8,931	5,016 <sup>r</sup>	5,020
Turkey:					
Illite	17,265	--	800	16,200 <sup>r</sup>	16,000
Other	277	1,253	1,504	9,240 <sup>r</sup>	9,200
Total	17,542	1,253	2,304	25,440 <sup>r</sup>	25,200
United States, scrap and flake <sup>6</sup>	52,000	47,500	48,100	48,200 <sup>r</sup>	32,600 <sup>7</sup>
Grand total	1,100,000	1,080,000	1,130,000	1,140,000 <sup>r,e</sup>	1,130,000

<sup>e</sup>Estimated. <sup>r</sup>Revised. -- Zero.

<sup>1</sup>Grand total, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Includes data available through June 16, 2016.

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

<sup>4</sup>Year beginning March 21 of that stated.

<sup>5</sup>Reported exports.

<sup>6</sup>Does not include, if any, U.S. production of low-quality sericite and sheet mica.

<sup>7</sup>Reported figure.