



2013 Minerals Yearbook

FELDSPAR AND NEPHELINE SYENITE [ADVANCE RELEASE]

FELDSPAR AND NEPHELINE SYENITE

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In 2013, feldspar production in the United States was estimated to be about 550,000 metric tons (t), down slightly from 560,000 t in 2012, but its value was up nearly 10% to about \$40 million (table 1). Exports of feldspar in 2013 increased by 36% to 17,700 t valued at about \$5.3 million, and imports of feldspar more than doubled to 4,310 t valued at \$1.11 million. Imports of nepheline syenite (predominantly from Canada) increased by 27% to 491,000 t valued at \$59.3 million. World production of feldspar was estimated to be about 19.6 million metric tons (Mt) (tables 1, 7).

Apparent consumption of feldspar and nepheline syenite combined was about 1 Mt, primarily for use in the ceramics and glass industries but also as filler in various products such as paints and coatings. Domestic feldspar production data include the estimated feldspar content of feldspar-quartz mixtures from silica producers and the weight of aplite (a rock with quartz and feldspar as the dominant minerals) from one producer. Domestic nepheline syenite production was consumed only as roofing granules and in other construction applications; therefore, domestic production data for nepheline syenite are excluded from tables in this chapter. Discussion of nepheline syenite follows that of feldspar.

Feldspar

Production.—Feldspar was mined in seven States. These were, in descending order of estimated output, North Carolina, Idaho, California, Virginia, Georgia, Oklahoma, and South Dakota. North Carolina was by far the leading producer. Data on domestic production and sales and use of feldspar in this report are based upon data collected by the U.S. Geological Survey (USGS) by means of a voluntary survey. Nine companies mined and processed feldspar from 11 mines and beneficiating facilities—3 in North Carolina, 2 in California, 2 in Idaho, and 1 in each of the 4 remaining States (table 3). Of these beneficiation facilities, eight responded to the canvass, representing about 72% of the total 2013 production tonnage listed in tables 1 and 2. Production for the remaining operations was estimated using prior-year output levels and worker-hour reports from the U.S. Department of Labor's Mine Safety and Health Administration (MSHA).

In July, the Idaho Department of Land granted a 10-year mineral lease renewal for I-Minerals Inc.'s Helmer-Bovill property in north-central Idaho (Patel, 2013). Included was a reclamation mining permit to allow the company to mine about 45,000 metric tons per year (t/yr) (up to 50,000 short tons per year) of feldspathic sand for 10 years between June and October. The project's primary products were expected to be halloysite clay and kaolin, but the products reportedly included 800,000 t of potassium feldspar sand, mostly from a tailings dump at the project, and high purity quartz sands (I-Minerals Inc., 2012).

The Quartz Corp., a 50–50 joint venture of Imerys SA (Paris, France) and Norsk Mineral AS (Molde, Norway), continued to upgrade and expand production and processing of feldspar and mica resources associated with high-purity quartz, the company's primary product, from Imerys' pegmatite resources in Spruce Pine, NC (Quartz Corp., The, 2011; Imerys SA, 2014, p. 45–46, 261).

Consumption.—In 2013, almost 55%, by tonnage, of domestic feldspar sold or used was consumed in the manufacture of glass, including glass containers, flat glass, specialty glass, and fiberglass for home insulation (table 4). In glassmaking, feldspar promotes the mixing of the melt components by fluxing (reducing the viscosity of) the system. The alkalis in feldspar (especially potassium and sodium ions) lower the melting temperature and chemically bond with and promote the fusing of the other glass batch minerals such as silica. Alumina and calcium ions in feldspar impart increased resistance to physical and chemical breakdown of the glass product.

Much of the remaining feldspar consumption was in the manufacture of ceramics, including ceramic and porcelain tile, electrical insulators, sanitaryware, and tableware. In ceramics, as in glassmaking, the alkalis (calcium, potassium, and sodium) in feldspar act as flux, working with soda ash to lower the melting temperature of the mixture while increasing the fusibility of the batch materials; the feldspar also controls the degree of vitrification of the ceramic body during firing. Smaller quantities of feldspar were used as fillers and extenders in paint, plastics, and rubber.

In 2013, a number of factors contributed to the slight decrease in the production and consumption of domestic feldspar—increased production costs, substitution of imported nepheline syenite for feldspar in ceramic tile (especially porcelain tile) and glass, competition from imported ceramic tile, and decreased foreign demand for and exports of domestic tile (Whitmire, 2014).

The use of nonglass containers for products such as baby food, fruit juices, mineral water, and wine, and a recent trend to import less expensive containers from China competed with domestic glass containers and thus reduced domestic consumption of traditional raw materials for glass manufacture. The use of cullet, especially from the ongoing growth in post-consumer “bottle-to-bottle” recycling programs, continued to compete as a substitute for primary raw materials such as feldspar, and tended to decrease the demand for them in the manufacture of glass containers. Increasing the amount of cullet in glass container production decreases primary raw material and energy costs, reduces greenhouse gas emissions, and extends the life of glass manufacturing furnaces (Cattaneo, 2011; Glass Packaging Institute, 2013).

The construction industry is a major consumer of glass and ceramic products. In the United States, construction starts for new privately owned housing increased by 18.5% to nearly 925,000 units in 2013 from 781,000 units in 2012, continuing the upward trend since 2009 when housing starts were 554,000 units. The 2013 rate still remained significantly lower than annual starts reported from at least 1959 through 2007 (U.S. Census Bureau, 2014b). The value of total (private and public) residential and commercial construction, both of which use significant quantities of flat glass and ceramic tile products, increased for the second consecutive year, up by about 5.8% to nearly \$911 billion in 2013 from \$861 billion in 2012. Total construction spending peaked at \$1.17 trillion in 2006 (U.S. Census Bureau, 2014a).

In 2013, production increased in the domestic ceramic tile and automobile industries. For the third consecutive year, shipments of ceramic tile increased by 6% to 73.7 million square meters from 69.5 million square meters in 2012. In 2013, imports of tile, which accounted for nearly 70% of U.S. tile consumption, increased by almost 16%, mostly from (in descending order) China, Mexico, and Italy. Exports of tile in 2013 decreased by 13% (the majority of the exports, in descending order, going to Canada and Mexico) (Whitmire, 2014). In the automobile industry, a major consumer of glass products, production of automobiles and light trucks in North America increased by 4.4% in 2013. Sales of automobiles and light trucks in the United States increased by 7.4% in 2013 following a 13.4% increase in 2012 from that of 2011 (Ward's Automotive Group, 2014).

Foreign Trade.—In 2013, about 38% of U.S. exports of feldspar went to Norway, 28% to Venezuela, and 18% to Canada, differing from that of 2012 when 68% of exports went to Norway, 15% to Canada, and 4% to Colombia, with most of the remainder going to Central American and other South American countries (table 5). Nearly 75% of imports of feldspar were from Turkey, 17% from Mexico, and 5% from Spain, in contrast to that of 2012 when 84% of imports of feldspar were from Mexico and 13% from Germany (table 6).

World Review.—More than 70 countries had significant resources of feldspar and more than 50 produced feldspar in 2013. Italy was the leading producer in 2013, followed by Turkey, China, India, and Thailand. Estimated world production was about 19.6 Mt (table 7).

Worldwide ceramic tile production increased by 6.4% in 2013 to 11.9 billion square meters with increases in all producing regions, and global consumption increased by 5.9% to 11.6 billion square meters (Ceramic World Web, 2014). Ceramic tile production, about 50% of which was for floor tile, increased most substantially in China, India, and non-European Union Europe (including Turkey). Asian countries consumed about 66% of the world's ceramic tile, and China, the world's leading tile producer and consumer, accounted for nearly 48% of world production and slightly more than 39% of world consumption; Brazil and India continued to be second and third, respectively, in each category. The rate of growth in tile consumption for the African continent continued to be high, up by 13.4% to 692 million square meters. Ceramic tile exports from China, the world's leading exporter, continued to increase, as did those

of Spain and Italy, the second and third leading exporting countries, respectively (Stock, 2014; Whitmire, 2014).

China.—Feldspar was mined in the eastern and southeastern Provinces of China. Ranking third globally, China produced an estimated 2.5 Mt of feldspar in 2013, which was used to produce ceramic tile, sanitaryware, and tableware. In 2013, China continued to be the world's leading producer and consumer (as well as exporter) of ceramic tile. Porcelain tile was the main type of ceramic tile produced, followed by polished and antique-style tile. The country's ceramic tile output was up 9.6% to 5.7 billion square meters, of which nearly 1.15 billion square meters were exported (Hao and Baylis, 2012; Ceramic World Web, 2014).

Greenland.—Hudson Resources Inc. progressed with work on its White Mountain anorthosite (calcium feldspar) project located in western Greenland. Cores from the 2013 drilling program confirmed the quality of anorthosite in the core samples taken in the 2012 drill program. Beneficiation tests performed on samples from the drilling project exhibited the need for minimal processing of the ore. Environmental impacts of the project are expected to be low because the project is essentially a rock quarry and dock facility, which has nearby access to shipping on the tidewater, and because the purity of the ore does not require chemicals or water for processing. Key studies required for the submission of an exploitation license application and mining permit—a bankable feasibility study, an environmental impact assessment, and a social impact assessment—were in process and planned for completion in early 2014. Three potential high-value applications for which the anorthosite was being evaluated and marketed were the high end fiberglass (E-glass) industry; filler and coating material used in paints, paper, and plastics; and alumina for aluminum smelters. (Hudson Resources Inc., 2013).

India.—According to the Indian Bureau of Mines, feldspar exports accounted for 39% of nearly 1.5 Mt of feldspar produced in fiscal year (FY) 2013, down from 47% in FY 2012 and 64% in FY 2011 (Indian Bureau of Mines, 2013, p. 14, 54; 2014, p. 15, 53).

Italy.—As the world's leading feldspar producer in 2013, Italy produced an estimated 4.7 Mt and consumed most of its output in the domestic ceramics industry (table 7). Italy exported about 261,000 t of feldspar and imported nearly 1.9 Mt, nearly 96% of which came from Turkey (United Nations Statistics Division, undated a). Ceramic tile production, Italy's leading sector of the ceramics industry and a significant consumer of feldspar, decreased slightly to 363 million square meters in 2013 from 367 million square meters in 2012. Total sales volumes for the ceramics industry increased slightly in 2013; a 5% increase in exports more than offset a decrease in domestic sales (Confindustria Ceramica, 2014).

Thailand.—According to Thailand's Department of Primary Industry and Mines (DPI&M), feldspar production in the first 9 months of 2013 was 1 Mt, following a 5.8% increase to 1.1 Mt in 2012 from 2011. Thailand exported feldspar to India, Indonesia, Malaysia, Vietnam, and the Middle East (Torisi, 2014)

Turkey.—Turkey was the world's second-leading feldspar producer with an estimated 4.5 Mt (table 7). Slightly more

than 4 Mt of its production was exported, about 44% to Italy, 21% to Spain, 10% to Russia, and nearly 4% to Poland (United Nations Statistics Division, undated a). Feldspar was mined in the southwestern part of Anatolia, mainly from the Menderes Massif. Turkey was the leading supplier of feldspar to the Middle East, accounting for most of the feldspar entering Israel, Saudi Arabia, and the United Arab Emirates.

Nepheline Syenite

Production.—No nepheline syenite was produced in the United States for ceramics, glass, or filler use. Nepheline syenite with high iron content, however, was produced in Little Rock, AR, by 3M Co., primarily for use in roofing granules for the asphalt shingle industry and also for asphalt and concrete aggregates and related products. The Little Rock facility supplied the roofing industry in the southern and southeastern United States.

Consumption.—In glass and ceramics manufacturing, nepheline syenite, like feldspar, provides alkalis that act as a flux. In glass, nepheline syenite also supplies alumina, imparting the same benefits as feldspar. Nepheline syenite also is used as a filler in adhesives, paint, plastics, and sealants, and it can be used in the production of aluminum and fertilizers.

World Review.—Nepheline syenite was produced in Brazil, Canada, China, Norway, Russia, and Turkey for feldspathic uses. The leading producing company was Belgium-based SCR-Sibelco NV, through its subsidiaries, Sibelco Europe in Norway and Unimin Corp. in Canada. Other producers included Fineton Industrial Minerals Ltd. in China and OJSC Apatit AG and UC RUSAL in Russia.

Canada.—Canada's sole nepheline syenite producer, Unimin, operated two mines at its Blue Mountain and Nephon, Ontario, deposits, about 175 kilometers northeast of Toronto. Production of marketable nepheline syenite was estimated to be about 674,000 t in 2013, up from about 586,000 t in 2012 (Natural Resources Canada, 2014). The material was consumed in the glass, ceramics, filler, and abrasives markets. Canada's nepheline syenite exports were 545,000 t in 2013, of which 491,000 t were exported to the United States (table 1; United Nations Statistics Division, undated b)

Norway.—Sibelco Europe produced nepheline syenite in the summer and autumn from an open pit mine on the Arctic island of Stjernoy. On-site processing of the ore (crushing, drying, milling, sieving, magnetic separation, and air classification) resulted in various products for the glass, ceramics, and paint industries and for desulfurization of steel. In 2013, exports of nepheline syenite from Norway were 328,000 t, most of which went to other European countries, including 30% to Poland, 21% to the Netherlands, 17% to Germany, and 11% to the United Kingdom (United Nations Statistics Division, undated b).

Russia.—From its Kiya-Shaltyr Mine on the Goryachegorsk Massif in east-central Siberia, UC RUSAL produced 4.66 Mt of nepheline syenite, a 6% decrease from 4.95 Mt produced in 2012, for use in the production of alumina. The company accounted for approximately 8% of global production of aluminum. The decrease in nepheline syenite production was

mainly owing to reduced alumina production at the Achinsk Alumina Refinery (UC RUSAL, 2014).

In 2013, phosphate producer PhosAgro AG, through its subsidiary OJSC Apatit, was Russia's only producer of nepheline concentrate. At the Apatit mining and beneficiation complex, the company mined and processed apatite-nepheline ore from its reserves at the Khibiny deposit on the Kola Peninsula in the Murmansk region of northwest Russia. The Apatit operation produced phosphate rock, nepheline concentrates, and other mineral concentrates, including nepheline syenite for the glass and ceramics industries. In 2013, nepheline concentrate production decreased by 6.3% to 991,000 t and sales decreased by 4.8%, with all sales going to Basel Cement Pikalevo. From 1929 to 2013, nearly 67 Mt of nepheline concentrate were produced at the Apatit mines (OJSC PhosAgro AG, 2014, p. 29, 42–43).

Outlook

Producers of feldspar and nepheline syenite are expected to continue facing challenges during the next several years related to excess supply and increased production and transportation costs. Higher charges for shipping feldspathic products by rail and truck likely will continue to increase delivered raw material costs to industrial consumers and could increase the cost of glass and tile. Demand for glass food containers in the United States, nonetheless, is expected to increase slightly during the next several years as a result of consumer demand and Federal Government and State government initiatives for environmentally friendly and recyclable food and beverage packaging, potentially increasing feldspar consumption by glass container manufacturers. Conversely, significant increases in glass container recycling and use of cullet could reduce the quantities of raw materials needed to manufacture these containers.

As economic conditions continue to improve in 2014 and 2015, new residential construction and commercial and residential remodeling is expected to increase, creating increased demand for ceramics, fiberglass, and glass, and thus feldspar and nepheline syenite. Domestic fiberglass consumption also is likely to continue to increase as residential and commercial construction increases.

The use of flat glass by the automobile and light truck industry in North America is expected to continue increasing during the next several years at about 2% per year, leading to increased use of raw materials such as feldspar (Murphy and Stoddard, 2013).

Following the trend of the past several years, the ceramics industry is expected to continue to recover for the next several years, which likely will also increase the use of feldspar. Domestic consumption of ceramic tile is expected to continue to increase in 2014 with continued growth in the construction industry (Whitmire, 2014). Worldwide, demand for ceramic tile is expected to be especially driven by increases in construction in the growing economies of Brazil, China, India, and Indonesia, where most ceramic tile is consumed in the residential replacement market. Although consuming much of its own output, China is likely to continue as an important exporter of

ceramic tile. Residential replacement, which typically accounts for more than one-half of the total market, is projected to be the fastest growing market for ceramic tile at an estimated annual rate of growth of more than 8% from 2012 to 2018 (PR Newswire Association LLC, 2013). A trend in recent years of innovative ideas and products in ceramics, such as thinner, stronger ceramic sheets that can be laid without removing existing tiled floors, and an increasing percentage of porcelain tile production (especially in China and India) that offers superior physical and chemical characteristics, in part owing to increased feldspar content, is likely to help strengthen use in the ceramics industry.

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TABLE 1
SALIENT FELDSPAR AND NEPHELINE SYENITE STATISTICS¹

		2009	2010	2011	2012	2013
United States:						
Production, feldspar:						
Quantity ^{e, 2, 3}	metric tons	540,000 ^r	500,000 ^r	580,000 ^r	560,000 ^r	550,000
Value ^{e, 2}	thousands	\$41,000 ^r	\$37,800 ^r	\$45,400 ^r	\$36,500 ^r	\$40,100
Exports, feldspar: ⁴						
Quantity	metric tons	7,520	16,800	17,000	13,000	17,700
Value ⁵	thousands	\$1,150	\$2,280	\$3,020	\$4,390	\$5,310
Imports for consumption ⁴						
Feldspar:						
Quantity	metric tons	2,120	2,050	1,710	1,640	4,310
Value ⁶	thousands	\$646	\$503	\$476	\$342	\$1,110
Nepheline syenite:						
Quantity	metric tons	308,000	368,000	394,000	386,000	491,000
Value ⁶	thousands	\$36,800	\$52,400	\$41,500	\$44,200	\$59,300
Consumption, apparent ^{e, 3, 7}	metric tons	840,000 ^r	850,000	960,000 ^r	930,000 ^r	1,000,000
World, production ⁸	thousand metric tons	19,200 ^r	21,300 ^r	20,600 ^r	19,800 ^r	19,600 ^c

^eEstimated. ^rRevised.

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

²Includes hand-cobbed feldspar, flotation-concentrate feldspar, feldspar in feldspar-quartz mixtures, and aplite; predominantly in the production of ceramics and glass, may differ from sales in table 4.

³Rounded to two significant digits to avoid disclosing company proprietary data.

⁴Source: U.S. Census Bureau.

⁵Free alongside ship (f.a.s.) value.

⁶Customs value.

⁷Production plus imports minus exports. Includes feldspar and imported nepheline syenite.

⁸Feldspar only.

TABLE 2
ESTIMATED FELDSPAR PRODUCTION IN THE UNITED STATES¹

(Thousand metric tons and thousand dollars)

Year	Flotation concentrate		Other ²		Total	
	Quantity	Value	Quantity	Value	Quantity	Value
2012 ^r	60	6,110	500	30,400	560	36,500
2013	30	3,310	520	36,800	550	40,100

^rRevised.

¹Quantity data are rounded to two significant digits, and value data are rounded to three significant digits; may not add to totals shown.

²Includes hand-cobbed feldspar, feldspar content of feldspar-quartz mixtures, and aplite; does not include nepheline syenite.

TABLE 3
U.S. PRODUCERS OF FELDSPAR IN 2013

Company	Location	Product
APAC-Central, Inc.	Muskogee, OK	Feldspar-quartz mixture.
G3 Enterprises Inc.	Byron, CA	Do.
Graniterock Co.	Felton, CA	Do.
I-Minerals, Inc.	Bovill, ID	Potassium feldspar-quartz-halloysite mixture.
Pacer Corp.	Custer, SD	Potassium feldspar.
Imerys Ceramics	Monticello, GA	Do.
Quartz Corp., The	Spruce Pine, NC	Sodium-potassium feldspar.
Do.	do.	Sodium-potassium feldspar; feldspar-quartz mixture.
Unimin Corp.	Emmett, ID	Feldspar-quartz mixture.
Do.	Spruce Pine, NC	Sodium-potassium feldspar.
U.S. Silica Holdings, Inc.	Montpelier, VA	Aplite.
Do., do. Ditto.		

TABLE 4
ESTIMATED FELDSPAR SOLD OR USED BY PRODUCERS IN
THE UNITED STATES, BY USE^{1,2}

(Thousand metric tons and thousand dollars)

Use	2012 ^f		2013	
	Quantity	Value	Quantity	Value
Glass ³	320	22,500	300	21,600
Ceramics/pottery and miscellaneous	240	14,600	250	18,200
Total	560	37,100 ⁴	550	39,800 ⁴

^fRevised.

¹Includes hand-cobbed feldspar, flotation-concentrate feldspar, feldspar in feldspar-quartz mixtures, and aplite.

²Quantity data are rounded to two significant digits, and value data are rounded to three significant digits; may not add to totals shown.

³Includes container glass, fiberglass, and other glass.

⁴Represents final marketable product; value is higher than that listed for production in tables 1 and 2.

TABLE 5
U.S. EXPORTS OF FELDSPAR, BY COUNTRY¹

(Metric tons and dollars)

Country	2012		2013	
	Quantity	Value ²	Quantity	Value ²
Argentina	395	47,400	42	18,000
Brazil	313	33,200	100	14,800
Canada	1,990	590,000	3,150	740,000
China	166	50,600	126	41,900
Colombia	584	109,000	1,410	300,000
Costa Rica	177	41,200	350	70,200
Italy	--	--	103	7,240
Japan	120	59,700	--	--
Nicaragua	19	2,970	210	31,700
Norway	8,860	3,330,000	6,730	3,150,000
Panama	100	27,300	181	54,800
Trinidad and Tobago	147	39,600	123	29,600
Venezuela	22	3,910	4,980	703,000
Other (6 countries)	170 ^r	53,100 ^r	244	147,000
Total	13,000	4,390,000	17,700	5,300,000

^rRevised. -- Zero.

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

²Free alongside ship value.

Source: U.S. Census Bureau.

TABLE 6
U.S. IMPORTS FOR CONSUMPTION OF FELDSPAR, BY COUNTRY OF
ORIGIN^{1,2}

(Metric tons and dollars)

Country	2012		2013	
	Quantity	Value ³	Quantity	Value ³
China	40	13,200	--	--
Germany	212	107,000	85	52,200
Mexico	1,380	214,000	725	175,000
Norway	3	7,540	--	--
Spain	--	--	226	35,000
Sweden	--	--	1	5,540
Turkey	--	--	3,230	809,000
United Kingdom	--	--	39	32,300
Total	1,640	342,000	4,310	1,110,000

-- Zero.

¹Does not include nepheline syenite (mostly from Canada), which is listed in table 1.

²Data are rounded to no more than three significant digits; may not add to totals shown.

³Customs value.

Source: U.S. Census Bureau.

TABLE 7
FELDSPAR: WORLD PRODUCTION, BY COUNTRY^{1,2}

(Metric tons)

Country and grade ³	2009	2010	2011	2012	2013 ^e
Argentina	213,551	217,213	216,721	273,896 ^r	230,000
Australia, includes nepheline syenite ^c	50,000	50,000	50,000	50,000	45,000
Brazil, processed, marketable	115,264	276,448	333,352	249,152 ^r	335,000 ^p
Bulgaria	NA ^r	NA ^r	NA ^r	NA ^r	NA
Burma ⁴	NA ^r	NA ^r	NA ^r	NA ^r	NA
Chile	9,079	7,723	7,563	6,399	3,874 ⁵
China ^c	2,000,000	2,000,000	2,100,000	2,100,000	2,500,000
Cuba ^c	4,700	2,800	3,100	3,800	3,200
Czech Republic	431,000	388,000	407,000 ^e	445,000	411,000
Ecuador	111,985	156,888	83,481	85,000 ^e	90,000
Egypt ^c	353,623 ^{r,5}	405,600 ^{r,3}	210,000 ^r	200,000 ^r	200,000
Ethiopia	750	1,500	441	500 ^{r,e}	530
Finland	23,120 ^r	28,013	26,292	43,124	47,636 ⁵
France, crude	NA ^r	NA ^r	NA ^r	NA ^r	NA
Germany ^e	201,000	203,000	218,000	205,000	205,000
Greece	55,737	23,050	10,200	12,000	12,000
Guatemala	5,762	402	2,890	19,356	19,611 ⁵
India	522,639 ^r	506,256 ^r	763,263 ^r	1,177,702 ^r	1,200,000
Iran	643,503	652,020	576,643	580,000 ^e	580,000
Italy ^c	4,700,000	4,700,000	4,700,000	4,700,000	4,700,000
Japan, includes aplite ^c	115,000	110,000	104,109 ⁵	100,000	105,000
Kenya ^c	30	30	35	35	35
Korea, Republic of	622,700	496,511	384,221	360,413	343,241 ⁵
Macedonia	19,377	23,188	25,032	17,168	15,168 ⁵
Malaysia	410,053	455,497	379,628	482,906	314,399 ⁵
Mexico	347,510	398,849	382,497	380,441	380,000
Morocco ^e	28,000	--	43,889 ⁵	45,000	45,000
Nigeria ^c	1,700	1,616 ⁵	1,700	1,700	1,700
Norway	71,000	56,000	25,000	--	--
Pakistan ⁶	46,000	102,000	107,000	53,235 ^r	38,218 ⁵
Peru	5,154	3,589	11,645	26,359	22,695 ⁵
Philippines	16,394	15,882	22,050	24,969 ^r	30,388 ⁵
Poland, run of mine ⁷	445,500	513,700	550,000 ^r	376,500 ^r	374,000
Portugal	157,476	121,827	114,600	109,273	70,057 ⁵
Romania ^{e,8}	14,000	5,500	2,500	6,500 ^r	6,800
Russia ^c	45,000	45,000	45,000	45,000	45,000
Saudia Arabia ^c	55,000	42,300	160,000	168,000 ⁵	100,000
Slovakia ^c	10,000	10,000	--	--	--
South Africa	101,394	94,307	101,559	94,458	191,443 ⁵
Spain, includes pegmatite	597,496	691,894	662,418 ^r	530,000 ^r	602,908 ⁵
Sri Lanka	73,365	75,405	53,337 ^r	55,000 ^{r,e}	57,000
Sweden, salable, crude and ground ^c	44,000	44,000	30,000	27,000	30,000
Thailand	718,692	641,900	1,041,152	1,100,619	1,100,000
Turkey	4,212,547	6,281,597	4,355,003 ^r	4,524,943 ^r	4,545,197 ⁵
United Kingdom, china stone ^e	400	500	500	--	--
United States ^{e,8,9}	540,000 ^r	500,000 ^r	580,000 ^r	560,000 ^r	550,000
Venezuela	1,059,000 ^r	925,000 ^r	1,715,000 ^r	584,000 ^r	92,000 ⁵
Total	19,200,000 ^r	21,300,000 ^r	20,600,000 ^r	19,800,000 ^r	19,600,000

^eEstimated. ^pPreliminary. ^rRevised. NA Not available. -- Zero.

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

²Includes data available through June 10, 2015.

³In addition to the countries listed, Colombia, Namibia, the United Arab Emirates, and Yemen may produce feldspar, but output is not officially reported; and available information is inadequate to make reliable estimates of output levels.

⁴Data are for fiscal year ending March 31 of the following year.

⁵Reported figure.

⁶Data are for fiscal year ending June 30 of the following year.

TABLE 7—Continued
FELDSPAR: WORLD PRODUCTION, BY COUNTRY^{1,2}

⁷The dedicated feldspar run of mine production accounts for only part of total feldspar production.

⁸Rounded to two significant digits to avoid disclosing company proprietary data.

⁹Includes hand-cobbed feldspar, flotation-concentrate feldspar, feldspar in feldspar-quartz mixtures, and aplite.