



# 2012 Minerals Yearbook

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## FELDSPAR AND NEPHELINE SYENITE

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# FELDSPAR AND NEPHELINE SYENITE

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In 2012, feldspar production in the United States was estimated to be about 520,000 metric tons (t) valued at \$35.7 million, a decrease from 590,000 t valued at \$40.5 million in 2011 (table 1). Exports of feldspar in 2012 decreased by 23% to 13,000 t valued at about \$4.4 million, and imports of feldspar decreased by about 4% to 1,640 t valued at \$342,000. Imports of nepheline syenite (predominantly from Canada) decreased slightly to 386,000 t valued at \$44.2 million. World production of feldspar was estimated to be about 18 million metric tons (Mt) (tables 1, 7).

Apparent consumption of feldspar and nepheline syenite combined was about 900,000 t, 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 feldspar-quartz mixtures from silica producers and 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, Virginia, Idaho, California, Oklahoma, Georgia, and South Dakota. North Carolina was by far the leading producer State. 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 12 mines and beneficiating facilities—3 in North Carolina, 3 in California, 2 in Idaho, and 1 in each of the 4 remaining States (table 3). Of these beneficiation facilities, four responded to the canvass, representing about one-third of the total 2012 production tonnage listed in tables 1 and 2. Production for the remaining operations was estimated using prior-year output levels supplemented with worker-hour reports from the U.S. Department of Labor's Mine Safety and Health Administration (MSHA). Production of feldspar in North Carolina decreased, in part owing to decreased production by The Quartz Corporation (TQC) [a 50-50 joint venture of Imerys SA (Paris, France) and Norsk Mineral AS]. TQC specialized in high-purity quartz production from Imerys' pegmatite resources in Spruce Pine and concentrated on increasing markets for those products while working to upgrade and expand the production and processing of associated feldspar and mica resources (Quartz Corp., The, 2011; Imerys SA, 2013, p. 208, 238).

I-Minerals Inc. announced output and sales of feldspathic sand mined from the Helmer-Bovill property in north-central Idaho.

I-Minerals began production in the latter half of September, following approval by the Idaho Department of Lands to allow mining of up to 50,000 metric tons per year (t/yr) of feldspathic sand during June through October. Following screening to remove material fines, an initial 30 t of silica-potassium feldspar product was sold to Wendt Pottery of Lewiston, ID, for further grinding, packaging, and sale to the pottery industry. I-Minerals expected to expand its sales to tile and pottery producers in 2013 (I-Minerals Inc., 2012).

**Consumption.**—The principal markets for feldspar were the ceramics and glass industries with lesser amounts used as fillers and extenders in paint, plastics, and rubber. In 2012, an estimated 55%, by tonnage, of domestic feldspar sold or used was consumed in the manufacture of glass, including glass containers, flat glass, fiberglass for home insulation, and specialty glass (table 4). In glassmaking, feldspar promotes the mixing of the melt components by fluxing (making fluid) 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. Stabilizing components in feldspar (alumina and calcium ions) impart increased resistance to physical and chemical breakdown.

Much of the remaining feldspar consumption was in the manufacture of ceramics (pottery), 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 a mixture while increasing the fusibility of the batch materials and controlling the degree of vitrification of the ceramic body during firing. The value of total feldspar sold or used as listed in table 4 is higher than the feldspar production value listed in tables 1 and 2 because table 4 values represent the final marketable feldspar products.

In 2012, increased consumption of imported ceramic tile, a drawing down of stocks of feldspar produced in 2011, decreased foreign customer demand, and the substitution of imported nepheline syenite for feldspar in ceramic tile (especially porcelain tile) and glass, contributed to decreased production and consumption of feldspar in 2012.

The sales of glass containers in North America remained stable in 2012. Nonglass containers for such products as baby food, fruit juices, mineral water, and wine and a recent trend to import less expensive containers from China continued to provide increasing competition for domestic glass container production and thus reduced domestic consumption of traditional raw materials.

The use of cullet, especially from post-consumer “bottle-to-bottle” recycling programs, increasingly competed as a substitute for primary raw materials such as feldspar, tending to

decrease the demand for them. 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).

The construction industry was a major consumer of glass and ceramic products. In the United States, construction starts for new privately owned housing increased by about 28% to nearly 781,000 units in 2012 from 609,000 units in 2011, continuing the upward trend since 2009 when housing starts were 554,000 units, but remained significantly lower than annual starts reported from at least 1959 through 2007 (U.S. Census Bureau, 2013b). The value of total (private and public) residential and commercial construction, both of which use significant quantities of flat glass and ceramic tile products, also reversed the recent downward trend, increasing by about 8.8% to \$857 billion in 2012 from \$788 billion in 2011. Total construction spending peaked at \$1.17 trillion in 2006 (U.S. Census Bureau, 2013a).

In 2012, production increased in the domestic ceramic tile and automobile industries. For the third consecutive year shipments of domestic ceramic tile rose, increasing by about 4% to 69.5 million square meters (Mm<sup>2</sup>) from 66.7 Mm<sup>2</sup> in 2011. In 2012, imports of tile, which accounted for nearly 70% of U.S. tile consumption, increased by almost 6%, mostly from (in descending order) Mexico, China, and Italy. Exports of tile in 2012 increased by less than 1% (the majority, in descending order, going to Canada, Mexico, and China) (Whitmire, 2013b). Therefore, unlike 2011 when exports exceeded imports, in 2012, imports exceeded exports. In the automobile industry, a major consumer of glass products, production and sales of automobiles and light trucks in North America each increased by about 13% in 2012. Sales of medium and heavy trucks also increased by about 13% in 2012 (Ward's Automotive Group, 2013).

**Foreign Trade.**—In 2012, 68% of U.S. exports of feldspar went to Norway, 15% to Canada, and most of the remainder to Central American and South American countries (table 5). Nearly 85% 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 2012. Italy was the leading producer, followed by Turkey, China, and Thailand. Estimated world production was unchanged at 18.3 Mt (table 7).

Ceramic tile production in the world increased by 5.4% in 2012 to 11,200 Mm<sup>2</sup> with increases in all producing regions except the European Union, where production was down by less than 1%. Ceramic tile production, about 50% of which was for floor tile, increased most substantially in China, India, and Iran. China, the world's leading producer and consumer, accounted for more than 46% of world production and nearly 39% of world consumption; Brazil and India were second and third, respectively, in each category. The largest percentage of growth in tile consumption was in Africa, up by 18.7% to 609 Mm<sup>2</sup>. Ceramic tile exports from China, the world-leading exporter, continued to increase, as did those of Spain and Iran, respectively the second and fourth leading exporting countries (Ceramic World Web, 2013).

**China.**—Feldspar was mined in the eastern and southeastern provinces of China. Ranking third globally, China produced an estimated 2.1 Mt of feldspar in 2012, which was used to produce ceramic tile, sanitaryware, and tableware. China's ceramics industry was concerned with overcapacity and excess production relative to demand, increasing production costs, and environmental controls. Porcelain tile was the main ceramic tile produced, followed by polished and antique tile. (Hao and Baylis, 2012; Ceramic World Web, 2013).

**Greenland.**—Hudson Resources Inc. initiated exploration of its 100%-owned Naajat (White Mountain) anorthosite (calcium feldspar) project located in western Greenland with nearby access to shipping on the tidewater. Beneficiation tests performed on samples from the drilling project exhibited the need for minimal processing of the ore. The company initiated baseline environmental studies for an open pit mining project. Samples of anorthosite were shipped to potential end users in Europe and North America to market this new source of feedstock for the glass industry and as filler and extender material for the plastics, paint, and paper industries (Hudson Resources Inc., 2012).

**India.**—The Board of the Indian Council of Ceramic Tiles and Sanitaryware asked the Government of India to place a ban on the export of feldspar and quartz. Demand for these minerals has increased and the Board maintained that increasing exports led to local shortages. Further depletion of these raw materials could lead domestic industries to rely increasingly on imports, thereby making tile and sanitaryware more expensive to produce and forcing manufacturers to shut down. In financial year (FY) 2012, the Indian Bureau of Mines reported that feldspar exports accounted for nearly 60% of production. In FY 2012, feldspar consumption in India increased by about 10%; 77% of consumption was by the ceramics industry, 14% by the glass industry, and the remaining 9% by the cement, refractory, abrasive, and electrode industries (Hindu Business Line, The, 2012; Indian Bureau of Mines, 2013).

**Italy.**—Italy, the world's leading feldspar producer with an estimated 4.7 Mt, consumed most of its output in the domestic ceramics industry. Italy exported about 271,000 t of feldspar, 72% to Spain, and imported nearly 2.2 Mt, nearly 82% from Turkey (United Nations Statistics Division, undated a). Ceramic tile production, Italy's ceramics industry's leading sector and a significant consumer of feldspar, decreased by 8% to about 370 Mm<sup>2</sup> in 2012 compared with output in 2011. Total sales volumes for the ceramics industry decreased by about 7% in 2012 owing to a significant decrease in domestic sales and a small decline in exports (Confindustria Ceramica, 2013).

**Turkey.**—Turkey exported about two-thirds of its production of feldspar, about 45% of those exports went to Italy, 18% to Spain, and 11% to the Russian Federation (United Nations Statistics Division, undated a). Also, Turkey was the leading supplier of feldspar to the Middle East, accounting for most of the feldspar entering the United Arab Emirates and Saudi Arabia. Feldspar was mined in Anatolia in the southwestern part of the country, mainly from the Menderes Massif.

## 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 in asphalt and concrete aggregated road materials and related products. The Little Rock facility supplied the roofing industry in the southern and southeastern United States.

**Consumption.**—In glass and ceramics manufacture, 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 producer 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 plants at its Blue Mountain and Nephton, Ontario, deposits, about 175 km northeast of Toronto. Production of marketable nepheline syenite was estimated to be about 586,000 t in 2012 (Natural Resources Canada, 2013). The material was consumed in the glass, ceramics, filler, and abrasives markets. Canada's nepheline syenite exports were 456,000 t in 2012, of which, 386,000 t were exported to the United States (United Nations Statistics Division, undated b).

**Norway.**—Sibelco Europe produced nepheline syenite in the summer and autumn from an open pit 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 2012, exports of nepheline syenite from Norway were 315,000 t, most of which went to other European countries (United Nations Statistics Division, undated b).

**Russia.**—UC RUSAL, a leading producer of aluminum, produced more than 4.9 Mt of nepheline syenite for use in the production of aluminum. The company's production was from its Kiya-Shaltyr Mine on the Goryachegorsk Massif in east-central Siberia (UC RUSAL, 2013).

In 2012, Russian phosphate producer PhosAgro AG purchased the Russian Federation's share of OJSC Apatit, increasing its stake in the company to more than 67% with future plans to purchase the remaining 33% (OJSC PhosAgro AG, 2013b). Apatit, the only Russian producer of nepheline syenite for the glass and ceramics industries, increased production by 6%, producing slightly more than 1 Mt of nepheline concentrate from the apatite complex on the Kola Peninsula in northwest Russia (OJSC PhosAgro AG, 2013a, p. 32).

## Outlook

Producers of feldspar and nepheline syenite were expected to face continuing challenges during the next several years related to excess supply and increased production and transportation costs. Higher transportation 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 modestly 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 could reduce the quantities of raw materials needed to manufacture these containers.

The slow recovery in 2012 from the economic recession of 2008–09 was expected to continue in 2013 and 2014. As economic conditions improve, 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 was expected to continue to increase during the next several years, albeit at more modest levels of 2% to 3% per year, leading to increased use of raw materials such as feldspar (Murphy and Stoddard, 2013). The production and sales of medium-weight and heavy trucks also were expected to increase but also at a slower pace than during the past few years (Ward's Automotive Group, 2013).

The ceramics industry was expected to continue its rebound of 2010–12 for the next several years, which likely will also increase the use of feldspar. Domestic consumption of ceramic tile was expected to continue to increase in 2013 (Whitmire, 2013a). Worldwide, demand for ceramic tile was expected to be especially driven by increases in construction in the emerging economies of Brazil, China, India, and Indonesia, even as globally 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 globally accounted for about 54% of the total market in 2011, was 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. Owing to continued growth in construction and infrastructure, especially in the emerging Asia Pacific economies of China, India, and Indonesia, demand for feldspar and associated raw materials may follow. The potential volatility of raw material prices and government action regarding increasing environmental problems, such as urban and suburban air and water pollution, may contribute to increasing production costs of ceramic tile and hinder growth. An increasing consumer

preference toward replacing paints, metal slabs, and marble flooring with ceramic tile may expand the ceramic tile market during the same forecast period (PR Newswire Association LLC, 2013). Innovative ideas and products in ceramics, such as thinner, stronger ceramic sheets that can be laid without removing existing tiled floors, and porcelain tile that offers superior physical and chemical characteristics, in part owing to increased feldspar content, are likely to help strengthen the ceramics industry sector.

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TABLE 1  
SALIENT FELDSPAR AND NEPHELINE SYENITE STATISTICS<sup>1</sup>

		2008	2009	2010	2011	2012
United States:						
Production, feldspar:						
Quantity <sup>e, 2, 3</sup>	metric tons	650,000	550,000	550,000 <sup>r</sup>	590,000 <sup>r</sup>	520,000
Value <sup>e, 2</sup>	thousands	\$40,000	\$35,600	\$33,400	\$40,500	\$35,700
Exports, feldspar: <sup>4</sup>						
Quantity	metric tons	14,600	7,520	16,800	17,000	13,000
Value <sup>5</sup>	thousands	\$2,390	\$1,150	\$2,280	\$3,020	\$4,390
Imports for consumption <sup>4</sup>						
Feldspar:						
Quantity	metric tons	2,030	2,120	2,050	1,710	1,640
Value <sup>6</sup>	thousands	\$646	\$646	\$503	\$476	\$342
Nepheline syenite:						
Quantity	metric tons	321,000	308,000	368,000	394,000	386,000
Value <sup>6</sup>	thousands	\$35,000	\$36,800	\$52,400	\$41,500	\$44,200
Consumption, apparent <sup>e, 3, 7</sup>	metric tons	960,000	850,000 <sup>r</sup>	850,000 <sup>r</sup>	970,000 <sup>r</sup>	900,000
World, production <sup>8</sup>	thousand metric tons	21,400 <sup>r</sup>	18,600 <sup>r</sup>	20,800 <sup>r</sup>	19,400 <sup>r</sup>	18,300 <sup>e</sup>

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

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

<sup>2</sup>Includes hand-cobbed feldspar, flotation-concentrate feldspar, feldspar in feldspar-quartz mixtures, and aplite; may differ from sales in table 4.

<sup>3</sup>Rounded to two significant digits to avoid disclosing company proprietary data.

<sup>4</sup>Source: U.S. Census Bureau.

<sup>5</sup>Free alongside ship (f.a.s.) value.

<sup>6</sup>Customs value.

<sup>7</sup>Production plus imports minus exports. Includes feldspar and imported nepheline syenite.

<sup>8</sup>Feldspar only.

TABLE 2  
ESTIMATED FELDSPAR PRODUCTION IN THE UNITED STATES<sup>1</sup>

(Thousand metric tons and thousand dollars)

Year	Flotation concentrate		Other <sup>2</sup>		Total	
	Quantity	Value	Quantity	Value	Quantity	Value
2011	220 <sup>r</sup>	16,300	370 <sup>r</sup>	24,200	590 <sup>r</sup>	40,500
2012	160	12,700	370	23,100	520	35,400

<sup>r</sup>Revised.

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

<sup>2</sup>Includes hand-cobbed feldspar, feldspar content of feldspar-quartz mixtures, and aplite; excludes nepheline syenite.

TABLE 3  
U.S. PRODUCERS OF FELDSPAR IN 2012

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.
P.W. Gillibrand Co., Inc.	Simi Valley, CA	Feldspar-quartz mixture.
Quartz Corp., The	Monticello, GA	Potassium feldspar.
Do.	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<sup>1,2</sup>

(Thousand metric tons and thousand dollars)

Use	2011		2012	
	Quantity <sup>r</sup>	Value	Quantity	Value
Glass <sup>3</sup>	322	24,700	287	21,100
Ceramics/pottery and miscellaneous	268	16,600	230	15,200
Total	590	41,300 <sup>4</sup>	520	36,300 <sup>4</sup>

<sup>r</sup>Revised.

<sup>1</sup>Includes hand-cobbed feldspar, flotation-concentrate feldspar, feldspar in feldspar-quartz mixtures, and aplite.

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

<sup>3</sup>Includes container glass, glass fiber, and other glass.

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

TABLE 5  
U.S. EXPORTS OF FELDSPAR, BY COUNTRY<sup>1,2</sup>

(Metric tons and dollars)

Country	2011		2012	
	Quantity	Value <sup>3</sup>	Quantity	Value <sup>3</sup>
Argentina	16	6,390	395	47,400
Brazil	53	35,300	313	33,200
Canada	1,800	490,000	1,990	590,000
China	93	64,300	166	50,600
Colombia	773	282,000	584	109,000
Costa Rica	38	5,830	177	41,200
Japan	389	80,400	120	59,700
Norway	13,500	1,920,000	8,860	3,330,000
Panama	20	6,080	100	27,300
Trinidad and Tobago	90	22,300	147	39,600
Other (8 countries)	259 <sup>r</sup>	111,000 <sup>r</sup>	189	56,100
Total	17,000	3,020,000	13,000	4,390,000

<sup>r</sup>Revised.

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

<sup>2</sup>Presentation of annual data is based on the quantities (gross weight) of the 10 leading countries in 2012.

<sup>3</sup>Free alongside ship value.

Source: U.S. Census Bureau.

TABLE 6  
U.S. IMPORTS FOR CONSUMPTION OF FELDSPAR, BY COUNTRY OF ORIGIN<sup>1,2</sup>

(Metric tons and dollars)

Country	2011		2012	
	Quantity	Value <sup>3</sup>	Quantity	Value <sup>3</sup>
China	30	7,370	40	13,200
Germany	393	181,000	212	107,000
Mexico	1,250	257,000	1,380	214,000
Norway	--	--	3	7,540
United Kingdom	35	30,600	--	--
Total	1,710	476,000	1,640	342,000

-- Zero.

<sup>1</sup>Excludes nepheline syenite (mostly from Canada), which is listed in table 1.

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

<sup>3</sup>Customs value.

Source: U.S. Census Bureau.



TABLE 7  
 FELDSPAR: WORLD PRODUCTION, BY COUNTRY<sup>1,2</sup>

(Metric tons)

Country and grade <sup>3</sup>	2008	2009	2010	2011	2012 <sup>e</sup>
Argentina	220,234	213,551 <sup>r</sup>	217,213	216,721 <sup>r</sup>	215,000
Australia, includes nepheline syenite <sup>c</sup>	50,000	50,000	50,000	50,000	50,000
Brazil, processed, marketable	121,952	115,264	276,448 <sup>r</sup>	333,352 <sup>r</sup>	247,152 <sup>4</sup>
Bulgaria <sup>c</sup>	90,000	80,000	80,000	80,000	80,000
Burma <sup>e,5</sup>	10,000	10,000	10,000	10,000	10,000
Chile	17,834	9,079	7,723	7,563	6,399 <sup>4</sup>
China <sup>c</sup>	2,000,000	2,000,000	2,000,000 <sup>r</sup>	2,100,000	2,100,000
Colombia	NA <sup>r</sup>	NA <sup>r</sup>	NA <sup>r</sup>	NA <sup>r</sup>	NA
Cuba	4,300	4,700	2,800	3,100 <sup>r</sup>	3,800
Czech Republic, excluding nepheline syenite	488,000	431,000	388,000	407,000	445,000 <sup>4</sup>
Ecuador	86,889 <sup>r</sup>	111,985	156,888 <sup>r</sup>	83,481 <sup>r</sup>	85,000
Egypt	168,673 <sup>r</sup>	5,953 <sup>r</sup>	3,808 <sup>r</sup>	102,114 <sup>r</sup>	4,000
Ethiopia <sup>5</sup>	520 <sup>r</sup>	750	1,500	441 <sup>r</sup>	370
Finland	45,250	2,312 <sup>r</sup>	28,013 <sup>r</sup>	26,292 <sup>r</sup>	43,124 <sup>4</sup>
France, crude <sup>c</sup>	650,000	650,000	650,000	650,000	650,000
Germany, for industrial uses <sup>c</sup>	161,416 <sup>4</sup>	201,000 <sup>r</sup>	203,000 <sup>r</sup>	218,000	205,000
Greece	62,000	55,737 <sup>r</sup>	23,050 <sup>r</sup>	10,200 <sup>r</sup>	12,000
Guatemala	45,854	5,762	402	2,890 <sup>r</sup>	19,356 <sup>4</sup>
India <sup>c</sup>	385,436 <sup>4</sup>	390,000	400,000	420,000	430,000
Iran	501,821	634,503 <sup>r</sup>	652,020 <sup>r</sup>	576,643 <sup>r</sup>	580,000
Italy <sup>c</sup>	4,700,000 <sup>r</sup>	4,700,000	4,700,000	4,700,000	4,700,000
Japan, includes aplite <sup>c</sup>	120,000 <sup>r</sup>	115,000 <sup>r</sup>	110,000 <sup>r</sup>	104,109 <sup>r,4</sup>	100,000
Jordan	2,950	--	--	--	--
Kenya <sup>c</sup>	30	30	30	35 <sup>r</sup>	35
Korea, Republic of	344,257	622,700	496,511	384,221 <sup>r</sup>	360,413 <sup>4</sup>
Macedonia	28,920	19,377	23,188	25,032	17,168 <sup>4</sup>
Malaysia	457,377	410,053 <sup>r</sup>	455,497	379,628 <sup>r</sup>	482,906 <sup>4</sup>
Mexico	445,519	347,510	398,849	382,497	380,441 <sup>4</sup>
Morocco <sup>c</sup>	28,000 <sup>r</sup>	28,000 <sup>r</sup>	-- <sup>r</sup>	43,889 <sup>r,4</sup>	45,000
Nigeria <sup>c</sup>	1,700	1,700 <sup>r</sup>	1,616 <sup>r,4</sup>	1,700 <sup>r</sup>	1,700
Norway, excluding nepheline syenite	62,000	71,000 <sup>r</sup>	56,000 <sup>r</sup>	25,000 <sup>r,e</sup>	-- <sup>4</sup>
Pakistan	28,300 <sup>r</sup>	46,000	102,000 <sup>r</sup>	107,000 <sup>r</sup>	62,000
Peru	13,333	5,154	3,589 <sup>r</sup>	11,645	26,359 <sup>4</sup>
Philippines	15,838	16,394	15,882	22,050 <sup>r</sup>	22,000
Poland, run of mine <sup>6</sup>	599,100	445,500	513,700 <sup>r</sup>	510,000 <sup>r,e</sup>	510,000
Portugal	157,539	157,476 <sup>r</sup>	121,827 <sup>r</sup>	114,600 <sup>r</sup>	109,273 <sup>4</sup>
Romania <sup>e,7</sup>	25,000	14,000	5,500 <sup>r</sup>	2,500 <sup>r</sup>	6,000
Russia, excluding nepheline syenite <sup>c</sup>	45,000	45,000	45,000	45,000	45,000
Saudia Arabia <sup>c</sup>	55,000 <sup>r</sup>	55,000 <sup>r</sup>	42,300	160,000 <sup>r,4</sup>	168,000 <sup>4</sup>
Serbia	-- <sup>r</sup>	-- <sup>r</sup>	-- <sup>r</sup>	-- <sup>r</sup>	--
Slovakia <sup>c</sup>	10,000 <sup>r,4</sup>	10,000 <sup>r</sup>	10,000 <sup>r</sup>	-- <sup>r</sup>	--
South Africa	105,815	101,394	94,307	101,559 <sup>r</sup>	94,458 <sup>4</sup>
Spain, includes pegmatite	690,256	597,496 <sup>r</sup>	691,894 <sup>r</sup>	580,000 <sup>r,e</sup>	580,000
Sri Lanka	32,586	73,365	75,405	70,000 <sup>e</sup>	72,000
Sweden, salable, crude and ground <sup>c</sup>	42,000	44,000 <sup>r</sup>	44,000 <sup>r</sup>	30,000 <sup>r</sup>	27,000
Thailand	670,618	718,692 <sup>r</sup>	641,900 <sup>r</sup>	1,041,152 <sup>r</sup>	1,100,619 <sup>4</sup>
Turkey, run of mine	6,767,500	4,212,547	6,281,597	4,477,993 <sup>r</sup>	3,500,000
United Kingdom, china stone <sup>c</sup>	500 <sup>r</sup>	400 <sup>r</sup>	500 <sup>r</sup>	500 <sup>r</sup>	--
United States <sup>e,7,8</sup>	650,000	550,000	550,000 <sup>r</sup>	590,000 <sup>r</sup>	520,000
Uruguay	-- <sup>r</sup>	-- <sup>r</sup>	-- <sup>r</sup>	-- <sup>r</sup>	--
Uzbekistan	NA <sup>r</sup>	NA <sup>r</sup>	NA <sup>r</sup>	NA <sup>r</sup>	NA
Venezuela <sup>c</sup>	200,000	200,000	200,000	170,000 <sup>r</sup>	170,000
Total	21,400,000 <sup>r</sup>	18,600,000 <sup>r</sup>	20,800,000 <sup>r</sup>	19,400,000 <sup>r</sup>	18,300,000

<sup>e</sup>Estimated. <sup>r</sup>Revised. NA Not available. -- Zero.

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

<sup>2</sup>Table includes data available through August 20, 2014.

TABLE 7—Continued  
FELDSPAR: WORLD PRODUCTION, BY COUNTRY<sup>1,2</sup>

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

<sup>4</sup>Reported figure.

<sup>5</sup>Data are for fiscal year ending July 7 of the following year.

<sup>6</sup>The dedicated feldspar run-of-mine production accounts for only part of total feldspar production.

<sup>7</sup>Rounded to two significant digits to avoid disclosing company proprietary data.

<sup>8</sup>Includes hand-cobbed feldspar, flotation-concentrate feldspar, feldspar in feldspar-quartz mixtures, and aplite.