



2011 Minerals Yearbook

FELDSPAR AND NEPHELINE SYENITE [ADVANCE RELEASE]

FELDSPAR AND NEPHELINE SYENITE

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In 2011, feldspar production in the United States was estimated to be nearly 650,000 metric tons (t) valued at \$40.5 million, an increase from 550,000 t valued at \$33.4 million in 2010, based upon a combination of reported and estimated U.S. Geological Survey (USGS) data. Exports of feldspar in 2011 increased slightly to 17,000 t valued at about \$3 million, and imports of feldspar decreased by about 17% to 1,710 t valued at \$476,000. Imports of nepheline syenite (predominantly from Canada) increased by 7% to 394,000 t valued at \$41.5 million. World production of feldspar was estimated to be about 21 million metric tons (Mt) (tables 1, 7).

Apparent consumption of feldspar and imported nepheline syenite combined was 1.0 Mt, primarily for use in the glass and ceramics industries and also as fillers in various products such as paints and coatings. Data on feldspar include silica producers that produce feldspar-quartz mixtures and one U.S. producer of aplite, a rock in which quartz and feldspar are the dominant minerals. Because domestic nepheline syenite production was consumed for use as roofing granules and in other construction applications (such as, excluding ceramics, glass, and filler applications) the data were not included in this chapter. Trade data in this report are from the U.S. Census Bureau.

Feldspar

Production.—Feldspar was mined in seven States. These were, in descending order of estimated output, North Carolina, Virginia, California, Idaho, Oklahoma, Georgia, and South Dakota. North Carolina was by far the lead producing State. Data on domestic production and sales and use of feldspar in this report are based upon data collected by the USGS by means of a voluntary survey. Seven companies mined and processed feldspar from 11 mines and beneficiating facilities—3 in North Carolina, 3 in California, and 1 in each of the 5 remaining States (table 3). Of these beneficiating facilities, eight responded to the canvass, representing about 70% of the total 2011 production tonnage listed in tables 1 and 2. Production for the remaining operations was estimated using prior-year output levels.

Consumption.—The principle markets for feldspar were glass, ceramics, and less so as fillers and extenders in paint, plastics, and rubber. In 2011, of the domestic feldspar sold or used, an estimated 55% by tonnage was used in the manufacture of glass, including glass containers, flat glass, fiberglass for home insulation, and specialty glass (table 4). In glassmaking, feldspar fluxes the system—lowering the melting temperature and helping promote mixing of the melt components.

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, the alkalis (calcium, potassium, and sodium ions) in feldspar acts as a flux, working with soda ash to lower the

melting temperature of a mixture, as in glassmaking. The value of total feldspar sold or used listed in table 4 is higher than the feldspar production value listed in tables 1 and 2 because table 4 values represent the final marketed feldspar products.

The glass container industry in North America remained stable in 2011 with regard to sales, although some 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, provided increasing competition for domestic glass, and thus with its traditional raw materials.

The use of cullet, especially from post-consumer “bottle-to-bottle” recycling programs, also competed with and tended to slow the demand for traditional raw materials such as feldspar. 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 4% to 609,000 units in 2011 from 587,000 units in 2010, higher than the 554,000 units in 2009, but remaining significantly lower than the 906,000 units started in 2008. Completions of privately owned housing decreased by about 10% to 585,000 units in 2011, down from 652,000 units in 2010, 794,000 units in 2009, and 1.12 million units in 2008 (U.S. Census Bureau, 2012b). The value of all (private and public) residential and commercial construction, both of which use significant quantities of flat glass and ceramic tile products, continued to trend downward, decreasing to \$778 billion in 2011 from \$805 billion in 2010. Total construction spending peaked at \$1.17 trillion in 2006 (U.S. Census Bureau, 2012a). In 2011, for the third consecutive year, shipments of domestic tile rose, increasing 4% to 62.5 million square meters (Mm²), the highest since 64.6 Mm² were shipped in 2004. Imports of ceramic tile, which comprised 69% of U.S. tile consumption, increased slightly, mostly from (in descending order) Mexico, China, and Italy. Exports increased by 7.7%, the majority going to Canada, China, and Mexico (Whitmire, 2012).

In March, Imerys SA (Paris, France) and Norsk Mineral AS, in a 50-50 joint venture, formed The Quartz Corp. (TQC), a new feldspar, mica, quartz company, combining Imerys’ KT Feldspar Corp. (Spruce Pine, NC) and The Feldspar Corp. (Spruce Pine, NC and Monticello, GA) with Norsk Mineral’s Norwegian Crystallites into one company. TQC planned to focus on increasing markets for and development of high purity quartz products from Imerys’ pegmatite resources in Spruce Pine using Norwegian Crystallites’ processing capabilities and to upgrade and expand the production and processing of the associated feldspar and mica resources (Quartz Corp., The, 2011).

World Review.—Feldspar was produced in more than 50 countries, with significant resources of feldspar occurring in at least 70 countries. Turkey was the leading producer, followed by Italy, and China. World production increased by an estimated 1.1 Mt to 21.2 Mt (table 7).

Ceramic tile production increased in the world's leading producing and consuming countries of China, Brazil, India, and Iran. Ceramic tile exports from the world leading exporter, China, continued to increase, as did those of the other three. In Brazil and India, increased construction continued, resulting in increased domestic sales of ceramic tiles; all four countries' ceramic industries were significantly more dependent on domestic consumption than exports (Feytis, 2011).

China.—Feldspar, used in the manufacture of China's ceramic products, was mined in the country's eastern and southeastern provinces. As the world's third-ranked producer of feldspar with 2.1 Mt of production in 2011, China remained the world's leading producer, consumer, and exporter of ceramic tiles, sanitaryware, and tableware, producing an estimated 9 billion square meters of ceramic tile, more than 200 million pieces of sanitaryware, and 30 billion pieces of tableware. Of concern to China's ceramic industry were overcapacity and excess production relative to demand, rising production costs, and environmental controls. Porcelain tile was the main ceramic tile produced, followed by polished and antique (Hao and Baylis, 2012).

Greece.—Feldspar, typically sodium feldspar from pegmatites, is mined mostly in the northeastern part of the country. About 23,000 metric tons per year (t/yr) is produced for use in sanitaryware and glassware for domestic use and export. The Greek ceramic industries, particularly for floor and wall tiles and sanitaryware, consume about 40,000 t/yr of feldspar. Imports were from the European Union, mainly from Turkey.

Mevior Co. SA (majority owned by Ankerpoort, a subsidiary of the Sibelco Group) mined feldspar from pegmatite deposits in the area of Karteres Thessaloniki. About one-half of Mevoir's production supplied domestic industries; the remainder was exported to Italy, the Czech Republic, and Germany. Filceram Johnson Co. SA mined feldspar in Platanochori Chalkidiki and consumes 30,000 t/yr of coarse-grained (0–6 millimeters) material for floor and wall tiles. The company suspended operations at yearend, likely for financial reasons (Tsirambides and Filippidis, 2012).

India.—In financial year 2011, 472,000 t of feldspar was produced, 5% less than in 2010 owing to temporary closures at some mines. The States of Rajasthan and Andhra Pradesh led production with 51% and 44% of total production, respectively. Nine mines produce more than 10,000 t/yr each, accounting for about two-thirds of total production. Feldspar consumption in India was 405,000 t; 84% was consumed by the ceramics industry, 13% by the glass industry, and the remaining 3% by the cement, refractory, abrasive, and electrode industries (Indian Bureau of Mines, 2012).

Italy.—Ranking second in the world in feldspar production at 4.7 Mt, most of Italy's output was used in the country's ceramics industry. Italy exported about 290,000 t of feldspar and imported nearly 2 Mt, more than 1.8 Mt of which was from Turkey (United Nations Statistics Division, undated a). Ceramic

tile production, the Italian ceramic industry's leading sector and a significant consumer of feldspar, increased by 3% to nearly 400 Mm² of tiles in 2011 compared with output in 2010. Total sales volumes increased slightly in 2011 owing mainly to a 3% increase in exports, but domestic sales decreased by 7% (Ceramics of Italy, 2012).

Norway.—Nordic Mining ASA and the Norwegian Institute of Energy Technology (NIET), in a joint project, successfully produced high grade alumina by acid leaching anorthosite, a rock composed mostly of plagioclase feldspar and rarely utilized as an alumina source. Work continued to make the process economically viable. In theory, 1 Mt of anorthosite can yield about 300,000 t of alumina. Precipitated calcium carbonate is a byproduct of the process. The joint venture was working on the development of anorthosite powder products for applications in glass, ceramics, and fillers. Nordic's subsidiary Gudvangen Stein AS produces 200,000 t/yr of anorthosite for road building aggregate and as an alumina source feedstock in the production of mineral wool for manufacturing building insulation products (Roberts and Elliot, 2011).

Turkey.—Turkey exported nearly 4 Mt of its production of feldspar; about two-thirds of the exports went to Italy and Spain (United Nations Statistics Division, undated a). Feldspar was mined in the southeastern part of the country, mainly from the Menderes massif.

Nepheline Syenite

Production.—No nepheline syenite was produced in the United States for ceramic, glass, or filler use. Nepheline syenite with high iron content, however, was produced in Arkansas for use in roofing granules, road materials, asphalt and concrete aggregate, and related products.

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 is produced in Brazil, Canada, China, Norway, Russia, and Turkey for feldspathic uses. The leading producer is Sibelco, based in Antwerp, Belgium, via its subsidiaries Sibelco Nordic in Norway and Unimin Ltd., in Ontario, Canada. Other producers included Fineton Co. Ltd., based in China, and OJSC Apatit and United Company Rusal, in Russia.

Canada.—Canada's sole nepheline syenite producer, Unimin Canada, Ltd., operated two plants at its Blue Mountain and Nephon, Ontario, deposits, about 175 kilometers northeast of Toronto. Production of marketable nepheline syenite was estimated to be about 610,000 t in 2011 (Natural Resources Canada, 2012). The material was consumed in glass, ceramics, filler, and abrasives markets. Total Canadian nepheline syenite exports were 463,000 t in 2011, 394,000 t of which went to the United States (United Nations Statistics Division, undated b).

China.—Hong Kong-based Fineton Industrial Minerals Ltd. produced nepheline syenite at its plant in Anyang, Henan Province, to supply the ceramics, glass, and paint filler markets in China and other Asian markets. The company planned to

construct a new 50,000-t/yr nepheline syenite plant in southern China at its deposit in northern Quangdong Province (Industrial Minerals, 2010).

Norway.—Sibelco Nordic produces nepheline syenite during the summer and autumn from an open pit on the Arctic Island of Stjernoy. Processing of the ore, including crushing, drying, milling, sieving, magnetic separation, and air classification, produces different products for the glass, ceramic, and paint industries, and for desulfurization of steel. In 2011, total nepheline syenite exports from Norway were 334,000 t, with Poland receiving about 96,000 t; the Netherlands, 73,400 t; Germany, 52,700 t; the United Kingdom, 34,600 t; Spain, 20,700 t; France, 20,600 t; and Portugal, 11,600 t; and the remainder to several other countries (United Nations Statistics Division, undated b).

Russia.—UC Rusal, a leading producer of aluminum, produced about 4.6 Mt of nepheline syenite for use in the production of aluminum. UC Rusal's production was from its Kiya-Shaltyr Mine on the Goryachegorsk Massif in east-central Siberia (UC Rusal, 2012). In 2011, the Russian phosphate producer CJSC PhosAgro AG, which owned a majority interest in OJSC Apatit, the only Russian producer of nepheline syenite for the glass and ceramics industries, produced 1 Mt of nepheline concentrate from the apatite complex operation on the Kola Peninsula in northwestern Russia (OJSC PhosAgro AG, 2012).

Outlook

Producers of feldspar and nepheline syenite were expected to face continuing challenges in 2011 and into the future related to excess supply and increased production costs. Higher transportation charges for shipping feldspathic products by rail and truck in 2012 likely will continue to increase delivered raw material costs to industrial consumers.

U.S. glass food container demand is expected to rise modestly during the next several years, increasing feldspar consumption by glass container manufacturers. The use of glass containers in the United States may increase in the future as a result of consumer demand and Federal Government and State government initiatives for environmentally friendly and recyclable food and beverage packaging. Increases in glass container recycling, however, could reduce the quantities of raw materials needed to manufacture these containers.

The use of flat glass by the automobile industry was expected to continue to increase with increased production and sales of automobiles. Production and sales of automobiles and light trucks in North America, which rose by about 11% each in 2011 from the levels of 2010, were expected to continue to increase through 2014 leading to increased use of raw materials such as feldspar. The production and sales for medium and heavy trucks also were expected to increase, but at a slower pace (Ward's Automotive Group, 2012). As economic conditions improve, new residential construction and commercial and residential remodeling is expected to increase in 2012 and 2013, creating increased demand for glass and ceramics and thus feldspar.

Globally, ceramics industry growth significantly slowed during the 2008–09 recession, and with it, the use of feldspar. It is anticipated that the ceramic industry will continue its

relatively slow rebound of 2010–11 in the next several years. The main centers of ceramic production are China, India, Italy, Latin America, and Southeast Asia. Although consuming much of its own output, China is likely to continue as an important exporter of ceramic tile. Owing to continued recovery in the construction sector, demand for feldspar and associated raw materials is likely to follow. Innovative ideas and products in ceramics, such as thinner, stronger ceramic sheets that can be laid without need for removal of existing tiled floors, and porcelain tiles that offer superior physical and chemical characteristics, in part owing to increased feldspar content, are likely to help strengthen that sector. The main growth in feldspar demand is expected to be in Southeast Asia, China, Eastern Europe, India, and South America.

Fiberglass consumption in the United States is forecast to increase as residential and commercial construction increases and be driven by efforts to reduce costs and broaden markets, with best growth prospects anticipated for glass wool fiber.

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TABLE 1
SALIENT FELDSPAR AND NEPHELINE SYENITE STATISTICS¹

		2007	2008	2009	2010	2011
United States:						
Produced, feldspar:						
Quantity ^{e, 2, 3}	metric tons	730,000	650,000	550,000	550,000	650,000
Value ^{e, 2}	thousands	\$43,800	\$40,000	\$35,600	\$33,400 ^r	\$40,500
Exports, feldspar:⁴						
Quantity	metric tons	9,980	14,600	7,520	16,800	17,000
Value ⁵	thousands	\$1,950	\$2,390	\$1,150	\$2,280	\$3,020
Imports for consumption⁴						
Feldspar:						
Quantity	metric tons	3,570	2,030	2,120	2,050	1,710
Value ⁶	thousands	\$642	\$646	\$646	\$503	\$476
Nepheline syenite:						
Quantity	metric tons	391,000	321,000	308,000	368,000	394,000
Value ⁶	thousands	\$38,900	\$35,000	\$36,800	\$52,400	\$41,500
Consumption, apparent ^{e, 7}	thousand metric tons	1,120	958 ^r	856	900 ^r	1,030
World, production ⁸	do.	21,600 ^r	22,800 ^r	19,600	21,300 ^r	21,200 ^e

^eEstimated. ^rRevised. do. Ditto.

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

²Includes hand-cobbed feldspar, flotation-concentrate feldspar, feldspar in feldspar-quartz mixtures, and aplite; 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 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
2010	160 ^r	10,300 ^r	390 ^r	23,100 ^r	550	33,400 ^r
2011	240	16,300	410	24,200	650	40,500

^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; excludes nepheline syenite.

TABLE 3
U.S. PRODUCERS OF FELDSPAR IN 2011

Company	Location	Product
APAC-Arkansas, Inc.	Muskogee, OK	Feldspar-quartz mixture.
Graniterock Co.	Felton, CA	Do.
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.	Byron, CA	Feldspar-quartz mixture.
Do.	Emmett, ID	Do.
Do.	Spruce Pine, NC	Sodium-potassium feldspar.
U.S. Silica Co.	Montpelier, VA	Aplite.
Do., do. Ditto.		

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

(Thousand metric tons and thousand dollars)

Use	2010		2011	
	Quantity	Value	Quantity	Value
Glass ³	340	21,400 ^r	350	24,700
Ceramics/pottery and miscellaneous	210	12,000	300	16,600
Total	550	33,500 ^{r,4}	650	41,300 ⁴

^rRevised.

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, glass fiber, 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 COUNTRY^{1,2}

(Metric tons and dollars)

Country	2010		2011	
	Quantity	Value ³	Quantity	Value ³
Brazil	134	35,100	53	35,300
Canada	1,260	356,000	1,800	490,000
China	151	82,500	93	64,300
Colombia	1,100	354,000	773	282,000
Costa Rica	96	14,300	38	5,830
Ecuador	1,330	221,000	18	5,130
French Polynesia	2	6,300	16	18,900
Hong Kong	113	12,000	--	--
India	--	--	148	48,600
Japan	17	20,900	389	80,400
Mexico	--	--	37	27,500
Norway	10,200	855,000	13,500	1,920,000
Russia	2,130	226,000	--	--
Trinidad and Tobago	179	52,200	90	22,300
Other (21 countries)	74 ^r	41,500 ^r	76	23,700
Total	16,800	2,280,000	17,000	3,020,000

^rRevised. -- Zero.

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

²Presentation of annual data is based on the quantities (gross weight) of the 10 leading countries in 2010 and 2011.

³Free alongside ship value.

Source: U.S. Census Bureau.

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

(Metric tons and dollars)

Country	2010		2011	
	Quantity	Value ³	Quantity	Value ³
China	--	--	30	7,370
Germany	516	201,000	393	181,000
Mexico	1,530	302,000	1,250	257,000
United Kingdom	--	--	35	30,600
Total	2,050	503,000	1,710	476,000

-- Zero.

¹Excludes 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	2007	2008	2009	2010	2011 ^c
Argentina	291,562	220,234	213,671	217,213 ^r	215,000
Australia, includes nepheline syenite ^c	50,000	50,000	50,000	50,000	50,000
Brazil, processed, marketable	166,089	121,952	115,264	115,300	115,000
Bulgaria ^c	90,000	90,000	80,000	80,000	80,000
Chile	6,704	17,834	9,079	7,723 ^r	7,563 ⁴
China ^c	2,000,000	2,000,000	2,000,000	2,100,000	2,100,000
Colombia ^c	91,000	86,000	85,000	85,000	85,000
Cuba ^c	5,600	4,300	4,700	2,800 ^r	3,000
Czech Republic	514,000	488,000	431,000	388,000	407,000
Ecuador	63,557 ^r	24,799 ^r	111,985 ^r	86,085 ^r	80,000
Egypt	135,290	407,320	353,623	406,000 ^r	406,000
Ethiopia ^c	459	424	750 ^{r,4}	1,500 ^{r,4}	1,500
Finland	48,890	45,250	45,000	45,000	45,000
France, crude ^c	650,000	650,000	650,000	650,000	650,000
Germany	171,303	161,416	106,837	204,000 ^{r,c}	218,000
Greece ^c	95,000	62,000 ⁴	28,617 ⁴	30,000	30,000
Guatemala	30,234	45,854	5,762	402 ^r	1,000
India ^c	486,472 ⁴	385,436 ⁴	390,000	400,000	420,000
Iran ^c	512,261 ⁴	501,821 ⁴	500,000	500,000	500,000
Italy ^c	4,200,000	4,727,000 ⁴	4,700,000	4,700,000	4,700,000
Japan, includes aplite ^c	750,000	700,000	700,000	650,000	650,000
Jordan	9,800	2,950	--	--	--
Kenya ^c	30	30	30	30	30
Korea, Republic of	398,513	344,257	622,700	496,511 ^r	500,000
Macedonia	32,814	28,920	19,377	23,188 ^r	25,032 ⁴
Malaysia	358,775	457,377	356,620	455,497 ^r	400,000
Mexico	438,696	445,519	347,510	398,849	382,497 ⁴
Morocco ^c	20,000	20,000	20,000	20,000	20,000
Nigeria ^c	1,700	1,700	13,631 ⁴	10,000	10,000
Norway ^c	65,000	62,000 ⁴	48,000	48,000	48,000
Pakistan	13,236	28,500 ^r	46,000 ^r	40,000 ^r	35,000
Peru	15,450	13,333	5,154 ^r	5,006 ^r	11,645 ⁴
Philippines	14,837	15,838	16,394	15,882 ^r	16,000
Poland, run of mine ⁵	497,900	599,100	445,500	450,000 ^c	450,000
Portugal	168,606	157,539 ^r	151,976 ^r	113,327 ^r	113,000 ^p
Romania ^{c,6}	45,000	25,000	14,000	15,000	15,000
Russia ^c	45,000	45,000	45,000	45,000	45,000
Saudi Arabia	73,000	550,000	550,000 ^{r,c}	42,300 ^r	50,000
Serbia ^c	3,500	3,500	3,500	3,500	3,500
Slovakia ^c	5,000	5,000	13,000 ⁴	13,000	12,000
South Africa	79,578 ^r	105,815	101,394	94,307 ^r	95,000
Spain, includes pegmatite ^c	683,134 ^{r,4}	690,256 ^{r,4}	550,000	580,000 ^r	590,000 ^p
Sri Lanka	28,866	32,586	73,365 ^r	75,405 ^r	70,000
Sweden, salable, crude and ground ^c	42,000	42,000	42,000	42,000	42,000
Thailand ^c	684,668 ⁴	670,618 ⁴	600,000	600,000	600,000
Turkey	6,548,796	6,767,500	4,212,547	6,281,597 ^r	6,000,000
United Kingdom, china stone ^c	2,000	1,000	1,000	1,000	1,000
United States ^{c,6}	730,000	650,000	550,000	550,000	650,000 ⁴
Uruguay ^c	2,500	2,500	2,500	2,500	2,500
Uzbekistan ^c	4,300	4,300	4,300	4,300	4,300
Venezuela ^c	200,000	200,000	200,000	200,000	200,000
Total	21,600,000 ^r	22,800,000 ^r	19,600,000	21,300,000 ^r	21,200,000

^cEstimated. ^pPreliminary. ^rRevised. -- Zero.

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

²Table includes data available through August 10, 2012.

³In addition to the countries listed, 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.

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

⁴Reported figure.

⁵The dedicated feldspar run of mine production accounts for only part of total feldspar production.

⁶Rounded to two significant digits to avoid disclosing company proprietary data.