In 2016, the bulk of fluorspar consumed in the United States was from imports. Although not included in fluorspar production or consumption calculations, byproduct fluoroaluminate (FSA) from some aluminum production, byproduct hydrofluoric acid (HF) from the U.S. Department of Energy’s (DOE’s) conversion of depleted uranium hexafluoride (DUF6), and small amounts of byproduct synthetic fluorspar produced from industrial waste streams supplemented fluorspar as a domestic source of fluorspar. Apparent consumption was 371,000 metric tons (t), a decrease of 10% from 411,000 t in 2015 (table 1). Estimated world production decreased by 3% to 5.93 million metric tons (Mt).

Fluorspar is the commercial name that refers to crude or beneficiated material mined and (or) milled from the mineral fluotite (calcium fluoride, CaF2). Most of the fluorspar consumed and traded is either acid grade (also called acidspars), which is more than 97% CaF2, or subacidic grade (including ceramic and metallurgical grade), which is less than or equal to 97% CaF2 and is commonly called metspar.

Globally, there are three leading fluorspar-consuming industries. The manufacture of HF, the leading source of fluorine in industrial applications and a precursor in the production of most other fluorine-containing chemicals, accounts for approximately 40% of global annual fluorspar consumption. The manufacture of aluminum fluoride (AlF3) and cryolite (Na3AlF6), essential for primary aluminum smelting, accounts for approximately 18% of global annual fluorspar consumption. Both of these applications typically require acid-grade fluorspar, although FSA can also be used to produce AlF3. Fluorspar used as a steelmaking flux accounts for approximately 34% of global consumption. Metallurgical-grade fluorspar is primarily used in this application, although acid-grade material can also be used (Roskill Information Services Ltd., 2013, p. 151). Other applications of fluorspar include use in the manufacture of cement, ceramics, enamel, glass, and welding rod coatings.

**Legislation and Government Programs**

The Frank R. Lautenberg Chemical Safety for the 21st Century Act was signed into law on June 22, 2016. The law amends the Toxic Substances Control Act of 1976, the Nation’s primary chemicals management law. By law, all new and existing chemicals are subject to a safety review by the U.S. Environmental Protection Agency (EPA). Following this preliminary review, the EPA may further prioritize potentially harmful chemicals for a full, risk-based assessment. The law empowers the EPA to request information necessary to support these evaluations, seeks to make that information more transparent and publicly available while preserving the confidentiality of business information, establishes clear and enforceable timelines for the review of chemicals and action on identified risks, and provides mechanisms for funding the EPA’s activities under the new law. Existing State laws remain in effect, but States are precluded from placing new restrictions on chemicals regulated by the EPA (Grace, 2016; U.S. Environmental Protection Agency, undated d).

A new amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer was adopted in Kigali, Rwanda, on October 15, 2016. The goal of the amendment is to reduce the production and consumption of hydrofluorocarbon gases (HFCs) by 80% over the next 30 years to reduce greenhouse gas emissions. Hydrofluorocarbon gases have a global warming potential (GWP) that is typically hundreds to thousands of times more potent than carbon dioxide and are commonly used as aerosols, refrigerant gases, and solvents, and in fire protection systems and foam insulation products. Hydrofluorocarbon gases are the fastest growing greenhouse gases, increasing approximately 10% each year, driven largely by demand for air-conditioning and refrigeration in developing countries. Developed countries are slated to begin phasing down consumption by 2019 with an eventual consumption freeze in 2024. Developing countries and certain countries with hotter climates are subject to a less aggressive schedule. Initiatives under the amendment are expected to reduce projected global warming by as much as 0.5 degree Celsius by the end of the century (United Nations Environment Programme, 2016; U.S. Environmental Protection Agency, undated c).

The EPA issued Final Rule 21 under the Clean Air Act’s (CAA’s) section 612, the Significant New Alternatives Policy Program. The rule lists as unacceptable, or narrows the use of, numerous commonly used HFCs in new centrifugal and displacement chillers, new cold storage warehouses, household freezers and refrigerators, and retail food refrigeration. The use of HFCs in many foam-blowing applications were listed as unacceptable or limited, including a prohibition on the import of materials such as foam insulation boards or foam appliance panels manufactured using HFCs listed as unacceptable. The rule approved the use of a hydrofluoroolefin (HFO), HFO-1234yf, for use in refrigeration systems in newly manufactured medium-duty passenger vehicles, heavy-duty pickup trucks, and complete heavy-duty vans, and in the use of 2-bromo-3,3,3-trifluoropropene in total flooding and streaming fire suppression systems in aircraft. The EPA also approved the use of propane in refrigeration for applications including new self-contained commercial ice machines, new water coolers, and new, very low temperature refrigeration equipment. Propane in these end uses was excluded from venting prohibitions under section 608 of the CAA (U.S. Environmental Protection Agency, 2016d).

Per- and polyfluoroalkyl substances (PFAS) are a class of fluorinated chemicals with a wide range of uses. Per- and polyfluoroalkyl substances are commonly used to make products resistant to grease, oil, and water and have been used in firefighting foams and as a processing aid in the manufacture of certain materials such as foam insulation boards or foam appliance panels manufactured using HFCs listed as unacceptable.

**Domestic survey data and tables were prepared by Samir Hakim, statistical assistant.**
of fluoropolymers. The substances, particularly long-chain PFAS (PFAS molecules containing eight or more carbon atoms, which are sometimes referred to as C-8), have come under scrutiny in the past 10 to 15 years, owing to their environmental persistence, widespread geographic distribution, and prevalence in the bloodstream of 99% of the U.S. population. Per- and polyfluoroalkyl substances can enter the environment directly or through the degradation of other fluorinated telomers.

Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) are two PFAS that have received the most attention. Human studies examined possible links between elevated blood levels of PFOA and PFOS and numerous adverse health conditions. Perfluorooctane sulfonate was voluntarily phased out of production by 2002, and the EPA's voluntary 2010/2015 PFOA Stewardship Program has likely reduced or eliminated the manufacture and import of PFOA and other long-chain PFAS. Although the presence of PFOA and PFOS in blood levels remained widespread, the levels are thought to have decreased (U.S. Environmental Protection Agency, undated a, b). However, numerous communities and States across the Nation have identified localized areas with PFOA and PFOS contamination, particularly those near industrial sites where the chemicals were manufactured or used at airfields in firefighting foams (Morrison, 2016).

In May, the EPA issued drinking water health advisories for both PFOA and PFOS. Although a separate advisory was issued for each chemical, the EPA established, to maximize protection of the most Americans over the course of an individual lifetime, that the combined level of PFOA and PFOS should be no more than 70 parts per trillion (ppt). If water sampling confirms that the combined level of PFOA and PFOS exceeds 70 ppt, the EPA recommends that water system operators undertake additional action to address the contamination, including additional sampling to determine the scope and source of contamination; notification of the primary State water safety agency; and notifying water consumers on the level of contamination, possible health effects, and information on the actions being taken to address the contamination. The EPA's health advisories are non-regulatory, non-enforceable, and primarily intended to provide State agencies, public health officials, and local water operators technical information on health effects, analytical methodologies, and treatment technologies associated with drinking water contamination (U.S. Environmental Protection Agency, 2016a, b, c).

In December, the Vermont Legislative Committee on Administrative Rules permanently set a limit of 20 ppt on PFOA and PFOS concentrations in drinking water (Weiss-Tisman, 2016). The State used an emergency rule to enact a temporary limit after several wells in Bennington County tested positive for contaminants in February.

The U.S. Air Force awarded a contract to replace the firefighting foam known as aqueous film forming foam (AFFF) in fire vehicles. Aqueous film forming foam is particularly effective at extinguishing highly flammable liquid fuel fires and is commonly used at industrial, commercial, and military aviation facilities. Aqueous film forming foam used by the military and in most civilian applications contains fluorinated surfactants. To reduce possible environmental contamination, the new generation of AFFF contains fluorinated surfactants with a six carbon chain structure. A second contract was awarded to retrofit all aircraft rescue and firefighting vehicles with specialized equipment that allows firefighters to conduct fire vehicle operational checks and required annual foam tests without discharging any AFFF into the environment. Future use of AFFF is to be restricted to emergency use. Foam residue is to be treated as hazardous waste and removed and destroyed (U.S. Air Force, 2016). In 2016, the U.S. Department of Defense was in the process of conducting environmental sampling at over 600 sites nationwide where the military had conducted fire or crash training (Mcdermott, 2016).

The U.S. Food and Drug Administration (FDA) revoked two food additive regulations that permitted the use of five long-chain PFASs in grease-repellent food packaging. The substances had been used in the coatings on paper food-packaging such as microwaveable popcorn bags, pet-food bags, pizza or other ‘to-go’ boxes, and other fast-food wrappers to prevent grease and oil leakage. Following a safety review, food-paper manufacturers voluntarily agreed to discontinue distribution of products containing these chemicals in 2011; however, existing supplies were allowed to be used. Although food-paper manufacturers had likely discontinued use of the long-chain PFAS, the FDA, in response to a petition filed by numerous environmental groups, decided at yearend 2015 to revoke the food additive regulation pertaining to three long-chain PFAS. Any return to the use of these substances would require initiation of the FDA’s Food Contact Notification process. A second rule covering the use of two other long-chain PFASs was revoked later in 2016, in response to a petition from the 3M Company, which stated that, as the sole domestic and international manufacturer, the company had completely abandoned use of the chemicals in the U.S. market (U.S. Food and Drug Administration, 2015, 2016, undated).

Production

In 2016, small amounts of fluorspar may have been produced in Illinois by Hastie Mining & Trucking as a byproduct of limestone-mining operations, but no data were collected on quantities produced. Synthetic fluorspar may have been produced as a byproduct of petroleum alkylation, stainless steel pickling, and uranium processing. However, the U.S. Geological Survey (USGS) has no data survey for synthetic fluorspar produced in the United States.

Fluorosilicic acid was produced as a byproduct of the processing of phosphate rock into phosphoric acid. The USGS developed domestic production data for FSA from a voluntary canvass of U.S. phosphoric acid operations known to recover FSA. Of the five active FSA operations surveyed, responses were received from all, representing 100% of the total sold or used by producers. In 2016, three companies—J.R. Simplot Co., Mosaic Fertilizer LLC (a subsidiary of The Mosaic Co.), and PCS Phosphate Co., Inc.—produced marketable byproduct FSA at five phosphoric acid plants (part of phosphate fertilizer operations) in Florida, Louisiana, North Carolina, and Wyoming. In 2016, production of FSA decreased by 31% to 44,400 t (equivalent to about 72,100 t of fluorspar grading 100%
Fluor, Inc., and Solvay Solexis, Inc. HF is also crucial in many producers were Arkema Inc., Chemours, Daikin America, Inc. and water- and stain-resistant clothing and textiles. Major U.S. automotive, home, and industrial air-conditioning systems; gases used in household and commercial refrigeration and touch-screen devices; nonstick coatings on cookware; refrigerant United States. Examples include the antifingerprint coatings of (fluoropolymers and fluoroelastomers). These substances HFOs] used as aerosols, refrigerants, and solvents, and in chemicals [hydrochlorofluorocarbons (HCFCs), HFCs, and The leading use for HF is in the manufacture of fluorocarbon apparent consumption of fluorspar was estimated at 371,000 t, a imports, minus exports, plus adjustments for changes in stocks. yearend consumer stocks were made to facilitate calculation during the past 20 to 30 years, however, fluorspar manufacturing processes, such as the cleaning and etching of semiconductors and circuit boards, the enrichment of uranium, the production of low octane fuels (petroleum alkylates), and the removal of impurities from metals (pickling).

Internationally, acid-grade fluorspar was used in the production of AlF₃ and cryolite, which are essential in primary aluminum smelting. Alumina (Al₂O₃) is dissolved in a bath that consists primarily of molten cryolite and small amounts of AlF₃ and fluorspar to allow the electrolytic recovery of aluminum. During the aluminum smelting process, the amount of excess sodium in the bath (a result of impurities in the alumina) is controlled by the addition of AlF₃, which reacts with the sodium to form cryolite. This reaction results in excess bath material, which is drawn off in a liquid form, allowed to cool and solidify, and can then be crushed and reused to start up new pots or to compensate for electrolyte losses. This excess material is variously called crushed tapped bath, secondary cryolite, or bath cryolite, in addition to other terms. In the aluminum smelting process, AlF₃ is also used to replace fluorine losses (either absorbed by the bath walls or captured as emissions). Most AlF₃ is produced directly from acid-grade fluorspar or byproduct FSA. The AlF₃ requirements of the U.S. aluminum industry were met through imports in 2016 (table 8) as there were no active AlF₃ producers in the United States.

Chemours announced its intention to construct a new manufacturing facility to produce HFO-1234yf at its Corpus Christi site in Ingleside, TX. The facility allows Chemours to triple production capacity of the chemical, a low-GWP refrigerant used in automotive air-conditioning and other applications. The plant is expected to begin production in the third quarter of 2018 (Chemours Co., The, 2016).

The merchant fluorspar market in the United States included sales of metallurgical- and acid-grade material mainly to steel mills, where it was used as a fluxing agent to increase the fluidity of the slag. Sales were also made to smaller markets such as cement plants, foundries, glass and ceramics plants, and welding rod manufacturers in railcar, truckload, and less-than-truckload quantities. Complete data on merchant fluorspar sales cannot be shown because consumption of acid-grade fluorspar for HF production was combined with other uses in table 2 to avoid disclosing company proprietary data. In the late 1970s, the United States annually used upwards of 500,000 t for these applications. During the past 20 to 30 years, however, fluorspar use in such industries as steel and glass has declined because of product substitutions or changes in industry practices.

In the United States, FSA is used primarily for water fluoridation, but it also is used as a metal surface treatment and cleaner and for pH adjustment in industrial textile processing or laundries. Fluorosilicic acid also can be used in the processing of animal hides, for hardening masonry and ceramics, and in the manufacture of other chemicals. In 2016, the amount of FSA sold or used by producers was 42,300 t (table 1) (equivalent to about 68,800 t of fluorspar grading 100% CaF₂), a 33% decrease compared with that of 2015.

**Consumption**

The USGS developed domestic consumption data from a quarterly survey of two large consumers that provide data on HF consumption and four distributors that provide data on the merchant market (metallurgical and other uses). Because industry participation in the survey declined in recent years, it is estimated that only 28% of total fluorspar consumption was reported in 2016. Owing to decreased survey participation, beginning in 2014, total reported U.S. fluorspar consumption and data on quarterly consumer stocks were withheld to avoid disclosing company proprietary data (table 2). However, estimates of yearend consumer stocks were made to facilitate calculation of apparent consumption, which is defined as production plus imports, minus exports, plus adjustments for changes in stocks. Apparent consumption of fluorspar was estimated at 371,000 t, a 10% decrease from 411,000 t in 2015 (table 1).

Two companies used fluorspar for the production of HF in 2016: The Chemours Co. and Honeywell International Inc. The leading use for HF is in the manufacture of fluorocarbon chemicals [hydrochlorofluorocarbons (HCFCs), HFCs, and HFOs] as aerosols, refrigerants, and solvents, and in the production of high-performance plastics and rubbers (fluoropolymers and fluoroelastomers). These substances are found in dozens of familiar products used daily in the United States. Examples include the antifingerprint coatings of touch-screen devices; nonstick coatings on cookware; refrigerant gases used in household and commercial refrigeration and automotive, home, and industrial air-conditioning systems; and water- and stain-resistant clothing and textiles. Major U.S. producers were Arkema Inc., Chemours, Daikin America, Inc. (formerly MDA Manufacturing Ltd.), Honeywell, Mexichem Fluor, Inc., and Solvay Solexis, Inc. HF is also crucial in many manufacturing processes, such as the cleaning and etching of semiconductors and circuit boards, the enrichment of uranium, the production of low octane fuels (petroleum alkylates), and the removal of impurities from metals (pickling).
disclosing company proprietary data. Known consumer and distributor stocks at the end of 2013 totaled 313,000 t, the highest in the past 10 years (table 1, fig. 1). The substantial decrease in imports in 2014 and 2015 has been partially attributed to a drawdown in consumer and distributor stocks. By yearend 2016, stocks were estimated to be approximately 147,000 t, closer to the levels typical of the past 10 years.

The United States depends on imports for most of its fluorspar supply. Metallurgical-grade fluorspar is shipped routinely as lump or gravel, with the gravel passing a 75-millimeter (mm) sieve and not more than 10% by weight passing a 9.5-mm sieve. Acid-grade fluorspar is shipped in the form of damp filtercake that contains 7% to 10% moisture to facilitate handling and to reduce dust. This moisture is removed by heating the filtercake in rotary kilns or other dryers before treatment with sulfuric acid to produce HF. Acid-grade imports from China and South Africa are usually shipped by ocean freight using bulk carriers of 10,000- to 50,000-t deadweight capacity; ships in this size range are termed “handymax.” Participants negotiate freight levels, terms, and conditions. Some of the acid-grade and ceramic-grade fluorspar is marketed in bags for small users and shipped by truck.

**Prices**

In 2016, acidspar prices from China declined for the fifth consecutive year, and those from South Africa declined for the third. Acidspar prices from Mexico remained stable. According to Industrial Minerals magazine, the yearend 2016 price range for acidspar filtercake from China—dry basis, cost, insurance, and freight Gulf port—decreased to $260 to $270 per metric ton at yearend 2016 from $270 to $300 per metric ton at yearend 2015. The price range for Mexican high-arsenic acidspar filtercake, free on board (f.o.b.) Tampico, was $260 to $280 per metric ton, and Mexican low-arsenic acidspar (less than 5 parts per million arsenic), f.o.b. Tampico, was $280 to $310 per metric ton (table 3, fig. 2).

**Foreign Trade**

In 2016, U.S. exports of fluorspar decreased by 13% to 11,900 t compared with those of 2015 (table 4). With the absence of fluorspar stocks in the National Defense Stockpile and only a small amount of mined or byproduct fluorspar, exports are likely re-exports of imported material. Approximately 90% of exports went to Canada.

In 2016, combined acid- and metallurgical-grade fluorspar imports for consumption were 383,000 t, a 2% increase compared with those of 2015 (table 5). Acid-grade imports were unchanged from 2015. Metallurgical-grade imports increased by 16% to 55,200 t. The leading suppliers of fluorspar to the United States were Mexico (70%), China (12%), South Africa (8%), Vietnam (6%), and Spain (3%). The following imports are compared with those of 2015.

Imports of HF increased by 4% to 126,000 t (table 6); the majority of HF imports were from Mexico (90%) and China (6%). Imports of cryolite decreased by 17% to 15,700 t (table 7). Aluminum fluoride imports decreased by 37% to 20,500 t (table 8), with almost all coming from two countries: China (59%) and Mexico (35%). Mexico was previously the leading source of imported AlF₃, but imports from Mexico decreased much more (61%) than those from China (11%). Aluminum fluoride imports decreased each year for the past 4 years, which reflects a similar trend in the domestic production of primary aluminum.

On August 5, 2016, the U.S. International Trade Commission determined that United States industry was materially harmed by certain HFC blends from China being sold at less than fair value. As a consequence, antidumping duties were to be imposed. The investigation excluded blends that include products other than HFCs, patented HFC blends, and any blend or semifinished blend that includes an HFC other than R-32, R-125, R-143a, and R-134a. Individual HFC components from China were not found to have materially harmed United States industry (U.S. International Trade Administration, 2016).

**World Review**

**Bulgaria.**—In January, Solvay S.A. announced its intention to cease operations at its fluorspar mine in Chiprovtsi. The company cited reduced demand for fluorspar and depletion of quality ore. All 116 employees were scheduled to be laid off by March 2016 except for 9 who would maintain the mine until its permanent closure (Mihaylov, 2016).

**Canada.**—In April, Canada Fluorspar Inc. (CFI) began development at its site near St. Lawrence on Newfoundland’s Burin Peninsula. CFI’s resources include the AGS, Blue Beach North, Director, and Tarefare veins, which total 8.8 Mt of resources with an average grade of 39% fluor spar. The company expects to begin operations in late 2017, with the 200,000-metric-ton-per-year capacity mill processing material from the open pit mining operations at the AGS vein (Gorrill, 2016).

**Kenya.**—Citing weak demand and low prices, Kenya Fluorspar Company Ltd. suspended operations at its facilities in western Kenya on April 30, 2016. The company sustained financial losses for the past 3 years and had previously suspended operations for approximately 2 months in 2015. All employees were to be terminated but would receive preferential treatment in rehiring should the company resume operations (Kenya Fluorspar Company Ltd., 2016).

**Outlook**

Because of fluorspar’s role as the basic material for almost all other fluorochemicals, fluorspar consumption is primarily driven by factors affecting the downstream industries. Fluorochemicals, particularly those containing carbon, are stable and versatile, and new applications continue to be developed. However, numerous environmental, health, and safety issues constrain the use of fluorine, HF, and other fluorinated substances. These conflicting factors complicate an assessment of the outlook for fluorspar. The following discussion examines fluorspar consumption within three leading industrial sectors.

**Aluminum.**—Aluminum fluoride and cryolite, essential for aluminum smelting, are estimated to account for approximately
18% of global fluorspar consumption (Roskill Information Services Ltd., 2013, p. 151). Because aluminum produced from scrap does not require either AlF₃ or cryolite, demand for fluorspar is expected to increase with primary aluminum production only. Aluminum fluoride produced from FSA may displace some AlF₃ produced from fluorspar. However, because of differing physical properties, the two products are not readily interchangeable.

**Chemicals.**— Approximately 40% of global annual fluorspar production is used to produce HF, which is the precursor for almost all other fluorochemicals. Of total HF production, organic fluorine compounds have been estimated to consume over 55% of HF annually, well over one-half of which are used as refrigerant and air-conditioning gases (Roskill Information Services Ltd., 2013, p. 151). Other uses include foam-blowing agents, propellants, solvents, and precursory use in the manufacture of a wide range of fluoropolymers and fluoroelastomers.

Because of the ozone-depleting potential of early generations of fluorocarbon gases [chlorofluorocarbons (CFCs) and later HFCFs], many fluorinated substances used as foam-blowing agents, propellants, refrigerants, and solvents have been a major target for reduction and eventual phase out under the Montreal Protocol, which was adopted in 1987. Chlorofluorocarbons and HCFCs have been replaced by HFCs, which, although not ozone depleting, in many cases are potent greenhouse gases owing to high GWP and long atmospheric lifetimes. The adoption of the Kigali Amendment in 2016 effectively expanded the scope of the Montreal Protocol to reduce the use of many higher GWP HFCs as well.

Fluorinated foam-blowing agents and propellants are still in use but have been replaced in many applications by nonfluorinated alternatives. The use of fluorinated refrigerants has persisted, and increased global demand for refrigeration and air-conditioning, particularly in developing countries, is expected to drive increased consumption of fluorspar. Further, subsequent generations of fluorinated refrigerants often contained more fluorine than previous generations, which increased the amount of fluorspar required for their manufacture. Although low-GWP fluorinated refrigerants have been developed and are gaining acceptance, a portion of the refrigerant market is expected to transition to nonfluorinated alternatives, which could temper increased consumption of fluorspar in this sector.

The use of some fluorocarbons, particularly those used to manufacture fluoropolymers and fluoroelastomers, has not been restricted by the provisions of the Montreal Protocol because chemicals used entirely as feedstock in the manufacture of other chemicals are excluded from production and consumption calculations. Fluoropolymers and fluoroelastomers possess a wide range of advantageous properties including low adhesion; low index of refraction; low gas permeability; and chemical, electrical, oil, temperature, and water resistance, which make them invaluable in a wide range of applications in harsh and demanding environments. Some examples include gaskets, o-rings, and seals in automotive and aviation applications; fittings, liners, and seals in the chemical industry; cable, insulation, and protective coatings used in electronics, photovoltaics, and semiconductors; architectural fabrics and coatings; and medical applications such as cardiovascular grafts and ligament replacements. In 2012, fluropolymer industry revenue was estimated to be $3.8 billion with an estimated 6.5% compound annual growth rate (Bodny, 2012).

**Fluxes in Steelmaking.**— Approximately 34% of annual global fluorspar production is estimated to be used as a flux in steelmaking (Roskill Information Services Ltd., 2013, p. 151). However, this use varies significantly by geographic region. Metspar consumption in Europe and North America decreased dramatically in the 1990s with the decreasing use of open-hearth steelmaking furnaces that used large quantities of fluorspar as a flux. Improvements in steelmaking technology have also reduced the unit consumption of fluorspar per unit ton of steel produced. In less developed countries, the quantity of fluorspar used as a flux in steelmaking continues to be much higher, but further efficiency improvements are expected to moderate growth.

**References Cited**


Gorrill, Lindsay, 2016, St. Lawrence fluorspar resource overview: St. Lawrence, Newfoundland and Labrador, Canada, Canada Fluorspar Inc., October 25, 29 p.


**FLUORSPAR—2016 [ADVANCE RELEASE]**


GENERAL SOURCES OF INFORMATION

U.S. Geological Survey Publications


Fluorspar. Ch. in Mineral Commodity Summaries, annual.


Other


ICIS Chemical Business Americas. Industrial Minerals.

United Nations Commodity Trade Statistics Database.


TABLE 1
SALIENT FLUORSPAR STATISTICS1, 2

<table>
<thead>
<tr>
<th></th>
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<td>United States:</td>
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<td></td>
</tr>
<tr>
<td>Exports:3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quantity metric tons</td>
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<td>13,400</td>
<td>13,700</td>
<td>11,900</td>
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<td>414,000</td>
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<td>383,000</td>
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<td>$102,000</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Reported metric tons</td>
<td>416,000</td>
<td>441,000</td>
<td>W</td>
<td>W</td>
<td>W</td>
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<tr>
<td>Apparent6 do.</td>
<td>525,000</td>
<td>548,000</td>
<td>518,000</td>
<td>411,000</td>
<td>371,000</td>
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<td>Fluorosilicic acid:</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Production metric tons</td>
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<td>74,300</td>
<td>70,100</td>
<td>64,500</td>
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<td>Sold and used do.</td>
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<td>73,900</td>
<td>70,600</td>
<td>63,500</td>
<td>42,300</td>
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<td>Stocks, consumer and distributor, December 31 metric tons</td>
<td>234,000</td>
<td>313,000</td>
<td>195,000</td>
<td>146,000</td>
<td>147,000</td>
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<td>World, production do.</td>
<td>7,930,000</td>
<td>7,110,000</td>
<td>6,780,000</td>
<td>6,090,000</td>
<td>5,930,000</td>
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</table>

1Estimated. 2Revised. do. Ditto. W Withheld to avoid disclosing company proprietary data.
1Table includes data available through May 3, 2018. Data are rounded to no more than three significant digits.
2Does not include byproduct or synthetic fluor spar production.
3Source: U.S. Census Bureau; data may be adjusted by the U.S. Geological Survey.
4Free alongside ship values at U.S. ports.
5Cost, insurance, and freight values at U.S. ports.
6Imports minus exports plus adjustments for changes in stocks.

TABLE 2
U.S. REPORTED CONSUMPTION OF FLUORSPAR, BY END USE1

<table>
<thead>
<tr>
<th>End use or product</th>
<th>Containing more than 97% calcium fluoride</th>
<th>Containing not more than 97% calcium fluoride</th>
<th>Total</th>
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<tbody>
<tr>
<td>Hydrofluoric acid</td>
<td>W</td>
<td>W</td>
<td>--</td>
</tr>
<tr>
<td>Metallurgical</td>
<td>W</td>
<td>W</td>
<td>29,700</td>
</tr>
<tr>
<td>Other2</td>
<td>W</td>
<td>W</td>
<td>--</td>
</tr>
<tr>
<td>Total</td>
<td>W</td>
<td>W</td>
<td>29,700</td>
</tr>
<tr>
<td>Stocks, consumer and distributor, December 31</td>
<td>W</td>
<td>W</td>
<td>21,200</td>
</tr>
</tbody>
</table>

1Estimated. W Withheld to avoid disclosing company proprietary data. -- Zero.
1Table includes data available through May 3, 2018. Data are rounded to no more than three significant digits; may not add to totals shown.
2May include cement, enamel, glass and fiberglass, hydrofluoric acid, steel castings, and welding rod coatings.

TABLE 3
PRICES OF IMPORTED FLUORSPAR1

<table>
<thead>
<tr>
<th>Source and grade</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acidspar:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chinese, dry basis, cost, insurance, and freight (c.i.f.) Gulf port, filtercake</td>
<td>270–300</td>
<td>260–270</td>
</tr>
<tr>
<td>Chinese, free on board (f.o.b.) China, wet filtercake</td>
<td>260–280</td>
<td>250–270</td>
</tr>
<tr>
<td>Mexican, f.o.b. Tampico, filtercake</td>
<td>260–280</td>
<td>260–280</td>
</tr>
<tr>
<td>Mexican, f.o.b. Tampico, arsenic &lt;5 parts per million</td>
<td>280–310</td>
<td>280–310</td>
</tr>
<tr>
<td>South African, f.o.b. Durban, filtercake</td>
<td>260–280</td>
<td>200–220</td>
</tr>
<tr>
<td>Metspar, Mexican, f.o.b. Tampico</td>
<td>230–270</td>
<td>230–250</td>
</tr>
</tbody>
</table>

1Table includes data available through May 3, 2018.

<table>
<thead>
<tr>
<th>Country or locality</th>
<th>2015 Quantity</th>
<th>2015 Value</th>
<th>2016 Quantity</th>
<th>2016 Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(metric tons)</td>
<td>($ metric)</td>
<td>(metric tons)</td>
<td>($ metric)</td>
</tr>
<tr>
<td>Australia</td>
<td>759</td>
<td>$110,000</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Canada</td>
<td>12,500</td>
<td>2,050,000</td>
<td>10,700</td>
<td>$1,730,000</td>
</tr>
<tr>
<td>Chile</td>
<td>--</td>
<td>--</td>
<td>214</td>
<td>28,300</td>
</tr>
<tr>
<td>Colombia</td>
<td>97</td>
<td>10,800</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>--</td>
<td>--</td>
<td>199</td>
<td>28,800</td>
</tr>
<tr>
<td>France</td>
<td>--</td>
<td>--</td>
<td>5</td>
<td>3,820</td>
</tr>
<tr>
<td>Indonesia</td>
<td>5</td>
<td>2,800</td>
<td>4</td>
<td>2,800</td>
</tr>
<tr>
<td>Italy</td>
<td>--</td>
<td>--</td>
<td>44</td>
<td>6,000</td>
</tr>
<tr>
<td>Malaysia</td>
<td>--</td>
<td>--</td>
<td>10</td>
<td>9,930</td>
</tr>
<tr>
<td>Mexico</td>
<td>210</td>
<td>15,000</td>
<td>672</td>
<td>85,100</td>
</tr>
<tr>
<td>Netherlands</td>
<td>47</td>
<td>6,840</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Nicaragua</td>
<td>20</td>
<td>2,880</td>
<td>30</td>
<td>4,350</td>
</tr>
<tr>
<td>Taiwan</td>
<td>21</td>
<td>2,990</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>--</td>
<td>--</td>
<td>44</td>
<td>6,350</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>13,700</strong></td>
<td><strong>2,210,000</strong></td>
<td><strong>11,900</strong></td>
<td><strong>1,900,000</strong></td>
</tr>
</tbody>
</table>

-- Zero.

1Table includes data available through May 3, 2018. Data are rounded to no more than three significant digits; may not add to totals shown.

2Free alongside ship values at U.S. ports.

Source: U.S. Census Bureau.
### TABLE 5
U.S. IMPORTS FOR CONSUMPTION OF FLUORSPAR, BY COUNTRY AND CUSTOMS DISTRICT

<table>
<thead>
<tr>
<th>Country and customs district</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quantity (metric tons)</td>
<td>Value (thousands)</td>
</tr>
<tr>
<td><strong>Containing more than 97% calcium fluoride (CaF₂):</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>China:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Houston, TX</td>
<td>18,700</td>
<td>$6,600</td>
</tr>
<tr>
<td>New Orleans, LA</td>
<td>7,050</td>
<td>1,970</td>
</tr>
<tr>
<td>Total</td>
<td>25,700</td>
<td>8,580</td>
</tr>
<tr>
<td>France, Houston, TX</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td><strong>Germany:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baltimore, MD</td>
<td>19</td>
<td>8</td>
</tr>
<tr>
<td>Houston, TX</td>
<td>38</td>
<td>21</td>
</tr>
<tr>
<td>New York, NY</td>
<td>203</td>
<td>104</td>
</tr>
<tr>
<td>Total</td>
<td>260</td>
<td>133</td>
</tr>
<tr>
<td>Israel, New Orleans, LA</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td><strong>Mexico:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baltimore, MD</td>
<td>1,070</td>
<td>748</td>
</tr>
<tr>
<td>Laredo, TX</td>
<td>4,410</td>
<td>1,380</td>
</tr>
<tr>
<td>New Orleans, LA</td>
<td>170,000</td>
<td>48,100</td>
</tr>
<tr>
<td>Philadelphia, PA</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Total</td>
<td>176,000</td>
<td>50,300</td>
</tr>
<tr>
<td><strong>Netherlands, Houston, TX</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>South Africa, Houston, TX</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spain, Houston, TX</td>
<td>21,700</td>
<td>5,240</td>
</tr>
<tr>
<td>United Kingdom:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chicago, IL</td>
<td>19</td>
<td>12</td>
</tr>
<tr>
<td>Cleveland, OH</td>
<td>2,000</td>
<td>1,090</td>
</tr>
<tr>
<td>Houston, TX</td>
<td>10</td>
<td>34</td>
</tr>
<tr>
<td>Los Angeles, CA</td>
<td>291</td>
<td>150</td>
</tr>
<tr>
<td>Total</td>
<td>2,320</td>
<td>1,280</td>
</tr>
<tr>
<td><strong>Vietnam:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Houston, TX</td>
<td>30,600</td>
<td>9,950</td>
</tr>
<tr>
<td>New Orleans, LA</td>
<td>25,600</td>
<td>6,180</td>
</tr>
<tr>
<td>Total</td>
<td>56,200</td>
<td>16,130</td>
</tr>
<tr>
<td>Grand total</td>
<td>328,000</td>
<td>95,000</td>
</tr>
<tr>
<td><strong>Containing not more than 97% CaF₂:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>China:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Houston, TX</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Los Angeles, CA</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>New Orleans, LA</td>
<td>500</td>
<td>282</td>
</tr>
<tr>
<td>New York, NY</td>
<td>182</td>
<td>97</td>
</tr>
<tr>
<td>Seattle, WA</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Total</td>
<td>682</td>
<td>379</td>
</tr>
<tr>
<td><strong>Mexico:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laredo, TX</td>
<td>2,940</td>
<td>472</td>
</tr>
<tr>
<td>New Orleans, LA</td>
<td>43,500</td>
<td>10,700</td>
</tr>
<tr>
<td>Total</td>
<td>46,400</td>
<td>11,200</td>
</tr>
<tr>
<td><strong>Grand total, all grades</strong></td>
<td>376,000</td>
<td>107,000</td>
</tr>
</tbody>
</table>

1Revised. -- Zero.

2Table includes data available through May 3, 2018. Data are rounded to no more than three significant digits; may not add to totals shown.

3Cost, insurance, and freight values at U.S. ports.

Source: U.S. Census Bureau.
### TABLE 6
U.S. IMPORTS FOR CONSUMPTION OF HYDROFLUORIC ACID, BY COUNTRY OR LOCALITY

<table>
<thead>
<tr>
<th>Country or locality</th>
<th>2015 Quantity (metric tons)</th>
<th>Value (thousands)</th>
<th>2016 Quantity (metric tons)</th>
<th>Value (thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>(3)</td>
<td>$3</td>
<td>1</td>
<td>$4</td>
</tr>
<tr>
<td>Canada</td>
<td>597</td>
<td>1,090</td>
<td>594</td>
<td>986</td>
</tr>
<tr>
<td>China</td>
<td>7,170</td>
<td>7,580</td>
<td>7,570</td>
<td>6,920</td>
</tr>
<tr>
<td>Germany</td>
<td>1,470</td>
<td>3,690</td>
<td>1,100</td>
<td>2,260</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>1</td>
<td>9</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>India</td>
<td>37</td>
<td>42</td>
<td>72</td>
<td>75</td>
</tr>
<tr>
<td>Japan</td>
<td>1,470</td>
<td>2,400</td>
<td>1,560</td>
<td>2,020</td>
</tr>
<tr>
<td>Korea, Republic of</td>
<td>508</td>
<td>1,320</td>
<td>89</td>
<td>334</td>
</tr>
<tr>
<td>Mexico</td>
<td>108,000</td>
<td>178,000</td>
<td>114,000</td>
<td>175,000</td>
</tr>
<tr>
<td>Singapore</td>
<td>243</td>
<td>660</td>
<td>274</td>
<td>750</td>
</tr>
<tr>
<td>Spain</td>
<td>113</td>
<td>337</td>
<td>149</td>
<td>424</td>
</tr>
<tr>
<td>Taiwan</td>
<td>385</td>
<td>1,010</td>
<td>532</td>
<td>1,140</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>120,000</td>
<td>196,000</td>
<td>126,000</td>
<td>190,000</td>
</tr>
</tbody>
</table>

---

1Table includes data available through May 3, 2018. Data are rounded to no more than three significant digits; may not add to totals shown.
2Cost, insurance, and freight values at U.S. ports.
3Less than ½ unit.

Source: U.S. Census Bureau.

### TABLE 7
U.S. IMPORTS FOR CONSUMPTION OF CRYOLITE, BY COUNTRY OR LOCALITY

<table>
<thead>
<tr>
<th>Country or locality</th>
<th>2015 Quantity (metric tons)</th>
<th>Value (thousands)</th>
<th>2016 Quantity (metric tons)</th>
<th>Value (thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>9,070</td>
<td>$4,160</td>
<td>7,830</td>
<td>$2,720</td>
</tr>
<tr>
<td>China</td>
<td>964</td>
<td>644</td>
<td>261</td>
<td>178</td>
</tr>
<tr>
<td>Denmark</td>
<td>--</td>
<td>--</td>
<td>19</td>
<td>40</td>
</tr>
<tr>
<td>Germany</td>
<td>1,150</td>
<td>1,900</td>
<td>1,930</td>
<td>2,640</td>
</tr>
<tr>
<td>Hungary</td>
<td>221</td>
<td>321</td>
<td>228</td>
<td>348</td>
</tr>
<tr>
<td>Iceland</td>
<td>173</td>
<td>143</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>India</td>
<td>--</td>
<td>--</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Italy</td>
<td>322</td>
<td>371</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Japan</td>
<td>5,110</td>
<td>5,730</td>
<td>4,510</td>
<td>5,580</td>
</tr>
<tr>
<td>Mexico</td>
<td>--</td>
<td>--</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Spain</td>
<td>1,440</td>
<td>569</td>
<td>236</td>
<td>72</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>--</td>
<td>--</td>
<td>50</td>
<td>51</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>494</td>
<td>841</td>
<td>628</td>
<td>1100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>18,900</td>
<td>14,700</td>
<td>15,700</td>
<td>12,800</td>
</tr>
</tbody>
</table>

---

1Table includes data available through May 3, 2018. Data are rounded to no more than three significant digits; may not add to totals shown.
2Includes natural and synthetic cryolite.
3Cost, insurance, and freight values at U.S. ports.

Source: U.S. Census Bureau.
### TABLE 8
U.S. IMPORTS FOR CONSUMPTION OF ALUMINUM FLUORIDE, BY COUNTRY OR LOCALITY<sup>1</sup>

<table>
<thead>
<tr>
<th>Country or locality</th>
<th>2015 Quantity (metric tons)</th>
<th>2015 Value&lt;sup&gt;2&lt;/sup&gt; (thousands)</th>
<th>2016 Quantity (metric tons)</th>
<th>2016 Value&lt;sup&gt;2&lt;/sup&gt; (thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>420</td>
<td>$634</td>
<td>1,130</td>
<td>$1,540</td>
</tr>
<tr>
<td>China</td>
<td>13,600</td>
<td>18,100</td>
<td>12,100</td>
<td>13,600</td>
</tr>
<tr>
<td>Mexico</td>
<td>18,400</td>
<td>22,800</td>
<td>7,200</td>
<td>7,880</td>
</tr>
<tr>
<td>Other&lt;sup&gt;3&lt;/sup&gt;</td>
<td>37</td>
<td>82</td>
<td>96</td>
<td>96</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>32,400</strong></td>
<td><strong>41,600</strong></td>
<td><strong>20,500</strong></td>
<td><strong>23,100</strong></td>
</tr>
</tbody>
</table>

<sup>1</sup>Table includes data available through May 3, 2018. Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Cost, insurance, and freight values at U.S. ports.

<sup>3</sup>Includes all countries and (or) localities with quantities less than 1,000 metric tons.

Source: U.S. Census Bureau.
## Table 9
**Fluorspar: World Production, by Country or Locality**

(Metric tons)

<table>
<thead>
<tr>
<th>Country or locality</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Argentina</td>
<td>35,874</td>
<td>37,967</td>
<td>39,520</td>
<td>39,000</td>
<td>39,000</td>
</tr>
<tr>
<td>Brazil:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acid grade</td>
<td>5,768</td>
<td>6,835</td>
<td>6,496</td>
<td>6,500</td>
<td>6,500</td>
</tr>
<tr>
<td>Metallurgical grade</td>
<td>18,380</td>
<td>20,886</td>
<td>17,353</td>
<td>17,000</td>
<td>17,000</td>
</tr>
<tr>
<td>Total</td>
<td>24,100</td>
<td>27,700</td>
<td>23,800</td>
<td>23,500</td>
<td>23,500</td>
</tr>
<tr>
<td>Bulgaria</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>5,200,000</td>
<td>4,800,000</td>
<td>4,310,000</td>
<td>3,820,000</td>
<td>3,800,000</td>
</tr>
<tr>
<td>Egypt</td>
<td>7,700</td>
<td>850</td>
<td>900</td>
<td>1,105</td>
<td>1,000</td>
</tr>
<tr>
<td>Germany, acid grade</td>
<td>54,202</td>
<td>48,744</td>
<td>58,100</td>
<td>49,801</td>
<td>50,000</td>
</tr>
<tr>
<td>Iran</td>
<td>80,000</td>
<td>69,828</td>
<td>78,736</td>
<td>39,286</td>
<td>40,000</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>100,000</td>
<td>108,000</td>
<td>110,000</td>
<td>110,000</td>
<td>110,000</td>
</tr>
<tr>
<td>Kenya, acid grade</td>
<td>110,000</td>
<td>48,500</td>
<td>74,000</td>
<td>64,395</td>
<td>42,656</td>
</tr>
<tr>
<td>Korea, North</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexico:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acid grade</td>
<td>749,608</td>
<td>707,514</td>
<td>631,590</td>
<td>623,740</td>
<td>593,000</td>
</tr>
<tr>
<td>Metallurgical grade</td>
<td>487,483</td>
<td>502,963</td>
<td>478,131</td>
<td>400,000</td>
<td>395,000</td>
</tr>
<tr>
<td>Total</td>
<td>1,240,000</td>
<td>1,210,000</td>
<td>1,110,000</td>
<td>1,020,000</td>
<td>988,000</td>
</tr>
<tr>
<td>Mongolia:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acid grade</td>
<td>157,200</td>
<td>76,400</td>
<td>71,900</td>
<td>47,300</td>
<td>34,100</td>
</tr>
<tr>
<td>Submetallurgical and other grades</td>
<td>327,200</td>
<td>161,700</td>
<td>303,000</td>
<td>183,500</td>
<td>167,700</td>
</tr>
<tr>
<td>Total</td>
<td>484,000</td>
<td>238,000</td>
<td>375,000</td>
<td>231,000</td>
<td>202,000</td>
</tr>
<tr>
<td>Morocco, acid grade</td>
<td>79,300</td>
<td>81,200</td>
<td>79,840</td>
<td>80,890</td>
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<td>Namibia, acid grade</td>
<td>68,966</td>
<td>60,774</td>
<td>65,485</td>
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<td>1,495</td>
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<td>Pakistan, metallurgical grade</td>
<td>7,840</td>
<td>11,292</td>
<td>8,961</td>
<td>6,238</td>
<td>6,625</td>
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<td>Russia, concentrate</td>
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<td>South Africa</td>
<td>170,338</td>
<td>157,776</td>
<td>164,056</td>
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<td>Spain:</td>
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<tr>
<td>Acid grade</td>
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<td>94,467</td>
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<td>Ceramic grade</td>
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<td>5,200</td>
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<td>Metallurgical grade</td>
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<td>4,320</td>
<td>3,000</td>
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<tr>
<td>Total</td>
<td>107,000</td>
<td>104,000</td>
<td>126,000</td>
<td>130,000</td>
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<td>15,000</td>
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<td>Turkey</td>
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<td>United Kingdom</td>
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<td>16,000</td>
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<td>Vietnam</td>
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<td>Grand total</td>
<td>7,930,000</td>
<td>7,110,000</td>
<td>6,780,000</td>
<td>6,090,000</td>
<td>5,930,000</td>
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Of which:

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<th>Country or locality</th>
<th>2012</th>
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<th>2014</th>
<th>2015</th>
<th>2016</th>
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<td>Acid grade</td>
<td>1,320,000</td>
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<td>918,000</td>
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<td>Metallurgical grade</td>
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<tr>
<td>Other and unspecified</td>
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<td>5,440,000</td>
<td>5,160,000</td>
<td>4,660,000</td>
<td>4,580,000</td>
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</tbody>
</table>

1Estimated. 2Revised.  NA Not available.  -- Zero.
1Table includes data available through May 2, 2017. All data are reported unless otherwise noted. Totals and estimated data are rounded to three significant digits; may not add to totals shown.
2An effort has been made to subdivide production of all countries by grade (acid, ceramic, and metallurgical). Where this information is not available, the data have been entered without qualifying notes.
3Estimate based on export data.
4As reported by China’s Ministry of Land and Resources. Production may include a significant amount of submetallurgical-grade material.
5As reported by the International Organizing Committee for the World Mining Congress.
6Flotation concentrate, includes some material less than 97%.
7May include some submetallurgical-grade fluorspar.
8Data were reported in wet tons, but have been converted to dry tons to be consistent with other data in the table.
Figure 1. Quarterly acid- and metallurgical-grade imports for consumption and consumer stocks of fluorspar from 2006 through 2016. Reported quarterly stock data were withheld beginning in the fourth quarter of 2014; yearend stocks for 2014 through 2016 are estimated. Sources: U.S. Geological Survey and U.S. Census Bureau.
Chinese, dry basis, cost, insurance, and freight gulf port, filtercake, high
Chinese, dry basis, cost, insurance, and freight gulf port, filtercake, low
Mexican, free on board (f.o.b.) tampico, filtercake, high
Mexican, free on board (f.o.b.) tampico, filtercake, low
Mexican, free on board (f.o.b.) tampico, arsenic <5 parts per million, high
Mexican, free on board (f.o.b.) tampico, arsenic <5 parts per million, low
South African, free on board (f.o.b.) Durban, filtercake, high
South African, free on board (f.o.b.) Durban, filtercake, low

Figure 2. Prices of acid-grade fluorspar from leading exporting countries from 2001 through 2016. Source: Industrial Minerals.