FLUORSPAR

(Data in thousand metric tons unless otherwise noted)

<u>Domestic Production and Use</u>: In Illinois, fluorspar (calcium fluoride) was processed and sold from stockpiles produced as a byproduct of limestone quarrying. Byproduct calcium fluoride was recovered from industrial waste streams, although data are not available on exact quantities. Domestically, production of hydrofluoric acid (HF) in Louisiana and Texas was by far the leading use for acid-grade fluorspar. HF is the primary feedstock for the manufacture of virtually all fluorine-bearing chemicals and is also a key ingredient in the processing of aluminum and uranium. Other uses included as a flux in steelmaking, in iron and steel casting, primary aluminum production, glass manufacture, enamels, welding rod coatings, cement production, and other uses or products. In 2011, an estimated 74,000 tons of fluorosilicic acid (equivalent to about 130,000 tons of 92% fluorspar) was recovered from phosphoric acid plants processing phosphate rock. Fluorosilicic acid was used primarily in water fluoridation.

Salient Statistics—United States:	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	2011 ^e
Production:					
Finished, all grades		NA	NA	NA	NA
Fluorspar equivalent from phosphate rock	94	111	114	128	130
Imports for consumption:					
Acid grade	577	496	417	442	430
Metallurgical grade	43	76	58	97	120
Total fluorspar imports	620	572	475	539	550
Fluorspar equivalent from hydrofluoric acid					
plus cryolite	233	209	175	209	220
Exports	14	19	14	18	23
Shipments from Government stockpile	17	_		_	_
Consumption:					
Apparent ¹	613	528	473	502	520
Reported	539	506	400	448	450
Stocks, yearend, consumer and dealer ²	90	115	103	121	130
Net import reliance ³ as a percentage of					
apparent consumption	100	100	100	100	100

Recycling: A few thousand tons per year of synthetic fluorspar is recovered—primarily from uranium enrichment, but also from petroleum alkylation and stainless steel pickling. Primary aluminum producers recycle HF and fluorides from smelting operations. HF is recycled in the petroleum alkylation process.

Import Sources (2007–10): Mexico, 59%; China, 28%; South Africa, 9%; and Mongolia, 4%.

<u>Tariff</u> : Item	Number	Normal Trade Relations 12-31-11	
Acid grade (97% or more CaF ₂)	2529.22.0000	Free.	
Metallurgical grade (less than 97% CaF ₂)	2529.21.0000	Free.	

Depletion Allowance: 22% (Domestic), 14% (Foreign).

Government Stockpile: The last of the Government stocks of fluorspar officially were sold in fiscal year 2007.

Events, Trends, and Issues: Fluorspar prices began rising in the first quarter of 2011 and continued to rise through the summer. Prices for Chinese fluorspar (acidspar and metspar) exhibited the largest increases owing to increases in production costs, appreciation of the Chinese yuan relative to the U.S. dollar, and rising demand. Rising fluorspar prices have caused price increases for fluorspar-derived products such as aluminum fluoride and fluoropolymers.

Canada Fluorspar Inc. (Markham, Ontario, Canada) and French fluorochemicals company Arkema Inc. (Colombes, France) signed an agreement to fund reopening of the St. Lawrence fluorspar mine near the town of St. Lawrence on the Burin Peninsula of Newfoundland Island in the Province of Newfoundland and Labrador, Canada. The agreement called for Arkema to purchase Canada Fluorspar shares and for the two companies to form a limited partnership in which Canada Fluorspar and Arkema each hold 50% stakes. As part of the partnership, Canada Fluorspar and Arkema were to enter into an offtake agreement whereby the partners would each receive a prorated share of the output. In addition, for a period of 10 years, Arkema was to have the right to purchase approximately 20% of CFI's share of the output. The mine last operated in the early 1990s.

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South African fluorspar producer Witkop Fluorspar Mine (Pty.) Ltd. restarted operations in the second quarter. The mine had been on standby since June 2009 (Nicholas Davidoff, Firebird Management LLC, written commun., August 15, 2011).

A World Trade Organization (WTO) dispute settlement panel ruled that aspects of China's export policies on several important industrial raw materials (including fluorspar) are inconsistent with China's WTO obligations. The panel recommended that China bring its policies into conformity with its WTO obligations, although China had until September 3, 2011, to appeal the findings. The WTO panel's findings were the result of complaints filed in 2009 by the European Union, Mexico, and the United States about China's policy of applying export duties, export licenses, export quotas, and minimum export prices on fluorspar and several other mineral commodities. The panel found that China's export duties and export quotas were inconsistent with WTO rules, and that certain aspects of China's export licensing system restrict exports and are therefore inconsistent with WTO rules. Concerning China's argument that its export policies were justified on grounds of natural resource conservation, the panel found that China was unable to prove that it imposed such export restrictions while restricting domestic production or consumption of the raw materials in order to conserve the raw materials.

<u>World Mine Production and Reserves</u>: Production estimates for individual countries were made using country or company specific data where available; other estimates were made based on general knowledge of end-use markets. The reserve estimate for Mongolia has been revised based on new information.

	Mine pr	Mine production		
	<u>2010</u>	<u>2011^e</u>	Reserves ^{5, 6}	
United States	NA	NA	NA	
Brazil	64	65	NA	
China	3,300	3,300	24,000	
Kazakhstan	67	70	NA	
Kenya	44	115	2,000	
Mexico	1,070	1,080	32,000	
Mongolia	420	430	22,000	
Morocco	75	90	NA	
Namibia	95	100	3,000	
Russia	250	250	NA	
South Africa	200	270	41,000	
Spain	135	140	6,000	
Other countries	<u>290</u>	300	<u>110,000</u>	
World total (rounded)	6,010	6,200	240,000	

<u>World Resources</u>: Identified world fluorspar resources were approximately 500 million tons of contained fluorspar. The quantity of fluorine present in phosphate rock deposits is enormous. Current U.S. reserves of phosphate rock are estimated to be 1.4 billion tons, which at 3.5% fluorine would contain about 101 million tons of 100% calcium fluoride (fluorspar) equivalent. World reserves of phosphate rock are estimated to be 65 billion tons, equivalent to about 4.7 billion tons of 100% calcium fluoride equivalent.

<u>Substitutes</u>: Aluminum smelting dross, borax, calcium chloride, iron oxides, manganese ore, silica sand, and titanium dioxide have been used as substitutes for fluorspar fluxes. Byproduct fluorosilicic acid has been used as a substitute in aluminum fluoride production and also has the potential to be used as a substitute in HF production.

^eEstimated. NA Not available. — Zero.

¹Excludes fluorspar equivalent of fluorosilicic acid, hydrofluoric acid, and cryolite.

²Industry stocks for two leading consumers and fluorspar distributors.

³Defined as imports – exports + adjustments for Government and industry stock changes.

⁴Canada Fluorspar Inc., 2011, Canada Fluorspar announces strategic agreement with Arkema resulting in a CDN\$83.5 million investment to fund the St. Lawrence fluorspar project: Markham, Ontario, Canada, Canada Fluorspar Inc. news release, June 15, 4 p.

⁵See Appendix C for resource/reserve definitions and information concerning data sources.

⁶Measured as 100% calcium fluoride.