

FLUORSPAR

(Data in thousand metric tons unless otherwise noted)

Domestic Production and Use: In 2013, fluorspar (calcium fluoride) production began at the Klondike II fluorspar mine in Kentucky. In addition, some fluorspar was 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 2013, an estimated 76,000 tons of fluorosilicic acid (equivalent to about 134,000 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:	2009	2010	2011	2012	2013^e
Production:					
Finished, all grades	NA	NA	NA	NA	NA
Fluorspar equivalent from phosphate rock	114	128	124	130	134
Imports for consumption:					
Acid grade	417	442	560	464	500
Metallurgical grade	58	97	167	156	125
Total fluorspar imports	475	539	727	620	625
Fluorspar equivalent from hydrofluoric acid plus cryolite	175	209	209	209	194
Exports	14	18	24	24	18
Consumption:					
Apparent ¹	473	492	672	525	585
Reported	400	446	454	416	440
Stocks, yearend, consumer and dealer ²	103	131	162	234	256
Employment, mine, number ^e	--	4	11	5	6
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 (2009–12): Mexico, 73%; China, 15%; South Africa, 8%; Mongolia, 3%; and other, 1%.

Tariff: Item	Number	Normal Trade Relations 12–31–13
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 production began at the Klondike II Mine in Livingston County, KY. Initial mining activities simply involved stockpiling of ore. Plans were to process the ore through a heavy media separation plant, which was expected to be sufficient to upgrade the ore to acid grade. Planned output included acid-grade and metallurgical-grade fluorspar, with the latter possibly including briquettes.

Exploration and development work continued at fluorspar projects in Canada, Mongolia, South Africa, the United States, and Vietnam. The status of the projects varied from exploration drilling to mine startups.

Russia's major fluorspar mine in Russia's far eastern Primorye territory was mothballed because of low-quality ores and the need to modernize the mine. The shutdown was expected to last an extended period, potentially into 2016. The mine was licensed to develop the Pogranichnoye and Voznesenskoye fluorspar deposits, which according to the Russian reserve classification system contained 22 million metric tons of reserves.

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Fluorspar prices decreased in 2013 as a result of a slowdown in downstream global fluorochemicals markets. As of October 2013, the price of Chinese acid-grade fluorspar, wet filtercake, free on board China, had decreased by 25% compared with the yearend 2012 price. During the same time period, Mexican high-arsenic acid-grade prices decreased by 17%. In addition, substantial price decreases were reported for various Chinese metallurgical grades of fluorspar.

World Mine Production and Reserves: 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 the United States has been revised on information from company sources. Previously published reserve estimates for Namibia and Spain were based on out-of-date data; current reserve data were not available.

	Mine production		Reserves ^{4,5}
	2012	2013 ^e	
United States	NA	NA	4,000
Brazil	25	26	1,000
China	4,400	4,300	24,000
Kazakhstan	65	50	NA
Kenya	110	48	2,000
Mexico	1,200	1,240	32,000
Mongolia	471	350	22,000
Morocco	78	75	NA
Namibia	80	85	NA
Russia	100	80	NA
South Africa	225	180	41,000
Spain	117	110	NA
Other countries	200	180	110,000
World total (rounded)	7,070	6,700	240,000

World Resources: 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.

Substitutes: 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.

¹Excludes fluorspar production withheld for proprietary reasons and 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.

⁴[See Appendix C for resource/reserve definitions and information concerning data sources.](#)

⁵Measured as 100% calcium fluoride.