

FLUORSPAR

(Data in thousand metric tons unless otherwise noted)

Domestic Production and Use: Fluorspar (calcium fluoride) production was expected to begin 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 2012, an estimated 73,000 tons of fluorosilicic acid (equivalent to about 128,000 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:	2008	2009	2010	2011	2012^e
Production:					
Finished, all grades	NA	NA	NA	NA	NA
Fluorspar equivalent from phosphate rock	111	114	128	124	128
Imports for consumption:					
Acid grade	496	417	442	560	475
Metallurgical grade	76	58	97	167	145
Total fluorspar imports	572	475	539	727	620
Fluorspar equivalent from hydrofluoric acid plus cryolite	209	175	209	209	220
Exports	19	14	18	24	21
Consumption:					
Apparent ¹	529	473	492	672	605
Reported	506	400	446	454	480
Stocks, yearend, consumer and dealer ²	115	103	131	162	156
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 (2008–11): Mexico, 69%; China, 20%; South Africa, 8%; and other, 3%.

Tariff: Item	Number	Normal Trade Relations 12–31–12
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: Development work continued on the Klondike II Mine in Livingston County, KY. The incline being driven from the surface was expected to hit the vein orebody by yearend 2012. In addition, exploration work began in adjoining Crittenden County, KY, by parties unrelated to the Klondike II Mine project. The drilling program was targeting southern Crittenden County, an area that had limited fluorspar production in the past.

After a long, slow development process, the Nui Phao fluorspar mining project in Vietnam made major progress in 2012 and commissioning of the mine and mill is scheduled for the end of the first quarter in 2013. At full production, the project was expected to produce more than 200,000 tons per year of acid-grade fluorspar for export.

Other noteworthy developments in the international fluorspar industry included the sale of the United Kingdom's sole fluorspar producer, which shut down yearend 2010, and the announcement that it would reopen in early 2013. Russia's primary fluorspar producer became a wholly owned subsidiary of Russia's leading aluminum company, which announced plans to invest about \$3 million to modernize the fluorspar mining operation north of Vladivostok.

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In September 2011, China appealed the World Trade Organization (WTO) ruling that its export restrictions on several industrial raw materials (including fluorspar) were inconsistent with WTO rules. In January 2012, the WTO Appellate Body affirmed a WTO dispute settlement panel's July 2011 finding that found China's export restraints on these materials to be inconsistent with China's WTO obligations and rejected China's attempts to portray its export restraints as conservation or environmental protection measures or measures taken to manage critical shortages of supply.

Fluorspar prices remained relatively stable in 2012 despite weak demand, especially by the global fluorochemicals industry. The price of Chinese acid-grade fluorspar (free on board China), however, had decreased by at least \$30 per ton by the summer of 2012.

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 Mongolia has been revised based on new information.

	Mine production		Reserves ^{4, 5}
	2011	2012 ^e	
United States	NA	NA	NA
Brazil	26	25	1,000
China	4,700	4,200	24,000
Kazakhstan	67	60	NA
Kenya	117	107	2,000
Mexico	1,207	1,200	32,000
Mongolia	416	420	22,000
Morocco	79	75	NA
Namibia	80	80	3,000
Russia	260	150	NA
South Africa	240	220	41,000
Spain	124	120	6,000
Other countries	200	190	110,000
World total (rounded)	7,520	6,850	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.

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

⁵Measured as 100% calcium fluoride.