

FLUORSPAR

(Data in thousand metric tons unless otherwise noted)

Domestic Production and Use: In Illinois, fluorspar 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, about 85% of reported fluorspar consumption went into the production of hydrofluoric acid (HF) in Louisiana and Texas and aluminum fluoride in Texas. HF is the primary feedstock for the manufacture of virtually all organic and inorganic fluorine-bearing chemicals and is also a key ingredient in the processing of aluminum and uranium. The remaining 15% of the reported fluorspar consumption was 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. An estimated 52,000 tons of fluorosilicic acid (equivalent to about 92,000 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:	2004	2005	2006	2007	2008^e
Production:					
Finished, all grades	—	—	—	—	NA
Fluorspar equivalent from phosphate rock	90	86	70	94	92
Imports for consumption:					
Acid grade	546	586	490	577	465
Metallurgical grade	53	43	62	43	75
Total fluorspar imports	599	629	553	620	540
Fluorspar equivalent from hydrofluoric acid plus cryolite	197	209	233	233	230
Exports ¹	21	36	13	14	15
Shipments from Government stockpile	62	28	66	17	—
Consumption:					
Apparent ²	691	616	608	613	460
Reported	618	582	523	539	550
Price, average value, dollars per ton, c.i.f. U.S. port					
Acid grade	167	202	217	NA	NA
Metallurgical grade	83	93	101	111	104
Stocks, yearend, consumer and dealer ³	105	131	90	90	80
Employment, mine and mill, number	—	—	—	—	—
Net import reliance ⁴ 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 (2004-07): China, 58%; Mexico, 26%; South Africa, 10%; and Mongolia, 6%.

Tariff: Item	Number	Normal Trade Relations 12-31-08
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: There were no sales of fluorspar during fiscal year 2008. The Defense National Stockpile Center, Defense Logistics Agency, reported that 206 tons of unspecified acid-grade and metallurgical-grade fluorspar remained in the stockpile as of September 30, 2008.

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Events, Trends, and Issues: In 2008, Hastie Mining Co. and Moodie Mineral Co. completed their drilling program for fluor spar in Livingston County, KY, and barring permitting problems expected to break ground on the Klondike II Fluorspar Mine before the end of the year. The company installed a heavy-media plant to process stockpiled fluor spar ore produced as a byproduct at its limestone quarry in Hardin County, IL. The flotation mill at Salem, KY, was vandalized while it sat idle; as a result, it will require significant time and expense to bring the plant back into operating condition.⁵

Acid-grade fluor spar prices increased dramatically and reached historic highs in 2008. A reduction in Chinese exports of fluor spar was the leading cause, but other factors such as increasing costs in China (production, domestic transport, and taxes), high ocean shipping rates, and inflationary pressures contributed to the rise in prices. Published prices for Chinese acid-grade fluor spar delivered to the U.S. Gulf of Mexico increased from a range of \$300 to \$305 per metric ton at the beginning of the year to \$530 to \$550 per ton in early October. These steep price increases were reflected, although to a lesser degree, in prices for Mexican and South African acid-grade fluor spar. During the same time period, Mexican prices (for low-arsenic product) increased from a range of \$270 to \$280 per ton to \$400 to \$420, while South African prices (free on board Durban) increased from \$175 to \$204 per ton to \$250 per ton.^{6,7}

World Mine Production, Reserves, and Reserve Base: Estimates for reserves and reserve base for France were revised to zero. France's sole producer ceased production in 2006, citing insufficient reserves for further production.

	Mine production		Reserves ^{8,9}	Reserve base ^{8,9}
	2007	2008 ^e		
United States	—	NA	NA	6,000
China	3,200	3,200	21,000	110,000
Kenya	82	100	2,000	3,000
Mexico	933	980	32,000	40,000
Mongolia	380	400	12,000	16,000
Morocco	90	90	NA	NA
Namibia	¹⁰ 118	¹⁰ 120	3,000	5,000
Russia	180	200	NA	18,000
South Africa	285	340	41,000	80,000
Spain	150	140	6,000	8,000
Other countries	<u>270</u>	<u>270</u>	<u>110,000</u>	<u>180,000</u>
World total (rounded)	5,690	5,840	230,000	470,000

World Resources: Identified world fluor spar resources were approximately 500 million tons of contained fluor spar. The quantity of fluorine present in phosphate rock deposits is enormous. Current U.S. reserves of phosphate rock are estimated to be 1.0 billion tons, which at 3.5% fluorine would contain 35 million tons of fluorine, equivalent to about 72 million tons of fluor spar. World reserves of phosphate rock are estimated to be 18 billion tons, equivalent to 630 million tons of fluorine and 1.29 billion tons of fluor spar.

Substitutes: Aluminum smelting dross, borax, calcium chloride, iron oxides, manganese ore, silica sand, and titanium dioxide have been used as substitutes for fluor spar fluxes. Byproduct fluorosilicic acid from phosphoric acid production 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.

¹Exports are all general imports reexported or National Defense Stockpile material exported.

²Excludes fluor spar equivalent of fluorosilicic acid, hydrofluoric acid, and cryolite.

³Industry stocks for three leading consumers and fluor spar distributors.

⁴Defined as imports – exports + adjustments for Government and industry stock changes.

⁵B. Moodie, Moodie Mineral Co., oral commun., September 2008.

⁶Industrial Minerals, 2008, Prices: Industrial Minerals, no. 484, January, p. 64.

⁷Industrial Minerals, 2008, Prices: Industrial Minerals, no. 493, October, p. 88.

⁸See Appendix C for definitions.

⁹Measured as 100% calcium fluoride.

¹⁰Data are in wet tons.