

FLUORSPAR

(Data in thousand metric tons unless otherwise noted)

Domestic Production and Use: There was little or no domestic mining of fluor spar in 2005. Some byproduct calcium fluoride was recovered from industrial waste streams, although data are not available on exact quantities. Material purchased from the National Defense Stockpile or imported was screened and dried for resale to customers. Domestically, about 87% of reported fluor spar 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 13% of the reported fluor spar consumption was as a flux in steelmaking, in iron and steel foundries, primary aluminum production, glass manufacture, enamels, welding rod coatings, cement production, and other uses or products. An estimated 49,000 tons of fluorosilicic acid (equivalent to about 86,000 tons of 92% fluor spar) was recovered from phosphoric acid plants processing phosphate rock. Fluorosilicic acid was used primarily in water fluoridation, either directly or after processing into sodium silicofluoride.

Salient Statistics—United States:	2001	2002	2003	2004	2005^e
Production:					
Finished, all grades ¹	NA	—	—	—	—
Fluor spar equivalent from phosphate rock	104	92	94	90	86
Imports for consumption:					
Acid grade	495	466	533	546	550
Metallurgical grade	27	28	34	53	50
Total fluor spar imports	522	494	567	599	600
Fluor spar equivalent from hydrofluoric acid plus cryolite	176	182	180	197	208
Exports²	21	24	31	21	23
Shipments from Government stockpile	65	23	75	62	22
Consumption:					
Apparent ³	543	477	589	691	600
Reported	536	588	616	673	634
Stocks, yearend, consumer and dealer⁴	221	245	206	105	104
Employment, mine and mill, number	5	—	—	—	—
Net import reliance⁵ as a percentage of apparent consumption	100	100	100	100	100

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

Import Sources (2001-04): China, 63%; South Africa, 19%; Mexico, 15%; and other, 3%.

Tariff: Item	Number	Normal Trade Relations 12-31-05
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: During fiscal year 2005, the Defense National Stockpile Center (DNSC) sold about 47,800 tons (52,700 short dry tons) of metallurgical grade and 10,000 tons (11,000 short dry tons) of acid grade from the Defense National Stockpile. Under the proposed fiscal year 2006 Annual Materials Plan, the DNSC will be authorized to sell 54,400 tons (60,000 short dry tons) of metallurgical grade and 10,900 tons (12,000 short dry tons) of acid grade, although actual quantities will be limited to remaining inventory.

Stockpile Status—9-30-05⁶

Material	Uncommitted inventory	Committed inventory	Authorized for disposal	Disposal plan FY 2005	Disposals FY 2005
Acid grade	5	5	5	11	53
Metallurgical grade	40	47	40	54	10

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Events, Trends, and Issues: Tiberon Minerals Ltd. announced the completion of the final feasibility study for the Nui Phao tungsten-fluorspar project in Vietnam. The study concluded that the project could successfully produce more than 210,000 tons per year of fluorspar, 4,700 tons per year of tungsten, and quantities of bismuth, copper, and gold. In addition, the Vietnamese Government granted the project a mining license, which allows Tiberon and its partners to proceed with financing, construction, and startup of the mining operation, which is scheduled for early 2008.⁷

There were spot shortages of fluorosilicic acid for water fluoridation during the summer, which resulted in higher prices. The shortages were caused by the ongoing shutdown (expected to close in December 2005) of U.S. Agri-Chemicals Corp.'s phosphoric acid plant in Fort Meade, FL, and by increased demand from communities starting up new fluoridation programs (especially in California).⁸ In previous years, the Fort Meade plant had produced about 15% of U.S. annual production of fluorosilicic acid and accounted for an even higher percentage of the amount sold for water fluoridation.

There continues to be concern among environmental groups and some scientists over the possible health effects of fluorides, especially on certain age groups. In response to research that appears to offer evidence for the carcinogenicity of fluoride in young boys, a coalition of U.S. Environmental Protection Agency (EPA) unions has requested a moratorium on the national program of the U.S. Public Health Service to fluoridate all U.S. public water supplies. In a related fluoride issue, environmental groups have petitioned the EPA to retract the recently finalized fluoride pesticide tolerances on food. The rule pertains to the fluoride-based pesticide, sulfuryl fluoride, which is used as a pesticide in the structural fumigation industry, but has now been approved as a fumigant to replace the ozone-depleting chemical, methyl bromide, in the food processing, grain milling, and stored commodity industries.

World Mine Production, Reserves, and Reserve Base:

	Mine production		Reserves ^{9, 10}	Reserve base ^{9, 10}
	2004	2005 ^e		
United States	—	—	NA	6,000
China	2,700	2,700	21,000	110,000
France	90	95	10,000	14,000
Kenya	108	110	2,000	3,000
Mexico	808	750	32,000	40,000
Mongolia	295	350	12,000	16,000
Morocco	81	85	NA	NA
Namibia	¹¹ 105	¹¹ 112	3,000	5,000
Russia	170	170	Moderate	18,000
South Africa	275	275	41,000	80,000
Spain	140	140	6,000	8,000
Other countries	<u>290</u>	<u>290</u>	<u>110,000</u>	<u>180,000</u>
World total (rounded)	5,060	5,080	230,000	480,000

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 1.0 billion tons, which at 3.5% fluorine would contain 35 million tons of fluorine, equivalent to about 72 million tons of fluorspar. 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 fluorspar.

Substitutes: Olivine and/or dolomitic limestone have been used as substitutes for fluorspar. 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.

¹Shipments.

²Exports are all general imports reexported or National Defense Stockpile material exported.

³Excludes fluorspar equivalent of fluorosilicic acid, hydrofluoric acid, and cryolite.

⁴Industry stocks for three leading consumers, fluorspar distributors, and National Defense Stockpile material committed for sale pending shipment.

⁵Defined as imports – exports + adjustments for Government and industry stock changes.

⁶[See Appendix B for definitions.](#)

⁷Tiberon Minerals Ltd., 2005, Press releases, accessed August 31, 2005, via URL <http://www.tiberon.com/pressreleases.html>.

⁸McCoy, Michael, 2005, Fluoride shortfall: Chemical and Engineering News, v. 83, no. 40, October 3, p. 12.

⁹[See Appendix C for definitions.](#)

¹⁰Measured as 100% calcium fluoride.

¹¹Data are in wet tons.