# FLUORSPAR

(Data in thousand metric tons, unless otherwise noted)

**Domestic Production and Use:** There was no domestic mining of fluorspar in 2003. 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 80% 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 20% of the reported fluorspar 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 52,000 tons of fluorosilicic acid (equivalent to 92,000 tons of 92% fluorspar) 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: | 1999 | 2000 | 2001 | 2002 | 2003[e] |
|---|---|---|---|---|---|
| Production: | | | | | |
| Finished, all grades[1] | — | NA | NA | — | — |
| Fluorspar equivalent from phosphate rock | 122 | 119 | 104 | 92 | 92 |
| Imports for consumption: | | | | | |
| Acid grade | 419 | 484 | 495 | 466 | 510 |
| Metallurgical grade | 59 | 39 | 27 | 28 | 35 |
| Total fluorspar imports | 478 | 523 | 522 | 494 | 545 |
| Fluorspar equivalent from hydrofluoric acid plus cryolite | 192 | 208 | 176 | 182 | 200 |
| Exports[2] | 55 | 40 | 21 | 24 | 30 |
| Shipments from Government stockpile | 131 | 106 | 65 | 23 | 75 |
| Consumption: | | | | | |
| Apparent[3] | 615 | 601 | 543 | 442 | 590 |
| Reported | 514 | 512 | 536 | 588 | 574 |
| Stocks, yearend, consumer and dealer[4] | 373 | 289 | 221 | 245 | 217 |
| Employment, mine and mill, number | — | 5 | 5 | — | — |
| Net import reliance[5] as a percentage of apparent consumption | 100 | 100 | 100 | 100 | 100 |

**Recycling:** An estimated 8,000 to 10,000 tons per year of synthetic fluorspar is recovered primarily from uranium enrichment, but also from stainless steel pickling and petroleum alkylation. Primary aluminum producers recycled HF and fluorides from smelting operations. HF is recycled in the petroleum alkylation process.

**Import Sources (1999-2002):** China, 66%; South Africa, 22%; and Mexico, 12%.

| Tariff: Item | Number | Normal Trade Relations 12/31/03 |
|---|---|---|
| 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 2003, there were no fluorspar sales from the Defense National Stockpile. Under the proposed fiscal year 2004 Annual Materials Plan, the Defense National Stockpile Center will be authorized to sell 54,400 metric tons (60,000 short dry tons) of metallurgical grade and 10,900 tons (12,000 short dry tons) of acid grade.

**Stockpile Status—9-30-03[6]**

| Material | Uncommitted inventory | Committed inventory | Authorized for disposal | Disposal plan FY 2003 | Disposals FY 2003 |
|---|---|---|---|---|---|
| Acid grade | 7 | 80 | 11 | 11 | — |
| Metallurgical grade | 82 | 13 | 54 | 54 | — |

Prepared by **M. Michael Miller [(703) 648-7716, mmiller1@usgs.gov, fax: (703) 648-7757]**

# FLUORSPAR

**Events, Trends, and Issues:** China cut its fluorspar export quotas for 2003 to 850,000 tons. This is the second year in a row that China has cut exports, and during that period, exports have decreased by 300,000 tons. This has resulted in short supplies and rising prices. Other producers are likely to attempt to increase production, but short of new mine development, there is no way to make up for the entire Chinese shortfall. There are prospects for new mine development in Australia, Canada, Mexico, and Vietnam, but even if any of these projects are completed, it will still be several years before significant new production is seen.

The European Commission of the European Union (EU) has prepared draft legislation to reduce emissions of fluorinated gases in the EU by 25% by 2010. The Commission's regulations target combined emissions of hydrofluorocarbons (HFCs), perfluorocarbons, and sulfur hexafluoride and call for a phaseout of HFC-134a in air-conditioning systems in new vehicles between 2009 and 2013. The regulations will require approval by all 15 EU member nations and the European Parliament. If approved, the regulations will negatively affect future fluorspar and fluorochemical demand in Europe.

**World Mine Production, Reserves, and Reserve Base:**

| | Mine production | | Reserves[7, 8] | Reserve base[7, 8] |
|---|---|---|---|---|
| | 2002 | 2003[e] | | |
| United States | — | — | NA | 6,000 |
| China | 2,450 | 2,450 | 21,000 | 110,000 |
| France | 105 | 110 | 10,000 | 14,000 |
| Kenya | 98 | 100 | 2,000 | 3,000 |
| Mexico | 650 | 630 | 32,000 | 40,000 |
| Mongolia | 200 | 190 | 12,000 | 16,000 |
| Morocco | 96 | 95 | NA | NA |
| Namibia | [9]81 | [9]85 | 3,000 | 5,000 |
| Russia | 200 | 200 | Moderate | 18,000 |
| South Africa | 227 | 240 | 41,000 | 80,000 |
| Spain | 130 | 125 | 6,000 | 8,000 |
| Other countries | 310 | 320 | 110,000 | 180,000 |
| World total (rounded) | 4,550 | 4,540 | 230,000 | 480,000 |

**World Resources:** Identified world fluorspar resources were approximately 500 million tons of contained fluorspar. Resources of equivalent fluorspar from domestic phosphate rock were approximately 32 million tons. World resources of fluorspar from phosphate rock were estimated at 330 million tons.

**Substitutes:** Olivine and/or dolomitic limestone were used as substitutes for fluorspar. Byproduct fluorosilicic acid from phosphoric acid production was used as a substitute in aluminum fluoride production, and the potential also exists to use it as a substitute in HF production.

[e]Estimated. NA Not available. — Zero.

[1]Shipments.

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

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

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

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

[6]See Appendix B for definitions.

[7]See Appendix C for definitions.

[8]Measured as 100% calcium fluoride.

[9]Data are in wet tons.