

## SULFUR

(Data in thousand metric tons of sulfur, unless otherwise noted)

**Domestic Production and Use:** In 1996, elemental sulfur and byproduct sulfuric acid were produced at 168 operations in 30 States, Puerto Rico, and the U.S. Virgin Islands. Total shipments were valued at about \$450 million. Total elemental sulfur production was 10.3 million metric tons; Texas and Louisiana accounted for about 50% of domestic production. Elemental sulfur was recovered at petroleum refineries, natural gas processing plants, and coking plants by 59 companies at 150 plants in 26 States, Puerto Rico, and the U.S. Virgin Islands. Elemental sulfur was produced by one company at two mines in two States, using the Frasch method of mining. Byproduct sulfuric acid, representing 13% of sulfur in all forms, was recovered at 16 nonferrous smelters in 10 States by 11 companies. Domestic elemental sulfur provided 69% of domestic consumption and byproduct acid 11%. The remaining 20% of sulfur consumed was imported sulfur and sulfuric acid. About 90% of sulfur was consumed in the form of sulfuric acid. Agricultural chemicals (primarily fertilizers) comprised 67% of sulfur demand; chemicals, organic and inorganic, 8%; metal mining, 6%; and petroleum refining, 5%. Other uses, accounting for 14% of demand, were widespread because a multitude of industrial products require sulfur in one form or another during some stage in their manufacture.

<b>Salient Statistics—United States:</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996<sup>e</sup></b>
Production: Frasch	2,320	<sup>1</sup> 1,900	2,960	3,150	W
Recovered elemental	7,050	<sup>2</sup> 7,720	7,160	7,250	<sup>3</sup> 10,300
Other forms	<u>1,300</u>	<u>1,430</u>	<u>1,380</u>	<u>1,400</u>	<u>1,500</u>
Total	<u>10,700</u>	<u>11,100</u>	<u>11,500</u>	<u>11,800</u>	<u>11,800</u>
Shipments, all forms	11,000	10,500	11,700	12,100	11,800
Imports for consumption:					
Recovered, elemental	2,730	2,040	1,650	2,510	2,000
Sulfuric acid, sulfur content	649	797	696	628	650
Exports:					
Frasch and recovered elemental	966	656	899	906	1,000
Sulfuric acid, sulfur content	46	46	46	56	35
Consumption, apparent, all forms	13,400	12,600	13,100	14,300	13,400
Price, reported average value, dollars per ton					
of elemental sulfur, f.o.b., mine and/or plant	48.14	31.86	28.60	43.74	38.00
Stocks, producer, yearend	809	1,380	1,160	583	800
Employment, mine and/or plant, number	3,200	3,100	3,100	3,100	3,100
Net import reliance <sup>4</sup> as a percent of					
apparent consumption	20	12	12	21	11

**Recycling:** About 3 million tons of spent acid was reclaimed from petroleum refining and chemical processes.

**Import Sources (1992-95):** Frasch and recovered: Canada, 68%; Mexico, 31%; and other, 1%. Sulfuric acid: Canada, 71%; Germany, 10%; Japan, 5%; Mexico, 5%; and other, 9%. Total sulfur imports: Canada, 70%; Mexico, 18%; Germany, 5%; Japan, 3%; and other, 4%.

<b>Tariff: Item</b>	<b>Number</b>	<b>Most favored nation (MFN)</b>	<b>Non-MFN<sup>5</sup></b>
		<b>12/31/96</b>	<b>12/31/96</b>
Sulfur, crude or unrefined	2503.10.0000	Free	Free.
Sulfur, all kinds, other	2503.90.0000	Free	Free.
Sulfur, sublimed or precipitated	2802.00.0000	Free	Free.
Sulfuric acid	2807.00.0000	Free	Free.

**Depletion Allowance:** 22% (Domestic), 22% (Foreign).

**Government Stockpile:** None.

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**Events, Trends, and Issues:** Although domestic sulfur demand was reasonably strong, the availability of excess sulfur worldwide forced price reductions by suppliers to maintain market share. Sulfur consumers were looking for alternative sources of supply to keep their costs down, and for this reason the United States saw its first shipments of molten sulfur from Germany. Reduced prices prompted the single domestic Frasch company to cut production at its mines off-shore Louisiana and in west Texas by an equivalent of 350,000 tons per year in an attempt to balance supply and demand and to stabilize prices. The price slide that began early in the year seemed to be leveling off by yearend, and slight increases were expected.

Prices of imports from Canada reached a low enough level that some Canadian producers withheld product from the United States market rather than face the possibility of an antidumping investigation. After several years of investigation, the U.S. Department of Commerce levied antidumping duties against several Canadian sulfur producers that were exporting to the United States from December 1, 1991, through November 30, 1992.

Domestic sulfur production is expected to increase slightly for the next few years, with Frasch production remaining relatively stable at reduced levels as long as both mines continue to operate. Recovered production should continue its slow but consistent growth. Small quantities of sulfur or sulfuric acid recovered from electric powerplants should enter the market during the next few years. Apparent consumption of sulfur is projected to be 13.5 million tons in 1997.

### World Production, Reserves, and Reserve Base:

	Production—All forms		Reserves <sup>6</sup>	Reserve base <sup>6</sup>
	1995	1996 <sup>e</sup>		
United States	11,800	11,800	140,000	230,000
Canada	9,010	9,100	160,000	330,000
China	6,530	6,000	100,000	250,000
France	1,100	1,100	10,000	20,000
Iraq	475	475	130,000	500,000
Japan	2,860	2,900	5,000	15,000
Mexico	2,880	3,000	75,000	120,000
Poland	2,440	2,000	130,000	300,000
Russia	4,000	4,000	NA	NA
Saudi Arabia	2,200	2,200	100,000	130,000
Spain	702	600	50,000	300,000
Other countries	<u>10,300</u>	<u>10,800</u>	<u>500,000</u>	<u>1,300,000</u>
World total (may be rounded)	54,300	54,000	1,400,000	3,500,000

**World Resources:** Resources of elemental sulfur in evaporite and volcanic deposits and sulfur associated with natural gas, petroleum, tar sands, and metal sulfides amount to about 5 billion tons. The sulfur in gypsum and anhydrite is almost limitless, and some 600 billion tons are contained in coal, oil shale, and shale rich in organic matter, but low-cost methods have not been developed to recover sulfur from these sources. The domestic resource is about one-fifth of the world total.

**Substitutes:** There are no adequate substitutes for sulfur at present or anticipated price levels; some acids, in certain applications, may be substituted for sulfuric acid.

<sup>e</sup>Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data.

<sup>1</sup>Includes 10 months of Frasch sulfur data. Two remaining months of Frasch data included with recovered sulfur data to conform with proprietary data requirements.

<sup>2</sup>Includes corresponding Frasch sulfur data for November and December.

<sup>3</sup>Includes Frasch sulfur data.

<sup>4</sup>Defined as imports - exports + adjustments for Government and industry stock changes.

<sup>5</sup>See Appendix B.

<sup>6</sup>See Appendix C for definitions.