SULFUR

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

Domestic Production and Use: In 2001, elemental sulfur and byproduct sulfuric acid were produced at 128 operations in 30 States and the U.S. Virgin Islands. Total shipments were valued at about $200 million. Elemental sulfur production was 9.3 million tons; Louisiana and Texas accounted for about 50% of domestic production. Elemental sulfur was recovered at petroleum refineries, natural-gas-processing plants, and coking plants by 39 companies at 117 plants in 26 States and the U.S. Virgin Islands. Mining of elemental sulfur using the Frasch method, ended in 2000. Byproduct sulfuric acid, representing 11% of sulfur in all forms, was recovered at 10 nonferrous smelters in 7 States by 8 companies. Three copper smelters that previously generated byproduct sulfuric acid were idle. Domestic elemental sulfur provided 70% of domestic consumption, and byproduct acid accounted for 8%. The remaining 22% of sulfur consumed was provided by imported sulfur and sulfuric acid. About 90% of sulfur was consumed in the form of sulfuric acid. Agricultural chemicals (primarily fertilizers) composed 63% of reported sulfur demand; petroleum refining, 14%; metal mining, 5%; and organic and inorganic chemicals, 5%. Other uses, accounting for 13% of demand, were widespread because a multitude of industrial products required sulfur in one form or another during some stage of their manufacture.

Salient Statistics—United States:	1997	1998	1999	2000	2001[e]
Production:					
Frasch[e]	2,820	1,800	1,780	900	—
Recovered elemental	7,650	8,220	8,220	8,380	8,200
Other forms	1,550	1,610	1,320	1,030	1,000
Total[e] (may be rounded)	12,000	11,600	11,300	10,300	9,200
Shipments, all forms	11,900	12,100	11,100	10,500	9,100
Imports for consumption:					
Recovered, elemental	2,060	2,270	2,580	2,330	1,700
Sulfuric acid, sulfur content	659	668	447	463	480
Exports:					
Frasch and recovered elemental	703	889	685	762	760
Sulfuric acid, sulfur content	39	51	51	62	80
Consumption, apparent, all forms	13,900	14,100	13,400	12,500	10,400
Price, reported average value, dollars per ton of elemental sulfur, f.o.b., mine and/or plant	36.06	29.14	37.81	24.73	18.00
Stocks, producer, yearend	761	283	451	208	300
Employment, mine and/or plant, number	3,100	3,100	3,000	3,000	2,700
Net import reliance[1] as a percentage of apparent consumption	13	18	16	18	12

Recycling: Between 3 and 5 million tons of spent sulfuric acid was reclaimed from petroleum refining and chemical processes.

Import Sources (1997-2000): Elemental: Canada, 68%; Mexico, 22%; Venezuela, 8%; and other, 2%. Sulfuric acid: Canada, 70%; Mexico, 10%; Japan, 8%; and other, 12%. Total sulfur imports: Canada, 68%; Mexico, 20%; Venezuela, 6%; and other, 6%.

Tariff: Item	Number	Normal Trade Relations 12/31/01
Sulfur, crude or unrefined	2503.00.0010	Free.
Sulfur, all kinds, other	2503.00.0090	Free.
Sulfur, sublimed or precipitated	2802.00.0000	Free.
Sulfuric acid	2807.00.0000	Free.

Depletion Allowance: 22% (Domestic and foreign).

Government Stockpile: None.

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SULFUR

Events, Trends, and Issues: Total sulfur production decreased significantly in 2001 because the final U.S. Frasch mine closed in 2000. Production of recovered elemental sulfur from petroleum refineries will continue its steady growth, supported by new facilities being installed to increase refining capacity and the capability of current operations to handle higher sulfur crude oil. Additional equipment will be installed at many refineries to reduce the sulfur in gasoline and diesel fuel to comply with the new environmental regulations enacted in 2000 and 2001. Recovered sulfur from natural gas processing decreased. Byproduct sulfuric acid production continued at low rates. A Frasch operation in Poland closed, leaving one in operation there. Despite decreased native sulfur production, world production remained about the same because of expanded recovered sulfur production worldwide. Pyrites production decreased because of environmental and cost considerations.

Significantly decreased production in the domestic phosphate fertilizer industry resulted in dramatically lower sulfur consumption. Increased production of phosphate fertilizers could raise sulfur consumption to about 11.2 million tons in 2002. Increased imports will be required to meet most increased demand. Additional facilities for importing formed sulfur were under development to increase the alternative sources available.

World Production, Reserves, and Reserve Base:

	Production—All forms		Reserves[2]	Reserve base[2]
	2000	2001[e]		
United States	10,300	9,200	80,000	230,000
Australia	689	750	NA	NA
Belgium	410	400	NA	NA
Canada	9,900	9,500	160,000	330,000
Chile	1,100	1,100	NA	NA
China	5,220	5,000	100,000	250,000
Finland	850	850	NA	NA
France	1,110	1,000	10,000	20,000
Germany	1,240	1,250	NA	NA
Iran	1,350	1,500	NA	NA
Italy	693	700	NA	NA
Japan	3,500	3,500	5,000	15,000
Kazakhstan	1,500	1,700	NA	NA
Korea, Republic of	490	500	NA	NA
Kuwait	675	600	NA	NA
Mexico	1,310	1,350	75,000	120,000
Netherlands	512	550	NA	NA
Poland	1,700	1,300	100,000	300,000
Russia	5,900	6,400	NA	NA
Saudi Arabia	2,400	2,100	100,000	130,000
South Africa	448	400	NA	NA
Spain	685	500	50,000	300,000
United Arab Emirates	1,120	1,200	NA	NA
Uzbekistan	460	470	NA	NA
Venezuela	450	500	NA	NA
Other countries	3,200	3,200	630,000	1,800,000
World total (may be rounded)	57,200	55,500	1,300,000	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. Elemental sulfur deposits have become marginal reserves unless the deposits are already developed. Sulfur from petroleum and metal sulfides may be recovered where they are refined, which may be in the country of origin or in an importing nation. The rate of sulfur recovery from refineries is dependent on the environmental regulations where refining is accomplished, most of which are becoming more stringent.

Substitutes: Substitutes for sulfur at present or anticipated price levels are not satisfactory; some acids, in certain applications, may be substituted for sulfuric acid.

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

[1]Defined as imports - exports + adjustments for Government and industry stock changes.

[2]See Appendix C for definitions.