BISMUTH

(Data in metric tons of bismuth content, unless otherwise noted)

Domestic Production and Use: One refinery in Nebraska produced bismuth as a byproduct of lead refining. Thirty-five companies in the Eastern United States accounted for an estimated three-fourths of the bismuth consumed in 1996. Based on the average annual price, the value of bismuth consumed was estimated at more than $12 million. About 62% of bismuth was used in pharmaceuticals and chemicals, 20% in fusible alloys and solders, 15% in metallurgical additives, and 3% in other uses.

Salient Statistics—United States:	1992	1993	1994	1995	1996[e]
Production, refinery	W	W	W	W	W
Imports for consumption	1,620	1,330	1,660	1,450	1,600
Exports[1]	90	70	160	261	120
Shipments from Government stockpile excesses	91	—	145	139	137
Consumption, reported	1,300	1,300	1,450	([2])	([2])
Price, average, domestic dealer, dollars per pound	2.66	2.50	3.25	3.85	3.60
Stocks, yearend, consumer	272	323	402	390	400
Employment, plant, number[e]	30	30	30	30	30
Net import reliance[3] as a percent of apparent consumption	W	W	W	W	W

Recycling: Bismuth was recovered from fusible alloy scrap, contributing about 5% of the U.S. supply.

Import Sources (1992-95): Mexico, 35%; Belgium, 31%; China, 12%; the United Kingdom, 7%; and other, 15%.

Tariff: Item	Number	Most favored nation (MFN) 12/31/96	Non-MFN[4] 12/31/96
Articles thereof, including waste and scrap	8106.00.0000	Free	7.5% ad val.

Depletion Allowance: 22% (Domestic), 14% (Foreign).

Government Stockpile:

Stockpile Status—9-30-96

Material	Uncommitted inventory	Committed inventory	Authorized for disposal	Disposals Jan.-Sept. 96
Bismuth	229	136	229	84

Events, Trends, and Issues: On April 15, 1996, the only domestic producer announced that it had reached agreement with the City of Omaha, NE, to cease all operations at its Omaha refinery by February 1, 1998, and remediate the property for use as a park. The company stopped refining lead at Omaha on June 1, 1996, but planned to continue processing other materials, including bismuth, at the plant until February 1998.

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Bismuth was used in several newly developed applications designed to provide nontoxic substitutes for lead. New products include bismuth fishing sinkers; bismuth shot for waterfowl hunting; and bismuth-containing brass, pigments, ceramic glazes, solders, lubricating greases, and crystal ware. In order to make a large impact on the bismuth market, lead would have to be banned or severely restricted nationwide for a major use. This happened, when seven large faucet makers, representing about one-half of domestic faucet sales, agreed in July 1995, to remove essentially all lead from plumbing fixtures in the settlement of a suit brought by the State of California and the Natural Resources Defense Fund. However, demand for bismuth in this sector had not yet increased in 1996.

World production of bismuth has not increased for 3 years, owing mainly to low prices. World lead production has also declined in recent years, limiting the amount of bismuth that can be produced. The domestic price drifted down from $4.20 per pound to $3.30 per pound during 1996, and averaged $3.60 per pound. This was the first year in the past 3 years that the price did not increase. The Defense Logistics Agency (DLA) sold 137 tons of bismuth from the National Defense Stockpile in fiscal year 1996. The DLA was authorized to dispose of 136 tons in fiscal year 1997.

The U.S. Fish and Wildlife Service again conditionally approved the use of 97% bismuth - 3% tin shot for waterfowl hunting in the 1996-97 hunting season. Recent studies have shown bismuth-tin shot to be nontoxic to waterfowl. Bismuth-tin shot is an alternative to steel shot, which replaced lead shot for waterfowl hunting in 1991.

A potential supply problem caused by the shutdown of production by the only domestic producer will likely be ameliorated by production anticipated from the Tasna Mine in Bolivia, the only mine in the world where bismuth is the primary product, and by the startup of a new smelter in British Columbia that will upgrade one Canadian company from campaign producer to steady producer.

World Mine Production, Reserves, and Reserve Base:

	Mine production		Reserves[5]	Reserve base[5]
	1995	1996[e]		
United States	W	W	9,000	14,000
Australia	—	—	18,000	27,000
Bolivia	—	—	5,000	10,000
Canada	126	125	5,000	30,000
China	700	700	20,000	40,000
Japan	177	175	9,000	18,000
Kazakstan	25	25	5,000	10,000
Mexico	900	900	10,000	20,000
Peru	1,000	1,000	11,000	42,000
Other countries	110	100	15,000	35,000
World total (rounded)	[6]3,040	[6]3,030	110,000	250,000

World Resources: Bismuth is recovered in the United States during the processing of domestic and imported lead ores and concentrates. It is also potentially recoverable as a byproduct of the processing of molybdenum and tungsten ores, although extraction of bismuth from these ores is for the most part not economic. World reserves of bismuth are usually associated with lead deposits, except in China and North Korea, where bismuth is found with tungsten ores, and in Australia, where it is found with copper-gold ores. Bismuth minerals rarely occur in sufficient quantities to be mined as principal products, except in Bolivia and possibly in China.

Substitutes: Antibiotics, magnesia, and alumina can replace bismuth in pharmaceutical applications. Titanium dioxide-coated mica flakes and fish scale extracts are substitutes in pigment uses. Indium can replace bismuth in low-temperature solders. Resins can replace bismuth alloys in holding jigs for machining. Glycerine-filled glass bulbs replace bismuth alloys as a triggering device for fire sprinklers. Selenium, tellurium, or lead could replace bismuth in free machining alloys.

[e]Estimated. W Withheld to avoid disclosing company proprietary data.

[1]Includes bismuth, bismuth alloys, and waste and scrap.

[2]Data currently under review.

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

[4]See Appendix B.

[5]Most of reserves and reserve base represent bismuth recoverable from the lead reserve base. See Appendix C for definitions.

[6]Excludes U.S. production.