

BERYLLIUM

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

Domestic Production and Use: A company in Utah mined bertrandite ore and recovered beryllium hydroxide from this ore and from imported beryl. The beryllium hydroxide was shipped to a plant in Ohio, where it was converted into beryllium metal, alloys, and oxide. Beryllium consumption of 220 tons was valued at about \$80 million, based on the quoted producer price for beryllium-copper master alloy. The use of beryllium (as an alloy, metal, and oxide) in electronic and electrical components and aerospace and defense applications accounted for an estimated 80% of total consumption.

Salient Statistics—United States:	1998	1999	2000	2001	2002^e
Production, mine shipments	243	200	180	100	100
Imports for consumption, ore and metal	50	20	20	115	120
Exports, metal	60	40	35	60	100
Government stockpile releases ^{e 1}	57	145	220	60	60
Consumption:					
Apparent	320	385	300	230	220
Reported, ore	270	260	240	170	170
Price, dollars (yearend):					
Domestic, metal, vacuum-cast ingot, per pound	327	327	421	338	NA
Domestic, metal, powder blend, per pound	385	385	492	375	375
Domestic, beryllium-copper master alloy, per pound of contained beryllium	160	160	160	160	160
Domestic, beryllium oxide, powder, per pound	77	77	100	100	NA
Stocks, consumer, yearend	80	20	115	100	60
Net import reliance ² as a percentage of apparent consumption	24	48	37	57	55

Recycling: Quantities of new scrap generated in the processing of beryllium-copper alloys and quantities of obsolete military equipment containing metallic beryllium were recycled. Data on beryllium recycled in this manner were not available.

Import Sources (1998-2001): Ore, metal, scrap, and master alloy: Kazakhstan, 37%; Russia, 16%; Brazil, 9%; Philippines, 8%; and other, 30%.

Tariff: Item	Number	Normal Trade Relations 12/31/02
Beryllium ores and concentrates	2617.90.0030	Free.
Beryllium oxide or hydroxide	2825.90.1000	3.7% ad val.
Beryllium-copper master alloy	7405.00.6030	Free.
Beryllium:		
Unwrought powders	8112.12.0000	8.5% ad val.
Waste and scrap	8112.13.0000	Free.
Other	8112.19.0000	5.5% ad val.

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

Government Stockpile:

Stockpile Status—9-30-02³

Material	Uncommitted inventory	Committed inventory	Authorized for disposal	Disposal plan FY 2002	Disposals FY 2002
Beryl ore (11% BeO)	227	34	227	145	54
Beryllium-copper master alloy	41	10	41	80	—
Beryllium metal	294	11	249	36	4

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Events, Trends, and Issues: For the first half of 2002, sales of alloy products (strip and bulk) were reported to have decreased compared with those of the previous year, owing to continued weak demand from the telecommunications and computer markets. Sales of beryllium products for defense applications increased. In 2001, mine production was down significantly; a decrease in overall beryllium demand contributed to the decline. Overall beryllium imports increased significantly, owing to a rise in beryl ore imports from Brazil and a significant increase in beryllium-copper master alloy (BCMA) from Russia. In 2002, imports for consumption of beryllium materials continued to increase; Brazil, Germany, Japan, and Nigeria were the leading suppliers. Beryllium exports were up, with Canada, France, Germany, Japan, the Republic of Korea, and the Netherlands the major recipients of the materials.

For fiscal year 2002, the Defense National Stockpile Center (DNSC) sold about 18 tons of beryllium metal valued at about \$2.84 million from the National Defense Stockpile. There were no sales of BCMA in fiscal year 2002. For fiscal year 2003, the DNSC proposed maximum disposal limits of about 3,630 tons⁴ of beryl ore (about 145 tons of beryllium content), about 907 tons⁴ of BCMA (about 36 tons of beryllium content), and about 36 tons of beryllium metal.

Because of the toxic nature of beryllium, the industry must maintain careful control over the quantity of beryllium dust and fumes in the workplace. The U.S. Environmental Protection Agency issues standards for certain hazardous air pollutants, including beryllium, under the Clean Air Act, and the Occupational Safety and Health Administration issues standards for airborne beryllium particles. To comply with these standards, plants are required to install and maintain pollution-control equipment. In beryllium-processing plants, harmful effects are prevented by maintaining clean workplaces; requiring the use of safety equipment, such as personal respirators; collecting dust, fumes, and mists at the source of deposition; establishing medical programs; and implementing other procedures to provide safe working conditions.

World Mine Production, Reserves, and Reserve Base:

	Mine production^e		Reserves and reserve base⁵
	<u>2001</u>	<u>2002</u>	
United States	100	100	The United States has very little beryl that can be economically handsorted from pegmatite deposits. The Spor Mountain area, Utah, an epithermal deposit, contains a large reserve base of bertrandite, which was being mined. Proven bertrandite reserves in Utah total about 18,000 tons of beryllium. The world reserves and reserve base are not sufficiently well delineated to report consistent figures for all countries.
China	15	15	
Kazakhstan	4	4	
Russia	40	40	
Other countries	<u>2</u>	<u>2</u>	
World total (rounded)	160	160	

World Resources: World resources of beryllium have been estimated to be more than 80,000 tons (contained mostly in known nonpegmatite deposits). About 65% of the beryllium resources is concentrated in the United States; the Spor Mountain and Gold Hill areas in Utah and the Seward Peninsula area in Alaska account for most of the total.

Substitutes: Although the cost of beryllium is high compared with that of other materials, it is used in applications in which its properties are crucial. Graphite, steel, and titanium may be substituted for beryllium metal in some applications, and phosphor bronze may be substituted for beryllium-copper alloys, but these substitutions can result in substantial loss in performance. In some applications, aluminum nitride may be substituted for beryllium oxide.

^eEstimated. NA Not available. — Zero.

¹Net quantity (uncommitted inventory).

²Defined as imports - exports + adjustments for Government and industry stock changes.

³See Appendix B for definitions.

⁴Actual quantity limited to remaining sales authority or inventory.

⁵See Appendix C for definitions.