

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 190 tons was valued at about \$70 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:	1999	2000	2001	2002	2003^e
Production, mine shipments	200	180	100	80	100
Imports for consumption, ore and metal	20	20	115	150	140
Exports, metal	40	35	60	120	120
Government stockpile releases ^{e, 1}	145	220	60	60	40
Consumption:					
Apparent	385	300	230	180	190
Reported, ore	260	240	170	120	NA
Price, dollars (yearend):					
Domestic, metal, vacuum-cast ingot, per pound	327	421	338	NA	NA
Domestic, metal, powder blend, per pound ²	385	492	375	375	375
Domestic, beryllium-copper master alloy, per pound of contained beryllium	160	160	160	160	160
Domestic, beryllium oxide, powder, per pound	77	100	100	NA	NA
Stocks, consumer, yearend	20	115	100	90	NA
Net import reliance ³ as a percentage of apparent consumption	48	37	57	56	47

Recycling: Beryllium was recycled mostly from new scrap that was generated during the manufacture of beryllium-related components. Detailed data on the quantities of beryllium recycled are not available but may compose as much as 10% of apparent consumption.

Import Sources (1999-2002): Ore, metal, scrap, and master alloy: Japan, 28%; Kazakhstan, 24%; Russia, 10%; Brazil, 9%; and other, 29%.

Tariff: Item	Number	Normal Trade Relations 12/31/03
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—9-30-03⁴

Material	Uncommitted inventory	Committed inventory	Authorized for disposal	Disposal plan FY 2003	Disposals FY 2003
Beryl ore (11% BeO)	227	34	227	⁵ 145	—
Beryllium-copper master alloy	41	9	41	⁵ 36	—
Beryllium metal:					
Vacuum-cast	96	234	132	36	43
Hot-pressed powder	155	—	—	—	—

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Events, Trends, and Issues: For the first half of 2003, sales of alloy products (strip and bulk) were reported to have increased compared with those of the previous year, owing to improved demand from the appliance, automotive, and computer sectors, particularly in Southeast Asia. Sales of beryllium products, mostly for defense applications, increased. In 2003, U.S. imports for consumption of beryllium increased; Brazil, China, Germany, Kazakhstan, Nigeria, and Spain were the leading suppliers. Beryllium exports were unchanged; Canada, France, Germany, Japan, Singapore, and the United Kingdom were the major recipients of the materials.

For fiscal year 2003, the Defense National Stockpile Center (DNSC) disposed of about 43 tons of vacuum-cast beryllium metal from the National Defense Stockpile. There were no sales of beryl ore, BCMA, and hot-pressed beryllium metal powder in fiscal year 2003. For fiscal year 2004, the DNSC announced maximum disposal limits of about 3,630 tons⁵ of beryl ore (about 145 tons of beryllium content), about 1,090 tons⁵ of BCMA (about 44 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 (OSHA) 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. Standards for exposure to beryllium were under review by OSHA and private standard-setting organizations.

World Mine Production, Reserves, and Reserve Base:

	Mine production⁵		Reserves and reserve base⁶
	2002	2003	
United States	80	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 16,000 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>1</u>	<u>2</u>	
World total (rounded) ⁷	140	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: Because 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.

⁵Estimated. NA Not available. — Zero.

¹Net quantity (uncommitted inventory).

²This price quotation was discontinued in February 2003.

³Defined as imports – exports + adjustments for Government and industry stock changes.

⁴See Appendix B for definitions.

⁵Actual quantity limited to remaining sales authority or inventory.

⁶See Appendix C for definitions.

⁷Other beryllium-producing countries include Brazil, Madagascar, Mozambique, Portugal, and Zambia.