

BERYLLIUM

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

Domestic Production and Use: One company in Utah mined bertrandite ore and recovered beryllium hydroxide from this ore and from domestic beryl. Beryllium hydroxide was shipped to a plant in Ohio, where it was converted into beryllium metal, alloys, and oxide. Another company in Pennsylvania purchased beryllium oxide and converted this material into beryllium alloys. Small quantities of beryl were recovered as a byproduct of U.S. pegmatite mining operations in various States. Beryllium consumption of 240 tons was valued at more than \$80 million, based on the 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 more than 80% of consumption.

Salient Statistics—United States:	1994	1995	1996	1997	1998^e
Production, mine shipments	173	202	211	231	230
Imports for consumption, ore and metal	53	32	20	20	35
Exports, metal	29	61	57	40	60
Shipments from Government stockpile excesses ¹	² (2)	² (19)	—	—	—
Consumption: Apparent	198	198	197	240	240
Reported	174	227	234	259	260
Price, dollars:					
Domestic, metal, vacuum-cast ingot, per pound	275	308	327	327	327
Domestic, metal, powder blend, per pound	295	385	385	385	385
Domestic, beryllium-copper master alloy, per pound of contained beryllium	160	160	160	160	160
Domestic, beryllium oxide, powder, per pound	72.50	70.50	77.00	77.00	77.00
Stocks, consumer, yearend	113	162	139	110	75
Employment, number:					
Mine, full-time equivalent employees ^e	25	25	25	25	25
Primary refineries ^e	400	400	400	400	400
Net import reliance ³ as a percent of apparent consumption	13	E	E	4	4

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 are not available.

Import Sources (1994-97): Ore, metal, scrap, and master alloy: Russia, 42%; Kazakhstan, 19%; France, 8%; Canada, 8%; and other, 23%.

Tariff: Item	Number	Normal Trade Relations (NTR) 12/31/98	Non-NTR⁴ 12/31/98
Beryllium ore and concentrates	2617.90.0030	Free	Free.
Beryllium oxide or hydroxide	2825.90.1000	3.7% ad val.	25.0% ad val.
Beryllium-copper master alloy	7405.00.6030	1.2% ad val.	28.0% ad val.
Beryllium unwrought:			
Waste and scrap	8112.11.3000	Free	Free.
Other	8112.11.6000	8.5% ad val.	25.0% ad val.
Beryllium, wrought	8112.19.0000	5.5% ad val.	45.0% ad val.

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

Government Stockpile:

Stockpile Status—9-30-98⁵

Material	Uncommitted inventory	Committed inventory	Authorized for disposal	Disposal plan FY 1998	Disposals FY 1998
Beryl ore (11% BeO)	469	42	469	73	—
Beryllium-copper master alloy	222	18	222	45	45
Beryllium metal	363	—	—	—	—

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Events, Trends, and Issues: For the first one-half year, sales of beryllium products improved compared with those of the previous year. Sales were boosted by strong demand for copper beryllium alloys from the aerospace, oil and gas, and communications markets. Imports for consumption of ore and metal increased, with Canada providing all of the ore imports and Kazakhstan, France, and Russia the leading suppliers of metal imports. Metal exports were up, with Japan, France, the United Kingdom, and Germany the major recipients of the materials. Beryllium price quotations remained unchanged.

For fiscal year (FY) 1998, ending September 30, 1998, the Defense Logistics Agency (DLA) had authority to sell about 1,810 tons of beryl ore and about 1,130 tons of beryllium copper master alloy from the National Defense Stockpile. In May and September 1998, the DLA sold a total of about 1,130 tons of beryllium copper master alloy valued at about \$6.34 million. The sales exhausted DLA's authority for beryllium copper master alloy disposals under the Annual Materials Plan in FY 1998. There were no sales of beryl ore in FY 1998. For FY 1999, the Department of Defense (DOD) planned to dispose of about 1,810 tons of beryl ore and about 1,130 tons of beryllium copper master alloy. Also, the DOD proposed to dispose of about 36 tons of beryllium metal.

Beryllium dust and fines have been recognized as the cause of berylliosis, a chronic lung disease. Harmful effects are minimized by maintaining a clean workplace and requiring the use of safety equipment.

World Mine Production, Reserves, and Reserve Base:

	Mine production	
	1997	1998 ^e
United States	231	230
Brazil	(7)	(7)
China ^e	55	55
Kazakhstan ^e	4	4
Russia ^e	40	40
Other countries	<u>1</u>	<u>1</u>
World total	331	330

Reserves and reserve base⁶

The United States has very little beryl that can be economically handsorted from pegmatites. The Spor Mountain area, Utah, contains a large reserve base of bertrandite, which was being mined. Domestic deposits of bertrandite ores in Utah and Texas contain about 21,000 tons of beryllium. The world reserves and reserve base are not sufficiently well delineated to report consistent figures for all countries.

World Resources: No quantitative information is available on foreign resources of beryllium-bearing minerals and rocks.

Substitutes: Because of the relatively high price of beryllium, uses are expected to continue principally in applications that require its light weight, high strength, and high thermal conductivity. Steel, titanium, and graphite composites may be substituted for beryllium metal; phosphor bronze may be substituted for beryllium-copper alloys, but with substantial loss of performance. Aluminum nitride can substitute for beryllium oxide in some applications.

^eEstimated. E Net exporter.

¹Data in parentheses denote stockpile acquisitions.

²Data represent the difference between the estimated beryllium content of beryl shipped for upgrading and stockpile receipts of beryllium metal. These data are not included in net import reliance calculations.

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

⁴See Appendix B.

⁵See Appendix C for definitions.

⁶See Appendix D for definitions.

⁷Less than 1/2 unit.