

BERYLLIUM

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

Domestic Production and Use: One company in Utah mined bertrandite ore, which it converted, along with imported beryl and beryl from the National Defense Stockpile, into beryllium hydroxide. Some of the beryllium hydroxide was shipped to the company's plant in Ohio, where it was converted into beryllium-copper master alloy, metal, and/or oxide—some of which was sold. Estimated beryllium consumption of 270 tons was valued at about \$121 million, based on the estimated unit value for beryllium in imported beryllium-copper master alloy. Based on sales revenues, 45% of beryllium use was estimated to be in consumer electronics and telecommunications products, 12% was estimated to be in defense-related applications, 11% was estimated to be in industrial components and commercial aerospace applications, and the remainder was used in appliances, automotive electronics, energy, medical devices, and other applications.

Salient Statistics—United States:	2007	2008	2009	2010	2011^e
Production, mine shipments ^e	150	175	120	180	210
Imports for consumption ¹	72	70	24	271	91
Exports ²	101	112	23	39	25
Government stockpile releases ³	28	47	19	29	11
Consumption:					
Apparent ⁴	100	218	170	456	270
Reported, ore	190	220	150	200	190
Unit value, annual average, beryllium-copper master alloy, dollars per pound contained beryllium ⁵	144	159	154	228	205
Stocks, ore, consumer, yearend	100	60	30	15	35
Net import reliance ⁶ as a percentage of apparent consumption	E	20	29	61	21

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

Import Sources (2007–10):¹ Russia, 45%; Kazakhstan, 22%; Japan, 7%; Kenya, 5%; and other, 21%.

Tariff: Item	Number	Normal Trade Relations 12-31-11
Beryllium ores and concentrates	2617.90.0030	Free.
Beryllium oxide and hydroxide	2825.90.1000	3.7% ad val.
Beryllium-copper master alloy	7405.00.6030	Free.
Beryllium:		
Unwrought, including 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: The Defense Logistics Agency, U.S. Department of Defense, had a goal of retaining 45 tons of hot-pressed beryllium powder in the National Defense Stockpile. Disposal limits for beryllium materials in the fiscal year 2012 Annual Materials Plan are as follows: beryllium metal, 47 tons of contained beryllium.

Stockpile Status—9-30-11⁷

Material	Uncommitted inventory	Authorized for disposal	Disposal plan FY 2011	Disposals FY 2011
Beryl ore (11% BeO)	—	—	—	—
Beryllium-copper master alloy	—	—	—	—
Beryllium metal:				
Hot-pressed powder	86	41	—	11
Vacuum-cast	14	14	47	—

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Events, Trends, and Issues: Market conditions improved for beryllium-based products in 2011. During the first half of 2011, the leading U.S. beryllium producer reported volume shipments of strip and bulk beryllium-copper alloy products to be 3% and 32% higher, respectively, than those during the first half of 2010. Sales of beryllium products for key markets, including aerospace and industrial components, automotive electronics, industrial x-ray products, oil and gas, semiconductor processing equipment, and telecommunications infrastructure were higher than those during the first half of 2010. Sales of beryllium products for defense-related applications in the first half of 2011 remained about the same as those of the first half of 2010. The revenue growth in 2011 was also due in part to higher beryllium prices.

In an effort to ensure current and future availability of high-quality domestic beryllium to meet critical defense needs, the U.S. Department of Defense in 2005, under the Defense Production Act, Title III, invested in a public-private partnership with the leading U.S. beryllium producer to build a new \$90.4 million primary beryllium facility in Ohio. Construction of the facility was completed in early 2011, and during the first half of the year the facility produced a small, nonproduction level quantity of pure beryllium metal. Approximately two-thirds of the facility's output was to be allocated for defense and government-related end uses, the remaining output going to the private sector. Plant capacity was reported to be 160,000 pounds per year of high-purity beryllium metal. Primary beryllium facilities, the last of which closed in the United States in 2000, traditionally produced the feedstock used to make beryllium metal products.

Because of the toxic nature of beryllium, various international, national, and State guidelines and regulations have been established regarding beryllium in air, water, and other media. Industry is required to carefully control the quantity of beryllium dust, fumes, and mists in the workplace, which adds to the final cost of beryllium products.

World Mine Production and Reserves:

	Mine production ^e	
	2010	2011
United States	180	210
China	22	22
Mozambique	2	2
Other countries	1	1
World total (rounded)	205	240

Reserves⁸

The United States has very little beryl that can be economically handsorted from pegmatite deposits. The Spor Mountain area in Utah, an epithermal deposit, contains a large bertrandite resource, which was being mined. Proven bertrandite reserves in Utah total about 15,900 tons of contained beryllium. World beryllium reserves are not sufficiently well delineated to report consistent figures for all countries.

World Resources: World resources in known deposits of beryllium have been estimated to be more than 80,000 tons. About 65% of these resources is in nonpegmatite deposits in the United States—the Gold Hill and Spor Mountain 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. In some applications, certain metal matrix or organic composites, high-strength grades of aluminum, pyrolytic graphite, silicon carbide, steel, or titanium may be substituted for beryllium metal or beryllium composites. Copper alloys containing nickel and silicon, tin, titanium, or other alloying elements or phosphor bronze alloys (copper-tin-phosphorus) may be substituted for beryllium-copper alloys, but these substitutions can result in substantially reduced performance. Aluminum nitride or boron nitride may be substituted for beryllium oxide in some applications.

^eEstimated. E Net exporter. — Zero.

¹Includes estimated beryllium content of imported ores and concentrates, oxide and hydroxide, unwrought metal (including powders), beryllium articles, waste and scrap, and beryllium-copper master alloy.

²Includes estimated beryllium content of exported unwrought metal (including powders), beryllium articles, and waste and scrap.

³Change in total inventory level from prior yearend inventory.

⁴The sum of U.S. mine shipments and net import reliance.

⁵Calculated from gross weight and customs value of imports; beryllium content estimated to be 4%.

⁶Defined as imports – exports + adjustments for Government and industry stock changes.

⁷See Appendix B for definitions.

⁸See Appendix C for resource/reserve definitions and information concerning data sources.