

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, 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 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, 31% of beryllium alloy strip and bulk products was estimated to be used in industrial components and commercial aerospace applications, 20% in consumer electronics applications, 17% in automotive electronics applications, 12% in energy applications, 11% in telecommunications infrastructure applications, 7% in appliance applications, and 2% in defense and medical applications. Based on sales revenues, 55% of beryllium metal and beryllium composite products was estimated to be used in defense and science applications, 25% in industrial components and commercial aerospace applications, 9% in telecommunications infrastructure applications, 6% in medical applications, and 5% in other applications.

Salient Statistics—United States:	2010	2011	2012	2013	2014^e
Production, mine shipments	180	235	225	235	240
Imports for consumption ¹	271	92	100	57	62
Exports ²	39	21	55	35	28
Government stockpile releases ³	29	22	(4)	10	(4)
Consumption:					
Apparent ⁵	456	333	265	262	270
Reported, ore	200	250	220	250	260
Unit value, annual average, beryllium-copper master alloy, dollars per pound contained beryllium ⁶	228	203	204	208	204
Stocks, ore, consumer, yearend	15	10	15	20	25
Net import reliance ⁷ as a percentage of apparent consumption	61	29	15	10	11

Recycling: Beryllium was recovered from new scrap generated during the manufacture of beryllium products and from old scrap. Detailed data on the quantities of beryllium recycled are not available but may account for as much as 20% to 25% of total beryllium consumption. The leading U.S. beryllium producer established a comprehensive recycling program for all of its beryllium products, and indicated a 40% recovery rate of its beryllium alloy new and old scrap. Beryllium manufactured from recycled sources requires only 20% of the energy as that of beryllium manufactured from virgin sources.

Import Sources (2010–13):¹ Russia, 39%; Kazakhstan, 28%; China, 8%; Japan, 4%; and other, 21%.

Tariff: Item	Number	Normal Trade Relations 12–31–14
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 Strategic Materials had a goal of retaining 45 tons of hot-pressed beryllium powder in the National Defense Stockpile.

Stockpile Status—9–30–14⁸

Material	Inventory	Disposal Plan FY 2014	Disposals FY 2014
Beryl ore	1	—	—
Metal	77	16	—
Structured powder	2	—	—

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Events, Trends, and Issues: Apparent demand for beryllium-based products increased slightly in 2014. During the first 9 months of 2014, the leading U.S. beryllium producer reported the volume of shipments of strip and bulk beryllium-copper alloy products to be slightly higher than those during the first 9 months of 2013. Sales of beryllium-copper alloy products for industrial components and commercial aerospace and telecommunications remained relatively unchanged from sales in the first 9 months of 2013, while sales for consumer electronics, energy, and beryllium hydroxide were greater. Sales of beryllium-copper alloy products for automotive electronics were lower. Sales of beryllium metal and beryllium composite products increased about 19% during the first 9 months of 2014 from those in the same period of 2013, with sales for medical and science uses up approximately 24% and 15%, respectively. Sales of beryllium metal and beryllium composite products for the largest application, defense, remained relatively unchanged.

The leading U.S. beryllium producer increased beryllium hydroxide production capacity at its operation in Delta, UT. The company anticipated that global demand for beryllium would exceed production during the next 3 years and global inventories would be drawn down.

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.

World Mine Production and Reserves:

	Mine production		Reserves⁹
	2013^e	2014^e	
United States	235	240	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 15,000 tons of contained beryllium. World beryllium reserves are not available.
China	20	20	
Mozambique	6	6	
Other countries	<u>1</u>	<u>1</u>	
World total (rounded)	260	270	

World Resources: World identified resources 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 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.

^eEstimated. — 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.

⁴Less than ½ unit.

⁵The sum of U.S. mine shipments and net import reliance.

⁶Calculated from gross weight and customs value of imports; beryllium content estimated to be 4%.

⁷Defined as imports – exports + adjustments for Government and industry stock changes.

⁸See [Appendix B](#) for definitions.

⁹See [Appendix C](#) for resource/reserve definitions and information concerning data sources.