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 (or) oxide—some of which was sold. Estimated beryllium consumption of 220 tons was valued at about $103 million, based on the estimated unit value for beryllium in imported beryllium-copper master alloy. Based on sales revenues, 42% of beryllium use was estimated to be in consumer electronics and telecommunications products, 11% was estimated to be in defense-related applications, 11% was estimated to be in industrial components and commercial aerospace applications, 8% was estimated to be in energy applications, and the remainder was used in appliances, automotive electronics, medical devices, and other applications.

Salient Statistics—United States:	**2008**	**2009**	**2010**	**2011**	**2012[e]**
Production, mine shipments[e]	175	120	180	235	200
Imports for consumption[1]	70	24	271	92	106
Exports[2]	112	23	39	21	63
Government stockpile releases[3]	47	19	29	22	([4])
Consumption:					
Apparent[5]	218	170	456	333	220
Reported, ore	220	150	200	250	190
Unit value, annual average, beryllium-copper master alloy, dollars per pound contained beryllium[6]	159	154	228	203	209
Stocks, ore, consumer, yearend	60	30	15	10	30
Net import reliance[7] as a percentage of apparent consumption	20	29	61	29	10

Recycling: Beryllium was recycled from new scrap generated during the manufacture of beryllium products, as well as old scrap. Detailed data on the quantities of beryllium recycled are not available but may represent as much as 30% of apparent consumption.

Import Sources (2008–11):[1] Russia, 44%; Kazakhstan, 26%; Japan, 6%; Kenya, 5%; and other, 19%.

Tariff: Item	**Number**	**Normal Trade Relations 12–31–12**
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 2013 Annual Materials Plan are as follows: beryllium metal, 54 tons of contained beryllium.

Stockpile Status—9–30–12[8]

Material	**Uncommitted inventory**	**Authorized for disposal**	**Disposal plan FY 2012**	**Disposals FY 2012**
Beryllium metal:				
Hot-pressed powder	83	38	—	3
Vacuum-cast	6	6	54	8

Events, Trends, and Issues: Market conditions weakened for beryllium-based products in 2012. During the first half of 2012, the leading U.S. beryllium producer reported volume shipments of strip and bulk beryllium-copper alloy products to be 29% and slightly lower, respectively, than those during the first half of 2011. Sales of beryllium

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products for key markets, including automotive electronics, consumer electronics, defense and science, industrial x-ray products, medical equipment, and telecommunications infrastructure were lower than those during the first half of 2011. Sales of beryllium hydroxide and beryllium products for commercial aerospace and industrial components, however, were higher than those during the first half of 2011.

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 2011. The startup activities of the new facility continued throughout 2012, and 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 73 tons 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.

Owing to several large shipments of beryllium metal imported from Russia in 2010, total beryllium imports in that year were more than 10 times higher than those of 2009, and 4 times higher than those of 2008. Although imported from Russia, the beryllium metal was most likely sourced from Kazakhstan, as beryllium purchase contracts were established in 2010 between companies in the United States and Kazakhstan.

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]		Reserves[9]
	2011	2012	
United States	235	200	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 15,200 tons of contained beryllium. World beryllium reserves are not sufficiently well delineated to report consistent figures for all countries.
China[10]	22	25	
Mozambique	2	2	
Other countries	1	1	
World total (rounded)	260	230	

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 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.

[e]Estimated.

[1]Includes 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.

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

[3]Change in total inventory level from prior yearend inventory.

[4]Less than ½ unit.

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

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

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

[8]See Appendix B for definitions.

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

[10]Official sources for China's beryllium production in 2011 and 2012 reported lower figures than industry sources, which estimated that China produced more than 60 metric tons of contained beryllium for each year.