

## CESIUM

(Data in kilograms of cesium content unless otherwise noted)

**Domestic Production and Use:** Cesium is not mined in the United States, though there are occurrences of pollucite, the principal ore mineral of cesium, in pegmatites in South Dakota and Maine. Pollucite is a hydrated aluminosilicate that occurs in lithium-rich granite pegmatites. Pollucite is imported from Canada by one U.S. company for production of specialty, high-density drilling fluids used in the global oil and gas exploration industry. Cesium is also used in DNA separation techniques, infrared detectors, night vision devices, photoelectric cells, and traffic controls. It was once researched as a possible rocket fuel by the aerospace industry. Cesium is an important component in the U.S. Naval Observatory's atomic clocks that are accurate to a few hundred trillionths of a second. Jet aircraft that track returning U.S. space shuttles are synchronized using cesium clocks, and the accuracy of cesium clocks is important for internet and cell phone transmissions, missile guidance, and global positioning satellites. Cesium-137, a reactor-produced radioactive isotope of cesium, may be used in cancer treatment, specifically brachytherapy, where the radioactive source is placed within the body; in industrial gauges, mining, and geophysical instruments; and for sterilization of food, sewage, and surgical equipment.

**Salient Statistics—United States:** Cesium production, consumption, import, and export data are not available, and world mine production and U.S. consumption data have not been available since the late 1980s. Annual consumption is estimated to amount to a few thousand kilograms. There is no trading of the metal and no official market price. Several companies publish their prices for cesium and cesium compounds, and these prices have remained relatively stable for several years. In 2004, one company offered 1-gram ampoules of 99.8% (metals basis) cesium for \$41.30 each and 99.98% (metals basis) cesium for \$54.30. The price for 50 grams of 99.8% (metals basis) cesium was \$542.00, and 100 grams of 99.98% (metals basis) cesium was priced at \$1,489.00.

**Recycling:** None.

**Import Sources (2000-03):** The United States is 100% import reliant. Canada is the chief source of cesium ore imported by the United States.

<b>Tariff:</b>	<b>Item</b>	<b>Number</b>	<b>Normal Trade Relations</b>
	Alkali metals, other	2805.19.9000	<u>12-31-04</u> 5.5% ad val.
	Chlorides, other	2827.39.5000	3.7% ad val.

**Depletion Allowance:** 14% (Domestic and foreign).

**Government Stockpile:** None.

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**Events, Trends, and Issues:** Unless the cesium market changes enough to make domestic deposits economic, the United States will continue to depend on foreign sources of cesium, mainly Canada. The high cost of cesium and its reactivity limit its applications. Special cesium drilling muds, which are used in petroleum exploration, are readily biodegradable and have minimal environmental impact. No environmental or human health issues have been associated with stable cesium.

**World Mine Production, Reserves, and Reserve Base:** Data on mine production of cesium are not available, and data on resources are limited. Estimates of reserves and reserve base are based on occurrences of pollucite, the cesium-bearing aluminosilicate mineral that is found in some zoned pegmatites in association with the lithium minerals lepidolite and petalite. Pollucite is mined as a byproduct with other pegmatite minerals; commercial concentrates of pollucite may contain about 20% cesium by weight.

	Reserves <sup>1</sup>	Reserve base <sup>1</sup>
Canada	70,000,000	73,000,000
Namibia	—	9,000,000
Zimbabwe	—	23,000,000
Other countries	NA	NA
World total (rounded)	70,000,000	110,000,000

**World Resources:** World resources of cesium have not been estimated. Cesium may be associated with pegmatites worldwide; cesium resources have been found in pegmatites in Namibia and Zimbabwe. Cesium occurrences are also known in brines in Chile and China and in geothermal systems in Germany, India, and Tibet.

**Substitutes:** The physical properties of cesium and its compounds are similar to those of rubidium and its compounds, and they may be used interchangeably in many applications.

NA Not available. — Zero.

<sup>1</sup>See [Appendix C](#) for definitions.