

CESIUM

(Data in kilograms of cesium content unless otherwise noted)

Domestic Production and Use: Cesium is not mined in the United States. Pollucite, the principal ore mineral of cesium, is imported as concentrate from Canada by one company in the United States. There are occurrences of pollucite in pegmatites in South Dakota and Maine. Because of its high density, the main use of cesium is in the production of specialty, high-density drilling fluids used in the global oil and gas exploration 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. For example, the returning U.S. space shuttles are tracked by jet aircraft whose positions are synchronized using cesium atomic clocks. Global positioning satellites, Internet and cell phone transmissions, and missile guidance systems also depend on the accuracy of cesium atomic clocks. Cesium is also used in DNA separation techniques, infrared detectors, night vision devices, photoelectric cells, and traffic controls. A reactor-produced radioactive isotope of cesium, cesium-137, may be used in cancer treatment, specifically brachytherapy, where an encapsulated cesium-137 source is placed within the body. Cesium-137 is also used 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. There is no trading of the metal and no official market price. Annual consumption is estimated to be a few thousand kilograms. Several companies publish their prices for cesium and cesium compounds, and these prices have remained relatively stable for several years. In 2005, as 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 (2001-04): The United States is 100% import reliant, and Canada is the chief source of cesium imported by the United States.

Tariff: Item	Number	Normal Trade Relations
Alkali metals, other	2805.19.9000	<u>12-31-05</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 occurrences economic, the United States will continue to depend on Canada for cesium. Its high cost and reactivity limit the applications of cesium metal. No environmental or human health issues have been associated with stable cesium. Cesium, when used in specialty drilling muds or cesium formate fluids, is readily biodegradable and has minimal environmental impact. The International Atomic Energy Agency and other sources have indicated that radioactive materials such as cesium-137 may be used in radiological dispersion devices or “dirty bombs.”

World Mine Production, Reserves, and Reserve Base: Data on resources and mine production of cesium are either limited or not available. Estimates of reserves and reserve base are based on occurrences of pollucite that is mined as a byproduct with other pegmatite minerals, specifically the lithium mineral lepidolite. Pegmatites are exceptionally coarse-grained granitic rocks. Pollucite, which is a hydrated aluminosilicate mineral, may form in association with lithium-rich, lepidolite-bearing or petalite-bearing zoned pegmatites. Commercial concentrates of pollucite may contain about 20% cesium by weight. The Canadian deposit contains approximately 300,000 tons of pollucite that grades 24% Cs₂O. The next largest deposit thought to be potentially economic is in Zimbabwe.

	Reserves¹	Reserve base¹
Canada	70,000,000	73,000,000
Namibia	—	9,000,000
Zimbabwe	—	23,000,000
Other countries	<u>NA</u>	<u>NA</u>
World total (rounded)	<u>70,000,000</u>	<u>110,000,000</u>

World Resources: World resources of cesium have not been estimated. Cesium may be associated with lithium-bearing 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.

¹[See Appendix C for definitions.](#)