

THALLIUM

(Data in kilograms of thallium content, unless otherwise noted)

Domestic Production and Use: Thallium is a byproduct metal recovered in some countries from flue dusts and residues collected in the smelting of copper, zinc, and lead ores. Although thallium was contained in ores mined or processed in the United States, it has not been recovered domestically since 1981. Consumption of thallium metal and its compounds continued for most of their established end uses. These uses included a semiconductor material for selenium rectifiers, an activator in gamma radiation detection equipment, an electrical resistance component in infrared radiation detection and transmission equipment, and a crystalline filter for light diffraction in acousto-optical measuring devices. Other uses included an alloying component with mercury for low-temperature measurements, an additive in glass to increase its refractive index and density, a catalyst or intermediate in the synthesis of organic compounds, and a high-density liquid for sink-float separation of minerals. Also, the use of radioactive thallium compounds for medical purposes in cardiovascular imaging continued in 2002.

Salient Statistics—United States:	1998	1999	2000	2001	2002^e
Production, mine	—	—	—	—	—
Imports for consumption ¹	104	838	100	2,110	100
Exports	NA	NA	NA	NA	NA
Consumption ^e	300	380	300	800	500
Price, metal, dollars per kilogram ²	1,280	1,295	1,295	1,295	1,250
Net import reliance ³ as a percentage of estimated consumption	100	100	100	100	100

Recycling: None.

Import Sources (1998-2001): Belgium, 79%; Canada, 14%; France, 3%; Russia, 2%; and United Kingdom, 2%.

Tariff: Item	Number	Normal Trade Relations⁴ 12/31/02
Unwrought; waste and scrap; powders	8112.91.6000	4.0% ad val.

Depletion Allowance: 14% (Domestic and foreign).

Government Stockpile: None.

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Events, Trends, and Issues: Research and development activities of both a basic and applied nature were conducted during 2002 to improve and expand the use of thallium. These activities included the development of high-temperature superconducting materials for such applications as magnetic resonance imaging, storage of magnetic energy, magnetic propulsion, and electric power generation and transmission. Consideration continued to be given to the use of a thallium-oxide superconductor as a material for such applications. The development of improved methods for synthesizing high-temperature superconductors, such as thallium cuprates, also received attention during the year. Further use of radioactive thallium in clinical diagnostic applications, including cardiovascular and oncological imaging, also was studied during 2002. One such study involved the use of a thallium radiation technique to assess the therapeutic response to a particular type of oncological treatment.

Thallium metal and its compounds are highly toxic materials and are strictly controlled to prevent a threat to humans and the environment. Thallium and its compounds can be absorbed into the human body by skin contact, ingestion, or inhalation of dust or fumes. In 2002, the U.S. Environmental Protection Agency initiated health assessments on thallium and several other metals and chemicals for inclusion in the agency's Integrated Risk Information System data base. Information from the public was requested in making the assessments. The U.S. Department of Transportation issued a proposed rule that would amend its requirements for the safe transport of radioactive materials, including thallium, to make them compatible with international requirements.

World Mine Production, Reserves, and Reserve Base:⁵

	Mine production		Reserves ⁶	Reserve base ⁶
	<u>2001</u>	<u>2002</u>		
United States	(?)	(?)	32,000	120,000
Other countries	<u>15,000</u>	<u>15,000</u>	<u>350,000</u>	<u>530,000</u>
World total (may be rounded)	15,000	15,000	380,000	650,000

World Resources: World resources of thallium contained in zinc resources total about 17 million kilograms; most are located in Canada, Europe, and the United States. An additional 630 million kilograms is in world coal resources. The average thallium content of the Earth's crust has been estimated at 0.7 part per million.

Substitutes: While other light-sensitive materials can substitute for thallium and its compounds in specific electronic applications, ample supplies of thallium discourage development of substitute materials.

⁶Estimated. NA Not available. — Zero.

¹Unwrought; waste and scrap; powders, including thallium contained in compounds.

²Estimated price of 99.999%-pure granules in 100-gram lots.

³Defined as imports - exports + adjustments for Government and industry stock changes.

⁴By the North American Free Trade Agreement, there is no tariff for Canada or Mexico.

⁵Estimates are based on thallium content of zinc ores.

⁶See Appendix C for definitions.

⁷Thallium contained in mined base-metal ores, estimated at 450 to 500 kilograms per year, is separated from the base metals but not extracted for commercial use.