# 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 was not recovered domestically in 2000. Consumption of thallium metal and its compounds continued in 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 was continued in 2000.

| Salient Statistics—United States: | 1996 | 1997 | 1998 | 1999 | 2000[e] |
|---|---|---|---|---|---|
| Production, mine | — | — | — | — | — |
| Imports for consumption[1] | 166 | 168 | 104 | 838 | 100 |
| Exports | NA | NA | NA | NA | NA |
| Consumption[e] | 300 | 300 | 300 | 380 | 300 |
| Price, metal, dollars per kilogram[2] | 1,200 | 1,280 | 1,280 | 1,295 | 1,295 |
| Net import reliance[3] as a percent of apparent consumption | 100 | 100 | 100 | 100 | 100 |

**Recycling:** None.

**Import Sources (1996-99):** Belgium, 51%; Canada, 33%; Germany, 12%; and United Kingdom, 4%.

| Tariff: Item | Number | Normal Trade Relations[4] 12/31/00 |
|---|---|---|
| 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 2000 to improve and expand the use of thallium. These activities focused principally on 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; further use of radioactive thallium in clinical diagnostic applications, including cardiovascular and oncological imaging, also was studied. In addition, the use of thallium salt as a catalyst in the cyanidation process for the recovery of gold was investigated during the year.

Thallium metal and its compounds are highly toxic materials and are strictly controlled to prevent threats 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. With regard to such toxicity concerns, the U.S. Department of Transportation issued a notice of proposed rulemaking during the year that addressed international harmonization in the transport of hazardous materials, including the transport of thallium-containing materials. The proposed rule amended the Hazardous Materials Regulations of the United States to conform with recent changes in the standards of the International Maritime Dangerous Goods Code, the International Civil Aviation Organization's Technical Instructions for the Safe Transport of Dangerous Goods by Air, and the United Nations Recommendations on the Transport of Dangerous Goods.

**World Mine Production, Reserves, and Reserve Base:**[5]

| | Mine production | | Reserves[6] | Reserve base[6] |
|---|---|---|---|---|
| | 1999 | 2000 | | |
| United States | (7) | (7) | 32,000 | 120,000 |
| Other countries | 15,000 | 15,000 | 350,000 | 530,000 |
| 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.

[e]Estimated. NA Not available.

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

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

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

[4]No tariff for Canada and Mexico for item shown.

[5]Estimates, based on thallium content of zinc ores.

[6]See Appendix C for definitions.

[7]Thallium 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.