

BERYLLIUM

(Data in metric tons of contained beryllium, unless otherwise noted)

Domestic Production and Use: One company in Utah mined bertrandite ore and recovered beryllium hydroxide from this ore and from domestic beryl. Beryllium hydroxide was shipped to a plant in Ohio, where it was converted into beryllium metal, alloys, and oxide. Another company in Pennsylvania purchased beryllium oxide and converted this material into beryllium alloys. Small quantities of beryl were recovered as a byproduct of U.S. pegmatite mining operations in various States. Beryllium consumption of 205 tons was valued at more than \$70 million, based on the producer price for beryllium-copper master alloy. The use of beryllium (as an alloy, metal, and oxide) in electronic and electrical components, and aerospace and defense applications accounted for more than 80% of consumption.

| Salient Statistics—United States: | 1993 | 1994 | 1995 | 1996 | 1997^e |
|---|-----------------|------------------|-------------------|-------------|-------------------------|
| Production, mine shipments | 198 | 173 | 202 | 211 | 210 |
| Imports for consumption, ore and metal | 8 | 53 | 32 | 20 | 45 |
| Exports, metal | 20 | 29 | 61 | 57 | 45 |
| Shipments from Government stockpile excesses ¹ | ² 31 | ² (2) | ² (19) | — | — |
| Consumption: Apparent | 183 | 198 | 198 | 204 | 205 |
| Reported | 196 | 174 | 227 | 234 | 230 |
| Price, dollars: | | | | | |
| Domestic, metal, vacuum-cast ingot, per pound | 308 | 275 | 308 | 327 | 327 |
| Domestic, metal, powder blend, per pound | 295 | 295 | 295 | 385 | 385 |
| Domestic, beryllium-copper master alloy, per pound of contained beryllium | 160 | 160 | 160 | 160 | 160 |
| Domestic, beryllium oxide, powder, per pound | 72.50 | 72.50 | 70.50 | 77.00 | 77.00 |
| Stocks, consumer, yearend | 114 | 113 | 162 | 139 | 144 |
| Employment, number: | | | | | |
| Mine, full-time equivalent employees ^e | 25 | 25 | 25 | 25 | 25 |
| Primary refineries ^e | 400 | 400 | 400 | 400 | 400 |
| Net import reliance ³ as a percent of apparent consumption | E | 13 | E | E | E |

Recycling: Quantities of new scrap generated in the processing of beryllium-copper alloys and quantities of obsolete military equipment containing metallic beryllium were recycled.

Import Sources (1993-96): Ore, metal, scrap, and master alloy: Russia, 46%; Kazakstan, 20%; China, 9%; France, 9%; and other, 16%.

| Tariff: Item | Number | Most favored nation (MFN) 12/31/97 | Non-MFN⁴ 12/31/97 |
|--------------------------------|---------------|---|---|
| Beryllium ore and concentrates | 2617.90.0030 | Free | Free. |
| Beryllium oxide or hydroxide | 2825.90.1000 | 3.7% ad val. | 25.0% ad val. |
| Beryllium-copper master alloy | 7405.00.6030 | 2.4% ad val. | 28.0% ad val. |
| Beryllium unwrought: | | | |
| Waste and scrap | 8112.11.3000 | Free | Free. |
| Other | 8112.11.6000 | 8.5% ad val. | 25.0% ad val. |
| Beryllium, wrought | 8112.19.0000 | 5.5% ad val. | 45.0% ad val. |

Depletion Allowance: 22% (Domestic), 14% (Foreign).

Government Stockpile:

Stockpile Status—9-30-97⁵

| Material | Uncommitted inventory | Committed inventory | Authorized for disposal | Disposal plan FY 1997 | Disposals FY 1997 |
|-------------------------------|------------------------------|----------------------------|--------------------------------|------------------------------|--------------------------|
| Beryl ore (11% BeO) | 469 | 43 | 469 | 73 | 73 |
| Beryllium-copper master alloy | 268 | — | — | — | — |
| Beryllium metal | 363 | — | — | — | — |

BERYLLIUM

Events, Trends, and Issues: For the first one-half year, sales of beryllium products increased compared with those of the previous year, reflecting continued strength in electronics markets and increasing demand for beryllium-aluminum alloys. Imports for consumption of ore and metal were up, with Canada providing most of the ore imports and Russia the leading supplier of metal imports. Metal exports continued to decline, with Canada, Germany, and Japan being the major recipients of the materials.

In January, the International Trade Administration (ITA) made a final determination that beryllium metal and high-beryllium alloys (beryllium content equal to or greater than 30%) from Kazakhstan were being sold in the United States at less than fair value. The ITA determined that the material would be subject retroactively to a 16.56% dumping margin for the period of investigation of July 1, 1995, through December 31, 1995. However, in March, the International Trade Commission determined that an industry in the United States is not materially injured or threatened with material injury, and the establishment of an industry in the United States is not materially retarded, by reason of imports from Kazakhstan of beryllium metal and high-beryllium alloys. Thus, the investigation was terminated and all securities posted refunded or canceled. The United States imported 23 tons of subject products in 1995, no imports of the materials were recorded in 1996, and about 3 tons of imports were recorded through July 1997.

For fiscal year 1997, ending September 30, 1997, the Defense Logistics Agency sold about 1,800 tons of beryl from the National Defense Stockpile valued at \$400,000, which exhausted the fiscal year Annual Materials Plan (AMP) quantity for beryl disposals. In its fiscal year 1998 AMP, the Department of Defense (DOD) also has authority to sell about 1,800 tons of beryl. Additionally, the DOD proposed to dispose of about 1,130 tons of beryllium copper master alloy in fiscal year 1998.

Beryllium dust and fines have been recognized as the cause of berylliosis, a chronic lung disease. Harmful effects are minimized by maintaining a clean workplace and requiring the use of safety equipment.

World Mine Production, Reserves, and Reserve Base:

| | Mine production | |
|------------------------|-----------------|-------------------|
| | 1996 | 1997 ^e |
| United States | 211 | 210 |
| Brazil | 34 | 35 |
| China ^e | 55 | 55 |
| Kazakstan ^e | 4 | 4 |
| Russia ^e | 32 | 30 |
| Other countries | (7) | 1 |
| World total | 336 | 335 |

Reserves and reserve base⁶

The United States has very little beryl that can be economically handsorted from pegmatites. The Spor Mountain area, Utah, contains a large reserve base of bertrandite, which was being mined. Domestic deposits of bertrandite ores in Utah and Texas contain about 21,000 tons of beryllium. The world reserves and reserve base are not sufficiently well delineated to report consistent figures for all countries.

World Resources: No quantitative information is available on foreign resources of beryllium-bearing minerals and rocks. The identified resources of beryllium in known domestic deposits are estimated at 66,000 tons of contained beryllium.

Substitutes: Because of the relatively high price of beryllium, uses are expected to continue principally in applications that require its light weight, high strength, and high thermal conductivity. Steel, titanium, and graphite composites may be substituted for beryllium metal; phosphor bronze may be substituted for beryllium-copper alloys, but with substantial loss of performance. Aluminum nitride can substitute for beryllium oxide in some applications.

^eEstimated. E Net exporter.

¹Data in parentheses denote stockpile acquisitions.

²Data represent the net difference between the estimated beryllium content of beryl shipped for upgrading and stockpile receipts of beryllium metal. These data are not included in net import reliance calculations.

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

⁴See Appendix B.

⁵See Appendix C for definitions.

⁶See Appendix D for definitions.

⁷Less than ½ unit.