

**GARNET (INDUSTRIAL)<sup>1</sup>**

(Data in metric tons of garnet, unless otherwise noted)

**Domestic Production and Use:** Garnet for industrial use was mined in 2003 by three firms, one in Idaho and two in New York. The estimated value of crude garnet production was about \$3.9 million, while refined material sold or used had an estimated value of \$10.8 million. Major end uses for garnet were abrasive blasting media, 35%; waterjet cutting, 30%; water filtration, 15%; abrasive powders, 10%; and other end uses, 10%.

<b>Salient Statistics—United States:</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003<sup>e</sup></b>
Production (crude)	60,700	60,200	52,700	38,500	38,700
Sold by producers	43,900	51,900	46,200	37,500	34,100
Imports for consumption <sup>e</sup>	12,000	23,000	23,000	23,000	28,400
Exports <sup>e</sup>	10,000	10,000	10,000	10,400	10,900
Consumption, apparent <sup>e</sup>	33,700	66,300	59,300	51,400	58,900
Price, range of value, dollars per ton <sup>2</sup>	50-2,000	55-2,000	50-2,000	50-2,000	50-2,000
Stocks, producer <sup>e</sup>	52,100	50,100	50,000	48,700	16,700
Employment, mine and mill, number	220	220	220	200	180
Net import reliance <sup>3</sup> as a percentage of apparent consumption	E	23	22	27	56

**Recycling:** Small amounts of garnet reportedly are recycled.

**Import Sources (1999-2002):<sup>e</sup>** Australia, 47%; India, 35%; China, 17%; and other, 1%.

<b>Tariff: Item</b>	<b>Number</b>	<b>Normal Trade Relations 12/31/03</b>
Emery, natural corundum, natural garnet, and other natural abrasives, crude	2513.20.1000	Free.
Emery, natural corundum, natural garnet, and other natural abrasives, other than crude	2513.20.9000	Free.
Natural abrasives on woven textile	6805.10.0000	Free.
Natural abrasives on paper or paperboard	6805.20.0000	Free.
Natural abrasives sheets, strips, disks, belts, sleeves, or similar form	6805.30.1000	Free.

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

**Government Stockpile:** None.

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**Events, Trends, and Issues:** During 2003, U.S. garnet consumption increased 15%, while domestic production of crude garnet concentrates only increased slightly from that of 2002. In 2003, imports were estimated to have increased more than 23% compared with 2002, and exports were estimated to have increased about 5% from those of 2002. The 2003 domestic sales of garnet declined 9% from the 2002 level. Since 1999, the United States has moved from being a net exporter to being a net importer. Garnet imports have displaced U.S. production in the domestic market, with Australia, China, and India becoming major garnet suppliers.

In 2003, neither of Montana's garnet producers reported any production, and both operations may be sold. One of the New York garnet producers closed its quarry at the end of 2002 and has only processed stocks during 2003.

The garnet market is very competitive, and for that reason, there is a need to keep production costs to a minimum by developing deposits where garnet is produced in combination with other minerals. Demand is expected to rise owing to increased demand in blasting and other markets.

### **World Mine Production, Reserves, and Reserve Base:**

	Mine production		Reserves <sup>4</sup>	Reserve base <sup>4</sup>
	<u>2002</u>	<u>2003<sup>e</sup></u>		
United States	38,500	38,700	5,000,000	25,000,000
Australia	127,000	130,000	1,000,000	7,000,000
China	27,000	27,000	Moderate to Large	Moderate to Large
India	63,000	63,000	90,000	5,400,000
Other countries	<u>21,000</u>	<u>21,000</u>	<u>6,500,000</u>	<u>20,000,000</u>
World total (rounded)	277,000	280,000	Moderate	Large

**World Resources:** World resources of garnet are large and occur in a wide variety of rocks, particularly gneisses and schists. Garnet also occurs as contact-metamorphic deposits in crystalline limestones, pegmatites, serpentinites, and vein deposits. In addition, alluvial garnet is present in many heavy-mineral sand and gravel deposits throughout the world. Large domestic resources of garnet also are concentrated in coarsely crystalline gneiss near North Creek, NY, and other significant domestic resources of garnet occur in Idaho, Maine, Montana, New Hampshire, North Carolina, and Oregon. In addition to the United States, major garnet deposits exist in Australia, China, and India, where they are mined for foreign and domestic markets; deposits in Russia and Turkey also have been mined in recent years, primarily for internal markets. Additional garnet resources are located in Canada, Chile, Czech Republic, Pakistan, South Africa, Spain, Thailand, and Ukraine; small mining operations have been reported in most of these countries.

**Substitutes:** Other natural and manufactured abrasives can substitute to some extent for all major end uses of garnet. In many cases, however, the substitutes would entail sacrifices in quality or cost. Fused aluminum oxide and staurolite compete with garnet as a sandblasting material. Ilmenite, magnetite, and plastics compete as filtration media. Diamond, corundum, and fused aluminum oxide compete for lens grinding and for many lapping operations. Emery is a substitute in nonskid surfaces. Finally, quartz sand, silicon carbide, and fused aluminum oxide compete for the finishing of plastics, wood furniture, and other products.

<sup>e</sup>Estimated. E Net exporter.

<sup>1</sup>Excludes gem and synthetic garnet.

<sup>2</sup>Includes both crude and refined garnet; most crude concentrate is \$50 to \$150 per ton, and most refined material is \$150 to \$450 per ton.

<sup>3</sup>Defined as imports – exports + adjustments for industry stock changes.

<sup>4</sup>See Appendix C for definitions.