

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

(Data in metric tons of garnet unless otherwise noted)

**Domestic Production and Use:** In 2018, garnet for industrial use was mined by four firms—one in Idaho, one in Montana, and two in New York. The estimated value of crude garnet production was about \$23 million, and refined material sold or used had an estimated value of \$71 million. The major end uses of garnet were, in descending percentage of consumption, for abrasive blasting, water-filtration media, water-jet-assisted cutting, and other end uses, such as in abrasive powders, nonslip coatings, and sandpaper. Domestic industries that consume garnet include aircraft and motor vehicle manufacturers, ceramics and glass producers, electronic component manufacturers, filtration plants, glass polishing, the petroleum industry, shipbuilders, textile stonewashing, and wood-furniture-finishing operations.

<b>Salient Statistics—United States:</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018<sup>e</sup></b>
Production (crude)	59,900	77,200	81,300	107,000	110,000
Production (refined, sold or used)	35,900	47,200	46,600	96,800	170,000
Imports for consumption <sup>e, 2</sup>	162,000	212,000	156,000	54,200	250,000
Exports <sup>e</sup>	15,400	14,700	13,400	23,300	18,000
Consumption, apparent <sup>e, 3</sup>	206,000	274,000	224,000	138,000	340,000
Price, average value, dollars per ton, import	280	250	190	260	210
Stocks, yearend	NA	NA	NA	NA	NA
Employment, mine and mill, number <sup>e</sup>	99	105	108	120	135
Net import reliance <sup>4</sup> as a percentage of apparent consumption	71	72	64	22	68

**Recycling:** Garnet was recycled in Pennsylvania with a recycling capacity of up to 25,000 tons per year and a new plant in Oregon, with a recycling capacity of up to 16,000 tons per year, opened in November 2018. Garnet can be recycled multiple times without degradation to its quality. Most used garnet is recycled from blast cleaning and water-jet-assisted cutting purposes.

**Import Sources (2014–17):<sup>e</sup>** Australia, 43%; India, 35%; South Africa, 13%; China, 7%; and other, 2%.

<b>Tariff:</b>	<b>Item</b>	<b>Number</b>	<b>Normal Trade Relations 12–31–18</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.

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

**Government Stockpile:** None.

**Events, Trends, and Issues:** During 2018, estimated domestic production of crude garnet concentrates increased by 5% compared with production in 2017. U.S. garnet production was estimated to be about 10% of total global garnet production. The 2018 estimated domestic sales or use of refined garnet increased by 76% compared with sales in 2017. This increase in domestic sales or use of refined garnet was mainly due to a garnet processing plant in Pennsylvania beginning full production and the opening of a new processing plant in Oregon. The two processing plants have a refined garnet production capacity of 422,000 tons per year.

## GARNET (INDUSTRIAL)

Garnet imports in 2018 were estimated to have more than tripled compared with those of 2017. The significant increase in imports of garnet can be attributed to easing of supply restrictions of garnet from India and an increase in garnet required for the processing plants in Pennsylvania and Oregon. Imports from India increased in 2018 but were still significantly lower than in 2016, prior to the export restrictions in 2017. However, there was a substantial increase in imports from South Africa in 2018 to meet consumption requirements. In 2018, the average unit value of garnet imports was \$210 per ton, which represents a decrease of 19% compared with the average unit value in 2017. In the United States, most domestically produced crude garnet concentrate was priced at about \$205 per ton. Exports in 2018 were estimated to have decreased by 24%.

Over the past 5 years, U.S. production has increased steadily while imports have varied widely. It is thought that producer stocks have been able to augment supply to meet consumption requirements. The significant increase in imports in 2018 may be partially attributed to resupplying stocks that were used in 2017.

The United States consumed about 31% of global garnet production and world production of garnet increased by 13% in 2018. In India, garnet production continued to be limited. Garnet production in South Africa increased in 2018.

The garnet market is very competitive. To increase profitability and remain competitive with imported material, production may be restricted to only high-grade garnet ores or other salable mineral products that occur with garnet, such as kyanite, marble, metallic ores, mica minerals, sillimanite, staurolite, or wollastonite.

**World Mine Production and Reserves:** Reserves for India were revised based on Government reports.

	Mine production		Reserves <sup>5</sup>
	2017	2018 <sup>e</sup>	
United States	107,000	110,000	5,000,000
Australia	364,000	330,000	Moderate to Large
China	100,000	110,000	Moderate to Large
India	142,000	180,000	13,000,000
South Africa	211,000	270,000	NA
Other countries	50,000	60,000	6,500,000
World total (rounded)	974,000	1,100,000	Moderate to Large

**World Resources:** World resources of garnet are large and occur in a wide variety of rocks, particularly gneisses and schists. Garnet also occurs in 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; other significant domestic resources of garnet occur in Idaho, Maine, Montana, New Hampshire, North Carolina, and Oregon. In addition to those in the United States, major garnet deposits exist in Australia, Canada, China, India, and South Africa, 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 in Chile, Czechia, Pakistan, 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, using 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. Corundum, diamond, and fused aluminum oxide compete for lens grinding and for many lapping operations. Emery is a substitute in nonskid surfaces. Fused aluminum oxide, quartz sand, and silicon carbide compete for the finishing of plastics, wood furniture, and other products.

<sup>e</sup>Estimated. NA Not Available.

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

<sup>2</sup>It was assumed that 75% of imports under Harmonized Tariff Schedule codes 2513.20.1000 and 2513.20.9000 were industrial garnet.

<sup>3</sup>Defined as crude production + imports – exports.

<sup>4</sup>Defined as imports – exports.

<sup>5</sup>See Appendix C for resource and reserve definitions and information concerning data sources.