

GARNET (INDUSTRIAL)¹

(Data in metric tons of garnet unless otherwise noted)

Domestic Production and Use: In 2021, garnet for industrial use was mined by four firms—one in Idaho, one in Montana, and two in New York. One processing facility operated in Oregon and another operated in Pennsylvania. The estimated value of crude garnet production was about \$15 million, and refined material sold or used had an estimated value of \$53 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.

<u>Salient Statistics—United States:</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021^e</u>
Production:					
Crude	92,900	101,000	104,000	101,000	75,000
Refined, sold or used	84,100	166,000	147,000	146,000	120,000
Imports for consumption ²	50,400	265,000	208,000	115,000	110,000
Exports	17,700	14,200	12,600	13,600	15,000
Consumption, apparent ³	126,000	352,000	300,000	202,000	170,000
Price, average import unit value, dollars per ton	306	215	214	250	325
Employment, mine and mill, number ^e	140	170	160	130	120
Net import reliance ⁴ as a percentage of apparent consumption	26	71	65	50	56

Recycling: Garnet was recycled at a plant in Oregon with a recycling capacity of 16,000 tons per year and at a plant in Pennsylvania with a recycling capacity of 25,000 tons per year. Garnet can be recycled multiple times without degradation of its quality. Most recycled garnet is from blast cleaning and water-jet-assisted cutting operations.

Import Sources (2017–20):^e South Africa, 43%; China,⁵ 22%; India, 20%; Australia, 12%; and other, 3%.

<u>Tariff:</u>	<u>Item</u>	<u>Number</u>	<u>Normal Trade Relations</u> <u>12–31–21</u>
	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 2021, estimated domestic production of crude garnet concentrates decreased by 26% compared with production in 2020. This decrease was due to lower production levels from a mine in Montana, although most other U.S. garnet mines also produced less compared with that in 2020. U.S. garnet production was estimated to be about 7% of total global garnet production. The 2021 estimated domestic sales or use of refined garnet decreased by about 16% compared with sales in 2020.

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Garnet imports in 2021 were estimated to have decreased slightly compared with those in 2020. This decrease was attributed to lower imports of garnet from Australia, China, and India. In 2021, the average unit value of garnet imports was \$325 per ton, an increase of 30% compared with the average unit value in 2020. In the United States, most domestically produced crude garnet concentrate was priced at about \$206 per ton. U.S. exports in 2021 were estimated to have increased by 11%.

During 2021, the United States consumed about 170,000 tons of garnet. This was a 16% decrease from that of 2020.

The U.S. natural gas and petroleum industry is one of the leading garnet-consuming industries, using garnet for cleaning drill pipes and well casings. Natural gas and petroleum producers also use garnet as a reservoir-fracturing proppant, alone or mixed with other proppants. During 2021, the number of drill rigs operating in the United States was 339 rigs at the beginning of the year, increasing through the year to 508 rigs at the end of September, likely indicating that more garnet was consumed in well drilling.

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 as a byproduct of other salable mineral products that occur with garnet, such as kyanite, marble, metallic ore minerals, mica minerals, sillimanite, staurolite, or wollastonite.

World Mine Production and Reserves:

	Mine production		Reserves ⁶
	<u>2020</u>	<u>2021^e</u>	
United States	101,000	75,000	5,000,000
Australia	360,000	360,000	Moderate to large
China	310,000	310,000	Moderate to large
India	130,000	130,000	13,000,000
South Africa	140,000	140,000	NA
Other countries	<u>60,000</u>	<u>60,000</u>	<u>6,500,000</u>
World total (rounded)	1,100,000	1,100,000	Moderate to large

World Resources:⁶ 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, and serpentinites and in 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.

^eEstimated. NA Not available.

¹Excludes gem and synthetic garnet.

²Sources: U.S. Census Bureau and Trade Mining, LLC; data adjusted by the U.S. Geological Survey.

³Defined as crude production + imports – exports.

⁴Defined as imports – exports.

⁵Includes Hong Kong.

⁶See Appendix C for resource and reserve definitions and information concerning data sources.