

GARNET (INDUSTRIAL)¹

(Data in metric tons of garnet unless otherwise noted)

Domestic Production and Use: In 2022, garnet for industrial use was mined by four companies—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 \$17 million, and refined material sold or used had an estimated value of \$52 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>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022^e</u>
Production:					
Crude	101,000	104,000	101,000	81,700	76,000
Refined, sold or used	166,000	147,000	146,000	127,000	120,000
Imports for consumption ²	265,000	208,000	115,000	144,000	190,000
Exports	18,900	16,700	18,200	20,300	24,000
Consumption, apparent ³	347,000	296,000	198,000	205,000	240,000
Price, average import unit value, dollars per ton	215	214	250	280	200
Employment, mine and mill, number ^e	170	160	130	120	110
Net import reliance ⁴ as a percentage of apparent consumption	71	65	49	60	69

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 (2018–21):^e South Africa, 48%; China,⁵ 18%; India, 18%; Australia, 11%; and other, 5%.

<u>Tariff:</u>	<u>Item</u>	<u>Number</u>	<u>Normal Trade Relations</u> <u>12–31–22</u>
	Emery, natural corundum, natural garnet, and other natural abrasives:		
	Crude	2513.20.1000	Free.
	Other than crude	2513.20.9000	Free.

Depletion Allowance: 14% (domestic and foreign).

Government Stockpile: None.

Events, Trends, and Issues: During 2022, estimated domestic production of crude garnet concentrates decreased by 7% compared with production in 2021. This decrease was due to the closing of the Emerald Creek Garnet Mine in Idaho in July 2022. U.S. garnet production was estimated to be about 8% of total global garnet production. The 2022 estimated domestic sales or use of refined garnet decreased by about 6% compared with sales in 2021.

Garnet imports in 2022 were estimated to have increased by 32% compared with those in 2021. This increase was attributed to increased imports of garnet from Australia, India, and South Africa. In 2022, the average unit value of garnet imports was \$200 per ton, a decrease of 29% compared with the average unit value in 2021. In the United States, most domestically produced crude garnet concentrate was priced at about \$220 per ton. U.S. exports in 2022 were estimated to have increased by 18%. During 2022, the United States consumed an estimated 240,000 tons of garnet. This was a 17% increase from that in 2021.

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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. At the end of September 2022, the number of drill rigs operating in the United States was 765 rigs, an increase of 237 rigs over the end of September 2021, likely indicating that more garnet was consumed in well drilling.⁶

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.

Garnet production in India is still recovering from the effects of the global coronavirus disease 2019 (COVID-19) pandemic and has not yet returned to pre-pandemic levels.

World Mine Production and Reserves: Reserves data for China was revised based on Government reports.

	Mine production		Reserves ⁷
	<u>2021</u>	<u>2022^e</u>	
United States	81,700	76,000	5,000,000
Australia	321,000	370,000	Moderate to large
China	^e 310,000	310,000	2,200,000
India	12,000	15,000	13,000,000
South Africa	^e 140,000	150,000	NA
Other countries	<u>60,000</u>	<u>60,000</u>	<u>6,500,000</u>
World total (rounded)	925,000	980,000	Moderate to large

World Resources:⁷ 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.

⁶Source: Baker Hughes Co., 2022, Rig count overview & summary count: Baker Hughes Co., accessed October 4, 2022, at <https://bakerhughesrigcount.gcs-web.com/>.

⁷See Appendix C for resource and reserve definitions and information concerning data sources.