

GARNET (INDUSTRIAL)¹

(Data in metric tons unless otherwise specified)

Domestic Production and Use: In 2023, garnet for industrial use was mined by three companies—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 \$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.

Salient Statistics—United States:	2019	2020	2021	2022	2023^e
Production:					
Crude	104,000	101,000	81,700	76,400	68,000
Refined, sold or used	147,000	146,000	127,000	121,000	120,000
Imports for consumption ²	208,000	115,000	144,000	268,000	160,000
Exports	16,700	18,200	20,400	23,300	19,000
Consumption, apparent ³	296,000	198,000	205,000	321,000	210,000
Price, average import unit value, dollars per metric ton	214	250	280	194	190
Employment, mine and mill, number ^e	160	130	120	90	78
Net import reliance ⁴ as a percentage of apparent consumption	65	49	60	76	67

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 (2019–22):^e South Africa, 51%; Australia, 16%; China,⁵ 16%; India, 14%; and other, 3%.

Tariff:	Item	Number	Normal Trade Relations 12–31–23
	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 2023, estimated domestic production of crude garnet concentrates decreased by 11% compared with production in 2022. This decrease was due to the Emerald Creek Garnet Mine in Idaho closing in July 2022. U.S. garnet production was estimated to be about 7% of total global garnet production. The 2023 estimated domestic amount of refined garnet sold or used was essentially the same as that in 2022.

Garnet imports in 2023 were estimated to have decreased by 40% compared with those in 2022. This decrease was attributed to decreased garnet imports from Canada, China, and India. In 2023, the average unit value of garnet imports was \$190 per ton, a slight decrease compared with the average unit value in 2022. In the United States, most domestically produced crude garnet concentrate was priced at about \$220 per ton. U.S. exports in 2023 were estimated to have decreased by 18%. During 2023, the United States consumed an estimated 210,000 tons of garnet, a 35% decrease from that in 2022.

GARNET (INDUSTRIAL)

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 beginning of 2023, the number of drill rigs operating in the United States was 772; by the end of the second week of October 2023, the number of rigs operating had declined to 622, likely indicating that less garnet was consumed in well drilling. The year-to-date average was 705 rigs operating each week in the United States.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.

World Mine Production and Reserves: Reserves for China, India, and South Africa were revised based on company and Government reports.

	Mine production		Reserves ⁷
	2022	2023 ^e	
United States	76,400	68,000	5,000,000
Australia	388,000	390,000	Moderate to large
China	310,000	310,000	37,000,000
Czechia	^e 500	500	NA
India	15,000	15,000	8,600,000
Pakistan	1,870	1,900	NA
South Africa	<u>179,000</u>	<u>180,000</u>	<u>320,000</u>
World total (rounded)	971,000	970,000	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, China, Czechia, India, Pakistan, 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 but production data were not reported. Additional garnet resources are in Canada, Chile, Spain, Thailand, and Ukraine; small mining operations have been reported in most of these countries, but available information was inadequate to make reliable estimates of their individual output.

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 increased cost or decreased quality. 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., 2023, North America rotary rig count Jan 2000 - current: Baker Hughes Co., accessed October 16, 2023, at <https://rigcount.bakerhughes.com/na-rig-count>.

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