

**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 2013 by four firms—one in Idaho, one in Montana, and two in New York. The estimated value of crude garnet production was about \$8.6 million, while refined material sold or used had an estimated value of \$7.1 million. Major end uses for garnet were waterjet cutting, 35%; abrasive blasting media, 30%; water filtration, 20%; abrasive powders, 10%; and other end uses, 5%.

| <b>Salient Statistics—United States:</b>                                 | <b>2009</b> | <b>2010</b> | <b>2011</b> | <b>2012</b> | <b>2013<sup>e</sup></b> |
|--------------------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------------------|
| Production (crude)                                                       | 45,600      | 52,600      | 56,400      | 46,900      | 47,000                  |
| Production (refined, sold or used)                                       | 22,100      | 28,900      | 33,700      | 25,800      | 26,000                  |
| Imports for consumption <sup>e</sup>                                     | 71,100      | 79,700      | 116,000     | 166,000     | 160,000                 |
| Exports <sup>e</sup>                                                     | 13,200      | 11,700      | 14,500      | 14,600      | 15,000                  |
| Consumption, apparent <sup>e, 2</sup>                                    | 104,000     | 121,000     | 158,000     | 199,000     | 192,000                 |
| Price, range of value, dollars per ton <sup>3</sup>                      | 50–2,000    | 50–2,000    | 50–2,000    | 50–2,000    | 50–2,000                |
| Employment, mine and mill, number <sup>e</sup>                           | 160         | 160         | 160         | 160         | 160                     |
| Net import reliance <sup>4</sup> as a percentage of apparent consumption | 56          | 56          | 64          | 76          | 76                      |

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

**Import Sources (2009–12):<sup>e</sup>** Australia, 45%; India, 43%; China, 10%; and other, 2%.

| <b>Tariff:</b> | <b>Item</b>                                                                            | <b>Number</b> | <b>Normal Trade Relations<br/>12–31–13</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 2013, domestic U.S. production of crude garnet concentrates was essentially the same as the production in 2012. U.S. garnet consumption decreased slightly compared with that of 2012. The United States consumed about 11% of global garnet production. In 2013, imports were estimated to have decreased by 4% compared with those of 2012, and exports were estimated to have increased slightly from those of 2012. The 2013 estimated domestic sales or use of refined garnet was essentially the same as the sales in 2012. In 2013, the United States remained a net importer. Garnet imports have supplemented U.S. production in the domestic market; Australia, Canada, China, and India were major garnet suppliers.

The garnet market is very competitive. To increase profitability and remain competitive with foreign 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, mica minerals, sillimanite, staurolite, wollastonite, or metallic ores.

### **World Mine Production and Reserves:**

|                       | Mine production |                   | Reserves <sup>5</sup> |
|-----------------------|-----------------|-------------------|-----------------------|
|                       | 2012            | 2013 <sup>e</sup> |                       |
| United States         | 46,900          | 47,000            | 5,000,000             |
| Australia             | 263,000         | 260,000           | Moderate to Large     |
| China                 | 510,000         | 510,000           | Moderate to Large     |
| India                 | 800,000         | 800,000           | 6,700,000             |
| Other countries       | <u>50,000</u>   | <u>83,000</u>     | <u>6,500,000</u>      |
| World total (rounded) | 1,670,000       | 1,700,000         | 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, 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 in 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. Quartz sand, silicon carbide, and fused aluminum oxide compete for the finishing of plastics, wood furniture, and other products.

<sup>e</sup>Estimated.

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

<sup>2</sup>Defined as crude production – exports + imports.

<sup>3</sup>Includes crude and refined garnet; most crude concentrate is \$75 to \$210 per ton, and most refined material is \$75 to \$290 per ton.

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

<sup>5</sup>[See Appendix C for resource/reserve definitions and information concerning data sources.](#)