

## RARE EARTHS<sup>1</sup>

[Data in metric tons, rare-earth-oxide (REO) equivalent, unless otherwise specified]

**Domestic Production and Use:** Rare earths were mined domestically in 2023. Bastnaesite (or bastnäsite), a rare-earth fluorocarbonate mineral, was mined as a primary product at a mine in Mountain Pass, CA. Monazite, a phosphate mineral, was stockpiled as a separated concentrate or included as an accessory mineral in heavy-mineral-sand concentrates in the southeastern United States. Mixed rare-earth compounds were also produced in the western United States. The estimated value of rare-earth compounds and metals imported by the United States in 2023 was \$190 million, a 7% decrease from \$208 million in 2022. The estimated leading domestic end use of rare earths was catalysts. Significant amounts of rare earths are imported as permanent magnets embedded in finished goods. Other end uses were ceramics and glass, metallurgical applications and alloys, and polishing.

<b>Salient Statistics—United States:</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023<sup>e</sup></b>
Production: <sup>e</sup>					
Mineral concentrates	28,000	39,000	<sup>e</sup> 42,000	<sup>e</sup> 42,000	43,000
Compounds and metals	—	—	120	95	250
Imports: <sup>e, 2</sup>					
Compounds	12,200	6,510	7,690	10,700	8,800
Metals:					
Ferrocerium, alloys	330	270	330	396	300
Rare-earth metals, scandium, and yttrium	627	363	580	487	580
Exports: <sup>e, 2</sup>					
Ores and compounds	28,300	40,000	46,000	46,000	40,000
Metals:					
Ferrocerium, alloys	1,290	625	825	1,500	950
Rare-earth metals, scandium, and yttrium	83	25	20	24	64
Consumption, apparent, compounds and metals <sup>3</sup>	11,800	6,490	<sup>e</sup> 7,900	<sup>e</sup> 10,200	8,800
Price, average, dollars per kilogram: <sup>4</sup>					
Cerium oxide, 99.5% minimum	2	2	2	1	1
Dysprosium oxide, 99.5% minimum	239	261	410	382	323
Europium oxide, 99.99% minimum	35	31	31	30	27
Lanthanum oxide, 99.5% minimum	2	2	2	1	1
Mischmetal, 65% cerium, 35% lanthanum	6	5	6	7	5
Neodymium oxide, 99.5% minimum	45	49	98	134	80
Terbium oxide, 99.99% minimum	507	670	1,346	2,051	1,300
Employment, mine and mill, annual average, number	202	185	293	350	450
Net import reliance <sup>5</sup> as a percentage of apparent consumption: <sup>6</sup>					
Compounds and metals	100	100	>95	>95	>95
Mineral concentrates	E	E	E	E	E

**Recycling:** Limited quantities of rare earths are recovered from batteries, permanent magnets, and fluorescent lamps.

**Import Sources (2019–22):** Rare-earth compounds and metals: China,<sup>7</sup> 72%; Malaysia, 11%; Japan, 6%; Estonia, 5%; and other, 6%. Compounds and metals imported from Estonia, Japan, and Malaysia were derived from mineral concentrates and chemical intermediates produced in Australia, China, and elsewhere.

<b>Tariff:</b>	<b>Item</b>	<b>Number</b>	<b>Normal Trade Relations</b>
			<b>12–31–23</b>
	Rare-earth metals	2805.30.0000	5% ad valorem.
	Cerium compounds	2846.10.0000	5.5% ad valorem.
	Other rare-earth compounds:		
	Oxides or chlorides	2846.90.2000	Free.
	Carbonates	2846.90.8000	3.7% ad valorem.
	Ferrocerium and other pyrophoric alloys	3606.90.3000	5.9% ad valorem.

**Depletion Allowance:** Monazite, 22% on thorium content and 14% on rare-earth content (domestic), 14% (foreign); bastnaesite and xenotime, 14% (domestic and foreign).

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**Government Stockpile:**<sup>8</sup> In the addition to the materials listed below, the fiscal year (FY) 2023 potential acquisitions included 100 tons of rare-earth magnet block, and FY 2024 potential acquisitions include 300 tons of neodymium-praseodymium oxide, 286 tons of neodymium-iron-boron magnet block, and 200 tons of samarium-cobalt alloy.

Material	FY 2023		FY 2024	
	Potential acquisitions	Potential disposals	Potential acquisitions	Potential disposals
Cerium	550	—	550	—
Lanthanum	1,300	—	1,300	—
Neodymium	600	—	600	—
Praseodymium	70	—	70	—

**Events, Trends, and Issues:** Global mine production was estimated to have increased to 350,000 tons of REO equivalent. China's Ministry of Industry and Information Technology raised 2023 quotas for rare-earth mining and separation to 240,000 tons and 230,000 tons of REO equivalent, respectively. In 2023, mine production quotas were allocated to 220,850 tons of light rare earths and 19,150 tons of ion-adsorption clays.

**World Mine Production and Reserves:** Reserves for Australia, Russia, Thailand, and the United States were revised based on company and Government reports.

	Mine production <sup>e</sup>		Reserves <sup>9</sup>
	2022	2023	
United States	42,000	43,000	1,800,000
Australia	18,000	18,000	<sup>10</sup> 5,700,000
Brazil	80	80	21,000,000
Burma	12,000	38,000	NA
Canada	—	—	830,000
China	<sup>11</sup> 210,000	<sup>11</sup> 240,000	44,000,000
Greenland	—	—	1,500,000
India	2,900	2,900	6,900,000
Madagascar	960	960	NA
Malaysia	80	80	NA
Russia	2,600	2,600	10,000,000
South Africa	—	—	790,000
Tanzania	—	—	890,000
Thailand	7,100	7,100	4,500
Vietnam	1,200	600	22,000,000
World total (rounded)	300,000	350,000	110,000,000

**World Resources:**<sup>9</sup> Rare earths are relatively abundant in the Earth's crust, but minable concentrations are less common than for most other mineral commodities. In North America, measured and indicated resources of rare earths were estimated to include 3.6 million tons in the United States and more than 14 million tons in Canada.

**Substitutes:** Substitutes are available for many applications but generally are less effective.

<sup>e</sup>Estimated. E Net exporter. NA Not available. — Zero.

<sup>1</sup>Data include lanthanides and yttrium but exclude most scandium. See also the Scandium and Yttrium chapters.

<sup>2</sup>REO equivalent or content of various materials were estimated. Source: U.S. Census Bureau.

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

<sup>4</sup>Source: Argus Media group, Argus Non-Ferrous Metals.

<sup>5</sup>Defined as imports – exports.

<sup>6</sup>In 2019 and 2020, all domestic production of mineral concentrates was exported or held in inventory, and all compounds and metals consumed were assumed to be imported material.

<sup>7</sup>Includes Hong Kong.

<sup>8</sup>Gross weight. See Appendix B for definitions.

<sup>9</sup>See Appendix C for resource and reserve definitions and information concerning data sources.

<sup>10</sup>For Australia, Joint Ore Reserves Committee-compliant or equivalent reserves were 3.3 million tons.

<sup>11</sup>Production quota; does not include undocumented production.