

RARE EARTHS¹

[Data in metric tons of rare-earth oxide (REO) equivalent content unless otherwise noted]

Domestic Production and Use: Rare earths were mined domestically in 2018. Bastnaesite (or bastnäsite), a rare-earth fluorocarbonate mineral, was mined as a primary product at a mine in Mountain Pass, CA, which was restarted in the first quarter of 2018 after being put on care-and-maintenance status in the fourth quarter of 2015. Monazite, a phosphate mineral, also may have been produced as a separated concentrate or included as an accessory mineral in heavy-mineral concentrates. The estimated value of rare-earth compounds and metals imported by the United States in 2018 was \$160 million, an increase from \$137 million in 2017. The estimated distribution of rare earths by end use was as follows: catalysts, 60%; ceramics and glass, 15%; metallurgical applications and alloys, 10%; polishing, 10%; and other, 5%.

Salient Statistics—United States:	2014	2015	2016	2017	2018^e
Production, bastnaesite concentrates	5,400	5,900	—	—	15,000
Imports: ²					
Compounds	12,300	9,160	11,500	11,000	9,800
Metals:					
Ferrocerium, alloys	371	356	268	309	330
Rare-earth metals, scandium, and yttrium	348	385	404	524	1,000
Exports: ²					
Compounds	4,390	4,980	590	1,740	15,000
Metals:					
Ferrocerium, alloys	1,640	1,220	943	982	1,300
Rare-earth metals, scandium, and yttrium	140	60	103	55	30
Consumption, apparent ³	12,200	9,550	10,500	9,060	9,500
Price, dollars per kilogram, average: ⁴					
Cerium oxide, 99.5% minimum	5	3	2	2	2
Dysprosium oxide, 99.5% minimum	395	279	198	187	180
Europium oxide, 99.99% minimum	822	344	74	77	56
Lanthanum oxide, 99.5% minimum	5	3	2	2	2
Mischmetal, 65% cerium, 35% lanthanum	10	7	5	6	6
Neodymium oxide, 99.5% minimum	63	48	40	50	51
Terbium oxide, 99.99% minimum	713	564	415	501	461
Employment, mine and mill, annual average	391	351	—	24	150
Net import reliance ⁵ as a percentage of apparent consumption: ⁶					
Compounds and metals	56	38	100	100	100
Mineral concentrates	NA	NA	NA	NA	E

Recycling: Limited quantities, from batteries, permanent magnets, and fluorescent lamps.

Import Sources (2014–17): Rare-earth compounds and metals: China, 80%; Estonia, 6%; France and Japan, 3% each; and other, 8%. Imports of compounds and metals from Estonia, France, and Japan were derived from mineral concentrates and chemical intermediates produced in China and elsewhere.

Tariff: Item	Number	Normal Trade Relations 12–31–18
Rare-earth metals, scandium, and yttrium, whether or not intermixed or interalloyed	2805.30.0000	5.0% ad val.
Cerium compounds:		
Oxides	2846.10.0010	5.5% ad val.
Other	2846.10.0050	5.5% ad val.
Other rare-earth compounds:		
Lanthanum oxides	2846.90.2005	Free.
Other oxides	2846.90.2040	Free.
Lanthanum carbonates	2846.90.8070	3.7% ad val.
Other carbonates	2846.90.8075	3.7% ad val.
Other rare-earth compounds	2846.90.8090	3.7% ad val.
Ferrocerium and other pyrophoric alloys	3606.90.3000	5.9% ad val.

Depletion Allowance: Monazite, 22% on thorium content and 14% on rare-earth content (Domestic), 14% (Foreign); bastnäsite and xenotime, 14% (Domestic and foreign).

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Government Stockpile:⁷

Material	Inventory As of 9–30–18	FY2018		FY 2019	
		Potential Acquisitions	Potential Disposals ⁸	Potential Acquisitions	Potential Disposals ⁸
Dysprosium	0.1	0.5	0.5	0.5	—
Europium	7.1	18	—	35	—
Ferrodysprosium, gross weight	0.5	—	—	—	—
Rare earths	—	416	—	416	—
Rare-earth-magnet feedstock	—	—	—	100	—
Yttrium oxide	25	10	—	10	—

Events, Trends, and Issues: Mining of rare earths increased with renewed production in the United States supplemented with new and or increased production in Australia, Burma (Myanmar), and Burundi. In China, mine production quotas for the first and second halves of 2018 were set at 73,500 tons and 46,500 tons, respectively—an annual increase of 14% compared with the combined quota in 2017. According to China’s Ministry of Commerce, production of rare-earth-oxide equivalent in China was estimated to be at least 180,000 tons based on magnet material production. Illegal and undocumented production in China continued despite Government efforts.

In May 2018, the U.S. Department of the Interior, in coordination with other executive branch agencies, published a list of 35 critical minerals (83 FR 23295), including rare earths. This list was developed to serve as an initial focus, pursuant to Executive Order 13817, “A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals” (82 FR 60835).

World Mine Production and Reserves: Reserves for Russia were revised based on Government reports.

	Mine production ⁹		Reserves ⁹
	2017	2018	
United States	—	15,000	1,400,000
Australia	19,000	20,000	¹⁰ 3,400,000
Brazil	1,700	1,000	22,000,000
Burma (Myanmar)	NA	5,000	NA
Burundi	—	1,000	NA
China	¹¹ 105,000	¹¹ 120,000	44,000,000
India	1,800	1,800	6,900,000
Malaysia	180	200	30,000
Russia	2,600	2,600	12,000,000
Thailand	1,300	1,000	NA
Vietnam	200	400	22,000,000
Other countries	—	—	4,400,000
World total (rounded)	132,000	170,000	120,000,000

World Resources: Rare earths are relatively abundant in the Earth’s crust, but minable concentrations are less common than for most other ores. Resources are primarily in four geologic environments: carbonatites, alkaline igneous systems, ion-adsorption clay deposits, and monazite-xenotime-bearing placer deposits. Carbonatites and placer deposits are the leading sources of production of light rare-earth elements. Ion-adsorption clays are the leading source of production of heavy rare-earth elements.

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

⁹Estimated. E Net exporter. NA Not available. — Zero.

¹Data include lanthanides and yttrium but exclude most scandium. See also Scandium and Yttrium.

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

³Defined as production + imports – exports.

⁴Price range from Argus Media group – Argus Metals International.

⁵Defined as imports – exports.

⁶In 2014–15, domestic production of mineral concentrates was included with apparent consumption of compounds and metals. In 2018, domestic production of mineral concentrates was exported and consumers of compounds and metals were reliant on imports and stockpiled inventory.

⁷See Appendix B for definitions.

⁸Disposals are defined as any barter, rotation, sale, or upgrade of National Defense Stockpile stock.

⁹See Appendix C for resource and reserve definitions and information concerning data sources.

¹⁰For Australia, Joint Ore Reserves Committee-compliant reserves were about 2.1 million tons.

¹¹Production quota does not include undocumented production.