

RARE EARTHS¹

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

Domestic Production and Use: Rare earths were mined for part of the year by one company in 2015. Bastnäsite, a fluorocarbonate mineral, was mined and processed into concentrates and rare-earth compounds at Mountain Pass, CA. The United States continued to be a net importer of rare-earth products in 2015. The estimated value of rare-earth compounds and metals imported by the United States in 2015 was \$150 million, a decrease from \$191 million imported in 2014. The estimated distribution of rare earths by end use was as follows, in decreasing order: catalysts, 60%; metallurgical applications and alloys, 10%; ceramics and glass, 10%; glass polishing, 10%; and other, 10%.

Salient Statistics—United States:	2011	2012	2013	2014	2015^e
Production, bastnäsite concentrates	—	3,000	5,500	5,400	4,100
Imports: ²					
Compounds:					
Cerium compounds	1,120	1,390	1,110	1,440	1,400
Other rare-earth compounds	6,020	3,400	7,330	9,400	9,700
Metals:					
Ferrocerium, alloys	186	276	313	371	360
Rare-earth metals, scandium, and yttrium	468	240	393	348	460
Exports: ²					
Compounds:					
Cerium compounds	1,640	996	734	608	600
Other rare-earth compounds	3,620	1,830	5,570	3,800	6,000
Metals:					
Ferrocerium, alloys	2,010	960	1,420	1,640	1,200
Rare-earth metals, scandium, and yttrium	3,030	2,080	1,050	140	60
Consumption, estimated	11,000	15,000	15,000	17,000	17,000
Price, dollars per kilogram, yearend: ³					
Cerium oxide, 99.5% minimum	40–45	10–12	5–6	4–5	2
Dysprosium oxide, 99.5% minimum	1,400–1,420	600–630	440–490	320–360	215–240
Europium oxide, 99.9% minimum	3,780–3,800	1,500–1,600	950–1,000	680–730	130–175
Lanthanum oxide, 99.5% minimum	50–52	9–11	6	5	2
Mischmetal, 65% cerium, 35% lanthanum	47–49	14–16	9–10	9–10	5–6
Neodymium oxide, 99.5% minimum	190–200	75–80	65–70	56–60	37–42
Terbium oxide, 99.99% minimum	2,800–2,820	1,200–1,300	800–850	590–640	410–490
Employment, mine and mill, annual average	146	275	380	391	351
Net import reliance ⁴ as a percentage of estimated consumption	100	80	63	68	76

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

Import Sources (2011–14): Rare-earth compounds and metals: China, 71%; Estonia, 7%; France, 6%; Japan, 6%; and other, 10%.

Tariff: Item	Number	Normal Trade Relations 12–31–15
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: None.

Events, Trends, and Issues: In 2015, excess supply caused prices for rare-earth compounds and metals to decline significantly, and China continued to dominate the global supply of rare earths. According to China's Rare Earth Industry Association, consumption of rare-earth oxides in China was forecast to increase from 98,000 tons in 2015 to 149,000 tons in 2020. In 2015, China's consumption was led by magnets (35%), abrasives (18%), and catalysts (15%). Illegal production was cited as a major factor in declining prices. According to sources in China, despite Government efforts, illegal production of rare-earth materials was ongoing. China's rare-earths industry was in the process of being consolidated into six major industrial entities. The rare-earth mining production quota for 2015 was set at 105,000 tons, unchanged from 2014. China ended its rare-earth export quotas, removed export tariffs, and began to impose resource taxes on rare earths based on sales value instead of production quantity. Through October 2015, China had exported 26,800 tons of rare-earth materials, a 20% increase compared with exports for the same period in 2014. Production of rare-earth oxide equivalent in Malaysia, derived from Australian mine production, was 7,750 tons through September 2015, a 55% increase compared with the same period in 2014. U.S. domestic consumption of rare-earth compounds and metals was estimated to be nearly unchanged compared with that of 2014. In October, the Mountain Pass mining and separation operations were idled indefinitely. Price declines were cited as a key factor in the suspension of operations. The suspension resulted in a decline in mine production and exports of rare-earth compounds.

Exploration efforts to develop rare-earth projects continued in 2015. Exploration and development assessments in the United States included Bear Lodge, WY; Bokan Mountain, AK; Diamond Creek, ID; Elk Creek, NE; La Paz, AZ; Lemhi Pass, ID-MT; Pea Ridge, MO; Round Top, TX; and Thor, NV. Additional projects were underway in Australia, Brazil, Canada, China, Finland, Greenland, India, Kyrgyzstan, Madagascar, Malawi, Mozambique, Namibia, South Africa, Sweden, Tanzania, Turkey, and Vietnam.

World Mine Production and Reserves:

	Mine production ^e		Reserves ⁵
	2014	2015	
United States	5,400	4,100	1,800,000
Australia	8,000	10,000	⁶ 3,200,000
Brazil	—	—	22,000,000
China ⁷	105,000	105,000	55,000,000
India	NA ⁸	NA ⁸	3,100,000
Malaysia	240	200	30,000
Russia	2,500	2,500	(⁹)
Thailand ¹⁰	2,100	2,000	NA
Other countries	NA	NA	41,000,000
World total (rounded)	123,000	124,000	130,000,000

World Resources: Rare earths are relatively abundant in the Earth's crust, but discovered minable concentrations are less common than for most other ores. U.S. and world resources are contained primarily in bastnäsite and monazite. Bastnäsite deposits in China and the United States constitute the largest percentage of the world's rare-earth economic resources, and monazite deposits constitute the second largest segment.

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

^eEstimated. 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.

³Price range from Metal-Pages Ltd.

⁴Defined as estimated consumption – production. Insufficient data were available to determine stock changes and unattributed imports and exports of rare-earth materials.

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

⁶For Australia, Joint Ore Reserves Committee-compliant reserves were about 2.2 million tons.

⁷Production quota does not include undocumented production.

⁸Significant quantities are contained in stockpiled monazite tailings, but quantitative data are not available.

⁹Included with "Other countries."

¹⁰Based on imports to China.