RARE EARTHS[1]

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

Domestic Production and Use: Rare earths were not mined domestically in 2004. Bastnäsite, a rare-earth fluocarbonate mineral, was previously mined and processed as a primary product at Mountain Pass, CA. Rare-earth concentrates, intermediate compounds, and individual oxides were available from stocks. The United States continued to be a major exporter and consumer of rare-earth products in 2004. The estimated value of refined rare earths consumed in the United States was more than $1 billion. Based on final 2003 reported data, the estimated 2004 distribution of rare earths by end use was as follows: automotive catalytic converters, 46%; glass polishing and ceramics, 14%; metallurgical additives and alloys, 13%; petroleum refining catalysts, 7%; rare-earth phosphors for lighting, televisions, computer monitors, radar, and X-ray intensifying film, 5%; permanent magnets, 3%; and other, 12%.

Salient Statistics—United States:	**2000**	**2001**	**2002**	**2003**	**2004[e]**
Production, bastnäsite concentrates[e]	5,000	5,000	5,000	—	—
Imports:[2]					
Thorium ore (monazite)	—	—	—	—	—
Rare-earth metals, alloy	2,470	1,420	1,450	1,130	790
Cerium compounds	4,310	3,850	2,540	2,630	1,980
Mixed REOs	2,190	2,040	1,040	2,150	1,540
Rare-earth chlorides	1,330	2,590	1,800	1,890	1,520
Rare-earth oxides, compounds	11,200	9,150	7,260	10,900	12,400
Ferrocerium, alloys	118	118	89	111	109
Exports:[2]					
Rare-earth metals, alloys	1,650	884	1,300	1,190	1,240
Cerium compounds	4,050	4,110	2,740	1,940	2,000
Other rare-earth compounds	1,650	1,600	1,340	1,450	4,590
Ferrocerium, alloys	2,250	2,500	2,830	2,800	3,910
Consumption, apparent	12,100	15,100	11,000	9,340	6,670
Price, dollars per kilogram, yearend:					
Bastnäsite concentrate, REO basis[e]	4.08	4.08	4.08	4.08	4.08
Monazite concentrate, REO basis	0.73	0.73	0.73	0.73	0.73
Mischmetal, metal basis, metric ton quantity[3]	5-7	5-7	5-6	5-6	5-6
Stocks, producer and processor, yearend	W	W	W	W	W
Employment, mine and mill, number	78	90	95	90	NA
Net import reliance[4] as a percentage of apparent consumption	71	67	54	100	100

Recycling: Small quantities, mostly permanent magnet scrap.

Import Sources (2000-03): Rare-earth metals, compounds, etc.: China, 67%; France, 17%; Japan, 4%; Estonia, 4%; and other, 8%.

Tariff: Item	**Number**	**Normal Trade Relations 12-31-04**
Thorium ores and concentrates (monazite)	2612.20.0000	Free.
Rare-earth metals, whether or not intermixed or interalloyed	2805.30.0000	5.0% ad val.
Cerium compounds	2846.10.0000	5.5% ad val.
Mixtures of REOs except cerium oxide	2846.90.2010	Free.
Mixtures of rare-earth chlorides except cerium chloride	2846.90.2050	Free.
Rare-earth compounds, individual REOs (excludes cerium compounds)	2846.90.8000	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).

Government Stockpile: None.

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RARE EARTHS

Events, Trends, and Issues: Domestic demand for rare earths in 2004 was higher overall because of increased demand for rare-earth oxides and other refined rare-earth compounds used in automotive catalytic converters, fiber optics, lasers, oxygen sensors, phosphors for fluorescent lighting, color television, electronic thermometers, and X-ray intensifying screens, pigments, superconductors, and other applications. U.S. demand, however, was lower for cerium compounds used in glass polishing and glass additives, rare-earth chlorides used in the production of fluid cracking catalysts, rare-earth metals and alloys used in metallurgical applications and permanent magnets, and mixed-rare-earth oxides used in a variety of applications. U.S. imports of rare earths decreased in most trade categories. Although the rare-earth separation plant at Mountain Pass, CA, is still closed, it is expected to resume operations. Bastnäsite concentrates and other rare-earth intermediates and refined products continued to be sold from the mine stocks at Mountain Pass. The trend is for a continued increase in the use of rare earths in many applications, especially automotive catalytic converters, permanent magnets, and rechargeable batteries.

The international conferences that are planned are the 35ièmes Journées des Actinides—2005, April 23-26 in Baden/Wien, Austria; the 24th Rare Earth Research Conference, June 26-30, 2005, in Keystone, CO, United States; and the Sixth International Conference on f-Elements (ICFE-6), 2006, in Wroclaw, Poland. The 2005 Intermag Conference is planned for April 5-8, 2005, in Nagoya, Japan, and the 50th Conference on Magnetism and Magnetic Materials is scheduled for October 30 to November 3, 2005, in San Jose, CA, United States. The Rare Earths '04 was held November 7-12, 2004, in Nara, Japan, and the Rare Earth Metals 2004 was held October 24-26, 2004, in Hong Kong.

World Mine Production, Reserves, and Reserve Base:

	Mine production[e]		Reserves[5]	Reserve base[5]
	2003	2004		
United States	—	—	13,000,000	14,000,000
Australia	—	—	5,200,000	5,800,000
China	92,000	95,000	27,000,000	89,000,000
Commonwealth of Independent States	2,000	2,000	19,000,000	21,000,000
India	2,700	2,700	1,100,000	1,300,000
Malaysia	250	250	30,000	35,000
Thailand	2,200	2,000	NA	NA
Other countries	—	—	22,000,000	23,000,000
World total (rounded)	99,100	102,000	88,000,000	150,000,000

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 learget percentage of the world's rare-earth economic resources, while monazite deposits in Australia, Brazil, China, India, Malaysia, South Africa, Sri Lanka, Thailand, and the United States constitute the second largest segment. Xenotime, rare-earth-bearing (ion adsorption) clays, loparite, phosphorites, apatite, eudialyte, secondary monazite, cheralite, and spent uranium solutions make up most of the remaining resources. Undiscovered resources are thought to be very large relative to expected demand.

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

[e]Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data. — Zero.
[1]Data includes lanthanides and yttrium, but excludes most scandium. See also Scandium and Yttrium.
[2]REO equivalent or contents of various materials were estimated. Data from U.S. Census Bureau.
[3]Price range from Elements—Rare Earths, Specialty Metals and Applied Technology, Trade Tech, Denver, CO, and Web-based High Tech Materials, Longmont, CO.
[4]Defined as imports – exports + adjustments for Government and industry stock changes.
[5]See Appendix C for definitions.