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 2003. Bastnäsite, a rare-earth fluocarbonate mineral, was previously mined as a primary product at Mountain Pass, CA. The United States was a processor of rare earths and continued to be a major exporter and consumer of rare-earth products in 2003. The estimated value of refined rare earths consumed in the United States was more than $1 billion. The approximate distribution in 2002 by end use was as follows: petroleum refining catalysts, 27%; glass polishing and ceramics, 23%; automotive catalytic converters, 21%; metallurgical additives and alloys, 15%; permanent magnets, 5%; rare-earth phosphors for lighting, televisions, computer monitors, radar, and X-ray intensifying film, 4%; and other, 5%.

Salient Statistics—United States:	1999	2000	2001	2002	2003[e]
Production, bastnäsite concentrates[e]	5,000	5,000	5,000	5,000	—
Imports:[2]					
Thorium ore (monazite)	—	—	—	—	—
Rare-earth metals, alloy	1,780	2,470	1,420	1,450	1,130
Cerium compounds	3,990	4,310	3,850	2,540	2,630
Mixed REOs	5,980	2,190	2,040	1,040	2,150
Rare-earth chlorides	1,530	1,330	2,590	1,800	1,890
Rare-earth oxides, compounds	7,760	11,200	9,150	7,260	10,900
Ferrocerium, alloys	120	118	118	89	111
Exports:[2]					
Rare-earth metals, alloys	1,600	1,650	884	1,300	1,190
Cerium compounds	3,960	4,050	4,110	2,740	1,940
Other rare-earth compounds	1,690	1,650	1,600	1,340	1,450
Ferrocerium, alloys	2,360	2,250	2,500	2,830	2,800
Consumption, apparent	11,500	12,100	15,100	11,000	11,500
Price, dollars per kilogram, yearend:					
Bastnäsite concentrate, REO basis[e]	4.85	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	5-7	5-6	5-6
Stocks, producer and processor, yearend	W	W	W	W	W
Employment, mine and mill, number	78	78	90	95	90
Net import reliance[4] as a percentage of apparent consumption	70	71	67	54	100

Recycling: Small quantities, mostly permanent magnet scrap.

Import Sources (1999-2002): Rare-earth metals, compounds, etc.: China, 66%; France, 25%; Japan, 4%; Estonia, 3%; and other, 2%.

Tariff: Item	Number	Normal Trade Relations 12/31/03
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 2003 was essentially the same as that of 2002. U.S. imports of rare earths decreased in most trade categories as a result of decreased demand in the United States in 2002. Although the rare-earth separation plant at Mountain Pass, CA, is still closed, it is expected to resume operations, possibly in 2004. The mine at Mountain Pass continued to produce bastnäsite concentrates and cerium concentrates. The trend is for continued increased use of the rare earths in many applications, especially automotive catalytic converters, permanent magnets, and rechargeable batteries.

The international conference *Rare Earths '04* is planned for November 7-12, in Nara, Japan. The *Fifth International Conference of f-Elements (ICFE-5)* was held in Geneva, Switzerland, August 24-29, 2003. The first *Scandium Symposium* was held August 17-23, 2003, in Oslo, Norway. *The International Conference on Magnetism (ICM 2003)* convened in Rome, Italy, July 27-August 1, 2003.

World Mine Production, Reserves, and Reserve Base: Brazil's reserve base was lowered based on marginal reserves becoming subeconomic.

	Mine production[e]		Reserves[5]	Reserve base[5]
	2002	2003		
United States	5,000	—	13,000,000	14,000,000
Australia	—	—	5,200,000	5,800,000
Brazil	—	—	110,000	200,000
Canada	—	—	940,000	1,000,000
China	88,000	90,000	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	450	450	30,000	35,000
South Africa	—	—	390,000	400,000
Sri Lanka	120	120	12,000	13,000
Other countries	—	—	21,000,000	21,000,000
World total (rounded)	98,300	95,000	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 largest 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. 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.