BORON

(Data in thousand metric tons of boric oxide (B_2O_3) unless otherwise noted)

Domestic Production and Use: The estimated value of boric oxide contained in minerals and compounds produced in 2006 was $265 million. Domestic production of boron minerals, primarily as sodium borates, was done by three companies in southern California. The leading producer operated an open pit tincal and kernite mine and associated compound plants. The majority of the remaining output was produced using saline brines as the raw material. A third company that previously processed calcium and calcium sodium borates was selling from stocks. A fourth company was idle during most of 2003 and all of 2004 and 2005. Boron minerals and chemicals were principally consumed in the North Central and the Eastern United States. The estimated distribution pattern for boron compounds consumed in the United States in 2005 was glass and ceramics, 70%; soaps and detergents, 5%; fire retardants, 4%; agriculture, 2%; and other, 19%.

Salient Statistics—United States:	2002	2003	2004	2005	2006[e]
Production[1]	543	605	637	612	612
Imports for consumption, gross weight:					
Borax	([2])	([2])	([2])	1	1
Boric acid	49	47	49	52	60
Colemanite	32	24	21	31	25
Ulexite	125	80	110	103	90
Exports, gross weight:					
Boric acid	84	70	61	183	200
Colemanite	5	23	18	—	—
Refined sodium borates	150	131	135	308	360
Consumption:					
Apparent	492	532	509	439	400
Reported	359	366	385	NA	NA
Price, dollars per ton, granulated pentahydrate borax in bulk, carload, works[3]	376	400-425	400-425	400-425	400-425
Stocks, yearend[4]	NA	NA	NA	NA	NA
Employment, number	1,300	1,300	1,300	1,300	1,300
Net import reliance[5] as a percentage of apparent consumption	E	E	E	E	E

Recycling: Insignificant.

Import Sources (2002-05): Boric acid: Turkey, 57%; Chile, 31%; Peru, 5%; Russia, 3%; and other, 4%.

Tariff: Item	Number	Normal Trade Relations 12-31-06
Borates:		
Refined borax:		
Anhydrous	2840.11.0000	0.3% ad val.
Other	2840.19.0000	0.1% ad val.
Other	2840.20.0000	3.7% ad val.
Perborates:		
Sodium	2840.30.0010	3.7% ad val.
Other	2840.30.0050	3.7% ad val.
Boric acids	2810.00.0000	1.5% ad val.
Natural borates:		
Sodium	2528.10.0000	Free.
Other:		
Calcium	2528.90.0010	Free.
Other	2528.90.0050	Free.

Depletion Allowance: Borax, 14% (Domestic and foreign).

Government Stockpile: None.

Prepared by **Phyllis A. Lyday [(703) 648-7713, plyday@usgs.gov, fax: (703) 649-7757]**

BORON

Events, Trends, and Issues: The United States was the world's leading producer of refined boron compounds during 2006, and about one-half of domestic production was exported. U.S. processed products had fewer impurities and were produced with lower emissions than in other countries. The U.S. industry produced boron minerals with a higher productivity per worker hour than those produced in other countries. It was reported that a leading indicator for demand for refined borates was a strong housing market. The demand for housing decreased at yearend 2006.

In 2006, Rio Tinto Borax, Luzenac Talc, and Dampier Salt were combined to form a new organization, Rio Tinto Minerals, located in Colorado.[6] Together with Rio Tinto Iron & Titanium, the two will form the Industrial Minerals product group, effective in 2007.[7] The Boron Mine in southern California continues to be the leading producer of domestic boron compounds. Production of borates during 2005 was reported to be 560,000 tons, a decrease of 1% from 2004 production.

Salta Mining and Energy Resources, located in Salta Province in northern Argentina, increased exports of boric acid, lithium chloride, colemanite, and sodium octaborate to China during 2006.[8]

Exported U.S. borate materials competed with borax, boric acid, colemanite, and ulexite, primarily from Turkey, the leading producer of boron ore in the world.

World Production, Reserves, and Reserve Base:[9]

	Production—All forms		Reserves[10]	Reserve base[10]
	2005	2006[e]		
United States	1,150	1,150	40,000	80,000
Argentina	820	650	2,000	9,000
Bolivia	68	60	NA	NA
Chile	590	460	NA	NA
China	140	140	25,000	47,000
Iran	3	2	1,000	1,000
Kazakhstan	30	30	NA	NA
Peru	9	10	4,000	22,000
Russia	400	400	40,000	100,000
Turkey	1,700	1,850	60,000	150,000
World total (rounded)	4,910	4,750	170,000	410,000

World Resources: Large domestic reserves of boron materials occur in California, chiefly in sediments and their contained brines. Extensive resources also occur in Turkey. Small deposits are being mined in South America. At current levels of consumption, world resources are adequate for the foreseeable future.

Substitutes: Substitution for boron materials is possible in such applications as soaps, detergents, enamel, and insulation. In soaps, sodium and potassium salts of fatty acids are the usual cleaning and emulsion agents. Borates in detergents can be replaced by chlorine bleach or enzymes. Some enamels can use other glass-producing substances, such as phosphates. Insulation substitutes include cellulose, foams, and mineral wools.

[e]Estimated. E Net exporter. NA Not available. — Zero.

[1]Minerals and compounds sold or used by producers; includes both actual mine production and marketable products.

[2]Less than ½ unit.

[3]Chemical Market Reporter.

[4]Stocks data are not available and are assumed to be zero for net import reliance and apparent consumption calculations.

[5]Defined as imports – exports + adjustments for Government and industry stock changes.

[6]Jones, Laura, 2005, World leaders in borates, talc, and salt combine to form Rio Tinto Minerals: Toulouse, France, Rio Tinto Group press release, November 8, 1 p.

[7]Rio Tinto Group, 2005, Finding and processing the earth's minerals 2005, accessed December 6, 2006, at URL http://www.riotinto.com/library/annualreview05/operations/minerals.aspx.

[8]Prensa Latina, 2006, Argentina ups mineral exports to China, accessed May 29, 2006, at URL http://www.prensa-latina.org.

[9]Gross weight of ore in thousand metric tons.

[10]See Appendix C for definitions.