BORON

(Data in thousand metric tons of boric oxide (B₂O₃) unless otherwise noted)

<u>Domestic Production and Use</u>: The estimated value of boric oxide contained in minerals and compounds produced in 2004 was \$517 million. Domestic production of boron minerals, primarily as sodium borates, was 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 continued to process calcium and calcium sodium borates, and a fourth company was inactive during most of 2003 and all of 2004. Principal consumption of boron minerals and chemicals was in the production of glass by firms in the North Central and the Eastern United States. The estimated distribution pattern for boron compounds consumed in the United States in 2004 was: glass and ceramics, 75%; fire retardants, 4%; soaps and detergents, 4%; agriculture, 3%; and other, 14%.

Salient Statistics—United States:	<u>2000</u>	<u>2001</u>	2002	<u>2003</u>	2004 ^e
Production ¹	546	536	518	560	562
Imports for consumption, gross weight:			•		
Borax	1	1	(²)	19	5
Boric acid	39	56	49	47	52
Colemanite	26	35	32	24	7
Ulexite	127	109	125	80	122
Exports, gross weight:					
Boric acid	119	85	84	70	43
Colemanite	NA	NA	5	23	18
Refined sodium borates	413	221	150	131	131
Consumption:					
Apparent	356	482	492	532	509
Reported	360	347	359	348	NA
Price, dollars per ton, granulated pentahydrate					
borax in bulk, carload, works ³	376	376	376	400-425	400-425
Stocks, yearend⁴	NA	NA	NA	NA	NA
Employment, number	1,300	1,300	1,300	1,300	1,300
Net import reliance⁵ as a percentage of					
apparent consumption	Е	E	E	Е	E

Recycling: Insignificant.

Import Sources (2000-03): Boric acid: Turkey, 49%; Chile, 34%; Italy, 7%; Peru, 5%; and other, 5%.

m Number	Normal Trade Relations 12-31-04
ax:	
us 2840.11.0000	0.3% ad val.
2840.19.0000	0.1% ad val.
2840.20.0000	3.7% ad val.
2840.30.0010	3.7% ad val.
2840.30.0050	3.7% ad val.
2810.00.0000	1.5% ad val.
S:	
2528.10.0000	Free.
2528.90.0010	Free.
2528.90.0050	Free.
	ax: 2840.11.0000 2840.19.0000 2840.20.0000 2840.30.0010 2840.30.0050 2810.00.0000 s: 2528.10.0000

<u>Depletion Allowance</u>: Borax, 14% (Domestic and foreign).

Government Stockpile: None.

BORON

Events, Trends, and Issues: The United States was the world's leading producer of refined boron compounds during 2004, and about one-half of domestic production was exported. U.S. processed products had fewer impurities, lower emissions, and higher productivity per worker hour than boron minerals produced in other countries.

It was reported that a leading indicator for demand for refined borates was a strong housing market. Domestic market sectors for boron minerals and chemicals were fiberglass, 64%; borosilicate glass, 6%; fire retardants, 4%; soaps and detergents, 4%; agriculture, 3%; frits and ceramics, 3%; and other uses, 16%.

The second leading producing company in the United States also produced specialty borates in Tuscany, Italy, where production was curtailed in 2002 because of a lack of colemanite feedstock from Turkey. Turkey was using the colemanite to make value-added derivatives for export. The Italian plant was able to continue producing high-purity boric acid during 2004 by importing boron compounds.

During 2004, the first commercial magnetic levitation (maglev) train using boron magnets went into service between the Shanghai airport and downtown. Trains on the \$1.2 billion system travel 32 kilometers (20 miles) in less than 8 minutes. The top speed was 461 kilometers per hour (287 miles per hour). Two German manufacturers are bidding for a planned \$16 billion maglev line between Shanghai and Beijing.

The National Center for Environmental Assessment, a division of the U.S. Environmental Protection Agency, and the European Food Safety Agency established a safe level for the mineral boron. In humans, there is evidence that boron may influence the metabolism of other nutrients, such as vitamin D, that in turn stimulate the absorption of calcium. Boron is a mineral supplement has been used to treat arthritis in amounts of 200 parts per million.

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:⁶

		on—all forms	Reserves ⁷	Reserve base ⁷	
	<u>2003</u>	2004 ^e			
United States	1,150	1,130	40,000	80,000	
Argentina	545	550	2,000	9,000	
Bolivia	34	33	NA	NA	
Chile	500	300	NA	NA	
China	130	130	25,000	47,000	
Iran	3	3	1,000	1,000	
Kazakhstan	30	30	NA	NA	
Peru	9	7	4,000	22,000	
Russia	1,000	1,000	40,000	100,000	
Turkey	<u>1,400</u>	<u>1,400</u>	<u>60,000</u>	<u>150,000</u>	
World total (rounded)	4,800	4,600	170,000	410,000	

<u>World Resources</u>: 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.

<u>Substitutes</u>: 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.

^eEstimated. E Net exporter. NA Not available.

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

²Less than ½ unit.

³Chemical Market Reporter.

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

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

⁶Gross weight of ore in thousand metric tons.

⁷See Appendix C for definitions.