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 1998 was $440 million. Domestic production of boron minerals, primarily as sodium borates, by four companies was centered in southern California. The largest producer operated an open pit tincal and kernite mine and associated compound plants. A second firm, using Searles Lake brines as raw material, accounted for the majority of the remaining output. A third company continued to process small amounts of calcium and calcium sodium borates. A fourth company used an in-situ process. Principal consuming firms were in the North Central and Eastern States. The reported distribution pattern for boron compounds consumed in the United States in 1998 was as follows: Glass products, 71%; soaps and detergents, 5%; agriculture, 4%; fire retardants, 4%; and other, 16%.

Salient Statistics—United States:	1994	1995	1996	1997	1998[e]
Production[1]	550	728	581	604	619
Imports for consumption, gross weight:					
Borax	9	9	11	54	63
Boric acid	20	16	25	26	25
Colemanite	27	45	44	44	38
Ulexite	120	153	136	157	170
Exports, gross weight of boric acid and refined borates	498	588	381	473	473
Consumption: Apparent	389	312	234	483	504
Reported	296	NA	367	403	NA
Price, dollars per ton, granulated pentahydrate borax in bulk, carload, works[2]	324	324	375	340	340
Stocks, yearend[3]	NA	NA	NA	NA	NA
Employment, number	900	900	900	900	900
Net import reliance[4] as a percent of apparent consumption	E	E	E	E	E

Recycling: Insignificant.

Import Sources (1994-97): Boric acid: Chile, 35%; Turkey, 30%; Bolivia, 14%; Italy, 13%; and other, 8%.

Tariff: Item	Number	Normal Trade Relations (NTR) 12/31/98	Non-NTR[5] 12/31/98
Borates:			
Refined borax:			
Anhydrous	2840.11.0000	0.3% ad val.	1.2% ad val.
Other	2840.19.0000	0.1% ad val.	0.4% ad val.
Other	2840.20.0000	3.7% ad val.	25% ad val.
Perborates:			
Sodium	2840.30.0010	3.7% ad val.	25% ad val.
Other	2840.30.0050	3.7% ad val.	25% ad val.
Boric acids	2810.00.0000	1.5% ad val.	8.5% ad val.
Natural borates:			
Sodium	2528.10.0000	Free	Free.
Other:			
Calcium	2528.90.0010	Free	Free.
Other	2528.90.0050	Free	Free.

Depletion Allowance: Borax 14% (Domestic), 14% (Foreign).

Government Stockpile: None.

Prepared by **Phyllis A. Lyday [(703) 648-7713, plyday@usgs.gov, fax: (703) 649-7722]**

BORON

Events, Trends, and Issues: The United States was the world's largest producer of boron compounds during 1998 and exported about one-half of domestic production. Exported materials competed with borax, boric acid, colemanite, and ulexite primarily from Turkey, the largest producer of boron ore in the world.

Importation of borates from northern Chile continued. Ulexite is mined in Chile for the production of boric acid, synthetic colemanite, and refined ulexite for use in ceramics, insulating and reinforcing fiberglass, and agriculture.

The in-situ borate project produced synthetic calcium borate product that was being tested for usage in the glass industry.

The only domestic underground operation continued production during the year.

Neodymium-iron-boron alloys are used to produce the strongest magnetic material known. Interest in magnetic levitation (Maglev) trains was renewed as a federal law authorized $1 billion to explore and construct a Maglev segment. Maglev uses magnetic fields to lift a train above a guide way. The new transportation law sets aside at least $55 million for various regions to conduct Maglev feasibility and other related studies. The U.S. Department of Transportation will designate one project as being eligible for $950 million. The Federal Railroad Administration planned to solicit proposals for 1998 and to designate five projects for further study next year. Several Maglev projects received renewed interest as a result of the funding in California, Maryland, and Florida. Preliminary projects in New York, Pennsylvania, Georgia, and Tennessee are under way.

World Production, Reserves, and Reserve Base:[6]

	Production—all forms		Reserves[7]	Reserve base[7]
	1997	1998[e]		
United States	1,190	1,200	40,000	80,000
Argentina	270	270	2,000	9,000
Bolivia	5	5	4,000	19,000
Chile	150	150	8,000	41,000
China	140	140	27,000	36,000
Iran	1	1	1,000	1,000
Kazakhstan	7	7	14,000	15,000
Peru	40	40	4,000	22,000
Russia	13	13	40,000	100,000
Turkey	1,250	1,250	30,000	150,000
World total (rounded)	3,070	3,080	170,000	470,000

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. World resources are adequate, at current levels of consumption, for the foreseeable future.

Substitutes: Substitution for boron materials is possible in applications such 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 use other glass producing substances, such as phosphates. Insulation substitutes include foams and mineral wools.

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

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

[2]Chemical Market Reporter.

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

[4]Defined as imports - exports + adjustments for Government and industry stock changes.

[5]See Appendix B.

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

[7]See Appendix D for definitions.