

BORON

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

Domestic Production and Use: The estimated value of boric oxide contained in minerals and compounds produced in 2000 was \$498 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 United States and the Eastern United States. The reported distribution pattern for boron compounds consumed in the United States in 1999 was as follows: glass products, 73%; soaps and detergents, 6%; agriculture, 3%; fire retardants, 4%; and other, 14%.

Salient Statistics—United States:	1996	1997	1998	1999	2000^e
Production ¹	581	604	587	618	627
Imports for consumption, gross weight:					
Borax	11	54	14	8	1
Boric acid	25	26	23	30	37
Colemanite	44	44	47	42	63
Ulexite	136	157	170	178	104
Exports, gross weight:					
Boric acid	42	92	106	107	40
Refined sodium borates	381	473	453	450	380
Consumption:					
Apparent	234	483	412	534	503
Reported	367	403	NA	416	NA
Price, dollars per ton, granulated pentahydrate borax in bulk, carload, works ²	375	340	340	376	376
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 (1996-99): Boric acid: Chile, 37%; Turkey, 30%; Bolivia, 19%; Italy, 6%; Peru, 5%; other, 3%.

Tariff: Item	Number	Normal Trade Relations 12/31/00
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.

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Events, Trends, and Issues: The United States was the world's largest producer of boron compounds during 2000 and exported about one-half of domestic production. All production was from California. Exported materials competed with borax, boric acid, colemanite, and ulexite primarily from Turkey, the largest producer of boron ore in the world.

The large surface mine increased its stripping ratio to 36 to 1 during the year. An unforeseen slide involving some 32 million tons of material during 1999 increased the quantity of stripped overburden during the year to 100 million tons. The increased overburden removal is a result of a plan to increase the stability by constructing less steep benches. An agreement between the largest producer of borates and a large producer of flame retardants was signed to develop and expand the use of borates in plastics and as polymer additives. Potential opportunities for growth include the use of zinc borates in styrenics, engineering plastics and other compounds that take advantage of the low toxicity and flame-retardant performance of zinc borates.

The production of boron, sodium bicarbonate, and sodium sulfate production from underground brines in California continued, and the company planned a sale of the assets.

World Production, Reserves, and Reserve Base:⁵

	Production—all forms		Reserves ⁶	Reserve base ⁶
	1999	2000 ^e		
United States	1,220	1,120	40,000	80,000
Argentina	350	350	2,000	9,000
Bolivia	10	10	4,000	19,000
Chile	200	200	8,000	41,000
China	110	110	27,000	36,000
Iran	1	1	1,000	1,000
Kazakhstan	1	1	14,000	15,000
Peru	30	30	4,000	22,000
Russia	1,000	1,000	40,000	100,000
Turkey	1,410	1,400	30,000	150,000
World total (rounded)	4,370	4,270	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. 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 use other glass-producing substances, such as phosphates. Insulation substitutes include 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.

²Chemical Market Reporter.

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

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

⁵Gross weight of ore in thousand metric tons.

⁶See Appendix C for definitions.