

## BORON

(Data in thousand metric tons of boric oxide (B<sub>2</sub>O<sub>3</sub>), unless otherwise noted)

**Domestic Production and Use:** The estimated value of boric oxide contained in minerals and compounds produced in 2001 was \$557 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 2000 was as follows: glass products, 75%; soaps and detergents, 7%; agriculture, 4%; fire retardants, 4%; and other, 10%.

<b>Salient Statistics—United States:</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001<sup>e</sup></b>
Production <sup>1</sup>	604	587	618	546	650
Imports for consumption, gross weight:					
Borax	54	14	8	1	1
Boric acid	26	23	30	39	40
Colemanite	44	47	42	26	40
Ulexite	157	170	178	127	130
Exports, gross weight:					
Boric acid	92	106	107	119	100
Refined sodium borates	473	453	370	413	400
Consumption:					
Apparent	483	412	534	356	482
Reported	403	NA	416	360	NA
Price, dollars per ton, granulated pentahydrate borax in bulk, carload, works <sup>2</sup>	340	340	376	376	376
Stocks, yearend <sup>3</sup>	NA	NA	NA	NA	NA
Employment, number	900	900	900	1,300	1,300
Net import reliance <sup>4</sup> as a percentage of apparent consumption	E	E	E	E	E

**Recycling:** Insignificant.

**Import Sources (1997-2000):** Boric acid: Chile, 37%; Turkey, 32%; Bolivia, 15%; Italy, 8%; Peru, 5%; and other, 3%.

<b>Tariff:</b>	<b>Item</b>	<b>Number</b>	<b>Normal Trade Relations</b> <b><u>12/31/01</u></b>
<b>Borates:</b>			
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 2001 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 largest domestic producer continued mining and processing ore at its open pit mine. The production of boron, sodium bicarbonate, and sodium sulfate production from underground brines in California continued, but the company involved planned to sell its assets. The domestic underground and insitu operations also continued production during the year.

A Canadian company continued plans to develop a borate project in Yugoslavia. Material from the Piskanja property was being evaluated for grade, purity, and composition.

The Russian boric acid plant at Dalnegorsk was being transferred to a company that is 66% owned by the State. A \$5.5 million line of credit was allocated until 2008 to pay off wage arrears and clear outstanding debts. In 2000, boric acid production decreased 25% to 70,000 tons per year because of downtime from September to December. Production returned to capacity at 17,000 tons for January and February 2001.

A subsidiary of Turkey's largest mining company was building a boric acid plant at Emet that will produce 100,000 tons per year by 2003. Production at the Bandirma plant was planned to be increased from 45,000 tons per year to 60,000 tons per year by 2002. Turkey is building a 274,000-ton-per-year pyrite-burning sulfuric acid plant at Bandirma to supply the acid for boric acid plants at Bandirma and Emet.

### **World Production, Reserves, and Reserve Base:<sup>5</sup>**

	<b>Production—all forms</b>		<b>Reserves<sup>6</sup></b>	<b>Reserve base<sup>6</sup></b>
	<b>2000</b>	<b>2001<sup>e</sup></b>		
United States	1,070	1,300	40,000	80,000
Argentina	360	360	2,000	9,000
Bolivia	35	35	4,000	19,000
Chile	340	340	8,000	41,000
China	105	110	27,000	36,000
Iran	4	4	1,000	1,000
Kazakhstan	30	30	14,000	15,000
Peru	30	9	4,000	22,000
Russia	1,000	1,000	40,000	100,000
Turkey	<u>1,400</u>	<u>1,400</u>	<u>30,000</u>	<u>150,000</u>
World total (rounded)	4,370	4,600	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 cellulose, foams, and mineral wools.

<sup>e</sup>Estimated. E Net exporter. NA Not available.

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

<sup>2</sup>Chemical Market Reporter.

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

<sup>4</sup>Defined as imports - exports + adjustments for Government and industry stock changes.

<sup>5</sup>Gross weight of ore in thousand metric tons.

<sup>6</sup>See Appendix C for definitions.