

# SODA ASH

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Soda ash, also known as sodium carbonate ( $\text{Na}_2\text{CO}_3$ ), is an alkali chemical refined from the mineral trona or naturally occurring sodium carbonate-bearing brines (both referred to as natural soda ash), the mineral nahcolite (referred to as natural sodium bicarbonate, from which soda ash can be produced), or manufactured from one of several chemical processes (referred to as synthetic soda ash).

## Production

Soda ash production and inventory data were collected by the U.S. Geological Survey (USGS) from monthly, quarterly, and annual voluntary surveys of the U.S. soda ash industry. A survey request was sent to each of the six soda ash companies, all of which responded, representing 100% of the total production data in this report (table 1). The information and data are fundamental resources for analysis, both within and outside the government. The soda ash data and information are used by the public and private sectors to better understand minerals and materials usage, the ultimate disposition of materials in the economy and in the environment, and to develop public and private sector policies and practices that better utilize our mineral and material resources. Some of the organizations that use the soda ash data and information are financial institutions, State and Federal agencies, soda ash consuming industries (e.g., glass, chemicals, detergents), educational institutions, and the general public.

U.S. production of natural soda ash from California, Colorado, and Wyoming in 2001 was 10.3 million metric tons (Mt), which was slightly higher than that of 2000. Based on about 14.5 Mt (16 million short tons) of total nameplate capacity, the U.S. soda ash industry operated at 71% of total capacity. This capacity utilization rate appears low because it includes the full nameplate capacity of 900,000 metric tons (t) (1 million short tons) for American Soda, L.L.P., which intentionally operated at only half-capacity during the year but was included in the industry total because nameplate capacity is based on the industry total as of December 31 of each year. Furthermore, the capacity utilization rate was low because OCI Chemical Corp. and FMC Wyoming Corp. had idled 816,000 t (900,000 short tons) and 1.18 Mt (1.3 million short tons), respectively, of available capacity until market conditions improved. Approximately 2 Mt of nameplate capacity (2.2 million short tons), which represented about 14% of total industry nameplate capacity, was idled in 2001.

The U.S. soda ash industry consisted of six companies in 2001—four in Wyoming operating five plants that produced soda ash from underground trona ore, one in California that produced soda ash from sodium-carbonate-rich brines, and one in Colorado that produced soda ash and sodium bicarbonate from solution mining underground nahcolite. Nahcolite is a mineral that is naturally occurring sodium bicarbonate (its name is derived from the chemical elements contained in sodium

bicarbonate—Na (sodium), H (hydrogen), C (carbon), O (oxygen), and “lite” (stone).

In May, FMC terminated trona mining and indefinitely suspended all soda ash refining at its Granger, WY, facility (formerly owned by Tg Soda Ash Inc.), which had been acquired in July 1999. FMC mothballed one-half of the Granger’s plant capacity in November 1999 to streamline costs and reorganize its mine plan for the facility. Company officials stated that the total shutdown of 1.18 Mt (1.3 million short tons) of capacity was temporary and that the mine and plant would be brought back into service when market conditions improve and additional capacity was required (North American Minerals News, 2001b).

## Consumption

The USGS collects reported consumption data by end use on a quarterly basis from the marketing and sales departments of each company. Every effort has been made to categorize company sales within the correct end-use sector. Quarterly reports are often revised in subsequent quarters owing to customer reclassifications or other factors. Because all U.S. soda ash companies responded to the quarterly survey, the data represented 100% of the total reported consumption data found in this report.

In 2001, U.S. apparent consumption of soda ash was 6.30 Mt; reported consumption, however, was 6.38 Mt (table 3). Reported consumption and apparent consumption data do not necessarily correspond because reported consumption data are based on actual sales, whereas apparent consumption data are derived from the calculated quantity available for domestic consumption based on balancing supply (production, imports, and inventory adjustments) with external demand (exports).

In 2001, U.S. apparent consumption and reported consumption varied by 80,000 t, which was slightly more than 1% of apparent consumption. The discrepancy between the two forms of consumption was attributed to disagreement between the sources of export data used to derive consumption statistics. The two sources were the U.S. Census Bureau, which reports exports upon departure from the U.S. ports, and the soda ash producers, which consider a shipment as exported when their export association, the American Natural Soda Ash Corp. (ANSAC), takes consignment of the product at the California, Colorado, or Wyoming plant sites. Transit times between the plant and port, which can take about 2 to 3 weeks before the cargo is actually exported, and carryover export inventories contribute to the discrepancy between reported and apparent consumption as well.

The distribution of soda ash by end use in 2001 was glass, 48%; chemicals, 26%; soap and detergents, 11%; distributors, 5%; flue gas desulfurization, pulp and paper, and water treatment, 2% each; and other, 4%.

**Glass.**—Glass manufacture represented about 48% of

domestic soda ash consumption (the container sector accounted for 49% of that); flat, 36%; fiber, 8%, and specialty, 7%. There were 57 glass container manufacturing plants in 24 States that produced a variety of different colored glass containers for various products. About 58% of the container market was clear (flint) glass, 35% was brown (amber) glass, 6% was green, and 1% was miscellaneous colors. The containers are made for beverages (beer and carbonated and noncarbonated drinks), chemical and household products, food, liquor, medical products, and toiletries and cosmetics.

**Chemicals.**—Soda ash is used to manufacture many sodium-base inorganic chemicals, including sodium bicarbonate, sodium chromates, sodium phosphates, and sodium silicates.

In addition to American Soda, L.L.P., which began producing soda ash and sodium bicarbonate from Colorado nahcolite in October, AmerAlia, Inc., received a solution mining permit from the U.S. Bureau of Land Management. The permit allows the full commercial development of the project to proceed after the company posts land reclamation bonds. The plant had a planned production capacity of 68,000 metric tons per year (t/yr) (75,000 short tons per year) of sodium bicarbonate. AmerAlia's partner U.S. Filter, Inc., agreed to finance the construction of the facility, provided AmerAlia successfully obtained commitments for at least \$32 million by the end of the construction and startup periods (North American Minerals News, 2001a).

**Soaps and Detergents.**—Detergents were the third largest use of soda ash. Soda ash was used as a builder to emulsify oil stains, to reduce the redeposition of dirt during washing and rinsing, to provide alkalinity for cleaning, and to soften laundry water. In addition, soda ash was a component of sodium tripolyphosphate (STPP), another major builder in detergent formulations. Soda ash consumption has been decreasing because phosphatic detergents can contribute to eutrophication, which is an environmental concern. Many regions of the Nation adopted phosphate limitations or bans, affecting about 40% of the U.S. population. A strong U.S. economy the past couple of years boosted demand for industrial and institutional cleaners and automatic dishwashing detergents. New technology incorporating enzymes in dishwashing detergents and a move toward liquid cleansers, however, may adversely affect STPP consumption in the future.

In response to the environmental concern that cardboard detergent packaging contributes to the volume of landfill waste, detergent manufacturers have changed formulations to make compact and superconcentrated products. These reformulations required sodium silicates and synthetic zeolites, which are made from soda ash. Liquid detergents, which do not contain any soda ash, competed with powdered detergents and commanded about 50% of the household laundry detergent market in 2000 and 2001 compared with 15% in 1978.

## Stocks

Yearend 2001 stocks of dense soda ash in domestic plant silos, warehouses, terminals, and on teamtracks amounted to 226,000 t. Producers indicated that a potential supply problem could exist if inventories fell below 180,000 t. Most consumers of soda ash did not have the storage facilities to accommodate large quantities of soda ash and had to rely on suppliers to provide the material on a timely basis.

## Prices

In the domestic market, large-volume buyers of soda ash were primarily the major glass container manufacturers whose purchases were seasonal (more beverage containers made in the second and third quarters for summertime beverage consumption). Soda ash sales to the flat glass sector were usually dependent on the state of the economy because the largest use of flat glass was in automobile manufacture and in residential housing and commercial building construction. These two major industrial sectors were especially sensitive to changing economic conditions, and soda ash sales follow trends in the two sectors.

In 2001, the average annual value for bulk, dense natural soda ash, free-on-board (f.o.b.) Green River, WY, Searles Valley, CA, and Parachute, CO, was \$74.73 per metric ton (\$67.79 per short ton), which was a 2% increase compared with that of 2000. The value is not a "price" but rather the value of the combined revenue of California, Colorado, and Wyoming bulk, dense soda ash sold on an f.o.b. plant basis at list, spot, or discount prices, on long-term contracts, and for export, divided by the quantity of soda ash sold. The list prices quoted in trade journals or by producers differed from the annual average values reported to and by the USGS. This value may or may not correspond to the posted list prices. The list price for Wyoming bulk, dense soda ash has not changed since it was raised effective July 1, 1995, or as contracts permitted to \$105 per short ton (\$116 per metric ton) from \$98 per short ton (\$108 per metric ton). The California price for the comparable product also increased by \$7 per short ton (\$8 per metric ton), to \$130 per short ton (\$143 per metric ton) from \$123 per short ton (\$136 per metric ton) (table 4).

Rising energy costs in late 2000 and early 2001 adversely affected the operating economics of the domestic soda ash industry. As a result, on January 19, 2001, FMC Corp. announced an energy surcharge of \$7 per short ton (\$8 per metric ton) on all grades of soda ash effective February 1. This is in addition to the \$5-per-short-ton (\$6-per-metric-ton) off-list price increase it announced on December 4, 2000. The energy surcharge would continue until such time as natural gas costs, as reported by the New York Mercantile Exchange, return to the level of \$2.25 per million British thermal units (\$2.37 per million kilojoules), at which point the surcharge would be removed. Other producers soon after announced similar energy surcharges (FMC Corp., 2001).

The U.S. soda ash industry made several price increase announcements after midyear. Solvay Minerals Inc. initiated an increase of \$10 per short ton (\$11 per metric ton) on July 9; General Chemical Corp. followed with a \$10-per-short-ton (\$11-per-metric-ton) increase on July 16, and FMC Corp. followed with an increase of \$10-per-short-ton (\$11-per-metric-ton) effective August 1 or as contracts permitted (Chemical Week, 2001c). IMC Chemicals Inc. announced a dual price increase on July 24—a \$10-per-short-ton (\$11-per-metric-ton) increase effective August 1 or as contracts allowed and an additional \$5-per-short-ton (\$6-per-metric-ton) increase effective October 1 or as contracts allowed on off-list pricing. The increases included a portion of the energy costs that the company would incur for the foreseeable future. IMC Chemicals would remove, effective August 1, the energy surcharge on all noncontracted business (IMC Chemicals Inc., 2001). In early August, OCI Chemical announced a price

increase of \$15 per short ton (\$17 per metric ton) effective immediately or as contracts allowed and eliminated the previously announced \$7-per-short-ton (\$8-per-metric-ton) energy surcharge (OCI Chemical Corp., 2001<sup>1</sup>). Also in August, American Soda raised its prices on soda ash by \$10 per short ton (\$11 per metric ton) effective immediately or as contracts allowed (Chemical Market Reporter, 2001a). The companies stated that the increases were necessary in order to bring prices to reinvestment levels and to offset rising energy costs.

## Foreign Trade

U.S. soda ash export data for 2001 from the U.S. Census Bureau were adjusted using trade statistics from the Journal of Commerce's Port Import-Export Reporting Service and information provided by the industry. Approximately 340,000 t of erroneous or omitted export data (about 330,000 t through the San Diego customs district to Australia, Brazil, Colombia, Indonesia, and Venezuela; remainder through the Columbia-Snake River customs district to Colombia, and through the Houston-Galveston customs district to Venezuela) were adjusted from the U.S. Census Bureau's total of 4.43 Mt. The adjusted total for exports in 2001 is 4.09 Mt, which represented about 40% of U.S. soda ash production. The problems in the Asian economies that began in late 1997 had virtually subsided in 2001. However, this upturn in the economies in most of the nations did not stimulate soda ash exports sales to Asia because China continued to compete with the United States in the Asian markets. In 2001, Asia received 39% of total U.S. soda ash exported, representing 15% of domestic production, whereas in 2000, Asia received 44% of the U.S. soda ash exported, accounting for 17% of total domestic output.

Total U.S. soda ash exports are slowly increasing. In 2001, exports were 5% greater than those of 2000. In 2001, U.S. exports to 45 countries, on a regional basis, were as follows: Asia, 39%; North America, 26%; South America, 17%; Europe, 8%; the Middle East, 5%; Africa and Oceania, 2% each; and Central America, 1% (table 6). Shipments to the Caribbean were negligible. The average free alongside ship value was \$119.02 per metric ton in 2001 compared with \$122.52 per ton in 2000. Although the data in tables 1 and 6 are rounded to three significant digits, the unit values shown are based on the actual unrounded statistics and not the rounded data. The top 10 countries, representing 67% of total U.S. soda ash exports, in decreasing order and percentage of total, were: Mexico, 15%; Canada, 10%; Japan, 9%; Brazil, 7%; Indonesia, 7%; the Republic of Korea, 6%; Chile, 4%; Malaysia, 3%; Belgium, 3%; and Venezuela, 3%. About 56% of all U.S. soda ash exports went through the Columbia-Snake River customs district; the Laredo, TX, customs district was the second largest, with 15% of the total (table 5).

Imports of soda ash decreased by 56% to 33,000 t. The majority (95%) came from Canada, where General Chemical operated a synthetic soda ash plant in Amherstburg, Ontario, until April. The remainder was imported from Bulgaria, China, Germany, Hong Kong, Israel, Japan, Mexico, Turkey, and the United Kingdom. The average customs, insurance, and freight value of imported soda ash was \$121.83 per ton.

<sup>1</sup>A references that includes a section twist (§) is found in the Internet Reference Cited section.

## World Review

The largest consumers of soda ash were, for the most part, developed nations; these countries, however, also usually had lower growth rates compared with developing countries, which usually have greater demands for consumer products. Although the production and consumption quantities varied among the countries, the end-use patterns were basically the same; glass, chemicals, and detergents were the major sectors (table 8).

Nine countries had the capacity to produce more than 1 million metric tons per year (Mt/yr). They are, in descending order, the United States, China, Russia, India, Germany, France, Italy, Poland, and the United Kingdom. Bulgaria, Romania, and Ukraine had production installations that were rated at about 1 Mt/yr; adverse economic conditions, however, had caused these nations to produce below their design capacities. Recent acquisitions or joint ventures with major European soda ash producers that have soda ash manufacturing expertise should reverse this situation in the next few years. Most of these soda-ash-producing countries have large populations that require consumer products made with soda ash. The less developed nations tend to have higher soda ash demands and higher growth rates as soda-ash-consuming industries are developed. In 2001, world soda ash production was estimated to be 35.1 Mt, which was a 3% increase compared with that of 2000.

**Australia.**—In November, IMC Global Inc. sold Penrice Soda Products Pty. Ltd., its synthetic soda ash operation in Osborne, to Castle Harlan Australian Mezzanine Partners Pty. Ltd. (CHAMP) for \$43 million. CHAMP is a firm that manages and advises private equity capital for investment opportunities in Australia. It is the successor to Australian Mezzanine Investments Pty. Ltd., one of Australia's oldest private equity companies, and the partner of Castle Harlan, Inc., a leading New York-based private equity firm (IMC Global Inc., 2001).

**Canada.**—Overcapacity, high energy costs, and low profitability were cited as reasons why General Chemical closed its synthetic soda ash plant in Amherstburg in April and would reopen the plant when market conditions improved. The plant, which was built in 1919, had a nameplate capacity of 500,000 t/yr. The company would supply its United States and Canadian customers from its Green River, WY, plant (Chemical Week, 2001a).

**India.**—Nirma Ltd., a leading soda ash producer, announced plans to increase capacity at its plant in Bhavnagar, Gujarat Province, to 650,000 t/yr from 420,000 t/yr. The \$23 million expansion was scheduled to be finished by December 2002. Nirma, which also is a major detergent manufacturer, intended to use the additional soda ash to meet the growing demand for the Indian detergents market (Industrial Minerals, 2001b).

The Indian Government responded to the petition filed by the U.S. Trade Representative to lower the soda ash import duty. There was concern that the U.S. Trade Representative would remove India's generalized system of preferences on certain products, such as garments and handicrafts, that had been imported from India duty-free. As a result, the Indian Government proposed a 15% reduction (to 20% from 35%) in the soda ash import duty and to abolish the 3.5% surcharge. In addition, a countervailing duty of 22.16% paid by consumers that manufacture a product made from imported soda ash would be reduced to 19.2%. Lastly, a special additional duty of 6.43% would be reduced to 5.57%. The Alkali Manufacturers Association of India has protested this proposal stating that the

basic duty of 35% complies with World Trade Organization duty rates (Industrial Minerals, 2001a).

**India's Monopolies and Restrictive Trade Practices Commission** investigated allegations filed by Insilco Co., a major soda ash consumer, that India's three major soda ash producers fixed prices between July and December 1994. The soda ash companies—Nirma Ltd., Gujarat Heavy Chemicals Ltd., and Tata Chemicals Ltd.—denied the charges (Chemical Week, 2001b).

**Iran.**—Shiraz Petrochemical Co. (a subsidiary of National Petrochemical Co. of Iran) announced plans to construct a synthetic soda ash plant in Shiraz. The facility, which was scheduled to be on-stream in 2004, has a planned capacity of 80,000 t/yr (Industrial Minerals, 2001c).

**Japan.**—Asahi Glass Co., Ltd., permanently closed its synthetic soda ash plant in Kitakyushu in late March. The decision to close the plant, which had a capacity of 350,000 t/yr, was based on the large capital expenditure required to modernize the facility and the company's investment in the U.S. soda ash industry. Through its subsidiary AG Soda Corp., Asahi has a 20% partnership with Solvay Minerals in its Wyoming operation (Chemical Market Reporter, 2001b).

**Mexico.**—Minera MGM SA de CV (a subsidiary of Morgain Minerals, Inc., of Toronto, Canada) began harvesting surface trona at the Adair trona deposit on the east coast of the Sea of Cortez in the northwestern Sonora. Trona sales to the local animal feed industry provided capital to fund ongoing development work. The ultimate plan was to construct a soda ash plant to process the underground trona brines into soda ash to help relieve the nation's dependency on soda ash imports, which total about 400,000 t/yr. Approximately 80% of the trona resource, which has an estimated reserve base of 100 Mt, is located in underground brines. The company was still evaluating the technical and economic feasibility of the project (Industrial Minerals, 2001d).

## Outlook

The U.S. soda ash industry showed signs of rebounding as the new millennium began. Excess domestic nameplate capacity and growing competition from China will be major topics in the near future. Additional shutdowns of small, uneconomic soda ash plants and industry consolidation throughout the world may be required to reduce soda ash capacity and bring soda ash demand in line with higher capacity utilization rates. If this occurs, prices could stabilize, which would improve the operating economics of most producers.

At the beginning of the new millennium, three dominant groups have survived to become the world leaders in soda ash—Solvay S.A. of Belgium, ANSAC of the United States (which represents all six domestic producers), and China. In years to come, these three soda ash suppliers will produce and export soda ash to many customers all over the world. Because the glass container sector is the largest soda ash consuming sector, the demand for soda ash for glass containers may decline as consumers slowly accept their food and beverages packaged in the newer PET containers.

The outlook for soda ash for the next 5 years is favorable. Domestic soda ash demand is expected to grow between 0.5% and 1.0% per year, and world demand growth is forecast to range from 2.0% to 2.5% per year for the next several years. Asia and South America remain the likeliest areas for increased

soda ash consumption in the near future.

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TABLE 1  
SALIENT SODA ASH STATISTICS 1/

(Thousand metric tons and thousand dollars, except average annual value)

	1997	1998	1999	2000	2001
<b>United States:</b>					
Production 2/	10,700	10,100	10,200	10,200	10,300
Value 2/	\$915,000	\$842,000	\$779,000	\$748,000	\$773,000
<b>Value, average annual:</b>					
Per short ton	\$77.25	\$75.30	\$69.11	\$66.23	\$67.79
Per metric ton	\$85.15	\$83.00	\$76.00	\$73.00	\$74.73
Production, Wyoming trona	17,100	16,500	15,900	15,700	15,400
Exports	4,190	3,660	3,620	3,900	4,090
Value	\$547,000	\$478,000	\$447,000	\$477,000	\$487,000
Imports for consumption	101	83	92	75	33
Value	\$13,400	\$10,800	\$11,100	\$8,570	\$4,070
Stocks, December 31, producers'	259	273	248	245	226
<b>Consumption:</b>					
Apparent	6,670	6,560	6,740	6,430	6,310
Reported	6,480	6,550	6,430	6,390	6,380
World, production e/	33,100	32,400	33,200	34,200	35,100

e/ Estimated.

1/ Data are rounded to no more than three significant digits, except value per ton.

2/ Natural only; soda liquors and purge liquors are withheld to avoid disclosing company proprietary data.

TABLE 2  
U.S. PRODUCERS OF SODA ASH IN 2001

(Million short tons, unless otherwise noted)

Company	Plant nameplate capacity	Plant location	Source of sodium carbonate
American Soda, L.L.P. 1/	1.00	Parachute, CO	Underground nahcolite.
FMC Wyoming Corp. - Green River 2/	3.55	Green River, WY	Underground trona.
FMC Wyoming Corp. - Granger 3/	1.30	Granger, WY	Do.
General Chemical (Soda Ash) Partners 4/	2.80	Green River, WY	Do.
IMC Chemical Co. 5/	1.45	Trona, CA	Dry lake brine.
OCI Chemical Corp. 6/	3.10	Green River, WY	Underground trona.
Solvay Minerals Inc. 7/	2.80	do.	Do.
Total	16.00		
Total	million metric tons	14.50	

1/ Came on-stream October 2000. A joint venture with Williams Sodium Products Co., which is a wholly owned subsidiary of The Williams Companies, Inc. (60%), and American Alkali, Inc. (40%).

2/ Formed joint venture (20%) in February 1996 with Sumitomo Corp. and Nippon Sheet Glass Co., Ltd., both of Japan.

3/ Tg Soda Ash Inc. was sold to FMC Wyoming Corp. in July 1999.

4/ A joint venture between General Chemical Corp. (51%), Owens-Illinois, Inc. (acquired Australian Consolidated Industries International in 1998) (25%), and Tosoh Wyoming Inc. of Japan (24%), which purchased part of ACI's share in June 1992. An expansion was completed in 1998.

5/ IMC Global Inc. acquired North American Chemical Co. in April 1998; operation renamed.

6/ Rhône-Poulenc Basic Chemicals Co. of France sold its 51% share to OCI Chemical Corp. of the Republic of Korea on February 29, 1996; Anadarko Petroleum Corp. (acquired Union Pacific Resources Co. in 2000) owns 49%. An 800,000-short-ton expansion, brought on-stream in November 1998, increased plant capacity to 3.1 million short tons; however, the company planned to take 900,000 short tons out of service temporarily for equipment refurbishment.

7/ Solvay Soda Ash Joint Venture is owned by Solvay S.A. of Belgium (80%) and Asahi Glass Co. of Japan (20%), which became a partner in February 1990. Capacity increase of 272,000 metric tons (300,000 short tons) installed December 1995 and 454,000 metric tons (500,000 short tons) in October 2000.

TABLE 3  
REPORTED CONSUMPTION OF SODA ASH IN THE UNITED STATES, BY END USE, BY QUARTERS 1/

(Metric tons)

SIC code	End use	2000	2001				Total
			First quarter	Second quarter	Third quarter	Fourth quarter	
32	Glass:						
3221	Container	1,530,000	358,000	392,000	394,000	363,000	1,510,000
3211	Flat	1,150,000	269,000	287,000	269,000	269,000	1,100,000
3296	Fiber	247,000	61,300	60,900	60,200	63,300	246,000
3229	Other	240,000	58,800	57,300	55,900	49,500	222,000
	Total	3,170,000	748,000	798,000	779,000	744,000	3,070,000
281	Chemicals	1,720,000	414,000	414,000	420,000	434,000	1,680,000
284	Soaps and detergents	715,000	179,000	171,000	174,000	173,000	697,000
26	Pulp and paper	114,000	34,100	41,700	37,600	34,600	148,000
2899	Water treatment 2/	89,800	25,300	23,900	27,200	25,300	102,000
	Fluegas desulfurization	121,000	29,100	26,300	34,600	29,000	119,000
	Distributors	372,000	94,300	93,300	78,000	72,400	338,000
	Other	91,100	54,100	62,500	45,500	61,900	224,000
	Total domestic consumption 3/	6,390,000	1,580,000	1,630,000	1,600,000	1,570,000	6,380,000
	Exports 4/	4,010,000	859,000	864,000	975,000	979,000	3,680,000
	Canada	202,000	65,800	94,900	91,100	97,800	350,000
	Total industry sales 5/	10,400,000	2,440,000	2,500,000	2,570,000	2,550,000	10,100,000
	Total sales from plants	10,200,000	2,520,000	2,610,000	2,660,000	2,700,000	10,500,000
	Total production	10,200,000	2,580,000	2,600,000	2,560,000	2,600,000	10,300,000

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes soda ash equivalent from soda liquors and purge liquors sold to powerplant for water treatment. Sales of mine water are excluded.

3/ Imports reported by the producer/importer have been distributed into appropriate end-use categories listed above.

4/ As reported by producers. Includes Canada. Data may not necessarily agree with that reported by the U.S. Census Bureau for the same periods.

5/ Represents soda ash from domestic origin (production and inventory changes) and imports and for exports. Includes soda ash sold by coproducers and distributed by purchasers into appropriate end-use categories.

TABLE 4  
SODA ASH YEAREND PRICES

(Per short ton)

	2000	2001
Sodium carbonate (soda ash):		
Dense, 58% Na <sub>2</sub> O 100-pound, paper bags, carlot, works, f.o.b.	\$153.00	\$75.00-90.00
Bulk, carlot, same basis, tons	105.00	105.00
Light 58% 100-pound, paper bags, carlot same basis	210.00	210.00
Bulk, carlot, same basis, tons	173.00	173.00

Sources: Chemical Market Reporter. Current Prices of Chemicals and Related Materials, v. 259, no. 1, January 1, 2001, p. 21, and v. 261, no. 1, January 7, 2001, p. 26.

TABLE 5  
REGIONAL DISTRIBUTION OF U.S. SODA ASH EXPORTS, BY CUSTOMS DISTRICTS, IN 2001 1/

(Metric tons)

Customs districts	North America	Central America	South America	Caribbean	Europe	Middle East	Africa	Asia	Oceania	Total	Percent of total
Atlantic:											
Miami, FL	--	26	41	28	--	--	--	--	--	95	(2/)
New York, NY	--	--	--	--	3,290	169	--	--	--	3,460	(2/)
Gulf:											
Houston-Galveston, TX	--	31	179 3/	13	811	--	--	--	--	1,030	(2/)
Port Arthur, TX	--	--	139,000	11,300	--	--	66,100	--	--	216,000	5
Pacific:											
Anchorage, AK	201	--	--	--	--	--	--	--	--	201	(2/)
Columbia-Snake River	--	34,000	317,000 3/	--	312,000	173,000	--	1,390,000	56,000	2,280,000	56
Los Angeles, CA	--	--	28,200	--	--	--	--	22,500	5	50,700	1
San Diego, CA	757	21,900	221,000 3/	--	4,980	--	--	176,000 3/	36,700 3/	462,000	11
Seattle, WA	32,800	--	--	--	--	--	--	2	--	32,800	1
North Central:											
Chicago, IL	--	--	--	--	--	25	--	(2/)	--	25	(2/)
Detroit, MI	331,000	--	--	--	784	--	--	--	--	332,000	8
Duluth, MN	358	--	--	--	--	--	--	--	--	358	(2/)
Great Falls, MT	15,000	--	--	--	--	--	--	--	--	15,000	(2/)
Pembina, ND	10,900	--	--	--	--	--	--	--	--	10,900	(2/)
Northeast:											
Buffalo, NY	8,230	--	--	--	--	--	--	--	--	8,230	(2/)
Ogdensburg, NY	679	--	--	--	--	--	--	--	--	679	(2/)
St. Albans, VT	448	--	--	--	--	--	--	--	--	448	(2/)
Southwest, Laredo, TX	603,000	--	--	--	--	--	--	--	--	603,000	15
Other, San Juan, PR	--	--	--	5	--	14,000	--	--	--	14,000	(2/)
Unknown	56,900	--	--	--	--	--	--	--	--	56,900	1
Total	1,060,000	55,900	706,000	11,400	322,000	188,000	66,100	1,590,000	92,700	4,090,000	100
Percentage of total	26	1	17	(2/)	8	5	2	39	2	100	XX

XX Not applicable. -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Less than 1/2 unit.

3/ Data discrepancies for Australia (through San Diego customs district), Brazil (through San Diego customs district), Colombia (through San Diego and Columbia-Snake River customs districts), Indonesia (San Diego customs district), and Venezuela (through San Diego and Houston-Galveston customs districts) were adjusted. Approximately 340,000 metric tons of erroneous or omitted export data were adjusted from the U.S. Census Bureau's total of 4.43 million metric tons. About 30,000 metric tons of unreconciled data are contained under "Unknown" for North America.

Source: U.S. Census Bureau. Reviewed by the U.S. Geological Survey using trade data and information from the Journal of Commerce.

TABLE 6  
U.S. EXPORTS OF SODA ASH, BY COUNTRY 1/

Country	2000			2001		
	Quantity (thousand metric tons)	Value 2/ (thousands)	Unit value	Quantity (thousand metric tons)	Value 2/ (thousands)	Unit value
Argentina	114	\$16,200	\$142.54	79	\$11,400	\$144.66
Australia	64	8,460	132.22	73	8,920	122.75
Belgium	60	7,290	121.55	114	13,400	117.55
Bolivia	2	271	135.50	3	420	167.82
Brazil	261	36,200	138.86	295	43,300	146.67
Canada	223	20,000	89.87	422	31,800	75.30
Chile	165	23,800	144.06	171	24,500	142.81
China	135	11,600	86.23	77	6,160	79.84
Colombia	82	12,600	153.20	65	11,500	175.63
Costa Rica	17	2,680	157.53	20	3,450	172.25
Ecuador	10	1,430	143.40	4	845	188.90
France	47	4,940	105.04	60	6,220	103.60
Guatemala	17	2,840	167.12	32	3,900	120.53
Indonesia	243	26,200	108.02	284	38,100	134.23
Italy	10	925	92.50	20	2,280	115.00
Jamaica	2	288	144.00	--	--	--
Japan	353	45,500	128.84	381	44,400	116.49
Korea, Republic of	390	48,200	123.69	264	32,100	121.53
Malaysia	117	15,500	132.66	142	20,200	142.69
Mexico	612	67,500	110.22	604	66,500	110.25
Netherlands	(3/)	7	372.58	24	4,580	189.58
New Zealand	22	2,390	108.55	20	2,380	118.97
Nigeria	9	4,480	497.89	5	479	100.69
Pakistan	10	1,180	118.10	15	1,770	118.00
Panama	4	556	139.00	4	593	168.03
Peru	15	2,220	147.80	11	1,660	153.26
Philippines	74	8,740	118.12	81	9,410	116.68
Portugal	5	671	134.20	15	1,850	120.00
Russia	(3/)	47	110.11	4	461	114.38
Saudi Arabia	117	10,800	92.44	143	12,300	86.20
Singapore	13	1,420	108.92	--	--	--
South Africa	76	9,960	131.00	61	7,990	130.18
Spain	40	4,160	104.03	83	8,880	106.62
Taiwan	186	23,600	126.95	138	16,500	119.40
Thailand	163	19,100	117.28	191	22,600	118.22
Trinidad and Tobago	9	1,400	156.00	11	1,770	156.39
United Arab Emirates	21	1,790	85.05	45	3,720	83.43
United Kingdom	6	856	142.67	1	82	109.85
Venezuela	185	29,700	160.56	112	18,800	167.33
Vietnam	15	1,460	97.13	17	1,700	99.96
Other 4/	1	203 r/	203.00 r/	(3/)	49	172.11
Total	3,900	477,000	122.52	4,090	487,000	119.02

r/ Revised. -- Zero.

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ F.a.s. value.

3/ Less than 1/2 unit.

4/ Includes Aruba, The Bahamas (2001), the Dominican Republic (2000), Egypt (2001), El Salvador (2001), Finland, Ghana (2000), Hong Kong (2000), Jordan (2001), Norway (2000), Saint Kitts and Nevis (2001), and Switzerland (2000).

Source: U.S. Census Bureau. Reviewed by the U.S. Geological Survey using Journal of Commerce trade data and information.



TABLE 7  
 U.S. PRODUCTION OF SODIUM COMPOUNDS, BY MONTH 1/

(Thousand metric tons)

	2000		2001	
	Soda ash	Wyoming trona 2/	Soda ash	Wyoming trona 2/
January	809	1,380	834	1,280
February	740	1,330	779	1,270
March	841	1,390	962	1,380
April	839	1,290	870	1,290
May	810	1,220	860	1,220
June	881	1,230	875	1,330
July	871	1,110	879	987
August	875	1,400	869	1,100
September	835	1,350	814	1,290
October	966	1,490	880	1,430
November	897	1,310	852	1,360
December	880	1,220	870	1,420
Total	10,200	15,700	10,300	15,400

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes solution-mined trona.

TABLE 8  
SODA ASH: ESTIMATED WORLD PRODUCTION, BY COUNTRY 1/ 2/

(Thousand metric tons)

Country	1997	1998	1999	2000	2001
Australia	300	300	300	300	300
Austria	150	150	150	150	150
Bosnia and Herzegovina	15	15	15	15	15
Botswana	200 3/	190 r/ 3/	234 3/	117 r/ 3/	270
Brazil	200	200	200	200	200
Bulgaria	800	800	800	800	800
Canada	300	300	300	300	300
China	7,258 3/	7,440 3/	7,654 3/	8,343 3/	9,000 3/
Egypt	50	50	50	50	50
Ethiopia	15	15	5 3/	5 3/	5
France	1,053 3/	1,000	1,000	1,000	1,000
Germany	1,400	1,400	1,400	1,400	1,400
India	1,500	1,500	1,500	1,500	1,500
Italy	1,000	1,000	1,000	1,000	1,000
Japan	801 3/	722 3/	722 3/	669 r/ 3/	680
Kenya 4/	258 3/	243 3/	246 3/	238 r/ 3/	260 p/
Korea, Republic of	320	300	310	310	310
Mexico	290	290	290	290	290
Netherlands	400	400	400	400	400
Nigeria	(5/)	(5/)	(5/)	(5/)	(5/)
Pakistan	220	220	230	230	200
Poland	950 3/	1,000	926 3/	1,081 r/	1,100
Portugal	150	150	150	150	150
Romania	548 3/	550	550	550	560
Russia	1,652 3/	1,538 3/	1,918 3/	2,199 3/	2,200
Spain	500	500	500	500	500
Taiwan	128	126	140	140	140
Tanzania	(6/)	(6/)	(6/)	(6/)	(6/)
Turkey	500 3/	500	500	500	500
Ukraine	367 3/	390	460 3/	500	500
United Kingdom	1,000	1,000	1,000	1,000	1,000
United States 4/	10,700 3/	10,100 3/	10,200 3/	10,200 3/	10,300 3/
Total	33,100	32,400	33,200	34,200	35,100

p/ Preliminary. r/ Revised.

1/ World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

2/ Table includes data available through April 19, 2002. Synthetic unless otherwise specified.

3/ Reported figure.

4/ Natural only.

5/ Information is inadequate to make reliable estimates of output levels.

6/ Less than 1/2 unit.