

SODA ASH

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The 20th century has been called the greatest century of industrial progress in the history of civilization. In that time, the world soda ash industry has emerged as an important component of the family of chlor-alkali chemicals. During the past 100 years, the world soda ash industry expanded rapidly to provide a multitude of new products for millions of users. As the century closes and the new millennium begins, the world soda ash industry is undergoing a restructuring as competition increases from new sources and traditional end-use markets change. The end of the 1990's marks an important period in the U.S. soda ash industry.

Production

Monthly soda ash production and inventory data are 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 operations, all of which responded, representing 100% of the total production data shown in this report (table 1).

U.S. production of natural soda ash from California and Wyoming increased slightly to 10.2 million metric tons in 1999. On the basis of 13.15 million tons of total nameplate capacity, the U.S. soda ash industry operated at 77% of that total capacity. At the beginning of 1999, the U.S. soda ash industry was composed of six companies; five in Wyoming produced soda ash from underground trona ore and one in California that produced soda ash from sodium carbonate-rich brines. However, FMC Wyoming Corp. acquired Tg Soda Ash, Inc. on July 1 for \$50 million with a second payment (as high as \$100 million) due yearend 2003 based on the profitability of the combined operations between 2001 and 2003 (Chemical Week, 1999e). FMC planned to extend its mining operations to mine Tg Soda Ash's undeveloped trona resource without the cost of developing a new mine. The purchase was intended to provide FMC cost savings and increased competitiveness, especially in overseas markets. In November, FMC announced it would lower its Granger plant's (the former Tg facility) soda ash capacity by 50%, or about 590,000 tons (650,000 short tons); a 14% decrease in FMC's combined capacities of the two facilities. The temporary downsizing is part of a plan to streamline costs and use sodium carbonate-rich mine water as a low-cost source of alkali to run the Granger plant. FMC also reduced staff and production consolidations to reduce its costs (Chemical Week, 1999d).

Many foreign synthetic soda ash producers and consumers have become advocates of having a presence in the U.S. natural soda ash industry. Foreign investment in U.S. soda ash operations decreased to 38% of total nameplate capacity in

1999 from 46% in 1998 because of the Tg Soda Ash acquisition by FMC in 1999. The five U.S. companies have partners from Belgium, the Republic of Korea, or Japan (table 2).

Because Asia has been an important market for U.S. soda ash exports, the economic problems in various countries in Asia continued throughout 1999 affected U.S. soda ash production and export sales. With excess domestic production capacity, Solvay Minerals, Inc., postponed bringing on-stream the first phase of its expansion until the third quarter of 2000. OCI Chemical Corp., which completed its expansion in November 1998, continued to keep about 816,000 tons (900,000 short tons) of older existing capacity out of service through 1999. This temporarily reduced the plant's total capacity to 2.0 million tons (2.2 million short tons); this idle capacity is, however, included in the company's total 1999 nameplate capacity, as shown in table 2 because it will be brought back into service once demand improves.

Federal land managers in Colorado approved permits for American Soda L.L.P.'s nahcolite project in the Piceance Basin of Rio Blanco County. Construction of the \$400 million American Soda facility at Parachute, CO, was under construction by yearend with startup scheduled for November 2000 with the first commercial shipments planned for January 2001 (Industrial Minerals, 1999b). When fully operable, the facility will have an annual capacity of 900,000 tons of soda ash and about 135,000 tons of sodium bicarbonate. American Soda is a joint venture with Williams Soda Products Co., which is a wholly owned subsidiary of The Williams Companies, Inc. (60%) and American Alkali, Inc. (40%). The company was optimistic that its solution mining technology using hot water injection would have a 20% cost advantage compared with the Wyoming trona-based soda ash operations (Industrial Minerals, 1999a).

Consumption

The USGS collects reported consumption data by end use quarterly from the marketing and sales departments of each company within the industry. Every effort has been made to categorize company sales with the intended end-use sector. Quarterly reports are often revised in subsequent quarters because of customer reclassifications or other factors. Because all six 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 1999, U.S. apparent consumption of soda ash was 6.74 million tons; reported consumption was, however, 6.43 million tons (table 3). Reported consumption data and apparent consumption data do not necessarily correspond because

reported consumption data were based on actual sales, whereas apparent consumption data were the calculated quantity available for domestic consumption based on balancing supplies (production, imports, and inventory adjustments) with external demand (exports).

In 1999, U.S. apparent consumption and reported consumption varied by 310,000 tons, which was significant. 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. Bureau of the Census, 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 California 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. A comparison of export statistics from the Journal of Commerce's Port Import-Export Reporting Service and the U.S. Bureau of the Census export data showed a disparity in both sets of data. The only major adjustment to the trade statistics was with soda ash shipments to Brazil that were erroneously reported by the U.S. Bureau of the Census. An additional 58,600 tons valued at \$7.47 million are included in the export statistics.

The distribution of soda ash by end use in 1999 was glass, 51%; chemicals, 26%; soap and detergents, 11%; distributors, 5%; flue gas desulfurization, pulp and paper, and water treatment, 2% each; and other, 1%.

Glass.—Glass manufacture represented about 51% of domestic soda ash consumption; the container sector comprised 49%; flat, 35%; and specialty and fiber, 8% each. According to U.S. Bureau of the Census data, production of glass containers decreased from 8.92 million tons (9.83 million short tons) in 1999 to 8.82 million tons (9.72 million short tons) in 1998, primarily because of the beverage sector which continued to decline because more soft drinks were packaged in plastic containers than in glass bottles. Production of glass containers for the beer industry increased 1.6% in 1999 to 3.95 million tons from 3.89 million tons in 1998.

In 1999, the estimated glass recycling rate remained the same as that of 1998 at about 35%, of which postconsumer cullet was estimated to be 24% of this rate with the remainder being in-house scrap. Some municipalities have started to terminate their glass-collection programs because the price of clean, sorted cullet has declined, thereby making it less attractive to recyclers. Another reason is that breakage during collection has affected the quality of material sold to glass container manufacturers.

Various plastics have competed with glass in the packaging market for at least the last two decades. A relatively new competitor to certain glass container products is emerging that has the potential to further reduce soda ash consumption in glass container manufacture the way polyethylene terephthalate (PET) did in the early 1980's. The introduction of polyethylene naphthalate (PEN) plastic to the food packaging sector may displace part of the glass container market, especially in the

food container category and possibly part of the beer container sector. This would further reduce soda ash consumption. PEN is the next generation of plastics that has better performance properties than PET plastic products. PEN is highly suited for hot fill products, such as baby foods, beverage containers (for enhanced oxygen and carbon dioxide resistance), jams, and in jellies. It also screens ultraviolet light to extend the product's shelf life and preserve the drink's natural flavors. BP Amoco Corp. began PEN production at its Decatur, AL, plant in April 1997. The plant had an initial annual nameplate capacity of 27,000 metric tons; however, the present capacity is approximately 30,000 metric tons. BP Amoco also has experimented with purified terephthalic acid (PTA) and purified isophthalic acid (PIA) as other types of polyester plastic containers. PTA and PIA bottles are clear, lightweight, shatterproof, and are more recyclable than PEN bottles (Chemical Market Reporter, 1999f). These containers have been tested by certain beer manufacturers, who report good results as far as flavor preservation, minimal oxygen and carbon dioxide gas exchange through the container.

Shell Chemical Co. also has entered the PEN market with production plants in Point Pleasant, WV, and Patrica, Italy. Although PEN was first synthesized in 1945, it has only been commercially available since 1990 but its feedstock, 2,6-naphthalene dicarboxylic acid, remains expensive to produce and the number of suppliers is small. Therefore, very few customers can afford to use this material at the present time. Although PEN has been test-marketed in Japan, Europe, and in Latin America, it is forecast that PEN plastic and PET-PEN blends may be introduced to select U.S. markets within the next few years. With a world beer bottle market of 300 billion containers, one source reports that about 36,000 metric tons of PEN would be required to capture a 5% market share (Chemical Market Reporter, 1999e).

Despite the potential of PEN displacing a portion of the packaging market held by the glass container sector, a new glass container was recently introduced. Owens-Illinois, Inc., (O-I) developed a new lightweight glass bottle known as the Duraglass XL™ (for Duraglas Extra Light) bottle, that reduces the amount of glass required to make a typical bottle, resulting in faster and more cost effective production of containers, reduced energy consumption, and lower transportation costs. Furthermore, raw material requirements reportedly are reduced 10% to 20%, which will further reduce soda ash sales to this sector. O-I has two production lines for this new container set up at its Streator, IL, plant but plans to install the process at some of its other locations as the new container gains acceptance. Miller Brewing Co. was listed as one of first customers to use this new glass bottle at its Milwaukee, WI, brewery. The new bottles are 100% recyclable (Resource Recycling, 1999). O-I also became a 25% partner of General Chemical Corp.'s soda ash business in 1998 when O-I acquired British Tire & Rubber, p.l.c., which owned the soda ash share through its subsidiary, Australian Consolidated Industries International. This transaction gives O-I a stake in the raw material side of glassmaking as well.

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

According to data from the Bureau of the Census, production of sodium bicarbonate increased by 3% to 505,000 tons in 1998 from 491,000 tons in 1998 (Bureau of the Census, 1999). Based on a domestic demand of 517,000 tons, the estimated end-use distribution for sodium bicarbonate consumption in 1998 was food, 32%; agricultural feed, 29%; chemicals, 9%; pharmaceuticals, health and beauty aids, 9%; cleaning products, 9%; swimming pools, 6%; abrasive blast media, 2%; fire extinguishers, 2%; and industrial water treatment, 2% (Chemical Week, 1999h).

In addition to American Soda, which will produce soda ash and sodium bicarbonate from Colorado nahcolite, AmerAlia, Inc. secured a \$4.2 million loan to begin construction of a 68,000-ton-per-year (75,000-short-ton-per-year) sodium bicarbonate plant in Colorado. AmerAlia's partner, U.S. Filter, Inc., will design and construct the plant. The project was still contingent on AmerAlia securing the remainder of the project financing. Startup was scheduled for late 2000 (Chemical Week, 1999a).

Church & Dwight Co., Inc. completed its \$7.3 million expansion of its Green River, WY, sodium bicarbonate plant. The project increased the plant's capacity 20%; from 181,000 tons (200,000 short tons) to 218,000 tons (240,000 tons) (Chemical Market Reporter, 1999d, a). A similar expansion will be done at the company's facility at Old Fort, OH, that will raise capacity by 36,000 tons (40,000 short tons) to 254,000 tons (280,000 short tons) (Chemical Week, 1999b).

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, an environmental problem. Many regions of the nation have adopted phosphate limitations or bans, affecting about 40% of the U.S. population. A strong U.S. economy boosted demand for industrial and institutional cleaners and automatic dishwashing detergents in the past couple of years. New technology incorporating enzymes in dishwashing detergents and a move toward liquid cleansers may, however, adversely affect STPP consumption in the future.

In response to the environmental issue, detergent manufacturers 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 50% of the household laundry detergent market in 1999 compared with 15% in 1978.

Stocks

Yearend 1999 stocks of dense soda ash in domestic plant silos, warehouses, terminals, and on teamtracks amounted to 248,000 tons. Producers indicated that a potential supply problem could exist when inventories fall below 180,000 tons. 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, the large volume buyers of soda ash were primarily the major glass container manufacturers, whose purchases were seasonal (more beverage containers made in 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 residential housing and commercial building construction. These two major industrial sectors were especially sensitive to changing economic conditions. If construction starts and automobile sales are up, then soda ash sales will proportionally follow.

The average annual value for bulk, dense natural soda ash, f.o.b. Green River, WY, and Searles Valley, CA, was \$76.00 per metric ton (\$69.11 per short ton), which was an 8% decrease compared with that of 1998. The value is not a "price," but rather the value of the combined revenue of California 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 permit, to \$105 per short ton from \$98. The California price for the comparable product also increased by \$7 per ton; to \$130 per short ton from \$123 per ton (table 4).

General Chemical and Solvay Minerals announced a soda ash price increase of \$8.25 per short ton in July and August, respectively; however, FMC announced only a \$4 price increase effective September 1 (Chemical Week, 1999i, f). OCI and IMC Chemical Co. also followed with a \$4 increase. The industry indicated that the price increase attempt was in response to an improving supply-demand balance for soda ash during the fourth quarter of 1999. Although there was some success in raising prices in the spot market, the full effect of the increase attempt would not be noticeable until the following year because 90% of domestic sales are on annual contracts that are renewed each January (Chemical Market Reporter, 1999c).

Foreign Trade

Exports represent about 35% of U.S. soda ash production. The problems in the Asian economies that began in late 1997 continued throughout 1999; however, an upturn in the economies in certain nations was evident late in the year. In 1999, Asia accounted for 38% of total U.S. soda ash exports, representing 14% of domestic production. The economic problems lasted longer than most market analysts had forecast, resulting in several delays in domestic soda ash capacity expansions. Excess Chinese soda ash capacity and a slowdown in Chinese soda ash consumption resulted in a supply surplus. To alleviate the buildup of inventory, Chinese soda ash

manufacturers lowered their prices and exported less expensive soda ash to many of the Asian countries that historically purchase U.S.-produced soda ash (China Chemical Week, 1999). Although Chinese soda ash producers agreed to reduce production 5% on 1998 levels and raise prices, the efforts were not enough, according to U.S. producers (Chemical Week, 1999c). Chinese producers unwilling to reduce production would be penalized by the State Administration of the Petroleum and Chemical Industry (Industrial Minerals, 1999d).

The European Soda Ash Producers Association (ESAPA) requested the European Commission to investigate alleged soda ash dumping by U.S. producers in Western Europe. ESAPA indicated the U.S. soda ash was being sold at dumping margins since the elimination of the antidumping duties in October 1997 (Industrial Minerals, 1999f). Brunner Mond P.L.C. reported that European customers were offered U.S. soda ash at \$125 per ton, which was about 20% below the average selling price in Western Europe (Chemical Market Reporter, 1999b).

In February, ANSAC addressed the U.S. House of Representatives' subcommittee on East Asian and Pacific Affairs regarding allegations that China maintains an unfair advantage in the world soda ash market with its tariff and non-import tariff barriers (Industrial Minerals, 1999c). An appeal was made to the U.S. Government to oppose China's request to join the World Trade Organization unless it reverses its position on maintaining the tariffs. In China, independent soda ash distributors pay a 58% import tax, while customers pay a 12% import tax plus a value added tax for a total of 31.04% duty. In other parts of the world, such as in Western Europe, the import duty is 5.5%.

In 1999, total U.S. soda ash exports decreased slightly to 3.62 million tons. U.S. exports to 43 countries, on a regional basis, were as follows: Asia, 38%; North America and South America, 22% each; Europe, 9%; Africa and the Middle East, 3% each; Oceania, 2%; and Central America, 1% (table 6). Shipments to the Caribbean were negligible. The average "free alongside ship" value was \$123.34 per ton in 1999 compared with \$130.66 per ton in 1998. 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 70% of total U.S. soda ash exports, were, in decreasing order and percent of total, Mexico, 15%; Japan, 9%; Brazil, 8%; Indonesia, 8%; Canada, 7%; the Republic of Korea, 6%; Thailand, 5%; Chile, 4%; Taiwan, 4%; and Venezuela, 4%. About 59% of all U.S. soda ash exports were through the Columbia-Snake River custom district; the Laredo, TX, custom district was the second largest port, with 13% of the total (table 5).

Imports of soda ash increased 11% to 92,000 tons. The majority, or 99%, came from Canada, where General Chemical Corp. operated a synthetic soda ash plant in Amherstburg, Ontario. The remainder of imports were from Germany, Italy, Mexico, the Netherlands, Turkey, and the United Kingdom. The average customs value of imported soda ash was \$116.98 per ton.

World Review

The largest consumers of soda ash tended to be the developed nations; however, these countries 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; that is, glass, chemicals, and detergents were the major sectors (table 8).

Nine countries have the capacity to produce more than 1 million tons per year. They are, in descending order, the United States, China, Russia, India, France, Germany, Italy, Poland, and the United Kingdom. Bulgaria, Romania, and Ukraine had production installations that were rated at about 1 million tons; adverse economic conditions have, however, caused these nations to produce below their design capacities. Recent acquisitions or joint ventures with major European soda ash producers having 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 1999, world soda ash production was estimated to be 32.9 million tons, which was a 1% increase compared with that of 1998.

Germany.—IMC Chemicals announced it would close its synthetic soda ash plant in Duisburg in January 2000. The plant was formerly owned by Matthes & Weber, and had an annual capacity of 280,000 tons, or about 5% of the European soda ash industry capacity (Chemical Week, 1999g).

Tanzania.—Tanganyika Gold N.L. of Australia acquired an exploration license to evaluate the sodium carbonate resources at Lake Natron. Previous studies showed the Lake's brine contained 18% to 20% sodium carbonate with a thick crust of sodium carbonate on the surface. The company will invest \$1 million to National Chemical Industries, Inc., which formerly had controlled the project. The feasibility study was expected to be completed by yearend 2000. Tanganyika Gold indicated the project, if economically feasible, would produce 350,000 tons to 500,000 tons of soda ash annually (Industrial Minerals, 1999h).

Turkey.—A consortium consisting of Eti Holding A.S., formerly known as Etibank A.S., (26%), Bayindir Holding Inc. (37%), and Park Holding Inc. (37%) conducted a feasibility study to develop the trona deposit at Bepazari. Although there have been several unsuccessful projects to fully develop this deposit in the past 20 years, the new group expects the study to be completed in 2001. If the project looks promising, the venture was scheduled to produce 1 million tons of soda ash per year (Industrial Minerals, 1999g).

Ukraine.—The government announced plans to sell a 64.47% share of the soda ash plant the Crimea (European Chemical News, 1999). Internal barriers had prevented any

such foreign investment in the past, but the World Bank had instructed the country to improve its economy by selling certain operations to outside investors. The soda ash plant is close to raw material sources, railway lines, and the Black Sea for export (Industrial Minerals, 1999e).

Outlook

The 1990's may be regarded as the most turbulent decade in the 20th century for the global soda ash industry. Closures of synthetic soda ash plants in Europe, South America, and Asia have reduced the number of plants in the world. However, despite the downsizing of the global industry, the emergence of China as a major soda ash producer and exporter has caused the U.S. soda ash industry to respond to a determined competitor in the Asian markets, which represents a significant area for U.S. soda ash exports. The economic problems in Asia that began in late 1997 have improved, which should benefit the United States.

It may be argued that 1997 was the zenith of the U.S. soda ash industry, and that future growth in the domestic industry may be reactionary to issues and events elsewhere in the world. The acquisition of Tg Soda Ash by FMC was the first step in consolidation within the U.S. soda ash industry. Other issues, such as the proposed sale of IMC Chemicals and other company consolidations, will continue into 2000.

Domestic soda ash is expected to grow between 0.5% and 1.0% per year, and world demand is forecast to range from 2.0% to 2.5% per year for the next several years. Despite the current problems in the Asian economies, the majority increase in soda ash consumption in the future will be in Asia and South America, no matter which nation expands their export markets to serve these areas.

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TABLE 1
SALIENT SODA ASH STATISTICS 1/

(Thousand metric tons and thousand dollars, except value per ton)

	1995	1996	1997	1998	1999
United States:					
Production 2/	10,100	10,200	10,700	10,100	10,200
Value 2/	\$829,000	\$926,000	\$915,000	\$842,000	\$779,000
Value, average annual:					
Per short ton	\$74.50	\$82.60	\$77.25	\$75.30	\$69.11
Per metric ton	\$82.12	\$91.05	\$85.15	\$83.00	\$76.00
Production, Wyoming trona	16,500	16,300	17,100	16,500	15,900
Exports	3,570	3,840	4,190	3,660	3,620
Value	\$445,000	\$508,000	\$547,000	\$478,000	\$447,000
Imports for consumption	83	107	101	83	92
Value	\$12,000	\$14,700	\$13,400	\$10,800	\$11,100
Stocks, December 31: Producers'	306	271	259	273	248
Consumption:					
Apparent	6,510	6,470	6,670 r/	6,560	6,740
Reported	6,500	6,390	6,480	6,550	6,430
World: Production	31,700 r/	31,800 r/	33,100 r/	32,500 r/	32,900 e/

e/ Estimated. r/ Revised.

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

2/ Natural only, soda liquors and purge liquors converted to soda ash equivalent are as follows: 1995-105,000 tons; 1996 to 1999 data withheld to avoid disclosing company proprietary data.

TABLE 2
U.S. PRODUCERS OF SODA ASH IN 1999

(Million short tons, unless otherwise noted)

Company	Plant nameplate capacity	Plant location	Source of sodium carbonate
FMC Wyoming Corp. - Green River 1/	3.55	Green River, WY	Underground trona.
FMC Wyoming Corp. - Granger 2/	1.30	Granger, WY	Do.
General Chemical (Soda Ash) Partners 3/	2.80	Green River, WY	Do.
IMC Chemical Co. 4/	1.45	Trona, CA	Dry lake brine.
OCI Chemical Corp. 5/	3.10	Green River, WY	Underground trona.
Solvay Minerals Inc. 6/	2.30	do.	Do.
Total	14.50		
Total	million metric tons	13.15	

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

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

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

4/ IMC Global acquired North American Chemical Co. in April 1998; operation renamed. An agreement to sell a majority share to Mincorp L.L.C. (a joint venture with Citicorp Venture Capital) was signed in December 1998.

5/ Rhône-Poulenc of France sold its 51% share to Oriental Chemical Industries Co. Ltd. (OCI) of Korea on February 29, 1996; Union Pacific Resources Co. owns 49%. An 800,000-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 tons out of service temporarily for equipment refurbishment.

6/ 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 tons (300,000 short tons) installed December 1995.

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

(Metric tons)

SIC code	End use	1998	1999				Total
			First quarter	Second quarter	Third quarter	Fourth quarter	
32	Glass:						
3221	Container	1,610,000	395,000	425,000	407,000	390,000	1,620,000
3211	Flat	1,100,000	250,000	287,000	295,000	302,000	1,130,000
3296	Fiber	260,000	66,600	63,500	65,100	67,600	263,000
3229	Other	244,000	59,400	64,000	63,500	67,200	254,000
	Total	3,220,000	772,000	839,000	831,000	827,000	3,270,000
281	Chemicals	1,760,000	406,000	411,000	428,000	424,000	1,670,000
284	Soaps and detergents	704,000	179,000	181,000	181,000	188,000	729,000
26	Pulp and paper	134,000	32,500	29,100	26,900	32,100	121,000
2899	Water treatment 2/	104,000	32,400	23,900	25,400	22,600	104,000
	Fluegas desulfurization	214,000	36,400	33,000	34,500	26,000	130,000
	Distributors	317,000	78,300	82,600	79,500	89,000	329,000
	Other	102,000	20,600	26,000	11,400	17,200	75,300
	Total domestic consumption 3/	6,550,000	1,560,000	1,620,000	1,620,000	1,630,000	6,430,000
	Exports 4/	3,650,000	872,000	976,000	975,000	1,020,000	3,850,000
	Canada	198,000	63,500	53,800	60,700	64,200	242,000
	Total industry sales 5/	10,200,000	2,430,000	2,600,000	2,590,000	2,650,000	10,300,000
	Total sales from plants	9,890,000	2,370,000	2,520,000	2,590,000	2,660,000	10,100,000
	Total production	10,100,000	2,460,000	2,580,000	2,540,000	2,670,000	10,200,000

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 Bureau of the Census 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)

	1998	1999
Sodium carbonate (soda ash):		
Dense, 58% Na ₂ O 100-pound, paper bags, carlot, works, f.o.b.	\$153.00	\$153.00
Bulk, carlot, same basis tons	105	105
Light 58% 100-pound, paper bags, carlot same basis	158	210
Bulk, carlot, same basis tons	110	173

Sources: Chemical Market Reporter. Current Prices of Chemicals and Related Materials, v. 255, no. 1, January 4, 1999, p. 36 and v. 257, no. 1, January 3, 2000, p. 24.

TABLE 5
REGIONAL DISTRIBUTION OF U.S. SODA ASH EXPORTS, BY CUSTOMS DISTRICTS, IN 1999 1/

(Metric tons)

Customs districts	North America	Central America	South America	Caribbean	Europe	Middle East	Africa	Asia	Oceania	Total	Percent of total
Atlantic:											
Baltimore, MD	--	--	--	--	23	--	--	--	--	23	(2/)
Miami, FL	--	73	--	869	--	--	--	--	--	942	(2/)
New York, NY	--	--	--	--	18	--	--	--	--	18	(2/)
Norfolk, VA	--	--	--	--	647	--	--	--	--	647	(2/)
Philadelphia, PA	--	--	--	--	389	--	--	--	--	389	(2/)
Savannah, GA	--	24	--	--	--	--	--	--	--	24	(2/)
Gulf:											
Houston-Galveston, TX	--	247	--	--	52	--	--	--	--	299	(2/)
New Orleans, LA	--	165	96	--	--	--	--	--	--	261	(2/)
Port Arthur, TX	--	--	209,000	15,400	--	--	74,400	--	--	299,000	8
Pacific:											
Columbia-Snake River	--	20,600	331,000	--	304,000	110,000	17,000	1,300,000	56,300	2,140,000	59
Los Angeles, CA	--	--	--	--	--	--	--	1,180	--	1,180	(2/)
San Diego, CA	57,700	4,000	264,000	--	15,200	--	--	82,500	10,200	433,000	12
San Francisco, CA	--	--	--	--	100	--	--	--	36	136	(2/)
Seattle, WA	11,400	--	--	--	--	--	--	--	--	11,400	(2/)
North Central:											
Detroit, MI	185,000	--	--	--	473	--	--	--	--	185,000	5
Duluth, MN	474	--	--	--	--	--	--	--	--	474	(2/)
Great Falls, MT	7,480	--	--	--	--	--	--	--	--	7,480	(2/)
Pembina, ND	6,460	--	--	--	--	--	--	--	--	6,460	(2/)
Northeast:											
Buffalo, NY	28,300	--	--	--	--	--	--	--	--	28,300	1
Ogdensburg, NY	609	--	--	--	--	--	--	--	--	609	(2/)
St. Albans, VT	371	--	--	--	--	--	--	--	--	371	(2/)
Southwest:											
Laredo, TX	487,000	--	--	--	--	--	--	--	--	487,000	13
Nogales, AZ	258	--	--	--	--	--	--	--	--	258	(2/)
Unknown:											
	18,900	--	--	--	--	--	--	--	--	18,900	1
Total	804,000	25,100	804,000	16,300	321,000	110,000	91,400	1,390,000	66,500	3,620,000	100
Percent of total	22	1	22	(2/)	9	3	3	38	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.

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

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

Country	1998			1999		
	Quantity (thousand metric tons)	Value 2/ (thousands)	Unit value	Quantity (thousand metric tons)	Value 2/ (thousands)	Unit value
Argentina	102	\$14,700	\$144.72	114	\$15,800	\$139.08
Australia	32	3,770	117.96	45	5,370	118.66
Belgium	115	14,300	124.29	118	14,500	123.36
Bolivia	2	371	176.67	2	426	173.48
Brazil	202	27,000	133.84	301	39,300	130.61
Canada	209	19,300	92.40	259	21,400	82.82
Chile	152	22,200	146.68	150	21,800	145.46
China	51	5,710	111.19	40	3,230	81.10
Colombia	99	15,500	155.88	73	10,300	140.50
Costa Rica	14	2,320	165.27	9	1,440	160.19
Croatia	8	1,050	127.89	--	--	--
Ecuador	11	1,900	166.33	5	646	129.00
El Salvador	4	712	178.00	--	--	--
France	139	14,400	103.89	84	9,430	112.18
Germany	1	101	126.92	1	71	109.96
Guatemala	32	5,090	160.73	16	2,660	165.12
Indonesia	228	32,100	140.41	272	33,600	123.65
Italy	--	--	--	5	688	135.00
Jamaica	2	314	152.40	5	914	188.83
Japan	306	40,800	133.25	312	41,400	132.48
Korea, Republic of	241	34,000	140.94	227	30,600	134.52
Malaysia	101	14,900	147.78	95	13,400	141.29
Mexico	511	57,400	112.23	545	60,200	110.57
New Zealand	14	1,550	109.99	21	2,310	108.89
Nigeria	12	1,190	100.70	8	792	100.83
Panama	4	547	136.75	--	--	--
Peru	21	3,400	162.48	20	2,980	152.25
Philippines	73	10,000	138.09	64	8,320	129.50
Portugal	10	1,330	131.67	5	658	130.00
Russia	1	101	110.01	(3/)	43	109.94
Saudi Arabia	97	10,500	108.25	92	8,950	97.29
Singapore	11	1,430	128.08	16	1,980	127.87
South Africa	100	12,600	125.67	84	10,600	127.08
Spain	90	9,510	106.24	100	10,300	103.13
Taiwan	249	34,500	138.47	157	20,200	128.26
Thailand	146	21,100	144.35	194	26,900	138.76
Trinidad and Tobago	8	1,400	165.31	11	1,930	170.42
United Arab Emirates	28	2,730	97.53	18	1,600	88.83
United Kingdom	11	1,610	148.15	8	1,100	144.82
Uruguay	2	330	150.71	1	116	146.60
Venezuela	216	36,000	166.56	138	20,000	145.03
Vietnam	4	343	85.70	9	783	87.00
Other 4/	1	130 r/	211.04 r/	1	70	100.04
Total	3,660	478,000	130.66	3,620	447,000	123.34

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 The Bahamas (1999), Dominican Republic (1998), Hong Kong (1998), Norway (1999), Suriname, and Tonga (1999).

Source: Bureau of the Census, as adjusted 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/

(Metric tons)

	1998			1999 2/	
	Soda ash	Caustic soda 3/	Wyoming trona 4/	Soda ash	Wyoming trona 4/
January	889,000	15,600	1,570,000	835,000	1,490,000
February	861,000	18,500	1,450,000	749,000	1,230,000
March	786,000	19,800	1,520,000	877,000	1,480,000
April	818,000	13,500	1,320,000	833,000	1,320,000
May	899,000	15,300	1,410,000	886,000	1,450,000
June	838,000	17,700	1,410,000	859,000	1,370,000
July	842,000	11,600	1,360,000	911,000	1,140,000
August	833,000	W	1,300,000	803,000	1,180,000
September	849,000	W	1,070,000	824,000	1,280,000
October	831,000	W	1,320,000	888,000	1,290,000
November	858,000	W	1,390,000	899,000	1,290,000
December	840,000	W	1,430,000	884,000	1,350,000
Total	10,100,000	180,000	16,500,000	10,200,000	15,900,000

W Withheld to avoid disclosing company proprietary data; included in "Total."

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

2/ Caustic soda withheld to avoid disclosing company proprietary data.

3/ As soda ash equivalent.

4/ Includes solution mined trona.

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

(Thousand metric tons)

Country	1995	1996	1997	1998	1999
Australia	300	300	300	300	300
Austria	200	200	150	150	150
Bosnia and Herzegovina	15	15	15	15	15
Botswana	202 3/	119 3/	200 3/	196 r/ 3/	196
Brazil	200	200	200	200	200
Bulgaria	796 3/	800 3/	800	800	800
Canada	300	300	300	300	300
China	5,997 3/	6,693 3/	7,258 3/	7,440 r/ 3/	7,654 3/
Egypt	51	51	51	50	50
France	1,120	1,100	1,053 3/	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	1,070 r/ 3/	1,100 r/ 3/	1,000 r/	1,000 r/	1,000
Japan	1,049 3/	926 3/	801 3/	722 r/ 3/	750
Kenya 4/	218 3/	223	258 r/ 3/	243 r/ 3/	240
Korea, Republic of	310	320	320	300	320
Mexico	290	290	290	290	290
Netherlands	400	400	400	400	400
Pakistan	200	215 3/	220	220	230
Poland	1,019 3/	909 3/	950 3/	1,000 r/	1,000
Portugal	150	150	150	150	150
Romania	504 3/	537 3/	548 3/	550	550
Russia	1,823 3/	1,500	1,700	1,600	1,600
Spain	500	500	500	500	500
Taiwan	128 3/	128	128	127 3/	127
Turkey	385	400	500	500	500
Ukraine	475	375	367 3/	390 r/	460 3/
United Kingdom	1,000	1,000	1,000	1,000	1,000
United States 3/ 4/	10,100	10,200	10,700	10,100	10,200
Total	31,700 r/	31,800 r/	33,100 r/	32,500 r/	32,900

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 20, 2000. Synthetic unless otherwise specified.

3/ Reported figure.

4/ Natural only.