

SODA ASH

By Dennis S. Kostick

Soda ash is a refined inorganic chemical made from the mineral trona that is used in many familiar household products, such as glass, soaps and detergents, paper, textiles, and foods. Chemically, soda ash is known as sodium carbonate. It is the 11th largest inorganic chemical in terms of production of all domestic inorganic and organic chemicals, excluding petrochemical feedstocks.¹ Internationally, two types of soda ash are produced—natural and synthetic. The United States is the world's largest soda ash-producing nation with the world's largest natural deposit of trona. Because the majority of world output is made synthetically, which usually is more expensive to manufacture, U.S. natural soda ash is extremely competitive in world markets.

Although soda ash represented about 2% of the total \$38 billion nonfuel mineral industry that was surveyed in 1995, its use in many consumer products consequently contributes substantially to the gross domestic product of the United States. Because soda ash is used in flat glass for automobile and building construction, which are important economic sectors of the domestic economy, monthly soda ash production data are incorporated into monthly economic indicators for industrial production by the Federal Reserve Board that monitor the economic condition of the U.S. economy.

Production

Monthly soda ash production and inventory data are collected by the U.S. Geological Survey from monthly, quarterly, and annual voluntary surveys of the U.S. soda ash industry. Of the six soda ash operations to which a survey request was sent, all responded, representing 100% of the total production data shown in this report. (See table 1.)

The U.S. soda ash industry in 1995 was composed of six companies; five in Wyoming and one in California. All produce natural soda ash from either sodium carbonate-rich brines or from underground mining of trona ore. Many foreign synthetic soda ash producers have now become advocates of having a presence in the Green River natural soda ash community. Foreign investment in U.S. soda ash operations has risen from 10% of capacity in 1981, when Société Nationale Elf Aquitaine of France bought Texasgulf Chemical Co., to 49% in 1995. Five of the six U.S. companies have either Australian, Belgian, French, South Korean, or Japanese partners. With the European producers' acquisitions of or partnerships in some of the U.S. facilities (Société Nationale Elf Aquitaine of France owning 100% of Tg Soda Ash, Rhône-Poulenc of France owning 51% of Rhône-Poulenc Basic Chemical Co., and Solvay S.A. of Belgium owning 80% of Solvay Minerals Co.), the international

competitive situation had begun to change. Approximately 35% of the Wyoming soda ash production capacity is European-owned as of 1995 (Tg Soda Ash with 1.18 million metric tons, Rhône-Poulenc with 1.06 million tons, and Solvay with 1.67 million tons). Highlighting this membership is Solvay S.A., the world's foremost leader in soda ash production and experience. FMC Corp. remained the only U.S. producer without any foreign ownership into 1995; however, on February 6, FMC announced plans to sell a combined 20% interest of its Wyoming soda ash business for \$150 million to Nippon Sheet Glass Co., Ltd. and Sumitomo Corp., both of Japan.² Nippon is a major flat glass manufacturer and Sumitomo is the largest soda ash distributor in Japan. The sale was completed in July 1995. The two Japanese companies will have a share in FMC's \$135 million solution mining project, which was scheduled to be on-stream by mid-1996. (See table 2.)

The project will add 635,000 tons (700,000 short tons) of capacity to FMC's existing 2.59 million tons (2.85 million short tons) of capacity. The new process will take spent mine tailings, which normally have been discharged to surface tailing ponds, and inject them underground with water where the solutions will migrate downslope to a natural depression in the mine that will act as a collection sump. The solution becomes enriched in sodium carbonate as it dissolves trona in the floor and pillars in abandoned sections of the mine. The solution is recovered and pumped to the surface and becomes feedstock for the soda ash refinery.³ The process reportedly will reduce production costs by 30% to 40%.⁴ Some of the soda ash from the new expansion is for use in FMC's agreement with Du Pont. Iron chloride and hydrochloric acid waste at Du Pont's New Johnsonville, TN titanium dioxide plant will be treated with soda ash to produce iron carbonate and about 200,000 tons of food-grade salt, which will be marketed by North American Salt Co.⁵

At 8:26 a.m. on February 3, 1995, a severe tremor from an apparent earthquake was detected measuring 5.1 on the Richter Scale with the epicenter at Solvay Minerals' mine near Green River, WY. A massive pillar failure occurred in the southwest section of the mine that caused a tremendous amount of destruction. Of the 54 miners underground at the time, 52 escaped. The first of the two men trapped was rescued within 24 hours; however, the last man succumbed to cardiac arrest shortly after he was rescued 2 days after the accident.⁶ The roof collapse caused extensive damage to the mine's ventilation system. About 2.83 million cubic meters (100 million cubic feet) of methane and ammonia gases were liberated from overlying and underlying oil shale in the mine and need to be exhausted. The Mine Safety and Health Administration investigated the incident and completed its report in February

1996.⁷ The report concluded that the damage was not due to any tectonic activity but most likely because of very rapid progressive pillar failure from a buildup of rock material weaknesses and stresses. Alternative theories for the collapse included failure of the large barrier pillar, sudden failure of the overlying beds, and a collapsed gas pocket under the southwest trona panels.

In July, Solvay announced plans for an expansion at its Green River facility. About 272,000 tons (300,000 short tons) of additional nameplate capacity costing \$3.2 million, which was perhaps the lowest cost expansion on record, was planned to be on-stream by yearend 1995. The project included converting from coal to natural gas in the trona calciners.⁸

On November 29, 1995, Rhône-Poulenc S.A. of France sold its 51% share of Rhône-Poulenc of Wyoming to Oriental Chemical Industry (OCI) of the Republic of Korea for \$150 million.⁹ The remaining 49% is owned by Union Pacific Resources Co., which is a major lease owner in the region. OCI operates a synthetic soda ash plant in the Republic of Korea that has an annual capacity of 400,000 tons. The U.S. soda ash operation was renamed OCI Chemicals and the headquarters will remain based in Shelton, CT. The company indicated it planned to initiate a feasibility study to raise soda ash capacity by 454,000 tons (500,000 short tons) to 907,000 tons (1 million short tons) annually.

Harris Chemical North America, which owns North American Chemical Co. in California, indicated it would sell a 20% share of its Searles Lake operation to any interested party to generate revenue and increase production levels. One of the items for sale is the power cogeneration facilities at the complex, which is considered a nonstrategic asset by the company.¹⁰ North American Chemical continued to install new fluid bed dryer technology that would raise nameplate capacity from 1.18 million tons (1.3 million short tons) to 1.32 million tons (1.45 million short tons). There was no confirmation that the new capacity was installed by yearend.¹¹

The Owens Lake Soda Ash Co., which was a joint venture between Vulcan Soda Ash Co., a subsidiary of Vulcan Materials Co.'s Chemical Division, and Lake Minerals Corp., which was a subsidiary of Cominco American Inc., announced on December 13 it would suspend plans to construct a 544,000-ton-per-year (600,000 short tons) soda ash refinery at Owens Lake, near Lone Pine, CA.¹² About \$7.1 million had been spent by Vulcan before the project was canceled. The company cited a continuing series of permitting delays and other unanticipated problems as reasons for the decision.

U.S. production of natural soda ash from California and Wyoming in 1995 increased 8% to a record 10.1 million tons. Based on 11.3 million tons of total nameplate capacity, the U.S. soda ash industry operated at 89% of total nameplate capacity. Solvay's 272,000 tons of new expansion capacity came on-stream by December and is included in this total for the industry. The increase in production was because of increased export and domestic sales. A total of 105,000 tons of soda ash equivalent from soda liquors and mine waters was included in the total and used primarily for neutralizing powerplant process water. The

liquors represent a growing market for soda ash producers and provide additional revenue. In addition, 184,000 tons of soda ash equivalent was used to manufacture chemical caustic soda by FMC, Solvay Minerals, and Tg Soda Ash. The total quantity of trona mined in Wyoming in 1995 was 16.5 million tons. (*See table 7.*)

Legislation and Government Programs

Soda ash mined on Federal lands is subject to the Mineral Leasing Act of 1920, which provides royalty payments to the United States Government. The Federal royalty is 5% of the quantity or gross value of the output of the product at the point of shipment to market. Each Federal lease also has other costs, such as bonds, acreage rental fees, sodium prospecting permit application fees, and permit bonds.

In Wyoming, the soda ash deposit within the Known Sodium Leasing Area is under the jurisdiction of the U.S. Government (administered by the Bureau of Land Management [BLM]), the State, and the Union Pacific Railroad, which was given alternate 0.6-square-kilometer sections (1-square-mile) north and south of the railway it constructed in the 1860's. Of the almost 370,000 hectares (915,000 acres) of total sodium mineral estate, the Federal ownership is 55.7%, Union Pacific, 38.1%; and the State, 6.2%. Sixteen leasees hold 53 active and inactive Federal leases having a total of 75,783 acres. In order to prevent a possible land monopoly, no lessee may hold more than 6,216 hectares (15,360 acres) of Federal land, but may lease more private or State land. The State royalty rate is tied to the Federal rate of 5%; however, the private royalty rate varies. One-half of all Federal royalties collected by the Minerals Management Service is disbursed to the Wyoming Government for various State and local programs.

An effort was made in December 1992 to raise the Federal royalty rate from 5% to 8% on all new Wyoming sodium leases and any to be renewed. The proposed action was opposed by all five Wyoming soda ash producers and the issue continued into thorough 1995 when the BLM evaluated the comments raised by the industry before implementing the recommendation. After further studies and Congressional hearings in May 1995, the BLM recommended that the Federal royalty rate should be increased to 8% for new leases and increased to 6% for renewals. The proposal was forwarded higher within the U.S. Department of the Interior for final endorsement; however, the no decision was made by yearend.¹³

Consumption and Uses

The U.S. Geological Survey (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 respond to the quarterly survey, the data represents 100% of the total

reported consumption data found in this report. Reported consumption data and apparent consumption data do not necessarily correspond because reported consumption data are based on actual sales whereas apparent consumption data are the calculated quantity available for domestic consumption based on balancing supplies (production, imports, and inventory adjustments) with external demand (exports). (See table 3.)

U.S. apparent consumption and reported consumption in 1995 were virtually the same. 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 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 (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.

The distribution of soda ash by end use in 1995 was glass, 48%; chemicals, 25%; soap and detergents, 12%; distributors, 5%; pulp and paper and miscellaneous, 3% each; and water treatment and flue gas desulfurization, 2% each.

Glass.—Glass manufacture represented about 48% of domestic soda ash consumption, with the container sector comprising 54%; flat, 31%; specialty, 8%; and fiber, 7%. According to Bureau of the Census data, production of glass containers declined from 10.39 million tons (11.45 million short tons) in 1994 to 10.25 million tons (11.30 million short tons) in 1995, primarily because of the beverage sector which continued to decline because more soft drinks were packaged in plastic containers than glass bottles. On the positive side, glass containers for the beer industry increased 7% in 1995 compared with that of 1994 primarily because of the popularity of local microbreweries. The distribution of glass containers, by type, in 1995 was food, 39% (widemouth food was 74% and narrow-mouth food was 26%); beer, 30%; beverages, 13%; wine, 9%; liquor, 7%; medical, and toiletries and cosmetics, 1% each; and chemical, household, and industrial, less than 1%.

The glass recycling rate remained the same at about 37%, of which postconsumer cullet was estimated at 24% of this rate with the remainder being in-house scrap; however, some areas of the country have begun to reassess the merits of including glass in various recycling programs. Cullet prices have been flat, and breakage during collection reduces the quality of material sold to glass container manufacturers. The closure of some glass container plants has affected the collection efforts of some recycling companies that must either transport cullet greater distances or sell to alternate markets.

Based on Bureau of the Census data, flat glass production rose about 4% from 3.89 million tons in 1994 to 4.03 million tons in 1995 because of increased demand for window glass for automobiles and residential and commercial building construction.

Chemicals.—Soda ash is used to manufacture many sodium-

base inorganic chemicals, including sodium bicarbonate, sodium chromates, sodium phosphates, and sodium silicates. Part of the increase in reported consumption of soda ash in the chemicals sector was because 184,355 tons of soda ash equivalent were consumed to produce chemical caustic soda that was used in various downstream applications.

Soaps and Detergents.—Detergents is the third largest use of soda ash. Soda ash is used as a builder to emulsify oil stains, reduce the redeposition of dirt during washing and rinsing, provide alkalinity for cleaning, and soften laundry water. In addition, soda ash is a component of sodium tripolyphosphate, another major builder in detergent formulations, but soda ash consumption has been decreasing because phosphatic detergents can contribute to the environmental problems of eutrophication. Many regions of the nation have adopted phosphate limitations or bans. These areas represent about 40% of the U.S. population. In response to the environmental issue, detergent manufacturers began reformulating their detergents to make compact and superconcentrated products. These reformulations require sodium silicates and synthetic zeolites, which are made from soda ash. Liquid detergents, which do not contain any soda ash, compete with powdered detergents and command 40% of the household laundry detergent market, up from only 15% in 1978.

Stocks

Yearend stocks of dense soda ash in domestic plant silos, warehouses, terminals, and on teamtracks amounted to 306,000 tons. Producers indicate that a potential supply problem could exist when inventories fall below 180,000 tons. Most consumers of soda ash do not have storage facilities to accommodate large quantities of soda ash and must rely on suppliers to provide the material on a timely basis.

Prices

About two-thirds of U.S. soda ash production is consumed domestically with the remainder dedicated for export sales. In the domestic market, the large volume buyers of soda ash are primarily the major glass container manufacturers, whose purchases are seasonal (more beverage containers made in second and third quarters for summertime beverage consumption). Soda ash sales to the flat glass sector are usually dependent on the state of the economy because the largest use of flat glass is in automobile manufacture and residential housing and commercial building construction. These two major industrial sectors are especially sensitive to changing economic conditions. If construction starts and automobile sales are up, soda ash sales will proportionally follow.

The list prices of natural and synthetic soda ash historically were identical until the mid-1970's when higher energy costs and costs to implement the controls imposed by antipollution legislation caused the synthetic soda ash price to increase compared with that of the natural material. New natural soda ash producers came on-stream in 1976 and 1982 and

contributed to slight changes in price-value trends. Changes in the domestic demand pattern also affected average annual values, especially after 1980, when domestic demand declined.

The average annual value for dense natural soda ash, f.o.b. Green River, WY, and Searles Valley, CA, was \$82.12 per ton (\$74.50 per short ton), which was a 6% increase over that of 1994. The value is not a "price;" it is 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 differ 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 was raised effective July 1, 1995, or as contracts permit, to \$105 per short ton from \$98 per short ton. The California price for the comparable product also increased by \$7 per ton; from \$123 per short ton to \$130 per short ton. The list price of light soda ash was raised to \$110 per short ton. Bag list prices would range from \$153 to \$168 per short ton. A \$15 per short ton off-list price increase also was announced effective July 1.¹⁴ The announcement was targeted for large-volume soda ash buyers that negotiate contracts in the fall and go in effect beginning in January. (See table 4.)

Foreign Trade

U.S. soda ash exports increased 11% in 1995 to 3.57 million tons. U.S. exports to 50 countries, on a regional basis, were as follows: Asia, 48%; South America, 22%; North America, 16%; Europe and the Middle East, 4% each; Africa, 3%; and Central America, the Caribbean, and Oceania, 1% each. The top six countries that represented 52% of total U.S. soda ash exports were, in decreasing order, Mexico, Indonesia, Japan, the Republic of Korea, Thailand, and Brazil. (See tables 5 and 6.)

After an extensive investigation of reported antidumping violations by the U.S. soda ash industry, the European Commission, which is the administrative section of the European Union, released its findings on April 10, 1995. The Commission imposed provisional antidumping duties ranging from 0% to 14.3% for a 4 month period while definitive measures were decided upon. The companies affected and the duties imposed were FMC, 14.3%; North American Chemical, 9.4%; Solvay Minerals, 8.8%; General Chemical, 8.1%; Asahi Glass, 6.7%; Rhône-Poulenc, 5.4%; and Tg Soda Ash, 0%. After intensive lobbying on behalf of the U.S. soda ash producers by European glass producers, the Commission issued its definitive decision on October 15 that softened the duties. Although the antidumping duties will be in effect for the next 5 years, a review will be conducted after 1 year to reevaluate the situation. The final duties were FMC, 8.9%; North American Chemical, 7.1%; Solvay Minerals, 6.2%; General Chemical, 2.5%; Asahi Glass, 5.5%; Rhône-Poulenc, 5.3%; and Tg Soda Ash, 0%.¹⁵

World Review

The largest consumers of soda ash tend to be the developed nations; however, these countries also usually have lower growth rates compared with developing countries that have greater demands for consumer products. Although the production and consumption quantities vary among the countries, the end-use patterns are basically the same (e.g., glass, chemicals, and detergents are the major sectors). Although the United States is the largest soda ash-producing country in the world, foreign ownership in the U.S. soda ash industry is presently 49% of nameplate capacity. (See table 8.)

Ten countries have the capacity to produce more than 1 million tons annually. They are, in descending order, the United States, China, Russia, India, Germany, France, Japan, and the United Kingdom. Bulgaria, Romania, and the Ukraine have production installations that had been rated at about 1 million tons; however, adverse economic conditions have caused these nations to produce below their design capacities. Most of these soda ash-producing countries have large populations that require consumer products made with soda ash. The lesser developed nations tend to have greater soda ash demand and higher rates of growth as soda ash-consuming industries are developed.

Botswana.—Soda ash Botswana, which is owned by African Explosives and Chemical Industries, Anglo American, and the Botswana government, continued to have financial losses that required the to company to begin liquidation proceedings. The action was necessary because the operation lost \$40 million in 1994 and was expected to lose another \$60 million in 1995. The company was given a 3 month extension, while the new managing group tried to negotiate refinancing or restructuring to keep it in operation or to find a buyer.¹⁶

Japan.—Tosoh Corp. of Japan announced it planned to close its 320,000 ton plant in Shinnanyo, Yamaguchi Prefecture in September 1996 and import soda ash from its U.S. joint-venture operation in Wyoming. Tosoh Wyoming Inc. owns 24% of the General Chemical Corp. facility.¹⁷ Tosoh has about 200,000 tons of the total Japanese soda ash market, which is about 1.3 million tons.

Outlook

Supply was tight throughout most of 1995 as both domestic and export sales were strong, which continued until the fourth quarter, when demand began to decline, particularly in the glass container sector. Consumption is expected to increase beginning late in the first quarter of 1996 as glass manufacturers gear up production for beverage sales, which peaks during each summer.

Domestic soda ash consumption should begin to increase in 1996 as FMC enters its agreement to supply Du Pont soda ash at its Tennessee plant. Reportedly, about 200,000 tons of soda ash will be required annually for this use.

Despite the setback in exports to the European market because of the outcome of the antidumping investigation, the

outlook for U.S. soda ash exports remains optimistic. Exports in 1995 increased for the second consecutive year, representing more than 35% of U.S. production. The two largest exporting organizations in the world are Solvay and ANSAC, which includes Solvay as a member. From its strategic location in Wyoming, Solvay is poised to penetrate markets in Asia, Central America, and South America that would be economically inaccessible from its European bases. Although ANSAC is prohibited from exporting to the European Community nations, the six individual U.S. soda ash producers will continue to strive to increase exports to that region pending a favorable outcome to the antidumping investigation review in October 1996.

Export opportunities to the Middle East and South America also are very favorable. In addition, it is likely that some South American production capacity could be reduced as certain countries examine the operating economics of some facilities. Argentina, Brazil, Colombia, and Venezuela are probable areas for future growth in soda ash consumption.

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³Chemical Week. FMC to Spend \$90 Million on New Soda Ash Technology. Mar. 16, 1995, v. 154, No. 10, p. 13.

⁴———. FMC's Soda Ash Expansion: New Technology and a New Application. Feb. 1, 1995, v. 156, No. 4, p. 14.

⁵Chemical Marketing Reporter. North American, Du Pont Link for Evaporated Salt Facility. June 12, 1995, v. 247, No. 24, p. 3.

⁶The Washington Post. Miner Trapped After Earthquake Found Alive. Sun., Feb. 5, 1995, p. A-25.

⁷U.S. Department of Labor, Mine Safety and Health Administration. Accident Investigation Report, Mine I.D. No. 48-01295, Solvay Minerals Inc. Mine, Feb. 3, 1995.

⁸Chemical Marketing Reporter. Solvay Minerals to Add Low Cost Soda Ash Capacity. July 17, 1995, v. 248, No. 3, p. 3.

⁹Chemical & Engineering News. Rhône-Poulenc to Sell Soda Ash Business to OCI. Dec. 4, 1995, v. 73, No. 49, p. 11.

¹⁰Chemical Marketing Reporter. Harris Chemical is Busy on the Deal-Making Front. Nov. 6, 1995, v. 248, No. 19, p. 5.

¹¹Industrial Specialties News. July 24, 1995, v. 9, No. 14, p. 2.

¹²Press Release. Vulcan Materials Co. News. Dec. 13, 1995.

¹³U.S. Bureau of Land Management. Sodium Royalty Rate and Diligent Development Analysis. June 1993, 89 pp.

¹⁴Chemical Marketing Reporter. Market Briefs. June 12, 1995, v. 247, No. 24, p. 21.

¹⁵Official Journal of the European Communities. Imposing a Provisional Anti-Dumping Duty on Imports of Disodium Carbonate Originating in the United States of America. Commission Regulation (EC) No. 823/95 of Apr. 10, 1995, 11 pp.

¹⁶Chemical & Engineering News. Botswana Soda Ash Venture Handed Over to Liquidators. June 26, 1995, v. 73, No. 26, p. 14.

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TABLE 1
SALIENT SODA ASH STATISTICS 1/

(Thousand metric tons and thousand dollars)

	1991	1992	1993	1994	1995
United States:					
Production 2/	9,010	9,380	8,960	9,320	10,100
Value 2/	\$836,000	\$837,000	\$734,000	\$724,000	\$829,000
Value, average annual:					
Per short ton	\$84.18	\$80.93	\$74.34	\$70.44	\$74.50
Per metric ton	\$92.79	\$89.21	\$81.95	\$77.65	\$82.12
Production, Wyoming trona	14,700	14,900	14,500	14,600	16,500
Exports	2,730	2,960	2,800	3,230	3,570
Value	\$409,000	\$434,000	\$376,000	\$406,000	\$445,000
Imports for consumption	134	72	89	79	83
Value	\$21,300	\$12,800	\$17,100	\$12,100	\$12,000
Stocks, Dec. 31: Producers'	234	371	274	203	306
Consumption:					
Apparent	6,460	6,360	6,350	6,240	6,510
Reported	6,280	6,320	6,280	6,260	6,500
World: Production	31,200	30,700 r/	29,500 r/	29,700 r/	30,800 e/

e/ Estimated. r/ Revised.

1/ Data are rounded to three significant digits.

2/ Natural only, soda liquors and purge liquors converted to soda ash equivalent are as follows: 1991, 117,000 tons; 1992, 121,000 tons; 1993, 85,100 tons; 1994, 92,000 tons; and 1995, 105,000 tons.

TABLE 2
U.S. PRODUCERS OF SODA ASH IN 1995

(Million short tons, unless otherwise noted)

Company	Plant nameplate capacity	Plant location	Source of sodium carbonate
FMC Wyoming Corp.	2.85	Green River, WY	Underground trona.
General Chemical (Soda Ash) Partners 1/	2.40	do.	Do.
North American Chemical Co. 2/	1.30	Trona, CA	Dry lake brine.
Rhone Poulenc of Wyoming, L.P. 3/	2.30	Green River, WY	Underground trona.
Solvay Minerals Inc. 4/	2.30	do.	Do.
Tg Soda Ash Inc. 5/	1.30	Granger, WY	Do.
Total	12.45		
Total	million metric tons	11.29	

1/ 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.

2/ Oriental Chemical Industries of Korea as a partner had 27% equity share, but was reduced to about 7% in 1993.

3/ Joint venture between Rhone-Poulenc Basic Chemicals Co. of France (51%) and Union Pacific Resources Co. (49%).

4/ 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 Feb. 1990. Capacity increase of 272,000 tons (300,000 short tons) installed Dec. 1995.

5/ Owned by Texasgulf Inc., subsidiary of Societe Nationale Elf Aquitaine of France (100%).

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

(Metric tons)

SIC Code	End use	1994 total	1995				Total
			First quarter	Second quarter	Third quarter	Fourth quarter	
32	Glass:						
3221	Container	1,780,000	417,000	448,000	442,000	384,000	1,690,000
3211	Flat	926,000	236,000	245,000	254,000	244,000	979,000
3296	Fiber	220,000	52,500	52,700	54,300	54,800	214,000
3229	Other	220,000	63,400	60,900	62,000	61,800	248,000
	Total	3,150,000	769,000	807,000	812,000	744,000	3,130,000
281	Chemicals	1,370,000	407,000	373,000	423,000	447,000	1,650,000
284	Soaps and detergents	834,000	186,000	210,000	192,000	196,000	783,000
26	Pulp and paper	145,000	52,400	48,300	45,000	40,700	186,000
2899	Water treatment 2/	103,000	25,700	26,800	28,000	27,800	108,000
	Fluegas desulfurization	138,000	32,200	30,000	38,600	28,900	130,000
	Distributors	313,000	78,000	87,800	77,100	80,300	323,000
	Other	206,000	45,500	44,300	41,700	53,200	185,000
	Imports 3/	78,700	19,000	22,700	20,200	20,800	82,700
	Total domestic consumption	6,260,000	1,600,000	1,630,000	1,660,000	1,620,000	6,500,000
	Exports 4/	3,270,000	889,000	858,000	913,000	940,000	3,600,000
	Canada	143,000	50,200	41,200	45,000	44,100	180,000
	Total industry sales 5/	9,530,000	2,480,000	2,490,000	2,570,000	2,560,000	10,100,000
	Total sales from plants	9,230,000	2,380,000	2,440,000	2,490,000	2,450,000	9,760,000
	Total production	9,320,000	2,400,000	2,490,000	2,540,000	2,650,000	10,100,000

1/ Data are rounded to 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/ Data are from the Bureau of the Census and may vary from the quantity reported by the producer/importer. Actual imports are proprietary data but have been distributed into appropriate end-use categories and included in "Total Domestic Consumption."

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

	1994	1995
Sodium carbonate (soda ash):		
Dense, 58%, Na ₂ O 100-pounds, paper bags, carlot, works, f.o.b.	\$146.00	\$153.00
Bulk, carlot, same basis tons	98.00	105.00
Light 58%, 100-pounds, paper bags, carlot same basis	151.00	158.00
Bulk, carlot, same basis tons	103.00	110.00

Sources: Chemical Marketing Reporter. Current Prices of Chemicals and Related Materials. V.247, No. 1, Dec. 30, 1994, p. 32, and V. 249, No. 1, Jan. 1, 1996. p. 32.

TABLE 5
REGIONAL DISTRIBUTION OF U.S. SODA ASH EXPORTS, BY CUSTOMS DISTRICTS, IN 1995 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	--	--	125	--	227	--	--	--	--	352	--
Charleston, SC	--	--	31	--	--	--	--	--	--	31	--
Miami, FL	--	--	293	218	--	--	--	--	--	511	--
New York, NY	--	--	20	--	569	--	--	4,960	--	5,550	--
Norfolk, VA	--	--	83	--	32	--	--	--	--	115	--
Philadelphia, PA	--	--	17	--	--	--	--	--	--	17	--
Savannah, GA	--	--	--	--	2	--	--	--	--	2	--
Tampa, FL	--	--	--	39	--	--	--	--	--	39	--
Gulf:											
Houston-Galveston, TX	--	--	7,780	31	--	--	--	--	--	7,810	--
New Orleans, LA	--	--	18	63	--	--	--	--	--	81	--
Port Arthur, TX	--	5,910	216,000	37,600	10,700	24,500	70,900	--	--	366,000	10
Pacific:											
Anchorage, AK	38	--	--	--	--	--	--	--	--	38	--
Columbia-Snake River	--	5,000	240,000	3,000	102,000	98,700	18,000	1,610,000	50,600	2,130,000	60
Los Angeles, CA	--	--	60,300	--	10,100	--	--	1,290	60	71,700	2
San Diego, CA	15,500	37,200	242,000	--	28,400	--	23,000	60,900	--	407,000	11
San Francisco, CA	--	--	--	--	--	20	--	--	123	143	--
Seattle, WA	10,900	--	--	--	--	--	--	161	--	11,000	--
North Central:											
Chicago, IL	--	--	--	--	10	--	--	--	--	10	--
Detroit, MI	103,000	--	--	--	244	--	--	--	--	103,000	3
Great Falls, MT	28,400	--	--	--	--	--	--	--	--	28,400	1
Pembina, ND	9,290	--	--	--	--	--	--	--	--	9,290	--
Northeast:											
Buffalo, NY	12,800	--	--	--	--	--	--	--	--	12,800	--
Ogdensburg, NY	837	--	--	--	--	--	--	--	--	837	--
St. Albans, VT	194	--	--	--	--	--	--	--	--	194	--
Southwest:											
Laredo, TX	382,000	--	--	--	--	--	--	--	--	382,000	11
Other:											
San Juan, PR	--	--	--	--	--	15,900	--	--	--	15,900	--
Unknown:											
	21,700	--	--	--	--	--	--	--	--	21,700	1
Total	584,000	48,100	767,000	40,900	153,000	139,000	112,000	1,680,000	50,800	3,570,000	100
Percent of total	16	1	21	1	4	4	3	47	1	100	--

1/ Data are rounded to three significant digits; may not add to totals shown.

Source: Bureau of the Census as adjusted 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/

(Thousand metric tons)

Country	1994	1995	Country	1994	1995
Argentina	109	121	Korea, Republic of	341	277
Australia	26	31	Malaysia	58	78
Belgium	129	23	Mexico	343	397
Belize	--	6	New Zealand	7	20
Bolivia	6	4	Panama	3	4
Brazil	167	233	Peru	17	19
Canada	150	187	Philippines	76	103
Chile	59	78	Poland	30	--
China	92	50	Russia	2	(2/)
Colombia	68	86	Saudi Arabia	56	65
Costa Rica	5	16	Singapore	13	26
Croatia	63	27	Slovenia 3/	12	--
Dominican Republic	(2/)	3	South Africa	84	112
Ecuador	10	11	Spain	--	97
El Salvador	4	4	Taiwan	188	198
France	14	5	Thailand	195	263
Guatemala	15	18	Trinidad and Tobago	9	35
Indonesia	284	343	United Arab Emirates	--	16
Iran	--	25	Uruguay	9	5
Israel	36	33	Venezuela	164	210
Italy	47	--	Other 4/	1	1
Jamaica	4	2	Total	3,230	3,570
Japan	340	339			

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Less than 1/2 unit, included with "Other."

3/ Formerly part of Yugoslavia.

4/ Includes Antigua (1994), Aruba (1994), The Bahamas (1995), Bahrain (1995), Barbados (1995), Finlandn(1995), Germany (1995), Hong Kong, Ireland, Federated States of Micronesia (1995), the Netherlands (1995), the Netherlands Antilles (1994), Paraguay (1994), Sierra Leone (1994), Sweden (1994), and the United Kingdom.

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/

(Thousand metric tons)

	1994			1995		
	Soda ash	Soda liquors	Wyoming trona	Soda ash	Soda liquors	Wyoming trona
January	714	7	1,290	840	7.5	1,460
February	691	7	1,150	698	8.07	1,220
March	786	9	1,270	867	9.87	1,490
April	734	6	1,120	837	7.86	1,360
May	791	8	1,210	843	7.79	1,380
June	746	8	1,110	816	6.85	1,350
July	799	8	1,160	860	9.65	1,440
August	741	11	1,170	840	9.27	1,380
September	775	7	1,170	845	9.35	1,430
October	853	8	1,250	870	9.72	1,390
November	834	7	1,340	876	W	1,270
December	858	7	1,350	907	W	1,320
Total	9,320	92	14,600	10,100	105	16,500

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

1/ Data are rounded to three significant digits; may not add to totals shown.

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

(Thousand metric tons)

Country	1991	1992	1993	1994	1995 e/
Albania e/	16	(3/)	--	--	--
Australia e/	300	300	300	300	300
Austria e/	150	150	150	150	200
Belgium e/ 4/	380	375	300	300 r/	300
Bosnia and Herzegovina e/ 5/	XX	25	20	15	15
Botswana	62	124	126	174 r/	202 6/
Brazil e/	200	200	200	200	200
Bulgaria	893	517	259 r/	300 r/ e/	300
Canada e/	310	305	305	300	300
China e/	3,940	4,500	5,270	5,680	5,820
Colombia e/	121	121	121	121	121
Czechoslovakia e/ 7/	104	100	XX	XX	XX
Egypt e/	52 6/	51	51	51	51
France	1,140	1,100	1,222 r/	1,200 e/	1,200
Germany	1,948	1,639	1,586	1,380 r/	1,400
India e/	1,500	1,500	1,500	1,500	1,500
Italy e/	600	600	500	500	500
Japan	1,103	1,057	1,056	1,050 r/	1,070
Kenya 8/	245 e/	186 r/	145 r/	145 r/ e/	145
Korea, Republic of e/	300	300	310	310	310
Mexico e/ 9/	449	440	440	440 r/	450
Netherlands e/	400	400	400	400	400
Pakistan e/	147	146	186 6/	180	180
Poland	962	929	815 r/	997 r/	1,000
Portugal e/	150	150	150	150	150
Romania	471	452	371 r/ e/	350 r/	350
Russia	XX	2,700 r/	2,000 r/	1,550 r/	1,800
Spain e/	500	500	500	500	500
Taiwan	109	91	100 e/	100 e/	100
Turkey e/	385	385	385	385	385
U.S.S.R. e/ 10/	4,100	XX	XX	XX	XX
Ukraine e/	XX	1,000	800 r/	660 r/	475
United Kingdom e/	1,000	1,000	1,000	1,000	1,000
United States 8/	9,000	9,380	8,960	9,320	10,100 6/
Yugoslavia 5/ 11/	140 e/	XX	XX	XX	XX
Total	31,200	30,700 r/	29,500 r/	29,700 r/	30,800

e/ Estimated. r/ Revised. XX Not applicable.

1/ World totals, U.S. data, and estimated data are rounded to three significant digits; may not add to totals shown.

2/ Table includes data available through May 23, 1996. Synthetic unless otherwise specified.

3/ Less than 1/2 unit. Plant at Vlora reportedly closed in 1993.

4/ Plant at Couillet closed by yearend 1993.

5/ All production in Yugoslavia for 1991 came from Bosnia and Herzegovina.

6/ Reported figure.

7/ Dissolved on Dec. 31, 1992.

8/ Natural only.

9/ Includes natural and synthetic. Estimated production of natural soda ash, in thousand metric tons, was as follows: 1991--190; 1992--160; and 1993--160. Natural soda ash operation closed in Aug. 1993.

10/ Dissolved in Dec. 1991.

11/ Dissolved in Apr. 1992.