



2011 Minerals Yearbook

SODA ASH

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The U.S. soda ash industry continued to rebound in 2011 after experiencing a decline in domestic and export sales caused by adverse global economic conditions in 2009 in the major soda ash-consuming sectors. The annual average unit value of soda ash set a record high in 2011, and soda ash exports increased as well, accounting for 51% of total production. The total value of U.S. soda ash production was \$1.58 billion. World soda ash production was estimated at 51.3 million metric tons (Mt) (table 1).

Soda ash, also known as sodium carbonate (Na_2CO_3), is an alkali chemical refined from the mineral trona, or from naturally occurring sodium-carbonate-bearing brines (the soda ash from both is referred to as natural soda ash) or manufactured from one of several chemical processes (the soda ash from this process is referred to as synthetic soda ash).

Soda ash is an important industrial compound used to manufacture chemicals, glass, pulp and paper, soaps and detergents, and many other familiar consumer products. The United States has the world's largest natural deposit of trona and is the world's second ranked soda ash-producing nation. U.S. natural soda ash is extremely competitive in world markets because the majority of the world output of soda ash is made synthetically, which is usually a more expensive process.

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 five soda ash companies, all of which responded, representing 100% of the total production data in this report (table 1).

The United States remained the world's second ranked soda ash-producing nation in 2011 behind China. U.S. production of natural soda ash from California and Wyoming was 10.7 Mt in 2011. Based on about 14.5 million metric tons per year (Mt/yr) (16 million short tons per year) of total nameplate production capacity, the U.S. soda ash industry operated at 74% of total capacity. This capacity utilization rate appears to be low because it is calculated partially based on the full nameplate capacity of 900,000 metric tons per year (t/yr) (1 million short tons per year) for Solvay Chemicals, Inc.'s Parachute, CO, plant; 816,000 t/yr (900,000 short tons per year) for OCI Chemical Corp.'s plant; and 1.18 Mt/yr (1.3 million short tons per year) for FMC Corp.'s Granger plant, some of which included nameplate capacity idled since 2009. On January 7, 2011, FMC announced it would restart its Granger facility at the rate of 454,000 t/yr (500,000 short tons per year) in June in response to strong export sales. The plant restarted in June at which time the company announced it would increase the operating rate

to 1.09 Mt/yr (1.2 million short tons per year) by 2014 (FMC Corp., 2011c, d).

Approximately 2.5 Mt/yr of nameplate capacity (2.22 million short tons per year), which represented about 14% of total industry nameplate capacity, was idled in 2011. This available capacity could be brought back online when market conditions improve. The U.S. soda ash industry used the term "effective capacity" to minimize the effect that "mothballed capacity" had on operating rates. This resulted in higher capacity utilization percentages. Individual effective capacity data are not publicly disclosed. Producers use nameplate capacities to determine export allocations set by a U.S. export association, the American Natural Soda Ash Corp. (ANSAC).

The U.S. soda ash industry consisted of five companies in 2011—four companies operating five plants in Wyoming that produced soda ash from underground trona ore and one in California that produced soda ash from sodium-carbonate-rich brines. Solvay operated a plant in Wyoming and a plant in Colorado, which was mothballed in September 2004 but continued sodium bicarbonate production using soda ash feedstock from the company's Wyoming soda ash facility.

Each of the U.S. companies is either wholly owned or partially owned by foreign soda ash-producing companies or foreign soda ash consumers. The U.S. soda ash industry was 62% foreign owned and 38% domestically owned. At yearend, the countries and foreign percentage ownership were India, 21%; Belgium, 19%; Japan, 11%; and the Republic of Korea, 11% (table 3).

The U.S. Environmental Protection Agency issued new air pollution regulations in March 2011 for new coal-fired powerplants. About 20% of these powerplants were expected to use dry sorbent injection technology. In response, Tata Chemicals (Soda Ash) Partners, Church & Dwight Co., and FMC Corp. formed NatronX Technologies to produce sodium-base dry sorbents for flue-gas treatment processes at coal-fired powerplants. The joint-venture company would invest \$60 million to construct a 450,000-metric-ton-per-year facility by the fourth quarter of 2012 (Tata Chemicals Ltd., 2011).

The economic distress of the U.S. soda ash industry in 2004, caused partially by the emergence of China as a competitor in the export market to Asia, led to the passage of the Soda Ash Royalty Reduction Act of 2006. Passage of the legislation lowered the Federal royalty rate of 6% to 2% for a 5-year period for holders of Federal sodium leases prior to the legislation's expiration date of October 11, 2011. An extension of the royalty reduction was under consideration at yearend (Abbey, 2011; U.S. Department of the Interior, 2011, p. 1–3).

Consumption

The USGS collects soda ash 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 because of customer reclassifications or other factors. All U.S. soda ash companies responded to the quarterly surveys; data represented 100% of the total reported consumption data found in this report.

In 2011, U.S. apparent consumption and reported consumption were nearly identical. Apparent consumption of soda ash was 5.22 Mt; reported consumption was 5.15 Mt (table 1). Reported consumption and apparent consumption do not necessarily correspond because reported consumption is sales reported by producers, whereas apparent consumption is the calculated quantity available for domestic consumption based on balancing supply (production, imports, and inventory adjustments) with external demand (exports).

When the two types of consumption do not closely correspond, the difference is usually attributed to a discrepancy in the export data that were used to derive consumption statistics. The two sources for export data were the U.S. Census Bureau, which reports exports upon departure from U.S. ports, and the California and Wyoming soda ash producers, which consider shipments to be exported when their export association, ANSAC, takes consignment of the product at the Wyoming plant sites. Transit times between the plant and port, which can be 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.

In the domestic market, large-volume buyers of soda ash were primarily the major glass container manufacturers whose purchases were seasonal (more beverage containers are made in the second and third quarters for summertime beverage consumption). Soda ash sales to the flat glass sector depended more on the state of the economy because the leading uses of flat glass were in automobile manufacture and residential housing and commercial building construction. These two major industrial sectors are especially sensitive to changing economic conditions, and was glass, 48%; chemicals, 29%; soap and detergents, 8%; distributors, 6%; flue gas desulfurization and other, 3% each; pulp and paper, 2%; and water treatment, 1% (table 4).

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

Glass.—Glass manufacture represented about 48% of domestic soda ash consumption as follows: container, 51%; flat, 39%; and fiber and other, 5% each. Glass containers are made for beverages (beer, carbonated, and noncarbonated drinks), chemical and household products, food, liquor, medical products, and toiletries and cosmetics.

Soaps and Detergents.—Detergents were the third ranked 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 have adopted phosphate limitations or bans, affecting about 40% of the U.S. population.

In response to the environmental concern that cardboard detergent packaging contributes to the volume of landfill waste, 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 about 50% of the household laundry detergent market in 2011.

Stocks

Yearend 2011 stocks of dense soda ash in domestic plant silos, terminals, warehouses, and on teamtracks amounted to 283,000 metric tons (t). Producers indicated that a potential supply problem could exist if inventories decreased to less than 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

The annual average value in 2011 for bulk, dense natural soda ash, free on board (f.o.b.) Green River, WY, and Searles Valley, CA, was \$147.34 per metric ton (\$133.57 per short ton), which was a 15% increase from that of the previous year. 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. Only merchant soda ash is used to derive the annual value; therefore, no soda ash for value-added products or soda liquors is included. The list prices quoted in trade journals or by producers differed from the annual average values reported to and by the USGS.

On June 3, FMC announced a soda ash price increase of \$20 per short ton effective July 1, 2011, or as contracts allowed for all grades of soda ash and for both bulk and packaged products. The company stated the increase was necessary to “recover cost increases and to support continued investment in the business.” The new list price for bulk, dense soda ash was \$260 per short ton (PR Newswire, 2011). Tata Chemicals North America Inc., followed FMC with a \$20 per short ton increase on June 7 (Tata Chemicals North America Inc., 2011a).

In September, FMC announced another \$15-per-short-ton rise effective November 1, 2011, or as contracts permit, for all grades of soda ash (FMC Corp., 2011a). Tata Chemicals also raised its list and off-list price of bulk and packaged soda ash by \$15 per short ton late in the year (Tata Chemicals North America Inc., 2011b).

Foreign Trade

The majority of U.S. soda ash exports were controlled by ANSAC, which is involved exclusively in the export trade

of soda ash, defined as an alkali product designated by the chemical formula Na_2CO_3 , whether manufactured by brine evaporation and purification, Solvay process, trona refining, or any other means. Under the Treaty of Rome agreement (1958), ANSAC is not permitted to ship soda ash to the European Union (EU); however, the members of the U.S. soda ash industry formed another organization for shipping to this region. It is the American-European Soda Ash Shipping Association, Inc. (AESSA) that is engaged solely in storage, transportation, and other related logistical and technical support activities to promote and further its members' individual commerce in soda ash being shipped to the EU. Both ANSAC and AESSA were formed as Webb-Pomerene export associations under the authority of the U.S. Federal Trade Commission.

On June 15, ANSAC announced it would raise prices of soda ash for export by \$50 per metric ton on a worldwide basis effective July 1, 2011. The action was a result of strong demand for soda ash around the world (American Natural Soda Ash Corp., 2011).

According to the U.S. Census Bureau, U.S. soda ash exports for 2011 were 5.47 Mt, which represented about 51% of U.S. soda ash production. For comparison, exports accounted for only 5% of U.S. production in 1970, 13% in 1980, 26% in 1990, and 38% in 2000. In 2011, the regional percentage distribution of U.S. exports to 56 countries was Asia and South America, 27% each; North America, 21%; Europe, 11%; Africa, 6%; the Middle East and Oceania, 3% each; Central America, 2%; and the Caribbean, less than 1% (table 5). The average free alongside ship value was \$190.13 per metric ton in 2011 compared with \$164.38 per ton in 2010. Although the data in tables 1 and 6 are rounded to three significant digits, the unit values listed in table 6 are based on the unrounded statistics. The 10 leading countries, representing 68% of total U.S. soda ash exports were, in decreasing order and percentage of total, Mexico, 16%; Brazil, 12%; Indonesia, 10%; Canada, 5%; Chile, 5%; Japan, 4%; the Republic of South Korea, 4%; South Africa, 4%; Taiwan, 4%; and the Netherlands, 4% (table 6). About 42% of all U.S. soda ash exports went through the Columbia-Snake River customs district in Idaho, Oregon, and Washington; the Port Arthur, TX, customs district was the second-ranked customs district with 29% of the total; and the Laredo, TX, customs district was third with 13% of the total (table 5).

Imports of soda ash increased to 27,000 t in 2011 and came from 14 countries according to U.S. Census Bureau data. In 2010, 82% of soda ash imports was from Canada (47%), Italy (20%), the United Kingdom (9%), and China (6%). The remaining 18% of imports was from the Dominican Republic, France, Germany, Hong Kong, India, Japan, Mexico, Poland, Romania, and Ukraine. The Dominican Republic and Hong Kong were listed as sources; however, neither country produces soda ash. It is possible that the entry was erroneous or that the product was transshipped from another location, such as imports from Canada (which no longer produces soda ash) that may have originated from England. The imports from China actually were thought to be sodium carbonate peroxohydrate that is the active ingredient in algacides and fungicides. The average cost, insurance, and freight value of imported soda ash was \$210.29 per ton, and the customs value was \$176.67 per ton.

World Review

Soda ash is a mature commodity in which consumption tends to increase in proportion to population and gross domestic product growth rates. For this reason, the leading consumers of soda ash were, for the most part, developed nations with lower growth rates compared with those of developing countries. The developing nations tend to use less soda ash than developed nations but have higher growth rates. 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.

In 2011, world soda ash production was estimated to be 51.3 Mt, which was a 7% increase from that of 2010. Of the 29 countries that produce natural and synthetic soda ash, the United States was the world's second-ranked producer, accounting for 21% of total world output. Only Botswana, China, Ethiopia, Kenya, Turkey, and the United States produce soda ash from natural sources; the remaining 23 nations manufacture soda ash through various chemical processes, primarily the Solvay process. Total world natural soda ash production represented about 26% of combined world soda ash production.

Eight countries produced more than 1 Mt/yr of soda ash. They were, in descending order, China, the United States, Germany, Russia, India, Turkey, France, and Poland (table 7). These nations accounted for 86% of world production in 2011. Bulgaria, Romania, and Ukraine had production installations that were rated at about 1 Mt/yr; adverse economic conditions, however, caused these nations to produce below their facilities' design capacities.

China.—Solvay S.A. of Belgium, the world's leading soda-ash-producing company, acquired a 30% share (\$23 million) of a synthetic soda ash plant being built by Tianjin Soda Ash Plant in Bin Hai. The facility will have the capacity to produce 800,000 t/yr of soda ash. Solvay will be allowed to sell 220,000 t/yr of soda ash and 30,000 t/yr of sodium bicarbonate under its own name (Solvay International Chemical Group, 2011).

Ethiopia.—The Ministry of Mines in Ethiopia signed a contract with the country's natural soda ash producer, Abijata Soda Ash Share Co., to expand soda ash production to more than 130,000 t within 10 years. The \$1.96 million contract is for a plan to develop the lake deposit resources (Lismore, 2011).

Kenya.—In October, Tata Chemicals commissioned its new \$100 million natural soda ash plant at Lake Magadi, 90 kilometers (56 miles) southwest of Nairobi. The new facility has a capacity of 200,000 t/yr. The company's existing soda ash plant can produce 350,000 t/yr (Bloomberg Businessweek, 2011).

Namibia.—Gecko Mining (Pty.) Ltd. (South Africa) planned to invest \$1.8 billion to construct three chemical plants and a harbor near Swakopmund. The chemical complexes would produce phosphoric acid, sulfuric acid, and soda ash to support the country's uranium mining industry (IOL Business Report, 2011).

Saudi Arabia.—The International Institute for Democracy and Electoral Assistance (IDEA) established the IDEA Soda Ash and Calcium Chloride Co. (ISACC) that awarded an engineering and project management contract for the construction of the first synthetic soda ash plant in Jubail II Industrial City. The

planned production capacity of the \$293 million plant will be 500,000 t/yr of soda ash and 575,000 t/yr of calcium chloride. Startup was expected by yearend 2014 (MEED Ltd., 2011).

South Africa.—South Africa does not import soda ash from ANSAC but does permit individual United States soda ash producers access to South African markets. As such, on April 15, FMC announced a \$30-per-metric-ton price increase on its dense soda ash and a \$50-per-metric-ton increase on light soda ash (FMC Corp., 2011b). Tata Chemicals followed with a \$50-per-metric-ton increase on September 27 for all bulk and packaged soda ash shipments to South Africa (Tata Chemicals North America Inc., 2011c).

Turkey.—Eti Soda AS (Ciner Group, 74% and state-owned Eti Maden, 26%), Turkey's natural soda ash producer at Bepazari, announced it would increase production capacity to 1.7 Mt/yr from 1 Mt/yr sometime in 2013. Eti's majority partner, the Ciner Group, acquired the Kazan trona deposit from Rio Tinto plc in January 2011 for an undisclosed sum. Ciner planned to construct a 1-Mt/yr soda ash plant in 2012 with startup scheduled for 2014 with an additional 1-Mt/yr expansion scheduled for 2015 (O'Driscoll and Feytis, 2011).

Outlook

The domestic and foreign industries that consume soda ash continued recovering from the global economic problems that began in 2008. U.S. soda ash producers increased production and exports in 2011 with soda ash prices reaching a record high. Three dominant groups have survived to become the world's leading suppliers of soda ash—ANSAC of the United States (which represented three of the five domestic producers in 2011), Chinese producers, and Solvay S.A. of Belgium. India has emerged recently to become the fourth dominant source of soda ash. It is very likely that some smaller soda ash facilities in the world may close because of energy and environmental considerations and competition from the major producers.

With the continued recovery in the U.S. economy, U.S. soda ash production for 2012 through 2015 is expected to increase. Because exports now exceed domestic consumption, it is forecast that U.S. soda ash suppliers will continue to achieve higher soda ash sales prices by placing greater emphasis on export sales to compete with the more expensive foreign synthetic soda ash. Global economic problems are expected to ease slowly in the next few years and stimulate world soda ash consumption. The United States likely will continue to compete with Chinese soda ash producers in the Far Eastern markets. U.S. soda ash exports in 2012 are expected to increase, causing domestic soda ash production to increase slightly. Many industry analysts agree that increases in world consumption are forecast to range from 2.0% to 2.5% per year for 2012 through 2015. Asia and South America remain the most likely areas for increased soda ash consumption in the near future.

References Cited

- Abbey, Robert, 2011, Statement of testimony before subcommittee on public lands and forests: United States Senate, S.1144, August 3, 3 p. (Accessed September 22, 2011, at [http://www.blm.gov/pgdata/etc/medialib/blm/wo/Communications_Directorate/2011_congressional.Par.66530.File.dat/S.1144_Soda_Ash_Competition_Act_\(FINAL\).pdf](http://www.blm.gov/pgdata/etc/medialib/blm/wo/Communications_Directorate/2011_congressional.Par.66530.File.dat/S.1144_Soda_Ash_Competition_Act_(FINAL).pdf).)
- American Natural Soda Ash Corp., 2011, ANSAC to increase price globally by \$50.00/mt on July 1, 2011: Westport, CT, American Natural Soda Ash Corp. press release, June 15. (Accessed August 18, 2011, at <http://www.ansac.com/news/2011/06/15/>.)
- Bloomberg Businessweek, 2011, Tata Chemicals plans to build new soda ash plant in Kenya: October 25. (Accessed October 26, 2011, at <http://www.businessweek.com/news/2011-10-25/tata-chemicals-plans-to-build-new-soda-ash-plant-in-kenya.html>.)
- FMC Corp., 2011a, FMC increases soda ash prices: Philadelphia, PA, FMC Corp. news release, September 29. (Accessed October 4, 2011, at <http://fmc.com/aboutfmc/news/tabid/763/ctl/detail/mid/10683/itemid/32/fmc-increases-soda-ash-prices-.aspx>.)
- FMC Corp., 2011b, FMC increases soda ash prices in South Africa: Philadelphia, PA, FMC Corp. news release, April 15. (Accessed May 16, 2011, via <http://www.fmc.com/aboutfmc/news/tabid/763/ctl/detail/mid/10683/itemid/12/fmc-increases-soda-ash-prices-in-south-africa.aspx>.)
- FMC Corp., 2011c, FMC increases soda ash production capacity in response to strong export demand: Philadelphia, PA, FMC Corp. news release, January 7, 2 p. (Accessed February 11, 2011, at <http://www.fmcchemicals.com/LinkClick.aspx?link=Content/Granger+PR+010711+FINAL.pdf&tabid=4660&mid=10623>.)
- FMC Corp., 2011d, FMC starts design work to add capacity to Wyoming soda ash facility: Philadelphia, PA, FMC Corp. news release, June 10, 1 p. (Accessed August 2, 2011, at <http://www.fmcchemicals.com/LinkClick.aspx?link=Content/FINAL+Granger+Second+Phase+Announce+June2011.pdf&tabid=4660&mid=10623>.)
- IOL Business Report, 2011, SA firm to invest \$1.8bn in Namibia: Capetown, South Africa, IOL Business Report, April 28. (Accessed April 28, 2011, at <http://www.iol.co.za/business/markets/south-africa/sa-firm-to-invest-1-8bn-in-namibia-1.1062281>.)
- Lismore, Siobhan, 2011, Ethiopia looks to boost soda ash presence with joint venture: Industrial Minerals, September 19. (Accessed September 27, 2011, via <http://www.indmin.com/>.)
- MEED Ltd., 2011, New SR1bn industrial complex to be built in Jubail: Dubai, United Arab Emirates, MEED Ltd., November 2. (Accessed November 7, 2011, via <http://www.ameinfo.com/280127.html>.)
- O'Driscoll, Michael, and Feytis, Alex, 2011, Turkey to become a major soda ash force by 2015: Industrial Minerals, May. (Accessed April 28, 2011, via <http://www.indmin.com/>.)
- PR Newswire, 2011, FMC increases soda ash prices: United Business Media, June 3. (Accessed June 6, 2011, via <http://www.prnewswire.com/news-release/fmc-increases-soda-ash-prices-123126543.html>.)
- Solvay International Chemical Group, 2011, Solvay and Tianjin Soda Ash Plant set up joint soda ash plant in China: Solvay International Chemical Group press release, June 8. (Accessed June 8, 2011, via http://www.solvay.com/EN/NewsPress/20110608_Tianjin.aspx.)
- Tata Chemicals Ltd., 2011, Tata Chemicals, Church & Dwight, and FMC announce joint venture for air pollution control: Mumbai, India, Tata Chemicals Ltd. press release, September 22, 2011. (Accessed January 5, 2012, at http://tatachemicals.com/media/releases/201109sept/air_pollution_control.html.)
- Tata Chemicals North America Inc., 2011a, [Untitled]: East Hanover, NJ, Tata Chemicals North America Inc. press release, June 7. (Accessed July 15, 2011, at http://www.tatachemicals.com/north-america/media_center/pdf/price_increase_letter_june_7_2011.pdf.)
- Tata Chemicals North America Inc., 2011b, [Untitled]: East Hanover, NJ, Tata Chemicals North America Inc. press release, September 13, 1 p. (Accessed October 4, 2011, at http://www.tatachemicals.com/north-america/media_center/pdf/price-increase-september13-2011.pdf.)
- Tata Chemicals North America Inc., 2011c, [Untitled]: East Hanover, NJ, Tata Chemicals North America Inc., September 27, 1 p. (Accessed October 16, 2011, at http://www.tatachemicals.com/north-america/media_center/pdf/Price_increase_September_27_2011.pdf.)
- U.S. Department of the Interior, 2011, U.S. Department of the Interior, report to Congress, the Soda Ash Royalty Reduction Act of 2006: U.S. Department of the Interior, September 30, 36 p. (Accessed October 16, 2011, at http://www.blm.gov/pgdata/etc/medialib/blm/wo/MINERALS__REALTY__AND_RESOURCE_PROTECTION_/non-energy_minerals.Par.8606.File.dat/SodaAshReport_09-30-11.pdf.)

GENERAL SOURCES OF INFORMATION

U.S. Geological Survey Publications

Evaporites and Brines. Ch. in United States Mineral Resources, Professional Paper 820, 1973.

Historical Statistics for Mineral and Material Commodities in the United States, Data Series 140.

Soda Ash. Ch. in Mineral Commodity Summaries, annual.

Soda Ash. Mineral Industry Surveys, monthly.

Other

Engineering and Mining Journal, commodities survey.

Industrial Minerals.

Manufacture of Soda. American Chemical Society Monograph Series, 1942.

Natural Soda Ash. Van Nostrand Reinhold, 1992.

Proceedings of the First International Soda Ash Conference. Wyoming State Geological Survey, 1998.

Soda Ash. Ch. in Industrial Minerals and Rocks, Society for Mining, Metallurgy, and Exploration, Inc., 1994.

Soda Ash. Mining Engineering, annual review of industrial minerals (June issue).

Soda Ash and Sodium Sulfate. Ch. in Mineral Facts and Problems, U.S. Bureau of Mines Bulletin 675, 1985.

TABLE 1
SALIENT SODA ASH STATISTICS¹

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

	2007	2008	2009	2010	2011
United States:					
Production:					
Soda ash:					
Quantity	11,100	11,300	9,310	10,600	10,700
Value	1,260,000	1,520,000	1,330,000	1,360,000	1,580,000
Value, average annual:					
Per short ton	\$103.53	\$122.11	\$129.88	\$116.47	\$133.57
Per metric ton	\$114.12	\$134.60	\$143.17	\$128.39	\$147.24
Wyoming trona	17,200	17,800	15,100	15,900	16,500
Exports:					
Quantity	5,130	5,370	4,410	5,390 ^r	5,470
Value	734,000	939,000	838,000	886,000	1,040,000
Imports for consumption:					
Quantity	9	13	6	20	27
Value	2,760	3,820	2,350	5,770	5,660
Stocks, December 31, producers'	206	259	217	220	282
Consumption:					
Apparent	6,030	5,860	4,950	5,200	5,220
Reported	5,940	5,700	5,020	5,270	5,150
World, production ^c	46,200 ^r	47,000 ^r	44,400 ^r	48,100 ^r	51,300

^cEstimated. ^rRevised.

¹Data are rounded to no more than three significant digits, except average annual value.

TABLE 2
U.S. PRODUCTION OF SODIUM COMPOUNDS, BY MONTH¹

(Thousand metric tons)

	2010		2011	
	Soda ash	Wyoming trona ²	Soda ash	Wyoming trona ²
January	877	1,530	888	1,510
February	814	1,260	813	1,410
March	845	1,300	904	1,480
April	876	1,100	824	1,270
May	915	1,410	881	1,290
June	821	1,350	899	1,370
July	874	1,270	918	1,130
August	948	1,380	970	1,450
September	844	1,280	849	1,300
October	918	1,330	941	1,480
November	911	1,330	864	1,360
December	927	1,420	975	1,420
Total	10,600	15,900	10,700	16,500

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

²Includes solution-mined trona.

TABLE 3
U.S. PRODUCERS OF SODA ASH IN 2011

(Million short tons unless otherwise noted)

Company	Partner(s)	Plant nameplate capacity	Plant location	Source of sodium carbonate
FMC Wyoming Corp.:				
Granger	None	1.30	Granger, WY	Underground trona.
Green River	Joint venture with Sumitomo Corp. and Nippon Sheet Glass Co., Ltd. (20%, combined)	3.55	Green River, WY	Do.
OCI Chemical Corp.	DC Chemical Co., Ltd. (51%) and Anadarko Petroleum Corp. (49%)	3.10	do.	Do.
Searles Valley Minerals, Inc.	None	1.45	Trona, CA	Dry lake brine.
Solvay Chemicals, Inc.:				
Green River	Joint venture with Asahi Glass Co. (20%)	2.80	Green River, WY	Underground trona.
Parachute	do.	1.00	Parachute, CO	Underground nahcolite.
Tata Chemicals (Soda Ash) Partners	Joint venture with Owens-Illinois, Inc. (25%)	2.80	Green River, WY	Underground trona.
Total		16.00		
Total	million metric tons	14.50		

Do., do. Ditto.

TABLE 4
REPORTED CONSUMPTION OF SODA ASH IN THE UNITED STATES, BY END USE, BY QUARTER¹

(Thousand metric tons)

NAICS ² code	End use	2011				Total	
		2010	First quarter	Second quarter	Third quarter		Fourth quarter
3272	Glass:						
327213	Container	1,280	299	319	322	315	1,260
327211	Flat	965	248	239	242	244	973
327993	Fiber	139	34	35	32	32	132
327212	Other	119	34	28	30	30	122
	Total	2,510	615	621	626	620	2,480
32518	Chemicals	1,520	379	385	386	361	1,510
325611	Soaps and detergents	513	116	119	95	101	430
322	Pulp and paper	89	22	21	19	23	85
221310	Water treatment ³	46	13	14	16	15	58
56221	Flue gas desulfurization	191	36	32	48	44	160
422	Distributors	271	73	70	72	66	282
	Other	138	32	34	35	36	138
	Total domestic consumption ⁴	5,270	1,290	1,300	1,300	1,270	5,150
	Exports ⁵	5,360	1,300	1,320	1,380	1,480	5,470
	Canada	231	64	62	60	63	249
	Total industry sales ⁶	10,600	2,590	2,610	2,680	2,740	10,600
	Total sales from plants	10,800	2,630	2,630	2,700	2,780	10,800
	Total production	10,600	2,600	2,600	2,740	2,780	10,700

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

²North American Industry Classification System.

³Includes soda ash equivalent from soda liquors and purge liquors sold to powerplants for water treatment. Sales of mine water are excluded.

⁴Imports reported by the producer/importer have been distributed into appropriate end-use categories listed above.

⁵As reported by producers; includes Canada. Data may not necessarily agree with those reported by the U.S. Census Bureau for the same periods.

⁶Represents soda ash from domestic origin (production and inventory changes) and imports and exports. Includes soda ash sold by coproducers and distributed by purchasers into appropriate end-use categories.

TABLE 5
REGIONAL DISTRIBUTION OF U.S. SODA ASH EXPORTS, BY CUSTOMS DISTRICTS, IN 2011¹
(Metric tons)

Customs districts	North America	Central America	South America	Caribbean	Europe	Middle East	Africa	Asia	Oceania	Total	Percentage of total
Atlantic:											
Miami, FL	--	49	439	18	--	--	--	--	--	506	(2)
New York, NY	--	--	--	--	1,700	--	--	245	--	1,950	(2)
Norfolk, VA	--	--	--	--	694	--	--	--	--	694	(2)
Tampa, FL	93	--	--	--	--	--	--	--	--	93	(2)
Wilmington, NC	--	--	--	--	48	--	--	--	--	48	(2)
Gulf:											
Houston-Galveston, TX	--	8,220	29,600	10	39	--	9,300	--	--	47,200	(2)
Port Arthur, TX	--	5,510	756,000	11,200	497,000	--	316,000	--	--	1,590,000	29
North-central:											
Chicago, IL	--	--	--	--	113	--	--	178	--	291	(2)
Cleveland, OH	--	--	--	--	--	--	--	21	--	21	(2)
Detroit, MI	203,000	--	--	--	--	--	--	--	--	203,000	4
Duluth, MN	13,100	--	--	--	--	--	--	--	--	13,100	(2)
Great Falls, MT	25,300	--	--	--	--	--	--	--	--	25,300	(2)
Pembina, ND	7,490	--	--	--	--	--	--	--	--	7,490	(2)
Northeast:											
Buffalo, NY	19,300	--	--	--	--	--	--	--	--	19,300	(2)
Ogdensburg, NY	335	--	--	--	--	--	--	--	--	335	(2)
Portland, ME	--	--	27,900	--	--	--	--	--	--	27,900	(2)
Pacific:											
Anchorage, AK	--	--	--	--	--	--	--	64	--	64	(2)
Columbia-Snake River, ID-OR-WA	--	71,400	384,000	--	71,000	144,000	--	1,470,000	154,000	2,290,000	42
Los Angeles, CA	--	--	293,000	--	22,000	114	20	12,900	6,000	334,000	6
San Diego, CA	61,300	--	--	--	--	--	--	--	--	61,300	1
San Francisco, CA	--	--	59	--	--	117	--	--	--	176	(2)
Seattle, WA	19,000	--	--	--	--	--	--	1,650	--	20,600	(2)
Southwest:											
El Paso, TX	126,000	--	--	--	--	--	--	--	--	126,000	2
Laredo, TX	699,000	--	--	--	--	--	--	99	--	700,000	13
Nogales, AZ	7	--	--	--	--	--	--	--	--	7	(2)
Unknown	809	--	--	--	--	--	--	--	--	809	(2)
Total	1,170,000	85,200	1,490,000	11,200	593,000	144,000	326,000	1,490,000	159,000	5,470,000	100
Percentage of total	21	2	27	(2)	11	3	6	27	3	100	XX

XX Not applicable. -- Zero.

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

²Less than ½ unit.

Source: U.S. Census Bureau; data adjusted by the U.S. Geological Survey using data and information from the Journal of Commerce PIERS trade database and industry sources.

TABLE 6
U.S. EXPORTS OF SODA ASH, BY COUNTRY¹

Country	2010			2011		
	Quantity (thousand metric tons)	Value ² (thousands)	Unit value	Quantity (thousand metric tons)	Value ² (thousands)	Unit value
Argentina	82	\$13,100	\$160	100	\$19,000	\$190
Australia	87	15,800	182	136	28,600	210
Belgium	175	22,300	128	138	21,400	155
Brazil	701	113,000	161	659	111,000	169
Canada	253	52,400	207	288	57,500	200
Chile	272	45,300	167	294	51,900	176
Colombia	128	19,100	150	132	22,800	173
Costa Rica	19	3,640	192	24	4,660	194
Ecuador	27	4,160	154	14	2,930	209
Egypt	25	2,690	107	--	--	--
El Salvador	10	1,670	167	16	3,350	209
France	42	6,080	145	49	6,910	141
Guatemala	35	6,080	174	37	7,340	198
Indonesia	457	64,100	140	526	112,000	212
Japan	229	33,200	145	240	43,900	183
Korea, Republic of	229	35,900	157	216	46,400	215
Lithuania	122	16,700	137	71	10,800	152
Malaysia	49	8,540	174	43	9,520	221
Mexico	823	175,000	212	886	192,000	217
Netherlands	137	18,700	137	204	35,200	173
New Zealand	29	4,920	170	23	4,400	191
Peru	57	9,010	158	104	19,800	191
Philippines	62	9,070	146	66	12,700	193
Portugal	49	5,960	122	27	3,800	141
Saudi Arabia	116	15,200	131	88	13,500	153
South Africa	162	18,100	112	216	29,800	138
Spain	61	8,440	138	69	10,400	150
Taiwan	252	39,600	157	211	43,100	204
Thailand	142	18,800	133	153	29,400	192
Tunisia	149	17,900	120	103	14,100	137
United Arab Emirates	72	11,400	158	55	8,390	152
United Kingdom	29	5,350	185	19	5,810	306
Venezuela	252	55,500	220	189	43,400	230
Vietnam	38	5,370	141	29	5,400	186
Other	21 ^r	4,040 ^r	192 ^r	48	7,890	164
Total	5,390 ^r	886,000	164	5,470	1,040,000	190

^rRevised. -- Zero.

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

²Free alongside ship value.

Source: U.S. Census Bureau; data adjusted by the U.S. Geological Survey using data and information from the Journal of Commerce PIERS trade database and industry sources.

TABLE 7
SODA ASH: ESTIMATED WORLD PRODUCTION, BY COUNTRY^{1,2}

(Thousand metric tons)

Country ³	2007	2008	2009	2010	2011
Australia	310	310	310	310	310
Bosnia and Herzegovina	11	11	11	11	11
Botswana ⁴	250	250	250	250	250
Brazil	200	200	200	200	200
Bulgaria	800	800	800	800	800
Chad ⁵	12	12	12	12	13
China	17,720 ⁶	18,540 ⁶	19,450 ^{r,6}	20,350 ^{r,6}	23,000
Egypt	50	50	50	50	50
Ethiopia ⁷	(8) ⁶	4 ⁶	4 ⁶	4 ^r	4
France	1,000	1,000	1,000	1,000	1,000
Germany	2,595 ⁶	2,715 ⁶	2,291 ⁶	2,539 ⁶	2,660
India	1,500	1,500	1,500	1,500	1,500
Iran	140	140	140	140	140
Italy	500	500	500	500	500
Japan	400	400	400	400	400
Kenya ⁴	387 ⁶	513 ⁶	405 ⁶	474 ^{r,6}	560
Korea, Republic of	310	310	310	310	310
Mexico	290	290	290	290	290
Netherlands	400	400	400	400	400
Pakistan	260	250	260	250	260
Poland	1,192 ⁶	1,190	890	1,010 ^r	1,010
Portugal	150	150	150	150	150
Romania	453	450	400	450	450
Russia	2,900	2,800	2,300	2,400	2,600
Spain	500	500	500	500	500
Turkey	947 ⁶	949 ⁶	1,079 ⁶	2,000 ^r	2,000
Ukraine	950 ^r	978 ^r	680 ^r	707 ^r	710
United Kingdom	900	500	500	500	500
United States ^{4,6}	11,100 ^r	11,300	9,310	10,600	10,700
Total	46,200 ^r	47,000 ^r	44,400 ^r	48,100 ^r	51,300

^rRevised.

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

²Table includes data available through March 30, 2012. Synthetic unless otherwise specified.

³In addition to the countries listed, Tanzania may produce soda ash for local consumption; available general information is inadequate for the formulation of reliable estimates of output levels.

⁴Natural only.

⁵Produced for local consumption only.

⁶Reported figure.

⁷Data for the Ethiopian calendar year ending July 7 of the year listed.

⁸Less than ½ unit.