



2019 Minerals Yearbook

SODA ASH [ADVANCE RELEASE]

SODA ASH

By Wallace P. Bolen

Domestic survey data and tables were prepared by Tiffany J. Lin, statistical assistant.

U.S. soda ash production in 2019 decreased slightly compared with that in 2018. Exports of soda ash in 2019 were about the same compared with those in 2018. The annual average unit value of soda ash increased by 3% in 2019 from that in 2018 and was slightly lower than the record high set in 2012. U.S. soda ash exports accounted for 60% of total domestic production, based on export data from the U.S. Census Bureau. U.S. soda ash production was 11.7 million metric tons (Mt) valued at \$1.8 billion in 2019. World soda ash production was 56.8 Mt, slightly more than the revised total of 56.1 Mt in 2018 (tables 1, 8).

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 (soda ash from both sources is referred to as natural soda ash) or manufactured from one of several chemical processes (soda ash from these processes 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 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 a cost-effective option in world markets because most of the world output of soda ash is made synthetically, which usually results in a more expensive product.

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. Survey requests were sent to each of the five soda ash companies, all of which responded, representing 100% of the total production data in this report (tables 1, 2).

The United States remained the world's second-ranked soda-ash-producing nation in 2019, second to China. U.S. production of natural soda ash from California and Wyoming was 11.7 Mt in 2019. The U.S. soda ash industry operated at 84% of its 13.9-million-metric-ton-per-year (Mt/yr) (15.3-million-short-ton-per-year) total nameplate production capacity (table 3). Three of the leading producers used nameplate capacities to determine export allocations set by a U.S. export association, the American Natural Soda Ash Corp. (ANSAC).

Several producers announced plans to increase soda ash production capacities at current operations or construct new greenfield operations. Solvay Chemicals, Inc. announced a 600,000-metric-ton-per-year (t/yr) expansion at its Green River, WY, facility, which was planned to be finalized by the end of 2021 (Morris, 2019). Genesis Alkali Wyoming Corp. planned to increase production capacity by 750,000 t/yr at its Granger, WY, plant with the new capacity coming onstream by the second quarter of 2022 (Greenfield, 2019e).

Ciner Group, the parent company of Ciner Wyoming LLC, announced plans to increase capacity at its Green River, WY, facility and develop two greenfield trona mines. The Green River capacity was to be increased by 1 Mt/yr. The two greenfield operations were expected to each have soda ash production capacities of 2.5 Mt/yr. One of these new operations was planned as a joint venture with Şişecam Group, a diversified company in Turkey that produced glass and chemicals (Glass on Web, 2019). Ciner planned to have the Green River capacity expansion completed by 2022 and the two greenfield facilities operational by 2025 (Greenfield, 2019d).

The U.S. soda ash industry consisted of five companies in 2019—four companies operating five plants in Wyoming that produced soda ash from underground trona ore and one company operating one plant in California that produced soda ash from sodium-carbonate-rich brines (table 3). One company that operated a mine and a plant in Wyoming also operated a plant in Colorado, which produced sodium bicarbonate using soda ash feedstock from the company's Wyoming soda ash facility. The operation in Colorado could produce soda ash from local nahcolite but because of production cost considerations chose to use the soda ash from Wyoming in place of the local material.

Each of the U.S. companies was either wholly or partially owned by foreign soda-ash-producing companies or foreign soda ash consumers. The U.S. soda ash industry was 54% foreign owned and 46% domestically owned. At yearend, the countries and their percentage of ownership of United States soda ash producers were India, 23%; Belgium, 15%; Turkey, 11%; and Japan, 5%.

The soda ash operation of Searles Valley Minerals, Inc., in Trona, CA, was affected by earthquakes in July that disrupted electrical and water services and cut rail and highway links to the facility. Force majeure was declared immediately after the earthquakes. The company was able to continue shipping from stockpiles through the summer months and limited production resumed in September before returning to near normal levels in October (Greenfield, 2019f).

Consumption

The USGS collected consumption data by end use for soda ash on a quarterly basis from the marketing and sales departments of each company. Every effort was made to categorize company sales within the correct end-use sector. Quarterly reports sometimes were revised in subsequent quarters because of customer reclassifications or other factors. All U.S. soda ash companies responded to the quarterly surveys; reported data represented 100% of the total reported consumption data in this report.

In 2019, U.S. apparent and reported consumption decreased by about 3% compared with that in 2018 (table 1). Apparent consumption of soda ash was 4.83 Mt, and reported

consumption was 4.72 Mt in 2019. Reported consumption and apparent consumption do not necessarily match because reported consumption is sales reported by producers, whereas apparent consumption is the quantity available for domestic consumption calculated by subtracting exports from the sum of production, imports, and changes in inventories.

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 because of increased beverage consumption during the summer). Soda ash sales to the flat glass sector depended largely 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 soda ash sales follow trends in the two sectors. The distribution of soda ash for domestic consumption by end use in 2019 was glass, 47%; chemicals, 29%; distributors, 6%; soap and detergents, 6%; flue gas desulfurization, 3%; pulp and paper, 1%; water treatment, 1%; and other, 7% (table 4).

Chemicals.—Soda ash is used to manufacture many sodium-base inorganic chemicals, including sodium bicarbonate, sodium chromates, sodium phosphates, and sodium silicates. Chemical production accounted for 1.37 Mt of soda ash consumption in 2019.

Glass.—Glass manufacture used 2.22 Mt of soda ash in different types of glass, as follows: container, 45%; flat, 43%; fiber, 8%; and other glass, 4%. Glass containers are made for beverages (carbonated and noncarbonated drinks such as alcoholic beverages, sodas, and juices), chemical and household products, food, medical products, and toiletries and cosmetics.

Soaps and Detergents.—Detergents ranked fourth in the use of soda ash with 272,000 metric tons (t) in 2019. Soda ash was 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 was a component of sodium tripolyphosphate (STPP), another major builder in detergent formulations. Soda ash consumption for STPP detergents has been decreasing owing to a decline in the use of phosphatic detergents because they can contribute to decreased quality of water habitats.

Liquid detergents, which do not contain soda ash, competed with soda-ash-containing powdered detergents, and have become the preferred form of household laundry detergent. In recent years, it was estimated that about 75% of household laundry detergent sales in the United States were liquid.

Stocks

Yearend 2019 stocks of dense soda ash in domestic plant silos, terminals, warehouses, and on teamtracks (small railroad sidings or spur tracks) were 289,000 t, which was 3% less than those in 2018 (table 1). Producers indicated that a supply problem could exist if inventories decreased to less than 180,000 t. Most consumers of soda ash did not have storage facilities for large quantities of soda ash and needed to rely on suppliers to provide the material on a timely basis.

Prices

The annual average unit value in 2019 for bulk, dense natural soda ash, free on board (f.o.b.) Green River, WY, and Searles Valley, CA, was \$153.24 per metric ton (\$139.02 per short ton), which was a 3% increase from that in 2018 (table 1). The value is not a “price,” but rather the sum 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 differ from the annual average values reported to and by the USGS.

Foreign Trade

The majority of U.S. soda ash exports were controlled by the ANSAC, which is involved exclusively in the export trade of soda ash. Soda ash is defined as an alkali product designated by the chemical formula Na_2CO_3 , whether manufactured by brine evaporation and purification, the Solvay process, trona refining, or any other means. In its Securities and Exchange Commission submission in February 2019, Ciner Resources announced its intention to withdraw from the ANSAC effective December 31, 2021. After the termination of its relationship with the ANSAC, Ciner planned to distribute exports through the global distribution network of Ciner Group, the parent company of Ciner Resources (Ciner Resources LP, 2019).

Under the Treaty of Rome agreement of 1958, the ANSAC is not permitted to ship soda ash to the countries of the European Union (EU); therefore, members of the U.S. soda ash industry formed another organization for shipping to this region. The American-European Soda Ash Shipping Association, Inc. (AESSA), which was formed in the mid-20th century, was inactive for several years prior to 2016 before notifying the U.S. Federal Trade Commission (FTC), in a letter dated December 23, 2015, that the AESSA was revoking its registration as a Webb-Pomerene export association, effective immediately. The AESSA originally was formed to engage solely in storage, transportation, and other related logistical and technical support activities to promote and further its members' individual commerce in soda ash shipped to the countries of the EU. Both the ANSAC and the AESSA were formed as Webb-Pomerene export associations under the authority of the FTC.

According to the U.S. Census Bureau, U.S. exports of soda ash in 2019 were 7.02 Mt, which represented 60% of U.S. soda ash production (table 1). For comparison, exports accounted for only 5% of U.S. production in 1970, 26% in 1990, and 51% in 2010. In 2019, the regional distribution of United States soda ash exports to 51 countries was as follows: Asia, 48%; Central America and South America, 24%; North America, 21%; Australia and Oceania, 4%; Africa, 2%; and Europe, 1% (table 5). The average free alongside ship value was \$221 per metric ton in 2019 compared with \$210 per metric ton in 2018. In 2019, the 12 leading countries or localities that each received more than 200,000 t of soda ash, were, in descending

order of tonnage, Mexico, 19%; Indonesia, 12%; Brazil, 11%; Malaysia, 7%; Chile, 6%; Australia, India, Japan, the Republic of Korea, Thailand, and Vietnam, 4% each; and Taiwan, 3% (table 6). About two-thirds of all U.S. soda ash exports went through the Columbia-Snake River, OR, customs district; the Laredo, TX, customs district ranked second with 13% of the total, and the Port Arthur, TX, customs district was third with 6% of the total (table 5).

Imports account for a very small portion of the soda ash supply in the United States. The quantity of soda ash imports in 2019 was 115,000 t, more than double the amount imported in 2018, and came from 17 countries or localities according to U.S. Census Bureau data adjusted by the USGS (table 7). Relatively large quantities of soda ash were imported from Turkey in March, June, and September 2019 after large increases in soda ash production in Turkey, which provided soda ash for export markets.

In 2019, 95% of United States soda ash imports were from Turkey (88%), Bulgaria (5%), and Mexico (2%) (table 7). The remaining imports were from Belgium, Brazil, Canada, China, France, Germany, India, Italy, Japan, Norway, Romania, Spain, Switzerland, and the United Kingdom. Although Canada, Norway, Switzerland, and Taiwan are listed as sources of soda ash imports, these countries or localities were not thought to produce soda ash. It is possible that the data were erroneous or that the product was transshipped from another location. Some of the imports were thought to be sodium carbonate peroxohydrate, which is an active ingredient in algacides and fungicides. The national average cost, insurance, and freight value of imported soda ash in 2019 was \$242 per metric ton, 10% less than the revised average cost for 2018.

World Review

Soda ash is a mature commodity, and the leading consumers of soda ash were, for the most part, developed nations where consumption tends to increase in proportion to population and gross domestic product rates of growth. In developing countries, per capita consumption is lower than in developed countries because these countries do not have a well-established industrial base. 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 end-use sectors.

In 2019, world soda ash production was 56.8 Mt, which was a slight increase from that in 2018 (table 8). The leading producer was China (48%), and the United States ranked second (21%). In addition to the 21 producing countries and (or) localities listed in table 8, several other countries, which are listed in one of the table's footnotes, were thought to produce soda ash, but reliable data for estimates of production were unavailable. Only Botswana, China, Ethiopia, Kenya, Turkey, and the United States produced soda ash from natural sources; the remaining nations manufacture soda ash through various chemical processes, primarily the Solvay process. China and Turkey were thought to produce soda ash using both natural sources and synthetic processes. Production in China was thought to be mostly synthetic, whereas production in Turkey was mostly natural.

Eight countries produced 1 Mt/yr or more of soda ash. They were, in descending order of tonnage, China, the United States, Turkey, Russia, Germany, India, Poland, and France. These nations accounted for 93% of world production in 2019. Romania and Ukraine had production installations that were rated at about 1 Mt/yr; however, adverse economic conditions caused these nations to produce below their facilities' design capacities.

China.—Soda ash production was estimated to have increased by 3% in 2019 compared with that in 2018 because several operations produced at higher rates after some maintenance projects were completed. Tangshan Sanyou Chemical Industries Co., Ltd., Shandong Haihua Co., Ltd., and Lianyungang Alkali Industry Co. each announced production increases during the year. Increased competition from soda ash exported from Turkey to eastern Asia resulted in less international demand for soda ash from China, which may have affected prices in the region (Lee, 2019). Glassmakers in China consumed less soda ash as environmental inspections increased the likelihood of production restrictions at the glass plants. Prices for soda ash in China dropped to the lowest levels in 2 years (Greenfield, 2019a).

Romania.—Poland's Ciech S.A. suspended soda ash production at its operations in Romania on September 18, 2019, owing to a 120% increase in the price of steam that the plant used. The plant's production capacity was 600,000 t/yr but production ranged from 400,000 to 450,000 t/yr. In response, the company was considering a joint venture that would produce the steam for its use (Greenfield, 2019b, c).

Turkey.—Ciner Group announced a two-part expansion plan at its 2.5-Mt/yr Kazan plant in Ankara. The first capacity expansion of 600,000 t/yr would be completed by 2021, and an additional 1-Mt/yr expansion would be completed by 2025 (Greenfield, 2019d).

Outlook

Four groups dominate production and have become the world's leading suppliers of soda ash—the ANSAC of the United States (which represented three of the five domestic producers in 2019), China's producers, Ciner Group of Turkey, and Solvay S.A. of Belgium. Soda ash producers in Turkey, with access to the world's second largest trona deposit, have become major suppliers after completing expansions in 2018. It is very likely that some smaller soda ash facilities elsewhere will close because of energy and environmental considerations and competition from the major producers.

It is likely that United States suppliers will struggle to achieve higher sales prices because of increasing supply from new low-cost trona operations in Turkey and potential oversupply in China that may enter the export market. If overall global economic conditions are favorable during the next few years, it is likely that there would be greater world soda ash consumption. The United States likely will continue to compete with producers in China for the Far East and Oceania markets and with producers in Turkey for European, Middle Eastern, and southern Asian markets. Asia and South America remain the most likely areas for increased soda ash consumption in the near future.

References Cited

- Ciner Resources LP, 2019, Form 8-K, current report: U.S. Securities and Exchange Commission, February 14, 12 p. (Accessed August 13, 2019, at <https://d18rn0p25nwr6d.cloudfront.net/CIK-0001575051/0a1075ae-a3a6-4804-bfc5-ad6ae5273353.pdf>.)
- Glass on Web, 2019, Şişecam Group is to co-invest in the US with Ciner Group to produce natural soda: Glass on Web, June 25. (Accessed October 18, 2019, at <https://www.glassonweb.com/news/sisecam-group-co-invest-us-with-ciner-group-produce-natural-soda>.)
- Greenfield, Michael, 2019a, Chinese soda ash spot price falls to two-year low, European contracts move up: Industrial Minerals, November 15. (Accessed February 11, 2020, via <http://www.indmin.com>.)
- Greenfield, Michael, 2019b, Ciech assessing new Romania steam supply; soda ash production unlikely before 2020: Industrial Minerals, August 21. (Accessed February 11, 2020, via <http://www.indmin.com>.)
- Greenfield, Michael, 2019c, Ciech confirms end to soda ash production at Romania plant: Industrial Minerals, November 1. (Accessed February 11, 2020, via <http://www.indmin.com>.)
- Greenfield, Michael, 2019d, Ciner joins raft of natural soda ash capacity expansions: Industrial Minerals, September 27. (Accessed February 11, 2020, via <http://www.indmin.com>.)
- Greenfield, Michael, 2019e, Two US expansions to bring 1.35 mln tpy of new capacity to soda ash market: Industrial Minerals, September 24. (Accessed February 11, 2020, via <http://www.indmin.com>.)
- Greenfield, Michael, 2019f, WSAC 19: Restart under way at Searles Valley soda ash plant but force majeure still in place: Industrial Minerals, September 30. (Accessed February 11, 2020, via <http://www.indmin.com>.)
- Lee, Helen, 2019, Asia soda ash market faces pressure from ample China output: Independent Commodity Intelligent Services (ICIS), July 7. (Accessed April 27, 2020, at <https://www.icis.com/explore/resources/news/2019/07/04/10387290/asia-soda-ash-market-faces-pressure-from-ample-china-output>.)
- Morris, Greg, 2019, Solvay increases glassmaking raw material capacity: Glass International, September 30. (Accessed September 30, 2019, at <https://www.glass-international.com/news/view/solvay-increases-glassmaking-raw-material-capacity>.)

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)

| | 2015 | 2016 | 2017 | 2018 | 2019 |
|---------------------------------|-----------|-----------|---------------------|---------------------|---------------------|
| United States: | | | | | |
| Production: | | | | | |
| Soda ash: | | | | | |
| Quantity | 11,600 | 11,800 | 12,000 | 11,900 | 11,700 |
| Value | 1,800,000 | 1,770,000 | 1,750,000 | 1,770,000 | 1,800,000 |
| Value, average annual: | | | | | |
| Per short ton | \$140.88 | \$135.92 | \$132.68 | \$134.89 | \$139.02 |
| Per metric ton | \$155.30 | \$149.83 | \$146.26 | \$148.69 | \$153.24 |
| Wyoming trona, quantity | 17,600 | 17,700 | 18,000 | 17,600 | 18,400 |
| Exports: | | | | | |
| Quantity | 6,400 | 6,760 | 6,990 | 6,960 | 7,020 |
| Value | 1,320,000 | 1,310,000 | 1,400,000 | 1,460,000 | 1,550,000 |
| Imports for consumption: | | | | | |
| Quantity | 40 | 35 | 19 | 51 | 115 |
| Value | 6,780 | 6,660 | 4,810 | 13,800 ^r | 28,000 |
| Stocks, December 31, producers' | 285 | 336 | 293 | 297 | 289 |
| Consumption: | | | | | |
| Apparent | 5,200 | 5,010 | 5,040 | 4,980 | 4,830 |
| Reported | 4,990 | 5,120 | 4,910 | 4,850 | 4,720 |
| World, production | 53,400 | 53,900 | 57,400 ^r | 56,100 ^r | 56,800 ^e |

^eEstimated. ^rRevised.

¹Table includes data available May 19, 2020. Data are rounded to no more than three significant digits, except average annual values.

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

(Thousand metric tons)

| Month | 2018 | | 2019 | |
|-----------|----------|----------------------------|----------|----------------------------|
| | Soda ash | Wyoming trona ² | Soda ash | Wyoming trona ² |
| January | 992 | 1,630 | 1,000 | 1,680 |
| February | 945 | 1,490 | 920 | 1,440 |
| March | 1,020 | 1,620 | 941 | 1,680 |
| April | 966 | 1,480 | 999 | 1,500 |
| May | 952 | 1,450 | 994 | 1,310 |
| June | 961 | 1,420 | 946 | 1,610 |
| July | 1,070 | 1,490 | 972 | 1,640 |
| August | 930 | 1,180 | 929 | 1,490 |
| September | 988 | 1,320 | 977 | 1,550 |
| October | 1,010 | 1,500 | 1,010 | 1,520 |
| November | 997 | 1,490 | 1,010 | 1,430 |
| December | 1,060 | 1,580 | 1,030 | 1,540 |
| Total | 11,900 | 17,600 | 11,700 | 18,400 |

¹Table includes data available May 19, 2020. Data 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 2019

(Million short tons unless otherwise noted)

| Company | Partner(s) | Plant nameplate capacity | Plant location | Source of sodium carbonate |
|-------------------------------------|--|--------------------------|-----------------|----------------------------|
| Ciner Wyoming LLC | Ciner Resources Corp. (51%) and Natural Resources Partners L.P. (49%) | 3.25 | Green River, WY | Underground trona. |
| Genesis Alkali Wyoming Corp. | | | | |
| Granger | XX | 1.30 | Granger, WY | Do. |
| Green River | Joint venture with Sumitomo Corp. (6%) | 3.55 | Green River, WY | Do. |
| Searles Valley Minerals, Inc. | XX | 1.45 | Trona, CA | Dry lake brine. |
| Solvay Chemicals, Inc., Green River | Joint venture with Asahi Glass Co. (20%) | 2.95 | Green River, WY | Underground trona. |
| Tata Chemicals (Soda Ash) Partners | Joint venture with Owens-Illinois, Inc. (25%) | 2.80 | do. | Do. |
| Total | | 15.30 | | |
| Total | million metric tons | 13.90 | | |

Do., do. Ditto. XX Not applicable.

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

(Thousand metric tons)

| NAICS ² code | End use | 2018 | | | | | 2019 | | | | |
|----------------------------|---|----------------|---------------|---------------|----------------|-----------------------------|----------------|---------------|---------------|----------------|-----------------------------|
| | | 1st quarter | 2d quarter | 3d quarter | 4th quarter | 1st quarter– 4th quarter | 1st quarter | 2d quarter | 3d quarter | 4th quarter | 1st quarter– 4th quarter |
| 3272 | Glass: | | | | | | | | | | |
| 327213 | Container | 279 | 284 | 257 | 233 | 1,050 | 250 | 250 | 255 | 250 | 1,010 |
| 327211 | Flat | 222 | 243 | 240 | 256 | 960 | 228 | 234 | 239 | 253 | 954 |
| 327993 | Fiber | 39 | 40 | 43 | 42 | 164 ^r | 39 | 41 | 44 | 42 | 166 |
| 327212 | Other | 26 | 25 | 25 | 26 | 102 | 27 | 23 | 23 | 22 | 95 |
| | Total | 566 | 591 | 565 | 557 | 2,280 | 545 | 548 | 562 | 566 | 2,220 |
| 32518 | Chemicals | 338 | 369 | 356 | 372 | 1,440 | 335 | 358 | 333 | 343 | 1,370 |
| 325611 | Soaps and detergents | 79 | 66 | 72 | 70 | 288 ^r | 69 | 67 | 71 | 65 | 272 |
| 322 | Pulp and paper | 12 | 13 | 11 | 11 | 47 | 10 | 10 | 9 | 10 | 39 |
| 221310 | Water treatment ³ | 11 | 12 | 12 | 9 | 44 | 10 | 11 | 10 | 10 | 41 |
| 56221 | Flue gas desulfurization | 47 | 43 | 52 | 49 | 191 | 47 | 38 | 39 | 38 | 162 |
| 4246 | Distributors | 79 | 74 | 75 | 74 | 302 | 71 | 61 | 68 | 61 | 261 |
| | Other | 71 | 69 | 65 | 59 | 265 | 84 | 74 | 108 | 88 | 354 |
| | Total domestic consumption ⁴ | 1,200 | 1,240 | 1,210 | 1,200 | 4,850 | 1,170 | 1,170 | 1,200 | 1,180 | 4,720 |
| | Exports ⁵ | 1,750 | 1,590 | 1,720 | 1,760 | 6,820 | 1,710 | 1,760 | 1,780 | 1,790 | 7,040 |
| | Exports, Canada | 47 | 49 | 47 | 48 | 190 | 44 | 49 | 43 | 42 | 178 |
| | Total industry sales ⁶ | 2,950 | 2,830 | 2,930 | 2,960 | 11,700 | 2,880 | 2,920 | 2,980 | 2,970 | 11,800 |
| | Total sales from plants | 3,010 | 2,860 | 3,020 | 3,030 | 11,900 | 2,890 | 2,970 | 2,990 | 3,030 | 11,900 |
| | Total production | 2,960 | 2,880 | 2,990 | 3,070 | 11,900 | 2,860 | 2,940 | 2,880 | 3,040 | 11,700 |

¹Revised.

¹Table includes data available through May 13, 2020. Data 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 power plants for water treatment. Sales of mine water are excluded.

⁴Imports reported by the producer or 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 2019¹

(Metric tons)

| Customs districts | Africa | Asia | Australia and Oceania | Europe | North America | South America and Central America | Total | Percent of total |
|-----------------------|----------------|------------------|--------------------------|---------------|------------------|--------------------------------------|------------------|---------------------|
| Atlantic: | | | | | | | | |
| Miami, FL | -- | 39 | -- | -- | -- | 1,320 | 1,360 | (2) |
| Mobile, AL | -- | -- | -- | 150 | -- | -- | 150 | (2) |
| New York, NY | -- | 575 | -- | 298 | -- | 130 | 1,000 | (2) |
| Norfolk, VA | -- | 1,000 | -- | 1,610 | -- | -- | 2,610 | (2) |
| Philadelphia, PA | -- | -- | -- | 596 | -- | -- | 596 | (2) |
| Savannah, GA | -- | -- | -- | 913 | -- | -- | 913 | (2) |
| Washington, DC | -- | -- | -- | 40 | -- | -- | 40 | (2) |
| Wilmington, NC | -- | -- | -- | 600 | -- | -- | 600 | (2) |
| Gulf: | | | | | | | | |
| Houston-Galveston, TX | 18 | 60 | -- | 277 | 72,000 | 155,000 | 227,000 | 3 |
| New Orleans, LA | -- | 22 | -- | 37 | -- | -- | 60 | (2) |
| Port Arthur, TX | 166,000 | -- | -- | 10,100 | -- | 269,000 | 445,000 | 6 |
| North-central: | | | | | | | | |
| Chicago, IL | -- | 297 | -- | 26 | -- | -- | 323 | (2) |
| Cleveland, OH | -- | 135 | -- | -- | -- | -- | 135 | (2) |
| Detroit, MI | -- | -- | -- | -- | 129,000 | -- | 129,000 | 2 |
| Duluth, MN | -- | -- | -- | -- | 3,630 | -- | 3,630 | (2) |
| Great Falls, MT | -- | -- | -- | -- | 26,100 | -- | 26,100 | (2) |
| Pembina, ND | -- | -- | -- | -- | 4,350 | -- | 4,350 | (2) |
| Northeast: | | | | | | | | |
| Buffalo, NY | -- | -- | -- | 57 | 11,400 | -- | 11,500 | (2) |
| Ogdensburg, NY | -- | -- | -- | -- | 1,260 | -- | 1,260 | (2) |
| Pacific: | | | | | | | | |
| Anchorage, AK | -- | 60 | -- | -- | -- | -- | 60 | (2) |
| Columbia-Snake, OR | -- | 3,230,000 | 279,000 | -- | -- | 1,160,000 | 4,670,000 | 66 |
| Los Angeles, CA | -- | 130,000 | 24 | 50 | 4,000 | 117,000 | 252,000 | 4 |
| San Diego, CA | -- | -- | -- | -- | 118,000 | -- | 118,000 | 2 |
| San Francisco, CA | -- | 1,850 | -- | -- | -- | -- | 1,850 | (2) |
| Seattle, WA | -- | -- | -- | -- | 13,600 | -- | 13,600 | (2) |
| Southwest: | | | | | | | | |
| El Paso, TX | -- | -- | -- | -- | 220,000 | -- | 220,000 | 3 |
| Laredo, TX | -- | -- | -- | -- | 890,000 | -- | 890,000 | 13 |
| Nogales, AZ | -- | -- | -- | -- | 778 | -- | 778 | (2) |
| Unknown | -- | -- | -- | 31 | -- | -- | 31 | (2) |
| Total | 166,000 | 3,360,000 | 279,000 | 14,800 | 1,490,000 | 1,700,000 | 7,020,000 | 100 |
| Percentage of total | 2 | 48 | 4 | (2) | 21 | 24 | 100 | XX |

XX Not applicable. -- Zero.

¹Table includes data available through May 5, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

²Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 6
U.S. EXPORTS OF SODA ASH, BY COUNTRY OR LOCALITY¹

| Country or locality | 2018 | | | 2019 | | |
|----------------------|---------------------------------------|---|---|---------------------------------------|---|---|
| | Quantity (thousand metric tons) | Value ² (thousand dollars) | Unit value (dollars per metric ton) | Quantity (thousand metric tons) | Value ² (thousand dollars) | Unit value (dollars per metric ton) |
| Argentina | 95 | 21,600 | 227 | 90 | 20,800 | 232 |
| Australia | 266 | 55,700 | 209 | 268 | 62,300 | 232 |
| Belgium | 3 | 311 | 110 | 2 | 307 | 128 |
| Brazil | 861 | 173,000 | 200 | 792 | 166,000 | 210 |
| Canada | 208 | 43,600 | 210 | 190 | 46,000 | 242 |
| Chile | 466 | 101,000 | 217 | 407 | 94,300 | 232 |
| China | 254 | 43,800 | 173 | 190 | 28,800 | 152 |
| Colombia | 176 | 36,900 | 209 | 182 | 41,100 | 226 |
| Costa Rica | 31 | 6,970 | 229 | 16 | 3,760 | 243 |
| Ecuador | 33 | 6,660 | 205 | 39 | 8,810 | 225 |
| El Salvador | 18 | 3,580 | 199 | 16 | 3,450 | 216 |
| Guatemala | 55 | 12,200 | 221 | 45 | 11,300 | 253 |
| India | 139 | 22,700 | 164 | 272 | 48,600 | 179 |
| Indonesia | 611 | 132,000 | 215 | 827 | 186,000 | 225 |
| Japan | 313 | 58,000 | 185 | 268 | 55,300 | 206 |
| Korea, Republic of | 311 | 61,700 | 199 | 263 | 56,100 | 213 |
| Malaysia | 378 | 77,800 | 206 | 518 | 116,000 | 224 |
| Mexico | 1,300 | 302,000 | 232 | 1,310 | 308,000 | 235 |
| Netherlands | 12 | 2,400 | 200 | 10 | 2,570 | 254 |
| New Zealand | 19 | 3,270 [†] | 171 | 12 | 2,210 | 192 |
| Nigeria | 26 | 8,080 [†] | 309 | 35 | 10,800 | 309 |
| Peru | 96 | 21,200 | 221 | 99 | 22,500 | 228 |
| Philippines | 56 | 12,100 | 218 | 65 | 14,400 | 221 |
| Saudi Arabia | 59 | 8,940 | 152 | 66 | 12,800 | 194 |
| South Africa | 80 | 15,600 | 195 | 64 | 11,300 | 175 |
| Spain | (3) | 106 | (3) | 1 | 136 | 139 |
| Taiwan | 207 | 43,200 | 209 | 215 | 49,000 | 228 |
| Thailand | 345 | 76,500 | 222 | 300 | 68,700 | 229 |
| Tunisia | 77 | 16,900 | 220 | 67 | 15,700 | 234 |
| United Arab Emirates | 90 | 14,300 | 159 | 73 | 13,300 | 183 |
| United Kingdom | 74 | 14,400 | 193 | (3) | 6 | 110 |
| Venezuela | 41 | 10,500 | 259 | 19 | 5,070 | 267 |
| Vietnam | 259 | 55,700 | 215 | 302 | 68,300 | 226 |
| Other | 6 | 1,110 | 195 | 4 | 710 | 166 |
| Total | 6,960 | 1,460,000 | 210 | 7,020 | 1,550,000 | 221 |

[†]Revised.

¹Table includes data available through May 1, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

²Free alongside ship value.

³Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 7
U.S. IMPORTS OF SODA ASH, BY COUNTRY OR LOCALITY, IN 2019^{1,2}
(Metric tons unless otherwise specified)

| Country or locality | January | February | March | April | May | June | July | August | September | October | November | December | Total quantity | Percent of total quantity | Total value ² (thousand dollars) |
|---------------------|---------|----------|--------|-------|-------|--------|-------|--------|-----------|---------|----------|----------|----------------|---------------------------|---|
| Bulgaria | 288 | 612 | 432 | 882 | 648 | 810 | 648 | 560 | 486 | 414 | 126 | -- | 5,910 | 5 | 2,350 |
| China | 77 | 72 | 180 | 41 | 56 | 99 | 257 | 120 | 88 | 120 | 20 | 148 | 1,280 | 1 | 783 |
| France | 44 | 91 | 41 | 91 | 64 | 50 | 99 | 13 | 75 | 94 | 43 | 52 | 757 | 1 | 1,170 |
| Mexico | 304 | 97 | 252 | 150 | 244 | 57 | 19 | 258 | 532 | 1 | 384 | 405 | 2,700 | 2 | 1,020 |
| Romania | 95 | 172 | 38 | 38 | -- | -- | 76 | 76 | 38 | 100 | 76 | -- | 709 | 1 | 312 |
| Turkey | -- | -- | 32,000 | -- | -- | 35,000 | -- | -- | 34,800 | -- | -- | -- | 102,000 | 88 | 20,400 |
| United Kingdom | 146 | 197 | 91 | 73 | 143 | 183 | 75 | 108 | 89 | 161 | 129 | 142 | 1,530 | 1 | 1,020 |
| Others | 24 | 9 | 3 | 10 | (3) | 1 | 12 | 39 | 186 | 1 | 1 | 518 | 804 | 1 | 883 |
| Total | 978 | 1,250 | 33,000 | 1,290 | 1,160 | 36,200 | 1,190 | 1,170 | 36,300 | 891 | 779 | 1,270 | 115,000 | 100 | 28,000 |

-- Zero.

¹Table includes data available through May 1, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

²Cost, insurance, and freight values at U.S. ports.

³Less than 1/2 unit.

Source: U.S. Census Bureau; data adjusted by the U.S. Geological Survey.

TABLE 8
SODA ASH: WORLD PRODUCTION, BY COUNTRY OR LOCALITY^{1,2}

(Thousand metric tons)

| Country or locality ³ | 2015 | 2016 | 2017 | 2018 | 2019 |
|-------------------------------------|------------------|------------------|---------------------|---------------------|---------------------|
| Bosnia and Herzegovina | 82 | 98 | 102 | 100 ^e | 100 ^e |
| Botswana, natural ⁴ | 243 | 280 | 227 | 297 ^r | 290 ^e |
| China, natural and synthetic | 25,920 | 25,850 | 27,670 | 26,200 ^r | 27,000 ^e |
| Egypt | 130 ^e | 40 | -- ^e | -- ^e | -- ^e |
| Ethiopia, natural ^{4,5} | 7 | 4 ^r | 6 ^r | 18 ^r | 18 ^e |
| France ^e | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| Germany ^e | 2,600 | 2,600 | 2,600 | 2,500 | 2,500 |
| India ^e | 2,500 | 2,400 | 2,500 | 2,500 | 2,500 |
| Italy ^e | 500 | 500 | 500 | 500 | 500 |
| Japan | 230 | 217 | 220 | 220 ^e | 220 ^e |
| Kenya, natural ⁴ | 320 | 302 | 304 ^r | 339 ^r | 330 ^e |
| Mexico ^e | 290 | 290 | 290 | 300 | 300 |
| Pakistan | 449 | 476 | 476 | 546 ^r | 530 ^e |
| Poland | 1,074 | 1,250 | 1,281 | 1,239 ^r | 1,250 ^e |
| Romania | 505 | 516 | 540 | 536 | 540 ^e |
| Russia | 3,078 | 3,234 | 3,376 ^r | 3,416 ^r | 3,400 ^e |
| Turkey, natural and synthetic | 1,854 | 1,977 | 3,274 | 3,400 ^e | 3,500 ^e |
| Ukraine | 600 ^e | 600 ^e | 608 ^r | 619 ^r | 620 ^e |
| United Kingdom | 400 | 400 ^e | 400 ^e | 400 ^e | 400 ^e |
| United States, natural ⁴ | 11,600 | 11,800 | 12,000 | 11,900 | 11,700 |
| Uzbekistan ^e | 90 | 90 | 90 | 90 | 90 |
| Total | 53,400 | 53,900 | 57,400 ^r | 56,100 ^r | 56,800 ^e |

^eEstimated. ^rRevised. -- Zero.

¹Table includes data available through June 9, 2020. All data are reported unless otherwise noted. Totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²Synthetic unless otherwise specified.

³In addition to the countries and (or) localities listed, Brazil, Bulgaria, Chad, Iran, the Republic of Korea, the Netherlands, Spain, and Tanzania may have produced soda ash, but available information was inadequate to make reliable estimates of output.

⁴Natural only.

⁵Production is based on fiscal year, with a starting date of July 8 of the year shown.