



2018 Minerals Yearbook

SALT [ADVANCE RELEASE]

SALT

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Total U.S. salt production in 2018 increased by 10% to 43.9 million metric tons (Mt) compared with the revised production in 2017 (table 1), making the United States the second-ranked salt-producing nation. Total U.S. apparent consumption was 61.1 Mt, an increase of 22% compared with that in 2017. Global salt production in 2018 was 290 Mt, and 63.6 Mt of that was produced in China (table 13).

Salt, also known as sodium chloride, consists of the elements sodium and chlorine. Sodium is a silver-colored metal that is so unstable that it reacts violently in the presence of water, and chlorine is a greenish-colored gas that is dangerous and may be lethal. Yet combined, these two elements form sodium chloride, which is a white crystalline compound essential to life itself. Virtually every person in the world has some direct or indirect daily contact with salt. People routinely add salt to their food as a flavor enhancer or apply rock salt to walkways to remove ice in the winter. Salt is used as feedstock for chlorine and caustic soda manufacture. These two inorganic chemicals are used to make many consumer-related end-use products, such as polyvinyl chloride (PVC), a plastic made from chlorine, and paper-pulping chemicals manufactured from sodium hydroxide (caustic soda).

Production

U.S. production and sales data for salt were developed by the U.S. Geological Survey (USGS) from an annual survey of U.S. salt-producing sites and company operations (table 2). Production refers to the quantity of salt mined or manufactured that was available for sale. Salt sold or used is the quantity of salt that was sold directly to customers or used by a salt producer, which usually was a chloralkali (chlorine and sodium hydroxide) manufacturer. The data in table 2 are rated capacities for mines and refineries as of December 31, 2018. Rated capacity is defined as the maximum quantity of product that can be produced in a specific time period on a normally sustainable long-term operating rate, based on the physical equipment of the plant, and the given acceptable routine operating procedures involving energy, labor, maintenance, and materials.

Five of the seven leading producing States, in descending order of total salt sold or used, were Louisiana (34%), Texas (17%), New York (16%), Kansas (7%), and Utah (5%). Michigan and Ohio were among the top seven salt-producing States in total quantity of salt sold or used, but their percentages were withheld to avoid disclosing company proprietary data (table 5). The distribution of domestic and imported evaporated and rock salt to each State and the District of Columbia in 2018 is reported in table 7.

The USGS does not survey small-scale producers of culinary “sea salt” operating from several locations in the United States. Most of these operations are located along the Atlantic, Gulf, or Pacific coasts, but some interior operations extract brine for

specialty salt production. These boutique operations, in total, are thought to produce less than 100 metric tons per year (t/yr) of sea salt.

Cargill, Inc. continued to work around water leaking into its Cleveland, OH, rock salt mine. The groundwater originates from within the 1,800 feet of rock layers above the salt deposit owing to convergence, a process involving extremely small movements within the ceiling or floor of a mine. The mining operations continued throughout the year, but the ongoing issue put a restraint on the supply of deicing salt especially noticeable during periods of high demand (Scofield, 2018).

The four types of salt that were surveyed were classified according to the method of recovery as follows: vacuum pan salt, from mechanical evaporation of a purified brine feedstock; solar salt, from solar evaporation of seawater, landlocked bodies of saline water, or primary or byproduct brines; rock salt, from surface or underground mining of halite deposits; and salt brine, from solution mining of underground halite deposits. Data for brine production and consumption represent anhydrous salt content only and not the weight of the water (tables 3, 4).

Vacuum Pan Salt.—Vacuum pan salt production in 2018 was 4.26 Mt, a 5% decrease compared with the revised 2017 total of 4.49 Mt (table 1). Mechanical evaporation of salt by the vacuum pan process is dependent on the number and size of the vacuum crystallizers operating in series. Rated capacities in table 2 were established by using proven design performance of the equipment.

Although rock salt, solar salt, and salt brine may be used to make vacuum pan salt, virtually all domestic vacuum pan salt was obtained from solution mining of underground salt formations. Vacuum pan salt was obtained by dehydrating brine using only heat or in combination with a vacuum. The grainer or open-pan process uses open, rectangular pans with steam-heated immersion coils to evaporate the water in the brine. The final product is usually flake shaped rather than the typical cubic form. Flake salt was preferred for the production of baked goods, butter, and cheese.

Solar Salt.—Solar salt production was 2.95 Mt in 2018, a 12% decrease from the 2017 total of 3.34 Mt (table 1). Because evaporation rates must exceed precipitation rates, the climatic conditions and geographic locations of solar evaporation facilities are critical to the successful production and harvesting of solar salt. Therefore, rated capacities in table 2 generally are based on the historical evaporation patterns within a region and differ depending on the location and the surface acreage of the evaporation ponds. Unpredictable seasonal precipitation and market conditions affected production rates of the facilities.

Rock Salt.—Increased demand for road salt in 2018 resulted in a 15% increase in rock salt production to 18.9 Mt compared with the 2017 total of 16.5 Mt (table 1). Rock salt was mined by the room-and-pillar method, similar to that used in coal and trona mining. Because most rock salt was used

for deicing, the operating rate of rock salt facilities fluctuated with the demand for deicing salt, which was dependent on the severity of winter weather conditions. During periods of strong demand, production levels often achieved, or exceeded in certain situations, the rated capacities. Full mine capacity generally is a function of the hoisting capabilities of the mine. For the production capacities of domestic rock salt operations listed in table 2, it was assumed that the workweek was 5 days (250 workdays per year) with two working shifts, one maintenance shift per day, and at least one short-term planned turnaround for the mine and mill per year.

Salt Brine.—U.S. salt brine production in 2018 was 17.9 Mt, 14% more than that in 2017 (table 1). Brine production capacities were difficult to derive because they were based on the variabilities of the injection rate of the solvent and the dissolution rates of the underground salt bodies, both of which determined the quantity of brine produced. In turn, these production levels usually were dependent on the demand for the products that the brine was being used to manufacture.

Solution mining was used to obtain a sodium chloride feedstock for vacuum pan salt production and for chlorine, caustic soda, and synthetic soda ash manufacture. Synthetic soda ash, however, was not produced in the United States. The quantity of underground salt dissolved and recovered as brine to make vacuum pan salt usually was not reported as primary salt production; only the quantity of vacuum pan salt manufactured was reported. The quantity of brine used to make chloralkali chemicals was reported as either the amount of captive brine used or brine sold. The chemical industry was the leading consumer of salt brine worldwide.

Consumption

There were about 14,000 direct and indirect uses of salt, according to industry sources. The USGS annual surveys cover eight major categories comprising 29 end uses. The 2018 reported consumption (sales or use as reported by the salt companies, including their exports and imports) was 53 Mt, and the distribution of salt by major end use was ice control (43%), chemicals (38%), distributors (grocery and other wholesalers and retailers and so forth) (9.2%), food processing (3.8%), agricultural (2.4%), general industrial (1.4%), other uses combined with exports (1.1%), and primary water treatment (1.1%) (table 6).

In 2018, apparent consumption (salt sold or used plus imports minus exports) was 61.1 Mt (table 1). Reported consumption statistics are those reported only by domestic salt-producing companies. Apparent consumption normally is greater than reported consumption because apparent consumption accounts for quantities of salt imported and exported by non-salt-producing companies, such as some chloralkali operations and salt distributors, especially importers along the northeastern coast of the United States, primarily for snow and ice control.

Distributors represented a substantial share of salt sales by the salt industry. All of the salt sold by distributors was ultimately resold to a variety of end users. For a more complete analysis of end-use markets, specific sectors of distribution listed in table 6 can be combined, such as agricultural and water treatment quantities reported by salt producers and those supplied by

distributors. In addition to the various types of salt, there were distinctions in packaging and applications of salt. Salt for human consumption was packaged in various sized containers for several specialized purposes.

Ice Control and Road Stabilization.—In 2018, U.S. consumption of salt for this application was 22.9 Mt, which was 17% more than that in 2017 (table 6). After relatively low consumption for this use during 2016 and most of 2017, consumption began to increase in late 2017 and remained at a higher level throughout most of 2018. The 2017–18 winter season was considered above average for salt consumption in many parts of the U.S. snowbelt.

Salt is an inexpensive, widely available, and effective ice-control agent. It does, however, become less effective as temperatures decrease below -9.5 degrees Celsius ($^{\circ}\text{C}$) [15 degrees Fahrenheit ($^{\circ}\text{F}$)]. At lower temperatures, more salt must be applied to maintain higher brine concentrations to provide the same degree of melting. Most winter snowstorms and ice storms happen when temperatures are between -4 $^{\circ}\text{C}$ and 0 $^{\circ}\text{C}$ (25 $^{\circ}\text{F}$ and 32 $^{\circ}\text{F}$), the range in which salt is most effective.

The use of salt brine for road deicing has been increasing during the previous several years. Regular rock salt can be dissolved to create a salt brine solution, which is used as pretreatment prior to ice or snow accumulation. In highway deicing, salt has been associated with corrosion of bridge decks, motor vehicles, reinforcement bar and wire, and unprotected steel structures used in road construction. Surface runoff, vehicle spraying, and windblown actions also affect soil, roadside vegetation, and local surface water and groundwater supplies. When the salt leaches from the immediate environment adjacent to roads, it often collects in lakes and other inland freshwater bodies, potentially changing water chemistry and affecting ecosystems and communities that use this water. Research by governmental and private organization into the use of salt brine and overall reduction in salt usage for winter precipitation cleanup has resulted in less road salt consumption at some locales. The number of consumers striving to decrease road salt applications continued to grow amid concerns regarding the impact of salt in the environment.

The quantity of salt consumed for road deicing each year is directly related to the severity of the winter weather conditions. The early start of the winter in late 2017 was characterized in many parts of the Midwest by above average precipitation and below average temperatures which resulted in above average salt consumption. By February 2018, many communities, mostly in the Midwest, reported shortages of salt, and new purchases were authorized to replenish stocks. The weather conditions generally moderated in February and the rate of salt consumption declined in later winter compared to earlier in the season. An unusual snow event in April in the Midwest required additional salt usage and some areas moved from surplus stockpiles of salt to a deficit requiring increased salt purchases. In the second half of the year and leading into the 2018–19 winter season, many consumers reported some shortages of supply and substantial increases in unit prices for road deicing salt. Long-range forecasting of salt consumption

and pricing in this application is extremely difficult because of the complexities in long-range forecasting of the weather.

In addition to use on highways during winter weather, salt can be added to soil to stabilize it and to provide firmness to the foundation upon which highways are built. The salt also acts to minimize the effects of changes in humidity and traffic load, which can cause shifting in the subsurface.

Chemical.—Since 1941, when the U.S. Bureau of Mines began collecting end-use data for salt, the leading consumer of salt has been the chemical industry, primarily as salt brine, except for 2011 and 2013–18 when salt for road deicing led. Salt brine is extracted from natural underground saline sources or solution-mined halite deposits (salt beds or salt domes) or produced through the dissolution of solar salt. Within this industry, the chloralkali sector remained the major consumer of salt for manufacturing chlorine, coproduct sodium hydroxide (caustic soda), and synthetic soda ash. Since 1986, when the last domestic synthetic soda ash plant was closed because of high production costs and an inability to compete with less expensive natural soda ash, no synthetic soda ash has been manufactured in the United States. Many other countries, however, continued to produce synthetic soda ash and used vast quantities of salt brine as feedstock. Total salt sold or used by the chemical industry was 20.1 Mt in 2018 (table 6).

Salt is used as the primary raw material in chlorine manufacture because it is an inexpensive and widely available source of chlorine ions. For sodium hydroxide production, salt is the main source of sodium ions. Chlorine and caustic soda are classified as the first generation of products made from salt. These two chemicals are used to manufacture other materials, such as household cleaners, plastics, and solvents for dry cleaning, which are classified as the second generation of products made from salt. Although most salt brine is produced by the same companies that use it, many chloralkali manufacturers now purchase brine from independent brine supply companies. In certain cases, brine is produced by a chemical company that uses some of it and sells the excess to neighboring competitors. According to industry sources, about 48% of the salt used to manufacture chlorine was captive (produced by the chloralkali companies) and 31% was purchased brine; domestically purchased solar salt and rock salt accounted for 12% of the supply and imported rock, solar, and vacuum pan salt, combined, accounted for 9%.

The industry average ratio is 1.75 metric tons (t) of salt required to produce 1.0 t of chlorine and 1.1 t of joint-product sodium hydroxide. Reported consumption of total domestic and imported salt for chemical manufacture was 20.1 Mt (table 6); however, the data do not include salt imported directly by chlorine producers or captive brine produced by them.

Salt also is used as a feedstock in chemical plants that make sodium chlorate, metallic sodium, and other downstream chemical products. In powdered soaps and detergents, salt is used as a bulking agent and a coagulant for colloidal dispersion after saponification. In pharmaceuticals, salt is a chemical reagent and is used as the electrolyte in saline solutions. It is used with sulfuric acid to produce sodium sulfate and hydrochloric acid. The “Other chemical” subsector is relatively small, representing about 10% of domestic salt sales for the

entire chemical sector and only 3% of total domestic salt consumption. The amount of salt consumed in this category increased by 10% in 2018 compared with that in 2017.

The consumption of salt for metallic sodium declined during the prior several years. The Chemours Co. was the sole manufacturer of metallic sodium in the United States in 2018. The domestic market for metallic sodium decreased because sodium metal was no longer needed to produce leaded gasolines. The leading use of sodium metal was for sodium borohydride production, the feedstock for sodium dithionite, which was used as a reductive bleaching agent by the pulp and paper industry. Sodium metal also is used to manufacture sodium azide, which is used in automotive air bags and as a power-reducing agent in the alternative polysilicon manufacturing processes. Other potential uses of sodium metal are in the remediation of chemical weapons, chlorofluorocarbons, pesticides, and polychlorinated biphenyls.

Distributors.—A large quantity of salt is marketed through distributors, some of which specialize in agricultural and water treatment services—two sectors in which the salt companies also have direct sales (table 6). Distributor sales also include grocery wholesalers and (or) retailers, institutional wholesalers, U.S. Government resale, and other wholesalers and retailers. Total salt sold to distributors was 4.87 Mt in 2018.

Food Processing.—Nearly every person uses some quantity of salt in food and sodium is found in many processed foods. Salt is added to food by the food processor or by the consumer as a flavor enhancer, preservative, binder, fermentation-control additive, texture-control agent, and color developer. Table salt may contain 0.01% potassium iodide as an additive to provide a source of iodine, which is essential to the oxidation processes in the human body. Kosher salt, sea salt, condiment salt, and salt tablets are varieties of salt, which are mostly used for human consumption.

The food-processing category is subdivided, in descending order of salt consumption, into other food processing, meat packers, canning, baking, dairy, and grain mill products. Total salt sold for food processing was 1.99 Mt in 2018, 15% more than that in 2017 (table 6).

In meat packing, salt is added to processed meats to promote color development in bacon, ham, and other processed meat products. As a preservative, salt inhibits the growth of bacteria to prevent spoilage of the product. Salt in sausages forms a binding gel made up of meat, fat, and moisture. Salt also acts as a flavor enhancer and as a tenderizer.

In canning, salt is added primarily as a flavor enhancer and preservative. It also is used as a carrier for other ingredients, dehydrating agent, enzyme inhibitor, and tenderizer.

In the dairy industry, salt is added to cheese as a color-, fermentation-, and texture-control agent. The dairy subsector includes companies that manufacture creamery butter, condensed and evaporated milk, frozen dairy desserts, ice cream, natural and processed cheese, and specialty dairy products.

In baking, salt is added to control the rate of fermentation in bread dough. It also is used to strengthen gluten (the elastic protein-water complex in certain doughs) and as a flavor enhancer, including as a topping on baked goods.

The food-processing category also contains grain-mill products. These products consist of milling flour and rice, manufactured cereal breakfast food, and blended or prepared flour.

In the “Other food processing” category, salt is used mainly as a seasoning agent. This category includes miscellaneous establishments that make food for human consumption (such as potato chips and pretzels) and for domestic pet consumption (such as cat and dog food).

Agricultural.—Barnyard and grazing livestock need supplemental salt rations to maintain proper nutrition. In 2018, 1.25 Mt of salt was sold to the agricultural industry (table 6). Animal feed and water conditioning salt are pressed into 22.7-kilogram (50-pound) blocks. Iodine, sulfur, trace elements, and vitamins are occasionally added to salt blocks to provide nutrients not found naturally in the diet of certain livestock.

General Industrial.—The industrial uses of salt are diverse. They include, in descending order of quantity consumed, oil and gas exploration, other industrial applications, pulp and paper, tanning and leather treatment, metal processing, textiles and dyeing, and rubber manufacture. Total salt sold to these sectors increased by 8% to 729,000 t in 2018 compared with 674,000 t in 2017 (table 6).

In oil and gas exploration, salt is an important component of drilling fluids used in well drilling. It is used to flocculate and increase the density of the drilling fluid to overcome high downwell gas pressures. When a drill hits a salt formation, salt is added to the drilling fluid to saturate the solution and to minimize the dissolution within the salt stratum. Salt also is used to increase the set rate of concrete in cemented casings.

In the pulp and paper industry, salt is used to bleach wood pulp. It also is used to make sodium chlorate, which is added along with sulfuric acid and water to manufacture chlorine dioxide, a strong oxygen-based bleaching chemical. The chlorine dioxide process, which originated in Germany after World War I, has become more popular because of efforts to reduce or eliminate other bleaching compounds containing chlorine.

In tanning and leather treatment, salt is added to animal hides to inhibit microbial activity on the underside of the hides and to attract moisture back into the hides. In rubber manufacture, salt is used to make buna, neoprene, and white types of rubbers. Salt brine and sulfuric acid are used to coagulate an emulsified latex made from chlorinated butadiene.

In metal processing, salt is used in concentrating uranium ore into uranium oxide (yellow cake). It also is used in aluminum, beryllium, copper, steel, and vanadium processing.

In textiles and dyeing, salt is used as a brine rinse to separate organic contaminants, to promote “salting out” of dyestuff precipitates, and to blend with concentrated dyes to standardize them. One of its main roles is to provide the positive ion charge to promote the absorption of negatively charged ions of dyes.

Water Treatment.—Many areas of the United States have hard water, which contains excessive calcium and magnesium ions that contribute to the buildup of a scale or film of alkaline mineral deposits in household and industrial equipment and pipes. Many commercial and residential water-softening units use salt to remove the ions that cause the hardness. Salt is compressed into pellets used for water conditioning. The sodium

ions captured on a resin bed are exchanged for the calcium and magnesium ions. Periodically, the water-softening units need to be recharged because the sodium ions become depleted. Salt is added and dissolved, and the brine replenishes the lost sodium ions. In 2018, 567,000 t of salt was sold for primary water treatment, and an additional 520,000 t was sold for water conditioning by distributors (table 6).

Transportation

Because the locations of the salt supplies often are not near consumers, transportation costs significantly add to the price of salt. In some cases, shipping costs are higher than the actual value of the salt. Pumping salt brine through pipelines is an economic means of transportation but cannot be used for dry salt. Large bulk shipments of dry salt in ocean freighters or river barges are low in cost but are restricted in points of origin and consumption. River and lake movement of salt in winter often is curtailed severely because of frozen waterways.

Transoceanic imports of salt have been increasing in some areas of the United States because they are cost competitive with purchasing salt from domestic suppliers and transporting it using barge, rail, or truck. One important factor that often determines the quantity of salt that can be imported is the depth of the channels and the ports; many ports are not deep enough to accommodate larger ships. When salt is packaged, handled, and shipped in smaller units, the costs increase and are reflected in higher selling prices.

Prices

The four types of salt that are produced have unique production, processing, and packaging factors that determine the selling prices. Generally, salt sold in bulk is less expensive than salt that has been packaged, pelletized, or pressed into blocks. Salt in brine is the least expensive salt sold because mining and processing costs are lower. Vacuum pan salt is the most expensive because of its purity and the higher energy costs involved in processing.

Price quotations are not synonymous with average unit values reported to the USGS. The quotations do not necessarily represent prices at which transactions took place, or bid and asked prices. The annual average unit values, as collected by the USGS and listed in table 8, represent a national average unit value for each of the types of salt and the various product forms.

Foreign Trade

In the Harmonized Tariff Schedule of the United States (HTS), imports are aggregated under one category named “Salt (including table and denatured salt) and pure sodium chloride, whether or not in aqueous solution, seawater.” The HTS code for salt is 2501.00.0000. The same classification also applies to exports. Although several other HTS codes pertain to various salt classifications, the United States aggregates shipments under one code because the sums of individual subclassifications fail to meet the minimum dollar requirements necessary for individual listings.

Based on U.S. Census Bureau data for 2018, the United States exported 986,000 t of salt; this was a 13% decrease compared with that in 2017 (table 9). In 2018, most exports (82%) were to Canada. Salt was shipped to 101 countries through 38 customs districts. The Cleveland, OH, customs district exported the most salt by tonnage and represented 28% of the U.S. total. No other customs district exported more than 10% of the U.S. total (table 10). Large percentage increases in exports and imports are normally in response to increased demand for rock salt for deicing related to the frequency and severity of winter storms in Canada and the United States.

The United States imported 17.9 Mt of salt from 70 countries in 2018, which was 42% more than was imported during 2017 (tables 1, 11). Chile was the leading source of imports, supplying 35% of the total, followed by Canada (18%), Mexico (15%), and Egypt (10%). Table 12 lists the imports of salt by customs districts. Of the 40 customs districts that imported salt in 2018, the New York, NY, customs district led in terms of tonnage, accounting for 17% of the total, followed by New Orleans, LA, and Philadelphia, PA (10% each), and Boston, MA (7%).

The quantity of salt imports was about 18 times that of exports in 2018. Net salt imports represented 28% of U.S. apparent consumption, indicating the magnitude of the U.S. reliance on salt imports. Most imported salt was brought into the country by foreign subsidiaries of major U.S. salt producers. Generally, imported salt could be purchased and delivered to many U.S. customers at prices lower than the comparable domestic product because production costs were lower abroad, currency exchange rates sometimes caused the price of imported salt to be lower than the price of domestic salt, and ocean freight rates were less expensive than overland rail or truck rates.

World Review

Table 13 lists world salt production statistics for 92 countries or localities based on reported and estimated information. In 2018, total world production increased 3% to 290 Mt. The United States remained the second-ranked salt-producing country, representing 15% of total world output. China rapidly increased its production of salt in the 21st century from 37 Mt in 2004 to 63.6 Mt in 2018, making it the leading salt producer in the world.

Australia.—Leichhardt Industrials planned to expand capacity at its Eramurra solar salt operation south of Karratha in Western Australia. The current capacity of 2.2 million metric tons per year (Mt/yr) would increase to as much as 3.5 Mt/yr using new crystallizers and sourcing more salt from brines and other sources (Roskill Information Services Ltd., 2018b).

Cambodia.—After heavy rains reduced domestic salt production, the Salt Producers Community of Kampot-Kep announced plans to import 30,000 t of salt to meet domestic demand. The annual demand for salt, used heavily during the fish harvest season, was about 100,000 t while recent production was only about 33,000 t and stockpiles held about 20,000 t (Pisei, 2018).

Confirel Co., Ltd. announced a partnership with Le Guérandais, a French salt cooperative, to produce high-quality salt for export. The partnership was to focus on

improving the quality of local salt by training salt farmers to produce salt that would meet European Union quality standards (Manet, 2018).

Canada.—Compass Minerals International, Inc. experienced reduced operations at its Goderich, Ontario, salt mine for the second consecutive year. After the mine experienced “geologic movements” which affected production in 2017, a 3-month worker strike during the summer of 2018 lowered production. The reduction in operations limited supply options for some consumers of this salt in the United States and put upward pressure on unit pricing for road salt (Van Dongen, 2018).

India.—Gujarat Heavy Chemicals Ltd. signed a Memorandum of Understanding with the government of the State of Gujarat for the production of salt in Kutch. The project would create about 1,000 jobs (dnaindia, 2018).

Tata Chemicals planned to increase capacity at its Charakla solar salt plant by 400,000 t/yr. The salt was processed for human consumption and as feedstock for Tata Chemical’s synthetic soda ash plant in Mithapur which had a soda ash production capacity of about 1 Mt/yr (Roskill Information Services Ltd., 2018c).

Indonesia.—Domestic salt production failed to meet demand in 2018 so imports were authorized as consumers struggled to maintain business amid limited salt supplies. In 2017, Indonesia imported 75,000 t of edible salt from Australia and salt smuggling was reported. For 2018, the Government authorized the importation of 676,000 t of industrial salt for companies struggling to find enough domestically produced salt (Straits Times, The, 2018).

Netherlands.—K+S AG announced plans to develop a new offshore brine operation in Harlingen. The brine fed into an existing vacuum salt plant which produced high purity salt for the chemical industry and a variety of industrial applications. The additional brine supply would increase capacity at the plant by 25% to 1.2 Mt/yr (Roskill Information Services Ltd., 2018a).

Salt producers in the Netherlands came under scrutiny after land subsidence issues reportedly damaged homes and leaks of diesel fuel and brine threatened groundwater. The main areas for salt mining were in Twente and Friesland where salt production was about 7 Mt in 2018. Gas production done in conjunction with the salt mining also may have contributed to the land subsidence issues (Dutch News, 2018).

Outlook

The United States continues to be one of the leaders in salt production, consumption, and world trade. Solar salt and vacuum pan salt production and consumption have been constant and are expected to remain stable. Rock salt production and consumption are heavily dependent on the severity of winter weather. The average to slightly above average number of winter weather events for many areas of the United States during the 2018–19 winter season will likely increase salt consumption and production in 2019, compared with that of the previous year.

Because salt is a relatively low-value commodity, the shipping cost for ocean, rail, or truck transportation can be an important determining factor when attempting to secure supply sources from either domestic or foreign locations. As energy prices

change, one mode of transportation may be more cost effective than others. Excluding deicing salt, domestic salt consumption may fluctuate but is likely to continue to increase with population growth.

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TABLE 1
SALIENT SALT STATISTICS¹

(Thousand metric tons and thousand dollars)

	2014	2015	2016	2017	2018
United States:					
Production:²					
Vacuum and open pans	4,140	4,190	4,050	4,490 ^r	4,260
Solar	3,900	3,590	2,900	3,340	2,950
Rock	20,000	20,400	17,900	16,500	18,900
Brine	17,300	16,900	16,900	15,600	17,900
Total	45,300	45,100	41,700	39,900 ^r	43,900
Sold or used by producers:					
Quantity	46,000	42,800	39,900	38,600 ^r	44,200
Value	2,180,000	2,360,000	2,190,000	2,390,000 ^r	2,570,000
Exports:					
Quantity	909	830	729	1,130 ^r	986
Value	138,000	141,000	146,000	180,000	176,000
Imports for consumption:					
Quantity	20,200	21,600	12,100	12,600	17,900
Value	589,000	578,000	390,000	438,000	629,000
Consumption:					
Apparent ³	65,300	63,600 ^r	51,300	50,000 ^r	61,100
Reported	55,700	52,300	47,800	45,500	53,000
World, production	287,000 ^r	287,000 ^r	277,000 ^r	282,000 ^r	290,000

^rRevised.

¹Table includes data available through September 29, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

²Excludes Puerto Rico.

³Sold or used plus imports minus exports.

TABLE 2
U.S. SALT COMPANIES BY PRODUCTION CAPACITY, LOCATION, AND TYPE IN 2018¹

(Thousand short tons)

Company	Vacuum and open pans	Solar	Rock	Brine
American Rock Salt Co., Hampton Corners, NY	--	--	4,500	--
Boardwalk Louisiana Midstream, LLC, Plaquemine, LA	--	--	--	(2)
California Supreme Salt, LLC, Twentynine Palms, CA	--	20	--	--
Cargill, Inc.:				
Akron, OH	350	--	--	(2)
Avery Island, LA	--	--	2,700	(2)
Breux Bridge, LA	250	--	--	--
Cleveland, OH	--	--	4,000	--
Freedom, OK	--	300	--	--
Hersey, MI	300	--	--	--
Lake Point, UT	--	850	--	--
Lansing, NY	--	--	2,500	--
Hutchinson, KS	450	--	--	--
Newark, CA	150	750	--	(2)
St. Clair, MI	425	--	--	--
Watkins Glen, NY	450	--	--	--
Chemours Co., The, New Johnsonville, TN	230	--	--	--
Corpus Christi Brine Services, Inc., Benavides, TX	--	--	--	(2)
Huck Salt Co., Fallon, NV	--	20	--	--
Hutchinson Salt Co., Hutchinson, KS	--	--	750	--
Independent Salt Co., Kanopolis, KS	--	--	750	--
Key Energy Services, LLC, Hobbs, NM	--	--	--	(2)
Kissner Group Holdings, LP, The:				
Lyons, KS	--	--	750	--
Detroit, MI	--	--	2,000	--
Moab Salt, Inc., Moab, UT	--	250	--	--
Morton International, Inc.:				
Fairport, OH	--	--	2,000	--
Glendale, AZ	--	150	--	--
Grand Saline, TX	150	--	400	--
Grantsville, UT	--	500	--	--
Manistee, MI	360	--	--	--
Rittman, OH	600	--	--	--
Silver Springs, NY	375	--	--	(2)
South Hutchinson, KS	350	--	--	--
Weeks Island, LA	--	--	1,800	(2)
New Mexico Salt and Mineral Corp., Loving, NM	--	125	--	--
North American Salt Co.:				
Cote Blanche, LA	--	--	3,500	--
Lyons, KS	425	--	--	--
Ogden, UT	--	1,500	--	--
Occidental Chemical Corp., Wichita, KS	--	--	--	(2)
Olin Corp.:				
Freeport, TX	--	--	--	(2)
McIntosh, AL	--	--	--	(2)
Plaquemine, LA	--	--	--	(2)
PB Energy Storage, Inc.:				
Dale, NY	--	--	--	(2)
Napoleonville, LA	--	--	--	(2)
Redmond Clay & Salt Co., Inc., Redmond, UT	--	--	150	--
Searles Valley Minerals, Inc., Trona, CA	--	250	--	--
South Bay Salt Works, Chula Vista, CA	--	125	--	--
Tetra Technologies, Inc., Amboy, CA	--	75	--	--

See footnotes at end of table.

TABLE 2—Continued
U.S. SALT COMPANIES BY PRODUCTION CAPACITY, LOCATION, AND TYPE IN 2018¹

(Thousand short tons)

Company	Vacuum and open pans	Solar	Rock	Brine
Texas Brine Corp.:				
Baytown, TX	--	--	--	(2)
Beaumont, TX	--	--	--	(2)
Chacahoula, LA	--	--	--	(2)
Clemville, TX	--	--	--	(2)
Houston, TX	--	--	--	(2)
Napoleonville, LA	--	--	--	(2)
Plaquemine, LA	--	--	--	(2)
Wyoming, NY	--	--	--	(2)
US Salt L.L.C., Watkins Glen, NY	375	--	--	(2)
United Salt Corp.:				
Baytown, TX	400	--	--	(2)
Carlsbad, NM	--	400	--	--
Hockley, TX	--	--	150	--
Saltville, VA	200	--	--	--
Westlake Chemical Corp.:				
Lake Charles, LA	--	--	--	(2)
New Martinsville, WV	--	--	--	(2)
Willow Creek Salt Co., Salina, UT	--	--	50	--
Total production capacity	5,840	5,320	26,000	16,900

-- Zero.

¹Table includes data available through September 29, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes brine for sale and for captive use. Individual brine capacity is assumed to be equal to the quantity of annual brine production, and therefore, considered company proprietary data. Brine producers include those chloralkali producers that produce captive brine and companies that supply brine for chloralkali manufacture, oilfield chemicals, and so on. Total brine production capacity is the quantity of brine produced for the year.

TABLE 3
SALT PRODUCED IN THE UNITED STATES, BY TYPE AND PRODUCT FORM¹

(Thousand metric tons)

Product form	Vacuum and open pans	Solar	Rock	Brine	Total
2017:					
Bulk	1,190 [†]	2,080	16,100	15,600	35,000 [†]
Compressed pellets	1,180 [†]	404	XX	XX	1,580 [†]
Packaged	2,000 [†]	729	285	XX	3,010 [†]
Pressed blocks	121 [†]	133	42	XX	296 [†]
Total	4,490 [†]	3,340	16,500	15,600	39,900 [†]
2018:					
Bulk	961	1,910	18,300	17,900	39,000
Compressed pellets	1,310	269	XX	XX	1,580
Packaged	1,870	642	530	XX	3,040
Pressed blocks	120	126	55	XX	301
Total	4,260	2,950	18,900	17,900	43,900

[†]Revised. XX Not applicable.

¹Table includes data available through September 29, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 4
SALT SOLD OR USED IN THE UNITED STATES, BY TYPE AND PRODUCT FORM^{1,2}

(Thousand metric tons and thousand dollars)

Product form	Vacuum and open pans		Solar		Rock		Brine		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
2017:										
Bulk	1,060 ^r	162,000 ^r	2,000	163,000	15,100	877,000	15,500	147,000	33,600 ^r	1,350,000 ^r
Compressed pellets	1,230 ^r	248,000 ^r	383	80,700	XX	XX	XX	XX	1,620 ^r	329,000 ^r
Packaged:										
Less-than-5-pound units	254 ^{r,c}	NA	13	NA	3	NA	XX	XX	270 ^{r,c}	XX
5-pound or larger units	1,820 ^{r,c}	NA	608	NA	334	NA	XX	XX	2,760 ^{r,c}	XX
Total	2,080 ^r	499,000 ^r	621	104,000	337	57,000	XX	XX	3,030 ^r	661,000 ^r
Pressed blocks:										
For livestock	89 ^{r,c}	NA	54	NA	16	NA	XX	XX	160 ^{r,c}	XX
For water treatment	35 ^{r,c}	NA	64	NA	19	NA	XX	XX	119 ^{r,c}	XX
Total	124 ^r	22,000 ^r	118	22,200	36	5,860	XX	XX	278 ^r	50,100 ^r
Grand total	4,500 ^r	932,000 ^r	3,120	371,000	15,500	940,000	15,500	147,000	38,600 ^r	2,390,000 ^r
2018:										
Bulk	759	104,000	1,830	171,000	18,600	1,070,000	17,900	148,000	39,100	1,490,000
Compressed pellets	1,250	253,000	244	49,100	XX	XX	XX	XX	1,490	302,000
Packaged:										
Less-than-5-pound units	323 ^c	NA	24 ^c	NA	6 ^c	NA	XX	XX	352 ^c	XX
5-pound or larger units	1,770 ^c	NA	554 ^c	NA	676 ^c	NA	XX	XX	3,000 ^c	XX
Total	2,090	520,000	577	99,200	681	108,000	XX	XX	3,350	727,000
Pressed blocks:										
For livestock	83 ^c	NA	57 ^c	NA	24 ^c	NA	XX	XX	164 ^c	XX
For water treatment	32 ^c	NA	66 ^c	NA	29 ^c	NA	XX	XX	128 ^c	XX
Total	116	20,500	123	23,800	53	8,940	XX	XX	292	53,200
Grand total	4,210	898,000	2,770	343,000	19,400	1,180,000	17,900	148,000	44,200	2,570,000

^cEstimated. ^rRevised. NA Not available. XX Not applicable.

¹Table includes data available through September 29, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

²As reported at salt production locations, the term "sold or used" indicates that some salt, usually salt brine, is not sold but is used for captive purposes by the plant or company. Because data do not include salt imported, purchased, and (or) sold from inventory from regional distribution centers, salt sold or used by type may differ from totals shown in tables 5 and 6, which are derived from company totals.

TABLE 5
SALT SOLD OR USED BY PRODUCERS IN THE UNITED STATES, BY STATE^{1,2}

(Thousand metric tons and thousand dollars)

State	2017		2018	
	Quantity	Value	Quantity	Value
Kansas	2,500 ^r	220,000 ^r	2,940	236,000
Louisiana	11,800	342,000	14,900	461,000
New York	6,410 ^r	578,000 ^r	6,940	568,000
Texas	7,220	184,000	7,560	181,000
Utah	2,020	256,000	2,180	306,000
Other Eastern States ³	7,370	655,000	8,380	667,000
Other Western States ⁴	1,410	171,000	1,330	154,000
Total	38,700 ^r	2,410,000 ^r	44,200	2,570,000
Puerto Rico ^c	45	1,800	45	1,800

^cEstimated. ^rRevised.

¹Table includes data available through September 29, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

²The term "sold or used" indicates that some salt, usually salt brine, is not sold but is used for captive purposes by the plant or company.

³Includes Alabama, Michigan, Ohio, Tennessee, Virginia, and West Virginia.

⁴Includes Arizona, California, Nevada, New Mexico, and Oklahoma.

TABLE 6
DISTRIBUTION OF DOMESTIC AND IMPORTED SALT BY PRODUCERS IN THE UNITED STATES, BY END USE AND TYPE^{1,2}

(Thousand metric tons)

End use	Vacuum and open pans		Solar		Rock		Brine		Total ³	
	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018
Chemical:										
Chloralkali producers	6	8	286	293	434	518	14,700	17,500	15,400	18,300
Other chemical	317	334	155	162	656	769	519	550	1,650	1,820
Total	323	342	441	455	1,090	1,290	15,200	18,000	17,000	20,100
Food-processing industry:										
Meat packers	207	248	42	53	8	8	--	--	257	310
Dairy	155	194	13	16	2	3	--	--	170	213
Canning	154	174	20	27	3	2	--	--	177	203
Baking	168	204	3	4	6	8	--	--	177	215
Grain mill products	90	103	9	11	7	7	--	--	106	121
Other food processing	602	692	174	181	68	59	1	1	845	933
Total	1,380	1,620	262	291	94	86	1	1	1,730	1,990
General industrial:										
Textiles and dyeing	9	10	20	27	1	(4)	--	--	30	37
Metal processing	4	4	4	3	26	31	--	--	34	38
Rubber	2	2	(4)	1	1	1	(4)	(4)	3	4
Oil	78	82	136	165	51	59	10	7	275	313
Pulp and paper	7	8	38	49	17	18	--	--	62	76
Tanning and (or) leather	1	1	11	16	21	27	--	--	33	44
Other industrial	49	65	82	79	107	74	(4)	(4)	238	218
Total	150	173	291	338	223	211	10	7	674	729
Agricultural:										
Feed retailers and (or) dealers mixers	260	276	284	330	164	155	--	--	708	761
Feed manufacturers	69	84	78	92	311	187	--	--	458	363
Direct-buying end user	22	21	20	23	74	82	--	--	116	126
Total	351	381	382	445	549	424	--	--	1,280	1,250
Water treatment:										
Government (Federal, State, local)	87	83	101	127	152	181	(4)	1	340	392
Commercial or other	31	38	46	54	40	55	14	27	131	174
Total	118	121	146	181	192	236	14	28	471	567
Ice control and (or) stabilization:										
Government (Federal, State, local)	3	35	391	422	15,800	18,600	(4)	--	16,100	19,000
Commercial or other	80	90	254	222	3,090	3,570	--	--	3,420	3,880
Total	83	125	645	644	18,800	22,200	(4)	--	19,600	22,900
Distributors:										
Agricultural	108	116	97	84	265	327	--	--	470	526
Grocery wholesalers and (or) retailers	371	383	138	145	28	41	(4)	(4)	537	570
Institutional wholesalers and end users	161	199	72	95	41	49	(4)	(4)	274	342
Water-conditioning	129	157	308	346	9	16	1	2	447	520
U.S. Government resale	(4)	(4)	(4)	(4)	165	192	--	--	165	192
Other wholesalers and (or) retailers	1,240	1,450	885	1,130	94	135	(4)	(4)	2,220	2,720
Total	2,010	2,310	1,500	1,800	603	759	1	2	4,110	4,870
Other ⁵	128	147	286	313	72	105	124	--	610	565
Grand total	4,540	5,210	3,950	4,470	21,700	25,300	15,300	18,000	45,500	53,000

-- Zero.

¹Table includes data available through September 29, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

²The quantity of imports included in the total for each type of salt is the amount reported by the U.S. salt industry, not the quantity reported by the U.S. Census Bureau that appears in tables 1, 9, 10, 11, and 12.

³Because data include salt imported, produced, and (or) sold from inventory from regional distribution centers, data for salt sold or used by type may differ from totals shown in tables 1, 3, and 4, which are derived from plant reports at salt production locations. Data from these tables may differ from totals shown in tables 5 and 7 because of changes in inventory and (or) incomplete reporting.

⁴Less than ½ unit.

⁵Includes exports.

TABLE 7
DISTRIBUTION OF DOMESTIC AND IMPORTED EVAPORATED AND ROCK SALT IN THE
UNITED STATES, BY DESTINATION^{1,2}

(Thousand metric tons)

Destination	2017				2018			
	Evaporated			Total	Evaporated			Total
	Vacuum and open pans	Solar	Rock		Vacuum and open pans	Solar	Rock	
Alabama	49	12	44	105	56	16	56	128
Alaska	1	3	(3)	3	1	3	(3)	4
Arizona	51	75	1	127	56	88	1	145
Arkansas	38	8	47	93	49	10	61	119
California	267	637	88	992	305	717	100	1,120
Colorado	23	89	31	143	25	97	29	152
Connecticut	12	4	474	489	12	5	500	517
Delaware	7	8	56	72	10	10	65	85
District of Columbia	--	--	32	32	--	--	33	33
Florida	119	154	101	374	132	201	115	449
Georgia	133	86	113	332	152	109	123	385
Hawaii	1	2	--	2	1	2	--	3
Idaho	25	273	2	300	32	243	2	277
Illinois	309	108	1,320	1,740	391	123	1,930	2,450
Indiana	266	95	395	755	306	117	628	1,050
Iowa	132	100	313	546	155	117	442	714
Kansas	76	39	751	866	87	48	843	978
Kentucky	73	5	580	658	79	6	782	867
Louisiana	99	10	131	240	115	11	152	278
Maine	18	2	128	149	20	3	147	170
Maryland	70	28	607	705	83	39	730	851
Massachusetts	39	15	570	624	43	20	623	686
Michigan	279	25	1,610	1,920	328	30	2,000	2,360
Minnesota	120	192	552	864	140	223	582	946
Mississippi	21	5	100	125	24	6	123	153
Missouri	115	85	356	556	128	120	392	640
Montana	4	28	(3)	32	5	26	(3)	32
Nebraska	58	43	122	223	66	50	161	277
Nevada	13	44	(3)	58	15	43	(3)	57
New Hampshire	10	6	163	180	12	8	230	250
New Jersey	98	28	877	1,000	105	35	1,010	1,150
New Mexico	28	153	(3)	181	33	143	(3)	176
New York	182	29	3,420	3,630	196	37	3,810	4,040
North Carolina	133	49	157	339	144	65	235	444
North Dakota	7	13	6	26	7	17	5	29
Ohio	451	43	2,140	2,630	525	66	2,830	3,420
Oklahoma	27	29	62	119	27	30	68	124
Oregon	23	49	1	74	29	61	1	90
Pennsylvania	191	101	2,260	2,550	226	134	2,600	2,960
Rhode Island	2	1	158	161	3	1	183	187
South Carolina	57	14	48	119	66	17	54	137
South Dakota	29	49	38	116	33	56	39	128
Tennessee	90	12	388	490	95	14	456	565
Texas	330	190	89	610	360	263	103	726
Utah	31	236	67	333	35	217	96	348
Vermont	3	1	341	344	3	1	464	468
Virginia	77	30	443	550	90	38	567	695
Washington	36	234	1	272	42	248	(3)	291
West Virginia	24	6	189	218	27	8	292	326
Wisconsin	218	161	1,540	1,920	252	187	1,330	1,770
Wyoming	4	57	1	62	5	31	60	96
Other ⁴	66	285	751	1,100	83	313	208	603
Total ⁵	4,540	3,950	21,700	30,100	5,210	4,470	25,300	34,900

See footnotes at end of table.

TABLE 7—Continued
DISTRIBUTION OF DOMESTIC AND IMPORTED EVAPORATED AND ROCK SALT IN THE
UNITED STATES, BY DESTINATION^{1,2}

-- Zero.

¹Table includes data available through September 29, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

²Each type of salt includes domestic and imported quantities. Brine is excluded because it is not shipped out of State.

³Less than ½ unit.

⁴Includes exports and shipments to overseas areas administered by the United States, Puerto Rico, and unspecified destinations.

⁵Because data include salt imported, purchased, and (or) sold from inventory from regional distribution centers, data for evaporated and rock salt distributed by State may differ from totals shown in tables 1 and 3, which are derived from plant reports at salt production locations. Data may differ from totals shown in tables 5 and 6 because of changes in inventory and (or) incomplete reporting.

TABLE 8
AVERAGE VALUE OF SALT, BY PRODUCT FORM AND TYPE¹

(Dollars per metric ton)

Product form	Vacuum and open pans	Solar	Rock	Brine
2017:				
Bulk	152.39 ^r	81.50	57.99	9.49
Compressed pellets	201.17 ^r	210.80	XX	XX
Packaged	240.62 ^r	168.18	169.30	XX
Average ²	208.04 ^r	115.88	60.41	9.49
Pressed blocks	176.66 ^r	187.92	164.07	XX
2018:				
Bulk	137.14	93.54	57.23	8.30
Compressed pellets	202.84	201.36	XX	XX
Packaged	248.80	171.87	157.92	XX
Average ²	214.12	120.56	60.78	8.30
Pressed blocks	177.55	193.35	168.59	XX

¹Revised. XX Not applicable.

¹Net selling value, free on board plant, excluding container costs.

²Salt value data reported prior to 1984 were an aggregate value per metric ton of bulk, compressed pellets, and packaged salt. For time series continuity, an average of these three types of product forms is presented that is based on the aggregated values and quantities of the product form for each type of salt listed in table 3.

TABLE 9
U.S. EXPORTS OF SALT, BY COUNTRY OR LOCALITY¹

(Thousand metric tons and thousand dollars)

Country or locality	2017		2018	
	Quantity	Value ²	Quantity	Value ²
Australia	1	1,330	1	1,130
Bahamas, The	1	455	1	498
Belgium	5	14,300	5	7,860
Brazil	2	3,780	2	4,610
Canada	971 ^r	66,800	811	63,400
China	75	44,100	78	44,000
Colombia	3	1,600	2	1,840
Costa Rica	2	847	2	785
Dominican Republic	3	743	3	973
El Salvador	1	347	1	257
Germany	2	908	2	1,320
Honduras	2	504	1	302
Ireland	1	1,550	1	1,480
Japan	3	2,180	4	3,060
Korea, Republic of	1	915	1	1,620
Mexico	33	12,600 ^r	37	14,700
Netherlands	1	724	1	880
Panama	2	683 ^r	1	462
Saudi Arabia	4	2,160	2	1,010
Singapore	5	11,700	10	12,400
United Arab Emirates	1	365	1	345
United Kingdom	3	2,240	2	2,510
Other	12 ^r	8,840 ^r	17	10,400
Total	1,130 ^r	180,000	986	176,000

^rRevised.

¹Table includes data available through September 29, 2021. Data are rounded to no more than three significant digits; may not add to totals shown. The Harmonized Tariff Schedule of the United States code for salt is 2501.00.0000.

²Free alongside ship value at U.S. ports.

Source: U.S. Census Bureau.

TABLE 10
U.S. EXPORTS OF SALT, BY CUSTOMS DISTRICT¹

(Thousand metric tons and thousand dollars)

District	2017		2018	
	Quantity	Value ²	Quantity	Value ²
Anchorage, AK	1	274	4	1,400
Baltimore, MD	1	438	1	504
Buffalo, NY	111	5,080 ^r	36	7,280
Chicago, IL	2	865	26	2,050
Cleveland, OH	421 ^r	18,400 ^r	279	11,200
Detroit, MI	97	12,700	45	12,300
El Paso, TX	2	571	3	621
Great Falls, MT	2	678	3	827
Houston, TX	26	2,770	31	3,930
Laredo, TX	23	9,020	27	10,800
Los Angeles, CA	81	59,400	88	58,800
Miami, FL	6	2,370	6	3,400
New Orleans, LA	3	1,040	1	478
New York, NY	17	19,500	15	14,000
Nogales, AZ	3	969	3	1,060
Norfolk, VA	5	6,590	8	8,760
Ogdensburg, NY	66	6,740	81	8,660
Pembina, ND	5	1,330 ^r	7	1,620
Philadelphia, PA	2 ^r	807	2	1,040
San Diego, CA	5	2,090	5	2,150
San Francisco, CA	1	919	1	603
Savannah, GA	1	975 ^r	1	769
Seattle, WA	37	5,540	10	3,050
St. Albans, VT	5	900	4	602
Other ³	211 ^r	19,700 ^r	299	19,900
Total	1,130 ^r	180,000	986	176,000

^rRevised.

¹Table includes data available through September 29, 2021. Data are rounded to no more than three significant digits; may not add to totals shown. The Harmonized Tariff Schedule of the United States code for salt is 2501.00.0000.

²Free alongside ship value at U.S. ports.

³Customs district unidentified but assumed to be rail and (or) truck shipments to Canada through various points of departure. Also includes minor shipments through 14 other customs districts.

Source: U.S. Census Bureau.

TABLE 11
U.S. IMPORTS FOR CONSUMPTION OF SALT, BY COUNTRY OR LOCALITY¹

(Thousand metric tons and thousand dollars)

Country or locality	2017		2018	
	Quantity	Value ²	Quantity	Value ²
Australia	156	2,290	22	944
Bahamas, The	320	9,530	708	20,500
Brazil	280	9,150	720	15,500
Canada	3,630	129,000	3,300	154,000
Chile	4,230	101,000	6,280	179,000
China	33	11,300	45	10,100
Dominican Republic	1	215	28	588
Egypt	629	19,900	1,790	51,100
Germany	2	2,350	2	2,110
Ireland	48	19,400	132	28,500
Israel	43	11,500	34	10,100
Italy	171	8,200	387	13,700
Korea, Republic of	109	2,740	109	4,210
Mexico	1,710	42,500	2,640	48,400
Morocco	185	4,790	211	5,690
Netherlands	383	12,000	457	15,800
Pakistan	63	13,100	57	16,300
Peru	262	5,180	270	6,670
South Africa	10	3,770	52	4,560
Spain	88	4,670	180	4,600
Tunisia	32	746	203	5,570
Turkey	137	4,260 ^r	111	4,470
Other ³	92 ^r	21,000	138	26,700
Total	12,600	438,000	17,900	629,000

^rRevised.

¹Table includes data available through September 29, 2021. Data are rounded to no more than three significant digits; may not add to totals shown. The Harmonized Tariff Schedule of the United States code for salt is 2501.00.0000.

²Customs value.

³Includes imports from 48 other countries.

Source: U.S. Census Bureau.

TABLE 12
U.S. IMPORTS OF SALT, BY CUSTOMS DISTRICT¹

(Thousand metric tons and thousand dollars)

District	2017		2018	
	Quantity	Value ²	Quantity	Value ²
Baltimore, MD	463	18,600	683	25,100
Boston, MA	1,810	41,300	1,220	45,000
Buffalo, NY	101	4,440	127	7,690
Charleston, SC	118	4,890	247	8,900
Chicago, IL	353	12,300	323	12,400
Cleveland, OH	142	4,010	525	18,100
Columbia-Snake, OR	132	5,240	135	5,160
Detroit, MI	1,080	31,900	1,140	43,800
Duluth, MN	70	7,890	121	12,700
El Paso, TX	(3)	93	(3)	93
Houston-Galveston, TX	3	3,470	3	4,090
Laredo, TX	269	3,990	915	5,310
Los Angeles, CA	155	18,100	138	18,400
Miami, FL	31	1,730	27	1,670
Milwaukee, WI	1,120	26,600	1,070	30,400
Minneapolis, MN	428	10,500	263	6,820
Mobile, AL	47	7,250	74	5,150
New Orleans, LA	220	9,300	1,850	60,900
New York, NY	2,030	64,300 ^r	3,050	88,500
Nogales, AZ	82	2,860	64	2,560
Norfolk, VA	157	24,200	274	35,300
Ogdensburg, NY	86	26,900	67	41,000
Pembina, ND	69	6,890	96	9,260
Philadelphia, PA	854	24,500	1,790	44,900
Portland, ME	945	19,500	1,120	28,100
Providence, RI	433	11,300	678	15,400
San Diego, CA	251	2,260 ^r	628	2,700
San Francisco, CA	159	6,720	188	9,280
Savannah, GA	43	2,710	205	3,280
Seattle, WA	188	8,020	94	6,740
St. Albans, VT	70	1,580	34	3,060
Tampa, FL	568	17,500	563	18,600
Wilmington, NC	113	3,830	125	3,970
Other ⁴	23	3,780	40	5,120
Total	12,600	438,000	17,900	629,000

^rRevised.

¹Table includes data available through September 29, 2021. Data are rounded to no more than three significant digits; may not add to totals shown. The Harmonized Tariff Schedule of the United States code for salt is 2501.00.0000.

²Customs value.

³Less than ½ unit.

⁴Includes imports through 7 other customs districts.

Source: U.S. Census Bureau.

TABLE 13
SALT: WORLD PRODUCTION, BY COUNTRY OR LOCALITY¹

(Thousand metric tons)

Country or locality ²	2014	2015	2016	2017	2018
Afghanistan, rock	41	87	98	57	76
Algeria, brine and sea	193	176	158	160 ^e	160 ^e
Angola ^c	40	48	43	45	40
Argentina, common	1,537	1,401	1,812	1,461 ^r	1,406
Armenia	30	27	32	33	23
Australia	12,998	11,390	10,410	11,675	12,894
Austria:					
Brine	1,148 ^r	969 ^r	1,028 ^r	1,150 ^r	1,170
Evaporated	1,154	1,100 ^e	1,100 ^e	1,100 ^e	1,100 ^e
Total	2,302 ^r	2,069 ^r	2,128 ^r	2,250 ^r	2,270
Azerbaijan, marketable	5	5	5	5	4
Bangladesh, marine ³	1,461	1,463	1,477	1,496 ^r	1,513
Belarus	1,821	2,055	2,477	3,069	3,347
Bolivia, rock	3	2	5	3 ^r	5
Bosnia and Herzegovina	921	992	1,092	1,029	1,186
Botswana ⁴	515	404	400	370	368
Brazil:					
Rock	1,451	1,476	1,410 ^r	1,382 ^r	1,400 ^e
Sea	6,050	6,200	6,100 ^r	6,000 ^r	6,000 ^e
Total	7,501	7,676	7,510 ^r	7,382 ^r	7,400 ^e
Bulgaria ^c	2,100 ^r	2,100 ^r	2,100 ^r	2,100 ^r	2,100
Burma, rock, crude	162 ^r	134 ^r	212 ^r	158 ^r	189
Cambodia, marine ³	150 ^r	170	140	32	10 ^e
Canada	14,473	14,343	10,252	11,424	10,713
Chile	10,533	11,831	8,140	7,441	10,012
China	70,497	66,655	66,201	66,542	63,640
Colombia:					
Rock	494	335	354	336	391
Sea	37	96	176	165	170 ^e
Total	531	431	530	501	561
Croatia	33	52	40	53	51
Cuba	243	285	248	246	193
Denmark ^c	600	600	600	600	600
Djibouti ^e	1	1	1	830	2,500
Egypt	1,543	1,669	1,700 ^e	1,750 ^e	1,700 ^e
Eritrea, sea ^c	300	300	310	320	320
Ethiopia, rock ^{e, 3}	420	440	450	450	450
France	5,725	6,062	5,463	5,003	5,653
Germany:					
Evaporated	274	280 ^e	290 ^e	290 ^e	300 ^e
Industrial brines	6,776	7,747 ^r	7,897 ^r	8,046 ^r	8,090
Rock and other brines	4,999	6,124	5,617 ^r	6,531 ^r	7,176
Total	12,049	14,151 ^r	13,804 ^r	14,867 ^r	15,566
Ghana ^c	250	250	250	250	250
Greece	146	122	158	160 ^e	160 ^e
India, other	23,017	24,241	27,500 ^e	28,000 ^e	29,000 ^e
Indonesia	2,192	600 ^e	1,000 ^e	1,000 ^e	1,000 ^e
Iran ⁵	3,940	4,450	3,000 ^e	2,800 ^{r, e}	2,500 ^e
Iraq	200	209	200 ^e	240 ^{r, e}	270 ^e
Israel, marketable	460	333	389	514	377
Italy:					
Industrial ⁶	3,288 ^r	3,031	2,551	2,283 ^r	1,515
Table	468	305	484	576 ^r	262
Total	3,756 ^r	3,336	3,035	2,859 ^r	1,777

See footnotes at end of table.

TABLE 13—Continued
SALT: WORLD PRODUCTION, BY COUNTRY OR LOCALITY¹

(Thousand metric tons)

Country or locality ²	2014	2015	2016	2017	2018
Japan	1 ^r	1 ^r	1 ^r	1 ^r	1 ^e
Jordan:					
Brine	35 ^e	40	46 ^r	41 ^r	49
Dead sea	2	3	1	1	1
Total	37	43	47 ^r	42 ^r	50
Kazakhstan	597	609	730	804	886
Kenya, refined	226 ^r	246 ^r	263 ^r	290 ^r	290 ^e
Korea, North ^c	70	70	100	100	100
Korea, Republic of	309 ^r	332 ^r	323 ^r	309	283
Kuwait	56	64	67	58	58 ^e
Kyrgyzstan, rock	2 ^e	2 ^e	2	2 ^e	5
Laos	18 ^r	24 ^r	24 ^r	24 ^r	1 ^e
Lebanon ^c	3 ^r	3 ^r	3 ^r	3 ^r	3
Libya ^c	30	30	30	40	50
Madagascar, sea	100 ^{r,e}	120	107 ^r	110 ^{r,e}	110 ^e
Malta, solar ^e	2	2	2	2	2
Mauritania ^c	1	1	1	1	1
Mauritius, sea	4 ^e	2 ^e	1	1 ^e	1 ^e
Mexico	10,251	9,088	8,907	9,000 ^e	9,000 ^e
Mongolia	2	2	-- ^r	1 ^r	1
Morocco, rock	459	556	635	659 ^r	692
Mozambique, sea ^c	160	160	170	170	170
Namibia	797	733	836	887 ^r	1,222
Netherlands, rock	6,485	6,743	6,625	6,935	6,744
New Zealand ^c	100	100	100	100	100
Niger ^c	30	30	30	30	30
Oman	13	13	12	18	12
Pakistan:					
Rock ⁴	2,243	2,779	3,535	3,493 ^r	3,959
Sea ^c	230 ^r	212 ^r	214 ^r	222 ^r	212
Total	2,473 ^r	2,991 ^r	3,749 ^r	3,715 ^r	4,171
Panama	57	60 ^e	60 ^e	41 ^r	38
Peru	1,175	1,471	1,450	1,481	1,510
Philippines, sea ^c	134 ^r	131 ^r	128 ^r	125 ^r	192
Poland:					
Evaporated	647	671	647	615 ^r	620
Rock	775	650	709	994 ^r	862
Other	2,705	2,798	2,965	2,989	2,929
Total	4,127	4,119	4,321	4,598 ^r	4,411
Portugal, rock	70	30	6	8	6
Romania:					
Rock	47	50	52	52	49
Other	2,000	2,100	2,000	2,300	2,300
Total	2,047	2,150	2,052	2,352	2,349
Russia	5,600	5,600	6,887	7,073 ^r	6,710
Saudi Arabia	1,990	2,000	2,400	2,520	2,646
Senegal	245	266 ^e	263	259	260 ^e
Serbia	13	13	13 ^e	13 ^e	13 ^e
Slovenia	--	2	2	2	2
South Africa	494	517	473	493	478
Spain:					
Rock	2,754	3,032 ^r	3,253	2,870 ^r	3,200
Sea, including evaporated	1,359	1,403 ^r	1,200	1,168 ^r	1,195
Total	4,113	4,435 ^r	4,453	4,038 ^r	4,395

See footnotes at end of table.

TABLE 13—Continued
SALT: WORLD PRODUCTION, BY COUNTRY OR LOCALITY¹

(Thousand metric tons)

Country or locality ²	2014	2015	2016	2017	2018
Sri Lanka	102	35 ^r	150 ^r	117 ^r	99 ^e
Sudan	37	70	223	235 ^r	267
Switzerland	388	550	458	590	492
Syria ^c	30	20	25	25	25
Tajikistan	35	36	36	24	37
Tanzania	75	92	171	100	36
Thailand	1,381	1,386	1,391	1,497	1,487
Tunisia, sea	888	1,700	1,600 ^e	1,600 ^e	1,580 ^e
Turkey	5,331	6,257	5,328	6,673 ^r	6,299
Turkmenistan	92 ^e	100 ^e	100	100	100 ^e
Uganda ^e	15	15	15	15	15
Ukraine	2,498	2,137	1,784	1,816	2,192
United Kingdom ⁷	4,690	4,700 ^{r,e}	4,700 ^{r,e}	4,700 ^{r,e}	4,700 ^e
United States:					
Brine	17,300	16,900	16,900	15,600	17,900
Rock	20,000	20,400	17,900	16,500	18,900
Solar	3,900	3,590	2,900	3,340	2,950
Vacuum and open pan	4,140	4,190	4,050	4,490 ^r	4,260
Other, from Puerto Rico ^e	45	46	46	45	45
Total	45,300	45,100	41,700	39,900 ^r	43,900
Vietnam	906	1,061	982	649 ^r	997
Yemen ^c	75	75	75	75	100
Grand total	287,000 ^r	287,000 ^r	277,000 ^r	282,000 ^r	290,000

^eEstimated. ^rRevised. -- Zero.

¹Table includes data available through March 15, 2021. All data are reported unless otherwise noted. Grand totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²In addition to the countries and (or) localities listed, Guinea, Iceland, Mali, and Venezuela may have produced salt, but available information was inadequate to make reliable estimates of output. Some salt brine production data for manufacture of chlorine, caustic soda, and soda ash are not reported because of incomplete reporting by many countries.

³Production is based on fiscal year, with a starting date of July 1 of the year shown.

⁴From natural soda ash production.

⁵Production is based on fiscal year, with a starting date of March 21 of the year shown.

⁶Does not include production from Sardinia and Sicily, which is estimated to be 200,000 metric tons per year.

⁷Production is based on fiscal year, with a starting date of July 16 of the year shown.