



2015 Minerals Yearbook

SALT [ADVANCE RELEASE]

SALT

By Wallace P. Bolen

Domestic survey data and tables were prepared by Linda M. Barnes, statistical assistant, and the world production table was prepared by Glenn J. Wallace, international data coordinator.

The United States was the world's leading salt-producing nation until 2005, when China surpassed the United States to become the world leader. Total U.S. salt production in 2015 decreased slightly to 45.1 million metric tons (Mt) compared with production of 2014 (table 1), making the United States the second-leading salt-producing nation. Global salt production in 2015 was 270 Mt with 70 Mt 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 contact with salt daily. 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 voluntary survey of U.S. salt-producing sites and company operations (table 2). Production refers to the quantity of salt mined or manufactured that is available for sale. Salt sold or used is the quantity of salt that was sold directly to customers or used by the salt producer, which usually is a chloralkali (chlorine and sodium hydroxide) manufacturer. The data in table 2 are rated capacities for mines and refineries as of December 31, 2015. Rated capacity is defined as the maximum quantity of product that can be produced in a period of time on a normally sustainable long-term operating rate, based on the physical equipment of the plant, and given acceptable routine operating procedures involving energy, labor, maintenance, and materials.

According to survey respondents, 28 companies operated 63 salt-producing plants in 16 States in 2015. Of these, 9 companies and 11 plants produced more than 1 Mt each and accounted for 89% and 64%, respectively, of total U.S. production and for 89% and 31%, respectively, of total value. Several companies and plants produced more than one type of salt. In 2015, 6 companies (18 operations) produced vacuum pan salt; 12 companies (16 operations), solar-evaporated salt; 10 companies (14 operations), rock salt; and 13 companies (27 operations), salt brine.

Five of the seven leading producing States were, in descending order of total salt sold or used, Louisiana with 30%;

Texas, 18%; New York, 17%; Kansas, 7%; and Utah, 5%. Ohio and Michigan were among the top seven salt-producing States in total quantity of salt sold or used, but their rankings 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 2015 is reported in table 7.

Of the 28 companies to which a canvass form was sent in 2015, 19 responded, representing 69% of the totals shown in this report. Data for the nonrespondents were estimated based on their responses to previous annual surveys, the 2015 production estimate survey, or brine production capabilities for chloralkali manufacture based upon published chlorine production capacities; that is, 1.75 metric tons (t) of salt required per ton of chlorine capacity. For rock salt producers, data from the Mine Safety and Health Administration also were used in estimating production. About 46% of the estimated data was brine, rock salt was 38%, and the remaining 16% was solar salt.

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 annually produce less than 100 t of sea salt.

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 was 4.19 Mt in 2015, a slight increase compared with the 2014 total of 4.14 Mt. 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 is obtained from solution mining of underground salt formations. Vacuum pan salt is obtained by dehydrating brine using heat alone 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 is preferred for the production of baked goods, butter, and cheese.

Solar Salt.—Solar salt production was 3.59 Mt in 2015, an 8% decrease from the 2014 total of 3.89 Mt. 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 vary depending on the location and the surface acres of the evaporation ponds. Only unpredictable seasonal precipitation and market conditions usually affect the production rates of the facilities.

Rock Salt.—In 2015, rock salt production was 20.4 Mt, a slight increase compared with the 2014 total of 20.0 Mt. Rock salt is mined by the room-and-pillar method, which is similar to that used in coal and trona mining. Rock salt producers operated at high rates in 2015 because sustained demand for most of the year required mining companies to extend hours to increase output.

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

In June, the Attorney General of Ohio announced the settlement of a lawsuit involving Cargill, Inc. and Morton International, Inc. The State accused the two companies of conspiring to fix rock salt prices in Ohio. The companies admitted no wrongdoing but agreed to pay \$11.5 million, which was to be distributed to various State agencies and local governments across the State (Gendreau, 2015).

In late October, The Kissner Group Holdings LP (Cambridge, Ontario, Canada) announced the acquisition of B.S.C. Holdings, Inc. (Mission, KS), which included rock salt miner Lyons Salt Co. (Lyons, Kansas) along with salt distributor Central Salt, L.L.C. (Elgin, Illinois). Kissner already operated Detroit Salt Co. LLC in Michigan (Hack, 2015).

Salt Brine.—U.S. salt brine production in 2015 was 16.9 Mt, a slight decrease compared with the 2014 total of 17.3 Mt. Brine production capacities are difficult to derive because they are based on the variabilities of the injection rate of the solvent and the dissolution rates of the underground salt bodies, both of which determine the quantity of brine produced. In turn, these production levels are usually dependent on the demand for the products that the brine is being used to manufacture.

Solution mining is used to obtain a sodium chloride feedstock for vacuum pan salt production and for chlorine, caustic soda, and synthetic soda ash (excluding the United States) manufacture. The quantity of underground salt dissolved and recovered as brine to make vacuum pan salt usually is not reported as primary salt production; only the quantity of vacuum pan salt manufactured is reported. The quantity of brine used to make chloralkali chemicals is reported as either the amount of

captive brine used or brine sold. The chemical industry is the leading consumer of salt brine worldwide.

In March, Dow Chemical Co. and Olin Corp. reached an agreement for Olin to purchase a significant portion of Dow's chloralkali and downstream derivatives business. Olin took over U.S. Gulf Coast chloralkali and vinyl and global chlorinated organics and global epoxy business from Dow (Dow Chemical Co., 2015).

In July, E.I. du Pont de Nemours and Co. spun off its performance chemicals unit as a separate company known as The Chemours Co. The performance chemicals unit includes brine operations near New Johnsville, TN (E.I. du Pont de Nemours and Co., 2015).

Consumption

Direct and indirect uses of salt number about 14,000, according to industry sources. The USGS annually surveys eight major categories comprising 29 end uses. The 2015 reported consumption (sales or use as reported by the salt companies, including their exports and imports) was 52.3 Mt, and the distribution of salt by major end use was ice control, 43.5%; chemicals, 37.2%; distributors (grocery and other wholesalers and retailers and so forth), 8.2%; food processing, 3.4%; agricultural, 2.5%; other uses combined with exports, 2.2%; general industrial, 1.6%; and primary water treatment, 1.4% (table 6).

In 2015, apparent consumption (salt sold or used plus imports minus exports) was 63.6 Mt. Reported consumption statistics are those reported only by domestic salt-producing companies. Apparent consumption normally is greater than reported consumption because apparent consumption includes additional quantities of salt imported and exported by non-salt-producing companies, such as some chloralkali operations and salt distributors, especially importers along the northeast 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 this salt 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. Aside from the various types of salt, there are distinctions in packaging and applications of salt. Salt for human consumption is packaged in various sized containers for several specialized purposes.

Ice Control and Road Stabilization.—In 2015, U.S. consumption of salt for this application was 22.7 Mt, which was about 7% less than that of 2014. After relatively low consumption for this use in 2011 and 2012, consumption in 2013 and 2014 increased significantly and then stayed near these higher levels for most of 2015.

The use of salt brine for road deicing has been increasing during the past 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.

Salt is an inexpensive, widely available, and effective ice-control agent. It does, however, become less effective as temperatures decrease below about -9.5 °C to -6.5 °C (15 °F to 20 °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 °C and 0 °C (25 °F and 32 °F), the range in which salt is most effective.

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. Although evidence of environmental loading of salt has been found during peak use, spring rains and thaws usually dilute the concentrations of sodium in the area where salt was applied. However, when the salt leaches from the immediate environment adjacent to roads, it sometimes collects in lakes and other inland freshwater bodies, potentially changing water chemistry and affecting ecosystems and communities that use this water.

Near Lake George, NY, community leaders, including government officials and concerned individuals, proposed a memorandum of understanding calling for the halt to excessive use of road salt. The local governments were working together to demonstrate how road salt use could be reduced without making roads less safe (Blais, 2015).

New technology may also more precisely control the use of road salt. One company developed technology that employs sensors on salt trucks that tracks where vehicles travel and the positioning of plows and the functioning of salt spreaders. The information is automatically relayed to all deployed vehicles, assisting drivers to avoid overspreading of salt and minimizing workloads for drivers (Sanders, 2015).

The quantity of salt consumed for road deicing each year is directly related to the severity of the winter weather conditions. Long-range forecasting of salt consumption in this application is extremely difficult because of the complexities in long-range forecasting of the weather.

Relatively mild winter weather in many parts of the United States in late 2014 resulted in satisfactory stocks of salt in most locales. News reports from Connecticut, Illinois, New Jersey, New York, Ohio, Pennsylvania, West Virginia, and Wisconsin in the first half of January 2015 noted that supplies of salt were plentiful with shortages only in Indiana and Missouri. Despite the lack of snow events during most of January, high salt sales were reported as governments prepared for potential snow storms later in the winter (Juliano, 2015; Runevitch, 2015).

In February 2015, prolonged cold weather and successive snow events caused salt shortages in Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, and Vermont. Later in the month, severe weather in Alabama, Louisiana, and Tennessee, States which seldom require significant deicing salt, caused salt shortages. February was characterized by increased salt prices amid a lack of supply, often because salt shipments were unable to reach the places where they were needed (Goslee, 2015; Gray, 2015; Thorne, 2015).

As the winter wrapped up in March, road salt users continued to struggle with salt shortages and higher costs until about the middle of the month. The States north and east of Pennsylvania reported exhaustion of salt supplies, and States

west of Pennsylvania generally reported less salt use than average for the winter season. Pennsylvania struggled with salt supplies in some areas, but other areas maintained adequate supplies throughout the season. As spring weather ensued and roads cleared, road salt consumers began the sometimes difficult process of reaching agreements with salt suppliers for the next deicing season, and salt prices remained high through the first quarter of 2015 (Dumcius, 2015; Finger, 2015; Householder, 2015; Miller, 2015).

Throughout the summer and early fall, as communities purchased salt for the next winter, quoted prices were generally higher than those of the previous year. However, by late 2015 officials in some areas, especially those that had surpluses from the previous year, were finding prices lower than a year earlier. Severe winter weather was very limited in late 2015, with just a few winter weather events reported in Iowa, Kansas, Nebraska, and Utah. The hard-hit areas of the northeastern United States in early 2015 experienced warmer than average conditions late in the year and very little salt, if any, was used throughout the region (Chiaramida, 2015; Knisely, 2015; Lawrence, 2015; Manna, 2015; Pelham, 2015; Ryle, 2015).

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, primarily as salt brine, has been the chemical industry, except for 2011 and 2013–15 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 remains 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 its inability to compete with less expensive natural soda ash, no synthetic soda ash has been manufactured in the United States; many countries, however, still produce synthetic soda ash and use vast quantities of salt brine as feedstock. Total salt sold or used by the chemical industry was 19.5 Mt in 2015 (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 made up 12% of the supply, and imported rock, solar, and vacuum pan salt combined, 9%.

The industry average ratio is 1.75 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 chlorine manufacture was 17.2 Mt (table 6); however, the data do not include salt imported directly by the chlorine producers or captive brine produced by them.

Salt is also 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 11% of domestic salt sales for the entire chemical sector and only 4% of total domestic salt consumption. However, the amount of salt consumed in this category increased by 3% in 2015 compared with that of 2014. The 2.2 Mt consumed for “Other chemical” uses in 2014 and 2015 represents the highest level seen in several decades, the most since 1993 when 1.9 Mt was consumed.

The consumption of salt for metallic sodium has declined during the past several years. E.I. du Pont de Nemours and Co. was the sole manufacturer of metallic sodium in the United States in 2015. The domestic market for metallic sodium decreased because sodium metal was no longer needed for the production of 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 various 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 4.3 Mt in 2015.

Food Processing.—Nearly every person uses some quantity of salt in food. Aside from table salt, 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 body. Kosher salt, sea salt, condiment salt, and salt tablets are special varieties of salt.

The food-processing category is subdivided, in descending order of salt consumption, into other food processing, meat packers, canning, dairy, baking, and grain mill products. Total

salt sold for food processing was 1.78 Mt in 2015, slightly higher than that of 2014 (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, which leads to 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 primarily added 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 the gluten (the elastic protein-water complex in certain doughs) and as a flavor enhancer, such 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).

Concerns about human consumption of salt continued in 2015 as many educators and Government agencies worked to inform people about salt in their diets. Some debate also continued concerning the efficacies of the official recommendations on salt consumption (Whoriskey, 2015).

The American Heart Association and the Centers for Disease Control and Prevention maintained their previous guidelines for all Americans, recommending a daily limit of 1,500 milligrams (mg) for those over 50 years of age (2,500 mg for younger adults). In January 2015, scientists at Emory University published research results that seemed to indicate that following this more stringent standard for older Americans exhibited no benefit (Graedon and Graedon, 2015). Another study, at the University of Delaware’s College of Health Sciences, reported that even in the absence of increased blood pressure for those with high salt diets, excess sodium can adversely affect various organs, such as the blood vessels, brain, heart, and kidneys (Kukich, 2015).

Agricultural.—Barnyard and grazing livestock need supplementary salt rations to maintain proper nutrition. In 2015, 1.32 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. Salt is also compressed into pellets that are used for water conditioning.

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, metal processing, tanning and leather treatment, textiles and dyeing, and rubber manufacture. Total salt sold to these sectors declined by 15% to 834,000 t in 2015.

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

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 type rubbers. Salt brine and sulfuric acid are used to coagulate an emulsified latex made from chlorinated butadiene.

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. The sodium ions captured on a resin bed are exchanged for the calcium and magnesium ions. Periodically, the water-softening units must be recharged because the sodium ions become depleted. Salt is added and dissolved, and brine replenishes the lost sodium ions. In 2015, 723,000 t of salt was sold for primary water treatment and an additional 440,000 t was sold for water conditioning by distributors (table 6).

Transportation

Because the locations of the salt supplies are not often 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 is often severely curtailed 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. As 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 less. 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 actually 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

Under Harmonized Tariff Schedule of the United States (HTS) nomenclature, 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 same classification also applies to exports. The HTS code for salt is 2501.00.0000. 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 2015, the United States exported 841,000 t of salt; this was a 10% decrease compared with that of 2014 (table 9). In 2015, most exports (84%) were to Canada. Salt was shipped to 104 countries through 37 customs districts; the Cleveland, OH, district exported the most and represented 50% of the U.S. total, and 11% went through Detroit, MI (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 21.6 Mt of salt from 60 countries in 2015, which was 7% more than was imported during 2014 (table 11). Chile was the leading source of imports, supplying about 40% of total imports, followed by Canada (28%). Table 12 lists the imports of salt by customs district. Of the 39 customs districts that imported salt in 2015, the New York, NY, customs district led in terms of tonnage, accounting for about 18% of the total, followed by Baltimore, MD, and Philadelphia, PA (12% each); Boston, MA (9%); and Detroit, MI (7%).

The quantity of salt imports was about 26 times that of exports. Net salt imports also represented about 33% 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 can be purchased and delivered to many U.S. customers at prices lower than the comparable domestic product because production costs are lower abroad, currency exchange rates may cause the price of imported salt to be lower than the price of domestic salt, and ocean freight rates are less expensive than overland rail or truck rates.

World Review

Table 13 lists world salt production statistics for 92 countries based on reported and estimated information. In 2015, the total estimated world production decreased slightly to about 270 Mt. The United States remained the second-leading salt-producing country, representing 17% of total world output. China has rapidly increased its production over the past decade from 37 Mt in 2004 to 70 Mt in 2015, making it the leading salt producer in the world.

Australia.—Rio Tinto Group announced layoffs at its Dampier Salt division in Western Australia. Two rounds of layoffs took place in the first half of 2015. The company action was one of several cost-cutting measures attributed to the drop in iron ore prices (Maqbool, 2015).

Cambodia.—Salt production in the Kampot and Kep Provinces nearly doubled in 2015 as a result of drought conditions in parts of the country. The increased production had a negative effect on pricing. The Kep-Kampot Salt Producer Community employs thousands of workers to produce solar salt each year. The Community considered exporting salt, but a lack of modern machinery and techniques make it difficult to compete on price with other exporters in Southeast Asia (Bopha, 2015).

Mexico.—Exportadora de Sal, a Mexican salt producer on the Baja California peninsula, is a joint venture between the Government of Mexico and Mitsubishi Corp. of Japan. In September, a Federal audit body questioned the financial arrangements of the venture and particularly questioned contractual pricing that did not cover operating expenses. Questions centered on pricing and export transportation costs and led to speculation that the Government of Mexico might sell its stake in the operation (Negro, 2015).

Namibia.—Workers at the Walvis Bay Salt Holdings (WBSH) operation went on strike in July over medical benefits, vacation days, and wages. WBSH was reportedly the largest solar salt producer in sub-Saharan Africa with annual production of at least 700,000 t (Hartman, 2015).

Outlook

The United States continued 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. U.S. annual salt production is expected to be between 40 and 45 Mt through 2017. Rock salt production and consumption are heavily dependent on the severity of winter weather. Milder winter

weather in many parts of the United States during the 2015–16 winter season will likely decrease salt demand and production in 2016. Although the severity of the weather is virtually impossible to accurately forecast far in advance, the supplies of salt, from either domestic or imported sources, are likely adequate to meet any anticipated increase in demand. Despite the closing and idling of some chlorine plants since 2007, the remaining chlorine facilities are able to run at higher capacity utilization rates if necessary to meet increased market demand. Because the chloralkali industry is energy intensive, lower energy prices may allow increased production of chlorine at competitive prices in the world markets and increasing consumption of salt brine as well.

Because salt is a relatively low-value commodity, the shipping cost for oceanic, 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.

International Mining (2014) projected salt demand to grow by about 2.7% per year through 2018, with the highest growth rate in Asia. China and the United States are both net importers of salt, and the leading exporters of salt are Australia, Chile, India, and Mexico. Most growth is projected to come from the chemicals sector with world growth in chloralkali consuming an additional 30 Mt of salt through 2018.

References Cited

- Bopha, Phorn, 2015, Late rains credited for rising salt production: Voice of America Cambodia, December 31. (Accessed January 5, 2016, at <http://www.voacambodia.com/content/late-rains-credited-for-rising-salt-production/3124658.html>.)
- Blais, Robert, 2015, Hold salt at Lake George: Times Union [Albany, NY], June 24. (Accessed June 25, 2015, at <http://www.timesunion.com/tuplus-opinion/article/Hold-salt-at-Lake-George-6347471.php>.)
- Chiaramida, Angeljean, 2015, Cost of road salt escalating rapidly: Daily News [Newburyport, MA], October 20. (Accessed October 20, 2015, at http://www.newburyportnews.com/news/local_news/pouring-salt-in-winter-s-wounds/article_05232388-079b-54bf-b417-5b1a3c8c962f.html.)
- Dumcius, Gianautas, 2015, 600,000 tons of salt later, Mass. snow and ice costs hit nearly \$130M: Boston, MA, WBUR, March 12. (Accessed March 15, 2015, at <https://www.wbur.org/2015/03/12/mass-winter-snow-ice-costs-budget>.)
- Dow Chemical Co., 2015, Dow and Olin Corporation create an industry leader in chlor-alkali and derivatives with revenues approaching \$7 billion: Dow Chemical Co. news release, March 27. (Accessed October 26, 2015, at <http://newsroom.dow.com/press-release/business-news/dow-and-olin-corporation-create-industry-leader-chlor-alkali-and-derivat>.)
- E. I. du Pont de Nemours and Co., 2015, DuPont completes spin-off of The Chemours Company: E.I. du Pont de Nemours and Co. news release, July 1. (Accessed March 31, 2017, at <http://www.dupont.com/corporate-functions/media-center/press-releases/dupont-completes-spin-off-of-the-chemours-company.html>.)
- Finger, Ray, 2015, Be extra careful—Road salt still in short supply: The Star Gazette [Elmira, NY], March 3. (Accessed March 3, 2015, at <http://www.stargazette.com/story/news/local/2015/03/03/road-salt-short-supply-chemung-county/24315915/>.)
- Gendreau, Henri, 2015, Road-salt price jump curbed by settlement: The Columbus [OH] Dispatch, July 13. (Accessed July 20, 2015, at <http://www.dispatch.com/content/stories/local/2015/07/13/road-salt-price-jump-curbed-by-settlement.html>.)

- Goslee, Kaitlin, 2015, Road salt supplies diminishing with each winter storm: Springfield, MA, WWLP, February 17. (Accessed February 20, 2015, at <http://wwlp.com/2015/02/17/road-salt-supplies-diminishing-with-each-winter-storm/>.)
- Graedon, Joe, and Graedon, Teresa, 2015, Policies on salt due for reversal: Albuquerque [NM] Journal, February 16. (Accessed February 19, 2015, at <http://www.abqjournal.com/541645/opinion/policies-on-salt-due-for-reversal.html>.)
- Gray, Callan, 2015, Salt supplies running low across Tri-Cities: Bristol, VA, WCYB, February 25. (Accessed February 25, 2015, at <http://www.wcyb.com/news/salt-supplies-running-low-across-tricities/31465198>.)
- Hack, Greg, 2015, Canadian group buys area salt company BSC Holding: The Kansas City [MO] Star, October 30. (Accessed November 1, 2015, at <http://www.kansascity.com/news/business/article41961804.html>.)
- Hartman, Adam, 2015, Salt workers strike at Walvis: The Namibian [Windhoek], July 7. (Accessed July 9, 2015, at http://www.namibian.com.na/index.php?category_id=1&page_type=story_detail&id=28774.)
- Householder, Sam, 2015, Goshen mayor says city 'got hosed' on cost of road salt last year: Goshen [IN] News, March 30. (Accessed March 31, 2015, at http://www.goshennews.com/news/local_news/goshen-mayor-says-city-got-hosed-on-cost-of-road/article_af6cd068-d729-11e4-8e3b-8fe2e5ba1470.html.)
- International Mining, 2014, Back to the salt mines, Asian demand forecast to grow at almost 5%/y to 2018: International Mining, February 26. (Accessed April 29, 2014, at <http://www.im-mining.com/2014/02/26/back-to-the-salt-mines-asian-demand-forecast-to-grow-at-almost-5y-to-2018/>.)
- Juliano, Frank, 2015, Road salt in good supply, but pricey as snow season looms: [Bridgeport] Connecticut Post, January 18. (Accessed January 26, 2015, at <http://www.ctpost.com/news/article/Road-salt-in-good-supply-but-pricey-as-snow-6024531.php>.)
- Knisley, Alex, 2015, As salt prices climb, tax dollars melt away: Times Reporter [New Philadelphia, OH], May 16. (Accessed May 18, 2015, at <http://www.timesreporter.com/article/20150516/NEWS/150519402>.)
- Kukich, Diane, 2015, Dietary sodium and health: Newark, DE, University of Delaware, UDaily, March 10. (Accessed March 11, 2015, at <http://www.udel.edu/udaily/2015/mar/sodium-health-031015.html>.)
- Lawrence, Al, 2015, County winter salt bids much lower this year: Mansfield [OH] News Journal, September 3. (Accessed September 4, 2015, at <http://www.mansfieldnewsjournal.com/story/news/local/2015/09/03/county-winter-salt-bids-much-lower-year/71654988/>.)
- Manna, John, 2015, Harsh winter increases New Castle's salt use: New Castle [PA] News, June 5. (Accessed June 5, 2015, at http://www.ncnewsonline.com/news/harsh-winter-increases-new-castle-s-salt-use/article_10e86070-0b44-11e5-b70f-ff399ad95d6f.html.)
- Maqbool, A.R., 2015, Rio Tinto cuts jobs at Dampier Salt division: Portsmouth, NH, snl.com, April 6. (Accessed April 8, 2015, via <https://www.snl.com/InteractiveX/article.aspx?ID=31995528&KPLT=4>.)
- Miller, Barbara, 2015, Municipalities ask Pennsylvania Emergency Management Agency for help with salt supplies: Mechanicsburg, PA, Pennlive.com, March 4. (Accessed March 6, 2015, at http://www.pennlive.com/midstate/index.ssf/2015/03/municipalities_ask_pennsylvania.html.)
- Negro, Guerrero, 2015, A covenant of salt—An unusual Japanese-Mexican venture runs into trouble with auditors: The Economist, September 12. (Accessed September 12, 2015, at <http://www.economist.com/news/business/21664198-unusual-japanese-mexican-venture-runs-trouble-auditors-covenant-salt>.)
- Pelham, Dennis, 2015, Road salt to cost less this winter? Daily Telegram [Adrian, MI], September 27. (Accessed September 28, 2015, at <http://www.lenconnect.com/article/20150927/NEWS/150929215>.)
- Runevitch, Jennie, 2015, Salt shortage and higher prices impact snow fight: Indianapolis, IN, WTHR, January 5. (Accessed January 20, 2015, at <http://www.wthr.com/story/27767326/salt-shortage-and-higher-prices-impact-snow-fight>.)
- Ryle, Jake, 2015 Ohio cities saving thousands due to bump in salt supply: Moraine, OH, WDTN, December 9. (Accessed December 14, 2015, at <http://wdtn.com/2015/12/09/ohio-cities-saving-thousands-due-to-bump-in-salt-supply/>.)
- Sanders, Bob, 2015, Firm's technology aims to spread less salt: New Hampshire Business Review, October 1. (Accessed October 2, 2015, at <http://www.nhbr.com/October-2-2015/Firms-technology-aims-to-spread-less-salt/>.)
- Thorne, Kristin, 2015, Salt companies say they have a hard time keeping up storm to storm: New York, NY, 7online.com, February 25. (Accessed February 26, 2015, at <http://7online.com/news/salt-companies-say-they-have-hard-time-keeping-up-storm-to-storm/534481/>.)
- Whoriskey, Peter, 2015, Could 95 percent of the world's people be wrong about salt? Washington Post, May 26. (Accessed May 26, 2015, at <http://www.washingtonpost.com/blogs/wonkblog/wp/2015/05/26/could-95-percent-of-the-worlds-people-be-wrong-about-salt/>.)

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.
- Salt. Ch. in *Mineral Commodity Summaries*, annual.

Other

- Chlorine Institute, The.
- Lefond, S.J., 1969, *Handbook of world salt resources*: New York, NY, Plenum Press, 384 p.
- Material Flow of Salt, The. U.S. Bureau of Mines Information Circular 9343, 1993.
- Salt. Ch. in *Canadian Minerals Yearbook*, annual.
- Salt. Ch. in *Industrial Minerals and Rocks* (7th ed.), Society for Mining, Metallurgy, and Exploration, Inc., 2006.
- Salt. Ch. in *Mineral Facts and Problems*, U.S. Bureau of Mines Bulletin 675, 1985.
- Salt. *Mining Engineering*, annual review of industrial minerals. Salt Institute.
- Sodium Chloride. American Chemical Society Monograph No. 145, 1960.
- Solution Mining Research Institute.

TABLE 1
SALIENT SALT STATISTICS¹

(Thousand metric tons and thousand dollars)

	2011	2012	2013	2014	2015
United States:					
Production: ²					
Vacuum and open pans	4,080	4,240	4,130	4,140	4,190
Solar	3,230	2,760	3,580	3,900	3,590
Rock	18,500	13,300	14,800	20,000	20,400
Brine	19,200	16,900	17,400	17,300	16,900
Total	45,000	37,200	39,900	45,300	45,100
Sold or used by producers:					
Quantity	45,500	34,900	43,100	46,000	42,800
Value	1,770,000	1,460,000	1,980,000	2,180,000 ^r	2,290,000
Exports:					
Quantity	846	809	525	935 ^r	841
Value	87,500	90,300	88,800	147,000 ^r	149,000
Imports for consumption:					
Quantity	13,800	9,880	11,900	20,200 ^r	21,600
Value	367,000	292,000	348,000	589,000 ^r	578,000
Consumption:					
Apparent ³	58,500	44,000	54,500	65,300 ^r	63,600
Reported	48,000	36,900	47,600	55,600 ^r	52,300
World, production	273,000 ^r	261,000 ^r	273,000	273,000 ^r	270,000 ^e

^eEstimated. ^rRevised.

¹Data 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 2015¹

(Thousand short tons)

Company	Vacuum and open pans	Solar	Rock	Brine
American Rock Salt Co., Hampton Corners, NY	--	--	4,500	--
Axiall Corp.:				
Lake Charles, LA	--	--	--	(2)
New Martinsville, WV	--	--	--	(2)
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 ³	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.: ⁴				
Cote Blanche, LA	--	--	3,500	--
Lyons, KS	425	--	--	--
Ogden, UT ⁵	--	1,500	--	--
Occidental Chemical Corp., Wichita, KS	--	--	--	(2)
Olin Corp.:				
Freeport, TX ⁶	--	--	--	(2)
McIntosh, AL	--	--	--	(2)
Plaquemine, LA ⁶	--	--	--	(2)
PB Energy Storage, Inc.: ⁷				
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 2015¹

(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	--	--	--
Total production capacity	5,840	5,320	26,000	16,900

-- Zero.

¹Data 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 forth. Total brine production capacity is the quantity of brine produced for the year.

³Formerly operated by E.I. du Pont de Nemours and Co.

⁴Owned by Compass Minerals, Inc.

⁵Owned by Compass Minerals; operated by Great Salt Lake Minerals Corp.

⁶Acquired from Dow Chemical Corp.

⁷Associated with Texas Brine Corp.

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

(Thousand metric tons)

Product form	Vacuum and open pans				Total
	Solar	Rock	Brine		
2014:					
Bulk	827	2,900	19,600	17,300	40,600
Compressed pellets	1,200	354	XX	XX	1,550
Packaged	2,000	566	310	XX	2,880
Pressed blocks	115	76	43	XX	234
Total	4,140	3,900	20,000	17,300	45,300
2015:					
Bulk	1,090	2,510	20,100	16,900	40,600
Compressed pellets	1,170	340	XX	XX	1,510
Packaged	1,810	622	266	XX	2,700
Pressed blocks	123	117	37	XX	277
Total	4,190	3,590	20,400	16,900	45,100

XX Not applicable.

¹Data 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
	2014:									
Bulk	811	97,900	2,370	110,000 ^r	20,300	949,000	17,500	159,000	41,000	1,320,000 ^r
Compressed pellets	1,250	221,000	423	60,800 ^r	XX	XX	XX	XX	1,670	282,000 ^r
Packaged:										
Less-than-5-pound units	226	NA	17 ^r	NA	2 ^r	NA	XX	XX	244 ^r	XX
More-than-5-pound units	1,680	NA	763 ^r	NA	429 ^r	NA	XX	XX	2,870 ^r	XX
Total	1,910	398,000	781	98,600 ^r	431	50,100	XX	XX	3,120	546,000 ^r
Pressed blocks:										
For livestock	75	NA	56 ^r	NA	16	NA	XX	XX	147 ^r	XX
For water treatment	34	NA	62 ^r	NA	21	NA	XX	XX	117 ^r	XX
Total	109	15,700	118 ^r	14,700 ^r	37	10,000	XX	XX	265 ^r	40,400 ^r
Grand total	4,080	733,000	3,700	284,000 ^r	20,800	1,010,000	17,500	159,000	46,000	2,180,000 ^r
2015:										
Bulk	937	128,000	2,070	102,000	17,600	954,000	17,000	174,000	37,600	1,360,000
Compressed pellets	1,210	220,000	425	67,500	XX	XX	XX	XX	1,630	287,000
Packaged:										
Less-than-5-pound units	238	NA	17	NA	3	NA	XX	XX	257	XX
More-than-5-pound units	1,710	NA	791	NA	508	NA	XX	XX	3,010	XX
Total	1,950	425,000	808	103,000	511	68,500	XX	XX	3,260	597,000
Pressed blocks:										
For livestock	93	NA	80	NA	15	NA	XX	XX	188	XX
For water treatment	36	NA	78	NA	18	NA	XX	XX	132	XX
Total	129	19,700	158	23,000	33	5,410	XX	XX	321	48,100
Grand total	4,220	792,000	3,460	295,000	18,200	1,030,000	17,000	174,000	42,800	2,290,000

^rRevised. NA Not available. XX Not applicable.

¹Data 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	2014		2015	
	Quantity	Value	Quantity	Value
Kansas	2,930	194,000	2,830	207,000
Louisiana	14,800	344,000	12,700	325,000
New York	7,740	577,000	7,320	615,000
Texas	8,010	182,000	7,570	173,000
Utah	2,360	157,000 ^r	2,010	159,000
Other Eastern States ³	8,610	565,000	8,670	636,000
Other Western States ⁴	1,600	165,000 ^r	1,710	175,000
Total	46,000	2,180,000 ^r	42,800	2,290,000
Puerto Rico ^e	45	1,720	46	1,790

^eEstimated. ^rRevised.

¹Data 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	
	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015
Chemical:										
Chloralkali producers	46	2	346	276	554	534	17,300 ^r	16,400	18,200 ^r	17,200
Other chemical	323	327	156	314	1,000	994	678	592	2,160	2,230
Total	369	329	502	591	1,560	1,530	17,900 ^r	17,000	20,400 ^r	19,500
Food-processing industry:										
Meat packers	183	205	40	44	17	25	--	--	240	274
Dairy	145	145	14	8	4	4	--	--	163	157
Canning	152	156	15	17	4	2	--	--	171	175
Baking	143	167	6	5	9	9	--	--	158	181
Grain mill products	101	95	11	10	8	9	--	--	120	114
Other food processing	628	617	147	178	131	79	1	1	907	875
Total	1,350	1,390	233	262	174	129	1	1	1,760	1,780
General industrial:										
Textiles and dyeing	14	10	21	27	3	2	--	--	38	39
Metal processing	4	6	12	4	40	36	--	(4)	56	46
Rubber	2	2	1	(4)	3	1	(4)	(4)	6	3
Oil	96	79	214	149	70	61	20	13	400	302
Pulp and paper	7	6	40	41	24	22	--	--	71	69
Tanning and (or) leather	1	1	14	14	24	23	--	--	39	38
Other industrial	97	84	55	53	209	198	13	(4)	374	335
Total	222	189	356	288	374	343	34	13	986	834
Agricultural:										
Feed retailers and (or) dealers mixers	251	267	185	250	503	332	--	--	939	849
Feed manufacturers	86	62	121	73	307	201	--	--	514	336
Direct-buying end user	26	27	18	20	91	87	--	--	135	134
Total	364	356	324	343	901	620	--	--	1,590	1,320
Water treatment:										
Government (Federal, State, local)	81	83	123	110	155	290	1	1	360	484
Commercial or other	40	37	83	38	118	163	2	1	243	239
Total	121	119	206	148	273	452	3	2	603	723
Ice control and (or) stabilization:										
Government (Federal, State, local)	3	3	1,330	376	15,400	12,600	--	(4)	16,800	13,000
Commercial or other	56	35	330	287	7,310	9,440	--	--	7,690	9,760
Total	59	38	1,660	664	22,700	22,000	--	(4)	24,500	22,700
Distributors:										
Agricultural	86	77	147	108	156	121	--	--	389	306
Grocery wholesalers and (or) retailers	409	381	170	153	129	173	(4)	(4)	708	707
Institutional wholesalers and end users	154	158	72	78	85	131	(4)	(4)	311	367
Water-conditioning	176	122	318	304	9	13	1	1	504	440
U.S. Government resale	(4)	(4)	(4)	(4)	(4)	(4)	--	--	(4)	(4)
Other wholesalers and (or) retailers	1,090	1,160	991	948	472	375	1	(4)	2,550	2,480
Total	1,910	1,890	1,700	1,590	851	813	2	1	4,460	4,300
Other ⁵	121	129	192	200	1,000	825	64	2	1,380	1,160
Grand total	4,520	4,440	5,170	4,090	27,900	26,700	18,000 ^r	17,000	55,600 ^r	52,300

¹Revised. -- Zero.

²Data are rounded to no more than three significant digits; may not add to totals shown.

³The 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.

⁴Because 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 table 6 because of changes in inventory and (or) incomplete reporting.

⁵Less than ½ unit.

⁶Includes exports.

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

(Thousand metric tons)

Destination	2014				2015			
	Evaporated		Rock	Total	Evaporated		Rock	Total
	Vacuum and open pans	Solar			Vacuum and open pans	Solar		
Alabama	48	12	51	111	44	12	56	112
Alaska	1	3	(3)	4	1	3	(3)	4
Arizona	48	74 ^r	1	123 ^r	48	72	1	121
Arkansas	46	7	89	142	45	9	54	108
California	256	698 ^r	67	1,020 ^r	256	659	115	1,030
Colorado	25	98 ^r	37	160 ^r	26	97	34	157
Connecticut	16	76 ^r	201	293 ^r	16	8	628	652
Delaware	7	11	8	26	7	19	76	102
District of Columbia	(3)	13	7	20	--	11	35	46
Florida	129	164 ^r	86	379 ^r	113	144	131	388
Georgia	124	94 ^r	109	327 ^r	138	95	152	385
Hawaii	1	2	--	3	1	2	--	3
Idaho	26	107 ^r	2	135 ^r	27	92	(3)	119
Illinois	358	128 ^r	2,950	3,430	339	120	1,910	2,370
Indiana	243	120 ^r	929	1,290	245	106	711	1,060
Iowa	125	108 ^r	551	784 ^r	194	100	358	652
Kansas	76	43 ^r	970	1,090	85	43	986	1,110
Kentucky	74	5	1,130	1,210	75	5	909	989
Louisiana	99	7	173	279	107	10	175	292
Maine	19	55	102	176	17	3	214	234
Maryland	72	300 ^r	256	628 ^r	72	138	729	939
Massachusetts	40	16	389	445	39	17	721	777
Michigan	258	59 ^r	2,690	3,010	246	31	2,100	2,380
Minnesota	111	181 ^r	868	1,160	116	187	579	882
Mississippi	18	17	146	181	19	5	135	159
Missouri	107	94 ^r	638	839 ^r	96	97	435	628
Montana	2	45 ^r	(3)	47 ^r	1	37	(3)	38
Nebraska	56	47 ^r	27	130 ^r	62	49	27	138
Nevada	12	209 ^r	29	250 ^r	12	187	23	222
New Hampshire	11	7	155	173	10	7	183	200
New Jersey	90	150 ^r	216	456 ^r	97	32	1,110	1,240
New Mexico	22	240 ^r	(3)	262 ^r	26	151	(3)	177
New York	174	37 ^r	3,590	3,800	150	32	3,780	3,960
North Carolina	127	128 ^r	110	365 ^r	125	93	115	333
North Dakota	8	17 ^r	7	32 ^r	6	14	4	24
Ohio	443	57	3,480	3,980	437	51	2,640	3,130
Oklahoma	26	27 ^r	106	159 ^r	26	30	100	156
Oregon	28	51 ^r	1	80 ^r	26	46	(3)	72
Pennsylvania	207	217 ^r	2,520	2,950 ^r	189	70	2,970	3,230
Rhode Island	3	1	47	51	2	1	208	211
South Carolina	44	14	35	93	47	12	60	119
South Dakota	26	49 ^r	6	81 ^r	27	49	5	81
Tennessee	109	6	584	699	101	12	653	766
Texas	328	187 ^r	150	665 ^r	313	186	114	613
Utah	29	164 ^r	53	246 ^r	31	177	39	247
Vermont	3	1	374	378	3	1	340	344
Virginia	98	98 ^r	351	547 ^r	73	77	591	741
Washington	34	229 ^r	(3)	263 ^r	34	219	(3)	253
West Virginia	33	6	373	412	25	6	273	304
Wisconsin	204	181 ^r	2,110	2,490	205	143	1,270	1,620
Wyoming	9	22 ^r	1	32 ^r	4	22	1	27
Other ⁴	65	607 ^r	1,110	1,780 ^r	18	(3)	--	18
Total ⁵	4,520	5,290 ^r	27,900	37,700 ^r	4,420	3,790	25,800	34,000

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}

¹Revised. -- Zero.

¹Data 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 were derived from plant reports at salt production locations. Data may differ from totals shown in table 5 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
2014:				
Bulk	120.75	46.39 ^r	46.66 ^r	9.08
Compressed pellets	177.10	143.88 ^r	XX	XX
Packaged	208.44	126.34 ^r	116.13 ^r	XX
Average ²	180.61	75.35 ^r	48.11	9.08
Pressed blocks	142.68	125.17 ^r	273.75 ^r	XX
2015:				
Bulk	136.00	49.40	54.07	10.27
Compressed pellets	181.89	158.65	XX	XX
Packaged	218.69	127.06	134.05	XX
Average ²	188.87	82.45	56.32	10.27
Pressed blocks	152.82	145.13	164.91	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 COUNTRY¹

(Thousand metric tons and thousand dollars)

Country	2014		2015	
	Quantity	Value ²	Quantity	Value ²
Australia	1	871	1	983
Bahamas, The	1	495	2	772
Bahrain	1	338	1	372
Belgium	8	12,100	6	17,500
Brazil	6	4,020	1	2,580
Canada	804 ^r	70,300 ^r	709	59,100
China	29 ^r	15,800 ^r	59	28,300
Colombia	1	615 ^r	2	860
Costa Rica	2	542	2	610
Dominican Republic	1	326	3	1,010
El Salvador	1	117	1	314
Germany	1	747	3	1,370
Honduras	1	155	1	216
Ireland	1	1,030	1	873
Japan	2	4,410	2	1,500
Korea, Republic of	1	667	1	690
Mexico	44	14,800	26	11,000
Netherlands	1	875	1	775
Panama	1	233	1	302
Saudi Arabia	7	3,110	3	1,500
Singapore	3	4,230	3	6,630
United Arab Emirates	2	782	1	850
United Kingdom	2	862	4	2,540
Other	13 ^r	9,620 ^r	7	8,100
Total	935 ^r	147,000 ^r	841	149,000

^rRevised.

¹Data 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	2014		2015	
	Quantity	Value ²	Quantity	Value ²
Anchorage, AK	3	948	3	1,150
Baltimore, MD	(3)	418 ^r	1	648
Buffalo, NY	38 ^r	8,170 ^r	25	6,180
Charleston, SC	(3)	609 ^r	1	1,060
Chicago, IL	1	364 ^r	4	1,360
Cleveland, OH	359 ^r	17,900 ^r	421	17,200
Detroit, MI	154 ^r	16,600 ^r	89	15,600
El Paso, TX	2	384	2	500
Great Falls, MT	6 ^r	2,190 ^r	3	1,440
Houston, TX	15	5,720	8	2,990
Laredo, TX	25	9,220 ^r	17	7,440
Los Angeles, CA	34 ^r	24,900 ^r	57	35,700
Miami, FL	4	2,190 ^r	5	2,230
New Orleans, LA	12	3,190 ^r	2	776
New York, NY	17	16,800 ^r	20	24,100
Nogales, AZ	4	1,560	4	1,740
Norfolk, VA	3	4,410 ^r	3	4,700
Ogdensburg, NY	20 ^r	3,640 ^r	15	3,260
Pembina, ND	11 ^r	1,530 ^r	4	1,330
Philadelphia, PA	1	444 ^r	1	456
San Diego, CA	2	1,070 ^r	3	1,370
San Francisco, CA	4	2,310	1	890
Savannah, GA	1	755	1	993
Seattle, WA	22 ^r	5,500 ^r	6	2,830
St. Albans, VT	6	906 ^r	4	670
Other ⁴	191 ^r	15,400 ^r	141	12,300
Total	935 ^r	147,000 ^r	841	149,000

^rRevised.

¹Data 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.

³Less than ½ unit.

⁴Unknown but assumed to be rail and (or) truck shipments to Canada through various points of departure. Also includes minor shipments through 19 other customs districts.

Source: U.S. Census Bureau.

TABLE 11
U.S. IMPORTS FOR CONSUMPTION OF SALT, BY COUNTRY¹

(Thousand metric tons and thousand dollars)

Country	2014		2015	
	Quantity	Value ²	Quantity	Value ²
Australia	127	4,640	433	12,900
Bahamas, The	1,010	33,400 ^r	672	22,200
Belgium	12 ^r	1,380 ^r	27	1,950
Bolivia	(3)	12	20	36
Brazil	312 ^r	8,940 ^r	710	16,000
Canada	5,800	191,000	6,140	163,000
Chile	7,890	167,000	8,570	180,000
China	21	2,580 ^r	38	6,140
Colombia	26	964	3	959
Dominican Republic	1	79	26	710
Egypt	560	18,000	671	17,500
France	13	6,040	13	7,260
Germany	111	5,730	170	8,820
India	(3)	215	231	4,110
Ireland	57	4,970	88	4,060
Israel	66	10,100	17	7,940
Italy	157 ^r	6,920 ^r	267	11,700
Korea, Republic of	43	2,270	35	1,780
Mexico	2,390	71,000	1,850	51,700
Morocco	177	10,600	352	16,300
Netherlands	257	7,770	345	10,300
Pakistan	56	4,420 ^r	139	5,750
Peru	722	11,300	456	8,030
South Africa	5	1,370 ^r	1	1,910
Spain	176	8,890	95	2,770
Tunisia	91	1,370	119	1,860
United Kingdom	2	2,130	24	2,540
Vietnam	52	580 ^r	28	534
Other	115 ^r	5,570 ^r	95	8,440
Total	20,200 ^r	589,000 ^r	21,600	578,000

^rRevised.

¹Data 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 only.

³Less than ½ unit.

Source: U.S. Census Bureau.

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

(Thousand metric tons and thousand dollars)

District	2014		2015	
	Quantity	Value ²	Quantity	Value ²
Anchorage, AK	18	687	16	788
Baltimore, MD	1,800	45,300	2,690	69,000
Boston, MA	2,120	42,300	1,970	43,800
Buffalo, NY	91	3,950	169	5,330
Charleston, SC	151	2,830	101	3,120
Chicago, IL	1,130	31,200	1,260	27,800
Cleveland, OH	370	13,900	427	8,580
Columbia-Snake, OR	136	4,890	118	4,640
Detroit, MI	1,830	49,200	1,570	31,500
Duluth, MN	134	12,900	86	9,160
Great Falls, MT	(3)	87	19	71
Houston-Galveston, TX	6	1,960 ^r	21	2,560
Laredo, TX	297	3,320	435	3,300
Los Angeles, CA	202 ^r	6,360 ^r	213	7,120
Miami, FL	2	750	3	1,190
Milwaukee, WI	1,420	31,400	1,290	22,600
Minneapolis, MN	334	6,740	463	8,140
Mobile, AL	9	5,600	6	4,050
New Orleans, LA	2,180 ^r	71,000 ^r	1,180	40,900
New York, NY	3,230	79,900 ^r	3,880	93,400
Nogales, AZ	72	1,200	50	1,900
Norfolk, VA	236	10,700	237	10,400
Ogdensburg, NY	97 ^r	41,000 ^r	122	33,300
Pembina, ND	83	5,670	70	7,020
Philadelphia, PA	2,070	51,000	2,670	65,300
Portland, ME	1,090	22,400	1,160	24,000
Providence, RI	257	6,730	703	17,700
San Diego, CA	57	2,510	45	2,040
San Francisco, CA	97	3,180	116	3,980
San Juan, PR	27	1,110	4	1,140
Savannah, GA	52	3,210	111	3,010
Seattle, WA	85	4,560	25	4,220
St. Albans, VT	41	2,560 ^r	11	1,610
St. Louis, MO	2	27	(3)	92
Tampa, FL	314	12,900 ^r	283	11,000
Wilmington, NC	147	6,020	98	3,430
Other ⁴	(3)	233 ^r	11	392
Total	20,200 ^r	589,000 ^r	21,600	578,000

¹Revised.

¹Data 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 only.

³Less than ½ unit.

⁴Includes imports through six other customs districts.

Source: U.S. Census Bureau.

TABLE 13
SALT: WORLD PRODUCTION, BY COUNTRY^{1, 2}

(Thousand metric tons)

Country ³	2011	2012	2013	2014	2015 ^e
Afghanistan, rock	186 ^e	147	124	35	40
Algeria, brine and sea	238	178	173	193	200
Angola ^c	40	40	40	40	40
Argentina	1,889	1,844	1,652	1,500 ^e	1,500
Armenia	36	38	31	30	30
Australia	12,250	12,500	12,900	13,000	11,000
Austria, mine output	1,143	958	1,115	1,154	1,100
Azerbaijan, marketable	5	5	5	5	5
Bangladesh, sea ⁴	1,430	1,439	1,439	1,461	1,400
Belarus	2,576	2,177	2,625	2,510 ^e	2,500
Bolivia, rock	2	2	2	2	2
Bosnia and Herzegovina	834	862	857	921	900
Botswana ⁵	447	389	521	515	500
Brazil:					
Rock	1,335	1,403	1,349	1,300 ^e	1,400
Sea	4,829	6,079	5,926	6,000 ^e	6,100
Total	6,164	7,482	7,275	7,300 ^e	7,500
Bulgaria	2,200	2,100	2,100	2,200 ^e	2,200
Burma, rock	NA ^r	207 ^r	169 ^r	188 ^r	190
Canada	12,625	10,845	12,210	13,876	12,500
Chile	9,966	8,057	6,577	10,533	11,800
China	67,420	69,120	73,676	70,497	70,000
Colombia:					
Rock	306	229	319	340	340
Sea	152	78	113	106	110
Total	458	307	432	446	450
Croatia	56	46	43	33	35
Cuba	281	216	222	243	240
Denmark ^e	600	600	600	600	600
Djibouti ^c	8	4	1	1	1
Egypt	2,809	2,802	2,194	2,200 ^e	2,200
Eritrea, sea ^c	180	240	290	290	290
Ethiopia, rock ^{c, 4}	388 ⁶	440	470	450	450
France	5,430 ^e	5,457	5,893	5,809	6,000
Georgia ^c	28	29	30	28	29
Germany:					
Evaporated, includes sea	329	301	297	274	280
Industrial brines	8,066	7,515	8,073	7,709	7,200
Rock and other brines	9,048	6,840	9,026	5,355	5,000
Total	17,443	14,656	17,396	13,338	12,500
Ghana ^e	250	250	250	250	250
Greece	175	192	190	146	150
India: ^e					
Rock	2	2	2	-- ^r	--
Other	16,000	17,000	18,000	17,000	17,000
Total	16,000	17,000	18,000	17,000	17,000
Indonesia	650	700	720	720	720
Iran ⁷	2,776	2,962	2,079	2,100 ^e	2,200
Iraq	136	143	182	180 ^e	180
Israel, marketed	410	415	442	460	460
Italy ⁸	2,912	3,098	2,879	1,501	1,600
Japan	1,153	1,077	1,052	1,000 ^e	1,000
Jordan:					
Brine	32	32	32	32	32
Dead Sea ⁹	1	1	1	1	1
Total	33	33	33	33	33
Kazakhstan	364	464	531	597	600
Kenya, refined	254	231	207	223	230
Korea, North	500	500	500	500	500

See footnotes at end of table.

TABLE 13—Continued
SALT: WORLD PRODUCTION, BY COUNTRY^{1,2}

(Thousand metric tons)

Country ³	2011	2012	2013	2014	2015 ^c
Korea, Republic of	372	309	421	304	310
Kuwait ^c	15	15	15	14	14
Kyrgyzstan ^c	1	1	1	1	1
Laos, rock	23	12	6	9	9
Lebanon ^c	20	20	15	15	15
Libya ^c	20	30	30	30	30
Madagascar ^c	85	85	85	85	85
Malta, solar ^c	1	1	1	1	1
Mauritania ^c	1 ⁶	1	1	1	1
Mauritius, sea ^c	4	4	4	4	4
Mexico	8,812	8,730	9,461	10,251	10,500
Mongolia, mine output	2	2	2	2	2
Montenegro, sea water evaporate	10	16	10	--	--
Morocco:					
Rock	721	730	489	439	440
Sea	25	25	20	20	20
Total	746	755	509	459	460
Mozambique, sea ^c	150	150	150	160	160
Namibia, sea	738	810	827	797	800
New Zealand ^c	95	95	100	100	100
Niger ^c	30	30	30	30	30
Oman ^c	12	13	12	13	13
Pakistan: ⁵					
Rock	2,173	2,091	2,263	2,241	2,200
Sea	315	292	297	300	300
Total	2,488	2,383	2,560	2,541	2,500
Panama, sea	61	37	61	57	60
Peru	1,565	1,200	1,205 ^r	1,175 ^r	1,200
Philippines, sea	720	775	993	1,016	1,000
Poland:					
Evaporated	415	658	686	642	640
Recovered from brine	2,633	2,891	2,735	2,800	2,800
Rock	1,234	793	1,320	775	770
Total	4,282	4,342	4,741	4,217	4,210
Portugal, rock	631	520	474	70 ^r	70
Romania: ^c					
Rock	40	40	40	40	40
Other	2,500	2,200	2,200	2,200	2,200
Total	2,540	2,240	2,240	2,240	2,240
Russia ^c	1,800	1,850	1,900	1,900	1,900
Saudi Arabia	1,890	1,611	1,900	1,990	1,990
Senegal	258	237	243	245	250
Serbia	23	17	14	13	13
Slovenia	4	6	3	--	--
South Africa	381	399	479	494	490
Spain:					
Rock	3,096	2,786	2,902	2,900 ^e	2,900
Sea and evaporated	1,407	1,323	1,376	1,400 ^e	1,400
Total	4,503	4,109	4,278	4,300 ^e	4,300
Sri Lanka	62	64	37	102	100
Sudan	11	26	21	37	35
Switzerland	501	528	652	390	400
Syria ^c	71 ⁶	34 ⁶	30	30	30
Tajikistan	27 ^e	28	32	32	30
Tanzania	32	34	34	75	70
Thailand, rock	1,359	1,364	1,300	1,381	1,300
Tunisia, sea	1,181	1,132	1,146	698 ^r	700
Turkey	6,546	5,255	5,565	5,932	6,000
Turkmenistan ^c	215	220	225	230	230

See footnotes at end of table.

TABLE 13—Continued
SALT: WORLD PRODUCTION, BY COUNTRY^{1, 2}

(Thousand metric tons)

Country ³	2011	2012	2013	2014	2015 ^e
Uganda ^c	15	15	15	15	15
Ukraine	5,938	6,189	5,796	4,800 ^e	6,100
United Kingdom ¹⁰	6,060	6,152	6,601	6,600 ^e	5,000
United States, including Puerto Rico:					
United States:					
Brine	19,200	16,900	17,400	17,300	16,900
Rock	18,500	13,300	14,800	20,000	20,400
Solar	3,230	2,760	3,580	3,900	3,590
Vacuum and open pan	4,080	4,240	4,130	4,140	4,190
Total	45,000	37,200	39,900	45,300	45,100
Puerto Rico ^e	45	45	45	45	45
Total, United States and Puerto Rico ^e	45,000	37,200	40,000	45,300	45,100
Vietnam	862	1,178	719	766	770
Yemen ^e	75	75	75	75	75
Grand total	273,000 ^r	261,000 ^r	273,000	273,000 ^r	270,000

^eEstimated. ^rRevised. NA Not available. -- Zero.

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

²Includes data available through October 5, 2017.

³Salt was produced in Guinea, Iceland, Mali, and Venezuela, but available information was inadequate to make reliable estimates of output levels. Some salt brine production data for manufacture of chlorine, caustic soda, and soda ash were not reported because of incomplete reporting by many countries.

⁴Year ending June 30 of that stated.

⁵From natural soda ash production.

⁶Reported figure.

⁷Year beginning March 21 of that stated.

⁸Does not include production from Sardinia and Sicily, which is estimated to be 200,000 metric tons per year.

⁹Extracted from Dead Sea for therapeutic use; contains bromide, calcium, chloride, magnesium, and potassium salts.

¹⁰Year ending July 15 of that stated.