



2012 Minerals Yearbook

SALT

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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 2012 decreased by 17% to 37.2 million metric tons (Mt) compared with that of 2011 (table 1). According to U.S. Geological Survey (USGS) data for 2012, 28 companies operated 61 salt-producing plants in 16 States. Of these, 8 companies and 12 plants produced more than 1 Mt each and accounted for 78% and 62%, respectively, of total U.S. production and accounted for 85% and 30%, respectively, of total value. Several companies and plants produced more than one type of salt. In 2012, 11 companies (25 operations) produced salt brine; 11 companies (15 operations), rock salt; 10 companies (13 operations), solar-evaporated salt; and 6 companies (17 operations), vacuum pan salt.

The five leading States were, in descending order of total salt sold or used, Louisiana with 33%; Texas, 22%; New York, 14%; Kansas, 7%; and Utah, 4%. Other Eastern States (Alabama, Michigan, Ohio, Tennessee, Virginia, and West Virginia) accounted for 15% of the domestic total of salt sold or used. Other Western States (Arizona, California, Nevada, New Mexico, and Oklahoma) represented 4% (table 5). The amount of salt delivered to every State and the District of Columbia in 2012 is reported in table 7.

Salt, also known as sodium chloride, comprises 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-colored 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 are developed by the 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, 2012. 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.

Of the 28 companies to which a canvass form was sent, 23 responded, representing 83% of the totals shown in this report. Data for the nonrespondents were estimated based on their prior responses to previous annual surveys, the 2012 production estimate survey, or brine production capabilities for chloralkali manufacture based upon published chlorine production capacities [1.75 metric tons (t) of salt required per ton of chlorine capacity].

The structure of the U.S. salt industry has changed throughout the years. In 1970, 50 companies operated 95 salt-producing plants in the United States. Market competition, increased energy and labor costs, less expensive imports, fluctuations in currency exchange rates, and an excess of production capacity (resulting in the downsizing of the industry through mergers and acquisitions) reduced the number of operations in the industry to 28 companies and 61 plants by 2012.

In October, Morton Salt announced the long-term layoff of 44 employees in Painesville, OH. Originally, 78 employees were placed on temporary leave in September, but 44 of these workers were not called back because of economic conditions. The parent company, K+S Group AG (Kassel, Germany) blamed low sales of deicing salt as a major factor in its decision. The layoffs were expected to last more than 6 months (McFee, 2012).

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

Rock Salt.—Rock salt is mined by the room-and-pillar method, which is similar to that used in coal and trona mining. Additional information about rock salt mining can be found in the salt chapter in Minerals Yearbook 2006.

Because most rock salt was used for deicing, the operating rate of rock salt facilities fluctuated with the demand for deicing salt, again 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 work week

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 2012, rock salt production was 13.3 Mt, a 28% decrease compared with the revised 2011 total of 18.5 Mt.

Solar Evaporation.—Solar salt production was 2.76 Mt in 2012, which was a 15% decrease from the revised 2011 total of 3.23 Mt. Solar evaporation uses the wind and the sun to evaporate the water and is an effective method of producing solar salt in areas of high evaporation and low precipitation. Additional information about solar salt production can be found in the salt chapter of the 2006 Minerals Yearbook.

Because evaporation rates must exceed the 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.

Solution Mining.—U.S. salt brine production in 2012 was 16.9 Mt, which was about 12% less than the 2011 total of 19.2 Mt. The brine production capacities for table 2 are difficult to derive because they are based on the variabilities of the injection rate of the solvent and the solubility 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. Brine capacity is assumed to be equal to the amount of annual brine production. In order to avoid revealing company proprietary data, individual company brine capacities are not included in table 2.

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. Additional information about salt brine production can be found in the salt chapter of the 2006 Minerals Yearbook.

Mechanical Evaporation.—Vacuum pan salt is not mined but is a type of salt produced using mechanical evaporation technology. Vacuum pan salt production was 4.24 Mt in 2012, which was a 4% increase compared with the 2011 total of 4.08 Mt. The 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 are usually easier to establish because of the 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. The Alberger process is a modified grainer operation that produces cubic salt with some flake salt.

Consumption

In 2012, apparent consumption (salt sold or used plus imports minus exports) was 44 Mt, whereas reported consumption (sales or use as reported by the salt companies, including their imports and exports) was 36.9 Mt. Although these two measures of consumption are not necessarily expected to be identical, they normally are similar. Apparent consumption normally is greater than reported consumption because apparent consumption includes additional quantities of salt imported and exported by nonsalt-producing companies, such as some chloralkali operations and salt distributors. Reported consumption statistics are those reported only by the domestic salt producing companies.

The 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 2012 reported percentage distribution of salt by major end use was, in descending order, chemicals, 45%; ice control, 30%; distributors (grocery and other wholesalers and retailers and so forth), 10%; food processing, 5%; agricultural, 4%; general industrial, 3%; other uses combined with exports, 2%; and primary water treatment, 1% (table 6). Distributors represented a substantial share of salt sales by the salt industry; all this salt is ultimately resold to many different end users. For a more complete analysis of end-use markets, specific sectors of distribution 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 the packaging and applications of salt. Salt for human consumption is packaged in different sized containers for several specialized purposes. Table salt may contain 0.01% potassium iodide as an additive, which provides a source of iodine that is essential to the oxidation processes in the body. Kosher salt, sea salt, condiment salt, and salt tablets are special varieties of salt.

Chemical Industry.—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 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 competition 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 16.8 Mt in 2012, of which 16 Mt was for chloralkali manufacture and 0.8 Mt was for other chemical uses (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 considered to be the first generation of products made from salt. These two chemicals are further used to manufacture other materials, which are considered to be 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, 9%.

The industry average ratio of 1.75 t of salt is required to produce 1.0 t of chlorine and 1.1 t of coproduct sodium hydroxide. Reported consumption of total domestic and imported salt for chlorine manufacture was 16 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 6% of domestic salt sales for the entire chemical sector and only 2% of total domestic salt consumption. 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. 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 was for sodium borohydride production, which is the feedstock for sodium dithionite 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. Other potential uses of sodium metal are in the remediation of chemical weapons, chlorofluorocarbons, pesticides, and polychlorinated biphenyls.

Ice Control and Road Stabilization.—In 2012, U.S. consumption of salt for this application was 11.1 Mt, which was about 43% less than that of 2011. Additional imports of rock salt by the salt companies were available if needed during 2012.

Snow and ice accumulation on roadways are treated in at least four ways. Anti-icing is the application of chemicals to roads prior to when the snow-pavement bond begins. This practice

emphasizes the prevention of this bonding rather than reaction. Deicing is the practice of removing the snow or ice after it has bonded to the road. This involves plowing and continued application of chemicals and abrasives. Plowing normally begins when there is an inch or more of snow covering the road. Pre-treatment is a form of anti-icing in which chemicals (calcium chloride, magnesium chloride, sodium chloride, calcium-magnesium acetate, and potassium acetate) are applied to the road up to 48 hours before adverse weather begins, to prevent a bond from developing between the pavement and the snow or ice. Pre-wetting pertains to treating the dry deicing chemicals with liquids prior to being applied to the roads. This hastens the activation of the chemicals before they are spread on the roads (Virginia Department of Transportation, undated).

The use of salt brine for road deicing has been increasing for the past several years. Regular rock salt can be dissolved to create the salt brine solution. Salt brine is used as a pre-treatment prior to ice or snow accumulation. After the solution is applied, it is possible that up to three-quarters of an inch of new snow can melt immediately (Caldwells Patch, The, 2011).

Salt is an inexpensive, widely available, and effective ice control agent. It does, however, become less effective as the temperature decreases below about -9.5° to -6.5 °C (15° 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° and 0 °C (25° 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 usage, spring rains and thaws usually dilute the concentrations of sodium in the area where salt was applied.

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.

The Attorney General of Ohio filed an antitrust lawsuit in March charging that two road-salt companies colluded during contract bidding to keep competitors out of the Ohio market for a decade. The suit was filed against Cargill Deicing Technology and Morton Salt Co. in Tuscarawas County, OH, capping a series of State investigations that began in 2008. Both companies denied the allegations, asserting that there had been no communication between the companies and, therefore, could be no collusion (Eggert, 2012).

The winters of 2010–11 and 2011–12 were less severe than the 2009–10 winter. Rock salt production and sales in 2012 decreased significantly, mostly in response to relatively mild winters with municipalities and State transportation departments again reporting high inventories during 2012 even as they prepared for the 2012–13 winter weather. Consumers benefited

with savings on salt costs, but salt producers experienced decreased sales throughout the year.

Only a trace amount of snow fell in December 2011, significantly less than in recent years and by mid-January 2012, concerns began to be raised about excess supplies of salt and a lack of storage facilities for the excess salt (Kelley, 2011; Liske, 2012). By late winter and early spring 2012, some governments were reporting savings on salt costs and overtime pay for snow removal (Wynn, 2012). Near the end of September, reports confirmed that many localities continued to have full silos from the spring and were not planning early winter purchases for the 2012–13 winter season (Bopp, 2012). This second consecutive winter of lower than average use of salt for treating roads was the primary cause of the steep decline in salt consumption in 2012 compared with 2011.

Salt is 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.

Distributors.—A large amount 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 3.52 Mt in 2012.

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, textiles and dyeing, tanning and leather treatment, and rubber manufacture. Total salt sold to these sectors was 1.05 Mt in 2012.

In oil and gas exploration, salt is an important component of drilling fluids 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 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.

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

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.

Although most health professionals recommend reduced salt in people’s diets, the debate continues. A pediatric study called into question the recommended salt intake for adults and children. A cardiologist concluded that cutting back on salt does lower blood pressure, but it may not reduce the risk of dying early. The study further stated that low salt intake may cause other physiological changes, such as increased resistance to insulin, which can set the stage for diabetes and increase the risk of death from heart disease (Moyer, 2012). Meanwhile, the American Heart Association supported the World Salt Awareness Week, in March, recommending that salt consumption should be limited to 1,500 milligrams a day (Morey, 2012). An Australian study from Deakin University addressed the labeling of reduced-salt foods and how labels affect attitudes toward these foods. The study concluded that consumers were less attracted to foods labeled low salt because of expectations of poor taste in low-salt food (Deakin University, 2012).

The U.S. Department of Health and Human Services reported that 77% of the sodium intake by people comes from processed and prepared foods with 65% coming from food bought at retail stores and another 25% from meals purchased in restaurants where the actual sodium contents can vary. The Centers for Disease Control and Prevention (CDC) indicated that 10 types of food account for 44% of the sodium intake by people. They are, in declining order of sodium content, breads and rolls, cold cuts and current meats (deli or packaged ham or turkey), pizza, fresh and processed poultry (chicken nuggets and tenders), soups, sandwiches (cheeseburgers), cheese, pasta dishes (excluding macaroni and cheese), meat mixed dishes (meat loaf with tomato sauce), and snacks (chips, pretzels, and popcorn). Other sources of sodium intake include salt added while cooking (5%), salt added while eating (6%), and from natural sources (12%) (Los Angeles Times, 2010; Ruggles, 2012; Centers for Disease Control and Prevention, 2012).

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 1.77 Mt in 2012.

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 would lead 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 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 milled flour and rice, 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).

Many consumers are confused with the words salt and sodium and often think the two words are synonymous, but they are not. Medical experts agree that the daily sodium intake per person should be 2,300 milligrams (mg) or less, which is the equivalent of one teaspoon of salt, or 5.8 grams (g). Each gram of salt contains 0.4 g of sodium, and one gram of sodium is equal to 2.5 g of salt (Downs, 2010; ScienceDaily, 2010).

Many food processors began to use sea salt in their foods as a replacement for vacuum pan salt (table salt) as a more natural and healthy alternative. By weight, sea salt and table salt contain about the same amount of sodium chloride, and both have the same basic nutritional value. Sea salt is advertised and marketed as containing beneficial trace elements from seawater. According to the Mayo Clinic, these trace elements are virtually insignificant for human health but do add some flavor, larger crystal size, and color to the sea salt compared with the table salt that eliminates trace minerals and adds iodine and various free-flowing agents (Phillips, 2010; Zeratsky, 2010).

Agricultural Industry.—Barnyard and grazing livestock need supplementary salt rations to maintain proper nutrition. In 2012, 1.46 Mt of salt was sold to the agricultural industry. Animal feed and water conditioning salt are made into 22.7-kilogram (50-pound) pressed 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.

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. 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 2012, 446,000 t of salt was sold for primary water treatment and an additional 472,000 t was sold for water conditioning distribution.

Stocks

Because bulk salt is stored at many different locations, such as plants, ports, terminals, and warehouses, data on the quantity of salt stockpiled by the salt industry were not reliable enough to formulate accurate inventory totals; however, yearend stocks of producers were estimated to be 2 Mt, and consumer inventories also were estimated to be high. Most of these inventories were imported rock salt and solar salt. Many salt distributors, municipalities, road deicing contractors, salt producers, and States stockpiled additional quantities of salt in anticipation of adverse weather conditions. Deicing salt inventories during late 2012 to early 2013 were very large because the winter weather was unseasonably mild throughout most of the country. For the reasons discussed above, salt stocks are assumed to be the difference between salt production and salt sold or used in calculating apparent consumption.

Transportation

Because the locations of the salt supplies are not often near consumers, transportation may be an important cost. 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. As salt is packaged, handled, and shipped in smaller units, the costs increase and are reflected in higher selling prices.

Transportation costs significantly add to the price of salt. In some cases, shipping costs are higher than the actual value of the salt. Ocean vessels can transport greater quantities of salt than barges, trains, or trucks. Transoceanic imports of salt have been increasing in some areas of the United States because they are more cost competitive than 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.

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 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 values, as collected by the USGS and listed in table 8, represent a national average 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. The trade tables in this report list the previous and current identification codes for salt. 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 2012, the United States exported 809,000 t of salt; this was a 4% decrease compared with that of 2011 (table 9). In 2012, most exports (90%) were to Canada. Salt was shipped to 94 countries through 38 customs districts; the Buffalo, NY, district exported the most and represented 54% of the U.S. total (table 10). Based on U.S. Census Bureau statistics, the United States imported 9.88 Mt of salt from 54 countries in 2012, which was 29% less than was imported during 2011 (table 11). Canada was the leading source of imports, representing about 40% of total imports, followed closely by Chile (37%).

Table 12 lists the imports of salt by customs districts. Of the 40 customs districts that imported salt in 2012, the Detroit, MI, customs district was the largest in terms of tonnage, accounting for about 14% of the total, followed by New York, NY (10%); Boston, MA (9%); Philadelphia, PA (8%); Milwaukee, WI (8%); Chicago, IL (7%); Portland, ME (7%); and Baltimore, MD (7%). The quantity of salt imports was about 12 times that of exports. Net salt imports also represented about 21% 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 113 nations based on reported and estimated information. In 2012, the total estimated world production decreased to about 259 Mt. The United States remained a leading salt-producing country, representing 14% of total world output. China has rapidly increased its production. In 2012, estimated salt production in China was about 70 Mt, making it the leading salt producer in the world, with about 27% of total world output.

Most countries possess some form of salt production capability, with production levels set to meet their own domestic requirements and with additional quantities available for export to other countries. Many developing nations tend to develop their agricultural resources to feed their populations first. Utilization of easily extractable mineral resources follows, and

salt is one of the first mineral commodities to be mined. Some countries, such as the United States, import a substantial amount of salt to meet total demand requirements because of economic factors, as previously discussed.

In October, Compass Minerals, Inc. announced the purchase of mining rights to approximately 100 Mt of salt reserves in the Chilean Atacama Desert. The new assets could enhance the company’s North American highway deicing business as well as its consumer and industrial businesses. The company stated that the Chilean reserves were of the highest quality in one of the lowest cost mining regions in the Western Hemisphere (Compass Minerals, Inc., 2012).

K+S Group, the leading salt-producing company in the world, announced the first salt shipment from its Chilean division to China. Santiago-based Sociedad Punta de Lobos shipped 150,000 t of salt to customers in China’s chemical industry in an attempt to break into the Chinese market (Weiss, 2012).

Outlook

The U.S. continued to be one of the leading countries in terms of salt production, consumption, and world trade. 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, any increase in energy prices is likely to reduce chlorine manufacture as well as salt brine usage. Solar salt and vacuum pan salt production and consumption have been constant and are expected to remain stable. U.S. salt production is expected to be between 40 Mt and 45 Mt through 2015. Rock salt production and consumption are heavily dependent on the severity of winter weather. Because many municipalities had sufficient inventories on hand for the 2012–13 winter season, less rock salt was produced in 2012. 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.

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. If energy prices increase, 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 in accordance with population growth. U.S. total salt production is expected to be an estimated 42 Mt in 2013.

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TABLE 1
SALIENT SALT STATISTICS¹

(Thousand metric tons and thousand dollars)

	2008	2009	2010	2011	2012
United States:					
Production:²					
Brine	18,900	17,800	18,500	19,200	16,900
Rock	20,900	20,300	17,600	18,500 [†]	13,300
Solar	4,070	3,880	3,120	3,230 [†]	2,760
Vacuum and open pans	4,200	4,030	4,100	4,080	4,240
Total	48,000	46,000	43,300	45,000	37,200
Sold or used by producers:					
Quantity	47,400	43,100	43,500	45,500	34,900
Value	1,690,000	1,750,000	1,690,000	1,770,000	1,460,000
Exports:					
Quantity	1,030	1,450	595	846	809
Value	65,900	74,100	69,300	87,500	90,300
Imports for consumption:					
Quantity	13,900	14,700	12,900	13,800	9,880
Value	282,000	337,000	322,000	367,000	292,000
Consumption:					
Apparent ³	60,200	56,400	55,800	58,500	44,000
Reported	53,100	45,000	48,600	48,000 [†]	36,900
World, production	261,000[†]	264,000[†]	269,000[†]	272,000[†]	261,000[‡]

[†]Estimated. [†]Revised.

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 2012

(Thousand short tons)

Company	Rock	Solar	Vacuum and open pans	Brine
American Rock Salt Co., Hampton Corners, NY	4,500	--	--	--
California Supreme Salt, LLC, Twentynine Palms, CA ¹	--	15	--	--
Cargill, Inc.:				
Akron, OH	--	--	350	(2)
Avery Island, LA	2,700	--	--	(2)
Breux Bridge, LA	--	--	200	--
Cleveland, OH	4,000	--	--	--
Freedom, OK	--	300	--	--
Lake Point, UT	--	800	--	--
Lansing, NY	2,400	--	--	--
Hutchinson, KS	--	--	450	--
Newark, CA	--	750	150	(2)
St. Clair, MI	--	--	425	--
Watkins Glen, NY	--	--	450	--
Corpus Christi Brine Services, Inc., Benavides, TX	--	--	--	(2)
Detroit Salt Co. LLC, Detroit, MI	1,500	--	--	--
Dow Chemical Co., The:				
Freeport, TX	--	--	--	(2)
Plaquemine, LA	--	--	--	(2)
E.I. duPont de Nemours, New Johnsonville, TN	--	--	230	--
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)
Lyons Salt Co., Lyons, KS	600	--	--	--
Moab Salt, Inc., Moab, UT	--	250	--	--
Morton International, Inc.:				
Fairport, OH	2,000	--	--	--
Glendale, AZ	--	150	--	--
Grand Saline, TX	400	--	150	--
Grantsville, UT	--	500	--	--
Manistee, MI	--	--	360	--
Rittman, OH	--	--	600	--
Silver Springs, NY	--	--	375	(2)
South Hutchinson, KS	--	--	350	--
Weeks Island, LA	1,800	--	--	(2)
Mosaic Company, The, Hersey, MI ³	--	--	300	--
New Mexico Salt and Mineral Corp., Loving, NM	--	100	--	--
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., McIntosh, AL	--	--	--	(2)
PB Energy Storage, Inc. ⁶				
Dale, NY	--	--	--	(2)
Napoleonville, LA	--	--	--	(2)
PPG Industries, Inc.:				
Lake Charles, LA	--	--	--	(2)
New Martinsville, WV	--	--	--	(2)
Redmond Clay & Salt Co., Inc., Redmond, UT	150	--	--	--
Searles Valley Minerals, Inc., Trona, CA	--	200	--	--
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 2012

(Thousand short tons)

Company	Rock	Solar	Vacuum and open pans	Brine
Texas Brine Corp.:				
Beaumont, TX	--	--	--	(2)
Chacahoula, LA	--	--	--	(2)
Clemville, TX	--	--	--	(2)
Corpus Christi, TX	--	--	--	(2)
Houston, TX	--	--	--	(2)
LaPorte, TX	--	--	--	(2)
Wyoming, NY	--	--	--	(2)
US Salt L.L.C., Watkins Glen, NY	--	--	335	(2)
Union Texas Products Corp., Plaquemine, LA	--	--	--	(2)
United Salt Corp.:				
Baytown, TX	--	--	400	(2)
Carlsbad, NM	--	400	--	--
Hockley, TX	150	--	--	--
Saltville, VA	--	--	200	--
Total production capacity	25,200	5,170	5,750	20,400

-- Zero.

¹Formerly Superior Salt Co.

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, oil field chemicals, etc. Total brine production capacity is the quantity of brine produced for the year.

³Sells salt to North American Salt Co.

⁴Owned by Compass Minerals, Inc.

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

⁶Associated with Texas Brine Corp.

Source: U.S. Geological Survey.

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
2011:					
Bulk	949	2,390 [†]	18,000 [†]	19,200	40,500
Compressed pellets	1,220	337	XX	XX	1,560
Packaged	1,790	429	438	XX	2,650
Pressed blocks	127	75	52	XX	254
Total	4,080	3,230[†]	18,500[†]	19,200	45,000
2012:					
Bulk	1,020	2,070	13,100	16,900	33,100
Compressed pellets	1,190	268	XX	XX	1,460
Packaged	1,900	376	152	XX	2,430
Pressed blocks	123	46	47	XX	215
Total	4,240	2,760	13,300	16,900	37,200

[†]Revised. 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
2011:										
Bulk	763	82,400	2,680 ^r	64,100 ^r	18,000 ^r	653,000 ^r	19,200	156,000	40,600	955,000
Compressed pellets	1,230	214,000	379	60,200	XX	XX	XX	XX	1,610	274,000
Packaged:										
Less-than-5-pound units	250	NA	49	NA	57	NA	XX	XX	356	XX
More-than-5-pound units	1,630	NA	639	NA	447	NA	XX	XX	2,720	XX
Total	1,890	378,000	688	67,400 ^r	504 ^r	54,000 ^r	XX	XX	3,080	500,000
Pressed blocks:										
For livestock	118	NA	111	NA	50	NA	XX	XX	279	XX
For water treatment	9	NA	3	NA	1	NA	XX	XX	13	XX
Total	127	17,900	114	16,300	51	8,480	XX	XX	291	42,600
Grand total	4,000	692,000	3,860 ^r	208,000 ^r	18,500	715,000 ^r	19,200	156,000	45,500	1,770,000
2012:										
Bulk	1,020	99,600	1,580	62,500	11,100	397,000	16,900	142,000	30,600	701,000
Compressed pellets	1,220	213,000	331	52,200	XX	XX	XX	XX	1,550	265,000
Packaged:										
Less-than-5-pound units	482	NA	86	NA	(3)	NA	XX	XX	568	XX
More-than-5-pound units	1,350	NA	479	NA	150	NA	XX	XX	1,980	XX
Total	1,830	380,000	565	62,900	150	17,700	XX	XX	2,550	461,000
Pressed blocks:										
For livestock	110	NA	83	NA	43	NA	XX	XX	236	XX
For water treatment	14	NA	4	NA	(3)	NA	XX	XX	19	XX
Total	125	17,300	87	12,500	44	7,500	XX	XX	255	37,300
Grand total	4,200	710,000	2,560	190,000	11,300	422,000	16,900	142,000	34,900	1,460,000

^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 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.

³Less than ½ unit.

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

(Thousand metric tons and thousand dollars)

State	2011		2012	
	Quantity	Value	Quantity	Value
Kansas	3,060	186,000	2,570	175,000
Louisiana	14,300	234,000	11,600	172,000
New York	6,520	452,000	4,800	383,000
Texas	9,330	180,000	7,790	161,000
Utah	2,660	126,000	1,380	99,600
Other Eastern States ³	8,190	485,000	5,340	346,000
Other Western States ⁴	1,440	109,000	1,420	128,000
Total	45,500	1,770,000	34,900	1,460,000
Puerto Rico ⁶	45	1,500	45	1,500

⁶Estimated.

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 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	Standard industrial classification	Vacuum and open pans		Solar		Rock		Brine		Total ³	
		2011	2012	2011	2012	2011	2012	2011	2012	2011	2012
Chemical:											
Chloralkali producers	2812	86	72	316	312	660	333	16,400	15,300	17,500	16,000
Other chemical	28 (excludes 2812, 2899)	255	285	173	183	598	301	--	55	1,030	824
Total		341	357	489	495	1,260	635	16,400	15,300	18,500	16,800
Food-processing industry:											
Meat packers	201	208	193	29	35	23	20	--	--	260	248
Dairy	202	162	155	11	13	6	5	--	--	179	173
Canning	2091, 203	151	153	24	20	20	9	--	--	195	182
Baking	205	143	143	6	6	12	11	--	--	162	160
Grain mill products	204 (excludes 2047)	103	113	8	11	7	8	--	--	118	132
Other food processing	206-208, 2047, 2099	645	676	121	139	87	60	1	3	854	877
Total		1,410	1,430	200	222	155	112	1	3	1,770	1,770
General industrial:											
Textiles and dyeing	22	16	16	25	23	5	3	2	--	49	41
Metal processing	33, 34, 35, 37	4	4	12	12	27	37	--	(4)	44	53
Rubber	2822, 30 (excludes 3079)	2	4	(4)	(4)	2	3	--	(4)	5	7
Oil	13, 29	66	111	157	211	85	73	15	46	322	441
Pulp and paper	26	7	5	43	41	17	15	--	--	67	61
Tanning and (or) leather	311	4 ^r	2	13	13	25	21	--	--	42	36
Other industrial	XX	126	125	109	170	198	117	--	1	433	412
Total		226	266	361	470	359	268	17	47	962	1,050
Agricultural:											
Feed retailers and (or) dealers mixers	5159	328	324	274	244	571 ^r	438	--	--	1,170	1,010
Feed manufacturers	2048	58	70	93	88	286	233	--	--	438	392
Direct-buying end user	02	7	2	13	6	75	54	--	--	95	62
Total		393	396	379 ^r	339	933 ^r	726	--	--	1,710	1,460
Water treatment:											
Government (Federal, State, local)	2899	65	74	102	138	47	84	10	11	225	306
Commercial or other	2899	28	36	38 ^r	60	20 ^r	40	1	3	87	140
Total		93	111	140 ^r	198	67	124	11	14	311	446
Ice control and (or) stabilization:											
Government (Federal, State, local)	9621	10	4	283 ^r	236	16,000	8,650	1 ^r	--	16,300	8,890
Commercial or other	XX	74	70	331 ^r	211	2,860 ^r	1,930	--	--	3,260	2,210
Total		84	74	613 ^r	447	18,900 ^r	10,600	1 ^r	--	19,600	11,100
Distributors:											
Agricultural	5191	74	66	139	135	162	52	--	--	375	253
Grocery wholesalers and (or) retailers	514, 54	401	401	196	169	108	20	--	(4)	706	591
Institutional wholesalers and end users	58, 70	130	141	68	63	88	50	(4)	(4)	286	253

See footnotes at end of table.

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

(Thousand metric tons)

End use	Standard industrial classification	Vacuum and open pans		Solar		Rock		Brine		Total ³	
		2011	2012	2011	2012	2011	2012	2011	2012	2011	2012
Distributors:—Continued											
Water-conditioning	7399	155	156	320	309	17	7	1	1	493	472
U.S. Government resale	9199	(4)	(4)	(4)	8	(4)	(4)	--	--	1	8
Other wholesalers and (or) retailers	5251	878	901	979	924	310	119	(4)	(4)	2,170	1,940
Total		1,640	1,670	1,700	1,610	686 ^r	248	2	2	4,030	3,520
Other ⁵		61	88	11	13	685	450	395 ^r	239	1,150 ^r	791
Grand total		4,250	4,390	3,900 ^r	3,790	23,000	13,100	16,800 ^r	15,600	48,000 ^r	36,900

^rRevised. -- Zero.

¹Data 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 table 6 because of changes in inventory and (or) incomplete reporting.

⁴Less than 1/2 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	2011				2012			
	Evaporated			Total	Evaporated			Total
	Vacuum and open pans	Solar	Rock		Vacuum and open pans	Solar	Rock	
Alabama	43	12	41	97	46	12	52	110
Alaska	2	3	--	4	1	3	--	4
Arizona	14	109	1	123	14	104	1	119
Arkansas	45	7	70	122	45	7	32	83
California	197	741 ^r	3	941 ^r	200	865	2	1,070
Colorado	12	86	31	129	11	81	20	112
Connecticut	14	5	159	178	14	6	41	61
Delaware	11	6	2	19	11	6	1	18
District of Columbia	(3)	(3)	(3)	(3)	(3)	2	--	3
Florida	75	195	3	273	85	183	3	270
Georgia	104	95	47	246	111	86	41	238
Hawaii	(3)	2	--	2	(3)	2	--	2
Idaho	20	130	(3)	150	22	117	(3)	139
Illinois	320	100	2,270	2,690	327	92	1,470	1,890
Indiana	246	115	887	1,250	254	102	492	848
Iowa	123	97	440	660	123	99	345	566
Kansas	75	38	835	948	74	40	687	801
Kentucky	72	6	1,080	1,160	68	6	447	521
Louisiana	59	8	233	300	117	26	138	281
Maine	15	4	126	145	17	3	105	126
Maryland	78	22	110	211	79	53	70	202
Massachusetts	33	6	334	373	34	8	153	195
Michigan	262	36	1,290	1,590	266	47	1,100	1,410
Minnesota	115	204	1,750	2,070	114	193	488	795
Mississippi	20	5	183	209	20	7	107	134
Missouri	110	97	540	747	111	78	226	415
Montana	1	62	(3)	63	1	41	(3)	42
Nebraska	54	43	212	310	53	46	15	114
Nevada	5	230 ^r	51 ^r	286 ^r	5	196	41	242
New Hampshire	15	10	78	103	14	8	52	74
New Jersey	105	94	112	311	108	34	37	178
New Mexico	21	196	(3)	217	23	167	(3)	190
New York	181	24	3,220	3,430	183	29	1,820	2,040
North Carolina	112	48	111	271	111	51	36	197
North Dakota	18	19	5	42	12	19	1	32
Ohio	431	47	2,710	3,190	425	45	1,660	2,130
Oklahoma	29	29	83	141	28	27	79	135
Oregon	20	41	1	62	20	47	(3)	67
Pennsylvania	187	65	2,090	2,350	191	80	1,160	1,430
Rhode Island	3	1	(3)	5	3	1	(3)	4
South Carolina	36	15	1	52	39	15	1	55
South Dakota	23	51	61	136	23	52	6	81
Tennessee	133	7	494	634	137	6	144	287
Texas	309	171	259	740	316	171	162	649
Utah	17	207	9	234	18	188	9	216
Vermont	5	1	327	332	4	1	242	247
Virginia	113	32	148	294	175	34	60	268
Washington	24	126	(3)	151	28	104	(3)	133
West Virginia	20	3	256	279	22	17	215	253
Wisconsin	202	173	1,650	2,030	207	150	936	1,290
Wyoming	3	62	(3)	65	4	23	1	27
Other ⁴	117	8	680	804	78	13	448	538
Total ⁵	4,250	3,900 ^r	23,000	31,100	4,390	3,790	13,100	21,300

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}

^rRevised. -- Zero.

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

²Each salt type includes domestic and imported quantities. Brine is excluded because brine 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 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	
2011:				
Bulk	108.06	23.91 ^r	36.36	8.14 ^r
Compressed pellets	173.92	159.02	XX	XX
Packaged	200.74	98.09 ^r	107.15 ^r	XX
Average ²	174.00	51.19 ^r	38.29	8.14 ^r
Pressed blocks	140.96	143.16	167.49	XX
2012:				
Bulk	97.72	39.67	35.79	8.44
Compressed pellets	174.19	157.78	XX	XX
Packaged	207.23	111.33	118.10	XX
Average ²	169.93	71.87	36.89	8.44
Pressed blocks	139.16	144.11	171.96	XX

^rRevised. 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	2011		2012	
	Quantity	Value ²	Quantity	Value ²
Canada	754	55,400	728	57,200
China	1	556	1	768
Colombia	2	537	2	400
Costa Rica	2	357	2	602
Dominican Republic	1	242	1	344
Germany	1	525	1	865
Honduras	1	267	1	265
Japan	6	1,710	4	3,600
Malaysia	1	1,210	1	443
Mexico	35	7,810	34	8,320
Netherlands	3	1,710	1	464
Panama	1	373	1	261
Saudi Arabia	6	1,660	5	1,980
United Arab Emirates	1	695	3	1,340
Other	31	14,500	24	13,500
Total	846	87,500	809	90,300

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	2011		2012	
	Quantity	Value ²	Quantity	Value ²
Anchorage, AK	2	331	2	839
Buffalo, NY	440	26,200	438	29,800
Cleveland, OH	(3)	85	14	997
Detroit, MI	75	9,670	48	7,820
El Paso, TX	2	315	2	334
Great Falls, MT	3	855	2	670
Houston, TX	11	4,230	10	4,820
Laredo, TX	29	6,410	25	6,140
Los Angeles, CA	10	4,290	5	4,380
Miami, FL	2	1,890	4	2,310
Mobile, AL	(3)	26	(3)	118
New York, NY	14	7,620	11	4,510
Nogales, AZ	3	692	5	1,020
Norfolk, VA	3	1,190	2	1,200
Ogdensburg, NY	27	5,270	22	4,350
Pembina, ND	4	1,090	3	1,070
San Diego, CA	1	389	3	821
San Francisco, CA	3	1,240	4	2,050
Seattle, WA	8	2,200	11	2,620
St. Albans, VT	7	1,200	7	1,150
Other ⁴	202	12,300	191	13,400
Total	846	87,500	809	90,300

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	2011		2012	
	Quantity	Value ²	Quantity	Value ²
Australia	63	947	1	339
Bahamas, The	512	8,940	366	9,160
Belgium	4	1,190	4	1,390
Brazil	132	3,120	(3)	253
Canada	5,340	153,000	3,980	126,000
Chile	5,030	102,000	3,620	68,600
China	12	1,750	10	3,310
Colombia	4	909	22	996
Cyprus	3	186	(3)	242
Egypt	359	7,450	112	2,950
France	17	5,620	8	6,610
Germany	2	1,880	2	1,630
India	4	314	2	267
Israel	13	4,120	11	6,620
Italy	34	3,390	68	3,170
Japan	1	161	(3)	46
Korea, Republic of	6	1,700	6	2,180
Mexico	1,480	44,700	1,270	37,600
Netherlands	127	5,800	134	5,090
New Zealand	(3)	98	(3)	418
Pakistan	3	1,520	6	2,450
Peru	560	8,250	154	2,360
South Africa	14	1,510	4	1,280
Spain	7	3,560	11	2,330
Switzerland	(3)	27	(3)	41
United Kingdom	13	1,270	16	1,640
Vietnam	1	245	25	384
Other	95	3,130	51	4,360
Total	13,800	367,000	9,880	292,000

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	2011		2012	
	Quantity	Value ²	Quantity	Value ²
Anchorage, AK	19	722	20	709
Baltimore, MD	1,320	35,800	712	20,300
Boston, MA	1,210	20,000	878	14,700
Buffalo, NY	107	2,700	142	3,070
Charleston, SC	182	4,000	103	2,140
Chicago, IL	1,140	22,600	734	15,600
Cleveland, OH	233	6,760	155	4,240
Columbia-Snake, OR	157	5,450	140	5,020
Dallas-Fort Worth, TX	(3)	73	(3)	50
Detroit, MI	1,180	24,400	1,430	26,300
Duluth, MN	62	5,880	19	1,760
Great Falls, MT	6	939	6	807
Los Angeles, CA	137	6,210	208	9,460
Miami, FL	1	429	1	385
Milwaukee, WI	1,060	22,400	807	16,400
Minneapolis, MN	287	5,960	259	5,270
Mobile, AL	1	1,220	4	4,250
New Orleans, LA	197	8,870	1	361
New York, NY	1,950	45,900	994	31,200
Norfolk, VA	154	3,980	182	6,890
Ogdensburg, NY	736	46,000	260	47,000
Pembina, ND	27	2,970	33	3,420
Philadelphia, PA	1,600	35,600	817	19,300
Portland, ME	891	18,400	728	15,400
Providence, RI	270	6,180	171	3,120
San Diego, CA	7	2,050	9	2,990
San Francisco, CA	38	1,940	118	3,010
San Juan, PR	5	968	26	1,350
Savannah, GA	31	1,630	57	2,570
Seattle, WA	121	4,410	51	4,240
St. Albans, VT	5	564	15	222
St. Louis, MO	1	273	(3)	43
Tampa, FL	432	10,100	392	10,300
Wilmington, NC	159	5,930	96	3,840
Other ⁴	123	5,530	312	5,950
Total	13,800	367,000	9,880	292,000

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	2008	2009	2010	2011	2012 ^c
Afghanistan, rock salt	158	180	186	190 ^c	180
Albania	NA ^r	NA ^r	NA ^r	NA ^r	NA
Algeria, brine and sea salt	99 ^r	109 ^r	107 ^r	170 ^r	280
Angola ^c	35	35	50 ^r	40 ^r	40
Argentina	1,681	1,478	1,532 ^r	1,885 ^r	1,900
Armenia	37	29 ^r	29 ^r	36 ^r	36
Australia	11,160	10,316	11,968	11,744	10,821 ⁴
Austria, rock and brine	874	1,038	1,083	1,143 ^r	1,100
Azerbaijan	8	5	4	19 ^r	19
Bahamas, The ^c	1,024 ^{r,4}	1,000	1,036 ^{r,4}	1,000	1,000
Bangladesh, marine salt ⁵	1,368 ^r	1,389 ^r	1,409 ^r	1,410 ^{r,c}	1,410
Belarus ^c	1,476 ⁴	1,695 ⁴	1,700	1,700	1,700
Bolivia	1	2	1	2	2
Bosnia and Herzegovina	555	556	663	832	862 ⁴
Botswana ⁶	171 ^r	241 ^r	365 ^r	350 ^r	325
Brazil:					
Marine salt	5,200 ^r	4,462 ^r	5,615 ^r	5,600 ^r	5,370
Rock salt	1,528 ^r	1,443 ^r	1,415 ^r	1,400 ^r	1,650
Total	6,728 ^r	5,905 ^r	7,030 ^r	7,000 ^r	7,020
Bulgaria ^c	2,100	1,300	1,900 ^r	2,200 ^r	2,100
Burkina Faso ^c	5	5	5	5	5
Burma, brine salt	54	133	97	100 ^{r,c}	100
Cambodia	78	NA ^r	NA ^r	NA ^r	NA
Canada	14,386	14,615	10,537	12,756 ^r	10,845 ⁴
Cape Verde ^c	2	2	2	2	2
Chile	6,431	8,382	7,695	9,966	8,057 ⁴
China	66,640 ^r	66,630	70,380	67,420 ^r	70,000
Colombia:					
Marine salt	386	356	357 ^r	140 ^r	100
Rock salt	245	255 ^r	289 ^r	290 ^{r,c}	300
Total	632	612	645 ^r	430 ^{r,c}	400
Croatia ^c	30 ^r	30 ^r	30 ^r	30 ^r	30
Cuba	232 ^r	237 ^r	231 ^r	259 ^r	250
Denmark	497 ^r	511 ^r	601 ^r	600 ^{r,c}	600
Djibouti ^c	12 ^r	12 ^r	12 ^r	12 ^r	12
Dominican Republic, marine salt	NA ^r	NA ^r	NA ^r	NA ^r	NA
Ecuador	NA ^r	NA ^r	NA ^r	NA ^r	NA
Egypt	2,952 ^r	2,666 ^r	2,460 ^r	2,800 ^r	2,900
El Salvador, marine salt	NA ^r	NA ^r	NA ^r	NA ^r	NA
Eritrea, marine salt ^c	8 ^r	8 ^r	8 ^r	8 ^r	8
Ethiopia, rock salt ^{c,5}	260 ^r	351 ⁴	330 ^r	388 ^r	440
France, all sources ^c	6,240 ^r	6,200 ^r	5,867 ^{r,4}	5,430 ^r	6,100
Georgia ^c	30	30	30	28 ^r	30
Germany:					
Industrial brines	9,084	9,798	8,752	8,066 ^r	5,470
Rock salt and other	6,169	8,816	10,602	9,048 ^r	6,130
Salt, evaporated, includes marine salt	580	325	322	319 ^r	3,150
Total	15,833	18,939	19,676	17,432 ^r	14,800

See footnotes at end of table.

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

(Thousand metric tons)

Country ³	2008	2009	2010	2011	2012 ^c
Ghana	239	250	85 ^r	100 ^r	100
Greece ^c	220 ^r	189 ^{r,4}	150	200 ^r	200
Guadeloupe	NA ^r	NA ^r	NA ^r	NA ^r	NA
Guatemala ^c	60	50	50	50	50
Guinea ^c	15	15	15	15	15
Honduras	NA ^r	NA ^r	NA ^r	NA ^r	NA
Iceland ^c	5	5	5	5	5
India: ^c					
Marine salt	16,000	16,500	17,000	16,000 ^r	17,000
Rock salt	3	3	3	2 ^r	2
Total	16,000	16,500	17,000	16,000 ^r	17,000
Indonesia ^c	700	585	600	650	700
Iran ⁷	2,158	2,816 ^r	3,291 ^r	3,000 ^{r,e}	3,300
Iraq ^c	109	113	102	136 ^r	140
Israel	421	357	421	410 ^r	410
Italy, all sources ⁸	2,200 ^e	3,471 ^r	4,006 ^r	2,912 ^r	2,200
Jamaica	NA ^r	NA ^r	NA ^r	NA ^r	NA
Japan ^c	1,200	1,200	1,122 ^{r,4}	978 ^{r,4}	1,000
Jordan, all sources	26 ^r	23	34 ^r	1 ^{r,e}	1
Kazakhstan	504	223	229	325	489 ⁴
Kenya, crude salt ⁹	24	24	6	25 ^r	25
Korea, North ^c	500	500	500	500	500
Korea, Republic of	384 ^r	382	223	372 ^r	300
Kuwait ^c	14	14	14	15	15
Kyrgyzstan ^c	1	1	1	1	1
Laos, rock salt ^c	35	35	32	35	35
Lebanon ^c	20	20	20	20	20
Libya ^c	40	40	40	20	30
Madagascar ^c	75	75	75	80	80
Mali ^c	6	6	6	6	6
Malta, solar salt ^c	6 ^r	6 ^r	6 ^r	6 ^r	6
Martinique	NA ^r	NA ^r	NA ^r	NA ^r	NA
Mauritania	1	(10)	(10)	1	1
Mauritius, marine salt	5 ^r	2 ^r	1 ^r	4 ^{r,e}	4
Mexico	8,809	7,445	8,430 ^r	8,812	10,798 ⁴
Mongolia, mine output	1	1	2 ^r	2 ^r	1
Montenegro, sea water evaporate	25	17	17	18	18
Morocco:					
Marine salt	16	17	20	25	25
Rock salt	225	240	503	721	700
Total ^c	241 ^r	257 ^r	523 ^r	746 ^r	725
Mozambique, marine salt ^c	110	110	120 ^r	120 ^r	130
Namibia, marine salt	732	807	771	738 ^r	740
Netherlands	NA ^r	NA ^r	NA ^r	NA ^r	NA
Netherlands Antilles ¹¹	-- ^r	-- ^r	--	--	--
New Zealand ^c	100	100	95 ^r	95 ^r	100
Nicaragua, marine salt	NA ^r	NA ^r	NA ^r	NA ^r	NA
Niger ^c	2	1	1	1	1
Oman	11	31	12	12 ^r	13
Pakistan: ⁵					
Marine salt	50 ^e	93	190	315 ^r	180
Rock salt	1,883	1,941	2,058	2,028 ^r	1,900
Total	1,930 ^e	2,034	2,248	2,343 ^r	2,080

See footnotes at end of table.

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

(Thousand metric tons)

Country ³	2008	2009	2010	2011	2012 ^c
Panama, marine salt	21 ^r	20 ^r	28 ^r	17	17
Peru	1,276	1,567	1,570 ^c	1,565 ^r	1,200 ⁴
Philippines, marine salt	510	516	558	720 ^r	720
Poland:					
Evaporated salt	622	299	411	415	393 ⁴
Rock salt	618	999	1,222 ^r	1,234	782 ⁴
Other (brine and desalination of mine waste water)	2,783	2,533	2,464	2,633	2,630
Total	4,023 ^r	3,831 ^r	4,097 ^r	4,282 ^r	3,810
Portugal, rock salt	607 ^r	595 ^r	619 ^r	631 ^r	561
Romania: ^c					
Rock salt	2,400	2,000	2,400 ^r	2,500 ^r	2,200
Other	50	40	40 ^r	40 ^r	40
Total	2,450	2,040	2,440 ^r	2,540 ^r	2,240
Russia ^c	1,800 ^r	1,600 ^r	1,800 ^r	1,800 ^r	1,800
Saudi Arabia ^c	1,600 ⁴	1,640	1,800	1,800	2,000
Senegal	241	222	232 ^r	258 ^r	260
Serbia	30	29	31	23	17 ⁴
Slovakia ^c	99 ⁴	38 ⁴	38 ^r	38 ^r	40
Slovenia ^c	1 ^r	3 ^r	(10) ^r	4 ^r	6 ⁴
South Africa	430	408	394	381 ^r	370
Spain:					
Marine and other evaporated salt	1,393 ^r	1,438 ^r	1,334 ^r	1,407 ^r	1,400
Rock salt	2,910 ^r	2,763 ^r	3,116 ^r	3,096 ^r	3,100
Total	4,303 ^r	4,201 ^r	4,450 ^r	4,504 ^r	4,500
Sri Lanka ^c	111 ⁴	11	10	11	12
Sudan	11	36	142	11 ^r	26 ⁴
Switzerland	535 ^r	435 ^r	500 ^r	501 ^r	528
Syria	89	78	81	80	40
Tajikistan ^c	52	52	52	27 ^r	28
Tanzania	26	27	34 ^r	32 ^r	34 ⁴
Thailand:					
Rock salt	-- ^r	-- ^r	-- ^r	-- ^r	--
Other	-- ^r	-- ^r	-- ^r	-- ^r	--
Total	-- ^r	-- ^r	-- ^r	-- ^r	--
Tunisia, marine salt	1,063	1,280	1,804	1,181 ^r	1,500
Turkey	2,472	3,768	4,044 ^r	6,546 ^r	5,000
Turkmenistan ^c	215	215	215	215	215
Uganda ^c	15 ^r	15 ^r	15 ^r	15 ^r	15
Ukraine	4,425	5,395	4,908	5,938 ^r	5,900
United Kingdom ¹²	5,565 ^r	6,166 ^r	6,666 ^r	6,700 ^{r,c}	6,700
United States, including Puerto Rico:					
United States:					
Brine	18,900	17,800	18,500	19,200	16,900 ⁴
Rock salt	20,900	20,300	17,600	18,500 ^r	13,300 ⁴
Solar salt	4,070	3,880	3,120	3,230 ^r	2,760 ⁴
Vacuum and open pan	4,200	4,030	4,100	4,080	4,240 ⁴
Total	48,000	46,000	43,300	45,000	37,200 ⁴
Puerto Rico ^c	45	45	45	45	45
Total, United States and Puerto Rico	48,100	46,100	43,300	45,000	37,200 ⁴
Venezuela ^c	350	350	350	350	350
Vietnam	717	679	975 ^r	929 ^r	930
Yemen ^c	65 ^r	79 ^r	75	75 ^r	75
Grand total	260,000 ^r	264,000 ^r	269,000 ^r	272,000 ^r	261,000

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

¹Grand total, 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 August 14, 2014.

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

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

⁴Reported figure.

⁵Year ending June 30 of that stated.

⁶From natural soda ash production.

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.

⁹Production by Magadi Soda Ash Ltd. only.

¹⁰Less than ½ unit.

¹¹Dissolved in 2010.

¹²Year ending July 15 of that stated.