

SALT

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Salt, also known as sodium chloride, has many end uses. 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) plastic made from chlorine and paper-pulping chemicals manufactured from caustic soda.

Production

U.S. production data for salt are developed by the U.S. Geological Survey (USGS) from an annual voluntary survey of U.S. salt-producing sites and company operations. Of the 31 companies to which a survey request was sent, all but 3 responded, representing 96% of the total production shown in this report. Data for the three companies were estimated on the basis of their prior responses to previous annual surveys, the 1998 production estimate survey, or brine production capabilities for chloralkali manufacture based upon chlorine production capacities.

Total U.S. salt production decreased slightly in 1998 compared with that of 1997. Although rock salt production was unchanged, rock salt for highway deicing declined by 12% because of the extremely mild winter caused by the El Niño weather phenomena. According to the USGS canvass for 1998, 31 companies operated 69 salt-producing plants in 15 States. Of these totals, 7 companies and 13 plants produced more than 1 million metric tons each and accounted for 90% and 72%, respectively, of the U.S. total production and 90% and 34%, respectively, of total value. Several companies and plants produced more than one type of salt. In 1998, 11 companies (16 operations) produced solar-evaporated salt; 6 companies (18 operations), vacuum pan salt; 10 companies (14 operations), rock salt (an 11th company, American Rock Salt Co. L.L.C., sold salt from its inventory while completing construction of its new rock salt mine); and 13 companies (27 operations), salt brine (tables 1, 2, and 3).

The five leading States in terms of total salt sold or used were Louisiana, 36%; Texas, 23%; New York, 10%; Kansas, 8%; and Utah, 4% (table 4). Other Eastern States (Alabama, Michigan, Ohio, Tennessee, and West Virginia) accounted for 15% of the domestic total salt sold or used. Other Western States (Arizona, California, Nevada, New Mexico, and Oklahoma) represented 4%.

U.S. salt production accounted for about 22% of total world production. Total estimated world production of all types of

salt decreased compared with that of 1997. Because the economy in Asia began to decline in late 1997, the market for chlorine and exports of PVC and ethylene dichloride continued to fall in 1998. Some environmental problems associated with emissions of chlorinated compounds may affect the short-term status of the world chloralkali industry, which is the largest single consumer of salt.

In September 1998, Detroit Salt Co., a new rock salt company, began mining rock salt at the old salt mine in Detroit, MI, which opened in 1906 but was closed in 1983 by its former owner, International Salt Co. (later renamed Akzo Nobel Salt, Inc.). When fully operational, the company anticipated mining about 900,000 metric tons (1 million short tons) per year of rock salt for highway deicing.

In October 1998, American Rock Salt Co. obtained financing to construct a new 2.27-million-metric-ton-per-year (2.5-million-short-ton-per year) rock salt mine in Hampton Corners, Livingston County, NY. The \$126 million project was expected to take 2 years to complete. The company continued to sell salt from the Retsof inventory it acquired from Cargill, Inc. (American Rock Salt Co. L.L.C, 1998).

On April 1, 1998, IMC Global, Inc., purchased the salt and chemical businesses of Harris Chemical Group Inc.—North American Salt Co. (with vacuum pan salt plants in Kansas and rock salt plants in Louisiana and Canada), North American Chemical Co., Great Salt Lake Minerals Corp. (produced solar-evaporated salt in Utah for sale by North American Salt), Penrice Soda Products Pty. Of Australia, and Salt Union, Ltd. in England; the transaction had been announced in December 1997. Harris Chemical produced boron chemicals, magnesium chloride, potash, salt, sodium bicarbonate, and sodium sulfate. IMC Global acquired the assets for \$450 million in cash and assumed about \$950 million of debt (Fertilizer Markets, 1998).

In May 1998, IMC Global reorganized its recently acquired business units—the soda ash, sodium sulfate, sodium bicarbonate, and boron chemicals sections were organized under IMC Chemicals, Inc., and the salt operations were organized under IMC Salt, Inc. The solar salt facility in Utah, formerly operated by Great Salt Lake Minerals, which was renamed IMC Kalium Ogden Corp., and the Hersey, MI, vacuum pan plant were placed under IMC Global's subsidiary, IMC Kalium, Inc. All the salt produced at these two facilities, including the byproduct evaporated salt from E.I. du Pont de Nemours & Co.'s titanium dioxide plant in New Johnsonville, TN, will be marketed by IMC Salt (IMC Global, Inc. 1998). DuPont generated waste iron chloride and hydrochloric acid that is treated with soda ash to produce iron carbonate and about 200,000 metric tons of byproduct food-grade salt. This

new salt operation established Tennessee as the 15th State that produces salt for sale.

Consumption

In 1998, apparent consumption (salt sold or used, plus imports, minus exports) was 48.8 million tons whereas reported consumption (sales or use as reported by the salt companies including their imports and exports) was 44.2 million tons, which was a decrease of 11% compared with that of 1997. Although these two measures of consumption are not necessarily supposed to be identical, they normally are similar. The 4.6-million-ton difference between the data for 1998 and 1997, however, can only be explained by stockpiling of imported salt by producers, distributors, and consumers during the year.

The 1998 reported percentage distribution of salt by major end use was chemicals, 50%; ice control, 21%; distributors, 10%; general industrial, 7%; agricultural and food, 4% each; other combined with exports, 3%; and primary water treatment, 1%. Distributors represented a substantial share of salt sales by the salt industry; all the salt, however, is ultimately resold to many end users, of whom some have specific uses. For a more complete analysis of end-use markets, specific sectors of distribution in table 5 can be combined, such as agricultural and water treatment with agricultural and water conditioning distribution, respectively.

The chemical industry consumes the majority of the salt produced, primarily salt brine. 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 a survey of domestic salt-base chlorine facilities, about 48% of the salt used to manufacture chlorine was produced by manufacturing companies, and 31% was purchased brine. Solar salt, rock salt, and vacuum pan salt are also used to manufacture many chemicals (tables 5 and 6).

In 1998, according to the Bureau of the Census data, 11.7 million tons of chlorine and 10.4 million tons of sodium hydroxide were produced. Based on the industry average ratio of 1.75 tons of salt required to produce 1.0 ton of chlorine and 1.1 tons of coproduct sodium hydroxide (caustic soda or lye), the chlorine and caustic soda industry consumed about 20 million tons of salt for feedstock. Reported consumption of total domestic and imported salt for chlorine manufacture was 20.7 million tons (table 5). The difference between the calculated and reported quantities was the amount of salt unreported to the USGS from imports or captive brine production of chloralkali producers.

The quantity of salt consumed for road deicing each year is directly related to the severity or mildness 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. Meteorologists, however, are becoming more aware of the dynamics of certain weather phenomena that influence the climate in various parts

of the world. One of these phenomena is El Niño, which is now believed to be the largest single weather influence on Earth. The mild winters of 1997 and 1998 were attributed to the El Niño effects. Highway deicing salt sales were the lowest in 1998 since about 1992, which also was an El Niño year.

Aside from the different types of salt, there are various 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, seasalt, condiment salt, and salt tablets are special varieties of salt.

Water conditioning and animal feed salt are made into 22.7-kilogram (50-pound) pressed blocks. Sulfur, iodine, trace elements, and vitamins are occasionally added to salt blocks to provide missing nutrients not found naturally in the diet of certain livestock. Salt is also compressed into pellets and used for water conditioning.

The direct and indirect uses of salt number about 14,000 uses, according to industry sources. The USGS annually surveys 8 major categories comprising 29 end-uses.

Chemical.—The greatest quantity of salt used in the chemical industry is by the chloralkali sector. Traditionally, the chloralkali sector included salt consumed for chlorine, coproduct sodium hydroxide, and synthetic soda ash. Since 1986, when the last synthetic soda ash plant 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.

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 the sodium ions. About 98% of the domestic chlorine and sodium hydroxide produced is obtained from the electrolysis of salt brine feedstock by using three cell technologies. The types of cells and percentage chlorine manufactured by them are diaphragm, 78%; mercury, 14%; and membrane, 6%; the remaining 2% of chlorine and caustic soda production is recovered as a byproduct from magnesium and sodium metal manufacture.

It takes about 1.75 tons of salt to make 1.0 ton of chlorine and 1.1 tons of coproduct caustic soda. The electrolytic process ionizes the sodium chloride compound and selectively allows the ions to migrate through special membranes. Chlorine gas forms at the anode while sodium ions bond with water molecules at the cathode to form sodium hydroxide with hydrogen gas evolving.

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 from salt. Salt is also used as a feedstock in chemical establishments that make sodium chlorate (by the electrolysis of an acidified salt brine using hydrochloric acid adjusted to a pH of 6.5), metallic sodium (by the electrolysis of a molten salt mixture containing

33.2% sodium chloride and 66.8% calcium chloride, which is added to reduce the melting temperature of salt), and other downstream chemical operations. 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 also used as a cofeedstock with sulfuric acid to produce sodium sulfate and hydrochloric acid. This subsector is relatively small, representing only 5% 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. Since the 1970's, the number of producers has decreased from three to one; Ethyl Corp. and RMI Titanium Corp. exited the market in about 1985 and 1992, respectively, leaving DuPont as the sole manufacturer of metallic sodium in the United States. In 1998, the domestic market was less than 30,000 tons having decreased from about 126,000 tons in 1978. The phasing out of tetraethyl lead and tetramethyl lead gasoline additives were the main reasons for the decline in consumption. In 1978, sodium usage in gasoline represented about 80% of the domestic market. The largest use of sodium in 1998 was for sodium borohydride production, which is the feedstock for sodium dithionite that is used as a reductive bleaching agent by the pulp and paper industry; sodium for sodium borohydride manufacture accounted for about 38% of metallic sodium consumption. Sodium metal also is used to manufacture sodium azide, which is used in automotive air bags. Other promising uses of sodium metal are in the remediation of chemical weapons, pesticides, polychlorinated biphenyls, and chlorofluorocarbons (Chemical Market Reporter, 1998).

Food Processing.—Every person uses some quantity of salt in their food. The salt is added to the food as a flavor enhancer, preservative, binder, fermentation control additive, texture aid, and color developer, by the food processor or by the consumer through free choice. This major category is subdivided, in descending order of salt consumption, meat packers, canning, other food processing, grain mill products, baking, and dairy.

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. Early pioneers stored their perishable food in salt barrels for protection and preservation. Salt acts as a binder in sausages to form a binding gel composed of meat, fat, and moisture. Salt also acts as a flavor enhancer and a tenderizer.

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

In the "other food processing" category, salt is used mainly as a seasoning agent. Other food processing includes miscellaneous establishments that make food for human consumption (e.g., potato chips, pretzels) and for domestic pet consumption (e.g., dog and cat food). 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 is grain mill products, which consists of milling flour and rice and manufacturing cereal breakfast food and blended or prepared flour.

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

General Industrial.—The industrial uses of salt are diverse. They include, in descending order, oil and gas exploration, other industrial, textiles and dyeing; metal processing, pulp and paper, tanning and leather treatment, and rubber manufacture.

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 down-well gas pressures. Whenever 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 strata. Salt is also used to increase the set rate of concrete in cemented casings. In metal processing, salt is used in concentrating uranium ore into uranium oxide (yellow cake). It is also used in processing aluminum, beryllium, copper, steel, and vanadium.

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 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-base bleaching chemical. The chlorine dioxide process, which originated in Germany after World War I, is becoming more popular because of environmental pressures to reduce or eliminate chlorinated bleaching compounds.

In tanning and leather treatment, salt is added to animal hides to inhibit microbial activity on the underside of the hides and to replace some of the moisture in 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.

Agricultural Industry.—Since prehistoric times, humankind has noticed that animals satisfied their salt hunger by locating salt springs, salt licks, or playa lake salt crusts. Barnyard and grazing livestock need supplementary salt rations to maintain proper nutrition. Veterinarians advocate adding loose salt in commercially mixed feeds or in block forms sold to farmers and ranchers because salt acts as an excellent carrier for trace elements not found in the vegetation consumed by grazing livestock; selenium, sulfur, and other essential elements are commonly added to salt licks, or salt blocks, for free-choice feeding.

Water Treatment.—Approximately 1.2 trillion liters (325

billion gallons) of water is used daily in the United States for residential and commercial applications. 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. Commercial and residential water-softening units use salt to remove the ions causing 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 the brine replenishes the lost sodium ions.

Ice Control and Road Stabilization.—The second largest end use of salt is for highway deicing. The developer of the Fahrenheit temperature scale discovered that salt mixed with ice (at a temperature below the freezing point of water) creates a solution with a lower freezing point than water by itself. The brine forms below the surface of the ice and snow and prevents the water from freezing into ice and bonding with the road surface. Therefore, salt causes snow and ice to melt. Salt is an inexpensive, widely available, and effective ice control agent. It does, however, become less effective as the temperature decreases below about -9.4°C to -6.7°C (15°F to 20°F). At lower temperatures, more salt would have to be applied to maintain higher brine concentrations to provide the same degree of melting. Most winter snowstorms and ice storms occur between -3.9°C and 0°C (25°F and 32°F), the range in which salt is most effective. An anticaking agent, such as ferric ferrocyanide (Prussian Blue) or sodium ferrocyanide (Yellow Prussiate of Soda), is used to prevent the salt from agglomerating. Both additives are nontoxic and harmless to humans. In fact, sodium ferrocyanide is approved for use in food-grade salt by the Federal Food and Drug Administration.

In highway deicing, salt has been associated with corrosion of motor vehicles, bridge decks, unprotected steel structures, and reinforcement bar and wire used in road construction. Surface runoff, vehicle spraying, and windblown actions also affect roadside vegetation, soil, and local surface- and ground-water supplies. Although evidence of environmental loading of salt has been found during peak usage, the spring rains and thaws usually dilute the concentrations of sodium in the area.

Salt is also added to stabilize the soil and to provide firmness to the foundation on which highways are built. The salt acts to minimize the effects of shifting caused by changes in humidity and traffic load in the subsurface.

Distributors.—A tremendous amount of salt is marketed through various distributors, some of which specialize in markets such as agricultural and water treatment services (table 5). In addition to these two categories, distributor sales include grocery wholesalers and/or retailers, institutional wholesalers, U.S. Government resale, and other wholesalers and retailers.

Stocks

Because bulk salt is stored at many different locations, such as at the plants, warehouses, ports, and terminals, data on the quantity of salt stockpiled by the salt industry is not reliable enough to formulate accurate inventory totals; however,

yearend stocks of producers were estimated to be 2.0 million tons and consumer inventories were estimated also to be high. Most of these inventories were imported rock salt and solar salt. Many salt producers, States, municipalities, distributors, and road-deicing contractors stockpiled additional quantities of salt in anticipation of adverse weather conditions. Deicing salt inventories were extremely large by yearend because the mild winter in the domestic snow belt did not require as much salt as had been stockpiled. 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 can become 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 are increased and are reflected in higher selling prices.

Transoceanic imports of salt have been increasing in some areas of the United States because they are less expensive with respect to transportation costs than that which could be purchased from domestic suppliers using rail transportation.

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 the higher energy costs involved in processing and the purity of the product.

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. Unfortunately, yearend prices for salt were no longer quoted in Chemical Market Reporter, resulting in the elimination of this table this year. The average annual values, as collected by the USGS and listed in table 7, represent a national average value for each of the types of salt and the various product forms.

Foreign Trade

Under the Harmonized Tariff Schedule (HTS) nomenclature, imports are aggregated under one category known as “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 the shipments under one code because the total of individual subclassifications fails to meet the minimum dollar requirements necessary for individual listings.

Based on Bureau of the Census statistics in 1998, the United States exported 731,000 tons; this was a 2% decrease compared with that of 1997 (table 8). Salt was shipped to 65 countries through 31 U.S. customs districts; the Cleveland, OH, district exported the most and represented 39% of the U.S. total (table 9). In 1998, the majority of exports, or 73% of the total, was to Canada.

Based on Bureau of the Census statistics, the United States imported 8.77 million tons of salt from 40 countries in 1998, which was 4% less than was imported during the previous year (table 10). Table 11 lists the imports of salt by custom districts. The continuing mild winter weather reduced the demand for imported rock salt. The quantity of imported salt was 12 times more than that of exports. Although this would indicate that the United States is import reliant on salt to meet its salt requirements, the majority of 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 customers at costs lower than the comparable domestic product because production costs are lower abroad, currency exchange rates are more favorable, and ocean freight rates are less expensive than overland rail or truck rates.

World Review

Table 12 lists world salt production statistics for 111 nations based on reported and estimated information. In 1998, total world production decreased by nearly 4% compared with that of 1997. The United States remained the world's leading salt-producing country, representing 21% of total world output. 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, energy and labor costs, less expensive imports, currency exchange rates, and an excess of production capacity resulting in the downsizing of the industry through mergers and acquisitions reduced the size of the industry to 31 companies and 69 plants by 1998.

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

In 1998, the Omani Center for Investment Promotion and Export Development announced plans for the construction of a \$300 million solar salt facility. Sohar Salt Co. intended to

produce 2.4 million tons of crude salt and 2.1 million tons of refined salt from seawater (Industrial Minerals, 1998).

Outlook

Supplies of salt are more than adequate to meet any surge in demand for the next couple of years. The new rock salt mine in New York and the reopening of the rock salt mine in Michigan should increase domestic rock salt production and cause rock salt imports to decline.

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¹Prior to January 1996, published by the U.S. Bureau of Mines.

TABLE 1
SALIENT SALT STATISTICS 1/

(Thousand metric tons and thousand dollars)

	1994	1995	1996	1997	1998
United States:					
Production total: 2/	40,100	42,100	42,200	41,400	41,200
Brine	18,000	20,600	21,500	21,400	21,100
Rock	15,100	14,000	13,500	12,900	12,900
Solar	3,020	3,540	3,270	3,170	3,190
Vacuum pan and open pan	3,960	3,950	3,920	3,980	4,040
Sold or used by producers	39,700	40,800	42,900	40,600	40,800
Value	\$990,000	\$1,000,000	\$1,060,000	\$993,000	\$986,000
Exports	742	670	869	748	731
Value	\$30,200	\$34,400	\$39,300	\$38,000	\$35,200
Imports for consumption	9,630	7,090	10,600	9,160	8,770
Value	\$151,000	\$114,000	\$167,000	\$148,000	\$145,000
Consumption, apparent 3/	48,600	47,200	52,600	49,000	48,800
Consumption, reported	47,200	46,500	52,800	49,500	44,200
World: Production	192,000 r/	196,000 r/	197,000 r/	199,000 r/	192,000 e/

e/ Estimated. r/ Revised.

1/ Data are rounded to three significant digits.

2/ Excludes Puerto Rico.

3/ Sold or used plus imports minus exports.

TABLE 2
SALT PRODUCED IN THE UNITED STATES, BY TYPE AND PRODUCT FORM 1/

(Thousand metric tons)

Product form	Vacuum pans and open pans	Solar	Rock	Brine	Total
1997					
Bulk	768	1,930	12,500	21,400	36,600
Compressed pellets	1,110	268	XX	XX	1,380
Packaged	1,850	843	311	XX	3,010
Pressed blocks	246	126	76	XX	448
Total	3,980	3,170	12,900	21,400	41,400
1998					
Bulk	790	2,020	12,400	21,100	36,300
Compressed pellets	1,190	289	XX	XX	1,480
Packaged	1,830	752	447	XX	3,030
Pressed blocks	228	130	73	XX	431
Total	4,040	3,190	12,900	21,100	41,200

XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

TABLE 3
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
1997:										
Bulk	763	39,900	1,780	31,600	11,800	226,000	21,400	143,000	35,800	440,000
Compressed pellets	1,130	152,000	267	29,600	XX	XX	XX	XX	1,400	182,000
Packaged:										
Less-than-5-pound units	130	NA	(3/)	NA	--	NA	XX	XX	130	XX
More-than-5-pound units	1,720	NA	802	NA	313	NA	XX	XX	2,840	XX
Total	1,850	256,000	803	49,200	313	23,100	XX	XX	2,970	328,000
Pressed blocks:										
For livestock	99	NA	70	NA	64	NA	XX	XX	233	XX
For water treatment	141	NA	52	NA	10	NA	XX	XX	203	XX
Total	240	25,000	122	10,700	75	7,140	XX	XX	437	42,800
Grand total	3,990	473,000	2,970	121,000	12,200	256,000	21,400	143,000	40,600	993,000
1998:										
Bulk	788	39,100	1,810	30,300	12,200	250,000	21,100	125,000	35,900	445,000
Compressed pellets	1,200	154,000	287	30,600	XX	XX	XX	XX	1,490	185,000
Packaged:										
Less-than-5-pound units	217	NA	3	NA	1	NA	XX	XX	221	XX
More-than-5-pound units	1,600	NA	716	NA	446	NA	XX	XX	2,760	XX
Total	1,820	245,000	719	44,800	447	26,000	XX	XX	2,980	315,000
Pressed blocks:										
For livestock	104	NA	121	NA	68	NA	XX	XX	293	XX
For water treatment	131	NA	7	NA	7	NA	XX	XX	145	XX
Total	235	22,300	128	11,600	75	7,380	XX	XX	437	41,300
Grand total	4,040	460,000	2,940	117,000	12,700	284,000	21,100	125,000	40,800	986,000

NA Not available. XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ As 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 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.

3/ Less than 1/2 unit.

TABLE 4
SALT SOLD OR USED BY PRODUCERS IN THE UNITED STATES, BY STATE 1/ 2/

(Thousand metric tons and thousand dollars)

State	1997		1998	
	Quantity	Value	Quantity	Value
Kansas	3,210	120,000	3,090	120,000
Louisiana	15,300	169,000	14,900	173,000
New York	3,590	183,000	4,120	198,000
Texas	9,780	91,000	9,420	83,900
Utah	1,670	69,000	1,770	68,100
Other Eastern States 3/	5,440	289,000	6,060	276,000
Other Western States 4/	1,580	72,800	1,450	66,000
Total	40,600	993,000	40,800	986,000
Puerto Rico e/	45	1,500	45	1,500

e/ Estimated.

1/ Data are rounded to three significant digits; may not add to totals shown.

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

3/ Includes Alabama, Michigan, Ohio, Tennessee (1998), and West Virginia.

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

TABLE 5
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		Salt in brine		Grand total 3/	
		1997	1998	1997	1998	1997	1998	1997	1998	1997	1998
Chemical:											
Chloralkali producers	2812	25	24	764	349	913	948	19,700	19,400	21,400	20,700
Other chemical	28 (excludes 2812, 2899)	396	285	211	533	370	426	94	114	1,070	1,360
Total		420	310	975	882	1,280	1,370	19,800	19,500	22,400	22,000
Food-processing industry:											
Meat packers	201	249	272	44	47	123	122	--	--	416	440
Dairy	202	122	116	5	7	3	2	--	--	130	125
Canning	2091, 203	202	175	84	49	46	49	2	1	334	275
Baking	205	152	200	1	4	13	14	--	--	167	219
Grain mill products	204 (excludes 2047)	103	94	15	5	47	45	--	--	164	144
Other food processing	206-208, 2047, 2099	229	383	28	63	46	45	1	1	304	492
Total		1,060	1,240	177	175	278	277	2	2	1,510	1,690
General industrial:											
Textiles and dyeing	22	198	173	55	57	14	15	6	6	273	250
Metal processing	33, 34, 35, 37	8	8	26	17	143	145	--	--	177	170
Rubber	2822, 30 (excludes 3079)	4	4	1	1	3	2	61	61	68	68
Oil	13, 29	35	33	219	200	61	53	2,130	2,040	2,440	2,320
Pulp and paper	26	10	14	52	53	27	30	17	17	107	115
Tanning and/or leather	311	11	10	25	28	42	55	--	--	78	93
Other industrial	--	50	96	182	51	135	71	(4/)	(4/)	367	219
Total		317	338	560	408	424	370	2,210	2,120	3,510	3,240
Agricultural:											
Feed retailers and/or dealers mixers	5159	367	350	435	386	303	450	--	--	1,110	1,190
Feed manufacturers	2048	69	73	108	122	506	341	--	--	683	536
Direct-buying end user	02	5	6	12	20	46	193	--	--	63	219
Total		442	430	502	527	854	984	--	--	1,850	1,940
Water treatment:											
Government (Federal, State, local)	2899	12	12	75	79	89	85	3	2	179	179
Commercial or other	2899	29	64	154	198	106	88	3	3	292	353
Total		40	76	228	277	195	173	6	5	471	531
Ice control and/or stabilization:											
Government (Federal, State, local)	9621	11	7	499	483	12,600	8,200	9	2	13,100	8,690
Commercial or other	--	78	37	137	87	1,680	671	--	--	1,900	794
Total		88	44	637	569	14,200	8,870	9	2	15,000	9,490

See footnotes at end of table.

TABLE 5--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		Salt in brine		Grand total 3/	
		1997	1998	1997	1998	1997	1998	1997	1998	1997	1998
Distributors:											
Agricultural distribution	5191	109	92	126	117	73	153	--	--	307	362
Grocery wholesalers and/or retailers	514, 54	511	525	227	223	62	59	--	--	800	807
Institutional wholesalers and end users	58, 70	121	166	39	47	24	31	(4/)	(4/)	185	244
Water-conditioning distribution	7399	150	161	417	408	53	29	4	--	624	598
U.S. Government resale	9199	(4/)	(4/)	1	1	1	21	--	--	2	22
Other wholesalers and/or retailers	5251	554	705	621	679	784	1,070	(4/)	(4/)	1,960	2,460
Total		1,440	1,650	1,430	1,480	997	1,360	(4/)	(4/)	3,880	4,490
Other n.e.s. 5/		281	137	241	110	278	472	29	47	829	766
Grand total		4,090	4,220	4,810	4,430	18,500	13,900	22,000	21,600	49,500	44,200

1/ Data are rounded to three significant digits; may not add to totals shown.

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

3/ Because data include salt imported, produced, and/or sold from inventory from regional distribution centers, 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 may differ from totals shown in table 6 because of changes in inventory and/or incomplete data reporting.

4/ Less than 1/2 unit.

5/ Includes exports.

TABLE 6
DISTRIBUTION OF DOMESTIC AND IMPORTED EVAPORATED AND ROCK SALT
IN THE UNITED STATES, BY DESTINATION 1/ 2/

(Thousand metric tons)

Destination	1997				1998			
	Evaporated		Rock	Total	Evaporated		Rock	Total
	Vacuum and open pans	Solar			Vacuum and open pans	Solar		
Alabama	61	1	76	138	72	1	89	162
Alaska	(3/)	4	(3/)	4	4	10	(3/)	14
Arizona	52	101	2	155	12	91	2	105
Arkansas	47	2	90	139	50	2	57	109
California	153	763	2	918	173	658	2	834
Colorado	14	88	106	208	16	90	122	228
Connecticut	9	59	58	126	11	46	74	131
Delaware	2	9	2	13	4	12	(3/)	16
District of Columbia	(3/)	1	9	11	(3/)	1	1	2
Florida	67	201	8	276	71	180	8	259
Georgia	70	100	55	225	90	93	57	240
Hawaii	1	2	--	3	1	2	--	3
Idaho	13	100	9	122	13	104	4	121
Illinois	323	192	2,000	2,510	315	163	1,220	1,690
Indiana	220	98	756	1,070	224	104	486	814
Iowa	199	77	579	855	161	75	490	726
Kansas	79	29	478	586	94	38	614	746
Kentucky	72	6	415	493	63	5	333	401
Louisiana	46	2	600	649	64	1	538	603
Maine	11	4	162	177	12	5	171	188
Maryland	61	62	266	389	60	38	71	168
Massachusetts	33	66	193	292	37	74	80	191
Michigan	244	28	1,880	2,150	252	27	1,040	1,320
Minnesota	148	213	699	1,060	154	200	627	980
Mississippi	31	1	224	255	37	(3/)	197	235
Missouri	98	39	526	662	131	32	415	578
Montana	1	44	2	47	1	41	1	42
Nebraska	74	41	214	329	80	44	225	349
Nevada	2	261	15	278	2	235	18	255
New Hampshire	10	66	45	121	10	54	54	117
New Jersey	127	82	272	481	119	50	46	215
New Mexico	11	103	1	115	12	94	(3/)	107
New York	205	78	2,780	3,060	239	63	2,130	2,430
North Carolina	174	76	80	330	128	74	64	266
North Dakota	7	32	9	47	6	21	12	39
Ohio	382	47	1,560	1,990	405	43	1,130	1,580
Oklahoma	38	17	98	153	45	22	96	163
Oregon	15	139	1	155	23	154	(3/)	178
Pennsylvania	186	98	1,170	1,460	197	93	767	1,060
Rhode Island	9	86	5	100	7	58	8	73
South Carolina	41	14	4	58	32	13	5	50
South Dakota	25	51	42	117	25	55	37	117
Tennessee	84	4	615	703	112	4	562	678
Texas	210	148	199	557	224	136	179	538
Utah	9	344	85	438	10	415	20	445
Vermont	4	3	267	274	5	3	207	215
Virginia	84	43	203	331	86	40	135	261
Washington	31	532	2	566	25	470	6	501
West Virginia	13	2	128	144	15	4	129	148
Wisconsin	200	134	1,360	1,700	206	124	1,020	1,350
Wyoming	(3/)	23	2	25	(3/)	24	3	27
Other 4/	94	93	188	375	86	39	339	465
Total 5/	4,090	4,810	18,500	27,400	4,220	4,430	13,900	22,500

1/ Data are rounded to three significant digits; may not add to totals shown.

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

3/ Less than 1/2 unit.

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

5/ Because data include salt imported, purchased, and/or sold from inventory from regional distribution centers, 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 data reporting.

TABLE 7
AVERAGE VALUE OF SALT, BY PRODUCT FORM AND TYPE 1/

(Dollars per metric ton)

Product form	Vacuum and open pans	Solar	Rock	Brine
1997:				
Bulk	\$52.29	\$17.83	\$19.09	\$6.67
Compressed pellets	134.57	110.88	XX	XX
Packaged	138.21	61.27	73.66	XX
Average 2/	119.61	38.81	20.50	6.67
Pressed blocks	103.84	87.79	95.63	XX
1998:				
Bulk	49.58	16.77	20.57	5.93
Compressed pellets	128.11	106.44	XX	XX
Packaged	134.54	62.36	58.23	XX
Average 2/	114.93	37.56	21.90	5.93
Pressed blocks	94.67	91.07	98.30	XX

XX Not applicable.

1/ Net selling value, f.o.b. plant, excluding container costs.

2/ Salt value data previously reported were an aggregate value per 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 shown in table 3.

TABLE 8
U.S. EXPORTS OF SALT, BY COUNTRY 1/

(Thousand metric tons and thousand dollars)

Country	1997		1998	
	Quantity	Value 2/	Quantity	Value 2/
Australia	1	92	1	127
Bahamas, The	1	247	1	153
Bahrain	(3/)	180	1	440
Belgium	(3/)	25	4	326
Benin	2	63	--	--
Canada	624	23,300	533	19,900
Chile	1	113	6	247
Colombia	1	193	1	323
Dominican Republic	1	140	(3/)	108
El Salvador	1	131	1	171
France	(3/)	163	1	120
Germany	(3/)	82	1	189
Honduras	2	229	2	325
Hong Kong	(3/)	107	1	96
Italy	(3/)	138	3	170
Japan	8	709	1	706
Kuwait	(3/)	76	1	194
Malaysia	2	152	3	78
Mexico	61	3,160	87	4,070
Netherlands	2	707	3	380
Nigeria	1	114	(3/)	4
Panama	1	229	25	519
Peru	1	46	(3/)	36
Philippines	(3/)	65	1	64
Saudi Arabia	16	1,610	24	2,250
Sweden	--	--	1	36
Taiwan	3	272	1	283
Thailand	(3/)	46	3	100
Togo	(3/)	43	4	43
United Arab Emirates	1	335	1	363
United Kingdom	2	863	4	380
Venezuela	7	2,620	10	1,230
Other	9	1,670 r/	6	1,800
Total	748	38,000	731	35,200

r/ Revised.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Free alongside ship (f.a.s.) value at U.S. ports.

3/ Less than 1/2 unit; included with other.

Source: Bureau of the Census.

TABLE 9
U.S. EXPORTS OF SALT, BY CUSTOMS DISTRICT 1/

(Thousand metric tons and thousand dollars)

District	1997		1998	
	Quantity	Value 2/	Quantity	Value 2/
Anchorage, AK	(3/)	4	--	--
Baltimore, MD	1	219	4	368
Boston, MA	(3/)	9	--	--
Buffalo, NY	65	4,200	71	4,420
Charleston, SC	2	201	2	117
Chicago, IL	(3/)	10	1	311
Cleveland, OH	363	8,050	284	4,890
Columbia-Snake, OR	3	97	(3/)	58
Detroit, MI	40	3,310	57	3,310
Duluth, MN	(3/)	6	(3/)	29
El Paso, TX	1	89	1	73
Great Falls, MT	8	490	2	121
Houston, TX	15	3,850	30	4,170
Laredo, TX	32	2,290	73	3,180
Los Angeles, CA	8	1,310	14	1,940
Miami, FL	4	689	2	556
Mobile, AL	1	116	1	62
New Orleans, LA	8	572	30	1,030
New York, NY	8	1,180	14	1,220
Nogales, AZ	1	87	3	164
Norfolk, VA	5	271	3	206
Ogdensburg, NY	7	933	10	794
Pembina, ND	3	278	2	359
Philadelphia, PA	(3/)	39	(3/)	109
Portland, ME	(3/)	21	(3/)	7
St. Albans, VT	26	690	(3/)	37
St. Louis, MO	21	1,100	4	60
San Diego, CA	(3/)	75	10	655
San Francisco, CA	3	911	18	405
San Juan, PR	43	1,360	(3/)	14
Savannah, GA	1	87	1	228
Seattle, WA	(3/)	30	10	532
Tampa, FL	(3/)	114	1	300
Other 4/	80	5,280	80	5,480
Total	748	38,000	731	35,200

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Free alongside ship (f.a.s.) value at U.S. ports.

3/ Less than 1/2 unit.

4/ Unknown, but assumed to be rail and/or truck shipments to Canada through various points of departure.

Source: Bureau of the Census.

TABLE 10
U.S. IMPORTS FOR CONSUMPTION OF SALT, BY COUNTRY 1/

(Thousand metric tons and thousand dollars)

Country	1997		1998	
	Quantity	Value 2/	Quantity	Value 2/
Australia	67	527	104	1,050
Bahamas, The	1,070	14,600	885	11,400
Brazil	170	1,980	158	1,700
Canada	3,630	72,200	4,180	77,300
Chile	1,920	22,800	1,260	16,600
China	1	285	2	592
Dominican Republic	69	581	123	976
Egypt	36	911	44	1,010
France	18	825	2	1,080
Germany	4	545	(3/)	553
Hong Kong	1	115	(3/)	12
Ireland	44	437	14	243
Israel	(3/)	126	2	169
Italy	1	125	4	216
Japan	(3/)	158	1	134
Korea, Republic of	1	709	3	606
Mexico	1,410	21,900	1,230	19,500
Netherlands	63	2,170	168	5,240
Netherlands Antilles	98	1,770	163	2,850
Peru	426	3,400	295	2,190
Spain	1	138	6	127
United Kingdom	75	714	32	269
Venezuela	51	381	75	609
Other	2	288 r/	13	429
Total	9,160	148,000	8,770	145,000

r/ Revised.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Customs value only.

3/ Less than 1/2 unit; included with other.

Source: Bureau of the Census.

TABLE 11
U.S. IMPORTS OF SALT, BY CUSTOM DISTRICTS 1/

(Thousand metric tons and thousand dollars)

District	1997		1998	
	Quantity	Value 2/	Quantity	Value 2/
Anchorage, AK	8	173	16	463
Baltimore, MD	791	11,100	458	7,310
Boston, MA	611	8,110	494	6,390
Buffalo, NY	339	7,170	410	8,150
Charleston, SC	95	2,200	125	3,400
Chicago, IL	336	7,520	866	17,600
Cleveland, OH	203	4,420	236	5,130
Columbia-Snake, OR	276	3,530	348	4,650
Dallas-Fort Worth, TX	(3/)	2	--	--
Detroit, MI	1,210	23,100	989	18,200
Duluth, MN	67	927	154	2,330
Great Falls, MT	1	62	(3/)	28
Honolulu, HI	(3/)	5	--	--
Houston-Galveston, TX	(3/)	164	(3/)	207
Laredo, TX	1	216	1	108
Los Angeles, CA	115	2,490	109	2,280
Miami, FL	(3/)	30	(3/)	15
Milwaukee, WI	1,150	23,100	1,010	19,000
Minneapolis, MN	--	--	(3/)	12
New Orleans, LA	319	6,240	294	5,360
New York, NY	829	10,100	914	13,500
Norfolk, VA	132	1,940	53	699
Ogdensburg, NY	94	2,140	97	1,450
Pembina, ND	23	1,020	16	626
Philadelphia, PA	672	7,580	285	4,050
Portland, ME	900	9,970	903	9,640
Providence, RI	221	2,570	158	1,910
St. Albans, VT	(3/)	131	7	258
St. Louis, MO	(3/)	69	(3/)	17
San Diego, CA	11	572	(3/)	33
San Francisco, CA	108	1,540	(3/)	80
San Juan, PR	315	4,180	8	254
Savannah, GA	8	508	124	1,750
Seattle, WA	(3/)	20	324	4,330
Tampa, FL	261	3,600	248	3,270
Wilmington, NC	73	1,140	122	2,410
Total	9,160	148,000	8,770	145,000

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Customs value only.

3/ Less than 1/2 unit.

Source: Bureau of the Census.

TABLE 12
SALT: WORLD PRODUCTION, BY COUNTRY 1/ 2/

(Thousand metric tons)

Country 3/	1994	1995	1996	1997	1998 e/
Afghanistan (rock salt) e/	13	13	13	13	13
Albania e/	10	10	10	10	10
Algeria (brine and sea salt)	178	250	250 e/	250 e/	250
Angola e/	30	30	30	30	30
Argentina:					
Rock salt	3	(4/)	--	(4/) r/	--
Other salt	834	1,009	1,096	857 r/	900
Total	837	1,009	1,096	858 r/	900
Armenia	30 e/	33	26	26 e/	26
Australia (brine salt and marine salt)	7,685	8,148	7,905	8,749 r/	8,879 5/
Austria:					
Brine salt	701	523	367 r/ e/	400 r/ e/	500
Rock salt e/	1	1	1	1	1
Total e/	702	524	368 r/	401 r/	501
Azerbaijan e/	30	20	15	15	15
Bahamas, The e/	900	900	900	900	900
Bangladesh (marine salt) e/ 6/	350	350	350	350	350
Belarus	263	1	1	1	1
Benin (marine salt) e/	(4/)	(4/)	(4/)	--	--
Bolivia	(4/) e/	5	(4/)	(4/) e/	5 5/
Bosnia and Herzegovina e/	50	50	50	50	50
Botswana 7/	186	208	94	185 r/	200
Brazil:					
Brine salt	4,670	4,460	3,870	5,064 r/	5,000
Rock salt	1,373	1,340	1,514	1,452 r/	1,500
Total	6,043	5,800	5,384	6,516 r/	6,500
Bulgaria	1,300	1,500	1,600	1,500 e/	1,500
Burkina Faso e/	7	7	7	5	5
Burma e/ 8/	30	35	35	35	35
Cambodia e/	40	40	40	40	40
Canada	11,700	10,957	12,248	13,264	13,320 p/
Cape Verde e/	4	4	5 r/	6 r/	7
Chile	3,178	3,494	4,043	5,488	6,207 5/
China	29,746 r/	29,780 r/	29,035 r/	30,830 r/	22,420 5/
Colombia:					
Marine salt	358	282 e/	424	182	185 p/
Rock salt	207	268	153	144	145 p/
Total	565	550 e/	576	326	330
Costa Rica (marine salt) e/	32	32	37	37	37
Croatia	22	22	19	17	17
Cuba e/	175	180	180	180	180
Czech Republic e/	180	--	--	--	--
Denmark (sales)	634	603	600 e/	600 e/	600
Dominican Republic:					
Marine salt	47	42	50	50 e/	50
Rock salt	10	11	11	12 e/	12
Total	58	53	61	62 e/	62
Egypt	1,008	1,990	1,530 r/	1,500 r/ e/	1,500
El Salvador (marine salt) e/	30	30	31	32	32
Eritrea:					
Marine salt e/	206	253	198	200	200
Rock salt e/	2	2	2	--	--
Total	208	255	200	200	200
Ethiopia (rock salt) e/ 6/	5	5	5	1	1
France:					
Brine salt	1,658	1,491	1,460	1,475 r/	1,500
Marine salt	1,123	1,473	1,970	1,188 r/	1,200
Rock salt	143	165	160 e/	371 r/	300
Salt in solution	4,612	4,410	4,273	4,051 r/	4,000
Total	7,536	7,539	7,860 e/	7,085 r/	7,000
Germany:					
Marine salt	542	617	731	700 e/	700
Rock salt and other	12,557 r/	14,607	15,176	15,087 r/	15,000
Total	13,099 r/	15,224	15,907	15,787 r/	15,700

See footnotes at end of table.

TABLE 12--Continued
SALT: WORLD PRODUCTION, BY COUNTRY 1/ 2/

(Thousand metric tons)

Country 3/	1994	1995	1996	1997	1998 e/
Ghana e/	50	50	50	50	50
Greece	206 r/	143 r/	147 r/	150 r/	150
Guatemala e/	48	48	48	48	48
Honduras e/	25	25	25	25	25
Iceland e/	5	4	4	4	4
India:					
Marine salt e/	9,500	9,500	9,500	9,500	9,500
Rock salt	3	2	2	3 e/	3
Total e/	9,500	9,500	9,500	9,500	9,500
Indonesia e/	650	670	670	680	650
Iran 9/	1,050	936	450 e/	500 e/	500
Iraq e/	300	250	250	250	250
Israel e/	1,120	900	800	800	800
Italy:					
Brine salt and rock salt	3,353	2,952	2,941 r/	2,910 r/	3,000
Marine salt, crude e/ 10/	600	600	600	600	600
Total	3,953	3,552	3,541 r/	3,510 r/	3,600
Jamaica	18	20	18	18 e/	20
Japan	1,387	1,351	1,390 e/	1,400 e/	1,400
Jordan e/	26	25	25	25	25
Kenya (crude salt) e/	71 5/	71	41	50 r/	35
Korea, North e/	600	600	590	590	550
Korea, Republic of e/	760	770	770	770	780
Kuwait e/	45	100	100	100	100
Laos (rock salt) e/	8	8	14 r/	18 r/	20
Lebanon e/	3	3	4	4	4
Leeward and Windward Islands e/	1	1	1	1	--
Libya e/	15	30	30	30	30
Madagascar	76	51	50 e/	50 e/	50
Mali e/	5	5	6	5	6
Malta (marine salt) e/	(4/)	(4/)	(4/)	(4/)	(4/)
Martinique e/	200	200	200	200	200
Mauritania e/	6	6	6	6	6
Mauritius e/	6	6	6	6	6
Mexico	7,458	7,670	8,508	7,933	8,412 5/
Mongolia (mine output)	1 r/	1 r/	1 r/	1 r/	1
Morocco (marine salt and rock salt)	177	173	168	170 e/	260
Mozambique (marine salt) e/	40	40	60	60	60
Namibia (marine salt) 11/	357	304	356 r/	493 r/	550
Nepal e/ 12/	7	7	7	7	8
Netherlands	3,500 e/	4,976	5,530	5,000 e/	5,500
Netherlands Antilles	420	424	366	432	450
New Zealand e/	80	50	67	67	65
Nicaragua (marine salt) e/	15	15	15	15	15
Niger e/	3	3	3	3	2
Pakistan: 6/					
Marine salt	13	17	18 e/	17 e/	18
Rock salt	847	935	940 e/	935 e/	938
Total	860	952	958 e/	952 e/	956
Panama (marine salt) e/	20	22	22	22	23
Peru	150 r/	126 r/	293 r/	79 r/	80
Philippines (marine salt)	562	535 r/	492 r/	492 r/	495
Poland:					
Rock salt	750	812	923	900 e/	900
Other salt	3,324	3,402	3,240	3,070 e/	3,000
Total	4,074	4,214	4,163	3,968	3,900
Portugal:					
Marine salt e/	125	--	--	--	--
Rock salt	519	545	610	600 e/	600
Total	644 e/	545	610	600 e/	600
Romania:					
Rock salt	892	669	350	350 e/	350
Other salt	1,310	1,820	2,339	2,300 e/	2,200
Total	2,202	2,489	2,689	2,650 e/	2,550

See footnotes at end of table.

TABLE 12--Continued
SALT: WORLD PRODUCTION, BY COUNTRY 1/ 2/

(Thousand metric tons)

Country 3/	1994	1995	1996	1997	1998 e/
Russia e/	4,000 r/	3,100 r/	2,100 r/	2,100 r/	2,000
Senegal e/	117	120	120	120	130
Serbia and Montenegro	32	14	22	28	30
Sierra Leone e/	200	--	50	10 r/	--
Slovakia	100	100	107	100 e/	100
Slovenia	8	3	5 e/	5 e/	5
Somalia e/	1	1	2	1	1
South Africa 11/	414	313	253	319	320
Spain:					
Marine salt and other evaporated salt	1,422	1,282	1,500 e/	1,500 e/	1,500
Rock salt	3,510	3,494	2,500 e/	2,500 e/	2,000
Total	4,932	4,776	4,000 e/	4,000 e/	3,500
Sri Lanka e/	56 5/	60	65	65	70
Sudan e/	75	75	50	50	50
Switzerland e/	259 5/	300	300	300	300
Syria	127	111	72 r/	70 r/ e/	70
Taiwan (marine salt)	186	221	233	62 r/	100
Tanzania	84	105	87	90 e/	90
Thailand:					
Rock salt	288	381	530	555 r/	550
Other e/	100	100	100	100	100
Total e/	388	481	630	655 r/	650
Tunisia (marine salt)	414	481	478	394 r/	450
Turkey	1,353	1,444	2,068 r/	2,000 r/ e/	2,000
Turkmenistan	300 e/	277	256	217	215
Uganda e/	10	10	10	10	5
Ukraine e/	3,500	3,000	2,800	2,500	2,500
United Kingdom:					
Brine salt e/ 13/	1,300	1,300	1,300	1,300	1,300
Rock salt e/	1,700 5/	1,800	1,800	1,800	1,800
Other salt 13/	4,004	3,548	3,512	3,500 e/	3,500
Total e/	7,000	6,650	6,610	6,600	6,600
United States including Puerto Rico:					
United States:					
Brine	18,000	20,600	21,500	21,400	21,100
Rock salt	15,100	14,000	13,500	12,900	12,900
Solar salt	3,020	3,540	3,270	3,170	3,190
Vacuum pan and open pan	3,960	3,950	3,920	3,980	4,040
Puerto Rico e/	45	45	45	45	45
Total e/	40,100	42,200	42,300	41,500	41,300
Venezuela e/	400	350	350	350	350
Vietnam e/	375	375	375	390	400
Yemen e/	110 5/	110	110	110	110
Grand total	192,000 r/	196,000 r/	197,000 r/	199,000 r/	192,000

e/ Estimated. p/ Preliminary. r/ Revised.

1/ World totals, U.S. data, and estimated data are rounded to three significant digits; may not add to totals shown.

2/ Table includes data available through July 9, 1999.

3/ Salt is produced in many other countries, but quantities are relatively insignificant and reliable production data are not available. Some salt brine production data for manufacture of chlorine, caustic soda, and soda ash are not reported because of incomplete data reporting by many countries.

4/ Less than 1/2 unit.

5/ Reported figure.

6/ Year ending June 30 of that stated.

7/ From natural soda ash production.

8/ Brine salt is produced as reported by the Burmese Government in metric tons, was as follows: 1994--58,612; 1995--81,156; 1996--71,350; 1997--70,000 (estimated); and 1998--72,000 (estimated).

9/ Year beginning March 21 of that stated.

10/ Does not include production from Sardinia and Sicily, estimated at 200,000 metric tons annually.

11/ South Africa's decline and Namibia's increase in 1994 were due to production from Walvia Bay now included under Namibia.

12/ Year ending July 15 of that stated.

13/ Data captioned "Brine salt" for the United Kingdom are the quantities of salt obtained from the evaporation of brine; that captioned "Other salt" is the salt content of brines used for purposes other than production of salt.