

# Present Situation on Salt Products and Development of Various Uses in North American Salt Markets and Environmental Considerations

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## ABSTRACT

The author traces the development of salt markets in the United States and Canada. Included is an estimate of present capacity, present salt use and projected salt use. The impact of the environmental movement as it affects the use of deicing salt is detailed and the author discusses questions of the effect of sodium on health as it relates to the use of food grade salt, the water conditioning market and highway snow and ice control.

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## INTRODUCTION

Before I report on the present condition of the salt industry in North America, let me briefly review for you the geography of our salt deposits and the locations of our production facilities.

The three primary salt deposits in the United States are in the Gulf of Mexico salt basin located in Louisiana and Texas; the southwestern salt basin with salt facilities primarily in Kansas; and the eastern salt basin with mines and evaporation plants in Michigan, Ohio and New York State (this deposit also provides a source of salt for Canadian companies). An additional salt deposit in the Williston Basin provides a source of salt in North Dakota and the western provinces of Canada. The Carboniferous basin is a source of salt for the Maritime provinces of Canada (Fig. 1).

Solar salt operations are found primarily in the Great Salt Lake region of Utah and in California. A few operations are in Nevada and New Mexico. A large solar operation is operated in Mexico and supplies salt for export.

## PRODUCTION AND MARKETS

There are 15 Salt Institute member companies in the United States responsible for over 95 percent of the nation's dry salt production (Fig. 2). Our two Canadian member companies produce all of the dry salt in Canada. The operator of the Mexican solar facility completes the mem-

bership of the Salt Institute in North America. The number one market in the United States is in highway deicing (about 10 million tons), more than double the next major market, the chemical industry (4.4 million tons). Those are followed by water conditioning, 3 million tons, agriculture, 1.8 million tons and the food and grocery industry, 1.7 million tons. The rest of the annual production is taken by the textile and dyeing industry, metal processors, paper and pulp companies, the oil industry and various other consumers.

Consumption of salt in Canada in 1977 was approximately 4.8 million tons. About 3.1 million tons were consumed for highway deicing, 1 million tons for the chemical industry, 200,000 tons for agriculture, 100,000 tons for water conditioning, with the remaining divided among fishing, meat packing, food processing, hide curing and the food and grocery industry.

**Domestic production.** During 1977, domestic production capacity totaled 22,917,000 tons (Table 1). Imports of rock and solar salt amounted to 4,569,000 tons. Subtracting the 929,000 tons of salt that was exported leaves a new total of 26,557,000 tons capacity. Consumption during 1977 was 22,073,000 tons, leaving an excess capacity of 4,484,000 tons.

## PAST USE AND PROJECTIONS

The history of salt use in the United States in the last ten years shows growth. Growth has been rather steady from 14 million tons total dry salt in 1966 to more than 22

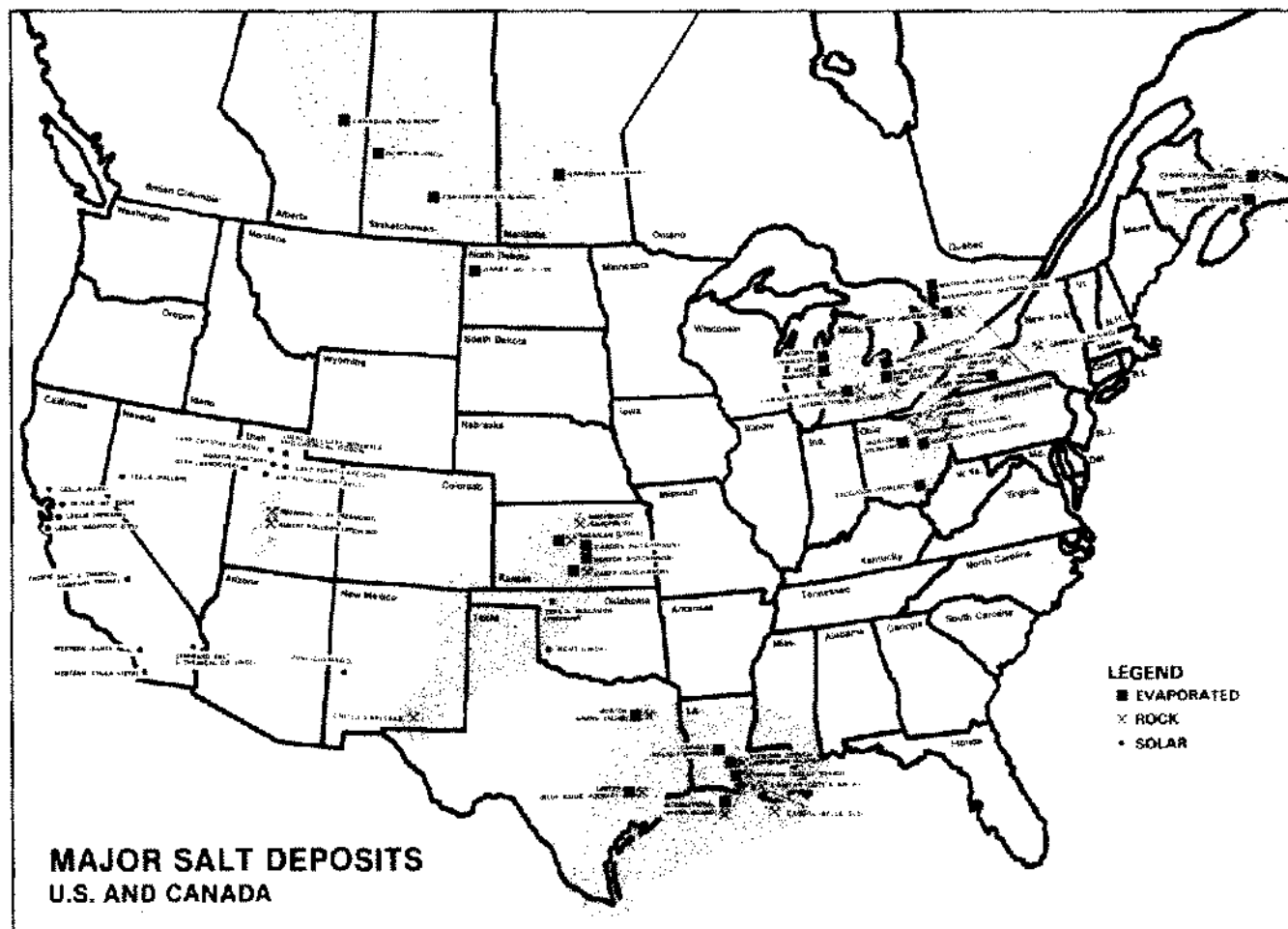


Figure 1. Major salt deposits of the United States and Canada.

million tons in 1977. However, if the amount of salt sold for highway deicing is subtracted, we see that the growth from other uses went from 9.5 million tons in 1966 to about 12 million tons in 1977.

The Salt Institute's projection for salt use in the United States to the year 2000 calls for a somewhat slower growth from the last 25 years (Fig. 3). Total dry salt sales should grow from just under 25 million tons to about 33 million tons, less highway deicing use, from 12.5 million tons to nearly 18 million tons. For Canada, the figures would be a growth from the present 4.8 million tons to about 5.2 million tons.

The expected growth by markets to reach our 33 million tons goal in the United States is in Table 2. Factors affecting future growth encompass a number of things that could make a considerable change in our forecast.

**Environmental and health factors.** On the negative side there is the environmental movement, which has had a considerable impact on highway salt use and, of course, that impact could be even more severe. Environmental criticism

has led to renewed efforts not only to restrict use of salt but to seek other methods of snow and ice control. Environmental restrictions also have an adverse impact on both the present and future of the water conditioning market.

Concern about sodium and health is another negative consideration. A United States Senate Committee chaired by Senator George McGovern initially recommended reduction of salt consumption by 50 to 85 percent to about three grams per day. Due to considerable objection to this unreasonable goal, a revised goal of reducing intake of salt (sodium chloride) to about 5 grams per day (added to foods) has been adopted. This is in addition to about 3 grams per day non-discretionary intake of sodium chloride (sodium occurring naturally in foods, expressed as sodium chloride). The committee recommendation, plus the attendant publicity, has led to a new wave of concern about the effect of high sodium intake on human health. This obviously could have a detrimental impact on food grade salt consumption but also on the water conditioning market, since ion exchange water softening does add to the sodium content of

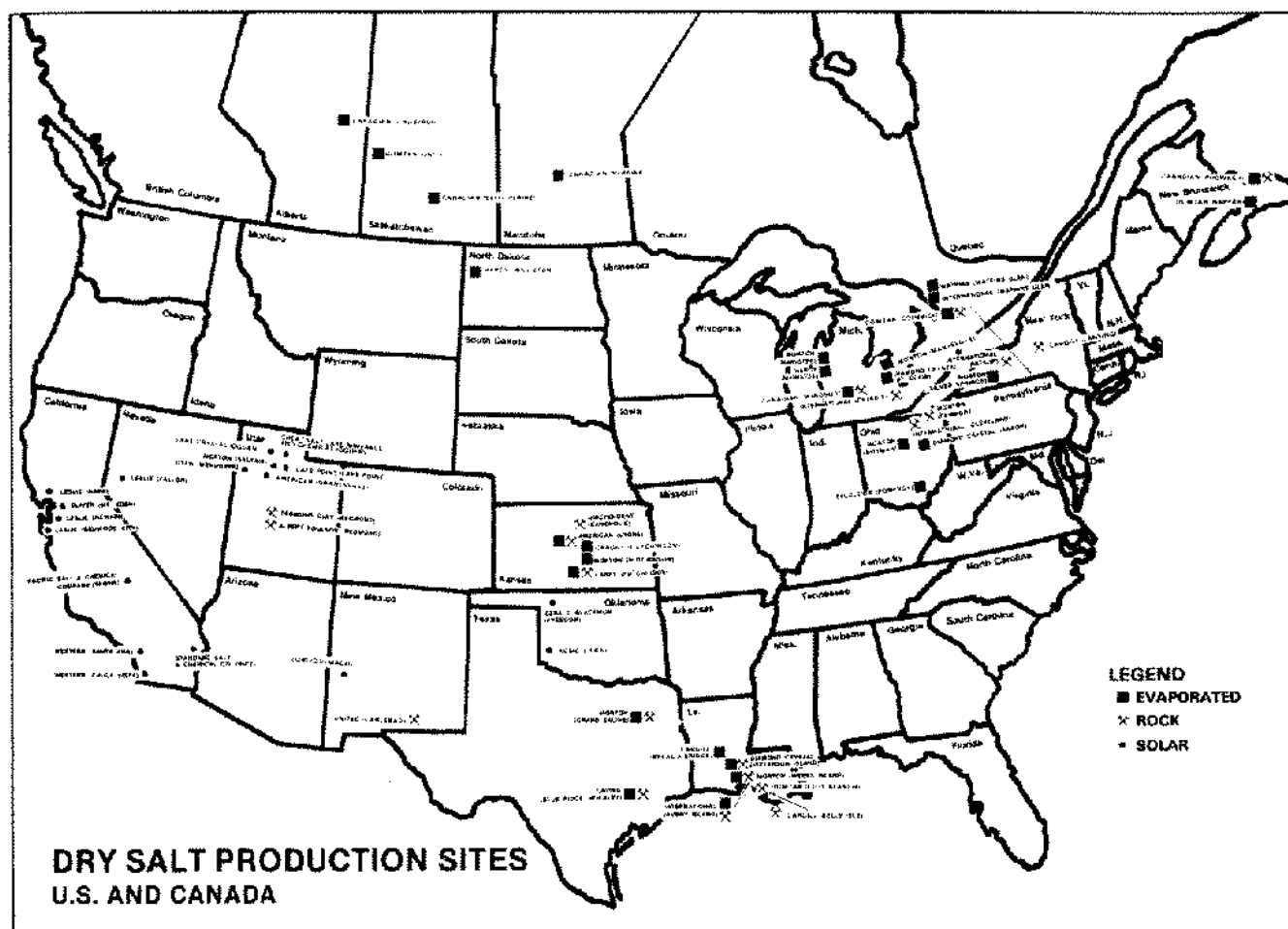


Figure 2. Dry salt production sites of the United States and Canada.

TABLE I  
United States Salt Statistics, 1977

Domestic Production Capacity	(1000's of Tons)
Evaporated	4,132
Rock	16,700
Solar	2,085*
Imports	4,569
Exports	929
Net	26,557
Consumption	22,073
Excess Capacity	4,484

\*Crude Capacity Considerably Higher

water and increases the intake of sodium through drinking water.

Another negative consideration is the movement in the U.S. to restrict disposal from home water softeners into septic tanks. It is estimated that as many as 50 percent of home

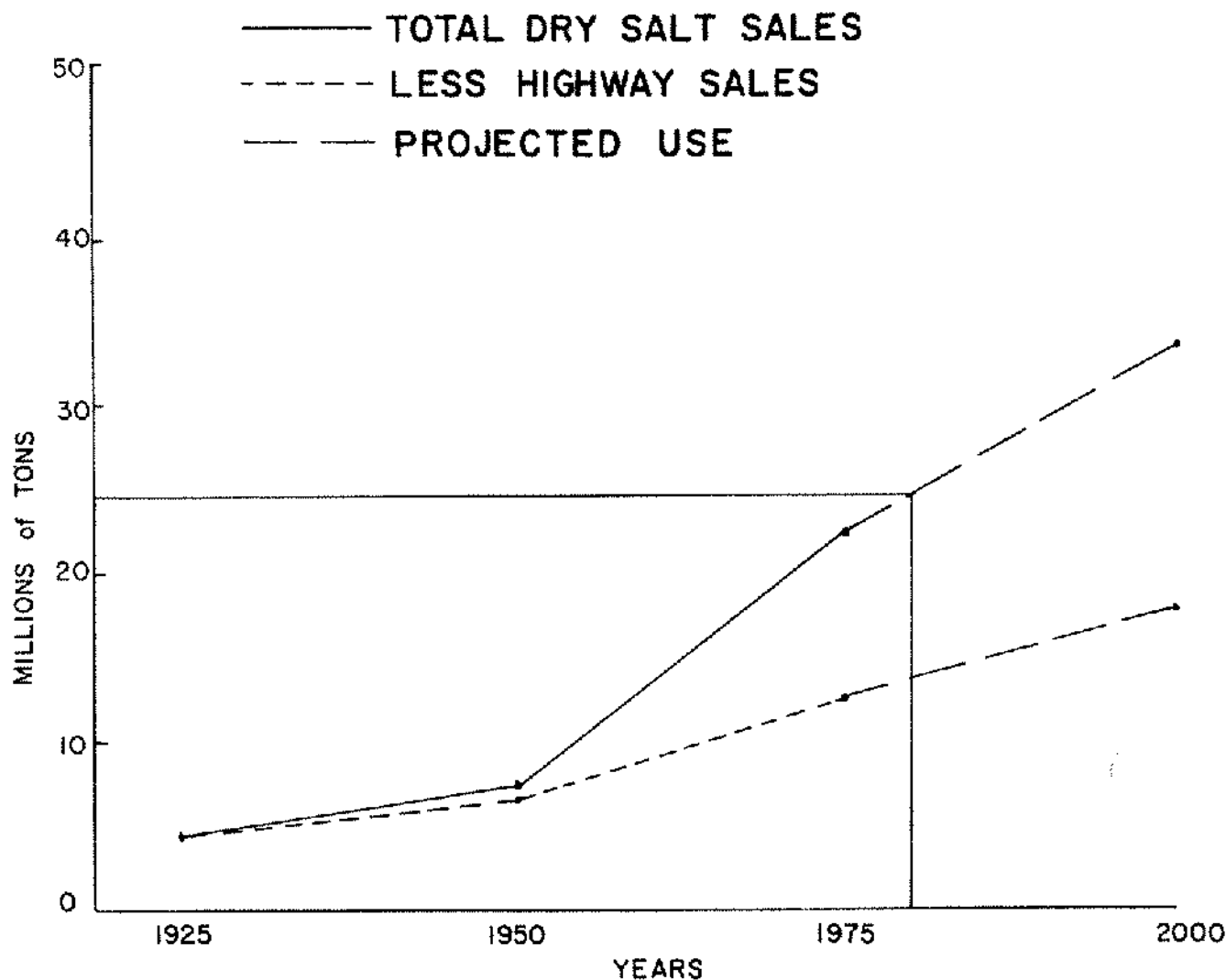
water softeners now discharge into private sewage disposal systems.

There is also a general concern about the effect on water supplies of disposal of salt brines, whether from water softeners, salt production facilities or facilities using brine in their operations.

**Growth factors.** On the positive side the Salt Institute feels that we have developed an answer to the critics of deicing salt use through our Sensible Salting Program. This is aimed at getting street and highway agencies to avoid excessive use of salt for both environmental and economic reasons. We feel that the problems in the water conditioning industry can be overcome. We have underway studies on the effect of disposal of water softener effluent into sewage disposal systems and we believe the results will be positive.

There certainly will be a natural expansion of the use of salt based on population growth and the need for salt in a vast number of markets. There are also possibilities for new uses of salt, such as in conjunction with fluidized bed combustion of coal, where limestone is added to reduce sulfur

## U.S. SALT SALES



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Figure 3. Salt sales in the United States by Salt Institute Members.

emissions and addition of small quantities of salt shows great economic promise by reducing the amount of limestone needed and making the combustion process more efficient.

Currently a consultant is advising the Salt Institute of developments in this promising field and he has projected a potential market for this salt use of at least 15 million tons per year within 15 years. And those figures are based on a penetration to only 25 percent of the total public utility coal burning equipment and just 50 percent of the industrial market. So, really, the market penetration could be considerably greater.

Another old use that might be rejuvenated, in view of our recent cold winter, is use of salt for freeze-proofing of coal. Much difficulty was experienced with frozen coal shipments.

## NUTRITIONAL USES

The industry continues to seek new additives for salt for animal feed and we believe this offers a growing market. For instance, our member companies supplied the salt for a two-year study to determine whether continuous zinc supplementation would benefit the calf and lamb crops.

TABLE 2  
U.S. Salt Industry Growth By Year 2000

Highway Salt	5 million tons increase
Agricultural Salt	1.25% Annually = .87 million tons
Food Grade Salt	22.7% increase based on population projections = .255 million tons
Chemical Industry	1 million tons increase
Water Conditioning	3 million tons increase
Miscellaneous Uses	1 million tons increase

That testing is being conducted by a U.S. Department of Agriculture Research Center. The tests should provide information on any strong preference by these livestock for plain versus zinc blocks, weight gain data, how easily blocks containing 1.5 percent and 3 percent zinc oxide can be manufactured and the resistance of plain and zinc blocks to weathering. We are also interested in obtaining information on the effect on reproduction.

The Institute provided a grant of \$1,000 to Colorado State University for a study on "The Effects of Low Dietary Salt on Egg Production." The findings have been published and indicate that laying hens need .5 percent salt in the ration for best results, a level somewhat higher than other studies. Indications are that salt for this use could double.

Our member companies were advised that after March 1, 1977, EDDI (Ethylene Diamine Di-hydriodide) should be excluded from blocks, since it was difficult to prove efficacy of EDDI for foot rot prevention in cattle. Canada banned EDDI five years ago. However, since then a major manufacturer of EDDI that found it difficult to prove efficacy now believes it can be proved. Those tests are proceeding. In addition, three of our member companies have agreed to provide test cattle feedlots, one in the West, one in the Midwest and one in the East, in order to determine consumption levels. The cost would then be divided among all member companies interested in producing those medicated blocks.

We have maintained contact with an American Feed Manufacturers Association committee that has been gathering data to get selenium approved for ruminant rations. That committee has obtained tissue residue data for beef cattle and sheep. Our agricultural consultant, Dr. T.J. Cunha, believes that dairy cattle should also be included. Recently it has been reported by animal scientists that selenium deficiencies in livestock are costing \$500 million yearly, that pregnant cows need twice the selenium in the total ration than is now recommended, and that using salt with 30 ppm selenium with pregnant ewes is effective in preventing a selenium deficiency with the lambs. These and other studies indicate that it is very important for the U.S. Food and Drug Administration to give approval for supplementing rumi-

nant rations with selenium. The committee is seeking that approval. The logical means for providing selenium for ruminants would be through salt and/or mineral supplements.

## CHEMICALS AND CHEMICAL INDUSTRY

In the area of water conditioning, which is one of our most promising markets, the Salt Institute made a survey of water conditioning dealers, in cooperation with the Water Quality Association, to determine current use and potential growth in that field. One finding was that water conditioning dealers could be doing more about selling salt and were missing out on additional profits by not emphasizing salt sales in their businesses. We are considering a promotional program to show them the potential additional profits in the handling of more salt. The next phase of our survey will be a poll of consumers in order to provide a profile of the typical home with a water softener, to help forecast who might buy next and to determine appeals that would aid purchase of softeners.

The situation in the chemical industry has some positive possibilities, but they are offset by some negative aspects. New production since the beginning of 1977, on the books and predicted, amounts to 4,300 tons of chlorine per day. However, two mercury cell plants in Canada were shut down, two others have been closed in the U.S. and one plant has been mothballed.

As far as the market is concerned, the operating rate in the chlorine industry is pretty dismal. As new plants go on stream, some of the old plants may have to shut down, particularly the smaller and older plants in the Gulf of Mexico area. The fact that the chlorine market is down is not being blamed on the ecology movement, but it is significant to note that two chemical companies have stopped manufacturing fluorocarbons used in air conditioners and aerosols, since our Environmental Protection Agency said that fluorocarbons could help deplete ozone in the atmosphere.

There are some new developments that could have a positive effect on the market for salt for the chemical industry. Nonasbestos diaphragm cell production required evaporation to separate caustic soda from salt. The mercury cell production method gives a 50 percent caustic solution but that method is being forced out by environmental concerns. A new membrane cell method produces caustic soda with very little salt in it in one stream and another stream of weak brine with a 17 percent concentration. In order for the brine to be reused, it must be re-saturated to 25 percent and that may require addition of dry salt. Seventy to 80 percent of the U.S. chlor-alkali production is based on solution mining. But, only if the plants are close to their brine supply source would it be feasible to return the brine to the brine wells for re-saturation. The weak brine could be evaporated to reach saturation but that would be very expensive. The

least expensive, and most logical way to re-saturate would appear to be to add dry salt. However, there is only one plant operating with the membrane cell in North America. A Japanese chemical company has developed a proprietary membrane that it claims is much superior to that in use in the one American plant. There are quite a few membrane plants in Japan, indicating that the chlorine industry could move in that direction and there could be an increase in the dry salt market in the U.S. and Europe.

### QUALITY ASSURANCE PROGRAM

While we search for new markets and new uses for salt, we must assure that our present products continue to be of high quality. Just over one year ago, the Salt Institute members in the U.S. started a quality assurance program with the purpose of assuring the public of quality products and of providing such assurance before federal regulatory agencies step in and force the issue. It was one of the most successful projects ever undertaken by the Institute, with quick results. An industry Quality Assurance Guidelines manual has been issued and a copy presented to the Food and Drug Administration. The Salt Institute now has a standing committee on

Quality Assurance that will monitor pending legislation and government regulations and alert member companies. It will keep the manual up to date to help ensure that salt manufactured for human consumption has been produced by good manufacturing practices as defined in the Quality Assurance Guidelines and, in general, work toward improving the quality image of salt and salt products.

### FINAL COMMENT

The kind of projection we have made on salt markets indicates my optimism about the future of the salt industry in North America. It is an essential industry, but we cannot take things for granted and we must work constantly to make sure the public always keeps salt in high regard, such as that portrayed in the outstanding article in the September, 1977 *National Geographic Magazine* entitled, "Salt—the Essence of Life." Let me close by quoting the last paragraph of the article: "Tonight at dinner, cast a more appreciative eye on that humble saltshaker. Your life and mine depend upon those little white crystals. Our blood, sweat, tears—the very beating of our hearts—all attest to that."