

The New Salt Industry

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ABSTRACT

Ten years ago, there was serious overcapacity in evaporated salt, lagging sales of rock salt and more supply than demand for solar salt in the west. The lack of research and product development in the salt industry was criticized.

Today the situation has changed completely. There is skyrocketing demand for rock salt brought on chiefly by increased demand for bare pavements in the snowbelt states. Evaporated salt consumption has increased to the point that current growth is nearly equivalent to the capacity of one new evaporating plant per year.

This paper covers the developments which lead to the current level of use and the outlook for the future.

Also reviewed is the vast amount of capital expenditure made by the salt industry and the increased product capacity which has resulted.

In a fast-moving world of moon shots and transplants there is still room for basic elements whose production is as vital to modern man as to his cave-dwelling ancestors.

Salt, the so-called "fifth element," is one of these.

Today, the salt industry is vibrant, alive, and aggressive, a keystone for world advancement.

The industry and its basic product have been called unglamorous. But those who know the business disagree. What could be more exciting than the production and distribution of a mineral that is essential to all that man dreams of doing?

The salt industry is in transition around the globe. It is gearing up to meet international de-

mands brought about by rising populations, increasing living standards and the accompanying demand for this basic building block of human progress.

Ten years ago, there was serious overcapacity in evaporated salt, overproduction of rock salt and more solar salt than was needed in some areas. Few salt companies actively engaged in research and product development. Only a few had even considered diversification.

To call what has happened in that decade a turnaround is putting it mildly indeed.

GROWTH TRENDS

To meet today's rising demands, the industry must add to evaporated production the equivalent of a new plant each year. Rock salt mines have been stretched to cope with rapidly growing needs. New rock salt production facilities are under construction or in the planning stages. Solar salt production is expanding at break-neck pace throughout the world.

With all this has come vast improvements in technology, in transportation and distribution methods and production techniques. There has been reorganization, diversification and intensified product development.

The revolution in the salt industry has a world-wide dimension. World salt production rose from 81.8 million tons in 1958 to 111.3 million tons by 1967, a gain of 36%.

In the U.S., production rose from 21.9 million tons in 1958 to 38.9 million tons in 1967, up 79%. That is about 35% of world production.

The largest proportion of this is sodium chloride

brine, food for chemical companies. Most is captive brine, pumped into the chemical plants from nearby underground sources.

But it is the surge in dry salt production that is most remarkable. Here is where results of engineering skill, large capital investment and the logistics of processing and moving large quantities of a heavy, low cost bulk material are paying off for members of the Salt Institute.

In 1958, U.S. dry salt production was only 9.17 million tons. By 1967, that figure had risen to 16.9 million tons, a gain of 85%.

In just one year, 1966-67, evaporated salt sales in the U.S. increased 9.4% in tonnage and 11% in value. Rock salt sales increased 15.8% in tonnage and 17.9% in value. Few industries can claim that kind of growth, nor point to the industry's potential for continued, even greater prosperity.

Confirmation of the trend is found in Canada, where dry salt production has tripled from its 1958 level of 1.2 million to today's figure of 3.9 million tons. Western European countries produce some 20 million tons. This is double the production of 20 years ago.

No longer is salt production following its historic growth pace that about equalled that of the gross national product. In recent years, the curve has shot up.

THE HIGHWAY DE-ICING MARKET

The leading market for dry salt in the U.S., Canada and some European countries is for street and highway de-icing. This use grew from 1.75 million tons in 1958 to this winter's estimated record high of 7 million tons in the U.S., and hit 1.6 million tons in Canada. The use has grown from practically nothing in Europe 20 years ago to over 2 million tons today.

Growth will continue with population increases (and the ensuing demand for safer winter driving conditions) and addition of new lane mileage. The 41,000-mile Interstate System is now about 70% complete, with some 27,000 miles open. Since 1960, an estimated 25,000 miles of state primary roads have been converted into 4-lane divided highways, and modernization of existing roads will continue at an accelerated pace in this country and elsewhere.

Salt use for all highway purposes is expected to reach a level of 8 million tons annually by 1970 and 10 million tons a year by 1975.

OTHER SALT MARKETS

Water softening holds second place in rate of growth for U.S. salt output. Sales of water softening appliances are increasing 10 to 15% annually, and will rise even more as quality water becomes less abundant. The average home water softener uses about 1,000 pounds of salt annually. At present growth rates, sales of salt for water softening will reach 1.1 million tons by 1975.

World-wide, sales of table salt and salt to the food industry are a leading contributor to producers' profits. In the U.S. in 1967, table salt accounted for 12.3% of all supermarket spice, extract and seasoning sales, and for 7.4% of profits in that department. Dollar volume on salt was nearly \$25 million of total seasoning sales of \$202 million.

The industry's only food product once was table salt. Now it is that and much more: salad dressings, spices and seasonings of all kinds, food concentrates and mixes.

Packet or portion products are a burgeoning field for the salt industry. Companies that entered the field several years ago find sales rising dramatically. Customers include the "fast feeding" business—restaurants, airlines, the vending industry and institutions of all kinds. Products are jams and jellies, mustard, honey, cheese, sugar, catsup, and salt. Special dietary kits for hospital use include a variety of carefully planned and measured nutritional requirements.

Salt industry investments in highly automated packet product plants have followed growth in volume, assuring those firms of greater flexibility and lower production costs.

For food processors, the salt industry has developed and either sells or leases a wide range of salt applicators and dispensers, including brine, compacted and granular systems. These systems apply the right kind of salt, in the right amounts, in literally every food product from soup to nuts.

Salt for human consumption, whether from the shaker or in prepared foods, is expected to be about 1.2 million tons by 1975.

In agriculture, the salt industry is rapidly upgrading its products to provide ranchers and other livestock producers a full range of salt-based minerals, vitamins and medicants. The marketing of salt to custom mixers of feeds and major feed producers has grown rapidly. As grazing lands become scarcer, higher volumes of feeds will be needed.

is will boost supplementary intake by animals. The supplements most needed are best provided in it.

Increases in the animal population on farm and range will mean a 31% increase in salt demand for at market between 1965 and 1975, to about 2 million tons.

SALT AND THE CHEMICAL INDUSTRY

Salt is a basic commodity that is converted into chemical building blocks such as chlorine and caustic soda, then into thousands of needed compounds and products. Most of the salt consumed by the chemical industry is in brine form. But about one-fifth of U.S. dry salt output, and a higher percentage in Canada and Europe, goes to the chemical industry.

Although the dollar return to the salt industry from its chemical business is comparatively low, it is important because of its dependability and volume. The grades of salt used for this purpose help line operators balance production.

U.S. production of chlorine and caustic soda products has more than doubled since 1958. To produce a ton of chlorine requires 1.7 tons of salt. So that 4-million ton gain has meant another 7 million tons of salt required by the chemical industry. End products include plastics, fibers, dyes, and many others basic to the economy.

In 1958, dry salt consumption by the chemical industry was 2.3 million tons. In 1967, the figure was 3.8 million tons, a 64% gain.

A startling growth pattern is shown in recent years in the catch-all area of "other chemicals," where dry salt consumption shot from 628,000 tons to 1.8 million tons between 1958 and 1967.

Total dry salt output for chemical manufacture could be over 6 million tons by 1975, about double the 1965 figure.

Historically, salt production has followed the trend set by salt consumption in chemicals. That industry is growing at a rate of 5% or better, domestically.

But worldwide chemical demand is moving faster. The pace will quicken as emerging nations begin their own chemical production, and that will mean far more demand for salt.

Salt-poor Japan is a major customer for world salt producers. Japanese salt demand is growing at the rate of 500,000 tons annually, or about 8% a year. Japan will require 8.5 million tons of salt annually by 1979.

The salt producers of the free world are closely involved in development of both the salt resources

and the basic chemical industries that will be required in a score of other countries between now and the turn of the century.

ADVANCES IN SALT RESEARCH AND DEVELOPMENT

Research departments, added by salt companies in the last decade, have paid off with scores of new salt products or additives to the mineral. New anti-caking compounds, corrosion inhibitors, and special flake sizes and shapes for a variety of uses are today's result. There have been new salt products across the spectrum of the product's end uses, from agriculture to water softening.

The industry is just scratching the surface of higher profitability through more sophisticated products and services.

In the chemical industry, salt companies provide specialized equipment for such uses as converting rock salt to brine and for feeding salt into conversion cells.

In the development of their own production facilities, salt companies have acquired valuable engineering and technical know-how that qualifies their personnel as consultants on similar projects. U.S., Canadian and overseas salt producers are actively engaged as consultants to governments and private concerns around the world on construction of solar salt works, mines and plants.

In the southwest, huge volumes of liquified petroleum gas are stored in cavities created in salt domes by hydraulic mining. Salt production continues as these mines are put to dual use. Investigation is underway into the feasibility of disposing of radioactive wastes in salt mine cavities.

Rock salt mines provide a controlled, safe environment for storing everything from furs and classic movie prints to valuable records and documents. A chamber at the 1,200-foot level in one mine provides a vibration-free environment for calibration of guidance system components essential to the U.S. space effort.

One salt company harvests more than salt from its solar ponds. That company now recovers, processes and markets a small brine shrimp as a protein source.

Where will continued diversification lead the industry? The facts point to more involvement in such industries as foods, chemicals, fertilizers, drugs and transportation.

SALT DISTRIBUTION

Distribution costs are a significant factor to salt companies, and may run 30% or more of gross sales dollars.

The industry's solutions to product distribution are lessons in logistics. The heavy, bulk commodity moves from a relatively few production points to markets around the world. Australian and Mexican salt ends up in Japan. Louisiana salt de-ices roadways in the U.S. snow-belt. Bahamian salt steams into East Coast, U.S., and Canadian ports.

The solid-form product travels by rail, water and truck. Brine moves by pipeline in some cases.

In 1967, 7.7 million tons of salt moved by rail in the U.S. at an average cost of \$5.35 per ton, giving U.S. railroads some \$41.5 million in revenues. Water carriers in that year transported 1.2 million tons of rock salt, and hauled in \$2.4 million.

Most of this salt traveled only part way by those modes, and was finally delivered to users by truck. Class 1 motor carriers alone in 1966 earned \$6.4 million, or over \$8 per ton, from deliveries of salt products and they carried only a fraction of the salt. Hauling of bulk rock salt brought many millions of dollars to truckers.

This year, U.S. rail rates on packaged salt were raised substantially; bulk salt rates rose 5%. This on top of other increases in past years. In other countries, rising freight costs are also one of the industry's burdens.

The industry has taken giant steps toward moving its product faster and cheaper. More are in the offing.

It is axiomatic that the unit cost of moving a commodity goes down with increasing volume. Rising salt output eases the transportation cost burden somewhat.

Large volume barge transportation of salt is comparatively new. Salt companies own barges and towing vessels. Some of these haul salt to market and take other bulk materials back the other way.

Salt companies are in the railroad and freight terminal business, mainly to move their product more economically and expeditiously.

Deep water is a key factor in selecting the site for most salt producing facilities. Availability of vessels has been responsible for significant new salt production, giving those ships cargo on both legs of their journeys.

The latest in dock facilities and loading equipment enables salt producers to load and unload ships of up to 50,000 tons capacity at rates of 1,500 tons an hour or more.

Companies that cater to de-icing markets, whether in Britain, Canada or the U.S., may have a score or more of terminals and stockpiles strategically located to give speedy service to public works agencies. The industry is spending several

million dollars annually on new storage depots, packaging and processing plants and improvements to existing terminals. For example, ten years ago, there were only 42 major distribution points for de-icing salt in the U.S. Today, there are over 200.

The multiple car rail concept is already being widely applied in the salt industry. We can logically expect salt producers to fully explore this method and even the unit train concept for moving their product longer distances in the near future.

The industry has made enormous progress in development of specially designed rail cars for handling different types of salt. Pneumatic transport is available for truck and rail shipments. Hydraulic systems permit salt to be unloaded and pumped as a slurry, originating either in a converted hopper car or in a pit located at the unloading point at raiiside. A variety of novel salt dissolvers transform dry salt into brine and move it in the right form and at the right rate into customers' plants.

WORLDWIDE SALT PRODUCTION EXPANDS

Between 1958 and 1967, U.S. production of dry salt (rock, vacuum and solar) increased 85%. Product value, in the same period, rose 68.7%.

The salt to meet that demand came from some new domestic sources, but also from imports. A big factor, too, was the stretching of existing mines and plants.

In the leading salt producing state of Louisiana, for example, rock salt output rose from 3.5 to 4.2 million tons between 1966 and 1967, as existing mines were pushed to turn out another \$2.4 million worth of product.

In 1958, the U.S. imported only 611,042 tons of salt. By 1967, that figure had reached 2,393,056 tons, with vast increases in Canadian, Mexican and Bahamian salt and with the addition of a new source in Tunisia that supplied 217,348 tons in 1967.

Between 1962 and 1967, the ratio of salt imports to consumption in the U.S. rose from 4.7 to 6.9.

In addition to the lowering of tariffs there was the factor of substantial new solar production in the Antilles and Bahamas by U.S.-based salt producers.

Meanwhile, the industry was working to increase its capacity.

Capital expenditures by the U.S. and Canadian salt industry are now running at an estimated annual rate of some \$25 million. New production

and processing equipment, new terminals and depots, new mines and plants are the end product of his massive spending.

More than 20 projects, to be completed by 1972, will have a combined cost of over \$70 million and provide over 10 million tons of new dry salt production—solar, rock or evaporated.

Mainly to supply Japanese demand, five salt companies are building or have just completed solar salt works in Australia. Investment in these solar plants alone is projected at \$30-35 million, with total production capacity of over five million tons by 1975.

One U.S. company, a member of the Salt Institute, has just made its first shipment of Australian solar salt, with an initial harvest only 33 months after it began construction.

A new rock salt mine will soon be under construction in New York. The cost: \$20 million. Time required to sink shafts: two or more years. Finally, when full production is reached, likely in 1972, annual capacity will be 2 1/2 million tons with a possibility of 4 million tons later.

Major new production by U.S. companies includes a \$6 million solar salt works in Netherlands Antilles that will have initial capacity of 400,000 tons annually. Another U.S. company has already had its initial harvest from a new solar plant in the Bahamas, completed at a cost of \$5 million. Within four years, that plant will yield 500,000 tons annually.

Then there is tremendous expansion in evaporating facilities and in rock salt mines already in existence. All this to enable U.S. firms to meet the demand for dry salt.

Canada has added two new mines since mid-1959. In that country, there is much activity in terms of expanding existing plants to push capacity higher. Canada now has seven evaporated salt plants, and the companies that operate them have plans to spend several million dollars over the next few years to boost their capacity. Around the world, there are new saltworks under study or construction in Ceylon, Greece and Sardinia. A Mexican solar operation has increased production from less than half a million tons in 1959 to three million annually today.

There is a new rock salt mine in Western Germany, two under study in Sicily, and at least

one being contemplated in Canada. There is a major salt mining operation in Chile.

Coupled with the huge expansion in U.S. and Canadian evaporated production are new vacuum plants in Denmark, Holland and France. European technology has permitted construction of huge evaporating plants, with capacity as large as 1.4 million tons annually.

Exploitation of the mineral resources in the Great Salt Lake could lead to major new salt production. There is an estimated three billion tons of sodium chloride in the Lake, plus untold quantities of other minerals. Companies now preparing to reap this mineral wealth could produce a great deal of sodium chloride in the process. One company now planning to produce 400,000 tons of magnesium chloride there estimates it will have a capacity of one million tons of by-product salt per year.

Meanwhile, other companies are expanding their production capacity at that location.

The oceans hold by far the greatest amount of salt on earth, about 4.5 million cubic miles. Water de-salting plants may someday produce vast quantities of salt. However, that is a far-away prospect, and a more likely development will be the use of weak effluent brine from these installations as the feed for solar evaporating plants. A pilot experiment with a Salt Institute member taking this brine into its evaporating ponds is now underway on the West Coast. The salt producer may get a higher yield per acre and faster production and the desalination facility would have a ready outlet for its waste product, which would otherwise be returned to the sea.

All this activity aimed at higher salt production is simply the result of higher demand. The mind boggles when one seeks to comprehend the volume of minerals needed by a world that will contain six billion people by the year 2000. Authorities say world consumption of non-fuel minerals will demand a five-fold increase by that time. U.S. projections alone indicate an increase of two to three times the present total by the end of this century.

That is a mere three decades from now. When I look back at the last decade's progress, I am not at all concerned that these huge demands can be met by the world's salt producers.