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HISTORY OF UTAH'S SALT INDUSTRY
1847-1970

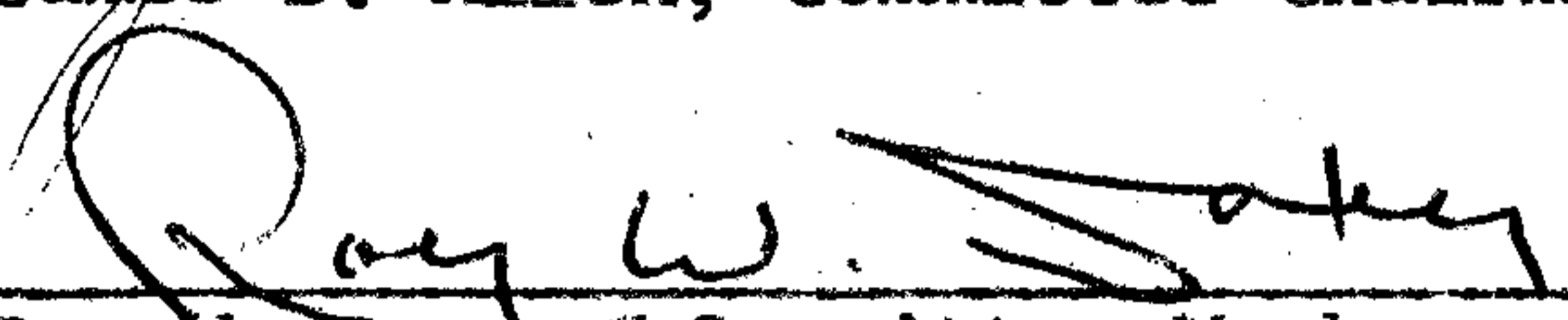
A Thesis
Presented to the
Department of History
Brigham Young University

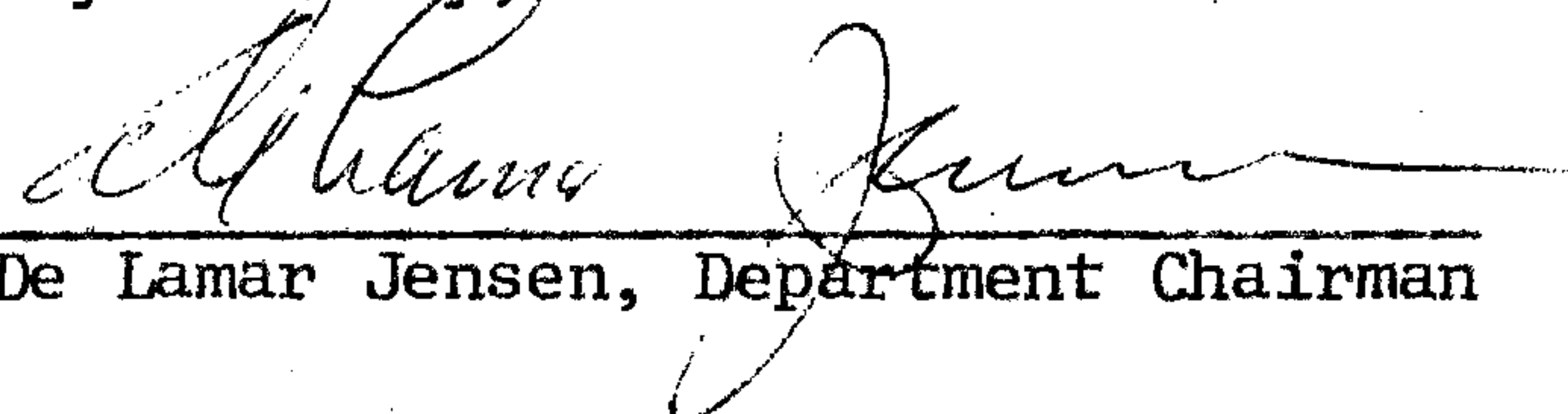
In Partial Fulfillment
of the Requirements for the Degree
Master of Arts

by
John L. Clark
August 1971

This thesis, by John L. Clark, is accepted in its present form by the Department of History of Brigham Young University as satisfying the thesis requirement for the degree of Master of Arts.


James B. Allen, Committee Chairman


Roy W. Doxey, Committee Member


De Lamar Jensen, Department Chairman

August 2, 1971
Date

PREFACE

While applying for a summer job at a salt company, I was prophetically warned by an elderly night watchman that salt has a mystic quality. "Salt gets in your blood. Once you have worked in it, you will always return." The warning went unheeded; consequently, during one-fourth of my life, much of my spare time and summer vacations have been spent researching and writing the history of Utah's salt industry.

This project was initiated with the hope that it would contribute to the knowledge of Utah's heritage. In a preliminary survey of available information, I found nothing had been written directly on the salt industry. I felt the topic was worthy of treatment because of the world-wide fame of Great Salt Lake, principal source of Utah salt. Production from the lake has been one of the oldest businesses in the state, dating from pioneer times.

An attempt has been made in this study to trace the methods used to extract and refine salt from the various sources and explore the economic, legal, and environmental factors that enhanced or impeded growth of the industry and the individual companies within it.

Since very little has been written on the salt industry, I have had to rely heavily on first-hand information from various experts, including the salt makers themselves. Every effort has

been made to write this history as honestly and objectively as possible; however, I must assume full responsibility for any inferences, implications, or interpretations placed upon this information which does not correspond to the message they tried to convey.

For the contribution they have made to this history, my heartfelt thanks is expressed to Don B. Allen, Norman Birchler, Milo Bosshardt, Ray W. Garrard, Thayne Imlay, Alonzo Jeffs, Morving Larsen, Sherrill W. Neville, James Palmer, Delbert Pence, Albert Poulson, A. Z. Richards, Jr., C. R. Rockwell, and James Wood. Because of the extra demands placed upon his time, special thanks must be given to Myron L. Sutton, Pond Foreman for Morton Salt Company. His knowledge of local salt history is unsurpassed and is recognized as such by the men in his field. His explanation of technical detail, on-the-spot locations of old salt works, and the thousand and one tidbits proved indispensable to the completion of this thesis.

An expression of thanks must be extended posthumously to L. LeRoy Imlay for his contribution; he was killed in an automobile accident before this work was completed.

I love, appreciate, and thank my parents, John W. and Elizabeth H. Clark, for their interest and encouragement. My father provided some insights into early-day salt-making methods from his personal experience.

I want to thank Dr. James B. Allen, my Graduate Committee Chairman, for his assistance in making this project meet acceptable standards. To the other members of my committee, Roy W.

Doxey, and Dr. Eugene E. Campbell, I express appreciation. I want to especially thank Mrs. Ruth K. Christensen who has done such a proficient job of typing and revising the final copy of this work.

I appreciate the open-hand generosity of George B. Gudgell, III, of Bush and Gudgell, Inc., who so graciously presented me with the maps that comprise Appendixes IV and V.

In recognition of the assistance given by the various institutions, mention should be made of the staff and personnel of the following: Brigham Young University Library, University of Utah Library, L.D.S. Church Historians Library, Bancroft Library at Berkeley, California, The Utah State Historical Society, Office of the Secretary of the State of Utah, Office of County Recorders in Davis and Salt Lake Counties, State of Utah.

I owe the greatest debt of gratitude to my wife, Linda, and to our five children--Lauren, Paul, Michael, Daniel, and Adam--whose sacrifice to see this work completed has gone, if not unheeded, unrewarded. My wife has spent many hours proof-reading, revising, editing, and critically evaluating every page of manuscript. She has given me the encouragement, support, understanding, and love needed to continue my work.

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CHAPTER I

INTRODUCTION

The history of Utah's salt industry closely parallels the steps taken by man throughout the ages to satisfy his need for salt. In the spectrum of Utah's history, men scooped up low-quality salt from the natural deposits on the shore of Great Salt Lake in much the same way as the ancients. With modern machines, Utah's present companies are producing salt over 99.7 per cent pure from vast, solar-pond complexes.

While recent marketing emphasis designates more than 95 per cent for industrial purposes,¹ man cannot live on a totally salt-free diet. If there is an imbalance, the body's hormone system causes water to be excreted via urination and perspiration until the correct salt-water ratio is restored. Water will continually be excreted until the body finally expires if there is a failure to stop the loss of salt.² Thus, man has frequently been required to use strenuous, even bizarre, methods to obtain this commodity.

Primitive African tribes have satisfied saline needs by

¹U.S., Department of Interior, Geological Survey, Mineral and Water Resources of Utah (Washington, D.C.: Government Printing Office, March, 1964), pp. 207-208.

²M. R. Bloch, "The Social Influences of Salt," Scientific American, CCIX (July, 1963), 89.

drinking the blood and urine of animals.³ Methods used by the Chinese further illustrate what man has done, and is willing to do, to flavor his food and satisfy, perhaps unknowingly, a vital, physical need. An ancient Chinese treatise dating back to 2700 B.C. describes two methods used to obtain salt from sea water. The first employed boiling ash from salt plants in a kettle of sea water over a fire made of salt weeds. Before the liquid was boiled, it was allowed to evaporate in order to form a concentrated brine, and was considered ready to boil only when an egg or a lotus seed floated on the surface. After twenty-four hours of boiling, the salt crystallized. The second method was the obtaining of solar salt⁴ by building embankments to impound the water and digging ditches to draw the sea water into the pond area, where it was allowed to stand until completely evaporated.⁵

At a later time, the Chinese developed other methods of producing salt. Travelers in the Orient reported that prior to 1700 A.D., over 10,000 brine wells had been sunk, many to depths of more than 1,500 feet. One well was said to have been 4,000 feet deep.⁶ Aside from the problem of how the Chinese knew where to bore their wells, the technological problems they faced with

³Ibid.

⁴Solar salt is a precipitate from a brine solution evaporated by solar heat.

⁵Dr. L. G. M. Baas-Becking, "Historical Notes on Salt and Salt-Manufacture," The Scientific Monthly, XXXII (January-June, 1931), 435-436.

⁶Dale W. Kaufmann, ed., Sodium Chloride (New York: Reinhold Publishing Corporation, 1960), pp. 435-436.

their primitive machinery seem almost overwhelming. Nearly all of the equipment used, such as rope, casing, and derricks, was made of wood or wood fiber. Bamboo was the chief source of wood, and manpower was the chief source of energy.

The drilling apparatus used by the Chinese consisted of an iron drill on the end of bamboo poles. A long beam attached to a frame functioned as a lever. At the end of the short section of the beam was attached a rope that suspended the drill in the hole. The drill was raised as several men stood on the long end of the pole. Then, as they all jumped off the pole onto the platform, the drill was dropped into the hole with great force. This continuous churning action was capable of drilling holes to great depths. After the well was completed, bamboo was used to make comparatively long pipelines to transport the brine from the well to where it was to be evaporated.⁷

The ancient salt makers in Europe followed patterns similar to those used by the Chinese. The most common method of salt production in southern Europe was solar evaporation of sea water. Some of the northern Roman provinces used a salt-making technique which varied a great deal from the solar-evaporation process used along the Mediterranean Sea. Those in Gaul and Germany poured salt water over burning oak or hazel logs to produce a dark-colored, but adequately-flavored, salt. Oak or hazel wood was chosen because it added a desirable flavor and, they supposed, the pure ash of these woods had the properties of salt.⁸

⁷Ibid.

⁸Pliny, Natural History, trans. by W. H. S. Jones, VII (Cambridge: Harvard University Press, 1963), p. 427.

The methods used by the early Chinese and European salt makers produced a bitter, foul-tasting product when compared with today's standards. Until comparatively recent times, an effective method of purifying salt was unknown. The old salt producers allowed the sea water to either boil dry or completely evaporate. All of the chemicals would precipitate out, and the "salt" thus produced would be approximately 77 per cent sodium chloride. The remaining 23 per cent would be chlorine, sodium, sulphur, magnesium, potassium, and calcium combined in various molecular forms, along with traces of other elements.⁹

One of the problems facing the salt makers was the sulphide precipitate. The sulphur, reduced by bacterial action and in combination with the ferrous hydrates in the soil, made a black, foul-smelling mud on the bottom of the salt ponds. In order to harvest the salt, the workmen had to use a flat shovel very carefully to avoid mixing the mud with the salt. Thus, the making of salt became a very fine art.¹⁰

At least as early as the first century A.D., and perhaps much earlier, salt that was shoveled from the floor of the ponds was further purified by leaving it exposed to the rain and dew to allow pure water to leach out the more soluble impurities. According to Pliny, in his description of the works at Salamis on the Island of Cyprus: "All salt is made sweet by rain water,

⁹Kaufmann, Sodium Chloride, p. 370.

¹⁰Baas-Becking, "Historical Notes on Salt and Salt-Manufacture," pp. 443-444.

more agreeable, however, by dew.¹¹ This leaching process dissolved much of the magnesium compounds and reduced the bitter taste. The sodium sulphate, which has a tendency to form a crust, would also be dissolved by the rain and dew. The leaching could not be allowed to continue too long, however, or the precious sodium chloride would be dissolved as well.¹²

The salt boilers had unusual methods for eliminating the undesirable compounds from the brine as they boiled it. According to Agricola, a sixteenth-century observer, they would follow this procedure:

From 37 dippers full of brine, two cones of salt are made. To clarify, to two casks, two dippers, add one and one-half cyathus of bullocks, or calf's blood. Boil one hour, stir, boil one hour more. Then add one and one-half cyathus of strong beer.¹³

The blood apparently formed chemical combinations with the undesirable chemicals in the brine, allowing the salt to crystallize at the bottom of the vat in a relatively pure form. Had these salt boilers been aware of the principle of fractional crystallization,¹⁴ they could have saved themselves a great deal of effort and blood.

¹¹Pliny, Natural History, pp. 433-434.

¹²Baas-Becking, "Historical Notes on Salt and Salt-Manufacture," p. 446.

¹³Ibid, p. 444.

¹⁴Fractional crystallization is a process used in modern times to separate the undesirable compounds from sodium chloride while in solution. The various chemicals dissolved in the brine precipitate out of solution at different densities. The brine is allowed to stand until the undesirable chemicals with a saturation point lower than sodium chloride have precipitated out, and is then moved into containers where the sodium chloride is

For nearly three centuries, the American colonists relied mainly on European salt before they developed any permanent commercial salt works of their own. The early colonial salt industry was precarious and spasmodic, usually taking the form of small, home industries deriving their salt from boiling or evaporating sea water.

During this period the American fishing industry, which required great amounts of salt as a preservative, imported much of its salt in trade for fish. Salt was brought from the warm, southern European countries as ballast on incoming ships. This imported supply was not always dependable, and the Colonists complained about a chronic shortage.

In 1614, the Virginia Colonists are reputed to have established the first salt works in the English Colonies. This Cape Charles salt works was built with the intention of acquiring a more dependable and less expensive source of salt. After several years of intermittent production, it failed. Lack of salt-making techniques and the poor quality of salt produced were two factors that inhibited the establishment of a permanent commercial salt works.¹⁵

The Colonists in New England also experienced difficul-

precipitated out of the solution. The brine is held until just before the chemicals with a saturation point higher than sodium chloride begin to precipitate out. The remaining brine or bittern is then drained off. Statement made to the author in private interview held at Saltair, Utah, June 26, 1965, by Myron L. Sutton, Pond Foreman at Morton Salt Company, Saltair Plant.

¹⁵Kaufmann, Sodium Chloride, pp. 9-10.

ties in setting up a profitable salt works. Governor William Bradford, of Massachusetts, sent to England for an experienced salt maker who, by 1624, had constructed solar evaporating ponds and a processing plant. The effort was a failure, however, because the soil underlying the ponds was of such a porous nature that the sea water drained off before evaporation could take place.

The following year a second, but equally unsuccessful, attempt was made. Pans were used to boil the water rather than risk the possibility of faulty ponds again. Shortly afterward, a fire destroyed the plant and damaged the pans, thus ending New England's initial attempt at commercial salt production.¹⁶

Interest in obtaining a domestic source of salt was mounting. In 1641, Samuel Winslow of Massachusetts was granted the first patent issued in America for his improved method of making salt. Even with a supposedly improved method of production, however, Winslow's salt works did not prove successful. Small "salteries" sprang up along the New England coast in competition with him. Although these small works were of a temporary, home-industry type, they produced enough salt to force Winslow to discontinue his enterprise.¹⁷

During the Revolutionary War, the British blockade cut off the supply from the southern European countries and caused a salt famine in America. The shortage became so critical that New

¹⁶Garnett Laidlaw Eskew, Salt, the Fifth Element (Chicago: J. G. Ferguson and Associates, 1948), pp. 27-28.

¹⁷Ibid, p. 30.

York State offered a prize of \$500 to each of the first five men who would set up plants and produce salt from sea water. Many of the old works were revived, but climate and British intervention ruined them.

Out of necessity, attention turned inland, hoping to exploit the salt springs.¹⁸ An attempt was made to recover the salt from the spring at Onandage Lake in upper New York, but the British and her Indian allies drove off any parties adventuresome enough to make the trip.

In 1790, following the war, the salt boilers located themselves on the lake shore and established the first permanent, commercial salt venture in the United States.¹⁹ From that time on into the 19th Century, this area became an exporter of salt. No longer would imported salt from Europe, or solar salt from the Atlantic Seaboard, need to be transported across the mountains into the back country.

Seven years after the Onandage salt springs were exploited, the Kanawha Valley springs began producing salt on a large, commercial scale. Salt springs of Kanawha and Big Bone Lick, West Virginia, were located in 1755 by Mary Draper Ingles. She had been captured by the Indians and forced to boil salt for them. After a heroic escape and a forty-day trek back to her home, Mary Ingles reported the whereabouts of this inland salt source.²⁰ The salt springs were then utilized only on occasion

¹⁸Ibid, p. 32.

¹⁹Kaufmann, Sodium Chloride, pp. 633-636.

²⁰Eskew, Salt, the Fifth Element, pp. 39-43.

by Indians or woodsmen until they were developed in 1797.²¹

The lack of an adequate supply of salt on the eastern seaboard provided a stimulus for the early colonists to establish a salt industry, but it was not until a higher quality salt produced from the salt springs came into being that a commercial salt works became successful and a permanent part of American commerce.

Following the establishment of salt works at Onandage and Kanawha, the development of the salt industry in America followed the pattern of westward migration in the 19th Century. Ohio followed Virginia in developing a permanent, commercial salt industry when a salt works was established at Salt Creek, Jackson County, in 1798.²² Louisiana, one of today's largest salt-producing states in America, utilized its massive deposits early in the 19th Century. The first works were developed in 1812 at the Avery Salt Dome. This was the first commercially-used, rock-salt discovery in America.²³

In California, the Indians and Spaniards scraped up the salt left in pools after the high tides, but it was not until after the 1849 gold rush that a commercial venture was established. A salt works was founded in 1853 at Alameda, California. By 1854, levees were constructed to retain the sea water in a solar-evaporation process. By 1864, an improved

²¹Kaufmann, Sodium Chloride, pp. 633-636.

²²Ibid.

²³Ibid. Rock salt is salt in a native mineral form.

quality of salt was produced from a series of settling and evaporation ponds.²⁴

Michigan, Texas, and Kansas, three of the largest salt-producing states in the country today, began to develop their salt deposits in 1859, 1885, and 1887, respectively.²⁵ Nevada, Oklahoma, and New Mexico have been producing salt on a small scale for many years. Long distances from population centers, and competition from older and better-established companies, have kept production down in these states. Arizona, Colorado, Idaho, and Oregon have produced salt in the past, but are no longer active in the market.²⁶

Salt production in Utah follows closely the historical pattern seen elsewhere. With the coming of the Mormon Pioneers in 1847, salt was obtained by scooping it up, or by taking brine from the lake and boiling it down. The Utah salt boilers faced the same problems that had plagued salt makers throughout history. After boiling the brine to complete dryness, the salt contained all the impurities found in the water, giving it a bitter taste.

Utah salt makers had an advantage over those in the east, however, because their brine was much more concentrated than either sea water or the brine taken from salt springs, and thus their salt was cheaper to make. Salt boiling in Utah never

²⁴Ibid.

²⁵Ibid.

²⁶Ibid.

reached the magnitude of the eastern producers because of several factors: the complexion of the market, Utah's isolated location, and the development of a purer grade of salt from the solar-evaporation process.

It was not until the 1880's, when solar-evaporation ponds were constructed, that salt production in Utah became a firmly established industry. From the turn of the century until the present time, Utah has been considered one of the top ten producers in the United States, providing about one per cent of the total salt sold or used in the United States.²⁷

²⁷Ibid, p. 90.

CHAPTER II

GEOLOGICAL ASPECTS OF UTAH'S SALT DEPOSITS

Utah's extensive salt deposits demonstrate the economic truism--abundance of a product does not ensure its marketability. There is enough of this saline mineral in the state to satisfy the world's need for years, yet much of it is commercially undeveloped. Some of the state's deposits have not been exploited due to the abundant supply of high-quality salt close to transportation facilities and population centers along the Wasatch front.

The largest, but as yet untapped, deposit is the Paradox Basin formation which is located in the southeastern corner of the state, extending into Colorado and New Mexico. There are 6,500 square miles of the Basin which are underlaid by salt anticlines up to 14,000 feet thick.¹ A smaller, but also untapped, deposit located in northern Utah underlies Rich, Morgan, and Summit Counties.² The smallest, but only commercially exploited rock-salt formation in Utah is in Sanpete and Sevier Counties. This deposit is interbedded with red shale and siltstone and contains finely disseminated red clay as an impurity. In spite of its impurities, this formation has been developed

¹Mineral and Water Resources of Utah, p. 208.

²Ibid.

because of its shallow depth and adaptability to open-cut mining.³

Other sources in Utah which have been exploited are various salt water springs and the crystalline salt beds in western Utah. The springs, where commercial production has occurred, are located on Spring Bay at the northern tip of Great Salt Lake and in Salt Creek Canyon east of Nephi.⁴ The vast salt beds in Great Salt Lake Desert have been used since the early part of the century, but most of the activity from this location has been during the last fifteen years.

The most extensively used salt source in Utah is the Great Salt Lake, located north and west of the densely populated Wasatch front. Unlike other mineral deposits, the salt content in Great Salt Lake is not being depleted by the continual extraction by salt makers. According to one study conducted in 1960-61, two million tons of dissolved solids are contributed to the lake each year. The most abundant elements that flow into the lake are sodium and chlorine.⁵ Assuming that sodium chloride makes up 20 per cent of the total dissolved solids, the annual contribution to the lake would amount to about 440,000 tons,

³Ibid, pp. 211-12.

⁴The Salt Lake Tribune, Jan. 28, 1940, p. 5. U.S., Department of the Interior, Geological Survey, Minerals Yearbook, 1949 (Washington, D.C.: Government Printing Office, 1951), p. 1054.

⁵D. C. Hahl, M. T. Wilson, and R. H. Langford, "Physical and Chemical Hydrology of Great Salt Lake, Utah," Geological Survey Research, 1965 (Salt Lake City: U.S. Geological Survey, 1965), pp. C-182-83.

which is more than the annual production of salt by all of Utah's salt companies combined for any year up through 1968.⁶

Great Salt Lake today is but a shallow remnant of a great inland sea of prehistoric time. The saline qualities of the present lake came as a partial result of the concentration of salt in solution from Lake Bonneville as its water slowly receded. According to Gilbert, the catchment basin for Lake Bonneville comprised that part of the Great Basin lying east of the Gosiute, Snake, and Pinon Mountains of eastern Nevada--an oblong area embracing about five degrees of latitude and three of longitude, and containing about 54,000 square miles. This is one-fourth of the Great Basin. The Colorado Plateau area, known as the eastern uplands, was the only important condenser of moisture, and the river system from this region contributed most of the water for the ancient lake.⁷

The area of the Bonneville water surface was 19,750 square miles. Its length, measured in a direct line from Cache Bay to the south end of Escalante Bay, was 346 miles, and its extreme width, from the mouth of Spanish Fork Canyon to a point on the Shoshone Range near Dondon Pass, was 145 miles. The actual length of coast line, exclusive of islands, was 2,550 miles.⁸

⁶Appendix III.

⁷Grove Karl Gilbert, Lake Bonneville (Washington, D.C.: Government Printing Office, 1890), pp. 20-21.

⁸Ibid., p. 105.

Other than the residual saline matter inherited from the desiccation of Lake Bonneville, the Great Salt Lake derives its saline material from two sources, rivers and littoral springs. The Bear, Weber, and Jordan Rivers, and a small number of creeks, rise in the uplands above the horizon of the Bonneville shore and bring water to the lake which is sensibly fresh, containing only minute quantities of mineral matter. These three rivers contributed about 82 per cent of the surface inflow of water to the lake during the water years 1960 and 1961; however, they contributed only about 55 per cent of the dissolved mineral load. The remaining 45 per cent of the mineral load came from springs, drains, and sewage canals.⁹ According to one authority, most of the saline material leached by the streams and ground water was leached first, from the salt beds of the Jurassic age, which crop out extensively in Sanpete Valley within the Great Salt Lake drainage area. The second source is the soils, derived in turn from the sedimentary, igneous, and metamorphic rocks of the drainage area of the lake.¹⁰

During the 1960 and 1961 water years, about two million tons of dissolved solids entered the lake from surface sources. The dissolved-solids concentration of the brine was about 200 times that of the surface inflow, and consequently was virtually unaffected by the two million tons of minerals being

⁹Hahl, "Physical and Chemical Hydrology of Great Salt Lake," p. C-183.

¹⁰A. J. Eardley, "Sediments of Great Salt Lake, Utah," Bulletin of the American Association of Petroleum Geologists, XXII (October, 1938), 1320.

delivered to the lake each year. The amount of dissolved salts in the brine varies according to the fluctuation of the lake level. In 1873, when the lake was at its highest recorded level, the lake volume was about 30 million acre-feet, and the brine contained about 6 billion tons of dissolved solids. In 1963, at the lake's lowest recorded stage, there was only about 8.7 million acre-feet of water, and the brine contained about 4 billion tons of dissolved solids.¹¹ The increase in total dissolved solids that occurs when the lake level rises is accounted for by the re-solution of the salts that precipitate out on the lake floor and shore. Therefore, the amount of dissolved solids in the lake brine is a result of the fluctuation of the lake more than the result of these solids coming into the lake from surface inflow.¹²

The Great Salt Lake is the largest body of concentrated brine in the United States. During the period from October, 1959, to September, 1961, the lake brine had an average volume of 10 million acre-feet and concentration of 266,000 parts per million [P.P.M.] dissolved solids.¹³

The following Table 1 provides a percentage breakdown of the principal salts in solution in Great Salt Lake brine and in ocean water.

¹¹Hahl, "Physical and Chemical Hydrology of Great Salt Lake," p. C-185.

¹²Ibid.

¹³Mineral and Water Resources of Utah, pp. 214-15.

TABLE 1
DISSOLVED SOLIDS IN OCEAN WATER COMPARED WITH
GREAT SALT LAKE BRINE

Chemical	Per Cent by Weight	
	Ocean	Great Salt Lake
Sodium chloride, NaCl	77.76	83.816
Magnesium chloride, MgCl ₂	10.88	5.734
Magnesium sulphate, MgSO ₄	4.74	2.455
Calcium sulphate, CaSO ₄	3.60	0.577
Potassium sulphate, K ₂ SO ₄	2.46	0.438
Magnesium bromide, MgBr ₄	0.22	
Calcium carbonate, CaCO ₃	0.34	
Total	100.00	100.000

Source: Dale W. Kaufmann, Sodium Chloride (New York: Reinhold Publishing Corporation, 1960), pp. 231-260.

A comparison of ocean water with brine in Great Salt Lake reveals very little difference in dissolved chemicals between the two salt sources. The dissolved solids in the brine follow a regular pattern of precipitation as the brine solution becomes more concentrated. The sequence of salt precipitation in Great Salt Lake is similar to, but not identical with, the sequence generally ascribed to a body of marine water. Calcium and magnesium carbonate are the first to precipitate, followed by anhydrite, sometimes called gypsum. Sodium chloride, or common salt, is deposited in the next phase and is followed by the chlorides and sulphates of magnesium, potassium, and perhaps sodium, which are deposited as complex mineral compounds upon complete evaporation.¹⁴

¹⁴Eardley, "Sediments of Great Salt Lake, Utah," p. 1322.

If the ocean water were concentrated to the same density as the brine from Great Salt Lake, the composition would be much the same in respect to sodium and magnesium. Lithium, however, would be about six times as abundant in the lake brine, which is comparably deficient in potassium and boron.¹⁵ The brine from the lake varies somewhat from ocean water in the chemical combinations present. The variance is probably due to the reaction between magnesium sulphate and sodium chloride during winter weather. Below 32°F. the Great Salt Lake contains sodium sulphate, whereas the ocean contains magnesium chloride.¹⁶

The Great Salt Lake, at the concentration indicated above, 266,000 P.P.M., contains about 4.4 billion tons of dissolved mineral solids, of which about 3.6 billion tons are common salt.¹⁷ The salt dissolved in the lake is valued at 56.3 billion dollars, using the 1961 value of \$12.80 per ton.¹⁸ Assuming the depletion factor is removed, the lake will most likely remain the state's chief source of salt if the economic and technological factors governing the market for, and production of, salt remain relatively unchanged over the years.

There are several reasons why the vast rock-salt deposits in Utah have been left unexploited. Use of the rock-salt deposit is limited by the depth of the salt formation--750 feet

¹⁵Mineral and Water Resources of Utah, pp. 214-15.

¹⁶Kaufmann, Sodium Chloride, p. 98.

¹⁷Hahl, "Physical and Chemical Hydrology of Great Salt Lake," p. C-183.

¹⁸Geological Survey, Minerals Yearbook (1965), p. 788.

at the shallowest known occurrence in the Paradox Basin,¹⁹ and complications that would be encountered in recovering it from that depth. After recovery of the salt, further refining would be necessary to bring it up to marketable quality. If the rock salt could be recovered cheaply enough, and produced with a quality comparable to that produced on the shores of the Great Salt Lake, there would still be the expense of transporting it to the market areas. It would be at a competitive disadvantage, for the Great Salt Lake producers are much closer to the market. Another factor affecting development of the rock-salt deposits is the limited market for salt. The producers on the shore of the lake are capable of producing more high-quality salt than the market requires. To compete, any company trying to break into the market would have to offer a less expensive salt of comparable or higher quality.

The Paradox Basin salt deposit has not been utilized directly on a commercial basis except in the preparation of artificial brines used for drilling fluids. Indirectly, the salt underlying the Moab area has been used by the Suburban Natural Gas Company for storage of petroleum products.²⁰

The salt beds in the Great Salt Lake Desert, until recent years, were used only for the potash; however, Utah Salt Company has produced salt on a commercial basis from this deposit since 1958. The open-cut salt mines near Redmond, Utah,

¹⁹Mineral and Water Resources of Utah, p. 210.

²⁰Ibid.

have been producing rock salt since pioneer days on a commercial basis. The purity of their product limits, to some extent, its marketability. Most of it is sold as livestock or road salt.

The northern Utah rock-salt deposit has not been utilized on a commercial basis, and the salt springs, even though they have been exploited, are not now under production.

CHAPTER III

BEFORE THE MORMONS

With the exception of the Indians, the use of salt in Utah before the Mormons arrived in 1847 was neither a planned nor an organized effort. For the most part, the trappers, immigrants, and explorers merely used the salt because it was convenient. Extensive development of the deposits by the Indians is not apparent. However, they did uncover rock-salt formations from which they gathered enough salt to fill their immediate needs.

Father Escalante, the first white man to enter Utah, mentions the locations of several salt deposits used by the Indians. While traveling through western Colorado, he reported in his journal under the date August 23, 1776:

We started from San Felipe [on the San Pedro River], climbed a hill and along the foot of the Tabehuachis mountains (so named because they are inhabited by the Yutas Indians of this name) we traveled for four leagues, which, because of the many turnings we took, would be two leagues to the east of San Felipe. We left behind the San Pedro River, which has its source in the Grulla mountains (in one of the branches), which, with the branch they call the Sierra de la Plata, continues north, changes to northwest and then west until it joins the Dolores River, near the low range called La Sal Mountains, because there are salt mines close by, from which, as we learned, the Yuta Indians living in this area take their salt.¹

¹Herbert S. Auerbach, Father Escalante's Journal with Related Documents and Maps (Salt Lake City: Utah State Historical Society, 1943), p. 39.

From the description he left, one cannot positively ascertain whether he was in present-day Utah or Colorado. Apparently, the mine was along the Utah-Colorado border, somewhere in the area between the confluence of the Dolores and the Colorado Rivers.

When Escalante's expedition arrived in Utah Valley, they questioned the Timpanois Indians about the surrounding area. They were told Utah Lake communicated with a much larger lake to the north, the waters of which were very salty. The Indians seemingly did not use this larger lake, the Great Salt Lake, as a source of salt for at least two reasons. First, they had a superstitious fear of the water, believing it to be noxious and extremely salty, and "anybody getting a part of his body wet, instantly feels a severe itching around the wet part."² Second, the Timpanois Indians were afraid of the Puaguampe Indians living around Great Salt Lake because they thought they were wizards or witch doctors. The Timpanois apparently had little communication with the Puaguampe Indians.³

The Timpanois Indians obtained their salt from a deposit a few miles south of Utah Lake. In his diary, Escalante describes the area south of Utah Lake where the Indians mined their salt:

September 27. We left the Arroyo of San Andres going south, and a league farther on over the plain we crossed another small river with as much water as in a medium-

²Ibid., pp. 69-70.

³Ibid.

size ditch. It flows on a level with the ground over which it passes, which makes the soil very good for planting. We continued south over the same plain for a league and a half, and went through the southern pass which we named the Puerto de San Pedro, and entered another extensive valley in which there are, close by to the east, the salt mines from which the Timpanois Indians take their supply. We named it the Valle de las Salinas, which is one of the valleys already mentioned. It may extend fourteen leagues from north to south, and about five from east to west.⁴

Miara y Pacheco, a member of Escalante's party, in his description of Utah Valley, left an account of this salt deposit:

The range of mountains of the east is also very fertile; there are many rivers and springs; good pasture for the breeding of all kinds of cattle and horses; Clustian pines and other kinds of timber; and in its valleys all kinds of plants can be sown. The veins seen at a distance in this ridge of mountains seem to be minerals. On the southern side of this ridge there are some hills of very fine mineral salt.⁵

The deposit that Escalante and Miera mention in their narratives is most likely the salt formation in Salt Creek Canyon near Nephi. Hubert E. Bolton concurs on the location in his summary analysis of the Escalante Expedition:

Next day [September 28] they continued south four leagues to a west-flowing stream [probably Salt Creek, according to Bolton's footnote], said by the natives to descend from the salt flats in the eastern Sierra.⁶

Even though Escalante found no evidence of the Timpanois Indians using salt from Great Salt Lake, it can be assumed that other Indian tribes made frequent visits to the lake and utilized

⁴Ibid., p. 71.

⁵Ibid., p. 115.

⁶Herbert E. Bolton, Pageant in the Wilderness, The Story of the Escalante Expedition to the Interior Basin, 1776 (Salt Lake City: Utah State Historical Society, 1950), p. 75.

the easily obtainable salt lying on the lake shore.

During the late fall of 1825, the mountain men from Ashley's Rocky Mountain Fur Company established a rendezvous site at the mouth of the Weber River, near the present site of Ogden City. While camped in the area, four of the men were assigned to explore the Great Salt Lake in hopes they might find some new beaver-bearing streams. After returning, they reported the body of water was not an arm of the Pacific Ocean, as some previously had thought, but a lake. To further allay their curiosity, they boiled away some of the lake water in a kettle to obtain salt.⁷

Entrance of Ashley's trappers into Great Salt Lake Basin came a year after Peter Skeene Ogden's men and Jim Bridger had made separate discoveries of the inland sea. However, the transient nature of the discoverers' visit lends credence to the claim that Ashley's men were the first to make salt from the brine of the lake.

Nearly a decade later, an American Fur Company trapper named Warren Angus Ferris was traveling with other trappers along the Sevier River in central Utah. He reports:

On the eighth [of September, 1834], I set out with others to procure salt, at a place discovered by our hunters yesterday. We passed three miles down the river, and found the salt in a slough on the west side of it. It was found on the surface of a black stinging mire, fifty or sixty paces in circuit; the upper strata was fine, and white as snow, to the depth of two inches; beneath which, was a layer of beautiful crystals to the depth of five or six inches, that rested on the surface of the mire. We slowly sank into the latter to our knees, whilst scooping up the salt, and then changed places, for we could scarcely extricate ourselves at that depth; and concluded that if we should remain long enough in

⁷Niles Weekly Register, VII (December 9, 1826), 229.

the same spot, we would at length disappear entirely. . . . I gathered about a half bushel in a few minutes, and returned with my companions, who were equally fortunate, to camp.⁸

Ferris is typical of many early trappers in the way he obtained salt; however, he was one of a very few who kept a journal or felt that gathering it was worthy to record.

The early pioneers passing through Utah on their way to California usually brought salt with them and, like the trappers who preceded them, were not motivated by a need for salt when they came to Utah. The journal of John Bidwell, an 1841 immigrant on his way to California, records a few details of his contact with salt. After they had turned west to go around the north end of the Great Salt Lake, Bidwell reported the following:

24th of August. Cattle strayed this morning to seek water--late start--day was warm--traveled about 10 miles in a W. direction, encamped where we found numerous springs, deep, clear and somewhat impregnated with salt. The plains were snowy white with salt. Here we procured salt of the best quality. The grass, that grew in small spots on the plains, was laden with salt which had formed itself on the stalks and blades in lumps, from the size of a pea to that of a hens egg, this was the kind we procured, it being very white, strong and pure.⁹

The springs mentioned by Bidwell would probably be Salt Wells, located northwest of Promontory, midway between the Hansel Mountains and the North Promontory Range. His contact with salt was merely a coincidence relative to his geographical proximity to the location, rather than any contrived plan to follow that

⁸J. Cecil Alter, "W. A. Ferris in Utah, 1830-1835," Utah Historical Quarterly, IX (1941), 96.

⁹John Bidwell, A Journey to California (San Francisco: John Henry Nash Printer, 1937), n.p.

route in order to obtain salt.

John C. Fremont gave some interesting details about Great Salt Lake and its saline content in his reports on the expeditions in this area. In 1843, during his second expedition west, he camped several miles from the Great Salt Lake with the intention of floating down the Weber River in a rubber raft. On the 9th of September, he reported that after going only a short distance, the river became so shallow they had to drag the raft through the soft mud. After proceeding in this fashion for about a mile, they came to a small, black ridge on the bottom, beyond which the water became suddenly salty, beginning gradually to deepen, and the bottom, they reported, was sandy and firm. According to Fremont, the division between the water from the river and the lake water was remarkable in its abrupt change, the lake he described as being entirely saturated with common salt.¹⁰ After sailing to Fremont Island, he described the salt that was deposited on the shore:

The cliffs and masses of rock along the shore were whitened by an incrustation of salt where the waves dashed up against them; and the evaporating water, which has been left in holes and hollows on the surface of the rocks, was covered with a crust of salt about one-eighth of an inch in thickness. It appeared strange that, in the midst of this grand reservoir, one of our greatest wants lately had been salt. Exposed to be more perfectly dried in the sun, this became very white and fine, having the usual flavor of very excellent common salt, without any foreign taste; but only a little was collected for present use, as there was in it a number of small black insects.¹¹

¹⁰John Charles Fremont, Memoirs of my Life (Chicago: Belford, Clarke and Company, 1887), pp. 230-31.

¹¹Ibid., p. 232.

Early the following morning, they returned to the mainland, after first filling a five-gallon bucket with water from the lake from which they intended to make salt. Fremont described the process by saying:

Today we remained at this camp, in order to obtain some further observations and to boil down the water which had been brought from the lake for a supply of salt. Roughly evaporated over the fire, the five gallons of water yielded fourteen pints of very fine-grained and very white salt, of which the whole lake may be regarded as a saturated solution.¹²

According to Fremont's description of boiling the salt water, they obtained salt at a rate of 14 pints of salt from 40 pints of brine, indicating a 35 per cent solution. The accuracy of Fremont's description is questionable. Salt begins to crystallize out of solution when the concentration reaches about 25.0 degrees on the Baume [Be] scale.¹³ When the density of the brine reaches 30.0 degrees [Be], all but about 12 per cent of the sodium chloride has precipitated out of the solution.¹⁴

If Fremont had collected water that produced 35 per cent solid matter, he would have had a proportionately smaller amount of sodium chloride and larger amounts of chlorides and sulphates

¹²Ibid., p. 236.

¹³Kaufmann, Sodium Chloride, pp. 253-54, and "Antoine Baume," The Encyclopedia Americana, 3 (1954), p. 350. The Baume hydrometer was developed by the French chemist, Antoine Baume (1728-1804). The Baume Hydrometer is used to measure liquids heavier than water. In pure water, the scale reads 0 degrees Be, and in saturated brine with 26.395 per cent salt, the reading is 24.6 degrees Be. The Be scale values correspond only roughly to the per cent of salt.

¹⁴Ibid., p. 101.

of magnesium and potassium, but this was not the case, as indicated by the following table:¹⁵

Chloride of sodium (common salt)	97.80
Chloride of calcium	0.61
Chloride of magnesia	0.24
Sulphate of soda	0.23
Sulphate of lime	<u>1.12</u>
Total	100.00

The brine taken from the lake and boiled to dryness would have resulted in a product about 84 per cent sodium chloride, rather than the 97.9 per cent they obtained. The ratio of salts found in Fremont's sample are dissimilar to any modern analysis, yet the current theory indicates the ratio of salts in solution changes very little, even though the concentration may fluctuate greatly over the years.¹⁶ Fremont's samples either were not representative or they had become contaminated somehow before the analysis.

During Fremont's expedition west in 1845, about two weeks were spent in the Salt Lake Valley and on the streams in the area. Some time was spent fixing the positions of various points, and extending their examination into and around the Great Salt Lake. In his report, Fremont made some significant observations in the peculiarities of the lake with regard to the content, and deposition of salt and the annual fluctuation of the lake level. He said:

¹⁵Fremont, Memoirs of my Life, p. 236.

¹⁶Hahl, "Physical and Chemical Hydrology of Great Salt Lake, Utah," p. C-185.

The rocky shores of its islands were whitened by the spray which leaves [sic] salt on everything it touches, and a covering like ice forms over the water which the waves throw among the rocks. This seems to be the dry season when the waters recede; and the shores of the lake, especially on the south side, are whitened with incrustations of fine white salt. The shallow arms of the lake, under a slight covering of briny water, present beds of salt extending for miles. Plants and bushes blown by the wind upon these fields are entirely incrustated with crystallized salt. The stem of a small twig, less than the size of a goose-quill, from the southeastern shore, showed a formation of more than an inch thick of crystallized salt.¹⁷

Not only was salt being deposited in large beds along the shore of the lake, but the entire bottom of Great Salt Lake was covered with crystalline salt. This deposition was due to the annual recession of the lake and its resultant concentration of the brine. Fremont observed this phenomena as he and Kit Carson rode horseback from the southeastern shore of the lake to Antelope Island. Their comments attest to the shallowness of the lake as they indicated the water did not reach above their saddle girths at any point in their crossing. Fremont pointed out, "The floor of the lake was a sheet of salt resembling softening ice, into which the horses' feet sunk to the fetlocks."¹⁸ Kit Carson said the salt on the floor of the lake varied from the thickness of a wafer to twelve inches.¹⁹ This trip, made in mid-October, was during the lake's annual low stage. The lake must have been at about the 4,196-foot level, which subsequent studies have shown produces a saturated-salt solution, and salt

¹⁷Fremont, Memoirs of my Life, pp. 429-31.

¹⁸Ibid.

¹⁹Kit Carson, Kit Carson's Autobiography, ed. by Milo Milton Quaife (Chicago: R. R. Connelley and Sons Co., 1935), pp. 88-89.

begins depositing on the lake floor.²⁰

After leaving the vicinity of the Salt Lake Valley, Fremont traveled the short distance to Utah Lake and began his investigation of that area. He made the following comments about the rock-salt deposits south of Utah Lake, probably those located in Salt Creek Canyon, east of Nephi:

When I was on this stream [a small stream entering the Utah Lake, south of the Spanish Fork], with Mr. Walker in that year [1844], he informed me that on the upper part of the river are immense beds of rock-salt of very great thickness, which he had frequently visited. . . . These strata probably underlie the bed of the Great Lake, and constitute the deposit from which it obtains its salt. It was found by us in the place marked by Humboldt on his map of New Spain as derived from the journal of the missionary Father Escalante, who towards the close of the last century attempted to penetrate the unknown country from Santa Fe of New Mexico to Monterey of California. But he does not seem to have got further in his adventurous journey--and this at that time was far--than the south end of the Timpanogos. Southeast of this lake is the chain of the Wasatch Mountains, at the place where Humboldt has written "Montagnes de sel Gemme," (Rock Salt Mountains), the strata of salt are found in thick beds of red clay, at the head of a small stream tributary to the Utah or Timpanogos Lake on its southeasterly side.²¹

From the scanty record left by those who entered the Utah area prior to 1847, their need for salt does not seem to have been a significant factor in directing their travels, nor do the vast salt resources in Utah appear to be a factor in attracting future travelers or settlers to the area. Father Escalante painted a glowing picture of Utah Valley and its possibilities for future colonization, but he did not mention the availability of salt as one of its attractions, although he was

²⁰Eardley, "Sediments of Great Salt Lake, Utah," 1319.

²¹Fremont, Memoirs of My Life, pp. 236, 430.

familiar with two immediately available deposits. Captain Fremont, commenting on the advantages of a military post in the north end of the Great Basin in the Bear River Valley, said:

A military post, and a civilized settlement, would be of great value here; and cattle and horses would do well where grass and salt so much abound. The lake will furnish exhaustless supplies of salt.²²

Fremont's comment about salt may have had some influence on the Mormons, inasmuch as they studied his reports prior to their trek west.²³ However, the Mormons obviously were much more concerned over the fertility of the land and available timber and water resources than they were over the availability of salt deposits.

²²Brevet Captain John C. Fremont, Report of the Exploring Expedition to the Rocky Mountains in the Year 1842, and to Oregon and North California in the Years 1843-'44 (Washington, D.C.: Gales and Seaton, Printers, 1845), p. 160.

²³B. H. Roberts, A Comprehensive History of the Church of Jesus Christ of Latter-day Saints (6 vols.; Provo: Brigham Young University Press, 1965), II, 521.

CHAPTER IV

PIONEER EXPLOITS, 1847-1880

On October 29, 1845, just eleven days after John C. Fremont described the immense beds of salt drying on the southeastern shore of the Great Salt Lake, and nearly four months before the first pioneer contingent left Nauvoo to cross the plains, a "Bill of Particulars" was published in the Nauvoo Neighbor.¹ The Bill provided the citizens of Nauvoo with an outline of what a family of five would find "necessary to reasonably equip [them] for the pioneer wilderness journey." Included among the various items on the list was 25 pounds of salt. That amount of salt was an ample supply for five people for one year; however, many people were required to wait much longer than a year before they could replenish their salt cellars from the salt beds described by Fremont.

The Mormons were unable to cross the plains during the year of 1846. Early in the spring of 1847, the Mormons, while camped at Winter Quarters, Iowa, selected a pioneer or advance party of 144 men to go to the Rocky Mountains. The purpose of the forerunners was to find a suitable route for the upcoming migration, and then prepare by building bridges, ferries, and good roads for the thousands of Mormon exiles who would follow

¹Nauvoo Neighbor, October 29, 1845.

them.² The majority of the advance group entered Salt Lake Valley on July 23, and immediately began to prepare for the coming winter and for those who were crossing the plains behind them. When Brigham Young entered the valley the next day, five acres of ground had been plowed and part of it planted to potatoes.³

Great Salt Lake, the most dominant feature of Salt Lake Valley, must have been high on the list of prospective sites to explore. On July 28, Brigham Young and some of the brethren made a special trip to the lake to satisfy their curiosity as to the nature of this well-known landmark, and to bathe in its salty water. William Clayton reports the brethren were quite impressed by the buoyant qualities of the water. Later their attention turned to the more practical aspects of the lake. Clayton wrote: "They suppose the water will yield 35 per cent pure salt. They gathered some off the rocks, which is as pure, white and fine as the best that can be bought on the market."⁴

Salt found deposited on the shore of the lake proved to be as important to the pioneers as that found in the water. Howard Stansbury, who surveyed the Salt Lake Valley in 1849, described the shore deposits and the process of deposition:

The southern part of the island [Antelope] is connected with the main shore by an extensive sand-flat, which, in the summer, is for the most part dry, but is frequently flooded

²Roberts, A Comprehensive History of the Church of Jesus Christ of Latter-day Saints, III, 539-40.

³Ibid., p. 224.

⁴William Clayton, William Clayton's Journal (Salt Lake City: Clayton Family Association, 1921), p. 325.

to the depth of eighteen inches, the water of the lake being driven over it by every gale from the north. Upon the cessation of the wind the water recedes, and then the depressions of the beach are filled with pools of shallow water, which, evaporating under the influence of the sun, leave extensive deposits of salt upon the sand. The beach is at all times sufficiently hard to allow the passage of wagons from the main shore to the island. . . .⁵

Shortly after the pioneers arrived in the valley, a committee was assigned to extract salt from the lake and deposits similar to those described by Stansbury. They left August 9 and returned August 13, "having prepared 125 bushels of coarse white salt, and boiled down four barrels of salt water to one barrel of fine white table salt."⁶ William Clayton recorded in his journal that the committee found a large bed of beautiful salt, six inches deep, lying between two sand bars. There appeared to be enough pure salt in this bed to provide at least ten wagon loads without any further refining.⁷

Howard Egan, a contemporary of Clayton's, did not feel that the salt brought back by the committee was as "pure" as Clayton declared it to be. Egan reported:

Two loads of salt arrived from the Salt Lake about 3 o'clock. It is the best kind I have ever seen, being as white as snow, though somewhat coarse. The brethren who brought it in remained on the shore of the lake for a day or two boiling down the salt together with water, in order

⁵Howard Stansbury, An Expedition to the Valley of the Great Salt Lake (Philadelphia: Lippincott, Grambo, and Co., 1852), pp. 158-59.

⁶William L. Knecht and Peter L. Crawley, compilers, History of Brigham Young (Berkeley: MassCal Associates, 1964), pp. 7-8.

⁷Clayton, William Clayton's Journal, p. 343.

to separate it from the particles of dirt with which it abounds.⁸ [Underlining supplied.]

Irrespective of the differences in reports pertaining to the quality of the salt, the saints seemed to be pleased at the prospects of having such an abundant, accessible supply. To ensure continued access to the lake, the Quorum of the Twelve issued an epistle directing the saints to build a bridge over the Jordan River, while the water was still low, in order to procure a year's supply of salt from the lake. This epistle further stated the lake would provide "a pleasant place of resort and its waters very healthy for bathing."⁹

There seemed to have been no restrictions on the use of the salt by the pioneers. Almost immediately after their arrival in the valley, they formulated a policy concerning the use of natural resources. No man should buy or sell land; every man was given a city lot and all the farm land he could properly till; there would be no private ownership in the water streams; and wood and timber would be regarded as community property.¹⁰ This philosophy also applied in theory to the salt deposits, although they were not specifically mentioned. For years, those who required salt would simply drive to the lake and obtain it. Others, who were more enterprising, could bring back an ample supply and sell a heaping bushel for fifty cents. Shortly after

⁸Journal History of the Church of Jesus Christ of Latter-day Saints (compiled by Church Historian's Office, Salt Lake City, Utah), August 12, 1847.

⁹Ibid., September 9, 1847.

¹⁰Roberts, A Comprehensive History of the Church of Jesus Christ of Latter-day Saints, III, 268-69.

his arrival in the Salt Lake Valley, Robert S. Bliss, a member of the Mormon Battalion, gave the following description of this method of gathering salt:

Nov. 7, 1847. The Great Salt Lake is 20 miles from us laying west and north from the town; salt is so plenty we can go to the lake and shovel it up and soon load wagons and the water of the lake is so salt that four barrels of water will make, by boiling, one barrel of fine table salt as good as can be made.¹¹

From these reports it can be safely concluded that the majority of the salt harvested from the shores of the lake in this early period was taken directly from the salt beds rather than from boiling down the brine. Many of the residents near the lake made excursions to the salt beds to procure their annual supply, even down into the 20th century, although after the 1880's, this became a very minor means of filling the salt needs of the Utahns.

There is some indication a salt boiler was set up on the lake shore as early as the summer of 1847. Possibly the salt-boiling apparatus used by the salt committee was left there to be used the next year. The following spring, April 24, 1848, Thomas J. Thurstin, Joseph Mount, Madison D. Hambleton, Albert Carrington, Jedediah M. Grant, and William W. Potter, while exploring the Great Salt Lake in a skiff, reported that they "steered for the salt works, passed the south point of Antelope

¹¹Robert S. Bliss, "The Journal of Robert S. Bliss, with the Mormon Battalion," Utah Historical Quarterly, IV (1931), 127. The author's father, born in 1890, remembers as a young man going to the lake and gathering a year's supply of salt. After bringing it home, they would roll the coarse crystals under a bottle on the kitchen table to produce fine table salt.

[Island], and seeing no one at the salt works, bore for the city."¹² This report confirms that a salt works of some sort was located on the lake shore, but in no way implies continuous or permanent operation. From a decision of the Quorum of the Twelve given in May, 1849, one would be led to believe that the salt works previously mentioned existed only during the first year, or that it was of a very temporary nature. The Quorum resolved:

That a company of men be appointed, to start as early as convenient, to explore the region near the north point of the [Oquirrh] mountains west of the valley, to ascertain its adaptability to farming purposes, and also the most suitable point to establish a manufactory of salt.¹³

There is no indication of any report being brought back to the Quorum regarding the success of this mission; however, by 1850 Charley White had a salt-boiling establishment under operation, and it produced salt for many years.

It is improbable that Charley White was operating his boilers before the spring of 1850. In the fall of 1849, Lieutenant J. W. Gunnison and Albert Carrington, members of Stansbury's survey party, traveled to the area of Great Salt Lake known as Block Rock to erect a triangle for their survey. Gunnison failed to report seeing a salt works, yet he describes the water of the lake and its buoyant powers, and he wrote of bathing in the lake.¹⁴ On April 23, 1850, Stansbury stopped at

¹²Knecht and Crawley, History of Brigham Young, p. 19.

¹³Ibid., p. 54.

¹⁴Lieutenant J. W. Gunnison, "Journal and Notes, Survey of Great Salt Lake Valley, Autumn of 1849, Base Line Notes" (MS. located at Bancroft Library, Berkeley, California).

Black Rock to perform what he called an "experiment upon the properties of the water of the lake for preserving meat."¹⁵

Although half a day was spent waiting for the beef to "corn," no mention was made of Charley White or his salt boilers. Stansbury first recorded the White family in his diary on June 23, 1850. He wrote of sailing from Stansbury Island to Black Rock, where he found Lieutenant Gunnison "discussing the spiritual-wife doctrine with Charley White's wife."¹⁶

In Gunnison's account of the salt works, he reported that White could boil 300 pounds of salt per day in his six 60-gallon kettles. "The salt boilers," Gunnison said, "affirm that they obtain two measures of salt from three of the brine, and they have christened this sheet of water, which is seventy miles long, with the name of the Great Briny Shallow."¹⁷

White obviously was exaggerating in his assertion that he could obtain two measures of salt from three of brine. Stansbury had a sample of lake water analyzed, and it was determined that the water contained 20.20 per cent salt by weight.¹⁸ Accord-

¹⁵Stansbury, An Expedition to the Valley of the Great Salt Lake, p. 171.

¹⁶Howard Stansbury, "Journal of Howard Stansbury, May 29 to July 14, 1850," Vol. 5 (MS. located at Bancroft Library, Berkeley, California), June 23, 1850.

¹⁷J. W. Gunnison, The Mormons or, Latter-day Saints in the Valley of the Great Salt Lake (Philadelphia: J. B. Lippencott and Company, 1856), p. 19. Dale L. Morgan, The Great Salt Lake (Indianapolis: The Bobbs-Merrill Company, 1947), pp. 387-89. The information taken from Morgan was not available in the Stansbury and Gunnison works cited above. Morgan indicated in his bibliographical note that he preferred to quote from the original, unpublished journals of these men.

¹⁸Stansbury, An Expedition to the Valley of the Great Salt Lake, p. 212.

ingly, on a weight ratio, one unit of salt could be obtained from five units of brine. Inasmuch as salt weighs twice as much as water, a volume comparison would make White's assertion even less plausible. Since the figure quoted by Gunnison is so grossly out of line, it could be suggested that White probably was just over-enthusiastic in his account.

Charley White operated his salt works for about ten years. It became the first established salt company of record to operate on the shores of the Great Salt Lake.

By early spring of 1853, White enlarged his operation in preparing to expand his market area to cover the whole territory. He invited "parties residing in remote cities and settlements, wishing to become agents for the sale of fine salt in their respective localities," to immediately contact him so that he could calculate the probable annual consumption as early as possible. He was producing three grades of salt: fine, coarse, and common, advertised to be of the best quality which may be had, wholesale and retail. Due to the scarcity of currency in Utah Territory, White indicated a willingness to accept cash or "cattle, grain, flour, hams, bacon, cheese, butter, pigs, sheep, lumber, poles, or firewood" as payment for his salt.¹⁹

John A. Bevan, a lifelong resident of Tooele County, left a good description of the White family and their early salt enterprise:

I believe that I am the only person now alive in Tooele County that saw Mother White and this was in 1858 or when I

¹⁹Deseret News, April 16, 1853.

was seven years old. It was when we were on our way to Lehi at the time of the Move. [During the Utah War.]

We were camped at some springs just beyond Black Rock near where Garfield is now. She had her girl with her who I think was about my age. Mrs. White and her husband Charley White had a good number of cattle on the range there at the time and she was around among these cattle. I remember that she carried a double barreled shot-gun with her. She was a rather large woman and seemed to be quite well acquainted with my father, as he had hauled firewood to their place to boil salt with, as they lived at Black Rock and made salt which Mr. White hauled to Salt Lake and sold. Their house was on the shore of the lake just opposite the Black Rock and they used the Black Rock for a corral. They had a sort of highway made from the shore to the Rock and when the cattle was [sic] there they could put up bars on the little highway and keep them there. So that this rock made a very good corral both in summer and winter. . . .

As I remember, Mr. White and his wife did not get along together very well in their domestic and business affairs judging from a conversation I heard between my father and Mr. White and I believe they separated as man and wife. Mrs. White staying on the ranch with her girl and the cattle, but I don't know what became of Mr. White, he was always known as Charley White.

However, probably about the year 1861, when Johnston's Army abandoned Camp Floyd over in Cedar Valley, many of his soldiers went East to take part in the war of the Rebellion. . . . I say about this time, Mother White went amissing and it was believed that she has been murdered by white men to get her cattle. It was also believed that the men that did the killing lived in Tooele Valley (not in Tooele City), as some of her cattle were afterwards seen in their possession. As to her daughter it was said that she was taken East by some of Johnston's Army men. It was generally believed that Mrs. White's body was sunk in the Salt Lake but in more recent years, it is claimed that a certain person, who claimed to know, said that her body was not put in the lake but was buried in the hills just south of where she was killed, which was at her home at Black Rock on the line between Salt Lake County and Tooele County. But so far as I know, she was never heard of neither dead or alive. I believe the theory that she was murdered for her property is the correct theory. . . .²⁰

The tragic circumstances in the lives of the Whites brought to an end the first attempt at making commercial produc-

²⁰John A. Bevan, "Events in the Early History of Tooele City" (typewritten manuscript at Tooele Free Public Library, Tooele, Utah.)

tion of salt a profitable enterprise in Utah.

Salt played a small but interesting role in the Utah War of 1857-1858. The officers in charge of supplies for the Utah expedition, thinking there would be plenty of salt for the Army in Utah, did not include enough salt among the lists of supplies needed for the expedition. Realizing their mistake upon encountering Mormon resistance on the Wyoming plains, which would possibly prevent them from entering Utah prior to winter, Johnston took steps to obtain salt at Laramie. Unsuccessful in their efforts, the officers were continually reminded of their poor planning after reaching Fort Bridger, as the men began grumbling in earnest over the insipid food.²¹

Toward the end of November, Brigham Young, being advised of the shortage, directed that several mule-loads of salt be sent to the army. It was his understanding that the army had no salt, "and that there was enough salt to last them until spring, when the army should retrace its steps to the United States, as enter the Mormon Settlement it should not."²² Colonel Johnston was adamant in his reply, writing that he could not accept the salt sent by Brigham Young, "not for the reason hinted at in his letter." Johnston went on in his reply to say that he could accept nothing from Brigham Young so long as he and his people maintained a hostile position to the government.²³

²¹William Preston Johnston, The Life of General Albert Sidney Johnston (New York: D. Appleton and Company, 1878), p. 218.

²²Ibid., p. 219.

²³Ibid.

There was some indication that Johnston refused the salt, thinking it may have been poisoned. To this suspicion, Johnston later replied: "So far as poison is concerned, I would freely partake of Brigham Young's hospitality, but I can accept of no present, nor interchange courtesies so long as he continues his present course."²⁴

At the time Brigham Young sent the salt to Johnston, bootleg salt was being sold to the soldiers for seven dollars a pint. Senator Sam Houston, on the Senate floor in his defense of the Mormons, intimated, with tongue in cheek, that Brigham Young had implied in his letter that he would sell him the salt if he did not want to accept it as a gift.²⁵

Wilford Woodruff later told how the value of salt had appreciated during this period:

During these trying circumstances in the army, President Young sent some salt which they needed very much. One of the sacks of salt which was sent, however, was lost, and later picked up by a traveler who sold it to merchants for twenty dollars. They in turn sold it to the soldiers for two hundred dollars. Ben Simons, a Cherokee, took to the army nine hundred pounds of salt, which he sold for two dollars and a half a pound, or a total of two thousand two hundred and fifty dollars.²⁶

The Utah War did not stimulate the salt industry in Utah noticeably. With the exception of a few enterprising merchants, little profit was made from salt as a result of the war.

In 1860, the Eighth Census of the United States listed

²⁴Ibid.

²⁵Ibid., p. 224.

²⁶Matthias F. Cowley, Wilford Woodruff (Salt Lake City: The Deseret News Press, 1909), p. 393.

only one salt-making concern in Utah. Since Mrs. White was not listed as missing until 1861, it can be assumed that the salt works reported in the Census was Charley White's salt company. The report indicated the company had \$4,000 invested in salt-making. It paid \$5,000 for materials and \$840 for the labor of two men. The salt makers produced 12,000 bushels of salt valued at \$6,000, or fifty cents a bushel.²⁷

There apparently was no great rush to fill the void in salt production left by the absence of the White company. In 1870, the Ninth Census reports only one establishment producing salt in Utah. The description of this salt works indicates a difference between it and that owned by White. The report described the salt works as having two boilers of 200-gallon capacity. Two men were hired to run the establishment at wages of \$300. Forty cords of wood were used during the year to produce 1,950 bushels of salt valued at \$780, or forty cents a bushel.²⁸

This salt works could have been one owned and operated by the Joseph Griffith and William F. Moss families of "E. T. City" (Lake Point). Moss and Griffith used their children to help run the salt works by allowing them to gather greasewood and sagebrush to keep the fires going under the boilers. Elizabeth Griffith related how one load of salt was taken to the

²⁷U.S., Department of Commerce, Bureau of the Census, Eighth Census of the United States, 1860 (Washington, D.C.: 1865), p. CXCVIII.

²⁸U.S., Department of Commerce, Bureau of the Census, Ninth Census of the United States, 1870 (Washington, D.C.: 1872), p. 622.

Grantsville Co-op and traded for a large number of old and mismatched shoes which her father mated up as best he could for his children.²⁹

From the above description, and that given in the Census report, the Moss and Griffith salt works was a small, home industry, most likely run as a sideline to a farm or ranch.

The salt boilers did not last long into the 1870 decade. The advent of the railroad and improved methods of producing salt brought new companies to the shore of the lake. Mineral Resources of the Territory of Utah reported in 1872 that the greater portion of salt taken from the lake for commercial purposes was obtained by solar evaporation in constructed ponds. The amount of salt taken by this method during 1872 was 450,000 pounds. Salt consumed within the territory amounted to 40,000 pounds, the remainder being exported to Wyoming, Colorado, and Nebraska.³⁰

There are several factors which account for the decline of the salt boilers. First, Utah salt had a reputation of having a bad taste.³¹ Failure to extract the impurities would account for the bitter taste of the salt. Second, by 1873, the Great Salt Lake had risen to its highest point in recent geolog-

²⁹Tooele County Daughters of Utah Pioneers, History of Tooele County (Salt Lake City: D.U.P. Tooele County Company, 1961), pp. 274-75.

³⁰John R. Murphy, The Mineral Resources of the Territory of Utah with Mining Statistics and Maps (Salt Lake City: James Dwyer, 1872), p. 10.

³¹Salt Lake Herald, February 1, 1871.

ical history, which diluted the brine by about one-third. As a result of the diluted brine, the boilers had to burn about one-third more wood to obtain the same amount of salt that was produced in the 1850's and early 1860's, when the lake was at a lower level and more concentrated. Third, the railroads were able to import salt much cheaper than the freighters, adding an expanded competitive factor. Fourth, the railroad provided cheap transportation and the silver mills, which required large amounts of salt in the reduction of silver ore, provided a new market which induced the development of solar evaporation ponds which produced large quantities of salt inexpensively. The railroad, a new market, and advanced technology began to create a new era in Utah's salt industry.

CHAPTER V

GENERAL, TECHNICAL, AND ECONOMIC DEVELOPMENTS

1860-1895

Salt manufacturing during the pioneer period of Utah's history was little more than a sideline. Supplying Mormon communities with hay, livestock, and table salt did not result in high-production quotas, nor did it stimulate new innovations. The industry received its first real impetus from the discovery of silver in Montana. Beginning in the mid-1860's, mining camps around Butte experienced a boom. The chlorination process for the reduction of silver ore was developed about the same time, placing a heavy demand on producers to supply the mills with enough salt to reduce the ores. Utah was in an ideal position. Kansas salt fields were not developed until 1887, and those in California were too far away to compete. Utah had the raw material and an expanding market. The key to its future success lay in a transportation system capable of handling high-tonnage loads cheaply. Railroads provided such a system. As tracks were laid to new markets, the demand for salt increased, which in turn stimulated the search for improved methods of production and refining.

Significance of Transportation Facilities

Judged by today's standards, means of transporting goods in the mountain west in the 1860's and 1870's were primitive. Before railroad lines and wagon roads extended into Montana, pack mules carried salt to the mines at a rate of \$200 a ton.¹ As roads improved, freight wagons hauled more tonnage at cheaper rates. For a few years, subsequent to the joining of the Central Pacific and the Union Pacific Railroads at Promontory Summit, Great Salt Lake was used to transport salt to Corinne, Utah, terminus for the Montana trade.

Old-timers in the salt trade say that a variety of barges and boats, constructed during the high-water level of the lake, were used to haul salt. It is believed that a small pier was constructed for this purpose near a salt works at North Point, a site several miles north of Morton Salt Company's Saltair Plant. The barges transported salt from the south shore of the lake, up the Bear River to a pier, where it was transferred to freight wagons.² Thomas G. Brown, of Corinne, built a barge which was used primarily to haul salt from a large bed along the Bear River to Corinne.³

Patrick E. Conner, considered the father of Utah mining, built a small smelter in Corinne. Ore from the mines in Montana was hauled by freight wagons to his smelter for processing.

¹U.S., Department of Interior, Geological Survey, Mineral Resources, 1903 (Washington, D.C.: Government Printing Office, 1904), pp. 492-93.

²Myron L. Sutton, interview.

³Bernice Gibbs Anderson, "The Gentile City of Corinne," The Utah Historical Quarterly, IX (1941), 148.

After the mines on the Oquirrh Mountains began to develop, Conner had a boat constructed to haul ore and salt across the lake to his smelter, and the salt was transferred to freight wagons which had been used to haul ore from Montana.⁴ Lake travel declined after 1872 due to a drop in the lake level and the extension of railroad branch lines into the intermountain market area.

Utah Central Railroad, which ran between Salt Lake City and Ogden, was completed on January 10, 1870.⁵ This line became an important means of hauling salt from the producers to the junction in Ogden. In 1878, salt was reported to be the third largest product in weight to be shipped. Almost three and one-half million pounds were shipped that year.⁶

The efforts of a Mr. F. Mitchell to enter the salt business give an example of the effect railroads had on the industry. In the spring of 1871, only a year after the completion of the Utah Central, Mitchell bought ten acres of land at Lake Side, Davis County, where he proposed to build a salt manufactory. He intended to produce one thousand tons of salt during that summer and ship it to the states.⁷ Unfortunately, a subsequent report of his success has not been found.

⁴Ibid., p. 147.

⁵Leonard J. Arrington, Great Basin Kingdom (Lincoln: University of Nebraska Press, 1958), pp. 270-75.

⁶H. L. A. Culmer, compiler, Utah Directory and Gazetteer for 1879-80 (Salt Lake City: J. C. Graham and Company, 1880), p. 25.

⁷L.D.S. Millennial Star, March 28, 1871. J. Cecil Alter, Utah, the Storied Domain, I (Chicago: The American Historical Society, Inc., 1932), 397.

After completion of Utah Central Railroad, officials of the Mormon Church encouraged an extension of the railroad from Ogden to Montana. A railroad connecting Ogden with Brigham City, Logan, and Franklin, Idaho, would consolidate the northern Mormon settlements, provide an outlet for their agricultural produce, and divert the Montana trade from the gentile city of Corinne. Utah Northern Railroad, as this branch line was called, was organized on August 23, 1871. The first section of track, finished January 31, 1873, connected Brigham City and Logan. The road from Brigham City to Ogden was completed February 5, 1874. The line to Butte, which connected Utah salt producers with their major market, was completed in 1881.⁸

Utah Southern Railroad, running south from Salt Lake City, connected the rich Tintic mining area with the salt producers on the lake by 1874.⁹ The Tintic mines proved to be a welcome customer for the salt makers. It was reported that salt shipped over this line in 1878 amounted to 268,696 pounds.¹⁰

Utah Eastern Railroad, a small branch line to the Park City mines, was completed in 1880 and provided inexpensive transportation for salt to the silver mills in that area.¹¹

Utah Western Railroad was running trains from Salt Lake City as far west as Garfield Beach by 1874. This railroad pro-

⁸Arrington, Great Basin Kingdom, pp. 283-85.

⁹Ibid., p. 281.

¹⁰Culmer, Utah Directory and Gazetteer for 1879-80, p. 25.

¹¹Arrington, Great Basin Kingdom, p. 347.

vided transportation for the salt companies on the south shore of the lake and encouraged new companies to consider this area for future development.¹²

Railroads not only provided inexpensive transportation to the silver mills, but they opened up possible new markets for Utah salt. For example, orders came from as far away as Omaha, Nebraska, although the long haul made the delivered price so high it was still difficult for Utah companies to compete with eastern concerns.¹³

Salt-Making Techniques

The opening of silver mines, plus the development of railroad lines to the important market areas in the intermountain region, brought about a new focus on quantity as well as quality salt. In 1869, when the railroad first came to Utah, Housel and Hopkins Salt Company directed their attention toward an improved product. Inasmuch as the quality of Utah salt had acquired an unfavorable reputation, the firm had the salt analyzed and compared with the highly regarded Turks Island Salt, which was produced on an island in the Bahamas and exported to the United States. The results of the analysis were very favorable to the Utah product, showing a 97.61 per cent pure article, as compared with 96.76 for Turks Island Salt. Salt Lake businessmen, encouraged by the report, were able to secure special freight

¹²Wain Sutton, Utah, A Centennial History, II (New York: Lewis Historical Publishers, 1949), 820-27.

¹³Report of the Governor of Utah to the Secretary of the Interior (Washington, D.C.: Government Printing Office, 1892), p. 652.

rates for salt, and preparations were well under way to make Salt Lake City the salt capital of America.¹⁴

As the market expanded, a large quantity of pure salt was required. Old methods of boiling brine or harvesting the naturally deposited salt along the lake shore were outmoded.

Although the salt from the lake shore was still an important source of crude salt for the silver mills, the men who intended to stay in the salt business and be successful had to develop new methods heretofore unused in Utah.

By 1873, the level of the lake had risen to such an extent that many of the salt beds were covered with water. The naturally deposited salt that was left was not sufficient, nor did it have the requisite quality to meet the growing market. One new method was to build a dike across the entrance to a small cove and open a dam when the lake water was high, allowing the cove to fill with brine. Another method was to build dikes along the shore of the lake and let the natural rise and fall of the lake fill the diked areas. The northwest wind, blowing across the lake, had the capability of raising the water on the southern shore of the lake from one to one and one-half feet. The early salt makers depended on the wind for fresh brine. The storms were not always dependable, and some of the stronger winds caused the waves to wash away the dikes and dissolve the salt that had been deposited.¹⁵

With experience, salt makers learned that earth alone was

¹⁴Salt Lake Herald, February 1, 1871.

¹⁵Mineral and Water Resources of Utah, pp. 493-95.

unsuitable for constructing dikes because the water washed it away, and planks would not bear the weight of the waves of heavy salt water. Jeremy and Company, organized in 1870, successfully constructed its ponds by driving cottonwood stakes into the ground every two feet, forming a long row. A parallel row of stakes was driven seven feet away from the first. A latticework of willows was woven on the stakes and backed by several inches of tule. The area between the two rows of stakes was filled with earth, making a substantial dike that proved effective.

Ponds from five to one hundred acres in extent were constructed in this manner. It was estimated that the cost of construction of this type of dike was one dollar per foot. A head-gate was placed at a convenient location to allow the lake water to enter the pond complex. Initially, pumps were not used and the ponds were filled by the wind blowing the water into them. A man was hired to watch the weather. If a storm approached, he quickly went to the salt works to allow the brine to enter the ponds by opening the dam in the canal connecting the ponds to the lake. Before the salt was harvested, the ponds were emptied by reversing the procedure and allowing gravity to drain them.¹⁶

Serious businessmen found the natural rise and fall of the lake too precarious for them to depend on as a means of

¹⁶U.S., Department of Commerce, Bureau of the Census, Tenth Census of the United States, 1880: Statistics and Technology of the Precious Metals, XIII, 485. J. P. Thomas statement, March 13, 1955, obtained from Myron L. Sutton's personal file.

filling the evaporating ponds. By the 1880's, some salt companies were using steam or horse-powered pumps to obtain their brine. By 1888, Inland Salt Company had established a central power source which ran the machinery in the mill and also provided power for a ten-inch centrifugal pump.¹⁷

The quality of the salt still presented a problem to all of the salt makers on the lake. Heretofore, the evaporating stages of the brine were not separated, and each batch was reduced to dryness as nearly as possible. The product was a damp, bitter-tasting mass caused by a high bittern-salts content. A new method, fractional crystallization, involved the use of a series of ponds. By discarding the bittern at the proper time, salt was produced that was reported to have contained over 99 per cent sodium chloride.¹⁸

The origin of the use of this process is not clear. Ponds built in the late 1870's and early 1880's imply the builders had some knowledge of it. However, Inland Salt Company specifically built its pond system in 1888 to use the principle.¹⁹

It is very probable the principle of fractional crystallization was acquired from the California solar-salt producers

¹⁷Salt Lake Herald, November 14, 1888, p. 8; September 6, 1890, p. 8. Myron L. Sutton, interview.

¹⁸William E. Ver Planck, Salt in California (California Department of Natural Resources, Division of Mines, Bulletin 175, San Francisco: March, 1958), 107.

¹⁹U.S., Congress, House, Executive Documents 6, part 2, 51st Cong., 2d sess., 1890, p. 891. Mineral Resources, 1888, p. 606.

who had been experimenting with methods to improve their salt. The first attempt by the Californians to upgrade the quality of their salt came in 1862. John Quigley built a salt works near Barron's Landing in the vicinity of Alvarado on the San Francisco Bay. This company, along with several other pioneer salt producers, developed a salt-making technique that, in principle, is followed today.²⁰

The pond systems adapted to this principle varied slightly with different companies, but followed the basic pattern. Salt water was brought from the lake by canal to a pump which elevated it to a flume or canal, where it flowed by gravity to a series of ponds for settling, concentration, and crystallization. The ponds were constructed in a terraced fashion, if possible, to enable the brine to flow from one pond to another without pumping.

It was first taken to the settling ponds, where it remained for five or six days to allow suspended matter to settle. It passed next into a series of concentration ponds. The brine was held there for about three weeks, until it reached a concentration of about 26.6 degrees Be. Calcium sulphate and calcium carbonate were allowed to completely precipitate out in the concentration ponds before the brine was transferred to the garden ponds. The evaporation phases of the calcium compounds and common salt overlapped. As a result, some sodium chloride formed in the concentration ponds. Allowing a small amount of sodium chloride to precipitate out in these ponds was necessary to

²⁰Ver Planck, Salt in California, p. 41.

remove as much of the calcium compounds as possible, but there was no salt build-up in the concentration ponds because the next batch of weaker brine redissolved it.

Next the brine flowed into the garden ponds where sodium chloride precipitated out in almost pure form. The brine was held there until a density of 29.5 degrees Be was reached. During this period, most of the salt crystallized out, dropping to the bottom of the pond. Here the crystals interlaced and grew to considerable size. The water was left in the garden ponds until about 60 per cent had evaporated. At that point, the water had a density of 30.0 degrees Be. About 12 per cent of the sodium chloride was left in the brine, but further evaporation would cause contamination with the bittern salts, which remained in solution. The bittern, which was returned to the lake, contained the chlorides and sulphates of magnesium, potassium, and sodium. The bittern was replaced by a fresh batch of brine from the concentration ponds.

This cycle was repeated from April, when pumping began, until the middle of September. Care was taken to drain off the last of the bitterns before cold weather came, in order to avoid precipitation of Glauber Salt (sodium sulphate), which precipitates out just before a freezing temperature. From one to six inches of salt were deposited on the floor of the ponds during each season, depending upon the weather and the care the pondman gave his job.²¹

²¹Salt Lake Tribune, October 4, 1936, p. 2. Kaufmann, Sodium Chloride, pp. 99-100. Myron L. Sutton interview.

The salt ponds were built on a ratio of one concentration pond to one crystallizing pond. This ratio varied slightly, however, depending upon the concentration of the lake. At times of low lake level, the brine was pumped directly into the garden ponds. Conversely, when the lake was high, the ratio might change to 1.5-to-1, or higher.²²

Utah salt makers developed the "split" or cleavage plane, which was a unique procedure to assist in the harvesting of salt. They allowed the salt to build up to a depth of several inches, forming a rock-hard floor on the bottom of the pond. At the beginning of each season, a thin layer of very fine crystals was deposited, forming a split between the floor and the large crystals of the annual crop. The objective of this procedure was to form a cleavage plane along which the upper layer of salt could be loosened. If a split were not made, the crystals from the new crop would interlock into the salt floor, making a hard, continuous formation with no way of breaking it loose.²³

Two methods were used to make the split. The early pond men formed what they called a "sun split" by draining the pond until a small amount of highly concentrated brine covered the floor. The split was created by precipitating a layer of very fine crystals to the depth of one-eighth inch over the large, jagged crystals below. After the fine crystals were deposited,

²²James L. Palmer, Solar Salt Company's Vice-President in Charge of Production, interview held at Grantsville, Utah, December 29, 1967.

²³LeRoy Inlay, former employee of several Utah salt companies, interview held at Grantsville, Utah, September 16, 1967.

fresh, highly-concentrated brine was brought into the ponds. The larger crystals of the annual crop built up on the fine salt layer. A mechanical split was made by dragging a rail across the floor of the pond. This process knocked the edges off the crystals and formed a fine layer of salt to separate the floor from the ensuing crop.²⁴

After a five-month growing season, the salt harvest began. The three-to-six-inch deep layer of interwoven crystals had solidified. Horse-drawn, single-bottom, moldboard plows were brought into the ponds to loosen the salt. A hole was chipped down to the split with a shovel or grubbing hoe, and the plow blade inserted. The plow share, or cutting edge, had to be perfectly flat to follow the split, or it would jump out and require the man plowing to dig into the salt and start the plow again. At the beginning of each furrow, a new hole was dug.

Efforts naturally were made to prevent contamination of the salt by the horse. A bag was strapped to his tail and hind legs in an attempt to catch the droppings, and in some cases an alert boy was hired to walk beside the horse, carrying a bucket to use any time it appeared that the animal was about to urinate.²⁵

After the salt was plowed, the men worked in pairs with square-mouth shovels to scoop up and load the salt into wheelbarrows. The wooden wheelbarrows could hold from five hundred

²⁴Thayne Imlay, Plant Manager of Hardy Salt Company, interview held at Grantsville, Utah, December 28, 1967.

²⁵LeRoy Imlay, interview.

to eight hundred pounds. Planks were laid across the ponds so the iron wheels would not break through the thin floors. The salt was piled at the edge of the pond. After it was three and one-half feet high and forty inches wide, scaffolding was arranged for the wheelbarrows to allow workers to form a truncated pyramid seven feet tall. Each man stacked an average of eight to twelve tons a day.²⁶ Other methods of harvesting salt have been used by different companies, a more detailed discussion of which will appear in succeeding chapters.

Prior to 1890, most of the salt produced in the state was sold as crude or pond-run salt. Very little salt refining was done in Utah until after the larger salt companies became established in the late 1880's and early 1890's. The larger companies installed purifying and drying machines consisting of large, rotary kilns with suction fans to draw off impurities in the form of dust. They utilized crushers and screens to size the salt, and some even had block presses to provide salt blocks for livestock.²⁷ The refining process has not changed radically since then, although minor changes in individual companies will be described in later chapters.

Economic Revolution

Between the mid-1880's and the turn of the century, an economic revolution took place within Utah's salt industry. Five factors coincided during that fifteen-year period to change a

²⁶Ibid.

²⁷Salt Lake Herald, November 14, 1888, p. 8. Deseret Evening News, September 24, 1892, p. 2.

highly competitive business into one dominated by a monopoly. Those factors were: First, a decrease in the silver-mill market; second, an increase in the market for refined grades of salt; third, available capital sufficient to construct large plants geared to produce refined grades of salt; fourth, over-production of salt during 1890, 1891, and 1892; and fifth, the depression of 1893.

Initially, the impetus to develop local salt resources on a large scale came from silver mills in the intermountain area. They were the largest single customer for Utah salt until the early 1890's. This market began to taper off in 1885. Because of lower-grade ores, mill and refinery owners at Butte were no longer making enough profit to buy salt in the quantities they had in the past. They contended a profit could not be made buying salt at five dollars a ton and paying twenty dollars a ton freight rates.²⁸ Competition among salt companies for a waning market drove the price of salt down from five dollars a ton in 1885 to between one and three dollars a ton through 1892.²⁹ Refined salt during this same period was selling for a much higher price, ten to thirty-five dollars a ton.³⁰ The higher prices paid for refined salt encouraged large companies built later to install extensive refining facilities.

By the early 1890's, salt companies in Utah could be

²⁸Mineral Resources (1885), pp. 474-85.

²⁹Ibid. (1894), p. 656.

³⁰Ibid. (1887), p. 639.

placed in two general categories. One, the speculative-type producer who had entered the business to take advantage of the silver-mill market, with emphasis on tonnage rather than on quality. The other category consisted of larger companies with huge production capacities which enabled them to produce for the silver mills and fill the needs of the new market for refined salt. The Inland Salt Company and its successor, Inland Crystal Salt Company, were such organizations.

Production statistics for the period 1885-1889 show an increase in production, with a corresponding decrease in value per ton. This trend can be accounted for in the depressed condition of the silver-mill market. By 1890, Inland Salt Company's first harvest came on the market, doubling the average annual production for the preceding five years. Its successor, Inland Crystal Salt Company, doubled and then tripled Inland's production during the next two years, respectively. Increased production in a depressed market dropped prices from the 1885-1890 average of \$2.88 to \$1.88 in 1892.

Lower prices and a glutted market, resulting from the huge production during 1890-1892, coincided with the depression of 1893. Not only had Utah's salt makers lost one of their biggest customers when the silver mills cut back, but the depression stifled the market generally. Only 15,200 tons of salt were sold during 1893. A comparative increase is shown in the value of the output in 1893 and 1894, due to the larger proportionate production of the finer grades of salt.³¹ Production

³¹Ibid. (1894), pp. 655-56.

for the next few years shows a fairly stable annual output, and the fluctuations in the price of salt became less radical.

The following table statistically illustrates the trends in the salt market over an eleven-year period:

TABLE 3
PRODUCTION AND VALUE OF SALT IN UTAH
1885-1895*

Year	Sold or Used by Producers (short tons)	Value	Price Per Ton
1885	15,000	\$ 75,000	\$ 5.00
1886	23,000	100,000	4.34
1887	45,500	102,375	2.25
1888	21,250	32,000	1.50
1889	28,000	60,000	2.14
1890	59,850	126,100	2.10
1891	135,660	265,350	1.87
1892	180,946	340,442	1.88
1893	15,200	130,075	8.55
1894	37,546	209,077	5.56
1895	41,228	121,762	2.95

*Calculated from: Mineral Resources (1885-1895).

Production statistics on individual companies were not published after 1892, making it impossible to be precise in evaluating the effect of the depression on them. Available statistics, however, indicate that Inland Crystal Salt Company produced over half of the annual output during 1892.³² Refined grades made up a much higher percentage of salt marketed in 1893 than in preceding years; therefore, Inland Crystal must have sold a proportionately greater amount of the salt marketed that

³²Report of the Governor of Utah (1892), p. 403.

year, since its refinery was capable of producing more. The refined grades of salt were selling for a much higher price than crude salt, so it logically follows that Inland Crystal Salt Company received a higher percentage of the money paid for salt during 1893.

If these assumptions are correct, the smaller companies were faced with an economic crisis. They were unable to increase their gross profits appreciably through expanded production during the lean years of 1890-1892. The average price of salt was much greater during 1893, because the extensive refined grades made up a greater portion of the total. The small companies, with limited refinery capacity, were still attempting to sell crude salt in a depressed market. The depression prevented them from building or expanding refineries; consequently, most of them went out of business or sold to the larger producers.

Conclusion

Stimulated by the discovery of a new silver ore reduction process, Utah's salt industry grew as transportation facilities expanded into the market area. New production and refining processes were developed as the pressure to produce more high-quality salt increased. Availability of sufficient capital to build a salt works capable of meeting the needs of a diversified market was the key to continued success during the economic crisis of the 1890's. The large salt companies on the south shore of the lake had access to enough capital to build

refining plants that produced the grades the salt market required, and by the end of the decade, the industry was under the control of a monopoly that lasted for over twenty years.

CHAPTER VI

EARLY SALT COMPANIES ON THE SOUTHERN SHORE OF GREAT SALT LAKE

The salt companies that developed on the southern shore of Great Salt Lake were more successful and endured longer than the other companies on the lake shore. This was due largely to certain geographical and economic advantages. The periodic fluctuation of the lake level was significant in deterring the growth of salt companies on the eastern shore. Between 1885 and 1905, the lake level dropped ten feet.¹ Due to the lower angle of the slope from the high ground to the water's edge, this drop exposed a strip of shore land more than two miles wide at the narrowest point of the eastern shore. In contrast, at the widest point of the southern shore, from the high ground to the water's edge, only one and one-quarter miles of shore land were exposed.² Expense involved in extending canals and in moving or purchasing additional pumps was a disadvantage to the eastern-shore producers.

Salt making on the northern shore was also adversely affected by the fluctuation of the lake. In addition, the isolation of this area from the market and labor force discouraged

¹Appendix II.

²Appendix III.

its extensive use.

In the 1880's and early 1890's, larger and better-equipped salt works were being built on the southern shore. They were each capable of producing more salt than the total production of all the companies from the other areas.³ The combination of better geographical placement and larger economic investments placed the southern companies in a dominant position in the salt industry.

There were over twenty different companies producing salt on the shores of Great Salt Lake during the period from 1880 to 1915. The men who organized the companies were attracted to the salt business by the ready market for crude salt provided by the silver mills. A good share of them invested no more capital than was necessary to scrape up crude salt deposited around the lake and haul it to a shipping point. Records from the period reveal very little about them, other than that they existed. The questions, where they operated, who owned them, and the years they produced salt, remain to be answered.⁴ The

³Mineral Resources, 1882-1892.

⁴Records of salt production and salt companies existing prior to 1880 are almost non-existent. The first annual records compiled by the government were those published in the Mineral Resources series, inaugurated by the Geological Survey. Data for the years 1880-1881 were included in the first issue published in 1882. A list of companies producing salt was not included in the Mineral Resources until 1887. Gazetteers, directories, and reports from the Governor of Utah have provided names of companies that produced salt from 1880 to 1915. A comparison of these sources shows that an accurate and complete list was not published by any one source. The gazetteers and directories have included names of companies that were involved only in merchandising salt, such as feed stores. Inasmuch as the names of some of the companies listed do not

emphasis, therefore, will be placed on the companies on the south shore of the lake that developed salt production into a major enterprise.

Jeremy and Company

Jeremy and Company was one of the first to make a major investment in the production of salt. The company was organized by Thomas E. Jeremy, Jr., Levi Reed, and Thomas J. Almy about 1870. The ponds were located at North Point, a portion of the lake shore three miles north and east of the site of the old Saltair resort.⁵ This company was one of the first to construct artificial evaporation ponds rather than depend on the deposition of salt in small, diked-off bays and inlets.

Jeremy and Company successfully experimented in dike construction by using two parallel rows of cottonwood stakes interwoven with willows and backed by several inches of tule. The area between the rows was filled with earth. Ponds from five to one hundred acres in extent were built at a cost of one dollar per foot. The ponds thus constructed were filled with water by using the natural rise and fall of the lake level that accompanies the changes in wind direction and seasons.⁶

After the salt was harvested, it was hauled to Salt Lake

indicate the nature of their business, it is difficult to distinguish them from salt producers.

⁵Culmer, Utah Directory and Gazetteer for 1879-1880, p. 21. J. P. Thomas, statement.

⁶U.S., Department of Commerce, Bureau of the Census, Tenth Census of the United States, 1880: Statistics and Technology of the Precious Metals (Washington, D.C.: 1882), XIII, 485.

City. Part of it was shipped to the silver mills in the intermountain area as crude salt. The rest was taken to the Jeremy plant at Sixth West and North Temple Streets, where it was refined into various grades.⁷

Government records show that Jeremy and Company harvested over half of the salt produced in Utah during the year 1880.⁸ With a constant annual production of 10,000 tons, it accounted for only one-sixth in 1890.⁹ In the spring of 1891, Jeremy and Company reincorporated as Jeremy Salt Company. That year the new company produced 13,000 tons of salt, but the next year production fell to 5,000 tons.¹⁰ Individual production records following 1892 were not published by the state or federal government. It is not known how much salt was produced from 1893 until the company was sold to the Inland Crystal Salt Company in 1896.

Several things contributed to the decline of Jeremy and Company and its successor, Jeremy Salt Company. First, the refining plant was inadequate. Built during the 1870's, the plant was unable to meet the growing demand for refined grades of salt during the next decade. Second, the price of crude salt was decreasing. The company failed to compensate for lower prices by expanding its pond facility to increase production, although over

⁷Culmer, Utah Directory and Gazetteer for 1879-1880, p. 21.

⁸Tenth Census of the United States, 1880: Statistics and Technology of the Precious Metals, 485.

⁹Mineral Resources, 1888, p. 605. Report of the Governor of Utah, 1890, p. 20.

¹⁰Report of the Governor of Utah, 1892, p. 403.

1,400 acres of suitable land had been purchased.¹¹ Third, Jeremy and Company faced overwhelming competition from a new company. Inland Salt Company, built in 1888, had a modern refinery, extensive salt ponds, and aggressive plans for expansion. By 1890, it had eclipsed the total amount of salt produced by all other salt companies in the state.¹² The state's salt production during 1891 and 1892 was more than five times as great as the average for the preceding six years, which caused a glutted market and a very small margin of profit. Fourth, the depression of 1893 caused many of the silver mills to discontinue operations, thus eliminating Jeremy's largest market for crude salt. This situation made it increasingly difficult for the Jeremy Salt Company to modernize its facility and produce refined salt in effective competition with other companies.

Inland Salt Company

Inland Salt Company was organized November 21, 1887, by a group of Mormon entrepreneurs. James Jack, treasurer of the Mormon Church, was named President of the new company. The other officers of the corporation were John W. Snell, G. H. Snell, Nephi W. Clayton, and J. E. Langford. Ten thousand shares of stock, valued at ten dollars per share, were issued by the company.¹³ Inland Salt Company was designed to become the largest producer in the territory. It was the predecessor of the Inter-

¹¹Salt Lake County Recorder's Office, "Deed Record Book 2 I," pp. 136-44.

¹²Report of the Governor of Utah, 1892, p. 403.

¹³The Salt Lake Herald, November 23, 1887, p. 8.

Mountain Salt Company, Inland Crystal Salt Company, Royal Crystal Salt Company, and Morton Salt Company's Utah branch.

The leaders of the Church of Jesus Christ of Latter-day Saints, and possibly the Church itself, became involved in the Inland Salt Company shortly after it was organized. Wilford Woodruff and George Q. Cannon, members of the First Presidency of the Church, and L. John Nuttall, Secretary to the First Presidency, had become leading stockholders in the concern by 1889.¹⁴ The historical climate at the time Inland Salt Company incorporated would indicate the company may have been partially owned by the Church through a secret trust agreement with the incorporators of the company.

From 1862 through the early 1890's, the federal government had placed pressure upon the Church to divest itself of political and economic control in Utah Territory and discontinue its practice of plural marriage. The Morrill Anti-Bigamy Act of 1862, in addition to the penalties against plural marriage, contained provisions which disincorporated the Church and stipulated that the value of real estate owned by the Church could not exceed fifty thousand dollars. The Edmunds Act of 1882 and the Edmunds-Tucker Act of 1887 were stronger laws passed by Congress along similar lines. The resulting pressure from the government caused the Church to turn over most of its property to trusted Church members and local Church congregations.¹⁵

¹⁴L. John Nuttall, "Diaries of L. John Nuttall, 1887-1901" (Typed ms., Brigham Young University Library, 1958), III, 61.

¹⁵Arrington, Great Basin Kingdom, pp. 357-58.

The way Nuttall purchased stock suggests he may have been holding at least part of it in trust for the Church. He stated in his diary:

I received from Brother James Jack a certificate of stock for one thousand shares in the Inland Salt Company of Utah for which I am to pay him five hundred dollars. The shares are for ten dollars each. I feel assured that this will be a good investment for home manufacture and with a view of helping it I take this stock.¹⁶

Nuttall did not specifically state he was holding the stock in trust for the Church, nor did he make any effort to explain why he only paid five hundred dollars for ten thousand dollars worth of stock. Regardless of the company's actual ownership, the hierarchy of the Church promoted its interests.

Inland Salt Company was the most progressive producer in the territory. Financial backing from Church leaders and technical knowledge from company officials John W. Snell and J. E. Langford, who each previously owned salt works, enabled it to construct a pond system capable of using the most advanced methods of salt making available.¹⁷

Construction of the ponds began in 1888. They were specifically designed to utilize the fractional crystallization process of salt making. Although pond systems of other companies built prior to 1888 imply some knowledge of the process, Inland Salt Company was the first in Utah to design its system for the specific application of this principle.¹⁸ Initially, one thousand

¹⁶Nuttall, "Diaries of L. John Nuttall," II, 380.

¹⁷Culmer, Utah Directory and Gazetteer for 1879-1880, p. 175. Myron L. Sutton, interview.

¹⁸Executive Documents 6 (1890), p. 891. Mineral Resources (1888), p. 606.

acres were laid out for the construction of ponds; however, during the first year of operation, 1888, only two hundred and fifty acres were used. Two years later there were nine hundred acres of salt ponds.¹⁹

The salt makers demonstrated remarkable ingenuity in treating the problems encountered during the initial stages of construction as a result of the lake's fluctuation. An access canal was dug from the lake to the mill, where the brine was pumped into a conducting canal. During the year 1889, due to the recession of the lake, the pump was moved one-half mile to the lake's edge of the previous year, and a flume was constructed to carry water the additional distance.²⁰ To avoid the expense of maintaining an additional engine at the pump site, the ends of a rope were connected to form a circuit. Fashioned after the same principle as the modern fan belt, the rope was placed around the fly wheels of both the engine and the pump and suspended from pulleys mounted on a framework which spanned the one-half mile distance. The power plant drove the rope through the circuit at the rate of sixty miles per hour. The pump, thus connected to the power source, was capable of raising the water from the canal to the flume at a rate of fifteen thousand gallons per minute. At that rate, it took three months to fill the nine hundred acres of

¹⁹Nuttall, "Diaries of L. John Nuttall," II, 365. Salt Lake Herald, November 14, 1888, p. 6; September 6, 1890, p. 8.

²⁰Salt Lake Herald, April 14, 1888, p. 4. Deseret Evening News, June 2, 1888, p. 3. Salt Lake Herald, November 14, 1888, p. 6. Nuttall, "Diaries of L. John Nuttall," III, 58.

ponds.²¹

Inland's refining system was the largest and most modern of any in the state. After the salt was harvested and placed in pyramid-shaped stacks at the edge of the ponds, it was shoveled into mule-drawn tram cars which ran from the ponds to the mill on portable tracks. At the mill, the tram cars were hoisted up a trestle, and the salt was dumped into a large stack. Initially, the salt from this stack was shoveled into an elevator, run through a crusher, and discharged into a hopper, ready to be sacked. Later, a rotary drier was installed to increase its purity. The drying process consisted of forcing currents of friction-heated air through a revolving cylinder. The salt was then crushed and sacked. From the time it left the large stack until it had gone through the refinery, machinery did most of the processing, resulting in a very inexpensive operation.²² With this system, the mill capacity was fifty tons per day.²³

Production statistics during the company's duration, 1888 to 1890, indicate its successful entrance into the intermountain salt market. In 1888, the first year of operation, five thousand tons of salt were produced. By 1890, it was producing two-thirds of the sixty thousand tons marketed by Utah companies.²⁴

The Montana silver mills were Inland's largest customers,

²¹Salt Lake Herald, September 6, 1890, p. 8.

²²Ibid.

²³Nuttall, "Diaries of L. John Nuttall," II, 365.

²⁴Mineral Resources (1888), p. 605. Report of the Governor of Utah, 1890, p. 652; 1892, p. 403.

purchasing more than half of the annual production. In order for the company to keep up with the market's demands, the mill had to increase production to one hundred tons per day.²⁵ In the light of its promising future, it is difficult to understand why the company's owners decided to sell the salt works.

Toward the end of 1890, James Jack and Nephi W. Clayton informed the First Presidency of the Church that Kansas City capitalists had offered to buy the Inland Salt Company. After consideration of the proposal, it was decided they would not sell for the time being. Negotiations continued during the first three months of the next year.²⁶ For some unexplained reason, a commitment to sell was made to the group from Kansas City over the objections of Nephi W. Clayton, L. John Nuttall, George Q. Cannon, and Joseph F. Smith. Nuttall wrote in his journal how he felt about the pending sale of the company:

We are in hopes something will transpire to break up the trade. As a people we have opened up many enterprises and as soon as they begin to pay the outsiders come along and buy them for half their value. I am opposed to such things. But if the company sells I will be obliged to do so also.²⁷

Before the sale was finalized, Nephi W. Clayton offered a counter-proposal to selling. He suggested that the other salt works around the lake be leased for a term "with a view to purchasing them and then to control the salt market." Clayton's proposal was considered, but rejected because the owners felt

²⁵Salt Lake Herald, September 6, 1890, p. 8.

²⁶Nuttall, "Diaries of L. John Nuttall," III, 224.

²⁷Ibid., III, 275.

they could not go back on the commitment to the Kansas City group.²⁸

The midwest buyers, represented by Mr. F. W. Meegan, offered to pay \$200,000 for the salt company if the deal were closed before March 1, 1891.²⁹ The other stipulations of the sale were that the Kansas City group would pay \$100,000 cash, \$50,000 in one year at 8 per cent interest, and \$50,000 worth of stock on a valuation of \$200,000 for all the stock. The Inland Company was to have on hand, piled up in good condition, 30,000 tons of salt.³⁰ After several days, the decision was made to sell. Mr. Meegan agreed to the conditions of sale and proposed coming to Utah to take over the property on or before April 1, 1891.³¹

In the fall of 1892, money from the sale of the Inland Salt Company was used to develop a resort and a new salt works on the shore of Great Salt Lake. Saltair Resort, Saltair Railway, and Inter-Mountain Salt Company resulted from this investment.³²

Inland Crystal Salt Company

On July 1, 1891, Inland Salt Company was reincorporated by the new owners from Kansas City. Its name was changed to Inland Crystal Salt Company, and the valuation of the property was increased to one million dollars.³³

²⁸Ibid., III, 260. ²⁹Ibid. ³⁰Ibid., III, 268.

³¹Ibid., III, 275.

³²Arrington, Great Basin Kingdom, p. 392.

³³Inland Crystal Salt Company, incorporation papers (Salt Lake City: Office of the Secretary of State, 1891).

Several significant changes were made by the new officials. First, one of the world's largest rotary kiln driers was installed in the mill as a result of a \$50,000 renovation program. The drier was forty-two feet long, nine feet high, and five feet in diameter. Salt was dried by being revolved two hundred times under 240-degree heat and purified by a suction fan that drew off dust containing sulphates of calcium, magnesium, and sodium.³⁴

The second change was the introduction of the brand name, "Royal Crystal" which appeared on the table and dairy grades of salt. This change was not significant because of any impact the brand name had on the market, but because of its historical duration. "Royal Crystal" salt has been sold by Inland Crystal Salt Company and its successors, including Morton Salt Company, until the present time.³⁵

The new company also developed a process for making salt blocks for livestock consumption. Salt was molded into fifty-pound blocks by means of a patented adhesive substance, and then placed in kilns and subjected to 250 degrees of heat for several days. Plain and sulphur blocks were produced, both reported to be solid as ordinary rock salt.³⁶

As a result of the growing market, and renovation of the refining facilities, total production of the company during 1891, its first year in operation, was 90,000 tons, 50,000 tons more than the Inland Salt Company produced the previous year. Output

³⁴Deseret Evening News, September 24, 1892, p. 2.

³⁵Ibid. ³⁶Ibid.

for the state during the three-year period from 1890 to 1892 was unusually high. The previous decade's annual production grew from 12,000 tons in 1880 to 28,000 tons in 1889. Increased production from Inland Salt Company and Inland Crystal Salt Company pushed that amount to 60,000 tons in 1890, 136,000 tons in 1891, and 180,000 tons in 1892.³⁷ The huge surplus of salt coincided with the depression the following year. Silver mills significantly reduced their purchase of salt. As a result, production for the state dropped to 15,200 tons in 1893. Output following 1893 picked up the ascending trend of the pre-1890's, with an annual production of 42,000 tons. Although records on individual companies were not published after 1892, it can be assumed Inland Crystal Salt Company continued to produce at least half of the state's salt until its merger with Inter-Mountain Salt Company in 1898.³⁸

Inter-Mountain Salt Company

Inter-Mountain Salt Company was organized October 1, 1892, under the leadership of James Jack, President, Nephi W. Clayton, Vice-President and General Manager, and Isaac A. Clayton, Secretary and Treasurer, all original owners of the Inland Salt Company.³⁹ Profits made from the sale of the Inland Salt Company were invested in the new salt works.

³⁷Report of the Governor of Utah, 1892, p. 403.

³⁸Mineral Resources (1893-1898).

³⁹Inter-Mountain Salt Company, incorporation papers (Salt Lake City: Office of the Secretary of State).

The refining mill was built in Salt Lake City east of the Jordan River between 10th and 11th West and between North and South Temple Streets. According to a newspaper report, it was the largest salt refinery in the west.⁴⁰

The refining methods were designed along similar lines to Inland Crystal Salt Company's system. The mill was capable of producing thirty tons of marketable salt each ten-hour day.⁴¹ Since the depression had stifled the silver-mill market, Inter-Mountain Salt Company entered the salt business at a time when it was forced by customer demands to produce a diversified refined product. About four-fifths of the salt that was sent through the refinery was sold as table salt. Due to its emphasis on the refined grades of salt, Inter-Mountain was able to stay in business through the depression. Utah table salt was of a higher quality than that produced by its out-of-state competitors. This enabled Inter-Mountain to expand its market area at a time other Utah companies were faced with an economic crisis.⁴²

Inter-Mountain Salt Company developed its pond complex directly east of the property owned by the Inland Crystal Salt Company. Some of the ponds and parts of the canal system are presently being used by the Morton Salt Company.⁴³

Inter-Mountain Salt Company operated successfully until March 2, 1898, when the plant burned to the ground. The reported

⁴⁰J. P. Thomas statement, March 13, 1955.

⁴¹Deseret Evening News, October 26, 1893, p. 1.

⁴²Ibid.

⁴³J. P. Thomas statement, March 13, 1955.

loss amounted to eighteen thousand dollars, only one-third of which was covered by insurance. The initial plan of the company was to immediately rebuild on a larger scale. Its plans were not carried out, however, due to the consolidation of the Inter-Mountain Salt Company with the Inland Crystal Salt Company later that year.⁴⁴

Stockholders of the Inter-Mountain Salt Company bought a controlling interest in the Inland Crystal Salt Company in 1898. The name of the latter company was retained, but the principal officers of the company were reorganized. The new officers were: Joseph F. Smith, President; John Long, of Kansas City, Vice-President; Isaac A. Clayton, Secretary and Treasurer; and Nephi W. Clayton, Manager.⁴⁵

Some major changes took place during the first decade after the merger. The company abandoned its pond complex and enlarged the salt ponds that were formerly owned by Inter-Mountain Salt Company. The expanded system covered eleven hundred acres of ground. The company also constructed a new mill and installed modern refining equipment. Finally, electricity replaced steam power following a fire that destroyed the mill in November, 1908.⁴⁶

Following the 1908 fire, new innovations and advanced machines were used in the reconstructed plant. The rotary kiln

⁴⁴Deseret Evening News, March 2, 1898, p. 8.

⁴⁵Inland Crystal Salt Company, incorporation papers.

⁴⁶Mineral Resources (1911), p. 923.

driers in use for the past twenty years were abandoned in favor of a new drying system. Unrefined salt was divided equally between two driers. Each drier was one hundred feet long, twelve feet high, and seventeen inches wide. It consisted of six horizontal troughs along which the salt was drawn by paddles connected to a continuous chain. The salt was scraped back on the trough below by the returning paddles. This process was repeated until the salt came out of the sixth trough. To maintain a high temperature throughout the drier, a suction fan kept a current of hot air blowing across the salt. A second fan attached to the drier carried off some of the impurities in the dust. An analysis of the salt thus refined showed 99.827 per cent purity.⁴⁷

After the merger with Inter-Mountain Salt Company in 1898, Inland Crystal Salt Company was not faced with a successful competitor on the south shore of the lake. However, in 1901 two companies, the Diamond Salt Company and the Weir Salt Company, attempted to establish salt works in the area.

Diamond Salt Company

Diamond Salt Company was incorporated February 2, 1901, with plans of establishing a sanitarium, bathing facility, amusement park, and salt manufacturing business. It appears the company intended to become competitive with Saltair in the resort business and break the monopolistic hold Inland Crystal Salt Company had on the salt market. Within a year after the company

⁴⁷ LeRoy A. Palmer, "Refining Salt from the Great Salt Lake, Utah," The Mining World (July 3--December 25, 1909), 225-26.

was incorporated, ponds were built north of the Salt Lake and Los Angeles Railway line and west of the salt works owned by Inland Crystal Salt Company. If construction was started on the resort, there is no physical evidence remaining to indicate to what degree it had progressed. Most likely, it went no further than the planning stage. The company sold its holdings to E. L. Sheets Company, which in turn was purchased by Inland Crystal Salt Company in 1915.⁴⁸

Weir Salt Company

Weir Salt Company began its operation about the same time Diamond Salt Company entered the industry. Its works were located at the site presently occupied by Hardy Salt Company at Lake Point, Utah. The ponds were south of the present location of the Hardy plant.

The Weir Company had problems from its inception. During construction of the long ditch from the water's edge to the pumping station, it encountered the rock-hard strata of sodium sulphate that underlies the shore land around the lake. By drilling holes with steam and blasting out the sodium sulphate with dynamite, a canal was constructed one thousand yards long.⁴⁹ Another problem was the ground water that seeped into the canal and diluted the brine. After Weir completed one hundred acres of ponds and pumped water into them, it was discovered the floor of the ponds was composed of a porous material, and much of the brine

⁴⁸Salt Lake County Recorder's Office, "Deed Record Book 10 N," pp. 381-82.

⁴⁹The Daily Tribune, July 11, 1901, p. 5.

would seep out before the salt concentrated to the point of deposition. An attempt was made to dig seal trenches around the ponds, but the company went out of business before this problem was solved.⁵⁰

Weir also began construction of a plant that was designed to produce twenty-five thousand tons of salt per year. It was to have a battery of new boilers with sixty horsepower each, and engines of one hundred horsepower.⁵¹ An open pan was installed to boil the brine to obtain a more pure salt.⁵² Before the plant was completed, however, it was discovered the foundation extended onto railroad property, and construction of the facility was never finished.⁵³

The record is silent as to the actual duration of the Weir Company. The above problems would indicate a very short term. Deseret Livestock Company later purchased the property and began construction of its salt works in 1949.

The Salt Monopoly

The merger of Inter-Mountain Salt Company and Inland Crystal Salt Company marked the end of an era in Utah's salt industry. Heretofore, it had been characterized by numerous small companies vying for the market. Gradually, the small companies went out of business or were purchased by the two levia-

⁵⁰LeRoy Imlay, interview.

⁵¹The Daily Tribune, July 11, 1901, p. 5.

⁵²LeRoy Imlay, interview.

⁵³Tooele County Daughters of the Utah Pioneers, History of Tooele County, p. 49.

thans who dominated the market for nearly a decade. Their merger in 1898 established a salt monopoly that was not significantly threatened until Morton Salt Company extended its influence into the intermountain region twenty years later.

The role of the Mormon Church in Utah's salt industry grew steadily through the decade prior to 1898 until it became the dominant influence in the emerging monopoly. The exact relationship between the Church and the company is not known; however, the information available suggests an increasing rate of Church involvement until after the merger of Inter-Mountain Salt Company and Inland Crystal Salt Company. At that time, the Church owned a significant amount of stock, and Joseph F. Smith, a member of the First Presidency, was President of the company.

In the spring of 1899, Isaac A. Clayton, a leading stockholder in the company, met with the First Presidency and invited the Church to buy his interest. He explained that he was in financial trouble and felt it to be his duty to inform the Presidency of his intentions, since his actions would affect control of the company. The First Presidency and the Quorum of the Twelve, after considering Clayton's offer, proposed that they buy two thousand dollars worth of the offered stock, including a portion of common stock. They agreed to purchase the balance of his preferred and common stock when it was released from the bank, where it was being held as security.⁵⁴ Although the Church did not own a controlling interest in the company until after the purchase of Clayton's stock, company policy was dictated by the

⁵⁴Journal History, April 1, 1899, p. 2.

Church before and after it was obtained.

Shortly after the merger, efforts were made by the Church-dominated company to maintain and strengthen its monopolistic position. Nephi W. Clayton and James Jack met with the First Presidency and discussed a proposed purchase of the Syracuse, Utah, salt plant owned by D. C. Adams. It was recommended that Adams' salt works be obtained, since it was the only company competing with their firm. It was also suggested a syndicate be formed for the purpose of buying out competitors.⁵⁵ There is no evidence to indicate the two proposals were ever acted upon. Failure to follow through on them came primarily from lack of need, rather than absence of purpose.

Minutes of a meeting of the First Presidency and Quorum of the Twelve in the spring of 1899 illustrate the lack of competition existing at that time. Discussion centered around the possibility that the Oregon Short Line Railroad would force the salt company to ship salt exclusively over its road.⁵⁶ It was concluded, however, that if the railroad were to do this and increase the rates, the company could raise the price of salt. It was also stated they could raise the price of salt for their own benefit if they chose to do so, without fear of successful

⁵⁵Journal History, November 2, 1898, p. 2.

⁵⁶Utah and Nevada Railroad, used by the Inland Crystal Salt Company, was one of eight railroads to consolidate as the Oregon Short Line and Utah Northern Railroad Company in 1889. This company went into receivership and on February 6, 1897, was incorporated as the Oregon Short Line Railroad Company. All of the property that had been in receivership was transferred to the Oregon Short Line on March 15, 1897. Interview with Mr. C. R. Rockwell, Union Pacific Railroad Public Relations Office, Salt Lake City, Utah, August 26, 1969.

competition.⁵⁷

In the late 1890's, possible sites for competing salt works around the lake were of more concern to the stockholders than competition from existing companies. To permit buying up the shore land, a proposal was made for the company to increase its capital stock. Wealthy Church members were invited to buy the new stock issue to prevent non-Mormons from obtaining stock.⁵⁸ Corporate records do not indicate whether the stock was increased to facilitate purchase of the shore lands, but county deed records show the Inland Crystal Salt Company was active in land purchases during the next two decades.⁵⁹

Not completely successful in their efforts to ward off competition by buying lake shore land, the company faced a three-pronged assault in 1901. Diamond Salt Company and Weir Salt Company constructed their facilities on the south shore of the lake. Sears Utah Salt Company, the third company organized that year in opposition to the monopoly, was located on the east shore of the lake near Syracuse, Utah.⁶⁰

⁵⁷Journal History, April 21, 1899, p. 2.

⁵⁸Ibid., September 7, 1899, pp. 3, 4.

⁵⁹The Church's interest in the land bordering the lake was shared by others who were attempting to establish salt works on the lake shore. Much of the land that was ideally situated for salt works was between the meander line and the water's edge. This land, termed "relection land," was unsurveyed. Applicants attempted to have the land surveyed and placed on the market, resulting in a seven-decade controversy over its ownership. This dispute, which will be covered more completely in Chapter XIII, has affected not only the salt industry but all other industries with plans to extract minerals from the waters of Great Salt Lake. The Daily Tribune, May 19, 1901, p. 4.

⁶⁰Ibid., July 9, 1901, p. 5.

There is no evidence that Inland Crystal Salt Company interfered in any way with the Diamond or Weir Salt Companies. This was not the case, however, with the Sears Utah Salt Company. It is reported that Inland employees tied several sticks of dynamite to the supports of the flume which brought water from the lake to the ponds of the Sears Company, lit the fuse and ran. Mr. Sears, who was living at the plant and serving as the night watchman, started running toward the flume with a gun. The vandals attempted to get away, but found themselves in a perplexing situation. Sears, thinking the men were still at the flume, continued to run toward the dynamite. Not wanting to cause Mr. Sears any personal harm, the Inland men yelled at him in an effort to divert him from his course. Upon hearing the shouts, Sears stopped and began shooting toward the sound of the voices. Unnerved, his antagonists lost all their concern for his safety and fled. Fortunately, only minor damage was caused to the flume, and Mr. Sears was unhurt.⁶¹

The Sears incident was not the only occasion where violence was resorted to in relation to the monopoly. Three Salt Lake businessmen owned a small salt plant near Syracuse, Utah, adjoining a strip of Inland Crystal Salt Company property. The salt works of the independent company were located some distance from the lake. Since the Inland Company land had a natural fall from the lake, the independent company built its canal across the land and constructed a pumping station on it. On a Saturday

⁶¹This information was obtained by the author from an authoritative, private source who must, at this point and for personal reasons, remain anonymous.

morning, the foreman of the Inland company and four of his men went to the Syracuse works and began filling in the section of the canal that crossed the Inland property. The men from the independent company asked them to stop. The Inland men refused, and after an altercation, the independent men withdrew, returning with an officer who arrested the Inland men on the charge of malicious mischief.

These men were released on bond, but returned the following Monday evening with twenty men and resumed their task of filling the canal. The independent men again ordered them to cease their work, but left when they received a negative reply. It was reported that within a short time, rifle balls began whizzing around the men at work in the canal. The riflemen fired about thirteen shots from a distance of two hundred yards and scared off the Inland men. If there was any subsequent action taken by either company, it was never reported.⁶²

In addition to strong-arm tactics, the Inland Company eliminated competition through its ability to control the price of salt. Charles A. Smurthwaite and Richard J. Taylor were a case in point. After they had invested heavily in property and a salt plant, their banker suggested they talk to Joseph F. Smith, President of Inland Crystal Salt Company, before proceeding any further with their project. President Smith gave them notice that "they must not compete with his Inland Crystal Salt Company by manufacturing salt, and that if they tried to, he would 'ruin

⁶²Journal History, May 30, 1901, p. 6.

them'."⁶³ An editorial in the Deseret Evening News gives an interesting counterpoint of view to that of Smurthwaite's. During the interview, President Smith

expressed his doubts as to their success in competition with a company that could control the market. This was evident to others, from the fact that there [were] serious obstacles in the way of their success, by reason of local difficulties that render[ed] salt making expensive at the place selected.⁶⁴

Smurthwaite and Taylor attempted to sell out their holdings to the Inland Company, but their offer was rejected because of the supposedly inflated value they had placed on them.

Utah's salt monopoly emerged during the trust-busting era of the 1890's. A local newspaper report reflected the anti-trust feeling of the nation in an article expressing approval of a salt company being built to break up the "salt trust."⁶⁵ However, any trust-busting feeling that may have been engendered locally was never followed through with any legal action to keep the officials of the Inland Company from establishing a firm hold on the Utah salt business.

There seems to be a relationship between the confidence with which company officials pursued their monopolistic course and the decision rendered by the U.S. Supreme Court in the Knight case (1895). The decision held that the mere purchase of property, even if it made for monopoly and the restraint of

⁶³Frank J. Cannon and Harvey J. O'Higgins, Under the Prophet in Utah (Boston: The C. M. Clark Publishing Company, 1911), pp. 322-24.

⁶⁴Deseret Evening News, April 20, 1905.

⁶⁵The Daily Tribune, July 11, 1901, p. 5.

trade, was not in itself illegal; further, that manufacture and production were no part of interstate commerce. As a result of this case, there was a temporary relaxing of the trust-busting spirit nationally, which was reflected on a local level by obvious efforts to establish a salt monopoly by company officials.

During the first two decades of the twentieth century, the Inland Company maintained its position as the major salt producer in the state. Other small companies produced salt in Utah during this period; however, the monopoly was not significantly threatened until Morton Salt Company moved into the area in 1918.

Conclusion

A factor which contributed to the success of the large salt companies was the ability to raise enough capital to invest in a salt works that could produce a refined, diversified product in large amounts. Many of the small companies that depended on the silver mills to purchase their crude salt went out of business after the depression of 1893. These companies not only lost their chief market, but were unable to obtain financing to construct adequate refineries.

The trend in Utah toward consolidation of salt companies, which resulted in monopolistic practices, before and after the turn of the century, was typical of a national trend. In 1880 there were over two hundred and sixty salt companies in the country. By 1900 there were about one hundred and fifty. The trend toward consolidation continued until, in recent times,

forty major companies own nearly all of the salt-producing facilities in the United States.⁶⁷ During the early 1880's, Utah had fifteen companies. This number was reduced to five by 1900.⁶⁸ Today three of the seven companies in Utah are owned by national salt firms.

⁶⁷Kaufmann, Sodium Chloride, p. 641.

⁶⁸Robert Sloan, Utah Gazetteer and Directory, 1884 (Salt Lake City: Herald Printing and Publishing Company, 1884), p. 299. Sutton, Utah, A Centennial History, III, 872.

CHAPTER VII

EARLY SALT COMPANIES ON THE EASTERN SHORE OF GREAT SALT LAKE

The land area referred to as the eastern shore of Great Salt Lake includes the shore land of Bear River Bay, south to the southern extremities of Farmington Bay. At the present time, due to the recession of the lake, the majority of this area is no longer inundated. Marsh lands and mud flats occupy the former lake bed. The Bear River Bay is no longer covered with water, and with the exception of a small, fresh-water arm of the lake extending into Farmington Bay, that area is now exposed. Along the east shore line, the narrowest strip of land exposed by the receding lake is two miles wide. In many places, these exposed lands are six or more miles wide.¹

The recession of the lake has had a greater adverse effect on the salt industry in this area than any other single factor. The expense encountered in extending canals to the lake, and maintaining pumping stations, made salt making a hazardous and short-lived undertaking.

One of the first salt works on the eastern shore was built in 1880 by George Payne. His salt ponds were located on the south side of the Syracuse Road, southwest of Syracuse,

¹Appendix III.

Utah.² According to Davis County deed records, Payne was buying and selling land in that area all during the 1880's. By the middle of the decade, large tracts of land were sold to William W. Galbraith. Apparently, those land sales marked the termination of his salt operation.³

William W. Galbraith bought up additional shore land in the vicinity of the land purchased from George Payne.⁴ Galbraith organized the Syracuse Salt Company and constructed ninety acres of salt ponds southwest of Syracuse, Utah. The water from the lake was supplied to the ponds by three steam engines. The fresh water used by the engines was supplied by artesian wells drilled near the site of each pump. Fuel for the engines was hauled from Ogden, Utah.⁵

The method Galbraith used to harvest salt varied from that used by other producers in that salt was first shoveled into piles inside the pond and then wheeled to the side of the pond in wheelbarrows. Later, horse-drawn carts were used to haul the salt to the side of the pond. Most of the salt was shipped directly to the silver mills without refining. Some of the purest salt was taken to a small mill located where the old Syracuse Resort was later built. This salt was ground and sacked in three and

²LeRoy Inlay, interview.

³Davis County Recorder's Office, "Deed Record Book I," pp. 702-03.

⁴Ibid., pp. 702-05.

⁵David E. Miller, "The Great Salt Lake, Its History and Economic Developments" (unpublished Ph.D. dissertation, University of Southern California, 1947), p. 231.

five-pound sacks.⁶ The Syracuse Salt Company, listed in the Mineral Resources for 1887 and 1888, produced twelve thousand tons the first year and two thousand tons the next.⁷ According to government records, there is no indication that the Syracuse Salt Company produced salt after 1888.

Davis County deed records indicate Galbraith sold over half his acreage to the Adams and Kiesel Salt Company by 1887.⁸ A question remains as to whether the production figures quoted above refer to Galbraith's operation or the Adams and Kiesel Salt Company, mistakenly referred to as the Syracuse Salt Company.

The Adams and Kiesel Company was incorporated May 17, 1886. The \$100,000 stock issue was divided into four thousand shares, valued at \$25 each. The officers were D. C. Adams, President and Director; Fred J. Kiesel, Vice-President and Director; William W. Galbraith, Director. These three men each held \$33,300 in stock. Theodore Schansenback, Treasurer, Secretary and Director; and William Schansenback, Director, each held \$50 in stock.⁹

The Adams and Kiesel Company built a resort, commonly referred to as the "Syracuse Resort." In addition to the salt

⁶Miller, "The Great Salt Lake," pp. 232-33.

⁷Mineral Resources, 1887, p. 605; 1888, p. 622.

⁸Davis County Recorder's Office, "Deed Record Book I," p. 708; "Deed Record Book J," p. 293.

⁹Adams and Kiesel Salt Company, incorporation papers (Salt Lake City: Office of the Secretary of the State of Utah).

works and resort, the company was also involved in cutting and selling cedar posts. The principal place of business was located in Ogden, Utah.¹⁰ It possibly served as a business office and a retail outlet for the salt and cedar posts sold to the local market.

From the source material available, there is no indication that the company owned an extensive refining operation, if it had one at all. The company was primarily concerned with shipping crude salt to the silver mills. Salt production, coupled with the resort trade, created enough traffic to justify the building of a spur to the lake by Union Pacific.¹¹ From 1889 to 1892, production records indicate the Adams and Kiesel Salt Company was selling 15,000 to 20,000 tons a year. If the unusually large Inland Salt Company is not used as a basis for comparison, the Adams and Kiesel plant would have been considered one of Utah's larger producers.¹²

The company continued the production of salt through the decade, although it was adversely affected by the receding lake, the depression of 1893, and competition from the larger salt companies on the southern shore of the lake. The level of Great Salt Lake dropped ten feet from 1886 to 1905, exposing up to two miles of shore land around the salt works.¹³ The expense of

¹⁰Ibid.

¹¹Miller, "The Great Salt Lake," pp. 233-34.

¹²Report of the Governor of Utah to the Secretary of the Interior, 1890, p. 652; 1892, p. 403.

¹³Appendixes II and III.

extending the intake canals, and possibly adding new pumps and building flumes, was compounded by the depression of 1893 and the resulting decline in the crude salt market. The Adams and Kiesel Company had been producing between 15,000 and 20,000 tons of salt annually prior to the depression. During 1893, the company was forced to compete for a market that consumed 15,000 tons of salt with two companies capable of individually producing five or six times as much as the market required.¹⁴ By 1898, the amount of salt produced by the Adams and Kiesel Company was not significant enough to justify the Inland Crystal Salt Company's buying the company to eliminate it from competition.¹⁵

On April 19, 1899, William B. Clarke, of Kansas City, Missouri, purchased the Adams and Kiesel Salt Company for \$30,000. The purchase included all the salt on the premises, the wheelbarrows, planks, shovels, and other implements and appliances used in the manufacture of salt. The agreement of sale included the pump and pump house, but no mention was made of a refinery or refining equipment; presumably, none existed.¹⁶ From the available records, there is no indication that salt was produced from this salt works by Mr. Clarke.

After the Utah Central Railroad was completed between

¹⁴The Inland Crystal Salt Company produced 90,000 tons during 1891; the other companies produced 58,000 tons, collectively. Individual production records were not published for the Inter-Mountain Salt Company; however, its production capabilities were similar to Inland Crystal Salt Company. Supra, pp. 78-79.

¹⁵Supra, pp. 83-84.

¹⁶Davis County Recorder's Office, "Deed Record Book Q," p. 337.

Ogden and Salt Lake City in 1870, the portion of the lake shore southwest of Farmington, Utah, became a prime site for salt works. The Farmington Bay angles off from the main body of the lake in a southeasterly direction. During the high-water mark in the early 1870's, the lake reached the tracks of the Utah Central Railroad. Transportation facilities bordering the lake attracted Frederick Mitchell to the area. He purchased ten acres of land at Lake Side, Davis County, with the intention of producing one thousand tons of salt during the summer of 1871.¹⁷ Unfortunately, the success of his operation was not subsequently reported.

In the year 1883, a spur of the Utah Central Railroad was built to the Lake Park Resort in Davis County. An extension of the spur induced the Deseret Salt Company to build a salt works on Farmington Bay, southwest of Farmington, Utah.¹⁸ The company was incorporated October 9, 1883, with a capital stock of \$150,000, divided into 15,000 shares.¹⁹

Information available on Deseret Salt Company leaves a confusing picture. The company was incorporated in 1883, but it was not listed in government reports until 1889. During this period, two of the company incorporators, George Y. Wallace and Charles W. Lyman, who also owned a forwarding company, were listed as two of the biggest salt shippers in the state.²⁰ To

¹⁷J. Cecil Alter, Utah, The Storied Domain (3 vols.; Chicago: The American Historical Society, Inc., 1932), I, 397.

¹⁸Mineral Resources, 1888, p. 606.

¹⁹Deseret Salt Company, incorporation papers (Salt Lake City: Office of the Secretary of the State of Utah, 1883).

²⁰Mineral Resources, 1883, 1884, p. 884.

add to the already confusing picture, a report was issued in 1890 to the effect that the Deseret Salt Company was incorporated that year. George Y. Wallace was listed as the Manager, and the company was reported to have a capitalization of \$50,000.²¹

A possible explanation of the foregoing might be that the Deseret Salt Company was producing salt from 1884 to 1892, but the production was being reported by two of the company directors, Lyman and Wallace, who were shipping salt through their independently-owned shipping company. Since the Deseret Company was listed in production reports from 1888 through 1892, the report of the incorporation in 1890 of that company was either an error or the report referred to a possible reincorporation of the company.

After the Deseret Company was initially organized in 1883, it invested \$20,000 in several large ponds. These were separated from the lake by a wide bank. A steam pump was used to force the water from the lake into the ponds. A railroad siding was laid on an embankment running lengthwise through the ponds.²²

²¹Descriptive Review of the Industries of Salt Lake City (Salt Lake City: The Trade and Commerce Publishing Company, 1890), p. 63.

²²The expense entailed in making salt with this type of system was about \$1,000 per 10,000 tons of salt. The coal used to run the steam pump cost \$6 per ton, 12 tons of which were used in pumping the brine for 10,000 tons of salt. The engineer was paid \$75 per month for operating the steam engine, which made up the cost of \$1,000. The cost of harvesting the salt, shoveling the salt into wheelbarrows, and wheeling the salt to the side of the ponds, varied with the thickness of the salt, but the usual contract price for that period was about \$0.40 per ton if the salt were six inches thick. The total expense for harvesting 10,000 tons of salt would be \$5,000. From 1883 through the decade, the margin of profit narrowed drastically. In 1883,

The Deseret Salt Company produced crude salt for the silver mill markets. Reports from the period, however, indicate they had intentions of producing a high-quality table salt. During the 1880's, large quantities of refined salt were being imported into Utah from Syracuse, New York, and Liverpool, England. The imported salt, with its greater purity, was superior for making butter. It was reported in 1885 that a salt plant near Farmington (presumably the Deseret Company) was attempting to manufacture salt, using the Liverpool process. Its superintendent was an experienced salt maker from England.²³ Later, a home-industry enthusiast wrote, "Salt is now manufactured at Farmington, Davis County, which is said to be superior in every respect to the far famed Liverpool salt, and is sold at half the price."²⁴ Two years later, however, the Deseret Company was still trying to improve its product to compete with the Liverpool salt, as the following statement indicates:

There is no good reason why absolutely pure table and dairy salt should not be made from the salt lake in great quantities, and the success of the refining works at Farmington, where Liverpool salt is being made of great purity, is confidently looked for.²⁵

The Deseret Salt Company was still producing crude salt

salt was selling for about \$6.50 per ton. The following year, the price dropped to \$4 per ton, then to \$2 in 1886 and 1887. In 1888 the price ranged from \$1 to \$2 per ton. Mineral Resources (1890), p. 606.

²³Alter, Utah, The Storied Domain, I, 443-44.

²⁴Ibid., I, 444.

²⁵Denver and Rio Grande Western Railway, Traffic Department, The Agricultural, Manufacturing, Mineral, and Range Productions of Utah, Circular 3 (1887).

for the silver mills in 1890, when a report stated that a refinery would soon be added.²⁶ Whether the company ever was able to produce a refined salt before it discontinued operations is an unanswered question.

The Deseret Salt Company is not referred to after 1892 in any of the records consulted. Competition from larger, more mechanized companies, the depression of 1893, and the receding lake level, led to its decline. The company could not have produced salt economically after 1900 if it still existed. The lake dropped three feet from 1900 to 1905, exposing four to seven miles of shore land around the company property.²⁷

Other small salt companies on the eastern shore of the lake that emerged in the late 1880's were chiefly interested in harvesting crude salt, and were either unwilling or unable to risk further investment in a salt refinery. One of those, Gwilliam Brothers Salt Company, was first listed in the Governors Report to the Secretary of Interior in 1890.²⁸ The company was located about two miles north and west of William Galbraith's Syracuse Salt Company. Gwilliam Brothers changed the company name to Solar Crystal Salt Company in 1892.²⁹ The records do not indicate how long they produced salt during the 1890's before discontinuing operations. In 1901, George W. Gwilliam incorporated

²⁶Descriptive Review of the Industries of Salt Lake City, p. 63.

²⁷Appendix II.

²⁸Report of the Governor of Utah (1890), p. 652.

²⁹Ibid., p. 403.

the Solar Crystal Salt Company for the second time.³⁰ The incorporation papers described the company holdings as less than one hundred acres of property, tracks, a pump, an engine, a building, salt ponds, roadways, dams, ditches, and tools.³¹ The company was reorganized, no doubt, with the intention of successfully competing with the Inland Crystal Salt Company by selling its salt at a lower price. How long the company was able to operate in competition with the larger company is not a matter of record.

Competition with the Inland Company involved two salt companies on the east shore of the lake in separate acts of violence. Employees of Inland attempted to fill in the canal of a Syracuse salt works owned by Messrs. Payne, Chesney, and Bills. The intruders were finally driven off when someone began shooting at them.³² Not enough damage was done to interfere with the operation of the salt works; however, the company did not endure long enough to be a successful competitor with the Inland Crystal Salt Company.

The Sears Utah Salt Company had its flume dynamited by Inland Company employees.³³ The Sears operation was located between Syracuse and Kaysville, Utah. A newspaper article implies the company moved its works from a site near Lagoon to one further north.³⁴ The Sears Company was still listed, along with

³⁰Solar Crystal Salt Company, incorporation papers (Salt Lake City: Office of the Secretary of the State of Utah, 1901).

³¹Ibid.

³²Journal History, May 30, 1901, p. 6.

³³Supra, pp. 84, 85.

³⁴The Daily Tribune, July 9, 1901, p. 5.

several others, in 1903.³⁵ How long it lasted after that is unknown.

For a short time, a salt company owned by A. H. Nelson operated near Brigham City, Utah. It was listed in the Governor's Report of 1890. The company did not report its production in 1891 and discontinued its operation in 1892.³⁶ The Nelson Company is typical of dozens of small companies that entered the salt business to take advantage of the market for unrefined, crude salt. In some cases, the companies were simply harvesting the salt deposits on the lake shore, where the only investment required was their tools and transportation costs to the nearest shipping point.

Typically, companies on the eastern shore lacked investment in modern facilities. The most significant factor discouraging large expenditures in this area was the shallow depth of the Great Salt Lake off the eastern shore. From 1875 to 1905, with the exception of a three-year upsurge in the lake level after 1883, the lake was in a thirty-year decreasing cycle.³⁷ The vacillating nature of the lake did not give the salt makers any assurance of a future unaffected by changes in the lake level; hence, large investments in a permanent salt industry on the eastern shore were not made.

³⁵Salt Lake City Directory, 1903 (Salt Lake City: R. L. Polk and Company, 1903), p. 1153.

³⁶Report of the Governor of Utah (1892), p. 403.

³⁷Appendix II.

CHAPTER VIII

MORTON SALT COMPANY

Inland Crystal Salt Company did not share its dominant position in Utah's salt industry with any serious competitor until Morton Salt Company leased a potash plant at Burmester, Utah, in 1918, and established a competitive foothold. In 1923, Morton Salt Company purchased controlling interest in the Inland Company from the Mormon Church. By 1927, the remaining stock was acquired, and Inland Crystal Salt Company was reincorporated as a wholly-owned subsidiary under the name of Royal Crystal Salt Company. Morton Salt Company produced salt from its plant at Burmester and also from its subsidiary plant at Saltair until 1933, at which time production and refining facilities were combined at the Saltair location. Although both companies operated from the same plant, the separate identity of Royal Crystal Salt was maintained until that company was dissolved in 1958.¹

Morton Salt Company's move into Utah was prompted by plans to establish a nationwide system of distribution, which made it necessary to set up plants located to serve contiguous areas. The company's history antedates its expansive move into Utah by many years. Joy Morton became involved in the salt

¹Myron L. Sutton, interview. Inland Crystal Salt Company, incorporation papers. Salt Lake Tribune, July 17, 1960.

industry in 1879 as a young, twenty-four-year-old businessman. He purchased a 20 per cent interest in E. I. Wheeler and Company, a salt brokerage in Chicago. After the death of Wheeler, Morton purchased his late partner's interest in the company. He took his brother, Mark Morton, in as a partner and changed the name of the company to Joy Morton and Company. After the panic of 1893, Morton expanded into the production field by purchasing and renting salt plants in the newly-developed Hutchenson, Kansas, salt field, and in Wyandotte, Michigan.²

Shortly after the turn of the century, Joy Morton became involved with the International Salt Company, a large, New York-based salt combine. He was placed in charge of the western group of operators, which were known as the International of Illinois. In 1910 Morton bought the Michigan and Kansas properties and businesses from the combine and formed Morton Salt Company. The stockholders of the new company were Joy Morton, President and principal stockholder; his brother, Mark Morton, Vice-President; his son, Sterling Morton, Secretary; and Daniel Peterkin, Treasurer. Three others, C. S. Ostrom, A. G. Warren, and Preston McGrain, all employees of long standing, completed the list of directors.³

After this company was organized, Morton put his technicians to work developing a better-quality salt. They found that by adding two per cent magnesium carbonate, a chemical which is healthful to the human body, they could eliminate the problem of

²Eskew, Salt, The Fifth Element, pp. 130-65.

³Ibid.

salt clogging, or packing down in damp weather. In order to capitalize on the free-flowing table salt, Morton initiated a nationwide advertising program. To provide national service, the company expanded its facilities in Michigan and Kansas, and acquired new operations in Utah, Texas, and California.⁴

Morton became involved in the Utah salt trade through a lease agreement with Salt Lake Chemical Company, a subsidiary of the Diamond Match Company. The chemical company had been in operation since 1916, extracting potash from the lake brine as a war industry. The method used to produce potash from lake water was simply an extension of the process used to extract salt and resulted in a large amount of salt being produced as a by-product. Some of this salt was being harvested, refined, and sold by Salt Lake Chemical Company; the remainder was redissolved and returned to the lake.⁵

At the time the potash market began to wane at the conclusion of World War I, Morton Salt Company negotiated the lease agreement with the Salt Lake Chemical Company. From 1918 to 1923, the potash company operated the shop, managed the pond system, harvested the salt, and delivered it to the mill for refining. During that period, Morton Salt Company was limited to the operation of the mill. Potash production was phased out in 1923, and Morton Salt Company operated the entire facility until the Burmester plant closed in 1933. Although the Burmester site

⁴Ibid., pp. 157-59, 163-64, 172.

⁵Salt Lake Tribune, October 4, 1936, p. C-9. Myron L. Sutton, interview.

remained inactive after 1933, it was kept under lease until 1950, when Morton purchased it from Uniform Chemical Company, a successor to Salt Lake Chemical Company.⁶

Morton Salt Company moved into an established production system when it leased the Burmester complex. Salt Lake Chemical Company had installed a kerosene-burning pump at the end of a two and one-fourth-mile wooden pipeline to bring the brine in from the lake. Morton installed a power line and an electric pump. As the lake receded from its 1923 peak, they dug a canal three-fourths of a mile beyond the pipeline and installed another pump. Due to further recessions of the lake, the canal was extended another one-half mile to allow the brine to flow into the pump. The canal and wooden pipeline paralleled the Western Pacific Railroad right-of-way until it reached the pond complex. The brine then flowed into a canal going south under the railroad tracks into the concentrator ponds. After the brine reached saturation point, it flowed north under the tracks again to allow the salt to crystallize out in the garden ponds.⁷

Until 1923, methods used to harvest salt at the Burmester plant were typical of the harvests described in earlier chapters. Machines subsequently were utilized after experiments proved their feasibility. Tractors were introduced by Ed Cassidy, a Morton employee, who brought his farm tractor to the ponds to replace the horses in pulling the plows. Previously, a horse, or team of horses, and a single, moleboard walking plow were used to break

⁶Myron L. Sutton, interview.

⁷Ibid.

the salt loose from the pond floor. Machinery had not been used in the past because of the fear of its weight breaking through the thin, salt floor. Following Cassidy's successful venture, however, the company purchased some Fordson tractors with which to plow the salt. Handwork was still used after the salt had been plowed. Men with shovels and wheelbarrows piled the salt along the edge of the ponds, as it had been done for decades. Beginning in 1929, a blade attached to a tractor scraped the salt over a trestle and dumped it into the hopper of a portable conveyor. The conveyor stacked it parallel to the railroad tracks for convenience in shipping. During the later years of Burmester's operation, a gas-powered scoop shovel was used to load salt into open railroad cars to be hauled to the mill. The shovel was moved to Saltair after 1933 and was used there for years.⁸

The refining system at Burmester was unique in that the kiln-drier complex consisted of three separate rotary kiln driers, each on a different floor of the mill. The driers were located in tiers in order that the salt, after passing through the uppermost kiln, could drop to the kiln below. A boiler, located outside each kiln, forced steam through coils located in a panel at the end of each drier. Strong fans distributed the heat throughout the kiln and drew off the impurities. The three-tiered steam drier was replaced in the middle twenties by a coke drier, which in turn was replaced by an oil-burning drier in 1930 or 1931. The latter drier was operated until 1933, when the Bur-

⁸Ibid.

mester plant shut down; then it was dismantled and transported to the plant at Saltair. The coke drier was also taken to the Saltair plant and converted into a cooler. Both driers are still in use at that plant.⁹

Production was consolidated at the Saltair plant to reduce the overhead involved in operating two plants. The economic conditions were such, as a result of the depression, that both plants were running at half capacity, or less. After an unsuccessful economy drive, with no prospect of increasing sales, the decision was made to combine the two operations. The Burmester plant, with its larger capacity, was initially favored over the Saltair location. Pressure from the Salt Lake, Garfield and Western Railroad caused the company to reconsider. The railroad, which derived much of its revenue from the Saltair plant, would have suffered financially if that plant were shut down. Rumors that the railroad would establish a competing company placed the Saltair location in a preferred position.¹⁰

Subsequent to the consolidation in 1933, the two companies retained independent status, although they shared the same production facilities. Utah sales offices for Morton Salt Company remained apart from Royal Crystal Salt Company, they paid taxes separately, and operated in competition with each other. The two companies were separate entities, although Royal Crystal Salt Company was authorized to control the payroll for both companies. The two sales offices were brought together only when J. A. Clements, Vice-President in Charge of Sales, came to Utah from

⁹Ibid. ¹⁰Ibid.

the main office in Chicago to chair scheduled meetings. Daniel Peterkin, President of Morton Salt Company, was also President of Royal Crystal Salt Company. Isaac A. Clayton, Jr., a holdover from the Inland Crystal Salt Company, was Vice-President and Sales Manager of Royal Crystal Salt Company and served in this position from 1935 to about 1955.

The Saltair plant produced a brand of salt for each company: "Royal Crystal Salt" and "Morton Salt." The sign on the mill at Saltair carried the name "Royal Crystal Salt Company" until 1949, when the plant burned down. After being rebuilt in 1950, the mill carried the name "Saltair Salt Plant." Royal Crystal Salt Company was dissolved in 1958 as a result of anti-trust litigation brought against it three years earlier. After this dissolution, the plant became "Morton Salt Company."¹¹

Radical changes were made after 1933 to keep abreast of new techniques being developed in the salt industry. Until the consolidation, salt had been harvested by hand, even though the use of tractors had proven successful at Burmester. The delay in changing over to a machine-oriented harvest at Saltair can be explained by the company's desire to revamp its pond system to handle the available machines and those that would be developed in the future. The ponds in use in 1933 were originally designed with a six or seven-inch salt floor. Twice that depth would be required to sustain the anticipated weight of the machines. To accommodate the deeper floor, earth fill was placed between plank

¹¹Ibid. On May 10, 1965, Morton Salt Company changed its name to Morton International, Inc.

framework to raise the height of the dikes eighteen inches.¹²

During the three years required to build up the floor and reconstruct the dikes, light tractors with scrapers or tumble-bugs were used on the ponds to harvest the salt. The tumble-bug was constructed in such a way that the salt could be scraped up into a small bin which was then pulled across the pond to the stockpile. A built-in pivot assembly permitted dumping the contents.

These tractors were abandoned in 1936 in favor of eight new machines that were designed and constructed in the machine shop at Saltair. The machines, called "Hootin' Nannys," were Fordson tractors with a three-quarter-ton capacity scoop attached to a framework in front. The scoop was lowered to the salt floor, pushed along until full, and then raised while driven at a rate of fifteen miles an hour to the pond's side, where the salt was dumped into a stacking conveyor.

The "Hootin' Nanny" was replaced in 1949 by another machine also designed by local salt men. Called a "Jackrabbit," the new machine was built around an air-cooled engine. Constructed more like an automobile than a tractor, it could hold more salt and was faster than the "Hootin' Nanny."

The "Jackrabbit" was replaced during the late fifties by a commercially-manufactured machine called the "Scoop-mobile," which was a larger, more powerful machine than the "Jackrabbit," with a hydraulic scoop-bucket in front. It was the first com-

¹²Ibid.

mercially-developed machine that proved to be superior to those built by the local salt men in their machine shops.¹³

The "Scoop-mobile" was replaced in 1964 by a revolutionary new machine called the "Palmer-Richards Salt Harvesting Combine." The combine employed a new concept of embodying several aspects of the harvest into one operation, and was developed locally by James Palmer and A. Z. Richards, Jr., of the Solar Salt Company. A blade on the machine cut through the salt to the split, excavated it, and conveyed it into a truck, which hauled the salt from the ponds to a central stockpile. This eliminated the miles of stockpiles along the edge of the ponds and the necessity of moving the salt the second time from the stockpiles to the mill.¹⁴

Fluctuations of Great Salt Lake have posed problems for Morton Salt Company as they have for every other producer on the lake. The intake system, originally installed by the Inter-Mountain Salt Company in 1893 and consisting of a canal, pump, and flume, has been used with some modification ever since. The system was located on the east side of the site occupied by the old Saltair Resort. In 1935, a pipeline was extended one-half mile from the flume. By 1951, the lake had risen and the pipeline was abandoned. In 1957, the intake canal was extended one-half mile into the lake to ensure a permanent brine supply. The canal was extended shoreward in 1965, and a new fiberglass pipe replaced the flume.¹⁵

¹³ Ibid. ¹⁴ Ibid.

¹⁵ J. P. Thomas, statement.

In recent years, Morton Salt Company has become increasingly concerned about the changes in salt content of Great Salt Lake. There is a greater need for salt to serve an expanding market, but at the same time, the south arm of the lake is becoming less concentrated. As a result, construction of more concentrator ponds is required to evaporate the water. At present, half the water must be evaporated before the solution becomes concentrated enough to put into the garden ponds. The change in density has been attributed to the combination of two factors: the construction of a causeway by the Southern Pacific Railroad across the north arm of the lake, and the periodic rise in the lake level. The salt companies claim the causeway has interrupted the normal circulation patterns of the lake. As a result, the northern portion of the lake has become more dense, while the southern arm has become diluted.

Taking into account the natural dilution resulting from the rise in the lake level, a comparison of the salt content before and after the causeway reveals a disproportionate change. For example, the concentration of the lake in 1969 was 15 to 16 per cent salt. At a corresponding lake level before the causeway, it was 24 per cent salt. As a result, the Morton Company added three hundred acres of concentrator ponds during the winter of 1968-1969, and more ponds are on the drawing boards for the future.¹⁶

Some of the more significant changes at the Saltair com-

¹⁶Myron L. Sutton, interview. Deseret News, January 28, 1970, p. B-11.

plex came about as a result of two fires. After the Inland Crystal Salt Company mill burned in 1926, the site was changed from the west side of the pond complex to the east side. Moving the location of the mill required reorientation of the railroad tracks in the ponds. The new refinery was located on the Salt Lake, Garfield and Western right-of-way, and the company tracks connected directly into its line. Some of the tracks on the west end of the ponds were used to form a spur connecting into the Western Pacific Railroad. These connections provided transportation over two competing lines to local and intermountain markets.¹⁷

The new building, constructed of fireproof corrugated transite board, was five stories high, with a cupola on top that housed the elevator head shafts. The mill, able to handle fifty thousand tons per season, was larger than its predecessor, but the refining system was not radically different from that used in the past.

Although the system was relatively unchanged, the equipment placed in the plant was modern, and new techniques were adopted where possible. The rotary kiln was heated to 300 degrees by an oil burner which replaced a coke-burning kiln. The salt, too hot to be put directly in wooden bins, passed into a cooler, constructed much the same as a drier but uninsulated. The old kiln drier from the Burmester plant was adapted to serve as a cooler after the consolidation. New sacking and packaging equipment was installed. Paper bags were introduced as a packaging material in 1948, and the following year a press was pur-

¹⁷Myron L. Sutton, interview.

chased to print the various brand and trade names on the bags. The manually operated, hydraulic block press was replaced in 1964 with an automatic, hydraulic block press.¹⁸

Again on January 25, 1949, fire destroyed the plant. The new building was similar in appearance to the previous one, with the exception of the elevator head shafts, which were placed under the roof, eliminating the cupola. The new plant capacity nearly doubled the 50,000-tons-per-season figure of the 1926 refinery. The building had 68,608 square feet of floor space. The ground floor housed the loading dock, block press, warehouse, kiln driers, and cooler. The packaging and bagging facility and the printing shop were located on the second floor. The upper floors had the crushers, screens, and bins for sizing the salt.¹⁹

In 1965, a new addition on the south side of the building for more warehouse space became necessary. A salt-washing machine was also installed to increase the purity of the salt. These improvements, coupled with three hundred acres of ponds constructed in 1969, were part of a \$12.5 million expansion program conducted at all of the Morton Salt Company plants in the United States.²⁰

Growth of the Saltair facility enabled the Morton Company to retain a dominant position in the intermountain market. Its

¹⁸Thomas B. Brighton, "Salt Making on the Great Salt Lake," Journal of Chemical Education, IX (January, 1932), 407-15. Myron L. Sutton, interview.

¹⁹Salt Lake Tribune, March 12, 1950. Myron L. Sutton, interview.

²⁰Deseret News, March 24, 1969, p. B-4. Myron L. Sutton, interview.

near monopoly faced a temporary threat from several new developments around the lake during the late 1930's and early 1940's; however, none of the new companies endured more than three or four years. It was not until the late 1940's and early 1950's that a strong, competitive challenge was offered. Lake Crystal Salt Company, Deseret Livestock Salt Company, and Stansbury Salt Company gained a foothold in the salt business and retained it. Fortunately, these new companies organized at a time when the market was expanding. In the decade following 1950, the market increased 50 per cent. It doubled again in the next ten years. Although Morton Salt Company now shared the market with three other companies, production still increased in spite of competitive pressure.²¹

During the course of the company's history, it became involved with the state and federal governments over three different legal problems. The first and longest in duration was the question of who owned the relection lands surrounding the lake. Its second problem, which developed during the early 1930's and continued into the 1950's, concerned royalty payments to the state for salt extracted from the brine of Great Salt Lake. Violation of the Sherman Anti-Trust Act constituted the third problem. Inasmuch as this litigation involved other salt companies around the lake, more details will be discussed in Chapter XIII.

Since its entrance into the state in 1918, Morton Salt Company has been successful in maintaining its position of domi-

²¹Minerals Yearbook (1950-1960).

nant salt producer in Utah, inherited from Inland Crystal Salt Company. It has met the challenge of a changing technology, endured the economic stress of a depression, and built from the ashes of two fires, new plants which enabled it to maintain a strong, competitive position in the intermountain salt market.

CHAPTER IX

SOLAR SALT COMPANY

Growth patterns of Solar Salt Company and its predecessors were typical of other locally-owned Utah salt companies, until it merged with, or sold to larger corporations. Capital was insufficient to start a major salt-making complex, capable of meeting the market demands in quantity or diversity of product. The local owners followed the philosophy of enlarging the facility as profits from the harvest became available. An immediate and obvious change was discernible when capital was invested in the complex by national corporations. Larger amounts of money made it possible for the new company to expand the production facility into a major salt works, capable of competing effectively for the intermountain market.

A unique feature in the history of the Solar Salt Company and its predecessors was the influence of the local personnel. Experience and ingenuity of the men in the field, coupled with technical assistance of an engineering firm whose owners were stockholders in the salt company, brought about a revolutionary, new harvesting machine and developed one of the finest salt works in the west.

Crystal White Salt Company

Crystal White Salt Company was organized in 1938 by Mr. Ray B. Elderkin, with the intention of producing salt for the California market. Completely naive about salt production, he was encouraged to go into the salt business by his brother-in-law, a salt salesman in a midwestern company. Elderkin organized the salt company with the help of Nephi W. Clayton, Jr. and James K. Miller. Clayton, an experienced salt man, had been involved with Inland Crystal Salt and Royal Crystal Salt Companies for years. Miller's services were obtained because of his experience as the pond man for the old Inland Crystal Salt Company.¹

After much investigation into the ethical, economical, and practical feasibility of producing salt at a new location on the lake, the new company selected a site six miles from Grantsville on the mud flats south of Stansbury Island. The west side of the lake was selected because of the purity and concentration of the lake brine, the accessibility to the railroad, and the character of the flats. Samples of brine taken from the proposed pump site, when compared with the brine at Saltair, showed one per cent denser solution near Stansbury Island. Rivers and Salt Lake City's sewer system all entered the lake on the east side, giving credence to the thought that the west side of the lake would have a denser and purer brine.²

¹A. Z. Richards, Jr., Ex-Vice-President of Operations for Solar Salt Company, interview held at Salt Lake City, Utah, September 20, 1968.

²A. Z. Richards, Jr., "Salt" (unpublished B.S. thesis, University of Utah, 1939), pp. 15-17.

Before the final pond site was determined, a road connecting Highways 40-50 and the southern tip of Stansbury Island had to be built. A good, stable road was vital to the success of the company, since a haul of six miles was required to bring salt from the ponds to the future plant.

Seven miles of road construction for a new company with limited funds was too large a project to handle alone. Tooele County agreed to align the road, clear off the brush, and prepare the subgrade on the condition that the salt company would surface the entire seven miles with a blanket coat of gravel. The agreement was satisfactory with the salt company, and the county proceeded with the work in July of 1938. An eighteen-foot roadbed was constructed over the high spots, but two and one-half miles of low mud flats were left untouched. Required to finish the job alone, the company acquired road-building equipment and proceeded with the project. Thirteen thousand cubic yards of material for the roadbed, with an additional 4,000 cubic yards of gravel for the surface coat, were used before the project was completed.³

An engineering firm made a detailed study of the general area selected for the pond site before the specific location was determined. In the feasibility study, four factors were listed as necessary for the success of a salt operation:

(1) Permanence. Due to the fluctuation in lake levels the ponds should be located on ground high enough to be protected against a future rise which is inevitable. Also the site of the ponds should be safe from the direct flow of flood streams which might develop on the mainland or on the flats during a rainstorm.

³Ibid., pp. 24-38.

(2) Ground. Both the surface and the underlying ground should be impervious to water, so that no loss will occur by seepage which prevent the formation of a hard salt bottom of the gardens.

(3) Availability of Water. The site of the ponds should be such that water can be economically conveyed to it.

(4) Proximity of Railroad. The ponds should be so located that costly transportation will be eliminated.⁴

On the basis of the above recommendations, the ponds were located on land ten feet above the lake level and three and one-half miles from the lake. Construction of the ponds began in the late summer of 1938. By the following year, thirty-five acres of ponds had been constructed: three eight-acre garden ponds and an eleven-acre concentrator. During the winter of 1938-1939, more than 260 piles were driven into the lake bottom to support the pump house and a wooden pipe that would extend one mile inland from the pump. A two and one-half mile canal was built from the end of the pipe to the ponds. The system was in full operation by June of 1939.⁵

The lake had reached saturation point during the summer of 1939, which caused problems with the pump. James Palmer, Plant Manager of Solar Salt Company, related the following human-interest experience he had as a young man, maintaining the pump while an employee of Crystal White Salt Company:

During the first summer water was pumped into the ponds the lake was at a saturated condition. The pump accumulated so much encrusted salt it was necessary to flush it out with fresh water. This task was accomplished by removing the foot valve from the pump and soaking it in fresh water. To replace the valve I tied a rope around my waist with a heavy piece of steel tied to the end. In order to reach the pump I was submerged up to my chin in the brine. After the foot valve was replaced one hundred

⁵Ibid., pp. 21-22.

gallons of fresh water was back-flushed through the pump to clean out the encrusted salt. This process was repeated every eleven hours through the summer season.⁶

The dikes built around the ponds were constructed with hand labor. One-inch by eight-inch, low-grade lumber was used to make the dike facing. The dike faces were placed about thirty inches apart and the space between was filled with mud shoveled in from the adjacent ground. The completed dikes were thirty inches wide by forty inches high.⁷

Harvesting methods employed by Crystal White Salt Company were slightly different from those employed by other producers. Instead of plowing the salt, which had been the usual practice, the salt was scarified. This method used a blade attached to the rear of a rock sled, and worked on the same principle as a carpenter's plane. The scarifier was pulled by a caterpillar tractor. After the blade loosened the salt, the men scooped it up with shovels and hauled it to a central stockpile in wheelbarrows. During the first summer, less than one thousand tons of salt were produced, most of which was marketed as road salt.⁸

Crystal White Salt Company went out of business in 1941. Two factors affected the discontinuance of the company: lack of capital and the death of Mr. Elderkin. The company had been unable to construct a refinery or organize a sales force because of the limited resources with which to operate. After Elderkin's death in 1939, his brother-in-law came from Texas and tried to

⁶James Palmer, interview.

⁷A. Z. Richards, Jr., interview.

⁸James Palmer, interview.

salvage what he could of the company. After several unsuccessful attempts to keep the company solvent, including the sale of Mrs. Elderkin's jewels, it went into receivership. The site of Crystal White Salt Company lay dormant until the incorporators of the Stansbury Salt Company reactivated it.⁹

Stansbury Salt Company

The properties of the defunct Crystal White Salt Company were sold at a sheriff's auction June 21, 1948, to Mrs. Mary Godbe Gibbs for \$2,500. Mrs. Gibbs, of Salt Lake City, purchased the abandoned ponds and all of the remaining rights, if there were any. The Stansbury Salt Company was organized by Mrs. Gibbs' husband Lorin W. Gibbs, Willard B. Richards, Jr., A. Z. Richards, Sr., A. Z. Richards, Jr., and Alton H. Sorensen. Willard B. Richards provided the capital, and the technical engineering assistance was provided by A. Z. Richards, Sr., A. Z. Richards, Jr., and Mr. Sorensen.¹⁰

A refinery was built in 1950 on the north side of the intersection of U.S. Highways 40-50 and the Stansbury Island Road. Old railroad ties and other used material went into its construction. The plant was originally designed to produce 10,000 tons per year. By operating twenty-four hours a day, the plant increased production to 40,000 tons in 1956, when it was

⁹Ibid. A. Z. Richards, Jr., interview.

¹⁰A. Z. Richards, Jr., interview. A. Z. Richards, Sr., A. Z. Richards, Jr., and Alton H. Sorensen had been involved with the Crystal White Salt Company through their engineering firm. The roads, ponds, canal, and pipeline had been designed by them.

abandoned.¹¹ The equipment initially installed, like the building, evidenced a lack of capital. The bagger consisted of a hopper that allowed salt to be poured into a five-gallon can, where it was measured by volume before being placed in paper or burlap bags. The paper bags were hand-stapled shut, and the burlap bags were closed by hand sewing, using needle and thread. The rotary kiln drier, three feet in diameter and eighteen feet long, was capable of producing only three tons per hour. It was replaced in 1956 by a new kiln capable of producing ten tons per hour.¹²

Lack of a block press severely limited growth during the first few years. The company faced a great deal of resistance from customers who wanted to buy a full line of products from one source. To compensate for this deficiency, an attempt was made to buy blocks from Morton Salt Company, even at retail prices, in order to sell a full line. The Morton Company, however, refused to sell blocks to a competitor. To alleviate the problem, a used, hand-operated press was purchased. Although it provided the company with salt blocks, it was so slow and expensive to operate that very little profit was made.¹³

Chemical Salt Production Company

Requiring more capital than was available, Stansbury Salt Company made limited progress until it was contacted in 1954 by

¹¹Minerals Yearbook (1950), p. 1066. A. Z. Richards, Jr., interview.

¹²James Palmer, interview.

¹³A. Z. Richards, Jr., interview.

representatives of chemical companies from the northwest. Hooker Electro Chemical Company and Penn Salt Chemical Company, both large users of salt in the Portland and Tacoma areas, investigated the possibility of acquiring salt from Utah. The two companies used over 600,000 tons of salt a year in making chlorine and caustic soda.¹⁴

Prior to 1954, they had been getting their salt from Leslie Salt Company, of San Francisco, and the world market. The chemical companies felt it would be advantageous for them to get another domestic source. Each time Leslie negotiated a contract, the price of salt went up. It had gotten to the point, the companies felt, where Leslie was taking advantage of them. Then, too, the world market was not completely reliable. A war, for instance, would severely interrupt delivery from foreign-producing areas. The use of foreign salt required stockpiling large amounts at the plant sites, which proved expensive. Salt from the world market was shipped as ballast, which entailed a certain vagueness of delivery. This condition limited the desirability of its use. As a result of the above-described situation, the chemical companies considered themselves in a trapped position if they continued status quo; therefore, they elected to go into the salt business for themselves.¹⁵

The Hooker and Penn Chemical Companies organized Chemical Salt Production Company and engaged Stansbury Salt Company, as

¹⁴Ibid.

¹⁵Ibid. James Palmer, interview. Salt Lake Tribune, June 6, 1956.

agent, to build a large, salt-evaporating complex adjacent to the Stansbury property. The agreement provided that Stansbury would acquire the land and design and build the facility. Stansbury operated under a management contract, and the northwest company agreed it would not sell salt on the open market in competition with the Utah corporation. If and when the larger facility could produce salt cheaper than the small operation, Stansbury would be entitled to buy salt at cost plus ten per cent. The new salt works were designed to produce 100,000 tons of salt per year for the northwest firm.¹⁶

From 1954 until 1956, both companies were operating on the lake, although no salt was produced by Chemical Salt Production Company pending completion of its facilities. In 1955, the Chemical Companies invited the stockholders of the Stansbury Company to merge. The offer was accepted in December, 1956. Stock was divided on the basis of 35 per cent for each of the Chemical Companies and 30 per cent for the Utah stockholders. The new combine was incorporated under the name "Solar Salt Company." T. E. Moffett, General Manager of Western Operations of Hooker Electro Chemical Company, became the first president. The presidency of Solar Salt Company fluctuated between Mr. Moffett and Fred Shanaman, President of Western Operations of Penn Salt Chemicals Company.¹⁷

¹⁶A. Z. Richards, Jr., interview. Salt Lake Tribune, September 30, 1954; June 12, 1955; August 24, 1955.

¹⁷A. Z. Richards, Jr., interview. Salt Lake Tribune, November 20, 1956.

Solar Salt Company

Solar Salt Company was initially incorporated with the intention of shipping salt to the chemical firm in the northwest. The new operation was completed in 1960, and favorable freight rates were negotiated with the Western Pacific Railroad. Anticipating that the northwest would absorb 100,000 tons each year, the ponds were designed to produce 160,000 to 200,000 tons of salt annually.¹⁸ However, no more than 50,000 tons of salt per year were shipped to the Chemical Plants. After incorporation of the Solar Company, circumstances changed within the chemical salt market that had a direct effect on the Utah producers.

In 1958 or 1959, Mr. D. K. Ludwig, owner of National Bulk Carriers, entered into a contract with the northwest companies to furnish salt at a slightly lower price if they would buy in large quantities. Ludwig was able to ship salt from his salt operation in Baja, California, via his large, ocean-going vessels, and could sell it cheaper than either Leslie Salt Company or the Utah producers. Consequently, National Bulk Carriers was provided the chemical salt contract for the northwest. In order to prevent the economic reversal that accompanies over-production, the northwest owners of Solar Salt Company continued to purchase 50,000 tons of salt annually, which was the minimum amount necessary to maintain the preferential freight rates. By 1965, the intermountain market expanded to the point Solar's increased capacity was essentially absorbed, making continued shipments to the northwest

¹⁸Salt Lake Tribune, November 17, 1959.

unnecessary.¹⁹

Enlarged capital resources, made available through the 1956 merger, enabled the local employees to express their initiative in the development of novel ideas for salt production. The old ponds built by Crystal White Salt Company were abandoned in favor of the new pond complex constructed for the Chemical Salt Production Company. The new ponds were designed to fit into a radical new production system. The pond arrangement, dike construction, harvesting equipment, and central stockpile comprised an integrated operation to minimize handling of salt, thus lessening production costs.

The method of constructing dikes out of a mud-filled lumber framework was abandoned in favor of embankments which could serve as roadways. These new dikes were built with the use of a dragline to heap clay material in the center to form a non-porous core, which was covered by crushed rock. The sides were covered with rip rap to prevent erosion. Wood was used in the bridges, culverts, and water gates. Cement was used in some headgates and weirs; however, the use of cement was restricted due to the deteriorating effect salt had upon it.²⁰

One of the newest and most radical developments in the salt industry was a salt-harvesting machine developed by Solar Salt Company. James Palmer, primarily responsible for the design

¹⁹A. Z. Richards, Jr., interview. James Palmer, interview. Deseret News, July 23, 1965, p. B-6. Minerals Yearbook (1960-1966).

²⁰A. Z. Richards, Jr., interview. James Palmer, interview.

of the revolutionary machine, had started out in the salt business as an employee of Crystal White Salt Company. After being hired by the Stansbury Salt Company, he tried new methods in an effort to make the harvest more efficient. Lack of capital meant cannibalizing parts from old machinery in fabricating the experimental implements. With the mechanical assistance of Joe Peterson, a fellow employee, a machine was developed that loosened the salt, excavated it, and conveyed it directly into trucks driven alongside. Mr. A. Z. Richards, Jr., one of the owners of Stansbury Salt Company and co-owner of Caldwell, Richards & Sorensen, Inc., helped redesign and improve the machine.

In the latter part of 1957, Mr. M. A. Montgomery, who managed the machinery division of the engineering firm, designed and built the first Palmer-Richards Salt Harvesting Combine. This machine was designated Model "A". Its design was based on the existing machine developed by Mr. Palmer and Mr. Richards. The Palmer-Richards machine has proven its efficiency and is being marketed internationally.

Following the building of the Model "A" combine, additional machines were designed with varying capacities. Since the various pond systems on which the combine was to be used had different soil-bearing characteristics, it was necessary to furnish several types of supporting wheel or track assemblies. Later models were designed with different driving arrangements and hoppers for controlling the salt being discharged into the

trucks.²¹

The new salt harvester enabled Solar Salt Company to transport salt directly to the mill in trucks. A central stockpile was formed by using a new stockpiling machine purchased in 1958. The stockpiler employed a 40-horsepower Stephens-Adamson "ship trimmer" to throw the salt at a rate of 300 tons an hour. The pile thus created was forty feet high and one hundred feet wide at the base.²²

To increase the marketability of the salt, a washer was added. The basic idea for this device was provided by the local employees of the firm. A detailed design was drawn by Caldwell, Richards & Sorensen, Inc. The washer utilized an endless belt of wire woven around hickory "straws." The straws were used to de-water the salt as it moved in a continuous operation under high-pressure brine sprays.²³

The promising local market and the production capacity of the ponds made it feasible to expand the refinery. The new \$320,000 plant, completed in 1965, more than tripled the capacity of the company. Included in the refining process was a powerful, \$90,000 block press, together with a new air-flow bag packer with five times the capacity of the former belt-fed machine. The

²¹Ibid. Caldwell, Richards & Sorensen, Inc., "Palmer-Richards Salt Harvesting Combine," advertising brochure (Salt Lake City: Caldwell, Richards & Sorensen, Inc., 1968), pp. 1-2.

²²Salt Lake Tribune, December 14, 1958.

²³Ibid.

refinery also installed a gas-fired, rotary drier and two milling machines that reduced the salt to desired granulations.²⁴

In 1967, Mr. Ludwig, of National Bulk Carriers, approached Solar Salt Company with an offer to buy the entire complex. Ludwig was being criticized by the west coast salt producers for selling large quantities of salt from a foreign source. Because of these accusations, Ludwig found it desirable to have his own salt operation on United States soil. He insisted on purchasing the entire operation and made such an attractive offer, the Chemical Companies, who owned over two-thirds of the stock, accepted. The Utah stockholders did not want to sell their shares in the company they had helped to build, but they reluctantly went along with the majority.²⁵

The salt complex on the southern end of Stansbury Island has progressed from the under-capitalized Crystal White Salt Company to the second largest salt producer in Utah. The Solar Salt Company, through the initiative of its local employees, developed one of the most effective salt harvesters in the industry. Like other salt complexes on the lake, the Stansbury operation started out as a locally-owned company and became affiliated with large, national firms. It is presently owned by an international salt production corporation.

²⁴A. Z. Richards, interview. James Palmer, interview. Salt Lake Tribune, July 23, 1965.

²⁵A. Z. Richards, Jr., interview.

CHAPTER X

HARDY SALT COMPANY

Salt has been produced from the waters of Great Salt Lake near Lake Point, Utah, since the pioneer period. Salt boilers were set up as a small home industry to supplement the meager income derived from nearby farms or ranches. Subsequently, half a dozen companies have used the location in an attempt to make a profitable enterprise out of salt extraction.

Historical Overview

Salt production using the solar-evaporation process at the Lake Point site was first introduced by Weir Salt Company in 1901. Nearly fifty years of dormancy followed Weir's abortive attempt to enter the industry before Deseret Livestock Company reactivated the site in the spring of 1949.¹ The livestock company was prepared to invest nearly two million dollars in building a first-rate salt complex. Its intention to make such a sizable investment differed from the practice of many salt companies who started out small, and gradually built up their operations. However, due to a controversy with the State of Utah over royalty laws, less than half that amount was actually spent.²

¹LeRoy Imlay, interview.

²Ibid. Utah Economic and Business Review, March, 1952, p. 5. Salt Lake Tribune, November 16, 1952.

In late 1952 or early 1953, ownership of Deseret Livestock Company, including the salt works, was sold to David Freed and David Robinson. Knowing little about salt production, they offered that part of their holdings for sale. Council McDaniel, a former executive in a west coast salt firm, purchased the company in 1955 for the sum of \$300,000. The salt works, while owned by the Deseret Livestock Company, was known as Deseret Livestock Salt Company. McDaniel deleted the word "Livestock" from the title and incorporated under the name "Deseret Salt Company." McDaniel operated the salt works until the latter part of 1958, when he sold to Leslie Salt Company.³

In 1961, Leslie Salt Company, largest salt producer on the west coast, was charged by the Federal Trade Commission with creating a monopoly. The complaint alleged that Leslie's acquisition of Deseret Salt Company tended to create a monopoly in the production and sale of salt in the west. The proceeding was settled through a divestiture order requiring Leslie to sell its Utah holdings. On November 2, 1965, Hardy Salt Company, of St. Louis, Missouri, purchased Leslie's Lake Point plant.⁴

Pond System

The pond system, constructed by Deseret Livestock Salt Company, cost about \$800,000. A series of fifteen ponds was laid out on high ground, south of the mill. Later, ten more ponds

³LeRoy Imlay, interview. Salt Lake Tribune, December 6, 1958.

⁴Salt Lake Tribune, January 13, 1961; November 3, 1965.

were constructed on the relection lands between the mill and the Western Pacific Railroad. Subsequent owners have added ponds in both locations, increasing the pond area to nearly five hundred acres.⁵

The original canal, dug by the Weir Company, was deepened. It brought the lake water three-fourths of a mile to the first pump station located on the north side of the Western Pacific railroad tracks. At this point, the canal was twenty feet deep. The pump raised the water six feet and dumped it into a second canal that allowed the water to flow by gravity to the second pump. At this station, water was elevated thirty feet to a canal that fed the upper ponds. All the water from the upper ponds flowed by gravity through the lower ponds, and back to the lake.⁶

Porous soil underlying the floor of the ponds has presented problems to the salt producers at the Lake Point site since 1901. Weir Salt Company encountered this condition, and the resulting seepage of brine from the ponds was a contributing factor in the demise of that company. The upper and lower ponds had unique features in the underlying strata that had to be treated separately.⁷

The upper ponds are underlaid by a soft, porous clay mud. A person could take a small rod and stick down into the mud a

⁵LeRoy Imlay, interview. Thayne Imlay, interview.

⁶Thayne Imlay, interview.

⁷Roy Imlay, interview.

distance of five feet with very little effort. A salt floor eighteen inches thick was required to support the heavy, harvesting machinery. The porous salt allowed brine to seep out through the dikes before a floor could build up. To counteract this problem, trenches were dug three or four feet in depth to an impervious clay under-strata. By creating a bond between the dike material and the clay, a seal was achieved that prevented seepage.⁸

The leakage problem in the lower ponds was more severe. They were underlaid by three feet of sand and a four-foot layer of sodium sulphate (Glauber's salt). Seal trenches two feet in width were dug through the sand and Glauber's salt to the clay below. Impervious clay, excavated from another location, was dumped into the trenches, forming a waterproof barrier. The sand was then pushed back on either side of the clay to form the sides of the pond.⁹

After the seepage problem was corrected, the lower ponds proved to be a better site. The combination of sand over the solid layer of Glauber's salt made a firm bed upon which to build a salt floor. A floor six to eight inches deep was all that was required.¹⁰

A second problem, more annoying than critical, was the small, fresh-water springs seeping into the ponds. The water

⁸Thayne Imlay, interview.

⁹Ibid.

¹⁰Ibid. Ray W. Garrard, ex-employee of Deseret Salt Company, interview held at Provo, Utah, July 8, 1970.

dissolved the salt floor in the vicinity of the spring, creating a hazard for the harvesting equipment. As a solution, the harvesting equipment skirted the area, allowing a deeper floor to build up, or a hole, five to ten feet in diameter, was dug around the seep and filled with cement. The latter procedure did not seal off the seep, but dispersed it enough that the dilution of the brine was held to a minimum, allowing the natural deposition of salt to seal it off."¹¹

Harvesting and Refining Procedures

As with other salt makers, men at Lake Point experimented with different methods of production. Initially, Deseret Livestock Salt Company followed the traditional method of plowing up the salt. A two-bottom, moleboard plow was first used, but it was later replaced by a disc plow. When the plow did not prove completely satisfactory, a "ripper" was used. This implement consisted of a foot-shaped piece of metal, the sole of which cut down to the split and broke up the salt. The ripper was pulled back and forth across the pond, loosening the salt at two-foot intervals. The ripper proved to be too slow and was replaced by a new disc plow, larger and heavier than the earlier one. The discs, which were about two feet in diameter, worked off the hydraulic system of a Case tractor. Pressure placed on the plow by the hydraulic system cut down to the split very effectively.¹²

One of the first salt-harvesting machines used at Lake Point was designed by the salt company and built by the Rocky

¹¹Ibid. ¹²Ibid.

Mountain Machinery Company. It was a self-propelled combine consisting of a blade about six feet long that dug through the previously loosened salt. As the salt passed over the blade, rotating metal paddles pushed the salt back onto a fifteen to twenty-foot long conveyor belt that elevated the salt and dropped it into trucks which were driven behind the combine.¹³

The machine described above was replaced by a Carryall that carried out the complete harvest operation. Manipulated by one man, the Carryall was a Johnson 619 self-loading elevator scraper that cut a swath ten feet wide and loaded fifteen tons of salt a minute.¹⁴

Deseret Livestock Salt Company began using a central stockpile, and each of its successors has followed suit. The salt was placed in piles forty-five feet high by a radial stacker, which placed sixty to seventy-thousand tons of salt in a hollow, open-end stack. A salt thrower attached to the stacker threw additional salt into another pile against the outside of the first. From the stack it was taken into the refinery for further processing.¹⁵

After the salt was harvested, but before it was stacked, it went through a concentrated brine spray to wash off the dirt and foreign salt adhering to the surface of the crystals. The undesirable solution was skimmed off into a waste ditch and returned to the lake.¹⁶

¹³Ibid. ¹⁴Ibid.

¹⁵Thayne Imlay, interview. Ray W. Garrard, interview.

¹⁶Ibid.

After the salt was brought from the stack to the plant, it was cooled, screened, and stored in bins according to granule size. A bagger was constructed on tracks below the bins, which allowed it to be moved from one bin to another. An automatic, electric scale measured the amount of salt that dropped into each bag.¹⁷

Improvements Made by Each Company

Hundreds of thousands of dollars have been invested in the refinery facility at the Lake Point salt works. Deseret Livestock Company invested \$160,000 in the building and equipment used to refine salt. The first salt washer used in Utah was installed by this company. Its plant was a three-story structure, constructed over railroad ties. Some of the storage bins and other materials used in this building were salvaged from the defunct Solar Salt Company in Clearfield, Utah.¹⁸

Neither growth nor improvements were noted during the interim the company was owned by Freed and Robinson. Council McDaniel purchased the company in 1955 and built a small, cinder-block warehouse, a storage shed for equipment, and a maintenance shed. Unable to install a block press with his limited capital, his company was unable to reach its full potential before it was sold to Leslie Salt Company.¹⁹

¹⁷Ray W. Garrard, interview.

¹⁸Deseret News and Telegram, April 28, 1953. LeRoy Imlay, interview. Thayne Imlay, interview. Ray W. Garrard, interview.

¹⁹Thayne Imlay, interview.

After purchasing the company, Leslie invested \$200,000 in a block press, a building to house it in, and a new warehouse. The press was shipped in from Leslie's Newark, California, plant and was converted to automation. It became the first automatic block press in Utah. The warehouse was constructed from cement blocks, with overhead arch suspension to support the roof. Thus constructed, the warehouse covered fourteen thousand square feet of uninterrupted floor space.²⁰

Hardy Salt Company invested \$200,000 in a major expansion project after it purchased the plant in 1965. Part of the investment went into several hundred acres of new evaporation ponds. Other improvements included a new salt washer, drier, coolers, and a minerals-mixing system to provide for the various types of salt blocks the market required.²¹

Factors Affecting Growth of the Complex

Growth of the salt complex at Lake Point was limited by four factors: physical limitations inherent in the site, problems due to frequent changes in ownership, lack of capital, and legal problems. The additional expense incurred in correcting the leakage problems in the pond was not a continual drain on the company's resources. Once the dikes were built, the cost of maintenance was no greater than that of competing companies; however, the large, initial expense of construction discouraged an increase in the capacity.

²⁰Salt Lake Tribune, December 24, 1959.

²¹Ibid., June 11, 1966.

Frequent changes in ownership were much more significant in depressing the growth of the operation. Each time the company was sold, old customers were absorbed by competitors. Lack of capital was a severe problem with owners prior to Leslie Salt Company, because they were unable to produce a full line, especially salt blocks. Customers who required diversified grades filled their orders at other plants.²²

Litigation has caused a great deal of concern to the owners of the Lake Point facility. As early as 1940, officials of Deseret Livestock Company began negotiations with the State Land Board over royalty payments on the minerals in the waters of Great Salt Lake. They maintained such minerals were "free goods" and could not be taxed by the state. A Utah State Supreme Court ruling, however, held that state ownership of the lake bed carried with it ownership of the minerals in solution.²³ This opinion established the precedent upon which the Land Board based its lease policy. Royalty payments, initially set at thirty-five cents a ton, were considered restrictive to the salt industry. Deseret Livestock Company was unwilling to pay the high royalty, and suit was brought against it.

As a result of the state's action, "uncertainty" was given by the Deseret Company as a reason for its decision in the early part of 1952, to discontinue plans for a proposed one million dollar processing plant, and to limit present plant activity

²²Thayne Imlay, interview.

²³Deseret Livestock Company v. State of Utah, et al, 171 P.2d 401 (1946).

to processing coarse salt only.²⁴ Reduction of the royalty to ten cents a ton in November of 1954 had no apparent influence on Freed and Robinson to invest more in the company; however, it could have encouraged Council McDaniel in his plans for the purchase of the plant.²⁵

In 1955, a federal grand jury indicted Morton Salt Company, Royal Crystal Salt Company, Deseret Livestock Company, and Deseret Salt Company as conspirators in violating the Sherman Anti-Trust Act. Named as co-conspirators, but not defendants, were Council M. McDaniel and Stansbury Salt Company. The indictment charged that since 1953, the defendants had engaged in an unlawful combination and conspiracy to stabilize and control the price and terms of sale, and to eliminate distributors who sold at less than agreed prices. The defendants were found guilty of the charges. Deseret Salt Company was fined \$3,000. Other than the fine, any repressive effect this suit may have had on the growth of the company was minimal, if it had any at all.²⁶

Three years after Leslie Salt Company moved into the intermountain area, the Federal Trade Commission issued a complaint against it, alleging that the acquisition of Deseret Salt Company had tended to create a monopoly in the production and sale of salt in the west. Company officials countered with the

²⁴Salt Lake Tribune, March 11, 1952; November 16, 1952. Deseret News, March 11, 1952.

²⁵Salt Lake Tribune, September 19, 1954.

²⁶United States v. Morton Salt Company, et al, CR-38 (1955). Information obtained from U.S. District Court, Clerk's Office, Post Office and Court Building, Salt Lake City, Utah.

defense that acquiring the Lake Point properties was undertaken for the purpose of permitting the company to enter into competition in the Rocky Mountain area. They contended that it had fostered, and in no way lessened, competition or promoted monopoly.²⁷ Leslie Salt Company lost the case and was required to sell the Utah salt complex. A valuation of \$600,000 was set for the company by the Federal Trade Commission, and Leslie was given five years to find a new purchaser. One of the provisions of the ruling stipulated that if Leslie failed to find a buyer within six months, the price must be reduced to \$450,000, excluding sales commission.²⁸

The FTC ruling, however, did not prohibit Leslie from marketing salt in the intermountain area. Leslie announced in 1962 that the firm would build a one million dollar, solar evaporation plant on the shores of Great Salt Lake in the event present facilities were sold. Although the plant was never built, the proposal was made with the intention of having the new buyer supply Leslie with salt at cost for two years following purchase. This proposal would enable Leslie to continue to market its product in the area with very little disadvantage.²⁹ In November of 1965, Hardy Salt Company bought the plant and agreed to supply Leslie with salt products to sell in the area.³⁰

²⁷Salt Lake Tribune, January 13, 1961.

²⁸Ibid., January 18, 1962.

²⁹Ibid., January 19, 1962.

³⁰Ibid., November 3, 1965.

Contacts made with company officials indicate Hardy agreed to supply Leslie with salt for a five-year period, rather than two years as reported in the newspapers.³¹

Conclusion

Hardy Salt Company and its predecessors have established a firm position in Utah's salt market that should remain secure in the future. Its growth will depend on factors shared by other Utah producers, such as increasing dilution of the lake, adverse weather conditions, freight rates, and development of marketable salt from the newly-established mineral industries on the lake.

³¹Thayne Inlay, interview.

CHAPTER XI

SALT COMPANIES ON THE EAST AND NORTH SHORES OF GREAT SALT LAKE

Three sites around the east and north portion of the lake have been used for salt production: Spring Bay, on the extreme north end of the lake, Promontory Point, and the mud flats west of Syracuse, Utah. Irregardless of the long-term objectives of the companies using these sites, their reticence to make substantial investments in the initial stages of their operations committed them to supplying the peripheral needs of the salt market, rather than supplying a complete line of products in competition with the larger companies on the south shore. Problems associated with the rising or receding lake level, which directly or indirectly led to the abandonment of several salt works, could have been overcome if the men developing the pond systems had invested enough money in the necessary equipment and materials to construct adequate dikes and canal systems.

Salt Companies on the Eastern Shore of the Lake

From the turn of the century until 1939, there was no significant activity on the eastern shore of the lake. Inland Crystal Salt Company and its successors, Morton Salt Company and Royal Crystal Salt Company, were firmly-established producers,

providing the market with the diversified products it required, and jealously guarding their position in the industry. Much of the shore land around the lake adaptable for use by salt companies had been purchased by the Inland Company or the Morton Company, making it very difficult for competitors to locate on the lake.¹ From 1910 until 1930, the lake was high, leaving no relection land below the occupied uplands available for use.²

Ritz Salt Company

By 1939, the lake had become stabilized at the bottom of a fifteen-year declining cycle, exposing large areas of relection land. Available shore land encouraged C. J. Call to organize the Ritz Salt Company. Promise of a ready market supplying salt to O. P. Skaggs Company prompted Call to petition Davis County for access across Morton Salt Company land to the lake. With a provision that Call build a road to the lake, the county condemned a right-of-way.³ After the access road was completed, about fifty-five acres of ponds were constructed and filled with lake brine. A thin floor was deposited, and 5,000 to 6,000 tons of salt were harvested that fall. Plans were made for the construction of a salt refinery, but they were never brought to fruition.⁴

¹Appendix IV.

²Appendix II.

³Clifford Westenskow, "The Economic Development of Davis County, Utah" (unpublished M.S. thesis, Brigham Young University, 1946), p. 168. Roy Imlay, interview.

⁴Roy Imlay, interview.

Morton Salt Company, believing in the riparian right of the upland owners, threatened to bring suit against the Ritz Salt Company for trespass. Call was financially unable to pursue the case, or he felt his position insecure. Either way, he sold his holdings to Morton Salt Company in 1941.⁵

Unwilling to give up his interest in the salt business, Call moved to the eastern tip of Promontory Point and built a few ponds between the lake's edge and the tracks of the Southern Pacific Railroad.⁶ There is no record available on how much salt was produced from this site, or how long he was able to operate. It can be concluded, however, that since the lake started into its rising cycle in 1945, his ponds would have been washed out by 1950.

Call's attempt to get into the salt market in either location would have been unsuccessful without a large expenditure. Had he won the case with Morton Salt Company over the property at the Syracuse location, the rising lake level ultimately would have washed his ponds away. The only course Call could have followed successfully at the locations he selected was to construct retaining dikes of sufficient height and strength to hold out the rising lake water, and this would have entailed considerable expense.

⁵Westenskow, "The Economic Development of Davis County," p. 168.

⁶Thayne Imlay, interview.

Solar Salt Company

A. T. Smith, owner of Smith Canning Company in Clearfield, Utah, became interested in producing salt for his cannery and for sale on the regular market. He employed LeRoy Imlay, a past employee of Morton Salt Company, to supervise construction of the ponds and mill. With an investment of about \$20,000, fifty acres of ponds were built and a small mill was constructed.⁷

The ponds were located a mile below the meander line, straight west of Syracuse. A canal was dug from the lake, and a gasoline-powered pump elevated the water from it into the ponds. dikes were constructed with wooden shoring filled with clay.⁸

Three thousand tons of salt were harvested during 1940. That year the salt floor in the ponds was so shallow that planks were required to support the harvesting equipment. After the salt was excavated, it was hauled in trailers to the side of the ponds and stacked. Trucks transported the salt to the mill located in Clearfield.⁹

The mill, small in comparison with others in the state, contained a rotary kiln, screens, and a roller for crushing the salt into smaller grades. The kiln drier had been purchased from a brewery in Ogden, where it had been used to dry out the mash used in making beer. At the time the kiln was purchased, it contained four-inch, stainless-steel pipe, which was removed and sold for enough to pay for the kiln and for transporting it to Clearfield.¹⁰

⁷Roy Imlay, Interview. ⁸Ibid. ⁹Ibid. ¹⁰Ibid.

During its operation, the company built up a small market among canneries, stock raisers, and uranium mines; however, its success was hampered by the lack of an adequate labor force. Men in the Clearfield area, not involved in World War II, were employed in the canneries or on farms and were not available to work on the salt harvest until after the perishable crops were harvested and canned. The salt beds often were frozen in before all the salt could be harvested, resulting in a loss of hundreds of tons of salt. The labor shortage was a problem dealt with patiently by the company. The coup de grace, which caused the demise of the company, came in 1945. Rising waters washed away the dikes and 20,000 tons of salt were dissolved. The Syracuse site subsequently has remained inactive as a salt-producing area.¹¹ In 1949, the small mill was dismantled and used in constructing the Deseret Livestock Company salt plant at Lake Point, Utah.¹²

Salt Companies on the Northern Shore
of Great Salt Lake

In addition to the common problems encountered by salt makers in other locations around the lake, the north shore has never been considered a prime area for a salt operation due to its remote location. However, the north end of the lake offered some promise shortly after the transcontinental railroad came through Utah in 1869. At that time, Corinne looked like it might develop into an important railroad junction and city of commerce.

¹¹Ibid. ¹²Ibid.

Housel and Hopkins Salt Company, encouraged by Corinne's future, constructed its ponds east of Locomotive Springs on the shore of Spring Bay. A newspaper report indicated it was operating during 1871, although no further disclosure was found to determine the duration of the company.¹³ Some of the relics in the area shed light on the method this company, or possibly other later companies, used to pump lake water into their ponds. A cement dam was poured at Locomotive Springs to raise the water level high enough for it to flow into a ditch, which carried it about four miles to the vicinity of the salt ponds, where it paralleled a canal bringing brine from the lake. A water wheel, powered by the pressure of the fresh-water flow, turned a water wheel that raised the brine from the intake canal and poured it into the ponds.¹⁴ With the exception of Housel and Hopkins, no information has been found of any other salt works using this site until the late 1930's.

Quaker Crystal Salt Company

Organization of the Quaker Crystal Salt Company in 1939 came about as a result of a severe earthquake at the base of Monument Point on the northern shore of the lake. Three warm springs of undetermined depth began to flow. These contained from 11 to 15 per cent salt. Analysis of the spring water revealed grades of salt suitable for cheese-making and other

¹³Salt Lake Herald, February 1, 1871.

¹⁴Jim Wood, owner of Quaker Crystal Salt Company, interview held at Garland, Utah, December 31, 1969.

uses for which salt was being imported into Utah. The combination of a pure source of salt from the springs, and the lake close at hand for conventional salt production, provided the stimulus necessary to organize the company.¹⁵

The company was not consistent in the use of brine from the springs. At times, spring water was used exclusively in making salt. During those times, it was placed in a holding pond until it reached 18 per cent concentration. It was then transferred to a concentrator pond until it reached 26 to 27 per cent salt. After the water was transferred to the garden ponds, it remained there until it evaporated dry. The salt makers felt the spring water contained a pure salt solution without contaminating minerals; therefore, the bittern was not drained off. When lake water was used, conventional methods of salt-making were employed.¹⁶

The ponds initially constructed by the company were located adjacent to the water's edge, which allowed the brine to be pumped directly into them from the lake. Subsequently, and as a result of the receding lake level, it was necessary to construct a canal two miles long. The company did not use a conventional pump, but employed a paddle wheel powered by a gasoline engine to elevate the water from the lake into the canal.¹⁷

Different types of salt harvesters were used by Quaker

¹⁵The Salt Lake Tribune, January 28, 1940.

¹⁶Jim Wood, interview.

¹⁷Ibid.

Crystal Salt Company. The first employed an eighteen-inch-wide cutting bar that loosened the salt down to the split. Salt was drawn into a boot attached to the cutting bar and elevated on a belt to a truck driven behind. During the last harvest from this location, the salt was cut, pushed into four-foot-high ricks or ridges to dry, and placed in trucks with a front-end loader.¹⁸

The mill, built in 1939 or 1940, consisted of an open shed eighty feet wide and one hundred and sixty feet long. An old CCC barracks was converted into storage bins. Refining equipment comprised an oil-burning, rotary-kiln drier, and screens to segregate the salt into four different grades. One of the problems encountered in the refining process was the shortage of bags. Consequently, the company used whatever it could get: paper, cotton, burlap, or army surplus sand bags. Lack of equipment required all of the bags to be filled and sewn by hand. In spite of the drawbacks of the small refinery, it had a capacity of two and one-half tons per hour.¹⁹

Production under those conditions did not pose a significant competitive threat to the other companies, but the owners were able to market all of the salt harvested each season.²⁰

Inconveniences encountered in the refining system were troublesome to the company, but the most expensive problems resulted from lake fluctuations and petty vandalism. Some of the ponds constructed early in the company's history were built on

¹⁸Ibid. ¹⁹Ibid. ²⁰Ibid.

the lower land near the lake. In 1947 or 1948, after the ponds had been filled with water in the usual manner, a strong, south wind blew the lake water over the dikes, filling the ponds to overflowing. A few hours later, the wind changed direction, allowing the lake to recede. Pressure from the water in the ponds burst the dikes and large sections were washed away. More ponds were built but they, too, were washed away in 1952. The third set of ponds, built higher on the shore, were safe, since the lake went into a declining cycle after 1952.²¹

Most of the work accomplished at the salt works was done during the owner's spare time. This situation left the equipment unattended for long periods. Jim Wood described the conditions, as follows:

We bought a tractor with a back hoe and took it out there. When we returned a couple of weeks later someone had stolen a pump off the tractor. We had to go back to town to buy another one, in the mean time some thing else was stolen. This type of thing was going on all the time.²²

The climax to the trouble-filled existence of the company came on Labor Day, 1965, as a result of a fire that destroyed the mill. Vandalism, the reputed cause of the fire, and expense resulting from fluctuations of the lake had depleted the company's resources to the point that continued operation could not be justified on the basis of anticipated profits.²³

Lake Crystal Salt Company

During the late 1930's and early 1940's, Great Salt Lake had become stabilized at a historically low level. Concentration

²¹Ibid. ²²Ibid. ²³Ibid.

of the brine had reached saturation point, and salt was deposited on the bottom of the lake. Salt thus deposited was being recovered and marketed by Joe Sharp. The site used by Sharp for his small enterprise was acquired in 1946 by investors who intended to make salt production a serious business.²⁴ Lake Crystal Salt Company was incorporated in 1947 by Howard F. Pence, Bulo B. Suttlemyre, and Harold D. Pence. The production and refining operations were located at Promontory Point; the sales and storage facilities were in Ogden.²⁵

The inexperienced owners found themselves involved in a major setback before they were able to construct a suitable salt works. Coincident with the building of the ponds on the shore, the lake entered a rising cycle and washed out the dikes. The ponds were successfully relocated on higher ground. After the company became larger and could afford adequate machinery, it rebuilt the ponds on the lower shore.²⁶

Lake Crystal Salt Company had an advantage not shared by competing salt companies on the lake. Due to the concentrated condition of the north arm of the lake, the total pond acreage of 300 acres was devoted to garden ponds. This provided a significant savings in initial pond-construction expense, compared with other companies who have more than half their acreage

²⁴Delbert Pence, owner of Lake Crystal Salt Company, interview held at Ogden, Utah, June 16, 1970.

²⁵Lake Crystal Salt Company, incorporation papers (Salt Lake City: Office of the Secretary of the State of Utah).

²⁶Delbert Pence, interview.

devoted to concentrator ponds.²⁷

The harvesting procedures of Lake Crystal have gone through several changes as more experience and capital have been obtained. Initially, the salt was harvested with an apparatus similar in appearance to a rock sled with a blade attached to the front. The blade, in a horizontal position, cut down to the split and loosened the salt. A road patrol with rippers is now used to break up the salt. After the salt is loosened, front-end loaders scoop it up and dump it into trucks, which haul it to the side of the ponds where it is stockpiled. To supply the needs of the mill, a secondary stockpile is maintained at the mill site.²⁸

Construction of the mill began in 1947. Refining equipment consisted of a kiln drier, screens, and rollers which provide a variety of grades for the market. Since a block press had not been installed, all of the salt blocks must be purchased from one of the other producers in the state. Recent sales have increased to the point a new kiln drier with a twenty-five-ton capacity was installed. The new warehouse and sales office were built in Ogden during 1970.²⁹

The market area covers seven western states, primarily those in the northwest, but expansion into the eleven western states by 1971 is anticipated.³⁰

Lake Crystal Salt Company's prospects for the future are as good as the market. Being a smaller company, its ability to

²⁷Ibid. ²⁸Ibid. ²⁹Ibid. ³⁰Ibid.

absorb financial setbacks is not as great as the larger companies to the south, nor does it have the support of parent companies to assume part of the stress during troubled times. As a small, home-owned company, it entered the salt industry at a time when others were failing; however, from all indications, it has firmly established itself in Utah's salt industry.

Summary

The north and east shores of Great Salt Lake have not become a major salt-producing area due to several geographical and economic conditions. Ownership of strategically-located upland property by Morton Salt Company has discouraged competitors from moving into potential salt-producing sites. Although Morton Salt Company did not acquire comprehensive coverage of the lake shore, its properties were located where access to the lake was possible, market areas were close by, and suitable land for development into a salt works was available. In recent years, however, much of the land on the eastern shore of the lake has lost much of its value as possible salt-producing sites. The receding lake has placed the water's edge too far from shore to make a salt works practical, and inflowing streams have nearly freshened the water south of the Antelope Island causeway.

Distance from the salt works to the local market becomes a factor in computing the success of any potential site. Inasmuch as salt has such a low intrinsic value, freight rates often place isolated companies at a competitive disadvantage. This is especially true of the area around the north arm of Great Salt

Lake. Other drawbacks are lack of power source, unimproved roads, distance from a railroad facility, and high wages.

Lack of capital and an insufficient labor force have been significant factors in retarding the growth of the salt industry in the area. Problems which accrued through lack of capital were twofold: one, inability to construct a pond system capable of withstanding the natural hazards of a vacillating lake; two, the companies did not build production systems of sufficient size to compete in the market with a full line of products, thus placing themselves in the position of supplying the peripheral needs of the market.

The final factor, in many ways interrelated to those described above, was the fluctuation of Great Salt Lake. The rise and fall of the lake not only placed the pond system in danger of being washed out, but the length of the intake canal and location of the pumps were subject to change with each vacillation of the lake. The problem was compounded by three types of lake fluctuations: periodic, nonperiodic, and temporary wind-caused changes. The annual rise-and-fall cycles are termed periodic fluctuations.³¹ The upsurge in the cycle comes as a result of the large spring inflow from rivers and streams. The decline in late summer and fall is the result of evaporation and the decrease in fresh-water inflow. Nonperiodic cycles, due to climatic and other factors, influence the lake over extended periods. During the last one hundred and twenty years, the ele-

³¹Gilbert, Lake Bonneville, pp. 238-39, 243-44.

vation of the lake has varied as much as twenty feet. Although this variation marks the extreme, ten-foot fluctuations during a twenty-year cycle are not uncommon.³² The non-periodic fluctuations would not be critical to the salt producers if the basin of the lake were not so shallow. The average slope of the lake shore is one foot per thousand, and a ten-foot rise or drop in the lake could expose or inundate several miles of shore land.³³

Temporary vacillations of the lake due to wind storms have had a positive and a negative effect upon the industry through its history. Some salt makers have reported a rise of as much as three feet within a period of a few hours during a strong wind.

A hostile environment and a demanding market have eliminated dozens of producers from the north and east shore of the lake during the last hundred years. Lake Crystal Salt Company stands as the lone survivor, unique in its continuance as well as its ownership. Of the four companies on the lake, it is the only one that has not been engulfed by large, national salt concerns.

³²Appendix II.

³³State of Utah v. United States of America (before the Special Master of the U.S. Supreme Court, October Term, 1969, No. 31), p. 23. Brief of the United States with respect to the Navigability of the Great Salt Lake. Copy obtained from the Clerk of the U.S. Supreme Court.

CHAPTER XII

SALT PRODUCTION FROM SOURCES OTHER THAN GREAT SALT LAKE

Sources of salt production other than Great Salt Lake have been rock-salt formations in central Utah and deposits on the Bonneville Salt Flats east of Wendover. The mines, primarily owned by local investors, have developed over a period roughly parallel to the lake-shore companies. Production of rock salt, however, has not reached the proportions of the solar-salt industry. Impurity of product and distance from the market account for the disparity in the success of the two industries.

Salt has been produced on a limited scale from surface deposits near Wendover since 1913.¹ Salt from this location has usually been a byproduct from potash recovery projects. In 1958, Utah Salt Company purchased salt from Bonneville Limited and sold it for road and livestock use. Production from this operation has been high enough to have ranked it as the second largest producer in the state.² Methods used to recover salt from the desert are similar to those used by the lake producers.

¹Mineral Resources (1913), p. 304.

²Mineral Yearbook (1959), III, 997.

Rock Salt Production--Nephi, Utah

The journal of the Escalante-Dominguiz expedition into Utah in 1776 mentions the salt deposits in the mountains east of Nephi, including a comment that the Indians mined their salt from that location.³ It was not until the Mormon pioneers moved to the area that the deposit was exploited.

Timothy B. Foote was one of the first white men to mine the salt deposits. In 1854, he built a toll road to his salt works and charged twenty-five cents for every wagonload of lumber or wood hauled over it.⁴ Four years later, David Salisbury, Richard Jenkins, and Thomas Booth began mining salt from a cave they located about seven miles north and east of Nephi. The trio was able to crush, boil, and dry about five hundred pounds each day, selling it for six cents a pound. Because of Indian trouble in the area, the plant was moved to Nephi in 1862. After the Eureka Mining District opened up, thousands of tons of salt were mined and hauled in horse or mule-drawn wagons to the Shoe Bridge Mill for use in refining ore; however, rock salt from Nephi was used primarily for livestock consumption, with small amounts boiled down and sold as table salt.⁵

A corporation of Nephi residents organized the Nebo Salt

³Auerbach, Father Escalante's Journal with Related Documents and Maps, p. 39.

⁴Alice Paxman McCune, History of Juab County, 1847-1947 (Springville, Utah: Juab County Company of the Daughters of Utah Pioneers, 1947), pp. 95-96.

⁵Nephi Centennial Historical Committee, Nephi's Centennial Jubilee, 1851-1951 (Nephi, Utah: Nephi Centennial Historical Committee, 1951), p. 33.

Manufacturing Company with the intention of producing a pure salt from the waters of a salt spring located in Salt Creek Canyon. The company brought water three hundred and fifty feet from the spring to a twenty-by-forty-foot building constructed to house the boilers, evaporators, and other salt-making machines.⁶

The brine was converted into table, dairy, and packing salt.⁷ Analysis taken from a random sampling showed the salt to be 99.172 per cent pure. According to a newspaper report:

It was the only salt made in the state which can be successfully used in preserving butter or in packing meats. . . . About 12 tons a day goes as fast as it is made, and it is sold as far east as Colorado and as far west as California.⁸

Its unusual purity was accounted for, according to another report, by the fact that it was "evaporated by steam . . . the lime and other minerals held in solution by the brine are precipitated out by the steam pipes."⁹

The Nebo Salt Company operated for about four years before Inter-Mountain Salt Company purchased it in 1897 to eliminate competition.¹⁰

Salt has been mined intermittently from the Nephi location until about 1942. There have been no reports of activity

⁶Ibid.

⁷The Blade (Nephi), July 13, 1895.

⁸Deseret News, July 24, 1897, as quoted in McCune, History of Juab County, pp. 95-96.

⁹Deseret Evening News, August 27, 1897.

¹⁰Ibid.

from this site subsequent to 1943. In fact, any information of salt production from Nephi is rare after 1897.¹¹

Rock Salt Production--Redmond, Utah

Salt from subterranean deposits near Redmond have been used since prehistoric times. Indians, with their grubbing sticks, poked out enough salt to maintain their subsistence needs. The Mormon pioneers used the salt from the time they first settled the Sanpete area. During the late 1870's, the pioneer locators of the salt formation took a stock interest in the Sevier Valley Salt Company and operated the concern for more than thirty years. The Gunnison Valley Salt Company acquired the property in 1909 and mined salt until 1926, when it was sold to the Great Western Salt Company. The last-named company invested \$100,000 in a branch line of the railroad to the mine, a new mill building, and machinery. A block press, able to exert 1,000 tons of pressure to mold fifty-pound salt block, was noted as part of the new machinery.¹²

Six or eight other companies or individuals were producing salt from the formation east of Redmond from the 1870's through the 1890's. In 1902 William Poulson, after a great deal of prospecting, opened up a mine on the west side of the valley in a location containing a higher grade salt. Poulson's sons, France, John, and Albert, later bought him out and changed the name to Poulson Brothers Salt Company. Albert Poulson left his

¹¹Minerals Yearbook (1943), p. 1537.

¹²Deseret News, March 21, 1927.

brothers in 1920 and organized a company named after himself. He sold it to Royal Crystal Salt Company later in the decade. Poulson worked the mine for Royal Crystal until 1964, when he bought it back. Since then, he and his sons have operated the company.¹³

Wallace, Jewel, and Blaine, sons of John Poulson, acquired Poulson Brothers Salt Company from their father and uncle and managed it until 1965, when it was sold to the Redmond Clay and Salt Company. This company and the Albert Poulson Company are the only two rock-salt works producing in the state. The other salt companies ceased operations during the 1940's. The smaller companies were either absorbed by Great Western Salt Company, or they went out of business because of too much overburden to maintain an open-pit mine and decreasing purity of salt.¹⁴

Methods used in the rock-salt industry to discover and mine salt deposits provide an interesting contrast to the farming techniques used in the solar-evaporation process. Prospectors in Sanpete Valley roamed the area looking for a red soil, usually an indication of rich halite deposits. After finding likely spots, they drove long, metal rods, one-half inch in diameter and twenty feet long, into the ground to test the depth of

¹³Salt Lake Tribune, September 29, 1961. Albert Poulson, owner of Albert Poulson Salt Company, private interview held at Redmond, Utah, September 30, 1967.

¹⁴Milo Bosshardt, Co-owner of Redmond Clay and Salt Company, private interview held at Redmond, Utah, September 30, 1967. Albert Poulson, interview.

the overburden and the quality of the salt. The threaded collars on the rods allowed several sections to be added. Sledge hammers were used to drive the rods into the ground. Water was used to soften the dirt and allow deeper penetration. If the test hole indicated a high-quality salt at a depth economically feasible to mine, the overburden was removed with horse-drawn plows and scrapers.¹⁵

Excavating the salt was done by hand. "Double jacking" was one of the methods used, prior to modern air hammers, to drill holes in the salt for blasting charges. Holes one and one-half to two inches in diameter were drilled by two men with sledge hammers, hitting the six-foot-long drill bits in succession. Each man turned the bit an eighth of a turn after hitting it. After the bit had been turned completely around, a long, steel spoon was inserted to clean out the dust. This process was repeated until a hole six feet deep was drilled. Two quarts of black, blasting powder were used and the resulting explosion blew out large chunks of salt.¹⁶

Double jacking was replaced by one man using a badger-claw bit. This bit had four prongs on it. Two rotated to the left and two rotated to the right, cutting a three-inch hole. Even though this bit was operated by hand, one man could cut as

¹⁵Morving Larsen, an oldtimer from Redmond who worked in the local salt mines, private interview held at Redmond, Utah, September 30, 1967.

¹⁶Morving Larsen, interview. Albert Poulson, interview.

much as two men by double jacking.¹⁷

Other methods successfully used were churn drills and coal augers. A man with a churn drill sat on the ground with the bit between his knees and "churned" it up and down. Water was added and when "soup" formed, it was scooped out with a long spoon. Over forty years ago, hand-socket coal augers were twisted manually into the salt. During World War II, a four-inch hole was drilled with an auger rigged to a gasoline engine. Eleven quarts of black powder placed in a hole blasted out fifty to one hundred tons of salt.¹⁸

After large chunks of salt were blasted out of the halite formation, men with the use of gads (a chisel-like tool) and sledge hammers broke them into smaller lumps weighing 100 to 150 pounds. The larger lumps were loaded by hand into wagons and hauled to the shipping point to be sold as salt blocks for livestock. Lumps too small for use as stock salt were taken to the refinery, where they were placed in large, wooden vats filled with water. Two pounds of salt per gallon of water were placed in the vats. After the salt dissolved, the dirt settled to the bottom, and the purer salt water was tapped near the top and run off into boilers. The boilers, metal vats ten feet long with 100-gallon capacity, were heated over wood fires until the salt precipitated out of solution and settled to the bottom. The salt was scooped out and placed in baskets to dry, after which

¹⁷Ibid.

¹⁸Ibid.

it was run through steel rollers to produce a fine table salt. Young girls and women placed the salt in five, ten, and twenty-five pound bags they had sewn themselves. The women who bagged the salt did so as a family endeavor rather than as an occupation; however, at times they were paid for their work. Burlap and cotton bags became so expensive that very little salt was produced after 1915.¹⁹

One of the more troublesome problems encountered by the rock-salt producers was seepage water collecting in the pits. The early-day miners bailed it out with buckets, pouring the water into barrels to be hauled out of the pit on horse-drawn sleds. Some miners removed the water with the use of barrels hoisted from the pit with derricks. In modern times, gasoline pumps can remove 380 gallons per minute, a process requiring repetition two or three times a month.²⁰

Following World War I, crushed livestock salt was introduced as a product after stockmen complained that the hard, rock salt was breaking off their animals' teeth. After the salt was broken up into small pieces, it was placed in a crusher which consisted of an outer layer of corrugated steel, within which a square bolt would turn and crush the salt against the corrugated ribs. A horse was used to turn the bolt. Approximately one or two tons per day were produced in this fashion.²¹

¹⁹Ibid. Irvin L. Warnock, Thru the Years, a Centennial History of Sevier County (Springville, Utah: Art City Publishing Company, 1947), pp. 280-281.

²⁰Morving Larsen, interview. Albert Poulson, interview.

²¹Ibid.

For the stockmen who liked the mineral content of the salt but not the hard lumps, nor the easily-dissolved crushed salt, a new line of blocks was produced. A block press, capable of exerting three thousand pounds per square inch, was purchased.²²

The two companies presently operating in Redmond follow basically the same system for mining and marketing as the old timers, but they have replaced the hand methods with modern machinery. Air hammers are used to drill holes, nitron powder blows out the salt, and large caterpillar tractors with front-end loaders scoop it up and load it into trucks. The salt is hauled to the mill where it is crushed, passed through coarse, medium, or fine mesh screens, and mixed with various chemicals to give the customer a variety of grades from which to choose.²³

Albert Poulson added a new innovation to his salt project in 1967 by selecting the purest vein of salt and cutting a tunnel into it. Plans were to leave a thirty-five-foot cap overhead and follow the formation several thousand feet, or until the purity of the salt changed. Redmond Clay and Salt Company installed a new \$50,000 crusher at its mine site to increase production from two tons per hour to forty tons per hour.²⁴

The two mines in Redmond are producing about ten thousand

²²Morving Larsen, interview.

²³Ibid. Albert Poulson, interview.

²⁴Albert Poulson, interview.

tons of salt annually. Salt is shipped as far away as Canada, Arizona, and Nebraska. The largest customer is the State Highway Department for ice-control use on the roads. The second largest category is the livestock producers.²⁵

The amount of rock salt produced annually in Utah has not varied a great deal over the years. The output in 1888 was 5,000 tons.²⁶ This amount has vacillated, but it is doubtful if annual production has exceeded 10,000 tons throughout the history of rock-salt mining in Utah. Minerals Yearbook reported 6,000 tons produced in 1952, and production in 1968 was 10,000 tons.²⁷ As a comparison, during 1968, the production from all sources within the state was 405,000 tons.²⁸ A little over two per cent of the salt in Utah is taken from the mines in Redmond.

As the statistics indicate, the rock-salt industry is not large. Mainly, it has been a family-owned and operated enterprise, and from present indications, it will remain that way.

Utah Salt Company

Salt production from the vast salt beds in western Utah is unique, inasmuch as it has been marketed as a byproduct from the solar-evaporation ponds established primarily for the recov-

²⁵Ibid. Deseret News, May 26, 1968.

²⁶Mineral Resources (1888), p. 622.

²⁷Minerals Yearbook, III (1963), 1012. Deseret News, May 26, 1968.

²⁸Minerals Yearbook, II (1968), 970.

ery of potash.

Bonneville Limited and its successor, Kaiser Aluminum and Chemical Company, have constructed hundreds of miles of dikes throughout the salt flats. Run-off from precipitation and water pumped from wells dissolves the various salts within the diked area. The brine is collected in canals and circulated through evaporation ponds which cover thousands of acres. Since sodium chloride must be removed from the brine before the potash precipitates, vast amounts of salt have been deposited and allowed to build up in some cases to depths of six to twelve feet. This relatively pure source of salt attracted the attention of the organizers of Utah Salt Company, and they entered into negotiations with the potash company. Under the agreement reached in July of 1958, the potash company controls the pond system completely, and the salt company harvests the salt from ponds designated by them.²⁹

The harvest system is slightly different from that employed by the producers on the lake. All harvesting operations conducted by Utah Salt Company are done in water-filled ponds. The potash company's prime concern is the potassium dissolved in the highly-concentrated brine. After the salt precipitates out of solution, the brine is left in the ponds to continue concentrating until the potassium is deposited. Before the potassium precipitates out of solution, a caterpillar tractor with a ripper

²⁹Alonzo Jeffs, Foreman of Utah Salt Company, private interview held at Utah Salt Company plant near Wendover, Utah, July 28, 1970.

loosens the salt to a depth of about four inches. Quite frequently, it will be found that a natural split has formed at the four-inch depth, marking the annual deposition. After the salt has been loosened, the caterpillar with a dozer attachment is used to push the salt into six-foot winnrows to drain before being hauled to the mill.³⁰

Transferring the salt is a simple procedure. A truck with a forty-ton capacity, dump-bed trailer is driven into the brine-filled ponds to the winnrow. The truck driver loads the salt with a front-end loader and hauls it back to be dumped on the stockpile at the mill.³¹

Utah Salt Company's refining system contains elements in common with the other solar-salt companies in the state. The salt is crushed to eliminate any large lumps and dried in a rotary kiln. From the drier, it is elevated to the top of three steel bins and passed over screens that segregate the salt into three general grades--hay and stock, water-softener, and road salt. From the bins, the salt is conveyed to the block press, bagging department, or it is shipped in bulk form.³²

The market area covers most of the western states: Utah, Nevada, Idaho, Washington, Arizona, Colorado, and North and South Dakota. A small amount of salt is also marketed in British Columbia.³³

³⁰Ibid.

³¹Ibid. Personal observation of the author.

³²Ibid.

³³Alonzo Jeffs, interview.

An advantage Utah Salt Company has over the companies on the lake is the over-abundance of extra-coarse salt crystals. The extra-coarse grade of salt is very desirable for use in water softeners. The vacuum-pan operators in the east are unable to produce a large crystal, and have to manufacture a salt pellet to satisfy this particular market need. Until recent years, the producers on the lake had an advantage over eastern companies because of their inexpensive source of extra-coarse salt. However, the market's demand for this grade sometimes exceeds the lakeside companies' ability to produce and, at times, they have had to purchase from Utah Salt Company to fill their orders.³⁴

Two years after Utah Salt Company was organized, the refinery complex was leased to Wendover Specialties, Incorporated. Under the lease agreement, Utah Salt Company harvested the salt and continued to sell crude salt; Wendover Specialties operated the refinery and produced all the finished products. One-third of the shares in the new firm were owned by Richard E. McLeod, Vice-President and General Manager, and his brother, Robert, who was Sales Manager. Utah Salt Company owned 15 per cent and the remaining shares were held by Van Waters and Rogers, a Seattle, Washington-based distributor of chemical products.³⁵

Wendover Specialties catered to the specific needs of individual stockmen, primarily through the production of salt blocks. It was the first manufacturing effort in the United

³⁴Ibid.

³⁵Salt Lake Tribune, April 24, 1960.

States directed at bringing salt, mineral, and protein blocks, essential for the better feeding of range livestock, to the cow on the range. If a rancher had too much halogeton, larkspur, or grass tetanus on his range, or if he wanted a special formula made up that would contain elements to treat those specific problems, the company made it up in any quantity desired. Van Waters and Rogers assisted the rancher with a formula and checked it out to see that it would not be harmful to the animals.³⁶

Wendover Specialties added a new innovation to the salt industry by purchasing a special block press costing \$75,000 which would produce blocks of varying degrees of hardness. It also developed a protein block which would not dissolve in rain or melt in the sun, and a soft block covered with a protein cap on three sides. The advantage of the soft block was the reduction in the amount of time it took to lick the block to get a cow's daily salt quota.³⁷

After six years, Wendover Specialties gave up its lease. The refinery was subsequently leased by Bonanza Salt Company from 1966 to 1968. Utah Salt Company retained ownership throughout the entire period and supplied salt to the lessees. In 1968, Utah Salt Company resumed operating the refinery and has been producing salt since that time.³⁸

³⁶Ibid. Alonzo Jeffs, interview.

³⁷Ibid.

³⁸Alonzo Jeffs, interview. Subsequent to 1968, Bonanza Salt Company retained its position as a distributor in the area, obtaining its salt from Solar Salt Company.

An abundant and inexpensive source of salt has enabled Utah Salt Company to compete very favorably with the other producers. It was the second largest producer in the state in 1959, and in 1960, it was listed as the third largest.³⁹ Although production statistics on individual companies are not published, estimates from a comparison of several sources would rank Utah Salt Company as the third largest producer up through 1969.⁴⁰

One of the factors limiting the growth of Utah Salt Company is the purity of its product. Morton Salt Company produces a consistent 99.5 to 99.7 per cent pure salt, compared with Utah Salt Company's product which fluctuates between 97 and 99 per cent pure. Lack of control over the pond system accounts for most of the impurities. Since salt is being produced as a by-product, the potash company does not make an effort comparable to the solar-salt companies to assure a product free from contaminating elements. The impurities in the salt prevent Utah Salt Company from marketing several grades of salt requiring a high degree of purity.⁴¹

The Utah Salt Company project could be considered a pilot study in the future success of the efforts to market salt by the chemical companies now constructing huge, solar-evaporation

³⁹Mineral Yearbook, III (1959), 997; (1961), 1029.

⁴⁰Minerals Yearbook (1960-1968). Utah State Land Board, "Land Board Royalty Schedule," Salt Lake City: Utah State Capitol. Salt companies taking salt from the Great Salt Lake are required by law to report their tonnage to the State Land Board. These figures were made available to the author by the Land Board.

⁴¹Myron L. Sutton, interview. Alonzo Jeffs, interview.

plants on the shores of the lake. Millions of tons of salt will be produced as a byproduct annually by these companies. Four factors will determine the success of their efforts: purity of the salt, diversification of their products, cost to produce them, and the rate at which the market will grow to accommodate the tonnage produced.

Considering the amount of salt that has been sold in the past by Utah Salt Company in competition with the other salt companies, its future in the industry should be as promising as the market. During the last twenty years, the market has expanded rapidly enough to absorb the added production of each new company that has entered the field, and yet allowed them to grow individually. If the increase in population and growth in industrial uses for salt continues, the market will accommodate the expected production of the future.

CHAPTER XIII

LITIGATION PERTINENT TO THE SALT COMPANIES ON GREAT SALT LAKE

There are four major legal issues in which Utah salt companies have been, or will be, involved. First is the controversy over ownership of relection lands exposed by the receding waters of Great Salt Lake. The second issue concerns royalty payments for minerals extracted from the waters of Great Salt Lake. The third issue involved the salt companies on the south shore of the lake in violation of antitrust laws and a monopoly suit. Legal action being taken on the fourth issue consists of a lawsuit against Southern Pacific Railroad. The salt companies are holding Southern Pacific Railroad legally responsible for the change in the chemistry of the brine as a result of the Lucin Cut-off Causeway.

Relection Lands Controversy

The relection lands controversy primarily involves Morton Salt Company because of its ownership of a large share of the private land adjacent to the lake.¹

¹U.S., Congress, House, Committee on Interior and Insular Affairs, Great Salt Lake Relected Lands, Hearings, before a subcommittee of the Committee on Public Lands, House of Representatives, on H.R. 1791 and H.R. 6267, 89th Cong., 1st sess., 1966, p. 69. See Appendix III.

A brief review of the major issues involved in this controversy will help to establish its relevancy to the history of the salt industry:

Assuming that the Lake is navigable, . . . the State of Utah obtained title to the bed of the Lake on January 4, 1896, as an aspect of statehood. . . .

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The real title questions arise in attempting to determine what constitutes the bed of the Great Salt Lake and therefore what ownership the State of Utah obtained at statehood. It is reasonably clear that the bed of the Lake included everything up to the "mean high-water mark" at the time of statehood. . . . It is not an easy task to determine where that line was. Some of the gauge readings of the Lake at the time placed the water level at approximately 4202 feet above sea level, but the actual water line is not necessarily the mean high-water line. The mean high-water line should be that point on the shore of the lake which the water reaches in its ordinary fluctuations so that it is reasonably discernible from the absence of vegetation, or from erosion or other factors. This line is difficult to determine on the Great Salt Lake because it is so shallow that minor fluctuations in water level can expose substantial areas of shore lands. Therefore, while the elevation of 4202 feet above sea level may not be too difficult to survey, the real boundary (mean water-line) would be almost impossible to ascertain. . . .

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In any event, a line was surveyed and was accepted by the Surveyor General for the great majority of the Lake, and this line is commonly referred to as the "official surveyed meander." The date 1855 will be used to identify the government survey.

The government meander line as surveyed and as approved by the Surveyor General was platted on the official records of the offices of the county records in the counties located along the lake. . . .

While there are some exceptions, the Federal Government, the State of Utah, and the private persons who owned lots adjacent to the meander line, all assumed that the State owned title to all lands below the meander that were exposed by the receding waters of the Lake. . . .

Consequently, the State Land Board assumed control and management of the lands situated below the survey meander and issued many leases to applicants and sold certain of these lands. . . .

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The present dispute concerning ownership of these lands was brought to a focal point in 1959 when the Federal Government notified the State Land Board that it intended to

complete the survey of a certain area of the Lake as a basis for a waterfowl withdrawal, and advised that the intent was to establish a contour representing the height of the Lake on January 4, 1896 (asserted to be 4200.8), which was the date on which Utah was admitted to the Union. . . . The Area Administrator subsequently determined that the surveyed meander was not a proper boundary between state and federal ownership and concluded that the correct boundary was a fixed elevation representing the level of the lake at the date of statehood. Subsequently, the Director of the Bureau of Land Management reversed this decision, . . . and concluded that the boundary between state and federal ownership fluctuated with the changing water level of the lake, and that the correct boundary should now be surveyed along the present water's edge because it was impossible to establish a mean high-water mark on a lake as shallow as the Great Salt Lake. . . .

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 It is estimated that approximately 40 per cent of the land adjacent to the surveyed meander line is still held and owned by the United States, and approximately 60 per cent has been patented by the United States to private ownership.²

Due to problems raised by the uncertain location of the mean high-water mark, an act was passed in 1966 by Congress establishing the lake's boundary to coincide with the 1855-1856 surveyed meander line. The act also provided the settlement of a second question, that of ownership of the lake bed. Utah acquired ownership of the lake bed at statehood, determined on the assumption the lake was navigable. The navigability of the lake has since been questioned, and the federal government and private landowners, whose positions are parallel, also claim the lake bed, including the relection lands. A provision of the act allowed Utah to purchase, at fair market value, all lands claimed by the federal government, thereby making its claims to the relection land secure, or they could maintain an action in the Supreme Court of the United States to secure a judicial determination of

²Ibid., pp. 38-39.

the right, title, and interest of the United States in the lands conveyed to the State of Utah.³ The latter course has been followed by the state and the case has been heard by a Special Master of the Supreme Court of the United States, who made a recommendation in favor of the State of Utah.⁴ A decision by the court on this case was scheduled for June, 1971 (see Appendix VI).

It must be remembered that the issue decided by the Supreme Court was whether the lake was navigable at the time of statehood. If so, the state would own the land it claimed since 1896. If not, the state could purchase the relected land lying below the federally-owned upland. Location of the mean high-water mark and the disposition of the land claimed by the federal government were determined by Congressional act and are now being reviewed by the court. Legality of that act, and any claims to relection lands pursuant thereto, must be settled by future suit.

Morton Salt Company, a major landowner among the private parties around the lake, filed suit on June 20, 1966, in the U.S. District Court seeking to have a federal court determine the rights of the various landowners and determine if the lake was navigable or non-navigable, and what the legal consequences of the land ownership would be. In June, 1967, it was ordered by Judge Willis W. Ritter, who had heard the case, that it be

³U.S., Congress, Senate, An Act to Authorize Conveyance of Certain Lands to the State of Utah Based Upon Fair Market Value, Pub. L. 89-441, 89th Cong., 1st sess., 1966, 1-3.

⁴Deseret News, October 6, 1970, p. 1.

"stayed" or, in other words, any determination of this suit be postponed until after the Supreme Court had a chance to hear the matter.⁵

The position of Morton Salt Company and the other private landowners in the case is summarized as follows:

The [private landowners] point to the basic law regulating the right of ownership of littoral upland, which is: If the body of water involved is not navigable, an owner of upland owns nothing. If the body of water is navigable, the same rule applies except the lower boundary of the upland ownership stops at the water line wherever this may be or wherever it may move. A state (or the United States during territorial times) as the sovereign government, has possession of the remaining water-covered bed. This latter possession, however, exists only to protect the rights of citizens to navigate upon the water. Consequently, it is not an ownership of a "fee" or absolute nature (it is a limited trusteeship) and the "sovereign" government does not have the right of fee ownership . . . and the area is not fixed.

Upland owners further point out the absence of any specific grant of Great Salt Lake lands to the State of Utah. The Federal Government has never claimed right of possession of the water-covered lake bed other than that which the prevailing law gives a sovereign. When Utah became a state, it did become the sovereign government but with no more possession of the bed of Great Salt Lake than had theretofore been held by the United States. Thus no significance attaches to the position of the water line of Great Salt Lake at the time Utah became a state. . . .⁶

Since the State of Utah has assumed ownership and control of all relection lands since 1896, Morton Salt Company has not had the use of or benefits from the land it claims as a littoral upland owner. This being the case, if, after the Supreme Court decision, the suit before the U.S. District Court is pursued and lost, the company will have lost nothing but a claim to the prop-

⁵Don B. Allen, member of Ray, Quinney & Nebeker, law firm representing Morton Salt Company, interview at law office, Salt Lake City, Utah, June 10, 1970.

⁶U.S., Congress, House, Great Salt Lake Relected Lands, pp. 75-76.

erty and benefits that may have accrued therefrom. If Morton Salt Company wins the suit, it will be awarded the judgment on the basis of the Supreme Court decision regarding the navigability of the lake. The company will follow one or the other lines of reasoning outlined below, depending upon that decision.

Since the lake was judged to be navigable, Morton Salt Company could seek a judgment that would recognize its claim to the relection land. The upland owners claim strips of land from their property to the water's edge, no matter where that edge may be at any specific time. The projection of the boundaries would be determined by taking a line from the corner of the property on the meander line and survey in such a way that the line intersects the water's edge at right angles, forming a perpendicular line. Morton not only claims ownership to the relected lands fronting its property, but rights to the use and profits of them, including the right to extract minerals from the waters of the Great Salt Lake fronting its relected lands. The company also claims to have been deprived of the money collected by the state from those who have been allowed the use of the property.⁷

If the Supreme Court had ruled in favor of the non-navigability of the lake, Morton Salt Company's suit against the state would have sought recognition of its claim to the relection land from the meander line to the thread of the lake, which is an imaginary line drawn down the middle of the lake with similar imaginary lines drawn between the meander line and the various islands of the lake. Ownership of the relection lands would be

⁷Appendix IV. Don B. Allen, interview.

determined by running perpendicular lines from the corners of the upland property to intersect at right angles with the thread of the lake. The lake being non-navigable, the position of the water's edge becomes irrelevant because ownership of the land would take in everything from the meander line to the middle of the lake. If the judgment had been in its favor, Morton Salt Company could have asked the court for a decree ordering the State Land Board to rescind all regulations, cancel all leases, options to lease, easements, and royalty agreements, and to account for any and all monies collected by the state from Morton's water-covered lands. The state would have been further directed in the decree to turn over to Morton all monies collected from those sources, with interest thereon to the date of payment.⁸

The primary difference in the two aspects of the case is that Morton Salt Company would have had more to gain if the lake were considered non-navigable. It could have sued for the recovery of the land, as well as the monies derived from the relected land and the minerals in the lake.

Salt Royalty Controversy

Ownership of the lake bed was one of the key issues in the controversy over the state's right to levy a royalty on salt produced from the lake. Since statehood, Utah has assumed ownership of the lake bed, water, and minerals in solution, but it was

⁸Don B. Allen, interview. Morton International, Inc. v. State of Utah, et al, C-127 (1966). (Court action was not yet completed. Typed ms. obtained from Don B. Allen). Appendix V.

not until 1933 that a law was passed to provide for a royalty payment on salt production. Dissolved minerals were considered essentially free goods until then. At that time, an opinion from the State Attorney General's office on the law determined several principles directly affecting the taking of salt from the lake. His opinion stated:

Great Salt Lake, the bed underlying the lake and all the minerals in the water, belongs to the state of Utah to be administered by the state land board for the benefit of the public. . . . Mineral rights cannot be acquired by a mineral filing or appropriation through the State Engineer. In order to acquire the right to extract the minerals in solution, a mineral lease must be secured from the State Land Board and rentals and royalties paid. . . . Abutting property owners do not acquire any right to use of such water by reason of being an abutting property owner. The common law doctrine of riparian right has been totally abrogated in the state of Utah. Private owners on Antelope Island cannot acquire rights in the waters of Great Salt Lake.⁹

In March of 1941, the State Legislature passed two laws that amended the 1933 law and a subsequent law passed in 1939. The amendments stipulated that before the State Land Board entered into a contract for the sale of salt from navigable lakes, it must require evidence that an application for the appropriation of water had been filed with the State Engineer. Before that office approved the application, the applicant must file with them a copy of the contract for the payment of royalties to the State of Utah.¹⁰

In December, 1940, prior to laws passed in 1941, the Deseret Livestock Company filed an application with the State

⁹Deseret News, December 2, 1933.

¹⁰Deseret Livestock v. State of Utah, 171 P.2d 402.

Engineer's office for the appropriation of twenty-two second feet of water from Great Salt Lake for the purpose of recovering salt and mineral content therefrom. On March 7, 1941, the State Land Board filed a protest to the granting of such application. The following August a hearing was held on the application and the protest thereto, and on February 19, 1943, the State Engineer approved the application, subject to the filing with him of a royalty contract as provided by Utah law.¹¹

Deseret Livestock objected to this condition and filed for a plenary review of the State Engineer's decision in the Third Judicial District Court of the State of Utah, in which it alleged that its application was not subject to the provisions of the 1941 laws because its application was filed prior to the enactment of the acts, and neither of the provisions in the acts was made retroactive. It also alleged that the state did not own the salt carried in solution in the water subject to appropriation, and therefore the acts seeking to give the state the right to sell such salts or minerals and requiring the filing of a royalty contract before the approval of an application by the State Engineer were unconstitutional. The District Court ruled in this case in favor of the State Engineer, and the decision was appealed to the Utah Supreme Court.¹²

There were two questions that would determine the outcome of the case. First, were the laws passed in 1941 constitutional and valid enactments; second, was the state the owner of

¹¹Ibid. ¹²Ibid.

the salt carried in solution in the waters of Great Salt Lake. In order to make this determination, the court had to decide if the salt in solution was an inseparable part of the water or if it was a mineral, valuable for its own sake. A mineral was defined as any natural substance having sufficient value to be mined, quarried, or extracted for its own sake or its own specific use. Under this definition, the court reasoned that salt found in the waters of Great Salt Lake, because of its quantity, was a "mineral" and was valuable for its own sake. In fact, it was because the salt found in the water was valuable for its own sake that Deseret Livestock Company sought to appropriate the water and extract the salt from it.¹³

The state made a distinction between water, appropriation of which has no fee, and minerals in solution in that water. According to law, the only manner in which water could be appropriated was to be placed in beneficial use. If Deseret Livestock Company owned salt and were seeking an application to appropriate water to carry it, the company would be placing the water to beneficial use and could appropriate as much water as it needed for that purpose. However, Deseret Livestock Company did not own the salt in solution in the lake. The court took judicial notice of the fact that Great Salt Lake was a navigable body of water and, in the opinion of the court, the state, as owner of the beds of navigable bodies of waters, is entitled to all valuable minerals in or on them. Since the state was the sole owner of the

¹³Ibid.

salt contained in the waters of Great Salt Lake, it followed that Deseret Livestock Company was in no position to appropriate water until it acquired rights to the salt therein from the State Land Board.¹⁴

The second aspect of the case, the validity and constitutionality of the 1941 laws, was upheld on the grounds the laws took no right which could have been acquired by the filing of an application for the appropriation of water before their enactment. They merely provided a method by which rights to the salt could be acquired from the State Land Board and thus placed one in a position to put the water to a beneficial use. They also provided a check with the State Engineer so that water could not be appropriated from navigable bodies of water for the sole purpose of taking the minerals.¹⁵

Following the 1946 Supreme Court decision, Deseret Livestock Company entered into negotiations with the State Land Board for an equitable royalty lease. The company officials claimed that after receiving verbal assurance from the Land Board of fair treatment, they spend half a million dollars developing evaporation ponds, canals, and seal trenches near the lake to get into the salt industry. Subsequently, the Land Board decided to get tough and establish royalty payments of from ten to twelve and one-half per cent of the value of the salt, or a maximum of thirty-five cents a ton. A contemplated salt-processing plant near Lake Point, costing about \$900,000, was postponed by the

¹⁴Ibid. ¹⁵Ibid.

company pending the outcome of the lease dispute.¹⁶

The royalty dispute centered around two points of argument. First, the royalty payment would reduce the small margin of profit on sales in the outlying regions of the market area to the point that continued service would be an economic strain. If the market area were contracted, production would be lowered which, in turn, would reduce the profits and the capability of the company to compete effectively with out-of-state companies. Second, Morton Salt Company had not been paying a royalty on salt extracted from the lake, but merely paying \$10,000 per year for a grazing permit. This fee was equivalent to about eight cents per ton of salt. Deseret Livestock Company's position relative to the inequity of the situation was made clear by its attorney, David Lawrence McKay, when he said the company "realizes it must and is willing to pay royalties--but we're not going to pay more than Morton Salt Company."¹⁷

Morton Salt Company had been paying the state a grazing fee from 1946 through 1951. In 1952, the state drafted a new mineral lease contract and refused to accept rental payments from Morton in lieu of royalties. Morton Salt Company and Deseret Livestock Company both objected to the high royalties and refused to sign the new contract. Consequently, the State Land Board requested Attorney General Clinton D. Vernon to take appropriate action against the companies in order to effect compliance with

¹⁶Deseret News, March 11, 1952; March 13, 1952; April 20, 1952. The livestock company changed hands during 1952 or 1953, and the proposed processing plant was never constructed.

¹⁷Salt Lake Tribune, March 11, 1952.

Utah royalty laws.¹⁸ A suit was brought against the companies, but it was later dismissed after an agreement was reached on the amount of royalty payments to be made to the state. Under the agreement, Morton Salt Company paid \$24,429 for salt extracted during 1952 and 1953, or an equivalence of ten cents per ton. It agreed to pay ten cents per ton of dry salt extracted thereafter.¹⁹ Deseret Salt Company paid ten cents a ton on all the salt they had produced up through November 1, 1954, and agreed to pay ten cents a ton thereafter. Strangely enough, Lake Crystal Salt Company, which had been producing salt since 1949, paid a thirty-five cent royalty on its salt up through November 14, 1954.²⁰

As noted above, the legal precedent granting the state authority to levy the royalty tax on the salt producers was based on the judicial assumption that Great Salt Lake is a navigable body of water. If the case of Utah v. United States, pending before the Supreme Court, is decided in favor of the United States, Utah's right to the minerals in the lake will be questionable. Implications stemming from the solution of the relection controversy will have far-reaching effect, not only on the ownership of the land left exposed by the lake, but the right of the state to collect and retain money collected from leases and royalties.

¹⁸Ibid. Utah Economics and Business Review (March, 1952), p. 5.

¹⁹Salt Lake Tribune, September 19, 1954.

²⁰State Land Board Office (unpublished records).

Salt Companies and Lawsuits

There have been two major suits pursued against salt companies operating in Utah. The first was an indictment for violating the Sherman Anti-Trust Laws in 1955. It involved Deseret Livestock Company, Deseret Salt Company, Morton Salt Company, and its wholly-owned subsidiary, Royal Crystal Salt Company. The second suit was brought against Leslie Salt Company in 1961 and came about as a result of the company's size and the control it had over the west-coast salt market.

The 1955 suit was the result of a grand jury indictment. The case was handed up to the United States District Court for the District of Utah, Central Division. Judge A. Sherman Christensen, Jr. entered the judgment. The court found the defendants guilty of violating Section I of the Sherman Anti-Trust Act. The salt companies appealed on the basis the evidence was insufficient to establish their guilt, and the case was sent to the United States Court of Appeals, Tenth Circuit, and heard by Judge Huxman. The appeals court affirmed the decision of Judge Christensen.²¹

The original grand jury indicted as conspirators Morton Salt Company, Royal Crystal Salt Company, Deseret Livestock Company, and Deseret Salt Company. Stansbury Salt Company and Council M. McDaniel were included in the conspiracy, but they were not named as defendants. The charge was conspiring to

²¹Salt Lake Tribune, September 18, 1955. United States v. Morton Salt Company, et al, 235 F.2d 573 (10th Cir. 1956).

restrain trade, with an attempt to eliminate Utah Ice and Storage Company as a competitor. They were further accused of an attempt to stabilize and control the prices and terms for the sale of salt; to adopt and maintain uniform and noncompetitive prices and terms; to restrict and eliminate price competition between themselves and others in the sale and distribution of salt; to adopt and use uniform price scales and price keys; and to eliminate distributors who sold at less than agreed-upon prices.²²

The historical setting of the case and the activities of the defendant companies which led up to the indictment are summarized as follows:

Prior to 1952, Morton Salt Company and its wholly owned subsidiary Royal Crystal Salt Company, maintaining separate sales offices and operating under different brand names, enjoyed a virtual monopoly of the sale of salt in this [intermountain] area. No other company was selling more than a negligible quantity of salt from the Great Salt Lake. . . . In 1949 the Deseret Livestock Company began the preparation of facilities for the production of salt from the Great Salt Lake. In 1951 it harvested its first crop and made a few small sales, and by 1952 it was in a position to begin substantial competition with Morton and Royal Crystal. Late that year or in early 1953 the ownership of the Deseret Livestock Company came into the hands of David Freed and David Robinson. Knowing little about the salt business these two went to Freed's long time friend, I. A. Clayton, Vice President and manager of Royal Crystal, to see if that part of Deseret Livestock's business could be sold to Morton. Clayton stated that Morton was not interested because of the possibility, if this potentially important competitor was bought out, of monopoly charges under the Sherman Act.

Deseret Livestock kept its salt facilities and sold salt in the area market through the year 1954. Its sales steadily increased. . . . Stansbury Salt Company started selling salt in about December, 1950, and its sales progressed much less rapidly than Deseret Livestock. . . . The price fixing conspiracy was alleged to have begun between Royal Crystal,

²²United States v. Morton Salt Company, et al., 235 F.2d 573.

Morton, and Deseret Livestock some time in 1953, with Stansbury and McDaniel, as an individual, joining in the middle of 1954. . . . Council McDaniel was a former executive in a west coast salt company and sought to purchase an interest for himself in a salt business in the Salt Lake Area. . . . He negotiated with Stansbury Salt Company with a view to acquiring shares of that company. It was his introduction of Richards, the manager of Stansbury, to Clayton of Royal Crystal which allegedly precipitated Stansbury's entry into the conspiracy. McDaniel finally purchased the salt properties of Deseret Salt, and from and after January 1, 1955, operated the business as the Deseret Salt Company. . . . The new Deseret Salt Company under McDaniel's direction allegedly joined the conspiracy in Deseret Livestock's former role.²³

The court found Morton Salt Company, Royal Crystal Salt Company, Deseret Livestock Company, and Deseret Salt Company guilty as charged, and levied a \$5,000 fine on the first three-named companies and a \$3,000 fine on Deseret Salt Company. Council McDaniel and the Stansbury Salt Company were also found guilty, but they were not fined.²⁴ To eliminate the chance of any future charges of conspiracy, Morton dissolved its subsidiary, Royal Crystal Salt Company, in 1958.²⁵

Leslie Salt Company became involved in litigation through the process of its parent company in California, acquiring small salt plants until it became the largest salt producer on the west coast. Following the purchase of the Deseret Salt Company, which allowed the company to compete in the intermountain area, the Federal Trade Commission, on December 14, 1960, issued a complaint alleging that Leslie's acquisition of the Utah company tended to

²³Ibid.

²⁴United States v. Morton Salt Company, et al, Cr-38 (1955).

²⁵Salt Lake Tribune, July 17, 1960.

create a monopoly in the production and sale of salt in the west.²⁶ The FTC suit sought to divest Leslie Salt Company of the Deseret Salt Company and Golden West Products Company, now California Salt Company, of Los Angeles. Leslie acquired Golden West stock interest in 1936 and Deseret Salt Company in 1958.²⁷

In December, 1961, the FTC announced approval of a consent order requiring Leslie Salt Company to sell Deseret Salt Company. At the same time, it dismissed a charge that Leslie's acquisition of California Salt Company violated the anti-merger provision of the Clayton Anti-Trust Act. Under terms of the consent order, Leslie was ordered to sell the Lake Point producer and not acquire any interest in other salt-producing or distributing firms for the next ten years.²⁸

First Security Bank of Utah was named to handle the negotiations for sale of the company. A price of \$600,000 for the Utah plant had been set by the FTC, and Leslie Salt Company was given five years to find a purchaser. If not sold during that period of time, Leslie would be allowed to keep the plant. One of the provisions of the ruling stipulated that Leslie must find a buyer within six months or the price would be dropped to \$450,000, not counting sales commissions. Also, Leslie was to make quarterly reports to the Commission on action taken, as required by the sales arrangements.²⁹

²⁶Deseret News, December 14, 1961.

²⁷Salt Lake Tribune, January 13, 1961.

²⁸Deseret News, December 12, 1961.

²⁹Deseret News, January 1, 1962.

Hardy Salt Company bought Leslie's Lake Point plant on November 2, 1965, well within the five-year period. Although Leslie Salt Company no longer owned a production facility in Utah, Hardy Salt Company agreed to supply salt products for the intermountain region, allowing Leslie to continue to market salt in the area.³⁰

Litigation Pending on Salt Migration

During 1957-1959, Southern Pacific Railroad Company constructed a permeable rock-fill causeway across Great Salt Lake. Although the causeway contains two fifteen-foot wide culverts to allow interchange of brine, it has essentially divided the lake into two parts and interrupts the formerly free movement of brine about the lake. It has caused significant changes in the chemistry of the lake, including a dilution of the brine in the south part of the lake and a concentration of the brine in the north part.³¹

The southern end of the lake receives over 90 per cent of the surface inflow, and since 1957 has rarely reached saturation. The north arm of the lake has no appreciable inflow, and a high rate of evaporation exists. The surface elevation of the water in the north part is at a lower level, which causes an imbalanced

³⁰Salt Lake Tribune, November 3, 1965. Deseret News, November 21, 1965.

³¹R. J. Madison, "Effects of a Causeway on the Chemistry of the Brine in Great Salt Lake, Utah" (unpublished manuscript prepared for the U.S. Geological Survey in cooperation with the Utah Geological and Mineralogical Survey, 1970), p. 5.

rate of exchange between the two arms of the lake. In a recent study on the effects of the causeway on the chemistry of the brine, it was found that discharge through the culverts accounted for about 45 per cent of the total brine moving northward, but only about 15 per cent of the total brine moving southward.³²

According to another study, the salt content of the water passing through the culverts varies, but approaches 25 per cent. This means that for every four tons of water which evaporate from the north end of the lake, approximately one ton of salt is left behind. This high rate of transfer will not continue indefinitely, but will decrease as the years pass by because the density of the south arm will reduce proportionately. The net result of this pattern will be the reduction of the southern portion of the lake to sea-water consistency, while the north arm conceivably could become a vast area of solid salt, with only a remaining finger of the lake north of the causeway.³³

Alarmed about the migration of salt to the north arm of the lake, representatives of two southern-shore companies expressed their concern in a meeting of the Great Salt Lake Authority. It was explained that as the lake water becomes more dilute, it requires more land for ponds to concentrate the brine before it is transferred to the garden ponds. This condition

³²Ibid.

³³Caldwell, Richards & Sorensen, Inc., "A Preliminary Master Plan for the Development of the Great Salt Lake--Over a Period of the Next 75 Years" (unpublished report prepared for the Great Salt Lake Authority, 1965), p. 8.

will eventually reach an economic breaking point.³⁴

The salt companies have been considering the possibility of entering into litigation against the Southern Pacific Railroad for several years; however, Hardy Salt Company has been the only company to file suit against the railroad. Hardy has asked the court to order Southern Pacific to stop its causeway from interfering with the natural circulation of the lake waters, and also for \$100,000 damages.³⁵

According to the representatives of the various salt companies consulted on the salt-migration problem, the railroad could be asked to tear out sections of the causeway and replace them with a trestle in order to restore normal circulation of the lake, or they may be required to compensate the salt companies for additional expense incurred for pond construction and loss in production as a result of the causeway.

Litigation involving the salt companies in antitrust suits is the only aspect of this chapter that is conclusive. The salt royalty issue cannot be decided ultimately until after the decision from the Supreme Court on relection lands, and legal proceedings have just begun on the salt-migration issue.

³⁴Salt Lake Tribune, February 5, 1966.

³⁵Deseret News, December 26, 1970.

CHAPTER XIV

SIGNIFICANCE AND FUTURE OF UTAH'S SALT INDUSTRY

The largest diamond in the world, lying undiscovered on a hillside in Africa, is no more valuable than the matrix surrounding it until discovered, cut, polished, and marketed. The same is true of the salt resources in Utah. There is enough salt in Great Salt Lake to supply the world's needs for decades, yet Utah is producing only one per cent of the nation's salt.¹ The importance of this industry is determined by the marketability of its product, which has been limited, historically, by the lack of industrialization and population in the market area and by freight rates that determine this area.

Considering the vast amount of salt in Utah, it may surprise some to realize the relatively insignificant position of the state's salt industry when compared with national figures. In 1968, the nearly half million tons of salt harvested or mined in Utah represented about one per cent of the total national production. At the turn of the century, Utah ranked sixth in the nation. It ranked ninth in 1968. During the intervening years, its position has fluctuated within the latter half of the top ten producers. Regardless of its rank through the years, Utah

Minerals Yearbook, II (1968), 970.

has consistently marketed about one per cent of the nation's total output.²

A comparative breakdown of the states that produce salt and the companies dispersed among those states is one of the factors that help to determine the significance of Utah's production. Utah was among seventeen states that recorded salt production during 1968. The top five states were Louisiana, Texas, Ohio, New York, and Michigan, supplying 85 per cent of the total output. They were followed by California, West Virginia, Kansas, and Utah. Salt was produced in the seventeen states by fifty-six companies with one hundred plants. The twelve largest plants, or those annually producing over one million tons each, supplied 56 per cent of total domestic production, or 23,112,740 tons; and fourteen plants, annually producing five hundred thousand tons to one million tons each, supplied an additional 21 per cent, or 5,493,020 tons. The remainder, 4,667,540 tons, or 21 per cent, was supplied by seventy-three plants. Production from Utah's seven plants was included in the latter group.³ Although production from Utah ranks low in the comparative analysis, it serves a market covering the eleven western states. This area is larger than any served by the other producing states. The major restriction on Utah's production is the low population density in that area.

²U.S., Geological Survey, Bulletin No. 225 (Washington, D.C.: Government Printing Office, 1903), p. 493. Mineral Resources (1900-1931). Minerals Yearbook (1932-1968).

³Minerals Yearbook, II (1968), 969-972.

A comparison of Utah's salt output with other minerals produced on a local level also aids in evaluating the significance of the state's salt industry. The value of salt produced from earliest record to the end of 1965 amounted to \$49,699,000, compared to \$9,628,289,000 value for the state's total production of gold, silver, copper, lead, zinc, coal, iron ore, and uranium ore.⁴ Salt is classified as a mineral in the non-metallic class. When compared to other nonmetals produced in the state, it ranks fifth in value, accounting for 7 per cent of the total value of the group.⁵

Some of the factors that contribute to a successful salt industry are vast resources, high-quality products, and inexpensive means of production. Utah producers have had all of these advantages. However, the market, which ultimately determines the significance of the state's industry, is so structured that Utah's position will probably not vary in the future any more than it has in the past.

The most significant factors affecting the market are the location of population and industries, and freight rates to those areas in competition with neighboring producers. Utah is surrounded by states of low population and relatively little industrialization. Consequently, the market in those states is directed toward salt for agricultural use. The states on the

⁴Utah's Mining Association, Utah's Mining Industry (Salt Lake City: Utah's Mining Association, 1967), p. 23.

⁵Minerals Yearbook, III (1958), 1084.

outer fringe of Utah's market area--Oregon, Washington, and Colorado--are more heavily populated and industrialized, but are so far away that competition from California and Kansas salt producers limits the volume of salt shipped there from Utah.

There is a significant correlation between population and its corresponding industrial development in the market area of Utah and California and the amount of salt annually produced from these two states. In 1968, California produced 1.7 million tons of salt, or four times the 403,000 tons produced in Utah. Utah's market area, consisting of Utah, Montana, Idaho, Wyoming, Washington, Nevada, Oregon, Colorado, North and South Dakota, and Arizona, had an estimated population of four to five and one-half million in 1960. California's market area consisted of California, Nevada, Arizona, Oregon, and Washington, and served an estimated population of eighteen to twenty million, or about four times greater than the population served by Utah. Population within the market area of the two states almost completely accounts for the variance of output.⁶

The low intrinsic value of salt with a correspondingly low margin of profit hampers the shipment of salt over long distances, inasmuch as the freight costs make up the bulk of the price at the destination. Unless the difference in freight costs from two competing areas is small enough to be absorbed from the profit, the producer who ships the longest distance is

⁶Luman H. Long, ed., World Almanac and Book of Facts, 1969 (New York: Newspaper Enterprise Association, Inc., 1968), 593-95.

eliminated from that area. A comparison of the costs involved in shipping salt from Utah to Tacoma, Washington, a large consumer of industrial salt, will illustrate the point. Tariff rates from Saltair Junction, near Morton Saltair plant, to Tacoma are \$7.83 per ton. The corresponding rate from Newark, California, is \$7.01. The price of coarse, bulk salt shipped from Saltair is \$15 per ton, making the delivered price \$22.83. In this example, unless California salt is \$0.82 more expensive per ton to produce, the Utah company must absorb the tariff differential in order to compete. Freight rates for the Washington market have limited Utah sales to eastern Washington. The industrial sections of Washington and Oregon are too convenient to California for the Utah plants to compete, thus limiting Utah to the rural mountain west.⁷

Detailed statistics on the amount of salt marketed by each company, and percentage of various grades within the total amount produced, are considered confidential information by the producers and are unavailable from government sources. Enough information is available, however, to project the probable market trends. During the 1950's, 70 per cent of the salt sold within the Utah marketing territory was used by the livestock industry. Industrial users followed. The demand was for salt used in water softeners for both boiler feed and process water, as well as in other processing phases in nonferrous smelting,

⁷Norman Birchler, Sales Manager for Morton Salt Company, Utah Branch, interview held in Salt Lake City, Utah, August 13, 1970.

steel, vanadium, and in the manufacture of explosives. The food industry, including canning, meat packing, cheese, and butter factories, were next, followed by salt used in regenerating home water softeners and salt used for ice removal from roads and streets. Least important in quantity consumed was the salt packaged for human consumption in the home.⁸

Consumption patterns changed slightly during the 1960's. Salt manufactured for agricultural use was the largest selling, and the market demand increased steadily. Water softener salt, classified separately due to increased sales, was the third largest selling, and also the fastest-growing part of the industry. Salt used in ice removal was one of the largest, single grades of salt sold. Twenty to 25 per cent of the salt produced in Utah is marketed within the state, and about half of this amount, or 40,000 tons, is sold as road salt. As the mountain west becomes more industrialized, the water softener and industrial grades of salt may increase to the point that they surpass the agricultural grades. If favorable freight rates can enlarge the market area into the industrialized regions of the west, this trend is assured.⁹

Construction of three multi-million-dollar plants, begun during the late 1960's to extract various chemicals from the brine of Great Salt Lake, will have an effect on the future of

⁸Ibid. Utah Economics and Business Review (March, 1952), 4-5.

⁹Norman Birchler, interview. Utah Economics and Business Review (March, 1952), 4-5.

Utah's salt industry. Inter-Mountain Chemical Corporation and National Lead Company, both located on the west side of the lake, and Great Salt Lake Minerals and Chemicals Company, located west of Ogden, Utah, are capable of producing millions of tons of common salt as a byproduct. Salt output from Great Salt Lake Minerals and Chemicals Company alone is expected to exceed five million tons annually. According to figures published in 1968, the market for Utah salt is absorbing just under one-half million tons annually. However, the huge salt production of the chemical companies will not have as drastic an effect on the industry as one might think. The market is only capable of absorbing a certain amount of salt in the various grades. The salt companies are geared to produce the quality and the grades demanded, and their sales forces have an established clientele.¹⁰

Most of the salt companies in Utah have a greater production potential than the market can absorb. Even if the chemical companies decide to enter the salt business wholeheartedly, they will just be one among many competing for a limited market. Men experienced in the salt business feel the cost to produce a high-quality, refined product will be the same for the chemical companies as it is for the established salt companies, regardless of their production potential. Their main concern is sharing the market with three other companies.¹¹

¹⁰Great Salt Lake Minerals and Chemicals Corporation, "The Great Salt Lake Project" (unpublished promotion brochure, distributed by Great Salt Lake Minerals and Chemicals Corporation, Ogden, Utah).

¹¹Thayne Imlay, interview. A. Z. Richards, interview.

Conclusion

Utah's salt industry has had an important impact on the state's economy. Its significance cannot be compared in magnitude to some of the state's major industries, but it would be grossly unfair to suggest its proportionately smaller output renders it insignificant. Among its positive merits might be mentioned the following.

Salt production is one of the oldest, if not the oldest, continuously operated manufacturing industries in the state. Although it has been affected by adverse conditions in its economic environment, records show a steady growth through the years. Since three-fourths of the industry's production is exported, Utah's economy is stabilized and bolstered by money coming in from out of state. The economy has benefited through taxes paid to the state. Royalties paid for salt taken from Great Salt Lake since 1949 have amounted to nearly one-half million dollars. Information on other taxes is not a matter of public record; however, income from sales, property, and corporate taxes must be considered. Although annual employment figures for the industry show some fluctuation through the years due to mechanization and growth, statistics for 1970 indicate 217 employees were paid about 1.75 million dollars.¹² About one-third of the money derived from gross sales by the companies is retained in the state as wages paid to their employees.

¹²Sherrill W. Neville, employee of Utah Department of Employment Security, Salt Lake City, Utah, interview held June 4, 1971.

In a category only slightly removed from economics is the contribution made by the men in the industry. They have seen production techniques progress from an intuitive art to an exact science, and in many cases they have been responsible for the change. The future success of the industry is in their hands. Great Salt Lake contains from sixty to ninety billion dollars worth of minerals. How much of this is exploited by the salt companies will be determined by the vision and determination of these men.

APPENDIXES

- Appendix I. Production and Value of Salt in Utah, 1880-1968
- Appendix II. Fluctuations of Great Salt Lake
- Appendix III. Map of Great Salt Lake, Utah
- Appendix IV. Plat showing Morton International, Inc. properties and their extensions to the edge of Great Salt Lake
- Appendix V. Plat showing Morton International, Inc. properties and their extensions to the thread of the Great Salt Lake
- Appendix VI. U.S. Supreme Court decision on the navigability of Great Salt Lake--June, 1971.

APPENDIX I

PRODUCTION AND VALUE OF SALT IN UTAH
1880-1968

Year	Sold or Used by Producers (Short Tons)	Value
1880	12,000	\$ 60,000
1881	14,000	70,000
1882	13,000	65,000
1883	15,000	100,000
1884	16,000	80,000
1885	15,000	75,000
1886	23,000	100,000
1887	45,500	102,375
1888	21,250	32,000
1889	28,000	60,000
1890	59,850	126,100
1891	135,660	265,350
1892	180,946	340,442
1893	15,200	130,075
1894	37,546	209,077
1895	41,228	121,762
1896	39,172	96,550
1897	56,725	196,056
1898	37,275	103,778
1899	33,059	115,100
1900	34,878	151,662
1901	46,828	326,016
1902	58,450	270,626
1903	29,813	181,710
1904	35,536	321,301
1905	24,828	135,465
1906	36,710	169,635
1907	48,378	199,779
1908	33,975	169,833
1909	34,571	147,318
1910	34,979	185,869
1911	38,139	171,268
1912	39,661	154,734
1913	46,262	191,686
1914	52,564	231,512

Year	Sold or Used by Producers (Short Tons)	Value
1915	55,279	\$ 266,334
1916	60,653	289,457
1917	79,195	352,145
1918	94,204	508,375
1919	77,336	432,130
1920	75,259	546,186
1921	68,874	491,354
1922	81,909	387,093
1923	81,449	468,765
1924	78,577	463,143
1925	88,150	432,846
1926	77,350	422,317
1927	74,690	334,732
1928	85,800	193,582
1929	84,940	202,676
1930	85,240	188,983
1931	74,010	159,778
1932	61,230	132,930
1933	56,305	141,330
1934	Information not available	
1935	57,625	163,639
1936	56,480	168,706
1937	69,696	205,328
1938	61,959	192,495
1939	68,100	202,244
1940	71,472	191,263
1941	107,079	196,413
1942	110,871	290,040
1943	169,810	562,293
1944	119,809	368,500
1945	122,997	363,997
1946	121,669	339,505
1947	113,285	340,028
1948	113,779	429,474
1949	78,611	386,935
1950	116,694	511,938
1951	131,444	570,379
1952	136,125	522,721
1953	154,088	722,035
1954	166,506	1,020,061

Year	Sold or Used by Producers (Short Tons)	Value
1955	195,726	\$ 1,339,085
1956	184,000	1,471,000
1957	221,000	2,013,000
1958	184,000	2,215,000
1959	209,000	2,453,000
1960	231,000	3,092,000
1961	249,000	3,187,000
1962	311,000	3,349,000
1963	325,000	3,462,000
1964	371,000	3,848,000
1965	384,000	3,591,000
1966	427,000	3,770,000
1967	403,000	3,525,000
1968	405,000	3,756,000

Source: U.S. Department of the Interior, Geological Survey,
Minerals Yearbook (Washington, D.C.: Government
 Printing Office).

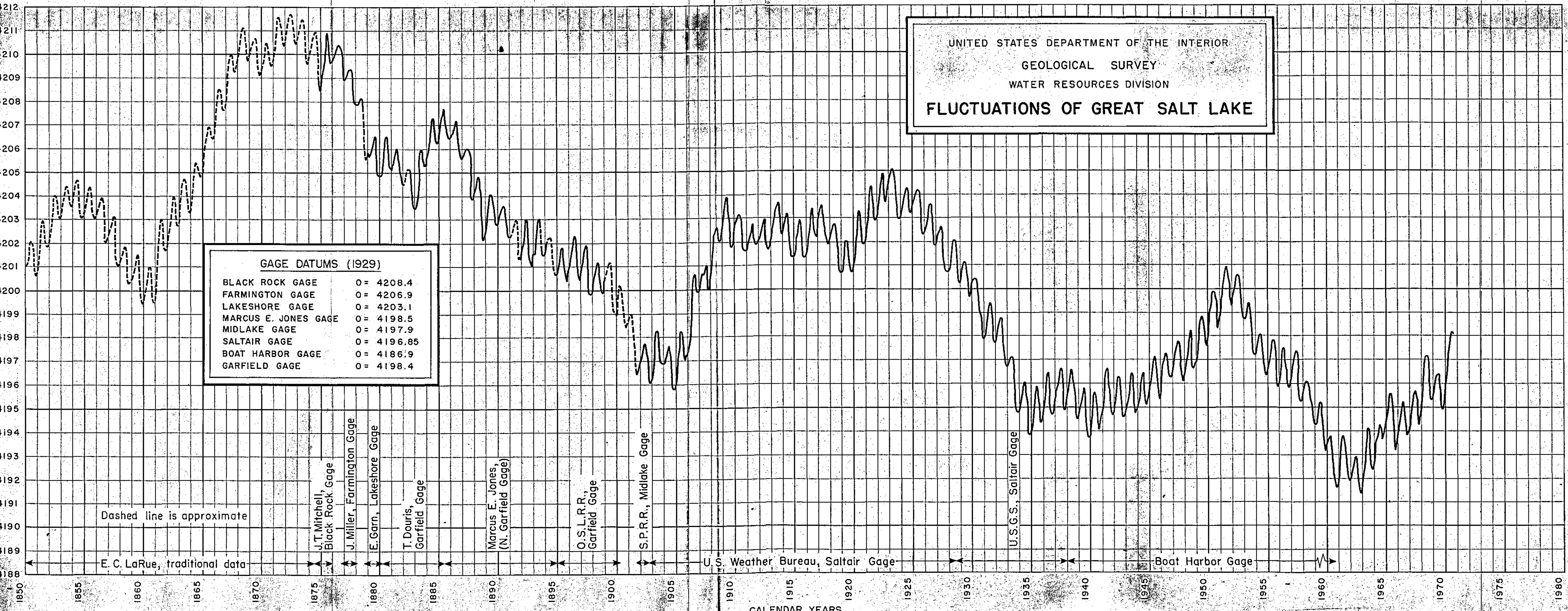
APPENDIX II

FLUCTUATIONS OF GREAT SALT LAKE

ELEVATION IN FEET ABOVE MEAN SEA LEVEL

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
FLUCTUATIONS OF GREAT SALT LAKE

GAGE DATUMS (1929)	
BLACK ROCK GAGE	0 = 4208.4
FARMINGTON GAGE	0 = 4206.9
LAKESHORE GAGE	0 = 4203.1
MARCUS E. JONES GAGE	0 = 4198.5
MIDLAKE GAGE	0 = 4197.9
SALT AIR GAGE	0 = 4196.85
BOAT HARBOR GAGE	0 = 4186.9
GARFIELD GAGE	0 = 4198.4



Dashed line is approximate

E. C. LaRue, traditional data

J. T. Mitchell,
Black Rock Gage

J. Miller, Farmington Gage

E. Garn, Lakeshore Gage

T. Douris,
Garfield Gage

Marcus E. Jones,
(N. Garfield Gage)

O.S.L.R.,
Garfield Gage

S.P.R.R., Midlake Gage

U.S. Weather Bureau, Saltair Gage

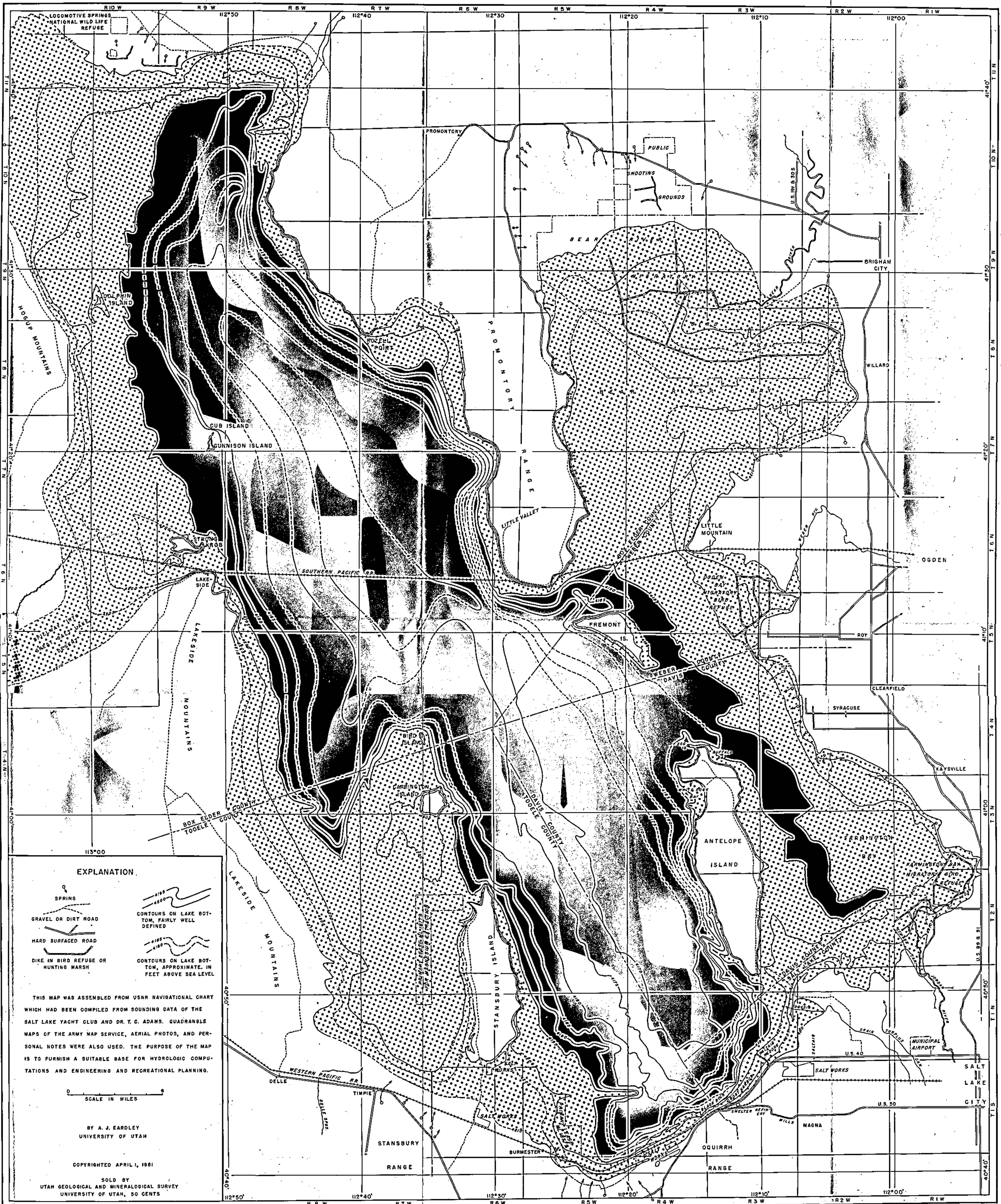
U.S.G.S., Saltair Gage

Boat Harbor Gage

CALENDAR YEARS

APPENDIX III

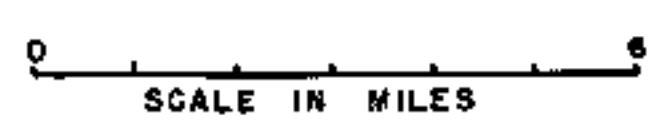
MAP OF GREAT SALT LAKE, UTAH



EXPLANATION.

- SPRING
- GRAVEL OR DIRT ROAD
- HARD SURFACED ROAD
- DIKE IN BIRD REFUGE OR HUNTING MARSH
- CONTOURS ON LAKE BOTTOM, FAIRLY WELL DEFINED
- CONTOURS ON LAKE BOTTOM, APPROXIMATE, IN FEET ABOVE SEA LEVEL

THIS MAP WAS ASSEMBLED FROM USNR NAVIGATIONAL CHART WHICH HAD BEEN COMPILED FROM SOUNDING DATA OF THE SALT LAKE YACHT CLUB AND DR. T. G. ADAMS. QUADRANGLE MAPS OF THE ARMY MAP SERVICE, AERIAL PHOTOS, AND PERSONAL NOTES WERE ALSO USED. THE PURPOSE OF THE MAP IS TO FURNISH A SUITABLE BASE FOR HYDROLOGIC COMPUTATIONS AND ENGINEERING AND RECREATIONAL PLANNING.



BY A. J. EARDLEY
UNIVERSITY OF UTAH

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UNIVERSITY OF UTAH, 50 CENTS

THE GREAT SALT LAKE, UTAH

APPENDIX IV

PLAT SHOWING MORTON INTERNATIONAL, INC.
PROPERTIES AND THEIR EXTENSIONS TO THE
EDGE OF GREAT SALT LAKE

R9W

R8W

T 11 N

MEANDER LINE

ELEV. 4195

MEANDER LINE

GREAT SALT LAKE

ELEV. 4195

LAKE

R3W

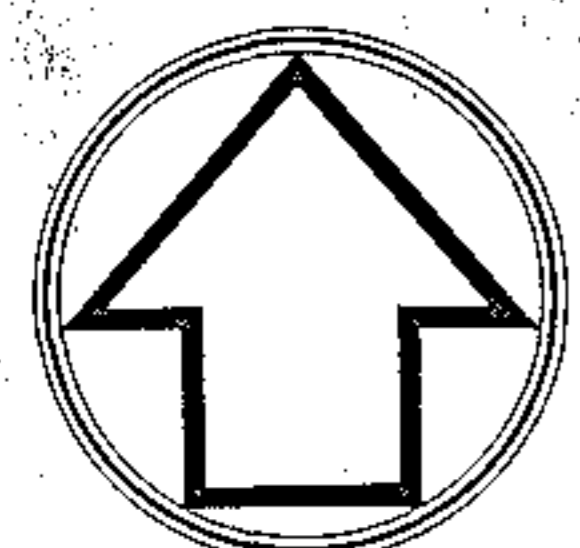
MEANDER LINE

R2W

R1W

ANTelope ISLAND

FREMONT ISLAND



SCALE IN MILES
0 1 2

MEANDER LINE

MORTON INTERNATIONAL INC. PROPERTIES

MORTON INTERNATIONAL INC. PROPERTIES EXTENDED TO THE GREAT SALT LAKE

NOTE: THE WATER LEVEL AS SHOWN ON THIS PLAT IS AT ELEV. 4195

PLAT SHOWING
MORTON INTERNATIONAL, INC.
PROPERTIES AND THEIR
EXTENSIONS TO THE EDGE OF
THE GREAT SALT LAKE

PREPARED BY
BUSH & GUDGELL, INC.
ENGINEERS
555 SOUTH 3RD EAST STREET
SALT LAKE CITY, UTAH
84602-3000 K.G.V. JUNE 1966

R5W

R4W

R3W

R2W

R1W

T 6 N

T 5 N

T 4 N

T 3 N

T 2 N

T 1 N

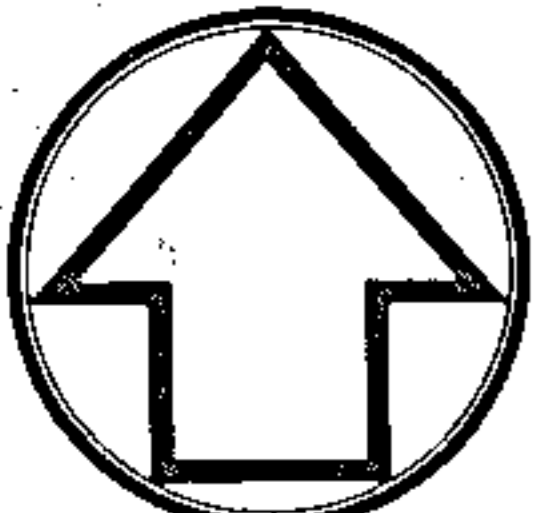
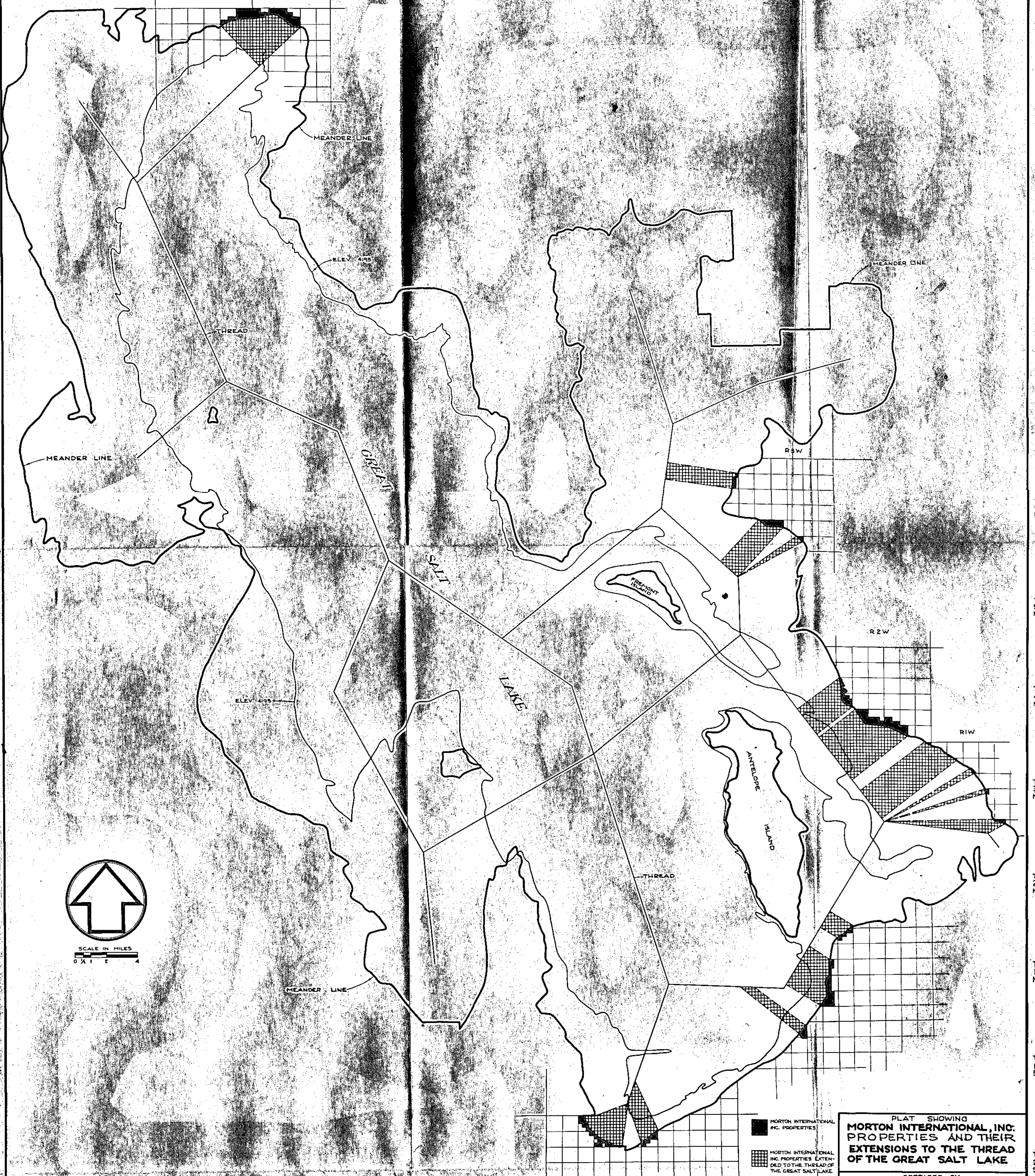
T 5 S

T 2 S

APPENDIX V

PLAT SHOWING MORTON INTERNATIONAL, INC.
PROPERTIES AND THEIR EXTENSIONS TO THE
THREAD OF THE GREAT SALT LAKE

R9W R8W



SCALE IN MILES
 0 1/4 1 2 4

■ MORTON INTERNATIONAL, INC. PROPERTIES
 ▨ MORTON INTERNATIONAL, INC. PROPERTIES EXTENDED TO THE THREAD OF THE GREAT SALT LAKE

NOTE: THE WATER LEVEL AS SHOWN ON THIS PLAT IS AT ELEV. 4195

PLAT SHOWING
MORTON INTERNATIONAL, INC. PROPERTIES AND THEIR EXTENSIONS TO THE THREAD OF THE GREAT SALT LAKE

PREPARED BY
BUSH & GUDGELL, INC.
 ENGINEERS
 865 SOUTH 5TH EAST STREET
 SALT LAKE CITY, UTAH
 57 C 20,300 K.G.V. JUNE 1964

R5W R4W R3W R2W R1W

T3N
T4N
T5N
T6N
T7S
T8S

APPENDIX VI

U.S. SUPREME COURT DECISION ON THE
NAVIGABILITY OF GREAT SALT LAKE--
JUNE, 1971¹

On June 7, 1971, the U.S. Supreme Court held, by an 8-0 decision, that Great Salt Lake was navigable at the time of statehood and, therefore, that the State of Utah owns the lake beds.

Ownership of shore lands exposed by the receding lake since statehood in 1896 will be settled by future litigation. The state claims once the state owns the lake bed, the relected portions still belong to the state. Owners of shore land, including the United States which holds most of the shore lands as public lands, dispute this claim.

¹Deseret News, June 7, 1971.

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HISTORY OF UTAH'S SALT INDUSTRY

1847-1970

John L. Clark

Department of History

M.A. Degree, August 1971


ABSTRACT


Utah salt makers have extracted salt from three sources, the principal of these being brine from Great Salt Lake. Other sources are saline beds in Great Salt Lake Desert and subterranean halite formations in central Utah.

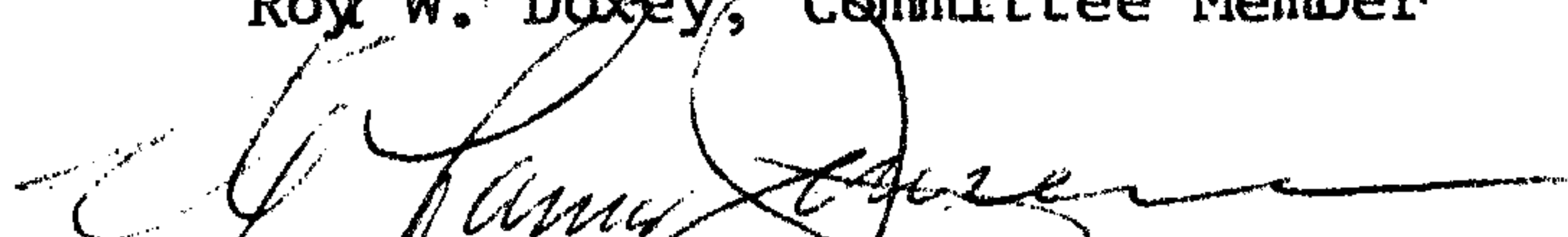
This study traces the development of methods used to recover and refine salt by the industry, in general, and by specific companies. It provides brief, historical sketches of the major corporations and the economic, legal, and environmental factors affecting their growth.

Utah produces about 1 per cent of the nation's salt, exporting over half of it from the state. The major factors limiting the growth of the local industry are the lack of population and industrial development in Utah's market area. Transportation rates for a product with low intrinsic value but high in weight determine this area.

COMMITTEE APPROVAL:


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Roy W. Doxey, Committee Member


De Lamar Jensen, Department Chairman