- - - THE SALT INDUSTRY IN KANSAS. - - -

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References. - "The Mineral Resources of Kansas."

"The 9th Annual Report of the Kansas Bureau of Labor."

"The Kansas Farmer".

Salt is one of most useful minerals that is produced from the bowels of the earth. It is indispensible to us as an appetizer, and for preserving meat, and from Bibical times down to the present it has been in constant demand.

In the first books of the Old Testament, we find salt spoken of, and we have records of its being manufactured by mechanical means before the birth of Christ.

In America, the Jesuit missionaries found salt springs while among the Indians, and as early as the middle of the seventeenth century, salt was manufactured by the Indians in New York. It was not until 1878 that rock salt was discovered in New York, and ten years later, inexhaustable beds were found in Kansas, Michigan, Louisana, Utah, and other states.

The salt in Kansas occurs in two relatively distinct forms: (1) That left in the salt marshes when the evaporation takes place during dry seasons; and second, rock salt, found beneath the surface. The area containing salt marshes reaches from Republic county to Barber county. Rock salt is known to exist under an area comprising several counties in the south central part of the state. (See Plate II). Salt was collected from the marshes as early as 1861, but Kansas was not counted with the salt producing states until rock salt was discovered in 1888.

Two kinds of salt are sent out from the factories; (1), Rock salt, in which the solid rock is blasted, brought to the surface, crushed, screened, and put on the market; and (2), evaporated salt, in which brine is evaporated in large pans or vats, leaving the crystalized salt ready for the market. The former is located in the

Permian formation, a division of the secondary. The two geologic sections (Plates III and IV) show the relations of the salt beds to the other beds in the same formation. The eastern limit of the great salt lake from which this salt was precipitated is fairly well known, but it is not known how far west it extends. In the north and south direction our knowledge covers a little wider area, reaching from Anthony on the south to Kanopolis on the north. By an examination of Plate (III) it will be seen that the salt beds at Anthony are four hundred and four feet thick, while at Kanopolis they are only two hundred and fifty. At this rate of decrease, the beds would dissapear before the north line of the state is reached. The wells show no deposit of gypsum under the salt beds. It seems strange that such extensive deposits of salt could be formed without there being more gypsum under them, while the counties in the northern part of the state at the same depth have so much of it. It is generally believed that the gypsum was precipitated from the water in the northern part of the state, and before the salt was deposited there was a surface movement, making a basin of what is now the salt region; and the water drained into it and evaporated, leaving the salt. The depth of the salt beds varies at different points. Plates (III) and (IV) show the depths at the points in the geologic sections. In the beds of salt, there are beds of shales, but two-thirds of the depth is of salt. Some of the salt layers are from twenty to thirty feet thick, but the most of the beds are from eight to ten feet in thickness. The shales are accounted for by the streams flowing into the inland sea during the Permian age, and carrying in earthy sediment and spreading it out.

The two kinds of salt manufactured in Kansas are produced by

different methods, viz., that of rock salt, and that of evaporation. There are four processes in the manufacture of evaporated salt. A description of each one of the five processes of salt production given in detail will be sufficient to understand how it is carried on at the various points in the salt belt. A description of the Lyons Rock Salt mine will be given, as it is one of the best in the state.

- - Lyons Rock Salt. - -

Rock salt was discovered at this place in 1887, while boring for oil and gas, at a depth of 800 feet. A shaft was sunk to a depth of 1100 feet in 1890, and a large building, 80 X 150 and 85 feet high, erected over it. The company controls 4000 acres of ground, and the shaft is in the center of the area. The shaft is 7 X 16 feet and divided into three compartments; two for hoisting and one for ventilation. The shaft enters the salt bed at a depth of 793 feet, and goes 275 feet into the strata, going through fifteen workable veins, from four to eighteen feet thick. The eighteen foot vein at a depth of 1000 feet is mined, the salt from it giving a test of 99.97 by the salometer. The bottom of the mine is laid off like the streets of a city, the main street being twenty-five feet wide. Pillars fifty feet thick are left to support the roof.

The salt is undercut, wedged, or blasted down. The drilling machines are operated by compressed air. A number of holes are drilled into the salt at a distance of six or eight feet, charged with dynamite and exploded by electricity. Often as much as a hundred tons of salt are broken down at once. The largest pieces are then broken up with hammers, and loaded into cars, holding two tons each, which are hauled to the foot of the shaft by mules or by hand. The salt is hoisted to the surface, dumped into the breakers, and broken

into moderately small pieces. It is then passed through eight screens, which separate it into nine different sizes. All the impurities are then separated from the salt by boys and girls who throw out all the discolored rocks by hand. The nine grades of salt produced vary in size from lumps weighing twenty-five to two hundred pounds each , to the finely powdered article, and are used by ranchmen, packers, manufacturers of caustic soda, and butchers.

The cost of the shaft, buildings, and machinery was $200,000, which seems a large sum to invest in one enterprise; but it has a capacity of 1000 tons per day, and the beds will not be exhausted for ages. The power is furnished by seven large boilers, having together a capacity of 2500 horse power. Also, in the engine room, is the large air compression, which gives a pressure of one hundred pounds per square inch. At present the mine does not run to its full capacity, as there is no demand for so much salt. About seventy-five hands are employed during the year. Lyons has three rail roads, giving excellent means for the distribution of her salt, and were it not that salt can be produced in the Arkansas valley much cheaper than at home, she would be the greatest salt city in the state. Similar rock salt mines are located at Kanopolis and Kingman. Shafts were put down at Anthony, Wellington, and Mickerson, but were forced out of business by stronger and more favorably situated companies.

Notwithstanding the improved machinery which facilitates the production of salt from the mines, only a small portion of the salt used today is produced in this way. The source of most of our salt is the salt wells, from which the salt is taken in a saturated solution and evaporated to dryness.

- - Salt Wells. - -

In this method, there are two main processes: (1) The solar

process in which the heat for evaporation is furnished by the sun, and (2) the evaporation process in which the heat is furnished by artificial means. This latter, however, is divided again into three methods, viz: The pan process, the grainer process, and the vacuum process.

A well supplies enough brine for making several hundred barrels of salt daily, and although some of them have been in operation for several years, there are no indications of their being exhausted. The depth of the wells varies at the different locations.

The only solar process salt plant in the state is located at Solomon City. It consists of a large reservoir, 120 feet square, and four narrow rooms 16 X 300 feet each, called respectively, "water room", "lime room", "pickle room", and "crystal room". The brine is pumped from a well about one hundred feet deep into the reservoir to a depth of twelve inches. Here it remains until concentrated by evaporation by the sun's rays, and until the sediment in the brine sinks to the bottom. The brine then runs into the "water room" to a depth of about twelve inches, where the rest of the sediment is deposited on the bottom. From here, it runs into the "lime room" where the principal soluble impurities, such as gypsum and limestone, are precipitated, when it goes to the"pickle room", and here the formation of the crystals begins. It is then allowed to run into the "crystal room", where all the salt is crystalized. These four rooms have movable roofs which are kept in place when it rains, and removed in fine weather. In the "crystal room", after the salt is crystalized, it is shovelled into large baskets, allowed to drain a few minutes, and taken to a large room,where it becomes thoroughly dry. The size of the crystals depends upon the intensity of the heat. As this process of evaporation is very gradual, the salt is deposited in large crystals.

When thoroughly dried the salt is run between large rollers and crushed, screened, and placed in bags or barrels for the market. This plant has a capacity of about seven thousand barrels of the best salt per year.

The next three processes resemble each other, the only difference being in the application of the heat. So a few words will be common to all.

- - Other Processes. - -

The wells are made by drilling a hole large enough to receive a five-and-one-half inch pipe, which is driven to the top of the salt bed. The hole is drilled nearly to the bottom of the salt. A two-and-one-half inch pipe is placed inside of this large pipe, and allowed to extend to within ten or fifteen feet of the bottom of the well. Fresh water is forced down this smaller pipe by a steam-pump and dissolves the salt. The saturated brine is forced to the surface through the large pipe and allowed to run into the brine tanks where the impurities settle to the bottom. At all plants, besides the brine tanks there are sheds covering the evaporating pans, and a long shed for storing the salt away to dry and barrel.

In the pan process, the evaporation is done by direct heat. The pans are made of three-eighths inch steel, and are about twenty-five feet wide, one hundred feet long, and one foot deep. They are built upon brick foundations, and heated by three large furnaces. When they are full, they are kept at a heat of 200°F. The brine is allowed to evaporate about two hours undisturbed, while the crystals form on the surface. The salt is then raked out upon the flaring sides of the pans, where it drips in about an hour, and then is taken to the store room, where it is piled up in large heaps. Here it remains from twenty to sixty days, when it is barreled and shipped.

By far the greater part of our salt is made by this process. Hutchinson is the chief salt producing city in the state, and this is the method principally used. So plentiful is the salt that brine testing less than ninty-five on the salometer is allowed to escape.

The same process is being used at Kingman and Sterling. The grainer process is a new one, and is just being introduced. It is still a question as to whether it is more economical than the pan process, but there is practically no difference. The plant of the Barton Salt Company at Hutchinson will be described as a model of this process. The evaporating pans in this plant are made of wood, and are twelve feet wide by one hundred and thirty feet long. Running through the interior of this pan are eight pipes carrying steam from the boiler room. The water is evaporated and the salt deposited on the bottom of the pan. The salt is then raked to the sides, and shovelled out on the drip board to dry before being taken to the store room. The steam is furnished by three large boilers, which are at a short distance from the pans. After going through the pipes, the steam returns to the boiler and is used again. There are eight pans in this plant, and the finest salt in the state is produced by it. Other grainers are located at Kingman and Sterling.

The vacuum process introduced into Kansas in 1895, by the Hutchinson Packing Company, produces a very fine grained salt at a small cost. There is a large cylindrical shaped steel box having three distinct compartments. At the bottom and in the central part, is a fire box, in which is kept a hot fire. Then comes the brine compartment, and surrounding this is a third compartment which conducts the heat away. The first and third compartments are connected by pipes, which run through the middle compartment, and give off heat for evaporating the water. The air is pumped out of the top of the

~~top of the~~ brine compartment, so that the evaporation takes place at a low pressure, and therefore a low temperature. The salt falls to the bottom, and is carried away by an elevator, which also replenishes the brine.

The salt beds of Kansas are important to herself and to the surrounding country. Since the discovery of rock salt and the establishment of the salt industry in 1888, salt has decreased in value from $1.219 to the small sum of $0.27 per barrel. Kansas produces 1,800,000 barrels per year, or one twelfth of the amount used in the United States. Kansas ships salt to twenty-five states, and bids fair to always keep the lead in salt production. The salt industry furnishes employment to about eight hundred men and one hundred and fifty girls. Skilled workmen receive from $1.75 to $3.00 per day while the laborers get $1.50. The girls get $3.00 per week.

The occupation is a healthy one, as the mines are well ventilated by steam fans, and accidents rarely occur. The air has a chloric smell and a saline taste and is said to be a sure cure for catarrh and pulmonary diseases in their first stages.

Owing to the extra fine quality produced for dairy and table use, the output in Kansas is increasing. The brand R. S. V. P., manufactured at Hutchinson was awarded the medal at the Columbian Exposition in 1893, as the best in the world.

MAP SHOWING
LOCATION of SALTMINES
IN KANSAS.

PLATE I.

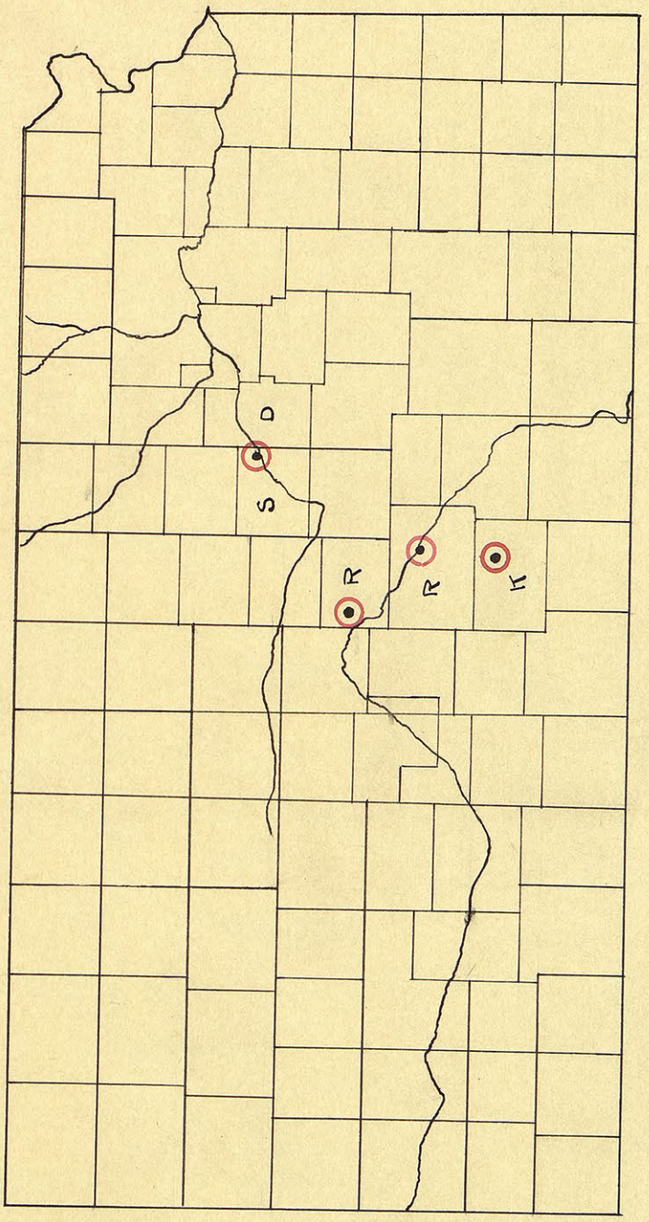

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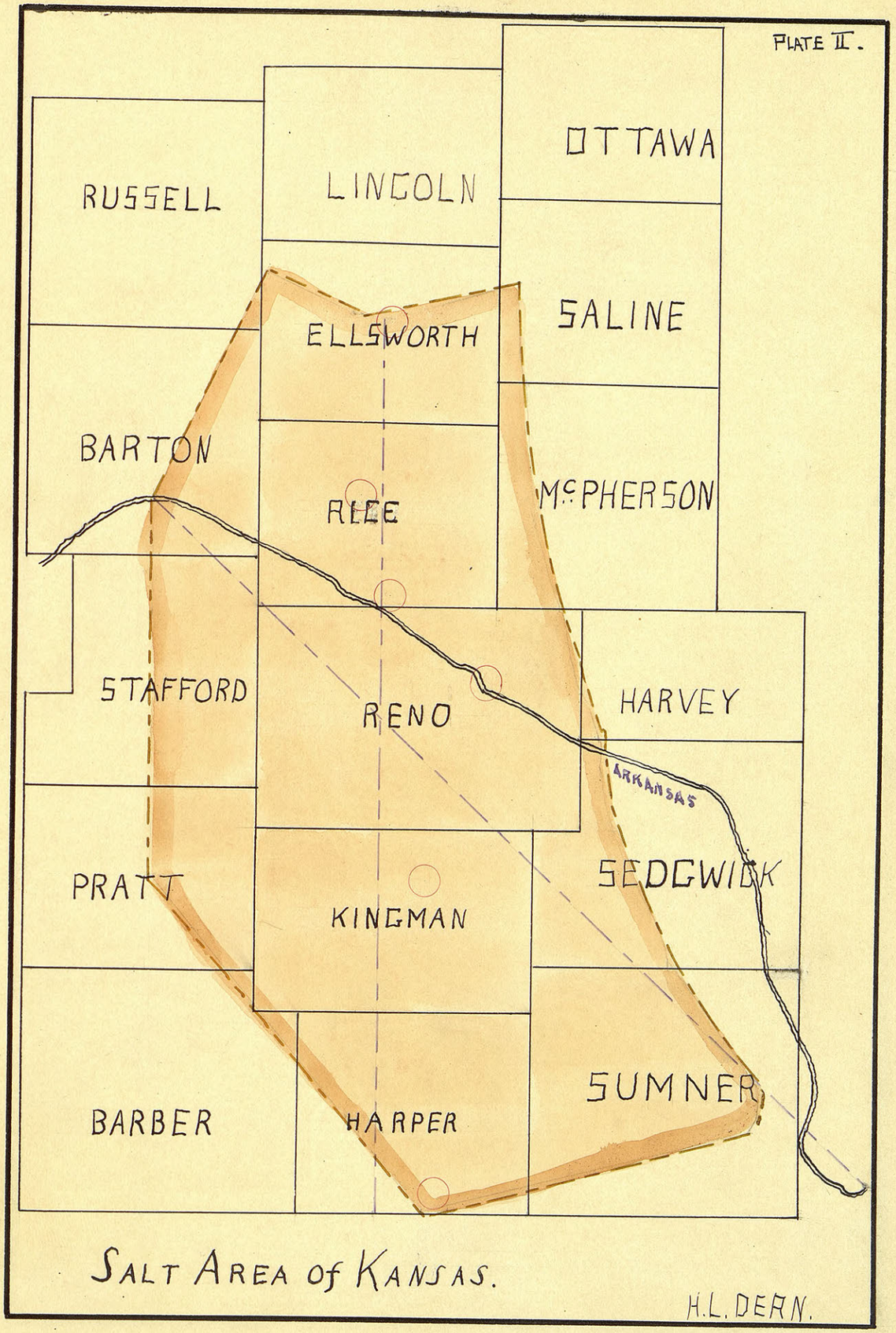
PLATE II.



SALT AREA of KANSAS.

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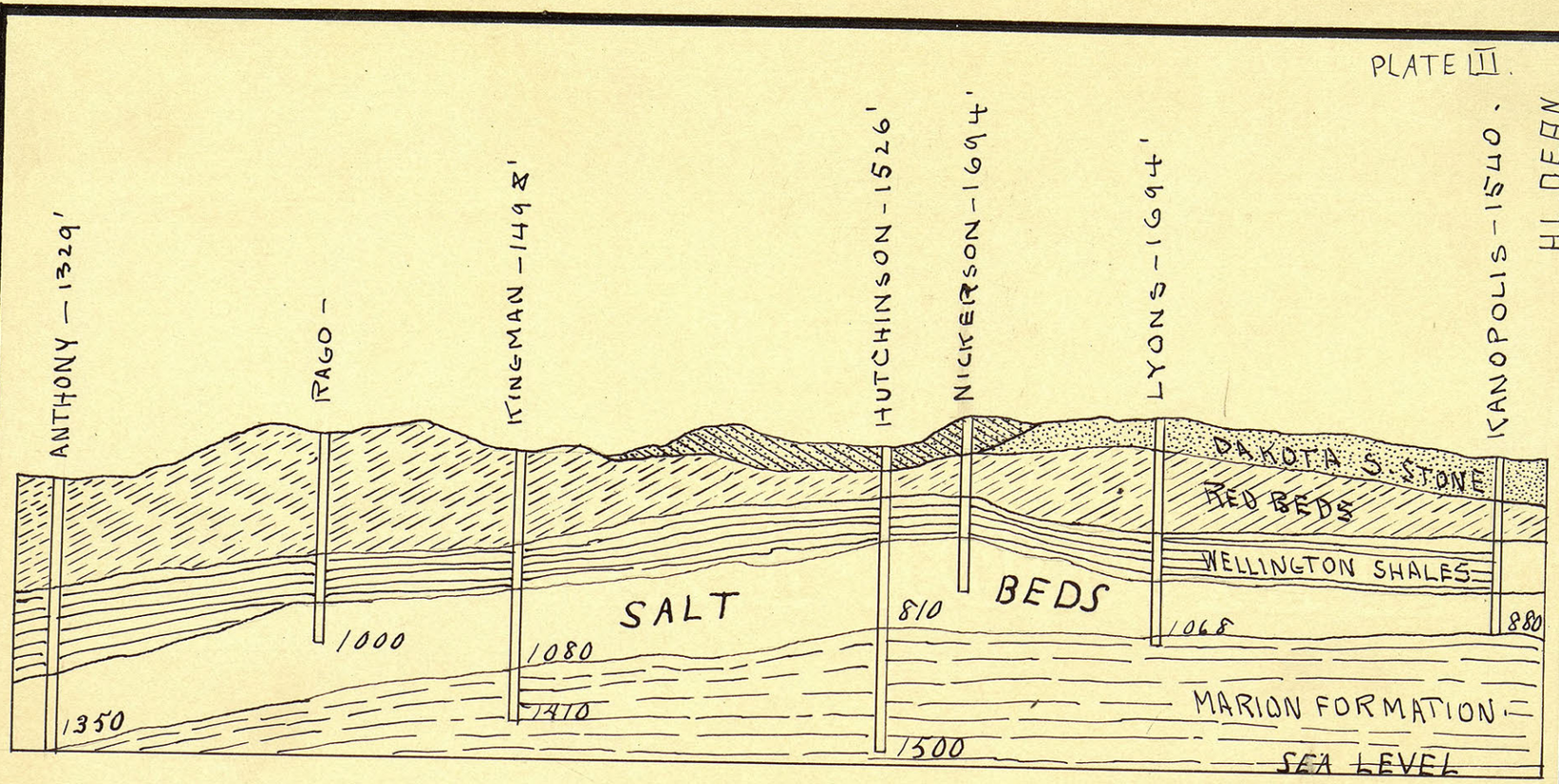
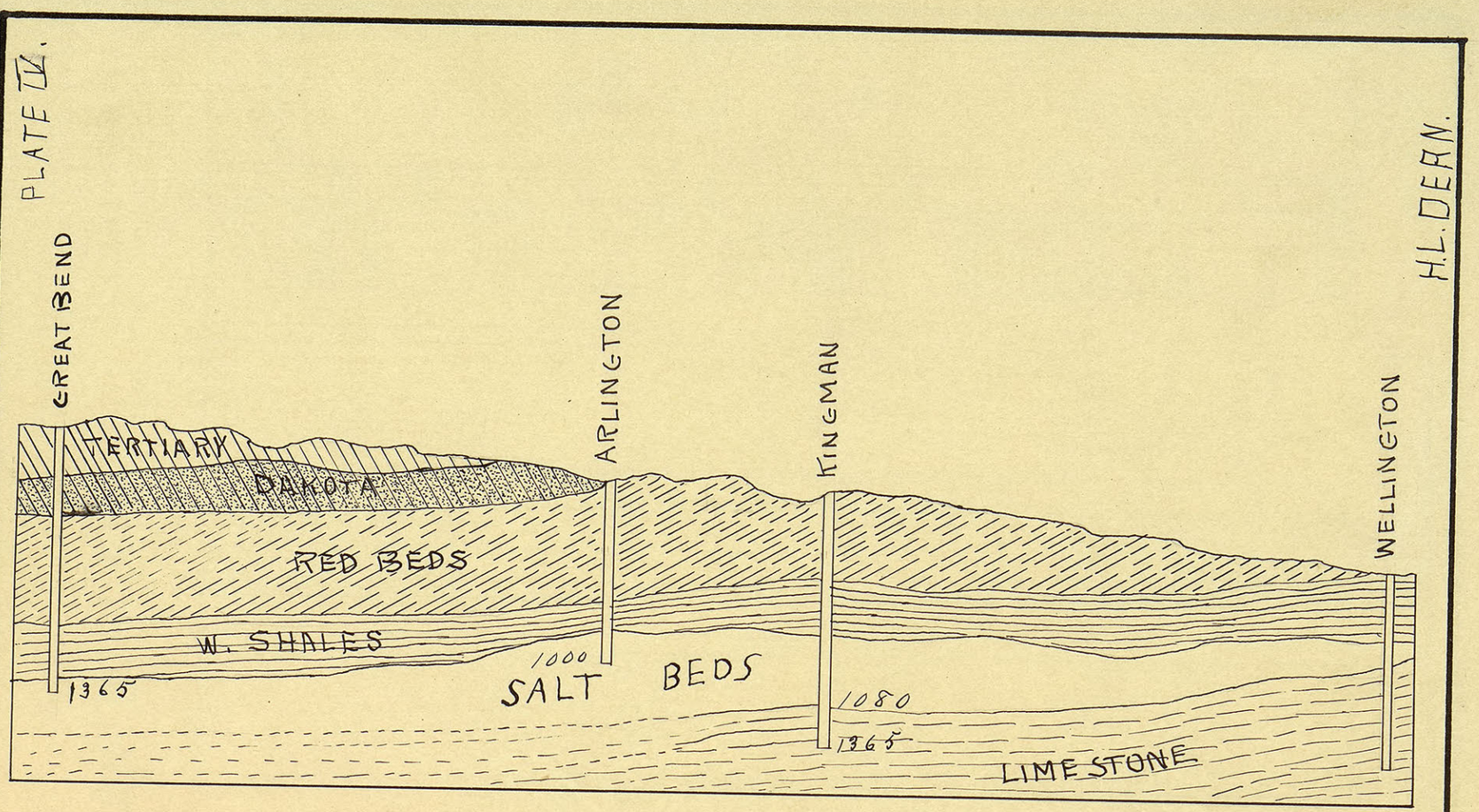
PLATE III.



GEOLOGIC SECTION ANTHONY TO KANOPOLIS

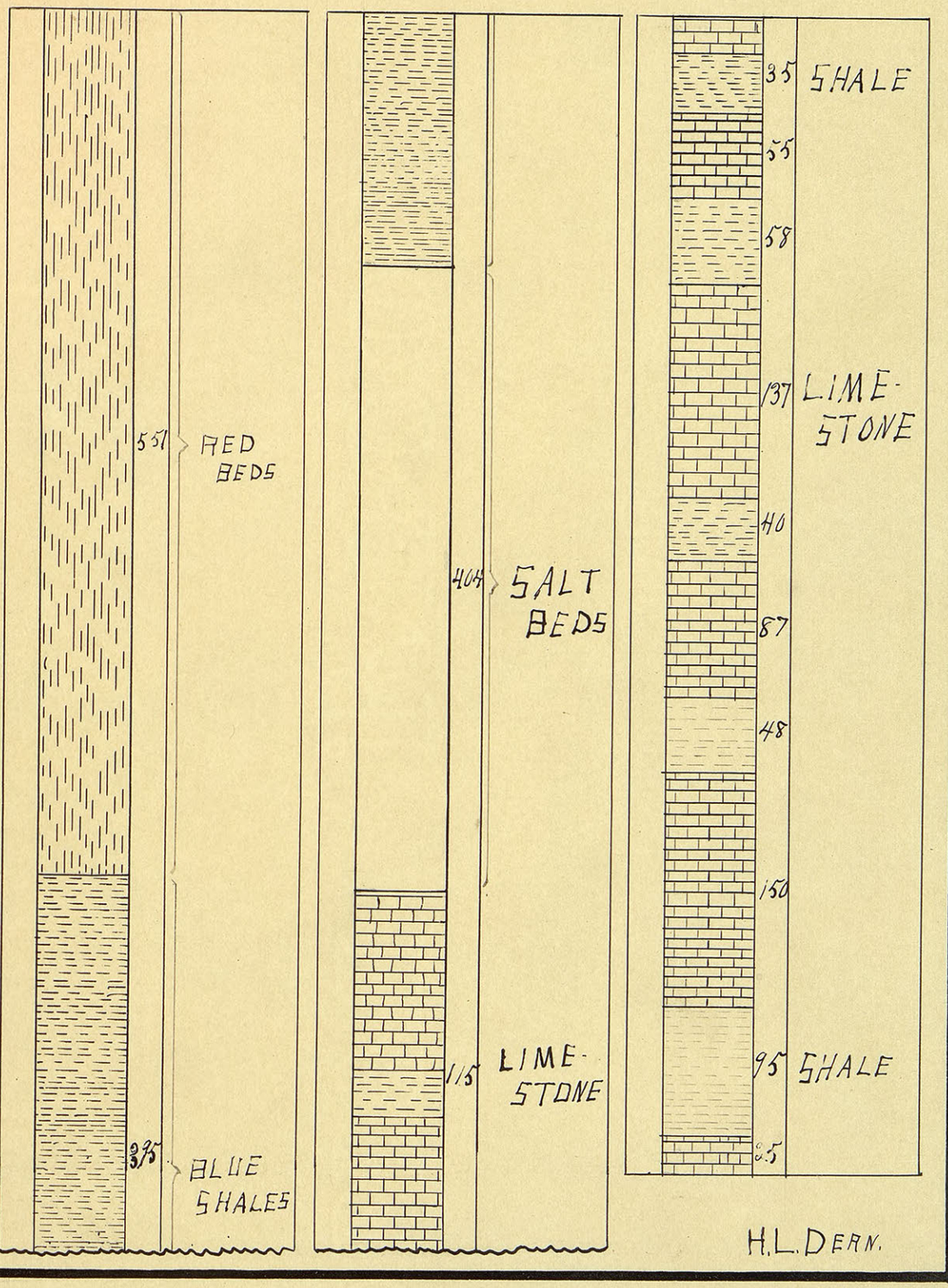
PLATE IV.



GEOLOGIC SECTION. GREAT BEND TO WELLINGTON.

PLATE V.

ANTHONY WELL.



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