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Article Summary: In Nebraska there have been a few periods of wildcat growth in a particular industry, but perhaps none was as intensive as the potash boom during and after World War I. At least five million dollars were invested in the construction of ten huge plants, each with the capacity to produce 100 tons of potash per day. This article presents the misconceptions and truths about this Nebraska boom.

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Names: G L Shumway, Charles W Pool, Francis McCarthy, Carl L Modisett, John H Show, William E Sharp, Heber Hord

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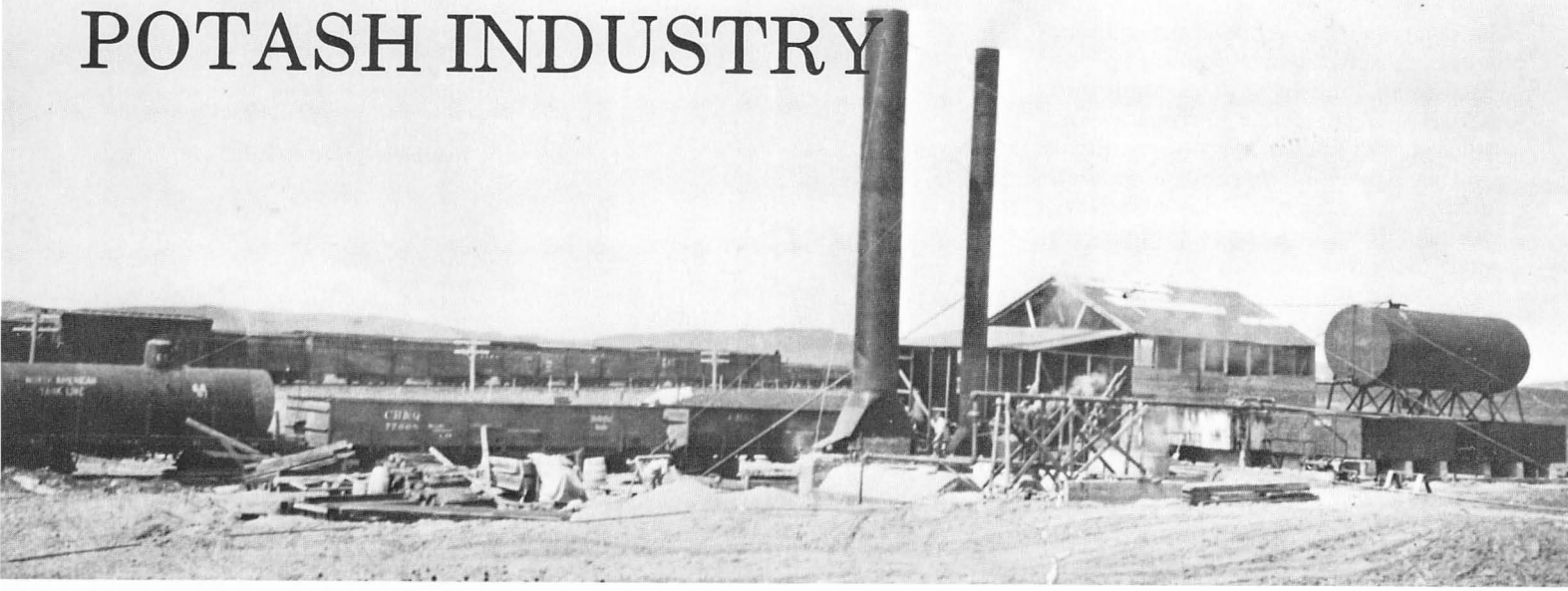
Photographs / Images: Potash Products Company, 1915 at Hoffland; Map showing potash plants in western Nebraska; Photograph of Carl Modisett experiments in lake bed sands; photos of potash process: Swenson evaporators, concentrator pipes, rotary dryers and steam engines; solar evaporation tower of the Potash Reduction Company's plant at Hoffland; National Potash company plant at Antioch; concrete water reservoir of a large plant; Nebraska Potash Company 1917 near Antioch; small company, a ten-ton plant on the shore of a potash lake; open pan evaporation in a ten-ton plant; American Potash Company plant, 1916; National Potash Company plant in 1918, before its destruction by fire 3 months later; The Alliance Potash Company near Antioch, 1917; Hord Potash Company plant at Lakeside; the largest and most expensive facility, the Western plant at Antioch during production and the ruins of the Western plant in the 1920's; graph showing price of potash per unit from 1913 through 1921; Table 1: Expenses, Income, and Profit; Ten Ton Plant chart [Standard Potash Company]

NEBRASKA'S WORLD WAR I POTASH INDUSTRY



The Potash Products Company was built in 1915 at Hoffland, a railroad siding on the edge of the Sandhills in southwestern Sheridan County.

By Richard E. Jensen

In Nebraska there have been a few periods of wildcat growth in a particular industry, but perhaps none was as intensive as the potash boom during and after World War I. At least five million dollars were invested in the construction of ten huge plants, each with the capacity to produce 100 tons of potash per day. To support the industry the towns of Antioch and Hoffland were founded, and at least three other communities experienced noticeable population explosions.

The scale of the industry, the towns it created, and the rumors of exhorbitant profits contributed to its widespread notoriety, but perhaps more important was the popular misconception that the plants produced a product vital for munitions. Unlike most common misconceptions, this one can be traced to its source. Early in 1917 several potash lakes were discovered on state-owned school land, and a company was quickly formed to lease the mineral rights. Since some of the company officials were (or had been) state employees, there were rumors that these men were receiving preferential treatment in securing the leases. In October State Land Commissioner G.L. Shumway and Secretary of State Charles W. Pool issued a press release denying the allegations and assuring the public that they would not tolerate any delays in potash production on state land because "our country needs the product for munitions." Given the patriotic furor created by the war, this statement stood out boldly, and newspaper writers throughout the state perpetuated the erroneous assumption.

Not everyone misunderstood the potash boom. In a sarcastic article about school land leases beginning with a banner headline "Potash for Munitions," the *Alliance Semi-Weekly Times* published the news release and commented that "we have been hearing that practically all of the western Nebraska potash is being used for fertilizer. We may be wrong but it is generally conceded around the plants that the product is not adapted to the manufacture of munitions. So much for patriotism."[1]

Richard E. Jensen, Curator of Anthropology at the Nebraska State Historical Society, is currently doing research for the new Indian Hall at the State Museum of History in Lincoln.

Other newspapers published the news release without the clarification, and from then on, virtually all newspaper articles about potash included mention of munitions or gunpowder. Newspapers in the potash region, whose readers were likely to know the truth, simply ignored the issue and let others expound on the patriotic work of the industry.

Before World War I, German mines produced most of the world's potash, which was used in the manufacture of products as diverse as glass and soap. By 1900 huge quantities were being used as a fertilizer additive in the American Cotton Belt and up to one million tons were imported each year. The price remained fairly stable at about $8 to $10 a ton until 1911-12 when it began to rise, perhaps because of the unsettled political situation in Europe.[2] When the war broke out, the price began to skyrocket in the United States as imports declined and shortages became severe. When the potash boom was at its peak late in 1917, potash was selling for more than $150 per ton.[3]

At war's end, Nebraska potash companies were unable to sell their product because consumers believed cheaper German potash would soon be available. As a result the plants were forced to shut down early in 1919. When imports were not forthcoming, the plants reopened in the fall and continued operations for another year. When normal trade relations were finally reestablished with Germany, the Nebraska firms were unable to offer their product at a competitive price. The demise of the industry was swift if not merciful, as many companies ended in bankruptcy and sheriff's sales.

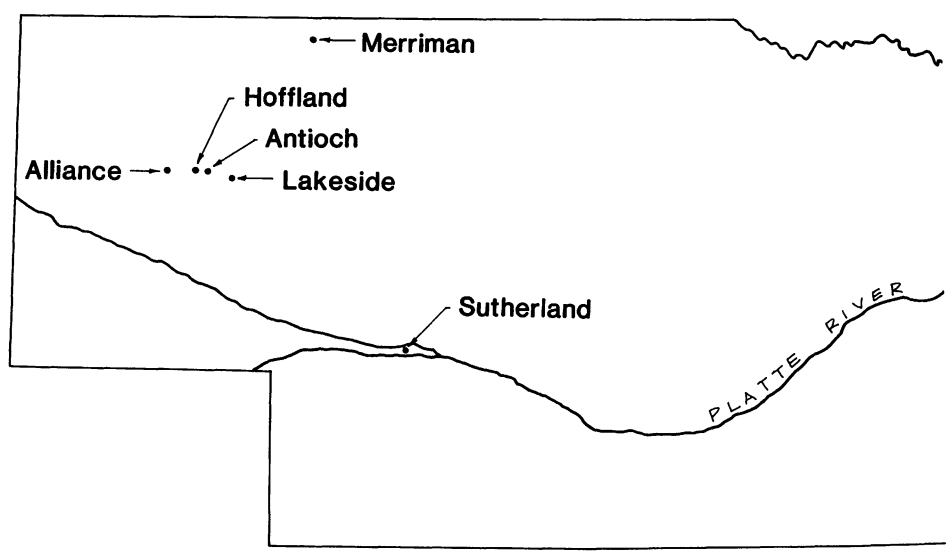
There had been a few experiments in American potash production before World War I. Potash was found as a by-product in the production of beet sugar, molasses, and Portland cement. During the war these sources accounted for slightly more than half the domestic production. However, the most promising single source was so-called alkali lakes. The first attempt to utilize a lake source in Nebraska occurred about 1900. Francis McCarthy collected alkali crusts from the shores of a lake in the Sandhills, packaged this crude potash, advertised it as "nature's product," and sold it in Omaha as a washing compound. This venture certainly did not revolutionize the soap business or relieve the nation's dependence on imports, but it was a testament to McCarthy's ability as a salesman. The cleansing ability of alkali crusts is about equal to that of mud mixed with enough lye to give it a sharp odor.[4]

The first serious attempt to utilize this resource was undertaken in 1911 by Carl L. Modisett and John H. Show. They investigated southern Sheridan and northern Garden counties, where hundreds of lakes are scattered among the rolling Sandhills. Most of the lakes contain fresh water and are surrounded by prime grassland, but there are also many alkali lakes in the area — dead spots of brackish water ringed by sand and alkali crusts. Except for the brief period of the potash boom, these have always been considered worthless.[5]

Show and Modisett found a wide range in the water quality of the Sandhills lakes, which would be critically important in locating profitable sources of potash. The amount of dissolved solids in the lakes varied from less than one percent in fresh water to a high of nineteen percent in Jesse Lake. By comparison, sea water contains about four percent dissolved solids; the Great Salt Lake about twenty percent. Potash accounted for up to thirty-five percent of the dissolved solids in some Sandhills lakes.[6] During peak production years many lakes with lower concentrations were used, but production costs were proportionately higher. A lake with five percent solids (of which twenty percent was potash) was considered a worthwhile source.[7]

After concluding their tests, Show and Modisett convinced several investors that valuable potash resources existed in the western Sandhills. They formed a small company in the spring of 1912 and built a plant on the shore of Jesse Lake, located about three miles north of Hoffland, at that time only some cattle-loading pens on the

Most potash plants were near one of a half dozen western Nebraska towns.



Chicago, Burlington, and Quincy Railroad. About 200 pounds of potash could be produced each day by boiling lake water in large open pans, and in November the first shipments went to Cudahy's in Omaha, to the Swift Packing Company in Chicago, and to the General Chemical Company in New York. The partners confidently announced plans to improve and expand the operation with an additional investment of $50,000. However, most of the money must have gone for operating expenses, because the cost of production still far exceeded the market price. By August of 1913 the plant was closed, and it is unlikely the owners expected it to reopen.[8]

After a hiatus of one year, Show, Modisett, and some of the original investors were back in business, perhaps anticipating the potash shortages caused by the war in Europe. The organization was formally named the Potash Reduction Company, but it was almost always referred to as the Hoffland Company.[9] While the early experiments had been a financial failure, new methods for increasing production and lowering overhead had been recognized. In 1915 the decision was made to locate the plant on the railroad and lay a pipeline to Jesse Lake. Although the initial cost was high, a pipeline was more cost effective than transporting coal to a lakeside plant and hauling the potash to the railroad.[10] Similar pipelines would become standard to the industry and hundreds of miles of pipe were laid. When it became apparent that potash water corroded the iron pipes, they were replaced with pipe made of wooden slats sealed with tar.

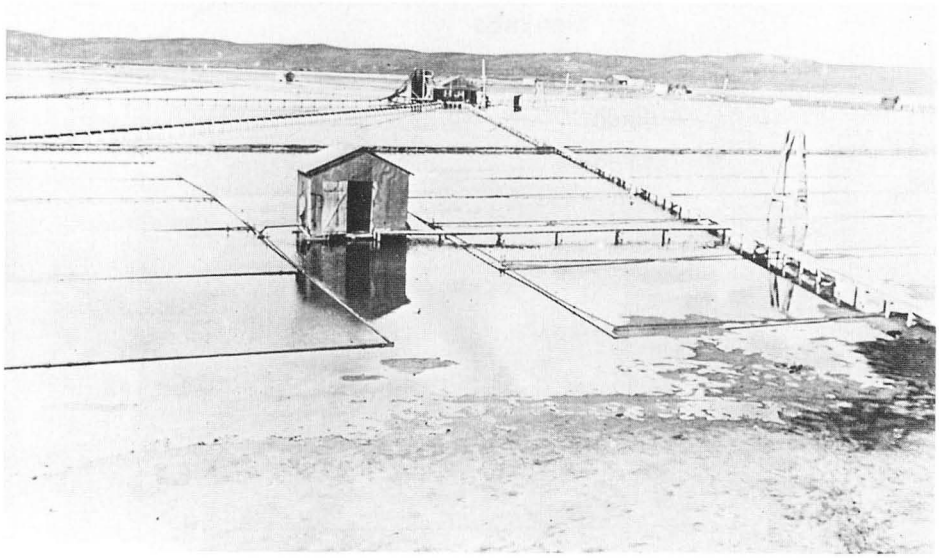
The early tests had shown that water in the sand under Jesse Lake contained more potash than the lake itself, so a network of sand point wells was installed, connected by suction lines to a gasoline-powered pump. When production peaked in 1917, there were 1,200 wells in the lake or about ten per acre.[11] Water was first pumped through a solar evaporating tower, which consisted of large, stacked, open pans, where some of the moisture was lost to natural evaporation. From there, the weak brine was pumped to the plant and through a second tower after which it was ready for the final evaporation process.[12]

This process was little more than an expansion of the one first used in 1912-13. It consisted of four concentration vats each holding about 5,000 gallons. To boil the brine, live steam was pumped through pipes in each vat. The brine in the first vat was brought to a boil, then piped to each succeeding vat where concentration advanced. When the brine reached saturation in the last vat, the wet crystaline mass was shoveled into a box car for shipment. The system was used during the first year of operation at Hoffland.[13] A crew of sixty employees could produce about seven tons of potash each day, but the plant was very inefficient.[14] The coal-fired boilers used huge amounts of fuel because of heat loss from the open vats. Because coal and potash were moved by hand, labor costs were relatively high. A third major expense was hidden in shipping costs. The potash was shipped wet and contained thirty to forty percent water, increasing freight charges by about one third.

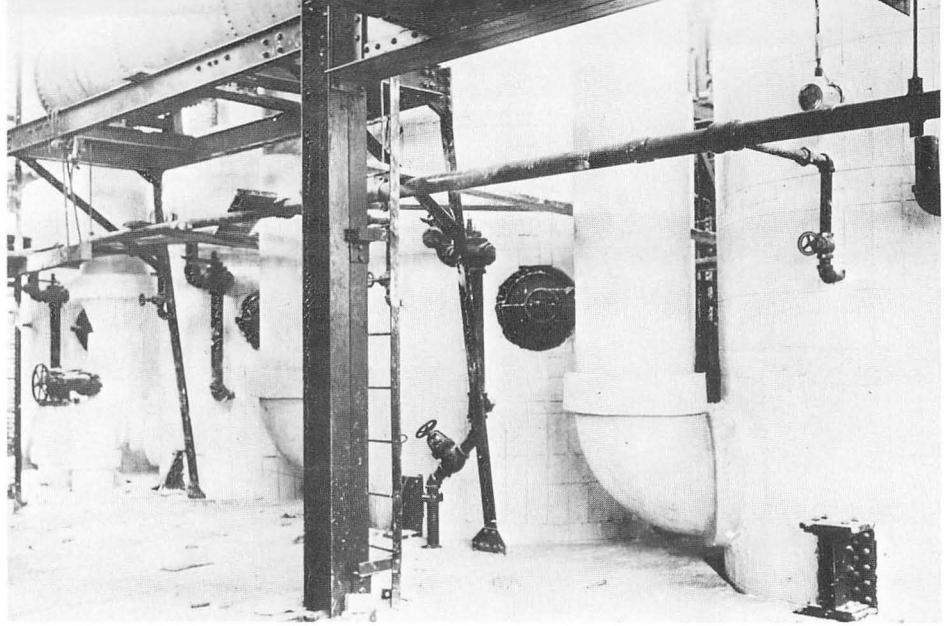
While the vats were inexpensive and required little maintenance, they were not cost effective because of their low rate of production. In 1916 the Hoffland Company installed the first Swenson evaporators. These large airtight steel tanks, which were usually operated in sets of three, were expensive to install and required expert control and maintenance. Each set had the capacity to produce ten to twelve tons of potash per day, and they were extremely efficient when compared to the open vats. These evaporators were later used by all of the big companies.

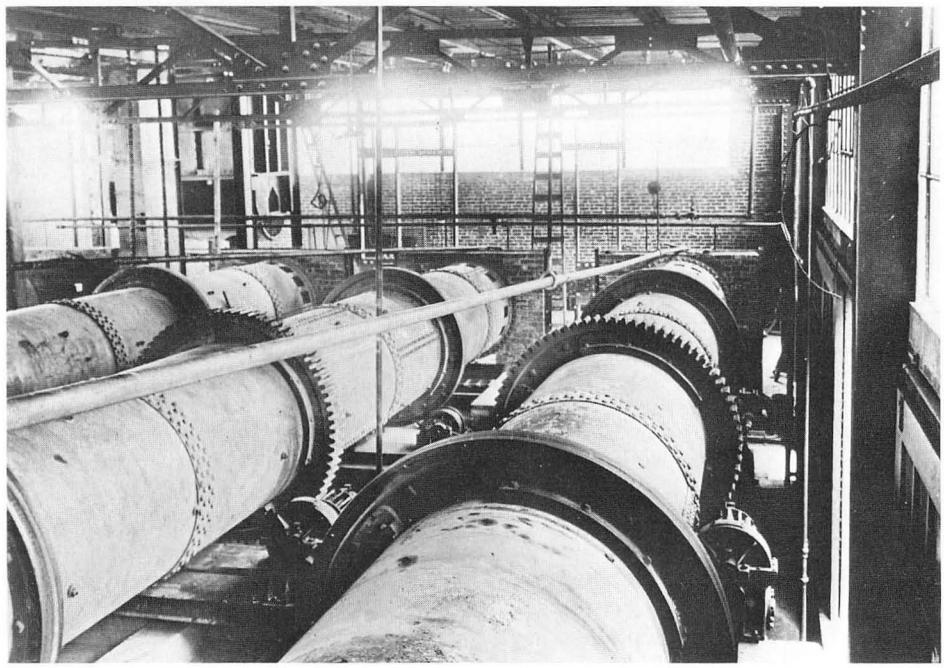
Brine taken from the last evaporator was an extremely concentrated liquid with the consistency of molasses. Crystalization began almost immediately after the brine exited from the Swenson evaporator although a large amount of water was still present. A rotary dryer was used to remove this remaining moisture. Four to six dryers were needed in each of the larger plants. From the rotary dryers the potash, now looking like cinders and ashes, passed through a grinder where it was reduced to the size of granulated sugar. Finally

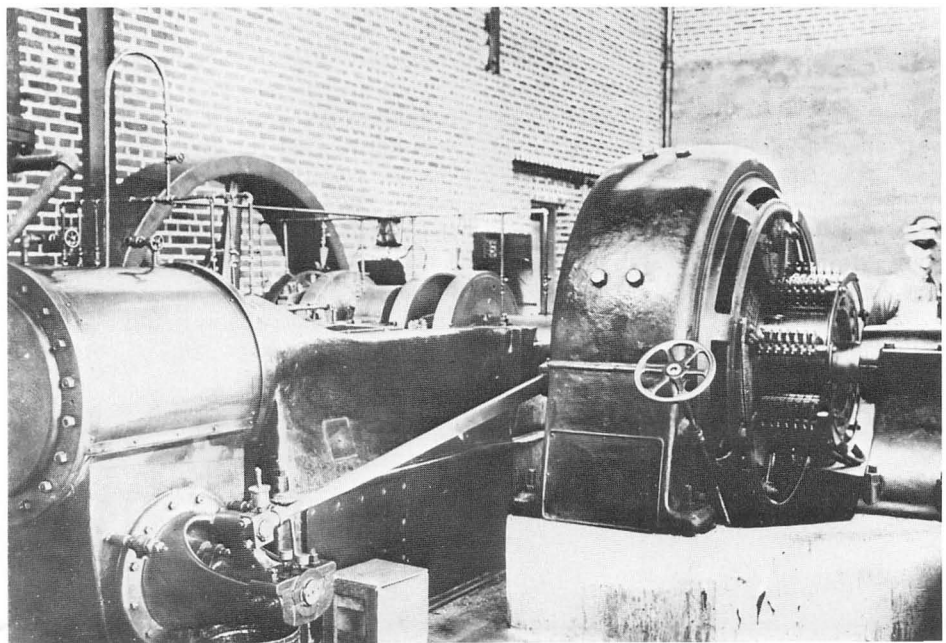
Experiments by industry pioneer Carl Modisett showed that water containing the most dissolved potash was in the lake bed sands. At least 1,200 sand point wells were sunk into Jesse Lake and connected to pipe leading to a central pumping station.

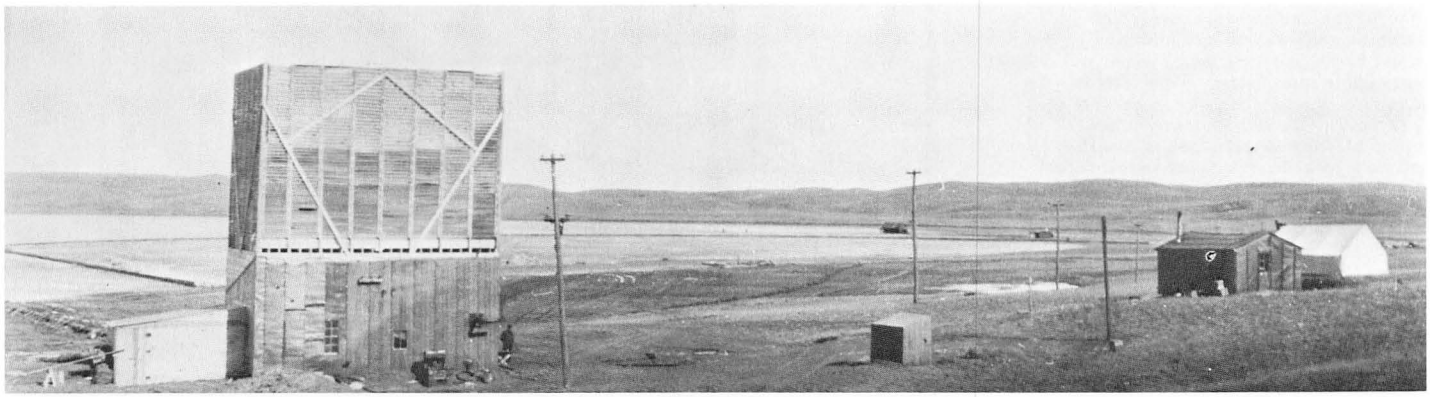


The heart of the process consisted of Swenson evaporators, airtight tanks about twelve feet high, which were operated in sets of three. Water was superheated under pressure in the first and piped to the second, where it was boiled at lower temperatures in a partial vacuum. Live steam was the heat source. If potash began to crystalize in the tanks, it clogged the complex valving systems and resulted in costly delays . . . . (Middle) The concentrate from the evaporators resembled molasses. The last of the water was evaporated in rotary dryers about forty feet long. The concentrate tumbled through the rotating cylinder heated by an open crude oil flame. Dry potash looked like coal cinders and was ground before shipment . . . . (Below) Steam engines drove direct current electric generators to light the plants, which operated twenty-four hours a day during the peak of the boom. Employees' houses were lit by electricity, and the Nebraska Potash Company plant provided power for the town of Antioch.









The solar evaporation tower of the Potash Reduction Company's plant at Hoffland was about forty feet high when construction was finished. It contained twenty floors, each fitted with a shallow open pan. Water pumped to the highest pan overflowed into one beneath it. Sun and wind evaporated much of the water at a low cost.

the potash was bagged in paper-lined burlap sacks which weighed between 160 and 200 pounds. These were shipped by rail to fertilizer companies in the east.[15]

As production increased, attempts were made to reduce the amount of manual labor involved. Railroad cars of coal were emptied directly from trestles into coal bins in the plant. From the bins augers moved coal into the fireboxes in the boiler room. Augers were first installed at Hoffland in the spring of 1917.[16]

Though most of the systems designed to increase the efficiency of the potash reduction process were pioneered at the Hoffland plant, one of the most obvious relics of the era is not present there. All of the other companies built huge concrete reservoirs adjacent to the plant. The largest was six feet deep, 315 feet long, and 190 feet wide.[17] These were usually referred to as spray ponds because a system of nozzles was installed over a portion of the reservoir. Heated lake water was sprayed into the air, and like the solar towers, this system used the wind and sun for evaporation. At Hoffland a natural pond south of the plant may have been used as a reservoir.[18]

Although each of the ten large potash companies searched for ways to increase productivity, none ever achieved a technological breakthrough that resulted in a significant advantage over its rivals. There were differences in the size and arrangement of the plants and the extent to which automation was used, but the process for evaporating water was similar at all of them.

There were also a few notable failures in the search for a more efficient production system. The rotary dryers were a major concern. They "kept one man constantly hammering the walls of the steel dryers to loosen the product from the sides," and as a result, potash dust was "flying around the plant and out on the prairies to be wasted in the winds."[19] The Nebraska Potash Company at Antioch and the Hord Company at Lakeside attempted to solve this problem with enclosed drying chambers. The concentrated "molasses" from the Swanson evaporators was sprayed into the chamber across huge oil burners. It was expected that the "molasses" would dry to the consistency of flour, thus eliminating the need for grinding. It was hoped that the enclosed chamber would retain the potash normally blown away from the open rotary dryers.[20] Several months later a local newspaper writer recalled that the "new fangled notion of a dryer . . . proved to be an absolute failure." The experiment cost one company $75,000.[21]

The Western Potash Company at Antioch also invested heavily in an innovative dryer. It was described as looking like a merry-go-round and although the details of the system are not clear, the wet potash was apparently loaded on a movable platform which revolved over a coal fire. The remains of the Western Plant clearly indicate that several rotary dryers were used, so perhaps the "merry-go-round" was not completely successful.[22]

Any brief description of a potash plant masks both its imposing size and its complexity. Although each plant varied in its configuration, there was an overall similarity dictated by function. A "main building," covering at least one quarter of a city block and three to five stories tall, was constructed of brick, concrete, and steel. The record of disastrous fires in frame buildings convinced plant owners to use more expensive, fire resistant materials. The main building housed the Swenson evaporators, rotary dryers, and grinders. Adjacent to it was a brick engine room for the boilers and steam engines which powered the machinery and the plant's electric system. Near the railroad siding was a frame warehouse where potash was stored to await shipment. Nearby was an office building, dormitories for up to 100 workers, small cottages for married workers, and spacious houses for supervisory staff. Nearly all of these were equipped with electric lights, steam heat, and indoor plumbing — conveniences seldom

found in rural or small town homes of that era. The whole complex covered several acres.

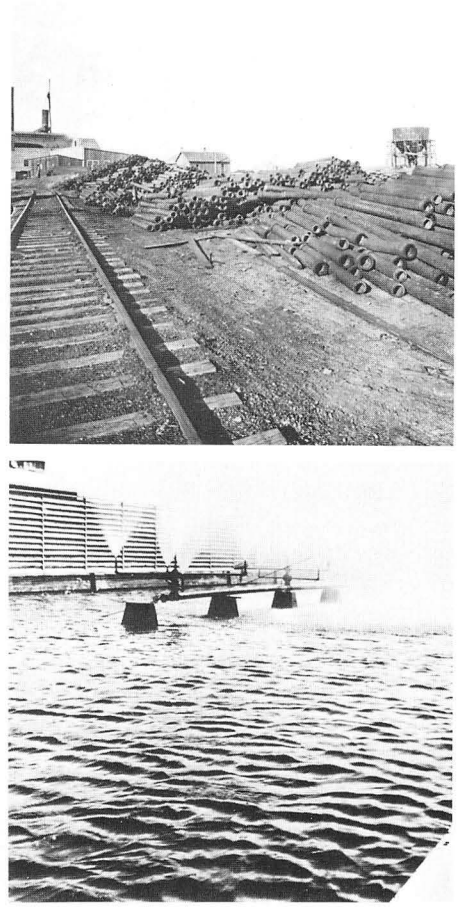
The plant at Hoffland was one of the largest, most productive, and most profitable in the industry. It had the triple advantage of an early start, rich lakes, and canny management. Nonetheless it was not entirely free of financial problems. Hoffland was involved in a costly lawsuit with the Nebraska Potash Company over control of a small portion of Jesse Lake. Numerous reconstructions and refinements were certainly expensive, but little is known about the details. One newspaper writer grumbled, "The Hoffland plant people refuse to give interviews — ever."[23] Improvements expanded the plant's capacity to 200 tons per day with a full crew of 200 men.[24] But early in January 1921,[25] full scale operations ceased, and for the next year there were intermittent experiments to refine potash which were costly but realized no income. There were hints that the company had succeeded in extracting certain saleable components of the crude potash, but it was a false lead.[26] On October 12, 1922, the *Antioch News* reported what may have been the last potash transaction when the company shipped five carloads to be sold at a loss. In the weeks that followed wrecking crews began their work on the foremost potash plant in Nebraska and probably the nation.

Although the Potash Reduction Company (Hoffland) was the pioneer, nine more big companies in the 100-ton-per-day class were organized. Hord Alkali Products had an operating plant at Lakeside by February of 1917, while the American Potash Company began production at Antioch about the same time. The Nebraska Potash Company's plant at Antioch began production on May 1, 1917. The following summer the Alliance Potash Company, the Western Potash Company, and the ill-fated National Potash Company opened at Antioch, and the Standard Potash Company began operations at Lakeside. In 1919 the Berg Potash Company began production at Merriman, and at Sutherland the Republic Chemical Works belatedly began to build a plant. Most of the smaller so-called "ten-ton" plants were erected during the summer of 1918. A few waited another year and paid dearly for missing the crest of the boom.

The American Potash Company was the first to commence operations at Antioch, the town which would become Nebraska's potash capitol. The American company had its origins in the Omaha Exploration Company, organized in 1915.[27] Omaha Exploration was reorganized and incorporated on March 8, 1916, as the American Potash Company.[28] Construction began almost immediately and the first plant at Antioch was operating by February of 1917. Initially the plant produced about seventeen tons of potash each day, but new machinery increased production to an average of sixty tons daily in August 1917.[29] About this time the company accepted an offer from the Western Potash Company to buy their plant for $825,000. One area newspaper reported that American's investors received $4.16 from this sale for each $1.00 invested.[30] This transaction undoubtedly gave credence to rumors that potash investors were becoming millionaires.

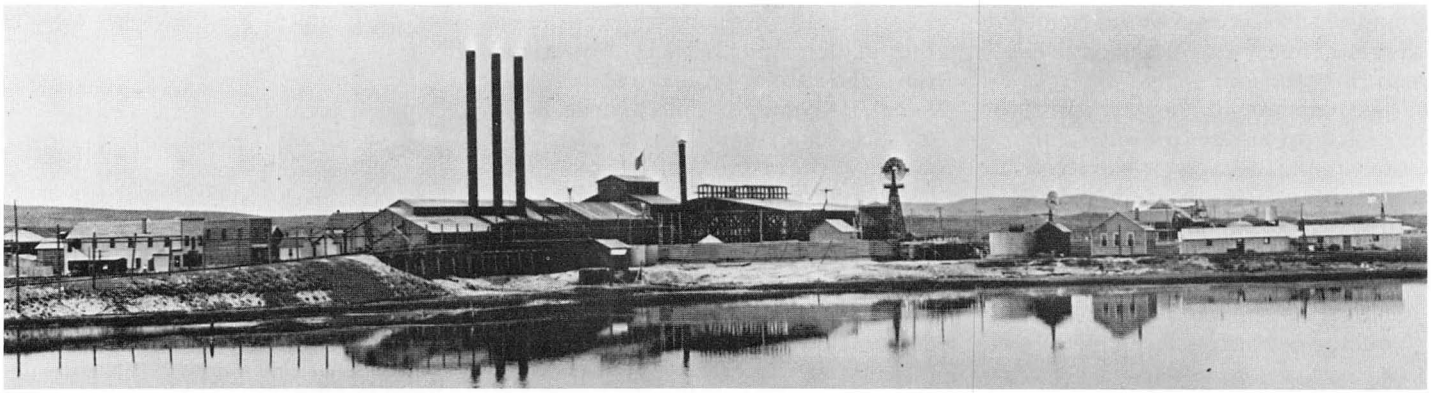
At about the same time as Western was buying the American company, it began construction of another plant, to be the largest and most expensive in the industry. The plant, reported to have cost $524,000 with a total investment exceeding $1,500,000, was ready for production by November 1918.[31] It was a monument to the owners' belief in the permanency of the industry, but despite the enormous investment, the plant never produced any significant amount of potash.[32]

Apparently the owners of American-Western were moving toward a monopoly, for in July of 1919 they merged to become the American Potash Company of Delaware.[33] About the same time they purchased the National Potash Company which had had a plant in Antioch since 1918.[34]

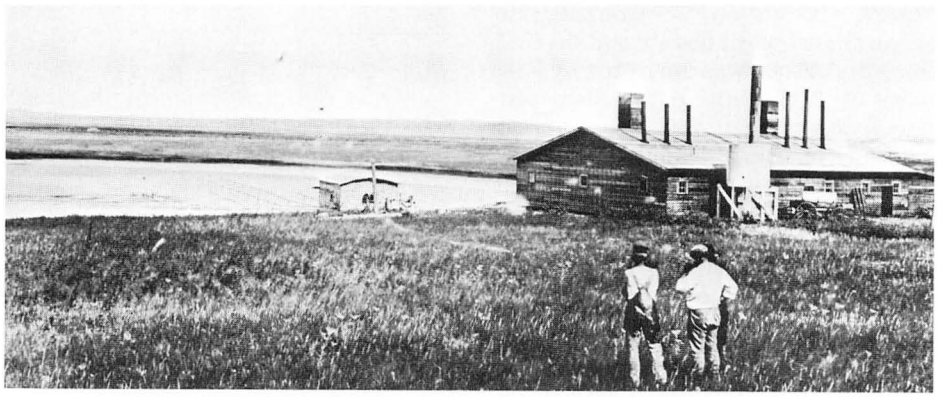


Since all 100 ton plants (such as this National Potash Company plant at Antioch) were located on the railroad, pipelines were laid to the potash lakes as far as forty miles away. Made of long wooden slats fitted together, wrapped with wire, and sealed with tar, they could withstand pressures of up to 300 pounds per square inch . . . . (Below) At the large plants water was held in huge concrete reservoirs. At one end was a spray pond where more water was evaporated by spraying it into the air.

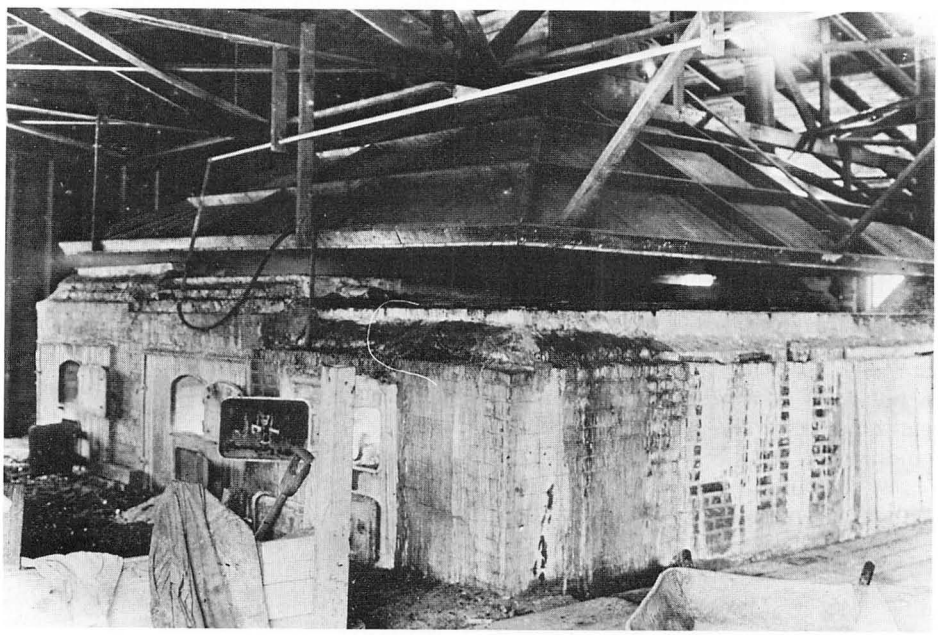
Losses from a disastrous 1918 fire had been a major setback for the National Potash Company. Some of the rebuilding costs were covered by insurance, but apparently the owners sustained a sizeable loss.[35] Debts began to mount, and the company was in receivership by May of 1919.[36] The monopoly-minded American-Western



The Nebraska Potash Company began production in April of 1917. Part of Antioch's business district can be seen to the left (south) of the plant. Reno Lake in the foreground is a fresh water pond.



Many small companies were organized and built so-called ten-ton plants on the shore of a potash lake. Only a few could produce ten tons daily and even fewer were financially successful. Potash was trucked to Antioch or Lakeside and sold to one of the big companies.



In a ten-ton plant water was evaporated in an open pan over a coal-fired furnace. Although inefficient, this method required only inexpensive, easily maintained equipment. Most ten-ton plants had a single rotary dryer.

Company had once offered to buy National but later acquired it at a receiver's sale for a mere $75,000.[37] New equipment was installed, and the plant was renamed the Union Potash Company.[38]

Despite its size and the backing of reputable Nebraska businessmen, American-Western was also beginning to face serious financial problems. All of the companies were forced to close from February to September 1919 after fertilizer companies refused to buy domestic potash. When the plants reopened neither Union nor Western was profitable, and proceeds from the old American plant could not support them.

On December 3, 1920, President William E. Sharp ordered the plants closed.[39] This action destroyed the confidence of some of the creditors who filed a petition in U.S. District Court asking that the American-Western Company be declared bankrupt. Soon afterwards, Sharp and his associates agreed to accept sole control of the company, and the reported indebtedness of $231,000 was paid though the owners sustained heavy losses. By this time the plants were worth only a salvage price.[40]

Another 100-ton plant was built in Antioch by the Nebraska Potash Company. Production began on April 29, 1917, but during the first few months, averaged only about twenty tons per day.[41] Some of the company's lakes contained as little as two percent solids, and it was necessary to evaporate huge amounts of water to produce a ton of potash.[42] In March 1918, Hoffland purchased a substantial block of company stock, putting an end to rumors that Hoffland would build another plant at Antioch.[43] After the merger, the Nebraska Company began pumping from the richer lakes owned by Hoffland, and daily production jumped to an average of 40 tons.[44] The end of the Nebraska Company came in December of 1920 when its production costs exceeded the market price of potash.[45] On July 3, 1921, a fire completely destroyed a large portion of the main building. The owners were probably delighted to receive the $50,000 insurance settlement because it was more than the plant was worth.[46]

The Alliance Potash Company was formed in the summer of 1917. Construction of a plant on the east edge of Antioch began in mid-August, and production started just nine months later.[47] The speed with which the plant was built reflected the owners' commitment to the industry. Within four months after production commenced, work was underway to enlarge the facility.

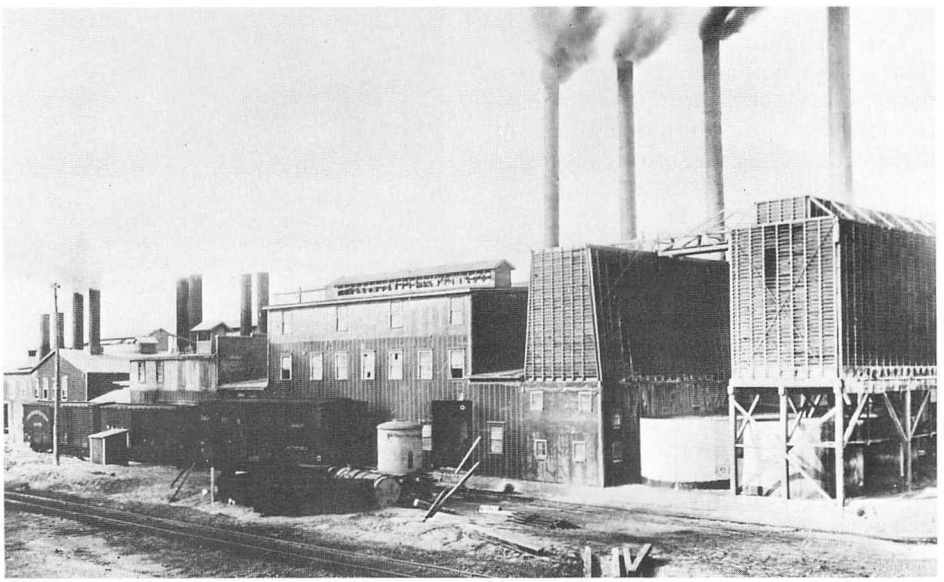
Near-disaster struck in mid-November. A fire started in a coal bin in the boiler room and destroyed part of the plant at a loss of $45,000.[48] This was an insignificant setback when compared to another major inadequacy of the company: its lakes contained a low percentage of dissolved solids and as a result operating expenses were high. Low production and declining potash prices finally convinced the owners that continued operations were futile. The plant closed in November 1920.[49]

After Hoffland, the second company to enter the potentially lucrative business of potash reduction was the Hord Alkali Products Company, a corporation managed by the Hord family. Company president Heber Hord controlled a vast rangeland north of Lakeside which included a number of lakes containing commercial levels of potash. Thus the company did not have the added expense of buying or leasing its potash source.[50]

The Hord plant was built at the southwest corner of Lakeside and commenced operations on February 12, 1917. For short periods it produced its maximum capacity of 100 tons daily but averaged only fifty tons a day during most of its life.[51] Like all plants, Hord closed temporarily in February 1919 when fertilizer companies suspended purchases of Nebraska potash.

Just a few days after the plant reopened on August 31, 1919, a fire destroyed the plant and nearly brought an end to the company. The main building along with costly machinery and 700 tons of coal was a total loss. Six houses, a garage, bunkhouse,

The American Potash Company's plant was operating by the spring of 1916. It was the first of five plants at Antioch, which became Nebraska's potash capital.

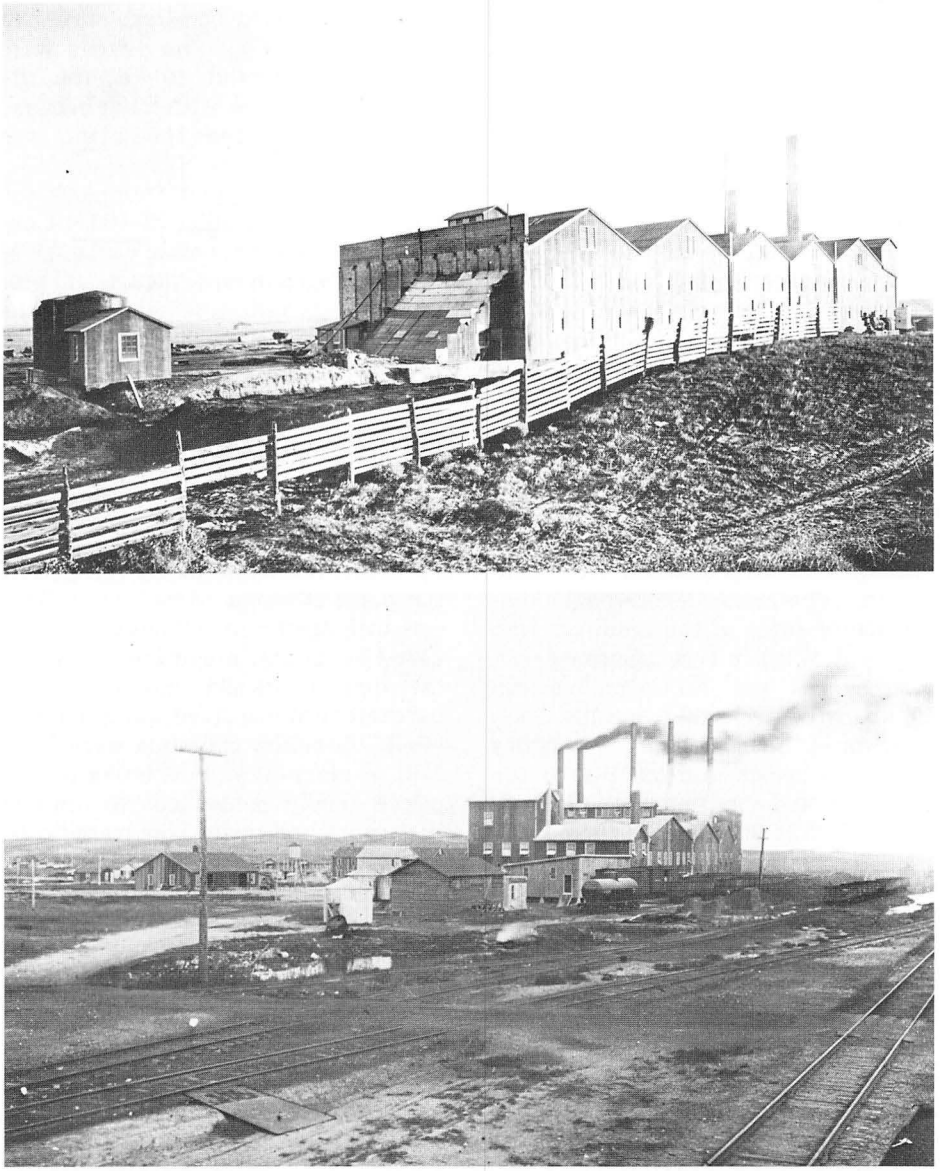


warehouse, and the office were also consumed. Company officials estimated the loss at $600,000.[52] The Hord partners finally decided to rebuild. Reconstruction began near the end of October with fireproof materials — tile, brick, and steel.[53]

Although the potash boom ended in December of 1920, the Hord plant continued full scale operations for another month, closing about February 1, 1921. For the next ten months there was some activity at the plant on an intermittent and experimental basis.[54] But the continued drain of these operations on the assets of the company and the fading hope of an increase in the price of potash finally brought an end to all activity.

The Standard Potash Company was incorporated on November 20, 1917, and in slightly less than a year had completed the second reduction plant at Lakeside.[55] This corporation suffered from the disadvantages common to all open stock companies in a business where timing was of critical importance. The organizers had to convince the appropriate state agencies that the company was not a fraudulent stock-selling scheme and that it had a reasonable chance for success. Then they had to convince potential investors of the same things and this took valuable time.

The Standard plant began production on November 9, 1918, just two days before the World War I armistice.[56] Operations continued for about three months before the plant was forced to close during the suspension of potash purchases. To avoid bankruptcy the board of directors asked stockholders for a loan to pay outstanding debts and provide funds to maintain the plant until the expected reopening. By May $90,000 had been borrowed at ten percent interest, which the company could ill afford to pay. Lenders were offered a chance to redeem their loans for new stock certificates of equal value. The bait for this exchange was the assumption that the stock would earn much more than ten percent once the plant reopened.[57] The scheme was at least partially successful, for the company survived and resumed production again in September 1919.



The ill-fated National Potash Company began operations at Antioch in June of 1918. In September it was destroyed by fire and a new facility (top) was built. In 1919 the plant was sold but proved a financial burden to both groups of owners . . . . (Below) The Alliance Potash Company, located near the northeast corner of Antioch, began production in the fall of 1917.

Standard operated almost without interruption for the next fifteen months. Although the plant was designed to produce 100 or more tons of potash per day, it never achieved this goal and averaged only about thirty-five tons per day. This was enough to pay the company's construction costs, operating expenses, and debts, but it left the stockholders with only miniscule profits. The plant closed on Christmas Day in 1920.[58]

In Nebraska there were two attempts

to produce potash on a large scale outside the southern Sheridan County area. One was at Merriman in northwestern Cherry County and the other was near Sutherland in central Lincoln County. Both ventures failed — primarily because the companies were organized too late to capitalize on the inflated wartime prices of potash.

The William Berg Company began as a manufacturer of wagons in Omaha, but it ceased operations in 1914 with the death of the owner. Four years later it reemerged as the Berg Potash Company, an open stock corporation.[59] In June 1918 construction began on a plant in the 100-ton class. Production began on December 31, 1918, and the next day the first of many misfortunes faced by the Berg Company occurred. A ruptured oil line sprayed the boiler room with crude oil, which immediately caught fire. The fire was quickly extinguished and production resumed in two days.[60] If the investors could have foreseen the future, they probably would have let the plant burn even though by mid-January it was operating twenty-four hours a day, seven days a week. The peak daily production had been forty-two tons, far short of the plant's capacity.[61]

The company was soon in financial trouble. Production had not been sufficient to pay construction and operating costs. The lakes had proved less rich than originally estimated. In order to save the company, it was reorganized as the Merriman Potash Products Company and additional stock was issued.[62] The plant remained closed during the period when no potash was being purchased. In September 1919 the company announced a plan to manufacture fertilizer at Merriman, bypassing reliance on eastern companies to process the crude potash. The new product, combining phosphates, organic "muck" from Sandhills valleys, and the plant's potash, was to be marketed under the "M.P.P." label.[63]

Just as the production of fertilizer reached full operation, the plant was idled due to a coal strike. When it reopened in February of 1920, operating funds were so short that the plant was forced to close for good in May. Stockholders had had enough, and the Merriman Potash Products company's assets were sold at a sheriff's sale in 1921 for $3,624.25[64]

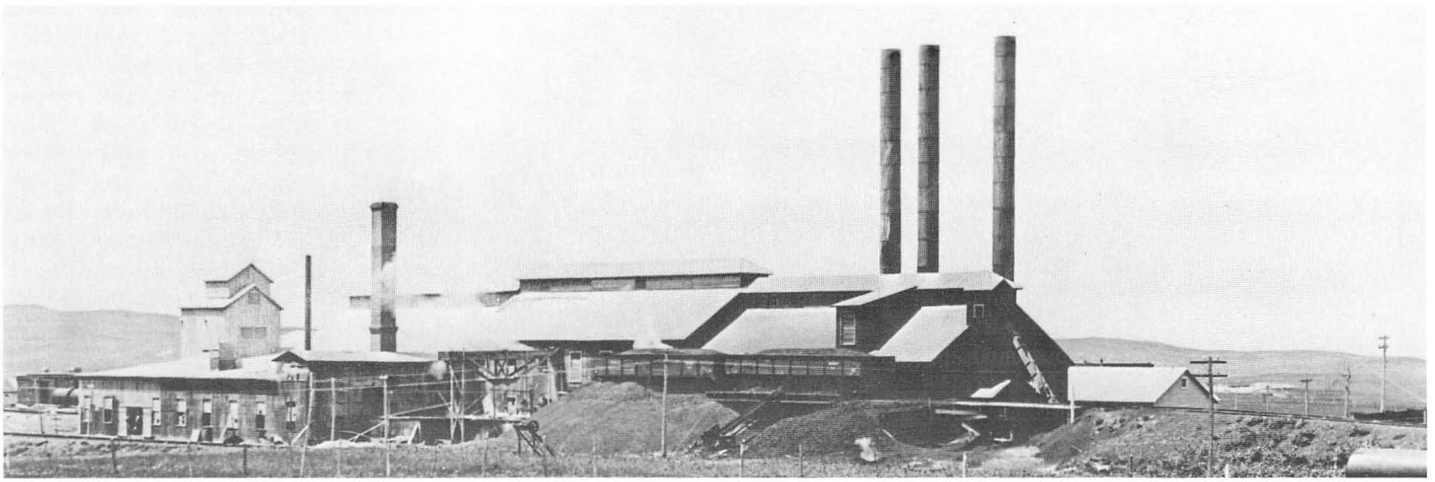
The only other firm to attempt potash production outside the primary lake district was the Republic Chemical Works. In October of 1918 the company began construction of a 100-ton plant about two miles west of Sutherland on the Union Pacific Railroad.[65] By the next summer the plant was nearing completion. At least two lakes were leased, and in June 1919 the wells were installed.[66]

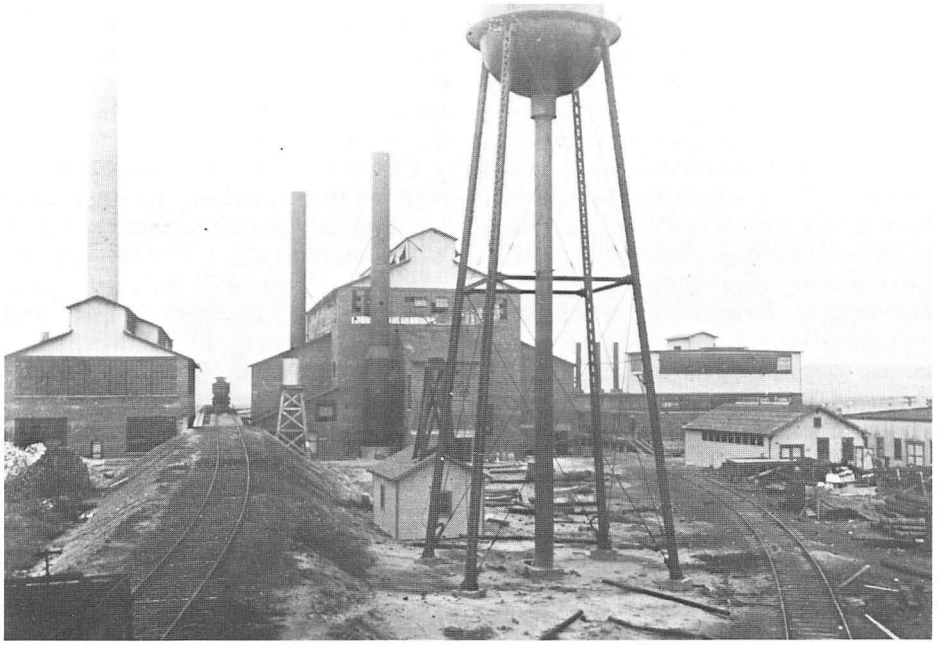
The Sutherland plant was probably ready to begin production at this time, but there was no market for potash and it continued to stand idle through the winter. Early in 1920 the facility was sold to the Mid-West Potash and Refining Company. This firm seems to have been formed for the single purpose of buying Republic and may have been only an internal reorganization rather than a purchase by outsiders.[67] Despite the substantial investment, there is no evidence that the Sutherland plant was ever operational. Late in 1921 Mid-West was sued by a creditor, bankruptcy proceedings followed, and a sheriff's sale ended another financial disaster of the potash boom.[68]

In addition to the ten large corporations, a number of small companies built so-called "ten-ton" plants. This was an optimistic description since few of them could produce at this rate, and none could sustain this level of production for any length of time. At least twenty such plants were built and nine others were planned.

The "ten-ton" plants relied pri-

The Hord Potash Company built one of the two plants at Lakeside. These buildings were destroyed by fire in August of 1919, but the plant was rebuilt and became a financial success.





The largest and most expensive facility, costing in excess of $1,500,000, was the Western plant at Antioch. Apparently the owners invested heavily in potash refining experiments, which contributed to failure of the company . . . . (Below) In the early 1920s all of the plants were dismantled and sold for scrap. The ruins of the Western plant remain as a monument to a unique but largely unsuccessful industry.

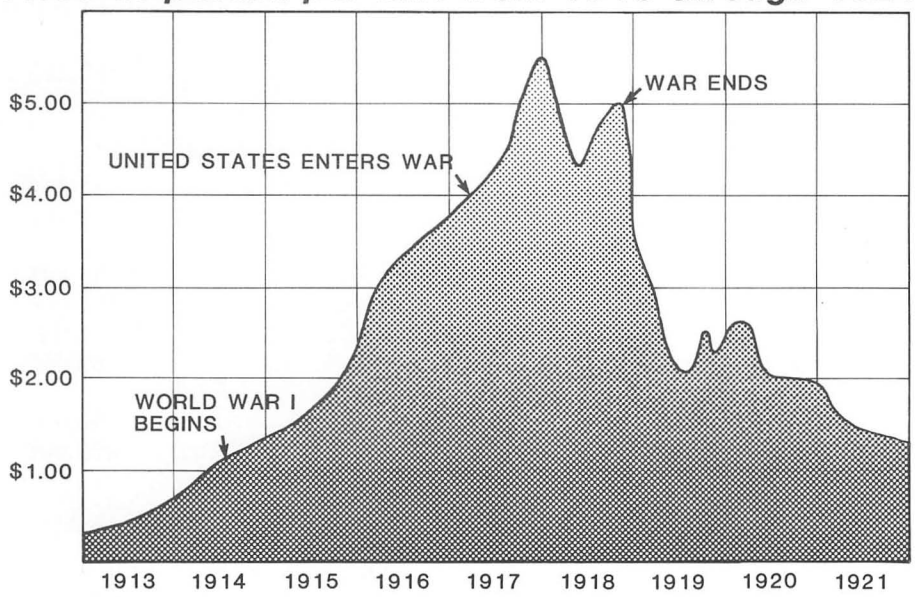
marily on the open pan and solar evaporation systems. Some might have a small warehouse and two or three shacks for employee living quarters. Coal and potash were transported by truck. Production from the small plants was usually sold to one of the big potash companies. Owners of the "ten-ton" plants faced many of the same problems and financial opportunities as the large companies only on a smaller scale. The same ingredients, an early start and a rich lake, were necessary for success. But most small plants were not built until the summer of 1918 or later and were soon burdened with debts of $5,000 to $10,000.

One group of small potash plants did have an advantage. These were built by ranchers who owned a potash lake and thereby saved the expense of lake purchase or lease. Some of these plants were operated as an adjunct to normal ranching operations with labor provided by ranch hands. The majority, however, were financed by outside investors.

In spite of the tenuous foundation for the Nebraska potash industry, the public believed that the industry would be able to compete successfully with German producers after the war. Certainly the massive plants gave every appearance of permanency. Newspapers bombarded readers with assurances that the industry would last, and although there were a few doubters, their voices were rarely heard. Even the signing of the armistice did not create concern. But by January of 1919 rumors concerning the demise of the industry began to circulate. Editors of potash town newspapers denied the rumors and explained away any action which might be construed as anti-industry. When the first reduction in the workforce came, a local paper labeled these workers as shiftless drifters who were fired for incompetence. Honest, hard-working men were told they had nothing to fear and that there was "no reason for pessimism" about the future.[69]

The prediction proved wrong for

Price of potash per unit from 1913 through 1921



during the first week in February, the Hoffland, Western, and American companies fired nearly all their employees and ceased production. Within a few days the other plants followed suit.[70] Newspaper writers forgot past predictions and offered a new theme, assuring readers that the shutdown was only temporary. Those who were patient would soon be rewarded with jobs in a revitalized and permanent industry.

The shutdown of 1919 resulted from speculation about future German imports rather than from any direct involvement by German producers. Owners of Nebraska potash companies knew they could not compete with the Germans in an open market. They believed it would be months or even years before the war-torn German companies could resume operation. In the meantime American fertilizer companies would continue to buy domestic potash at the inflated wartime price. The producers stored tons of potash in rented warehouses without much consideration for the cost.[71]

The fertilizer companies appraised the same future but came to a different conclusion. They believed the cheap German potash would be available, not in a few years, but in time to make fertilizer for the 1919 crop. They refused to buy the high priced domestic potash and forced the Nebraska potash producers to suspend operations.

Shortly after the armistice the potash interests enlisted an influential lobby to plead their case in Washington. Nebraska governor-elect Samuel R. McKelvie, Senator Gilbert M. Hitchcock, Congressman Moses P. Kinkaid, and George E. Condra all argued for an embargo on German potash. In the House of Representatives Kinkaid tried to amend a bill to place a duty on imported potash.[72]

Opposition to controls on imported potash came quickly from southern congressmen. They pointed out that maintaining an inflated price for potash injured not only the fertilizer manufacturers and cotton growers but ultimately the consumers of cotton goods.[73] Just as potash industry leaders must have been considering ways to minimize their losses, assistance came from an unlikely quarter and brought an end to the 1919 suspension of potash purchases.

It was the cotton farmers who ultimately helped the American potash producers. Because of the cost of domestic potash, fertilizer companies in 1919 had drastically reduced the potash content of their product and this fact did not go unnoticed. By the end of the growing season cotton planters recognized the deficiency and were demanding better fertilizer. Under pressure from customers, fertilizer companies returned to the American potash producers with offers to buy their stored surpluses and more. Some 33,000 tons of potash in storage were sold.[74] Plant shutdowns ended in mid-September 1919, and local newspapers announced the good news in banner headlines.[75]

Just as the plants reopened, producers faced a new problem. Labor unrest erupted in strikes in Wyoming coal mines.[76] By November 1919, coal reserves were depleted and no immediate settlement of the strikes seemed likely. Some of the plants were converted from coal to oil, but as many as 27,000 gallons per day were needed to keep the Sheridan County plants in operation on a stand-by status.[77] Full production at the plants did not resume until the end of December when the strike ended.[78]

For fifteen months the potash towns boomed again. The exodus of 1919 was reversed as workers were re-employed. However, the general optimism for the future of the industry was not shared by the plant owners because the market price of potash remained dangerously low, and there was not enough support in Congress for a protective tariff. By November 1920 rumors about another shutdown began to circulate when the Alliance Company admitted that a large order had been cancelled. The Alliance Company closed its doors about November 20, and on December 3 the American, Western, and National plants closed without warning.[79] The remaining companies followed in quick succession, and by February 1921 Nebraska's potash boom was over.

The Nebraska industry could not have survived for any extended period even had prices remained high or a pro-

tective tariff been enacted. Potash lakes were a finite resource and during the short life of the industry the amount of dissolved potash in the lakes rapidly diminished. Certainly the companies realized this, but the results of chemical analysis of lake water were a closely guarded secret. A reliable clue to the diminishing lake quality is revealed in the records of coal consumption at the plants. It required more than a ton of coal to evaporate enough water from a very rich lake to produce a ton of potash. If a very weak lake was used, much more water had to be evaporated with a related increase in coal consumption.

The plant at Hoffland was undoubtedly one of the most efficient, and Jesse Lake, their principal source of water, was one of the richest lakes. Prior to the temporary shutdown in 1919, an average of 1.22 tons of coal was required to produce a ton of potash.[80] From the plant's reopening in October until the final closure over a year later, the average coal consumption rose to 1.55 tons per ton of potash. There was a similar increase at the Nebraska plant over these same two periods. Although the Nebraska plant was touted as being highly efficient, the company lakes contained less potash than those at Hoffland. It required 2.09 tons of coal to produce a ton of potash prior to the 1919 shutdown and 2.43 tons of coal during the last months of operation. Statistics from other companies show a similar trend. In less than five years the most productive companies were using twenty-five percent more coal to produce the same amount of potash. At this rate, the cost of production alone would have been prohibitive in a few years.

While the industry had the potential for very high returns on investment, few individual investors had the luck or the wisdom to time their investments to realize such returns. Timing was the single most important factor in determining profit or loss. The price of potash had risen gradually from the beginning of the war in Europe, and by December of 1915, it was approximately equal to production costs. During the next twenty-one months the price doubled, held fairly steady for thirteen months, and then crashed. After the 1919 shutdown there was a slight revival, but this recovery was brief.

Maximum profits would have been made by those who invested early in 1916 and who then sold out near the end of 1918 just before the industry began to falter. The owners of the original American Potash Company very nearly achieved optimum timing. The owners of the Hoffland plant were also successful by virtue of their early start. At the other extreme were latecomers who invested after construction costs and operating expenses had risen and the price of potash was ready to plummet. There is no data relative to the number of winners and losers in the potash gamble, but scattered bits of information make possible an estimate of the relative success or failure of each major company and (from that) of the industry as a whole.

Unfortunately there is little data on the exact profits or losses of each company because few records have survived. Very incomplete records for the Standard Company and general information from other sources make it possible to draw some conclusions about the financial status of these organizations. The Standard Company records though fragmentary are the best available. They include various financial statements, trial balance sheets, and lists of outstanding obligations. Records of the Burlington Railroad provide data on the plant's potash production via tabulations of carloads shipped. An examination of the physical remains of the Standard plant show it to be near the median size, and there is no evidence of rebuilding. Table 1 provides data on income and expenses of the Standard Potash Company gleaned from available records.[81]

The profits earned by Standard represent slightly less than four percent per annum on the investment, certainly far below the excessive profits the public believed potash investors were making.

TABLE 1

EXPENSES	
Construction	
Plant construction and equipment	437,185
Engineering, contractor fees, and organizational costs	37,450
Operating Costs	
Supervisor salaries, legal fees, office supplies, travel (30 mo.)	51,300
Labor, 25 workers at .35/hr. for 25 mo.	41,562
Royalties paid to lake owners, projected for the life of plant	31,469
Coal, 36,400 tons at avg. 2.50/ton	91,000
Shipping (based on mean of $12/ton)	191,040
Leases of potash lakes	59,000
Incidentals, taxes, insurance (author's estimate)	50,000
Total	990,006
INCOME	
Potash Sales	
15,920 tons, est. value 2.50 per unit of K20 per ton of potash	1,049,554
PROFIT	59,548

The profits or losses of other companies can only be estimated. The Standard Company figures provide a basis but other factors must also be considered. The ratio of potash production to coal used is a revealing clue to a plant's efficiency and/or the lake water quality, both of which were keys to financial success. The length of time a plant was in production and setbacks such as fires are other factors that must be considered.

The Hoffland plant was clearly the most profitable. An early start, ownership of a high quality lake, the best coal-to-potash ratio, and a total production in excess of 90,000 tons are all indicators of success.[82] The Hord Company shared many of these advantages, but a destructive fire curtailed operations and limited production to 48,760 tons. Nevertheless the company must have realized a substantial profit. The Nebraska Company with a production of 27,760 tons would have made modest profits, perhaps better than Standard's profit due to Nebraska's earlier start. The original American Potash Company was very profitable, producing 18,000 tons of potash when prices were highest. The second owners of the firm were not so fortunate for they paid a high price for the company when the market was declining. The same group built the Western plant, reportedly costing $1,500,000, after the boom was well past. American-Western must be counted among the major financial failures. The National-Union Plant, with its low production and major fire, would have been another failure. The Alliance Company produced 14,040 tons of potash but would have had one of the highest production costs in the industry as indicated by a potash-to-coal ratio of 1 to 3.72. Alliance may have been at the breakeven point. The plant at Merriman was in constant financial trouble that led to bankruptcy while the one at Sutherland was never completed.

TEN-TON PLANTS

Company	*Built*	*Producing*	*Location*
Acme	spring 1918	summer 1918	6 miles north of Lakeside
Berigan	summer 1918		Ellsworth
Burnham	May 1918	June 1918	2 miles sw of Antioch
Burns		fall 1918	15 miles north of Antioch
Commonwealth	spring 1918	1919	near Birdsell
Ellsworth	summer 1918		Ellsworth
Fenner	fall 1920	fall 1920	west of Antioch
Great Northern	summer 1918	fall 1918	4 miles ne of Antioch
Great Western	spring 1918		5 miles se of Ellsworth
Hawkeye		fall 1918	nw of Antioch
Liberty		summer 1918	13 miles north of Antioch
Lincoln		fall 1918	16 miles north of Antioch
Omaha Potash & Refining	fall 1918		Lakeside
Peterson	fall 1918 (not completed)		Antioch
Pioneer		fall 1918	4 miles north of Antioch
Robbins		fall 1917	4 miles se of Antioch
Rogers-Smith		fall 1918	4 miles se of Antioch
Sauerwine		late 1917	5 miles se of Antioch
Walker	late 1918	spring 1919	4 miles north of Antioch
Wilson		summer 1918	east of Antioch

At least nine additional small companies were organized, but there is no evidence to suggest that they built plants or produced any potash.

Although the potash industry as a whole was a financial failure, its impact extended far beyond the company owners and investors. The towns of Antioch and Hoffland were built, then razed in the seven-year, boom-to-bust cycle of the industry. The resultant population shift nearly caused a division of Sheridan County. In the state capitol, politicians and bureaucrats became involved when lakes were discovered on state-owned land, while in Washington they argued the merits of a protective tariff. Within a year or two after potash production ceased, the plants, the controversies, and even the towns were gone.

NOTES

[1]*Alliance Semi-Weekly Times,* September 18, 1917.
[2]George E. Condra, *The Potash Industry of Nebraska* (Lincoln: Nebraska Bureau of Publicity, n.d.), 38.
[3]*Alliance Herald,* December 13, 1917.
[4]*Nebraska State Journal,* October 28, 1917, 14.
[5]Condra, 29. *Alliance Semi-Weekly Times,* October 18, 1912.
[6]Victor Ziegler, "The Potash Deposits of the Sand Hills Region of Northwestern Nebraska," *Colorado School of Mines Quarterly* (Golden, Colorado, 1915), 15-21; Condra, 12-13.
[7]*Nebraska Farmer,* December 19, 1917, 1351; *Nebraska State Journal,* October 28, 1917, 14.
[8]*Alliance Semi-Weekly Times,* November 15, 1912; June 6, 1913.
[9]Condra, 29-31.
[10]*Nebraska Farmer,* December 29, 1917, 13. *Alliance Semi-Weekly Times,* August 10, 1917.
[11]Condra, 25.
[12]Ziegler, 23.
[13]Ibid.
[14]*Alliance Semi-Weekly Times,* October 5, 1915.
[15]In 1917 and 1918 numerous newspapers published descriptions of the operations and facilities.
[16]*Alliance Semi-Weekly Times,* April 24, 1917.
[17]The ruins of the Antioch plants were mapped and photographed by the author in 1977.
[18]*Antioch News,* August 15, 1918.
[19]*Alliance Semi-Weekly Times,* September 28, 1917.
[20]Ibid; Condra, 32.
[21]*Antioch News,* January 30, 1919; July 7, 1921.
[22]*Alliance Semi-Weekly Times,* October 11, 1918.
[23]*Antioch News,* October 20, 1921.
[24]Ibid., November 20, 1920.
[25]Ibid., January 13, 1921.
[26]Ibid., January 19, 1922.
[27]*Nebraska State Journal,* October 18, 1917.
[28]Nebraska State Historical Society Archives Record Group 13, Number 161.
[29]Val Kuska Collection of Chicago Burlington and Quincy Railroad records, Monthly Station Reports, Nebraska State Historical Society MS 1431. Hereafter referred to as Kuska Collection.
[30]*Alliance Semi-Weekly Times,* January 8, 1918.
[31]Ibid., October 11, 1918; *Alliance Herald,* December 13, 1917.
[32]Kuska Collection.
[33]*Antioch News,* August 7, 1919.
[34]Ibid., June 27, 1918; December 4, 1919.
[35]Ibid., September 26, October 3, 1918.
[36]Ibid., May 29, 1919.
[37]Ibid., November 6, December 4, 1919.
[38]Ibid., April 8, 1920.
[39]Ibid., December 9, 1920.
[40]Ibid., June 22, 1922; December 7, 1922; *Alliance Herald,* December 31, 1920.
[41]*Alliance Semi-Weekly Times,* May 1, 1917; Kuska Collection.
[42]Condra, 33.
[43]*Alliance Semi-Weekly Times,* November 16, 1917; March 8, 1918.
[44]Kuska Collection.
[45]*Antioch News,* December 9, 1920.
[46]Ibid., July 7, 1921; *Alliance Semi-Weekly Times,* August 31, 1921.
[47]*Alliance Semi-Weekly Times,* May 3, 1918.
[48]Ibid., November 12, 1918.
[49]*Antioch News,* November 11, 1920; Kuska Collection.
[50]*Antioch News,* December 30, 1920.
[51]*Alliance Semi-Weekly Times,* February 13, 1917; Kuska Collection.
[52]*Lakeside Sun,* September 4, 1919.
[53]*Antioch News,* October 23, 1919.
[54]Ibid., October 21, 1921.
[55]Nebraska State Historical Society Archives Record Group 13, Number 278.
[56]*Lakeside Sun,* February 6, 1919.
[57]Nebraska State Historical Society Archives Record Group 13, Number 278.
[58]*Alliance Semi-Weekly Times,* December 31, 1920.
[59]*Omaha Daily Bee,* March 6, 1919, 9.
[60]*Merriman Maverick,* January 3, 1919.
[61]Ibid., January 17, 1919.
[62]Ibid., April 4, August 29, September 19 and 26, 1919.
[63]Ibid., October 31, 1919.
[64]Ibid., February 18, 1921; *Antioch News,* September 1, 1921.
[65]*Sutherland Courier,* October 31, 1918.
[66]Ibid., March 13, June 19, 1919.
[67]Ibid., March 18, 1919.
[68]Ibid., December 15, 1921.
[69]*Antioch News,* January 30, 1919.
[70]Ibid., February 6, 1919.
[71]Ibid., December 12, 1918.
[72]*Alliance Semi-Weekly Times,* November 26, December 10, 1918.
[73]*Antioch News,* November 7, 1918.
[74]*Nebraska State Journal,* August 5, 1919.
[75]*Antioch News,* September 18, 25, 1919.
[76]*Omaha World-Herald,* September 12, 1919.
[77]*Antioch News,* October 30, November 6, 1919.
[78]*Alliance Semi-Weekly Times,* December 23, 1919.
[79]*Antioch News,* November 4, 25, December 9, 1920.
[80]Kuska Collection.
[81]Nebraska State Historical Society Archives Record Group 13, Number 278.
[82]Kuska Collection.