KANSAS GEOLOGICAL SURVEY
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GYPSUM

by

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Blue Rapids

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KGS OF ND-1

According to the report of the University Geological survey of Kansas, published in 1899, there were eleven gypsum mills in operation in Kansas in 1898; today there are two. In 1898 the industry was in its infancy, gypsum plasters had not yet replaced lime for base coat plastering, and gypsum board and lath were unknown. Mechanical equipment in 1898 was crude, transportation problems were difficult, and costs were high.

Since then, the industry has grown to be one of the major factors in the building field. In 1929 a Market Survey of Gypsum Products, covering the period from 1890 to 1927, was published in the magazine Rock Products by R. M. Santmyers, Mineral Specialist, U. S. Bureau of Mines. This survey shows that gypsum production increased in the United States from 291,638 tons in 1898 to 5,346,888 tons in 1927, about eighteen times as much in 1927 as in 1898. The survey also breaks these figures down by states as follows:

	TOTAL TONS 1898	TOTAL TONS 1927	RATIO 1927 TO 1898
OKLAHOMA	3,150	271,484	86
NEW YORK	31,655	1,675,501	53
IOWA	24,733	792,159	32
OHIO	21,303	474,320	22
TEXAS	34,215	508,382	15
MICHIGAN	93,181	668,617	7
KANSAS	59,180	175,351	3
OTHER STATES	24,221	781,074	32
TOTALS	291,638	5,346,888	18

Thus, from the above, Kansas gained far less during this expansion period than any of the other states. In 1898 Kansas ranked second only to Michigan in tons produced; by 1927 Kansas was in seventh place or last among those states which possess extensive deposits of gypsum.

Since 1927, there have been no new developments of Kansas gypsum. New mills have been established in some of the other states, thereby probably making a similar comparison today still less favorable to Kansas.

Thus, the need for a definite program is clearly indicated.

The gypsum deposits of Kansas may be divided into three classifications, according to the products which may be manufactured from them:

(1) White rock gypsum with a purity of 98% or better, free from sand or grit of any kind, suitable for the manufacture of special white plasters, which can not be made from the grades listed under (2) or (3) below.

(2) Rock gypsum, which is contaminated to the extent that it can not be classed as in (1) above but well suited for the manufacture of wall plasters, gypsum wallboard and lath, and other products not requiring an exceptionally pure gypsum.

(3) Gypsite or dirt gypsum, lying in beds on or near the surface of the ground. This gypsum is in a finely divided state, requires only light crushing to remove lumps, and sometimes requires drying. It is not suitable for the manufacture of wallboard and lath but can be used for the manufacture of wall plasters. As described later, it is valuable for agricultural use as a crop stimulant.

The two deposits of gypsum which are being worked at present in Kansas, by the Certain-teed Products Corporation at Blue Rapids and the National Gypsum Company at Medicine Lodge, are of exceptional quality, equalled in the United States only at Southard, Oklahoma. For some purposes these deposits are superior to the Oklahoma deposit. Therefore, both of these deposits belong in Class (1) above.

Both companies utilize this high grade gypsum for the manufacture of special products, which require the use of pure white gypsum, and it is shipped over the whole of the United States and to other countries for making potters' moulds, for bedding plate glass during the polishing operation, for the manufacture of statuary, for making dental impressions, for running mouldings and for casting ornaments used for decoration of the ceilings and walls of theaters, hotels, and other large buildings, for gauging lime for white finish coats for walls, and for numerous other minor uses

The Medicine Lodge plant also is one of two or three in the United States that is equipped for the manufacture of Keene's Cement, that plant being the pioneer in the field, and the product today has the reputation of being the best obtainable. This company was known as the Best Brothers Keene's Cement Company until about a year ago, when it became the property of the National Gypsum Company.

Since a premium is paid for the special white plasters, practically none of the gypsum is utilized by these two companies for the manufacture of gypsum wall plasters, which, of course, provide the great bulk of the plaster business. Both companies have mills in Texas and Iowa, which manufacture wall plasters in large volume.

Other deposits are known in the state, which have indications of being comparable in quality to the two now being worked. Therefore, the promotion of these deposits with some of the other gypsum companies now operating in other states, but which are unable to compete in the special plaster fields because their present deposits are not sufficiently pure, would be one function of the project.

Gypsum wall plasters, as previously stated, provide the bulk of gypsum production. Second to them comes the manufacture of gypsum wallboard and lath, a section of the industry that has grown by leaps and bounds during the past fifteen years. The latest figures show that 1,181,237,868 square feet of wallboard and lath were manufactured in the United States during 1938, using approximately 600,000 tons of gypsum.

Kansas is known to have extensive deposits of rock gypsum in Class (2), not entirely suitable for the special white plasters but admirably suited for wall plasters and for gypsum wallboard and lath. However, not one square foot of the latter is being made in Kansas and very little wall plaster is being manufactured, due to the reticence of the two operating companies to utilize their high grade gypsum for that purpose. Therefore, especially since the building industry is again reviving at the present time, another function of the project would be the preparation of definite information on these deposits, which would then be available to interested parties and which could be presented to the people of the state and to the gypsum industry.

The gypsite or dirt gypsum deposits, lying principally in the central part of the state, might be utilized for the manufacture of wall plasters. However, there are two reasons why they should not be promoted for this use. First, the trend in Kansas and in neighboring states is away from the dark wall plasters made from gypsite and more and more in favor of the whiter plasters made from rock gypsum. Formerly, the gypsite plasters had certain physical properties which made them more suitable for wall plasters. The advent of the tube or ball mill for processing the plasters made from rock gypsum has overcome the objections to this type of plaster and it is today considered more satisfactory than the gypsite plasters. Second, the gypsite deposits are scattered and the supply in any one deposit is by no means inexhaustible within a reasonable period of time.

However, numerous deposits of gypsite are known in Kansas and the problem with them resolves into two parts, a use for the gypsite and a method of working the deposits profitably.

A vast field for gypsite has been waiting for many years and has never been developed to any extent. The quotations on the following pages are only a few from a number available in the literature on the use of gypsum in agriculture:

"The State of Washington Experiment Station has recently completed tests on crops grown on gypsum treated land. They found that worn-out lands were restored to life on gypsum treatment. Wheat diseases were greatly reduced and greater yields of better milling quality were grown on gypsum treated soils. It is claimed that the gypsum furnishes the necessary sulphur to the soil to replace that lost by drainage and cropping of legume and mixed hay. Application of land plaster (gypsum) puts the soil in better condition; it acts as a flocculent or deflocculent, depending on the nature of the soil. Increased yields of legume hay with higher protein value result."
- Rock Products

"The use of gypsum is recommended for seep and alkali lands.....Many of the diseases of farm stock are due to shortage of lime and sulphur in the forage. One authority states that gypsum has been used with great success as a cure and preventive of tuberculosis in cattle. German authorities make the statement that foot and mouth disease is not apt to occur where gypsum is used in the stable and feed yards."
- University of Idaho Bulletin

"The use of gypsum in northern Idaho to fertilize alfalfa plots has produced increased yields with a higher protein content. Professor C. R. McDole of the University of Idaho states 'The use of gypsum has been one of the most valuable recommendations yet developed by the Soils Department of the College of Agriculture and through its use the farmers have benefitted materially.' A gypsum treated test plot yielded 6160 pounds per acre in comparison with an untreated check plot yield of 2760 pounds. It is claimed that one application of gypsum lasts five years. Four year tests made on cutover lands in western Montana by the extension office of Flathead County have shown the increased yield to be over 100%. In nearly all cases the gypsum is applied at the rate of 200 pounds to the acre."
- The Idaho Farmer

"Recently incorporated, the Sulpho-Lime Products Company, Tacoma, Washington, will build a plant to pulverize gypsite from a 50 acre deposit procured by the company at Canford Mills in the Nicola valley in British Columbia, Canada.....The pulverized product will be marketed as a destroyer of plant and fruit tree insects and accelerator of plant growth. .....The company plans to dust a considerable acreage in eastern Washington by airplane to demonstrate the effectiveness of the product."
- Rock Products

"Gypsum exerts a physical effect similar to that of lime on the clay and adobe soils, improving the crum structure and making it more pervious to air and water. Therefore, gypsum makes clays looser, tends to prevent packing and baking, makes plowing and cultivating easier and, in general, makes the soil physically a healthful medium for plant growth. Gypsum, like lime, furnishes the element calcium, which is as essential for the growth of beneficial bacteria and other micro-organisms of the soil as to higher plants. Gypsum stimulates the beneficial soil organisms in the nodules on roots of leguminous plants, like the peas, beans, vetches, alfalfas, and clovers.....In alfalfa fields of several years standing, in which bare patches are found, an application of gypsum, not to exceed 300 or 400 pounds to the acre, alone with fall disking, will usually stimulate the plants and rejuvenate the field."
- University of California, College of Agriculture Bulletin

No elaborate equipment would be necessary for the utilization of the gypsite deposits for agricultural use. Many of the sand and gravel companies use portable plants, which work the small deposits and which can be moved readily from one to another to keep the plant close to the prevailing best markets. Portable plants are, therefore, suggested for the gypsite. The design of such a plant should be drawn up as part of this project.

PROJECT PLAN

A SURVEY OF LITERATURE

A study of all literature pertaining to gypsum, to be continued during the course of the whole investigation with the following objectives:

(1) Information leading to the manufacture of gypsum products not thought of today.

(2) Information leading to the substitution of gypsum for other materials used in industry at the present time.

(3) Data for the formulation of interesting and factually correct promotional articles for the use of the Commission in disseminating information.

B GEOLOGICAL SURVEY

A follow-up of the work of the Kansas Geological Survey, which has previously surveyed the gypsum resources of the state. With the co-operation of the State Geologist and the Geology departments of the state schools, this work should be carried out with the following objectives:

(1) Supplementation of information obtained by previous survey work by determining the approximate extent of gypsum deposits not previously surveyed fully.

(2) Complete information on deposits discovered since the last survey work was done.

(3) Depletion of the gypsum from previously surveyed deposits.

C CHEMICAL AND PHYSICAL TESTS

Complete tests of samples obtained from all known deposits of gypsum in the state, tests to be made in the same manner as they are made today by the gypsum companies:

(1) Sampling of deposits in approved manner by the use of a core drill for rock samples and by taking scoop samples of gypsite deposits.

(2) "Short" chemical analyses of the samples, as made by the gypsum companies, with complete analyses when considered necessary.

(3) Color comparison tests (Rock samples).

(4) Tests for grit (Rock samples).

(5) Other tests suggested in the course of the investigation.

(6) Classification of each deposit from the results of the above tests, according to the type of product for which it is suitable.

D PLANT LOCATION SURVEY

A complete survey of each gypsum deposit, which tests show to be of commercial value, with respect to the following points:

(1) Availability of rights to deposit from present owner.

(2) Type and size plant suited to deposit.

(3) Available site for plant.

(4) Available markets.

(5) Transportation facilities.

(6) Available power.

(7) Labor availability.

(8) Prevalent labor rates.

(9) Tax rates.

(10) Condition of any remnants of plants formerly operated in the vicinity.

Note: While the above survey is being made, information should be obtained on the operation and closing of plants formerly operated, where such plants existed.

E DESIGN OF PORTABLE PLANT

The design of a modern and easily portable plant for the stripping, digging, drying, pulverizing, and loading of gypsite, together with complete data regarding the cost of the plant and probable operating costs. The data developed on this to be used by the Commission for presentation to interested parties and for publication in connection with its promotional work.

F CORRELATION OF RESULTS

The grouping of all data for each separate deposit, classification of each deposit according to the products for which it is suitable, and a further classification according to the estimated profit return to be expected from the working of the deposit.

G PROMOTION

The people of Kansas are not generally aware of the gypsum resources of the state. For example, wall plasters used in the state come principally from Texas and are made from gypsite. The white plaster made at present in Kansas is being demanded in some markets in the state but its use is not being promoted by the two companies operating in Kansas. Here, then, is an opportunity for effective promotion work among the plastering trade. A demand by this trade for white plasters, made from gypsum rock instead of gypsite, will of necessity increase production in the two Kansas mills and will provide a stimulant for the construction of new mills in the state.

This project should include the following in regard to promotion:

(1) Presentation to the Commission of complete data on every deposit of gypsum known in the state, same to include maps, diagrams, photographs, etc., where these will serve to tell the story better, together with the complete data resulting from the Plant Location Survey.

(2) The preparation of articles for use by the Commission in its own publications, as well as in other publications in which the Commission is able to get space.

(3) Contact with all present producers of gypsum products to interest them in the possibilities extant in Kansas gypsum and to attempt to influence the present producers in Kansas to enlarge their existing operations.

(4) Promotional work with the plastering trade, as well as with the architects of the state and with prospective builders, in the interest of gypsum plasters made in Kansas.

(5) Promotional work throughout the state on the use of gypsum in agriculture.