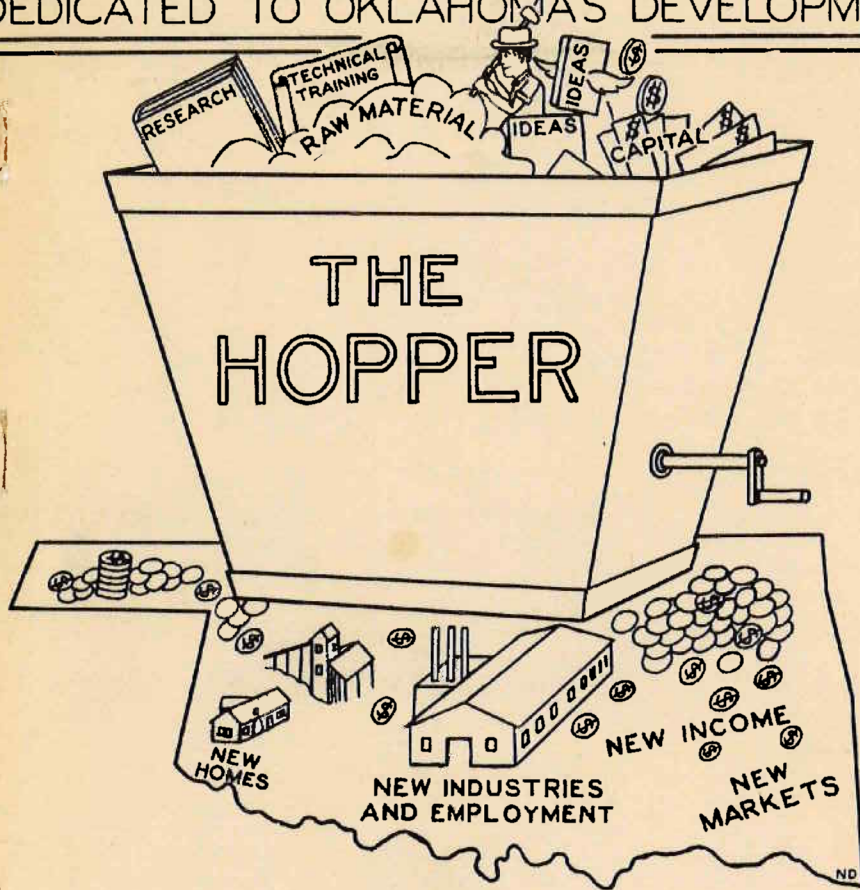


DEDICATED TO OKLAHOMA'S DEVELOPMENT



PUBLISHED IN THE OFFICE OF THE
OKLAHOMA GEOLOGICAL SURVEY
NORMAN, OKLA.

Vol. 15
No. 1

January, 1955

Up from the Ground

by

Albert L. Burwell

People are funny. Some of us enjoy trying to make a "good-for-something" from a "good-for-nothing". You probably know a farmer who is trying to convert a "good-for-nothing" piece of land into one that is "good-for-something". Among your acquaintances you probably know a parent who is trying desperately to change a "good-for-nothing" kid into one that will become a "good-for-something" man. Here at the Oklahoma Geological Survey we deal with the crust of the earth and find enormous quantities of mineral material for which there is little or no use. So much of the earth's surface is "good-for-nothing" as far as its present day usefulness is concerned. What is more intriguing than the possibility that some of this near-worthless material might be put to useful purpose and made of some value? Certainly it is worth trying, but who is going to do the trying?

Among the agencies of the State of Oklahoma is the Oklahoma Geological Survey. Its existence is provided for in the constitution of the state. The enabling act is Senate Bill No. 75 wherein it is stated: "The survey shall have for its object a study of the geological formations of the state with special reference to its mineral deposits, including coal, oil, gas, asphalt, gypsum, salt, cement, stone, clay, lead, zinc, iron, road building material, water resources and all other mineral resources". The bill also provides for preparation and publication of bulletins and reports resulting from these studies. It provides further for the consideration of such other scientific and economic questions as shall be deemed of value to the people.

This provision has been accepted as authorization for the survey to undertake investigations on the utilization of the mineral materials occurring in the state. Obviously after the state has spent time and the tax-payers money to find, to map, and to evaluate and report on these mineral materials, it is only logical that an effort be made to find use for them. In the federal organization the United States Geological Survey is supplemented by the United States Bureau of Mines, an agency devoted to research on production and utilization of mineral materials. In Oklahoma and in several other states it has been the policy to place problems of production and utilization under the state geological survey. This being so, isn't it up to the survey to try to develop uses for the state's mineral materials, including those that now yield wealth and those that presently are "good-for-nothing"?

What are these "good-for-nothing" mineral materials? Broadly speaking, they can all be classed as rocks. These rocks may be (1) limestones and dolomites, (2) shales and clays, (3) sandstones, (4) volcanic ash, (5) granites, (6) gabbros and other basic igneous rocks, (7) gypsum and anhydrite, and (8) sands and gravels. This list includes what are usually spoken of as the non-metallic minerals. All are characterized in common as having very little value in place in the earth and as having relatively low money value when produced. Yet, certain of them are of tremendous value in the over-all economics of the country.

What has the state survey accomplished already? Perhaps it would be interesting to peruse Bulletin No. 1, "Preliminary Report on the Mineral Resources of Oklahoma" by Chas. N. Gould, L. L. Hutchison, and Gaylord Nelson published in Novem-

ber 1908. The non-metallic materials reported on include coal, oil and gas, asphalt, gypsum, salt, glass sand, granite, limestone and marble, sandstone, clay and shale, portland cement rock, road material, sand and gravel, tripoli, volcanic ash, and novaculite. We read "The state has deposits, which for all practical purposes are inexhaustable" and continues "So little has been done in the way of development of the mineral resources of the state that no one can yet even estimate either their amount or their value". It might have added that the lack of development was to be expected because there had been very little exploration and investigation of the mineral occurrences.

From the year 1885 up to 1909, the total mineral production for Oklahoma amounted to approximately \$134,000,000. In the 40 years from 1909 up to and including 1949 the total amounted to the stupendous figure of \$11,833,800,000. No one could be so presumptuous as to credit the geological survey with creation of all this wealth. Neither could any well-informed person deny that the geological survey was an important factor in this matter. Exploration, development, and production of oil and gas are, of course, the most prominent components. Coal at one time accounted for a large percent of the wealth created, and it is again coming into the forefront. Less spectacular but of very great economic importance to the state are certain of the lesser known materials, - glass sand, limestone and dolomite of chemical grade, and woolrock. Investigations on occurrences of these minerals and research on their utility are responsible for their production and for industries that use them as raw materials. Bulletin No. 60, "Rock Wool Possibilities in Oklahoma" by F. C. Wood (1939) furnished the basis for Oklahoma's rockwool industry. Bulletin No. 65, "Geology and Glass

Sand Resources, central Arbuckle Mountains, Oklahoma" by W. E. Ham (1945) enabled expansion of the glass sand production upon which concurrent expansion of the Oklahoma glass industry depended. Mineral Report No. 16, "Geology and chemical composition of St. Clair Limestone near Marble City, Oklahoma" by Ham, Dott, Burwell, and Oakes (1943) made possible the development of the chemical-grade limestone industry which supplies the Sallisaw lime kilns, the calcium carbide plant at Pryor, and a number of glass plants. Mineral Reports No. 12 and No. 15 (1941 and 1943) deal with the coking properties of Henryetta and McAlester bed coals. The information contained in these reports gave the necessary assurance upon which the Lone Star Steel Co. built their coke ovens and these today consume a major portion of the coal mined in the state. Circular No. 26, "Geology and dolomite resources, Mill Creek-Ravia area, Johnston County, Oklahoma" by W. E. Ham (1949) brought about the establishment of the quarries and processing plant of Rock Products, Inc. at Troy which supply chemical-grade dolomite to the glass plants, fertilizer industry, and for agstone.

Not all the research projects carried out at the survey have yielded such positive returns, but the information is available and sooner or later should be utilized. Such work as that which demonstrated the possibilities and methods for converting volcanic ash into cellular products, a new method for producing an intimate mixture of calcium carbonate and ammonium sulfate by the action of ammonia gas and gaseous carbon dioxide on gypsum, a means of extracting the sulfur from gypsum by treating with natural gas and water vapor, and more recently reports on the investigation of the bloating properties of certain

Oklahoma shales for use as lightweight concrete aggregate.

So far, so good but the surface has only been scratched in investigation of non-metallic minerals in Oklahoma. In many respects our knowledge on some of these materials in 1908 was approximately the same as it is today. For example, our information on salt, its occurrence and its availability, is much the same as in 1908. Of course, with all the extensive exploration and drilling in the search for oil and gas, the drill has penetrated beds of salt, but salt held little economic interest for the petroleum companies and most of the records contain little information of value regarding the salt. It is very possible that the records of some companies contain reliable information which should be made available.

Production of salt in Oklahoma has had many ups and downs. Back in the early 1900-1905 era Oklahoma production was around 1,000 tons per year. Later the tonnage dropped to near nothing. An estimate of 20,000 tons as the current production should not be far wrong. Compared with the probable salt reserves in the state and compared with the U. S. production in 1950 of over 16,600,000 tons valued at about \$60,000,000 our figure appears trivial. However, the comparison is thought-provoking, isn't it?

The number of plant installations producing gypsum in Oklahoma was greater in 1913 than it is today, but the tonnage today is two and one-half times greater than in 1913. All things considered this is not a large increase in volume. It is questionable that our knowledge of the Oklahoma gypsums, their occurrences and the reserves, has increased even in this ratio. Recently a small

area in Jackson County received attention from the Survey, supplying needed information on that area. The report has not been published as yet.

Any person who has traveled over the state of Oklahoma must have noticed the prevalence of shale. Satisfactory brick and tile can be made from many shales. All are not equally acceptable, a fact which accounts for the high mortality among the brick plants in past years. It has been a case of "survival of the fittest", yet it is truly surprising to find that the value of heavy clay products made in Oklahoma from shales is no greater today than it was in the late teens and the twenties,-- a value of approximately \$2,000,000 per year. Oklahoma producers of clay products have stuck to structural brick and tile, with the exception of a few potteries, and have ignored the great amount of terra-cotta, stoneware, sewer pipe, and refractories transported into the state. Perhaps the kind of information available to them on the shales and clays, their occurrence, character, composition, and properties is not sufficient to justify their interest. As a matter of fact, one must rely on Bulletin No. 7, "Preliminary report on the clays and clay industry of Oklahoma" by L. C. Snider (1911) and on "Clays and Shales of Oklahoma" by L. F. Sheerar (1923), a publication prepared jointly by the Survey and the Engineering Experiment Station at Stillwater. Without disparaging the sole sources of information on Oklahoma clays and shales, it must be acknowledged that it is tragically incomplete and often erroneous due to the inability to secure representative samples. Whereas surface exposures of some minerals are reliable indications of what may be expected beneath, such is definitely not the case with shales, nor sometimes with clays. A comprehensive know-

ledge of Oklahoma clays and shales will be valuable to existing Oklahoma industry and undoubtedly will induce the establishment of other types and kinds than those now operating, including ceramics of several kinds, cements, refractories, and alumina.

Recent inquiries on tripoli and novaculite served to remind that nothing much has been added to our published information on tripoli since Bulletin No. 28, "Tripoli deposits of Oklahoma" by E. S. Perry (1917). Our present knowledge on novaculite is taken from Bulletin 32, "Geology of southern Ouachita Mountains of Oklahoma" by C. W. Moness (1923). What a tremendous job it is going to be to acquire the desired information.

To assure the people of Oklahoma that their agency, the Oklahoma Geological Survey, is aware of the need for economic geological information beyond that already published, announcement is here made of the imminent publication of (1) a new geologic map of the state in colors, (2) a broad comprehensive report on the Arbuckle Mountain region, (3) a report on recent information acquired on the Wichita Mountain area, (4) a report based on a recent survey of the Baum limestone in the area south of the Arbuckle Mountains, showing the location and chemical analyses of chemical-grade stone, and (5) a report on the Henryhouse marlstone on the Lawrence anticline in Pontotoc County, offering evidence of commercial usefulness for this material.

The last two reports mentioned deal with what really has been "good-for-nothing" and now as a result of these investigations appears very definitely to approach the "good-for-something" stage. It is the purpose of the Oklahoma Geological Survey to investigate and report on similar

natural mineral materials just as far as finance, personnel, and equipment will permit. The members of the survey staff are fully cognizant of the established fact that the influence of mineral production spreads far beyond the so-called mineral industry. Paul M. Tyler, an eminent mineral technologist and economist has written:

"Few people realize the extent to which the exceptional American standard of living depends on minerals." and "For every dollar paid a mining company for minerals, \$5.00 is paid to transportation and factory workers who handle and fabricate the product."

Certainly there is plenty of justification for more stress on mineral investigations, - the search for, the mapping and evaluation, and the utilization of all mineral materials of high and low estate, especially in Oklahoma.

GEOLOGIC MAP OF OKLAHOMA

The new geologic map of Oklahoma is now ready for distribution. It is printed in 34 colors. The scale is 1/500,000, about eight miles to the inch. The map represents seven years of work by Hugh D. Miser of the U. S. Geological Survey, and the field work is estimated to represent 80 man years. Eighty percent of the map is new material since the 1926 map, and nearly half of the area shows geologic work not otherwise in print. Oil companies allowed use of their confidential material covering nearly half of the state.

Mr. Miser also made the 1926 map. He retired from the U. S. Geological Survey on December 31, 1954, the month of his seventieth birthday. All of us who have worked with him have gained much

from that association, and we all feel that no other man could have carried the project to completion.

The map project is a cooperative enterprise of the Oklahoma Geological Survey and the U. S. Geological Survey. It was begun and field work completed while R. H. Dott was director of the Oklahoma Geological Survey. The map is available with or without red highway overprint. The price for either form is \$2.50. The map can be ordered from our office at any time and in any quantity. We are proud of this map and the geologic and drafting work it represents, and we are sure you will find the map invaluable.

GEOLOGIC MAP OF HUGHES COUNTY

A new geologic map of Hughes County in full color is now ready for distribution. The map is by O. D. Weaver, Jr., of Ft. Worth, who did the mapping for his doctoral dissertation at the University of Oklahoma. It is on a scale of 1 inch to 1 mile and shows formations from Boggy to Coffeyville. The map will also accompany Bulletin 70, "Geology and mineral resources of Hughes County", which we expect to be ready in January. The map alone is priced at \$1.25 and can be ordered from this office.

GEOLOGIC MAP OF OKFUSKEE COUNTY

The colored geologic map of Okfuskee County is now for sale at \$1.25 per copy. It is on a scale of 1 inch to 1 mile and shows formations from Senora to Vanoss. The mapping was done by Edward R. Ries, now in Sumatra, as part of his work for the doctorate at the University of Oklahoma. Bulletin 71, "Geology and mineral resources of Okfuskee County" will have the map in a pocket. The bulletin will be ready about February 1, 1955.

STATUS OF OKLAHOMA GEOLOGICAL SURVEY PUBLICATION'S

Bulletin 72-Geology and ground water resources of Ottawa County, by E. Reed and S. L. Schoff. In press; ready in January.

Circular 32-Economic possibilities of the Baum limestone, by W. E. Ham and Rex Wayland. Ready for publication.

Map of the geology of the Arbuckle Mountains, by W. E. Ham and Myron E. McKinley. Color proof has been examined. Ready in February.

MYRON E. MCKINLEY RESIGNS FROM SURVEY

Myron E. McKinley resigned from the Survey staff on December 30, 1954, to accept a position with Standard Oil Company of Texas, and will be stationed in Ardmore. McKinley has been with us since July, 1950, and has been assistant geologist since 1951. He receives his Master of Science degree from the University of Oklahoma in January 1955. While with the Survey, he worked mainly in the Arbuckle Mountain region. His article, "Stratigraphy of the Vanoss formation in the western Arbuckle Mountains" appeared in 1954 in the Proceedings of the Oklahoma Academy of Science. He is junior author of the geologic map of the Arbuckle Mountains, now in press, and has contributed to the comprehensive report on the Arbuckle group of rocks in the Arbuckle Mountains.

Mac is an expert photographer and has made excellent pictures which have appeared in Circular 31, Bulletin 70, Bulletin 71, and will appear in Circular 32. We shall miss him and Mrs. McKinley. We wish him good fortune and hope that the McKinleys will visit us often.