

DIVISION OF GEOLOGY

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Faculty members of the department of Geology at Indiana University are members of the staff, but act only in an advisory capacity to the Division of Geology. They are: E. R. Cummings, Stratigraphic Geology; C. A. Malott, Physiography and Stratigraphy; J. J. Galloway, Paleontology; W. D. Thornbury, Glaciology; and Ralph E. Esarey, Economic Geology. They receive no compensation from the Department of Conservation.

OIL AND GAS SUPERVISION

The Supervisor of Natural Gas, with the field force of eleven Deputy Natural Gas Inspectors, carries out the enforcement laws and regulations governing the development and production of petroleum and natural gas, supervises the plugging of dry and abandoned wells, and aids in the prevention of pollution of water courses by oil and brines. A very important part of the work of the staff consists of the collection and compilation of geological and production data. This material is made available to the public through various publications. All such data is on file in the Division office in Indianapolis, for use by the public.

During 1942 the Deputy Gas Inspectors were: Marion Brown, Loogootee; Harold L. Caldwell, Ligonier; Herman D. Chanley, Fredonia; Bryant W. Dawson, Evansville; L. W. Edmundson, Pennville; Fred E. Harrer, Tell City; Howard W. Legge, Bloomington; E. Edward Mollenhour, Bourbon; D. L. Norris, Vincennes; J. C. Wink, Shirley; and James Wyman, Sullivan. These deputy inspectors receive no salary from the Department of Conservation, but receive a part of the fee collected for plugging wells.

The Division of Geology, in addition to other duties, gathers information on the drilling wells in the State. This information is available to all interested persons. Each month the Oil and Gas Drilling Report, containing the latest available information on drilling wells, is mimeographed and mailed to a large number of interested persons in Indiana and other States. Through this bulletin, persons interested in the

* Jan. 1 to June 1, 1942; ** July 1 to Dec. 31, 1942; *** Feb. 1 to Dec. 15, 1942; entered Armed Forces; **** Jan. 1 to Mar. 23, 1942; entered Armed Forces.

petroleum industry are kept informed concerning developments in Indiana.

Collection of samples from drilling wells continued through 1942. At the end of the year there were approximately 1,150 sets of cuttings on file at the Laboratory of the Division at Indiana University at Bloomington. These samples may be studied by any person interested. The study of such cuttings furnishes information regarding subsurface conditions in Indiana, and are of the greatest aid to geologists.

OIL AND GAS OPERATIONS

In Indiana, 349 wells were drilled for oil and gas in the year 1942. Of this number, 125 oil wells and 21 gas wells were successfully completed and 203 were dry holes. Drilling activity declined 37 percent as compared with that of the year 1941. This reduction was brought about largely by Federal Conservation Order M-68, restricting drilling to one well on 40 acres, in order to save steel. This Order was later supplemented to permit closer spacing of wells drilled to sandstone formations in southwestern Indiana.

Most of the drilling in 1942 was in the southwestern part of the State. Posey County ranked first, with 94 completions and 44 producers; Gibson County, second, with 77 completions and 38 producing oil wells and 2 gas wells. There were 58 drilling operations in the State at the end of the year.

Of the 349 wells completed, 122 were wildcat wells; 26 were completed as oil wells; 17 were extensions to proven fields and 9 discovered new pools. Posey County was foremost in wildcat drilling, with 37 wells completed. Thirty-five percent of the wells drilled in 1942 were wildcat, as compared with 25.5 percent in 1941. It is anticipated that the percentage of wildcat wells drilled in 1943 will be greater, although the total number of wells drilled in the State will probably be less.

The new discoveries in Indiana in 1942 were, for the most part, one-well pools in the southwestern part—in Posey, Gibson and Spencer Counties. Most of the development in pools took place in the Hazleton and Kirksville pools in Gibson County, Mt. Vernon pool in Posey County, and the Vernon Heights pool in Vanderburgh County. Deeper production was obtained from the Osage limestone in the Hazleton pool at a depth of 2,402 feet, 650 feet below the productive McClosky limestone. The well had an initial production of 140 barrels. Extensions to 17 pools in the southwestern part of the State were successfully completed.

An interesting development during 1942 was new production from the Devonian limestone in the Dodds Bridge pool, Sullivan County. The Ohio Oil Company deepened one of its wells, which had been producing from a shallow sand, to the Devonian, and it was completed for an initial production of 77 barrels. Five other Devonian producing wells were completed in that area.

Crude oil production in Indiana in 1942 was 6,609,000 barrels. The Griffin field, Gibson and Posey Counties, which produced approximately 3,550,000 barrels, accounted for more than half of the State's production.

The Mt. Vernon and New Harmony fields were next in importance of production, with 684,000 and 523,000 barrels, respectively. The price of crude oil was \$1.22 a barrel for the old fields and \$1.37 for the new fields in southwestern Indiana. In the old Trenton field, in northeastern Indiana, the producers received \$1.60 a barrel for the crude, which was used as fuel oil.

Natural gas produced and marketed during the year totaled 1,630,000,000 cubic feet. The Rockport gas field, Spencer County, ranked first, with the production of 594,316,000 cu. ft. The Unionville field, Monroe County, and Greensburg field, Decatur County, were second and third, with 239,856,000 and 210,827,000 cu. ft., respectively.

There was very little pipe-line activity in the State during 1942. Short lines were constructed in southwestern Indiana to provide outlets to the new fields and Gulf Pipe Line Corporation completed the "loops" in its main line to Dublin, Indiana.

Repressuring is being conducted in the Griffin field with the dry gas from the Warrent Petroleum Company's natural gasoline plant on the Illinois side of the Wabash River. This plant was put in operation in August, 1942, and to the end of the year it had processed approximately 500,000,000 cu. ft. of gas from the Griffin field. At the present time, approximately 1,530,000 cu. ft. of dry gas is injected daily into the producing sands in the field, through 14 input wells. The Waltersburg sand, in the Ribeyre Island portion of the New Harmony field, is being repressured with 360,000 cu. ft. of dry gas per day from the same plant through four input wells.

OFFICE WORK

Routine office work has consisted mainly of answering correspondence, identifying rocks and minerals brought or sent in by owners or finders, supplying information to many hundreds of geologists, oil and gas operators, and others interested in oil and gas production and prospecting.

Many hundreds of mineral specimens and rocks are identified each year by members of the Division. Such specimens, many of which the owners believe to contain valuable minerals, are usually rather common materials. They include calcite, quartz, iron ores, pyrite, mica, etc. The Division welcomes these requests and members of the staff are always glad to be of service.

Many requests are received each year from individuals and companies interested in developing, or, in the possibilities of development, of the various mineral resources of Indiana. These include stone, sand and gravel, coal, oil and natural gas, iron ore, marl, peat, ground water, mineral wool, moulding sands, clay, kaolin, dolomite, etc. In many instances the Division is called upon for information concerning the status of mineral industries already established in Indiana.

Other requests for information upon all branches of geology include caves, fossils, physiography, topography, rock garden material, geology of the State parks, State forests, etc.

DEPARTMENTAL WORK

Dr. Wallace W. Hagan, graduate of the University of Illinois, was placed in charge of the Ground Water Section of the Division of Geology in July of 1942. An electrical earth-resistivity program was started at that time and it was facilitated by cooperation of the Illinois State Geological Survey and the Missouri Geological Survey. The program is designed to aid in the location of new and/or additional ground water supplies for municipalities, various schools of the War Department, Ordnance plants and industries engaged in the war effort. The instrument may also be used to locate commercial deposits. This service, which will be made upon request, is furnished free of charge. Construction of an electrical earth-resistivity machine was commenced in September of 1942 by the National Youth Administration under the supervision of Dr. Hagan. It was completed in March of 1943.

Dr. Hagan made a resistivity survey for the city of New Albany with an instrument loaned to the Division of Geology by the State of Missouri Geological Survey. Results indicated favorable locations to test-drill for underground water-bearing sand and gravel deposits.

A research survey was made in September, 1942, at Allison Division of General Motors Corporation Plant No. 5, Indianapolis, in close cooperation with the Layne-Northern Drilling Company, Inc. The results of these studies are on file in the Division.

The Ground-Water Section also answers inquiries regarding individual ground water supplies; it collects records of wells drilled as well as samples of materials penetrated; and it cooperates with the United States Geological Survey in the cooperative water program.

A cooperative research agreement with the Ground Water Division of the United States Geological Survey, instituted in 1935, was continued during the year. Observation water wells are located throughout the entire State and water levels are checked every two weeks in most wells. At the end of the year periodical measurements were being made in about 50 wells. These wells represent all variations of topography, altitude and water-bearing strata, and continuation of the measurement program will give valuable information concerning the fluctuations in level of the sub-surface water supplies. Data are assembled and studied in the office of the U. S. Geological Survey in Washington, D. C. During the summer field season, Charles L. McGuinness, of the Ground Water Division of the United States Geological Survey, has been continuing his ground water research in the State. As a result of his studies, Mr. McGuinness prepared a preliminary report on "Ground-Water Resources of the Indianapolis Area, Marion County, Indiana", and it was issued on January 1, 1943, as a publication of the Division of Geology.

As in previous years, the Department of Conservation cooperated with the United States Geological Survey in a topographic mapping program, wherein each sponsor furnished \$25,000.00 per year. Mapping of the quadrangles is done by engineers from the Federal Survey, and assistants who are residents of Indiana. The finished maps are compiled and published in Washington. The Divisions of Geology and Engineering have charge of the selection of areas to be mapped. Mapping

under the new program is done on the scale of 2 inches per mile, approximately, and each quadrangle, or map, is $7\frac{1}{2}$ minutes of arc square. The new, larger scale of these maps and the accuracy of the work done by the United States Geological Survey, make these maps very valuable. They are the most accurate maps of their kind in the world, and their utility in highway construction, flood control, State and city planning, exploration for oil and coal, and many other types of endeavor, cannot be over-estimated. Mapping has been completed along the Ohio River and work in other areas is progressing as rapidly as possible. During the year 1942, the following quadrangles have been published: Aberdeen, Ashley, Aurora, Brooksburg, Dennison, Dugger, Fairbanks, Florence, Guilford, Hooven, Hutton, Hymera, Lafayette, Patriot, Rising Sun, Sandborn, Stroh, Vevay, North, and Vevay, South.

PUBLICATIONS

Besides the publications already mentioned, the Annual Report upon the oil and gas industry was submitted to the American Institute of Mining and Metallurgical Engineers for publication in their proceedings. Reprints are available in this office.

STATE MUSEUM

The Division of Geology supervises the State Museum, located in the basement of the State House. The exhibits continue to attract large numbers of visitors and have great variety and appeal to persons in all walks of life.