

In order to have so many men working on private erosion it has been necessary to maintain large black locust nurseries. These nurseries produced during the year 23,228,835 seedlings. Over 16,063,950 seedlings were shipped to states adjoining Indiana for erosion control on private lands. Approximately 8,000,000 seedlings were planted on private lands for erosion control in Indiana.

The private land erosion camps have treated erosion on 575 farms. The watershed acreage of the various erosion projects is 14,274 acres. There have been 44,860 dams built on erosion control projects. Over 3,485 acres of land have actually been planted with black locust seedlings. The severity of the eroded areas treated ranges from approximately 20 per cent to 88 per cent of the total watershed washed away. The average of all eroded areas treated is approximately 55 per cent of the watershed areas eroded. There were quite a few developments and experiments tried on erosion projects during the past year. One of the most noteworthy is the fall planting of black locust on eroded land. The plantings made in the fall of 1933 have been so successful that it is planned to plant at least 10,000,000 black locust this fall and many more next spring.

It is valuable in building up wornout soils and will grow on practically any soil in this state.

REPORT OF THE DIVISION OF GEOLOGY

(Fifty-ninth Annual Report of the State Geologist)

W. N. LOGAN, State Geologist.

J. P. KERR, Supervisor of Natural Gas.

VERNE PATTY, Curator of Museum.

MARY E. LIVENGOOD, Clerk-Stenographer.

Members of the geology department at Indiana University who, in accordance with the plan of co-operation with the Department of Conservation, acted in an official, technical, or advisory capacity during the year were: W. N. Logan, State Geologist; E. R. Cumings, stratigraphic geology; C. A. Malott, physiographic geology; J. J. Galloway, paleontology; S. S. Visher, geography; J. E. Switzer, geography; Ralph E. Esarey, economic geology; and Howard Legge, preparator. These men receive no salary from the Department of Conservation.

NATURAL GAS SUPERVISION

The duties of the State Gas Supervisor and his deputies include the enforcement of the conservation laws, the supervision of the plugging of abandoned wells, the inspection of wells and equipment, and the collection of geological data. The State Gas Supervisor is also Assistant State Geologist.

Members of the natural gas inspection force include Marion Brown, Loogootee; Herman Chanley, Laconia; William Conners, Vincennes; L. W. Edmundson, Pennville; Fred Harrer, Tell City; J. P. Horton,

Montpelier; O. H. Hughes, Sharpsville; Howard Legge, Bloomington; Herschell Ringo, Muncie; and James Wyman, Sullivan. Members of this force draw a percentage of fees collected for supervising the plugging of abandoned oil and gas wells.

The information in the office files on the progress of drilling wells has been kept up to date through the assistance of drillers, operators, and other observers. A card file keeps this information in usable form, and from it comes the *Indiana Oil and Gas News*, which is mimeographed and mailed out on the first of each month. Our mailing list for this news letter has been revised to include only those who are actively interested in Indiana developments; it now contains about 220 addresses. The most valuable function of the *Oil and Gas News* is the contact it gives between the division and drillers and operators throughout the state.

A number of landowners were given advice concerning leasing practices in wildcat areas. Examinations were made of a number of abandoned gas wells, and records were kept of each of these wells until they were satisfactorily repaired or plugged. During the twelve months ending June 30, 1934, 166 dry or abandoned wells were plugged in Indiana.

OFFICE WORK

The routine work of the office force of the division consists largely in answering correspondence, dispensing information to callers, preparing maps and geological reports and tabulating information regarding oil and gas developments. Some of the information asked for in letters or by callers necessitates considerable work before a satisfactory answer can be offered. It is common for a person to bring or send in a mineral and ask its composition, occurrence, distribution, uses and value. Other inquiries are about coal, oil, gas, lime, cement, building stone, mineral wool, sands, gravels, soils, water supplies, clays and kaolins and their occurrence, distribution, the economic condition of the industry and where publications dealing with them may be had. Inquiries about state parks, caves, fossils, rock garden material, physiography, topography, and other phases of geology are received frequently. The division welcomes such inquiries and is glad to dispense to the citizens of the state whatever information is available.

PUBLICATIONS

Other than the Fifteenth Annual Report of the Department of Conservation, no publications have been issued this year. A doctor's thesis on the "Ground Water of Indiana," by Marshall Harrell, will be published as soon as sufficient funds become available.

Shorter reports have been written for publication, including a summary of oil and gas developments for 1933 for the American Institute of Mining and Metallurgical Engineers, and several short notices for the *Journal* of the American Association of State Geologists. Besides this, information on ground waters, oil and gas and other natural

resources was furnished to authors of special articles and to the federal code authorities and Federal Labor Board. Also the *Oil and Gas News* was mailed out each month.

A special effort has been made to increase the distribution of our available publications, especially to the colleges and universities in Indiana, and to city libraries throughout the state. Our free publications were sent to the many students who were interested enough to write for them. Our list of available publications has been revised and distributed widely. A complete set of our reports was sent to the office of the United States Bureau of Mines at Vincennes, where they may be referred to by anyone. Separates of papers dealing with the geology of Indiana, which appear in the Proceedings of the Indiana Academy of Science, are kept for sale by the division. Formation logs of oil and gas wells drilled since the publication of "Sub-Surface Strata of Indiana" are made available at ten cents each. Distribution of publications during the year is as follows:

Sale publications and well logs.....	403.	Total \$307 21
Free publications distributed	562.	

FERA help has been obtained to clean and arrange the geological library, a task which had not been completed since moving to the new building.

DEPARTMENTAL WORK

A soil survey was made of the proposed restoration area in the Kankakee River basin and a report submitted.

The site at Norway, where a fish hatchery was proposed, was inspected and a soil test made to determine if the available materials were suitable to be used in the construction.

A method of stopping the leaks in the ponds at the Avoca Hatchery was proposed, and materials that could be used were located. Several suggestions were offered on inspection trips as the work was being carried on.

The dam sites and materials to be used in the dam construction were inspected and approved at Spring Mill Park, Morgan-Monroe Forest, Ferdinand Forest and the Lincoln City ECW camp.

Dams across several of the streams in southern Indiana were inspected and suggestions were offered on how natural conditions, rock ledges in particular, could be used to the best advantage in constructing fishways.

A project for a survey of the coal mines of the Patoka River basin to determine which are contributing acid waters to the Patoka River was submitted to the State Administration of FERA and approval was granted. With the completion of this survey, we hope to be able to take the steps necessary to relieve the situation.

All the information we have on the mineral resources of Indiana has been made available to the State Planning Board to be used in the minerals section of the state plan now being prepared. The division feels that a state plan will be very beneficial to the state. Much of the

work being done in the minerals section will be found valuable to the Division of Geology. Partially through our efforts, the services of a geologist were made available to the planning board.

MAPPING

The United States Geological Survey, using funds supplied by the Public Works Administration, is mapping topographically three quadrangles in Indiana—the Porter quadrangle in Porter County, the Heltonville and Oolitic quadrangles in Lawrence County. A contour interval of 10 feet will be used in the first mentioned quadrangle and 20 feet in the other two, the larger interval being used in the region of greater relief. These maps will be checked by aerial photographs, a procedure used by the United States Geological Survey in making all of its topographic maps. These maps will be a decided asset to the state.

The division is endeavoring to arouse enough interest in topographic mapping to have a permanent mapping program adopted by the state. The state plan being prepared by the State Planning Board will incorporate such a program. Not including the three quadrangles now being mapped, only 10.1 per cent of Indiana has been mapped topographically. Only two states of the forty-eight have been more backward than Indiana in this mapping. Considering the fact that the Federal Government will pay one-half the cost of the mapping and printing, and considering the value they are to the state, it seems that any expenditure for this purpose would be well made. It is inevitable that the State of Indiana will be completely mapped topographically sometime, and the sooner it is accomplished the more use may be had from them.

Much might be said of the utility of accurate topographic maps. The hydraulic engineer finds them very useful in planning surface water reservoirs for cities and industries. The drainage engineer finds topographic maps necessary in his reclamation, restoration and flood control projects. Municipal and sanitary engineering programs are facilitated if topographic maps exist. The railway and highway engineers as well as engineers associated with telephone companies, power companies and pipe line companies are greatly benefited if a picture, as depicted by a topographic map, is available for the area they wish to traverse. Geological investigations intent upon determining the location and the feasibility of development or conservation of natural resources are greatly hindered by the absence of topographic maps. State and city planning boards find topographic maps very useful. Soil surveys, especially since the recent ones are based on aerial photograph, find their work much easier and cheaper if the topographic map is made first. Reforestation and erosion control are facilitated greatly by the presence of topographic maps.

STATE MUSEUM

Approximately one hundred acquisitions were made by the State Museum during the past year. Among these was the "Garrett Mastodon" found on the right of way of U. S. Road 27, two miles south

of Garrett in Dekalb County. This skeleton was brought to the State Museum and was being prepared with preservatives when the man on whose farm it was found claimed it. The state highway allows the landowner the mineral rights on all rights of way; thus, the farmer was justified in making his claim. He sold the skeleton to the Field Museum in Chicago.

The curator estimates that 45,000 persons visited the museum the past year. With the increasing number of exhibits and increasing interest shown in the museum, it will soon be necessary to acquire a larger place in which to show the exhibits. The museum could be made a more worthy educational factor in the state if sufficient funds existed.

Advantage has been taken of the available relief funds to clean and partially rearrange the cases and exhibits in the museum. A marked improvement in the appearance of the museum is expected with the completion of this work.

OIL AND GAS OPERATIONS, 1933-1934

This report includes those operations from July 1, 1933, to June 30, 1934. More activity existed in the oil business in the latter part of 1933 and early part of 1934 than in the previous year. The absence of the too restrictive proration and a better price for crude oil are responsible for the improvement. The gas business has been fairly constant, with several good wells completed in the last year, increasing the supply amply to meet the demands.

Of the 173 wells completed during the last twelve months, 79 were dry, 56 produced oil, and 40 produced gas, with 16 wells being uncompleted on June 30; that is, 45 per cent were dry and 55 per cent were productive. The average initial production of oil wells, including dry holes, was 13 barrels per well. The greater part of the drilling has been in Sullivan, Pike, Gibson, Vanderburgh, Knox and Perry counties in southwestern Indiana. Several gas wells have been drilled in Jay County in the northeastern field.

Several good gas fields are remaining idle because of the lack of suitable markets. The largest of these is the Unionville field in Monroe County. In the southwestern counties where the larger cities and towns are using natural or mixed gas for domestic, and in some cases commercial, purposes the demand has furnished a market for practically all the gas that can be located in that area. Natural gas is still being supplied to several of the smaller towns in the old Trenton field in northeastern and eastern Indiana. Approximately one billion cubic feet of gas was removed from wells in Indiana during the last year.

Several good oil producers were added to the Vanderburgh County pool, bringing its production up to approximately two hundred barrels a day. Dry holes on several outside offset locations have slowed down drilling activities temporarily.

A number of good oil wells have been brought in in Washington Township, Gibson County, and Logan Township, Pike County. In Washington Township, Pike County, several good gas wells have been completed, extending the Alford field north and east.

A nice oil well completed in June of 1934 in Robinson Township, Posey County, will probably be the discovery well for a new pool which will open up there. Other wells near proven areas have extended production, but purely wildcat wells have brought no other new pools into existence. It is likely that a number of other wildcat wells will be drilled in the near future and that some of them will be in Dubois County.

REPORT OF THE DIVISION OF ENGINEERING

ORGANIZATION

W. K. HATT, State Engineer.

DENZIL DOGGETT, Assistant State Engineer.

CHARLES H. BECHERT, Field Engineer.

The Division of Engineering of the Department of Conservation was created by an act of the 72d General Assembly and was organized in May, 1921.

The work of the Division of Engineering naturally falls under two classifications, namely, drainage and land reclamation and engineering service. The former work is specifically set forth in the act creating the division and considerable detail is given regarding the duties pertaining to these types of engineering work. The division's work under "Engineering Service" is allocated to the various divisions of the Department of Conservation and consists of planning and executing engineering works, making surveys, maps, investigations, reports, graphs and similar work. These two general classifications are grouped in more detail as follows:

- I. Drainage and Land Reclamation.
 1. Collection and Dissemination of Data and Statistics.
 2. Legislative Recommendations.
 3. Special Investigations and Reports on Drainage and Levee Projects.
 4. Advisory Consultation.
- II. Engineering Service.
 1. State Parks, Memorials, Reservations, Preserves and Fish Hatcheries.
 - a. Surveys, Design and Construction.
 - b. Supervision of ECW Design and Construction.
 2. Lakes.
 - a. Lake Levels and Surveys.
 3. Special Surveys, Investigations and Miscellaneous Works.

I. Drainage and Land Reclamation.

The Division of Engineering is empowered by statute to make investigations of drainage and flood control projects, to compile and disseminate information which may be used in planning such works, to recommend and secure enforcement of laws pertaining to such works, to assist in design of such works by measuring or computing flows in natural or artificial channels, to collect such data or information as it may regard necessary to any particular project, to assist drainage or levee commissioners, as they may desire, in the inspection of lands under consideration, to assist courts in an advisory capacity and to co-operate with superintendents of construction in matters on which advice is sought.