PRIVATE LAND EROSION CAMPS

Last year's report explains in some detail the policy under which the CCC camps are doing tree planting and erosion control work on private lands. The owner agrees to protect the trees and improvements for five years and agrees further that any products realized from the reforestation work belong to the state.

Soil erosion has taken a terrific toll of our valuable top soils and made thousands of acres of Indiana land impossible to till and unfit forever for agriculture purposes. Not only the land has been destroyed, but the soil has washed down our streams to fill them with silt and debris. This causes them to overflow their banks, destroying life and property and depositing unproductive mud and silt over the bottom lands until many of them, too, are covered so deeply that they are no longer productive and workable.

The Division of Forestry has only operated the soil erosion camps until April 1 of the present fiscal year. On this date they were transferred through the United States by an executive order of the President from state supervision to the Soil Conservation Service, a federal agency operating in the prevention of soil erosion.

Until March 31, 1935, the soil erosion camps under the administration of this division raised 18,112,545 seedlings in state nurseries for reforesting eroded lands and protecting check-dams and gullies. Of this number of trees, 15,112,545 were planted by the erosion and forest camps and 3,000,000 were shipped out of Indiana for other government planting agencies.

The ensuing chart shows the location of the CCC camps during the year.

REPORT OF THE DIVISION OF GEOLOGY

(Sixtieth Annual Report of the State Geologist)

W. L. LOGAN, State Geologist.
J. P. KERR, Supervisor of Natural Gas.
W. H. CORDELL, Assistant Geologist.
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 cooperation 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; W. D. Thornbury, glaciology; 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.

Members of the national gas inspection force include Marion Brown, Loogootee; Herman Chanley, Laconia; William Connors, 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 usuable form, and from it comes the *Indiana Oil and Gas News*, which is mimeographed and mailed out on the first of each month. The most valuable function of the *Oil and Gas News* is the contact it gives the Division of Geology and drillers and operators throughout the state.

Sample sacks have been furnished in a number of instances to contractors who were willing to furnish drilling samples from their wells, and much valuable information has been obtained in this manner. It has been found that by examining well cuttings in the laboratory more accurate logs may be had than if the log is made up in the field.

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, 1935, 248 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.

GEOLOGICAL FIELD INVESTIGATIONS

There was no regular field survey during the summer of 1935. Field investigations have been restricted largely to those connected with projects of the Department of Conservation and those necessary in enforcing the conservation laws pertaining to natural resources, in particular oil and gas, and gathering data to use in oil and gas reports.

PUBLICATIONS

During the past fiscal year three publications have been issued by the Division of Geology: "Ground Water in Indiana," by Marshall Harrell, was issued in mimeograph form. This report of 504 pages is a comprehensive discussion of ground water in the state. The first part of the book deals with the problem in general and the last part describes the ground water conditions by counties.

In February a report, entitled "Oil and Gas Developments in Indiana in 1934," was prepared to be used in the American Institute of Mining and Metallurgical Engineers' publication, "Petroleum Development and Technology, 1935." Separates of this paper on Indiana are available at the office of this division.

A map showing the location of active and depleted oil and gas fields of the state and the location of oil and gas pipe lines was published and distributed. A short article on natural gas was sent to the United States Bureau of Mines for *Minerals Yearbook*, 1935. The section in *Keystone Coal Buyers Guide*, 1935, on Indiana was revised and approved.

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. 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, 390; total, $283.53. Free publications distributed, 620.

FERA work has been carried on cleaning, arranging and indexing the geological library, a task which had not been completed since moving to the new building.

DEPARTMENTAL WORK

Much of the work of the Division of Geology during the past fiscal year has been in cooperation with the Division of Engineering on Department of Conservation projects. Sites for dams in state forests and parks were inspected and passed on or condemned in view of the existing geologic conditions: Earthen materials were selected to be used in designated parts of the dams. The geologic conditions at or near several prospective state properties were reported. State fish hatchery sites were inspected, and if found suitable, earthen materials to be used in

their construction were selected. This same thing was done for several conservation clubs, at which time suggestions on construction methods were offered. Advice on road material and water supplies in several of our state forests was supplied at the request of the State Forester.

An attempt has been made to familiarize the various divisions of the department, and in particular the Division of Education, with the nature of our work.

Following an intensive survey of the coal mine drainage stream pollution problem of the Patoka River basin, a program was outlined whereby the condition could be relieved. With the help of an FERA project, several abandoned slope mines were sealed. The purpose of the sealing is to prevent the exit of water from the mine or to prevent the entrance of air into the mine. Since air and water must be in contact with the iron sulphide of the coal for the formation of the harmful sulphuric acid, our problem is to keep either air or water away from the pyrite. Besides the slope mines sealed, five earthen dams have been completed and one partially finished in abandoned strip mine pits in an attempt to raise the water level above the pyrite-containing strata, thereby sealing out the air and preventing the formation of the harmful acid. Much remains to be done before the pollution is entirely cleaned up.

MAPPING

The United States Geological Survey, using funds supplied by the Public Works Administration, mapped topographically two quadrangles in Indiana, the Porter quadrangle in Porter County, the Heltonville quadrangle in Lawrence County. Work is now progressing on the Oolitic quadrangle in Lawrence County. The division is still endeavoring to arouse enough interest in topographic mapping to have a permanent mapping program adopted by the state. The state plan, prepared by the State Planning Board, has incorporated such a program. Not including quadrangles now being mapped, only 10.1 per ceent of Indiana has been covered by topographic maps. 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.

STATE MUESUM

Approximately one hundred small acquisitions were made by the State Museum the past year.

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, to complete an unfinished index, and to make new description cards. A marked improvement in the appearance of the museum is noticeable as the completion of this work approaches.

OIL AND GAS OPERATIONS—1934-1935

This report includes those operations from July 1, 1934, to June 30, 1935. More activity existed in the oil and gas business in the past fiscal year than in the previous four or five years. The absence of too restrictive proration and a better price for crude oil were partially responsible for the improvement. The gas business saw considerable exploratory activity. Several good wells completed in the last year maintained the supply to meet the demands. The laying of a pipe line connecting the Oaktown field with a main line has and doubtless will continue to stimulate drilling in that field.

Of the 197 wells completed during the past 12 months, 90 were dry, 40 produced oil and 59 produced gas. The greater part of the drilling has been in Daviess, Pike, Gibson, Spencer, Knox and Perry counties in southwestern Indiana.

The Unionville gas field in Monroe County is still remaining idle because of the lack of suitable market. 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 and one-half billion cubic feet of gas was removed from wells in Indiana during the last year.

Some of the better gas pools of the southwestern part of the state have been injured by competitive property line drilling, competitive production of gas, poor casing and other faulty operating and drilling technique, poor equipment and unwise offset drilling are shortening the lives of some of the wells. Too heavy a shot has often flooded out production as have breaks in second-hand casing often used in new wells. Failure to pump or to plug wells making water has no doubt injured nearby wells in some cases. On the other hand, natural water floods have increased production in some wells.

Considering the increased production attained in other states by repressuring and controlled flooding, it is likely that these methods will be tried successfully in this state. Another source of additional production in southwestern Indiana is from drilling to deeper horizons in proven areas. Worthwhile results have been obtained in the majority of the twenty-six lime wells treated with acid to date.

For additional information on oil and gas, the separate on "Oil and Gas Developments in Indiana 1935" may be consulted.