AGREEMENT WITH INDIANA UNIVERSITY

"The statement contained herein outlines a plan by which the Indiana State Department of Conservation and Indiana University will cooperate in offering to the people of the state, through their combined resources, the best possible service in surveying the state's natural mineral resources and in research dealing with the nature of such resources and their utilization.

"The plan, in short, proposes that the work of the Division of Geology, except as later herein provided, shall be transferred to the Bloomington campus of Indiana University and that it shall be carried on at the University in conjunction with the work of the Department of Geology.

"*The advantages of the plan.*—At the present time geological work in the state is carried on by both the Division of Geology, which is a part of the organization of the State's Department of Conservation, and by the University's Department of Geology. Both are supported by state funds. Both are interested in the geological problems of Indiana. Both are limited in funds for research, equipment, field service, and staff. It would appear to be desirable and economical, therefore, to pool the resources of the two agencies in order that the equipment, funds and staff of both might be used so far as possible in the development of a unified program. The proposed plan represents a development of the cooperation that has existed between the University and the Department of Conservation over a period of many years. It also represents a development of the geological program for Indiana that is in keeping with the developments along this line in other states."

"This plan will make available to the State's Division of Geology the highly qualified and trained staff of geologists who are members of the University's Department of Geology. Through their close association with the State's Division of Geology and the Department of Conservation they will be kept informed of the state's geological problems and they will be able to give to the state the benefit of their training and experience in a way that has not always been utilized in the past. Furthermore, the unification of the two programs will make available to the Division of Geology laboratory space and equipment for routine work and for research that might otherwise be difficult to provide. The University also has a very complete departmental library of geology, special libraries in other fields, and the general library, all of which contain many books of reference that are absolutely necessary for the study of geological problems. In addition to the University's laboratory facilities, library, and staff in geology, there are available on the campus, many special scientific laboratories, shops, and specialists in chemistry, physics, economics, various phases of business, and other subjects, who may be called upon whenever their services are needed.

"From the University's point of view, the plan for unification of the two agencies offers greater opportunities in the training of graduate students in geology. The proposal should make possible more funds for the employment of such men and women as field workers or as research assistants and fellows. At the same time that they are working toward their doctor's degree such students, working under the competent super-

vision and direction of experienced members of the staff, will contribute greatly to the solution of the state's geological problems. The service thus rendered will be far greater than could otherwise be provided at equal cost to the state.

"*The proposed organization.*—(1) The Head of the Geology Department of Indiana University shall also be the Director of the Division of Geology. Unified control and supervision appears to be desirable in order that all parts of the program may be properly correlated and integrated.

"(2) Different members of the staff will be given responsibility for surveys, research and study of the state's resources as follows: (a) Coal, (b) Oil and Gas, (c) Other industrial minerals, and (d) Paleontology.

"(3) One member of the staff will be given the responsibility of supervising the testing laboratory, and he will also work in conjunction with other members of the staff on laboratory problems involving work in their respective fields, namely coal, oil and gas, and other industrial minerals.

"(4) One member of the staff will be given the responsibility of Publications and Public Information. He will aid in the preparation of published reports, informational bulletins and other printed materials. He wil divide his time between the office in Bloomington and the office of the Conservation Department in Indianapolis. It is expected that he will spend a large part of his time in the Indianapolis office for the purpose of correlating the work of the Division in Bloomington with that of the State Department and for conferences with citizens of the state who desire to discuss geological problems with a representative of the Division of Geology.

"(5) Fellows for survey and research work will be assigned to each of the four staff members specified in (2) and (3) to aid them in the study of problems in their respective fields.

"(6) In the event that special surveys are authorized and funds for such surveys are made available by special appropriations, appointments of additional personnel to conduct this work will be made, unless it is expedient to conduct the surveys by the regular staff. Such surveys if they deal with the work of the Division of Geology will be provided space by the University for a headquarters office.

"The salaries of the Director and of all staff members of the University's Department of Geology, who also serve as members of the staff of the Division of Geology, will be paid from the University budget. The University will also make available for the use of the staff space and equipment for the work on all geological problems. The Department of Conservation, from funds made available to it for support of the Division of Geology, will provide the necessary traveling expenses for field work, expenses for publications, and for the compensation of graduate assistants and fellows in such numbers as funds will permit. When special appropriations are made for specific surveys in the state it is understood that the salaries of the additional personnel and for all other expenses made necessary for the survey will be paid from the funds appropriated for this specific purpose."

OPERATION OF THE PLAN

In September, 1945, the new State Geologist began his duties. The agreement between the University and the Division of Geology necessitated that an overall plan be made for development of the geologic work in Indiana before personnel could be hired and the terms of the agreement carried out. In broad outline, the plan consists of a three-year program in preparation for productive geologic work. The first year, 1945-46, was used to obtain new personnel, reorganize the Department of Geology at Indiana University, start to obtain new laboratory equipment needed, construct a new storage building to handle oil well samples, cores, industrial minerals, and fossils of Indiana, and to redesign and remodel Owen Hall into a modern geological laboratory. The second year, 1946-47, will be used to obtain specialized personnel and scientific equipment needed in the geological laboratory to accomplish the scientific work proposed for Indiana industrial minerals and fuels. In the second year also, the regulatory work of supervising oil and gas production is to be separated from the Division of Geology, placed under a separate director, and given increased funds in order that the conservation work in the State may be improved. The third year, 1947-48, will be used for active geologic work in the field on Indiana clays, coals, sands, limestone, and other industrial minerals, and also on basic scientific work in stratigraphy, paleontology, and geologic mapping.

NEW GEOLOGIC LABORATORY AT INDIANA UNIVERSITY

In order to carry out its part of the agreement Indiana University in 1945-46 has greatly expanded the physical plant of the Geology Department. A new building was constructed to store oil-well and gas-well samples and cores, industrial minerals, and field cars of the Division of Geology. Study of samples of drill cuttings gives reliable information concerning the rock strata from which oil is obtained and through which the wells must be drilled to reach the oil-bearing strata. The specimens of Indiana industrial minerals provide the scientists with experimental material from which they can determine the composition and industrial uses of these raw materials of industry. The new building provides ample space for storing the normal increase in number of samples for another decade if the past rate of drilling oil and gas wells remains constant. The building also contains a modern laboratory for the use of geologists in the Division of Geology, and also for any petroleum engineers or geologists and mining and industrial engineers who will need to study the samples or industrial minerals.

The geology building, Owen Hall, has been redesigned to provide laboratories for rock-crushing and preparation of samples; the preparation of thin sections and polished sections for microscopic study of minerals and rocks; a laboratory for chemical mineralogy, another for the study of the X-ray, thermal, and other physical properties of Indiana minerals and rocks; a new economic geology laboratory; and increased space for the geology library and for the use of graduate students and other research workers. The new physical plant is designed for producing highly trained geologists, and for basic research on Indiana geology. Actually the two functions are closely related because well-trained young

geologists are the men who will make the greatest contributions to knowledge of the geology of the State, which in turn is the information that must be provided to industry in order to utilize the State's raw materials and thereby increase its wealth.

SCIENTIFIC PERSONNEL

In the reorganized Division of Geology the faculty members of the Department of Geology at Indiana University constitute the scientific members of the staff. The State Geologist is the executive head of the Division of Geology and also is the Chairman of the Department of Geology at Indiana University. The specialized work in the various branches of geology is directed and supervised by the faculty members who are directly responsible to the Chairman. Professor Eugene Callaghan is in charge of the research program in economic geology, R. E. Esarey of petroleum geology, J. J. Galloway of paleontology, C. A. Malott of physiography and stratigraphy, and W. D. Thornbury of glaciology and its relation to ground water geology. New personnel is still to be found to take charge of mineralogy, coal, and hydrology. The salaries of the scientific staff are paid by the University, and the individuals do not receive compensation from the Department of Conservation.

In addition to the scientific staff, Mrs. Doris F. Bieberman is hired full-time as a petroleum technologist. She is making microscopic studies of oil well samples from which is established the stratigraphy of the oil-bearing formations in different parts of the State.

Part-time employees are hired as needed to clean, prepare, catalog, and store oil well samples and industrial minerals as they are received at the storage building.

OIL AND GAS CONSERVATION

The regulatory work necessary for the conservation of oil and gas in Indiana is carried on by Mr. A. C. Colby and a staff of four full-time employees. The work of oil and gas supervision is directed from the Indianapolis office of the Division of Geology, Room 415 State Historical Library Building. In addition to the two full-time deputy gas and oil inspectors, a field force of 11 deputy inspectors carries out the enforcement of laws and regulations governing the development and production of oil and natural gas. During the fiscal 1945-46 the part-time deputy inspectors were: M. J. Brown, Loogootee, in charge of Daviess and Martin Counties; H. L. Caldwell, Ligonier, in charge of DeKalb, Elkhart, Lagrange, Noble, Steuben, and Whitley Counties; F. E. Harrer, Tell City, in charge of Crawford, Dubois, Harrison, Orange, Perry, and Spencer Counties; H. W. Legge, Bloomington, in charge of Bartholomew, Brown, Decatur, Lawrence, and Monroe Counties; C. E. Mollenhour, Bourbon, in charge of Fulton, Kosciusko, LaPorte, Marshall, Pulaski, Stark, and St. Joseph Counties; Earl Sutton, Mays, in charge of Rush County; J. R. Townsley, Somerville, in charge of Gibson, Knox, and Pike Counties; J. C. Wink, Shirley, in charge of Delaware, Hamilton, Hancock, Henry, Madison, Shelby, and Wayne Counties; Earl Kesler, Hartford City, in charge of Adams, Allen, Blackford, Jay, Randolph, and Wells Counties;

and James Wyman, Sullivan, in charge of Clay, Greene, Owen, Sullivan, and Vigo Counties. These deputies serve primarily as inspectors for plugging dry and abandoned wells, and as oil scouts who furnish information to the Department concerning drilling operations in their respective areas. They do not receive a salary from the Department of Conservation, but are paid a part of the fee collected by the Division of Geology from oil operators for plugging wells. In addition to responsibilities for the northern and southern regions of the State R. A. Bess, Warren, is in charge of well plugging in Grant, Huntington, and Wabash Counties; and D. L. Norris, Vincennes, is in charge of Knox, Posey, Vanderburgh, and Warrick Counties. These two men are full-time employees of the Department of Conservation.

The regulatory branch of the Division of Geology also gathers information concerning the wells being drilled in the State. The information is made available to all interested persons by a monthly mimeographed "Oil and gas drilling report." Each issue contains the latest available information concerning oil production in the State and is mailed free of charge to interested oil and gas operators in Indiana and to interested persons or organizations in other states.

The conservation branch of the Division of Geology is charged with the responsibility for issuing all oil and gas drilling permits, and also recording complete records of the drilling operations and, after the wells are complete, of maintaining a record of the logs obtained by the drillers. The logs are furnished to the Division of Geology by the oil operators in the State. Mr. Colby and his deputies also are responsible for the collection of samples from wells being drilled, and for seeing that the samples are transported to the storage building at Indiana University. The Division of Geology issued 506 permits to drill new oil and gas wells, and supervised the plugging of 91 abandoned wells during the year.

One of the best public relation functions of the research branch is carried out by the conservation branch. The results of scientific work on oil well samples at the University are transmitted to the regulatory branch, which in turn transmits the information through to the oil or gas operators who need the information immediately in connection with their development work. Also the deputy inspectors who are constantly in contact with producers receive requests for special identifications of samples from key wells. These requests are transmitted immediately to the scientific branch which makes a special investigation and returns the information promptly to the oil operator who requested it.

In addition, the regulatory branch of the Division of Geology improved its relations with the oil public and are maintaining these relations by closer cooperation with the Indiana Scouts Association. Contacts were re-established with the Interstate Oil Compact Commission which may lead to Indiana becoming a member of the Compact.

OIL AND GAS PRODUCTION

The total pipe line runs of petroleum in Indiana during the calendar year 1945 were 4,114,000 barrels, a decline of nearly 17 percent below the estimated 4,950,000 produced in 1944.

Drilling activity during the year was centered in Posey and Gibson

Counties where seven new pools wered iscovered in the State. Four of the pools are in Posey County: Crunk, Farmersville, Jeffries, and St. Wendells East. The other 3 pools are in Gibson County: Johnson West, Lysle, and Mt. Carmel East.

The Griffin pool in Posey County continued to be the largest producer in Indiana, having pipe line runs of 1,721,559 barrels during 1945. The New Harmony pool (including New Harmony South) in Posey County was second in pipe line runs of 464,044 barrels, and the Mt. Vernon pool in Posey County, was third in pipe line runs of 404,283 barrels.

"Mink" Island, in the Wabash River, promises to be an important new development in the New Harmony South pool. The discovery well has an initial production of 600 barrels. The Superior Oil Company completed a well in an extension of the Owensville North pool in Gibson County. The initial production of the well was 1,300 barrels, which suggests that this development may attain large production.

Three new gas pools were discovered: The French pool, in Spencer County; the Friendship pool, in Ripley County, and the Oliver pool in Posey County. The discovery well in each pool had an initial production, respectively, of 1,118,000, 250,000, and 1,650,000 cubic feet. The most productive gas pools were in the Rockport pool in Spencer County, the Greensburg pool in Decatur County, the Unionville pool in Monroe County, and the Rush pool in Rush County. A number of small wells also were drilled in the Old Trenton Field.

Of the 315 completed wells drilled in 29 counties, 115 were oil wells, 36 were gas wells, and 165 were dry holes. Most of the completions were in Posey and Gibson Counties. During 1945 a total of 512,507 feet of new hole was drilled.

SCIENTIFIC BRANCH

The work of the scientific branch resolves itself into three types: basic research on purely scientific problems in geology; routine study and reports on oil geology and industrial minerals; and such public services as identification of specimens of minerals, rocks, and fossils, and responses to letters of inquiry for information from individuals and corporations. The scientific branch also is responsible for the preparation of manuscripts and illustrations for publication of the scientific reports of the Division of Geology.

Because the Division of Geology was in an early stage of reorganization and because scientific personnel was not available during the year for geologic work, only two geologic problems were studied. The first of these concerns the clay deposits in Lawrence and Martin Counties. Dr. Eugene Callaghan and two assistants mapped in detail the clay deposits northeast of Huron in Lawrence County. In connection with that work samples also were collected of the different types of clay which are to be analyzed chemically, optically, thermally, and with X-ray in order to determine precisely their composition. Three large samples were collected and shipped to the laboratory of the U. S. Bureau of Mines at Tuscaloosa, Alabama. The Bureau of Mines is doing experimental work on these samples to determine their potential industrial uses. The results