PITTSBURGH REGIONAL MEETING, OCTOBER 4–9

The regional meeting of the Association at Pittsburgh, Pennsylvania (September *Bulletin*, pp. 1844–46) attracted an attendance of 250 geologists at the program sessions in the William Penn Hotel and 100 on the 4-day field trip across Pennsylvania and New York. Copies of the 121-page, profusely illustrated guidebook, prepared by the Pittsburgh Geological Society, are available at $5.00 per copy, by writing Geo. C. Grow, Jr., 545 William Penn Place, Pittsburgh 19, Pennsylvania.

ABSTRACTS OF PITTSBURGH PAPERS

1. "General Orientation: Review of Geology of Appalachian Area," *by R. E. Sherrill.*

This paper reviews the general geology of the Appalachian basin for a better understanding of the remaining papers on the program and of the field trip. Particular attention is directed to the types of accumulation now known to prevail in the older fields and to the stratigraphic and structural problems in the search for new production.

2. "Petrology and Paleogeology of Greenbrier Limestone," *by Gordon Rittenhouse.*

This paper outlines the petrology and paleogeography of the Greenbrier formation of Mississippian age, as determined from study of well samples, insoluble residues, heavy minerals, and thin sections. In the Greenbrier, clastic limestone beds composed of calcareous sand, oölites, and quartz sand alternate with beds of fine-grained limestone in which clastic texture is indistinct or can not be recognized. The clastic limestones appear to be near-shore sediments and in part probably are ancient bar, beach, channel, and dune deposits and have the shapes and trends characteristic of such deposits. About half of the production of oil and gas from the Greenbrier is from clastic limestones; about half from dolomite and dolomitic limestone.

Dolomite and dolomitic limestones are largely confined to the basal 20–30 feet of the formation. This basal zone appears to transgress both structure and time units. The dolomite clearly replaces limestone. Four methods by which magnesium-bearing waters could be introduced into the formation are suggested and the probable pattern of dolomitization resulting from each method is considered.

The quartz sand in the Greenbrier was derived from two or more different sedimentary sources on the north. Earlier Mississippian and Upper Devonian sands of West Virginia, Ohio, and Pennsylvania were not important sources of the quartz sand.

3. "Hemlock Grove Oil Field," *by R. L. Alkire.*

Two factors have seriously handicapped the presentation of this review. One is the lack of a thorough understanding of the nature of oil accumulation in the Berea sand and the other is the unavailability of sand data and production statistics within the field. Several cores have been taken but the results of their analysis have not been released. In the absence of such information this paper is confined to a historical review leading to the discovery well, the field development, and finally a limited discussion of the Berea sand.

4. "Geology of McDonald and Adjacent Oil Fields, Allegheny and Washington Counties, Pennsylvania," *by A. I. Ingham.*

The McDonald, Venice, McCurdy, and Moon Run oil fields form a producing area 15 miles long by 1–4 miles in width, located in southwest Allegheny and north Washington counties, Pennsylvania. Regionally the area is in the western part of the Appalachian foreland, and approximately 5 miles west of the axis of the Pittsburgh-Huntington synclinorium.

Development in the area took place largely during the period 1890–1900. The McDonald field, one of the largest and most prolific in the Appalachian basin, was discovered in 1891. Two wells in the field each had an initial production variously estimated at 14,000–17,000 barrels per day. In late 1891, McDonald was producing 1,800,000 barrels per month. Cumulative production of all the fields to the middle of 1909 totalled 42,135,000 barrels.

The Wildwood anticline and Mt. Nebo syncline, northeast-southwest trending structures, pass through the fields. Approximately perpendicular to these two structures, and limiting them on the south, is the Cross Creek syncline. Minor structural features are common. Regional dip is south and southeast into the Nineveh and Cross Creek synclines.

Oil is produced principally from Conewango sands of Upper Devonian age—One Hundred foot, Fifty foot, Lower Nineveh, Gordon Stray, Gordon, Fourth and Fifth sands—the last three producing most of the oil.

The fields are typical of the stratigraphic-trap type, oil accumulation in the various pools being

controlled by the lenticular and lithologic character of the sands. Some structural control is indicated. Gas is found in the structurally higher parts of the sands.

5. "Geology and Occurrence of Natural Gas in Oriskany in Faulted Anticlines with Particular Reference to Northern Pennsylvania and Southern New York Producing Area," *by F. H. Finn.*

The Oriskany sandstone, which has been important as a source of natural gas in the Appalachian area, has been productive in 66 different pools throughout the Appalachian area. Many of the pools are small, and some of them were discovered many years ago when the Oriskany was not recognized as the producing formation. Most of the pools have resulted from structural trapping, although more than half of the total reserve of gas has been found in a large pool in West Virginia which is productive chiefly because of an interruption in porosity in an updip direction. Over 1½ trillion cubic feet of gas reserves have been discovered in the Oriskany since 1930.

In northern Pennsylvania and southern New York a producing province including 34 pools has been developed between 1930 and the present. Practically all of these pools result from structural traps caused by doming and thrust faulting along a series of prominent anticlines.

The province is described and a structure map of the area is presented. One of the most prominent producing trends (the Hebron-Harrison-Woodhull area), involving a complicated faulting pattern and the merging of two anticlines, is described in detail by means of surface and subsurface structure maps and cross sections.

6. "Structural Accumulation of Natural Gas in Oriskany Sand of Tri-State Area," *by John T. Galey.*

In the Tri-State area, comprising east-central Ohio, southwestern Pennsylvania and northern West Virginia, between the highly folded structures (Chestnut Ridge anticline) on the east, and the area in which the Oriskany sand becomes patchy in its distribution on the west, seven gas pools have been found in the Oriskany sand on low-relief domes. The history of discovery, stratigraphy, structure of the surface rocks, structure of the Berea sand, convergence between the Berea and Oriskany sands, and structure on the Oriskany sand, together with development, operation, and reservoir data, are discussed for the three most important of these pools, which are Blackhawk, located in South Beaver Township, Beaver County, Pennsylvania, and the Knox and Round Knob located in Knox and Madison townships, Columbiana County, Ohio, respectively.

7. "Oriskany Sand in Ohio," *by J. R. Lockett.*

The Oriskany is a somewhat regular sand body in an area comprising parts of fourteen counties in eastern Ohio. The western limit of this consistent deposit can be plotted as a very irregular line between Trumbull and Meigs counties. Although relatively large lenses of sandstone have been encountered at this horizon as far west as Knox County in the central part of the state, only two small fields have been discovered in western outliers.

The Cambridge field, discovered in 1922, was developed along the western pinch-out of the Oriskany in a typical stratigraphic trap extending from southwestern Guernsey County into south-central Tuscarawas County. The sand was absent west of the field, oil has accumulated immediately below the gas and a definite water horizon was encountered on the normal southeast dip below the oil at a depth of 2,600 feet below sea level. Although hard and sharp, the sand was exceptionally open in texture. Virgin rock pressure was 1,150 pounds. Gas wells were large in volume but relatively short lived. At its peak in 1926 the field produced 190,000 MCF per day.

During 1935 a small gas field with a virgin pressure in excess of 1,600 pounds was discovered on a closed structure in Madison and Wayne townships, Columbiana County, at an average depth of 3250 feet below sea level. The few wells drilled were soon ruined by water and the field was of no commercial importance. During 1946 a gas field was developed on a similar structure and at approximately the same depth a few miles east in Madison Township. High pressures and large initial volumes encouraged development but water encroachment ruined these wells within a year. These two small gas fields are the only producing areas developed in Ohio where accumulation in the Oriskany sand was definitely controlled by anticlinal structure.

In 1944 a gas field was discovered along the western limit of the Oriskany in eastern Knox Township, Columbiana County, at an average depth of 2,400 feet below sea level. Initial rock pressures were in excess of 1,300 pounds. Although no oil was discovered downdip, high permeability of the sand and large initial volumes of the wells indicate that their history will be comparable with that of the Cambridge field.

A gas well with an open flow capacity of 2,500 MCF was recently completed at a depth of approximately 2,100 feet below sea level near the Pennsylvania line in Vernon Township, Trumbull County. It is one location west of two small oil wells which are located immediately up the normal dip from