

STATE OF ILLINOIS
WILLIAM G. STRATTON, *Governor*
DEPARTMENT OF REGISTRATION AND EDUCATION
VERA M. BINKS, *Director*

DIVISION OF THE
STATE GEOLOGICAL SURVEY
JOHN C. FRYE, *Chief*
URBANA

CIRCULAR 195.

FAULTS AND OTHER STRUCTURES
IN SOUTHERN ILLINOIS

A COMPILATION

BY

H. B. STONEHOUSE and G. M. WILSON



PRINTED BY AUTHORITY OF THE STATE OF ILLINOIS

URBANA, ILLINOIS

1955

FAULTS AND OTHER STRUCTURES IN SOUTHERN ILLINOIS

A COMPILATION

by

H. B. Stonehouse and G. M. Wilson

ABSTRACT

Faults, folds, dikes, sills, and diatremes mapped in southern Illinois and parts of adjacent states have been compiled on one map.

Knowledge of faults and related structures is important in the exploration and exploitation of coal, oil and gas, fluorspar, and other mineral resources. The mineral resources named all occur in the area covered by this report. The compilation was undertaken to summarize known structural data on one map.

The area shown on the accompanying map includes southern Illinois and adjacent parts of southwestern Indiana, western Kentucky, and eastern Missouri. It is within a major zone of geological deformation extending from northwestern Oklahoma to central Pennsylvania. The faults, folds, and igneous intrusions shown on the map have been compiled from a number of sources (see below). The features were first mapped and are here shown on several horizons, most frequently the bedrock surface, or on No. 5 or No. 6 coal horizons. In this compilation, interpretation of the structure has been confined to joining faults compiled from different sources but in obvious continuity, and to projecting known faults occurring at the edge of a mapped area as short inferred faults beyond that edge. A few additions, corrections, and other extensions of the data are based on more recent field work and drill records.

The map shows two major structural trends. In the eastern and southeastern part of the mapped area, the structural trend is northeastward; in the rest of the area the trend ranges from west to northwest and, rarely, north-northwest. Dikes, which appear to strike northwest-southeast where the strike can be ascertained, are confined to a belt about 15 miles wide, trending NW-SE, and extending from Kentucky into southeastern Illinois.

Most of the faults are steeply dipping normal faults of small displacement, but displacements of from 400 to 2000 feet are known. Many of the faults are complex zones (rather than simple faults), in which there are parallel and cross-cutting fractures. Thrust faults occur in the area, the most prominent being the Shawneetown fault zone in southern Gallatin County and its southwestern extension in Saline and Pope counties, where the known displacement is as much as 3500 feet.

Anticlinal and synclinal folds are commonly associated with the fault systems, in continuity with and en echelon to the faults. Other folds are apparently not related to the faults. Folds are fairly gentle, with dips on the fold limbs generally less than 5° but as high as 20° in the Eagle Valley syncline.

Basic igneous dikes and sills of mica peridotite and lamprophyre are found in the eastern portion of the area. Dikes range in thickness from a few inches to 300 feet; sills up to 75 feet thick are known. Many of the dikes occur in more or less vertical cracks and are not associated with faults. Where they are associated, the faults disturb the dikes and faulting took place, in part at least, after intrusion.

Four diatremes or explosion breccias have been mapped in Hardin and Pope counties. The probable projection of one of these features has been observed in a hole drilled on Hicks Dome in Hardin County, Ill. (Brown, 1954). It is located between 1600 feet and 2944 feet (the bottom of the hole).

All faulting throughout the area is probably post-Pennsylvanian. In the southern part of the area, the faults are covered by Cretaceous strata not known to be faulted.

The cooperation of the mining and oil producing industries of Illinois in supplying data is gratefully acknowledged.

Information for this compilation was obtained from a number of sources, given below.

ILLINOIS STATE GEOLOGICAL SURVEY

Publications:

Bastin, E. S., 1931, The fluorspar deposits of Hardin and Pope counties, Illinois: Bull. 58, 116 p.

Butts, Charles, 1925, Geology and mineral resources of the Equality-Shawneetown area: Bull. 47, 76 p.

Cady, G. H., 1925, Structure of parts of northeastern Williamson and western Saline counties: Rept. Inv. 2, 20 p.

Cady, G. H., 1940, Structure of Herrin (No. 6) coal bed in Randolph, western Perry, southwestern Washington, and southeastern St. Clair counties: in Circ. 58, 19 p.

Cady, G. H., and others, 1938, Structure of Herrin (No. 6) coal bed in central and southern Jefferson, southeastern Washington, Franklin, Williamson, Jackson, and eastern Perry counties, Illinois: in Circ. 24, 11 p.

Cady, G. H., and others, 1939, Structure of Herrin (No. 6) coal bed in Hamilton, White, Saline, and Gallatin counties, Illinois, north of Shawneetown fault: in Circ. 42, 16 p.

- Cady, G. H., and others, 1951, Subsurface geology and coal resources of the Pennsylvanian system in certain counties of the Illinois Basin: Rept. Inv. 148, 123 p.
- English, R. M., and Grogan, R. M., 1948, Omaha pool and mica-peridotite intrusives, Gallatin County, Illinois: Rept. Inv. 130.
- Harrison, J. A., 1951, Subsurface geology and coal resources of the Pennsylvanian system in White County, Illinois: Rept. Inv. 153, 40 p.
- Kay, F. H., and others, 1917, Oil investigations in Illinois: Bull. 35, 80 p.
- Lamar, J. E., 1925, Geology and mineral resources of the Carbondale Quadrangle: Bull. 48, 172 p.
- Root, T. B., 1928, The oil and gas resources of the Ava - Campbell Hill area: Rept. Inv. 16, 27 p.
- Swann, D. H., 1951, Waltersburg sandstone oil pools of the lower Wabash area, Illinois and Indiana: Rept. Inv. 160, 21 p.
- Weller, J. M., 1940, Geology and oil possibilities of extreme southern Illinois - Union, Johnson, Pope, Hardin, Alexander, Pulaski, and Massac counties: Rept. Inv. 71, 71 p.
- Weller, J. M., and Ekblaw, G. E., Preliminary geologic map of parts of the Alto Pass, Jonesboro, and Thebes quadrangles in Union, Alexander, and Jackson counties: Rept. Inv. 70, 26 p.
- Weller, J. M., and others, 1952, Geology of the fluorspar deposits of Illinois: Bull. 76, 147 p.
- Weller, Stuart, and others, 1920, Geology of Hardin County and the adjoining part of Pope County: Bull. 41, 416 p.
- Weller, Stuart, and others, 1939, Preliminary geologic map of the Mississippian formations in the Dongola, Vienna, and Brownfield quadrangles: Rept. Inv. 60, 11 p.
- Weller, Stuart, and Weller, J. M., 1939, Preliminary geological maps of the pre-Pennsylvanian formations in part of southwestern Illinois - Waterloo, Kimmswick, New Athens, Crystal City, Renault, Baldwin, Chester, and Campbell Hill quadrangles: Rept. Inv. 59, 15 p.
- Unpublished maps in files.

OTHER SOURCES

Publications:

- Brown, J. S., 1954, Explosion well on Hicks Dome, Hardin County, Illinois: *Econ. Geol.*, v. 49, no. 3, p. 891-902.
- Clark, S. K., and Royds, J. S., 1948, Structural trends and fault systems in Eastern Interior Basin: *Bull. Am. Assoc. Petr. Geol.*, v. 32, no. 9, p. 1728-1749.
- Flint, R. F., The geology of parts of Perry and Cape Girardeau counties, Missouri: unpublished manuscript, Missouri Bur. Geol. and Mines.
- Gardner, J. H., 1915, A stratigraphic disturbance through the Ohio Valley running from the Appalachian plateau in Pennsylvania to the Ozark Mountains in Missouri: *Bull. Geol. Soc. Am.*, v. 26, p. 477-483.
- Ingham, W. I., 1948, Powell's Lake oil field, Union County, Kentucky: *Bull. Am. Assoc. Petr. Geol.*, v. 32, no. 1, p. 34-51.
- Lockett, J. R., 1947, Development of structures in basin areas of north-eastern United States: *Bull. Am. Assoc. Petr. Geol.*, v. 31, no. 3, p. 429-446.
- Shaw, E. W., and Savage, T. E., 1912, Murphysboro-Herrin folio: U.S. Geol. Survey Folio 185.
- Weller, Stuart, 1921, Geology of the Golconda Quadrangle: Kentucky Geol. Survey, ser. VI, v. 4, 148 p.
- _____, 1923, Geology of the Princeton Quadrangle: Kentucky Geol. Survey, ser. VI, v. 10, 105 p.
- _____, and St. Clair, Stuart, 1928, The geology of Ste. Genevieve County, Missouri: Missouri Bur. Geol. and Mines, ser. 2, v. 22, 352 p.
- _____, and Sutton, A. H., 1951, Geologic map of the west Kentucky fluorspar district: U.S. Geol. Survey, scale 1/63,360 (geology mapped 1920-1929).

Unpublished maps furnished by operating mining companies.