

quadrangle, strata generally dip 2° to 3° to the northeast, toward the structural center of the basin. The Bradshaw Creek and Shiloh Church Faults are newly named faults. A branch of the Ste. Genevieve Fault Zone, a major northwest-trending structure that crosses the northeast flank of the Ozark Dome in southeast Missouri and southwesternmost Illinois, transects the southwest corner of the quadrangle. Along the principal fault, the Cypress Sandstone on the southwest side is upthrown against limestone in the upper Okaw Formation on the northeast side. Throw across the fault is estimated to be 100 to 200 feet. The fault zone bifurcates, and a fault that trends southward juxtaposes lower Pope Group on the upthrown west side against lower Pope Group and Cypress on the east side. Estimated throw across this fault is 60 to 70 feet. Field interpretation suggests that the faults are high-angle, nor-

either the Caseyville or the Tradewater Formations that crop out in a discontinuous manner may be more

The Makanda Quadrangle is on the southwest margin of the Illinois Basin. In the northern portion of the

laterally continuous than is shown on the map.

STRUCTURAL GEOLOGY

central portion of the quadrangle. The axial plane strikes north-northeast and dips to the northwest. Both limbs have shallow dips; dips are steeper on the east limb near the anticlinal nose and the Bradshaw Creek Fault. The Bradshaw Creek Fault, which trends south-southeast, borders the Saratoga Anticline on the east and, at the surface, offsets the Degonia Formation, Kinkaid Limestone, and Raccoon Creek Group. Throw Saratoga Anticline on the west and, at the surface, also offsets the Degonia Formation, Kinkaid Limestone, and Raccoon Creek Group. The throw of this fault is estimated to be 70 to 80 feet, also down to the east. A All six wells were plugged and abandoned. small, unnamed, southwest-trending fault offsets strata in Sections 33 and 34, T11S, R1W. The Menard Limestone on the southeast, upthrown side is juxtaposed against Palestine Sandstone on the northwest side. Throw is estimated to be 30 to 40 feet. All of these faults are interpreted to be high-angle, normal faults. Two periods of deformation along the Ste. Genevieve Fault Zone have been recognized in Missouri (Weller and St. Clair 1928), but direct evidence for two episodes is not present in the Makanda Quadrangle. According to Nelson and Lumm (1985), during the Middle to Late Devonian, the Sparta Shelf was uplifted relative to the Ozark Dome. During latest Mississippian or earliest Pennsylvanian time, the Ozark Dome was uplifted relative to the Sparta Shelf and reverse faulting occurred along the Ste. Genevieve Fault Zone. normal, dip-slip faulting occurred along the branch of the Ste. Genevieve in this quadrangle. The timing of this faulting episode cannot be accurately determined, but it certainly occurred later than the middle Chesterian. The deformation that resulted in displacement along the Bradshaw Creek Fault, the Shiloh Weller, S., and S. St. Clair, 1928, Geology of Ste. Genevieve County, Missouri: Missouri Bureau of Geol-

Church Fault, and the Saratoga Anticline seems to have occurred during a fourth episode of deformation

the lower Tradewater Formation has been mined along the outcrop. In Section 28, the coal splits into a lower bed 0.4 feet thick and an upper bed 1.5 feet thick, separated by 2.5 feet of shale (unpublished ISGS field notes, 1933). In a ravine in Section 33, the coal was reported to be about 2 feet thick (unpublished ISGS field notes, 1929) or 3 feet thick (Lamar 1925). A thin coal bed in the upper Tradewater Formation (Smith? Coal Bed) was mined at numerous sites in the north- to west-trending ravine in the E ½ SE ¼ and S ½ NE ¼ of Section 27; the W 1/4 of Section 26; and the NE 1/4 NE 1/4 of Section 34, T10S, R1W. Field research in the 1930s indicated that this coal was 2.0 to 2.5 feet thick and the basal portion was shaley (unpublished ISGS field notes, 1933). All these coals are discontinuous and resources are negligible. Six oil and gas exploration wells were drilled in the quadrangle. The C.C. Bradley No. 1 well was drilled

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FAULT ZONE

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VERTICAL EXAGGERATION 2X

in the NE corner, SW 1/4 SE 1/4 of Section 27, T10S, R1W, to 1,332 feet deep into the Golconda Formation. The Rendleman No. 1 well was drilled in the NE corner, NE 1/4 SE 1/4 of Section 27, T10S, R1W, to 1,335 feet deep into either the Menard or Vienna Limestone. The S.M. Cast No. 1 well was drilled at 720 feet from the NL and 440 feet from the WL of Section 15, T11S, R1W, to 1,240 feet deep into the Mississippian Ste. Genevieve Limestone. The Wayman No. 2 well was drilled at 330 feet from the SL and 990 feet from the WL, SE 1/4 SW 1/4 of Section 17, T11S, R1W, to 1,204 feet deep, also into the Ste. Genevieve. The Basler No. 1 well was drilled on the east flank of the Saratoga Anticline, 330 feet from the NL and 330 feet from the EL, The Saratoga Anticline is a broad, nearly symmetric, northeastward-plunging anticline in the south-SE 1/4 SE 1/4 of Section 35, T11S, R1W. The total depth of this well was 4,053 feet, and it reached the Middle Ordovician Dunleith Formation of the Galena Group. A slight oil show was reported between 2,520 and 2,529 feet in the Middle Devonian Clear Creek Chert. The Tripp No. 1 well was drilled on the crest of the Saratoga Anticline, 330 feet from the SL and 330 feet from the WL, NW 1/4 SW 1/4 of Section 2, T12S, R1W. The well bottomed in the Middle Devonian Grand Tower Limestone at 2,415 feet. Oil shows were reported is estimated to be 50 to 60 feet down to the east. The Shiloh Church Fault, which trends south, borders the in the Fredonia Limestone Member of the Ste. Genevieve Limestone from 764 to 768 feet deep, in the Middle Devonian Lingle Formation below 2,320 feet, and in the Grand Tower Limestone below 2,378 feet.

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Greb, S. F., D. A. Williams, and A. D. Williamson, 1992, Geology and Stratigraphy of the Western Kentucky Coal Field: Kentucky Geological Survey, Bulletin 2, Series XI, 77 p. Lamar, J. E., 1925, Geology and Mineral Resources of the Carbondale Quadrangle: Illinois State Geological Survey, Bulletin 48, 172 p. Lamar, J. E., 1959, Limestone Resources of Extreme Southern Illinois: Illinois State Geological Survey,

Report of Investigations 211, 81 p. After the second episode of deformation, the stress responsible for the reverse faulting was released, and Nelson, W. J., and D. K. Lumm, 1985, Ste. Genevieve Fault Zone, Missouri and Illinois: Illinois State Geological Survey Contract/Grant Report 1985-3, U.S. Nuclear Regulatory Commission NUREG/CR GEOLOGIC MAP OF THE MAKANDA QUADRANGLE JACKSON, UNION, AND WILLIAMSON COUNTIES, **ILLINOIS** 

SHILOH CHURCH

Mmwy

**FAULT** 

BRADSHAW

**CREEK** 

**FAULT** 

SARATOGA ANTICLINE