KENTUCKY GEOLOGICAL SURVEY
James C. Cobb, State Geologist and Director
University of Kentucky, Lexington

BEDROCK GEOLOGIC QUADRANGLE
EVANSVILLE and WEST FRANKFORT
30 x 60 MINUTE QUADRANGLES, KY
Series XII, 2008
Version 1.0
Contract Report 31

BEDROCK GEOLOGIC MAP OF PARTS OF THE EVANSVILLE AND WEST FRANKFORT 30 x 60 MINUTE QUADRANGLES, WESTERN KENTUCKY

Compiled by Thomas N. Sparks and Steven L. Martin
Modified from compilations by Michael P. Solis and Matthew M. Crawford

2008

SCALE 1:100 000

Miles

Kilometers

Universal Transverse Mercator projection, zone 16, North American Datum of 1927

Roads, railroads, and cultural basemap features are from digital data available from the Kentucky Division of Geographic Information (gis.ky.gov).

KENTUCKY

QUADRANGLE LOCATIONS

WEST FRANKFORT

EVANSVILLE

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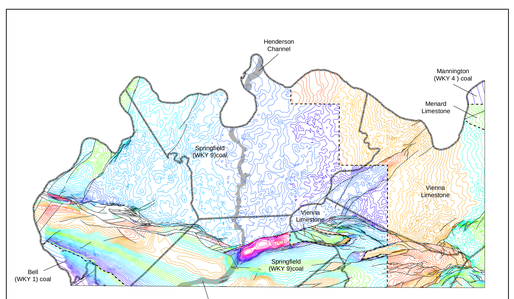
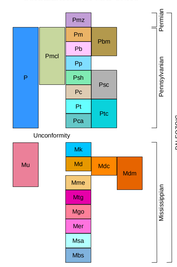


Location of structure contours in the Evansville and West Frankfort 30 x 60 minute quadrangles. Name represents datum horizon for particular map area. The horizon boundaries are shown as black dashed lines. Henderson Channel is in light gray color. Contour interval north of the Rough Creek Fault Zone is 40 ft. It places south of the fault zone where dip is relatively steep, contour interval is 100 or 200 ft. Legend is a modified full -spectrum color ramp distributed across fourteen (14) contour value classes (see below). Scale 1:500,000.

Color Legend
Structure contour (feet)

1201 - 1700	-439 - -240
841 - 1200	-619 - -440
521 - 840	-819 - -620
281 - 520	-1019 - -820
121 - 280	-1279 - -1020
-39 - 120	-1759 - -1280
-239 - -40	-2400 - -1760

CORRELATION OF MAP UNITS



EXPLANATION

- Contact
- Approximate contact
- Inferred contact
- Concealed contact
- Fault
- Inferred fault
- Concealed fault
- Coal bed
- Concealed coal bed
- Outline of Henderson Channel
- Bedrock topographic contours
- State boundary

GEOLOGIC SETTING AND STRUCTURAL SETTING

The surface of the Evansville and West Frankfort 30 x 60 minute quadrangles consists of flat-lying sediments and sedimentary rocks of the Quaternary, Pennsylvanian, and Mississippian age. These deposits extend across the Rough Creek Fault System, an east-west trending basement fault complex that extends from southern Illinois eastward into west-central Kentucky. This fault system marks the north margin of a failed rift basin depicted as a half graben with vertical offset as much as several thousand feet on its western end.

Numerous oil fields have been discovered north of the Rough Creek Fault System, and other stratigraphic, fault-related, or anticlinal structures may play an important role in the accumulation of petroleum resources. Major oil companies have explored for deep gas, particularly in the Cambrian rocks. Coal from the Western Kentucky Coal Field (part of the Illinois Basin in Kentucky) is also a major commodity in the mapped area as there is long history of production from numerous coal beds that have been surface and deep mined (Weisenfluh and others, 2001).

Faulting may have controlled the thickness and extent of some of the mapped rock units in the mapped area. Several major fluvial paleochannels have incised underlying rocks in the quadrangle. A Pennsylvanian channel called the Henderson Channel (Beard and Williamson, 1979) incises the Mulford (Western Kentucky No. 9, Springfield) coal and trends south from the city of Henderson to the Rough Creek Fault System. Other channels and paleovalleys exist in the Caseyville Formation and in the Mississippian section.

DESCRIPTION OF MAP UNITS

Mauzy Formation (Lower Permian)
Interbedded shale, siltstone, and limestone with minor sandstone and coal. Shale and siltstone (70%), interlaminated, poorly to well laminated, some steep crossbedding; calcareous and micaceous along bedding planes. Limestone (25%), very fine- to fine-grained, clayey to silty where interbedded; mostly even-bedded, up to 3 m (10 ft) thick. Sandstone (5%), fine-grained, thin-bedded, crossbedded, shale and siltstone interlaminations common. Coal, very thin coaly or carbonaceous shales in lowest part of section. Conformably overlies the Sturgis Formation (Mantoon Formation equivalent); the upper contact has been removed by erosion. Fossilinids of Early Permian age are found 43 m (140 ft) above the boundary. Type section located in Dekoven and Sebree Junction Rockby and Sturgis quadrangle border (Kehn and others, 1982).

Pennsylvanian Rocks, Undivided
Unit equivalent to unnamed or unknown Pennsylvanian rocks within mapped fault segments.

McLeansboro Group (Upper Pennsylvanian)
Unit equivalent to Mantoon, Bond, Patoka, or Shelburn Formations within mapped fault segments.

Mattoon and Bond Formations, Undifferentiated (Upper Pennsylvanian)
Sandstone, shale, siltstone, limestone, and coal. Sandstone, fine- to medium-grained, in part argillaceous, micaceous, commonly interbedded with shale. Shale, clayey to sandy, in part carbonaceous; commonly interbedded with sandstone; scattered siltstone nodules; locally abundant plant impressions in dark-gray and black shale; where shale is calcareous it contains brachiopod and crinoid fragments. Silstone, fine- to very fine-grained, sandy, micaceous; commonly grades into sandstone. Limestone, finely crystalline, dense, argillaceous to sandy. Coal, thin and shaly, pyritic in part. Originally mapped as Henshaw Formation and upper part of Lisman Formation; later reassigned as upper part of the Sturgis Formation.

Mattoon Formation (Upper Pennsylvanian)
Sandstone, shale, siltstone, limestone, and coal. Description same as above. Coal beds include the Geiger Lake, and Sulfur Springs. Base of formation is usually approximated 61 m (200 ft) beneath the Geiger Lake coal based on position of a limestone marker bed in the subsurface. However, with the mapping of the Geiger Lake coal consistently across most of the area, it was used as a proxy for the base.

Bond Formation (Upper Pennsylvanian)
Sandstone, shale, siltstone, limestone, and coal. Description same as above. Coal beds include the Western Kentucky No. 18 and Lisman coals. The Cambaga Limestone Member is 1 to 3 m (3 to 10 ft) thick regionally persistent marker bed, commonly recognized on electric logs, and is located at the base of the formation.

Patoka Formation (Upper Pennsylvanian)
Shale, sandstone, siltstone, coal, and limestone. Shale, clayey to sandy, in part carbonaceous; commonly interbedded with sandstone; scattered thin beds of calcareous shale containing brachiopod and crinoid fragments. Sandstone, fine- to medium-grained, silty, micaceous. Silstone, in part sandy, commonly interbedded with shale and sandstone. Coal beds thin, in part shaly and pyritic; commonly grade into black shale. Coals present, but not mapped, include the Western Kentucky No. 15, 16, and 17 beds. Limestone, argillaceous, silty. The base of the formation is placed at the top of the West Franklin Limestone Member (formerly mapped as the Madisonville Limestone Member) of the underlying Shelburn Formation (see description below).

Shelburn Formation (Upper Pennsylvanian)
Shale, sandstone, siltstone, coal, and limestone. Shale, clayey to sandy, in part calcareous, locally carbonaceous; commonly interbedded with sandstone and siltstone. Sandstone, fine- to medium-grained, locally coarse-grained, in part crossbedded, micaceous, locally carbonaceous; contains thin lenses of ironstone conglomeratic. Siltstone, sandy, micaceous, locally carbonaceous. Coals include, in ascending order, the Paradise, Baker, and Coiltown coals (formerly mapped as the Western Kentucky No. 12, 13, and 14). The Paradise coal occurs between beches of the Providence Limestone Member. Limestone, finely crystalline, dense, fossiliferous. West Franklin Limestone Member is at the top of the formation and includes one to three beds of limestone separated by calcareous clay shale. Providence Limestone Member, at the base of the formation, also consists of multiple limestone beds separated by shale.

Shelburn and Carbondale Formations (Middle and Upper Pennsylvanian)
Combined unit present in Usua quadrangle, previously mapped as Lisman and Carbondale Formations, undivided.

Carbondale Formation (Middle Pennsylvanian)
Sandstone, shale, coal, and limestone. Sandstone, fine- to medium-grained, micaceous, thin- to thick-bedded; in part crossbedded. Shale, clayey to sandy, slightly micaceous, scattered small calcareous concretions; commonly interbedded with sandstone. Coals include, in ascending order, the Davis, Dekoven, Hoochin Creek, Springfield, Briar Hill, and Herrin coal beds (previously mapped as the Western Kentucky No. 6, 7, 8, 9, 10, and 11). Limestone, finely crystalline, medium-bedded, locally sandy, commonly occurs below coal beds.

Tradewater Formation (Middle Pennsylvanian)
Sandstone, siltstone, shale, coal, and limestone. Sandstone, very fine- to medium-grained, micaceous, thin- to very thick-bedded, partly crossbedded. Siltstone, poorly exposed, micaceous; grades into shale and limestone. Shale, clayey to sandy, locally carbonaceous. Coals include, in ascending order, the Bell, Ice House, and the Mannington/Mannington City/Lewisport coal beds or zones (formerly mapped as the Western Kentucky No. 1b, 3, and 4). Curlew Limestone Member is a medium crystalline, dense, thin- to thick-bedded, locally fossiliferous limestone directly above the No. 4 coal. Other limenstones, very fine-grained, dense, cherty.

Caseyville Formation (Lower Pennsylvanian)
Sandstone, conglomeratic sandstone, shale and coal. Sandstone, quartzose, very fine- to coarse well-rounded grains, micaceous, thin- to very thick-bedded, locally crossbedded. Basal part, locally conglomeratic; contains rounded white quartz pebbles. Shale, silty to sandy, locally carbonaceous and clayey. Coal, blocky, hard, bright, thin; includes Battery Rock coal bed.

Tradewater and Caseyville Formations, Undivided (Lower and Middle Pennsylvanian)
Description same as above.

Undifferentiated Rocks of Upper Mississippian Age
Unit equivalent to Kinkaid Limestone, Degonia Sandstone, and possibly older rocks within mapped fault segment in Calhoun quadrangle.

Kinkaid Limestone (Upper Mississippian)
Limestone, very finely crystalline, fine- to coarse-grained, dense, subconchoidal fracture, in part shaly and dolomitic; fossiliferous with many brachiopods and crinoid columnals.

Degonia Sandstone (Upper Mississippian)
Shale and limestone. Clay shale containing thin beds of gray limestone. Poorly exposed, often mapped with underlying units. Mapped locally in Glenville and Calhoun quadrangles.

Degonia Sandstone and Clore Limestone, Undivided (Upper Mississippian)
Shale and limestone. Shale, slightly sandy, silty. Limestone, dark gray, dense. Mapped locally in Sebree mapped area.

Degonia Sandstone, Clore Limestone, Palestine Sandstone and Menard Limestone, Undivided (Upper Mississippian)
Shale, limestone, sandstone, and siltstone. Shale, clayey to sandy, in part calcareous. Limestone, very finely crystalline to coarse-grained, dense; abundant brachiopods, bryozoans, and crinoid columnals in lowermost limestone. Sandstone, very fine- to medium-grained, locally silty. Siltstone, in part sandy and calcareous, locally micaceous. Combined upper unit mapped locally with underlying Menard Limestone in Morganfield and Waverly quadrangles.

Menard Limestone (Upper Mississippian)
Limestone, shale, and sandstone. Limestone, fine- to coarsely crystalline, fine- to coarse-grained, in part shaly, locally dolomitic. Shale, clayey to sandy, in part calcareous. Sandstone, very fine-grained. Mapped locally in Utica quadrangle.

Tar Springs Sandstone and Glen Dean Limestone, Undivided (Upper Mississippian)
Tar Springs Sandstone includes sandstone and shale. Sandstone, very fine-grained, quartzitic, platy to very thin bedded; interbedded with shale in lower part. Shale, clayey to sandy, in part micaceous; may contain very thin resistant beds of ferruginous ironstone concretions. Glen Dean Limestone composed of finely crystalline, fossil-fragmental limestone. Mapped locally in Morganfield quadrangle.

Golconda Formation (Upper Mississippian)
Upper unit of Haney Limestone Member; limestone, fossil-fragmental, in part dolomitic, very oolitic, and slightly cherty. Lower unit of Big Clifty Sandstone Member; sandstone and shale. Sandstone, fine- to medium-grained. Shale, clayey to sandy. Mapped locally in Utica quadrangle.

Elwren Sandstone and Reelsville Limestone, Undivided (Upper Mississippian)
Elwren Sandstone consists of sandstone, very fine-grained, argillaceous, micaceous. Reelsville Limestone, composed of limestone, finely crystalline to very fine-grained, fossil-fragmental; in part oolitic, partly dolomitic. Mapped locally in Utica quadrangle.

Sample Sandstone (Upper Mississippian)
Sandstone, shale, and siltstone. Sandstone, very fine- to medium-grained. Shale and siltstone, partly sandy Mapped locally in Utica quadrangle.

Beaver Bend Limestone, Mooretown Formation, Paoli Limestone, and Ste. Genevieve Limestone, Undivided (Middle and Upper Mississippian)
Beaver Bend Limestone; limestone, fine-grained, fossil-fragmental, in part oolitic. Mooretown Formation; sandstone and shale. Sandstone, fine-grained, grains subrounded. Shale, sandy. Paoli Limestone; limestone and shale. Limestone, very finely crystalline to very fine-grained, fossil-fragmental, dense, very oolitic in upper half; subconchoidal fracture. Shale, clay, calcareous. Ste. Genevieve Limestone; limestone, very finely crystalline to very fine-grained, dense; subconchoidal fracture, in part very oolitic. Mapped locally in Utica quadrangle.

Artificial fill, engineered fill (Modern)
Compacted material used as fill for the construction of roads, railroads, buildings, floodwalls, and other engine-ered structures. Present in all areas of development: mapped only where fill significantly changes the elevation.

Artificial fill, mine spoil (Modern)
Disturbed bedrock and regolith produced from mining operations.

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This map was generated from compilation of Evansville and West Frankfort 1:24,000-scale Digitally Vectorized Geologic Quadrangle (DVGQ) maps completed by KGS personnel, 2000–01 (see References). The compilation dataset was edited for this contract deliverable by mapping the exposed and concealed bedrock contacts, approximating their subsurface extent where covered and not mapped by Quaternary sediments, and excluding all mapped Quaternary surface units. This work was funded in part by the U.S. Geological Survey National Cooperative Mapping Program under the STATEMAP Program authorized by the National Geologic Mapping Act of 1992, Grant No. 07HQAG0062, and by the Kentucky Geological Survey.

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