# BEDROCK GEOLOGY OF RIDGWAY QUADRANGLE
## GALLATIN AND SALINE COUNTIES, ILLINOIS


Prairie Research Institute
**ILLINOIS STATE GEOLOGICAL SURVEY**

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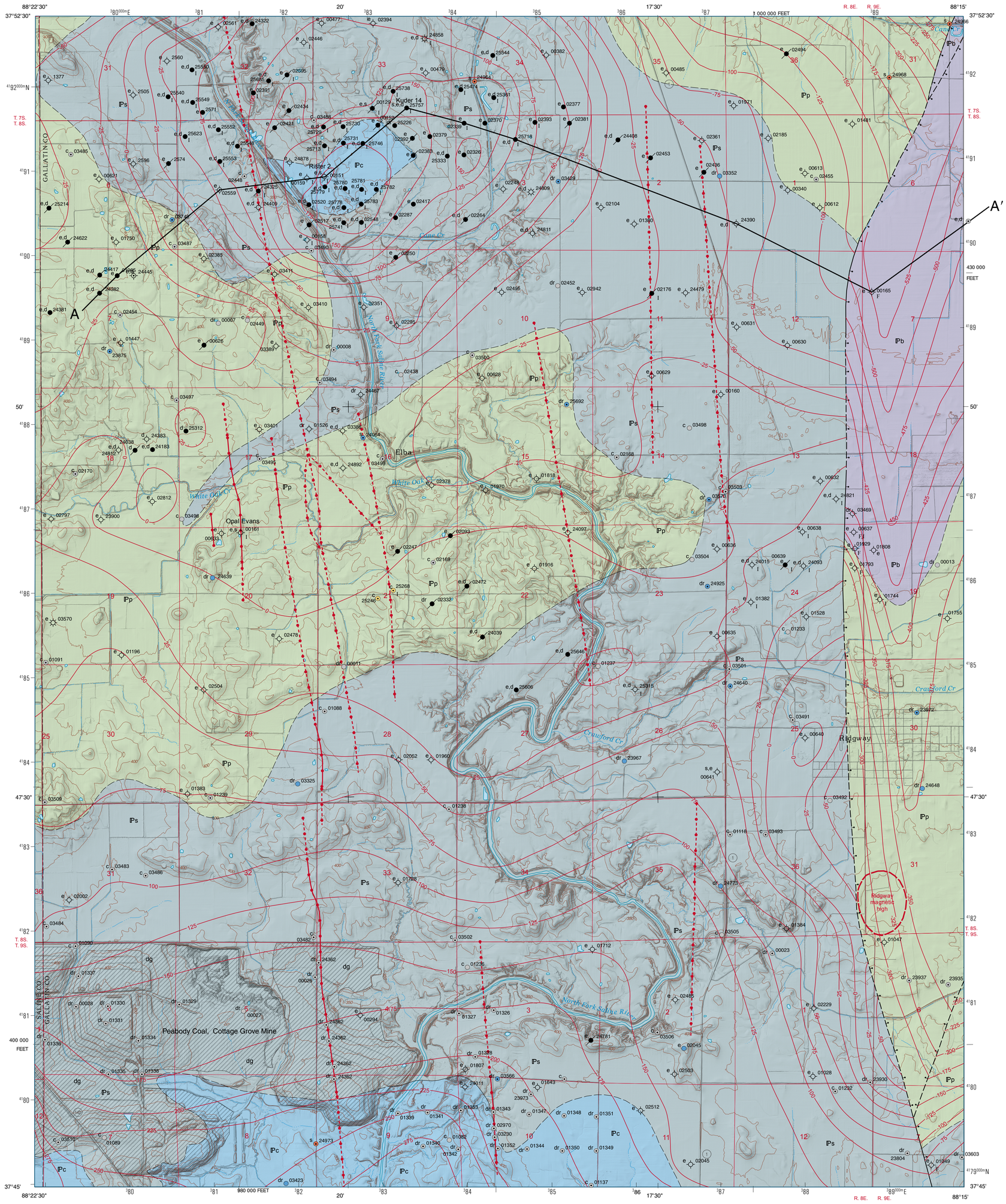
2017

STATEMAP Ridgway-BG




EXPLANATION

- dg — Disturbed ground: Surface mines from Myers and Chenoweth (2005)
- Pennsylvanian
  - Missourian
    - IPb — Bond Formation
    - IPp — Patoka Formation
  - Desmoinesian
    - IPs — Shelburn Formation
    - IPc — Carbondale Formation

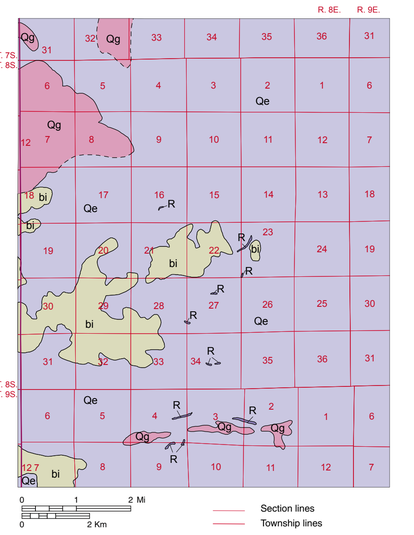
### Symbols

- Stragraphic boring
- Water well
- Engineering boring
- Coal test boring
- Oil well
- Oil well, abandoned
- Gas well
- Dry hole

c,d,dr,e,s 01049 F, I — Labels indicate core study (c), density and/or neutron log (d), driller's log (dr), electric log (e), and sample log (s). Boring penetrates fault (F), or igneous rock (I). Numeric label indicates the county number. Dot indicates location accurate within 100 feet. All oil-test holes are assumed to be accurately located.

### Line Symbols
dashed where inferred, dotted where concealed

- Igneous dike (Permian age)
- Contact
- Normal fault: bar and ball on downthrown side
- 400 — Structure contour of the top of the Springfield Coal (contour interval is 25 feet)
- A—A′ — Line of cross section




- Qe — Equality Formation–lake plain
- bi — Bedrock island–loess and thin, patchy till over bedrock
- Qg — Glasford Formation–moraine or other constructional feature of glacial till
- R — Bedrock outcrop

**Figure M1 Surficial Geology**
To aid in preparation of maps showing bedrock topography and "drift" thickness, We have prepared a map of surficial geology in the Ridgway quadrangle, based on Heinrich (1982).

The greater part of the quadrangle is a plain developed on Pleistocene lacustrine sediments. The upper surface of this plain is mostly at 370 to 385 feet elevation. North Fork Saline River and its tributaries have dissected the lake plain to a small extent. This youthful drainage is in the initial stage of incision into bedrock

Rising above the lake plain in the western part of the map area are low, rolling hills that reach maximum elevation of about 445 feet. Some of these hills were constructed of glacial sediments, whereas others consist of bedrock thinly mantled in loess and thin, patchy glacial till. Hills in the northwestern part of the quadrangle (Qg), are clearly constructional features. They partly overlie a buried valley in which bedrock is more than 100 feet below the surface. Although no sediment descriptions are available, these hills are similar in form to others in Saline County to the west, where detailed logs indicate till or diamicton. Thus, we interpret the hills in northwest Ridgway quadrangle as Illinoian till, Glasford Formation, mantled by younger loess.

Most of the hills south of White Oak Creek are "bedrock islands", as shown by water wells and coal-test boreholes that indicate Quaternary sediments 20 feet or thinner. No rock outcrops occur among these hills, but bedrock crops out along the North Fork near the hills in Secs. 22 and 23, T8S, R8E. A couple of drill holes in Secs. 21 and 22 show 30 to 40 feet of Quaternary deposits, most likely Glasford Formation. If all surficial sediments on these hills were removed, the hills would still rise slightly above the surrounding lake plain.

Interpreted as Glasford Formation moraine is the small range of hills that runs east-west in Secs. 2 to 4, T9S, R8E. Heinrich (1982) mapped these as bedrock islands, but drilling shows this is not the case. Surficial sediments are 30 to 40 feet thick across these hills, and bedrock lies entirely below the surface of the lake plain.


**References**

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Myers, A.R. and Chenoweth, C., 2005, Directory of coal mines in Illinois, 7.5-minute quadrangle series, Ridgway quadrangle, Gallatin and Saline Counties: Illinois State Geological Survey, 2 sheets, scale 1:24,000, and 13-page directory.

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Willman, H.B. and Frye, J.C., 1970, Pleistocene stratigraphy of Illinois: Illinois State Geological Survey, Bulletin 94, 204 p. and 3 plates.


Base map compiled by Illinois State Geological Survey from digital data (2015 US Topo) provided by the United States Geological Survey. Shaded relief and contours derived from 2009–2011 LiDAR elevation data.

North American Datum of 1983 (NAD 83)
Projection: Transverse Mercator
10,000-foot ticks: Illinois State Plane Coordinate systems, west zone

1,000-meter ticks: Universal Transverse Mercator grid system, zone 16

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SCALE 1:24,000

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER

BASE MAP CONTOUR INTERVAL 20 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988



Geology based on field work by W. John Nelson, 2016.

Digital cartography by Jennifer E. Carrell and Jeremy R. Breeden, Illinois State Geological Survey.


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This map has not undergone the formal Illinois Geologic Quadrangle map review process. Whether or when this map will be formally reviewed and published depends on the resources and priorities of the ISGS.

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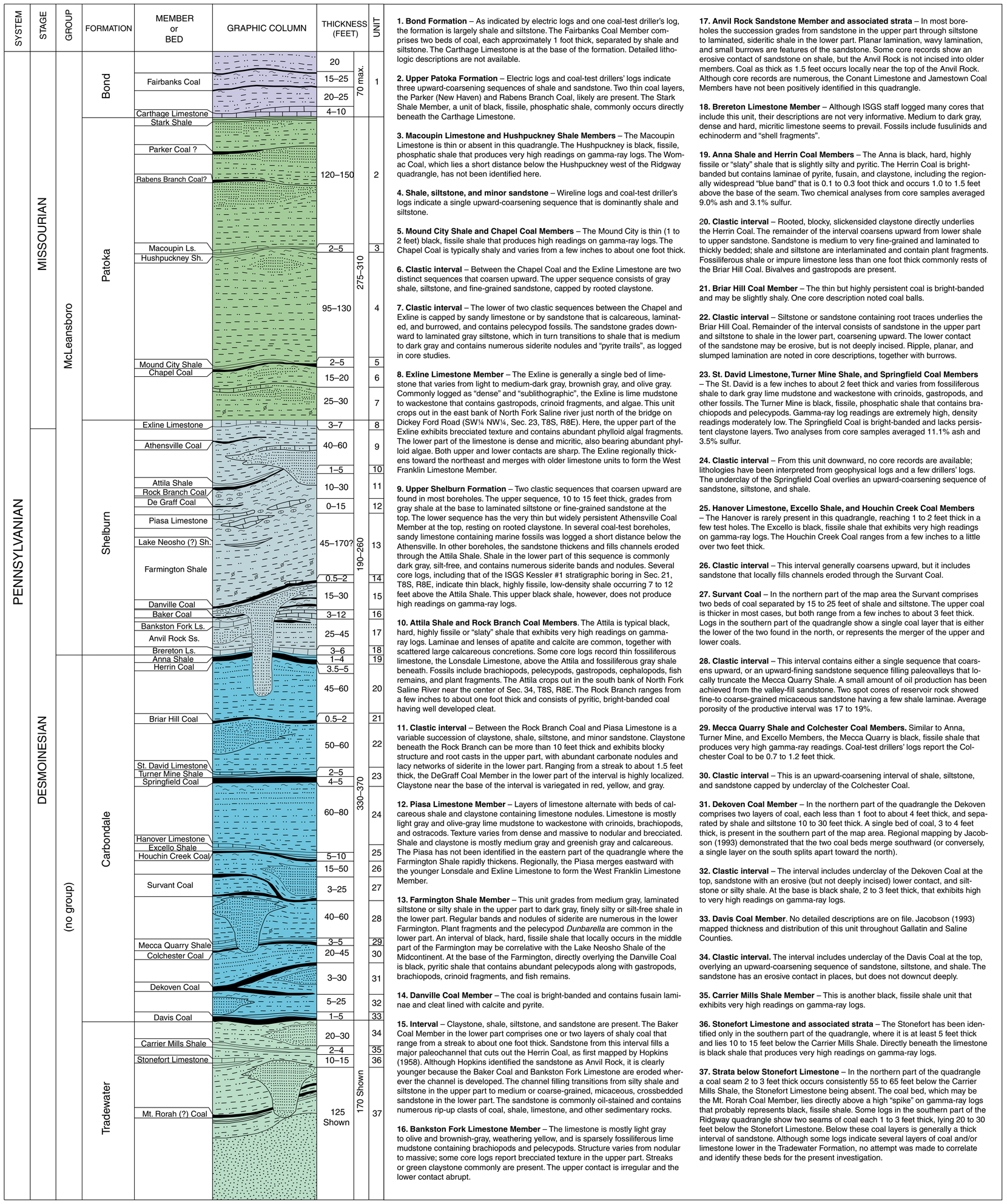
| 6 | 7 | 8 |

ADJOINING QUADRANGLES
1 Broughton
2 Norris City
3 New Haven
4 Eldorado
5 New Haven SW
6 Rudement
7 Equality
8 Shawneetown

1° MAGNETIC NORTH — TRUE NORTH
APPROXIMATE MEAN DECLINATION, 2017

ROAD CLASSIFICATION
State Route
Local road




**1. Bond Formation** – As indicated by electric logs and one coal-test driller's log, the formation is largely shale and siltstone. The Fairbanks Coal Member comprises two beds of coal, each approximately 1 foot thick, separated by shale and siltstone. The Carthage Limestone is at the base of the formation. Detailed lithologic descriptions are not available.

**2. Upper Patoka Formation** – Electric logs and coal-test drillers' logs indicate three upward-coarsening sequences of shale and sandstone. Two thin coal layers, the Parker (New Haven) and Rabens Branch Coal, likely are present. The Stark Shale Member, a unit of black, fissile, phosphatic shale, commonly occurs directly beneath the Carthage Limestone.

**3. Macoupin Limestone and Hushpuckney Shale Members** – The Macoupin Limestone is thin or absent in this quadrangle. The Hushpuckney is black, fissile, phosphatic shale that produces very high readings on gamma-ray logs. The Womac Coal, which lies a short distance below the Hushpuckney west of the Ridgway quadrangle, has not been identified here.

**4. Shale, siltstone, and minor sandstone** – Wireline logs and coal-test driller's logs indicate a single upward-coarsening sequence that is dominantly shale and siltstone.

**5. Mound City Shale and Chapel Coal Members** – The Mound City is thin (1 to 2 feet) black, fissile shale that produces high readings on gamma-ray logs. The Chapel Coal is typically shaly and varies from a few inches to about one foot thick.

**6. Clastic interval** – Between the Chapel Coal and the Exline Limestone are two distinct sequences that coarsen upward. The upper sequence consists of gray shale, siltstone, and fine-grained sandstone, capped by rooted claystone.

**7. Clastic interval** – The lower of two clastic sequences between the Chapel and Exline is capped by sandy limestone or by sandstone that is calcareous, laminated, and burrowed, and contains pelecypod fossils. The sandstone grades downward to laminated gray siltstone, which in turn transitions to shale that is medium to dark gray and contains numerous siderite nodules and "pyrite trails", as logged in core studies.

**8. Exline Limestone Member** – The Exline is generally a single bed of limestone that varies from light to medium-dark gray, brownish gray, and olive gray. Commonly logged as "dense" and "sublithographic", the Exline is lime mudstone to wackestone that contains gastropods, crinoid fragments, and algae. This unit crops out in the east bank of North Fork Saline river just north of the bridge on Dickey Ford Road (SW¼ NW¼, Sec. 23, T8S, R8E). Here, the upper part of the Exline exhibits brecciated texture and contains abundant phylloid algal fragments. The lower part of the limestone is dense and micritic, also bearing abundant phylloid algae. Both upper and lower contacts are sharp. The Exline regionally thickens toward the northeast and merges with older limestone units to form the West Franklin Limestone Member.

**9. Upper Shelburn Formation** – Two clastic sequences that coarsen upward are found in most boreholes. The upper sequence, 10 to 15 feet thick, grades from gray shale at the base to laminated siltstone or fine-grained sandstone at the top. The lower sequence has the very thin but widely persistent Athensville Coal Member at the top, resting on rooted claystone. In several coal-test boreholes, sandy limestone containing marine fossils was logged a short distance below the Athensville. In other boreholes, the sandstone thickens and fills channels eroded through the Attila Shale. Shale in the lower part of this sequence is commonly dark gray, silt-free, and contains numerous siderite bands and nodules. Several core logs, including that of the ISGS Kessler #1 stratigraphic boring in Sec. 21, T8S, R8E, indicate thin black, highly fissile, low-density shale occurring 7 to 12 feet above the Attila Shale. This upper black shale, however, does not produce high readings on gamma-ray logs.

**10. Attila Shale and Rock Branch Coal Members**. The Attila is typical black, hard, highly fissile or "slaty" shale that exhibits very high readings on gamma-ray logs. Laminae and lenses of apatite and calcite are common, together with scattered large calcareous concretions. Some core logs record thin fossiliferous limestone, the Lonsdale Limestone, above the Attila and fossiliferous gray shale beneath. Fossils include brachiopods, pelecypods, gastropods, cephalopods, fish remains, and plant fragments. The Attila crops out in the south bank of North Fork Saline River near the center of Sec. 34, T8S, R8E. The Rock Branch ranges from a few inches to about one foot thick and consists of pyritic, bright-banded coal having well developed cleat.

**11. Clastic interval** – Between the Rock Branch Coal and Piasa Limestone is a variable succession of claystone, shale, siltstone, and minor sandstone. Claystone beneath the Rock Branch can be more than 10 feet thick and exhibits blocky structure and root casts in the upper part, with abundant carbonate nodules and lacy networks of siderite in the lower part. Ranging from a streak to about 1.5 feet thick, the DeGraff Coal Member in the lower part of the interval is highly localized. Claystone near the base of the interval is variegated in red, yellow, and gray.

**12. Piasa Limestone Member** – Layers of limestone alternate with beds of calcareous shale and claystone containing limestone nodules. Limestone is mostly light gray and olive-gray lime mudstone to wackestone with crinoids, brachiopods, and ostracods. Texture varies from dense and massive to nodular and brecciated. Shale and claystone is mostly medium gray and greenish gray and calcareous. The Piasa has not been identified in the eastern part of the quadrangle where the Farmington Shale rapidly thickens. Regionally, the Piasa merges eastward with the younger Lonsdale and Exline Limestone to form the West Franklin Limestone Member.

**13. Farmington Shale Member** – This unit grades from medium gray, laminated siltstone or silty shale in the upper part to dark gray, finely silty or silt-free shale in the lower part. Regular bands and nodules of siderite are numerous in the lower Farmington. Plant fragments and the pelecypod *Dunbarella* are common in the lower part. An interval of black, hard, fissile shale that locally occurs in the middle part of the Farmington may be correlative with the Lake Neosho Shale of the Midcontinent. At the base of the Farmington, directly overlying the Danville Coal is black, pyritic shale that contains abundant pelecypods along with gastropods, brachiopods, crinoid fragments, and fish remains.

**14. Danville Coal Member** – The coal is bright-banded and contains fusain laminae and cleat lined with calcite and pyrite.

**15. Interval** – Claystone, shale, siltstone, and sandstone are present. The Baker Coal Member in the lower part comprises one or two layers of shaly coal that range from a streak to about one foot thick. Sandstone from this interval fills a major paleochannel that cuts out the Herrin Coal, as first mapped by Hopkins (1958). Although Hopkins identified the sandstone as Anvil Rock, it is clearly younger because the Baker Coal and Bankston Fork Limestone are eroded wherever the channel is developed. The channel filling transitions from silty shale and siltstone in the upper part to medium or coarse-grained, micaceous, crossbedded sandstone in the lower part. The sandstone is commonly oil-stained and contains numerous rip-up clasts of coal, shale, limestone, and other sedimentary rocks.

**16. Bankston Fork Limestone Member** – The limestone is mostly light gray to olive and brownish-gray, weathering yellow, and is sparsely fossiliferous lime mudstone containing brachiopods and pelecypods. Structure varies from nodular to massive; some core logs report brecciated texture in the upper part. Streaks or green claystone commonly are present. The upper contact is irregular and the lower contact abrupt.

**17. Anvil Rock Sandstone Member and associated strata** – In most boreholes the succession grades from sandstone in the upper part through siltstone to laminated, sideritic shale in the lower part. Planar lamination, wavy lamination, and small burrows are features of the sandstone. Some core records show an erosive contact of sandstone on shale, but the Anvil Rock is not incised into older members. Coal as thick as 1.5 feet occurs locally near the top of the Anvil Rock. Although core records are numerous, the Conant Limestone and Jamestown Coal Members have not been positively identified in this quadrangle.

**18. Brereton Limestone Member** – Although ISGS staff logged many cores that include this unit, their descriptions are not very informative. Medium to dark gray, dense and hard, micritic limestone seems to prevail. Fossils include fusulinids and echinoderm and "shell fragments".

**19. Anna Shale and Herrin Coal Members** – The Anna is black, hard, highly fissile or "slaty" shale that is slightly silty and pyritic. The Herrin Coal is bright-banded but contains laminae of pyrite, fusain, and claystone, including the regionally widespread "blue band" that is 0.1 to 0.3 foot thick and occurs 1.0 to 1.5 feet above the base of the seam. Two chemical analyses from core samples averaged 9.0% ash and 3.1% sulfur.

20. **Clastic interval** – Rooted, blocky, slickensided claystone directly underlies the Herrin Coal. The remainder of the interval coarsens upward from lower shale to upper sandstone. Sandstone is medium to very fine-grained and laminated to thickly bedded; shale and siltstone are interlaminated and contain plant fragments. Fossiliferous shale or impure limestone less than one foot thick commonly rests of the Briar Hill Coal. Bivalves and gastropods are present.

**21. Briar Hill Coal Member** – The thin but highly persistent coal is bright-banded and may be slightly shaly. One core description noted coal balls.

**22. Clastic interval** – Siltstone or sandstone containing root traces underlies the Briar Hill Coal. Remainder of the interval consists of sandstone in the upper part and siltstone to shale in the lower part, coarsening upward. The lower contact of the sandstone may be erosive, but is not deeply incised. Ripple, planar, and slumped lamination are noted in core descriptions, together with burrows.

**23. St. David Limestone, Turner Mine Shale, and Springfield Coal Members** – The St. David is a few inches to about 2 feet thick and varies from fossiliferous shale to dark gray lime mudstone and wackestone with crinoids, gastropods, and other fossils. The Turner Mine is black, fissile, phosphatic shale that contains brachiopods and pelecypods. Gamma-ray log readings are extremely high, density readings moderately low. The Springfield Coal is bright-banded and lacks persistent claystone layers. Two analyses from core samples averaged 11.1% ash and 3.5% sulfur.

**24. Clastic interval** – From this unit downward, no core records are available; lithologies have been interpreted from geophysical logs and a few drillers' logs. The underclay of the Springfield Coal overlies an upward-coarsening sequence of sandstone, siltstone, and shale.

**25. Hanover Limestone, Excello Shale, and Houchin Creek Coal Members** – The Hanover is rarely present in this quadrangle, reaching 1 to 2 feet thick in a few test holes. The Excello is black, fissile shale that exhibits very high readings on gamma-ray logs. The Houchin Creek Coal ranges from a few inches to a little over two feet thick.

**26. Clastic interval** – This interval generally coarsens upward, but it includes sandstone that locally fills channels eroded through the Survant Coal.

**27. Survant Coal** – In the northern part of the map area the Survant comprises two beds of coal separated by 15 to 25 feet of shale and siltstone. The upper coal is thicker in most cases, but both range from a few inches to about 3 feet thick. Logs in the southern part of the quadrangle show a single coal layer that is either the lower of the two found in the north, or represents the merger of the upper and lower coals.

**28. Clastic interval** – This interval contains either a single sequence that coarsens upward, or an upward-fining sandstone sequence filling paleovalleys that locally truncate the Mecca Quarry Shale. A small amount of oil production has been achieved from the valley-fill sandstone. Two spot cores of reservoir rock showed fine-to coarse-grained micaceous sandstone having a few shale laminae. Average porosity of the productive interval was 17 to 19%.

**29. Mecca Quarry Shale and Colchester Coal Members.** Similar to Anna, Turner Mine, and Excello Members, the Mecca Quarry is black, fissile shale that produces very high gamma-ray readings. Coal-test drillers' logs report the Colchester Coal to be 0.7 to 1.2 feet thick.

**30. Clastic interval** – This is an upward-coarsening interval of shale, siltstone, and sandstone capped by underclay of the Colchester Coal.

**31. Dekoven Coal Member** – In the northern part of the quadrangle the Dekoven comprises two layers of coal, each less than 1 foot to about 4 feet thick, and separated by shale and siltstone 10 to 30 feet thick. A single bed of coal, 3 to 4 feet thick, is present in the southern part of the map area. Regional mapping by Jacobson (1993) demonstrated that the two coal beds merge southward (or conversely, a single layer on the south splits apart toward the north).

**32. Clastic interval** – The interval includes underclay of the Dekoven Coal at the top, sandstone with an erosive (but not deeply incised) lower contact, and siltstone or silty shale. At the base is black shale, 2 to 3 feet thick, that exhibits high to very high readings on gamma-ray logs.

**33. Davis Coal Member**. No detailed descriptions are on file. Jacobson (1993) mapped thickness and distribution of this unit throughout Gallatin and Saline Counties.

**34. Clastic interval.** The interval includes underclay of the Davis Coal at the top, overlying an upward-coarsening sequence of sandstone, siltstone, and shale. The sandstone has an erosive contact in places, but does not downcut deeply.

**35. Carrier Mills Shale Member** – This is another black, fissile shale unit that exhibits very high readings on gamma-ray logs.

**36. Stonefort Limestone and associated strata** – The Stonefort has been identified only in the southern part of the quadrangle, where it is at least 5 feet thick and lies 10 to 15 feet below the Carrier Mills Shale. Directly beneath the limestone is black shale that produces very high readings on gamma-ray logs.

**37. Strata below Stonefort Limestone** – In the northern part of the quadrangle a coal seam 2 to 3 feet thick occurs consistently 55 to 65 feet below the Carrier Mills Shale, the Stonefort Limestone being absent. The coal bed, which may be the Mt. Rorah Coal Member, lies directly above a high "spike" on gamma-ray logs that probably represents black, fissile shale. Some logs in the southern part of the Ridgway quadrangle show two seams of coal each 1 to 3 feet thick, lying 20 to 30 feet below the Stonefort Limestone. Below these coal layers is generally a thick interval of sandstone. Although some logs indicate several layers of coal and/or limestone lower in the Tradewater Formation, no attempt was made to correlate and identify these beds for the present investigation.

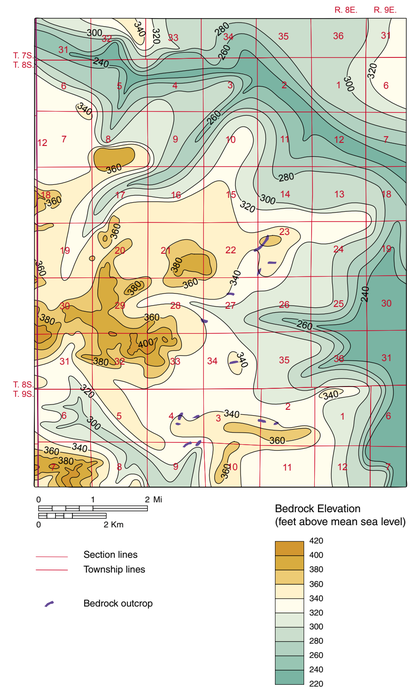



**Figure M2 Bedrock Topography**
Using data from boreholes and outcrops, We prepared a map of the topography (elevation) of the bedrock surface in the Ridgway quadrangle. The contour interval is 20 feet.

The most prominent feature is a buried valley that trends ESE across the northern part of the map area. The bottom of the valley is at about 240 feet elevation, which is 80 to 140 feet lower than adjacent bedrock hills. This valley represents ancestral (pre-glacial) course of the North Fork Saline River, which flowed directly to the pre-glacial Wabash River a short distance east of the Ridgway quadrangle.

The valley segment in the southeast part of the quadrangle, from Ridgway southward, is believed to be part of the pre-glacial Wabash River. Several well records indicate the valley floor lies between 225 and 235 feet elevation. The lower part of the valley fill is water-bearing sand that is tapped by water wells. Our interpretations generally agree with those of Heinrich (1982) and the statewide surficial geologic map of Stiff (2000), who mapped Henry Formation (sand and gravel of Wisconsinan age) in the buried valley segment that passes beneath Ridgway.

As Willman and Frye (1970) and Heinrich (1982) related, enormous torrents of meltwater coursed through the Wabash and Ohio Rivers during interglacial episodes. Sand and gravel deposits of these rivers and their tributaries comprise the Henry Formation. Silt and clay of the Equality Formation accumulated in the extensive backwater (or slackwater) lakes that inundated all the smaller tributary valleys. At the end of Pleistocene time, the North Fork established a new course atop the newly deposited sediments. The North Fork has eroded its channel into bedrock in several places where it was superimposed across buried hills.

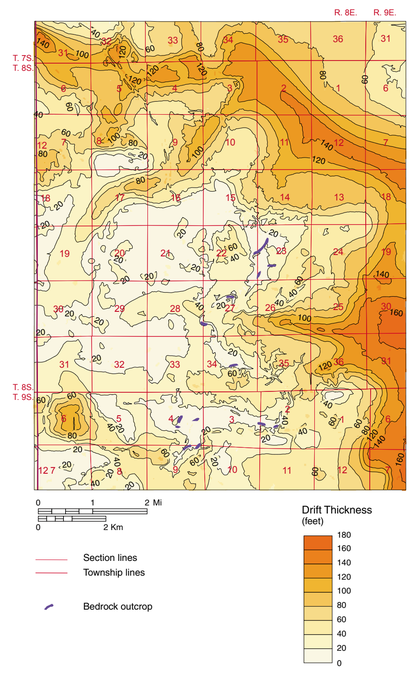



**Figure M3 Drift Thickness**
This map illustrates the entire thickness of unlithified Quaternary sediments in the Ridgway Quadrangle. This map was generated in ArcGIS software by subtracting the surface of elevation of bedrock from land surface elevation.