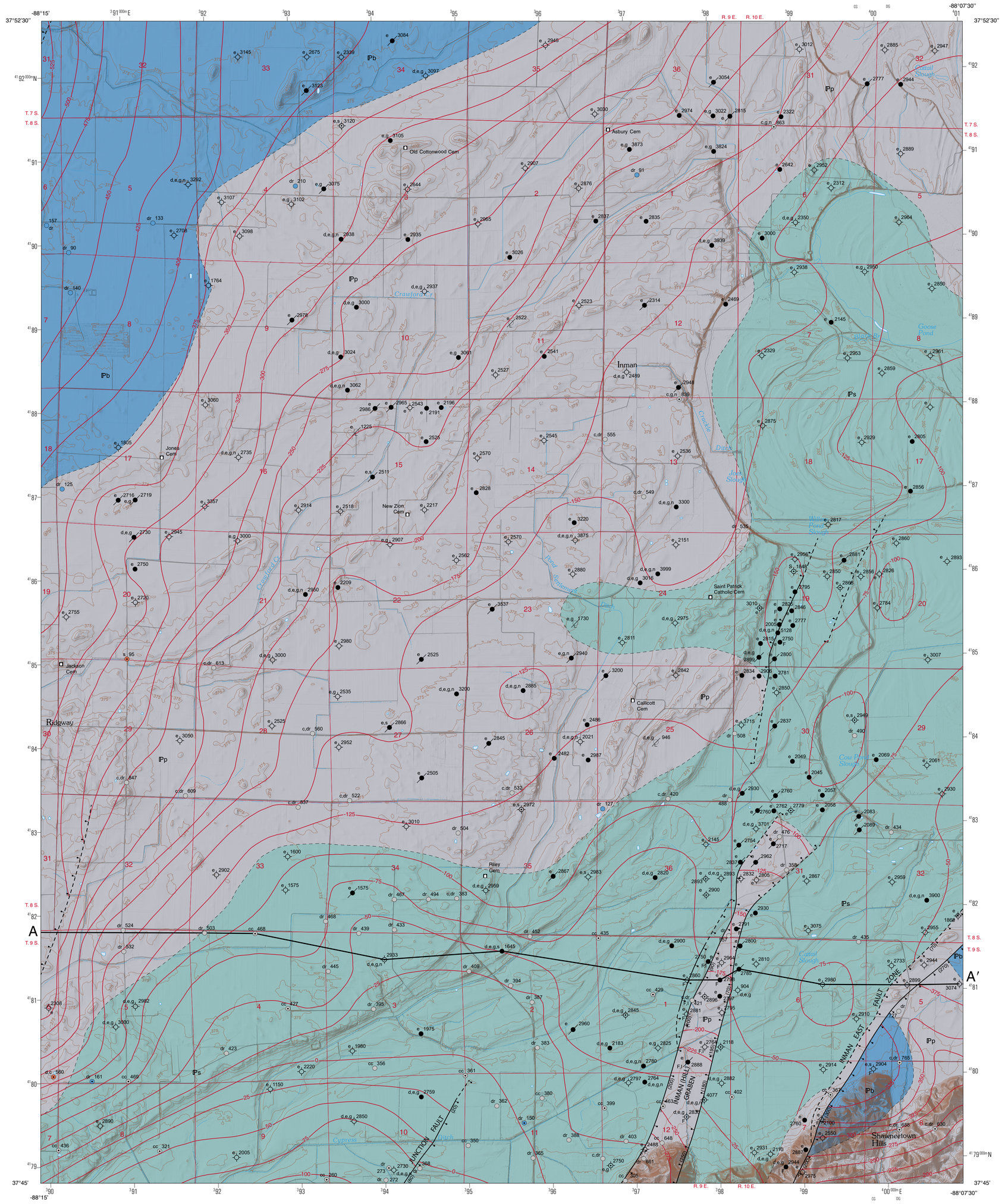
BEDROCK GEOLOGY OF NEW HAVEN SW QUADRANGLE
GALLATIN COUNTY, ILLINOIS

Prairie Research Institute
ILLINOIS STATE GEOLOGICAL SURVEY

W. John Nelson
2019

STATEMAP New Haven SW-BG



EXPLANATION

System	Series		
Pennsylvanian	Missourian	ℙb	Bond Formation
		ℙp	Patoka Formation
	Desmoinesian	ℙs	Shelburn Formation
		ℙc	Carbondale Formation (column and cross section only)
		ℙt	Tradewater Formation (column and cross section only)

Point Symbols

Drill Holes
from which subsurface data were obtained
Depths and log information omitted in densely drilled areas.

- Coal test boring
- Engineering test boring
- Water well
- Dry oil-test hole
- Oil Well
- Plugged oil well
- Water input well

Numbers denote total depth in feet. Dot in center signifies hole is accurately located.
Types of logs: partial core description (c), continuous core description (cc), density log (d), electric log (e), driller's log (dr), gamma-ray log (g), neutron log (n), sample study (s).
Other symbols: fault penetrated in wellbore (F), igneous rock penetrated in wellbore (I).

Line Symbols

- Contact, location accurate
- Contact, location approximate
- A——A′ Line of cross section
- Normal fault, location accurate; bar and ball on downthrown side, number denotes throw in feet
- Normal fault, location approximate
- Structure contour on top of Springfield Coal, contour interval 25 feet, elevation MSL

Note: Well and boring records are on file at the ISGS Geological Records Unit and are available online from the ISGS website.

Base map compiled by Illinois State Geological Survey from digital data (2018 US Topo) provided by the United States Geological Survey. Shaded relief derived from 2011 LiDAR elevation data.

North American Datum of 1983 (NAD 83)
Projection: Transverse Mercator
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 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1988

Geology based on data analysis by John Nelson, 2018–2019.

Digital cartography by Emily Bunse, Alan Myers, and Jennifer Obrad, 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.

The Illinois State Geological Survey and the University of Illinois make no guarantee, expressed or implied, regarding the correctness of the interpretations presented in this document and accept no liability for the consequences of decisions made by others on the basis of the information presented here. The geologic interpretations are based on data that may vary with respect to the accuracy of geographic location, the type and quantity of data available at each location, and the scientific and technical qualifications of the data sources. Maps or cross sections in this document are not meant to be enlarged.

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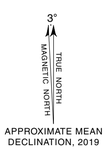
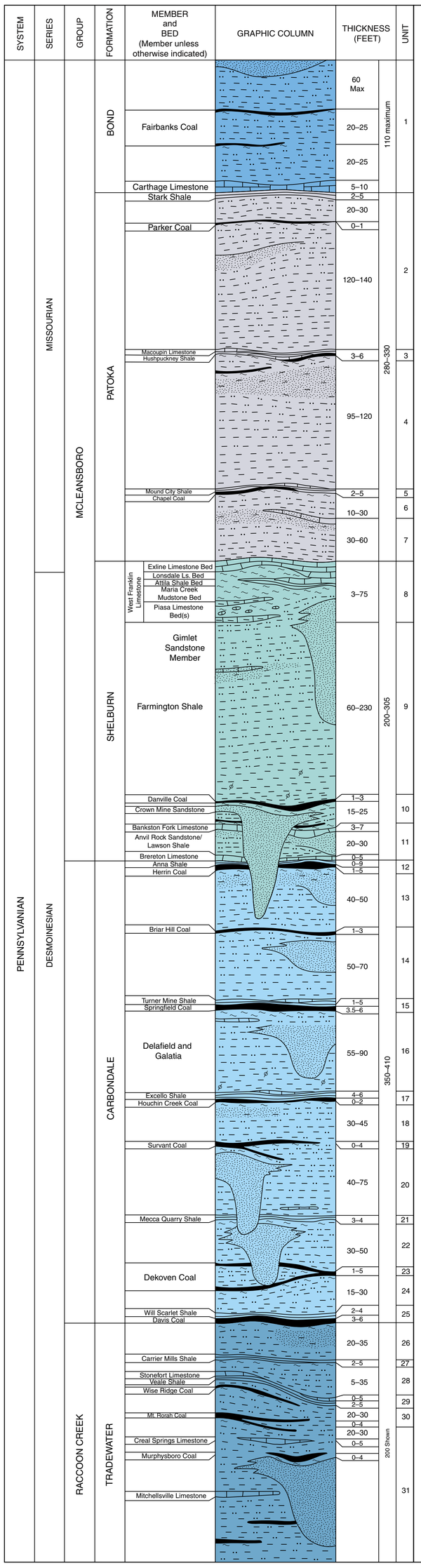
ADJOINING QUADRANGLES
1 Norris City
2 New Haven
3 Emma
4 Ridgway
5 Wabash Island
6 Equality
7 Shawneetown
8 Grove Center



APPROXIMATE MEAN DECLINATION, 2019

ROAD CLASSIFICATION

Local road



Permian igneous rocks (shown on cross section) Two cored coal-test boreholes encountered igneous rock (Table 1, report). In Union Colliery hole 44 the rock is described as "peridotite, dark gray, porphyritic, dense" containing calcite veinlets and accompanied by coked coal and metamorphosed shale. In Union Colliery hole 40 the log records greenish gray, highly mineralized igneous rock [composition unspecified], again accompanied by coked and mineralized coal. These rocks are presumed to be part of the complex of Permian intrusive breccias and ultramafic intrusions centered around the Illinois-Kentucky fluorspar district (Zartman et al., 1967).

Bond Formation

1 Bond Formation As indicated by electric, gamma-ray, and density logs, the preserved portion of the Bond Formation is dominantly shale and siltstone, with the Carthage Limestone at the base. One or two thin coal layers that occur 20 to 50 feet above the Carthage are correlated with the Fairbanks Coal Member, which has its type area in Sullivan County, Indiana (Shaver et al., 1970) and is widely traceable in the subsurface of eastern Illinois.

Patoka Formation

2 Upper Patoka Formation The Stark Shale Member, a unit of black, fissile, phosphatic shale, occurs directly beneath the Carthage Limestone and generates "hot" readings on gamma-ray logs. The thin Parker Coal Bed occurs 20 to 30 feet below the Stark, as indicated by coal-test core descriptions, drillers' logs, and geophysical logs. Kosanke (1950) named this unit the New Haven Coal in Illinois, but the name Parker (Fuller and Clapp, 1904) has priority. The remainder of the succession consists of shale, siltstone, and sandstone in upward-coarsening sequences, as depicted on the graphic log. Calcareous sandstone that contains brachiopods and crinoids was logged in drill core near the top of the thick lower sequence. The top of this sandstone represents the position of the Raben Branch Coal, but no coal was detected in this position within the map area.

3 Macoupin Limestone and Hushpuckney Shale Members The Macoupin Limestone is reduced to argillaceous, fossiliferous limestone or calcareous shale less than one foot thick. It is present in drill cores but is generally too thin to register on geophysical logs. The Hushpuckney Shale is black, fissile, phosphatic shale that produces very high or "hot" readings on gamma-ray logs and sharp inflections on resistivity logs. Cores indicate the Womac Coal to be impure coal or carbonaceous shale a few inches thick at the base of the Hushpuckney.

4 Shale, siltstone, and minor sandstone These strata are arranged in a single upward-coarsening sequence, capped by underclay of the Womac Coal. In a few boreholes, a second thin coal 10 to 20 feet below the Womac probably corresponds with the Corinth Coal of eastern Williamson County. One core description recorded brachiopods and gastropods in calcareous sandstone in the upper part of the interval.

5 Mound City Shale and Chapel Coal Members The Mound City is shale that is dark gray to black, fissile, and yields high to very high readings on gamma-ray logs. Some cores indicate thin marine limestone, the Cramer limestone member, directly overlying the Mound City. The Chapel Member is bright-banded coal that varies in thickness from a streak to approximately 2 feet.

6 Clastic interval Cores and geophysical logs record an upward-coarsening succession of shale, siltstone, and minor sandstone capped by rooted underclay of the Chapel Coal.

7 Clastic interval Another upward-coarsening sequence grades from shale in the lower part through silty shale and siltstone to sandstone in the upper part. Notably, calcareous sandstone to silty limestone containing marine fossils such as brachiopods and echinoderm fragments is widely present at the top of this sequence. This persistent carbonate unit has been mistaken for the West Franklin Limestone.

Shelburn Formation

8 West Franklin Limestone Member This complex and highly variable unit is discussed and diagrammed in greater detail in the pamphlet that accompanies this map. Briefly, the West Franklin comprises one to four beds or "benches" of limestone separated by shale and mudstone. Where intervening clastic layers wedge out, two or more carbonate benches merge into a single unit. Claystone layers represent paleosols; the West Franklin contains three distinct cycles of sedimentation. Near the northern edge of the New Haven SW quadrangle, most logs indicate a single bench of limestone that varies from 10 to more than 25 feet thick. This bench includes the Exline Limestone Bed and possibly the older Lonsdale Limestone Bed. Southward the Exline thins and the Lonsdale, sporadically developed, separates from the Exline. The black, fissile, phosphatic Attila Shale Bed beneath the Exline generates "hot" readings on gamma-ray logs. The Maria Creek Mudstone is an unusually thick paleosol characterized by green and red mottling. The Piasa Limestone comprises one or two layers of argillaceous limestone separated by mudstone and nodular limestone. The Piasa is confined to the southern part of the map area.

9 Farmington Shale Member The Farmington comprises a sequence of shale, siltstone, and minor sandstone that coarsens upward. In some areas, two or three upward-coarsening sequences can be detected. The Farmington is as thick as 230 feet in the northern part of the map area; close to a maximum for the Illinois Basin. A basal black shale bed, one foot or thinner, contains abundant pyritized bivalves and brachiopods. Above this bed, shale in the lower Farmington is medium to dark gray, finely silty to silt-free, and contains numerous siderite bands and nodules. Upward the shale grades to medium gray, massive to indistinctly laminated siltstone that contains plant fragments and pectenoid pelecypods. In some wells, one or two thin beds of sandy limestone or calcareous sandstone occur in the middle to upper Farmington. The Gimlet Sandstone Members fills incised valleys within the Farmington in the southern part of the study area. The Gimlet cuts down from the level of the Maria Creek Mudstone; sandstone is generally absent outside of incised valleys.

10 Danville Coal and underlying strata Persistent throughout the map area, the Danville Coal is bright-banded and pyritic coal about 1 to 3 feet thick. Beneath the coal is rooted claystone, then shale, siltstone, and sandstone. The Crown Mine Sandstone fills a major paleovalley that cuts within 10 feet above the Briar Hill Coal at its deepest point. The paleochannel was previously misidentified as the older Anvil Rock Sandstone (Hopkins, 1958). Near the base of the interval is the Baker Coal, which varies from bright-banded coal to dull, shaly coal and carbonaceous shale less than one foot thick. The Baker rests on claystone that is greenish gray, blocky, slickensided, and contains limestone nodules and root traces.

11 Limestone sandstone, and shale The Bankston Fork and Brereton Limestone Members sandwich clastic rocks of the Lawson Shale and Anvil Rock Sandstone. The Bankston Fork typically is light yellowish to brownish gray, micritic to bioclastic, massive to nodular, and contains streaks of green clay. Fossils include crinoid fragments, bivalves, and brachiopods. Some core logs describe the limestone as conglomeratic or brecciated. The Anvil Rock and Lawson Members variably include shale and sandstone that coarsen upward and sandstone that fines upward from an erosive base. Cores indicate presence of thin Conant Limestone and Jamestown Coal Members directly above the Brereton Limestone. The Conant is dark gray, argillaceous lime mudstone to wackestone that contains numerous large productid brachiopods. The Jamestown consists of thin, shaly coal and dark gray to black shale that is calcareous and contains brachiopods together with plant remains. The Jamestown and Conant are generally too thin to register on geophysical logs. The Brereton is limestone that is medium to dark gray, fossiliferous lime mudstone to wackestone that contains brachiopods, bivalves, crinoid fragments, fusulinids, and phylloid algae.

Carbondale Formation

12 Anna Shale and Herrin Coal The Anna Shale is black, hard, thinly fissile, phosphatic, and pyritic. Large septarian carbonate concretions are common. Gamma-ray signature is "hot". The fauna is sparse, comprising *Orbiculoidea*, *Lingula*, pectenoid bivalves, fish remains, and conodonts. The Herrin Coal is bright-banded, pyritic coal that contains several widespread layers of claystone, most notably the basin-wide "blue band" that occurs 1 to 1½ feet above the base.

13 Clastic interval Beneath the underclay of the Herrin Coal is a shale, siltstone, and sandstone sequence that typically coarsens upward, although some logs indicate presence of sandstone that has an erosive base.

14 Briar Hill Coal and underlying strata The Briar Hill is coal that varies from dull and shaly to bright-banded. Underclay typically is thin or absent; the coal rests on rooted siltstone or sandstone. The remainder of the interval is mostly shale and siltstone that coarsen upward, although some logs indicate sandstone that fines upward from an erosive base.

15 Turner Mine Shale and Springfield Coal The Turner Mine is black, hard, highly fissile, phosphatic shale that contains large limestone concretions and produces "hot" readings on gamma-ray logs. A thin zone of calcareous shale bearing broken fossils commonly occurs at the base. Overlying the black shale is the St. David Limestone, which locally reaches 2 feet thick in cores and in the Eagle No. 2 underground mine (now closed). The limestone is argillaceous lime mudstone to wackestone, massive to nodular, and contains a variety of marine fossils. Also observed in the underground mine were small lenses of the dark gray, finely silty Dykersburg Shale beneath the Turner Mine Shale. The Dykersburg contains fossil plants and pectenoid pelecypods, suggesting a nearshore, brackish-water setting. Both the St. David Limestone and Dykersburg Shale seldom register on geophysical logs. The Springfield Coal is dominantly bright-banded and lacks persistent clastic layers. Lenses and laminae of fusain and pyrite and thin bands of dull coal are present. In the Eagle No. 2 underground mine, cleat generally was not strongly developed, although no systematic measurements of cleat orientation were taken.

16 Delafield and Galatia Members The Delafield Member is an upward-coarsening sequence that grades from dark gray, sideritic, silt-free shale in the lower part through laminated, silty shale to siltstone and fine-grained shaly sandstone in the upper part. Capping the Delafield is rooted underclay (paleosol) of the Springfield Coal. Younger than the Delafield, the Galatia Member is largely sandstone that fills incised valleys and fines upward from an erosive lower contact.

17 Excello Shale and Houchin Creek Coal Similar to the Anna and Turner Mine Shales, the Excello is black, hard, thinly fissile, phosphatic, and produces a "hot" gamma-ray signature. Although seldom thick enough to be expressed in logs, the Hanover Limestone commonly overlies the Excello. The Houchin Creek is bright-banded coal found directly below the Excello Shale.

18 Clastic interval An upward-coarsening sequence of gray shale, siltstone, and sandstone is topped by rooted underclay of the Houchin Creek Coal.

19 Survant Coal Most logs indicate a single bed of coal that varies from approximately 1 to 4 feet thick. Two coal layers are present in places, separated by shale and siltstone as thick as 25 feet. Here and elsewhere in the Illinois Basin, the two "benches" of Survant Coal represent separate cycles of sedimentation and correspond to the Bevier (younger) and Wheeler Coals of the Midcontinent Basin.

20 Clastic interval In most of the map area a single upward-coarsening sequence of shale, siltstone, and sandstone is present. One or more layers of limestone less than one foot thick may occur in the lower part. Some logs reveal sandstone that fills incised valleys and cuts out the Mecca Quarry Shale.

21 Mecca Quarry Shale Like the Anna, Turner Mine, and Excello, the Mecca Quarry is black, hard, thinly fissile, and phosphatic. "Hot" gamma-ray readings are characteristic. The Colchester Coal is probably present beneath the black shale, but the coal is too thin to register on geophysical logs.

22 Clastic interval Except for the absence of limestone, this interval basically repeats Unit 20: overall upward coarsening, with local valley-filling sandstone that partially truncates the Dekoven Coal.

23 Dekoven Coal As mapped by Jacobson (1993), the Dekoven Member comprises two "benches" of coal separated by shale and siltstone. The clastic "parting" thickens from zero in the southern part of the New Haven SW quadrangle to as much as 30 feet near the northern border. Drill cores indicate the coal is largely bright-banded and pyritic, but dull, shaly, and canneloid coal also is present. Both coal "benches" rest on rooted, slickensided underclay and both are overlain by clastic intervals that coarsen upward. Such a relationship implies that the two coal layers formed in separate cycles of sedimentation, that probably correspond to the Abingdon (younger) and Greenbush cyclothems in western Illinois.

24 Clastic interval Medium to dark gray, silty, laminated shale in the lower part grades upward to lighter gray siltstone in the upper part, topped by non-fissile, rooted mudstone (paleosol) beneath the Dekoven Coal.

25 Will Scarlet Shale and Davis Coal The Will Scarlet is black, hard, thinly fissile shale that yields "hot" readings on gamma-ray logs. The Davis Coal is bright-banded, pyritic coal that ranges from about 3 to 6 feet thick, but it is 4 to 5 feet thick in most places within the map area (Jacobson, 1993). Cores reveal laminae of claystone and dull, "bony" coal together with laminae and lenses of fusain.

Tradewater Formation

26 Clastic interval Gray shale, siltstone, and sandstone overall coarsen upward and are topped by rooted paleosol mudstone beneath the Davis Coal.

27 Carrier Mills Shale The shale is black, hard, thinly fissile, and yields "hot" readings on gamma-ray logs. A small, sharp inflection identifies this unit on resistivity logs. Thin coal may occur below the black shale, but coal does not register on geophysical logs.

28 Clastic interval Gray shale, siltstone, and sandstone overall coarsen upward and are topped by rooted paleosol mudstone beneath the Carrier Mills Shale. The interval thickens from less than 10 feet on the north to about 35 feet in some wells in the southern part of the map area.

29 Stonefort Limestone and Veale Shale Members Sporadic in distribution, the Stonefort Limestone directly overlies shale that produces "hot" signature on gamma-ray logs. The Veale Shale is black shale that produces "hot" readings on gamma-ray logs.

30 Shale, siltstone, and coal No cores are available; interpretation is based on electric, gamma-ray, density, and neutron logs. An upper coal layer less than 2 feet thick near the base of the Veale Shale is presumed to be the Wise Ridge Coal Bed. Twenty to 30 feet below the Wise Ridge, one or two layers of coal each 1 to 3 feet thick are commonly accompanied by "hot" shale. These most likely represent the Mt. Rorah Coal and/or a slightly older coal bed.

31 Clastic rocks, coal, and limestone Positive correlation of units within this part of the Tradewater is uncertain. A number of geophysical logs and sample studies indicate a limestone bed a few feet thick and 20 to 30 feet below the Mt. Rorah Coal. Most likely this is the Creal Springs Limestone, and the next coal below would be the Murphysboro Coal. A second limestone, 40 to 60 feet below the Creal Springs(?), lies at the expected position of the Mitchellsville Limestone.