BEDROCK GEOLOGY OF HEROD QUADRANGLE
POPE, SALINE, AND HARDIN COUNTIES, ILLINOIS

ILLINOIS STATE GEOLOGICAL SURVEY
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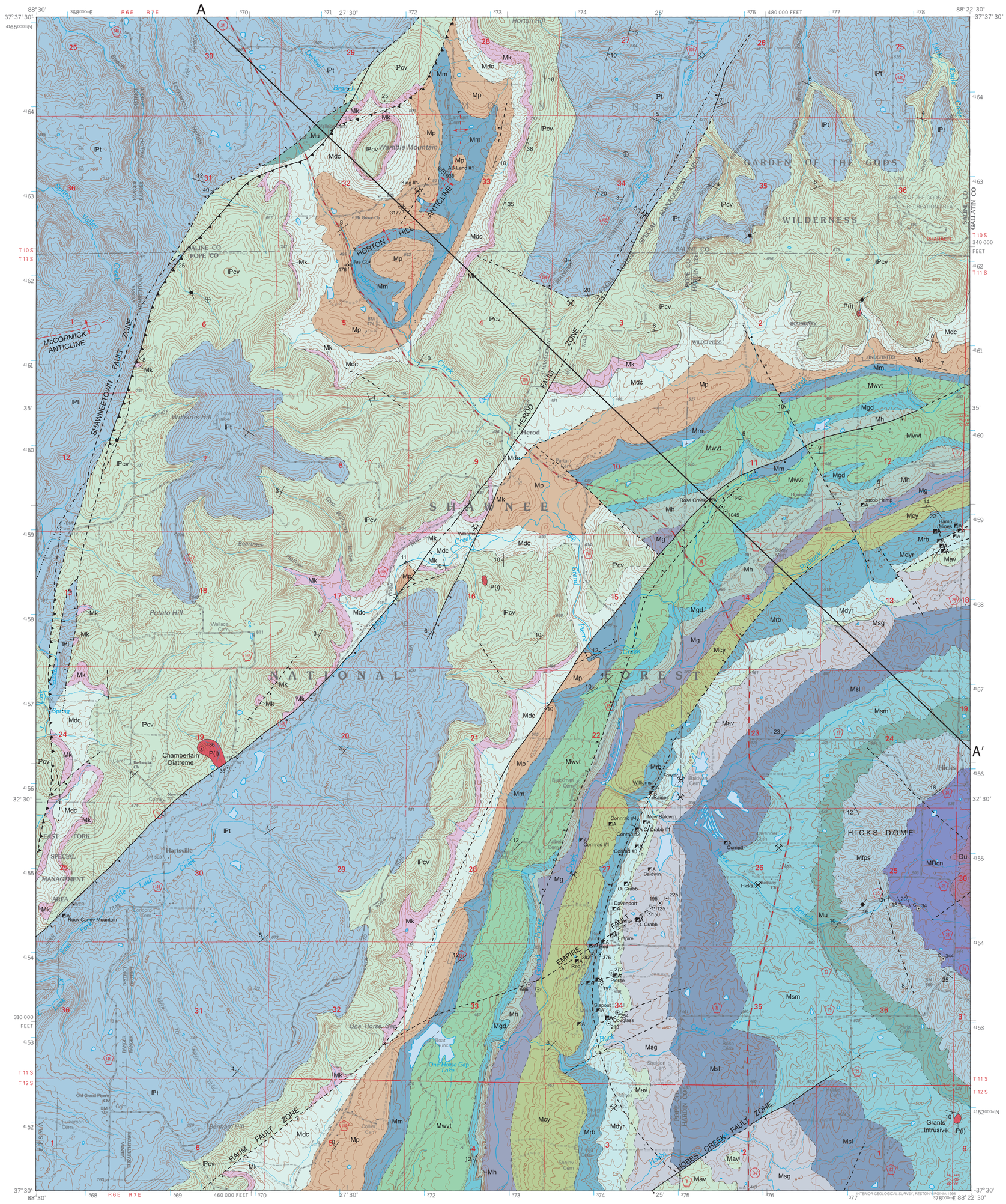
2008

STATEMAP Herod-BG



EXPLANATION

Permian	P(i)	Igneous dikes, sills, and pipes	Leonardian
	Unconformity		
Pennsylvanian	IPt	Tradewater Formation	Atokan
	IPcv	Caseyville Formation	Morrowan
	Unconformity		
	Mk	Kinkaid Limestone	Chesterian
	Mdc	Degonia Sandstone and Clore Formation	
	Mp	Palestine Formation	
	Mm	Menard Limestone	
	Mwvt	Waltersburg Fm, Vienna Ls, and Tar Springs Ss	
	Unconformity		
	Mgd	Glen Dean Limestone	
	Mh	Hardinsburg Sandstone	
	Mg	Golconda Formation	
Mississippian	Mcy	Cypress Sandstone	
	Unconformity		
	Mrb	Ridenhower Formation and Bethel Sandstone	
	Mdyr	Downeys Bluff Limestone, Yankeetown Sandstone, and Renault Limestone	
	Mav	Aux Vases Sandstone	
	Msg	Ste. Genevieve Limestone	Valmeyeran
	Msl	St. Louis Limestone	
	Msm	Salem Limestone	
	Mu	Ullin Limestone	
	Mfps	Fort Payne Formation and Springville Shale	
Devonian	MDcn	Chouteau Limestone and New Albany Shale	Kinderhookian and Devonian (Upper)
	Du	Devonian undifferentiated (St. Laurent Formation, Grand Tower Limestone, and Clear Creek Formation)	Devonian (Middle and Lower)

Symbols

- 40 — Strike and dip of bedding; number indicates degree of dip
- Horizontal bedding
- Vertical joints
- Abandoned pit
- A — Abandoned mine

Drill Holes
from which subsurface data were obtained

- Boring
- Coal boring
- Dry oil well
- SGC 109 — Labels indicate samples (s), geophysical log (g), or core (c). Numeric label indicates total depth of boring in feet. Dot indicates location accurate within 100 feet.

Line Symbols
dashed where inferred, dotted where concealed

- Contact
- Fault
- Normal fault; bar and ball on downthrown side
- Thrust fault
- A—A′ — Line of cross section

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

Base map compiled by Illinois State Geological Survey from digital data (Raster Feature Separates) provided by the United States Geological Survey. Topography compiled 1957. Planimetery derived from imagery taken 1993. Public Land Survey System and survey control current as of 1996. Partial field check by U.S. Forest Service 1996.

North American Datum of 1927 (NAD 27)
Projection: Transverse Mercator
10,000-foot ticks: Illinois State Plane Coordinate system, east zone (Transverse Mercator)
1,000-meter ticks: Universal Transverse Mercator grid system, zone 16

SCALE 1:24,000

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

BASE MAP CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Released by the authority of the State of Illinois: 2008

Geology based on field work by F. Brett Denny, W. John Nelson, and Joseph A. Devera, 2007–2008.

Digital cartography by Jane E.J. Domier, Brendon M. Aitken, and Steven M. Radil, Illinois State Geological Survey.

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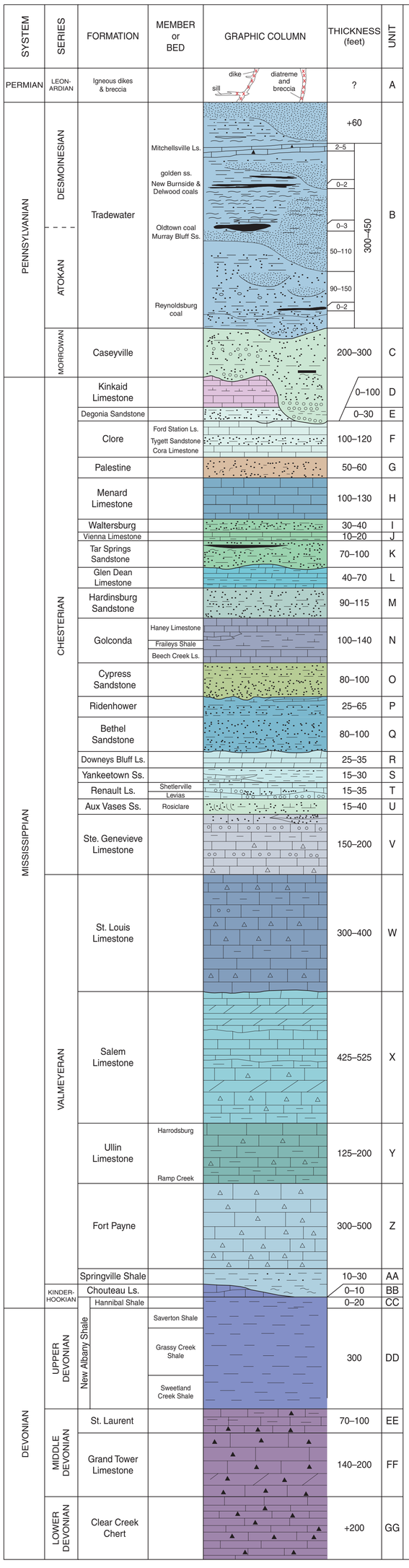
ADJOINING QUADRANGLES
1 Harrisburg
2 Rudement
3 Equality
4 Eddyville
5 Karbers Ridge
6 Waltersburg
7 Shetlerville
8 Rosiclare

APPROXIMATE MEAN DECLINATION, 2008

ROAD CLASSIFICATION

- Secondary highway, hard surface
- Light-duty road, hard or improved surface
- Light-duty road, dirt
- Light-duty road, dirt
- Unimproved road
- State Route
- County Route



A Permian Igneous Intrusives Ultramafic dike, lamprophyre, autolithic breccia, diatreme, and sills. The igneous intrusions form dikes, sills, and pipes. The dikes occur with a light-gray sugary texture or as a dark greenish-black (ultramafic) with an inequigranular porphyritic texture. The light-gray dikes are classified as lamprophyre. These rocks are dominantly composed of carbonate, but few microscopic examinations of this rock has been accomplished. The ultramafic rock contain serpentine (altered from olivine), apatite, phlogopite, titanite, chromite, magnetite, chlorite, perovskite, garnet, and calcite are commonly found in association with the light gray lamprophyres. The autolithic breccia is composed of country rock or wall rock incorporated into the circular pipe during the intrusions vertical ascent. It may have a siliceous or carbonate rich matrix. Where the pipes contain rounded autolithic clasts and not angular breccia clasts, the pipes may be described as diatremes. These intrusive magmatic bodies are thought to be related to a single geologic event of a gas-rich alkalic magma originating from the upper mantle. Fluorite was observed enclosed within an ultramafic rock indicating a genetic relationship between these intrusions and the fluorite mineralization of this region.

B Tradewater Formation Sandstone, siltstone, shale, conglomerate, and coal. The sandstones are composed of white to tan-brown fine to coarse grained quartz arenite and sublithic arenite. Mica is usually present and a small percentage of clay is present in the sublithic arenites. Sandstones are cross bedded and ripple marked. Ichnofossils are common and include both burrowing and feeding or grazing patterns. The siltstone are gray and mica may be present on the bedding surfaces. The shale is gray to black and thinly bedded. The few conglomerate layers were probably reworked quartz pebbles from the underlying Caseyville Formation into which the lower portion of this unit incises. Thin and discontinuous coal seams are reported in this unit. The Tradewater is unconformable with the underlying Caseyville but where the lower quartz arenite is deposited over an upper Caseyville quartz arenite it is difficult to define the contact.

C Caseyville Sandstone, shale, siltstone and conglomerate. The sandstone is usually a white to gray on fresh surfaces and weathers to a brown or orange-brown. It is composed of well rounded to sub angular coarse to medium grained quartz " quartz arenite" that has a sugary appearance. It may be cross bedded and also occurs in thin beds and massive ledges. Outcrops are usually well exposed bluffs showing diverse fluvial and tidal patterns including stacking channels, unidirectional and bidirectional cross beds. Iron bands "liesegang" may be very common in some sandstone outcrops. Occasional plant remains such as stimgeria are present but are rare in the sandstone and are more common within the shale. The shale is dark gray laminated to thinly bedded. Plant debris is common and iron nodules or concretions may be present. Siltstone occurs as thin beds usually with the shale. Conglomerates occur as shale pebbles within sandstone and more common quartz pebble within a coarse quartz sand. The quartz pebbles are very well rounded and usually white. They quartz pebbles may be several inches in diameter. This unit is unconformable with the underlying unit.

D Kinkaid Limestone Limestone, shale, and mudstone. Where this unit is well developed it consists of three members which in descending order are Goreville Limestone, Cave Hill, and Negli Creek. This unit is eroded by Lower Pennsylvanian units and may be entirely missing in portions of the quadrangle. The Goreville is a packstone to lime mudstone with a few thin shale breaks. It contains diverse marine fossils including fenestrate, trepostome, and fistuliporid bryozoans, spiriferids and other brachiopods, rugose corals, and crinoids. The bryozoan Archimedes can be abundant in the upper beds and pterotocrinus wing plates have been described and studied in the formation (Gutschick, 1965). The Cave Hill is composed of shale and mudstone with thin beds of limestone. The shale is dark gray, soft, fissile, calcareous, and may be laminated. The shale may grade to limestone which mainly lime mudstone. The negli Creek is primarily a dark gray lime mudstone to wackestone. Fossils include brachiopods, fenestrate bryozoans, blastoids, bellerophontid gastropods, and Girvanella spheriods. The lower contact is generally sharp but rarely well exposed.

E Degonia Formation Shale, sandstone, siltstone. The Degonia is largely shale that is dark gray to greenish gray, partly silty and moderately to highly fissile. Greenish gray siltstone to silty mudstone in the middle of the Degonia may be massive. Sandstone is light brown, very fine grained, clean quartz arenite with thin wavy bedding and ripple marks. More distinctive is very fine sandstone to siltstone that is dark olive to greenish gray, weathering rusty orange. This rock has planar lamination and erodes out as long rectangular and wedge-shaped blocks bounded by joints. The unit is poorly exposed and is mapped together with the underlying Clore Formation. The contact with the Clore is sharp to gradational.

F Clore Formation Limestone, shale, sandstone, siltstone, and chert. Limestones are mainly lime mudstone which are several feet thick, medium-dark gray to olive gray and weather to a light gray or orange-brown. Spiriferids, productid, and compositid brachiopods are common. The Ford Station Member is dark gray, calcareous, and fossiliferous, ranging from a platy clay shale to silty shale having laminae and thin interbeds of light gray siltstone. The Tygett Sandstone Member is light gray to light brown, very fine to medium-grained quartz arenite. The sandstone becomes thin-bedded with wavy ripple-marked bedding surfaces. Laminated sandstone in turn grades downward to siltstone and shale. The Cora Limestone Member contains thin beds and lenses of highly fossiliferous limestone and greenish gray, silty, and weakly fissile shale or mudstone. Limestone bed at the top is dark gray, very argillaceous brachiopod-bryozoan lime mudstone to wackestone that weathers yellowish gray. The lower contact is sharp.

G Palestine Formation Sandstone, siltstone, shale, mudstone, minor coal. Sandstone is light gray to white, very fine to fine quartz arenite. In most places the upper part is cross bedded and the lower portion having thin, flaggy and ripple-marked bedding. Siltstone is dark olive gray, thinly laminated. Carbonaceous black shale and coal was observed at the top of the Palestine overlying a rooted siltstone grading into laminated shaly sandstone.

H Menard Limestone Limestone and shale. The upper limestone is called the Allard Limestone Member. It is usually a gray lime mudstone and fine to coarse skeletal wackestone and packstone with thin shale interbeds and scattered chert nodules. The Scottsburg Limestone Member, is a light to dark gray limestone, sublithographic lime mudstone separated by thin shale layers. The lowest member is the Walche Limestone Member, which is composed of argillaceous micritic limestone. Fossils within the Menard include the brachiopods, bryozoans, and disarticulate crinoidal debris.

I Waltersburg Formation Sandstone, shale, siltstone. The unit is mainly dark gray, thin clay shale that becomes silty upward and grades into siltstone. Sandstone is olive gray to brownish gray, very fine grained, shaly, and thinly bedded. Thin coal and greenish shale may be present near the top of this unit.

J Vienna Limestone Limestone, shale, and chert. Limestone is largely dark gray to brownish gray, siliceous lime mudstone and wackestone. A few thin interbeds of sandy dark-gray shale are present. Dark brown chert nodules are numerous and commonly weather with a porous rind. The white to brown weathered, porous blocks of fossiliferous chert are diagnostic.

K Tar Springs Sandstone Sandstone, siltstone, shale, thin coal. Sandstone is white to light gray and greenish gray, very fine to medium-grained quartz that is slightly micaceous. It varies from thinly bedded to massive and displays ripple marks, crossbedding, small load casts, indistinct burrows, and shale rip-up clasts. Shale and siltstone are medium to dark gray, micaceous, and thinly laminated. Thin coal commonly occurs near the top; it rests on dark gray, rooted mudstone. Dark gray claystone also occurs in the lower Tar Springs. The lower contact is sharp in some localities but may grade into the underlying unit.

L Glen Dean Limestone Limestone and shale. The unit is generally composed of an upper limestone a middle shale and a lower limestone. The upper limestone is medium to dark gray crinoidal packstone and grainstone and may be oolitic. Fossils include crinoidal debris, fenestrate bryozoans, brachiopods, blastoids, and corals. The middle shale is thin medium to dark gray and greenish gray, fossiliferous, and calcareous. The middle shale beds grade into the lower limestone. The lower contact appears to be gradational.

M Hardinsburg Sandstone Sandstone, siltstone, and shale. Sandstone is light gray to buff, very fine to medium-grained quartz arenite that is thinly bedded to massive. Ripple marks and crossbedding are common. Siltstone and shale are medium to dark gray or greenish gray, ripple marked and laminated. The lower contact is generally unconformable with the underlying unit.

N Golconda Formation Limestone, shale, mudstone. The formation is divided into three members. The Haney Limestone Member at the top is largely light to dark gray, fine to coarse crinoidal wackestone to cross bedded grainstone, and in places oolitic. The lower part of the Haney comprises limestone and shale interbedded in roughly equal proportions which grade into the underlying Fraileys Shale Member. The Fraileys Shale Member is largely olive to greenish-gray to dark gray, calcareous, thinly fissile clay shale, with limestone beds of varied texture as thick as several feet. Red shale or mudstone may occur near the top. The Beech Creek Limestone Member at the base is dark gray to brown, partly dolomitic, argillaceous limestone. The lower contact is sharp with the underlying unit.

O Cypress Sandstone Sandstone, shale, and siltstone. The sandstone is white to light gray fine to medium grained subangular quartz sandstone. The upper portion contains thin beds of siltstone and interbedded sandstone and shale. The lower portion is primarily thick beds of sandstone. A red and green shale may be present near the top of the formation. Locally the contact with the underlying unit is unconformable.

P Ridenhower Formation Shale, limestone, and sandstone. The shale is dark gray with a green tint and may be fossiliferous. It is thin bedded and silty to finely sandy. Several feet of limestone may be present at the top of this formation. This unit is highly variable but is dominantly a dark gray shale with interbeds of gray-green siltstone.

Q Bethel Sandstone Sandstone with minor shale. White to light gray, fine to coarse grained quartz sandstone. The shale occurs as greenish thin interbeds between thicker beds of sandstone. Near the base shale and quartz pebbles may be present indicating this unit is locally unconformably with the underlying formation.

R Downeys Bluff Limestone Limestone, dolostone, shale, chert. The limestone is light gray crinoidal grainstone while the dolostone is brownish gray. Disarticulate crinoids may be replaced by pink chert, which is diagnostic for this unit. The upper portion is generally cherty while the lower may be silty. Shale occurs in thin interbeds and composes a minor portion of the unit.

S Yankeetown Formation Shale, limestone, siltstone. The shale is dark gray to green fossiliferous shale with interbedded dolomitic siltstone and thin beds of limestone. The contact with the underlying unit is gradational.

T Renault Limestone Limestone, siltstone, shale. The Renault is dominantly a fossiliferous light gray to brown-gray sandy to oolitic limestone. The siltstone is coarse grained, calcareous, and occurs near the base. The shales are calcareous and interbedded with limestone and siltstone.

U Aux Vases Sandstone, shale, siltstone. The sandstone is light green-gray fine grained and ripple marked. The sandstone beds are thin to medium with the thicker beds usually being cross bedded. Siltstones are also greenish-gray and interbedded with the sandstone and dark gray shale. This unit is locally mapped as the Rosiclare Member of the Aux Vases Formation. Some of the sandstone may be calcareous and this grades into the underlying limestone.

V Ste. Genevieve Limestone Limestone, dolostone, shale, chert. The limestone is light gray to medium gray, oolitic to micritic and sandy in places. Beds are thick to thin bedded and the oolitic beds are usually cross bedded. A sandy limestone "Spar Mountain Member" is locally present about 60 feet below the base of the Aux Vases Formation (Baxter et al., 1967). The dolomite is fine grained and the shale is gray. It is composed of a diverse marine fauna with oricinoidal debris being the most common. Chert is a minor and much more common in the underlying St. Louis Limestone below. The unit is gradational with the underlying limestone.

W St. Louis Limestone Limestone, dolostone, shale, chert. The limestone is medium to dark gray crystalline to micritic. The unit is cherty with gray to blue-gray chert nodules along bedding planes. It contains a diverse marine fauna including brachiopods, crinoids, and corals. Shales are thin and separate the thick limestone and dolostone beds.

X Salem Limestone Limestone, dolomite, chert, siltstone, and shale. The Salem Limestone is light brown to very dark gray mudstone to grainstone composed of rounded and broken fossil fragments. Bedding styles range from tabular to undulatory. The beds range from several inches to a few feet thick. The unit is composed primarily of small rounded fragments of disarticulated echinoderms and fenestrate bryozoans that are abraded into a fossil hash. Other macro fossils are corals, brachiopods, and Pentremites. Peloidal to oolitic limestone is also present, and portions may be dolomitic. Chert is light gray, may be bioclastic, and may weather with a porous rind. Siltstone is brown to light gray and thinly bedded, typically less than 1 inch thick. The shale is blue-gray to green-gray. The contact with the underlying unit is unconformable but difficult to identify.

Y Ullin Limestone Limestone, shale, chert. The limestone is light gray with dark gray fossil grains and appears to be speckled. The appearance is due to disarticulate bryozoan debris and the white "chalky" calcite cement or matrix. This texture is diagnostic for this unit, but the unit is poorly exposed in the quadrangle. The Ullin is conformable with the underlying unit.

Z Fort Payne Formation Limestone, siltstone, chert. The limestone is fine grained, dark gray, very cherty and siliceous. It also contains light gray siltstone interbedded with shale. The unit has been altered and silicified and few if any macro fossils are observable. Outcrops near Hicks Dome are composed of very cherty iron rich siliceous fractured limestone. An outcrop of this unit along Hicks Branch include a non-calcareous siliceous residuum with interbeds of clay.

AA Springville Shale Shale and clay. The shale is green-gray clay shale. The only exposure of this unit observed in the quadrangle was along Hicks Branch.

BB Chouteau Limestone Limestone. The unit is a medium green-gray micritic limestone. The only exposure of this unit observed in the quadrangle was along Hicks Branch.

CC Hannibal Shale Shale and siltstone. The unit is a thin gray-green siltstone and shale. The only exposure of this unit observed in the quadrangle was along Hicks Branch.

DD New Albany Shale Shale and siltstone. This unit is divided into three members which in ascending order are the Sweetland Creek Shale Member, Grassy Creek Shale, and the Saverton Shale. The shales are black to greenish and blueish-gray fissile shale that may be either silty or calcareous. Some of the more calcareous layers may grade into argillaceous limestones, but these are thin and rare. The unit is dominantly a black fissile shale with pyrite and few observable macro fossils. Good exposures of this units are present along a tributary of Hicks Branch.

EE St Laurent Cherty and siliceous limestone and dolostone. The unit was originally limestone but has been mostly silicified to a cherty or siliceous residuum at the surface. Subsurface data indicate the unit is a cherty argillaceous limestone.

FF Grand Tower Cherty limestone and dolostone. The unit is dominated by light gray lithographic and siliceous limestone.

GG Clear Creek Chert Cherty limestone and dolostone. The chert is light gray to white and the limestone has been altered to a siliceous porous rock with clasts of brachiopods.