

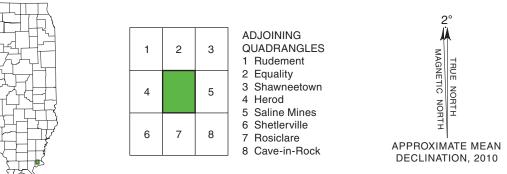
Note: Well and boring records are on file at the ISGS Geological Records Unit and are available online from the ISGS Web site.

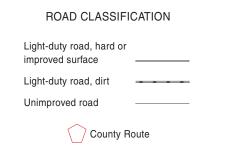
Denny, F.B., B. King, J. Mulvaney-Norris, and D.H. Malone, 2010, Bedrock Geology of Karbers Ridge Quadrangle, Hardin, Gallatin, and Saline Counties, Illinois: Illinois State Geological Survey, Illinois Geologic Quadrangle Map, IGQ Karbers Ridge-BG, 2 sheets, 1:24,000; report, 7 p.

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basis of the information presented here. The geologic interpretations are based on data that may vary with respect to 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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SYSTEM	SERIES	FORMATION	MEMBER or BED	GRAPHIC COLUMN	THICKNESS (feet)	UNIT
PERMIAN	LEO- NARDIAN	Igneous dikes and breccia		dike diatreme and sill breccia	?	A
PENNSYLVANIAN	I DESMOINESIAN	Tradewater	Golden Ss New Burnside and Delwood Coals		<u>0-2</u> 50-110 0	В
	ATOKAN		Willis Coal Reynoldsburg Coal		50-110 90-150 0-3 0-2	
	MORROWAN	Caseyville			200–300	С
	CHESTERIAN	Kinkaid Limestone	Goreville Ls Cave Hill Sh Negli Creek Ls		0–100	D
		Degonia Sandstone			0–30	Ε
		Clore	Ford Station Ls Tygett Sandstone Cora Limestone		100–120	F
		Palestine Ss		г. г -	50–60	G
		Menard Limestone	Allard Limestone Scottsburg Ls Walche Ls		100–130	Н
		Waltersburg			30–50	Ι
		Vienna Limestone Tar Springs Sandstone			5–20 70–110	J K
		Glen Dean Limestone			40–70	L
		Hardinsburg Sandstone			90–115	Μ
		Golconda	Haney Ls Fraileys Shale Beech Creek Ls		110–155	N
		Cypress Sandstone			80–100	0
					1 I	

Ridenhower

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 have been accomplished. The ultramafic rock contains serpentine (altered from olivine), apatite, phlogopite, titanite, chromite, magnetite, chlorite, perovskite, garnet, and calcite. The autolithic breccias are composed of country rock or wall rock incorporated into the circular pipe during the intrusion's 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 explosive 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 guartz 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 siltstones 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 Formation Sandstone, shale, siltstone, and conglomerate. The sandstone is usually a white to gray on fresh surfaces and weathers to a brown or orangebrown. It is composed of well-rounded to subangular coarse- to medium-grained quartz ("quartz arenite") that has a sugary appearance. The Caseyville 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 and unidirectional and bidirectional cross-beds. Iron "liesegang" bands 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 commonly as quartz pebbles within a coarse quartz sand. The quartz pebbles are very well rounded and are 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 Shale, and Negli Creek Limestone. 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, and calcare-

M Hardiburg 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 cross-bedding 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, and 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 is in places oolitic. Pterotocrinus capitalis is highly characteristic of the Haney Limestone Member, and the "wing plates" of this crinoid is commonly found in the shaly part of this member. 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.

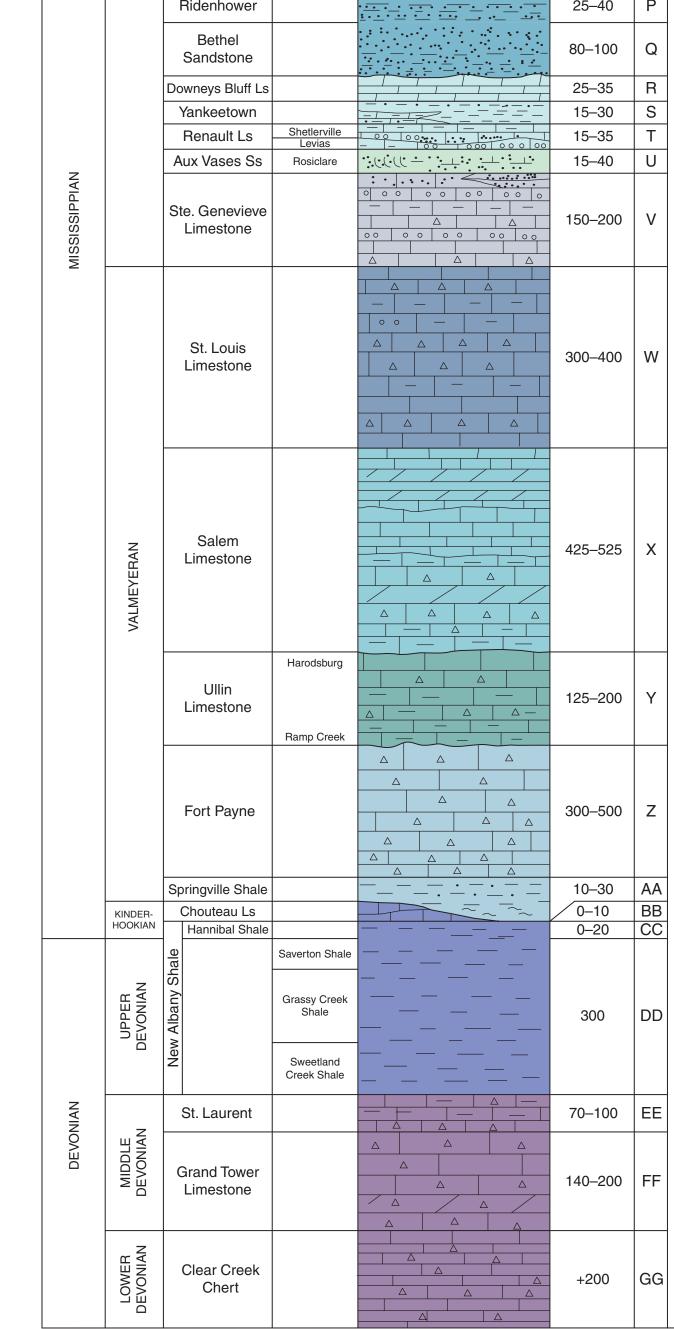
Q Bethel Sandstone Sandstone with minor shale. White to light gray, fine- to coarse-grained quartz dense sandstone. The shale occurs as greenish thin interbeds between thicker beds of sandstone. Near the base, shale and quartz pebbles may be present, indicating this unit is locally unconformable with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

R Downeys Bluff Limestone Limestone, dolostone, shale, and chert. The limestone is light-gray crinoidal grainstone; 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, and the lower may be silty. Shale occurs in thin interbeds and constitutes a minor portion of the unit.

S Yankeetown Formation Shale, limestone, and 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, and 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. Numerous Pentremites sp. along with the diagnostic crinoid Talarocrinus sp. occurs at this horizon.

U Aux Vases Sandstone Sandstone, shale, and 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 Sandstone. Some of the sandstone may be calcareous, and this grades into the underlying limestone.



ous and may be laminated. The shale may grade to limestone that is 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* spheroids. The lower contact is generally sharp, but rarely well exposed.

E Degonia Sandstone Shale, sandstone, and 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 that 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 Limestone 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. A limestone bed at the top is a dark-gray, very argillaceous brachiopod-bryozoan lime mudstone to wackestone that weathers yellowish gray. The lower contact is sharp.

G Palestine Sandstone Sandstone, siltstone, shale, mudstone, and 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 has thin, flaggy, and ripple-marked bedding. Siltstone is dark olive-gray and thinly laminated. Carbonaceous black shale and coal were observed at the top of the Palestine overlying a rooted siltstone grading into laminated shaly sandstone. The contact was not observed but is reported to be uncomfomable in places.

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 brachiopods, bryozoans, and disarticulate crinoidal debris. Where found in the shale layers above the Walche, the crinoid *Pterotocrinus menardensis* is diagnostic of this limestone.

I Waltersburg Formation Sandstone, shale, and siltstone. The unit is mainly darkgray, 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, and 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, cross-bedding, 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.

V Ste. Genevieve Limestone Limestone, dolostone, shale, and 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 Sandstone is locally present about 60 feet below the base of the Aux Vases Sandstone (Baxter et al. 1967). The dolomite is fine grained, and the shale is gray. The entire formation is composed of a diverse marine fauna with crinoidal debris being the most common. Chert is a minor component and is much more common in the underlying St. Louis Limestone. The unit is gradational with the underlying limestone.

W St. Louis Limestone Limestone, dolostone, shale, and chert. The limestone is medium to dark gray and crystalline to micritic. The unit is cherty with gray to blue-gray chert nodules along bedding planes and contains a diverse marine fauna including brachiopods, crinoids, and corals. *Acrocyathus* sp. is an index fossil, a colonial coral indicative of this unit. 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 lime 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 macrofossils are corals, brachiopods, and Pentremites. Peloidal 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, and chert. The limestone is light gray with darkgray fossil grains and appears to be speckled. The appearance is due to disarticulate bryozoan and echinoderm debris and the white "chalky" calcite cement or matrix mixed with crinoidal debris. 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, and 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 macrofossils are observable. Outcrops near Hicks Dome are composed of a very cherty, iron-rich, siliceous fractured limestone. An outcrop of this unit along Hicks Branch includes 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.

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.

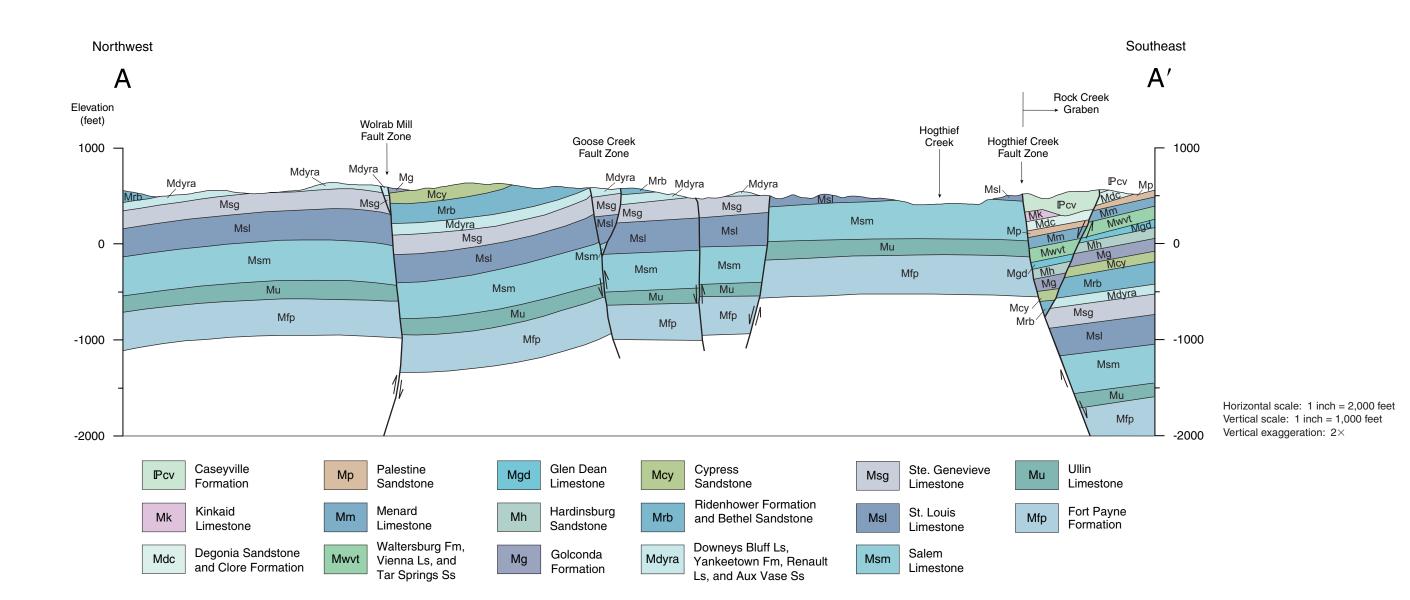
DD New Albany Shale Shale and siltstone. This unit is divided into three members, which in descending order are the, Saverton Shale, Grassy Creek Shale, and the Sweetland Creek Shale. The shales are black to greenish and bluish-gray fissile shale that may be either silty or calcareous. Some of the more 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 macrofossils. 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 Limestone 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 casts containing the brachiopods Amphigenia curta and Eodevonaria arcuata.

Note: See accompanying report for references.



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