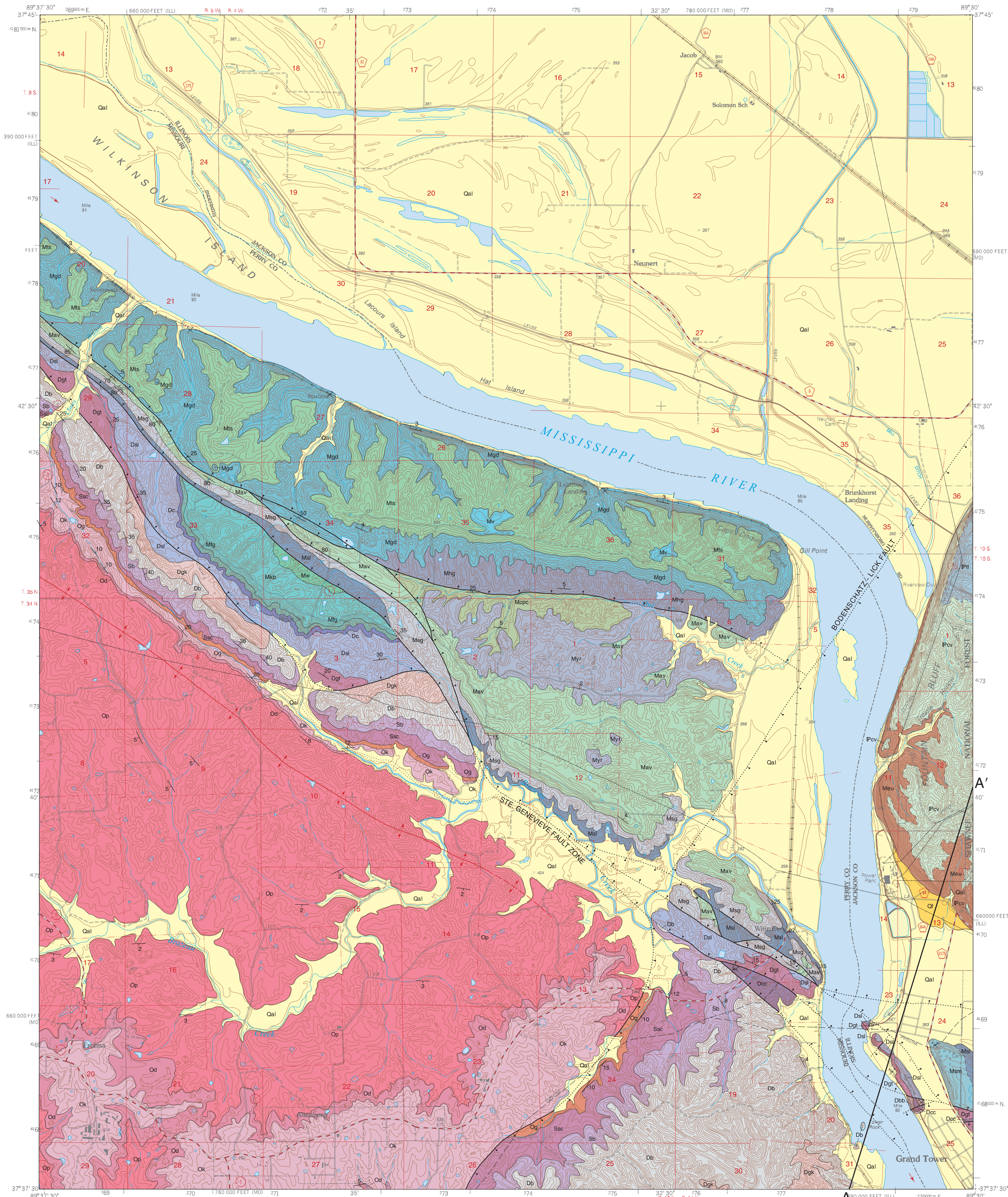


BEDROCK GEOLOGY OF ALTENBURG QUADRANGLE
JACKSON COUNTY, ILLINOIS AND PERRY COUNTY, MISSOURI

Institute of Natural Resource Sustainability
William W. Shilts, Executive Director
ILLINOIS STATE GEOLOGICAL SURVEY
E. Donald McKay III, Interim Director

Mary J. Seid, Joseph A. Devera, Allen L. Weedman, and Dewey H. Amos
2009

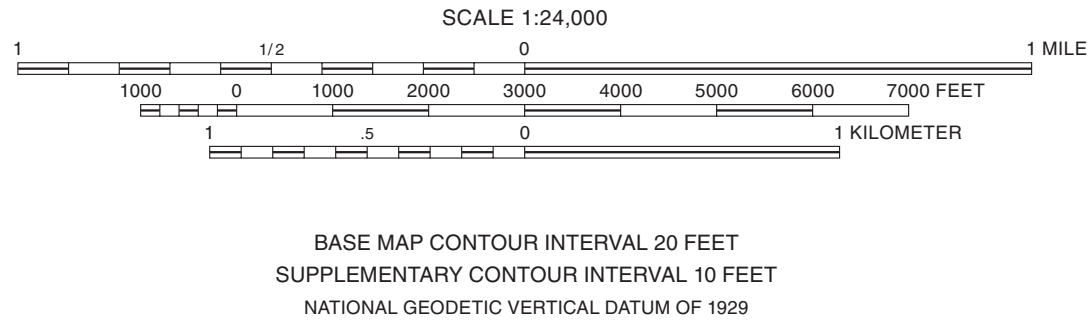
STATEMAP Altenburg-BG



Base map compiled by Illinois State Geological Survey from digital data (Digital Line Graphs) provided by the United States Geological Survey, Topography compiled 1946. Planimetry 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 1983 (NAD 83)
Projection: Transverse Mercator
10,000-foot ticks: Illinois State Plane Coordinate system, west zone (Transverse Mercator)
1,000-meter ticks: Universal Transverse Mercator grid system, zone 16

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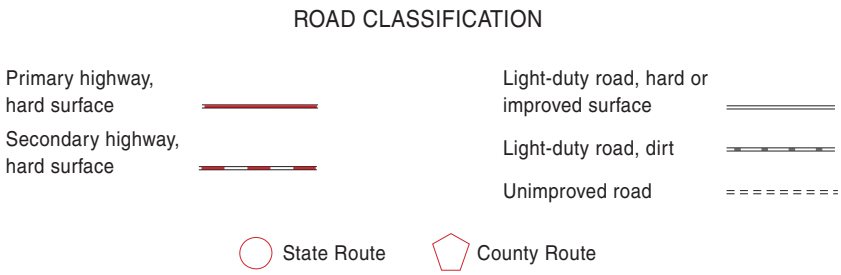
Geology based on field work and map compilation by Mary J. Seid, Joseph A. Devera, 2008–2009, and Allen L. Weedman, 1991. Missouri geology by Dewey H. Amos, 1985.

Digital cartography by Jane E.J. Domier, Steven M. Radli, and Daniel R. Stevenson, 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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GEOLOGIC UNITS

Quaternary	Qal	Alluvial deposits	Pleistocene and Holocene
	Qf	Fan deposits	
Pennsylvanian	Unconformity		Atokan
	Ptl	Lower Tradewater Formation	
	Pcv	Caseyville Formation	Morrowan
	Unconformity		
	Meu	Upper Elviran undivided, Waltersburg to top of Degonia	
	Mv	Vienna Limestone	Chesterian
Mississippian	Mts	Tar Springs Sandstone	
	Mgd	Glen Dean Limestone	
	Mhg	Hardinsburg Sandstone and Golconda Formations	
	Mpc	Cypress Sandstone through Paint Creek Formation	Valmeyeran
	Myr	Yankee Formation and Renault Sandstone	
	Mav	Aux Vases Sandstone	
	Msg	Ste. Genevieve Limestone	
	Msl	St. Louis Limestone	Upper
	Msm	Salem Limestone	
	Mw	Warsaw Formation	
Devonian	Mkb	Keokuk Limestone and Burlington Limestone	Middle
	Mfg	Fern Glen Formation	
	Unconformity		
	Dc	Chattanooga Shale, MO (Grassy Creek Shale, IL)	
	Dsl	St. Laurent Formation	Lower
	Dgt	Grand Tower Limestone	
	Dcc	Clear Creek Chert	
	Dbb	Backbone Limestone (Illinois)	
	Dis	Little Saline Ls (Missouri)	Middle
	Dgk	Grassy Knob Chert	
Silurian	Db	Bailey Limestone	
	Unconformity		
	Sb	Bainbridge Formation	Upper
	Ssc	Sexton Creek Limestone	
Ordovician	Og	Girardeau Limestone and Maquoketa Formation	Middle
	Unconformity		
	Ok	Kimmswick Limestone	
	Od	Decorah Shale	
	Op	Plattin Limestone	

Symbols

- Strike and dip of bedding; number indicates degree of dip
- Overturned bedding - showing strike and dip; number indicates degree of dip
- Abandoned quarry

Line Symbols

- dashed where inferred, dotted where concealed
- Contact
- Fault; bar and ball on downthrown side
- Anticline
- Line of cross section

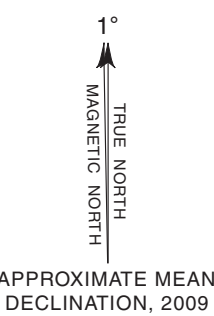
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For more information contact:
Institute of Natural Resource Sustainability
Illinois State Geological Survey
615 East Peabody Drive
Champaign, Illinois 61820-6964
(217) 244-2414
http://www.isgs.illinois.edu



1	2	3
4	5	
6	7	8

ADJOINING QUADRANGLES
1 Rockwood, MO
2 Raddie
3 Orville
4 Crostow, MO
5 Gorham
6 Oak Ridge, MO
7 Neelys Landing, MO
8 Wolf Lake



SYSTEM	QUATERNARY	SERIES	STAGE	FORMATION	MEMBER or BED	GRAPHIC COLUMN	THICKNESS (feet)	UNIT
PENNSYLVANIAN	PLEISTOCENE HOLOCENE	ATOKAN			Alluvium, fan, and terrace deposits		0–200	A
								B
PENNSYLVANIAN	MORROWAN			Lower Tradewater			100–150	C
				Caseyville			150–250	D
MISSISSIPPIAN	CHESTERIAN	UPPER ELVIRAN		Degonia Ss			100–250	E
				Clore Formation				
				Palestine Ss				
				Menard Limestone	Oolite bed			
				Waltersburg			25	F
				Vienna Ls				
				Tar Springs Sandstone			90	G
				Glen Dean Ls			75–100	H
				Hardinsburg Ss			20	I
				Haney			10	
				Golconda			70	
				Fralleys			10	
				Cypress Ss			20	J
							60	
				Paint Creek			70	
							20	
				Yankeetown			45	K
				Renault Limestone			80	
							60–100	
				Aux Vases Sandstone				
		VALMEYERAN		Ste. Genevieve Limestone			130–195	M
				St. Louis Limestone			150–170	N
				Salem Limestone			105–140	O
				Warsaw			160–210	P
				Keokuk and Burlington Limestones			400	Q
				Fern Glen			55–160	R
		UPPER		Chattanooga Sh (Grassy Creek Sh)			55–85	S
				St. Laurent			113–170	T
DEVONIAN	MIDDLE	GIVETIAN		Grand Tower Limestone			175–230	U
					Dutch Creek Sandstone			
		EIFELEIAN		Clear Creek Chert			140–165	V
				Backbone Ls (Little Saline Ls)			175	W
DEVONIAN	LOWER			Grassy Knob Chert			210	X
				Bailey Limestone			310	Y
				Bainbridge	Moccasin Springs		83–200	Z
				Sexton Creek Ls	St. Clair		30–65	AA
DEVONIAN	?			Girardeau Ls			4–10	BB
				Maquoketa	Orchard Creek		45	
					Thebes		25	
					Cape		40	
ORDOVICIAN	CINCINNATIAN			Kimmswick Limestone			50–165	CC
				Decorah Sh				
	CHAMPLAINIAN			Plattin Limestone			190	DD

A Alluvial deposits Sand, gravel, silt and clay. Sand is light gray to brown-gray, coarse to fine grained, poorly sorted, ranges from weakly stratified to well stratified. Sand and clay occur as laminae or cross bedded channels found on the floodplains and creeks. Gravels are angular to sub-rounded, composed of chert, quartz and rock fragments of igneous, metamorphic and local sedimentary origin. Silt is brown and gray, intermixed with sands and gravels. Clay is gray to yellow, intermixed with sand and silt layers, and dominantly in meander scars or oxbow lake settings. Unconformable with units below.

B Fan deposits Cobbles, gravel, and sand. Cobbles are composed of local bedrock deposited onto the Mississippi River floodplain; angular to sub-rounded, brown and gray. Sand is light brown quartz, poorly sorted, coarse to fine grained, locally containing well rounded quartz pebbles. This deposit originates at the mouth of large streams. Unconformable with alluvium and unit below.

C Lower Tradewater Sandstone and shale. Sandstone is brown to tan, medium to fine grained, sub-rounded sublitharenite; mica, dark mineral grains, clay, and occasional well rounded quartz pebbles and granules occur. On weathered face, iron-staining and liesegang banding are prominent. Shale is dark gray to medium gray, carbonaceous in part, weakly fissile, and varies from soft claystone to hard shale. Contact locally disconformable and sharp in most areas.

D Caseyville Sandstone and shale. Sandstone is tan quartz arenite, coarse to fine grained, well rounded to sub-rounded, and typically poorly sorted; however, fine to medium grained, well sorted quartz arenite is also observed. Rounded, white quartz pebbles common in places; thick to medium bedded with large scale unidirectional cross bedding, sacrositic texture, liesegang banding prominent on the weathered face; interstitial clay is present but localized. Shale is present but not exposed. Unconformable with underlying units.

E Upper Elviran undivided (Degonia Sandstone, Clore Formation, Palestine Sandstone, Menard Limestone, Waltersburg Formation) Sandstone, limestone, and shale. Sandstones are light gray to tan, fine grained, well sorted; bedding varies from thin to massive, rhythmically laminated, ripple laminated sheets, cross bedded. The Degonia Sandstone is locally calcareous near the top with abundant brachiopod molds and casts in the sandstone. Small primary sedimentary structures are characteristic. Shale is red and green claystone in upper part, gray to dark gray in middle and lower parts. Marine fossils in part dominated by productid brachiopods, *Composita subquadrata*, *Anthracospirifer increbescens*, and fenestrate bryozoans. Limestones are gray to dark gray lime mudstones. Fossil wackestones are argillaceous and display "hourglass" weathering. Less common are packstones and grainstones, but they can occur in some beds. Oolite beds were found in both the Menard Limestone and Clore Formation to the east in the Gorham Quadrangle. This unit is mapped as Upper Elviran undivided in places of poor exposure and complex structure. Some upper units are truncated by pre-Pennsylvanian erosion and subsequent Pennsylvanian cover. Basal contact is sharp but conformable with underlying unit.

F Vienna Limestone Limestone and chert. Dark gray, siliceous, weathers to a spongy rind; chert light to medium gray, occurs mainly as a pelmatozoan wackestone. The unit is poorly exposed in the Missouri section. Basal contact is sharp.

G Tar Springs Sandstone Sandstone and shale. Sandstone is light gray to tan-brown quartz arenite, can weather yellowish to reddish brown; fine grained, well sorted, thin to thick bedded; primary sedimentary structures include ripple marks, ripple laminated sheets, and cross bedding; thicker bedded, cross bedded and channel form sandstones occur in the lower part. Medium gray shale and tan to medium brown siltstone are seen in the middle part; scattered plant debris is associated with the shale and siltstone. Lower contact locally unconformable.

H Glen Dean Limestone Limestone and shale. Limestone is mostly thin, gray, wackestone facies containing oolitic packstones and fossiliferous packstones; bedding is thin to medium and can be tabular or undulatory and cross bedded with bioclasts; weathers from gray to tan; interbedded with dark gray, soft, calcareous shales in the upper part. Fossils occur in both limestones and shales; fossils include fenestrate bryozoans, *Prismopora serratula* (prism-shaped bryozoan), *Pentremites* sp. (large blastoid, commonly found at the Starland Quarry), *Cleothyridina* sp., spiriferids, productids and crinoids. The lower part grades into a shale at the base.

I Hardinsburg Sandstone and Golconda Shale, limestone, siltstone, and sandstone. The Hardinsburg Sandstone is dark gray shale with poorly exposed siltstone and sandstone streaks. The Golconda Formation is limestone and shale. The upper part is light gray, oolitic grainstone to fossil packstone, thick to medium bedded, locally cross bedded; numerous crinoids, blastoids, fenestrate bryozoans and brachiopods are present; shale is dark gray, dense, non-calcareous claystone but is fossiliferous in places; the middle part of the unit contains lenticular limestones which are bryozoan-pelmatozoan wackestones to packstones; the basal unit is argillaceous and fossiliferous wackestone containing foraminifera, gastropods and bivalves; lower contact was not observed, but it is unconformable.

J Cypress Sandstone and Paint Creek Shale, limestone, and claystone. The Cypress Sandstone is dark to medium gray and greenish gray, with a few red shale beds; Cypress Sandstone not

present at the surface due to faulting; description from nearby areas and subsurface data. The Paint Creek Formation is limestone and clay; light to medium gray oolitic grainstones and fossil packstones; fossils dominated by pelmatozoa and blastoids; thin bedded to lenticular; coarse grained texture; some greenish clay occurs in the matrix between coarse bioclasts; shale in the upper portion is dark to medium gray and locally calcareous; the middle part is dominated by weakly fissile dark to medium gray shales and red beds; the basal part is light gray limestone, cross bedded, and contains abundant pelmatozoa; some of the pelmatozoa are stained red; Paint Creek not present in this quadrangle due to faulting.

K Yankeetown and Renault Limestone Sandstone, limestone, and interbedded shale. The Yankeetown Formation is sandstone and shale; sandstone is light gray to reddish brown quartz arenite, well sorted, thin to thick bedded, with silty beds and cross bedded sandstones in places; bedding is undulatory or wavy and becomes locally cherty; shale medium to dark gray to reddish gray; calcareous and silty in part; unconformable at base. The Renault Limestone is limestone, shale and interbedded sandstone; laterally variable with all three lithologies; limestone is lime mudstone to fossil wackestone, medium to dark bluish gray, argillaceous; common fossils include fenestrate bryozoa, pelmatozoa and blastoids; shale is variegated red and green; calcareous in part; sandstone is light brown, fine grained, well sorted and calcareous; basal part of the formation is conglomeratic with sandstone and chert fragments; unconformable at base.

L Aux Vases Sandstone Sandstone. White to light gray, fine to medium grained quartz arenite, well sorted; thin to thick bedded, cross bedded, beds can be ripple marked or laminated; calcareous in places near the top; greenish gray shale clasts incorporated in sandstone. Prominent unconformity at base.

M Ste. Genevieve Limestone Limestone. Facies range among oolitic grainstone, fossil grainstones, and packstones, light gray to white; thick to medium bedded; grainstones are cross bedded; white chert nodules scattered in the middle part; important fossils include *Platycrinites penicillus*, found typically as disarticulated crinoid columnals. They are diagnostic and are oval shaped with calcareous nodules around the periphery. The small brachiopod, *Pugnoides ottumwa* is representative. The limestone can be dolomitized near fault zones. Basal contact was not observed.

N St. Louis Limestone Limestone and shale. Gray to medium gray lime-mudstone (sublithographic) displays conchoidal fracture; thick to massively bedded; white to light gray chert occurs in ovoid nodules with variegated light and dark gray banding in some. Fossil wackestones and rare packstones occur. Fossils, where they occur, are dominated by echinoderms, including disarticulated and complete crinoids and echinoids. Boundstones occur in the lower part of the unit and are primarily composed of *Acroclyathus proliferum* and *Acroclyathus floriformis*. Shale is medium gray, bluish gray, and green and occurs in thin beds between limestone beds. Basal contact was not observed but is conformable with the unit below.

O Salem Limestone Limestone, shale and dolostone. The top part is brownish dolostone with thin gray shale partings; oolite beds occur in the upper central and lower parts; Endothyrid foraminifera abundant in some beds; lower part was not observed due to faulting.

P Warsaw Limestone. Dominantly fossil wackestones with some packstone facies; medium gray to brown; localized oolitic and dolomitic beds; fossils include crinoids, bryozoans, and foraminifera; silty and shaly in the middle to lower parts; gradational contact with the unit below.

Q Keokuk Limestone and Burlington Limestone Limestone and chert. Fossil packstones, wackestones and some oolitic grainstones are dominant, but few lime-mudstone beds occur. Tan to white crinoidal grainstone facies occur in the upper section; cross bedded; coarsely crystalline appearance, caused by disarticulated skeletal remains of large crinoid columnals, echinoid plates, and spines. Chert is white to light gray; chert nodules and stringers become more prevalent lower in the unit; minor amounts of shale occur as thin gray beds; lower contact is gradational with the underlying unit.

R Fern Glen Limestone, shale, chert and dolostone. Limestone is medium to light yellowish brown packstones and wackestones, medium to thinly bedded, typically argillaceous; contains small quartz geodes in the lower beds; fossils include abundant crinoid columnals, brachiopods, bryozoans and corals. Shale is medium brown, green, red and calcareous in places. Chert is light to medium brown and irregularly bedded. Dolostone is tan to brown, argillaceous, and dominantly medium bedded; lower contact is unconformable.

S Chattanooga Shale (Grassy Creek Shale) Shale. Medium to dark brown or black, fissile, some beds are slightly silty, siliceous or dolomitized; unconformable with unit below.

T St. Laurent Shale, limestone, and chert. Dark gray to medium brown shale; shale grades into limestone; contains limestone lenses and chert in the upper part. Limestone is dark gray, yellowish brown, or reddish gray; ranges from argillaceous wackestones to oolitic grainstones; fossils include rugose corals, gastropods, crinoid columnals, bivalves, *Eldredgops cristata* (trilobite), and *Microcylcus discus* (the "button" coral, near the base); locally unconformable with the unit below.

U Grand Tower Limestone Limestone. The upper limestone is brown gray and thinly bedded; the basal part is light gray to medium gray sandy limestone. The lower part yields thick cross bedded limestone overlain locally by boundstones, which are composed of *Hexagonaria* and stromatoporoids. In places, a white sandstone laterally grades into a light gray crinoidal grainstone. Brachiopods are common—some beds are entirely composed of chonetid packstone facies; unconformable contact with unit below.

V Clear Creek Chert Chert and limestone. White to light brownish yellow, thin to medium well-bedded, fossiliferous chert; can be stained red and orange; some limestone beds occur throughout with sandy beds near the top; brachiopods and trilobites occur as internal casts; external molds and are common in some beds; vertical burrows have been observed; stylolites are prominent; locally unconformable and sharp contact with unit below.

W Little Saline Limestone (Backbone Limestone) Limestone. White to light gray, crinoid and brachiopod grainstone; cherty in the middle part; poorly exposed due to faulting; unconformable with unit below.

X Grassy Knob Chert Chert and limestone. Chert is white to light yellowish brown, medium to thick well-bedded and occurs as chert nodules; locally cemented with ferruginous material; non-fossiliferous but contains horizontal burrows. Limestone is light yellowish brown to gray brown argillaceous mudstone. Brecciated beds occur in the unit probably due to dissolution; gradational contact with unit below.

Y Bailey Limestone Limestone, chert and shale. Thinly bedded and interbedded lime mudstone and thin shale, gray to light gray; fossils occur in the argillaceous laminae above the thin beds of the middle and upper part, including the trilobite, *Huntonia* sp., tentaculids, brachiopods, and crinoids. Chert is light gray and occurs as small nodules within the thin beds; siliceous sponge spicules are common throughout. Greenish lime mudstones, shales and light green chert nodules occur in the lower part; unit is characterized by thin, very regular, graded beds; unconformable at the base.

Z Bainbridge Limestone. Brick red mudstone, argillaceous or marly, commonly mottled with purple and green; weathers to a red residuum; weakly fissile; dense gray with pinkish gray stains in the lower part; fossils include straight nautiloid cephalopods and dalmatid, phacopid and calymenid trilobites; unconformable at the base.

AA Sexton Creek Limestone Cherty limestone. Light gray to brownish gray, cherty lime mudstone; medium to thick bedded; chert is tan, waxy, and observed as flat irregularly shaped nodules. In the middle part, there are tabulate and colonial corals which are conspicuous, silicified, round and domed. Unconformable with unit below.

BB Girardeau Limestone and Maquoketa Limestone, shale, and sandstone. The Girardeau Limestone is medium to dark gray, dense lime mudstone; thin bedded with interbedded shale laminae; undulatory bedding with gray-brown chert nodules; fossils are well preserved below shale laminae atop lime mudstone beds; fossils include whole crinoids, trilobites, tentaculites and brachiopods; only locally exposed; unconformable with Maquoketa below. The Maquoketa consists of the Orchard Creek Shale, Thebes Sandstone, and Cape Limestone. The Orchard Creek Shale is shale and limestone; shale is medium gray to light greenish gray, weathers brown, calcareous; contains lenses of fossiliferous lime mudstone; fossils characteristic of this member include the trilobite *Anataphrus* sp. and edrioasteroids; poorly exposed; gradational contact with Thebes Sandstone below. The Thebes Sandstone is sandstone and shale; sandstone is greenish brown to tan, fine grained, quartz arenite; contains silt and shale in part; bedding is thin to locally thick; cross bedded; greenish blue-gray calcareous siltstone occurs in places and contains a small, blind trilobite, *Ampyxina bellatula*, and the trace fossil, *Chondrites* ichnosp.; the lower part contains shale and common brachiopods; unconformable with Cape Limestone below. The Cape Limestone is medium to dark gray lime mudstone, sandy in places, abundant crinoid columns; fossils include brachiopods and locally large orthoconic cephalopods; unconformable with unit below.

CC Kimmswick Limestone and Decorah Shale Limestone and shale interbedded. The Kimmswick is pure limestone; white crinoidal grainstone, pinkish in places; altered to yellowish dolomite in places, especially near faults; bedding ranges from thin to thick; *Receptaculites oweni* is a characteristic fossil alga; other fossils include trilobites, brachiopods, and crinoids; unconformable with Decorah Shale below. The Decorah Shale is limestone and interbedded shale; limestone is medium gray to dark purplish gray with common brachiopods; shale is greenish gray, fossiliferous; Decorah is locally absent due to post Decorah or pre-Kimmswick erosion; conformable with unit below.

DD Plattin Limestone Limestone and chert. Light gray to light brown lime mudstone, sublithographic; calcite or dolostone-filled burrows are common and characteristic of the Plattin Limestone; thin to medium wavy bedded; contains greenish gray to dark gray shale interbeds. Chert is light gray to light brown; occurs in nodules and discontinuous layers; locally fossiliferous but the lower part is mostly unfossiliferous; basal contact was not observed.

