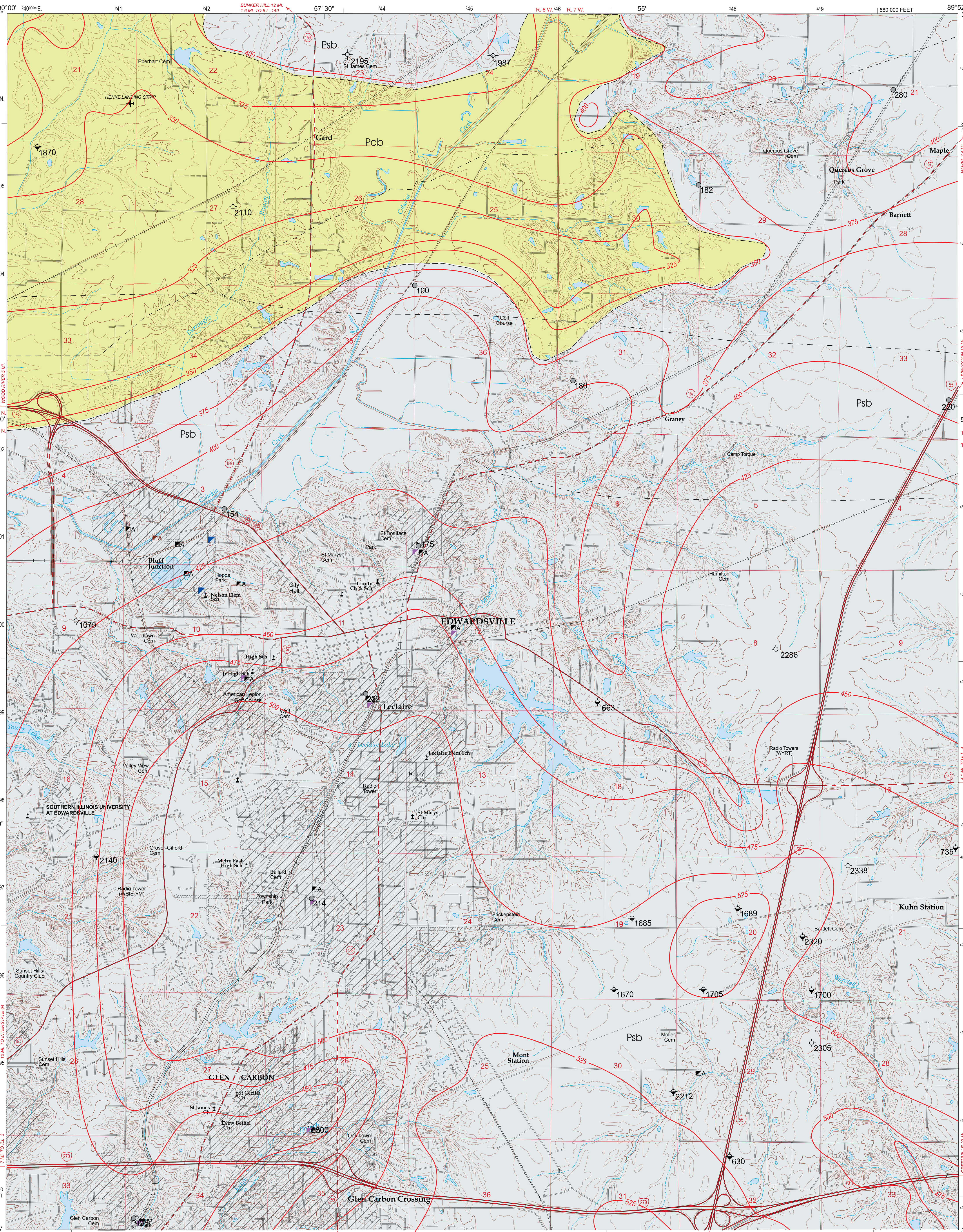
Rod R. Blagojevich, Governor
Department of Natural Resources
Joel Brunsvold, Director
Illinois State Geological Survey
William W. Shilts, Chief

BEDROCK GEOLOGY OF EDWARDSVILLE QUADRANGLE
MADISON COUNTY, ILLINOIS

Joseph A. Devera and F. Brett Denny
2003

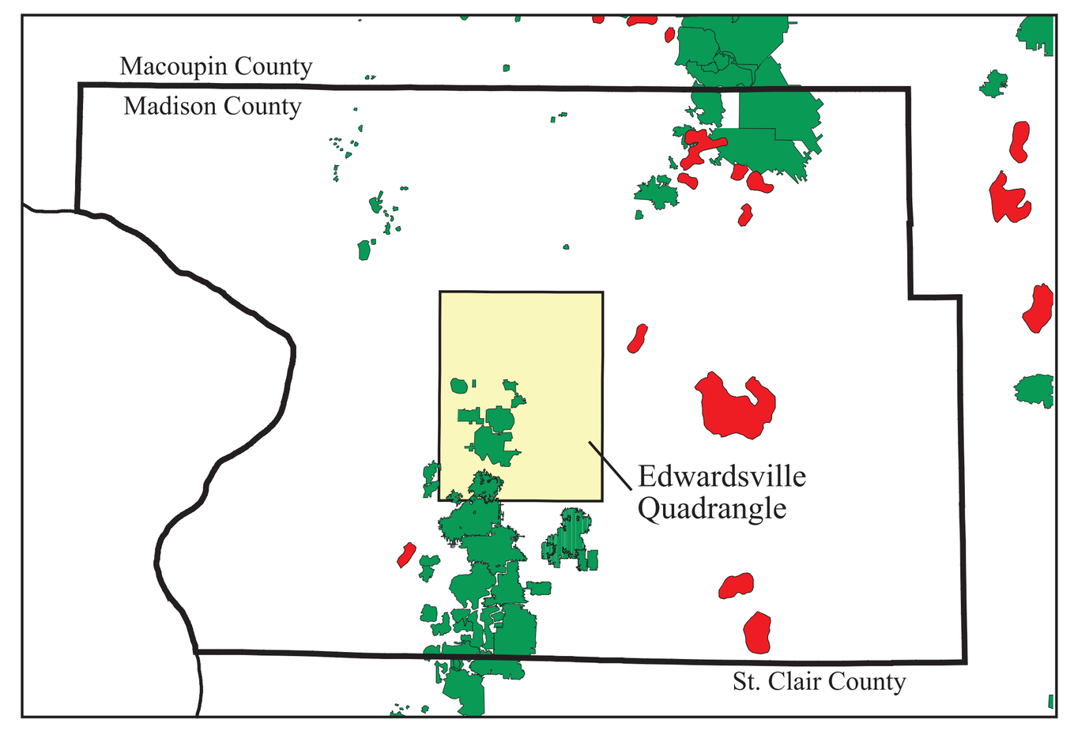


Pennsylvanian	Psb Shelburn Formation	Desmoinsian
	Pcb Carbondale Formation	

Line symbols: dashed where inferred

- Contact
- 475 Bedrock topography (elevation in feet)
- 220 Coal test (depth in feet)
- 2220 Oil test, dry hole (depth in feet)
- 2220 Oil test, show of oil (depth in feet)
- Mine shaft, abandoned
- Mine slope abandoned
- Mine underground uncertain location
- Underground coal mine area

Petroleum and Coal Resources of Madison County
(Resources have been removed)



1:500,000

Oil and gas fields — Coal mine area (coal has been removed)

Introduction

Bedrock Geology of Edwardsville Quadrangle is part of a statewide 1:24,000 scale geologic mapping program by the Illinois Department of Natural Resources (Illinois State Geological Survey). This map was funded through a grant by the United States Geological Survey. Geologic maps may aid in the exploration for economic minerals including coal, petroleum and natural gas, and may facilitate regional planning.

The Edwardsville 7.5' Quadrangle is about 18 miles east-northeast of St. Louis, Missouri and is dominantly composed of Middle Pennsylvanian (Desmoinsian) strata. Regional dip is 2 to 3E to the east and strike is near north-south. Bedrock exposures are rare in the quadrangle due to drift cover by Pleistocene glacial deposits of the Glasford Formation and Peoria and Roxana Silts. The only bedrock exposures seen in the quadrangle occur in Wendell Branch in the southeastern corner of the map and Judys Branch in the southern-most part. A tan, fine to medium grained, quartz arenite with mica that is thin bedded was observed in Wendell Branch. Siltstone was also seen in the creek at a higher elevation. Both sandstone and siltstone are part of the Shelburn Formation (Desmoinsian). Mainly gray platy shales occur in Judys Branch also part of the Shelburn.

A large area of the quadrangle has underground coal mines at a depth of 350 to 375 feet below the surface (see mined-out-area inset and map for detail). The Herrin Coal Bed of the Carbondale Formation was the seam that was mined. Coal mine subsidence has been a problem for the City of Edwardsville, Illinois. No coal mines are active in the quadrangle.

There is 140 feet of relief in the quadrangle; the Pin Oak Township being 570 feet above mean sea level and Cahokia Creek is 430 feet above mean sea level in the lowest area. Most of the quadrangle is flat which is reflected in the bedrock topography.

Bedrock Geology

There are three Middle Pennsylvanian units that occur below the Pleistocene: Tradewater, Carbondale, and Shelburn Formations, in ascending order. The base of the Tradewater Formation is a conglomeratic sandstone that contains rip-up clasts of siltstone, and limestone of the underlying formations of Chesterian Series. The conglomerate marks the boundary between the Mississippian and Pennsylvanian Systems and the sub-Absaroka unconformity. The Tradewater is dominated by shale with sandstones and siltstones. The base of the Carbondale Formation is the base of the Colchester Coal in this area. The most widespread limestone in the Carbondale is the Hanover Limestone Member. It is a light gray to olive gray, lime mudstone that contains a few < 10% small brachiopods. The upper part is argillaceous and has a nodular texture, the lower part is a massive limestone. The top of the Carbondale is marked by the Herrin Coal. Overlying the Carbondale is the Shelburn Formation it contains the Brereton Limestone Member at the base, the Bankston Fork Limestone Member and the Piasa Limestone Member in the upper part. The Danville Coal was reported in a number of boreholes.

Only two formations subcrop below the Pleistocene. The Carbondale subcrops in a large paleovalley trending east-west in the northern part of the quadrangle. The Shelburn overlies the Carbondale and subcrops throughout the rest of the quadrangle.

From drill records Chesterian units present include: Ste. Genevieve, Aux Vases, Renault, Yankeetown, Downeys Bluff, Cypress and Golconda. The Edwardsville Quadrangle is east of the St. Louis Fault Zone seen on the Geologic Map of the Bethalto 7.5' Quadrangle (Devera, in prep.). Chesterian strata represented is more consistent in borehole data. The angular unconformity seen in the Bethalto Quadrangle is more of a disconformity in the Edwardsville Quadrangle. There no longer is an angular relationship between the Pennsylvanian strata and the upper Mississippian strata.

Economic Geology

Coal

Eleven coal mines were active from 1875 to 1958 within the Edwardsville Quadrangle (see mined-out-area on the geologic map; Cheowith and Barrett, 2001)). All of the mines were in the Herrin # 6 Coal Bed. The thickness ranges from 2.6 to 8 feet and was mined at a depth ranging from 350 to 375 feet below the surface. No coal mines are currently active in the study area. North of Edwardsville, Illinois the Herrin Coal occurs at a strippable depth in a extensive area north of the paleovalley on the geologic map (Smith, 1961). Denny, (in prep.) discusses the adjoining area to the north in the Prairietown 7.5' Geologic Map where he also states that the Herrin Coal occurs at a strippable depth. The subcrop line of the coal is equal to the contact between the Carbondale and Shelburn on the geologic map. The Herrin Coal is eroded by pre-glacial erosion in this area. The extent of erosion on the Herrin Coal within the paleovalley is based on the bedrock topography (red contour) and a structure contour of the top of the Herrin Coal.

The Colchester # 2 Coal Bed is also present and can locally be 3 feet thick. However, this coal is highly variable throughout the quadrangle and has not been mined. The Danville # 7 Coal Bed occurs in a number of boreholes but is thin and discontinuous.

Oil and Gas

Numerous oil and gas tests were drilled in the quadrangle. The deepest test was drilled to the Ordovician St. Peter Sandstone at 2,500 feet below the surface in T. 4 N., R. 8 W., of Section 26. All wells were dry and abandoned. A few had shows of oil in Ordovician, Devonian, and Mississippian strata. No oil has been produced from the Edwardsville Quadrangle.

References

Chenoweth, C., and Barrett, M.E. 2001. Directory of Coal Mines in Illinois, 7.5' Quadrangle, Madison & Macoupin Counties, Illinois. with 'Coal Mines in Illinois - Edwardsville Quadrangle'. Illinois State Geological Survey Map (1:24,000).
Denny, F. B., (in preparation) Geologic Map of the Prairietown 7.5' Quadrangle, Illinois State Geological Survey Map sheets IGQ Series.
Devera, J. A., (in preparation) Geologic Map of the Bethalto 7.5' Quadrangle, Illinois State Geological Survey Map sheets IGQ Series.
Smith W. H, 1961, Strippable Coal Reserves of Illinois, Part 3 - Madison, Macoupin, Jersey, Greene, Scott, Morgan, and Cass Counties, Illinois State Geological Survey Circular 311, 4 pls., 40 p.

SYSTEM	SERIES	FORMATION	MEMBER and Bed	GRAPHIC COLUMN	THICKNESS (feet)	DESCRIPTION UNIT
Pennsylvanian	Desmoinesain	Shelburn	Piasa Ls.; Danville Coal; Brereton Ls.		100-150	A
		Carbondale	Herrin Coal; Hanover Ls.; Oak Grove Ls.; Coalchester; Seahorn Ls.		130-150	B
		Tradewater			40-120	C
Mississippian	Chesterian	Golconda			0-42	D
		Cypress			0-25	E
		Paint Creek			30-45	F
		Yankeetown			26	G
		Renault			8-10	H
		Aux Vases			67-90	I
		St. Genevieve Limestone	Spar Mountain Sandstone ?		60-80	J
	Valmeyeran	St. Louis Limestone			200-250	K

A. Shelburn Formation: *shale, siltstone, limestone, sandstone, and coal.* Shale varies from light, medium, to dark gray and in places variegated red and green where associated with the Piasa Ls. Black shale that is fissile occurs above the Danville Coal. Siltstones are gray to gray-green and range from laminated to thick bedded, commonly micaceous. Limestone is light gray to dark gray, argillaceous, with crinoids and brachiopods. It is dominantly a lime mudstone with fossil wackestone facies. In the lower part of the Piasa Limestone fusulinids are common. Sandstone is rare, but where seen it is a light gray to tan, medium grained, micaceous, quartz arenite. Coal is thin and discontinuous, bituminous and commonly overlain by a thin, black shale and red and green claystones and a limestone.

B. Carbondale Formation: *shale, claystone, sandstone, limestone, and coal.* Shale is the most dominant lithotype in this unit. The shale ranges from light gray to black, nonfissile to fissile. The Anna Shale is a marine, fissile, black shale that occurs above the Herrin Coal. Claystones are light gray to white and contain carbonized root remains below the coals. Sandstone is sporadic but can occur in the area as gray, medium grained, thick bedded quartz arenites. The Hanover Limestone is a dark to medium gray, nodular limestone that gets up to three feet thick in the study area. It is a persistent bed of argillaceous limestone that is brecciated and contains primarily brachiopods. The Oak Grove Limestone is a lithologically distinct sequence of thin lime-mudstones interbedded with thin dark gray and black shales. The Herrin and Colchester Coals are both bright banded coals. The Herrin Coal occurs near the top of the formation and contains a bluish gray argillaceous layer near the base called the “blue band”. The Colchester Coal occurs near the base of the formation in the study area and is thinner than the Herrin.

C. Tradewater Formation: *sandstone, siltstone, shale and conglomerate.* Dominated by siliciclastics this unit mainly contains, micaceous quartz arenites with some clay or altered feldspar sublitharenites. Sand size ranges from fine to coarse grained and can display cross bedding in places. Siltstones are gray to tan and contain abundant mica. Siltstones are laminated to thick bedded. Shales are light gray to dark gray and contain carbonaceous debris. Shales are typically interbedded with siltstone. The least common lithotype is conglomerate. It consists of chert gravel and pebbles with coarse grained sand to medium grained sand. Fossil plant debris is also found within the conglomerate that mainly occur at or near the base of this unit.

D. Golcanda Formation: *shale, siltstone, and limestone*. Shale is gray to dark gray, soft, grades into claystone and can be locally variegated red and green. The shale is calcareous in places and contains silty intervals. The siltstone is medium gray, calcareous, and occurs in the upper part of the formation. Limestones are lenticular and very argillaceous and difficult to distinguish from the calcareous shales. The basal limestone is a dense dark gray lithographic limestone that locally can be a dolostone.

E. Cypress Sandstone: *sand and shale.* Sand is white to light gray, fine grained, well sorted quartz arenite that can have a sucrosic texture. Sand is the dominant clastic component of the formation. Shale only seen as clay drapes in laminated sheets near the upper parts of the sandstone.

F. Paint Creek Formation: *shale, limestone, and sand.* Shales range from variegated red and green to light gray claystones. Typically shale is soft non-fissile but can locally contain marine fossils such as: blastoid and crinoid “heads”, pelmatozoa, productid brachiopods, rugose corals, and fenestrate bryozoans. Limestone is medium gray to dark gray, primarily composed of fossil packstones and wackestones of the aforementioned fossils. The limestones have shale interbeds that can contain fine grained quartz sand stringers. The upper limestone can have pink chert replaced crinoids. The basal limestone is mainly dark greenish gray but red, green, and brownish shales can be associated with it.

G. Yankeetown Sandstone: *sand, shale, and chert.* This unit contains very fine grained quartz- rich sand that can be white, red, and gray green. In places it has been silicified and has preserved as chert. Common sedimentary structure is stacked ripple bedded cherts that on close inspection yield very fine angular quartz sand. Shale is typically red claystone at the top of the unit but can also be variegated with greens and grays. This formation can grade into the underlying limestone.

H. Renault Limestone: *limestone, sandy limestone, and limestone conglomerate.* Limestone is light to medium gray containing oolites and fossils and diagnostic red crinoids. Mainly composed of packstones and grainstones, this limestone is dominated by pelmatozoa. Quartz sand is found within this limestone and in places carbonate conglomerates occur at the base.

I. Aux Vases Sandstone: *sand and shale.* This unit contains a clean, white, well sorted, quartz arenite that shows crossbedding and current ripples. Green shales and green clay drapes occur near the upper part of the sandstone. The lower part of the sand is calcareous and can be locally unconformable with the underlying unit.

J. Ste. Genevieve Limestone: *limestone and sand.* Limestone containing oolites and crinoids are abundant. Oolitic crossbedded grainstones or oosparites are found in the upper parts of the formation. These limestone beds are “chalky” white and contain calcium-rich carbonate. Near the upper part of the limestone approximately seven feet of very fine grained sand is present. The sand is light greenish gray, bioturbated, and has calcareous cement. The lower part of the unit is dominated by crinoidal packstones with tighlty packed coated grains and thin greenish shale laminae. Stylolites are common and chert is occasionally present. Greenish oncolites are seen in the lower beds.

K. St. Louis Limestone: *limestone and chert.* This formation is dominated by lime-mudstones dark gray to light gray, with conchoidal fracture. Stylolites are common and facies of fossil wackestone and packstone are present. This unit is thin bedded and commonly contains white to dark gray chert nodules and stringers. Yellowish beds of dolostone and breccia also occur in the middle part of the formation. The colonial coral *Acrocyathus* is common near the lower portion of the limestone.

Base map compiled by Illinois State Geological Survey from digital data provided by the United States Geological Survey. Topography compiled from imagery dated 1986. Transportation updated 1998. Hydrography updated 1991.

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, zone 16

SCALE 1:24 000
1 — 1/2 — 0 — 1 MILE
1000 — 0 — 1000 — 2000 — 3000 — 4000 — 5000 — 6000 — 7000 FEET
1 — .5 — 0 — 1 KILOMETER

BASE MAP CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Released by the authority of the State of Illinois: 2003

Geology based on fieldwork by Joseph A. Devera and F. Brett Denny.

Digital cartography by F. Brett Denny, Jane Domier and John D. McLeod, Illinois State Geological Survey.

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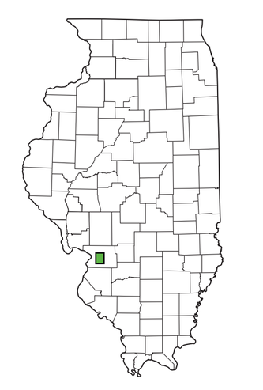
For more information contact:
Illinois State Geological Survey
615 East Peabody Drive
Champaign Illinois 61820-6964
(217) 244-2414
http://www.isgs.uiuc.edu



ADJOINING QUADRANGLES

1	2	3
4		5
6	7	8

1 Bethalto
2 Prairietown
3 Worden
4 Wood River
5 Marine
6 Monks Mound
7 Collinsville
8 St. Jacob

APPROXIMATE MEAN DECLINATION, 1991

ROAD CLASSIFICATION

- Primary highway, hard surface
- Secondary highway, hard surface
- Light duty road, hard or improved surface
- Unimproved road
- Interstate Route
- U.S. Route
- State Route