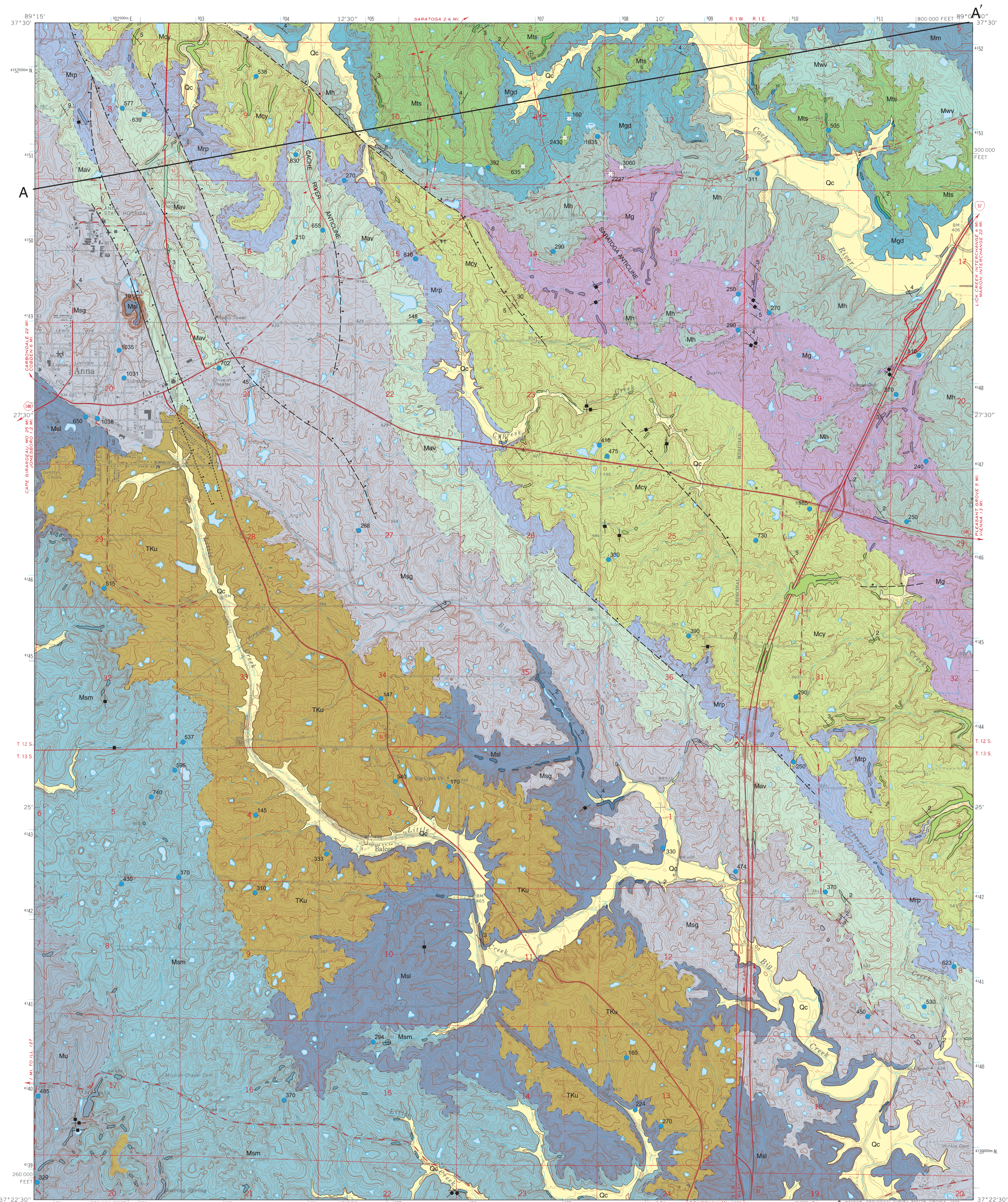


BEDROCK GEOLOGY OF ANNA QUADRANGLE  
UNION COUNTY, ILLINOIS

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

Joseph A. Devera and W. John Nelson  
mapped 1995, digitally compiled 2007

STATEMAP Anna-BG



EXPLANATION			
Quaternary	Qc	Cahokia Formation	Pleistocene and Holocene
	TKu	Tertiary and Cretaceous undifferentiated	
Tertiary and Cretaceous	Mm	Menard Limestone	Eocene to Upper Cretaceous?
	Mwv	Waltersburg Formation and Vienna Limestone	
	Mts	Tar Springs Sandstone	
	Mgd	Glen Dean Limestone	
	Mh	Hardinsburg Sandstone	
Mississippian	Mg	Golconda Formation	Chesterian
	Mcy	Cypress Formation	
	Mrp	Ridenhower Formation and Paoli Limestone	
	Mav	Aux Vases Formation	
	Msg	Ste. Genevieve Limestone	
	Msl	St. Louis Limestone	Valmeyeran
	Msm	Salem Limestone	
	Mu	Ulin Limestone	

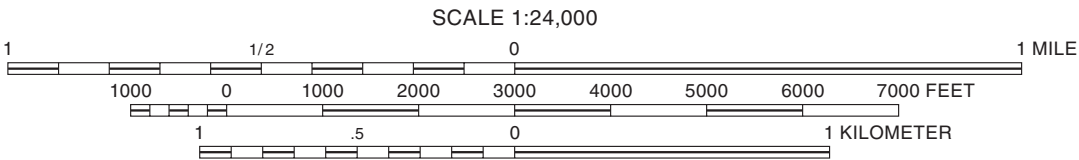
Note: Outcrops of each unit are shown with a darker shade of color.

- Symbols**
- Strike and dip of bedding: number indicates degree of dip
  - Horizontal bedding
  - Vertical joints
- Drill Holes**  
from which subsurface data were obtained
- Water well
  - Oil and gas boring
- Numeric labels indicate total depth of boring in feet
- Line Symbols**  
dashed where inferred, dotted where concealed
- Contact
  - Fault: bar and ball on downthrown side
  - Syncline
  - Anticline
- A—A' Line of cross section

Base map compiled by Illinois State Geological Survey from digital data provided by the United States Geological Survey. Topography by photogrammetric methods from imagery taken 1963. Field checked 1966. Photorevised 1978.

North American Datum of 1927 (NAD 27)  
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

**Recommended citation:**  
Devera, J.A., and W.J. Nelson, 1995, Bedrock Geology of Anna Quadrangle, Union County, Illinois: Illinois State Geological Survey, USGS-STATEMAP contract report, STATEMAP Anna-BG, 1:24,000.



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

Released by the authority of the State of Illinois: 2015

Geology based on field work by J. Devera and J. Nelson, 1990-1991.

Digital cartography by L. Verhelst and J. Domier, Illinois State Geological Survey.

This research was supported in part by the U.S. Geological Survey (USGS) National Co-operative Geologic Mapping Program (STATEMAP). The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.

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 IGS.

The Illinois State Geological Survey, the Illinois Department of Natural Resources, and the State 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 accuracy of geographic location, the type and quantity of data available at each location, and the scientific/technical qualifications of the data sources. Maps or cross sections in this document are not meant to be enlarged.

- ROAD CLASSIFICATION**
- Primary highway, hard surface
  - Secondary highway, hard surface
  - Light-duty road, hard or improved surface
  - Unimproved road
- 84 Interstate Route 85 U.S. Route 86 State Route



Index map showing area geologically surveyed by authors.

**DRAFT:**  
THIS MAP HAS NOT COMPLETED REVIEW  
AND IS NOT YET PUBLISHED.

ILLINOIS  
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

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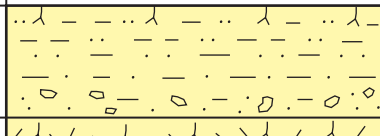
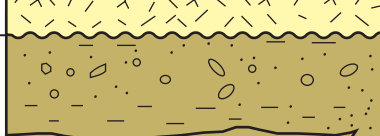
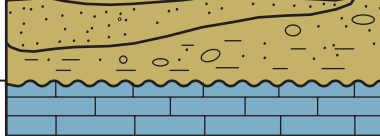
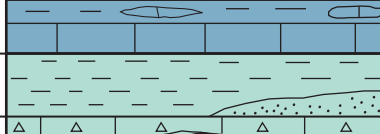


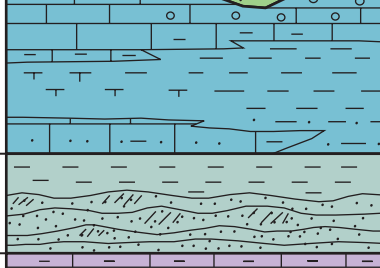
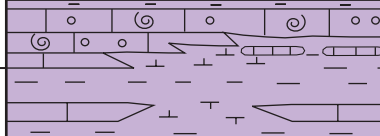
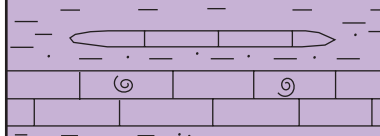
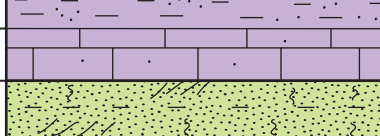
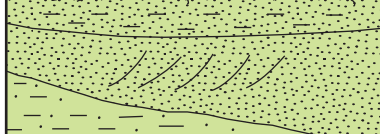
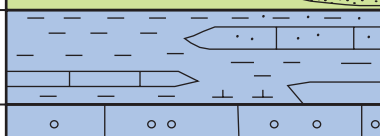
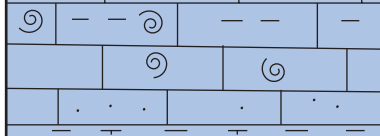
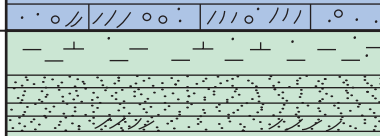
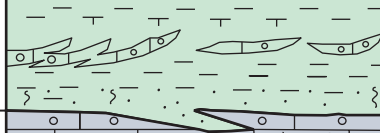
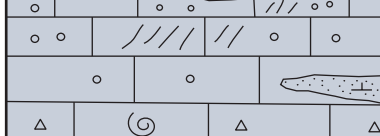

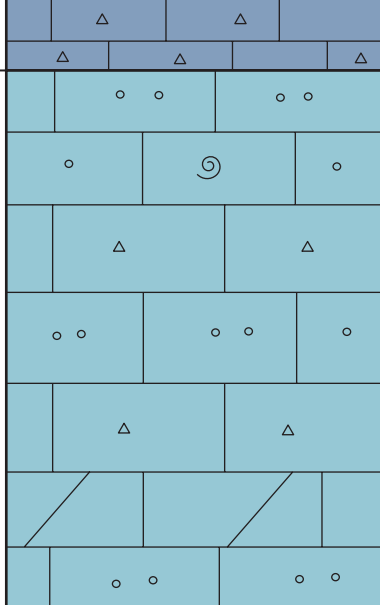
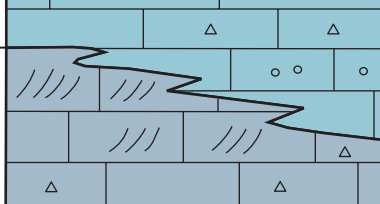


ADJOINING QUADRANGLES		
1	2	3
4	5	
6	7	8

- 1 Cobden
- 2 Makanda
- 3 Lick Creek
- 4 Jonesboro
- 5 Mt. Pleasant
- 6 Mill Creek
- 7 Dongola
- 8 Cypress

APPROXIMATE MEAN DECLINATION, 2007



SYSTEM	SERIES	GROUP	FORMATION	MEMBER	GRAPHIC COLUMN	THICKNESS FEET	UNIT DESCRIPTION
QUATERNARY	HOLOCENE		Cahokia			0-50	A
			loess			0-25	B
TERTIARY AND CRETACEOUS	PLEISTOCENE TO PRESENT		Tertiary and Cretaceous undivided			0-98	C
MISSISSIPPIAN	CHESTERIAN	POPE	Menard Limestone			50	D
			Waltersburg			30-40	E
			Vienna Ls.			5-20	F
			Tar Springs Sandstone			100-120	G
			Glen Dean Limestone			60-90	H
			Hardinsburg Sandstone			30-60	I
			Golconda	Haney Ls.		40-60	J
				Fraileys Shale		55-120	K
				Beech Creek		5-10	L
			Cypress Sandstone			120	M
			Ridenhower			50-60	N
			Paoli Limestone			100	O
			Aux Vases			120	P
			Ste. Genevieve Limestone			200-250	Q
			VALMEYERAN			St. Louis Limestone	
Salem Limestone						300-500	S
Ulin Limestone						100 (exposed)	T
<p><b>A Clay, silt, sand and gravel.</b> Valley fill along larger streams is brownish gray, mottled silty clay containing sand lenses and a thin, basal lag gravel. The Equality Formation, a silt and clay unit of Wisconsin age, probably underlies the Cahokia along the larger streams. Alluvium in the upland areas composed of bedrock fragments, silt and clay.</p> <p><b>B Silt, tan to yellow, massive, rooted.</b> Loess is thin and deflated in most of this quadrangle. In the uplands of the northeastern part of the quadrangle it ranges from 2 to 12 feet thick, whereas, it is as thick as 25 feet in the southern part of the map area.</p> <p><b>C Sandstone, sand, clay and gravel.</b> Sandstone occurs as large indurated float blocks composed of light brown, fine grained, well sorted, quartz arenite. Clay, sand and gravel seen in cut banks and on ridge tops above the indurated sandstone. The gravel contains well rounded quartz pebbles and dark gray chert clasts. Sand associated with the gravel is poorly sorted ranging from medium to coarse grained. This package of sediments also contains gravel with a brown glossy surface with a red pebbly sandstone. Unconformable with units below.</p> <p><b>D Limestone and shale.</b> The carbonate is composed of dark gray lime mudstone and crinoidal/ brachiopod wackestone to packstone. Bedding tabular to wavy in places, weathers hummocky and is thick bedded near the base of the unit. Chert present, containing fossil crinoid stems and silicified molds of crinoids. Shale is calcareous, dark gray and rare in the lower part of this unit. Only the basal portion of this limestone occurs in the northeastern corner of this quadrangle.</p> <p><b>E Shale and sandstone.</b> Medium to dark gray shale to platy claystone, poorly exposed with a thin rusty orange sandstone bench below. The sandstone is a tan, fine grained quartz arenite. The sandstone is tabular and laminated and contains simple horizontal burrows.</p> <p><b>F Limestone is a dark gray lime mudstone with bryozoan/ crinoidal wackestones and packstones.</b> Chert is commonly brownish gray packed with silicified fenestrites. The chert weathers to a tan spongy residuum. The basal part of this unit contains oolitic/skeletal grainstones and is lighter gray. The lower contact varies from sharp to gradational.</p> <p><b>G Sandstone, siltstone and shale.</b> Tan to brown, fine grained, well sorted, quartz arenite with brownish-gray shale and thin bedded siltstones near the top. Sandstone below is dominated by ripple-marked and crossbedded sandstones forming a 15 to 20' bench. The sandstone is tabular bedded but ripple laminated. This grades into a thin flaggy sandstone that is interbedded with siltstones and shales. Trace fossils commonly are Lockeia isp., Planolites isp., small Conostichus isp., and repichnia. The basal contact of the Tar Springs changes from a sharp contact in the southeast to a gradational contact in the northwest.</p> <p><b>H Limestone and shale.</b> Brownish gray to light gray carbonate rock is composed of medium bedded oolitic grainstone, fossil packstone and wackestone. Limestone is thick bedded at the base with thinnest beds at the top. Whole fossil brachiopods include spirifers, derbyids, compositids and cleiothyridinids. Conularia, intact whole Archimedes sp., shark teeth, rugose corals crinoid plates and pelmatozoa are common in the wackestone and packstone facies. The limestone grades into a dark gray calcareous shale containing limestone lenses. The shale becomes a claystone and silty near the base. The lower contact is gradational.</p> <p><b>I Sandstone, siltstone and shale.</b> This unit typically fines upward from a thick-bedded fine grained quartz arenite at the base to a wavy laminated siltstone in the middle to a shale at the top. The upper silty flaggy beds commonly contain ripple marks. The sandstone is cross bedded to massive whereas, the thin bedded siltstone is ripple laminated and contains numerous load structures, tool marks and plant impressions. Common trace fossils are Lockeia isp., Ucherites isp., Sclaratuba missouriensis, Aulichnites isp., Curvolithus isp., Cruziana isp., and Olivellites isp. The basal contact is sharp.</p> <p><b>J Limestone and shale.</b> Limestone tan, yellowish gray with greenish gray shale interbeds. Highly fossiliferous crinoidal/ bryozoan packstone shaly near the top. Abundant fossils found in the upper part include whole camerate and flexible crinoid heads, Pentremites sp., fenestrate bryozoans, trilobite pygidia, rugose corals, spirifers, compositids. This unit becomes shaly upward. The main limestone is composed of fossil packstone and oolitic/fossil grainstone facies. The lower contact is sharp.</p> <p><b>K Shale with limestone lenses.</b> Shale is gray to greenish gray, calcareous with fenestrate bryozoans in the upper part. Limestone lenses are thin fossil packstones. The middle part of this unit is a soft blocky claystone that is variegated red, green and gray. Thin fossiliferous limestone beds occur in the lower part which grades into a silty shale. This shale unit is rarely exposed. The basal part contains sandy shale lenses with a sharp basal contact.</p> <p><b>L Limestone is dark gray and sandy.</b> It does not crop out in the study area. It is only known from well log descriptions.</p> <p><b>M Sandstone, siltstone, and shale.</b> This unit is dominated by a tan to white, fine grained, well sorted quartz arenite. The upper part contains thin bedded sandstones and laminated siltstones and silty shales that are commonly bioturbated. Trace fossils include Eiona isp., Sclaratuba missouriensis and other repichnia. Ripple marks, load and tool marks are common in the upper portion of this formation. The lower part is a well exposed, cliff-former, composed of low-angle wedge-planar and tabular planar crossbedding, along with ripple and planar laminations. In some areas silty gray shale grades into the lower formation but many areas yield a sharp erosional contact with sandstone over shale.</p> <p><b>N Shale and thin limestone.</b> Shale is dark gray, platy, fissile in places soft. It contains siderite bands and lenses and is calcareous in places. Limestone is composed of fossil packstones and wackestones sand and shale is also mixed with the limestone. Multicolor mudstone clasts composed of green, red, gray, and tan are also associated with a sandy limy matrix. The lower contact is gradational.</p> <p><b>O Limestone ranges from light gray oolitic grainstone to fossil grainstone/packstone laterally changing to fossil greenish gray fossil wackestone facies.</b> Oolites and crinoids are the most common allochems. Some of the packstones contain pink crinoid skeletal grain fragments and rip-up clasts of red and green shale. Pentremites sp., Archimedes sp., ramose bryozoans, and several species of brachiopods are commonly well preserved in the greenish calcareous shaly intervals of this unit. Sandy limestone is a common character in the lower part of this unit. The basal contact is gradational.</p> <p><b>P Sandstone, siltstone, shale and limestone.</b> The upper part is a gray silty shale that grades into a tan, thin bedded, fine grained quartz arenite. The sandstone shows primary sedimentary structures such as, thick and thin laminated sets and herringbone crossbedding. The sandstone also has a greenish tint from glauconite and greenish clay clasts. It is calcareous; contains ooids and fossil skeletal debris. Bioturbation is common. The limestone is a purple to gray, crossbedded, ooid/fossil grainstone. A variegated red and green claystone occurs below either the sandstone or limestone. The limestone is locally present. The lower part of this unit is composed of a greenish gray, silty shale with thin calcareous stringers. Trace fossils of Planolites isp., and Conostichus isp., are common.</p> <p><b>Q Limestone is a white to light gray oolitic/fossil grainstone.</b> Fossil packstones interfinger with darker fossil wackestones. Occasionally a thin light gray calcareous, fine grained quartz arenite occurs in the upper layers. The upper part is crossbedded with lighter gray limestones whereas, the lower part is composed of interbedded medium-dark gray cherty lime mudstones and wackestones. On rare occasions, trace amounts of fluorite can be found associated with dark gray chert nodules. This formation is characterized by karst topography. The basal contact is gradational and intertonguing with the limestone below.</p> <p><b>R Limestone is medium to brownish gray weathers to a light gray.</b> It is primarily composed of a thick lime mudstone having dolomitic lenses and bands of dark bluish gray to black chert nodules. Fossil wackestone and packstone facies are also present. Upward the limestone overall becomes lighter gray and packstones become more common, grading into the overlying Ste. Genevieve Limestone. Acrocarythus proliferus are silicified rugose corals that are abundant near the base of the St. Louis and are found near the top of the underlying unit. The lower contact is gradational and intertonguing.</p> <p><b>S Limestone is dominantly medium to dark gray and brownish gray, weathers to a dark gray, composed of fossil packstones and wackestones with occasional oolites in the upper part.</b> Fossil grains are usually abraded and rounded, crossbedded in places. Bedding is thick to medium. Dark gray chert nodules are not common. Light gray oolitic packstone and grainstone are common in the middle to lower part of this unit. Medium sized dolostone beds occur in the middle portion of this unit. Some fossil wackestone and lime mudstone facies are also present near the basal gradational contact.</p> <p><b>T Limestone is light gray, weathers tanish gray, dominantly composed of high angled crossbedded crinoidal debris in a crushed fenestrate bryozoan matrix.</b> Crinoidal grainstones are common in the upper part. These grainstones have a speckled appearance in a fine fossil grain matrix. Light gray ovoid chert nodules are occasionally seen. Only the upper 100 feet exposed in this quadrangle.</p>							

