George H. Ryan, Governor

Department of Natural Resources
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William W. Shilts. Chief

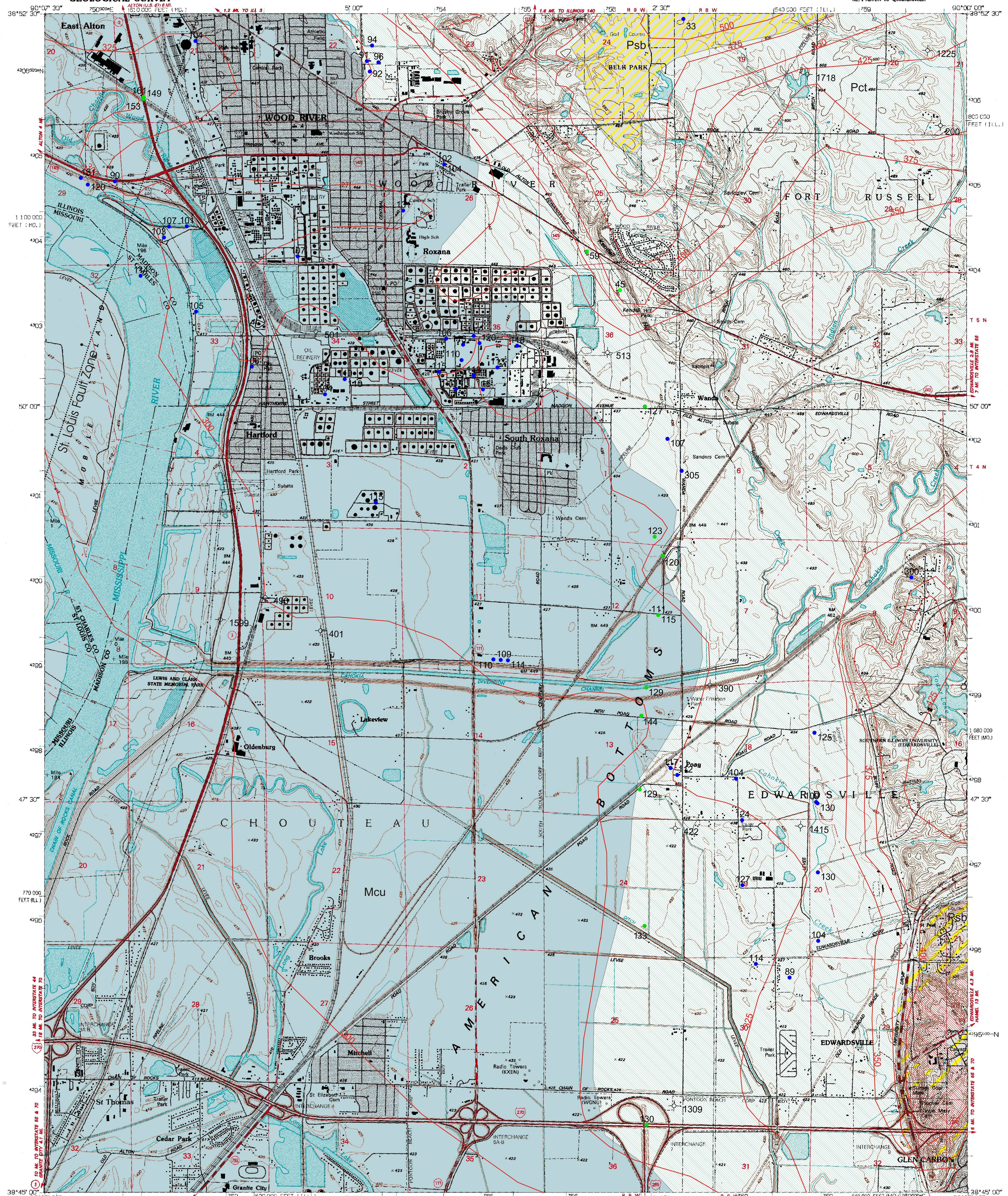
BEDROCK GEOLOGIC MAP

Wood River Quadrangle, Madison County, Illinois

F. Brett Denny and Joseph A. Devera

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

WOOD RIVER QUADRANGLE
ILLINOIS-MISSOURI
7.5 MINUTE SERIES (TOPOGRAPHIC)
SE/4 ALTON 15' QUADRANGLE



Produced by the United States Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1947-48 and planetable surveys 1947-48. Revised from aerial photographs taken 1988. Field checked 1993. Map edited 1994

Universal Transverse Mercator projection
10,000-foot grid ticks: Illinois coordinate system, west zone and Missouri coordinate system, east zone
1000-meter Universal Transverse Mercator grid ticks, zone 15, shown in blue
1927 North American Datum (NAD 27)

North American Datum of 1983 (NAD 83) is shown by dashed corner ticks. The values of the shift between NAD 27 and NAD 83 for 7.5-minute intersections are obtainable from National Geodetic Survey NADCON software

There may be private inholdings within the boundaries of the National or State reservations shown on this map

Gray tint indicates areas in which only landmark buildings are shown

UTM GRID AND 1994 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24000

CONTOUR INTERVAL 10 FEET
SUPPLEMENTARY CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

COMPLIES WITH U.S. GEOLOGICAL SURVEY STANDARDS FOR SPATIAL ACCURACY - CLASS 2

FOR SALE BY U.S. GEOLOGICAL SURVEY DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
AND ILLINOIS GEOLOGICAL SURVEY, CHAMPAIGN, ILLINOIS 61820
AND DIVISION OF GEOLOGY AND LAND SURVEY
MISSOURI DEPARTMENT OF NATURAL RESOURCES, ROLLA, MISSOURI 65401
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

QUADRANGLE LOCATION

ADJOINING 7.5' QUADRANGLE NAMES: 1 Alton, 2 Bethalto, 3 Prairietown, 4 Columbia Bottom, 5 Edwardsville, 6 Granite City, 7 Monks Mound, 8 Collinsville

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

WOOD RIVER, ILL.-MO.
SE/4 ALTON 15' QUADRANGLE
38090-G1-TF-024
1994
DMA 2961 I SE - SERIES V863

EXPLANATION

Quaternary deposits have been removed from map.

Graphic Column Units

Series	Symbol	Unit	System
Desmoinesian	Psb	Shelburn Formation	PENNSYLVANIAN
Desmoinesian	Pc	Carbondale Formation	PENNSYLVANIAN
Atokan	Pt	Tradewater Formation	PENNSYLVANIAN
Atokan	Pct	Carbondale and Tradewater Formations	PENNSYLVANIAN
		Unconformity	
Chesterian*	Mg	Golconda Formation	MISSISSIPPIAN
Chesterian*	Mcy	Cypress Formation	MISSISSIPPIAN
Chesterian*	Mpc	Paint Creek Formation	MISSISSIPPIAN
Chesterian*	Mr	Yankeetown Formation and Renault Formation	MISSISSIPPIAN
Chesterian*	Mav	Aux Vases Sandstone	MISSISSIPPIAN
Chesterian*	Msg	Ste. Genevieve Limestone	MISSISSIPPIAN
Chesterian*	Mcu	Chesterian undifferentiated	MISSISSIPPIAN
Valmeyeran	Msl	St. Louis Limestone	MISSISSIPPIAN
Valmeyeran	Ms	Salem Limestone	MISSISSIPPIAN
Valmeyeran	Mw	Warsaw Shale	MISSISSIPPIAN
Valmeyeran	Mbk	Burlington Keokuk Limestone	MISSISSIPPIAN
Valmeyeran	Mfg	Fern Glen and Meppen Formation	MISSISSIPPIAN

* Chesterian Boundary based on Maples and Water

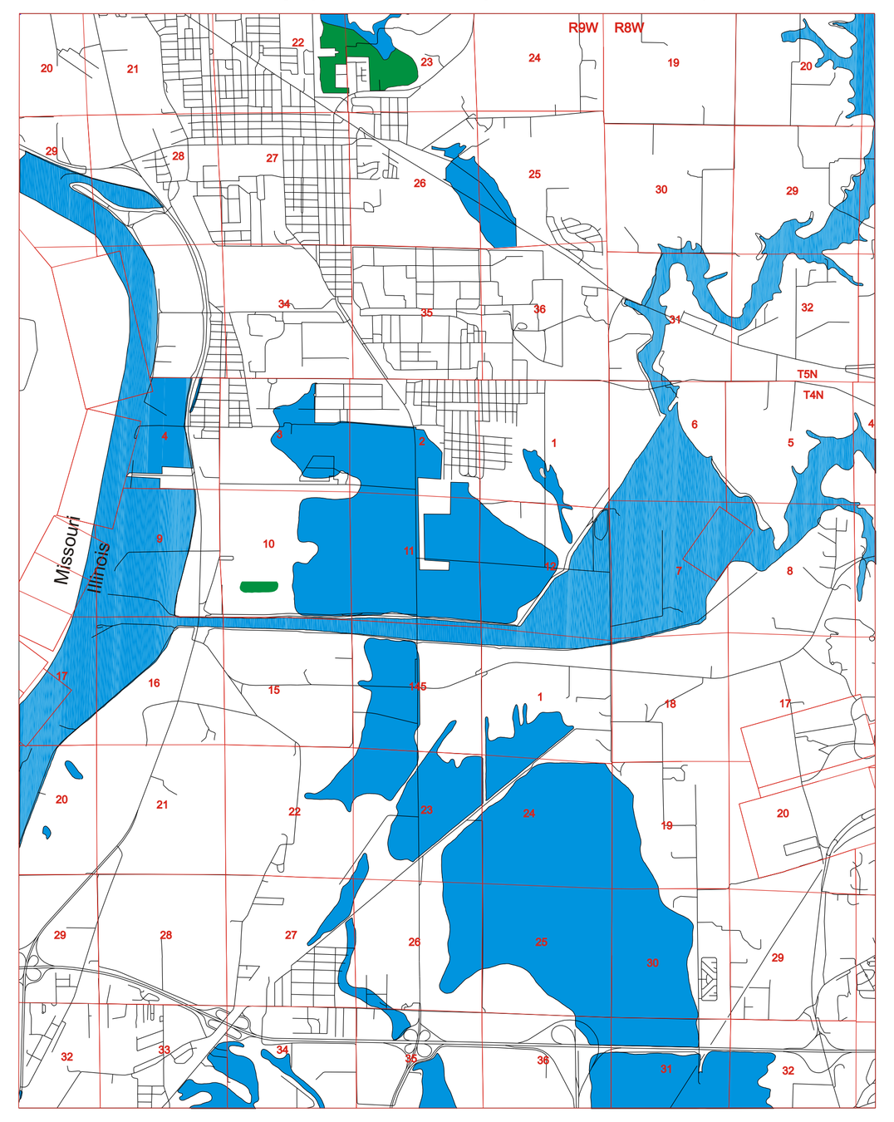
LINE SYMBOLS: Dotted where concealed

- Contact
- Fault, ball and bar on down-thrown side
- 400 Bedrock topography; CI 25 feet
- Coal mined out areas

DRILL HOLES: Subsurface data used to construct map. Number indicates depth of boring

- 90 water well
- 49 stratigraphic boring
- 1605 oil test hole (dry)

Flood Zone map for the Illinois portion of the Wood River Quad.
adapted from Illinois Department of Natural Resources
Illinois Geographic Information System, Volume 1, 1996)



100 year flood zone
500 year flood zone

N
Scale 1 inch = 8000 ft

SYSTEM	SERIES	Group or Subgroup	FORMATION	Member or Bed	Graphic Column	THICKNESS (feet)	DESCRIPTION UNIT
PENNSYLVANIAN	DESMOINESIAN		Shelburn	Bankston Fork Ls; Anna Shale/ Brereton Ls		0-80 (17-30; 6-9)	A
PENNSYLVANIAN	DESMOINESIAN		Carbondale	Herrin Coal; Springfield?; Colchester Coal		0-110 (5-6; 1.5)	B
PENNSYLVANIAN	Atokan		Tradewater			0-60	C
Mississippian	CHESTERIAN		Golconda	Fraileys Shale; Beech Creek		60-100 (35)	D
Mississippian	CHESTERIAN		Cypress			25-30	E
Mississippian	CHESTERIAN		Paint Creek			40	F
Mississippian	CHESTERIAN		Yankeetown and Renault			40-50	G
Mississippian	CHESTERIAN		Aux Vases			20-40	H
Mississippian	CHESTERIAN		St. Genevieve Limestone			0-80	I
Mississippian	Valmeyeran	Mammoth Cave Megagroup	St. Louis Limestone			200-270	J
Mississippian	Valmeyeran	Mammoth Cave Megagroup	Salem Limestone			110-130	K
Mississippian	Valmeyeran	Mammoth Cave Megagroup	Warsaw Shale			80-90	L
Mississippian	Valmeyeran	Mammoth Cave Megagroup	Burlington-Keokuk Limestone			175-200	M
Mississippian	Kinderhookian		Fern Glen Formation and Meppen Limestone			75-87	N
Mississippian	Kinderhookian	North Hill	Chouteau Limestone			18-32	O
Devonian	Kinderhookian	New Albany	New Albany Shale			20-40	P
Devonian	Middle		Cedar Valley Limestone			0-10	Q
Silurian	Niagaran		Joliet Formation			175-250	R
Silurian	Alexandrian		Kankakee Formation				
Silurian	Alexandrian		Edgewood Limestone				

Shelburn A. *Shales, limestones, and siltstones*. Shales are soft blue-gray to green-gray, black, and red and may be variegated. A red shale is present below the uppermost limestone in parts of the quadrangle. Limestones within this unit are brownish gray to dark gray. Silty, argillaceous and fossiliferous lime mudstones and fossil wackestones are locally present. The shale is soft and is variegated with a bluish green shale in places. The basal limestone is a dark gray, argillaceous and fossiliferous wackestone. It exhibits nodular bedding and is locally replaced by a black, fissile, fossiliferous shale. The basal contact is sharp with the underlying unit.

Carbondale Formation B. *Shale, siltstone, sandstone, limestone, and coal*. Siltstones are green-gray variegated, red and dark gray. Pyrite is common along with carbon traces and mica. Coal is well developed in a number of horizons within this unit.. All of the coals are rooted, vitreous and alternate bright to dull-banded. The unit is dominated by shales with siltstone intervals. The shale is dark gray carbonaceous and pyritic. Shaly limestones occur within the thick interval are composed of thin discontinuous, dark gray beds. The base of the unit is marked by a two foot thick rooted coal bed. The unit is conformable with the underlying formation.

Tradewater Formation C. *Sandstone and shale*. Sandstones are composed of well sorted, micaceous quartz arenites. Medium gray to dark gray shales are interbedded with the sandstone beds. Coals are thin and discontinuous. The shale is also brown and gray mottled, soft and plastic with pyrite. The shale or claystone is the dominant lithology and commonly shows rooting. This unit is unconformable with the limestones below.

Golconda D. *Limestone and shale*. The upper carbonate beds are light gray, oolitic grainstones and dark to medium gray fossil packstones. A red shale bed occurs below the upper carbonate where it is not eroded. Shale is the dominant lithology within this unit. It is typically dark gray and has silty interbeds. The shale is weakly fissile or weathers in platlets. A lower silty dolomitic thin limestone has a conformably sharp contact with the underlying sandstone.

Cypress E. *Sandstone*. This unit is composed of a white to light gray fine to medium grained, quartz arenite that is shaly. The shale is a minor component but occurs as wavy or flaser bedding in the upper part of the formation. Occasionally thin carbonaceous laminae to impure coals are found in the upper part as well. The mid-to-lower portion of the unit is composed of thick to medium bedded and cross bedded sandstone beds.

Paint Creek Group F. *Limestone, shale and sandstone*. This unit contains highly variable limestones and shales in the upper part. The limestones are light gray fossiliferous grainstones and packstones that locally contain oolitic facies and red stained fossil echinoderm fragments. The limestone beds are interbedded with green and red claystones and greenish gray shales. Sandstone beds are a minor lithologic component. The sandstone is a light gray, fine grained, quartz arenite. Most of the beds pinch out laterally and can be traced only locally. The thick shale is calcareous and also contains a thin red claystone bed. The basal limestone has fossil packstones and argillaceous fossil wackestones. The contact with the unit below is sharp but conformable.

Yankeetown and Renault G. *Limestone, shale and sandstone*. Yankeetown is composed of calcareous sandstone and variegated shale and cherts. The lower Renault limestone is dominately limestone with some variegated shales, sandy limestones, and commonly contains a conglomerate near the base.

Aux Vases H. *Sandstone*. The sandstone is a white, fine grained quartz arenite. It contains greenish shale rip-up clasts, sand-filled dessication marks and ripple marks in the upper part. Locally, the sandstone grades into calcareous sandstone and limey sandstone with abraded bioclasts. The lower portion is dominated by sandstone but also contains occasional shale laminae. The lower contact is unconformable.

Ste Genevieve Limestone I. *Limestone, dolomite, chert, and siltstone*. Limestones are tan-brown to light gray and contain laminated tidallites, wackestones to grainstones composed of rounded and broken fossils. Bedding styles range from tabular to undulatory. Cross-beds are present in grainstone facies. The unit has a dirty gray-brown grainy appearance. The diagnostic character of this formation is alternating beds of laminated, fine-grained (calcisiltite) facies with coarse bioclastic, peloidal, to oolitic grains that depict shoaling-upward cycles. Dolomites are brown and have moldic porosity. Cherts are light gray and may be bioclastic and occur between grainstones and laminated beds as elliptical nodules. Siltstones are brown to light gray and thinly bedded, typically less than 1 inch thick. Oolitic beds are rare. Fossils include spiriferid and productid brachiopods, rugose corals, conularids, and crinoids. Ramose, fenestrate, encrusting, and bifoliate bryozoans are also present. The contact with the underlying unit is gradational.

St Louis Limestone J. *Limestone, siltstone, shale, minor gypsum*. Light gray to medium gray dense lime-mudstone with fossil wackestones. Part of the unit contains quartz sand and subangular limestone breccia clasts. Oolitic grainstones, greenish oncolitic packstones, peloidal grainstones, stromatolitic boundstones, and carbonate intraclastic conglomerates make up a highly variable mix of microfacies. Beds of gypsum and anhydrite up to three feet thick are reported in some of the wells. Acrocyathus floriformis, a colonial coral, occurs in the upper part of the basal portion of this formation. A. floriformis is wide spread near the base of the unit. Yellowish dolomite beds are also present in this formation. Gray to dark gray chert occurs as nodules and stringers. Siltstones are calcareous and greenish. The shales are greenish gray and reddish brown, calcareous, soft, and non-fissile.

Salem Limestone K. *Limestone, dolomite, mudstone, and siltstone.* Medium-gray, crinoidal, bryozoan wackestones and packstones that contain a few brachiopods. In the lime-mudstone beds Archimedes sp. are preserved with coil and fronds attached. dolomite beds are gray-brown, thinly bedded, and contain chlorite-rich shale clasts with some small quartz geodes. The upper half of the unit is dominated by shaly limestone and dolomite beds. The lower half contains bluish gray mudstones up to 20 feet thick interbedded with thin lime-mudstones. Conularids and gastropods occur in the shaly portion of this unit. Siltstones are calcareous and fossiliferous and thinly bedded in the lower part. Quartz geodes are common in the shaly sequences. The basal contact is sharp and conformable with the underlying carbonate beds.

Warsaw L. *Limestone, dolomite, siltstone, and shale.* Medium-gray, crinoidal, bryozoan wackestones and packstones that contain a few brachiopods. In the lime-mudstone beds Archimedes sp. are preserved with coil and fronds attached. dolomite beds are gray-brown, thinly bedded, and contain chlorite-rich shale clasts with some small quartz geodes. The upper half of the unit is dominated by shaly limestone and dolomite beds. The lower half contains bluish gray mudstones up to 20 feet thick interbedded with thin lime-mudstones. Conularids and gastropods occur in the shaly portion of this unit. Siltstones are calcareous and fossiliferous and thinly bedded in the lower part. Quartz geodes are common in the shaly sequences.

Burlington and Keokuk Limestones M. *Limestone and minor shale*. Light gray to white crinoidal grainstones dominate and are interbedded with nodular and bedded light gray to black cherts. The cherts are white when weathered, and some have bioclasts of crinoids and brachiopods. The unit is characterized by alternating layers of light gray to white crinoidal grainstones with beds of argillaceous and sandy limestones. This cyclic sequence of crinoidal limestone over sandy cross-bedded limestone is common in the lower part of the unit. Large spirifers are common along with crinoids, bryozoans, and corals. Siltstones are dark gray with a greenish tint and are calcareous. Calcite and quartz filled vugs from 0.5 to 2 inches in diameter have been described within this unit. The unit is conformable with the underlying unit.

Fern Glen and Meppen Formations N. *Siltstone, limestone, and shale*. Green and red shaly calcareous siltstones are diagnostic of the unit. The cherts are greenish gray, nodular, and fossiliferous. The limestone is greenish gray, thin-bedded, and argillaceous and cherty containing small calcite geodes and crinoid stems. The basal part is grades into a micritic and sometimes dolomitic limestone.

Chouteau Formation O. *Limestone and siltstone*. Light brown to greenish gray irregular to wavy, thin beds of lime mudstone with thin beds of silty dolomite. Calcite geodes with diameters from 0.5 to 2 inches are common. Some of the calcite geodes are replaced with quartz. Chert nodules are locally abundant and typically are dark gray with light gray rims. The unit appears to be gradational with the underlying unit.

New Albany Formation P. *Shale, and siltstone*. The shales are black to dark gray fissile and may be carbonaceous. The only common fossil is an algal test called "*Tasmanites*". The unit t commonly contains disseminated pyrite near the base.

Cedar Valley Q . *Limestone and sandstone*. Thin and discontinuous fossil packstone with quartz sand. The lowest unit is a brownish gray sandstone overlain by fossiliferous and sometimes argillaceous limestone. It is gray where fresh and weathers to a brown tint and contains *Murcrospirifer* sp., and *Paraspirifer* sp., brachiopods, rugose corals, and platycerid gastropods. The sandy limestone is unconformable with the underlying unit.

Silurian R. *Limestone and dolomite with minor shale partings*. The dolomite is light gray to yellowish brown. The upper part of the dolomite may truncated by overlying strata. Shales are greenish gray to red and are silty. Bedding planes are flat to wavy in places and beds are typically several feet thick but can be thinly bedded. Chert occurs as nodules sporadically throughout the unit. Crinoids and the trilobites *Sthenarocalymene celebra* and cheirurid trilobites may be found.

Introduction

The Wood River 7.5' Quadrangle is located at the northern extent of the American Bottoms northeast of St. Louis, Missouri on the Illinois side of the Mississippi River. It is dominantly composed of Mississippi River alluvium, meander scars, and sand dunes. The eastern-most border contains low-lying bluffs composed of Pennsylvanian bedrock that are heavily mantled in loess. The bedrock has been eroded in the northeastern corner of the quadrangle along Indian Creek and at Cahokia Creek by pre-glacial paleo-valley development. Seasonal flooding is a hazard in portions of the quadrangle which are not protected by levees (see map)

The bedrock is poorly exposed but generally strikes north-south and dips 2° to the east. The regional dip was taken from a structure contour of the Herrin Coal that was mined in the area. Deformation in the bedrock was projected into the northwestern corner of the quadrangle by Harrison, 1997. Harrison suggests that the St. Louis Fault Zone is a right-lateral, strike-slip fault with strata offset down to the western side of the fault. Frank, 1948 stated that the St. Louis Fault was a normal fault with dip slip down to the west.

Much of the northern portion of the quadrangle in the American Bottoms has been changed by large oil refineries. This area has deep wells into the groundwater which creates a large cone-of -depression in this part of the quadrangle.

Stratigraphy

The deepest unit drilled in the quadrangle was the Plattin Formation (Ordovician) at 1,599 feet below the surface, in the West Lake Quarry Company (WLQC) No. 1 well, NW 1/4, SE 1/4 of Section 9 T.4N., R.9W. Subcropping below the Pleistocene and Holocene alluvium are rocks of Chesterian, upper Mississippian age that are unconformably overlain by Pennsylvanian strata.

Chesterian units subcrop from the Ste. Genevieve Limestone and Aux Vases Sandstone through Paint Creek Formation. Demoinsian units include the Tradewater, Carbondale, and Shelburn Formations. Chesterian units subcrop below the sands and gravels of the Pleistocene and Holocene in the Mississippi River alluvium whereas the Pennsylvanian units subcrop below the loesses and glacial tills along and above the bluff line.

Thick limestones of the Valmeyeran Series occur conformably below the Chesterian units include from oldest to youngest Fern Glen, Burlington-Keokuk, Warsaw, Salem and St. Louis Formations. The Kinderhookian Series is represented by the Hannibal Shale and Chouteau Limestone which is seventy nine feet thick in the WLQC well. The Devonian is thinned over the Sparta Shelf an Ozark basement high. Twenty seven feet of New Albany Shale and forty two feet of Middle Devonian limestone occurs at the WLQC well. The Silurian System is 185 feet thick in the quadrangle and unconformably overlies the Maquoketa Shale (Ordovician). The Maquoketa is 157 feet thick and overlies the Kimmswick Limestone. The oldest unit penetrated in the WLQC well was the Plattin Limestone.

The only bedrock exposures in the Wood River Quadrangle, occur near Rock Hill Road on the bluff west of the city of Wood River, Illinois. The exposure is composed of silisiclastics of the Tradewater Formation (Middle Pennsylvanian). This unit is dominated by medium grained, micaceous, quartz arenites interbedded with dark gray shales.

Structural Geology

The St. Louis Fault Zone was originally named by Frank (1948). Frank, was the first to discuss structural control of the Mississippi River in this area. This is significant because the river cuts across the topographic high known as the east flank of the Ozark Dome and the western portion of the Sparta Shelf. The structure is better developed south of the study area but Harrison (1997), projects the fault zone into the northwestern part of the Wood River Quadrangle. Harrison, (1997) also suggests that the two small earthquakes that registered 3.1 and 2.4 mq occurred along the St. Louis Fault Zone. This was the only indication of structure in the quadrangle.

Economic Geology

Coal

Coal mining was restricted the southeastern corner of the study area because most of the Carbondale Formation (the major coal producing formation in the area) subcrops along the eastern part of the Mississippi River bottoms.

There were two active Coal mines, in the Wood River Quadrangle, the Sunset Coal Mine and the Weiland & Miller Coal Company. Both coal mines were shaft type mines and were located on the Mississippi River bluff, north of Glen Carbon. The Herrin Coal was the target for five to six foot thick bituminous coal. Currently, there is no coal mining in the area.

Oil and Gas

Ten oil test holes were drilled in the study area all were dry, abandoned and plugged. Units tested for oil varied from the Salem Limestone to Silurian Dolomite and Trenton (Kimmswick Limestone). More drilling is needed to test the area for oil and gas.

Sand and Gravel

Sand was mined at the mouth of Indian Creek which is within a pre-glacial valley coming into the quadrangle from the northeast. The large sandpit is located in the southwest quarter of Section 31, T.5N., R.8 W., north of the Edwardsville Road at Wanda, IL. The sandpit is currently abandoned.

A large area near Poag, Illinois contains Pleistocene sand dunes. These dunes run parallel to the Mississippi River bluffs. There is potential for developing sand quarries in this area.

References

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Harrison, R.W., 1997, Bedrock Geologic Map of the St. Louis 30'X60' Quadrangle Missouri and Illinois, U.S. Geological Survey map I-2533.

Illinois Geographic Information System (Volume 1), 1996, Illinois Department of Natural Resource, Madison County Flood Zone Maps; original data set from Federal Emergency Management Agency (FEMA) National Flood Insurance Program (FIRM) and Flood Hazard Boundary maps.

This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program.

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Released by the authority of the State of Illinois: 2001

Acknowledgments
This map is one of a series prepared for the USGS 7.5-minute Wood River Quadrangle (Illinois portion) by a multidisciplinary team of geologists from the Illinois State Geological Survey (ISGS). This series will characterize surface landscapes and surface, bedrock, and engineering geology and will delineate coal, and sand and gravel resources. This map was significantly improved through review, suggestions, and comments by the following individuals: