Illinois Preliminary Geologic Map
IPGM New Athens West-G

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Geology of New Athens West Quadrangle

Monroe and St. Clair Counties, Illinois

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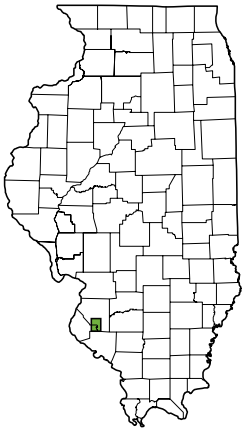
Illinois State Geological Survey

2004



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Location and Surficial Geology

The New Athens West Quadrangle is located about 30 miles southeast of St. Louis, Missouri. The lowest point of elevation on the quadrangle is about 370 feet below mean sea level. It occurs in the southeastern corner of the map on the banks of the Kaskaskia River. The study area is relatively flat with a total relief of 140 feet. The highest elevation is 510 feet above sea level and occurs on a north, northeast trending ridge along the eastern half of the quadrangle. The ridge parallels the Kaskaskia River and is composed of Illinois Episode outwash sands and gravels.

This prominent geomorphic feature occurs along the west bank of the Kaskaskia River on the New Athens West Quadrangle. The feature has about 100 feet of relief. At the southwestern corner of the quadrangle the ridge is dissected by Richland Creek. Exposed at the base is a gray diamicton of the Glasford Formation, sand and gravel of the Pearl Formation and Hagerstown Member, capped by silts of the Peoria Formation. This geomorphic feature is interpreted as being a dissected terrace of the proto-Kaskaskia drainage, an Illinois Episode gravel train deposit from glacial outwash. The only other geomorphic features to note are the Kaskaskia River and the sub-parallel Richland Creek drainage. The Kaskaskia River appears to follow the strike of the bedrock, which generally is north-south.

Later Wisconsin Episode deposits include: silty, dark gray, massive, clay of the Equality Formation and underlying sands and gravels of the Henry Formation (not mapped). The Equality is overlain by alluvium of the Cahokia Formation. The Peoria and Roxana Silts were not mapped so that details of bedrock in upland areas could be shown. The Henry Formation is interpreted as alluvial lag gravels and sands that originated from the underlying diamicton. This is overlain by the Equality Formation, which is interpreted as fine sediment deposited in slackwater lakes from high melt-water discharges and sediment loads of Wisconsinan glaciation.

Bedrock Geology

Bedrock is poorly exposed on the eastern half of the quadrangle due to thick sand and gravel deposits of the Pearl Formation and underlying glacial diamicton. Bedrock exposures are more common in the drainages of the western half of the quadrangle. The oldest formation exposed in the quadrangle is the Okaw (equivalent to Golconda through the Glen Dean Limestones, Chesterian Series, Hombergian Stage) and the upper Okaw (equivalent to Tar Springs through Waltersburg, Chesterian Series, early Elviran Stage). The youngest bedrock exposed in the study area is the lower middle Pennsylvanian sandstone unit, the Tradewater Formation (Desmoinesian). Regional dips of bedrock range from 2 to 3 degrees easterly. Areas of thin drift and deflated loess occur in an area north of Hecker, Illinois. Here drift ranges from only 3 to 5 feet thick. This area was quarried for limestone.

The Chesterian Series in the New Athens West Quadrangle is dominantly composed of gray and variegated green and red shales. Limestones are also present and are composed

of fossil packstones, grainstones and oolitic grainstones. One12-foot thick crossbedded, oolite bed was mapped in the Haney Member of the Golconda Formation. This unit is equivalent to the informal bed called the Marigold oolite (Sutton, 1934). Chesterian sandstone outcrops are rare. Sandstones are green to tan, fine-grained, well sorted, thin-bedded quartzarenites. The absence of Chesterian sandstone formations (i.e. Bethel and Tar Springs) and thin Cypress Sandstone attest to a probable muddy tidal flat that existed in the area during early to mid-Chesterian time.

The Pennsylvanian System contains thin one- to two-foot thick coals within the upper Tradewater Formation in the northern and eastern portion of the New Athens West Quadrangle. The coals are interbedded with dark gray shales and gray sandstones. The Pennsylvanian rocks are unconformable with the underlying Mississippian units.

Economic Geology

Limestone

Limestone was quarried in two areas. The first is located along a small tributary to Prairie du Long Creek in the southwestern-most corner of the quadrangle. The quarry is now abandoned. The second area was quarried one mile northeast of Hecker (T. 2 S., R. 8 W., Sections 28 and 27). This series of four quarries were known to fossil collectors to produce the “Hecker acorns”, which are large blastoids of the genus *Pentremites*. Limestone was quarried for gravel for road construction, and for agricultural lime that was used to neutralize local acidic soils. The quarry highwalls reveal a 12-foot thick stratigraphic sequence with a crossbedded oolite unit and grainstone beds. The oolitic grainstone is possibly the “Marigold” oolite of Sutton (1934). The quarries also contain shaly packstone and wackestone facies which probably added problems to production quality.

Sandstone

A small sandstone quarry located in the northwestern-most corner of the quadrangle was developed for a local housing development (T. 2 S., R. 8 W., Section 9). Quarried for flagstone and landscaping, the fine-grained, well sorted, and indurated quartzarenite is well suited for decorative stone. Bedrock is shallow in this northwestern area and was discovered when foundations were put into the new development. The sandstone is composed of the basal part of the Tradewater Formation, where bedding was laminated by tidal action.

Sand and Gravel

No sand and gravel has been quarried in the quadrangle. Areas of potential sand and gravel, however, occur in the northeast-southwest trending Hagerstown ridge mapped on the east half of the quadrangle. Layers of coarse gravels and fine- to medium-grained sands, and in some cases 8 to12 feet of clean brown quartz sand, occur in the drift ridge.

Oil and Gas

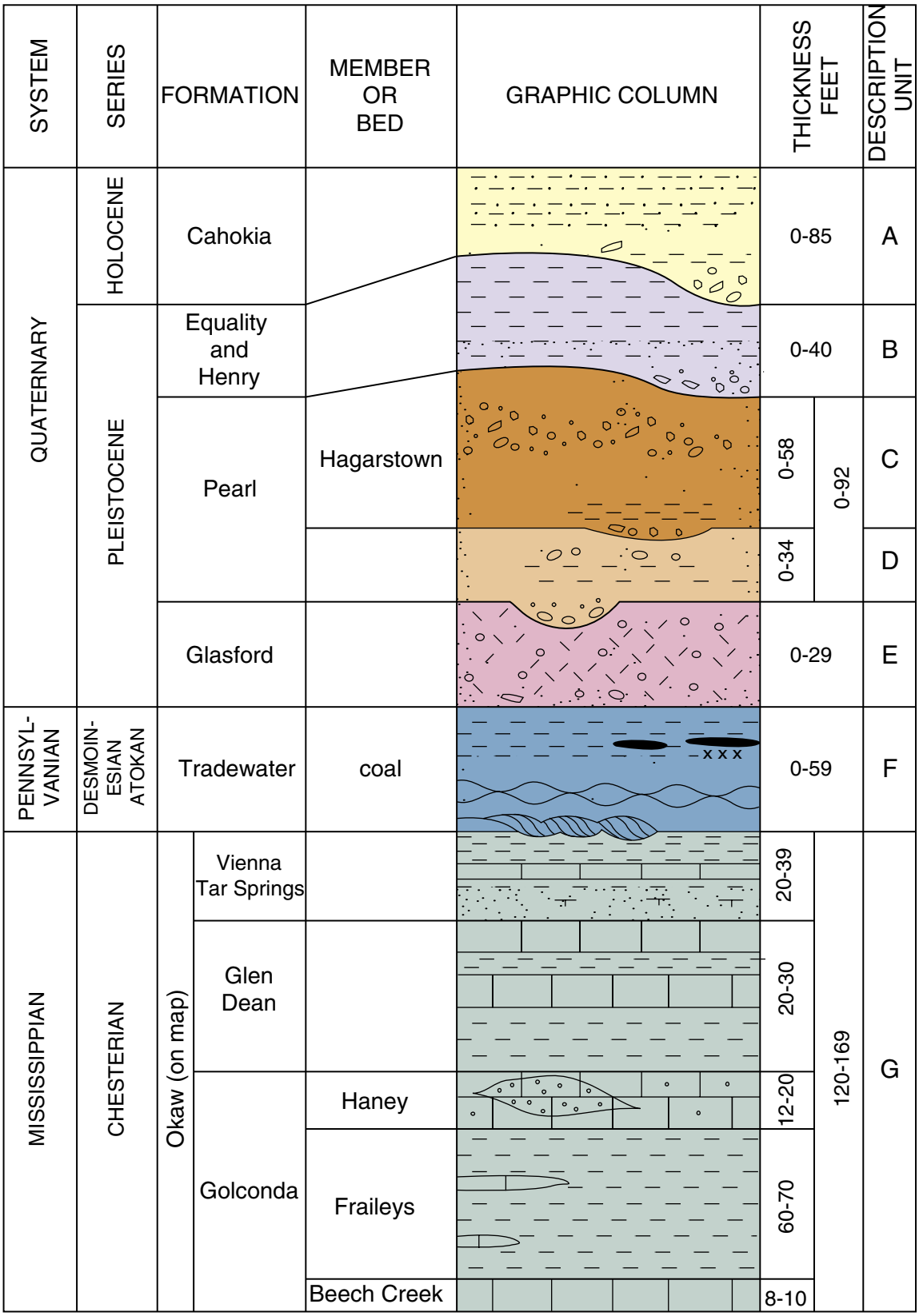
The southern edge of a gas field occurs in the northeastern corner of the New Athens West Quadrangle. This field continues north into the Freeburg Quadrangle. Numerous gas wells were drilled in the late 1930s to the 1960s. The highest initial production of gas in the study area was from a well drilled by McCandlish & Gwaltney Drilling Company on the John Lanter and Walter Schikedanz farm. It produced 4,550,000 cubic feet of gas per day. Production from all gas wells in the area is from the Cypress Sandstone. Depth to the Cypress in this area ranges from 340 to 370 feet below the surface.

Many of the once-productive gas wells were converted to gas storage wells from 1959 to 1975 by Illinois Power Company. The company also drilled and cored a large number of structural tests of the Cypress Sandstone in the northeastern corner of the quadrangle. The Cypress Sandstone is probably a stratigraphic “pinch-out” trap in the northeastern corner of the quadrangle. The formation thins into a shale in the western half of the study area. Other areas along strike (a north-south trend) may contain oil and gas within the Cypress Sandstone.

Oil and gas tests (about twenty-five) in other areas of the quadrangle were all dry and abandoned. However, shows of oil were found in two wells in Section 20 and 29 in T. 2 S., R. 7 W. Twenty of these wells were drilled to the Trenton (Ordovician, Kimmswick Formation). The deepest of these wells was the Smithton Hunting and Fishing Club # 1, drilled by Carline Wilson Company to a depth of 1907 feet below the surface (T. 3 S., R. 7 W., Section 6).

Reference

Sutton, A. H., 1934, Stratigraphy of the Okaw in southwestern Illinois: Journal of Geology, v. 42, p. 621-629.


SYSTEM
SERIES
FORMATION
MEMBER OR BED
GRAPHIC COLUMN
THICKNESS FEET
DESCRIPTION UNIT
QUATERNARY
HOLOCENE
PLEISTOCENE
Cahokia
Equality and Henry
Pearl
Glasford
Hagarstown
0-85
0-40
0-58
0-34
0-92
A
B
C
D
E
PENNSYL-VANIAN
DESMOIN-ESIAN ATOKAN
Tradewater
coal
x x x
0-59
F
MISSISSIPPIAN
CHESTERIAN
Okaw (on map)
Vienna Tar Springs
Glen Dean
Golconda
Haney
Fraileys
Beech Creek
20-39
20-30
12-20
60-70
8-10
120-169
G

A. **Clay with sand and gravel**. Silt loam, gray-brown to gray with sand and minor amounts of gravel mainly confined to stream valleys. Alluvium mainly clay and silt from eroded loess and Pleistocene lake deposits. The sand and gravel is derived from eroded diamicton with some local bedrock clasts and erratics.

B. **Clay and silt**. Silty clay, dark gray, massive in places, and laminated in others and contains carbonaceous plant debris. Forms terraces at about 400 feet above sea level. Eroded by unit A.

C. **Sand and gravel**. Sand, light tan, fine to medium grained, well sorted, and rounded quartz grains with minor amounts of mafic minerals. Occurs in alternating layers with gravel. Gravel is poorly sorted with sand and small amounts of silt and clay. The gravel contains rounded to sub-rounded igneous, metamorphic, and sedimentary clasts that vary in size from granule to boulder. The sand and gravel occur in a large elongate northeast-southwest trending ridge.

D. **Clay, sand, gravel, and silt**. Similar to unit C, but having more clay and silt. Tan to gray clays with quartz sand, silt, and gravel. Differs from unit C by formation as blanket layers rather than elongate ridges.

E. **Clay, silt, with minor sand and gravel**. Yellow-brown to gray, mostly silt loam diamicton with minor sand and silt beds. Shale, chert, and limestone pebbles are common along with some rounded igneous glacial erratics. Upper part is more clay rich and yellow, whereas the lower part is commonly gray and calcareous. This unit is unconformable with the underlying sandstone.

F. **Sandstone, siltstone, shale, and coal**. Sandstone is tan to brown, contains medium grained, quartzarenite to a sublitharenite. The sandstone is well sorted, subrounded, and has mica and lithic fragments. Bedding has primary sedimentary structures like ripple marks, cross bedding, and load structures. Fossils include plant remains mainly as plant fossil impressions. Siltstones are tan, gray and greenish, thin laminated beds are common and interbedded with gray shales. Coal occurs in the northern part of the study area and is thinly interbedded with gray claystone or shale. The thickest coal in the quadrangle is ranges up to about 2 feet. The basal sandstone is unconformable with the underlying unit.

G. **Limestone, shale, and sandstone**. Dark to medium gray, lime wackestones, packstones and grainstones commonly containing fossil invertebrates and oolites dominate the limestone lithologies in the lower half of the unit. The shale is mainly gray to dark gray, green and red, poorly fossiliferous, massive to platy, and occurs throughout the formation. The shale also contains thin limestone beds and lenses. The most common fossils found in the shaly limestones are pelmatozoan fragments, the bryozoan *Archimedes*, and the blastoid *Pentremites*. A 12-foot thick, cross bedded oolitic bed occurs in the middle part of this unit. Limestones in the upper part of the unit are composed of lime mudstones to wackestones that contain productid brachiopods, pelmatozoan, and brown chert

nodules. The sandstone is tan to light gray and made-up of fine grained, well sorted quartzarenite. The sandstone is calcareous in places and is thin to medium bedded.