Illinois Preliminary Geologic Map
IPGM Red Bud-G

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Geology of Red Bud Quadrangle

Randolph, Monroe and St. Clair Counties, Illinois

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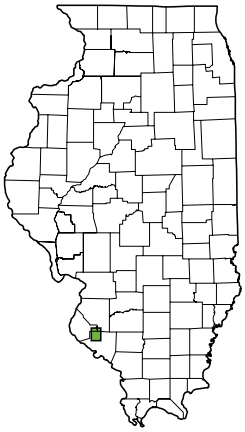
Illinois State Geological Survey

2004



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Location and Surficial Geology

The Red Bud Quadrangle is located about 30 miles southeast of St. Louis, Missouri. The lowest point of elevation on the quadrangle occurs in the southeastern corner, in the Kaskaskia River and is about 365 feet below mean sea level. The study area is relatively flat with a total relief of 145 feet. The highest point of elevation is 510 feet above sea level and occurs on a north-south ridge along the eastern side of the quadrangle. The ridge parallels the Kaskaskia River and is composed of Illinois Episode sands and gravels.

A prominent geomorphic feature runs north-south as a ridge east of the center line on the Red Bud Quadrangle. This feature has about 70 to 80 feet of relief. At the north central end 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 feature to note is the Kaskaskia River. The Kaskaskia River appears to follow the strike of the bedrock, which generally is north-south. Regional dips of bedrock range from 2 to 3 degrees easterly.

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 till. 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. However, in the southeastern corner of the quadrangle there are bedrock exposures of limestone that reach 10 to 20 foot in thickness on the east bank of the Kaskaskia River. Bedrock exposures are more common in the drainages of the western half of the quadrangle. The oldest formation exposed in the quadrangle is the Ridenhower Formation and overlying Cypress Sandstone (Chesterian Series, Gasperian Stage) near Ruma and in the western portion of Horse Creek. Above the Ridenhower/Cypress are the lower 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). It occurs in the town of Red Bud and in creeks within the northwestern corner of the quadrangle. The Pennsylvanian sandstones unconformably overlie the Chesterian carbonate rocks.

The Chesterian Series in the Red Bud 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. One 12-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. They have been only seen in Horse Creek north of Ruma and in creeks east of the Kaskaskia River.

Sandstones are green to tan, fine-grained, well sorted, thin bedded quartz arenites. The absence of Chesterian sandstone formations (i.e. Bethel and Tar Springs) and thin Cypress Sandstone attest to a probable mud-tidal flat that existed in the area during early to mid-Chesterian time.

Economic Geology

Limestone. Limestone was quarried in a small tributary to Horse Creek T. 4 S., R. 8 W., Section 27. The quarry is now abandoned. It was quarried for agricultural lime, a calcium-rich product used to neutralize local acidic soils. The quarry is composed of a crossbedded oolite bed and grainstone sequence that has a 12-foot thick exposure in the wall of the quarry. The oolitic grainstone is possibly the "Marigold" oolite bed of Sutton, (1934). Another potential area for limestone lies about one mile northeast of Red Bud. Here overburden is thin and ranges from approximately 2-20 feet in thickness. The bedrock in this area is composed of oolitic grainstone beds similar to the aforementioned quarry.

Sand and Gravel. No sand and gravel has been quarried in the quadrangle. However, areas of potential sand and gravel occur in the north-south Hagerstown ridge mapped on the east half of the Red Bud Quadrangle. Layers of coarse gravels and fine to medium-grained sands, in some cases 8 feet of clean brown quartz sand, occur in the drift ridge.

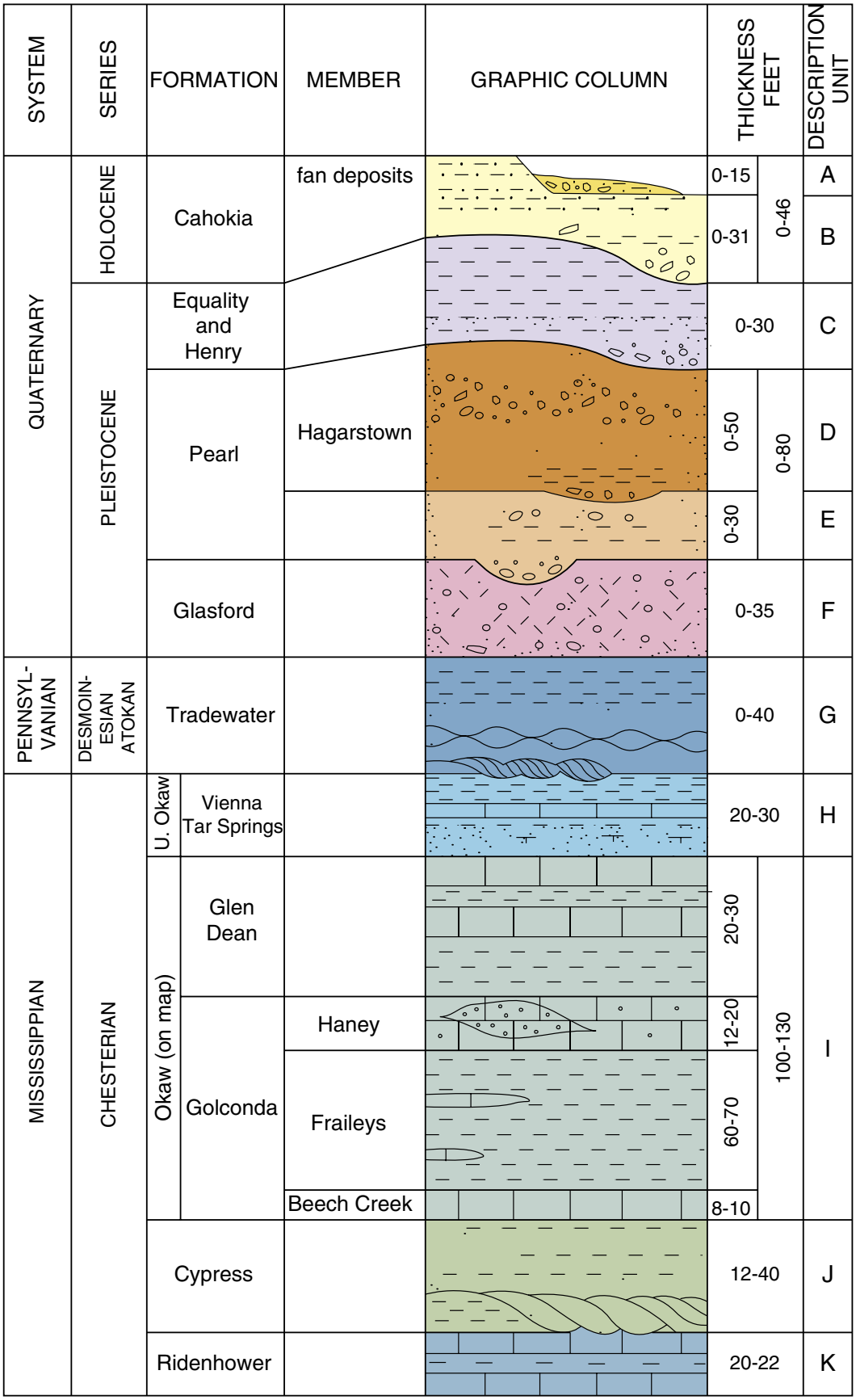
Oil and Gas. Thirty five oil and gas tests have been drilled in the Red Bud Quadrangle. The deepest test, the Ed C. Rust #2, had a total depth of 2,413 feet and stopped in the Joachim Dolomite (Ordovician). It had an initial production of 25,000 cubic feet of gas reported from the Cypress Sandstone at 230 to 240 feet below the surface. Numerous other gas wells were reported from Section 33, T. 3 S., R. 7 W., including the Weiss # 1, with initial production of 500,000 cubic feet of gas and the Ed C. Rust # 1, with initial production of 2,000,000 cubic feet of gas, all from the Cypress Sandstone. Oil shows are also associated with the gas wells like the Sommer # 1 well, which had a show of oil from the Cypress with an estimated 44,500 cubic feet of gas per day.

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 in other areas of the quadrangle were all dry and abandoned. However, shows of oil were found in two wells in Section 19, T. 4 S., R. 7 W., and a show of gas in Section 6, T.4 S., R. 7 W.

Reference

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


SYSTEM
SERIES
FORMATION
MEMBER
GRAPHIC COLUMN
THICKNESS FEET
DESCRIPTION UNIT
QUATERNARY
HOLOCENE
PLEISTOCENE
PENNSYL-VANIAN
DESMOIN-ESIAN ATOKAN
MISSISSIPPIAN
CHESTERIAN
Cahokia
fan deposits
Equality and Henry
Pearl
Hagarstown
Glasford
Tradewater
U. Okaw
Vienna Tar Springs
Okaw (on map)
Glen Dean
Golconda
Haney
Fraileys
Beech Creek
Cypress
Ridenhower
0-15
0-31
0-46
0-30
0-50
0-30
0-80
0-35
0-40
20-30
20-30
12-20
60-70
8-10
100-130
12-40
20-22
A
B
C
D
E
F
G
H
I
J
K

A Clay, sand and gravel Gray to tan mixture of angular bedrock (sandstone and limestone) fragments within clay and sand matrix. The clay is grayish brown to dark bluish gray and contains fine to very fine grained quartz sand. The gravel is a composite of rounded igneous, metamorphic and sedimentary pebbles to boulders with some angular bedrock clasts included. Found as modern, colluvial fan deposits splaying on to older sediments.

B Silt, 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 silt from eroded loess and sand and gravel from eroded diamicton.

C 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 in elevation above sea level. Eroded by unit B.

D Sand and gravel Sand, light tan, fine to medium grained, well sorted, 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 north-south trending ridge.

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

F 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.

G Sandstone, siltstone, and shale 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. The basal sandstone is unconformable with the underlying unit.

H Shale, limestone, and sandstone Shales are dark gray, calcareous in part, and contain lenticular limestones. Limestones are lime-mudstones to wackestones that contain productid brachiopods, pelmatozoan, and brown chert nodules. The base of the unit is composed of a sandstone. The sandstone is tan to light gray and composed of fine grained, well sorted quartzarenite. The sandstone is calcareous and is thin to medium

bedded. The lower unit is a channel sandstone and locally unconformable with the underlying formation.

I Limestone and shale Dark to medium gray, lime wackestones, packstones and grainstones commonly containing fossil invertebrates and oolites, dominate the limestone lithologies. The shale is mainly gray to dark gray, green and red, poorly fossiliferous, massive to platy. The shale also contains thin limestone beds and lenses. A 12-foot thick, cross bedded oolitic bed occurs in the upper middle part of this unit. The base is composed of a 8- to 10-foot thick fossiliferous limestone.

J Sandstone and shale Sandstone is greenish in the outcrop belt, fine grained, well sorted, but white in the subsurface. It is a quartzarenite that contains abundant shale above and below the sandstone beds. In the subsurface (in the eastern part of the quadrangle) the sandstone is up to 40 feet thick and contains cross beds, minor amounts of shale, and is porous and permeable. The shale is gray to greenish gray and can contain red beds. The lower part of the formation is conformable with the underlying unit.

K Limestone The limestone is gray, lime mudstone, wackestone to grainstone that is highly variable. It contains crinoids, blastoids, brachiopods, bryozoans, and oolites. The bryozoans *Cystodictya* and *Archimedes* are common. No sands are associated with this unit in the study area. Shale is thin in the upper and lower parts.