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Quaternary Geologic Map of the Big Rock Quadrangle, NE Illinois



# Map Units

# Holocene Units

**Disturbed Land** 

Cahokia Formation - modern alluvium Stratified sand, silt and clay with some beds of sandy gravel; 2-8m thick; occurs in floodplains and channels of major rivers and streams. Cahokia Formation - fluvial terrace 2

Stratified silts, sands and fine gravels underlying terrace surfaces 2-3m above modern floodplain. Cahokia Formation - fluvial terrace 1

Stratified sands and fine to medium gravels underlying terrace surfaces 3-5m above modern floodplain.

# Wisconsin Episode - Mason Group Units

Equality Formation - proglacial and supraglacial fine grained lacustrine facies; laminated to uniform silt and clay with some fine to med. sand beds; 2-10m thick; interbedded with deltaic facies (H-fd) near mouth of Kaneville Esker and overlain by 0-1.5m loess.

Henry Formation - proglacial outwash - Stratified to massive sand and gravel, containing some beds of silt, clay and debris flow diamicton; generally wellsorted; cross-bedded to plane- bedded; overlain by 0-1.5m loess; occurs at the surface and at depth beneath the Tiskilwa Formation as the Ashmore Tongue (lowermost Mason Group)

Henry Formation - proglacial fan-delta deposits Planar and cross-stratified sand and gravel, containing some silt beds and minor debris flow diamicton beds: deposited at the mouth of the Kaneville Esker and overlain by 0-1.5m loess.

Wasco facies, Henry Formation - Kame and kamic morainal deposits; irregularly bedded and moderately sorted sand and gravel, containing lenses of silt, clay and diamicton; 3-25m thick; often interstratified with Batestown Member, Lemont Formation (B-a); overlain by 0-1.5m loess.

Peddicord Tongue (subsurface only) stratified silt and clay glacial lacustrine beds of the lowermost Equality Formation (lowermost Mason Group); interbedded with and/or gradational with stratified sands and gravels of the Ashmore Tongue (lowermost sequence of Henry Formation outwash deposits); overlain by the Tiskilwa Formation.

# Illinois Episode Units

Pearl Formation (subsurface only) stratified sand and gravel outwash, containing some beds of silt, clay and diamicton, locally may consist of massive gravels; intertongues with Glasford Formation diamictons, of variable thickness due to erosion by succeeding glacial advances

Glasford Formation (subsurface only) loam to sandy loam diamicton; pinkish brown to yellow brown; locally contains beds of stratified silts, sands, and gravel and may also intertongue with the Pearl Fromation; of variable thickness due to erosion by succeeding glacial advances; directly overlies bedrock in this area.

# **Bedrock Units**

Silurian: dolomite; preserved as erosional remnants on bedrock highs

Ordovician Maguoketa Formation; interbedded shales, shaley carbonates and limestones

### REFERENCES

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cored strata.

This geologic map also represents an extension of previous mapping completed for quadrangles to the east and northeast (Curry, 1990; Curry et al., 1999; Grimley, 1998). The criteria for differentiating surficial map units and the stratigraphic nomenclature used here is adopted and expanded from these studies and from Hansel and Johnson (1996). Texture (grain size), sedimentary structures, clast lithology, and clay mineralogy where the primary characteristics used for differentiation and correlation of stratigraphic units. Holocene alluvial deposits were mapped on the basis of flood plain topography and morphostratigraphic sequence for the low terraces. Subsurface data for the cross sections are based upon scattered deeper borings including ) "Power Probe" cores obtained under this study, 2) control wells with lithologic logs completed by the ISGS, 3) unpublished engineering borings from bridges and the road bed along I-88, as well as scattered driller's logs from water wells completed within the guadrangle (on file with the ISGS). The sections at A' and B' consist of test holes whose upper stratigraphy can also be verified in outcrop within large quarries to the east.



Stratigraphic relationships for the late Wisconsinan Wedron and Mason Groups. The Wedron Group consists primarily of unsorted or poorly sorted diamictons (subglacial tills and diamictons in end moraines) that are interbedded with the sorted sediments (loess, fluvial outwash, and lacustrine deposits) of the Mason Group. (from Hansel and Johnson, 1996)

### Wisconsin Episode - Wedron Group Units

Batestown Member, Lemont Formation - ablation till Ablation till and stratified sediments deposited by stagnant ice; stratified to massive silt loam to loam diamicton similar to B-m interbedded with poorly sorted fluvial sands and gravels and laminated to massive lacustrine silts and clays; 7-30m thick.

Batestown Member, Lemont Formation - morainal Morainal facies; silt loam to loam diamicton; graybrown oxidizing to yellow-brown, orange-brown or pale pinkish-brown; often stratified and interbedded with silt and sand; 7-30m total thickness.

Batestown Member, Lemont Formation - subglacial Subglacial facies; usually massive (structureless) diamicton (similar to B-m) containing local fluvial sands and fine gravels deposited in subglacial channels; 1-4m thick; overlain by 0-1.5m loess.

Tiskilwa Formation (subsurface only) loam to clay loam diamicton, gray to pinkish gray, oxidizes to red brown, brown, or yellow brown; locally contains thick beds of silt, sand, and gravel; lowermost diamicton of the Wedron Group.

### QUATERNARY GEOLOGY

The oldest Quaternary deposits preserved in the map area consist of the Glasford Formation diamictons deposited primarily as subglacial tills and the correlative proglacial outwash sands and gravels of the Pearl formation. Locally, the coarse gravel facies consist of ice proximal subangular cobble and boulder beds that indicate an Illinoisan age ice margin lay just to the east of the northeastern portion of the quadrangle (Curry et al., 1999). No buried morainal facies from this former ice margin are present. The Illinois Episode dates from approximately 180,000 to 130,000 years ago but the specific time of deposition in the study area is unknown. Some of the Pearl Formation coarse sands and gravels are extensive enough to be utilized for aggregate resources and in certain locations are thick enough to support municipal groundwater supplies (Curry and Seaber, 1990). A major unconformity is indicated by the deeply weathered Sangamon Geosol, which formed in both the Glasford and Pearl formation deposits between about 130,000 to 55,000 years ago (Curry, 1989; Curry and Pavich, 1996). Wisconsin episode glacial erosion however has stripped much of the geosol as seen in quarry exposures and as reconstructed from

A thin, discontinuous layer of dark brown, organic-rich sediment, the Robein Member of the Roxana Silt, overlies the Sangamon geoson in a few rare quarry localities. Wood fragments, and even in situ tree stumps have been discovered in this unit (Curry et al., 1999), however it cannot be identified or is not present in any of the cores from the Big Rock quadrangle. It is interpreted as loess and colluvium and gives radiocarbon ages between about 50,000 to 25,000 years (Wickham et al., 1988).

The most recent glaciers (Wisconsin Episode) advanced into the Big Rock area about 25,000 years ago and persisted until about 17,500 years ago (Curry et al., 1999) during which two glacial successions were deposited. The oldest is the clay loam diamicton of the Tiskilwa Formation which is underlain by Henry Formation outwash deposits (Peddicord Tongue), both of which occur only in the subsurface. These deposits were in turn overlain by recessional outwash sand and gravel. The youngest sequence, the Batestown Member of the Lemont Formation occurs in the shallow subsurface and forms the primary surficial units which were deposited as ice readvanced into the Big Rock guandrangle. It consists of three primary facies including B-m; the ice marginal facies of the Mendota Moraine along the northwestern border of the quadrangle, B-g; a subglacial diamicton facies ("ground moraine") deposited by actively flowing ice as the Mendota moraine formed, and B-a; an ablation facies with the associated kames (W-k), which were deposited as the glacial ice stagnated over much of the quadrangle. The youngest glacial deposits consist of Henry formation outwash that accumulated to the south, and Equality Formation lacustrine sediments that were deposited while the last of the stagnant ice persisted, preventing drainage of meltwaters.

### **MAPPING METHODS**

Initial reconnaissance was conducted using 1:40,000 scale color infra-red aerial photography in conjunction with the definition of landform physiographic characteristics that were readily observable from the Kane County topographic base at 2' contour interval. At this interval, numerous subtle topographic details emerge that were found to be a great asset to differentiating surficial map units. Definition of the initial map units was also aided by the soils data and soils maps of Goddard (1979). Field investigations, ground truth verification, and sampling were conducted primarily by shallow (2-10m) hydraulic coring using a Giddings Probe. Over 70 shallow cores were obtained during the study with the definitive cores sites shown as red dots on the map. Lithologic logs from ISGS control wells, "Power Probe" cores, engineering borings and to a limited extent, water well logs, were also used as an aid to defining the distribution of surficial map units. The only outcrops examined in this study occur in the quarries along the northeastern margin of the quadrangle and in shallow stream cuts along the Big Rock River to the south.