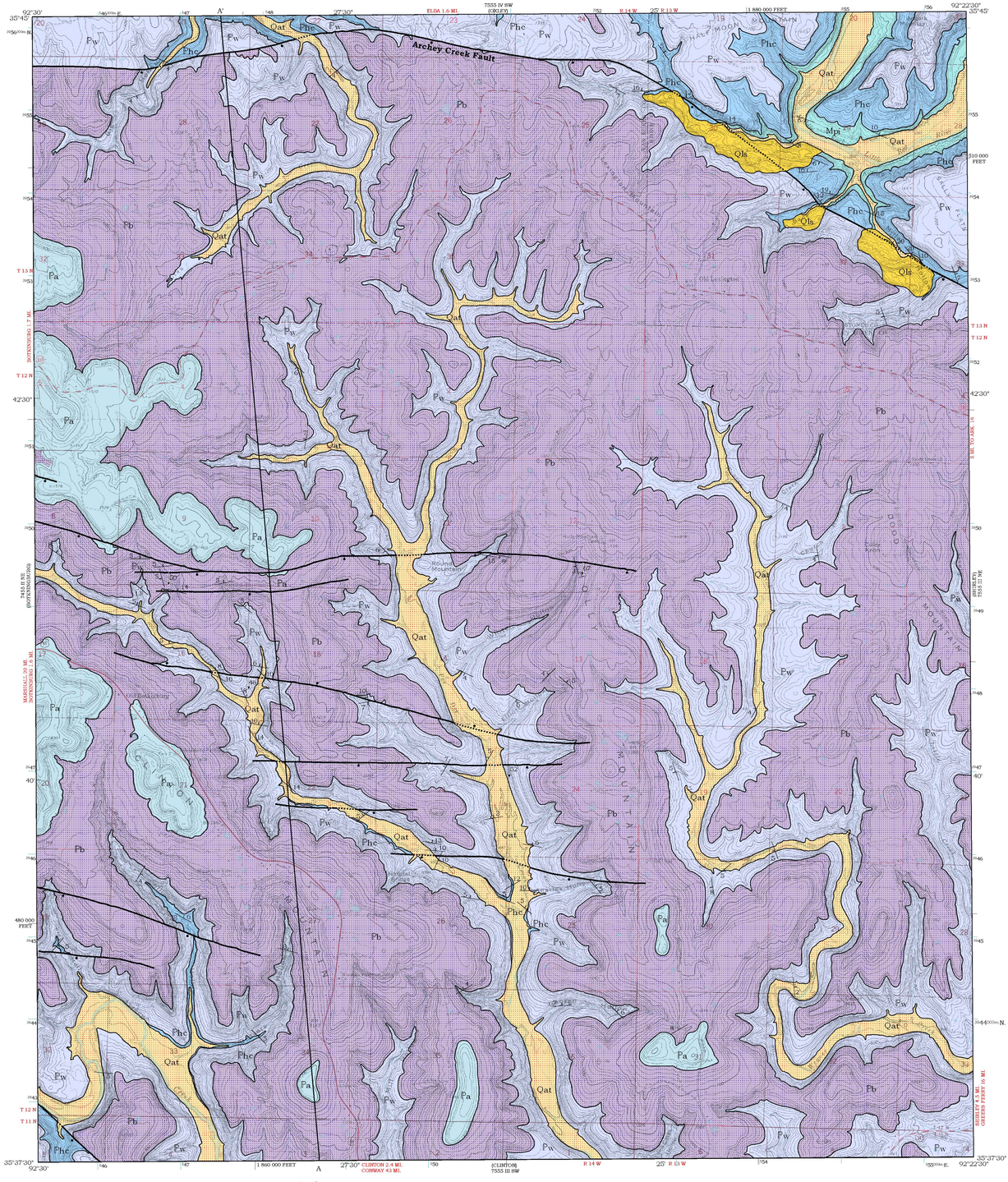
Arkansas Geological Survey
Bekki White, State Geologist and Director

Digital Geologic Quadrangle Map
Old Lexington Quadrangle
DGM-AR-00651

Geologic Map of the Old Lexington Quadrangle, Van Buren and Stone Counties, Arkansas

Geology by Richard S. Hutto and Daniel S. Rains
Digital Compilation by Daniel P. Holland
2010



Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1972. Field checked 1973

Projection and 10,000-foot grid ticks: Arkansas coordinate system, north zone (Lambert conformal conic)
1000-metre Universal Transverse Mercator grid ticks, zone 15, shown in blue. 1927 North American datum

Fine red dashed lines indicate selected fence and field lines where generally visable on aerial photographs. This information is unchecked

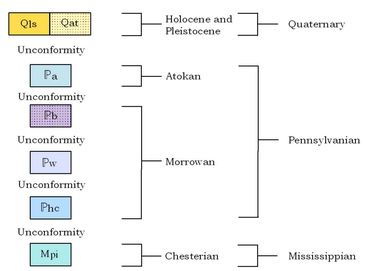
6.5°
Approximate mean declination 1965

Scale 1:24000
Miles 1 0.5 0 1
Kilometers 1 0.5 0 1
Contour Interval 20 Feet
North American Datum of 1983

Quadrangle Location

Road Classification
Heavy-duty
Medium-duty
Light-duty
Unimproved dirt

Correlation of Map Units



Introduction

This map graphically summarizes the bedrock geology of the Old Lexington 7.5-minute quadrangle. In this area over 1120 feet (381 meters) of late Mississippian to middle Pennsylvanian clastic and carbonate sedimentary rocks are exposed. Regional geology of the area is controlled by an uplift centered on southeastern Missouri known as the Ozark Dome. Progressively younger rocks form a series of plateau surfaces from that area southward into Arkansas. The area of this map is located within the southernmost and highest of these plateaus—the Boston Mountains Plateau.

There is only one major structural feature in the mapping area. The Archey Creek Fault starts on the Tilly quadrangle and crosses the Alread and Botkinburg quadrangles to the west, extends across the northern edge of this quadrangle and continues southeast. It is a normal fault downdropped to the south with up to 200 feet (61 meters) of offset. There are several smaller normal faults on the western half trending approximately east/west. Pee Dee and Weaver Creeks are the only major drainages on the map aside from small portions of Archey Creek and the Middle Fork of the Little Red River. They flow into Greers Ferry Lake just south of this area.

The geology of the 1:250,000 scale Russellville quadrangle, of which the Old Lexington quadrangle is a part, was mapped circa 1976 by E. E. Glick for the 1:500,000 scale Geologic Map of Arkansas. The current mapping builds on the previous work, but uses a revised stratigraphy and depicts structures and rock units in more detail. The contacts and structural features on this map were derived from field observations made from July 2009 through April 2010. Site locations were generated with the aid of a global positioning satellite receiver. Bedrock dipping at less than 2° was considered horizontal.

Description of Map Units

Qat **Alluvium and terrace deposits (Quaternary)** – composed of unconsolidated clay, silt, sand and gravel deposited by major streams, including deposits on one or more terrace levels.

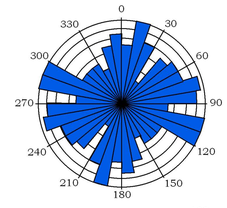
Qls **Landslide deposits (Quaternary)** – unsorted, unconsolidated rock and debris material typically resulting from failure of oversteepened slopes of interbedded sandstone and shale units.

Pa **Atoka Formation (Pennsylvanian, Atokan)** – sequence of black to tan shale interbedded with very thin- to thin-, ripple-bedded, micaceous siltstone and thin- to very thick-bedded, massive sandstone. Sandstone is typically quartz arenite with very fine to fine, sub-angular to sub-rounded grains. Color is tan to orange on fresh surfaces, and weathers dark orange to brown. Locally exhibits cross-bedding, stylolites and shale-pebble or chert-pebble conglomeratic zones. Unconformable with the underlying Bloyd Formation. Approximately 320 feet (98 meters) of the lower Atoka is exposed.

Symbols

- Contact
- Normal fault - dotted where concealed; ↓ - Indicates downdropped block
- 45 Strike and Dip
- Mine or quarry

Joint Frequency



Rose Diagram of strike frequency of joints recorded within the Old Lexington Quadrangle

Pb **Bloyd Formation (undifferentiated) (Lower Pennsylvanian, Morrowan)** – informally separated from the Witts Springs Formation on adjacent quadrangles by the Parthenon sandstone (Chandler and Zachry, 2010). On this map the Parthenon is no longer distinguishable, therefore the Bloyd is undifferentiated. It consists of fissile clay shale interbedded with thin- to very thick-bedded or massive, very fine- to coarse-grained, micaceous sandstone with lesser amounts of siltstone, sandy limestone and limy sandstone. Shale is tan to black on fresh surfaces and weathers orange to brown. Sandstone is orange to brown, buff to tan and pink on fresh surfaces, and weathers light to dark brown. It is typically well-sorted, though sandstone-, shale-and chert-pebble conglomeratic zones crop out locally. Commonly exhibits siliceous case-hardening and well-developed cross- and channel-beds. Siltstone is typically very thin- to medium-bedded, light- to medium-gray on fresh surfaces, and weathers tan to brown. It is typically well-indurated, with shale partings along micro cross-laminations. Sandy limestone and limy sandstone units are typically thin- to medium-bedded, medium- to dark-gray on fresh surfaces and weather dark-brown. They are finely to coarsely crystalline and locally fossiliferous. Fossils include brachiopods, gastropods, bryzoans and nautiloids. The Bloyd is unconformable with the underlying Witts Springs Formation. Ranges in thickness from approximately 280 to 320 feet (85 to 98 meters).

Pw **Witts Springs Formation (Lower Pennsylvanian, Morrowan)** - a variable sequence of interbedded sandstone and shale units with intermittent units of calcareous sandstone and limestone. A typical sequence contains 2 or more massive sandstone units ranging from 20 to 80 feet (6 to 24 meters) thick that locally form prominent bluffs which are separated by black clay shale and very thin- to thin-, ripple-bedded, very fine- to fine-grained sandstone units. Massive sandstone is quartz arenite to litharenite, typically well-sorted, fine- to medium-grained and rounded to sub-rounded. Color is buff to gray or tan with brown iron-oxide blebs on fresh surfaces. It weathers orange or orange-brown to dark brown and punky. Liesegang banding is common. Intervals of sandstone-, shale- and quartz-pebble conglomerate are common. Discontinuous, typically cross-bedded limy sandstone and sandy limestone units form ledges interbedded with shale in the upper third. They consist of fine sand and finely to coarsely crystalline calcite and are locally fossiliferous, oolitic and conglomeratic. Crinoid fragments are common, but other fossils include rugose corals, fenestrate bryzoans and brachiopods. Unconformable with the Cane Hill Member below and in some places has obviously scoured into it. Total thickness ranges from approximately 260 to 340 feet (79 to 104 meters).

Phc **Hale Formation (Lower Pennsylvanian, Morrowan)** – consists of two members: the Prairie Grove and the Cane Hill. Only the Cane Hill Member is mapped on this quadrangle. Rocks equivalent to the Prairie Grove Member are mapped as a part of the Witts Springs Formation.

Cane Hill Member typically medium- to dark-gray, thin-, ripple- to cross-bedded sandstone interbedded with black clay to silty shale and siltstone. Medium- to thick-bedded or massive sandstone crops out locally. Thin-bedded sandstone is a sublitharenite composed of mostly subangular, glassy to opaque quartz grains that are very fine to fine and moderately well-sorted. Cement is typically silicreous, however is locally calcareous. Fossil fragments can be associated with these calcareous zones. Trace fossils and load casts are present above shaly units. Unconformable with the underlying Imo shale. Thickness ranges from approximately 220 to 280 feet (67 to 85 meters).

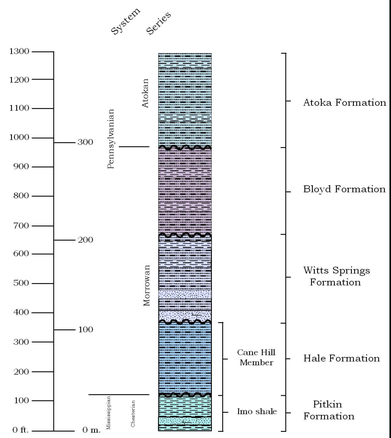
Mpi **Pitkin Formation (Upper Mississippian, Chesterian)** – informally divided into two members, the Pitkin Limestone and the Imo shale. Only the upper part of the Imo is exposed in the northeast corner of this map.

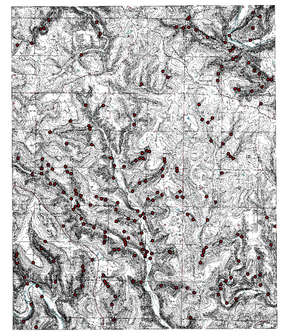
Imo shale (Upper Mississippian, Chesterian) – thin- to thick-bedded ledges of sandstone interbedded with black silty shale. The shales locally contain lenticular ironstone concretions. The sandstone is very fine-grained to fine-grained, light- to dark-gray on fresh surfaces, and weathers red to brown. It is moderately calcareous, silty and coaly, and contains sparse fossil and rock fragments. Reaches an approximate thickness of up to 120 feet (37 meters).

Pitting along bedding planes in cross-bedded sandstone of the Witts Springs Formation near Little Johnnies Creek.

Contact between massive sandstone of the lower Witts Springs Formation overlying very thin- to thin-bedded shale and siltstone of the Upper Cane Hill Member near the Middle Fork of the Little Red River.

Stratigraphic Column





Topographic map of the Old Lexington quadrangle. Red dots indicate location of data colletion points.

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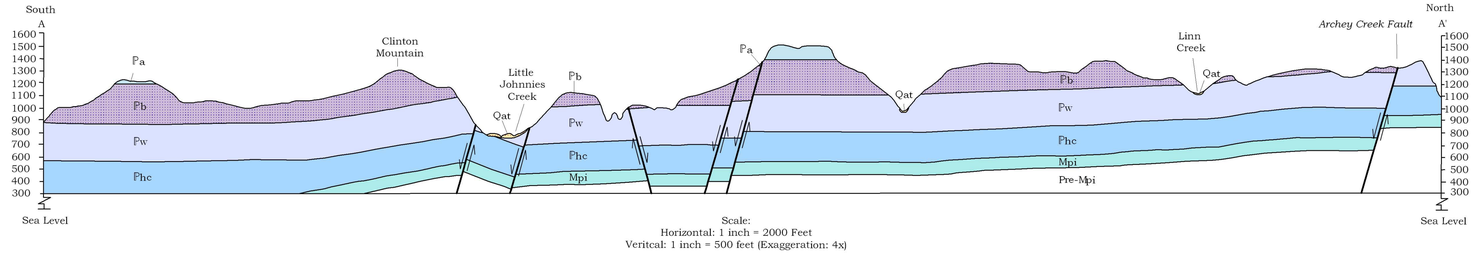

Scale:
Horizontal: 1 inch = 2000 Feet
Veritcal: 1 inch = 500 feet (Exaggeration: 4x)