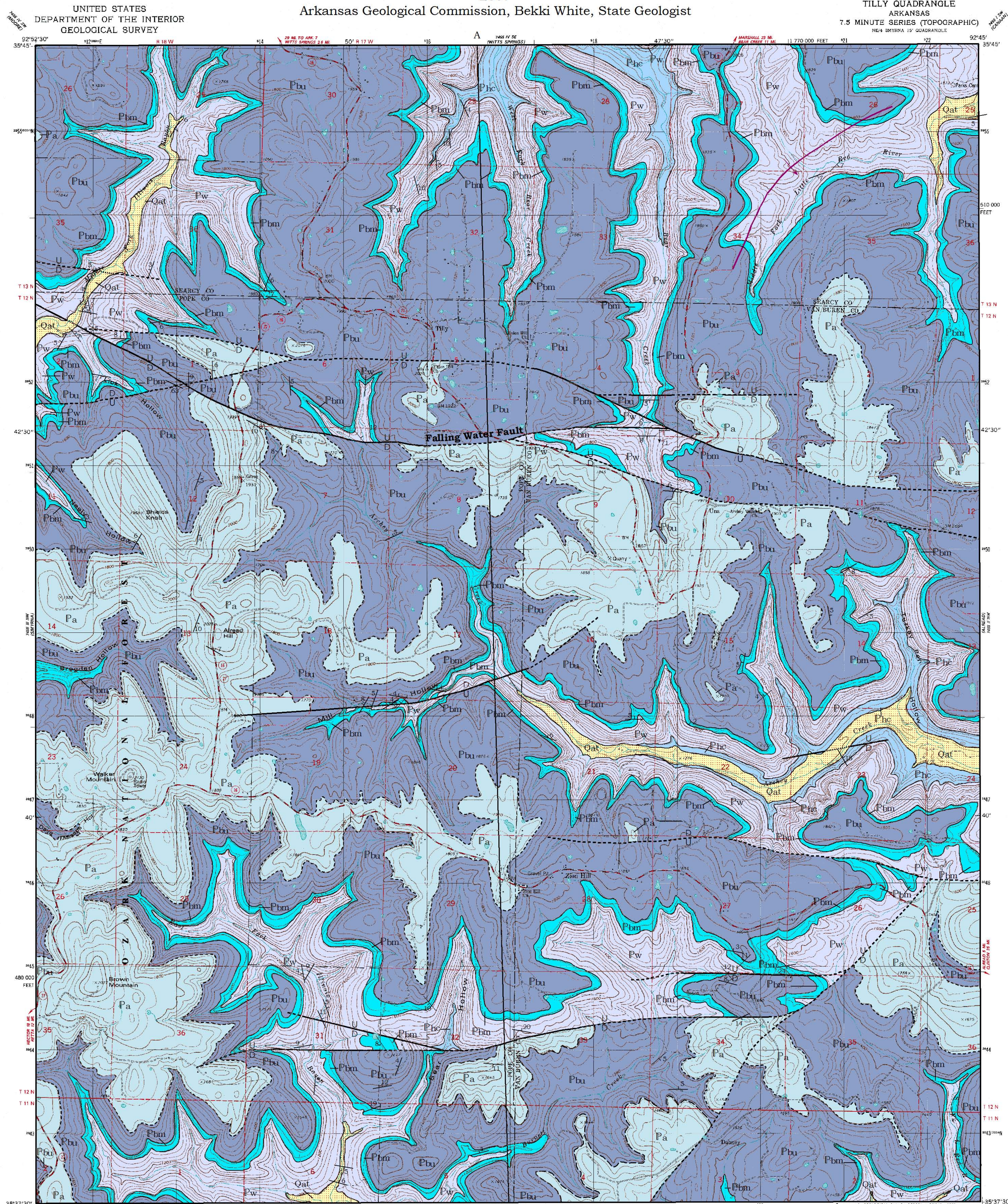


GEOLOGIC MAP OF THE TILLY QUADRANGLE, POPE, SEARCY, AND VAN BUREN COUNTIES, ARKANSAS

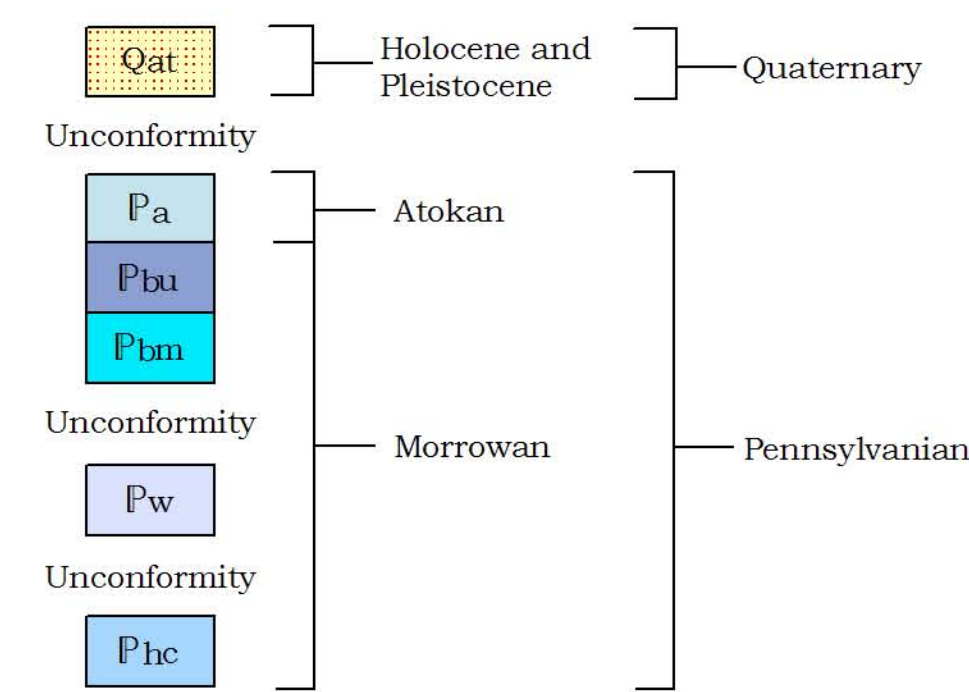
Geology by Daniel K. Smith and Richard S. Hutto
Digital compilation by Brandy R. Rakes
2007

Arkansas Geological Commission, Bekki White, State Geologist

Digital Geologic Quadrangle Map
Tilly Quadrangle, Arkansas
DGM-AR-00850



Correlation of Map Units



Introduction

This map graphically summarizes the surface geology of the Tilly 7.5-minute quadrangle. In this area over 1130 feet of early Pennsylvanian, clastic sedimentary rocks are exposed. The area lies on the northern edge of the Boston Mountains Plateau, the highest plateau on the southern flank of the Ozark Mountain dome which is centered in southeast Missouri. Within this area are located the headwaters of several major drainages including Bear Creek which flows north, the Middle, Archey and South Forks of the Little Red River which flow east, and the Middle and East Forks of the Illinois Bayou which flow south. Part of the Ozark National Forest lies on the western edge of the map.

The geology of this area was first mapped chiefly from aerial photography by Haley in 1972 as part of the Smyrna 15-minute quadrangle for the Geologic Map of Arkansas. The current map is the first to be mapped on the ground at the 1:24,000 scale and builds on the previous work while using a revised stratigraphy and adding certain stratigraphic refinements and structural details. The contacts and structural features on the map were derived from direct field observations at numerous sites. Site locations were generated with the aid of a global positioning satellite receiver. Bedrock dipping at less than 2° was considered horizontal.

Descriptions of Map Units

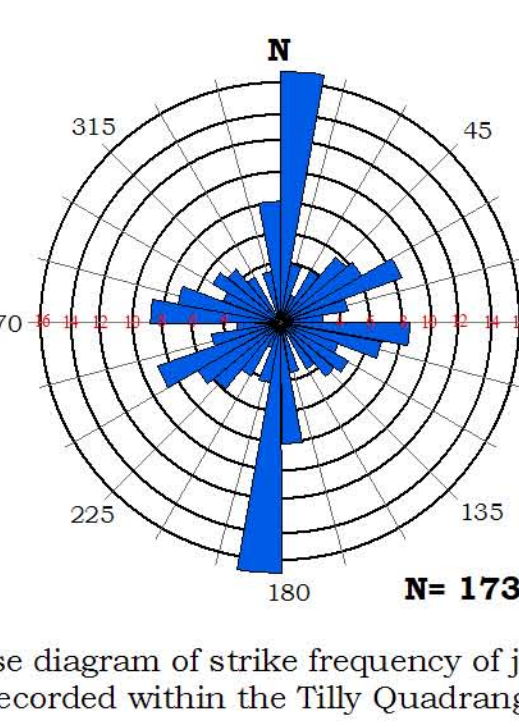
- Qat** Alluvium and terrace deposits (Quaternary) - Unconsolidated clay, silt, sand and gravel including terrace deposits on one or more levels.
- Pa** Atoka Formation (Middle Pennsylvanian, Atokan) - Consists of black to tan shales interbedded with very thin to thin, ripple-bedded, micaceous siltstones and thin to medium and occasionally massive bedded, fine to very fine-grained sandstones with sub-angular to sub-rounded grains. The sandstones are usually buff to tan on fresh surfaces, but can range to dark-red, dark-purple and dark-brown. Weathered surfaces are typically a medium to dark-brown. Occasionally the sandstone exhibits trace fossils along bedding planes, pebble conglomerate zones usually with external fossil molds, lensegging bands and cross-beds. Some sandstone is calcareous and contains white clay clasts which are typically less than 0.04 of an inch (1 mm), gray clay shale pebbles which can be up to 0.71 of an inch (18 mm), quartz pebbles ranging up to 0.35 of an inch (9 mm), shale partings, coal stringers. This rock-type is best exposed in the Freshour Quarry near Una (Juddville). The lower contact is tentative and will be resolved with future mapping. As much as 440 feet (134 meters) of the Atoka is exposed on this quadrangle.
- Pbx** Blloyd Formation (Lower Pennsylvanian, Morrowan) - The individual members of the Blloyd Formation (Brentwood and Kessler Limestones) cannot be differentiated on this quadrangle. These "marker zones" are used to divide the section into discernible units in the type section area in northwest Arkansas, and are either missing or have become unrecognizable on this quadrangle. Therefore, the Blloyd Formation is informally divided into upper, middle and lower parts on adjacent quadrangles (Braden et al., 2003) using the "middle Blloyd sandstone" (Zachry and Haley, 1975). On this map the "middle Blloyd sandstone", which was formerly considered to be the basal Atoka, is used to separate the upper part from the Wits Springs Formation. The rocks equivalent to the lower part of the Blloyd are mapped as the main body of the Wits Springs Formation. The Blloyd ranges approximately 200-280 feet (61-85 meters) on this quadrangle.
- Pbm** Upper part - Consists of thin, ripple-bedded to thick bedded, micaceous sandstones interbedded with clay to silty shales. The sandstones consist of very fine to fine-grained, sub-angular to sub-rounded quartz with occasional shale clasts. They are tan to dark-brown on fresh surfaces and weather dark-brown to dark gray. The shales are dark gray to black on fresh surfaces and weather tan to brown. This interval contains many trace fossils along bedding planes. The upper part ranges approximately 160-240 feet (49-73 meters) thick.
- Pw** "middle Blloyd sandstone" - A thin to massive bedded, cross-bedded, fine to medium-grained, poorly to moderately well-sorted, quartz or iron-cemented sandstone with sub-angular to sub-rounded quartz grains. Fresh surfaces are light-tan, light-gray or yellowish to reddish-brown, whereas weathered surfaces are light to dark-gray or light to dark brown depending upon iron content. Well-rounded, milky quartz pebbles which measure up to 0.24 of an inch (6 mm) are commonly present especially in the north-central section, and help to distinguish this sandstone from adjacent units. It is often somewhat micaceous and will sometimes contain shale pebbles measuring up to 1.57 inches (40 mm) and bryopod prints. It may also exhibit minor honeycomb weathering and lensegging banding. This sandstone is a prominent bluff-former throughout the quadrangle especially along the north side of the Archey Creek drainage. The "middle Blloyd sandstone" is unconformable with the Wits Springs Formation. Thickness ranges approximately 40-80 feet (12-24 meters).
- Pbc** Hale Formation (Lower Pennsylvanian, Morrowan) - The Hale Formation consists of two members: the Prairie Grove Member and the Cane Hill Member. Only the Cane Hill Member is interpreted to be present on this quadrangle.

Cane Hill Member - Typically gray to black, fissile, clay to silty shale sections with thin bedded, ripple-marked siltstone and sandstone. As the upper contact is approached, more massive, cross-bedded, calcareous sandstone is interbedded with the shale and siltstone. The sandstone is mostly well-sorted, sub-angular, and very fine to fine-grained. It can occasionally contain fossil material, mica, shale partings, shale pebbles and trace fossils. The sandstone varies in color from light to dark-gray on fresh surfaces, and from dark gray to dark-brown on weathered surfaces. As much as 160 feet (49 meters) of the Cane Hill is exposed on this quadrangle.

Symbols

- Contact
- Contact - inferred
- Fault - arrow showing dip of the fault plane
- U - upthrown
- D - downthrown
- Fault - inferred
- Fault - concealed
- Strike and dip of inclined bedding
- Monocline

Joint Frequency



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Control by USGS and NOS/NOAA
Topography by photogrammetric methods from aerial photographs taken 1975. Field checked 1976. Map revised 1980
Projection and 100,000-foot grid lines, Arkansas coordinate system, north zone (Lambert conformal conic)
1000-meter Universal Transverse Mercator grid, zone 15 1327 North American Datum
To place on the predicted North American Datum 1983 move the projection lines 6 meters south and 15 meters east as shown by dashed corner ticks
There may be private landholdings within the boundaries of the National or State Reservations shown on this map
Fine red dashed lines indicate selected fence and field lines where generally visible on aerial photographs. This information is uncheckd

SCALE 1:24,000
CONTOUR INTERVAL 40 FEET
NATIONAL GEOLOGIC VERTICAL DATUM OF 1979

ROAD CLASSIFICATION
Primary Highway Light-duty road, hard or improved surface
Secondary Highway Secondary road, hard surface
Unimproved road
Interstate Route U. S. Route State Route

TILLY, ARK.
NEW ARKANSAS QUADRANGLE
N3537.5-W95457.5
1980
DMA 2405 III NE-88185 V884

