GEOLOGIC MAP OF THE TREAT QUADRANGLE, JOHNSON AND POPE COUNTIES, ARKANSAS

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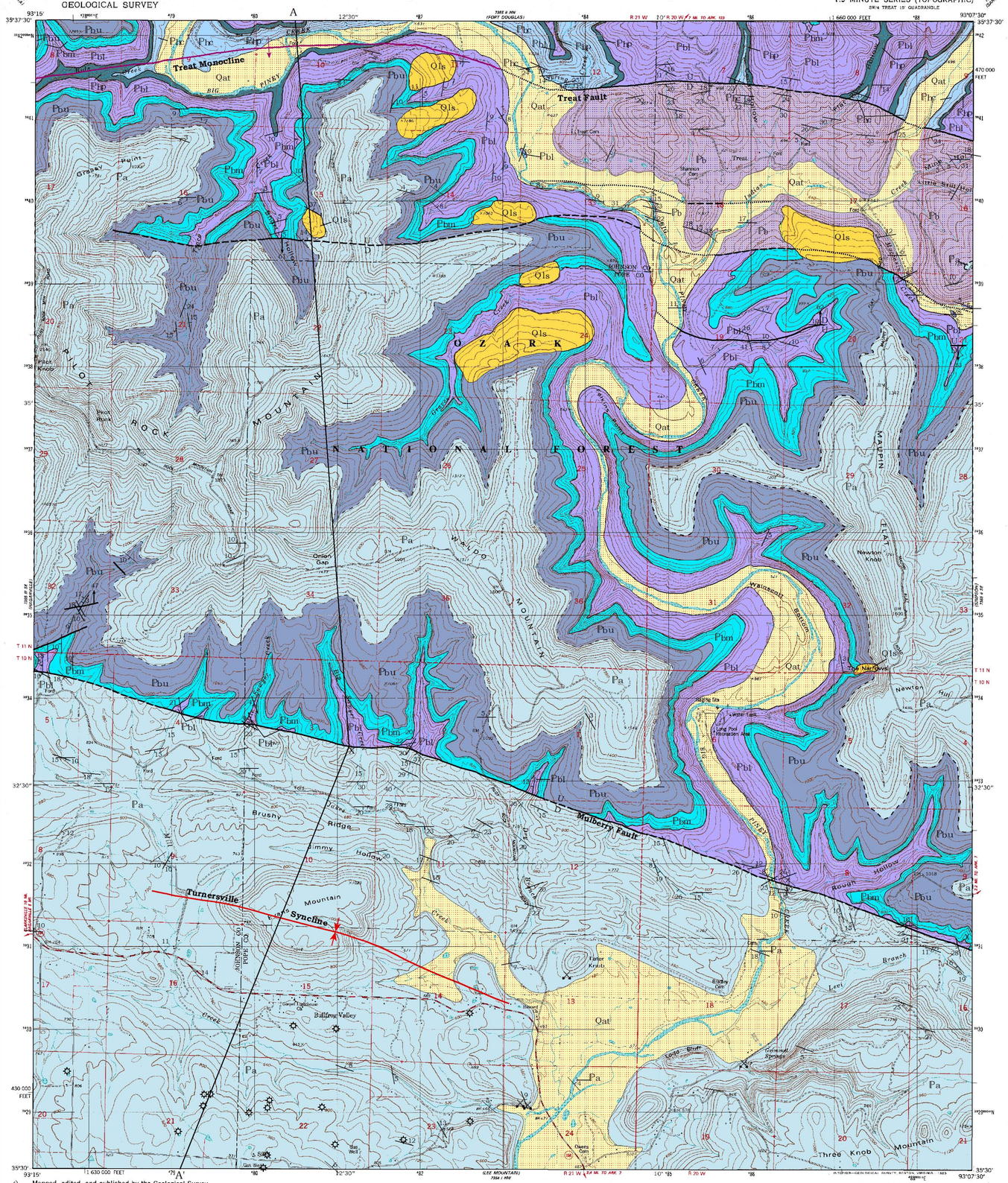
Digital compilation by Walter K. Mayfield
2006
Arkansas Geological Commission, Bekki White, State Geologist

DIGITAL GEOLOGIC QUADRANGLE MAP
TREAT QUADRANGLE, ARKANSAS
DGM-AR-00856

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

TREAT QUADRANGLE
ARKANSAS
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1975. Field checked 1976. Map edited 1980

Projection and 10,000-foot grid ticks: Arkansas coordinate system, north zone (Lambert conformal conic)
1000-meter Universal Transverse Mercator grid, zone 15
1927 North American Datum
To place on the predicted North American Datum 1983 move the projection lines 6 meters south and 16 meters east as shown by dashed corner ticks

There may be private inholdings 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 unchecked

SCALE 1:24 000

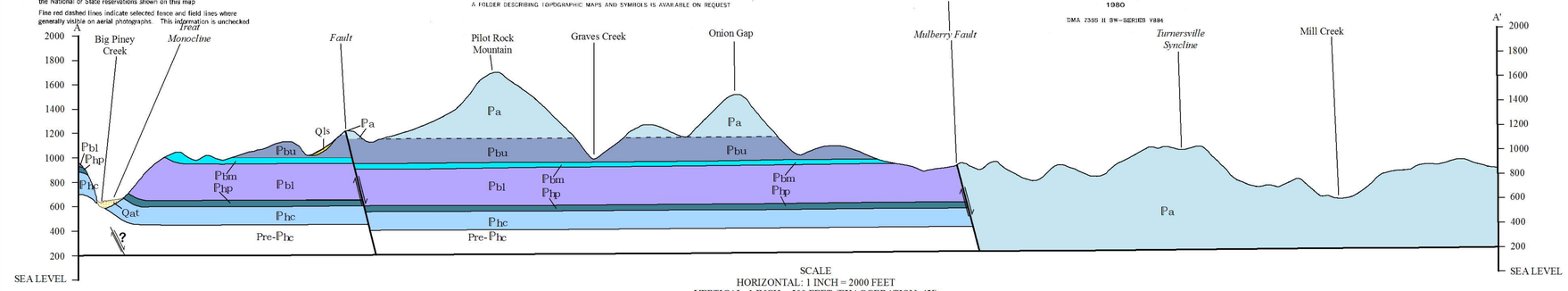
CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1980 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
AND ARKANSAS GEOLOGICAL COMMISSION, LITTLE ROCK, ARKANSAS 72204
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

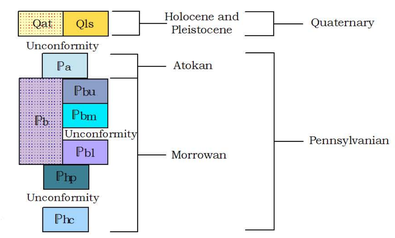
ROAD CLASSIFICATION
Primary highway, hard surface — Light-duty road, hard or improved surface
Secondary highway, hard surface — Unimproved road
Interstate Route · U. S. Route · State Route

TREAT, ARK.
SW/4 TREAT 15' QUADRANGLE
N3530—W9307.5/7.5
1980
DMA 7395 II SW—SERIES V884



SCALE
HORIZONTAL: 1 INCH = 2000 FEET
VERTICAL: 1 INCH = 500 FEET (EXAGGERATION: 4X)

Correlation of Map Units



Description of Map Units

Qls — **Landslide deposits (Quaternary)** - Mostly blocks of sandstone and covered shale slumps derived from the Bloyd Formation.

Qat — **Alluvium and terrace deposits (Quaternary)** - Unconsolidated clay, silt, sand and gravel including deposits on one or more terrace levels of local streams.

Pa — **Atoka Formation (Middle Pennsylvanian, Atokan)** - Consists of black to tan silty micaceous shales interbedded with very thin to thin ripple-bedded micaceous siltstones and thin to medium bedded, fine to very fine-grained sandstones with sub-angular to sub-rounded quartz grains. The sandstones are tan to buff colored on fresh and weathered surfaces and may contain clay pebbles, liesegang bands, horizontal trace fossils, and cross-beds. Occasionally the sandstones contain pebble conglomerate zones with external molds of fossils. The sandstones vary from 10 - 20 ft. (3 - 6 m) thick. Lower Atoka is exposed north of the Mulberry Fault while Upper Atoka is present south of the fault due to a displacement of approximately 2500-3000 feet (762-914 m) along the fault near this area (Haley, 1982). This contact is tentative and will be resolved with future mapping. Approximately 440-920 ft. (134-280 m) thick.

Bloyd Formation (Lower Pennsylvanian, Morrowan) - In this quadrangle the individual members within the Bloyd Formation cannot be recognized because its limestone units (Brentwood and Kessler Limestones) are either missing or have become shaly and sandy. There are no other "marker zones" to divide the section into the recognizable members known from the type section in northwest Arkansas. Therefore the Bloyd Formation is divided informally into lower and upper parts (Hudson et al., 2001) separated by the "middle Bloyd sandstone" (Zachry and Haley, 1975). In the northeastern area of the quadrangle the "middle Bloyd sandstone" cannot be recognized making the Bloyd Formation indivisible into lower and upper parts, therefore the Bloyd Formation is undifferentiated. Approximately 480-760 ft. (146-232 m) thick.

Pb — **Undifferentiated** – Consists of sections of thin to thick ripple to planar-bedded sandstone interbedded with very thin to thin ripple-bedded siltstones and clay to silty shale. The sandstones are fine to medium grained, gray, dark-gray to tan, may contain quartz pebbles, clay drapes and vertical trace fossils, and are sometimes calcareous and cross-bedded. The shales and siltstones are charcoal gray to black, sometimes weather reddish and contain siltstone concretions and *Asterosoma* trace fossils. Calcareous fossiliferous conglomerate layers occur throughout the Bloyd Formation. Sandy cross-bedded limestones occur in the lower portion of the formation. They are gray to dark gray on fresh surface but weather reddish or light gray to white and contain abundant fossils such as crinoids, brachiopods, blastoids and occasionally oolites. Approximately 320-440 ft. (98-134 m) exposed in the northeastern portion of the quadrangle.

Pbu — **Upper part** - Consists of thin to thick ripple-bedded micaceous sandstones interbedded with clay to silty shales. The sandstones consist of fine to coarse-grained sub-angular to sub-rounded quartz. They are light-brown to gray on fresh surface but weather dark-gray. The shales are dark-gray to black on fresh and weathered surfaces. This interval contains many trace fossils and load features. Approximately 200 - 360 ft. (60 - 110 m) thick.

Pbm — "**middle Bloyd sandstone**" - A thin to massive, medium to coarse-grained, cross-bedded quartz or iron-cemented sandstone with sub-angular to sub-rounded quartz grains. Reddish, gray, or light-tan on fresh surfaces but weathers brown to orange-brown due to iron content. This unit displays tabular cross-bedded packages that can be up to three feet thick. Contains lycopod fossils, rounded quartz pebbles, and occasionally marble sized and smaller sandstone concretions. This sandstone forms a prominent bluff along Big Piney Creek but is more difficult to delineate in other areas of the quadrangle. A pebble clast conglomerate is present at some localities at the base of this sandstone. The "middle Bloyd sandstone" is unconformable with the lower part of the Bloyd Formation. Approximately 80-120 ft. (24-37 m) thick.

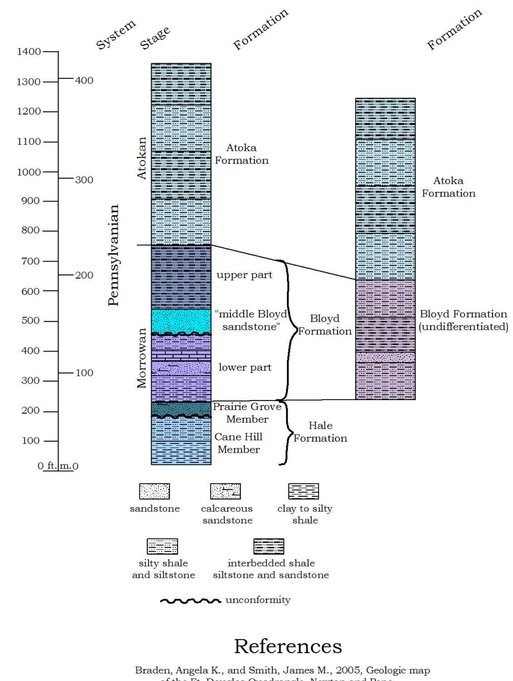
Pbl — **Lower part** - Consists of interbedded very thin to thin ripple-bedded micaceous siltstones and sandstones that are fine to medium-grained interbedded with black clay to silty shales. Throughout the lower portion is black fissile clay to silty shales and thin sandstones interbedded with thin to thick-bedded fossiliferous calcareous sandstones to sandy limestone beds. Thin-bedded pebble conglomerates are present within the interbedded shales and sandstones. The carbonate zones vary from red to gray on fresh and weathered surfaces and can be mottled and cross-bedded. The quartz grains are medium-grained and sub-angular to sub-rounded. This unit contains abundant trace fossils and loading features. Near the base of this unit along Big Piney Creek just south of the confluence of Graves Creek to south of Long Pool Recreation Area is a limestone that is probably equivalent to the Brentwood Member in northwest Arkansas. This limestone is dark gray on fresh surface but weathers buff to light gray. Sand stringers (sometimes along stylolites) throughout the limestone weather dark in relief giving the appearance of "striped or zebra rock". This limestone is very fossiliferous and sometimes contains oolites and possible blastoids (crushed). This unit ranges from 8-20 ft. (2-4 m) thick and has an unconformable upper and lower boundary sometimes containing mound-like structures. The contact between the lower part of the Bloyd Formation and the Prairie Grove is placed below a shaly layer conformable with the underlying massive calcareous sand of the Prairie Grove Member of the Hale Formation. Approximately 200-280 ft. (60-85 m) thick.

Hale Formation (Lower Pennsylvanian, Morrowan) - The Hale Formation consists of two Members; the Prairie Grove Member and the underlying Cane Hill Member. Approximately 160-260 ft. (49-79 m) thick.

Php — **Prairie Grove Member** - A fine to coarse-grained quartz sandstone with varying amounts of carbonate, crinoidal fragments and quartz pebbles. Reddish-gray to brown or mottled on fresh surfaces but weathers dark reddish-brown. Bedding varies from thin to massive and exhibits a rounded weathering profile. This unit often contains cross-beds, liesegang bands, and a pitted surface that is referred to as honeycomb weathering. The base of the Prairie Grove Member contains a fossiliferous quartz pebble conglomerate that contains clay drapes, limonite pebbles, and clasts of shale, siltstone, and sandstone. The Prairie Grove is a prominent bluff former and in the northern part of the quadrangle this unit sometimes forms a double bluff. It is becoming increasingly difficult to differentiate the Prairie Grove Member due to additional sandstone packages in the Hale Formation and the lower part of the Bloyd Formation in this quadrangle. The Prairie Grove Member is unconformable with the Cane Hill Member. Approximately 40-60 ft. (12-18 m) thick.

Phc — **Cane Hill Member** - Consists of a gray to black fissile clay to silty shale in the lower portion that contains iron nodules and small limonitic boxwork fragments. The upper portion consists of thin-bedded, ripple-marked, micaceous siltstones and sandstones. Varies from black to dark-gray on fresh surfaces and light-gray to light-orange-brown on weathered surfaces. Trace fossils and lycopod fragments are abundant. Approximately 120-200 ft. (37-61 m) exposed on the northern edge of the quadrangle.

Stratigraphic Column



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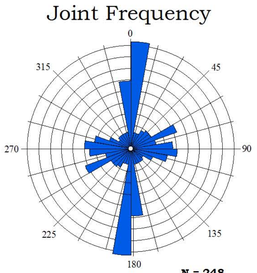
Symbols

- Contact
- Contact - inferred
- Fault - arrow showing dip of the fault plane (10), U - upthrown, D - downthrown
- Fault - inferred
- Fault - concealed
- Strike and dip of inclined bedding (10)
- Syncline
- Monocline
- Gas well
- Shale pit
- Prospect pit

Joint Frequency



N = 248

Rose diagram of strike frequency of joints recorded within the Treat Quadrangle.

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