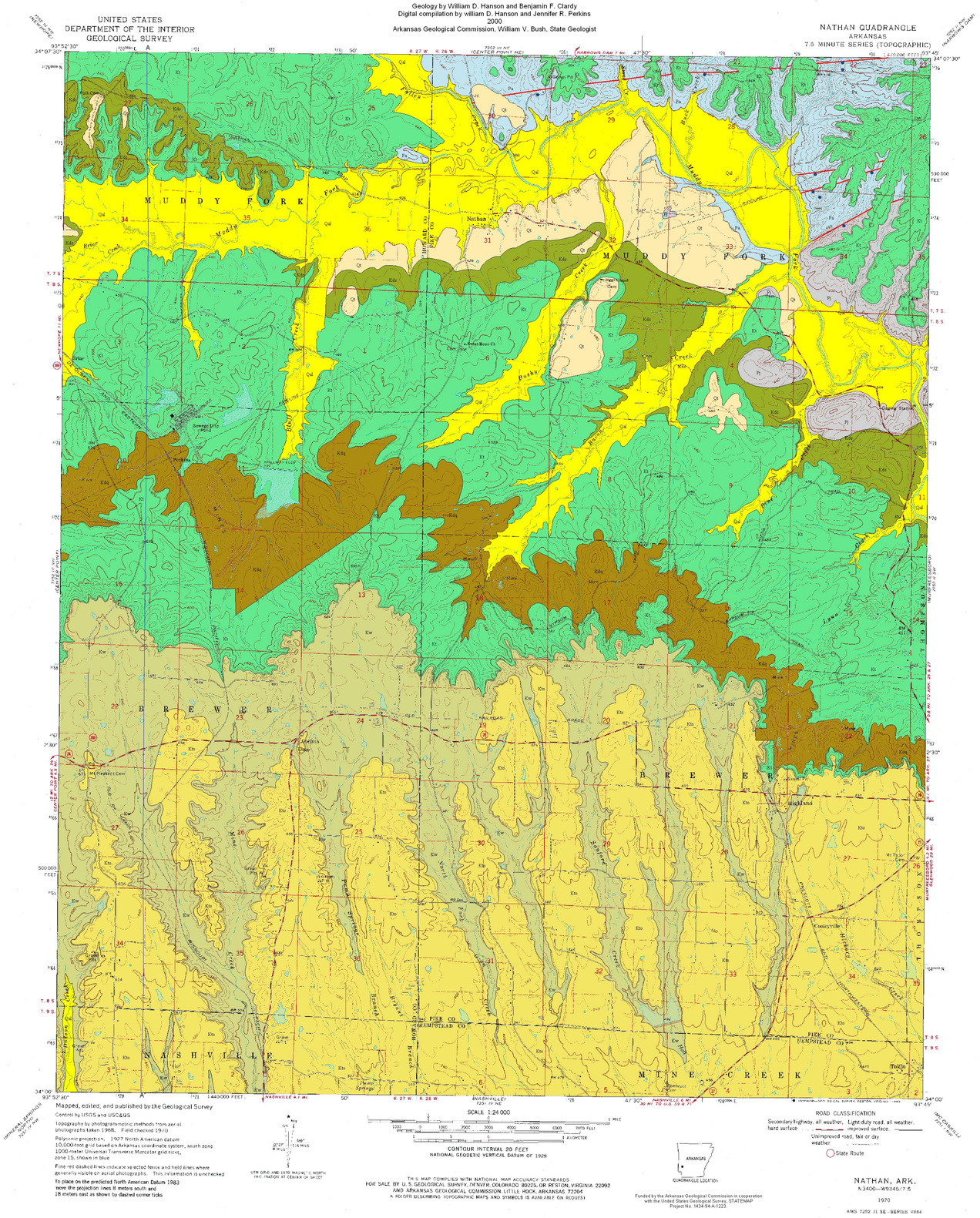
GEOLOGIC MAP OF THE NATHAN QUADRANGLE, HOWARD AND PIKE COUNTIES, ARKANSAS

Geology by William D. Hanson and Benjamin F. Clardy
Digital compilation by william D. Hanson and Jennifer R. Perkins
2000
Arkansas Geological Commission, William V. Bush, State Geologist



Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1968. Field checked 1970

Polyconic projection. 1927 North American datum
10,000-foot grid based on Arkansas coordinate system, south zone
1000-meter Universal Transverse Mercator grid ticks, zone 15, shown in blue

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

To place on the predicted North American Datum 1983
move the projection lines 8 meters south and
28 meters east as shown by dashed corner ticks

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
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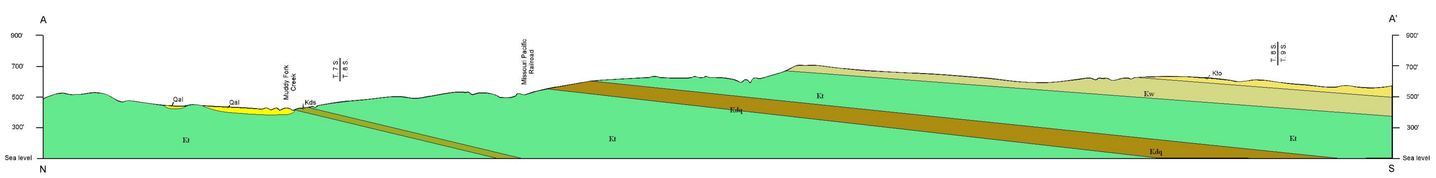
AND ARKANSAS GEOLOGICAL COMMISSION, LITTLE ROCK, ARKANSAS 72204
A PAMPHLET DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION
Secondary highway, all weather, hard surface
Light-duty road, all weather, improved surface
Unimproved road, fair or dry weather
State Route

ARKANSAS
QUADRANGLE LOCATION

Funded by the Arkansas Geological Commission in cooperation with the United States Geological Survey, STATEMAP Project No. 1434-94-A1223

NATHAN, ARK.
N.3400—W9345/7.5
1970
AMS 7252 II SE—SERIES V884



GEOLOGIC CROSS SECTION A-A'
Horizontal scale 1:24,000
Vertical scale 1" = 500'

CORRELATION OF MAP UNITS

Qal, Qt	Quaternary	CENOZOIC
UNCONFORMITY		
Kto	Upper Cretaceous	MESOZOIC
UNCONFORMITY		
Kw	Upper Cretaceous	MESOZOIC
UNCONFORMITY		
Kt, Kdq, Kds	Lower Cretaceous	MESOZOIC
UNCONFORMITY		
Pa	Pennsylvanian	PALEOZOIC
UNCONFORMITY		
Pj	Pennsylvanian	PALEOZOIC

DESCRIPTION OF MAP UNITS

Qal — **Alluvium (Quaternary)** - Variably sized gravel overlain by unconsolidated sand, silt, and clay comprises this unit. This unit occurs in the floodplains of streams and rivers. The sediments form a rich loam and are excellent for agriculture. Gravels, primarily novaculite, originated in the Ouachita Mountain region and from local Cretaceous formations. Thickness varies from 0 to 25 feet. Areas of alluvium are presently receiving sediment deposition.

Qt — **Terrace Deposits(Quaternary)** - Terrace deposits generally grade from basal gravel to silt and clay at the top. Gravels, primarily novaculite, originated in the Ouachita Mountain region and from local Cretaceous formations. Thicknesses vary, but are generally less than 50 feet. Terraces are topographic features which are former floodplains of the river. The sediments form a rich loamy soil. The basal gravel is sometimes utilized for water well production and gravel mining operations.

Kto — **Tokio Formation (Upper Cretaceous)** - The Tokio Formation consists of cross-bedded sand, gravel, gray clay, and volcanic ash. Basal cross-bedded gravels are approximately 30 feet thick. Minor sand and clay lenses occur within the gravel, while sand commonly fills the interstitial spaces around the gravel. Thinner beds (less than 1 foot in thickness) and lenses of gravel occur within the formation's sand intervals. The gravels range from pea-size to 6 inches in diameter and are composed of quartz, novaculite, sandstone, and quartzite. Iron-oxide-cemented conglomerates may be present locally. The cross-bedded sands are medium- to fine-grained quartz with minor amounts of heavy minerals, glauconite, iron-oxide concretions, and rip-up clasts of gray clay. Sands weather yellow to orange-red in color. Gray clays are lignitic, pyritic, fossiliferous, and may contain leaf imprints. The volcanic ash is light gray to white and has altered to kaolinitic clay. The source area for much of the formation's sediment was the Ouachita Mountain region. The formation outcrop belt extends from near Arkadelphia, southwest to the Arkansas-Oklahoma state line, and dips to the south at approximately 80 feet per mile. The approximate thickness in the quadrangle is less than 100 feet. The unit was deposited in a nearshore marine environment on an unconformable surface which separates it from the underlying Woodbine Formation (Upper Cretaceous).

Kw — **Woodbine Formation (Upper Cretaceous)** - The Woodbine Formation consists of water-laid, cross-bedded tuffs, tuffaceous sands, gravel, and red and gray clay. Basal cross-bedded gravels are approximately 20 feet thick and form a cuesta in the area. Thinner beds and lenses of gravel occur within the water-laid tuffs at the base of the unit. Gravels are 1/2 to 6 inches in diameter, well-rounded, and are composed of novaculite, quartz, sandstone, and quartzite. Iron-cemented conglomerates may be present locally. Igneous rock pebbles and cobbles are interbedded within the tuffs. Unweathered tuffs range from green to blue in color while weathered tuffs form a red waxy clay. The source for the volcanic sediments was probably centered in the area between Murfreesboro and Lockesburg, Arkansas. The source area for the gravels was the Ouachita Mountain region and the local Trinity Group. The formation outcrop belt extends from the valley of the Little Missouri River, near Murfreesboro, west to the Arkansas-Oklahoma state line, and dips approximately 80 feet per mile to the south. The unit was deposited in a near-shore marine environment following a major unconformity which separates it from the underlying Trinity Group (Lower Cretaceous). The approximate thickness in the quadrangle ranges from zero to 100 feet.

Kt — **Trinity Group (Lower Cretaceous)** - The Trinity Group is comprised of sand, gravel, clay, limestone, asphalt, and evaporite deposits. The upper part of the Trinity Group is mostly fine-grained, cross-bedded sand, usually weathered to a reddish color. Marginal marine fossils are noted from the Trinity Group. The Trinity Group is approximately 400 feet thick, and dips to the south 80 feet per mile. Members of the Trinity Group exposed include the Pike Gravel, Dierks Limestone Lentil, and DeQueen Limestone Member. The Pike Gravel, the basal member of the Trinity Group, is a bedded gravel deposit approximately 100 feet thick. The base of the Trinity rests unconformably on a surface of upturned and eroded Paleozoic rocks.

Kdq — The **DeQueen Limestone Member** is composed of interbedded gray fossiliferous limestone, gray and green calcareous clay, very fine quartz sand, silt, gypsum, and celestine. The thickness of the limestone beds vary, but rarely exceed 36 inches. Ripple marks, mud cracks, and worm trails are common on the upper surface of the limestone slabs. Clays weather yellow-brown in color and are sticky. The thickness of the member is approximately 100 feet in the quadrangle. Fossils present are primarily brackish-water molluscan fauna, the most common being the *Ostrea franklini*. This member corresponds in part to the Ferry Lake anhydrite in the subsurface of southern Arkansas.

Kds — The **Dierks Limestone Lentil** is an interbedded, calcareous clay and fossiliferous limestone found in the lower part of the Trinity Group. The limestones weather to thin slabs and nodular masses. Notable fossils include the *Ostrea franklini*. It is approximately 40 feet thick in this area.

Pa — **Atoka Formation (Pennsylvanian)** - The Lower Atoka Formation is primarily composed of numerous thin to thick interbedded layers of grayish black shale, and fine- to medium-grained micaceous sandstone. The shale weathers to a tannish gray color and the sandstone weathers to a light to dark brown color. Minor beds of black siliceous shale, chert, and conglomeratic sandstone are present. Chaotic intervals and debris flows are composed of lenses and masses of sandstone, siltstone, shale, and siderite. Some sandstones contain traces of coalified plant remains. A complete section of the Atoka strata does not exist in the Athens Plateau. Deep marine turbidite deposition is indicated by the abundant sedimentary features and trace fossils. The Atoka formation unconformably overlies the Johns Valley shale (Pennsylvanian) in this quadrangle.

Pj — **Jackfork Sandstone (Pennsylvanian)** - The Jackfork Sandstone contains alternating layers of grayish black shale, fine- to medium-grained, light-gray, quartzose sandstone. Shales weather reddish- to tannish-gray in color. The sandstone weathers white to reddish-brown in color. Some granule-conglomerate intervals occur in massive quartzose sands in both the upper and lower portions of the formation. Thin intervals of black siliceous shales with some pinkish siderite laminae are sometimes present. Debris flows containing clasts of shale, sandstone, and siderite are locally present. Some slurried silty sandstones contain coalified plant remains. Deep marine turbidite deposition is indicated by the abundant sedimentary features and trace fossils. In the Athens Plateau, the Jackfork Sandstone has a total thickness of about 7,000 to 7,500 feet.

SYMBOLS

- Thrust Fault
- Gravel and/or sand pit
- Contact

REFERENCES

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