Arkansas Geological Survey
Bekki White, State Geologist and Director

Geologic Map of the Brownsville Quadrangle Cleburne County, Arkansas

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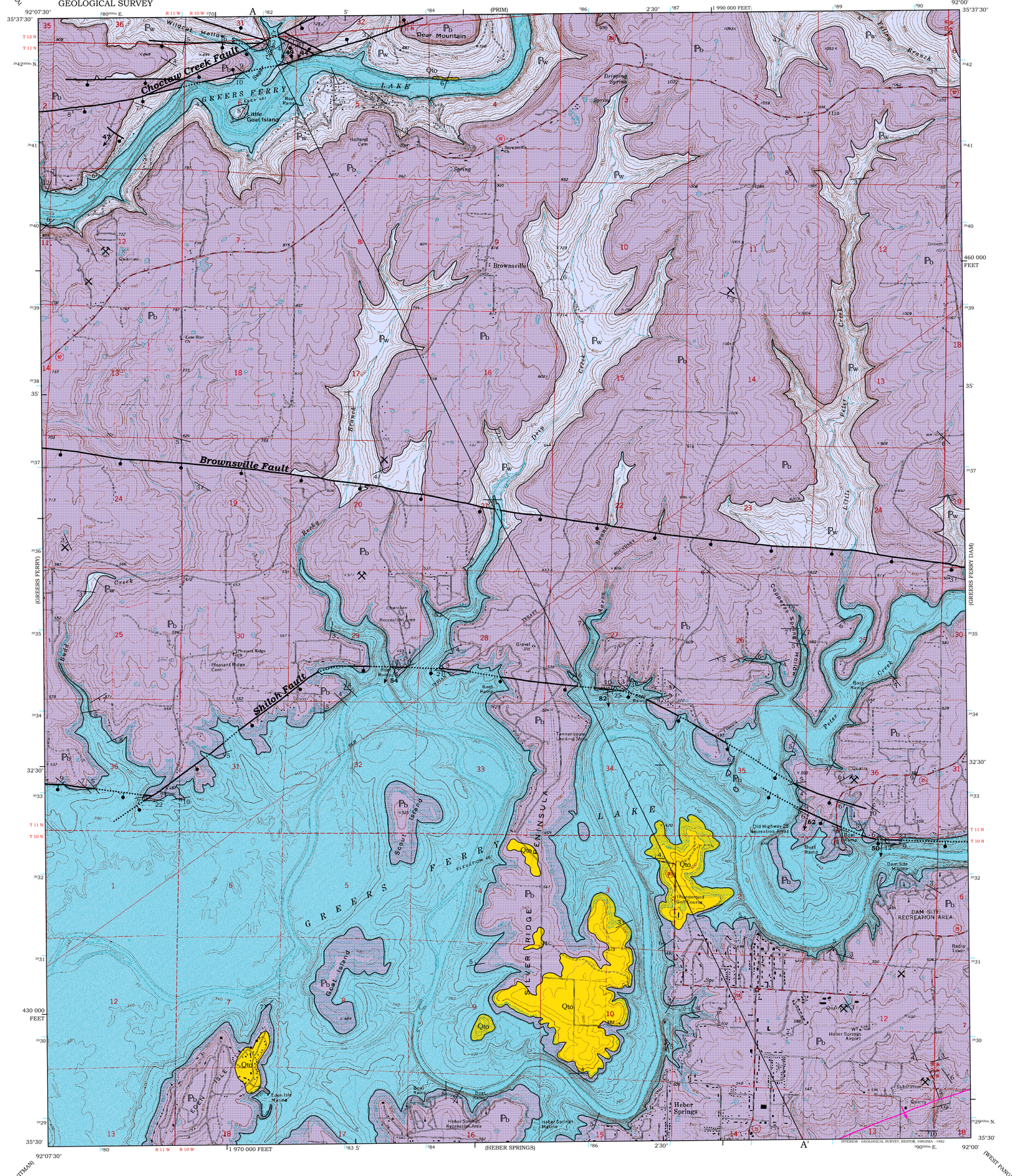
2016

Digital Geologic Quadrangle Map
Brownsville Quadrangle, Arkansas
DGM-AR-00106

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

BROWNSVILLE QUADRANGLE
ARKANSAS
7.5 MINUTE SERIES (TOPOGRAPHIC)



The topographic base is a Digital Raster Graphic (DRG). The DRG is a scanned image of a U.S. Geological Survey standard series topographic map published in 1973 and photorevised in 1981.

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.

Approximate mean declination 2016

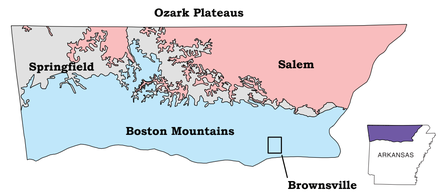
SCALE 1:24 000
1 MILE
1 KILOMETER
Contour Interval 20 Feet
National Geodetic Vertical Datum of 1929

QUADRANGLE LOCATION

Road Classification
- Secondary highway
- Light duty road
- Unimproved road
- State Route

Correlation of Map Units

Qto	Holocene and Pleistocene	Quaternary
Unconformity		
Pb	Morrowan	Pennsylvanian
Unconformity		
Pw		



Brownsville quadrangle location within the Ozark Plateaus.

Introduction

This map depicts the bedrock and surficial geology of the Brownsville 7.5-minute quadrangle. In this area, approximately 660 feet (201 meters) of Early Pennsylvanian (Morrowan) carbonate and clastic rocks are exposed. These rocks formed from sediment deposited in near-shore marine, deltaic and fluvial environments. The area is situated in the Interior Highlands Region on the southern flank of the Ozark Dome, a structural high centered in southeast Missouri. The dome has eroded to form several broad plateaus, the southernmost of which is the Boston Mountains Plateau, on which this quadrangle is located. Due to this structure, strata dip an average of about one degree to the south. Bench and bluff topography is characteristic of the area, and is due to differential weathering of sandstone and shale units. In 1962, the U.S. Army Corps of Engineers completed a dam at Heber Springs that flooded the valley of the Little Red River upstream creating Greers Ferry Lake. This lake now covers much of the area of this quadrangle.

There are three named structural features delineated on the map. The Choctaw Creek Fault in the northwest corner is part of a fault system that can be traced at the surface at least 28.5 miles (45.9 km). It is a normal fault downthrown approximately 50 feet (15 meters) to the south. An antithetic fault forms a graben south of the main fault. Preferential erosion along this fault system created the distinctive lineament which shapes the northern part of Greers Ferry Lake. The Brownsville Fault is a normal fault downthrown approximately 50 feet (15 meters) to the south. The Shiloh Fault is a normal fault downthrown approximately 150 feet (46 meters) to the south. Also, there are several strath terraces deposited by the Little Red River in the mapped area. These terraces were stranded when the river cut down from an elevation at least 260 feet (79 meters) above the modern channel bed. Samples of terrace material were collected and submitted for age analysis using optically stimulated luminescence (OSL) methods.

The geology of this area was mapped at the 1:100,000 scale for the Geologic Map of Arkansas circa 1973 by E. E. Glick. This map is primarily based on data collected by field observations made between September 2015 and January 2016. Representative rock samples were collected at various sites and thin sections were made to aid in petrographic and provenance studies. Site locations were recorded with a portable data collector.

Description of Map Units

Qto — **Old terrace and alluvial deposits (Quarternary)** - consists of unconsolidated clay, silt, sand, and gravel deposited by the Little Red River. Gravel consists primarily of white to orange, rounded sandstone cobbles, and rarely white to gray, subrounded chert cobbles. Gravel is typically medium pebble to small boulder sized, but ranges beyond these sizes. Matrix is typically sandy clay, locally, cemented by iron-oxide. Thickness unknown.

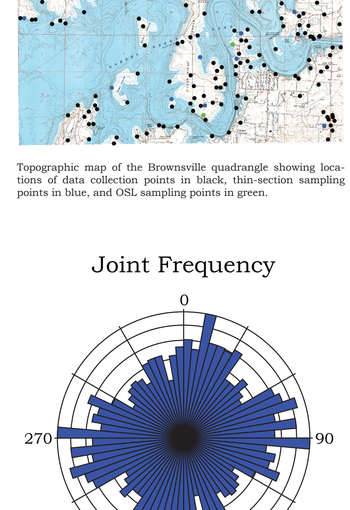
Pb — **Bloyd Formation - undifferentiated (Lower Pennsylvanian, Morrowan)** - consists of interbedded sandstone, siltstone, and shale units. A massive sandstone unit is typically present at the base in the northern part of the quadrangle. Sandstone beds are medium to thick, typically flat to lenticular, and locally stylolitic. Sandstone is very fine grained to fine grained, less commonly, medium-grained and locally micaceous. Typically orange, but locally tan, red, and/or white on fresh surfaces. Weathers light brown to dark brown. Locally displays rippled bedding, cross bedding, and soft sediment deformation. Locally contains shale and quartz pebbles, pebble molds, trace fossils, ironstone concretions, liesegang banding, boxwork, scour-and-fill structures, shale-partings, and petrified wood casts and molds. Fossils are rare but ammonoids are found locally. Shale is dark gray and siltstone is tan on fresh surfaces. Both weather tan to orange. Rests unconformable upon the Witts Springs Formation. Up to 280 feet (85.3 meters) thick.

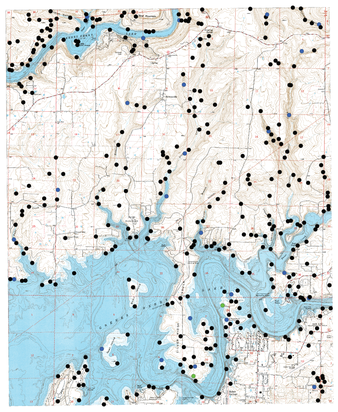
Symbols

- Contact
- Normal fault - dotted where concealed, bar on downthrown side, arrow indicates dip direction and magnitude of fault plane (50)
- Strike and dip of beds (7)
- Gravel Pit
- Quarry
- A — A' Line of cross-section
- Monocline

Pw — **Witts Springs Formation (Lower Pennsylvanian, Morrowan)** - consists predominantly of sandstone, including fossiliferous calcareous sandstone, with minor sandy limestone. Lesser units of shale and siltstone are also present. Sandstone is typically thin to thick bedded, and commonly cross bedded. Locally cross beds are overturned. Weathering commonly masks bedding so that it appears massive, and rounded or blocky. Sandstone is typically fine grained, but locally medium to coarse grained, and friable. Orange to buff on fresh surfaces, but weathers gray to brown, or orange. Commonly contains shale and quartz pebbles, pebble molds, and trace fossils. Liesegang banding, honeycomb weathering, and soft sediment deformation are common. Calcareous sandstone and sandy limestone typically contain crinoid fragments, but other fossils present may include: ammonoids, bryozoans, brachiopods, gastropods, and rugose and tabulate corals. Fossils commonly weather out leaving molds. Calcareous units are gray to brown on fresh surfaces, but weather brown to dark brown. Shale and siltstone units are commonly interbedded. Both are dark gray to black on fresh surfaces, but weather tan to orange. Up to 380 feet (115.8 meters) thick.

Stratigraphic Column



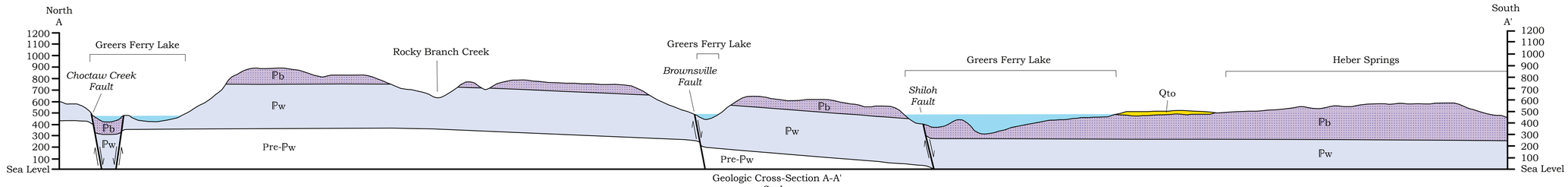


Topographic map of the Brownsville quadrangle showing locations of data collection points in black, thin-section sampling points in blue, and OSL sampling points in green.

Joint Frequency

n = 834

Rose diagram of strike frequency of joints recorded within the Brownsville quadrangle.



Geologic Cross-Section A-A'
Scale:
Horizontal: 1 Inch = 2000 Feet
Vertical: 1 Inch = 500 Feet (Exaggeration: 4x)

References

Glick, E. E., 1973, Partial geologic map of the Batesville quadrangle, Arkansas: Arkansas Geological Survey, Geologic Worksheet, 1 sheet, 1:100,000

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Limitations: This map, like all geologic maps, is based on interpretations which were made from the data available at the time it was created. As work continues and new information is collected, the contacts, structures, and other features depicted on this map may be changed.

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Map and cross-section digitized by Brian Kehner.