GEOLOGICAL SURVEY

Geologic Map of the Sulphur Rock Quadrangle, Independence County, Arkansas

Angela K. Chandler, Thomas J. Liner, John T. Gist, and Ciara M. Mills
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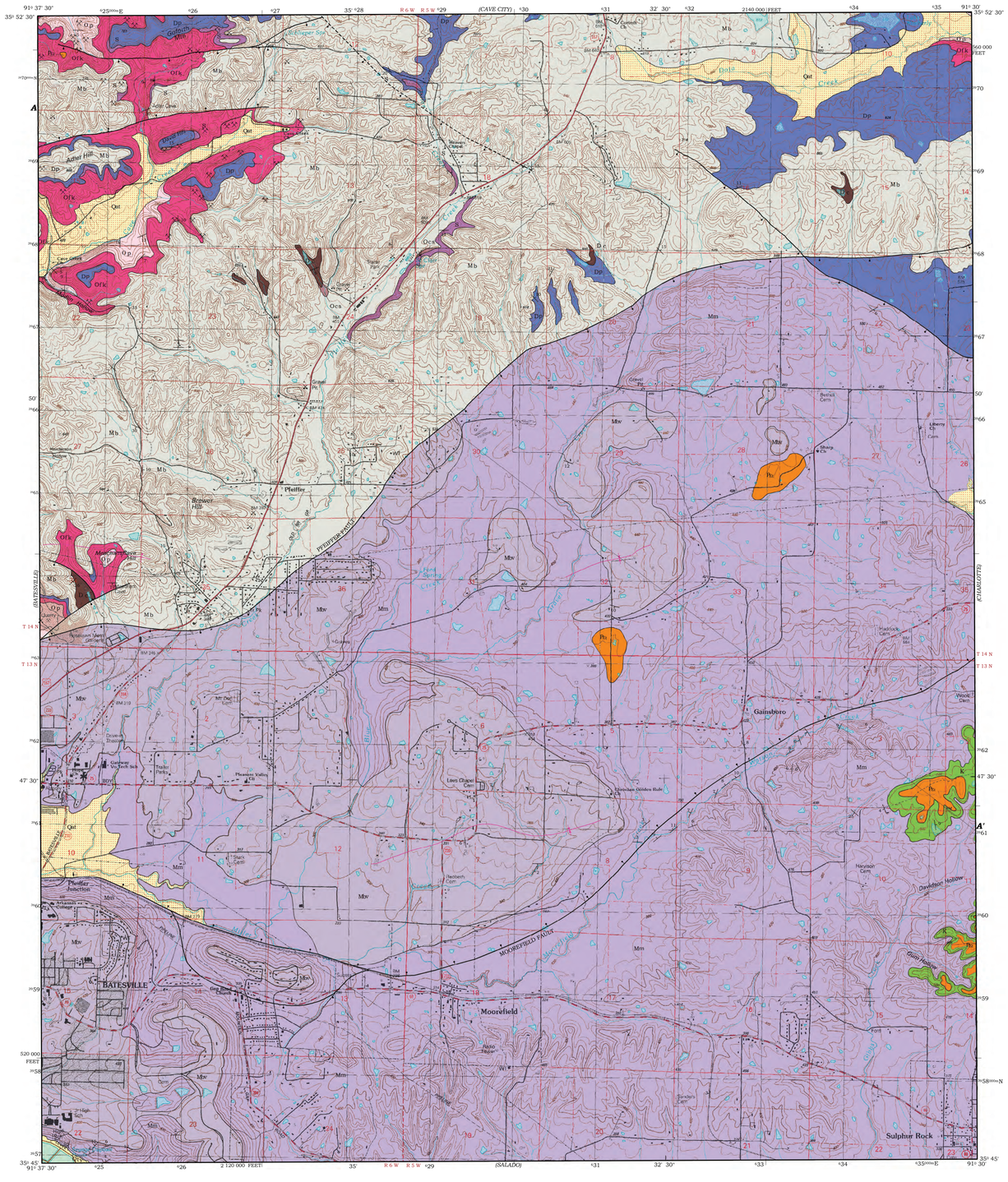
Scott M. Ausbrooks, Director and State Geologist

Digital Geologic Quadrangle Map
Sulphur Rock Quadrangle, Arkansas
DGM-AR-00836



Correlation of Map Units

Qat, Qty	Quaternary Pleistocene		Holocene
Unconformity			
PEt	Paleogene?		Paleogene?
Unconformity			
K	Cretaceous		Cretaceous
Unconformity			
Mbv	Chesterian		Mississippian
Mm	Meramecian		
Unconformity			
Mb	Osagean Kinderhookian		
Unconformity			
Dc	Upper to Lower		Devonian
Dp			
Unconformity			
S	Ludlow to Wenlock		Silurian
Unconformity			
Ocs	Upper		Ordovician
Unconformity			
Ofk			
Unconformity			
Op	Middle		

Location of Sulphur Rock quadrangle within the Ozark Plateaus.

Introduction

This map illustrates the surface geology of the Sulphur Rock quadrangle. The northwest portion of this quadrangle was mapped through the Earth Mapping Resources Initiative (EMRI) and the remaining portion of the quadrangle was mapped through the National Cooperative Geologic Mapping Program (STATEMAP).

Approximately 750 feet (240 meters) of Middle Ordovician to Late Mississippian strata are exposed on this quadrangle. Stranded Cretaceous sand and clay and Paleogene terrace deposits are preserved in several areas. A thick regolith consisting of red clay and chert fragments from the Boone Formation is present along faults and at other locations throughout the quadrangle. Much of the area is underlain by carbonate rocks and karst features including caves, disappearing streams, sinkholes, solutioned joint systems, and springs are common.

Several normal faults are present throughout the quadrangle. Displacement along the faults is primarily downthrown to the south except for the Moorefield Fault which is downthrown to the north. The Pfeiffer Fault and the Moorefield Fault bound a graben that contains at least two synclines.

This area was prospected for manganese from the late 1800's until the 1950's (Miser, 1922 and Stroud et al., 1981). Most mining was concentrated at the top of the Fernvale and the overlying Cason Formation. Other units that were mined for manganese are the Penters Chert, Lafferty Limestone, and the top of the Plattin Limestone.

The geology of the Sulphur Rock quadrangle was previously mapped in 1973 by E.E. Glick of the USGS for the 1:500,000-scale Geologic Map of Arkansas. This map builds on previous work but uses more detailed stratigraphy and depicts structures in greater detail. Field data was recorded on a portable GPS data collector and uploaded to a geodatabase.

Symbols

- Contact
- A — A′ Line of cross-section
- Normal fault - ball and bar on downthrown side. Dashed where inferred.
- Syncline
- Inclined bedding showing strike and dip
- Quarry or mine
- Gravel pit
- Secondary highway
- Light duty road (paved)

The topographic base is a collarless Digital Raster Graphic (DRG). The DRG is a scanned image of a U.S. Geological Survey 7.5-minute series topographic map published in 1989.

10,000-foot grid based on Arkansas coordinate system, north zone. 1000-meter Universal Transverse Mercator grid, zone15. 1927 North American Datum.

0° 33′ TRUE NORTH MAGNETIC NORTH
Approximate mean declination 2022

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

ARKANSAS
Quadrangle Location

Description of Map Units

Alluvium and terrace deposits (Quaternary) - unconsolidated clay, silt, sand, and gravel including deposits on one or more terrace levels along the larger tributaries. Ranges from approximately 10 to 15 feet (3-5 meters) thick.

Young terrace and active channel deposits (Quaternary) unconsolidated clay, silt, sand, and gravel in gravel bars and sandy point bar deposits along the White River. Primarily clay, silt, and sand in youngest terrace above the river. The tops of terraces are generally flat but can be hummocky and dissected by tributaries. Approximately 20-30 feet (6-9 meters) thick.

Terrace deposits (Paleogene?) - stranded gravel deposits sparsely located throughout the quadrangle. Deposit consists of unconsolidate, coarse sand- to cobble-sized angular to rounded chert and sparse sandstone on hilltops that are 200-300 feet above nearby drainages (60-91 meters). Historically, these deposits have been assigned to the Tertiary, (Glick 1973). Ranges from a veneer up to 20 feet (6 meters) thick.

Cretaceous undifferentiated (Cretaceous) - loosely consolidated, medium to coarse-grained, dark-red sand interbedded with light-gray or red clay. Contains abundant iron-cemented beds or cobbles and concretions in shapes consistent with liesegang banding. Highly prone to gully erosion. Upper surface is hummocky where overlain by gravel deposits. Unconformable with the Paleozoic rocks below. Ranges from 20-40 feet (6-12 meters) thick.

Batesville Sandstone (Upper Mississippian, Chesterian) - fine to medium-grained, sub-angular, moderately sorted, iron-cemented sandstone. Thin to medium bedded and flat bedded, but locally cross bedded. White to buff, tan, orange, and light brown on fresh surfaces and commonly banded. Weathers light to dark gray and dark brown. Conformable with the Moorefield Formation. Up to approximately 60 feet (18 meters) thick.

Moorefield Formation (Upper Mississippian, Meramecian, and Chesterian) - fissile shale interbedded with very-thin-to thin-bedded siltstone and finely crystalline limestone. Shale is dark gray to black on fresh and weathered surfaces. Siltstone is dark gray to brown on fresh surfaces but weathers light gray to buff. The finely crystalline limestone is commonly black but weathers light gray to white. Solutioning along joints is common in the limestone. Sparsely fossiliferous with mostly crushed brachiopods. Unconformable with the underlying Boone Formation. Ranges from approximately 80 to 180 feet (24 to 54 meters) thick.

Boone Formation (Lower Mississippian, Osagean and Kinderhookian) - fine-grained limestone interbedded with anastomosing and bedded chert. Light to medium gray on fresh surfaces but usually weathers to dark gray. The chert varies in color from white to light gray in the upper portion to dark gray or blue gray in the lower portion. Springs, caves, and sinkholes are common. Red clay mixed with angular chert fragments from the Boone and, where present, the underlying Penters Chert form a thick regolith throughout the area. Unconformable with underlying formations. Several quarries are present in the Boone regolith where it is especially thick along Highway 167. Approximately 100-200 feet (30-60 meters) thick.

Chattanooga Shale (Upper Devonian) - clay shale that is black on fresh surfaces and weathers dark gray to black. Unconformable with the underlying Penters Chert. Up to 20 feet (6 meters) thick where present.

Penters Chert (Lower to Middle Devonian) - medium to thick bedded chert. Gray and white banding is common but red, orange, and white mottling is also present. Commonly brecciated and highly fractured. Contains drusy quartz and manganese oxide coatings. Locally, chert is present as residual boulders. Historically mined for manganese. Unconformable with the underlying Lafferty Limestone. Approximately 15-60 feet (4-18 meters) thick.

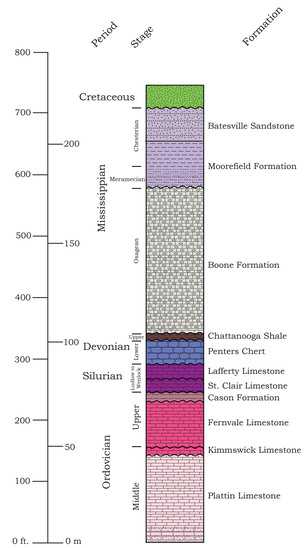
Lafferty Limestone (Silurian, Ludlow to Wenlock) - sparsely fossiliferous, finely-crystalline limestone. Commonly medium gray with red crinoidal fragments on fresh surfaces and weathers light gray. Thin to thick bedded and commonly stylolitic along bedding planes. Conformable with the underlying St. Clair Limestone. Up to 20 feet (6 meters) thick.
St. Clair Limestone (Silurian, Wenlock) - coarse-grained fossiliferous limestone. Contains abundant trilobite fragments and green clay, locally. Light gray to white on fresh surfaces but weathers medium gray. Unconformable with the underlying Cason Formation. Up to 15 feet (4.5 meters) thick.

Cason Formation (Upper Ordovician) - thin to medium bedded, reddish brown to buff siltstone interbedded with silty shale. Locally contains white chert fragments and flattened impressions of buttons. Historically mined for phosphate and manganese. Unconformable with the underlying Fernvale Limestone. Up to 10 feet (3 meters) thick.

Fernvale Limestone (Upper to Middle Ordovician) - medium to coarsely crystalline limestone. Medium to thick or massive bedded. Light pink to reddish on fresh surfaces, but weathers dark gray to brown. Fossils include barrel-shaped crinoids, brachiopods, bryozoans, and corals. Caves and sinkholes are abundant. Manganese oxide is present in nodules and thin horizontal zones within the upper portion of the limestone. Unconformable with the underlying Kimmswick Limestone. Ranges up to 120 feet (37 meters) thick.
Kimmswick Limestone (Middle Ordovician) - medium crystalline gray to white stylolitic limestone. Locally contains chert fragments. Contains brachiopods, bivalves, crinoids, and horizontal trace fossils. Unconformable with the underlying Plattin Limestone. Approximately 20 feet (6 meters) thick where present.

Plattin Limestone (Middle Ordovician) - very thin to medium bedded micritic to finely crystalline limestone. Light to medium gray on fresh surfaces, but weathers white to light gray and is locally mottled. Fossils include gastropods, bryozoans, and stromatolites. Horizontal and vertical trace fossils are locally filled with silt, especially in the upper section. Very thin shale layers are present in the top of the unit. Limestone glades containing abundant solutionally enlarged joints are present thoughout the outcrop area. Sinkholes and springs are abundant. Up to 200 feet (60 meters) exposed on this quadrangle.

Stratigraphic Column



Topographic map of the Sulphur Rock quadrangle showing location of data collection points.

Finely crystalline limestone of the Moorefield Formation exposed in Watson Creek. Note joint pattern.

Joint Frequency

n = 370

Rose diagram of the strike frequency of joints recorded within the Sulphur Rock quadrangle.

References

Adams, G.I., Purdue, A.H., and Ulrich, E.O., 1904, Zinc and lead deposits of northern Arkansas: U.S. Geol. Survey Prof. Paper 24, 118p.

Glick, E.E., 1973, Geologic map of the Sulphur Rock quadrangle, Independence County, Arkansas: Arkansas Geological Survey Geologic Worksheet, 1 sheet, 1:24,000.

Stroud, R.B., Kline, H.D., Brown, W.F., and Ryan, J.P., 1981, Manganese resources of the Batesville District, Arkansas: Arkansas Geological Survey Information Circular 27, 146 p.

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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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https://www.geology.arkansas.gov/maps-and data/geologic-maps/geologic-quadrangle-maps-for arkansas-1-24k-scale.html

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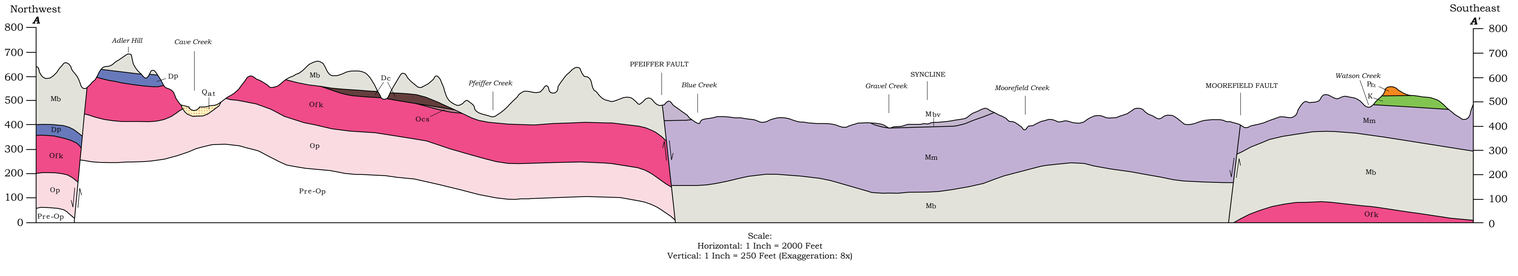
Map and cross section digitized by Jerry Clark.



Scale:
Horizontal: 1 Inch = 2000 Feet
Vertical: 1 Inch = 250 Feet (Exaggeration: 8x)