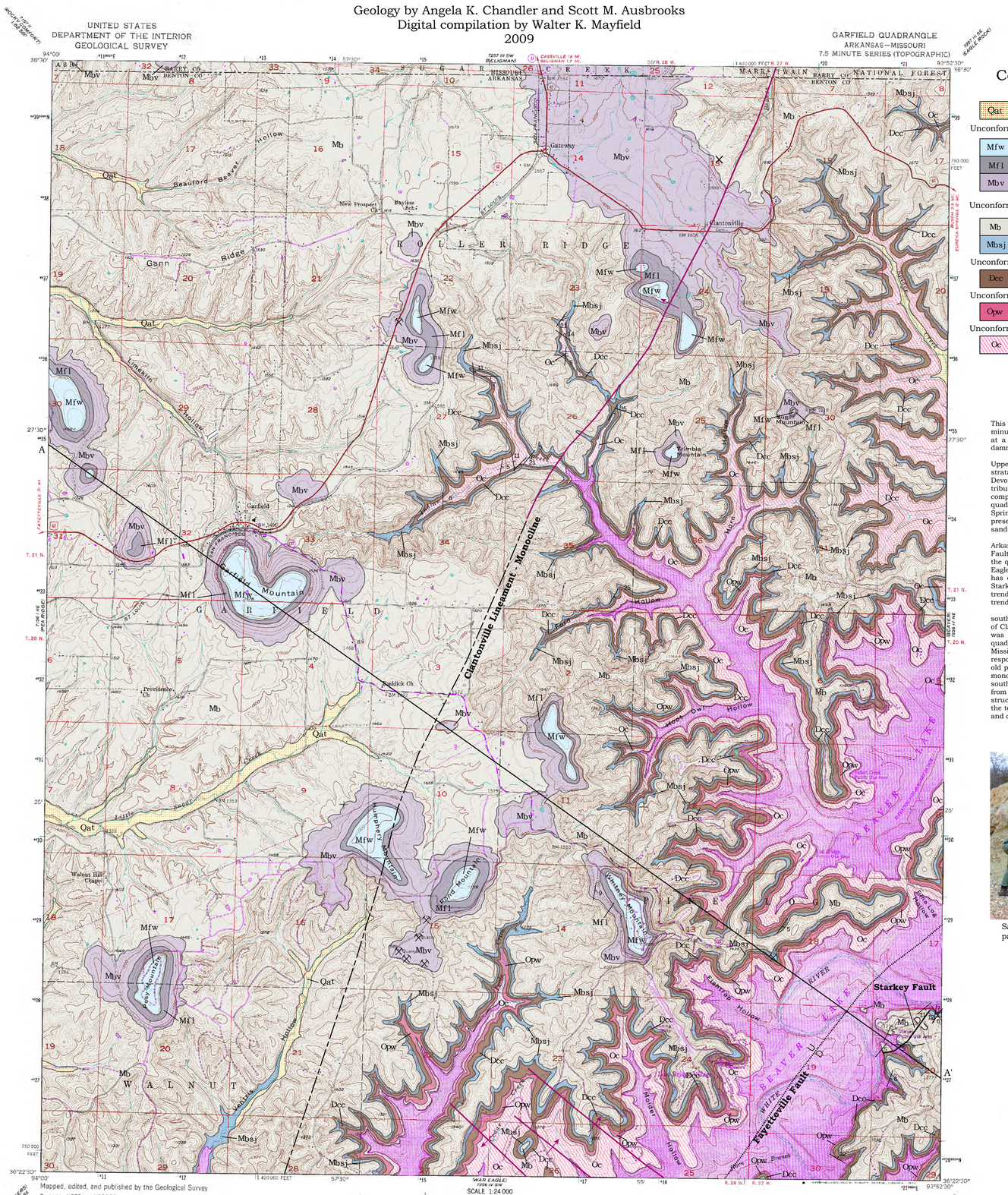
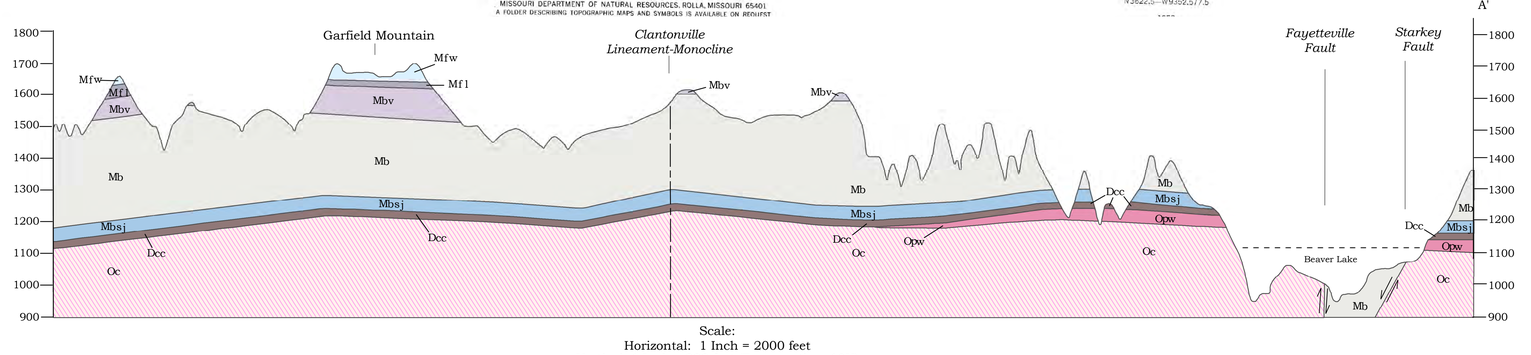
Arkansas Geological Survey
Bekki White, State Geologist and Director

Digital Geologic Quadrangle Map
Garfield, Arkansas
DGM-AR-00320

GEOLOGIC MAP OF THE GARFIELD QUADRANGLE BENTON COUNTY, ARKANSAS

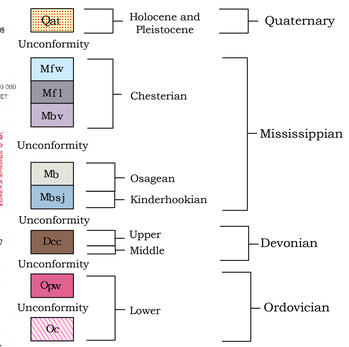
Geology by Angela K. Chandler and Scott M. Ausbrooks
Digital compilation by Walter K. Mayfield
2009





Scale:
Horizontal: 1 Inch = 2000 feet
Vertical: 1 Inch = 200 feet (Exaggeration: 10X)

Correlation of Map Units



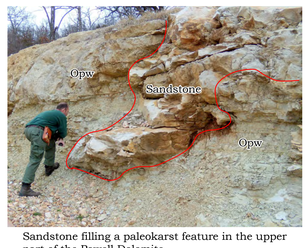
Introduction

This map illustrates the surface geology of the Garfield 7.5 minute quadrangle. This quadrangle was previously mapped at a 1:24,000 scale by Ernest E. Glick in 1970 before the damming of Beaver Lake.

Approximately 700 feet of Lower Ordovician, Middle to Upper Devonian and Lower and Upper Mississippian age strata are present on this quadrangle. Upper Ordovician and Devonian strata crop out around Beaver Lake and its tributaries. The Lower Mississippian Boone Formation comprises the surface rock over the majority of this quadrangle and forms the surface of the heavily dissected Springfield Plateau. Upper Mississippian age strata are present on the higher hills that are capped by resistant sandstone of the Wedington Member of the Fayetteville Shale.

Lineaments and faults characteristic of northwest Arkansas are present in this quadrangle. The Fayetteville Fault is concealed by Beaver Lake in the southeastern part of the quadrangle but can be seen to the southwest on the War Eagle Quadrangle. This fault is the west side of a graben that has down-dropped the Boone Formation to lake level. The Starkey Fault bounds the east side of the graben. Both faults trend approximately N 45ºE. One section of the Starkey fault trends N 60-70ºE.

The Clantonville Lineament – Monocline is a northeast to southwest trending structural feature that extends from north of Clantonville to Ventris Hollow. The location of this feature was determined from the 1:24,000 three dimensional quadrangle and from structural disparities in the Lower Mississippian rock units. This structural feature could be responsible for the presence of lead-zinc mineralization in an old prospect near Clantonville. The trend of this lineament to monocline is N 30-40ºE. Smaller monoclines are present in the southern portion of the quadrangle and correlate with faults from the War Eagle Quadrangle. Trend of these opposing structural features are N 45-50º W. Paleokarst features within the top of the Powell Dolomite are present around Beaver Lake and coincident with a lineament in Limekiln Hollow.



Sandstone filling a paleokarst feature in the upper part of the Powell Dolomite.

Symbols

- Contact
- Fault - U/D (U - upthrown, D - downthrown)
- Fault - concealed
- Lineament
- Strike and dip of inclined bedding (10)
- Monocline
- Lead and zinc prospect
- Quarry
- Limekiln tunnels

Description of Map Units

Qat — **Alluvium and terrace deposits (Quaternary)** - Unconsolidated clay, silt, sand and gravel including deposits on one or more terrace levels. Approximately 5-10 feet (1-2 m) exposed in the creeks.

Fayetteville Shale (Upper Mississippian, Chesterian) – The Fayetteville Shale can be divided into a lower part and an upper part separated by the Wedington Sandstone Member. Only the lower part and the Wedington Sandstone are present in this quadrangle. The Fayetteville Shale is unconformable with the underlying Batesville Sandstone.

Mfw — **Wedington Sandstone Member –** A fine to medium-grained sandstone that contains thin- to very thin, ripple bedded siltstones at the base. The sandstone is thin- to medium-bedded and contains cross-beds, liesegang banding and pock-marks or honeycomb weathering. Plant fossils, bryozoans and brachiopods are also present. The sandstone is yellowish to reddish or white on fresh surfaces but weathers gray. The contact with the underlying lower part was rarely seen, but at one location consists of interbedded shale with very thin-bedded ripple-bedded silt to very fine-grained sandstone. The Wedington Sandstone is a small bluff former that caps the hills in this quadrangle. Approximately 20-60 feet (6-18 m) exposed above the lower part of the Fayetteville.

Mfl — **Lower part** – A black clay shale that contains ironstone concretions at a few localities. Unconformable with the underlying Hindsville Limestone Member of the Batesville Sandstone. Approximately 20-30 feet (6-9 m) thick.

Mbv — **Batesville Sandstone (Upper Mississippian, Chesterian)** – Consists of very fine grained thin-bedded micaceous sandstone. The sandstone is light brown to gray on fresh surfaces but weathers orange buff to light gray. Contains pyrite and green shale partings which give the sandstone a greenish color at a few localities. Also contains, trace fossils, crinoid molds, laminae and cross-bedding. The sandstone is conformable with the Hindsville Limestone Member. Ranges from 5-15 feet (1-5 m).

Hindsville Limestone Member - A thin-bedded, fine- to coarsely crystalline limestone. The limestone is light- to dark-gray on fresh surfaces, but generally weathers to a light-gray or brown. Usually has a strong petroliferous odor on freshly broken surfaces. The limestones are fossiliferous and/or oolitic, contain pyrite and at various localities are interbedded with thin layers of clay shale and thin beds of siltstone to fine-grained sandstone. A breccia containing angular chert and limestone fragments at the base of this interval is present at one locality in the quadrangle. Approximately 60-80 feet (18-24 m) thick.

Mb — **Boone Formation (Lower Mississippian, Osagean and Kinderhookian)** - Coarse-grained fossiliferous and fine-grained limestones interbedded with anastomosing and bedded chert. Light to medium gray on fresh surfaces but usually weathers to a 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. Fairly chert free sections are petroliferous and contain brachiopods, corals and crinoids. A white oolitic limestone, possibly equivalent to the Short Creek Oolite, is present in the upper part of the Boone at a few localities. Springs and sinkholes are abundant. The Boone Formation caps the Springfield Plateau on this quadrangle and exhibits a fairly flat topography. The Boone regolith consists of red to orange clay with chert fragments and can be up to 40 feet (12 m) thick in this area. Approximately 340-400 feet (103-116 m) exposed on this quadrangle.

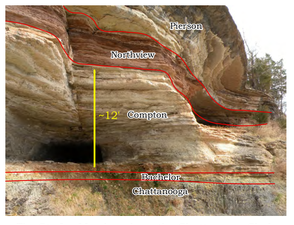
Mbsj — **St. Joe Limestone Member (Lower Mississippian, Kinderhookian)** – Consists of medium to coarsely crystalline and fine-grained thin-bedded limestone. These units are recognized as Formations in Missouri as follows: Bachelor, Compton, Northview and Pierson, respectively from oldest to youngest. These same units can be recognized in the St. Joe Limestone Member in Arkansas. Ranges from 20-40 feet (6-12 m) thick.

Pierson – Fine to coarsely crystalline, thin to thick planar bedded crinoidal limestone. Gray to white on weathered surfaces and gray to reddish gray on fresh surfaces. Forms the upper 10-15 feet (3-5 m) of the St. Joe bluff above the Northview re-entrant.

Northview –Fine-grained argillaceous limestone. Red to gray green on fresh and weathered surfaces. Forms 2-3 feet (1m) re-entrant between the Compton and Pierson Limestones.

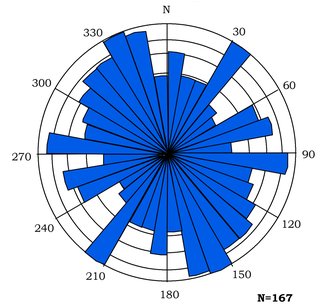
Compton – Fine-to medium-grained crinoidal limestone; thin bedded with wavy or nodular bedding. Gray to reddish gray on fresh surfaces but weathers light-gray to white. Contains brown to reddish chert with white crinoid fragments and horizontal trace fossils. Ranges from 12-15 feet (3-5 m) thick.

Bachelor – A gray green clay shale. Contact with underlying Chattanooga Shale is sharp and unconformable. Ranges from 0-1 foot (0-.3 m) thick.



The St. Joe Member above the Chattanooga Shale showing four recognizable units.

Joint Diagram



Rose diagram of strike frequency of joints recorded within the Garfield Quadrnangle.

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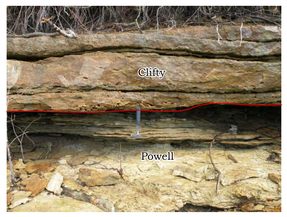
Dcc — **Chattanooga Shale (Devonian)** - A clay shale that is black on fresh and weathered surfaces. It contains very small iron concretions and pyrite-marcasite concretions that vary in size from one inch to three inches (76 mm) in diameter. Ranges from 10-40 feet (3-12 m) thick.

Clifty Sandstone (Devonian) – A fine-grained thin-to thick-bedded, silica-cemented sandstone. White on fresh surfaces and gray to orange on weathered surfaces. At some localities the sand is friable but more commonly is silica-cemented. Usually two sandstone beds can be distinguished within the sandstone ledge; however at a few localities several sandstone beds can be differentiated. The Sylamore Sandstone which is the basal member of the Chattanooga Shale may be present in the upper portion of this sandstone (Manger, 1985) at Beaver Dam. The sandstone contains chert fragments and pebble clasts/molds on the basal portion of bedding planes. At one locality mostly bedded chert is present. The Clifty Sandstone is unconformable (locally angular) with the underlying Powell or Cotter Dolomites. Ranges from 2-10 feet (.5-3 m) thick.

Opw — **Powell Dolomite (Lower Ordovician)** – A very fine-to fine-grained thin-to medium-bedded argillaceous and mottled dolostone. White to light-gray on fresh and weathered surfaces. The dolostone contains calcite vugs, gastropods and stromatolites. Very thin bedded gray-green to reddish shales are interbedded with the dolostone at a few localities. The basal contact is placed at the appearance of banded chert nodules and/or chert breccia in the upper portion of the Cotter Dolomite. Ranges from 0 - 30 feet (0-9 m) thick.

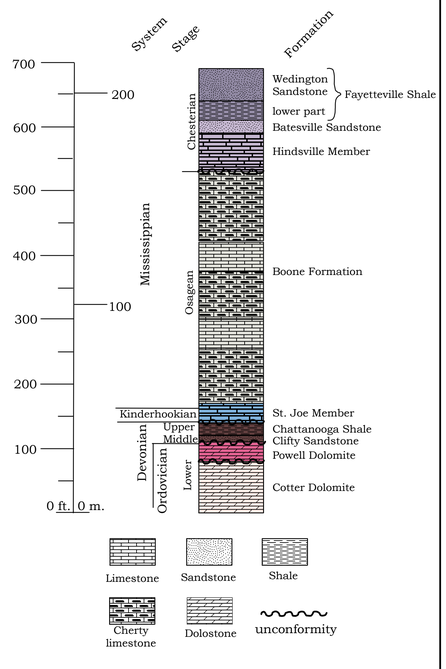
Oc — **Cotter Dolomite (Lower Ordovician)** – A fine-to medium-grained dolostone with interbedded mottled dolostone. Light gray on fresh surfaces but weathers dark gray. The dolostone contains banded chert or angular chert fragments at the upper contact with the Powell Dolomite. This unit also contains stromatolites, oolitic chert fragments and drusy quartz. At a few localities greenish clay shale is present as well as white coarse-grained sandstone in the upper portion of the dolostone. Small vugs containing pink dolomite are present in the dolostone in the Indian Creek area. Approximately 60 - 100 feet (18-30 m) of section is exposed around Beaver Lake.



The Clifty Sandstone above the Powell Dolomite.

Very thin-bedded shale in the Powell Dolomite.

Stratigraphic Column



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