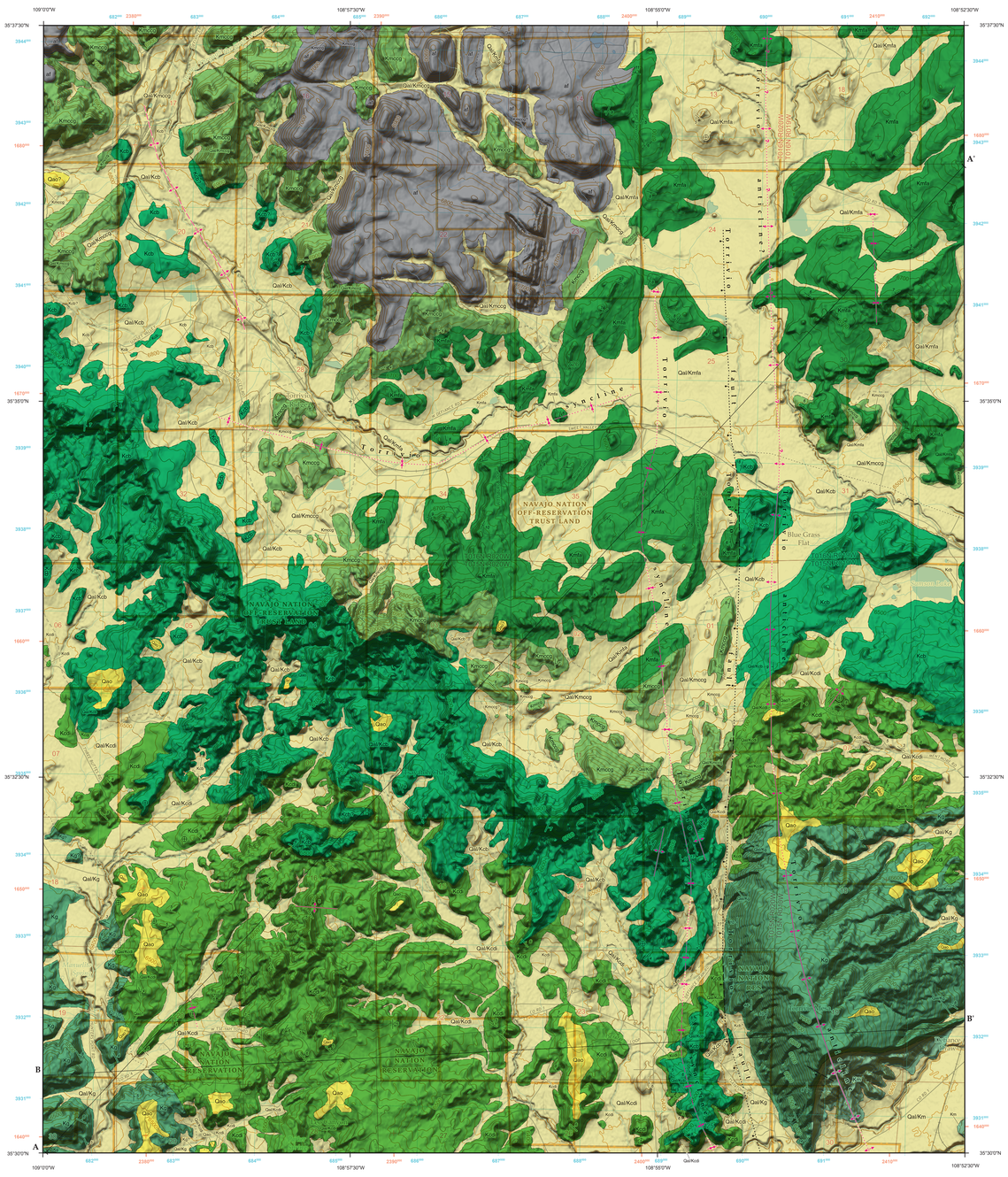
NMBGMR Open-File Geologic Map 312
Last Modified: August 2024



Base map from U.S. Geological Survey 2020.
North American Datum of 1983 (NAD83)
Projection and 1,000-meter grid: Universal Transverse Mercator, Zone 12S, shown in blue.
10,000-foot ticks: New Mexico Coordinate System of 1983 (West Zone), shown in red
Roads.....U.S. Census Bureau, 2015–2016
Names.....GNIS, 2016
Hydrography.....National Hydrography Dataset, 2014
Contours.....IFSAR 4.5 m Digital Terrain Model, 2008
Wetlands.....FWS National Wetlands Inventory 1977–2014
Public Land Survey System.....BLM, 2019

Quadrangle Location

1:24,000

1 0.5 0 1 Mile

1000 0 1000 2000 3000 4000 5000 6000 7000 Feet

1 0.5 0 1 Kilometer

Contour Interval 20 Feet
North American Vertical Datum of 1988

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This and other STATEMAP quadrangles are available for free download in both PDF and ArcGIS formats at:

https://geoinfo.nmt.edu

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New Mexico Bureau of Geology and Mineral Resources
Open-File Geologic Map 312

Geologic Map of the Samson Lake 7.5-Minute Quadrangle, Navajo Nation; McKinley County, New Mexico

September 2024

by
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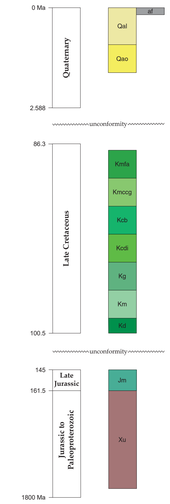
Correlation of Map Units



Explanation of Map Symbols

Contact—The identity and existence are certain. The location is accurate where solid, approximate where dashed, and concealed where dotted.

Gradational contact—The identity and existence are certain. The location is approximate where dashed and concealed where dotted.

Normal fault—The identity and existence are certain. The location is accurate where solid, approximate where dashed, and concealed where dotted. Bar and ball are on the downthrown block.

Fault in cross section showing local up/down offset—Arrows show relative motion along the fault plane.

Unconformable contact—The identity and existence are certain. The location is accurate.

Anticline—The identity and existence are certain and questionable where queried. The location is accurate where solid, approximate where dashed, and concealed where dotted.

Syncline—The identity and existence are certain. The location is accurate where solid, approximate where dashed, and concealed where dotted.

Asymmetric anticline—The identity and existence are certain. The location is accurate where solid and concealed where dotted. Beds are upright; the shorter arrow is on the steeper limb.

Horizontal bedding

Inclined bedding—Showing strike and dip.

Cross section line and label.

Comments to Map Users

A geologic map displays information on the distribution, nature, orientation, and age relationships of rock and deposits and the occurrence of structural features. Geologic and fault contacts are irregular surfaces that form boundaries between different types or ages of units. Data depicted on this geologic quadrangle map may be based on any of the following: reconnaissance field geologic mapping, a compilation of published and unpublished work, and photogeologic interpretation. Locations of contacts are not surveyed but are plotted by interpretation of the position of a given contact onto a topographic base map; therefore, the accuracy of contact locations depends on the scale of mapping and the interpretation of the geologist(s). Any enlargement of this map could cause misunderstanding in the detail of mapping and may result in erroneous interpretations. Site-specific conditions should be verified by detailed surface mapping or subsurface exploration. Topographic and cultural changes may not be shown due to recent development.

Cross sections are constructed based upon the interpretations of the author made from geologic mapping and available geophysical and subsurface (drill hole) data. Cross sections should be used as an aid to understanding the general geologic framework of the map area and not be the sole source of information for use in locating or designing wells, buildings, roads, or other human-made structures.

The New Mexico Bureau of Geology and Mineral Resources created the Open-File Geologic Map Series to expedite the dissemination of these geologic maps and map data to the public as rapidly as possible while allowing for map revision as geologists continued to work in map areas. Each map sheet carries the original date of publication below the map and the latest revision date in the upper right corner. In most cases, the original publication date coincides with the date of delivery of the map product to the National Cooperative Geologic Mapping Program (NCGMP) as part of New Mexico's STATEMAP agreement. While maps are produced, maintained, and updated in an ArcGIS geodatabase, at the time of the STATEMAP deliverable, each map goes through cartographic production and internal review before uploading to the Internet. Even if additional updates are carried out on the ArcGIS map data files, citations to these maps should reflect this original publication date and the original authors listed. The views and conclusions contained in these map documents are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the State of New Mexico or the U.S. Government.

Description of Map Units

QUATERNARY

af **Artificial fill (Recent)—**Areas that have been regraded due to mining activities.

Qal **Quaternary alluvium (Late Pleistocene to Holocene)—**Well-exposed, poorly sorted, thin- to thick-bedded, brown to pale-tan and yellowish, very fine- to coarse-grained, sometimes pebbly to cobbly, lenticular to tabular sand, silty sandstone, silt, and clayey silt. This unit covers extensive areas along modern valley bottoms and is well-exposed along modern drainages where channels have commonly incised 3–15 m in modern times. May contain some eolian and, particularly, reworked eolian material as well as "canyon-mouth" fans. Commonly at least 5–10 m thick and up to 20 m in valley axes. Contacts for this map unit are mapped as "approximately located" due to poor exposure except along incised channels. Mapped where >1 m thick.

Qao **Older quaternary alluvium (Pleistocene)—**Poorly exposed, loose to friable, reddish- to dark-brown, cobbly to sandy alluvium found it high topographic positions.

CRETACEOUS

Kmfa **Allison Member of the Menefee Formation (Late Cretaceous)—**The Allison Member (named for Allison, NM; a small community located immediately west of Gallup and on the adjacent Gallup West quadrangle) is most conspicuously composed of well-exposed, yellow- to brownish-weathering, moderately poor- to moderately well-sorted, quartz-rich, often feldspathic, carbonate-cemented, thin- to very thick-bedded, indistinctly cross-bedded to planar bedded, friable, broadly lenticular ((individual sandstone bodies rarely exceed a half mile in outcrop length (O'Sullivan et al., 1972)) sandstone containing rare channel fills indicating probably northward and northeastward paleotransport. Sandstones sometimes contain rust-colored (ironstone?) concretions >1 m in diameter, particularly to the north of the map area where they are characteristic of some parts of this unit. The Allison Member also contains substantial proportions of less well-exposed loose, fine grained sandstone, siltstone and shale. Coal comprises a relatively small proportion of the Allison Member and this has been used to distinguish it from the underlying Cleary Coal Member, with which it is gradational and/or interfingering. Coal beds in the Allison are generally less than 14 in. thick (Sears, 1925; Dillinger, 1990). Since coal beds are discontinuous and variable in thickness, this makes for a vaguely defined lower contact, and the position of this contact is not well constrained in the Gallup area (mapped contact is probably +/-30 m stratigraphically in many places). As near as possible we have tried to map this contact at the top of the last coal bed >14 in. within Kmccg. The Allison Member is at least 10–60 m thick, on the Samson Lake quadrangle, but upper contact is eroded and unit is at least 600 m thick, regionally.

Kmccg **Cleary Coal Member of Menefee Formation and Gibson Member of Crevasse Canyon Formation, undivided (Late Cretaceous)—**The Cleary Coal Member of the Menefee Formation and Gibson Member of Crevasse Canyon Formation cannot be divided south and west of the pinch out of the Point Lookout Sandstone, which occurs approximately 12 mi northeast of Gallup (O'Sullivan et al, 1972). This Member is composed of a diverse suite of swamp and fluvial sediments. Sandstones are yellowish to brownish weathering, very fine- to coarse-grained, lenticular, and poorly to well-sorted. Shale and siltstone are also present and are generally poorly exposed. The top of this unit is mapped as near as possible to the stratigraphically highest coal bed >14 in. thick (see description of Allison Member). The lower contact is similarly mapped near the lowest coal bed >14 in. thick, but variation in coal thicknesses and the stratigraphic position of thicker coal beds (lenses) make for a somewhat arbitrary lower contact. Dillinger (1990) reports coal beds up to 2 m thick in the Clearly Coal Member, but coal bed thicknesses are highly variable in the region (e.g. O'Sullivan, et al, 1972), and coal beds are not laterally extensive. Thickness ranges from about 60–80 m.

Kcb **Bartlett Barren Member of Crevasse Canyon Formation (Late Cretaceous)—**The Bartlett Barren Member is composed of mostly poorly exposed, reddish, pinkish, greenish and brownish silt, sandy silt and clayey silt and sandstone. Sandstones are poorly to moderately exposed, loose to friable, thin- to thick-bedded, very fine- to medium-grained, and carbonate-cemented. Interpreted as the landward equivalent of the Gibson/Cleary Members (see above). For discussions of contacts see overlying and underlying unit descriptions. The Bartlett Barren Member is 21–128 m thick, regionally (Kirk and Zech, 1987) and 80–100 m on the Samson Lake quadrangle.

Kcdl **Dilco Member of Crevasse Canyon Formation (Late Cretaceous)—**Mostly poorly exposed, light- to dark-gray and brown, thin- to thick-bedded, friable shale and siltstone and poorly to well-exposed, thin- to thick-bedded, very fine- to medium-grained, poorly to well-sorted sandstone. 21–67 m thick on the nearby Big Rock Hill quadrangle (Kirk and Zech, 1987). The Dilco Member is 80–120 m on the Samson Lake quadrangle.

Kg **Gallup Sandstone (Late Cretaceous)—**Well-exposed, very fine- to medium-grained, well-sorted, cross-bedded, thin to thick-bedded cliff-forming sandstone. Composed of transgressive/regressive marine and marginal marine sandstones with uncommon silty/shaly and coal beds. The upper part of the Gallup Sandstone is sometimes mapped separately as the Torrivio Sandstone, which is sometimes distinctive for its pinkish color, coarse-grained sandstone and the presence of feldspar (Thacker, in press Geologic Map of the Bread Springs Quadrangle). Although this unit is locally known as 'the pink sandstone' according to Sears (1925), in the map area it does not always exhibit this characteristic color, although some of the overlying sandstones of the lower Crevasse Canyon Formation do. Because the characteristic pinkish color is not prominent and not always confined to the upper beds on the Samson Lake quadrangle we have included the Torrivio Sandstone with the main body of the Gallup Sandstone here. The Torrivio Sandstone is interpreted as a fluvial rock (Anderson, 1990) and its presence, therefore, represents a transition from marine (the Gallup) to continental deposition during a relative sea-level fall. The sandstone is 10–50 m thick, regionally (Kirk and Zech, 1987), and ≈50 m exposed on the Samson Lake quadrangle.

Km **Mancos Shale (Late Cretaceous)—**Poorly exposed, black- to pale-grey, thin-bedded to laminated shale and thick-bedded, yellowish to light-grey sandstone. The Mancos has very limited exposures on the Samson Lake quadrangle. For a discussion of the upper contact of the Mancos, see the Gallup Sandstone description above. Regional thickness is 150–230 m (Dillinger, 1990) but only 30–50 m are exposed on the Samson Lake quadrangle.

CROSS SECTION ONLY

Kd **Dakota Sandstone (Late Cretaceous)—** Marine sandstone and shale. Approximately 50 m thick.

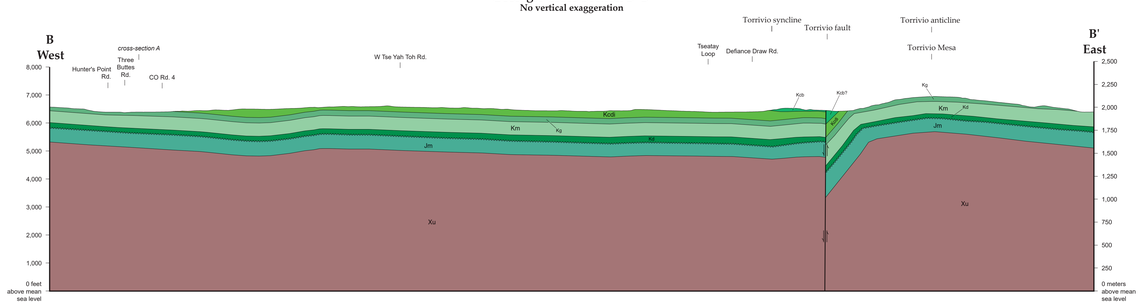
Rocks older than the Dakota Sandstone

Jm **Morrison Formation (Jurassic)—**Terrestrial sandstone, siltstone and shale. Approximately 120–200 m thick.

Xu **Older basement rocks, undivided (pre-Late Jurassic)—**Middle Jurassic through Proterozoic rocks. For descriptions of individual units see Hackman and Olson (1977) and Dillinger (1990).

Geologic Cross Section B–B'

No vertical exaggeration



Geologic Cross Section A–A'

No vertical exaggeration