



Geology of the Pecos 7.5-minute quadrangle Santa Fe and San Miguel counties, New Mexico



Adam S. Read and Geoffrey Rawling
May, 2002

New Mexico Bureau of Geology and Mineral Resources
Open-file Geologic Map OF-GM 52

Comments to Map Users

A geologic map graphically displays information on the distribution, nature, orientation and age relationships of rock and surficial units and the occurrence of structural features (Bates and Jackson, 1987). Geologic and fault contacts are irregular surfaces that form boundaries between different types or ages of units. Data depicted on this geologic map are based on field geologic mapping, compilation of published and unpublished work, and photogeologic interpretation. Locations of contacts are not rigorously surveyed, but are plotted by interpretation of the position of a given contact onto a topographic base map – often with the aid of a portable Global Positioning System (GPS) receiver. The accuracy of contact locations is variable and depends on the scale of mapping and the interpretation of the geologist. Site-specific conditions should be verified by detailed surface mapping or subsurface exploration. Topographic and cultural changes associated with recent development may not be shown everywhere.

This map was mapped and compiled at a scale of 1:24,000. Any enlargement of this map could cause misunderstanding in the detail of mapping and may result in erroneous interpretations. The information provided on this map cannot be substituted for site-specific geologic, hydrogeologic or geotechnical investigations. The use of this map to precisely locate buildings relative to the geological substrate is not recommended without site-specific studies conducted by qualified earth-science professionals.

The cross-sections in this report are constructed based on solely on surficial geology. As such, the cross-sections are interpretive and should be used as an aid to understand the geologic framework and not used in locating or designing wells, buildings, roads, or man-made structures.

This quadrangle map has been Open-filed in order to make it available as soon as possible. The map has not been reviewed according to New Mexico Bureau of Geology and Mineral Resources standards, and due to the ongoing nature of work in the area, revision of this map is likely. As such, dates of revision will be listed in the upper right corner of the map and on the accompanying report. ***The contents of the report and map should not be considered final and complete until it is published by the NMBGMR.***

Acknowledgments

Mapping of this quadrangle was funded by a matching-funds grant from the 2000-2001 STATEMAP program of the National Geologic Mapping Act coordinated by the U.S. Geological Survey and the New Mexico Bureau of Geology and Mineral Resources (Dr. Peter A. Scholle, Director; Dr. Paul W. Bauer, Geologic Mapping Manager).

Map Key

Dip and dip azimuth of bedding (dip • dip azimuth)

Dip and strike of minor fault plane (dip • dip azimuth) and slickenlines (plunge / trend)

Contact: dashed where inferred, dotted where covered, queried where assumed

Normal Fault: bar and ball on footwall; dashed where inferred, dotted where covered, queried where uncertain

Reverse Fault: teeth on hanging wall; dashed where inferred, dotted where covered, queried where uncertain

Anticline showing direction of plunge

Syncline showing direction of plunge

Monocline showing vergence

Line of cross section

CENOZOIC UNITS

- QHa Quaternary-Holocene alluvium. Unconsolidated sediments in active perennial and ephemeral stream channels and flood plain deposits composed of clay, silt, sand and gravel. Grades into minor colluvial or alluvial fans and older valley fills (Qvf). May include terrace deposits whose treads lie within 20 feet of grade. Note that much of the mapping this unit was based on photointerpretation. Thickness: 0 to 25(?) feet.
- Qc Quaternary colluvium. Primarily talus, locally derived. Commonly occurs as a veneer of variable thickness on slope-forming bedrock. Thickness: 0 to 30 (?) feet.
- Qvf Quaternary valley fill. Unconsolidated to consolidated fine grained valley fills composed of clay, silt, and sand along the margins of active stream channels and in areas of low relief or where runoff is not channelized. Deposits likely formed by a combination of alluvial, eolian, and hillslope processes. These fills may form terraces when incised by modern arroyos. Note that much of the mapping this unit was based on photointerpretation. Thickness: 0 to 40(?) feet.
- Qt Quaternary terrace deposits. Undivided, gravel-capped terrace deposits along the Pecos River and Glorieta Creek. See Karas (1988) for more detail on these deposits. Note that some of the mapping these terraces was based on photointerpretation. Thickness: 0 to 25 (?) feet.
- QTg Quaternary-Tertiary? Gravel deposits. Gravel and cobble deposits composed of rounded Proterozoic and Paleozoic clasts. These gravels were deposited prior to the establishment of the incised modern Pecos River and Glorieta Creek. Thickness: 0 to 30 feet.
- Tgv Tertiary gravel deposits. Fine- to coarse-grained deposits dominated by boulder and cobble gravel composed of rounded Proterozoic clasts with fewer clasts of Paleozoic age. Proterozoic clasts are heterolithic representing the varied metaigneous and metasedimentary rock types exposed throughout the Pecos Wilderness and the rest of the Santa Fe Range to the north. Deposits contain proportionally less Paleozoic rocks further to the north where exposed along the western edge of the quadrangle. Deposits are typically poorly exposed, but cobbles and boulders form highs in the landscape, up to 1500 feet above the modern Pecos River, and mantle hillsides with their colluvium. These deposits are similar to deposits found downstream in Texas and by inference are late Miocene to early Pliocene and equivalent to the Upper Ogallala (Hawley, 2002 personal communication). Thickness: 0 to 120 feet.

MESOZOIC UNITS

Chinle Group

- TRs Santa Rosa Formation. (*upper and middle units are not present on this quadrangle*)
- TRsl Santa Rosa Formation, Lower member - Light gray to buff, thick bedded, fine- to coarse-grained crossbedded sandstone with conspicuous iron oxide staining. Limestone- and chert-pebble conglomerates present in most places, particularly along the southwest edge of the quadrangle. Fossil wood is common. Thickness: 90-120 feet.
- TRm Moenkopi Formation — Grayish red to purplish-red sandstones, conglomerates, mudstones, and siltstones. Lacks gypsum. Sandstones are micaceous litharenites or lithic graywackes. Sandstones are modelately to poorly sorted, subangular to angular, and fine to coarse grained. Sandstones and conglomerates are generally trough crossbedded and lenticular. Fossils include vertebrate bones and coprolites, footprints, charophytes, and ostracods. Dark brown carbonate concretions that are up to 70 cm-diameter were found on the hill to the north of Rowe Peak. The contact with underlying Artesia Formation is disconformable. Thickness: is 75-120 feet. (about 120 feet near Rowe Peak).

-unconformity-

PALEOZOIC UNITS

- Pa Artesia Formation - moderate reddish brown (orange to brick-red), sandstones, siltstones and gypsum. Sandstones and siltstones are quartzarenites and usually gypsiferous. Sandstones are well sorted, subrounded to subangular, and very fine to fine grained. Sandstones are laminated, ripple laminated, and massive (bioturbated), crossbedding is rare, and beds are laterally persistent. Unfossiliferous except for bioturbation. Mottled greenish-white reduction spots are common. Thickness: 30-60 feet.
- Psa San Andres Formation – Buff to light gray thin-bedded dense silty limestone and interbedded calcareous sandstone. Reddish-orange chert or white aragonite satin spar (after gypsum?) is often present near the contact with the underlying Glorieta Sandstone. Thickness: 15-45 feet.
- Pg Glorieta Sandstone – Yellow to buff, thick-bedded, fine- to medium-grained quartz sandstone. Grains are well rounded, well sorted, and conspicuously frosted. Thickness: 80-120 feet.
- Py Yeso Formation – Reddish-orange to red thick-bedded mudstone and interbedded buff to reddish-orange and yellow, fine-grained sandstone and some buff, coarse-grained, arkosic sandstone. Buff to yellow, dense, nonfossiliferous, crystalline limestone 2-3 m thick in the upper part. Thickness: 160-200 feet.
- IPPsc Sangre de Cristo Formation – Brownish red to purple, thick-bedded mudstone and interbedded buff to dark brown arkosic sandstone. Sandstone beds are typically lensoidal. Also contains some gray to purple, thin-bedded, dense, microcrystalline limestone and buff, thin-bedded, medium-grained quartz sandstone. Along the NW side of the quadrangle, thick arkosic conglomerates are well indurated and laterally extensive. Minimum thickness of 2600 feet.
- Madera Group – These units retain local formation names rather than those applied in the Sandia and Manzano Mountains (see Keyes, 2001) to reflect the unique tectonic history of these basins and their very thick deposits.
- IPal Alamitos Formation — Gray medium to thin-bedded, fossiliferous marine limestone, interbedded buff to brown coarse-grained arkosic sandstone, and dark-grey to reddish shales. Many limestone and sandstone beds in the Northeast part of the quadrangle are dominantly composed of very coarse and angular K-spar fragments but nonetheless can often remain quite fossiliferous. Contact with overlying Sangre de Cristo Formation is locally sharp just east of Pecos but is gradational or poorly exposed in most places. Basal fedspathic unit is cemented by silica or clay. Aproximate thickness of 1500 feet.
- IPlp La Posada Formation — Gray medium to thick-bedded, fossiliferous marine limestone with banded chert layers, Thick limestone beds form cliffs where exposed near the State Fish Hatchery. Limestone is interbedded with thin shales and sandstones. Uppermost unit is quartz sandstone with calcite cement (wheras the basal Alamitos sandstone is silica cemented). Measured thickness at Dalton Bluff 973 feet (Sutherland, 1963).

-unconformity-

- Map Arroyo Penasco Group – Undifferentiated Mississippian rocks (cross section only). Thickness is 106 feet at Dalton Bluff (Sutherland, 1963).
- Xyu Proterozoic basement – Undifferentiated metagneous and metasedimentary rocks (cross section only)

SELECTED REFERENCES

- Bauer, P.W., Ralser, S., Daniel, C., Ilg, B., 1996, Geology of the McClure Reservoir 7.5-min quadrangle, Santa Fe County, New Mexico: New Mexico Bureau of Mines and Mineral Resources, Open-file Geologic Map OF-GM 7, scale 1:12,000. With mineral resource evaluation by M. Fulp
- Ilg, B., Bauer, P.W., Ralser, S., Rogers, J., and Kelley, S., 1997, Geology of the Glorieta 7.5' quadrangle, Santa Fe County, New Mexico: New Mexico Bureau of Mines and Mineral Resources, Open-file Geologic Map OG-DM 11, scale 1:12,000.
- Johnson, R.B., 1973, Geologic Map of the Pecos Quadrangle, San Miguel and Santa Fe Counties, New Mexico, United States Geological Survey, Map GQ-1110, scale 1:24,000.
- Karas, P.A., 1988, Quaternary alluvial sequence of the upper Pecos River and a tributary, Glorieta Creek, north-central New Mexico, unpublished M.S. Thesis, University of New Mexico, 112 p. (includes 1:24,000 scale map).
- Keyes, B.S., 2001, The Pennsylvanian System in New Mexico – overview with suggestions for revision of stratigraphic nomenclature, *New Mexico Geology*, v. 23, n. 4, p. 103-122.
- Melis, E., Bauer, P.W., and Goodwin, L.B., 2000 (unfinished), Geology of the Rosilla Peak 7.5-min. quadrangle, Santa Fe and San Miguel Counties, New Mexico, New Mexico Bureau of Mines and Mineral Resources, Open-file Geologic Map OF-GM 31, scale 1:12,000.
- Miller, J.P., Montgomery, A., and Sutherland, P.K., 1963, Geology of Part of the Southern Sangre de Cristo Mountains, New Mexico, New Mexico Bureau of Mines and Mineral Resources, Memoir 11, 106 p.
- Sutherland, P.K., 1963, Paleozoic Rocks, *in*: Miller, J.P., Montgomery, A., and Sutherland, P.K., 1963, Geology of Part of the Southern Sangre de Cristo Mountains, New Mexico, New Mexico Bureau of Mines and Mineral Resources, Memoir 11, 106 p., p. 22-44.