

Preliminary Geologic Map of the Sacramento Quadrangle, Otero County, New Mexico.

By

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New Mexico Bureau of Geology and Mineral Resources
Open-file Digital Geologic Map OF-GM 156

Scale 1:24,000

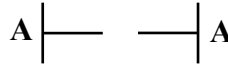
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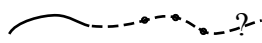


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MAP AND CROSS SECTION SYMBOLS


 Location of geologic cross section

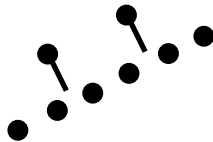
 Geologic contact, solid where exposed and identification is certain, dashed where approximately located and identification is certain, dashed with ball where approximately located and identification is probable, queried where identification and location are uncertain.


 Horizontal bedding


20 · 295  Dip and dip direction of bedding

80 · 295  Dip and dip direction of joints

90 · 295  Dip direction of vertical joints

 Buried normal fault, ball and bar on downthrown side.

 Normal fault motion within the plane of cross-section.

 Landslide or slump block. Headscarp indicated by hachures with ticks, toe indicated by dotted line

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OF-GM-156

Mapped and compiled by Geoffrey Rawling

EXPLANATION OF MAP UNITS

Anthropogenic Deposits

af Artificial fill for water impoundments and highway embankments.

Quaternary and Tertiary Surficial Deposits

QHa - Alluvium (Holocene to Historic) - Unlithified gravel and poorly to moderately sorted clay, silt, and sand in active stream channels. Generally present in gullies incised into **Qvf**. Only mapped where extensive and obvious on aerial photographs; unit is otherwise mapped with **Qvf**. Thickness: 0 to 4 (?) meters.

Qs – Spring deposits – (Pleistocene (?) to Holocene) – Vegetation-covered mounds formed at spring outlets by precipitation of tuffaceous carbonate. Deposits are white to pale-gray, chalky and friable, and have abundant incorporated organic debris. Springs do not appear to be presently depositing carbonate. Only the largest mounds are mapped, many smaller ones exist. Thickness: 0 to 10 (?) meters.

Qvf - Valley fill (upper Pleistocene to Holocene) - Unlithified valley fill composed of poorly sorted clay, silt, and sand, commonly with angular to subrounded cobbles of local bedrock. Matrix material is light to dark brown, reflecting soil development processes. Grades into minor alluvial and colluvial fans on toes of hillslopes. Often incised by active drainages, floored by sand and cobble to boulder gravel of **QHa**. Anthropogenic disturbance common in developed areas. Largely mapped from aerial photographs. Thickness: 0 to 12 (?) meters.

Qaf – Alluvial fan deposits (middle to upper Pleistocene) – Alluvial fans composed of poorly sorted cobbles, boulders, sand, silt, and clay. Fans head in short, steep tributary canyons and interfinger with and/or spread out onto valley bottom deposits. Stabilized by vegetation and apparently no longer active, and locally incised by drainages floored with **QHa**. Only mapped along major drainages where geomorphic expression is clear on aerial photos. Thickness: 0 to 10 (?) meters.

Qg – Stream gravel deposits (lower to middle (?) Pleistocene) – Poorly to well-lithified pebble to boulder gravel. Deposit forms eroded and locally incised terraces and bluffs in Rio Penasco Canyon and Curtis Canyon. Gravel pit exposure east of the

NM 24 – NM 130 intersection shows meter-scale interbedding of well-cemented pebble to cobble gravel and silty sand. Clasts are well-rounded and are composed of carbonates derived from the San Andres and Yeso Formations. Grades laterally into alluvial fan deposits and colluvium, which have much cruder bedding and more angular clasts. Postdates incision of modern drainages. Thickness: 0 to 40 (?) meters.

Qls – Landslide and slump deposits (lower to middle (?) Pleistocene) - Landslide and colluvium complexes. Deposits on slopes in Rio Penasco Canyon, Wills Canyon and Bear Canyon are composed of poorly sorted angular to subrounded blocks of San Andres limestone some of which are back-rotated towards the cliff. Deposits in Bear canyon are poorly exposed and recognizable only by blocks of Glorieta Sandstone at significantly lower elevations than elsewhere in the canyon. Thickness: 0 to 60 (?) meters.

Paleozoic Sedimentary Rocks

Psr, Psb - San Andres Formation (middle to upper Permian) – Light to dark gray and bluish gray limestone and dolomite. Limestones and dolomites range from thin to very thick bedded, and are carbonate mudstones, wackestones, and grainstones. Freshly broken surfaces are darker gray than weathered surfaces and often fetid. Silty and sandy beds are common. Float is nearly everywhere present but good outcrop is sparse and the unit is generally poorly exposed where tree cover is dense, generally to the west and at high elevations. Subdivision of the San Andres into the lower dominantly thick-bedded Rio Bonito Member (**Psr**) and upper dominantly medium- to thin-bedded Bonney Canyon member (**Psb**, Kelley, 1971) was based on aerial photograph interpretation. The two members cannot be reliably distinguished in the field within this quadrangle. On aerial photographs they can be distinguished based on average bed thickness and continuity, which is revealed by vegetation patterns that give the Bonney Canyon member a distinctly striped appearance. Where the average vegetation density increases greatly, such as on north facing slopes and the higher elevations in the central and western portions of the quadrangle, the two units cannot be distinguished on aerial photographs; thus the outcrop of the Bonney Canyon member may be more extensive than is mapped here. The Glorieta Sandstone Tongue is composed of gray and light to medium brown fine- to medium-grained sandstone consisting of frosted and well-rounded quartz grains. Semi-continuous outcrop and/or float and distinctive appearance makes this an easily recognizable marker unit and the basis for mapping the San Andres – Yeso contact formational contact, which occurs 12 to 25 m beneath the Glorieta Tongue. Commonly there is a break in slope above the Glorieta sandstone that is another useful criteria for identifying the base of the San Andres Formation. Thickness: Rio Bonito member: ~ 183 meters; Bonney Canyon member: top not exposed, at least 46 meters exposed in the Woodson Canyon quadrangle to the east; Glorieta Sandstone: 0 to 5 meters.

Py – Yeso Formation (middle Permian) - Yellow to tan siltstone and fine sandstone, red to pink muddy siltstone and fine sandstone, gray to tan silty limestone and dolomite. Siltstone and sandstones are thin to medium bedded and friable. Muddy siltstones and sandstones are laminated to very thin bedded. Limestones are very thin

to thin bedded, rarely medium to thick bedded. In general, they are thinner bedded than overlying basal San Andres beds. Meter scale interbedding of carbonate, siltstone, and sandstone is common. A vertically continuous medium-bedded carbonate section that forms cliffs along the canyon bottoms near the junction of Upper Rio Penasco, Will's, and Cox Canyons is traceable east and west for several miles. This section is about 400 feet below the top of the Yeso and probably corresponds to the thick limestone near the middle of the formation described by Kelly (1971) and Pray (1961). However in general, bedding dips are usually chaotic due to dissolution of gypsum and (and carbonates?) and individual beds are generally not traceable laterally for more than a few 10s of meters. Natural exposures are poor except in road and stream cuts and very steep slopes and the upper contact is usually mantled by colluvium and/or landslides from the overlying San Andres Formation. Thickness: Base not exposed; ~550 meters based on unit thickness in the Cloudcroft Unit #1 oil test well in the Bluff Springs quadrangle to the west.

PpCu - Permian to Proterozoic rocks - Paleozoic sedimentary rocks and Proterozoic igneous and metamorphic rocks, undivided (cross section only). Thickness of Sub-Yeso approximately 740 meters in the Cloudcroft Unit #1 oil test well in the Bluff Spring quadrangle to the west.