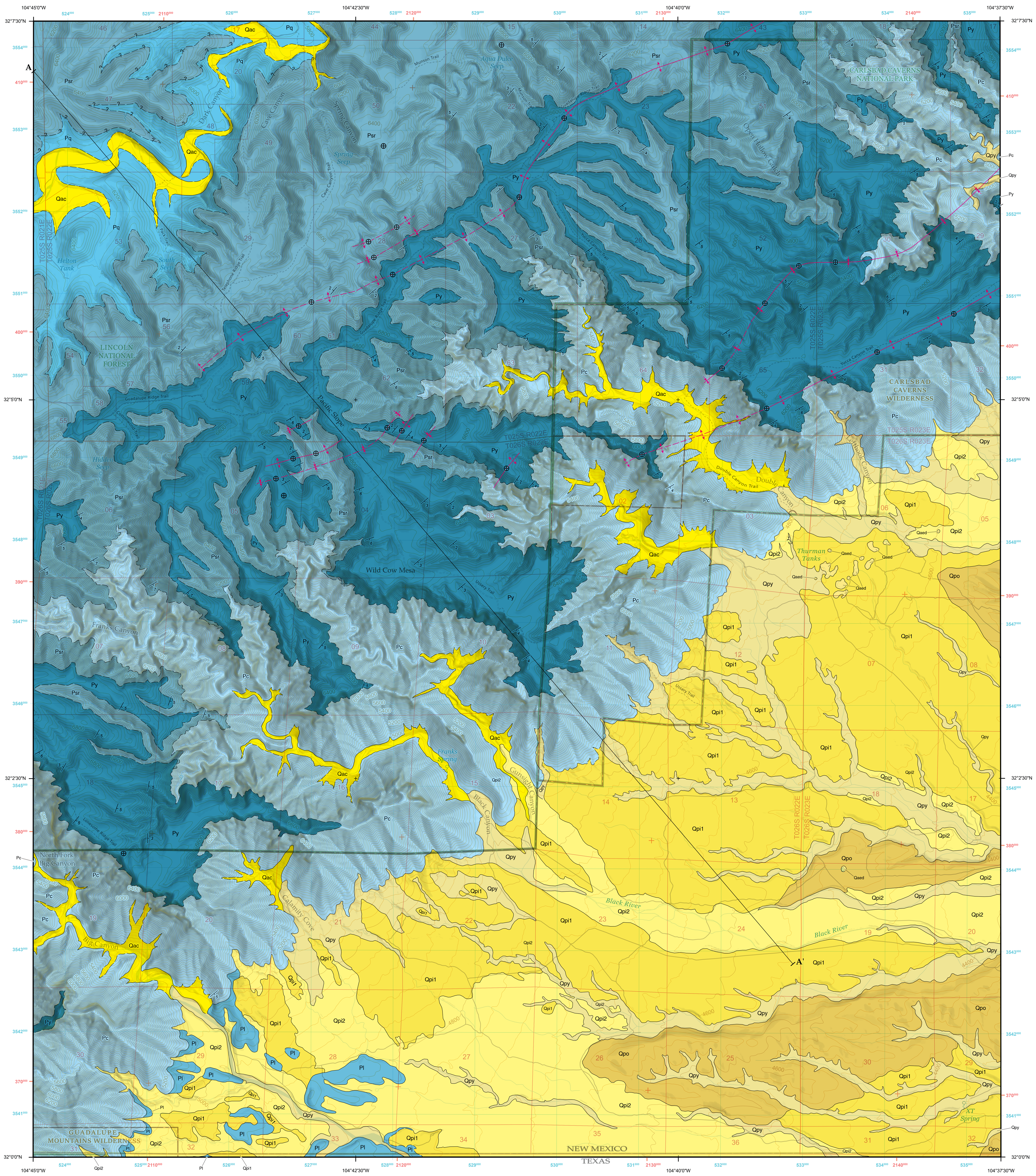


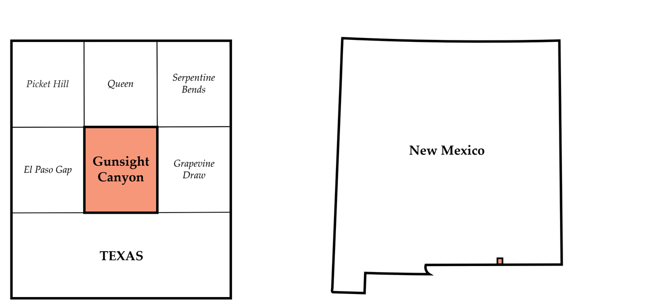
Base map from U.S. Geological Survey 2022. North American Datum of 1983 (NAD83)
Projection and 1,000-meter grid: Universal Transverse Mercator, Zone 13S, shown in blue.
10,000-foot ticks: New Mexico Coordinate System of 1983 (East zone), shown in red.

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

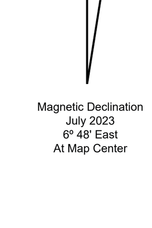
1:24,000

Contour Interval 40 Feet

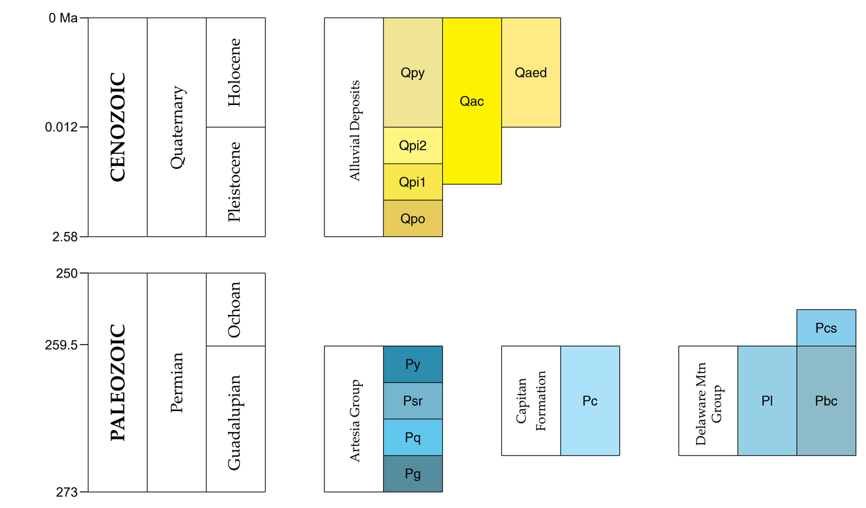
North American Vertical Datum of 1988



Quadrangle Location



Correlation of Map Units



Explanation of Map Units

Contact—Identity and existence are certain, or questionable where queried. Location is accurate where solid and approximate where dashed.

Anticline—Identity and existence are certain. Location is accurate where solid and approximate where dashed.

Syncline—Identity and existence are certain. Location is accurate where solid and approximate where dashed.

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map may be based on any of the following: reconnaissance field geologic mapping, a compilation of published and unpublished work, and photogeologic interpretation.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

CENOZOIC
Quaternary
Alluvial Deposits

Qpy **Younger piedmont alluvium (Holocene)**—Coarser debris, including cobbles and boulders in the vicinity of the mountain front, are Permian carbonate rocks derived from the Guadalupe Mountains and from reworking of older piedmont alluvium. Pale-tan to reddish-brown silty sand, sand, and pebbly sand comprise much of the unit in some areas. Includes accumulations of sediment in active channels together with deposits graded to levels a few meters above active channels and colluvium/slopewash at the base of older piedmont fan remnants. Focusing of surface runoff toward areas underlain by younger piedmont alluvium is commonly expressed by a relative abundance of vegetation and darker shades on aerial imagery. Surface roughness (microtopography) is locally pronounced close to the mountain front where cobble- and boulder-sized clasts are plentiful. Some drainages floored by Qpy deposits exhibit subvertical walls deeply cut into cemented gravel of older piedmont alluvium. Cutbank exposures of Qpy deposits up to a few meters thick are present in some areas.

Qaed **Closed basin deposits (Holocene)**—Primarily silt and sand; may contain gravel and cobbles washed in from depression margins. Fines are generally pale-tan to brown. Most of the depressions are probably karstic structures resulting from subsurface dissolution of Permian evaporites. Fills may be thin (< 1 m) to a few meters thick. In the map area, a group of depressions is present on intermediate fan remnants in the vicinity of Double Canyon, suggesting that Castile Formation gypsum/anhydrite is present in the subsurface at least that far south along the Guadalupe Mountains escarpment.

Qac **Undivided alluvium and colluvium (Holocene and Pleistocene)**—Includes alluvium along active channels, terrace deposits, hillslope colluvium along canyon walls, and unmapped areas of bedrock along scoured channel reaches and cutbanks. Deposits consist of pale-tan to brown siliciclastic silt and sand, gravel, cobbles, and boulders. Larger clasts are dominantly pale-colored dolomite and gray limestone derived from the surrounding Permian shelf and shelf-margin strata of the Capitan Formation and Artesia Group. Accumulations of sediment above active channels are commonly cemented. Deposits may locally be several meters thick beneath terraces and colluvial wedges. Map unit merges eastward with piedmont alluvium in the vicinity of the mountain front.

Qpi2 **Intermediate piedmont alluvium, younger subunit (Pleistocene)**—In the map area, these deposits are graded to a somewhat higher level than deposits of map unit Qpy, and are inset against older piedmont alluvium along the larger valleys and draws that drain eastward from the Guadalupe Mountains. Bar and swale microtopography is evident on depositional surfaces. Comparatively young deposits of gravelly alluvium in the western Delaware Basin, including relatively young deposits underlying the piedmont slope in the map area, are commonly cemented with calcium carbonate. This probably reflects a predominance of carbonate dust and debris in the region, and the arid climate. Preservation of microtopography and inset relations with other piedmont map units suggest a relatively young age for Qpi2 deposits. Erosion of older piedmont deposits, transport of sediment from the Guadalupe Mountains, and Qpi2 deposition may have occurred primarily during the last glacial episode. Thickness of the deposits is variable, ranging from decimeters to perhaps several meters. Exposures in deeply incised drainages near the Guadalupe Mountains escarpment generally reveal up to a few meters of Qpi2 sediment overlying surfaces inset into older alluvium.

Qpi1 **Intermediate piedmont alluvium, older subunit (Pleistocene)**—Deposits are graded to a higher level than deposits of Qpi2, and remnant surfaces are generally smoother. Qpi1 alluvium underlies the land surface over a broad area along the upper piedmont slope between Double Canyon and Big Canyon and extends eastward along the larger drainages where it is inset against older alluvium up to 20 meters above the floors of adjacent drainages. Gravelly strata are well cemented and finer-grained deposits are typically poorly exposed, even in deeply incised subvertical drainage cuts. Episodes of landscape erosion, sediment mobilization, and accumulation of Qpi1 alluvium may be associated with any of the glacial-interglacial climatic changes that occurred during the mid-Pleistocene. Unit probably ranges from less than one to several meters in thickness.

Qpo **Older piedmont alluvium (Pleistocene)**—Surface exposures are generally well-cemented conglomerate containing subangular to rounded pebbles, cobbles, and boulders derived from Permian carbonate rocks in the Guadalupe Mountains. Finer-grained strata are poorly exposed. Remnants of older piedmont alluvium are preserved as east-west oriented ridges that have been eroded and stripped down to resistant conglomeratic strata. Interfluvial summits underlain by Qpo remnants rise up to 40 meters above adjacent drainages. Slumping and tilting of the deposits, likely due to solution subsidence over extended periods of time, is evident in places. A lack of paleontologic or other evidence concerning the age of piedmont deposits along the Guadalupe Mountains escarpment leaves their absolute age range open to speculation. Piedmont alluvium apparently overlies the Castile Formation at least as far south as Double Canyon along the mountain front. Several kilometers to the southwest along the escarpment, the Castile has been completely removed and strata of the Bell Canyon Formation are exposed at the surface. Hale (1955), based on borehole lithologic logs available at that time, reported an estimated maximum thickness of about 60 m of accumulated clastic sediment in the upper Black River valley with gravel (conglomerate) comprising a comparatively small proportion of the total alluvial fill.

PALEOZOIC
Permian
Ochoan

Pcs **Castile Formation (Permian, Ochoan)**—Anhydrite. Composed of alternating regular laminae and thin beds of dark-colored and light-colored anhydrite. Shown only in cross-section.

Guadalupian
Artesia Group

Py **Yates Formation (Permian, Guadalupian)**—Interbedded dolomite and siltstone/fine-grained sandstone. Characteristically contains many more interbeds of dark-yellow-weathering siltstone and fine-grained sandstone than does the overlying Tansill Formation. Dolomite is typically massive and fenestrate, and commonly weathers a dark-tan color compared to the lighter-gray weathering of the Tansill Formation. The Yates Formation forms the high, flat plateaus along the top of the Guadalupe Mountains. Although the top is eroded, the thickness is up to 140 m.

Psr **Seven Rivers Formation (Permian, Guadalupian)**—Thick-bedded gray dolomite occurs in rather massive beds between 1–3 meters thick, separated by thin partings. From a distance, the formation appears regularly bedded, however, in exposed outcrops of the lower portion of the unit, conspicuously contains very few siltstone and/or fine-grained sandstone beds which are up to a few tens of centimeters thick. Forms cliffs and steep ledgy slopes. Thickness varies from zero meters, where it pinches out along the Capitan Formation, up to 170 meters.

Pq **Queen Formation (Permian, Guadalupian)**—Quartz siltstone and fine-grained quartz sandstone. Grains are subangular to subrounded. Typically contains very planar thin to thick beds that commonly erode recessively and form slopes. Locally contains very minor thin beds of light-gray dolomite approximately 10–30 cm thick that typically form small resistant ledges. The uppermost 20 meters or so contain several thin to thick, interbedded, light-gray dolomite layers up to several meters thick. The unit commonly forms deep-rusty-orange soils on poorly exposed vegetated slopes in the northwest corner of the map. The maximum thickness exposed within the quadrangle is approximately 120 meters.

Pg **Grayburg Formation (Permian, Guadalupian)**—Light-gray to very pale-yellowish-gray, laminated, fine-grained dolomite, interbedded with pale-orange siltstone and very fine-grained sandstone. Shown only in cross-section.

Capitan Formation

Pc **Capitan Formation (Permian, Guadalupian)**—Massive cliff-forming limestone and limestone breccia. From a distance, this unit exhibits a weekly developed inclined layering that dips southeastward at approximately 15–30°. This layering is more pronounced closer to the Delaware Basin. In outcrop, most exposures appear massive and structureless. A faint brecciated texture is visible locally where angular clasts of dolomite of all sizes are strongly cemented by different generations of carbonate. Coarse-grained, light-yellow palisade calcite spar commonly fills dissolution fissures and cracks. Fossils of sponge and brachiopod fragments are locally visible. Forms steep slopes and imposing cliffs. This unit represents the Capitan Reef itself, and the fragmented debris shed from the ancient reef down into the Delaware Basin. Thickness exposed along the escarpment is 450 meters.

Delaware Mountain Group

Pbc **Bell Canyon Formation (Permian, Guadalupian)**—Sandstone and interbedded limestone. Shown only in cross-section.

Pl **Lamar Limestone Member of the Bell Canyon Formation (Permian, Guadalupian)**—Thin- to thick-bedded limestone. Beds are mostly massive and composed of micrite or contain abundant mostly sand-sized fossil skeletal debris. Sparse light-gray bedded chert is visible locally within the lower half of the unit. Unlike the other limestone members of the Bell Canyon Formation, this unit contains no visible siltstone layers.

New Mexico Bureau of Geology and Mineral Resources
Open-File Geologic Map 310

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

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Geologic Map of the Gunsight Canyon 7.5-Minute Quadrangle, Eddy County, New Mexico

September 2024

by

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Geologic Cross Section A–A'