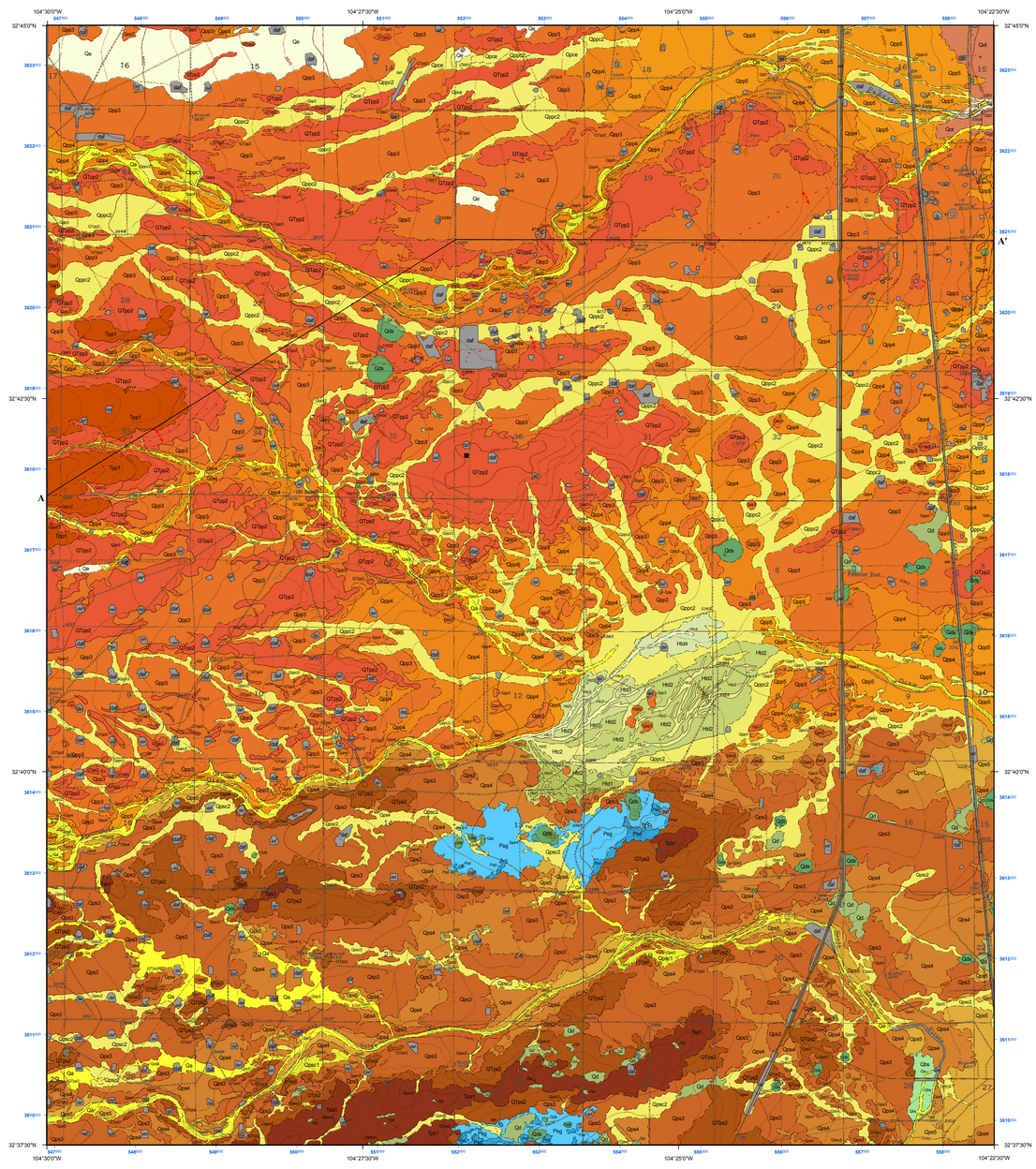

Base map from U.S. Geological Survey 1955, from photographs taken 1947. Topography by planetable surveys 1955.
Polyconic projection. 1927 North American datum, reprojected to UTM projection – zone 13N
1000-meter Universal Transverse Mercator grid, zone 13, shown in red

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 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Mapping of this quadrangle was funded by a matching-funds grant from the STATEMAP program of the National Cooperative Geologic Mapping Act, administered by the U. S. Geological Survey, and by the New Mexico Bureau of Geology and Mineral Resources, (Dr. Peter A. Scholle, *Director and State Geologist*; Dr. J. Michael Timmons, *Geologic Mapping Program Manager*).

QUADRANGLE LOCATION

Mn
Magnetic Declination
May, 2009
8° 15' East
At Map Center

New Mexico Bureau of Geology and Mineral Resources
Open-file Geologic Map 160

EXPLANATION OF MAP SYMBOLS

- A — A' — Location of geologic cross section.
- Geologic contact. Solid where exposed or known, dashed where approximately known, dotted where concealed or inferred.
- Artesia - Vacuum Arch. Subsurface anticlinal arch warping Permian and older strata.
- 7 — Inclined bedding showing degrees of dip.
- Arrows showing mean direction of paleoflow, based upon pebble imbrication, n ≥ 20 each arrow.
- Soil pit.
- 8717 — Oil & gas exploration well used in cross section construction.

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Geologic map of the Dayton quadrangle, Eddy County, New Mexico.

May 2011

by
David J. McCraw and Shannon Williams

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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map may be based on any of the following: reconnaissance field geologic mapping, compilation of published and unpublished work, and photogeologic interpretation.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 associated with recent development may not be shown.

Cross sections are constructed based upon the interpretations of the author made from geologic mapping, and available geophysical, and subsurface (drillhole) 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 man-made structures.

The map has not been reviewed according to New Mexico Bureau of Geology and Mineral Resources standards. The contents of the report and map should not be considered final and complete until reviewed and published by the New Mexico Bureau of Geology and Mineral Resources. The views and conclusions contained in this document 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 and NEOGENE

Alluvium, lacustrine, and anthropogenic deposits

daf — **Disturbed land and/or artificial fill (Historic) —** Dumped fill and areas affected by human disturbances, mapped where deposits or extractions are areally extensive. Especially notable are the numerous constructed oil and gas well pads. Also includes the U.S. Bureau of Reclamation's Kaiser Channel of the Pecos River, as well as other straightened reaches.

Qa — **Quaternary alluvium, undifferentiated (Historic to uppermost Pleistocene)** — Brown (7.5YR4/2) to light brown (7.5YR6/3), unconsolidated, moderately sorted, pebbly sand, silt, and clay. Contains primarily carbonate gravels and pebbles. Varies considerably in thickness from <1 to 3 m in tributaries and up to 10-12 m in the floodplain.

Qbs — **Pecos River floodplain alluvial backswamp deposits (upper Pleistocene to Historic)** — Light reddish-brown (5YR6/4) to very dark gray (7.5YR3/1), unconsolidated, well-sorted, silty sand, sandy clay, and clay in low-lying, poorly drained areas. These areas commonly receieved only fine-grained, slack-water flood deposition, prior to channelization. Thicknesses range from 3-15 (?) m.

Qp — **Quaternary playa deposits (upper Pleistocene to Holocene)** — Pinkish white (7.5YR8/2), unconsolidated, well-sorted, fine-grained sand, silt, and clay Thickness unknown (≥ 1m).

Fourmile Draw depression

Fourmile Draw formed in the low area between the Rio Peñasco and North Seven Rivers piedmont alluvial complexes, and is utilized in this mapping to differentiate these complex deposits. It is shallowly underlain by Permian Artesia Group sediments that are riddled with collapse depressions and sinkholes. Just west of U.S. Highway 285, it flows into a very large depression, roughly 1-1.5 km wide and 4 km long. This depression likely formed in the uppermost Pleistocene and/or early Holocene. Upon encountering the depression, Fourmile Draw has built 4 fluviodeltaic complexes containing distributary channels and levee deposits (Htc_{1-4} and Htd_{1-4}, respectively), distinctly mappable from aerial photography. These migrate with time from the western margin to the center of the depression, where the modern Htd_4 complex is located.

Hts4 — **Youngest Fourmile Draw distributary deposits (Holocene)** — Thickness <1 to 1+ m.

Htc4 — **Youngest Fourmile Draw distributary channel deposits (Holocene)** — Thickness <1 to 1+ m.

Hts3 — **Younger Fourmile Draw distributary deposits (Holocene)** — Thickness <1 to 2 m.

Htc3 — **Younger Fourmile Draw distributary channel deposits (Holocene)** — Thickness <1 to 2 m.

Hts2 — **Older Fourmile Draw distributary deposits (Holocene)** — Thickness <1 to 2 m.

Htc2 — **Older Fourmile Draw distributary channel deposits (Holocene)** — Thickness <1 to 2 m.

Htd1 — **Oldest Fourmile Draw distributary deposits (Holocene)** — Thickness <1 to 2 m.

Htc1 — **Oldest Fourmile Draw distributary channel deposits (Holocene)** — Thickness <1 to 2 m.

Pecos Valley alluvial terrace complex

Alluvial terraces of the Pecos River and its tributaries were first described in the classic study of Fiedler and Nye (1933). They recognized 3 terraces: (from lowest to highest) the Lakewood, the Orchard Park, and the Blackdom. On the Dayton quad, much of the higher Rio Peñasco and North Seven Rivers piedmont alluvial complexes are erroneously mapped by Fiedler and Nye (1933) as Blackdom terrace. These materials, however, are all derived from these western tributaries, not the Pecos River.

Lakewood terrace alluvial deposits (upper to middle Pleistocene) — Following McCraw, *et al.* (2007) and McCraw and Land (2008), three distinct, low-lying (upper to uppermost middle(?) Pleistocene) "Lakewood terraces" are recognized. Only the lowest and youngest deposit, Qlt_2, <1- 2 m above the floodplain, is found on the Dayton quad, extending up the Rio Peñasco. These deposits are comprised of occasional gravels and pebbles, brown (10YR5/3) to dark yellowish brown (10YR3/4), unconsolidated, moderately sorted, coarse- to fine- grained sand, silty sand, silt and sandy clay. Stage I pedogenic carbonate, mostly non-gypsiferous.

Qlt3 — **Youngest Lakewood terrace alluvial deposits (upper Pleistocene)** — Thickness <1 to 2 m.

Qot — **Orchard Park terrace alluvial deposits (upper Pliocene (?) to upper Pleistocene)** — According to Fiedler and Nye (1933), the Orchard Park terrace rises 1-3 m above the Lakewood terrace and 10.5-19 m above the Pecos floodplain. It is comprised of gravels and pebbles of dolomite, limestone, sandstone, chert, and quartzite in a very pale brown (10YR7/4) to reddish brown (5YR4/4), unconsolidated, moderately sorted, coarse- to fine- grained sand, silty sand, silt, and sandy clay. Pedogenic carbonate is a strong stage III. Thickness ranges from 5 to 45 m.

Rio Peñasco alluvial piedmont complex

Rio Peñasco alluvial piedmont deposits (Upper Pleistocene to Late Miocene(?)) — The headwaters of the Rio Peñasco are located high in the Sacramento Mountains in predominantly carbonate rocks of the San Andres formation (*Psa*) and clastic sediments of the Yeso formation (*Pye*). Where it leaves the Permian highlands, it has built a large piedmont alluvial complex, which coalesces with Eagle Creek to the north and the Seven Rivers to the south. These piedmont deposits grade to and onto the Pecos Valley alluvial terraces on the easternmost edge of the Dayton quad. Oldest, highest remnant surfaces (Tpp_1 and $QTpp_2$) are Pliocene or older, and likely graded to a river system which forms Gatuña formation deposits today. Middle to upper Pleistocene piedmont deposits (Qpp_{3-4}) are inset into these and grade to Qnt. The youngest, Qpp_5, grades to Qlt_2. Several channels (*e.g.*, Tumbleweed Draw) on this piedmont surface were likely former Rio Peñasco channels.

Lithologically, the Rio Peñasco piedmont deposits are distinctly different from those of Eagle Creek to the north and Seven Rivers to the south. While gravels are dominated by limestone clasts, dolomite, chert, yellow-brown sandstone, conglomerate, and quartzite are common. The matrix consists of dark yellowish brown (10YR3/4) to light brown (7.5YR6/3), unconsolidated, moderately sorted, coarse- to fine-grained sand, silty sand, silt, and sandy clay. Stage V-VI pedogenic carbonate can be found in the oldest deposits, while middle to upper Pleistocene deposits range from stage IV to III. Degree of pedogenic carbonate development can be the main distinguishing characteristic between the youngest deposits.

Qpp5 — **Youngest Quaternary piedmont alluvium (Holocene to upper Pleistocene)** — Thickness 1 to 3 m.

Qpp4 — **Younger Quaternary piedmont alluvium (Upper Pleistocene)** — Thickness 2 to 4 m.

Qpp3 — **Old Quaternary piedmont alluvium (Upper to middle Pleistocene)** — Most extensive deposit. Thickness 2 to 4 m.

QTpp2 — **Older piedmont alluvium (Middle Pleistocene to late Pliocene)** — Thickness 2 to 6 m.

Tpp1 — **Oldest piedmont alluvium (Late Pliocene to late Miocene(?))** — Thickness 2 to 6 m.

Rio Peñasco piedmont channel deposits (Historic to upper Pleistocene) — Numerous, thin alluvial channels, swales, and occasional coalescing depression fill deposits drain the piedmont alluvial complex. They usually consist of light brown (7.5YR6/4) to pinkish gray (7.5YR6/2), unconsolidated, poorly sorted, fine-grained sand, silt, and clay sediments. They were often mapped primarily by soil moisture increases in lower areas relative to adjacent piedmont deposits noted on photography. Eolian input often mantles the "v-shaped" contours associated with stream channels and in some areas sand sheets and dunes can fill these channels (*Qpce*). On the Rio Peñasco, older channels ($Qppc_{1}$) are mapped on Qpp_3 surfaces, similar and stratigraphically equivalent to those on North Seven Rivers Qps_3 deposits.

Qppc2 — **Young Quaternary piedmont channels (Holocene to upper Pleistocene)** — Thickness <1 to 2 m.

Qppc1 — **Older Quaternary piedmont channels (Upper Pleistocene)** — Thickness <1 to 2 m.

Qpce — **Youngest Quaternary piedmont channels filled with eolian sands, occasionally forming dunes (Holocene to upper Pleistocene)** — Thickness ≤ 1 m.

North Seven Rivers alluvial piedmont complex

North Seven Rivers alluvial piedmont deposits (Upper to middle Pleistocene) — North Seven Rivers, like the other Seven River channels head to the southwest out of the northern Guadelupe Mountains in both San Andres formation (*Psa*) carbonate rocks and Artesia Group (*Queen-Grayburg formations*) marine and non-marine redbeds and evaporites. To the south and west of the quad it flows out onto a piedmont alluvial complex, which coalesces with the Rio Peñasco to the north. Oldest, highest remnant surfaces and deposits are correlative to lower Pleistocene to late Miocene (?) piedmont deposits of the Rio Peñasco (Tpp_1 and $QTpp_2$). Like Eagle Creek to the north, gravels are almost exclusively limestone, derived from Psa, supported in a matrix of reddish brown (2.5YR4/6) to light brown (7.5YR6/3), unconsolidated, moderately sorted, coarse- to fine-grained sand, silty sand, silt (largely calcareous), and sandy clay. Topographic expression between the youngest deposits are often subtle to practically non-existent. Distinction is often based upon a stronger developed pedogenic carbonate (Qps_{3}= stage III – II+; Qps_3 = stage II). Qps_3 grades to Qlt_2.

Qps5 — **Youngest Quaternary piedmont alluvium (Holocene to upper Pleistocene)** — Thickness 1 to 3 m.

Qps4 — **Younger Quaternary piedmont alluvium (Upper Pleistocene)** — Thickness 2 to 4 m.

Qps3 — **Old Quaternary piedmont alluvium (Upper to middle Pleistocene)** — Most extensive deposit. Thickness 2 to 4 m.

QTps2 — **Older piedmont alluvium (Middle Pleistocene to late Pliocene)** — Thickness 2 to 6 m.

Tps1 — **Oldest piedmont alluvium (Late Pliocene to late Miocene(?))** — Thickness 2 to 6 m.

North Seven Rivers piedmont channel deposits (Historic to upper Pleistocene) — Numerous, thin alluvial channels, swales, and occasional coalescing depression fill deposits drain the piedmont alluvial complex. They usually consist of light brown (7.5YR6/4) to light reddish-brown (5YR6/4), unconsolidated, poorly sorted, fine-grained sand, silt, and clay sediments. They were often mapped primarily by soil moisture increases in lower areas relative to adjacent piedmont deposits noted on photography. Eolian input often mantles the "v-shaped" contours associated with stream channels and in some areas sand sheets and dunes can fill these channels (*Qsce*). On the North Seven Rivers, older channels ($Qpsc_{1}$) are mapped on Qps4 surfaces, similar and stratigraphically equivalent to those on Rio Peñasco (Qpp_{3}) deposits.

Qpsc2 — **Young Quaternary piedmont channels (Holocene to upper Pleistocene)** — Thickness <1 to 2 m.

Qpsc1 — **Older Quaternary piedmont channels (Upper Pleistocene)** — Thickness <1 to 2 m.

Qsce — **Youngest Quaternary piedmont channels filled with eolian sands, occasionally forming dunes (Holocene to upper Pleistocene)** — Thickness ≤ 1 m.

Quaternary depression fill and sinkhole deposits

Qd — **Quaternary depression fill, undifferentiated (Holocene to middle Pleistocene)** — Unconsolidated, well-sorted, fine-grained (fine sands to clay) complexes of alluvial, colluvial, eolian, and occasional lacustrine deposits within closed depressions. Colors variable. Depressions are created by either gradual subsidence or sudden collapse followed by gradual subsidence of underlying gypsiferous carbonate terrane. These complexes are often significantly modified by stream erosion and deposition, playa deposition, deflation, and mass wasting. Depression fills have been active since the middle Pleistocene and are usually 1-3 m thick but can reach thicknesses in excess of 30 m.

Qds — **Quaternary sinkhole deposits, primarily caused by collapse (Historic to middle Pleistocene)** — Complexes of unconsolidated, well- to poorly-sorted, coarse- to fine-grained sands to clay, alluvial, colluvial, eolian, and occasional lacustrine deposits within closed depressions. Colors variable. Thickness <1 to 3 m.

PALEOZOIC

Permian Artesia Group

Psr — **Seven Rivers formation, undifferentiated** — Cross section only.

Pqg — **Queen and Grayburg formations, undifferentiated** (Guadelupian) — Cross section only.

Lower Permian Formations

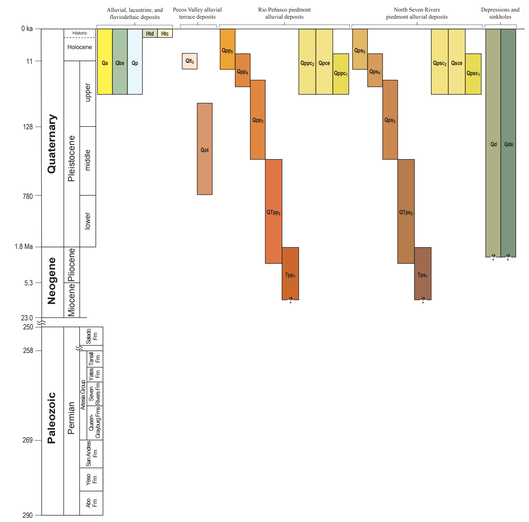
Psa — **San Andres formation** — Cross section only.

Pg — **Glorieta sandstone tongue** — Cross section only.

Pye — **Yeso formation, undifferentiated** — Cross section only.

Pa — **Abo formation, undifferentiated** — Cross section only.

CORRELATION OF MAP UNITS



View looking south-southwest of Permian Seven Rivers formation, mixed gypsiferous facies (*Psg*) gypsum and redbeds in the foreground, Quaternary sinkhole deposits (*Qds*) in the middle distance, and Permian Seven Rivers dolomitic (*Psd*) at the top of the bluff above *Psg* beyond the sinkhole. Photo by D. McCraw.

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GEOLOGIC CROSS SECTION