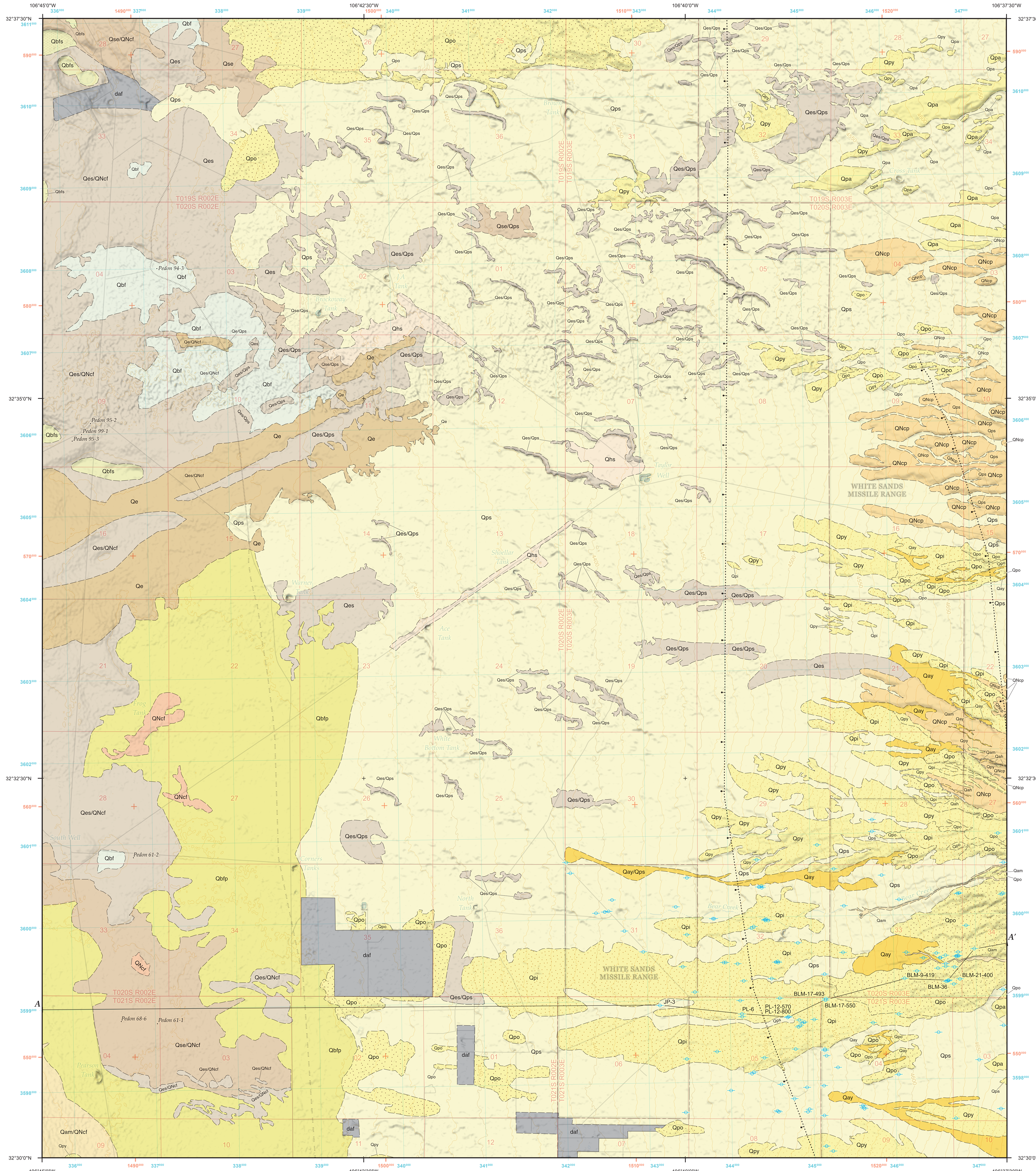
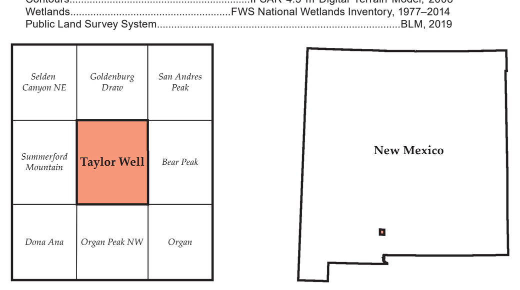
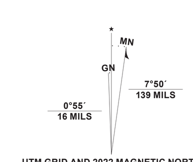


Base map from U.S. Geological Survey 2021.
North American Datum of 1983 (NAD83)
Projection and 1,000-meter grid: Universal Transverse Mercator, Zone 13S, shown in blue.
10,000-foot ticks: New Mexico Coordinate System of 1983 (Central Zone), shown in red.

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

New Mexico Bureau of Geology and Mineral Resources
New Mexico Tech
801 Leroy Place
Socorro, New Mexico
87801-4796

[575] 835-5490

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

http://geoinfo.nmt.edu

Digital layout and cartography by the NMBGMR Map Production Group:
Phil L. Miller, Amy L. Dunn, Ann D. Knight, and A.R. Baca

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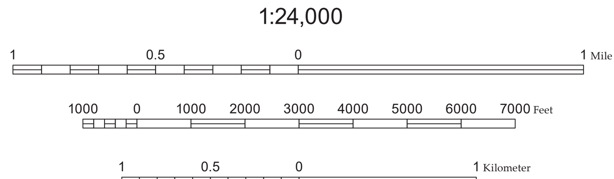

Contour Interval 10 Feet

North American Vertical Datum of 1988

New Mexico Bureau of Geology and Mineral Resources
Open-File Geologic Map 302

Mapping of this quadrangle was funded by a matching-funds grant from the STATEMAP program of the National Cooperative Geologic Mapping Act (Fund Number: G21AC10770), administered by the U. S. Geological Survey, and by the New Mexico Bureau of Geology and Mineral Resources (Dr. J. Michael Timmons, *Interim Director and State Geologist*; Dr. Matthew Zimmerer, *Interim Program Manager for Mapping Programs*).

Geologic Map of the Taylor Well 7.5-Minute Quadrangle, Doña Ana County, New Mexico

September 2022

by
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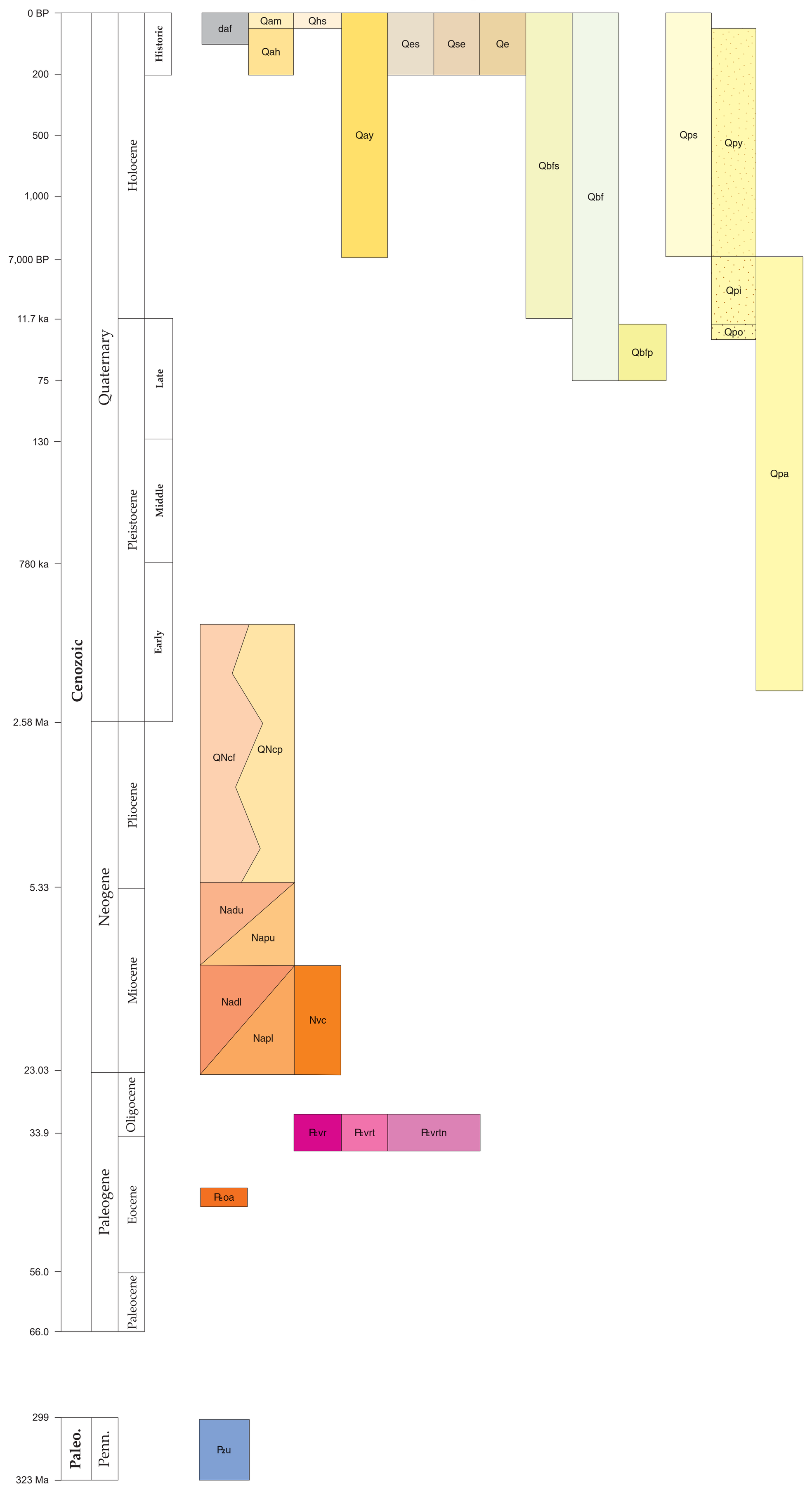
Comments to Map Users

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, 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.

Correlation of Map Units



Explanation of Map Symbols

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

Gradational contact between the Camp Rice fluvial facies and piedmont facies of various ages.—The identity and existence are certain. The location is accurate where solid and approximate where dashed.

Normal fault—The identity and existence are certain. The location is accurate where solid and concealed where dotted. Ball and bar on downthrown block.

A A′ Cross section line and label.

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

BLM-21-400 Well location (in cross section)—The location and depth of a well used to establish stratigraphy and geologic unit depth.

BLM-21-400 Well used for collection of water data.

Pedon 61-1 Field station locality.

Description of Map Units

CENOZOIC
Quaternary
Anthropogenic

daf **Disturbed and filled areas (Modern to ≈100 years old)**—Areas associated with agricultural or urban development. Fill thickness is 1–3 m.

Eolian Deposits

Qes **Eolian sand and sheetwash; undivided (Historic; AD 1850 to present)**—Loose silt to mostly fine-grained sand forming sheets or coppice dunes with evidence of fluvial reworking between the dunes. Colors range from reddish-brown to brown (5YR to 10YR); redder hues result from the presence of argillic (Bt) horizons. C horizons have developed beneath some taller (2–3 m) dunes. Coppice dunes formed from 1885 to 1920 CE (Gile, 1966) and are vegetated by mesquite (*Prosopis juliflora*). The deposit is <0.5–3 m thick.

Qse **Sheetwash and eolian sand; undivided (Historic)**—This unit is similar to Qes, but the dunes are farther apart and are less than 1 m high. Small, shallow, sandy drainage ways between the dunes are more common than within unit Qes. The deposit is <1–2 m thick.

Qe **Eolian sand (Historic)**—Loose, fine-grained sand and silt that forms continuous ridges of merged coppice dunes. Many of these features include moderate-reddish-orange, northeast-trending dune fields composed of fine- to medium-grained, moderately sorted, angular sand. The sand is composed primarily of quartz formed on the Camp Rice fluvial facies and on basin floor deposits north and northeast of South Well. Dunes are 1–2 m tall.

Arroyo Deposits in the Internally Drained Jornada del Muerto

Qhs **Historic clayey silt deposit (<50 years?)**—Thin, white to tan, clayey silt deposit that is first visible on satellite imagery from 2013. This deposit can still be observed covering roadways and Qps surfaces as of 2022 and is the remnant of a muddy flood that overtopped the banks of shallow arroyos in the vicinity of Taylor Well. Based on XRD analysis, the deposit is mostly quartz and calcite with lesser feldspar, chlorite, illite, and blödite. Blödite is $Na_2Mg(SO_4)\bullet 4H_2O$. The muddy flood covered cryptogamic soil, but in places, new lichen colonies are forming. The deposit is 0.5–2 mm thick.

Qam **Modern alluvium (Modern to ≈50 years old)**—Loose sand and gravel filling channels and forming longitudinal bars in ephemeral stream courses. The sand is light-tan to gray and is horizontal-planar or low-angle cross-laminated. Gravels occur predominantly in bars and are clast-supported. The deposit features bar-and-swale topographic relief of 0.3–0.5 m. This unit includes a young fan composed of granules and pebbles of gray volcanic clasts derived from the Doña Ana Mountains. This fan sits on basin-floor clayey silt (Qbfs), filling in animal hoof prints and anthropogenic roadbeds. The deposit is <2–4.5 m thick (Gile et al., 1981).

Qah **Historic alluvium (≈50 to ≈200 years old)**—Loose, sandy, pebble to boulder gravel forming low ridges along arroyo courses. The deposit lacks significant soil development. The surface features subdued bar-and-swale topographic relief of up to 0.25–0.3 m. Tread height is 0.2–0.8 m above modern grade. The deposit is 0.5–4.5 m thick.

Qay **Arroyo alluvium; undivided (Holocene)**—Varying proportions of modern (Qam), historic (Qah), and young piedmont alluvium (Qpy) filling arroyo bottoms and bordering modern channels. See detailed descriptions of each unit.

Basin-Floor Deposits

Qbfs **Sandy fine-grained basin-floor deposits (Holocene)**—Reddish-brown, sandy, clayey silt deposits that grade downward into Camp Rice fluvial deposits. Angular volcanic clasts from the Doña Ana Mountains to the west and exotic mixed rounded pebbles from the Camp Rice fluvial facies (e.g., chert, quartz, granite; ≈30%) are commonly scattered on the floor of the basin. The deposit is ≤2 m thick.

Qbf **Fine-grained basin-floor deposits (Holocene to Pleistocene)**—Brown to grayish-brown clay, silty clay, and clayey silt that grades down into sandy to gravelly distal piedmont or Camp Rice fluvial deposits. The deposit is 0.5–1.5 m thick.

Qbfp **Petts Tank fine-grained basin-floor deposits (Late Pleistocene)**—Brown to moderate-brown, carbonaceous, clayey silt with mud cracks and minor gravel deposits associated with the Petts Tank geomorphic surface. The unit was derived from Paleozoic carbonates in the San Andres Mountains to the east (Gile et al., 1981). This deposit is the distal facies of Qpo, and the Petts Tank surface is the basin-center equivalent of the Jornada II piedmont-slope surface (15 ka to 75 ka; Gile et al., 1981). Pebbles are sparse (<3%), and sand is absent. The upper deposits grade laterally into Qbfs. The deposit is ≤2 m thick.

Alluvial Fan and Piedmont-Slope Deposits

Qps **Piedmont-slope deposits composed of clayey silt (Recent to Holocene)**—White to tan, clayey silt derived from the erosion of Paleozoic carbonate exposed on the western flanks of the San Andres Mountains. Based on XRD analysis, the silt deposit is mostly quartz and calcite with lesser feldspar, chlorite, illite, and blödite. Blödite is $Na_2Mg(SO_4)\bullet 4H_2O$. Near the mountain front, the silt is commonly interbedded with lenses of gravel containing clasts of limestone, sandstone, shale, and chert with Proterozoic (mostly granite with minor schist and hornblende gneiss) and rhyolite clasts that become more common near the southern boundary of the quadrangle on the Bear Creek fan. Toward the basin's center, the silt overlies older fan-piedmont alluvium (Jornada II surface or Organ surface). The basin-center exposures correspond with the Whitebottom surface of Ruhe (1964, 1967), where erosion has exhumed the underlying gravels and the silt forms erosional scarps. The unit includes the exhumed older gravels. The deposit is <3 m thick.

Qpy **Younger fan-piedmont alluvium (Historic to Holocene)**—Deposits on fans, sheets, and lobes that are equivalent to the Organ morphostratigraphic unit. The unit is common on the lower piedmont slope. Bedding in the gravelly sand to sandy gravel ranges from tabular, graded, or cross-bedded (channels) to massive and poorly sorted (debris flows). A red-brown Bt and/or Bk horizon can be preserved, and the calcic soil development is Stage I. This undivided unit contains sedimentary clasts, with Proterozoic (mostly granite with minor schist and hornblende gneiss) and rhyolite clasts becoming more common near the southern boundary of the quadrangle on the Bear Creek fan. Gile and Grossman (1979) report charcoal at pedon sites 67-1, 67-3, 60-15, 59-6, and 59-7; a radiocarbon date on charcoal from 67-1 is 4,035 ± 115 years and on carbonate is 4,430 ± 135 years. A radiocarbon date on carbonate from 60-15 is 10,580 years; these pedon sites are located on the Organ Peak NW quadrangle just south of the Taylor Well quadrangle. Charcoal found in pale-brown silty clay in Organ alluvium at 13S 346237m E 3591721m N NAD83 on the Organ Peak NW quadrangle yielded radiocarbon dates of 1,770 ± 30 BP and 1,780 ± 30 BP. Gile et al. (1981) generally consider the Organ alluvium to be <7,000 years old. The deposit is <2–3 m thick (Gile et al., 1981).

Qpi **Intermediate fan-piedmont alluvium; Isaack's Ranch morphostratigraphic unit (Holocene to latest Pleistocene)**—Similar to unit Qpy, but it mostly occurs in undissected fans, sheets, and lobes correlated with the intermediate elevation Issack's Ranch geomorphic surface of Ruhe (1964, 1967) and morphostratigraphic unit of Gile et al. (1981). A red-brown Bt and/or Bk horizon can be preserved, and the calcic soil development is Stage II. This undivided unit contains limestone, sandstone, and chert clasts with Proterozoic (granite with minor schist and hornblende gneiss) and rhyolite clasts in the southeastern part of the quadrangle, sourced from Bear Creek. This unit may include Qpy. Radiocarbon dates on carbonate in the unit at pedons 59-6 and 59-7 on the Organ Peak NW quadrangle are 11,700 ± 170 years and 7,890 ± 150 years, respectively (Gile and Grossman, 1979). The deposit is 2–3 m thick.

Qpo **Older fan-piedmont alluvium (Late Pleistocene)**—Loose to moderately consolidated gravel that is massive to imbricated. Matrix sand is reddish-brown or pale- to yellowish-brown. This undivided unit contains limestone, sandstone, and chert clasts with Proterozoic (granite with minor schist and hornblende gneiss) and Paleogene volcanic/plutonic (rhyolite, andesite, and monzonite) clasts in the southeastern part of the quadrangle, sourced from Bear Creek. The deposit is commonly buried and can only be observed in arroyos. A red-brown Bt and/or Bk horizon can be preserved, and calcic soil development is Stage II+ to V. Likely correlative to the Jornada II surface (Ruhe, 1967; Gile et al., 1981). Radiocarbon dates on carbonate at pedon 59-7 on the Organ Peak NW quadrangle are 25,500 (+800,-700), 29,000 (+2,700, -2,100), and 26,950 ± 1,050 years (Gile and Grossman, 1979). The deposit is 2–10 m thick.

Qpa **Fan-piedmont alluvium; undivided (Historic to early Pleistocene)**—This undivided unit includes varying proportions of younger (Qpi) and older (Qpo, QNcp) fan-piedmont alluvium. See the detailed descriptions of each unit.

Quaternary to Neogene
Older Piedmont Deposits

QNcp **Piedmont facies of the Camp Rice Formation; Santa Fe Group (Early Pleistocene to Pliocene)**—Weakly consolidated to carbonate-cemented, pebble–cobble mid-fan gravel to pebble–cobble–boulder proximal gravel that is massive or in medium to thick (25–80 cm) tabular beds. Gravel clasts are generally matrix-supported (less commonly clast-supported). Clasts are very poorly sorted, angular to subrounded pebbles, cobbles, and boulders of sedimentary rocks eroded from the San Andres Mountains. The unit may grade to sand or silt with gravel interbeds at distal piedmont position, may contain buried soils, and is frequently capped by a laminar, petrocalcic (Stage IV to V) horizon (Gile et al., 1981). The maximum exposed thickness is 30–40 m.

QNcf **Axial-fluvial facies of the Camp Rice Formation; Santa Fe Group (Early Pleistocene to Pliocene)**—Weakly to moderately consolidated, calcite-cemented, pebble to cobble gravel and sand. This unit is not exposed on the quadrangle, but the unit is recognized based on lag gravel on the ground surface composed of exotic (quartzite, granite, and chert) and volcanic clasts. The C-horizon is present at the surface in the northwestern corner of the quadrangle in the vicinity of the Jornada Experimental Range (JER) headquarters and an area southeast of South Well. Monger (2006) noted significant chemical weathering in the A and B horizons in the ancestral Rio Grande alluvium in trenches and less chemical weathering in the C-horizon. The Camp Rice fluvial facies was deposited between 5 and ≈0.8 Ma (Mack et al., 1998). The maximum thickness is 215 m.

Napu **Upper proximal piedmont-slope alluvium; middle Santa Fe Group (Pliocene to Miocene)**—Cross section only. Indurated sandy gravel deposited on a proximal to medial piedmont slope with 50% volcanic clasts.

Nadu **Upper distal piedmont-slope alluvium; middle Santa Fe Group (Pliocene to Miocene)**—Cross section only. Partially indurated gravelly sand and clayey silt deposited on a medial to distal piedmont slope.

Napl **Lower proximal piedmont-slope alluvium; lower Santa Fe Group (Miocene)**—Cross section only. Indurated sandy gravel deposited on a proximal to medial piedmont slope with >50% volcanic clasts.

Nadl **Lower distal piedmont-slope alluvium; lower Santa Fe Group (Miocene)**—Cross section only. Partially indurated gravelly sand and clayey silt deposited on a medial to distal piedmont slope.

Nvc **Lower volcaniclastic proximal piedmont-slope alluvium; lower Santa Fe Group (Miocene)**—Semi-consolidated to consolidated, clay-rich conglomerate dominated by clasts of volcanic rocks. Most clasts are maroon to gray-black to black, aphanitic to slightly porphyritic andesite, but rhyolite and tuff clasts are also present. Limestone is present in this deposit toward the east.

Paleogene
Volcanic Rocks

Pevr **Rhyolite flows or intrusions (Late Eocene to early Oligocene(?))**—Not exposed on the map and not in cross section. Pink and white, flow-banded rhyolite to yellowish-tan, aphanitic rhyolite with <1–2% sanidine ± quartz crystals and sparse biotite and pyrite/chalcopyrite crystals; magnetite is common. The aphanitic rhyolite is a common clast in the piedmont deposits derived from Bear Creek and is likely associated with the rhyolite of Quartzite Mountain (Seager, 1981). Encountered and described in White Sands Test Facility (WSTF) wells north of the cross-section line.

Pevrt **Welded silicic pyroclastic rocks (Late Eocene to early Oligocene(?))**—Cross section only. Gray, welded tuff with 7–15% crystals of sanidine and quartz and trace biotite, magnetite, and enstatite 1–3 mm across encountered in wells BLM-9-419 and BLM-25-4555. Based on unpublished thin section descriptions of samples from 117 m (385 ft) and 156 m (515 ft) in well BLM-9-419 by Russell Clemons, this unit contains titanite, and the matrix is a mix of glass shards and cryptocrystalline quartz and feldspar. Karissa Vermillion (2022) dated a similar tuff from core in well BLM-8-418 and determined a $^{40}Ar/^{39}Ar$ date of 35.278 ± 0.11 Ma. Tuffs encountered at depths of 133–170 m in well BLM-9-419 are gray to red and are more lithic-rich. The welded tuff is at least 62–64 m thick.

Pevrtn **Non-welded silicic pyroclastic rocks (Late Eocene to early Oligocene(?))**—Cross section only. A succession of pumice beds and non-welded tuffs with crystals of quartz, feldspar, and biotite penetrated in well BLM 36. Approximately 120 m thick.

Peoa **Orejon Andesite (Middle Eocene)**—The name Orejon Andesite has been applied to nearby exposures of volcaniclastic strata and intermediate-composition lava flows on Hardscrabble Hill (Seager, 1981). The andesite is commonly black to red. The andesite is porphyritic with altered plagioclase and pyroxene phenocrysts with pyrite or is aphanitic to fine- to medium-grained. Creitz et al. (2018) determined U-Pb dates of 43.8 ± 0.4 Ma and 45.0 ± 0.7 Ma on the Orejon Andesite in Fillmore Canyon 15 km to the south. In the Organ Mountains, this unit is 450 to 610 m thick (Seager, 1981, p.48).

PALEOZOIC SEDIMENTARY ROCKS

Pzu **Upper Paleozoic sedimentary rocks; undivided (Pennsylvanian)**—Cross section only. Primarily limestone and red bed mudstones, with shale, sandstone, and some gypsum (marine and non-marine).

Geologic Cross Section A–A'