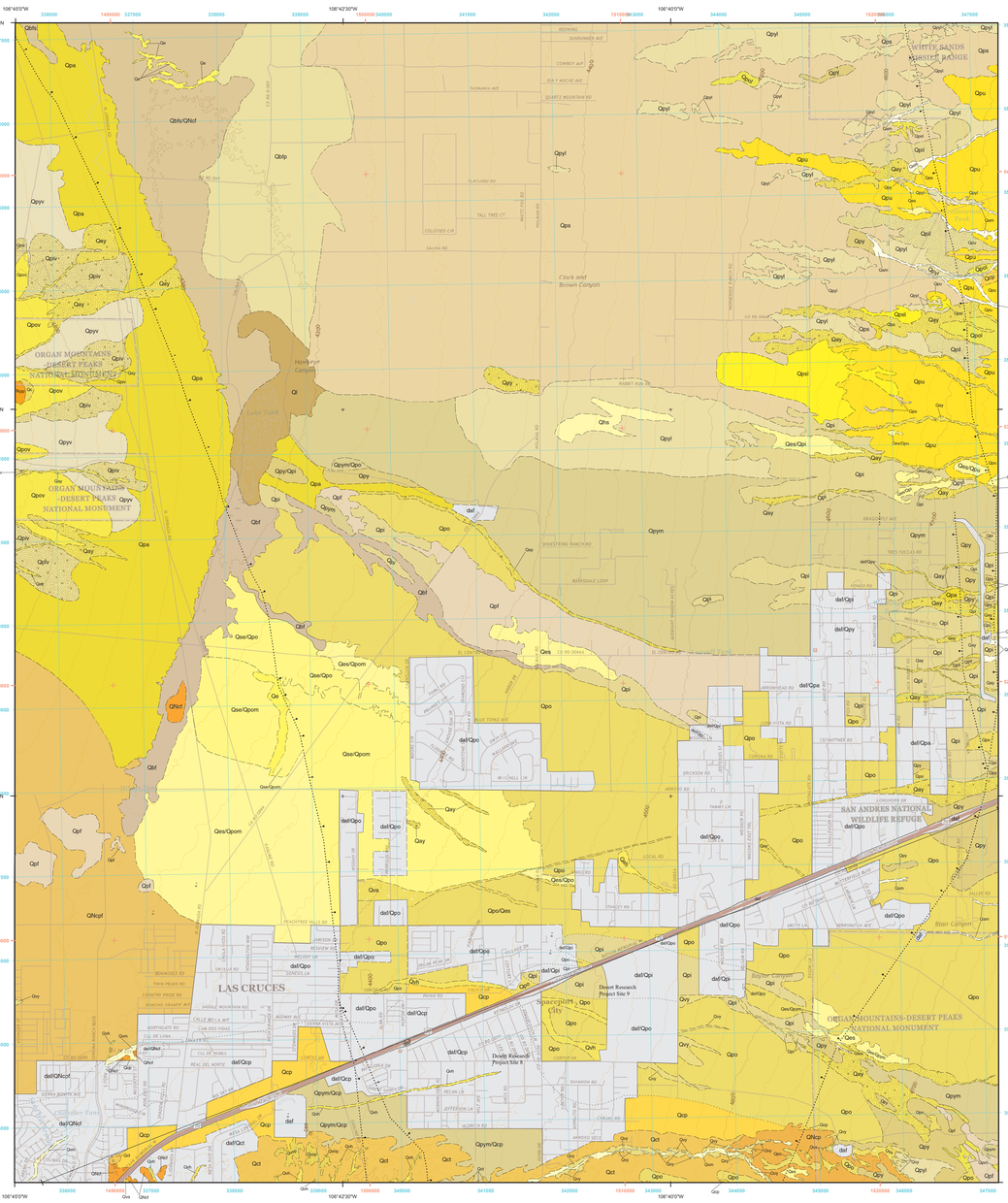

Base map from U.S. Geological Survey 2013.
North American Datum of 1983 (NAD83)
Projection and 1,000-meter grid: Universal Transverse Mercator, Zone 13S, shown in blue
10,000-foot ticks: New Mexico Coordinate System of 1983 (central zone), shown in red.

Roads	TomTom, 2008-2013
Names	GNIS, 2013
Hydrography	National Hydrography Dataset, 2009
Contours	IFSAR 4.5 m Digital Terrain Model, 2008
Wetlands	FWS National Wetlands Inventory 1977–2014

Quadrangle Location

1:24,000

Contour Interval 20 Feet

North American Vertical Datum of 1988

Magnetic Declination
July, 2020
8° 04' East
At Map Center

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 Justine L. Nicolette

New Mexico Bureau of Geology and Mineral Resources
Open-File Geologic Map 289

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Geologic Map of the Organ Peak NW 7.5-Minute Quadrangle, Doña Ana County, New Mexico

June 2021

by
Shari A. Kelley[1]

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map may be based on any of the following: reconnaissance field geologic mapping, compilation of published and unpublished work, and photogeologic interpretation.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

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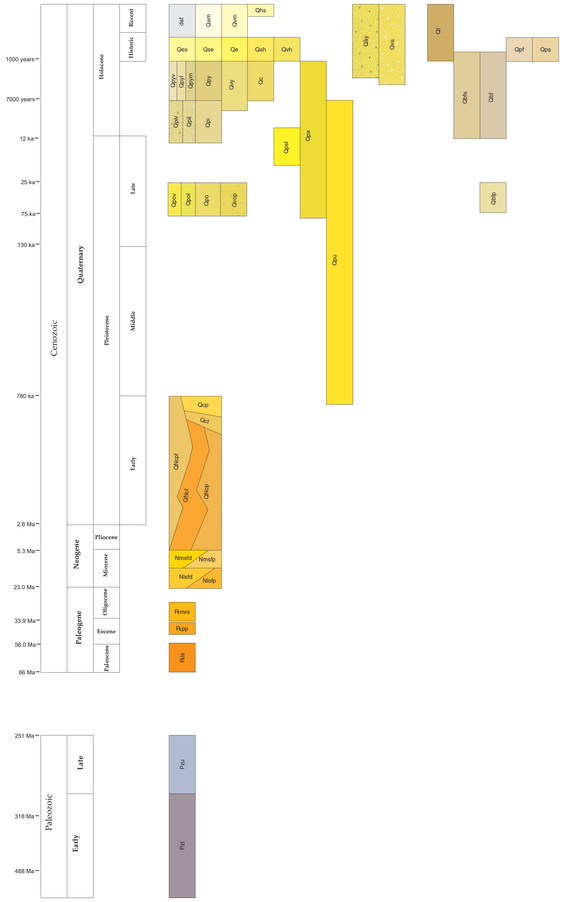
Correlation of Map Units



Explanation of Map Symbols

01.01.01 Contact—Identity and existence are certain. Location is accurate.

01.01.03 Contact—Identity and existence are certain. Location is approximate.

01.01.07 Contact—Identity and existence are certain. Location is concealed.

02.01.07 Fault (generic; vertical, subvertical, or high-angle; or unknown or unspecified orientation or sense of slip)—Identity and existence are certain. Location is concealed.

02.02.07 Normal fault—Identity and existence are certain. Location is concealed. Ball and bar on downthrown block.

31.08 Map neatline

31.22 Field station locality

Cross section only

02.06.03 Strike-slip fault, right-lateral offset—Identity and existence are certain. Location is approximate. Arrows show relative motion.

02.06.13 Strike-slip fault, left-lateral offset—Identity and existence are certain. Location is inferred. Arrows show relative motion.

31.02.26 Well location (in cross section)—The projected location and depth of a well used to establish stratigraphy and geologic unit depth.

Description of Map Units

01-00-00-00 — heading01 — Quaternary — Quaternary —

01-01-00-00 — heading02 — Anthropogenic Unit — Anthropogenic Unit — Anthropogenic Unit

01-01-01-00 — unit — daf — Disturbed Land and Anthropogenic Fill — Mapped for thick road fill along U.S. Highway 70, flood retention dams, and other areas affected by aggregate mining or urban development. Fill thickness is 1–10 m.

01-02-00-00 — heading02 — Eolian Units — Eolian Units — Eolian Units

01-02-01-00-00 — unit — Qes — Eolian Sand and Sheetwash, undivided — Loose silt to mostly fine-grained sand forming sheets or coppice dunes with evidence of fluvial reworking between the dunes. Coppice dunes are vegetated by mesquite and largely formed 1885–1920 CE (Gile, 1966). Thickness is <0.5–3 m.

01-02-02-00-00 — unit — Qse — Sheetwash and Eolian Sand, undivided — 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. Thickness is < 1–2 m.

01-02-03-00-00 — unit — Qe — Eolian Sand — Loose fine-grained sand and silt that forms continuous ridges of merged coppice dunes. Many of these features formed on the Camp Rice fluvial facies on the basin floor north of Isaacks Lake. Dunes are 1–2 m tall.

01-03-00-00-00 — heading02 — Colluvial Unit — Colluvial Unit — Colluvial Unit

01-03-01-00-00 — unit — Qc — Colluvium — Loose angular boulders and blocks up to 1 m across on the eastern lower slopes of a hill composed of Paleogene Palm Park andesite and andesite breccia. Thickness is 1–2 m.

01-04-00-00-00 — heading02 — Arroyo Deposits in the Internally Drained Jornada del Muerto — Arroyo Deposits in the Internally Drained Jornada del Muerto — Arroyo Deposits in the Internally Drained Jornada del Muerto

01-04-01-00-00 — unit — Qam — Modern Alluvium — Loose sand and gravel filling channels and forming longitudinal bars in ephemeral stream courses. Thickness is <2–4.5 m (Gile et al., 1981).

01-04-02-00-00 — unit — Qah — Historical Alluvium — Loose, sandy-pebble to boulder gravel forming low ridges along arroyo courses. Deposit lacks significant soil development. 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. Thickness is 0.5–4.5 m.

01-04-03-00-00 — unit — Qay — Arroyo Alluvium, undivided — Varying proportions of modern (Qam), historical (Qah), and young alluvium filling arroyo bottoms and underlying modern channels. See detailed descriptions of each unit.

01-05-00-00-00 — heading02 — Deposits in Arroyos Draining into the Rio Grande — Deposits in Arroyos Draining into the Rio Grande — Deposits in Arroyos Draining into the Rio Grande

01-05-01-00-00 — unit — Qvm — Modern Valley Alluvium — Loose sand and gravel filling channels and forming longitudinal bars in ephemeral stream courses. Deposit features bar-and-swale topographic relief of 0.3–0.5 m. Thickness is <2–4.5 m (Gile et al., 1981).

01-05-02-00-00 — unit — Qvh — Historic Valley Alluvium — Loose, sandy-pebble to boulder gravel forming low ridges along arroyo courses that drain into the Rio Grande. Deposit lacks significant soil development. 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. Thickness is 0.5–4.5 m.

01-05-03-00-00 — unit — Qvy — Younger Valley Alluvium — Includes Fort Selden (Fillmore and Leasburg landforms). Loose to weakly consolidated, pebbly-sand or sandy-pebble gravel. Surface soils feature cambic to weak calcic horizons featuring Stage I carbonate accumulation; the Bt horizons commonly have reddish-brown hues (5-7.5YR). Bedding is variably fining upward, laminar to cross-bedded channel deposits or poorly sorted, matrix-supported sand and gravel debris flow deposits. Charcoal and shell 14C ages span an interval from >9400 to 1100 cal yr BP, with soil development indicating a stable period <7000 ka (Gile and Hawley, 1968; Metcalf, 1969; Gile et al., 1981). This unit is correlative to the Fort Selden (Fillmore and Leasburg), Gile et al. (1981). Thickness ranges from 2–3 m on the piedmont slope.

01-05-04-00-00 — unit — Qva — Valley-floor Alluvium, undivided — This unit contains varying proportions of modern (Qvm), historical (Qvh), and younger (Qvy) alluvium filling valley-floors and underlying modern channels. See detailed descriptions of each unit.

01-05-05-00-00 — unit — Qvop — Picacho Valley Alluvium — Sandy-pebble to pebble-cobble gravel; clasts consist of monzonite, volcanic rocks, and limestone derived from the Organ Mountains. The deposit is poorly exposed in Arroyo de Alameda just south and east of Olate High School and the unit appears to be capped by a Stage III calcic horizon. Estimated to be 25–75 ka (Gile et al., 1981). The top of the deposit is inset <5 m below the La Mesa surface and the thickness is estimated to be <10 m.

01-06-00-00-00 — heading02 — Basin-floor Units — Basin-floor Units — Basin-floor Units

01-06-01-00-00 — unit — Ql — Playa Lake Deposits — Moderate-brown to grayish-brown to reddish-brown calcareous clay and silt deposited in modern Isaack Lake. Well-rounded volcanic (mostly rhyolite and andesite) pebbles are scattered across the surface. Gile and Grossman (1979) dug a pit into the basin floor and found that the soil is well mixed by repeated wet and dry cycles. These authors also note that soluble salts are not present because of deep percolation of precipitation during summer rainstorms. The playa deposit is up to 4 m thick.

01-06-02-00-00 — unit — Qbfs — Sandy Fine-Grained Basin Floor Deposits — 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 (≈60%), exotic mixed rounded pebbles from the Camp Rice fluvial facies (e.g., chert, quartz, granite; ≈30%), and sedimentary clasts (≈10%) are commonly scattered on the floor of the basin. The unit is up to 2 m thick.

01-06-03-00-00 — unit — Qbf — Fine-Grained Basin Floor Deposits — Brown to grayish-brown clay, silty clay, and clayey silt that grades down into sandy to gravelly distal piedmont or Camp Rice fluvial deposits. 0.5–1.5 m thick.

01-06-04-00-00 — unit — Qbfp — Petts Tank Fine-Grained Basin Floor Deposits — Brown to moderate-brown mud cracked carbonaceous clayey silt 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 deposits is the distal facies of Qpo, and the Petts Tank surface is the basin center equivalent of the Jornada II piedmont slope surface. Pebbles are sparse (<5%) and sand is absent. The upper deposits grade laterally into Qbfs. The age is estimated to be 25–75 ka (Gile et al., 1981). Unit is up to 2 m thick.

01-07-00-00-00 — heading02 — Alluvial Fan and Piedmont Slope Units — Alluvial Fan and Piedmont Slope Units — Alluvial Fan and Piedmont Slope Units

01-07-01-00-00 — unit — Qbs — Historic clayey silt deposit — Thin, reddish-brown clayey silt deposit with monzonite granules that is visible on photogrammetry imagery from 2009. This deposit can still be observed in the field as of 2021 and is the remnants of a muddy flood that overtopped the banks of shallow arroyos in an area south of Rabbit Run Road and east of Holman Avenue. The deposit is mostly quartz, with clasts, feldspars, illite, montmorillonite, kaolinite, richterite (or some similar amphibole); the quartz to calcite ratio occurs at ≈85:15–90:10, based on XRD analysis. The muddy flood covered cryptogrammic soil, but in one place a new colony is forming. The deposit is 0.5–2 mm thick.

01-07-02-00-00 — unit — Qpf — Fine-grained silty clay deposits — Moderate to light-brown clayey silt, silty clay, and clayey sandy silt deposits with little (<1–2 % volcanic clasts) to no gravel that fill in low spots on piedmont slopes both east and west of the basin floor. The elevation of these topographic lows is 10 m above the elevation of the Isaack Lake basin floor. The unit is estimated to be <7000 years old. The unit is generally less than 0.5 m thick.

01-07-03-00-00 — unit — Qps — Piedmont slope deposits composed of clayey silt — White to tan clayey silt derived from the erosion of Paleozoic carbonate exposed on the western flanks of the San Andres Mountains. Near the mountain front, the silt is commonly interbedded with lenses of gravel containing clasts of limestone, laminated sandstone, shale, and chert. Toward the center of the basin 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 (Figure 8). The unit includes the exhumed older gravels. The deposit is <3 m thick.

01-07-04-00-00 — unit — Qpy — Younger Fan-Piedmont Alluvium — Deposits on fans, sheets, and lobes that are equivalent to the Organ morphostratigraphic unit. 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 can be preserved and the calcic soil development is Stage I. This undivided unit contains subequal amounts of monzonitic, volcanic, and sedimentary clasts. Gile and Grossman (1979) report charcoal at pedon sites 67-1, 67-3, 60-15, 59-6, and 59-7; a 14C date on charcoal from 67-1 is 4035 ± 115 years and on carbonate is 4430 ± 135 years. A 14C date on carbonate from 60-15 is 10580 years. Charcoal found in pale-brown silty clay in a Qpy deposit at UTM 346237E 3591721N (NAD83) during this investigation yielded 14C dates of 1770 ± 0130 BP and 1780 ± 30 BP. Gile et al. (1981) generally consider the Organ alluvium to be <7000 years old. Thickness is <2–3 m (Gile et al., 1981).

01-07-04-01-00 — subunit — Qpyym — Younger Fan-Piedmont Alluvium with Monzonitic Clasts — Piedmont slope deposits predominantly containing monzonite granules and clasts and volcanic clasts derived from the Organ Mountains and San Agustin Peak.

01-07-04-02-00 — subunit — Qpyl — Younger Fan-Piedmont Alluvium with Limestone and Sedimentary Clasts — Piedmont slope deposits predominantly containing limestone, sandstone, shale, and chert derived from the San Andres Mountains.

01-07-04-03-00 — subunit — Qpyv — Younger Fan-Piedmont Alluvium with Volcanic Clasts — Piedmont slope deposits predominantly containing andesite and other volcanic clasts derived from the Doña Ana

01-07-05-00-00 — unit — Qpi — Intermediate Fan-Piedmont Alluvium, Isaacks' Ranch Morphostratigraphic Unit — Similar to units Qpy but occurring in mostly undissected fans, sheets, and lobes correlated with the intermediate elevation Isaacks' Ranch geomorphic surface of Ruhe (1964, 1967) and morphostratigraphic unit of Gile et al. (1981). A red-brown Bt and/or Bk can be preserved and the calcic soil development is Stage II. This undivided unit contains subequal amounts of monzonitic, volcanic, and sedimentary clasts. This unit may include Qpy. 14C dates on carbonate in the unit at pedons 59-6 and 59-7 are 11700 ± 170 years and 7980 ± 150 years, respectively (Gile and Grossman, 1979). The age range of Qpi is 8–15 ka (Gile et al., 1981). Thickness is 2–3 m.

01-07-06-01-00 — subunit — Qpil — Intermediate Fan-Piedmont Alluvium with Limestone and Sedimentary Clasts — Piedmont slope deposits predominantly containing limestone, sandstone, shale, and chert derived from the San Andres Mountains.

01-07-06-02-00 — subunit — Qpiv — Intermediate Fan-Piedmont Alluvium with Volcanic Clasts — Piedmont slope deposits predominantly containing andesite and other volcanic clasts derived from the Doña Ana Mountains.

01-07-07-00-00 — unit — Qpsl — Gravelly clayey silt piedmont slope deposit — This deposit occupies a large area near the center of the quadrangle that is composed of gravelly silt reworked from the older deposits Qpo and Qpu. The clasts are predominantly limestone and other sedimentary clasts derived from the San Andres Mountains. The unit is <2–3 m thick.

01-07-08-00-00 — unit — Qpo — Older Fan-Piedmont Alluvium — Moderately consolidated gravel that is massive to imbricated. Matrix sand is reddish-brown or pale- to yellowish-brown. This undivided unit contains subequal amounts of monzonitic and sedimentary clasts. Deposit is commonly buried and can only be observed in arroyos; a red-brown Bt and/or Bk can be preserved and calcic soil development is Stage II+ to III. Likely correlative to the Jornada II surface (Ruhe, 1967; Gile et al., 1981). Radiocarbon dates on carbonate at 59-7 are 25500 (+800, -700), 29000 (+2700, -2100), and 26950 ± 1,050 years (Gile and Grossman, 1979). The age range is estimated to be 25–75 ka (Gile et al., 1981). Thickness is 2–10 m.

01-07-08-01-00 — subunit — Qpsl — Older Fan-Piedmont Alluvium with Limestone and Sedimentary Clasts — Piedmont slope deposits predominantly containing limestone, sandstone, shale, and chert derived from the San Andres Mountains.

01-07-08-02-00 — subunit — Qpov — Older Fan-Piedmont Alluvium with Volcanic Clasts — Piedmont slope deposits predominantly containing andesite and other volcanic clasts derived from the Doña Ana Mountains.

01-07-09-00-00 — unit — Qpa — Fan-Piedmont Alluvium, undivided — This undivided unit includes varying proportions of younger (Qpy, Qpi) and older (Qpo) fan-piedmont alluvium. See the detailed descriptions of each unit.

01-07-10-00-00 — unit — Qpu — Old Fan-Piedmont Alluvium, undivided — High ridges on the east side of the quadrangle near the San Andres Mountains with varying proportions older (Qpo) fan-piedmont alluvium and Camp Rice piedmont slope facies (Qcp). These fans are derived from calcareous-sedimentary rock bearing units in the San Andres Mountains to the east of the quadrangle. See detailed descriptions of each unit.

02-00-00-00-00 — heading01 — Quaternary–Neogene — Quaternary–Neogene — Quaternary–Neogene

02-01-00-00-00 — heading02 — Basin-Fill Units — Basin-Fill Units — Basin-Fill Units

02-01-01-00-00 — unit — Qcp — Younger Piedmont Facies of the Camp Rice Formation — Weakly consolidated to carbonate-cemented, pebble-cobble to pebble-cobble-boulder 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 consist of angular to subrounded pebbles, cobbles, and boulders of monzonite and volcanic rocks eroded from the Organ Mountains. Unit may grade to loam or silt with gravel interbeds at distal piedmont positions (Qcf), may contain buried soils, and is frequently capped by a laminar, petrocalcic (Stage IV) horizon (Gile et al., 1981). Maximum thickness is 30-40 m.

02-01-02-00-00 — unit — Qct — Transitional Facies of the Camp Rice Formation — Weakly consolidated, massive, poorly sorted sand and gravel to tabular-bedded, imbricated gravel and sand channel deposits. Sand is commonly fine grained. Gravel is subround to subangular and consists primarily of monzonite granules to boulders or volcani

02-01-03-00-00 — unit — QNcf — Axial-fluvial Facies of the Camp Rice Formation — Weakly to moderately consolidated and calcite-cemented, pebble gravel and sand. Gravels are well-imbricated to cross-stratified and contain common exotic clasts (quartzite, granite, and chert). These deposits underlie internally massive to planar cross-stratified sand that is brownish (10YR) in color. Soils are generally not observed. The Camp Rice fluvial facies was deposited between 5 and ≈0.8 Ma (Mack et al., 1998). Maximum thickness is 215 m.

02-01-04-00-00 — unit — QNcpf — Piedmont and Fluvial Facies of the Camp Rice Formation — Weakly consolidated to carbonate-cemented piedmont and fanglomerate gravel-conglomerate derived from porphyritic volcanic rocks in the Doña Ana Mountains and fluvial facies sand with <1–3% exotic clasts of chert and quartz (Figure 9). Matrix sand is tan and is mostly fine grained, with medium- to coarse-grained intervals. Unit contains 10-15% thin beds of pebbly sand. Stage III to IV calcic horizons observed in upper 2 m in excavations and in the escarpment near Red Hawk Golf Course that correlate to the La Mesa surface. Exposed thickness is <10 m.

02-01-05-00-00 — unit — QNcp — Piedmont Facies of the Camp Rice Formation — Clast rock type and size are similar to Qcp. This unit has a 1-1.5 m thick pedogenic carbonate horizon, and generally has a reddish hue in contrast to the tan color of Qcp.

02-01-06-00-00 — unit — Nmsfp — Middle Santa Fe Group Proximal Piedmont-Slope Deposits — Indurated sandy gravel deposited on a proximal to medial piedmont slope. Not exposed. On cross sections only.

02-01-07-00-00 — unit — Nmsfd — Middle Santa Fe Group Distal Piedmont-Slope Deposits — Partially indurated gravelly sand and clayey silt deposited on a medial to distal piedmont slope. Not exposed. On cross sections only.

02-01-08-00-00 — unit — Nlsfp — Lower Santa Fe Group Proximal Piedmont-Slope Deposits — Indurated sandy gravel deposited on a proximal to medial piedmont slope. Not exposed. On cross sections only.

02-01-09-00-00 — unit — Nlsfd — Lower Santa Fe Group Distal Piedmont-Slope Deposits — Partially indurated gravelly sand and clayey silt deposited on a medial to distal piedmont slope. Not exposed. On cross sections only.

03-00-00-00-00 — heading01 — Paleogene — Paleogene —

03-01-00-00-00 — unit — PEmrs — Silicic pyroclastic and volcaniclastic rocks — Mainly rhyolite and dacitic ash-flow tuffs and tuffaceous sandstones primarily derived from the Organ caldera, with some capping basaltic-andesite flows. Not exposed. On cross sections only.

03-02-00-00-00 — unit — PEpp — Palm Park Formation — Gray to greenish-gray dacitic porphyry with 5–20% hornblende and plagioclase phenocrysts. The plagioclase is 2–3 mm long and the hornblende is 2–5 mm long; xenoliths of that are 1–2 cm across comprised of equigranular to porphyritic rocks are common; the equigranular xenoliths are composed of hornblende, and white and gray plagioclase and the porphyritic xenoliths have ≈2% hornblende and plagioclase. Fractures at the top of the knob are coated with epidote. Recent U–Pb and 40Ar/39Ar studies of the Palm Park Formation in the central part of the Doña Ana Mountains yielded dates of 41.3 ± 0.7–41.6 ± 0.7 Ma and 43.05 ± 0.28 Ma, respectively (Creitz et al., 2018; Ramos and Heizler, 2018). These dates are from the lower part of the formation. Reported 40Ar/39Ar of ≈36 Ma on the Doña Ana Rhyolite, which intrudes the Palm Park Formation, place an upper limit on the age of the andesite in this area (Ramos and Heizler, 2018). Approximately 30 m of this unit is exposed on a knob on the east flank of the Doña Ana Mountains.

03-03-00-00-00 — unit — PEls — Love Ranch Formation — Mostly red to reddish-brown sedimentary rocks, including sandstones, mudstones, and conglomerates with few or no volcanic constituents eroded from Laramide highlands. Not exposed. On cross sections only.

04-00-00-00-00 — heading01 — Paleozoic — Paleozoic —

04-01-01-00-00 — unit — Pzu — Upper Paleozoic sedimentary rocks, undivided — Primarily limestone and redbed mudstones, with shale, sandstone, and some gypsum (marine and nonmarine). Not exposed. On cross sections only.

04-01-02-00-00 — unit — Pzl — Lower Paleozoic sedimentary rocks, undivided — Primarily limestone, with shale and sandstone (mostly marine). Not exposed. On cross sections only.

Figure 1. – West-dipping Camp Rice Formation transitional facies in Arroyo del Alameda along the Jornada fault. Clipboard is 0.3 m tall.

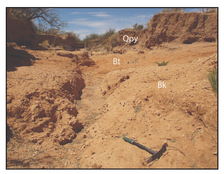
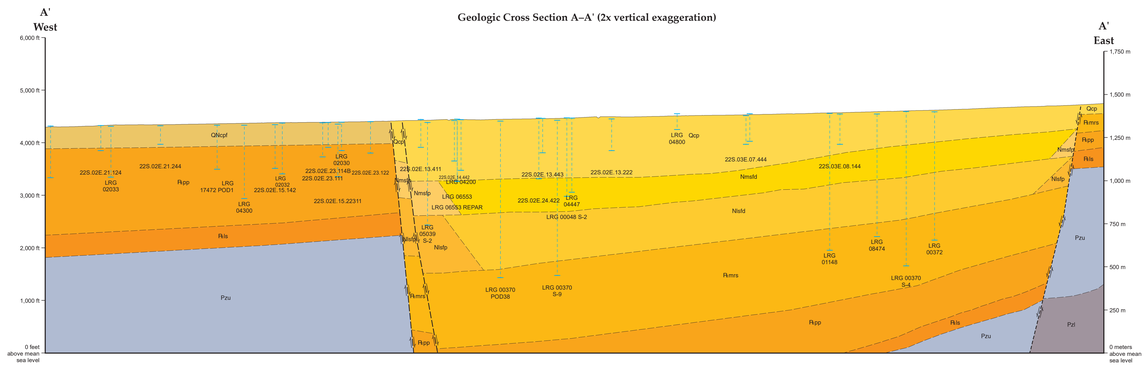


Figure 2. – Looking west across the East Jornada fault zone. The Bk horizon in Qpo in the foreground is dipping west below the Bt in Qpo in the middle ground. Note the well-cemented ledges below the Qpy

Geologic Cross Section A–A' (2x vertical exaggeration)