



DESCRIPTION OF MAP UNITS

[Most of the surficial deposits in the Cienega School quadrangle were deposited in the Salt Basin graben along the west side of the Guadalupe Mountains. In late Pleistocene time, this area was the site of a lake that extended southward into Texas. Almost all surficial deposits, with the notable exception of the highest, deeply dissected alluvial fans along the west side of the Brokeoff Mountains, were deposited within the confines of the now evaporated lake; the youngest surficial deposits are those deposited in the lowest, deepest parts of the pre-existing lake. Almost all alluvial and fluvial deposits were derived from the Permian San Andres and overlying Grayburg Formations.]

- Qa** Stream floodplain alluvium (Holocene)—Sand, silt, and clay deposited in broad, open stream valleys, in confined, ephemeral stream channels, or in ephemeral alkali lake beds adjacent to inlet channels. Generally less than 6.5 ft (2 m) thick.
- Qak** Alkali lake deposits (Holocene)—Pale olive-gray alkaline deposits in ephemeral lakes. Consist of very fine sand- and silt-sized, euhedral crystals of gypsum and minor subrounded grains of reddish-orange quartz silt. Locally, minor calcite/dolomite coats gypsum crystals. Thickness generally less than 20 in (0.5 m).
- Qd** Windblown sand and silt (Holocene)—Two types of contemporary aeolian deposits are present in the quadrangle: (1) deposits of cream white, gypsum sand dunes and thin, sheet sand deposits are common along the eastern, leeward margins of alkali lakes; dunes show maximum relief of about 3 feet (1 m) and cover areas ranging from several tens to several hundred square yards (meters); and (2) deposits of reddish-brown, fine grained sand- and silt-sized grains that consist mainly of subhedral crystals of gypsum, anhedral grains of calcite, and minor reddish-brown, subrounded quartz silt. Most deposits fill depressions related to geomorphic forms of older stabilized dune deposits (Qsd); depressions range in size from a few tens of yards (meters) to several hundred yards (meters) across. Windblown sand is also an important component of young alluvial deposits along the east side of the alkali lakes and has been mapped separately where it is a major component of deposit. Maximum thickness of all contemporary windblown deposits is near 10 feet (3 m).
- Qad** Alkali lake deposits and wind-blown sand (Holocene)—Alkali lake deposits (Qak) are locally mixed with windblown sand and silt (Qd).
- Qe** Colluvium (Holocene)—Weakly to strongly calcite-cemented soil developed in residual deposits of silt, sand, and clay and angular pebbles and cobbles; most commonly makes the San Andres Formation that underlies the eastern edge of Otero Platform on the west side of the quadrangle; thickness less generally than 15 in (50 cm).
- Qay** Young alluvium (Holocene)—Patchy deposits of reworked sand, silt, and clay derived mainly from adjacent alluvial fans and deposited as a thin, reddish-brown veneer; deposited in the intermediate parts of the evaporated late Pleistocene lake on gypsum- and calcite-rich lake sediments (Qev). Maximum thickness less than 6.5 feet (2 m).
- Qfy** Young alluvial fan deposits (Holocene)—Sand, silt, and clay deposited in intermediate parts of evaporated late Pleistocene lake and derived mainly from the erosion of older alluvium (Qd) and slopewash deposits (Qs).
- Qaa** Young alluvium and aeolian sand, undivided (Holocene)—Mixed deposits of slopewash (Qs), young alluvium (Qay), and windblown sand and silt (Qd) along the east side of late Pleistocene lake.
- Qaf** Alluvial and fluvial deposits (Holocene)—Sand, silt, clay, and pebble to cobble gravel deposited (1) in the southwest corner of the quadrangle, derived mainly from Culp and Fourmile Draws to the west that drain bedrock exposures of San Andres Formation (Psa) west of quadrangle, and (2) in active arrows that are incised into old alluvial fan deposits (Qfo) shed from the Brokeoff Mountains on the east. Generally less than 16 ft (5 m) thick.
- Qf** Alluvial fan deposits (Holocene)—Poorly sorted silty sand and gravel deposited in small alluvial fans along margins of highest strandline of late Pleistocene lake; commonly covers late Pleistocene lake deposits (Qev).
- Qs** Slopewash alluvium (Holocene)—Sand, silt, and clay deposited downslope of alluvial fan deposits (Qf) and alluvial and fluvial deposits (Qaf); generally less than 6.5 ft (2 m).
- Qsd** Stabilized dune deposits (Holocene)—Deposits interpreted to be stabilized sand dunes, based mainly on morphology seen best from aerial photographs. Dune types include barchanoid, parabolic, and transverse and are best preserved directly south of the quadrangle. In the Cienega School quadrangle, the dunes are mainly preserved as elongate, sinuous ridges of low to moderate relief that in places can be traced for distances of greater than 0.6 mi (1 km); also commonly form mounds of low to moderate relief composed of multiple, curvilinear ridges defining cusate or coliform map patterns. Windblown gypsumiferous sand and silt that originally composed the dunes are strongly altered during and after deposition by evaporation of near surface brines and the concomitant precipitation of evaporite minerals. The present surface of the dune deposits consists of medium to light gray, hard, vuggy surficial duricrust composed of variable amounts of gypsum and dolomite that ranges in thickness from 2-4 in (5-10 cm) to more than 16 in (40 cm). Underlying the duricrust is a friable, vuggy deposit of weakly cemented sand- to granule-sized crystals of gypsum and calcite that attains a maximum exposed thickness near 10 ft (3 m); large, 4-6 in (10-15 cm) long crystals of selenite are locally common and occur as single crystals, twins, and rosettes concentrated near the base of the friable zone. The duricrust and underlying friable zone do not display axiolite cross bedding; the uppermost duricrust displays a strong vertical texture controlled by the alignment of selenite crystals, whereas the lower, friable zone commonly displays a vague horizontal layering that becomes more distinct downward. Maximum relief on dune ridges is about 15 ft (4.5 m) in south-central part of map area adjacent to alkali lake; most ridges stand 6.5 to 13 ft (2 to 4 m) above adjacent depressions.
- Qev** Gypsum-calcite duricrust (Holocene and Pleistocene)—Cream-colored, sand- to granule-sized evaporite minerals, consisting mostly of calcite and gypsum; restricted to the western side of the quadrangle. Deposits are not present at elevations above 3685 ft (1105 m) (highest strandline of late Pleistocene lake). The composition and character of the rock is similar to stabilized and mineralogically altered dune deposits (Qsd), like the adjacent dunes, probably represents diagenetically altered sediment (Q) formed by evaporation of near surface brines within the Salt Basin graben. Maximum exposed thickness south of quadrangle is about 6.5 ft (2 m).
- Ql** Lake sediments (Pleistocene)—Laminated tan to light olive-tan, fine-grained layers that comprise late Pleistocene lake sediments; laminations range from tenth of inch to half inch (mm to cm) scale. In outcrop the rock is soft and blocky and commonly interbedded with hard, play, half inch-thick (cm-thick) beds. X-ray analysis shows the blocky sediment to consist of variable amounts of gypsum, halite, and calcite; trace amounts of clays and reddish-brown quartz are also present. The rock is very fine grained and porous; euhedral crystals of gypsum and associated calcite/dolomite, less than 0.008 inch (0.2 mm) across, compose the bulk of the rock. Hard, resistant layers are composed of very-fine grained halite and calcite/dolomite. Maximum exposed thickness is less than about 10 ft (3 m).
- Qfo** Old alluvial fan deposits (Pleistocene)—Poorly sorted silty sand and gravel deposited in large alluvial fans along the eastern margin of the late Pleistocene lake; fan deposits do not extend to elevations lower than 3675 ft (1102 m).
- Pg** Grayburg Formation (Upper Permian)—Dolomite and calcareous dolomite, grayish orange to very light orange and gray, fine grained, and medium bedded; contains minor interbeds of light-orange, very fine grained, thin to medium-bedded calcareous and dolomitic sandstone. Maximum thickness exposed in map area is about 300 ft (90 m); top not exposed.
- Psa** San Andres Formation (Lower Permian)—Dolomite and dolomitic limestone; medium gray to light olive gray, fine to medium-grained, thin to medium bedded, and contains medium gray chert nodules. Unit grades upward into Grayburg Formation on the east in the Brokeoff Mountains. Maximum thickness exposed in map area is about 600 ft (180 m); base not exposed.



GEOLOGIC MAP OF THE CIENEGA SCHOOL QUADRANGLE, NEW MEXICO AND TEXAS

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