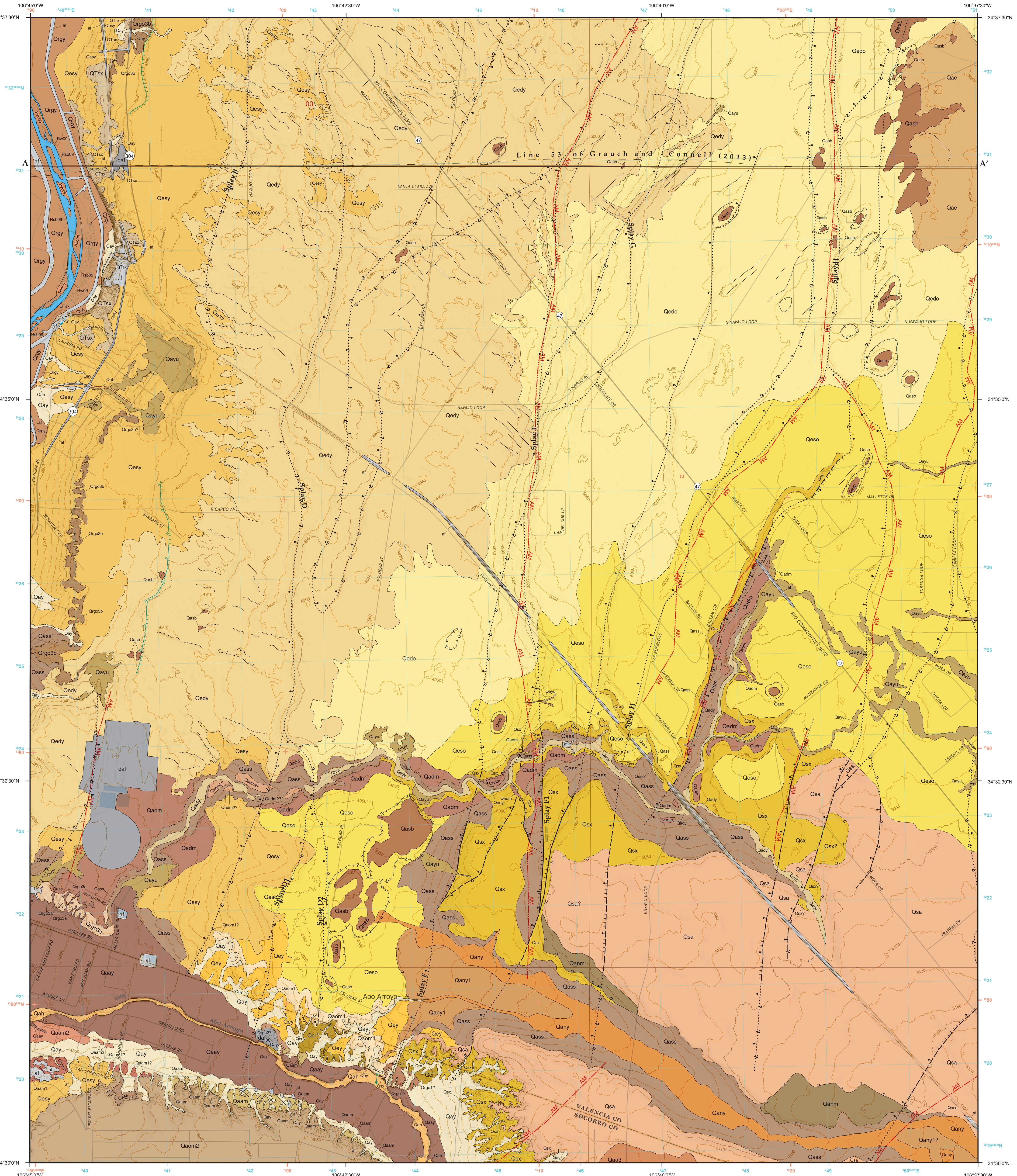
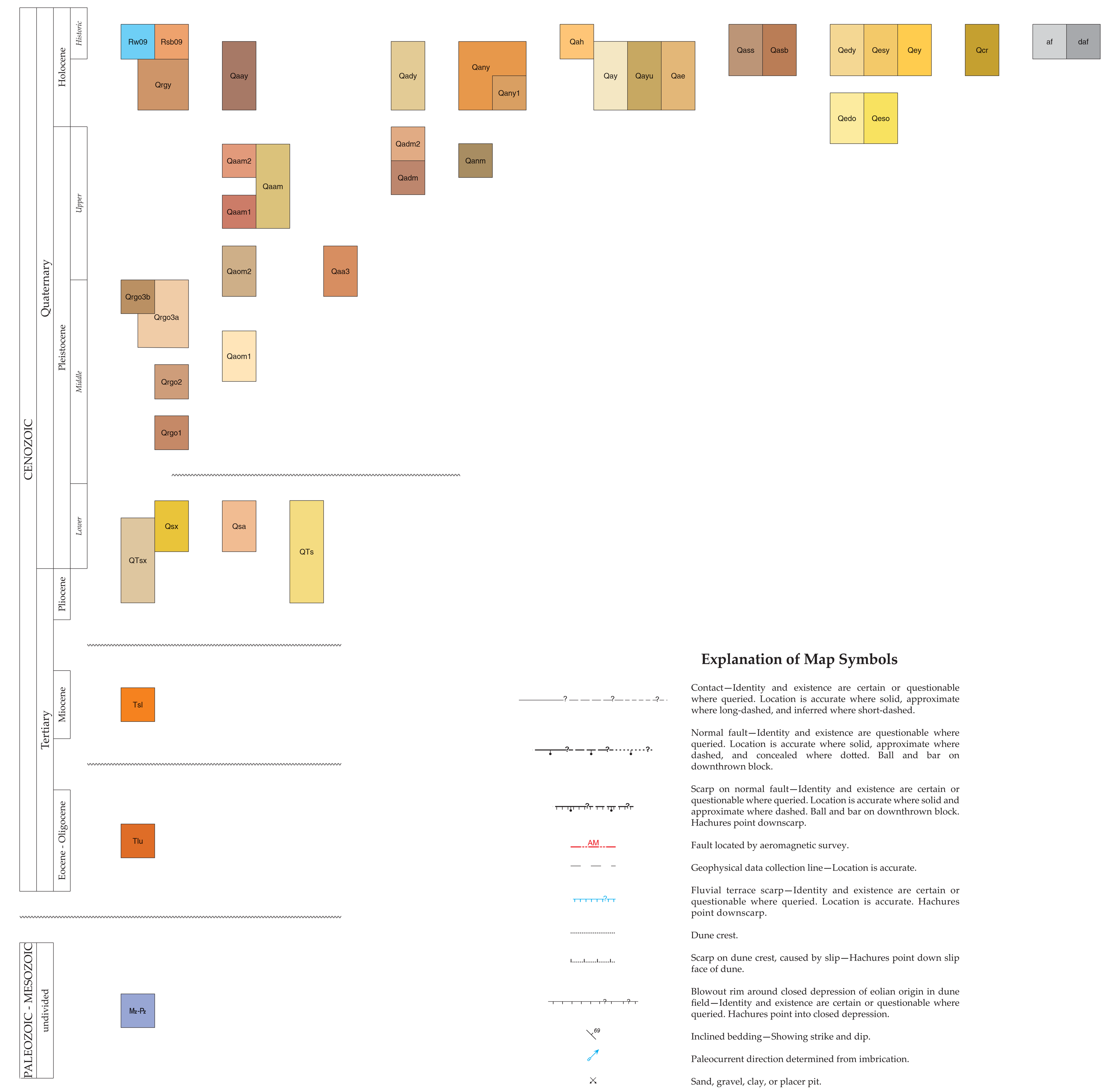
NMBGMR Open-File Geologic Map 255
Last Modified: April 2025



Correlation of Map Units



Explanation of Map Symbols

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

Normal fault—Identity and existence are questionable where queried. Location is accurate where solid, approximate where dashed, and concealed where dotted. Ball and bar on downthrown block.

Scarp on normal fault—Identity and existence are certain or questionable where queried. Location is accurate where solid and approximate where dashed. Ball and bar on downthrown block. Hachures point downscarp.

Fault located by aeromagnetic survey.

Geophysical data collection line—Location is accurate.

Fluvial terrace scarp—Identity and existence are certain or questionable where queried. Location is accurate. Hachures point downscarp.

Dune crest.

Scarp on dune crest, caused by slip—Hachures point down slip face of dune.

Blowout rim around closed depression of eolian origin in dune field—Identity and existence are certain or questionable where queried. Hachures point into closed depression.

Inclined bedding—Showing strike and dip.

Paleocurrent direction determined from imbrication.

Sand, gravel, clay, or placer pit.

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

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

Cross section line and label.

Description of Map Units

POST-SANTA FE GROUP

Artificial deposits

af — **Artificial fill (Historic)**—Compacted gravel, sand, and mud underlying road and railroad grades and dams. Thickness 0 to approximately 25 m.

daf — **Disturbed ground (Historic)**—Undivided excavations and gravel, sand, and mud from the excavation. Used where the disturbance masks the nature ofunderlying deposits. Thickness 0 to approximately 3 m.

Eolian and slopewash deposits

Qass — **Alluvial slopewash along slopes (Holocene)**—Brown to light brown (7.5YR 6/4 measured) muddy fine sands to fine sandy muds forming low-relief mantles onslopes. Includes material transported by slopewash, eolian, colluvial, and ephemeral channelized processes. Includes rare pebbles from underlying deposits. Thickness 0 to perhaps 1 m.

Qasb — **Alluvial slopewash along basinfloors (Holocene)**—Brown to light brown (7.5YR 4/3 measured) fine sandy muds to muddy fine sands underlying local closed low-relief basins. Includes material transported by slopewash, eolian, and ephemeral channelized processes. Sparse pebbles. Thickness 0 to perhaps 1 m.

Qey — **Sands mantling slopes (Holocene)**—Younger sands forming localized, discontinuous, low-relief slope mantles. Thickness 0 to perhaps 1 m.

Qesy — **Low-relief sand sheets (Holocene)**—Younger sands forming extensive, continuous, low-relief slope mantles. Locally includes slopewash and residuum. Thickness 0 to perhaps 1 m.

Qedy — **Dune sands (Holocene)**—Younger sands forming dune fields with moderate relief. Dunes are dominantly transverse in morphology with less abundant linear dune forms. Includes elongate closed basins interpreted to be blowouts. Thickness 0 to perhaps 6 m.

Qeso — **Low-relief sand sheets (Upper Pleistocene? to Holocene)**—Older sands forming extensive, low-relief slope mantles. Local exposures reveal an A/Bw/Bk (Stage I carbonate horizon) soil where directly overlying Sierra Ladrones Formation Stage IV petrocalcic horizon. Map unit also locally includes slopewash and residuum, as well as elongate closed basins interpreted to be eolian blowouts. Thickness 0 to 1.5 m.

Qedo — **Dune sands (Upper Pleistocene? to Holocene)**—Older sands forming dune fields with moderate relief. Dunes are dominantly linear in morphology with broad, rounded, low-relief forms. Includes elongate closed basins interpreted to be eolian blowouts. Thickness 0 to perhaps 3 m thick.

Qcr — **Undivided colluvium andresiduum (Upper Pleistocene? to Holocene)**—Unconsolidated pebbly sands derived from underlying, unexposed deposits. Mapped in areas where complex unit relationships are inferred to underlie the cover. Thickness 0 to perhaps 1 m.

Undivided alluvial units

Qah — **Historic alluvium (Historic)**—Unconsolidated sand, gravel, and lesser mud along active drainages channels. Deposits are poorly sorted muds to local boulders and consist of clasts reflective of upstream sediment sources. Deposits are commonly poorly vegetated and exhibit unaltered sedimentary structures such as bar-and-swale topography and cross-bedding. No apparent soil development. Thickness 0 to 4 m or greater.

Qay — **Channelized younger alluvium (Holocene)**—Light brown to brown to locally light reddish brown unconsolidated sands, muds, and gravels along channelized drainages. Sediments are poorly sorted and reflective of deposits in upstream sources. Low-relief bar-and-swale topography is common. No evidence of significant soil development was observed. Thickness 0 to perhaps 2 m or greater.

Qayu — **Undivided alluvium of broadswales (Holocene)**—Light brown to brown to locally reddish brown unconsolidated sands, muds, and lesser gravels along broad unchannelized swales. Sediments are poorly sorted and reflective of deposits in upstream source areas. Ephemeral low-relief rills, gullies, and gully-mouth fans are common. No evidence of signifcant soil development was observed. Thickness 0 to perhaps 1 m.

Qae — **Alluvium and eolian materialfrom off-quad drainges (Holocene)**—Light brown unconsolidated sands, muds, and rare gravels with surface evidence of variable eolian reworking. Sediments are poorly sorted and reflective of deposits in upstream source areas. Deposits appear to be derived from a drainage network that lay off-quad to the east. Low-relief coppice dunes as well as ephemeral rills, gullies, and gully-mouth fans are common surface features. No evidence of significant soil development was observed. Thickness 0 to perhaps 3 m or greater.

Rio Grande alluvium

Rw09 — **Water in 2009 aerial imagery (Recent)**—Extent of water in the Rio Grande apparent in 2009 aerial imagery. Water depth as much as 1 m.

Rsb09 — **Sand bars in 2009 aerial imagery (Recent)**—Sand bars along and within the Rio Grande apparent in 2009 aerial imagery. Thickness as much as 1 m.

Qrgy — **Younger Rio Grande alluvium (Holocene)**—Unconsolidated sand, gravel, and lesser mud underlying the Rio Grande floodplain. Includes channel and overbank deposits. No evidence of soil significant soil development. Thickness up to 25 m in this area (McCraw et al.,2006).

Qrgo3a — **Lowest terrace alluvium along Abo Arroyo (Middle Pleistocene)**—Unconsolidated Rio Grande alluvium underlying terrace treads about 26 m above the Rio Grande with no exposed basal strath. Correlation to unit Qrgt3 of McCraw et al. (2006) suggests a basal strath height of a few meters above the Rio Grande. Thickness at least 10 m.

Qrgo3b — **Lowest terrace alluvium with exposed strath (Middle Pleistocene)**—Loose, unconsolidated Rio Grande alluvium underlying an inferred terrace tread 28 to 30 m above the Rio Grande. Overlies stiffer, locally cemented aRG alluvium along a basal strath about 17 to 23 m above the Rio Grande. Correlative to unit Qem of Rawling and McCraw (2004). Thickness 0 to 11 m.

Qrgo2 — **Middle terrace alluvium (Middle Pleistocene)**—Unconsolidated Rio Grande gravels about 38 to 46 m above the Rio Grande along Abo Arroyo. Tentatively inferred to be an inset terrace deposit, potentially correlative to unit Qrgt2 of McCraw et al. (2006). Basal strath at 38 m above the Rio Grande. Thickness 7 to 9 m.

Qrgo1 — **Highest terrace alluvium (Middle Pleistocene)**—Rio Grande gravels about 50 to 56 m above the Rio Grande along Abo Arroyo. Tentatively inferred to be an inset terrace deposit, potentially correlative to unit Qrgt1 of McCraw et al. (2006). Commonly unconsolidated, with localized calcite cementation along preferential bedding planes. Local clay films on and bridging grains as well as carbonate accumulation on undersides of gravels toward top of preserved deposit may be weak soil development that occurred prior to burial by Qaom1. Local pinkish (5YR 6/3) and brown (7.5YR 5/4) colors measured. Basal strath at 50 m above the Rio Grande. Thickness 0 to 7 m.

Tributary alluvium along Abo, "North Abo," and"Dairy" Arroyos

Qaay — **Younger Abo Arroyo terrace alluvium (Holocene)**—Reddish brown (5YR 5/4 measured) unconsolidated very fine-fine sands and silts with interbedded gravel lenses underlying a terrace tread 3 to 5 m above the active channel. Sands and silts are poorly sorted and consist dominantly of subrounded quartz and silceous lithics (quartzite) in tabular and massive to internally planar or wavy laminated beds up to 30 cm thick. Gravel lenses consist of poorly sorted pebbles to rare boulders of quartzite, lesser red sandstones, and sparse limestone and foliated metamorphics rocks in clast-supported, matrix-rich lenticular beds with a matrix of poorly sorted very fine to very coarse sand. No signifcant soil development, and bar-and-swale topography is common on the terrace tread. Deposits 0 to 1 m thick.

Qaam — **Middle Abo Arroyo terrace alluvium (Upper Pleistocene)**—Light reddish brown (5YR 6/4 measured) unconsolidated muddy very fine to fine sands and rare pebbly channel-fills underlying terrace treads 5 to 18 m above the active channel. Sands poorly to moderately sorted and rounded and consist mainly of quartz and siliceous lithics (quartzite) in thin tabular beds. Pebbles are poorly sorted, subrounded to rounded, matrix- or clast-supported, and dominantly quartzite with lesser intermediate and felsic volcanic rocks, rare red sandstone and limestone, and sparse foliated metamorphic rocks, chert, granite, and basalt. Rinehart et al.(2014) report carbonate horizons with up to Stage II morphology. Thickness up to 3 m. Locally divisible into younger and older subunits based on insetting relationships.

Qaam2 — **Younger middle Abo Arroyo terrace alluvium (Upper Pleistocene)**—Sediments as described for Qaam, underlying terrace treads 5 to 8 m above the active channel. The terrace tread is inset against that of Qaam1. Thickness up to 3 m.

Qaam1 — **Older middle Abo Arroyo terrace alluvium (Upper Pleistocene)**—Sediments as described for Qaam, underlying terrace treads 15 to 18 m above the active channel. The terrace tread is inset upon by that of Qaam2. Thickness up to 3 m.

Qaa3 — **High-level fan deposits of Abo Arroyo (Middle(?) to Upper Pleistocene)**—Unconsolidated gravel and sand. Unexposed on quadrangle; Rinehart et al. (2014) report deposits consist of subrounded pebbles and cobbles of limestone, sandstone, granitic and metamorphic rock types with rare rounded aRG-derived pebbles, with soil development reaching State II and III carbonate horizons. Thickness 3 to 7 m.

Qany — **Younger "North Abo" arroyo alluvium (Holocene)**—Alluvium occurring along the arroyo floor. Inset against Qany1 and Qanm. Thickness 0 to perhaps 1 m.

Qany1 — **Higher-level younger "North Abo" arroyo alluvium (Holocene)**—Alluvium occurring along the arroyo floor, inset upon by Qany. Tread of Qany1 is up to 1 m higher than surface of Qany. Thickness 0 to perhaps 1 m.

Qanm — **Middle "North Abo" arroyo alluvium (Upper Pleistocene(?))**—Alluvium underlying a topographic bench along the flanks of the arroyo. Tread is 6 to 9 m above the arroyo floor. Thickness 0 to perhaps 0.5 m.

Qady — **Younger "Dairy" arroyo alluvium (Holocene)**—Alluvium occurring along the arroyo floor. Inset against Qadm and Qadm2. Thickness 0 to perhaps 1 m.

Qadm — **Middle "Dairy" arroyo alluvium (Upper Pleistocene)**— Alluvium underlying a terrace tread 2 to 4 m above the arroyo floor. Inset upon by Qadm2 and Qady. Thickness 0 to perhaps 0.5 m.

Qadm2 — **Middle "Dairy" arroyo alluvium, younger subunit? (Upper Pleistocene)**—Alluvium underlying a local, possible terrace tread 1 to 2 m above the arroyo floor. Inset against Qadm, inset upon by Qady. Thickness perhaps 0 to 0.5 m.

Qaom1 — **Older high-level tributary fan alluvium (Middle Pleistocene)**—Alluvium underlying a fan surface on the north side of Abo Arroyo 24 to 26 m above the active channel. Compared to Qaom2, the fan surface is less extensive, exhibits evidence of a well-developed carbonate soil horizon, and appears deformed by continuous linear scarps interpreted to be fault scarps. Carbonate soil horizon is not exposed, but abundant fragments of carbonate cement along the rim of the tread suggests a Stage III horizon at depth. Inferred to overlie Qrgo1 and Qrgo2; Qrgo3a appears to be inset against this deposit. Thickness at least 6 to 8 m.

Qaom2 — **Younger high-level tributary fan alluvium (Middle(?) to Upper Pleistocene)**—Alluvium underlying a fan surface on the south side of Abo Arroyo 25 to 30 m above the active channel. Compared to Qaom1, the fan surface is more extensive, lacks evidence for a well-developed soil, and is not cut by continuous linear scarps interpreted to be fault scarps. Inferred to overlie all Qrgo terrace deposits. Thickness 15 to 20 m.

SANTA FE GROUP

Qsa — **Abo Arroyo-derived piedmont facies (Lower Pleistocene)**—Light brown to red muds and sands with lesser gravel beds. Sands are very fine to fine grained with rare coarser grains and dominantly of quartz and siliceous lithics, with rare red mudstone lithics apparent in coarser beds. Gravel are poorly sorted pebbles to rare boulders of mainly quartzite with lesser red sandstones, rare limestone, and sparse foliated metamorphic rocks in clast-supported, massive or weakly cross- stratified lenticular beds.

Qsx — **Axial fluvial facies along Abo Arroyo (Lower Pleistocene)**—White to pale brown or pink (N, 2.5Y 8/1, 5YR 6/3 measured) pebbly sands/sandstones, lesser mudstones (reddish, 2.5YR 6/6 measured), and rare gravels/ conglomerates. Sands are dominantly fine- to medium-grained with lesser coarser grains of principally quartz and siliceous lithics with as much as 15% potassium feldspars, black basaltic or ferromag lithics, and sparse plagioclase and limestone lithics. Gravel are moderately to poorly sorted pebbles and lesser cobbles of dominantly quartzite with lesser intermediate to felsic volcanics and sparse basalt, chert, granite, foliated metamorphic rocks, limestone, and very sparse red sandstones. Beds are thin to medium thickness, broadly lenticular, commonly cross- stratified, and locally concretionary or cemented. Muds/ mudstones are generally more tabular and red in color. Map unit includes interfingered or intercalated Qsa beds.

QTsx — **Axial fluvial facies along the Rio Grande (Pliocene to Lower Pleistocene)**—White to light brown and locally brown (N, 10YR 8/2, 7.5YR 5/4-7/4 and 6/3 measured) sands/sandstones, pebbly sands/sandstones, lesser mudstones, and sparse conglomerates. Compositionally similar to Qsx, though with more abundant mud beds and more common massive matrix-rich and matrix-supported pebbly beds. Sparse buried soils marked by local reddish brown colors (5YR 4/4 measured), clay films, and up to Stage II carbonate horizon development.

QTs — **Sierra Ladrones Formation (Pliocene to Lower Pleistocene)**—Undivided unit used in cross-section due to poor subsurface control.

Tsl — **Pre-Sierra Ladrones Formation Santa Fe Group deposits (Late Oligocene(?) to Miocene)**—Cross- section only. Cuttings from the Grober-Fuqua #1 well and rare outcrop at the foot of the Manzano Mountains suggest pre-Sierra Ladrones sediments are white to pink to light brown fine- to very coarse-grained sandstones and pebbly sandstones grading down-section to fine-grained sandstones and mudstones. Gravel and sand compositions vary spatially but constituents include rhyolitic and intermediate volcanics, limestone, quartztite, sandstone, basalt, chert, granite, schist, and gneiss (Lozinsky, 1988). Thickness in the Grober-Fuqua #1 well is at least 1,120 m (Hudson and Grauch, 2003). Geophysical data inversions by Grauch and Connell (2013) suggest a thickness range of 0 to 1.8 km across the quadrangle. See report for further discussion of subsurface data and interpretations.

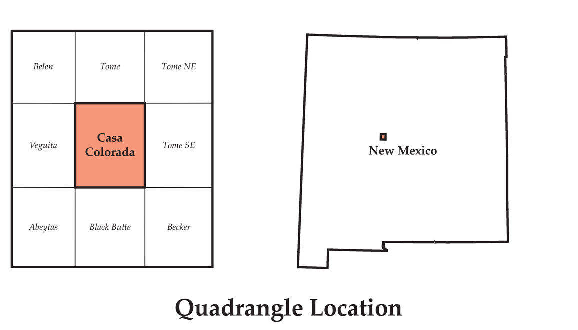
PRE-SANTA FE GROUP

Tlu — **Eocene-early Oligocene strata (Eocene-early Oligocene)**—Cross-section only. Pre-Santa Fe Group volcaniclastic sediments (Spears Group equivalents) as well as Laramide-age sediments (Baca and Galisteo Formation equivalents) are found in deep wells within and in outcrop in areas surrounding the Albuquerque basin (cf., Lozinsky, 1988). Grauch and Connell (2013) extrapolated deep well control for the depth to pre-Santa Fe Group strata into the area of the quadrangle utilizing gravity and seismic data. Pre-Santa Fe Group strata here may include either or both aforementioned units. Based on the geophysical interpretations of Grauch and Connell, thickness is approximately 700 to 950 m in this area. See report for further discussion of subsurface data and interpretations.

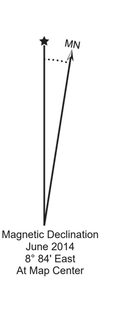
Mz-Pz — **Mesozoic and Paleozoic strata (Mesozoic and Paleozoic)**—Cross-section only. Based on a series of coherent, parallel, and increasingly high amplitude with depth reflectors in seismic depth section Line 53, Grauch and Connell (2013) inferred pre-Tertiary strata to lay approximately 2.4 to 2.6 km below the ground surface under the quadrangle. Nature of these deposits is not known, but likely reflective of Mesozoic and Paleozoic strata exposed in nearby highlands. Minimum thickness of approximately 1.7 km. See report for futher discussion of subsurface data and interpretations.

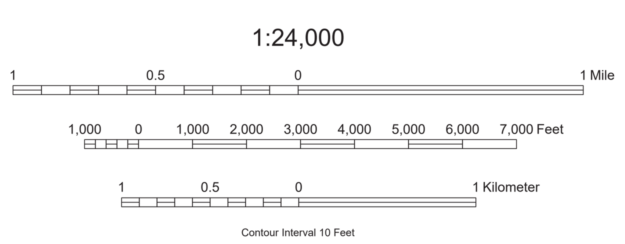
North American Datum of 1983 (NAD83) Projection and 1,000-meter grid: Universal Transverse Mercator, Zone 13S, shown in blue.
10,000-foot ticks: New Mexico Coordinate System of 1983 (West Zone), shown in red.

Digital base map data....................U.S. Geological Survey, 2019
Contours and hillshade....................IFSAR 4.5 m Digital Terrain Model, 2007



Quadrangle Location





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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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New Mexico Bureau of Geology and Mineral Resources
Open-File Geologic Map 255

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Geologic Map of the Casa Colorada 7.5-Minute Quadrangle, Socorro and Valencia Counties, New Mexico

June 2016

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, 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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Geologic Cross Section A–A'

(no vertical exaggeration)