Geologic Map of the Tome Quadrangle

OF-GM-90

Mapped and compiled by Geoffrey Rawling and David McCraw

EXPLANATION OF MAP UNITS

Rock colors are by comparison with the Munsell soil color chart. Mapping of surficial deposits east of the inner valley of the Rio Grande based largely on air photo interpretation and geomorphic position, and locally field checked.

Anthropogenic Deposits

af Artificial fill for highway and railroad grades and stock tanks.

daf Areas extensively affected by gravel mining and/or construction.

Quaternary Surficial Deposits

Qfw - Floodway of the Rio Grande (Holocene to Historic) - Includes active channel and adjacent floodplain contained between manmade barriers such as levees and irrigation and drainage ditches. Channel consists of pebbly sand in ripple and small dune bedforms, and larger bars. Laminated sand, silt, and clay form waning-flow deposits. Less than 5 m thick. Correlative to the Los Padillas formation of latest Pleistocene-Holocene age, together with **Qfp** (Connell et al., 2000). Thickness: < 5 m.

Qfp - Floodplain of the Rio Grande (Holocene to Historic) - Consists of sand, silt, and clay between valley margins and artificial barriers such as levees and irrigation ditches. Largely disturbed by agricultural fields and housing developments. Interfingers with and is overlain by **Qae** at valley margins. Correlative to the Los Padillas formation of latest Pleistocene-Holocene age, together with **Qfw** (Connell et al., 2000). Thickness: ≤ 30 m.

Qay - Arroyo and valley alluvium (Holocene) - Consists of variably bedded and stratified cobbles, pebbles, sand and silt. Pale brown (10YR 6/3) to brown (10YR 5/3). Locally incised up to 2 **–** 3 m by modern arroyos floored with recent sand and gravel. Includes local areas of eolian sand sheets less than 1 m thick, and broad areas of undifferentiated valley fill. Only mapped in large drainages. Thickness: ≤ 10 m (?).

Qae - Alluvium and eolian sand sheets, undivided (Upper Pleistocene to Holocene) - Generally forms low relief aprons and arroyo channels along valley margins. Pebbly sand is light brown (5YR 6/4) to grayish orange (10YR 7/4) to light yellowish brown (10 YR 6/4), unconsolidated, well sorted (eolian) to moderately or poorly sorted (alluvium), subangular to subrounded, and composed dominantly of quartz. Interfingers with and overlies **Qfp**. Thickness: ≤ 5 m.

Qeda - Active dunes (Holocene to Historic) - Dune field north of Canada de la Loma de Arena. Dunes are steep sided and up to 4 meters high. Field has active blowouts and less vegetation than adjacent areas. Thickness: 4 – 5 m.

Qe - Eolian deposits with subdued or no dune forms (Holocene) - Dominantly sand sheets. Deposit consists of light brown (7.5YR 6/4) to light reddish brown (5YR 6/4), fine to very fine grained, rounded to subrounded sand composed largely of quartz. Locally pebbly, possibly due bioturbation. Forms a broad undulating surface with little or no development of drainage incision or dune microtopography around shrubs. Unit typically has one or more episodes of soil development beneath the surface. Thickness: ≤ 2 m.

Qed - Eolian deposits with recent dune form development (Holocene) - Deposits are pink (7.5 YR 7/4), light brown (7.5YR 6/4) to very pale brown (10YR 7/4) to brownish yellow (10YR 6/6), unconsolidated, very fine- to medium-grained, moderately well-rounded to well-rounded sand composed largely of quartz. Contains scattered pebbles. Dunes are less than one meter to several meters in height. In the northern half of the map area, unit contains local areas of sand sheets (unit **Qe**). Along bluffs flanking the inner valley of the Rio Grande unit includes small (<1m) dunes and sand sheets generally less than 1 meter thick. Linear, barchan, and parabolic dunes are present in the southern and southwestern portions of the quadrangle. Lateral contacts with **Qe** and **Qedo** are often difficult to distinguish, and are locally queried. Thickness: Thickness: < 1 m to 5 m (?).

Qbf - Eolian and playa deposits on floors of small blowouts within Qedo (Holocene) - Deposits are sand, silty clay, and clay. Thickness: ≤ 2 m.

Qedo - Eolian deposits with older dune form development (lower (?) Holocene) - Composition is similar to **Qed**. Commonly buried by or reworked into **Qed**. Thickness: < 1 m to 5 m (?).

Qem - Edith formation or Menaul formation (?) (middle Pleistocene ?) – Ancestral Rio Grande deposits formed of cobble gravel with coarse sand matrix. Clast composition is similar to **QTsa** gravels (see below) but clasts appear to be smaller on average. Base of deposit is 21 – 25 meters above Rio Grande floodplain deposits (**Qfw** and **Qfp**), similar to the Edith and Menaul formations in the Albuquerque area (Connell et al., 2000). Deposit forms scattered, gravel-mantled subcrops on the eastern slope of the Rio Grande inner valley. Thickness: ≤ 10 m

Quaternary and Tertiary Sedimentary Rocks

Sierra Ladrones Formation (Upper Santa Fe Group, Pliocene to lower Pleistocene (?)) - Poorly lithified axial river deposits composed of sandy gravel, sand, silt, and clay and deposited by the ancestral Rio Grande. Discontinuously exposed along bluffs of the inner valley of the Rio Grande. Sands are composed largely of quartz, with lesser amounts of rock fragments and chert. Gravel clasts are up to 10 cm in length and are composed of at least 50% granite and quartzite. The remainder is dominated by intermediate and basaltic (often vesicular) volcanic rocks and sparse Pedernal chert. Gravels generally occur in crude fining upward sequences, often scoured into subjacent unit. Buried soils consisting of horizons of carbonate nodules, clay accumulations, and rubification are present in both gravels and sands. Matrix in the gravels is poorly sorted coarse sand. A white, 1-2 m thick stage III+ (IV locally) calcic soil (Machette, 1985; Birkeland, 1999) is present in the uppermost sand and/or basal dune sand at the top of bluffs, delineated by northeast-trending hachures on the map where exposed. Thickness: Base not exposed; ~ 45 m exposed between floodplain and top of inner valley escarpment in the northern portion of the quadrangle.

QTsa - **Axial river deposits of the ancestral Rio Grande, undivided** - Unit mapped where subdivision by texture is difficult due to poor outcrop. Consists of small rounded hills and bluffs usually mantled by gravel, even where gravel does not appear to be the main component of the unit. In general, unit is dominated by subequal amounts of medium bedded medium to coarse sand and sandy and silty clay, with subordinate gravel, and is probably **QTsas** or **Qtsasm**.

Three compositionally distinct units can be identified in the north portion of the quadrangle. Nomenclature after Cather (1997).

QTsas Axial river deposits of the ancestral Rio Grande - Unit is dominated by medium to coarse, moderately to poorly sorted, cross bedded sand and subordinate gravel in scoured channels. Contains buried soils consisting of carbonate nodules, clay accumulations, and rubification. Unit also includes dune sand composed of white, rounded to subangular, slightly frosted, medium to very coarse quartz sand with abundant elongate carbonate concretions.

QTsacs Axial river deposits of the ancestral Rio Grande - Subequal amounts of and gravel and moderately to poorly sorted cross bedded sand.

QTsasm Axial river deposits of the ancestral Rio Grande - Subequal amounts of sand and silty clay with sparse gravel. Sand is pink (7.5 YR 7/4) to pinkish gray (7.5 YR 7/2), fine to very fine, well rounded. Bedding is generally massive, and contains lenses of blocky and crumbly red to pale green clay up to 1m thick.

Qsu - Upper Sierra Ladrones Formation, undivided – Dominantly well-sorted, sandy fluvial deposits with interbeds of silty and clayey sand formed into upward-fining sequences within an overall coarsening-upward sequence. Cross section only. Unit description from well logs in Connell and Jackson (1999a) and Connell and Jackson (1999b). Thickness: 250 – 265 m in the Nancy Lopez (NMOSE-NL) and Tome (NMOSE-T1) groundwater monitoring wells.

QTsl - Lower Sierra Ladrones Formation, undivided – Dominantly clayey sand with gravel fine- to medium-grained sand interbeds. Cross-section only. Thickness: The Nancy Lopez and Tome groundwater monitoring wells penetrated ~ 100 m of lower Sierra Ladrones Formation but did not encounter the base.

Tpu, Tpl - Popatosa Formation (Middle and Lower Santa Fe Group, middle to upper Miocene) - Light brown to pink, coarse grained sand with silty sand and clay interbeds, fining downward to fine to medium grained sand with clay interbeds. This overlies interbedded light reddish brown to red clay, fine sand, and silty sand. Unit is not exposed in the quadrangle and is only shown on the cross section. Description is from Lozinsky (1988) based on cuttings from the Grober Fuqua #1 oil test well. Subdivision into upper (**Tpu**) and lower (**Tpl**) subunits is based on an upsection change in lithic fragment composition from volcanic and sedimentary dominated to metamorphic dominated at 3999 foot depth in the Grober Fuqua #1 well (Lozinsky, 1988). Upper Popatosa thickens greatly to the west across faults due to rapid Miocene extension (May and Russell, 1994).

Pre-Tertiary rocks

pTu Pre-Tertiary rocks, undivided - Cross section only

MAP AND CROSS SECTION SYMBOLS

Location of geologic cross section

Geologic contact, solid where exposed, dashed where approximately located, queried where inferred

Trace of aeromagnetic lineament inferred to represent trace of buried fault; data from Sweeney et al. (2002)

Topographic trace of fault scarp

Exposure of calcic soil developed at top of Sierra Ladrones Formation along rim of inner valley escarpment

Dip and dip direction of bedding

Horizontal bedding

Oil test, groundwater monitoring, or water supply (with NMOSE W.A.T.E.R.S. database reference #) well

Well projected into cross section

Elevation of water table

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