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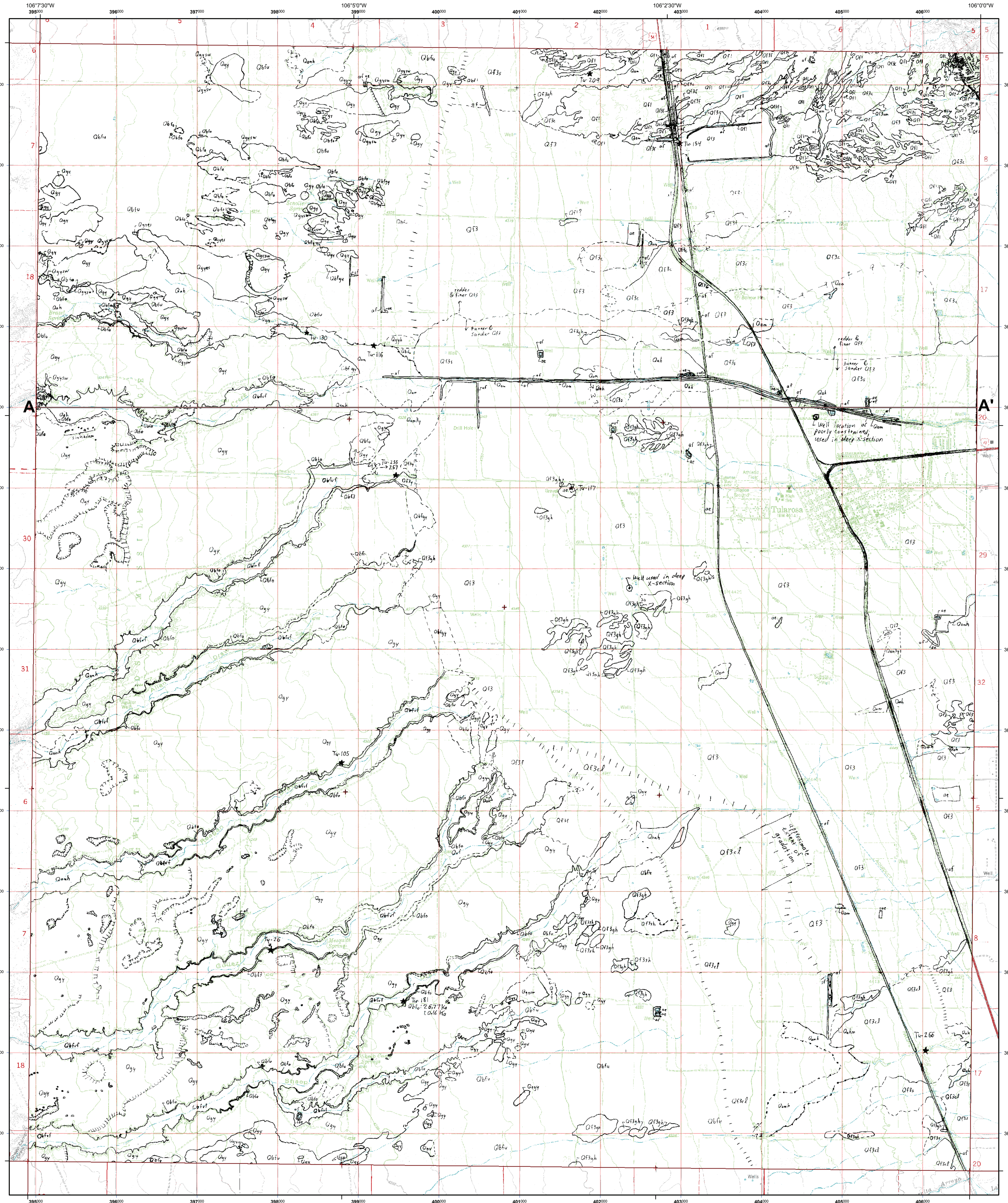


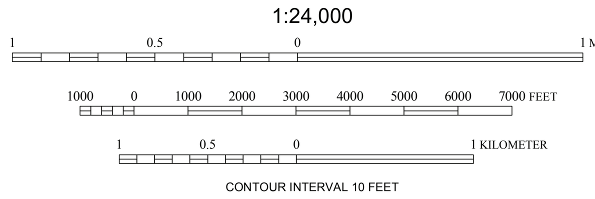
Geologic map of the Tularosa quadrangle, Otero County, New Mexico.

May 2008

by

Daniel J. Koning[1] and Jed Frechette[2]

[1]New Mexico Bureau of Geology and Mineral Resources, 801 Leroy Place, Socorro, NM 87801
[2]Dept. of Earth and Planetary Sciences, University of New Mexico, Albuquerque, New Mexico 87131



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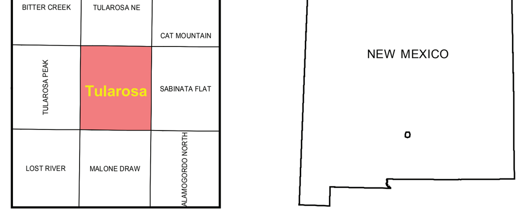
CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929



QUADRANGLE LOCATION

New Mexico Bureau of Geology and Mineral Resources
Open-file Map Series
OF-GM 179

DRAFT

DESCRIPTION OF MAP UNITS

QUATERNARY UNIT DESCRIPTIONS

SLOPEWASH

Qgysw **Gyspiferous slopewash (late Holocene) –** gypsum and gypsiferous silt and very fine to fine sand reworked from locally adjacent, topographically higher basin-floor deposits (i.e., **Qgy** and **Qbfy**). Because these deposits lie below the inferred 1-2 ka maximum depositional surface (see discussion in report), they are inferred to post-date 2 ka. In the valleys cut into gypsum in the western quadrangle, these slopewash deposits are lumped with unit **Qbfvf** and **Qah**. Estimated thickness of 2-5 m.

ARTIFICIAL FILL AND EXCAVATIONS

ae **Artificial excavation (modern) –** Pit, quarry, or reservoir; the base of these excavations have generally been filled by >10 cm-thick deposits of clay, silt, sand, and gravel carried into the pit by mass-wasting or slopewash processes.

af **Artificial fill (modern) –** Compacted silt, clay, and very fine to medium sand (minor coarse to very coarse sand and pebbles) under highways and railroads; also found in berms surrounding pits, quarries, or reservoirs. In the case of railroads and mounds in the White Sands Missile Range, very coarse pebbles and cobbles drape compacted fill.

DEPOSITS SPANNING THE ALLUVIAL FAN AND BASIN FLOOR

Qam **Sand, silt, gravel, and clay associated with modern drainages on alluvial fans and the basin-floor (0-50 yrs old) –** Sand, silt, and clay in various proportions at the mouths of small, discontinuous gullies. Sand and gravel dominate in the channel of Tularosa Creek. The surface of this unit exhibits fresh-appearing bar and swale topography (up to 30 cm relief). Sand is generally pink (5-7.5YR 7/3) to light reddish brown (5YR 6/3), very fine- to very coarse-grained, and poorly to well sorted. In the distal alluvial fans, this unit supports a moderate to dense cover of grass and mesquite. Bar and swale topography may be absent on distal alluvial fans. However, topography may still be present because of fine sediment (i.e., clay, silt, and very fine- to fine-grained sand) accumulating around dense vegetation, such as grass clumps and creosote bushes. Loose. Generally less than 2 m-thick.

Qah **Historical deposition of sand and silt at the mouths of discontinous drainages (50-200 yrs) –** Light brown (7.5YR 6/4) silt and very fine- to fine-grained sand that is distinctly planar-laminated, low-angle cross-laminated (<0.5 cm-thick), or wavy laminated. Surface exhibits subtle scouring or possible bar forms. No observable soil development, desert pavement or clast varnish. Unit is generally less than 20 cm-thick and overlies unit **Qf3**. Only mapped where fluvial morphology can be seen on surface using aerial photographs. However, field investigations indicate that unit **Qf3** may be locally overlain by 10-20 cm of this deposit, even though surface fluvial morphology was not apparent. This unit was deposited by sheet flood processes. 10-30(?) cm-thick.

Qamh **A composite unit consisting of Qam (mostly) and Qah (0-200 years) –** See descriptions of Qam and Qf3y above.

Qahm **A composite unit consisting of Qf3y (mostly) and Qam (0-200 years) –** See descriptions of Qam and Qf3y above.

ALLUVIAL FAN DEPOSITS

Qf3 **Silty-clayey sand, sand, and subordinate gravelly sand and clay (upper Holocene) –**This unit underlies the majority of alluvial fan surfaces in the study area, and coincides with both agricultural and urban areas. Sediment color generally ranges from light reddish brown (5YR 6/3-4), reddish brown (5YR 5/3-4), brown to light brown to pink (7.5YR 5/4, 6/3-4, and 7/4), and pinkish gray (7.5YR 6/2) to light gray (10YR 7/2). Sediment consists of a clayey-silty very fine- to medium-grained sand that is moderately sorted. The fine sediment is typically massive or in thick, vague beds that may be bioturbated (minor planar-laminations). Locally, coarse to very coarse-grained sand is present and minor pebbles may be scattered in a sandy matrix. There are also minor coarse channel-fills consisting of pebbly sand to sandy pebbles. These coarse channel fills are in thin to medium beds that are broadly lenticular to lenticular. Pebbles are very fine to very coarse with 1-5% fine cobbles, subrounded, and poorly sorted. Sand in coarse channel-fills is dark reddish gray to reddish brown (5YR 4/2-5/3), very fine- to very coarse-grained, and poorly sorted. The overall less gravelly texture helps in differentiating this unit from gravelly **Qf2** deposits. The surface is generally not as bouldery and cobbly as that associated with **Qf2**, but yet commonly has a pebble to fine cobble gravel lag in the medial and proximal fan areas that indicates erosion of the surface (see **Qf3c** description below). The surface has slight bar and swale relief of 10-30 cm. Its desert pavement has weak to no clast armor and no to slight varnish. Soil development is characterized by gypsum accumulaton as filaments or disseminated (comparable to a stage I in a calcic soil horizon). **Qf3** unconformably overlies **Qf1** (see **Figure 3**), and appears to interfinger laterally into unit **Qgy** (the transitional zone was mapped as **Qbfgy**). Unit generally corresponds to Qf3m and Qf3L of Koning (1999) and Koning et al. (2002), and to Qf3 of Koning et al. (2007). Unit correlates to the Organ alluvium in the Desert Project, which have been assigned an age of 7-1 ka (Gile et al., 1981). A Qf3 deposit on the Mule Canyon alluvial fan south of Alamogordo consisting of an in-filled swale returned a C-14 age of 1980 ± 50 yrs (Koning, 1999, and Koning et al., 2002). On the distal alluvial an southeast of this quadrangle, a C-14 date from charcoal returned an age of 5140 +/- 10 (radiocarbon years; **Table 2**). Generally less than 2 m-thick, but locally as much as 3-4 m (particularly in the medial and proximal parts of the fan).

Qf3am **Comination unit of Qf3 and Qam (upper Holocene to modern) –** See descriptions of **Qf3** and **Qam** above.

Qf3c **Gravelly sand and gravelly sand (upper Holocene)** – Sediment color generally ranges from light reddish brown (5YR 6/3-4), reddish brown (5YR 5/3-4), brown to light brown to pink (7.5YR 5/4, 6/3-4, and 7/4), and dark reddish gray (5YR 4/2). This unit consists of silty-clayey sand intercalated coarse channel-fills This sediment is similar to unit Qf3 (see above), but has slightly more coarse channel-fills of pebbly sand to sandy pebbles. Beds are thin to medium and broadly lenticular to lenticular (locally cross-stratified). Pebbles are very fine to very coarse with 1-5% fine cobbles, subrounded, poorly sorted, and composed of limestone with very minor clasts of Paleozoic sandstone-siltstone and Tertiary intrusives. Sand is very fine- to very coarse-grained and poorly sorted. Because of the general lack of exposures, this unit was mapped via aerial photographs for deposits underlying surfaces with more than 10-20% surface gravel coverage. Surface has slight bar and swale relief of 10-30 cm. Its desert pavement has weak to no clast armor and no to slight varnish. Surface soils characterized by gypsum accumulation (for comparative purposes, similar in amount to a stage I to II in a calcic soil). Commonly has a pebble to fine cobble gravel lag in the medial and proximal fan areas that indicates erosion of the surface; however, the surface has less coarse gravel compared to the surface of Qf2. Unit unconformably overlies Qf1 (see Tu-154 stratigraphic section in **Figure 3**). Like unit **Qf3**, this unit correlates to the Organ alluvium of the Desert Project by Las Cruces and ranges in age from 7 to 1 ka (Gile et al., 1981); most deposits are probably 5-2 ka. Weakly consolidated and 1-4 m-thick.

Qf3s **Sand and silty sand (middle to upper Holocene) –** Pink to reddish brown (7.5YR 7/4 to 5YR 5/4) silty very fine- to fine-grained sand with minor medium- to very coarse-grained sand. Sand is moderately to well sorted and contains minor pebble beds. Mapped immediately north of Tularosa Creek for an area that is tanner and sandier than sediment found near the northern border of the quadrangle. This unit probably extends south of Tularosa Creek, but its extent there is obscured by agricultural activity. Unit is also differentiated in the southeastern quadrangle near the railroad tracks. Base of unit not observed in field, but presumably it probably overlies **Qf1**. Probably 1-3 m-thick.

Qf3sh **Sandy distal alluvial fan deposits forming topographic highs (middle to upper Holocene) –** Sand and minor pebbly sand forming slight topographic highs near the basin-floor alluvial fan transition. Only mapped in the south-central portion of the quadrangle. Sand is light brown (7.5YR 6/3-4), very fine- to medium-grained, moderately sorted, and contains minor silt. Has <15% patches of strong gypsum accumulation exposed on its surface, but generally gypsum accumulation in the soil is probably similar to that of unit **Qf3**. Base of unit not observed in field, but presumably it overlies **Qbfo**, **Qf3**, or **Qf1**. Unit supports moderate creosote and grass vegetation. Probably 1-2 m-thick.

Qf3gh **Gravel-capped, slightly high-standing ridges of Qf3 (middle to upper Holocene) –** This is a subunit of **Qf3** which is differentiated because of its gravelly texture, slightly older surface (and associated higher gypsum content), and its topographically high nature. Unit consists of a reddish brown (5YR 5/4) pebbly sand. Sand is very fine- to very coarse-grained. Pebbles are very fine- to very coarse and locally includes 5% fine cobbles. Pebbles are subrounded to subangular, dominated by limestone, and form a weak to moderate pavement (generally greater than 10% clast surface cover). Clasts are weakly to moderately varnished. Surface lacks original bar- and swale relief and generally has <15% patches of strong gypsum accumulation. Surface gravel may overlie pink (7.5YR 7/3), internally massive, silty-clayey very fine- to fine-grained sand, with minor medium to very coarse sand; sediment contains 5% gypsum filaments (equivalent to a stage I in a calcic soil). The clast armor allows preservation of broad but yet elongated, relatively flat surfaces that stand 20-120 cm above surrounding, eroded low areas. Surface supports a moderate cover of creosote (mostly) and other shrubs (about 3 plants per 5 m^2).

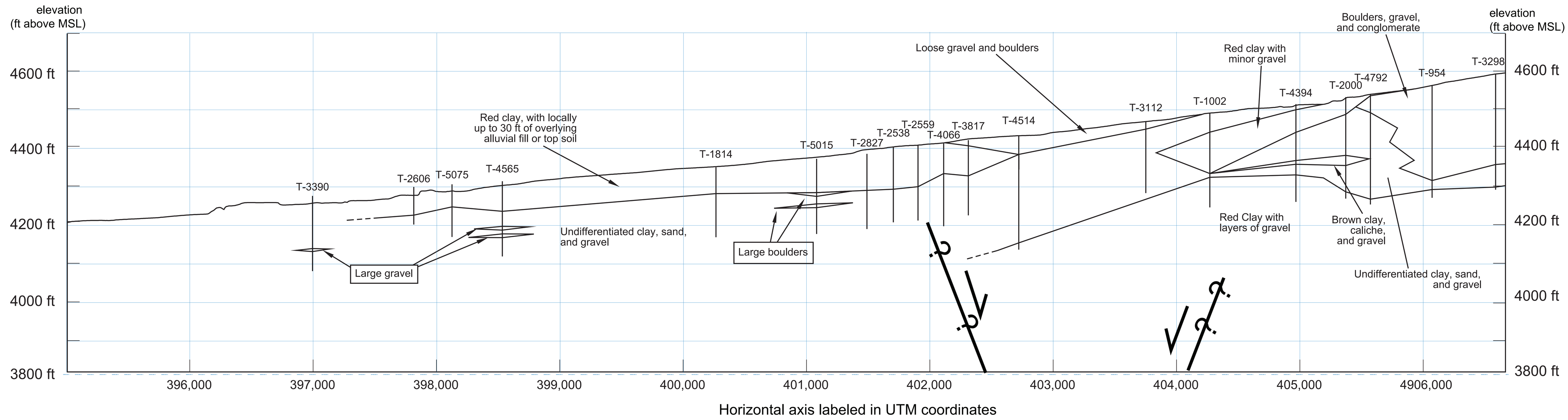
BASIN FLOOR DEPOSITS

TERTIARY IGNEOUS ROCKS IN SACRAMENTO MOUNTAINS

SEDIMENTARY ROCKS IN SACRAMENTO MOUNTAINS

ACKNOWLEDGMENTS

REFERENCES



Horizontal axis labeled in UTM coordinates (meters, zone 13).

NMBGMR Open-file Geologic Map 179
Last Modified 20 May, 2008

EXPLANATION OF MAP SYMBOLS

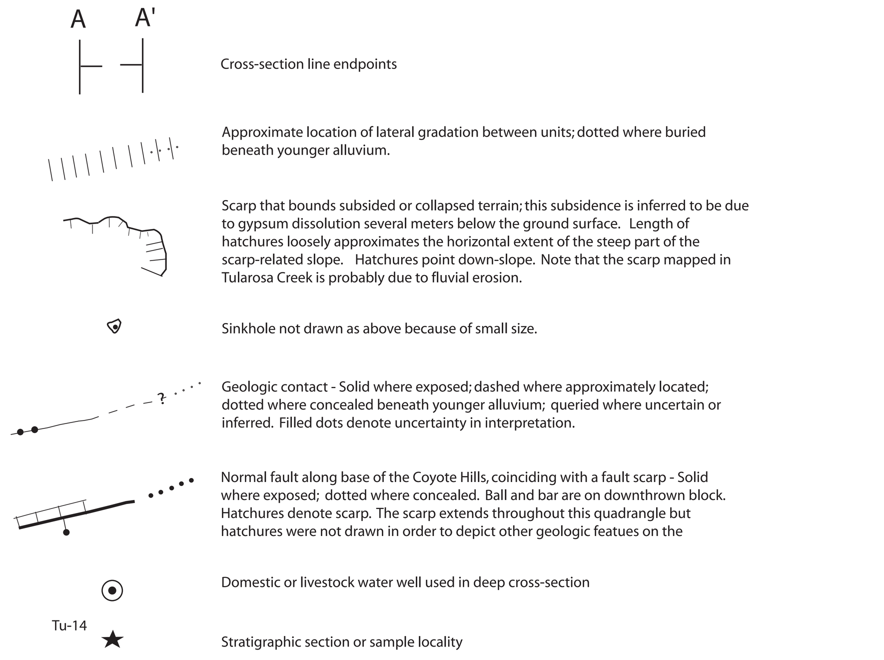
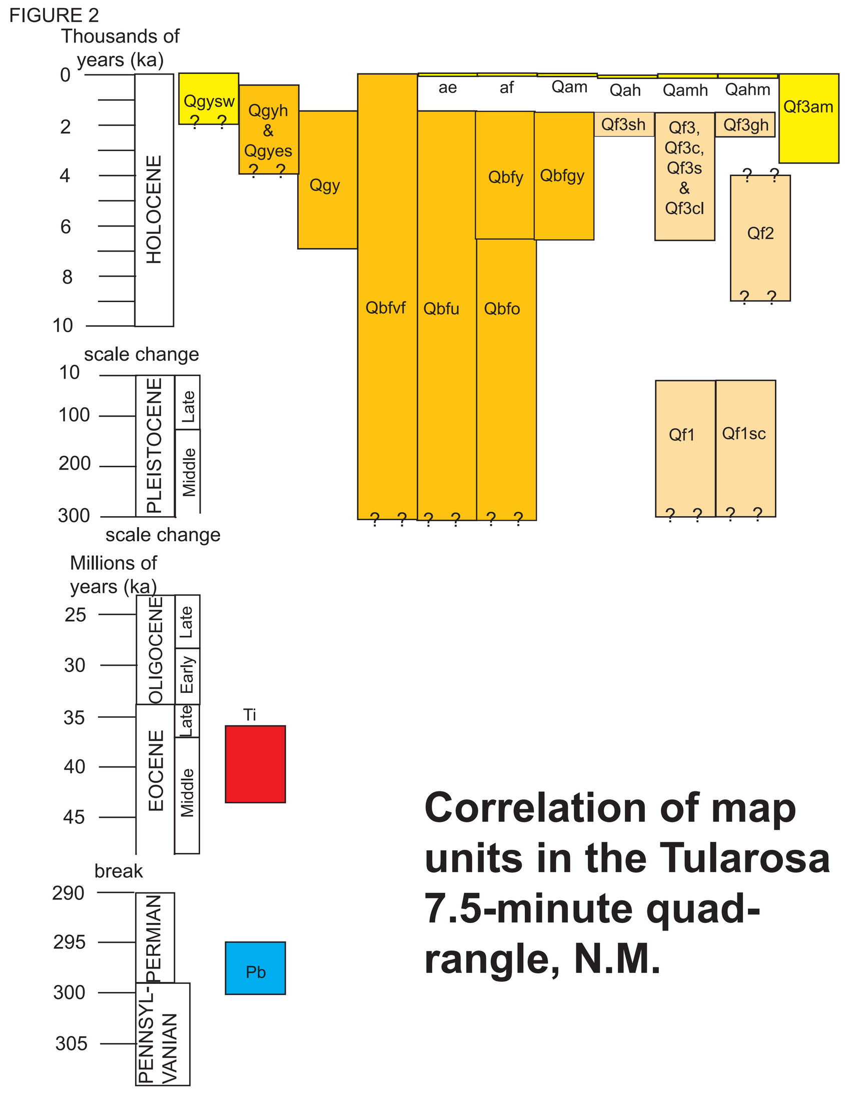
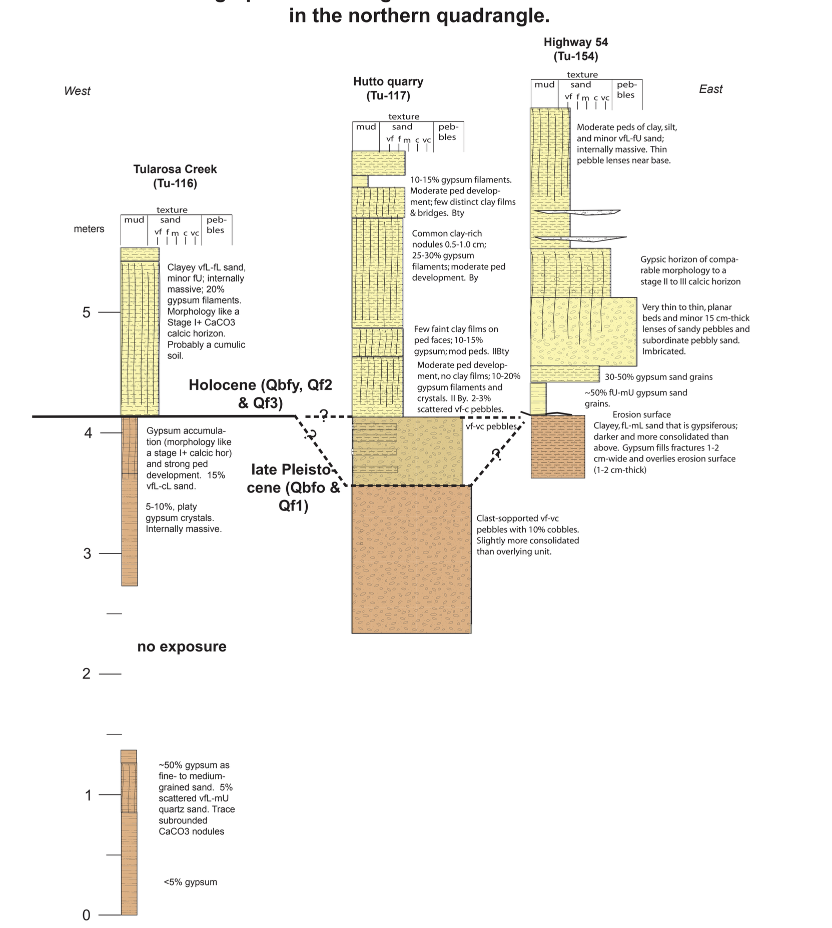


FIGURE 2

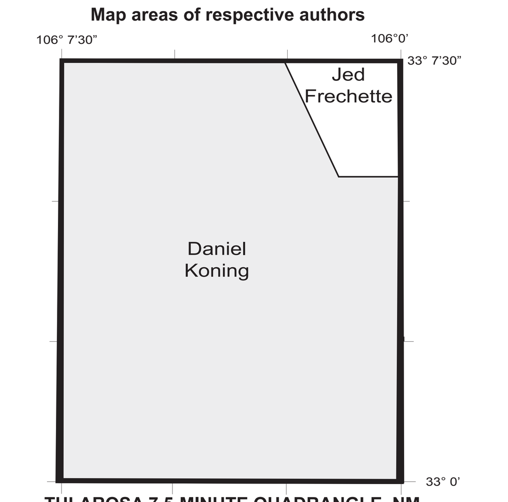


Correlation of map units in the Tularosa 7.5-minute quadrangle, N.M.

Figure 3 Stratigraphic fence diagram of selected strat sections in the northern quadrangle.



Map areas of respective authors



TULAROSA 7.5-MINUTE QUADRANGLE, NM
FIGURE 1