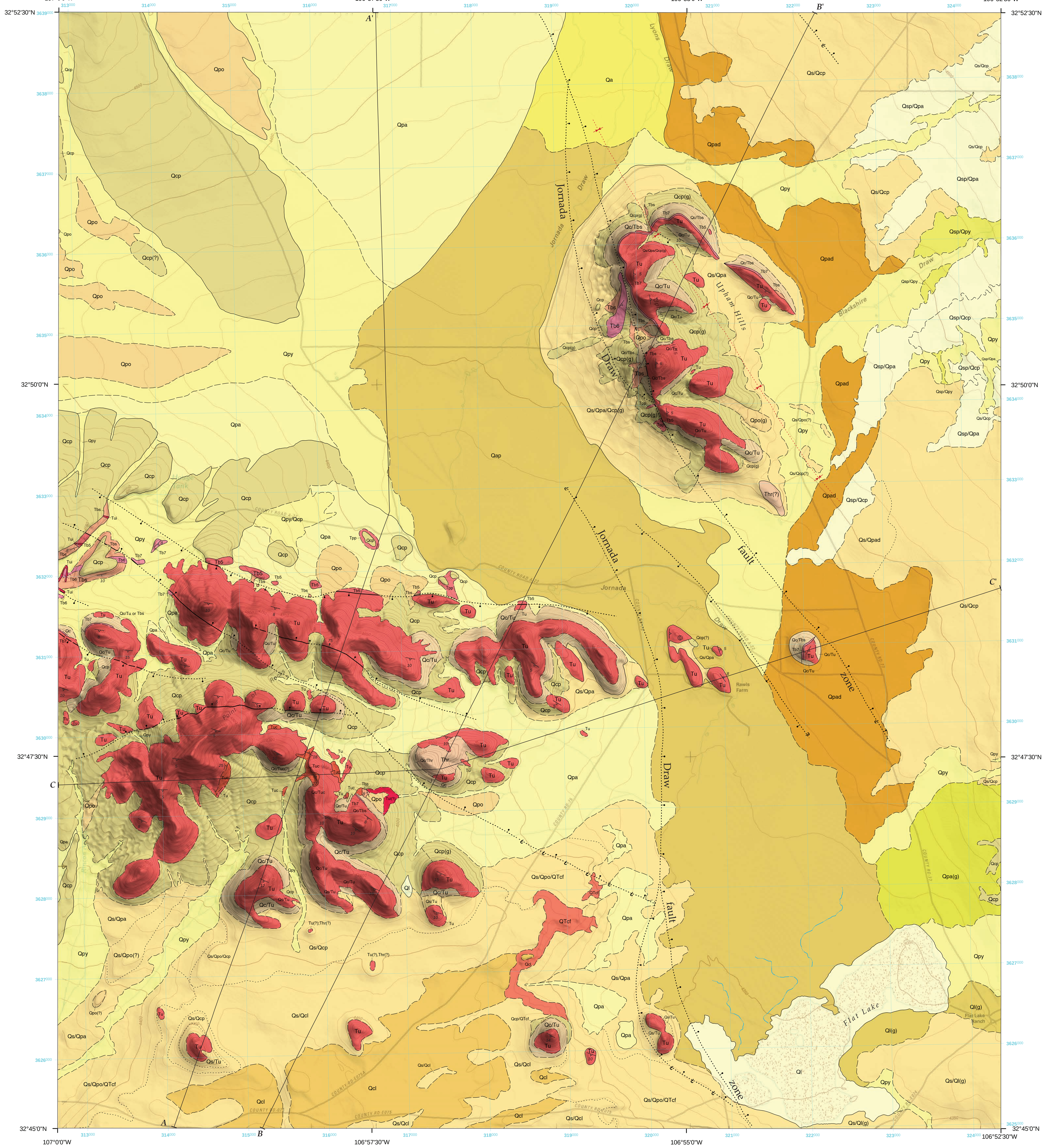
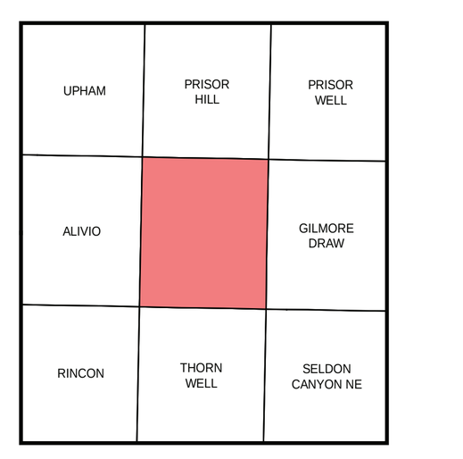
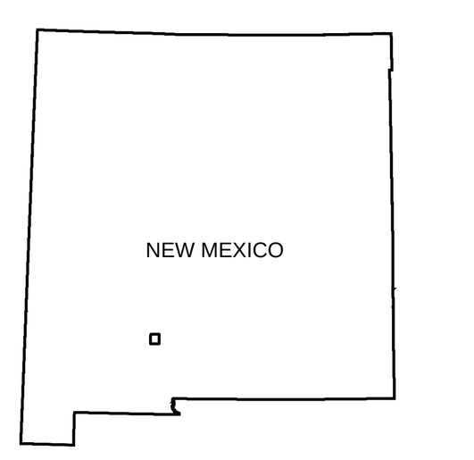
NMBGMR Open-file Geologic Map 113
Last Modified 2016

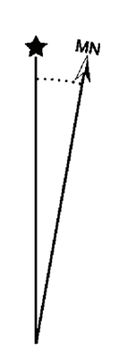


Base map from U.S. Geological Survey 1981, from photographs taken 1972, field checked in 1974, edited in 1981.
1927 North American datum, UTM projection -- zone 13N
1000-meter Universal Transverse Mercator grid, zone 13, shown in blue



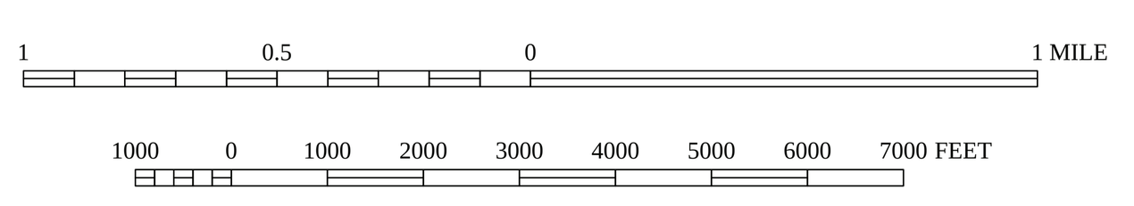


QUADRANGLE LOCATION



Magnetic Declination
May 2004
10º 25' East
At Map Center

1:24,000



CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

New Mexico Bureau of Geology and Mineral Resources
Open-file Geologic Map 113

New Mexico Bureau of Geology and Mineral Resources
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This and other STATEMAP quadrangles are available for free download in both PDF and ArcGIS formats at:

http://geoinfo.nmt.edu

Geologic Map of the Upham Hills 7.5-Minute Quadrangle, Sierra and Doña Ana Counties, New Mexico.

June 2002

by
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Map Symbols

- Gelogic contact.—Solid where certain and exposed, dashed where approximately located and intermittant-obscured
- Normal fault—Dashed where approximtely located, dotted where buried. Bar-and-ball on downthrown side
- Trace of synclinal hinge—Solid where exposed, dotted where concealed
- Channel
- Strike and dip of bedding
- Strike and dip of volcanic bedding
- Horizontal volcanic bedding
- Estimated strike and dip of lava flows or bedding in sedimentary rocks
- A—A' Location of geologic cross-section

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 associated with recent development may not be shown.

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.

The map has not been reviewed according to New Mexico Bureau of Geology and Mineral Resources standards. The contents of the report and map should not be considered final and complete until reviewed and published by the New Mexico Bureau of Geology and Mineral Resources. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the State of New Mexico, or the U.S. Government.

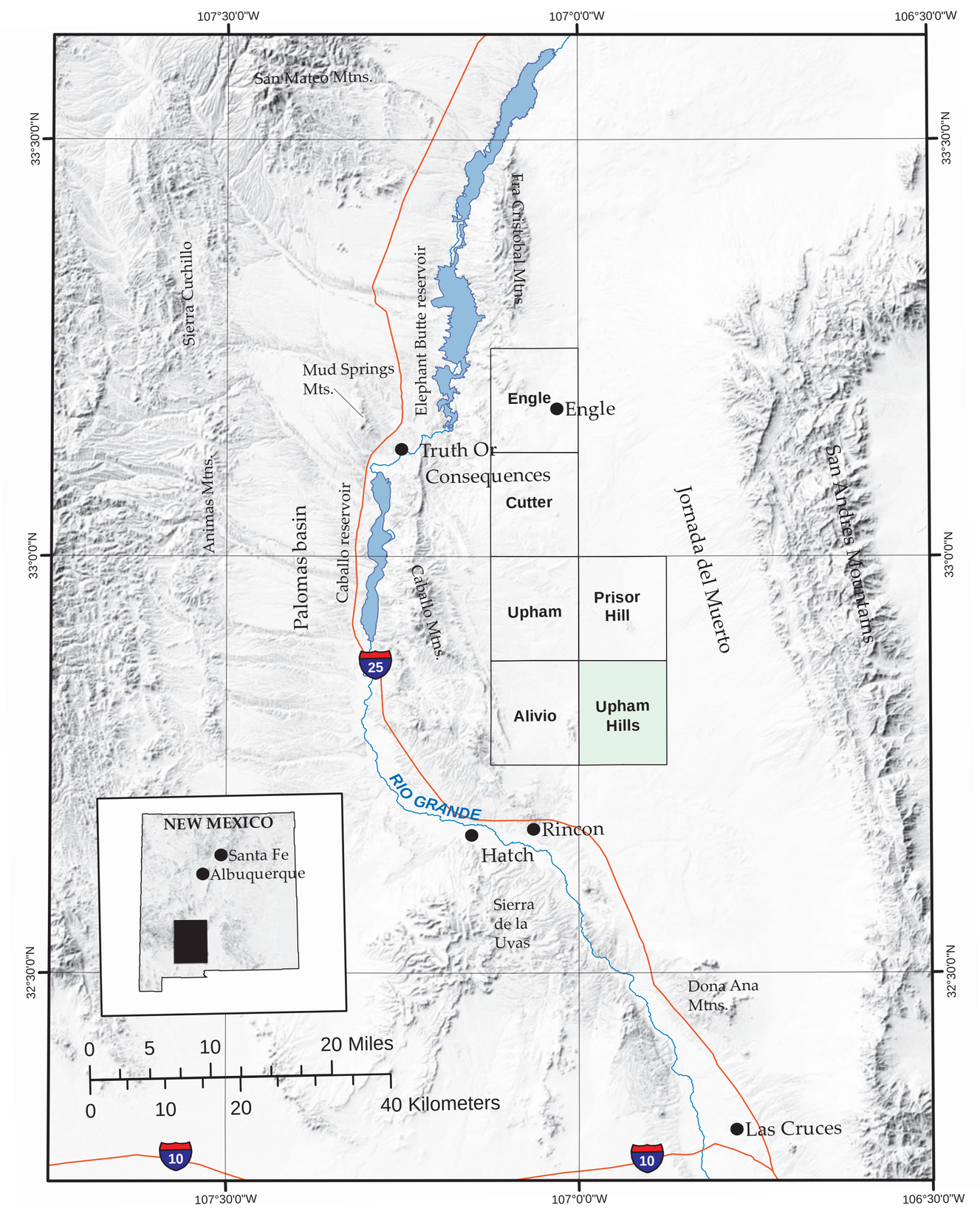
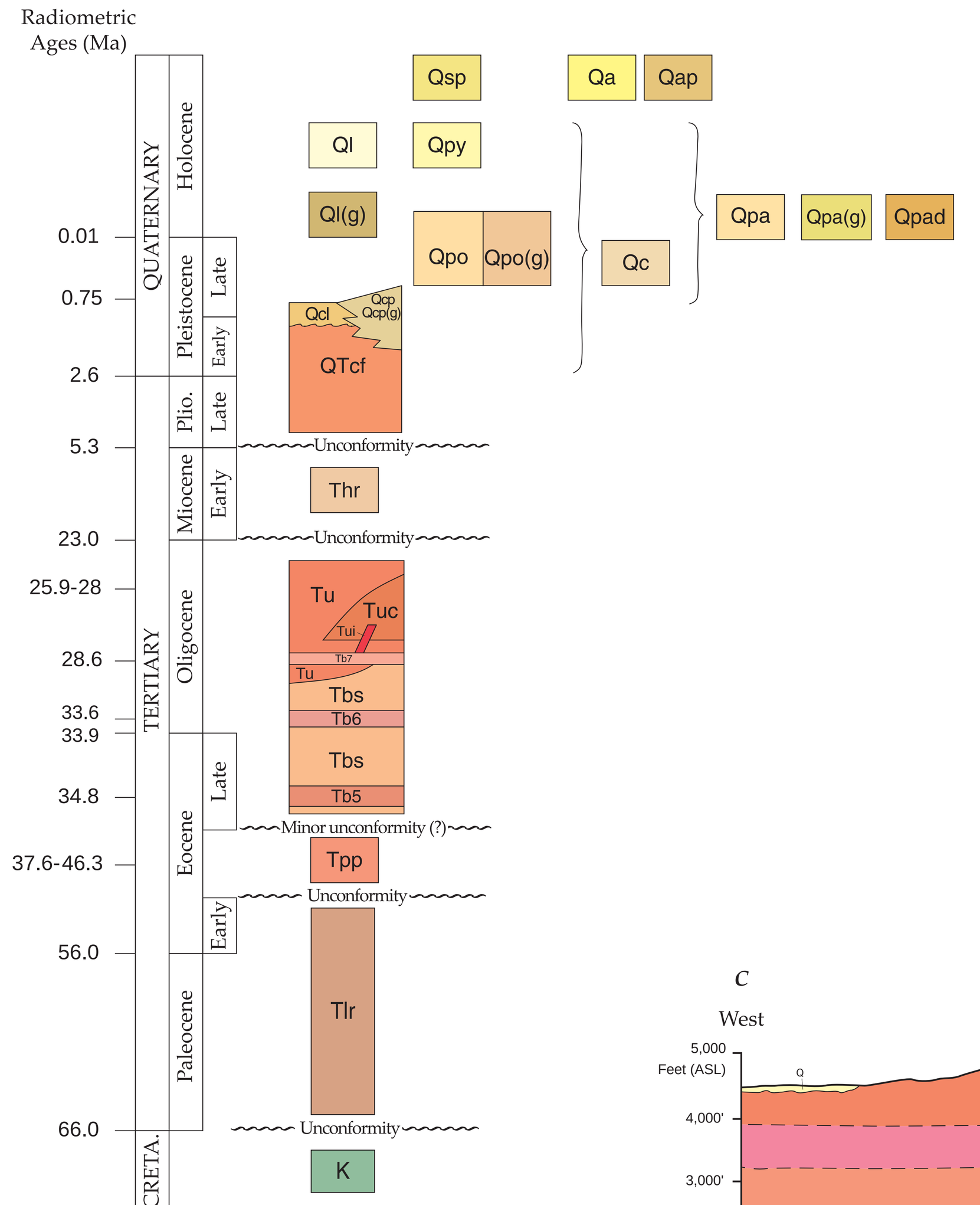


Figure 1—Location map, Prisor Hill and Upham Hills quadrangles.

Correlation of Map Units



Map Unit Descriptions

Quaternary

Q — **Quaternary sediments—** Cross-sections only.

Qs — **Eolian sand, coppice dunes—**Pale-red to pale-orange sand, mostly in the form of coppice dunes, but also including thin-sand sheets, as well as mounds and aprons, the thickest of which may be nearly barren of vegetation; best developed against the bedrock hills above the La Mesa surface; along the southeastern margins of Flat Lake playa; on the valley sideslopes of Rincon arroyo; along the western flanks of both the Upham Hills and Prisor Hill; and on the Jornada Draw fault escarpment west of Flat Lake; widespread, but discontinuous on the La Mesa surface and on the distal piedmont slopes (especially **Qcp**) of the San Andres Mountains; as much as 3m thick.

Qsp — **Eolian sand, parabolic dunes—**Pale-red to orange sand in the form of narrow, arcuate, weakly–parabolic dunes, which tend to form discontinuous transverse ridges; generally 1 to 2m in height, although locally they may exceed 4m; except for the highest, the dunes are largely stabilized by vegetation; forms distinctive fields of dunes on distal parts of alluvial fans derived from San Andres Mountains; dunes overlap both older **Qcp** and younger **Qpa**, **Qpo** and **Qpy** deposits, and probably interfinger downward with the latter; interdune areas are fine–grained or pebbly deposits of **Qpy**, **Qpo** or **Qcp**; generally 1 to 2m thick.

Ql, **Qlg** — **Playa deposits—**Pale–reddish–brown to tan silt, clay, and fine sand on the floor of Flat Lake playa; surficial deposits appear to be non-gypsiferous (**Ql**), but older, buried beds may be gypsiferous as indicated by selenite–rich lake sediment (**Qlg**) exposed along the southeastern margin of the lake; little or no soil development and little or no vegetation across broad areas of **Ql**; at least 1m thick and probably much more.

Qa — **Axial channel deposits—**Brown, pale–red, to dark-reddish–gray sand, silt, and minor gravel on the bed of Jornada Draw, an axial drainage of the Jornada del Muerto basin; 2m thick or more.

Qap — **Alluvial-plain deposits—**Pale–reddish–brown to tan silt, fine sand and clay adjacent to the lower reaches of Jornada Draw; gradients of the alluvial plains are generally less than 3.0m/km; non-gypsiferous, at least in the exposed uppermost parts; little or no soil development and locally no vegetation across broad areas; at least 1m thick and perhaps much more.

Qpy — **Younger piedmont-slope alluvium—**Gravel, sand, and silt on arroyo or canyon floors of upland areas, filling shallow drainageways on pediments or alluvial fans, and forming small alluvial fans at the mouths of such drainageways; includes broad but thin veneers of sediment on middle or distal parts of large alluvial fans. Deposits are graded to or within a meter or two of the floor of Flat Lake playa and are actively moving downslope by sheetflood and channelized runoff. Clast composition reflects local source areas, ranging from predominantly Uvas Basaltic Andesite adjacent to Point of Rocks, Upham Hills, and Prisor Hill, to Paleozoic limestone and sandstone derived from the Caballo and San Andres Mountains; unconsolidated, although the uppermost few centimeters may be weakly coherent because of incipient (stage I) soil development; as much as 2–3 m thick.

Qpo — **Older piedmont-slope alluvium—**Gravel, sand, and silt of canyon floors, arroyos, alluvial fans and pediment veneers; generally inset against older Camp Rice deposits on upper parts of piedmont slopes but overlap and bury Camp Rice deposits downslope. At least two generations of **Qpo** deposits exist; an older deposit distinguished on upper piedmont slopes by a geomorphic position just below the surface of Camp Rice fans, as well as by stage III-IV soil carbonate, and a younger deposit, inset against the older, displaying stage II soil carbonate. Like **Qpy** deposits, clast composition reflects local source areas. The surface of **Qpo** alluvial–fan deposits adjacent to Upham Hills exhibit gypcrete soil, as much as 2m thick, (**Qpo(g)**), that apparently was developed on eolian gypsum that mantled the fans in late Pleistocene time. Along the sideslopes of Rincon Arroyo and on the Jornada Draw fault escarpment, deposits mapped as **Qpo** are merely stage III–IV soil carbonate developed on underlying Camp Rice strata—the erosion surfaces on which the soils are present being correlative with the surface of **Qpo** deposits elsewhere; Except for these soils, **Qpo** deposits are at least 2 to 3m thick.

Qpa, **Qpad**, **Qpa(g)** — **Undifferentiated Qpy and Qpo—Qpa** includes medium to large alluvial fans or other piedmont-slope deposits on which patterns of **Qpy** and **Qpo** are complex, or where **Qpo** is locally buried by thin but extensive veneers of **Qpy**. **Qpad** refers to fine-grained, distal piedmont-slope deposits derived from the San Andres Mountains and located along the eastern margins of Jornada Draw; these consist of light-gray to white, fine sand and silt, are of uncertain age but probably correlative with **Qpo**, **Qpy** or **Qpa** elsewhere. **Qpa(g)** consists of fine-grained, tan to dark-gray, distal alluvial-fan deposits containing disseminated gypsum. **Qpa**, **Qpad**, and **Qpa(g)** all are located on active depositional surfaces subject to sheetfloods and to anastomozing, closely spaced, channelized runoff.

Qc — **Colluvium—**Bouldery hillside deposits that are slowly moving downslope, mostly by gravity; most deposits are cemented by stage IV carbonate and grade downslope to piedmont–slope alluvium of the Camp Rice Formation and therefore represent the most proximal part of the formation. Less commonly, colluvial deposits grade downslope into **Qpo** or **Qpy** alluvium. In any case, the deposits provide a hillside armor which seemingly slows erosion and effectively obscures underlying bedrock relationships over wide areas; mapped boundaries between colluvium and other alluvial deposits are entirely gradational and are generally portrayed on the geologic map somewhat diagrammatically. Furthermore, small outcrops of unmapped bedrock (Uvas Basaltic Andesite, especially), may locally project through the colluvium. 1–2m thick.

Qcp — **Camp Rice Formation, piedmont-slope deposits—**Boulder to pebble conglomerate, gravel, conglomeratic sandstone, pebbly-sand, sand and silt forming pediment veneers, and alluvial fans adjacent to local hills and mountains. Forming the highest constructional surfaces near mountain fronts, the deposits generally are buried downslope by younger piedmont–slope alluvium (**Qpo**; **Qpy**; **Qpa**); upslope on hillsides, the deposits grade into bouldery colluvium (**Qc**); unconsolidated to well cemented, the cementation a product of stage IV soil carbonate development in the upper 1 to 2m of the deposit. Clast composition and grain size reflect local sources. Basaltic boulder conglomerate is distinctive of proximal deposits adjacent to Point of Rocks, Upham Hills, and Prisor Hill, whereas limestone/sandstone pebble or cobble gravel and gravelly sand is characteristic of distal parts of pediments or alluvial fans draining the San Andres and Caballo Mountains. Gypcrete soil, as much as 2m thick, caps Camp Rice piedmont–slope deposits adjacent to Upham Hills and along the southeastern flank of Point of Rocks; these outcrops are shown on the map as **Qcp(g)**. Apparently of eolian origin, the gypcrete also overlies younger (**Qpo**) deposits and so is younger than both **Qcp** and **Qpo**; as much as 4m thick.

Qcl — **Camp Rice Formation, La Mesa surface—**Constructional-top of the fluvial facies of the Camp Rice Formation, marked by stage IV calcrete; covered over broad areas by coppice dunes; as much as 1.5m thick.

QTcf — **Camp Rice Formation, fluvial facies—**Light–gray, fine–grained, well-sorted sand and loamy sand, as much as 7m thick, that underlies the La Mesa surface and probably represents overbank or eolian deposits associated with the ancestral Rio Grande. These are underlain by acestral Rio Grande channel deposits consisting of gray, well-sorted, coarse- to medium-grained sand and sandstone containing scattered, well–rounded pebbles of Precambrian granite and chert derived from distant sources; largely uncemented but locally well–cemented by gypsum; locally exposed along the Jornada Draw fault escarpment; but, in general, outcrops are concealed by **Qs** and/or **Qpo** soils or by thin **Qpo** alluvium; total exposed thickness is at least 15m, base not exposed.

Tertiary

Thr — **Hayner Ranch Formation—**Boulder/cobble conglomerate consisting of angular to sub–rounded boulders of Uvas Basaltic Andesite and Bell Top ash–flow tuffs 5 and 6; clasts range up to 3/4m in length and are entirely disaggregated from matrix, resulting in "outcrops" consisting of boulder and cobble lag deposits; unconformably overlies Uvas Basaltic Andesite and Bell Top Formation on a deep, irregular-erosion surface; deposits are probably alluvial and colluvial fill of paleovalleys; at least 100m thick, top not exposed.

Tui — **Uvas Basaltic Andesite, dikes and plugs(?)—**Northwest-trending basaltic-andesite dikes exposed in the northwestern part of the Upham Hills quadrangle; transect Bell Top strata and ash–flow tuffs and may merge upward into and "feed" Uvas Basaltic Andesite flows; also includes possible plugs of basalt that intrude **Tbs** in the central part of Point of Rocks Hills; as much as 15m thick.

Tuc — **Uvas Basaltic Andesite, cinder cone—**Reddish–brown to tan, well–bedded basaltic-andesite cinder and lapilli-tuff breccia containing bombs and impact sag structures; well-cemented with calcium carbonate; initial dips of 25 degrees; interbedded with Uvas Basaltic Andesite flows near the base of the formation; represents part of northeastern, northern, and northwestern flanks of Uvas Basaltic Andesite cinder cone, which was largely buried by subsequent flows, then exhumed and almost entirely eroded; a thickness of approximately 50m is exposed.

Tu — **Uvas Basaltic Andesite—**Black, gray, reddish–brown, and tan basaltic-andesite flows; dense, massive, to vesicular or amygdaloidal (chalcedony) to platy; locally contains interbedded, very -poorly exposed, brown, coarse–grained volcaniclastic beds; locally a basal flow is interbedded with uppermost beds of the Bell Top Formation; individual flows range from 4–20m thick; at least 160m thick, top eroded.

Tbt — **Bell Top Formation—** Cross-sections only.

Tb7 — **Bell Top Formation, ash-flow tuff 7—**Light–grayish–brown, vitric, ash-flow tuff at the base of the Uvas Basaltic Andesite, although locally an Uvas Basaltic Andesite flow underlies the ash-flow tuff; probably represents distal parts of Vicks Peak Tuff, erupted from the Nogal Peak cauldron in the San Mateo Mountains (McIntosh et al., 1991); generally less than one meter thick.

Tb6 — **Bell Top Formation, ash-flow tuff 6—**Pale–pinkish to orange–gray, crystal–rich, ash-flow tuff; contains broken crystals of quartz, sanidine, biotite, and plagioclase in a matrix of devitrified ash; simple cooling unit; occurs near the middle of Bell Top sedimentary sequence (**Tbs**); 7–10m thick.

Tbs — **Bell Top Formation, sedimentary member—**White to light-tan, tuffaceous sandstone and interbedded–cobble to boulder conglomerate; divided into upper and lower units by medial ash–flow tuff 6 (**Tb6**); sandstones are medium- to thin-bedded and consist of a mixture of glass shards, pumice, quartz, sanidine, and biotite; sand- to granule–sized, white pumice grains are especially abundant and conspicuous. Conglomerate beds are poorly–exposed, generally represented only by disaggregated clasts; these include a variety of dark–gray to reddish–gray porphyries of intermediate composition, similar in appearance and composition to those of the McRae and basal Love Ranch Formations; generally well-rounded, the clasts may be recycled from McRae and Love Ranch conglomerates; interpreted to be syneruption, alluvial-fan and fluvial deposits on the distal flanks of large volcanoes, as well as the fill of the Goodsight–Cedar–Hills half graben; approximately 235m thick.

Tb5 — **Bell Top Formation, ash-flow-tuff 5—**Light–gray to grayish–tan, crystal and pumice–rich ash-flow tuff; coarse–grained fragments of sanidine, plagioclase, and bipyramidal quartz crystals, as well as biotite, are conspicuous in hand specimens; abundant pumice fragments range from 1 to 3cm in length and weather light–brown; unit is rather densely welded and is a simple cooling unit; white tuffaceous sandstone and air–fall tuff, approximately 5m thick, underlies tuff 5, separating it from the underlying Palm Park Formation; approximately 10m thick along northern edge of Point of Rocks Hills, including basal white, tuffaceous strata.

Tpp — **Palm Park Formation—**Pale-grayish–purple to gray conglomerate, breccia, and tuffaceous, volcaniclastic sandstone that probably represents distal piedmont–slope deposits of one or more andesitic stratovolcanoes; conglomerate and breccia clasts range up to boulder size, are matrix supported, and comprise a suite of intermediate composition porphyries containing phenocrysts of hornblende and plagioclase; matrix consists of a poorly-sorted mixture of ash, small clasts, and crystals; all lithologies are probably lahar deposits; prevailingly soft, the unit is poorly–exposed only along the northeastern edge of Point of Rocks Hills and on southwestern slopes of Upham Hills; elsewhere, its normal outcrop area is buried by a thin veneer of alluvial–fan sediments; thickness uncertain but may be as much as 600m.

Tlr — **Love Ranch Formation—**Cross-section only.

Cretaceous

K — **Undifferentiated Cretaceous—**Cross-section only.