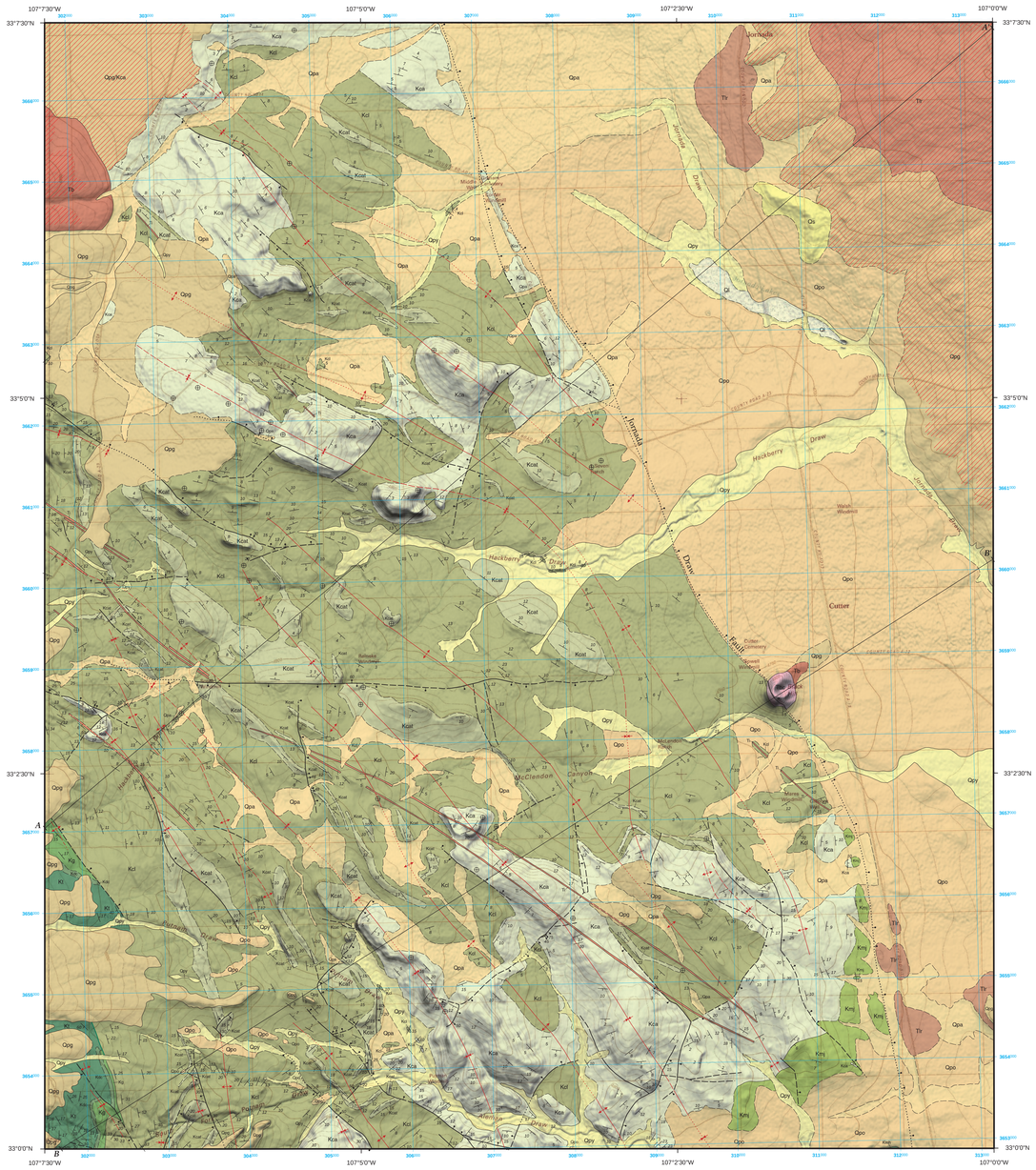
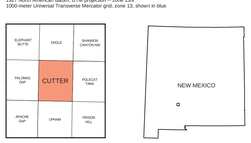


Base map from U.S. Geological Survey 1970, from photographs taken 1965, field checked in 1970, edited in 1993.
1927 North American datum, UTM projection -- zone 13N
1000-meter Universal Transverse Mercator grid, zone 13, shown in blue



QUADRANGLE LOCATION

1:24,000

1 0.5 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0.5 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

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

New Mexico Bureau of Geology and Mineral Resources — New Mexico Tech — Socorro, New Mexico — Science for the 21st Century

NEW MEXICO STATE UNIVERSITY

New Mexico Bureau of Geology and Mineral Resources
Open-file Geologic Map 206

Geologic Map of the Cutter 7.5-Minute Quadrangle, Sierra County, New Mexico.

May 1995

by
William R. Seager

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Map Symbols

- Geologic contact—solid where exposed or known, dashed where approximately known, queried where uncertain.
- Fault—bar-and-ball on downthrown side. Solid where exposed, dashed were approximately known, dotted where buried. Tick indicates an inclined or vertical fault, showing direction and dip.
- Trace of anticlinal hinge—showing direction of plunge, dashed where inferred, dotted where buried.
- Trace of syncline hinge—showing direction of plunge, dashed where inferred, dotted where buried.
- 30 — Strike and dip of bedding.
- Horizontal bedding.
- A — A' — Location of geologic cross section.
- Cuchillo Surface—Upper beds, which represent the constructional top of Qpg.

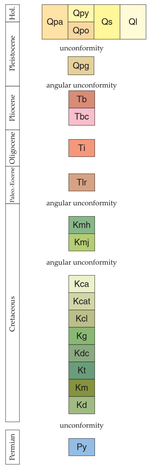
COMMENTS TO MAP USERS

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.

Correlation Diagram



Map Unit Descriptions

Quaternary

Ql — **Playa deposits**—mostly silt and clay; generally correlative with **Qpy** but may grade downward into deposits as old as **Qpo**.

Qpy — **Younger piedmont-slope alluvium**—Sand, gravel, silt, and clay of modern, shallowly-incised drainageways; and thin sand and gravel veneers mantling broad bediments; as much as 20ft (6m) thick.

Qpo — **Older piedmont-slope alluvium**—Gravel and gravelly-sand deposits of alluvial fans that are intermediate in geomorphic position between higher Palomas (**Qpg**) fans and lower (**Qpy**) arroyo alluvium; upper part of Qpo deposits are cemented by pedogenic carbonate that represents stage II to stage IV carbonate accumulation; as much as 25ft (7m) thick.

Qpa / **Qs** — **Undifferentiated Qpy and Qpo**

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.

Qpg — **Palomas Formation, piedmont-slope deposits**—Boulder to cobble conglomerate, gravel, and sandy-gravel of both high-level alluvial fans and erosion-surface veneers. Upper beds are generally indurated by stage IV caliche. Unit forms relatively undissected alluvial fans as well as mesa-capping erosional remnants of fans or pediment veneers; as much as 20ft (6m) thick.

Tertiary

Tb / **Tbc** — **Basalt**—Flows (**Tb**) and cinder cones (**Tbc**) ; alkali-olivine basalt; single flows are generally less than 20ft (6m) thick.

Ti — **Basaltic andesite dikes**—Part of a system of dikes in the Caballo Mountains that locally can be traced upward into flows of 28Ma Uvas Basaltic Andesite.

Tlr — **Love Ranch Formation**—Fining-upward sequence of red, gray, and purple conglomerate, conglomeratic sandstone, sandstone, and mudstone representing alluvial-fan and fluvial deposits in the Laramide Love Ranch Basin; the formation documents progressive erosional unroofing of Cretaceous intermediate-and silicic-composition volcanic rocks, Mesozoic and Paleozoic sedimentary rocks, and Precambrian granite from the Laramide Rio Grande uplift; poorly-exposed east of the Jornada Draw fault where it is mostly matled by a thin veneer of Palomas or younger pediment gravel; total thickness may exceed 3,000ft (914m).

Cretaceous

Kmh — **McRae Formation, Hall Lake Member**—Purple to grey shale and mudstone interbedded with tan, channel-form, volcaniclastic sandstone beds; only 10-20ft (3-6m) of the lower part of the member are exposed in the Cutter quadrangle.

Kmj — **McRae Formation, Jose Creek Member**—Brown to dark-gray boulder conglomerate in channel-form lenses; clasts are angular to sub-rounded, intermediate-composition volcanic and hypabyssal rocks ranging in size from 0.2 to 1 m in diameter; debris flow in origin; 20ft (6m) thick or less.

Kca — **Crevasse Canyon Formation, Ash Canyon Member**—Primarily thick-bedded, pale-tan to light-gray channel-form beds of cross-bedded gray, quartzose sandstone and conglomeratic sandstone interbedded with fewer beds of brown to greenish-brown sandstone, mudstone and shale, all of fluvial origin; maximum thickness is approximately 1,200ft (366m).

Kcat — **Crevasse Canyon Formation**—Tongues of Ash Canyon sandstone and conglomeratic sandstone within **Kcl**, each 30-50ft (9-15m) thick.

Kcl — **Crevasse Canyon Formation**—Gray, tan, dark-brown, thin- to medium-bedded, cross-bedded or laminated sandstone, interbedded with gray to brown mudstone; local large concretions in sandstone beds; fluvial in origin; approximately 1,000ft (305m) thick.

Kg — **Gallup Sandstone**—Massive to cross-bedded cream to gray marine sandstone and minor marine shale, gradational downward into D- Cross Tongue of Mancos; approximately 110ft (33m) thick.

Kdc — **D-Cross tongue of Mancos Shale**—Dark-gray, fissile, marine shale with thin interbeds of fossiliferous sandstone. 60ft (18 m) thick.

Kt — **Tres Hermanos Formation**—Lower Atarque Member consists of brown and greenish-brown fossiliferous, burrowed marine sandstone, followed upward by fluvial brown sandstone and olive-green mudstone of the Carthage Member, and capped by marine, brown, fossiliferous, burrowed sandstone of the Fite Ranch Member; total thickness is approximately 328 to 348ft (100-106m).

Km — **Mancos Shale (cross section only)**—Thin-bedded to fissile, marine siltstone and shale with at least five ash beds, each 2 to 5in (6 to 12cm) thick. Total thickness is approximately 394ft (120m).

Kd — **Dakota Sandstone (cross section only)**—Lower yellow-brown, cross-bedded, fluvial, quartzose sandstone overlain by marine shale and marine, cross-bedded quartzose sandstone; grades upward into Mancos Shale; approximately 144ft (44m) thick.

Permian

Py — **Yeso Formation (cross section only)**—Orange siltstone, orange to yellow sandstone, thick gypsum beds, and medium- to light-gray limestone. Total thickness, including both upper and lower map units and all four members described in McLeod Tank and Alivio quadrangles, is approximately 1,300ft (390m).

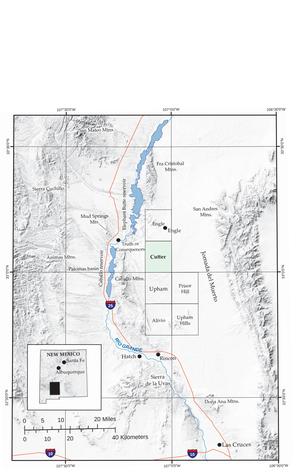


Figure 1—Location of the Cutter quadrangle and surrounding quadrangle locations.

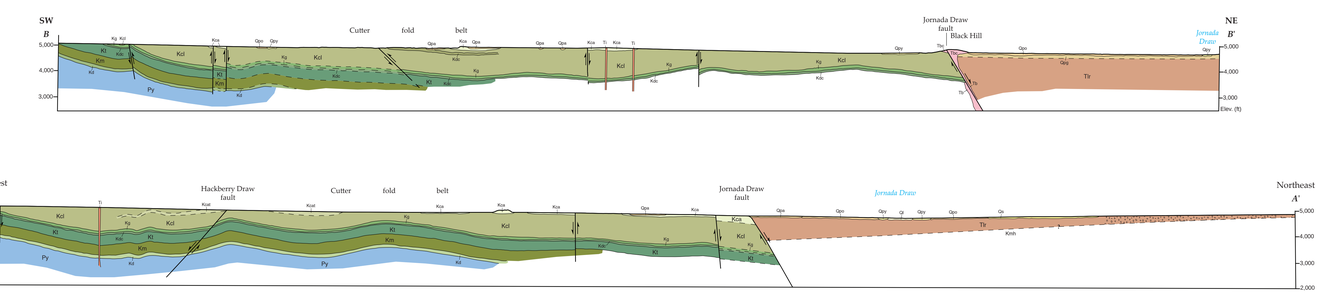


Figure 2—Composite stratigraphic column of the Cutter and Upham quadrangles.