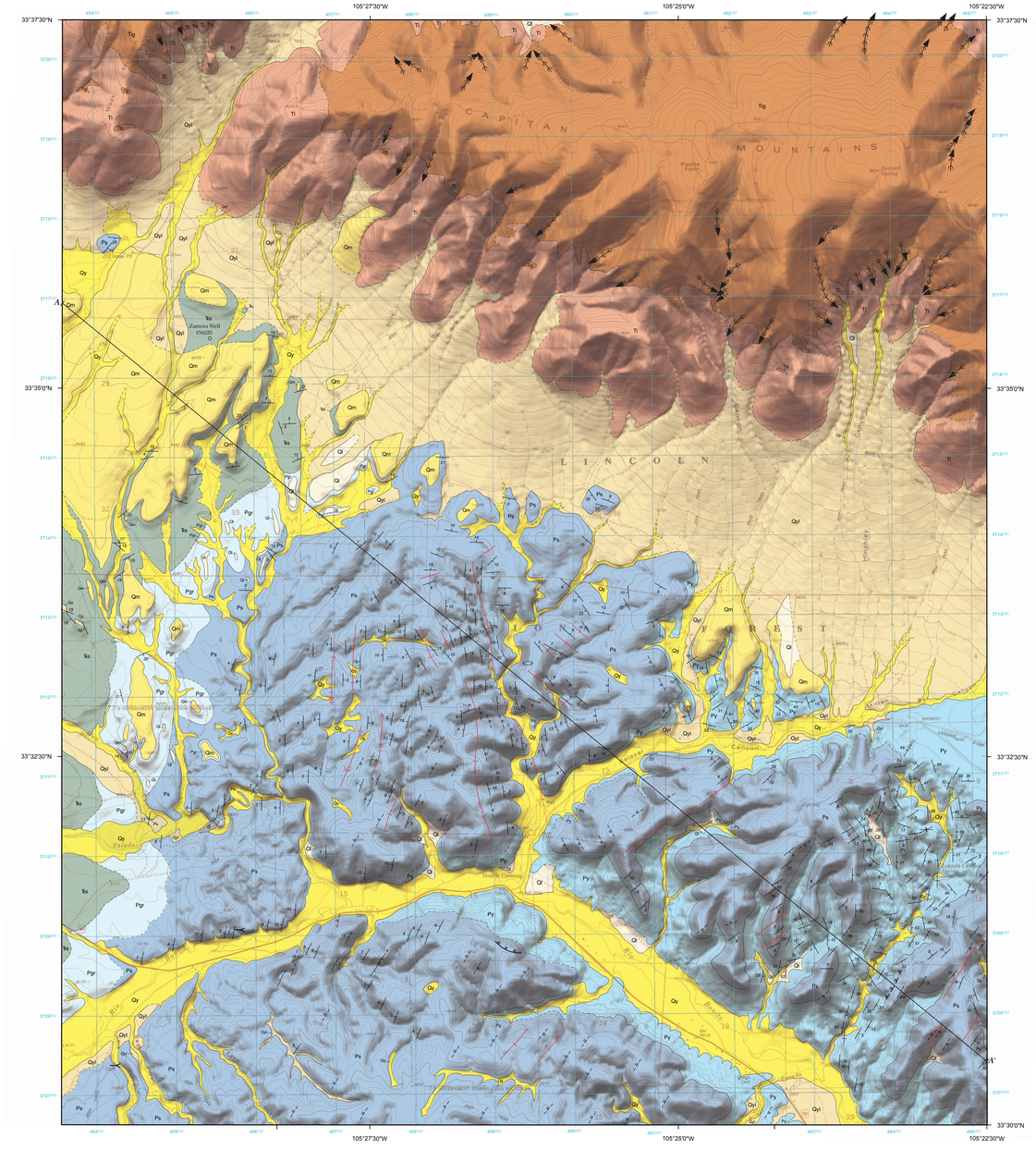
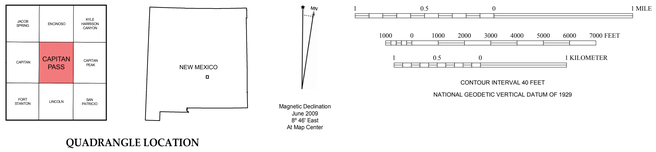



Base map from U.S. Geological Survey 1981, from photographs taken 1973, field checked in 1974, edited in 1981.
1927 North American datum, UTM projection – zone 13N
1000-meter Universal Transverse Mercator grid, zone 13, shown in blue

1:24,000




QUADRANGLE LOCATION

Mn
Magnetic Declination
June 2009
8° 46' East
At Map Center

1 0.5 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0.5 0 1 KILOMETER
CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

# Geologic map of the Capitan Pass quadrangle, Lincoln County, New Mexico.

**June 2010**

**by**
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**New Mexico Bureau of Geology and Mineral Resources**
**Open-File Geologic Map 208**

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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***

## Map Unit Descriptions

### Anthropogenic Deposits

**d** — **Disturbed by man**—This unit was mapped only as the earthen dam in the southwest part of the Capitan pass quadrangle along Salado Creek.

### QUATERNARY

**Qy** — **Holocene alluvial deposits**—These deposits were mapped separately from the remainder of the Quaternary surficial deposits because they are relatively easy to identify and are important because these are areas that may be prone to flooding. They are composed of weakly–consolidated interbedded gravel, silt, and clay. They commonly form relatively flat deposits at the bottom of the wider drainages. They characteristically contain abundant dark brown, organic–and silt–rich soils at the surface. The deposits are commonly incised up to about 2–3 m by the modern drainages, where vertical faces locally show older soil horizons. As mapped, this unit locally contains at least two and possibly three separate terrace levels.

**Qp** — **Holocene playa deposits**—Mostly weakly consolidated silt and clay. These fill depressions within the San Andres Formation in the southern part of the Capitan Peak quadrangle where they are interpreted to be sink holes that have filled sediment. The presence of small seasonal ponds within some of them suggests that water does not infiltrate within them very quickly.

**Qyf** — **Holocene and Late Pleistocene alluvial deposits, undivided**—Dominated by sand to boulders of fine-grained granite. As mapped, this unit contains both Late Pleistocene deposits with elevations about 3–9 m (10–30 feet) above the level of the modern drainages. Holocene deposits form one or more terrace levels below the level of **Ql** deposits. The two ages are very difficult to distinguish on the broad alluvial apron on the south side of the Capitan Mountains.

**Ql** — **Late Pleistocene alluvial deposits**—These deposits consist of poorly sorted sand, gravel, and boulders of dominantly **Ti**. They are poorly exposed, but commonly form terrace remnants less than about 6 m (20 feet) above the **Qyl** deposits.

**Qm** — **Middle Pleistocene alluvial deposits**—Composed of poorly–sorted subangular–to subrounded–pebbles to large boulders, the vast majority are composed of fine–grained granite (**Ti**). Some deposits contain a significant amount of angular to subrounded dark gray to black iron clasts (magnetite and hematite) from small pebbles up to about 40 cm across. Where **Qm** deposits have been significantly eroded the iron clasts locally form a lag placer. Although poorly exposed, these deposits locally contain a well developed horizon of laminar caliche. These deposits are higher in the landscape than **Ql** deposits have been dissected by deeper drainages. Commonly less than 12 m (40 feet) thick.

**Qo** — **Early Pleistocene alluvial deposits**—This unit forms only two small terraces on the far west side of the Capitan pass quadrangle where they reside about 60 m (200 feet) above the modern drainage. They are comprised of far–traveled sand to small boulders composed of brown quartz sandstone, gray limestone, chert, andesite (or monzonite/syenite) and a darker–gray platy granitic intrusive rock.

### TERTIARY

**Tig** — **Fine-grained granite**—Areas subjected to periglacial activity. This unit contains the areas of the Capitan pluton that were subjected to glacial or periglacial processes. There is almost no intact outcrop, yet nearly all of the surface rubble is composed of fine–grained granite. As mapped, this unit also contains talus and rock glacier deposits which contain material that has moved down–slope. Since it was not practical with the time available to distinguish the different types of slope deposits, it made sense to lump them into this one unit.

**Ti** — **Fine-grained granite**—Overall the mineralogy of this rock is very bland and non–descript. The rock is characteristically fine–grained and tan–colored, exhibiting phenocrysts of subhedral to euhedral K-feldspar up to about 4 mm across, and anhedral muscovite and/or biotite from 1–2 mm across. The rock commonly weathers a light rusty tan color and commonly exhibits either a smooth or slightly granular texture. Commonly forms large subangular to rounded boulders.

### TRIASSIC

**Tis** — **Santa Rosa Sandstone**—Sandstone, siltstone, and minor conglomerate. The lower parts of this unit are dominated by pale–yellow quartz sandstone and interbedded calcarenite and calcilutites. Limy sandstone beds are commonly fragmental and are composed of subrounded sand–size to small pebble–size (1.5 cm) fragments of tan to gray fine–grained limestone. Cross–bedding is common in sets, tens of centimeters thick, that show erosional bases. Even pebbly beds are cross–bedded and locally show erosional bases and rip–up clasts of sandstone. Locally, the yellow–sandstone beds contain chert–pebble conglomerate beds up to 1–2 m thick that form chert lags down–slope. The upper parts (as exposed) are composed of conglomerate containing angular to subrounded pebbles to boulders (1 m) of dark–brown medium–to coarse–grained sandstone, gray limestone, and a variety of felsic–intrusive rock that is darker gray and more platy than is **Ti**. All exposures are very poor and most exposures form gentle slopes covered with soil and grasses. Thickness is at least 179 m (590 feet).

### PERMIAN

**Pgr** — **Grayburg Formation**—Red siltstone, fine-grained sandstone, and minor gypsum. This unit is characteristically dominated by rusty–red quartz siltstone and fine–grained sandstone. Since exposure is poor, it was distinguished from the overlying Santa Rosa Sandstone mostly on the basis of color. Thickness is about 67 m (220 feet).

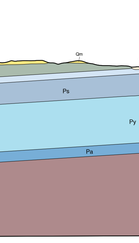
**Ps** — **San Andres Formation**—Medium- to thick-bedded dolomite and limestone. Dolomite beds are typically light–gray–colored, whereas limestone beds are commonly darker gray. Many beds contain sand–sized broken fossil debris surrounded by a matrix composed of micrite and more commonly microspar. Some beds contain faint, parallel laminae parallel to bedding. Other beds are massive and appear bioturbated. Orange–weathering chert is minor but widespread and is composed of granular microcrystalline quartz. The chert commonly forms irregularly shaped masses up to several tens of centimeters across that is both discordant and concordant to bedding. Common larger fossils include coiled gastropods up to about 5 cm across and less abundant nautiloids up to about 10 cm. Smaller recognizable fossils include crinoid stem segments, disarticulated brachiopods (commonly up to 2 cm and replaced by chert), and sparse fussilinids. The carbonate beds are interbedded with well sorted, fine–to medium–grained quartz sandstone from 1–10 m thick, which probably represent intertonguing Glorieta Sandstone. Maximum thickness of the San Andres Formation is about 243 m (800 feet).

**Pg** — **Glorieta Sandstone**—Well–sorted, fine–to medium-grained quartz sandstone from 1–10 meters thick. The sandstone beds appear to occur within a few hundred feet of the base of the San Andres Formation. Sandstone beds typically weather light–orange to brown and in most outcrops contain abundant calcite-cemented BB-size concretions up to 2–3 mm across. Maximum thickness is about 9 m (30 feet).

**Py** — **Yeso Formation**—Interbedded fine-grained quartz sandstone, siltstone, dolomite, and bedded gypsum. Siltstone is commonly rusty–red and pale–yellow. Dolomite beds are locally fossiliferus and contain silicified–brachiopod and crinoid fragments, abundant coiled gastropods, aminiods, and possibly other cephalopods. Dolomite beds locally contain moldic porosity with some pores still filled with gypsum. Gypsum beds are typically sub–horizontally banded and are locally thicker than 10 m. Exposures are poor and typically mantled by regolith. The thickess obtained from the log of the Muñoz Canyon AAN Fed. No. 1 well is 513 m (1,685 feet).

**Pa** — **Abo Formation (in cross-section only)**—Shown only in the cross-sections. The thickness obtained from the log of the Muñoz Canyon AAN Fed. No. 1 well is 112 m (370 feet).

## Correlation Diagram




## Map Symbols

- Gelogic contact– solid where exposed, dashed where inferred, dotted where concealed.
- Detachment fault–solid where exposed, dashed where inferred. Hatchures on upper plate.
- Anticline–solid where known, dashed where inferred, dotted where concealed.
- Syncline–solid where known, dotted where concealed.
- Strike and dip of vertical bedding
- Strike and dip of bedding
- Strike and dip of bedding, interpreted from aerial photo
- Strike and dip of overturned bedding
- Location of cave
- Sinkhole
- Talus slopes
- A — A' 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—View looking east-southeast down-slope from the east side of Capitan Peak.

FIGURE 2—An arroyo within **Qy** deposits near UTM 454400, 3712700 shows mostly fine, silty material interbedded with a layer of coarser sand and gravel.

FIGURE 3—Intercalated quartz sandstone and chert-pebble conglomerate within the Santa Rosa sandstone exposed near UTM 455700, 3714900. View is to the north.

FIGURE 4—Close-up of cross-bedding in Santa Rosa Sandstone exposed immediately below **Qo** deposits, near UTM 454000, 3713000. Pencil is about 15 cm long.

FIGURE 5—Red siltstone and fine-grained sandstone of the Grayburg Formation (**Pgr**) are best exposed beneath caps of **Qm**. View is looking northeast from near UTM 454000, 3711000.

FIGURE 6—View looking south-southwest down Lincoln Canyon towards Priest canyon across Rio Bonito from approximately UTM 464000, 3708000. The lower half of the hills are composed of the folded Yeso Formation (**Py**), while the upper parts of the mesas are composed of the nearly flat-lying San Andres Formation (**Ps**). The snow-covered Sierra Blanca is in the distance.v

FIGURE 7—Tightly folded dolomite and siltstone beds are exposed along Lincoln Canyon.