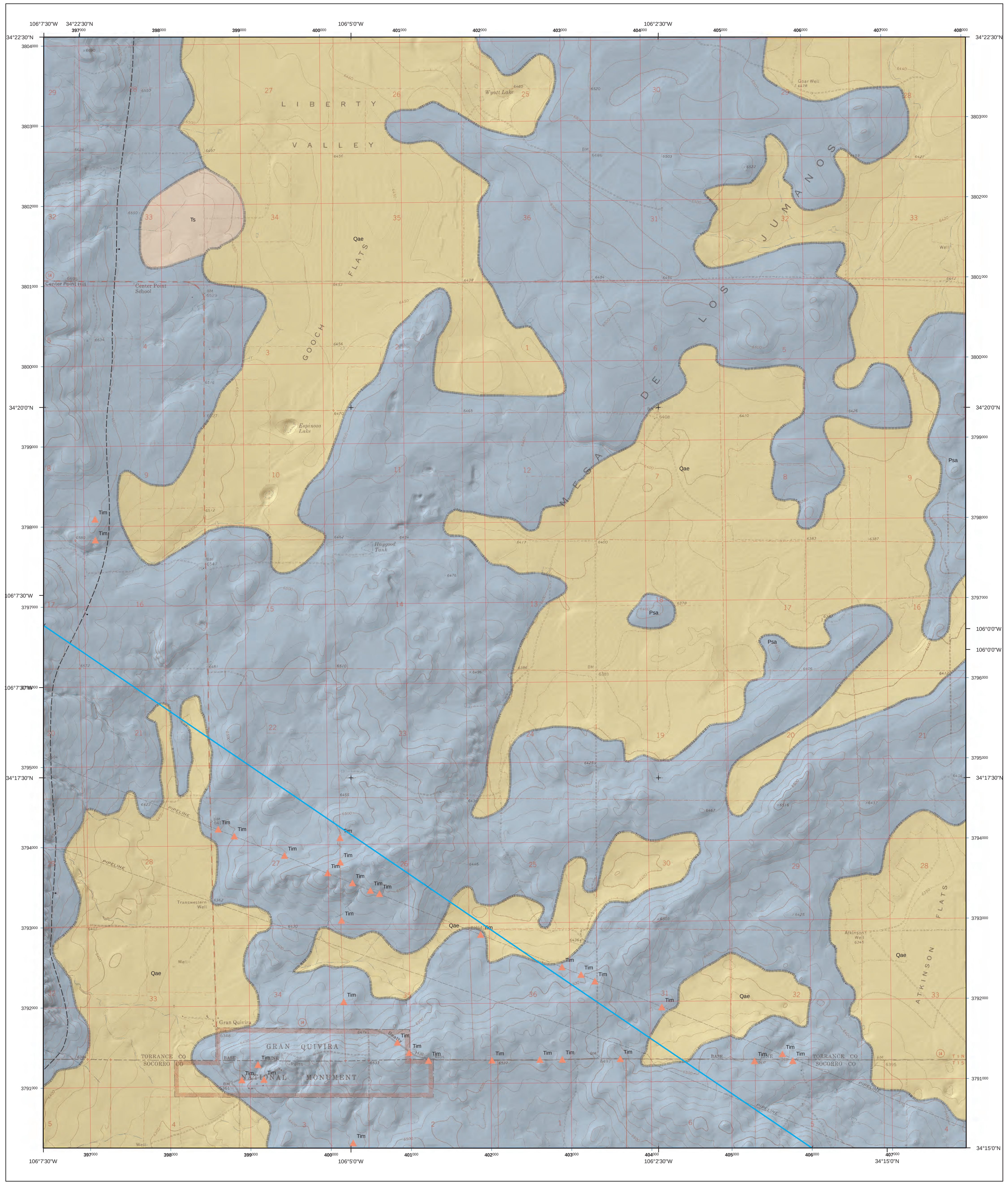
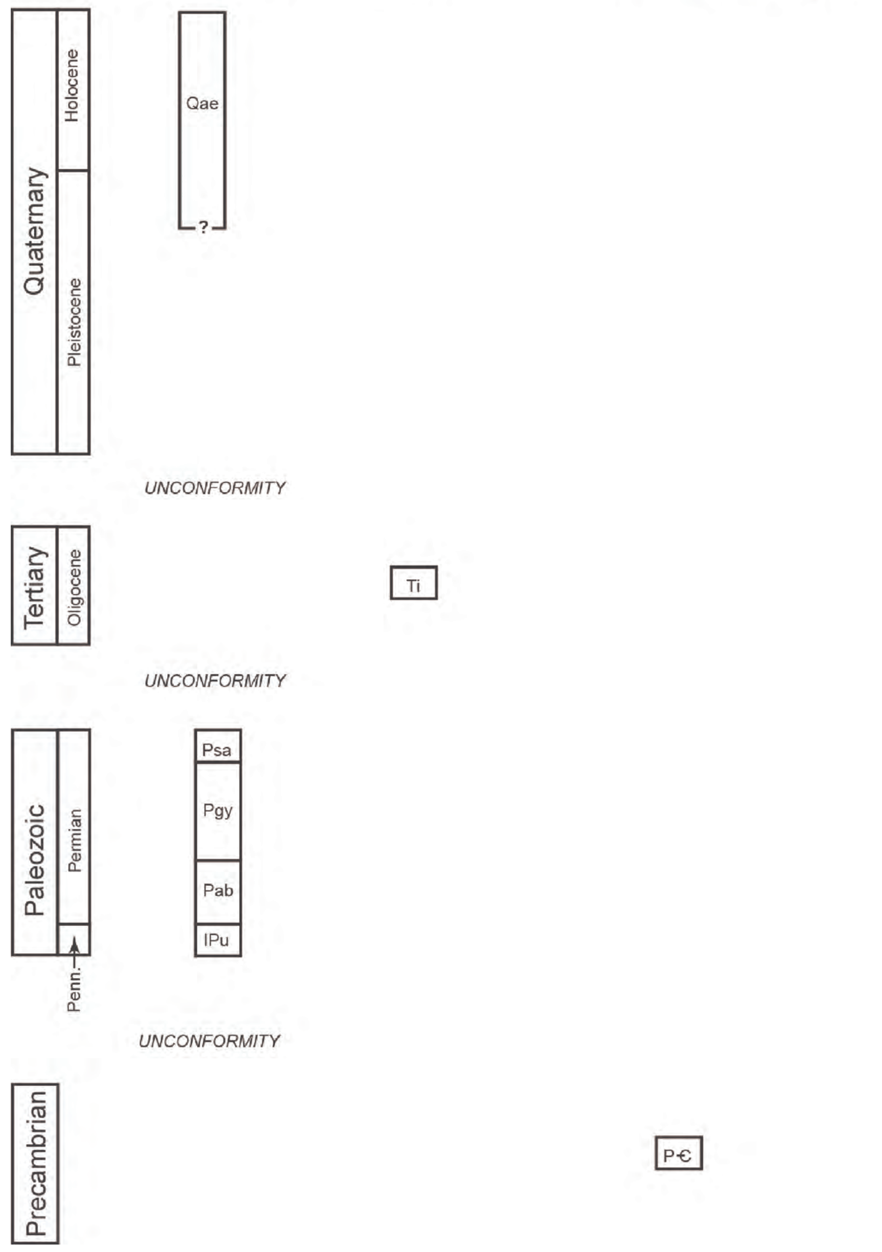


Base map from U.S. Geological Survey 1972, from photographs taken 1971, field checked in 1972.
1927 North American datum, UTM projection -- zone 13.
1000-meter Universal Transverse Mercator grid, zone 13, shown in red

CORRELATION OF UNITS



STRATIGRAPHY AND DESCRIPTION OF MAP UNITS

At the surface of the Gran Quivira quadrangle, the bedrock sedimentary units are Early Permian in age, and consist of limestone and gypsum of the Lower Permian San Andres Formation. Tertiary igneous rocks intrude the Permian rocks. Older stratigraphic units (Paleozoic and Precambrian) are shown on the cross section but are not exposed on the Gran Quivira quadrangle.

Cenozoic

Qae◎Stream alluvium and eolian sand (late Holocene to late Pleistocene) – poorly sorted, sandy to gravelly alluvium on valley bottoms, and eolian sand and silt in small dunes and mixed with alluvium and colluvium. Eolian deposits are present throughout the quadrangle, and these deposits, plus alluvium and colluvium, effectively cover the bedrock everywhere. Eolian sand in poorly developed longitudinal dunes appears on aerial photographs and satellite images as long streaks, having a southwest to northeast trend, but the longitudinal dunes are difficult to detect on the ground. Thickness is less than 30 ft (10 m).
◎◎
Ti◎Mafic dike rocks (Tertiary) – fine- to medium-grained basaltic andesite in poorly exposed dikes and sills that have intruded limestone and gypsum of the Permian Yeso Group and San Andres Formation. These dikes are Oligocene in age, and are part of the Magdalena radial dike swarm described by Chamberlin et al. (2009). Because the dikes intrude the Permian rocks and are poorly exposed, they are mapped on the Gran Quivira quadrangle with the San Andres Formation using the symbol Psa/Ti. Small exposures of Ti are marked on the geologic map with an X symbol. Thickness not determined.

Ts◎Gravel (Tertiary) – coarse-grained gravel, including well-rounded pebbles, cobbles, and boulders of rocks exotic to the Gran Quivira quadrangle; clast lithology includes: quartzite, chert, quartz, fine-grained volcanic rocks, and red, ripple-laminated sandstone similar to that from the Abo Formation. None of these rock types is presently exposed in the Gran Quivira quadrangle; the closest potential sources for most of the rocks is west of Chupadera Mesa, in the vicinity of Abo Pass and the Manzano and/or Los Pinos Mountains. Pebbles of these rock types are mixed with Quaternary deposits in low-lying areas in the northern 1/3 of the quadrangle. Thickness not determined.

Paleozoic

Psa◎San Andres Formation (Lower Permian or Leonardian) – gray marine limestone and interbedded gypsum. Thickness greater than 200 ft (60 m); neither the top nor the base of the formation is exposed in the Gran Quivira quadrangle.

[Paleozoic rocks not exposed at the surface on the Gran Quivira quadrangle, but shown on the cross section; thicknesses from exposures of these rocks west of the Gran Quivira quadrangle (Lucas et al., 2005; Scott et al., 2005; Krainer et al., 2009)]

Pgy◎Glorieta Sandstone and Yeso Group (Lower Permian or Leonardian) – sandstone, mudstone, gypsum, dolomite, limestone; Yeso Group consists of the Los Vallos and Arroyo de Alamillo Formations (Lucas et al., 2005). Thickness about 1100 ft (330) m.

Pab◎Abo and Bursum Formations (Lower Permian or Leonardian) – sandstone, mudstone, limestone. Thickness about 1100 ft (330 m).

IPu◎Pennsylvanian stratigraphic units, undifferentiated (Pennsylvanian) – limestone, mudstone. Thickness about 2100 ft (650 m).

Precambrian

PC◎Precambrian rock units, undifferentiated (Precambrian) – includes metamorphic rocks, such as quartzite, schist, and gneiss, and igneous rocks, such as granite, in the Manzano and Los Pinos Mountains to the west and northwest (Baer et al., 2003; Scott et al., 2005).

X◎Xs indicate small exposures of mafic intrusive rocks (Ti) in roadcuts, and along pipeline roads and fence lines (including approximate locations mapped by Bates et al., 1947).

EXPLANATION OF MAP SYMBOLS

Stratigraphic Units

Qae — Quaternary alluvial and eolian sediment

Ts — Tertiary gravel

Psa/Ti — Permian San Andres Formation intruded by Tertiary mafic igneous rock

X — small exposure of Tertiary mafic igneous dike rock

exposed, sub-horizontal, gradational geologic contact

obscured but probable fault; bar and ball on the downthrown side

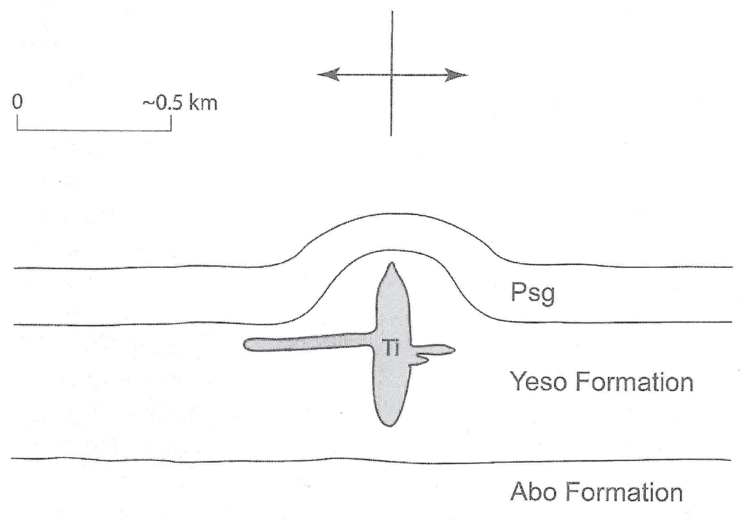
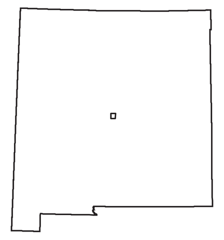


Figure 1. Modified from Cather (2009; Figure 7). Schematic cross section showing the relationship between dikes of the Tertiary intrusive igneous rocks (Ti) and the Permian sedimentary rocks in the Gran Quivira quadrangle. Psg = Permian San Andres and Glorieta Formations. The anticline symbol at the top of the diagram indicates that anticline structures were produced in the overlying sedimentary rocks; these anticline structures create elongate hills in the quadrangle; this includes the hill on which Gran Quivira pueblo and mission are built.

MESA DRAW	ROUND TOP	PROGRESSO
BIGBEE DRAW	Gran Quivira	PROGRESSO SW
TURKEY RIDGE	TURKEY RIDGE NE	CLAUNCH



Magnetic Declination
March, 2011
8º 55' East
At Map Center

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

Open-file Geologic Map **248**

QUADRANGLE LOCATION

This draft geologic map is preliminary and will undergo revision. It was produced from either scans of hand-drafted originals or from digitally drafted original maps and figures using a wide variety of software, and is currently in cartographic production. It is being distributed in this draft form as part of the bureau's Open-file map series (OFGM), due to high demand for current geologic map data in these areas where STATEMAP quadrangles are located, and it is the bureau's policy to disseminate geologic data to the public as soon as possible.

After this map has undergone scientific peer review, editing, and final cartographic production adhering to bureau map standards, it will be released in our Geologic Map (GM) series. This final version will receive a new GM number and will supercede this preliminary open-file geologic map.

DRAFT

Mapping of this quadrangle was funded by a matching-funds grant from the STATEMAP program of the National Cooperative Geologic Mapping Act, administered by the U. S. Geological Survey, and by the New Mexico Bureau of Geology and Mineral Resources, (Dr. Peter A. Scholle, *Director and State Geologist*, Dr. J. Michael Timmons, *Geologic Mapping Program Manager*).

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This and other STATEMAP quadrangles are (or soon will be) available for free download in both PDF and ArcGIS formats at:

http://geoinfo.nmt.edu/publications/maps/geologic/ofgm/home.html

Colored Relief map of the Gran Quivira quadrangle, Socorro County, New Mexico

June 2011

by
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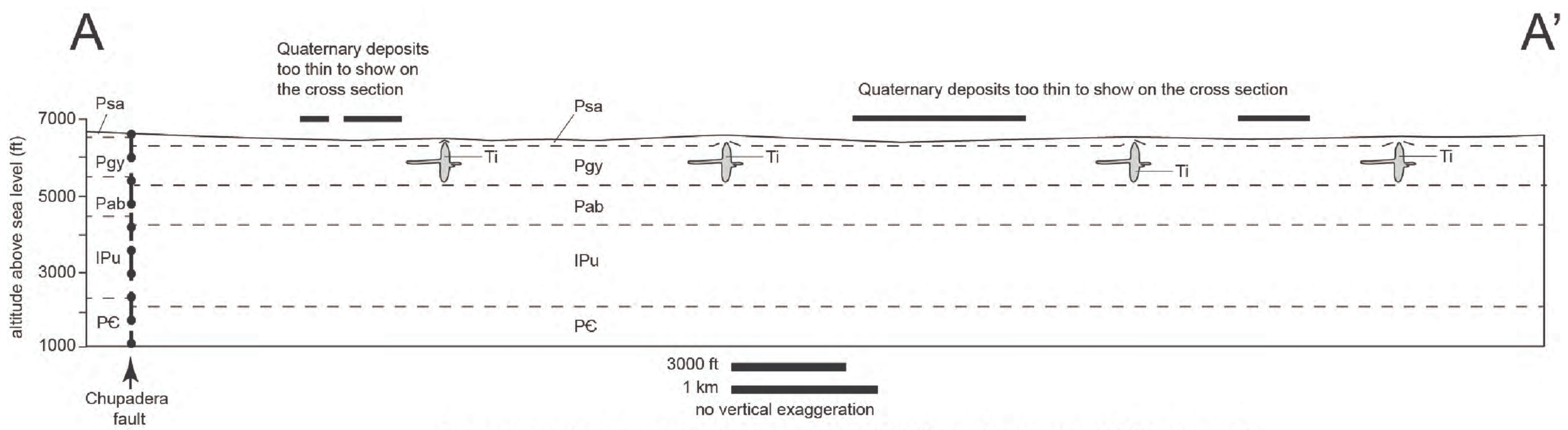
COMMENTS TO MAP USERS

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.



diagramatic shape and relative placement of Ti dikes after Cather (2009, Figure 7)