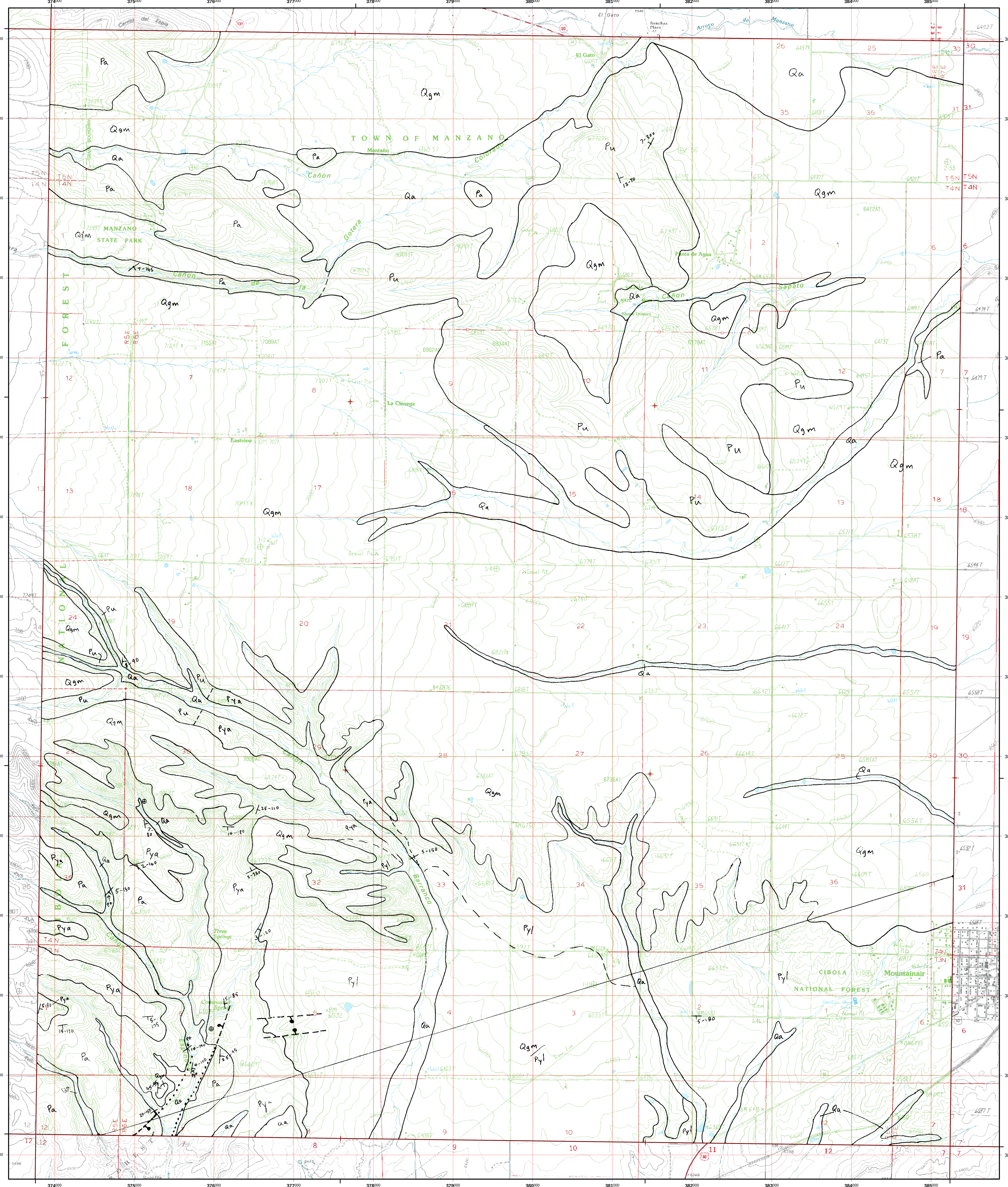
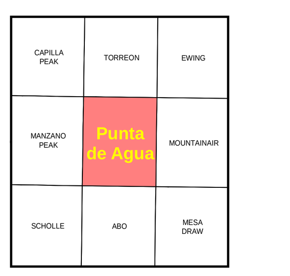
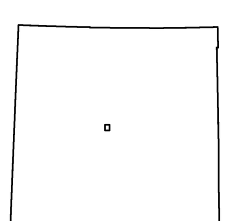
NMBGMR Open-file Geologic Map 220
Last Modified 24 June, 2011

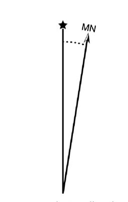


Base map from U.S. Geological Survey 1986, from photographs taken 1980, field checked in 1982, edited in 1986.
1927 North American datum, UTM projection -- zone 13N
1000-meter Universal Transverse Mercator grid, zone 13, shown in red

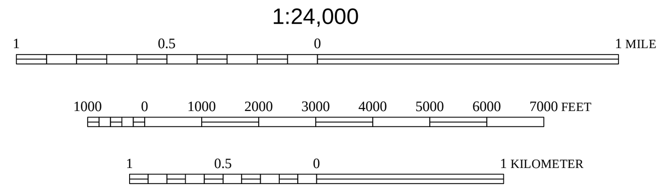




QUADRANGLE LOCATION



1:24,000



CONTOUR INTERVAL 20 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

New Mexico Bureau of Geology and Mineral Resources
Open-file Geologic Map 220

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

Geologic map of the Punta De Agua quadrangle, Torrance County, New Mexico

June 2011

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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.

STRUCTURAL GEOLOGY

Rocks in the Punta de Agua quadrangle are flat-lying to gently dipping. In the southwestern quarter of the quadrangle, some dips are as great as 45° in fault zones, but dips flatten to nearly horizontal in the rest of the map area. Anomalous dips of some dolomite, limestone, and sandstone outcrops of the Los Vallos Formation are caused by local collapse related to subsurface gypsum dissolution. Gentle dips to the southeast of less than 5° are common in most of the quadrangle.

Two faults are mapped in the southwestern corner of the quadrangle; their sense of displacement is inferred from the relative ages of rocks displaced by them. The dip of one of the faults can be seen in exposures at Cottonwood Spring (approximately 376200 E, 3819900 N); at this locality, the fault zone dips to the east, and the sense of motion on the fault seems to be dip slip, with the hanging wall up relative to the footwall. The other fault is not well exposed in the quadrangle so its kinematics have not been determined. It is shown as a vertical fault on the cross section. Estimated total displacement along each of these faults ranges from negligible to greater than 200 ft (60 m).

Machette (1978) and Machette and McGimsey (1983) have mapped a Quaternary fault zone across the Punta de Agua quadrangle from southwest to northeast cutting Quaternary gravel (Qgm), however, I have not observed scarps in the Qgm surface. Observations that could be interpreted as evidence for a fault zone in the bedrock along the trace mapped by Machette and McGimsey (1983) come from a topographic gap between surfaces capped by Qgm near the common corner of sections 29, 30, 31, and 32, township 4 north, range 6 east (near 376500 E, 3822300 N). In this area, the bedrock, which consists of sandstone of the Arroyo de Alamillo Formation, dips about 25° to the east, a dipthat is greater than the general dip of rocks in this area, and which could indicate that the rocks are in or near a fault zone. Several low hills in Qgm gravel in sections 9 and 16, T 4 N, R 6 E (378000 to 380000 E, 3825000 to 3828000 N) could be interpreted as up-thrown blocks on the east side of a northeast-striking fault zone, but the hills could be interpreted in alternative ways that are equally probable (e.g., differential erosion of underlying bedrock prior to gravel deposition at different levels). Considering these observations and interpretations, I have not shown a Quaternary fault on the Punta de Agua quadrangle along the trace proposed by Machette and McGimsey (1983). Although it is possible the bedrock units are deformed in a pre-Quaternary fault zone, subsurface investigations would be required to determine this.

STRATIGRAPHY AND DESCRIPTION OF MAP UNITS

In the Punta de Agua quadrangle, exposed bedrock sedimentary units are Early Permian in age, and consist of sandstone, mudstone, siltstone, limestone and dolomite, and gypsum. Stratigraphic units, in order of decreasing age, are the Abo Formation, and the Yeso Group, which includes the Arroyo de Alamillo and Los Vallos Formations. Most sandstones in the Abo and Yeso are red to orange, and these colors dominate roadcuts, natural exposures, and the younger alluvium derived from these rocks.

Cenozoic

Qa Stream alluvium (late Holocene to late Pleistocene) – poorly sorted, sandy to gravelly alluvium along valley bottoms; includes deposits underlying low stream terraces along some of the major drainages. Most Qa sediments are reddish in color. Thickness is less than 30 ft (10 m) in most places.

Qgm Gravel derived from Manzano Mountains sources (Pleistocene) – poorly sorted alluvial gravel, including clasts ranging in size from small pebbles to large boulders. Clasts include metamorphic crystalline rocks (Precambrian gneiss, schist, quartzite) exposed in the Manzano Mountains to the west, and sedimentary rocks of Pennsylvanian and Early Permian age (limestone eroded from Pennsylvanian formations and from the Permian Bursum Formation; sandstone from the Permian Abo Formation). Broad surfaces capped by Qgm slope to the east and southeast and overlie rocks of the Abo Formation and Yeso Group. The surfaces mapped as Qgm have a wind-blown silt (loess) cap that may be a meter or more thick. Thickness of Qgm is less than 30 ft (10 m) in most places.

Paleozoic

Pyl Los Vallos Formation, Yeso Group (Lower Permian or Leonardian) – reddish sandstone and mudstone, gray dolomite and limestone, and gypsum. The basal contact of Pyl is marked by a widespread 2-m thick gray dolomite or limestone unit, which is locally well exposed in the southwestern quarter of the Punta de Agua quadrangle. Members of the Los Vallos Formation, the Torres, Cañas, and Joyita Members (Lucas et al., 2005), are not discriminated on the Punta de Agua quadrangle because the contacts are poorly exposed. Thickness about 750 ft (230) m. Some areas mapped as Permian bedrock (Pyl, Pya, Pa, Pu) include small areas of Quaternary alluvium (Qa) and/or Quaternary gravel (Qgm).

Pya Arroyo de Alamillo Formation, Yeso Group (Lower Permian or Leonardian) – dominated by orange to reddish sandstone and minor mudstone; includes some yellowish to pinkish white sandstones near the top of the unit. The Arroyo de Alamillo Formation was previously mapped in this area as the Meseta Blanca Formation (Myers, 1977), but has been redefined and renamed by Lucas et al. (2005). A good description of the contrast between sandstones of the Arroyo de Alamillo Formation and those of the Abo Formation is given by Lueth et al. (2009, p. 89): "The differences between the Abo and the [Arroyo de Alamillo] are obvious. The orange color of the [Arroyo de Alamillo] contrasts sharply with the red Abo. The [Arroyo de Alamillo] contains a larger percentage of sandstone than the Abo, and [Arroyo de Alamillo] sandstones are slightly coarser-grained and have a greater lateral uniformity of thickness. Abo sandstones have basal stratigraphic relief and fill scours, whereas [Arroyo de Alamillo] sandstones have constructional, dune-shaped relief on upper bedding surfaces. Planar laminations and small-scale cross laminations are abundant in the [Arroyo de Alamillo]. Many bedding surfaces are rippled, and some bear tracks and trails. Interference ripples are common. A shallow marine to beach environment is suggested for the [Arroyo de Alamillo]." Thickness about 210 ft (60 m). Some areas mapped as Permian bedrock (Pyl, Pya, Pa, Pu) include small areas of Quaternary alluvium (Qa) and/or Quaternary gravel (Qgm).

Pa Abo Formation (Lower Permian or Wolfcampian) – red sandstone and mudstone; the upper member (Cañon de Espinoso Member of Lucas et al., 2005) is mudstone dominated, but contains sheet-like sandstone bodies that are ripple- and climbing-ripple laminated. White reduction spots, 1-3 cm in diameter, which are almost perfectly circular in cross section, are abundant in some of the red sandstone beds of the Abo. The Cañon de Espinoso Member is exposed in the Punta de Agua quadrangle. Thickness about 1000 ft (300 m) (Lucas et al., 2005). Some areas mapped as Permian bedrock (Pyl, Pya, Pa, Pu) include small areas of Quaternary alluvium (Qa) and/or Quaternary gravel (Qgm).

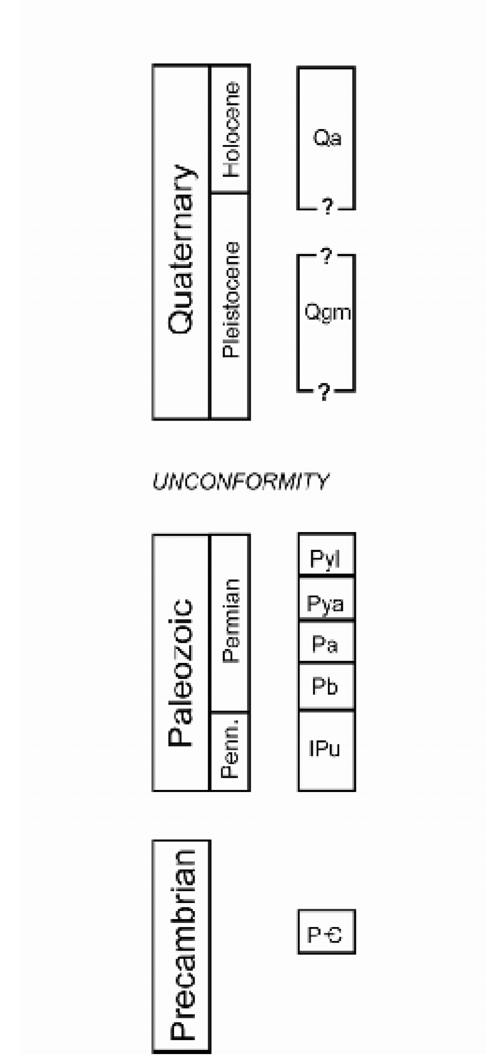
Pu Arroyo de Alamillo and Abo Formations, undifferentiated (Lower Permian or Wolfcampian) – red sandstones of the two formations where they cannot be separated easily on the ground, including in areas where exposures are not good, and in steep-walled canyons where the units cannot be easily separated at a scale of 1:24,000. Some areas mapped as Permian bedrock (Pyl, Pya, Pa, Pu) include small areas of Quaternary alluvium (Qa) and/or Quaternary gravel (Qgm).

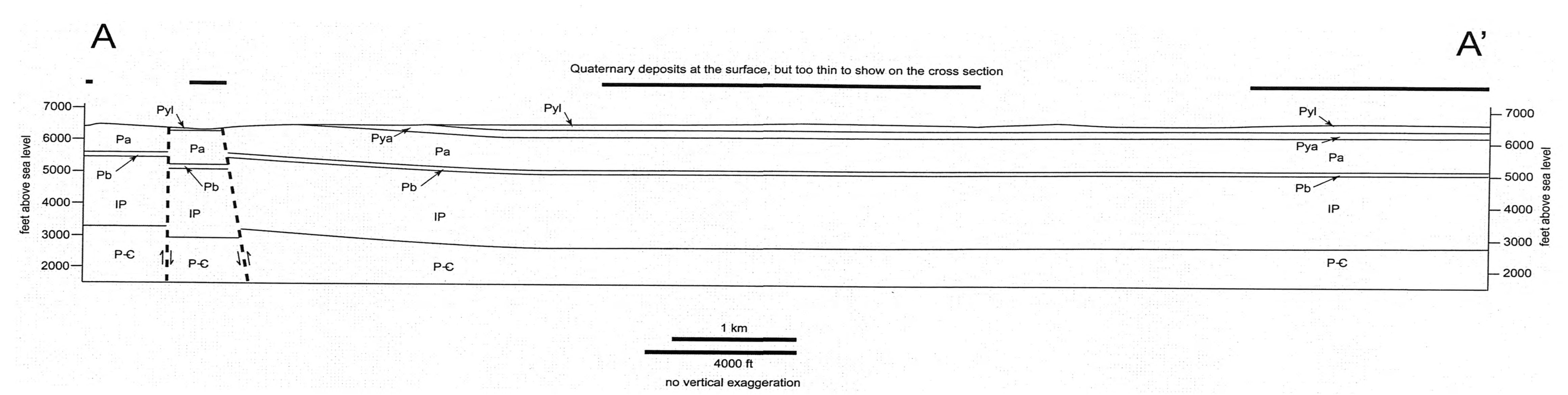
Pb Bursum Formation (Lower Permian or Wolfcampian) – not exposed in the Punta de Agua quadrangle; shown on the cross section. In the neighboring Scholle quadrangle the Bursum Formation contains limestones and shales (Scott et al., 2005). Thickness about 115 ft (35 m) (Krainer et al., 2009).

IPu Pennsylvanian stratigraphic units, undifferentiated (Pennsylvanian) – not exposed in the Punta de Agua quadrangle; shown on the cross section. Rocks include limestone, sandstone, siltstone, and mudstone Scott et al. (2005). Total thickness of Pennsylvanian rocks about 2100 ft (650 m).

PC Precambrian rock units, undifferentiated (Precambrian) – not exposed in the Punta de Agua quadrangle; shown on the cross section. Rocks include metamorphic rocks, such as quartzite, schist, and gneiss, and igneous rocks, such as granite (Baer et al., 2003; Scott et al., 2005).

CORRELATION OF UNITS





ACKNOWLEDGEMENTS

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