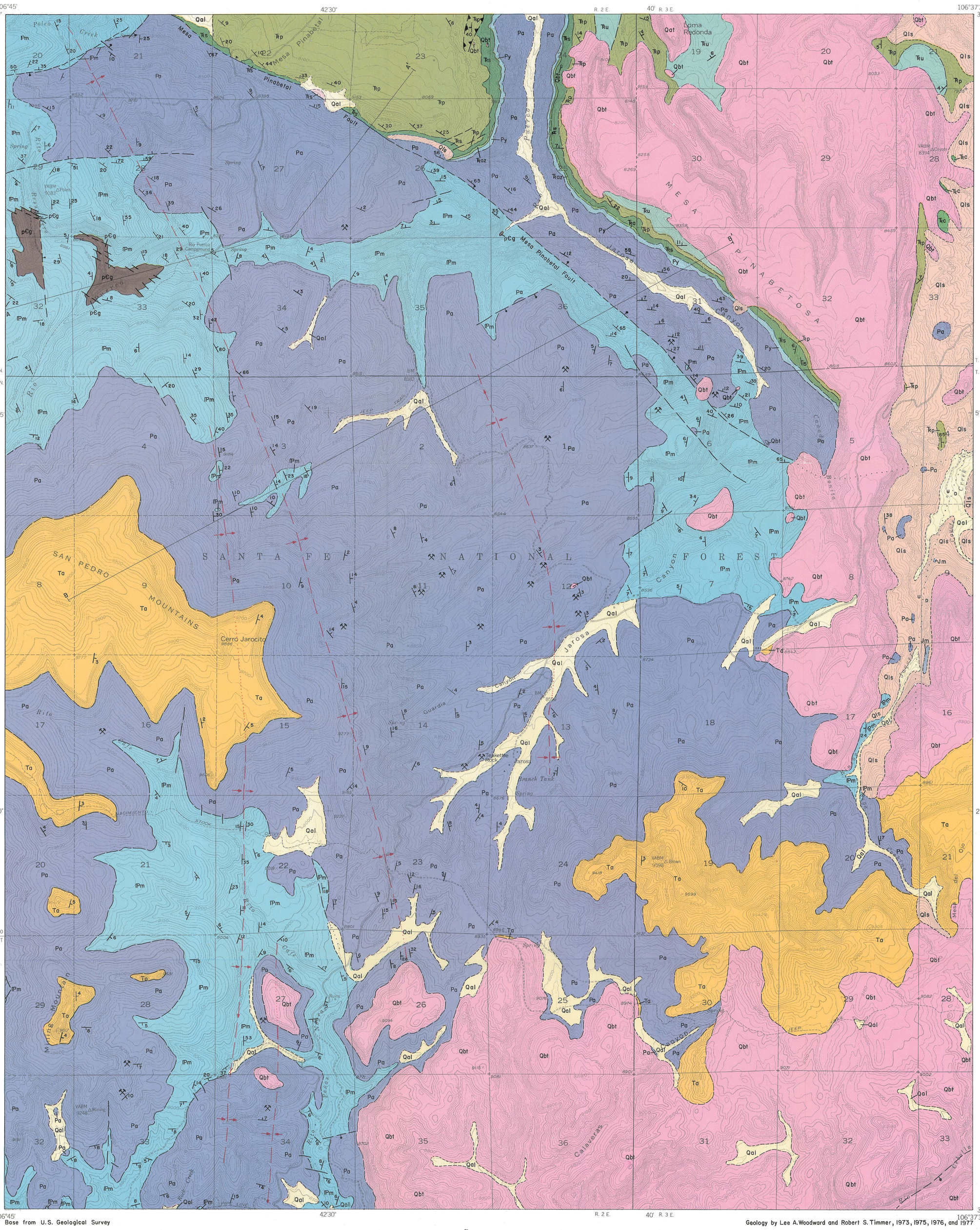


CORRELATION OF UNITS

Qal, Qls	Holocene & Pleistocene	QUATERNARY
Qbt	Pleistocene	
Ta	Miocene	TERTIARY
Jm	U. Jurassic	JURASSIC
Ru, Rp, Rs, Raz (Rc)	U. Triassic	TRIASSIC
Py	L. Permian	PERMIAN
Pa		
IPm	U. & M. Pennsylvanian	PENNSYLVANIAN
p€g	Precambrian Y(?) or X(?)	PRECAMBRIAN

DESCRIPTION OF UNITS

Qal Alluvium — *Clay, silt, sand, and gravel; includes minor colluvium; 0 to 25(?) ft thick*

Qls Landslide deposits — *Mostly large, angular blocks derived from the Bandelier Tuff; 0 to 50 ft thick*

Qbt Bandelier Tuff — *Nonwelded to densely welded ash-flow deposits consisting of rhyolite and pumice; contains quartz, sanidine, and sparse to abundant inclusions of hornblende-rich quartz-latite pumice and lithic fragments; 0 to 600 ft thick*

Ta Abiquiu Formation — *Lower member: sandstone, conglomeratic sandstone, tuffaceous sandstone, conglomerate, and minor dense tan-gray limestone; 0 to 300 ft thick. Pedernal Chert Member: white to bluish-gray chert with local red, yellow, and brown mottling; minor local cherty limestone; 0 to 20 ft thick. Upper member: slope-forming, gray, thin-bedded limestone and volcaniclastics; 0 to 110 ft thick*

Jm Morrison Formation — *Three members in ascending order: brownish-maroon siltstone and very fine grained sandstone with light-gray sandstone and maroon shale; brick-red and pale-green mudstone and gray to yellowish-buff sandstone with minor nodular limestone; white to tan sandstone, locally conglomeratic, kaolinitic near the top, with minor green and red shale interbeds; thickness about 900 ft in adjacent areas, complete section not exposed in this quadrangle*

Ru Upper Shale member — *Red shale with interbedded reddish-brown and gray, thin-bedded, fine- to coarse-grained sandstone; thickness about 600 ft in adjacent areas, only lower 200 ft exposed in this quadrangle*

Rp Poleo Sandstone Member — *Yellow-brown to olive-gray, fine- to coarse-grained, micaceous sandstone with pebble conglomerate near the base; thickness 80 to 120 ft*

Rs Salitral Shale Member — *Dark-red-brown and maroon shale; thickness 60 to 180 ft*

Raz Agua Zarca Sandstone Member — *White to buff, medium- to very coarse grained, quartzose sandstone and pebble conglomerate; thickness 0 to 40 ft*

Rc — Chinle Formation — *undivided*

Py Yeso Formation — *Tan-brown and orange-buff, even-bedded, fine-grained to very fine grained sandstone; thickness 60 to 80 ft*

Pa Abo Formation — *Reddish-brown mudstone and lenticular sandstone and arkose; minor conglomerate with metaquartzite pebbles; locally light-gray sandstone, arkose, and minor nodular limestone; thickness about 950 ft*

IPm Madera Formation — *Light-gray commonly fossiliferous limestone; gray to buff orthoquartzite; pink arkose; reddish and minor gray shale; arkosic limestone; thickness about 700 ft*

p€g Muscovite-biotite granite — *Pink and reddish-orange, medium-grained granite composed of microcline, quartz, sodic plagioclase, muscovite, and biotite; weakly porphyritic with pink microcline megacrysts*

Bedrock contacts, dashed where approximate

Contacts of surficial deposits

High-angle fault, dashed where approximate, dotted where concealed; U, up; D, down; ball and bar on downthrown side

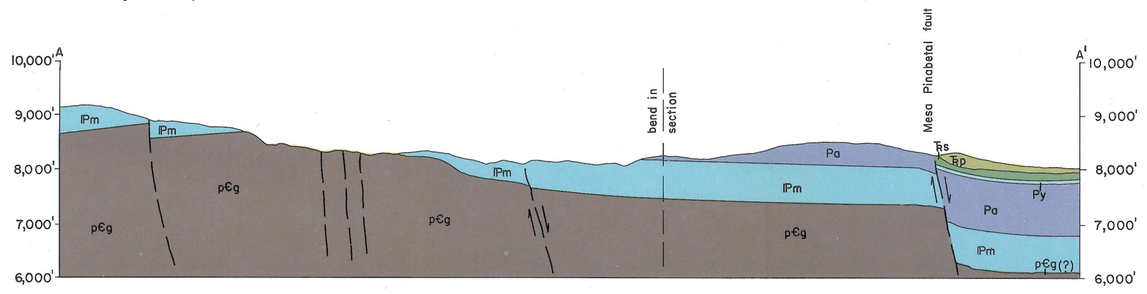
Gravity slide fault, barbs on upper plate, dashed where approximate

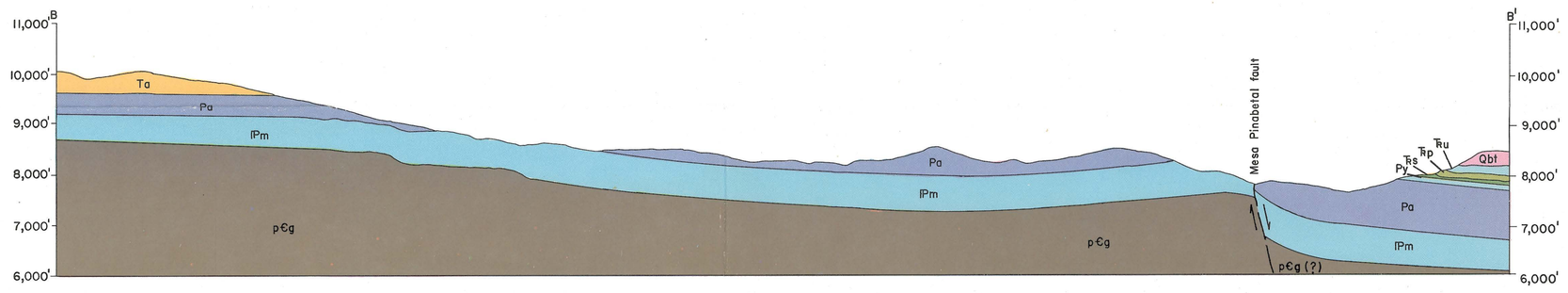
Syncline, showing plunge, dashed where approximate, dotted where concealed

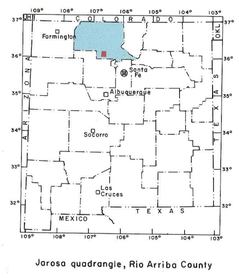
Monocline, showing plunge, dashed where approximate, dotted where concealed

15 *Strike and dip of bedding*

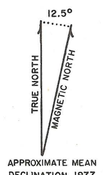
Prospect with copper mineralization







Jarosa quadrangle, Rio Arriba County



APPROXIMATE MEAN DECLINATION 1977

Base from U.S. Geological Survey

Geology by Lee A. Woodward and Robert S. Timmer, 1973, 1975, 1976, and 1977

GEOLOGY OF JAROSA QUADRANGLE, NEW MEXICO

by Lee A. Woodward and Robert S. Timmer, 1979

Scale 1:24,000 Contour interval 20ft

1 0 1 mi

1 0 1 km

PREVIOUS AND PRESENT WORK

A reconnaissance map of the Nacimiento Mountains and adjacent areas by Wood and Northrop (1946) included this quadrangle. Smith and others (1970) included the southern and eastern parts of the quadrangle in a map concerned principally with the Cenozoic volcanic rocks but generalized for the earlier rocks. Acosta (1973) mapped the northern part of the quadrangle.

Responsibility for mapping this quadrangle is shown on fig. 1. The mapping by Timmer was part of an M.S. thesis (1976) under the supervision of Woodward.

ROCK UNITS

No radiometric ages have been reported for Precambrian rocks in this quadrangle. However, Brookins (1974) reported ages of 1,800±50 m.y. and 1,840±170 m.y. for metamorphic rocks in the Nacimiento Mountains to the west. The granite (p€g) exposed in this quadrangle is probably correlative with granite exposed in the quadrangle to the west where the granite appears to be younger than the dated metamorphic rocks. Thus, the granite is assigned to Precambrian X(?) or Y(?) time (the age boundary between X and Y intervals is 1,600 m.y.).

The lowest unit of the Chinle Formation (Triassic), the Agua Zarca Sandstone Member, is locally absent, and the overlying Salitral Shale Member rests directly on the underlying Yeso Formation (Permian).

A complete section of the Morrison Formation (Jurassic) is not exposed in this quadrangle; limited exposures of the Morrison in the central-eastern part of the quadrangle are probably the middle and upper parts of the formation.

Smith (1938) named the Abiquiu Tuff for exposures about 15 mi northeast of the Jarosa quadrangle; this unit is referred to as the Abiquiu Formation here because tuff is a subordinate lithology. The lowest member is composed mostly of gravel and coarse-grained, arkosic sand, or where cemented, conglomerate and sandstone; this member is locally present beneath the Bandelier Tuff on Mesa Pinabetosa but is too thin to be shown on the map. The Pedernal Chert Member is absent at Mining Mountain where the upper member rests directly on the lower member of the Abiquiu. The upper member, consisting mainly of limestone and volcaniclastic rocks, is present at Cerro Jarocito, Mining Mountain, and VABM Brown (sec. 19, T. 21 N., R. 3 E.).

We mapped the Bandelier Tuff (Qbt) as one unit, although Smith and others (1970) have distinguished two members.

STRUCTURE

The Jarosa quadrangle is located at the junction of three major tectonic features: the Nacimiento uplift, the Chama Basin, and the Jemez volcanic field (fig. 2). Boundaries between these major elements are gradational and may overlap. The Nacimiento uplift trends north and is about 50 mi long and 6-10 mi wide; it grades into the Chama Basin to the northeast through a broad slope dipping toward the northeast. In the Jarosa quadrangle the boundary between the uplift and basin is interpreted to be the Mesa Pinabetal fault. Outcrops of the Bandelier Tuff mark the northwestern erosional edge of the Jemez volcanic field.

The Mesa Pinabetal fault surface is not exposed, but it is presumed to dip steeply to the northeast. This fault has about 1,000 ft of stratigraphic separation, down to the northeast; movement occurred prior to deposition of the Bandelier Tuff (Quaternary) and is probably late Tertiary.

Two northerly to northwesterly trending, east-facing monoclines are present in the western part of the quadrangle. These folds appear to have formed prior to deposition of the Abiquiu Formation and are probably of early Tertiary age.

A broad, shallow syncline in the central part of the quadrangle is seen in the Abo Formation. This fold is probably of early Tertiary age also, but no stratigraphic evidence for the age of folding is present here.

ECONOMIC GEOLOGY

Twenty small copper prospects and occurrences, mostly in the Abo Formation (Permian), were noted in the Jarosa quadrangle. These prospects consist of copper sulfides that have replaced carbonaceous material and are surrounded by halos of copper carbonates. The mineralized strata are gray arkose, and they are enveloped in reddish-brown, non-mineralized arkose, sandstone, and shale. Timmer (1976) observed that fresh biotite from non-mineralized arkose contains 308-3,260 ppm (parts per million) copper, and he suggested that oxidation of biotite may release copper to ground water with deposition of the metal near the carbonaceous material. Detailed descriptions of the copper occurrences are given by Timmer (1976).

Chenoweth (1974) reported several minor uranium occurrences in the Abo Formation in the Jarosa quadrangle. We did not observe any uranium minerals in this quadrangle.

ACKNOWLEDGMENTS —Field work was supported mainly by the New Mexico Bureau of Mines and Mineral Resources and partly by the U.S. Geological Survey, Department of the Interior, under USGS Grants 14-08-0001-G-255 and 14-08-0001-G-348.

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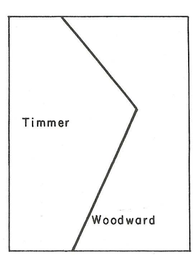

FIGURE 1–Mapping responsibilities

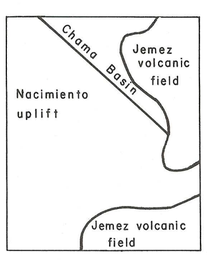

FIGURE 2–Major tectonic features of Jarosa quadrangle