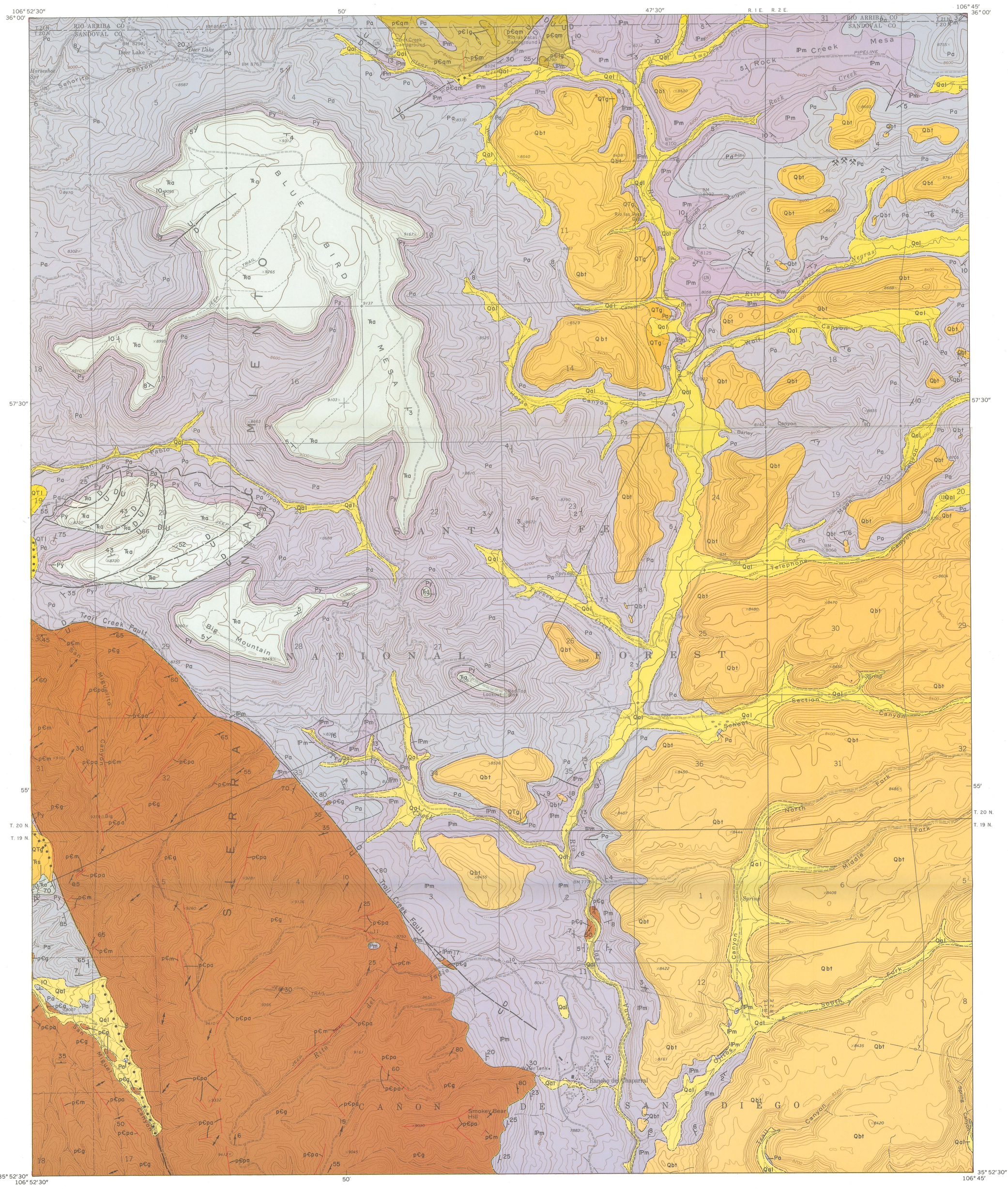


EXPLANATION

QUATERNARY

Qal — Alluvium
Clay, silt, sand, and gravel, mostly along valleys, some colluvium; 0 to 30(?) feet thick

Qbt — Bandelier Tuff
Nonwelded to densely welded ash-flow deposits of rhyolite and pumice; quartz, sanidine, and sparse to abundant inclusions of hornblende-rich, quartz-latite pumice and lithic fragments; up to 600 feet thick.

QTl — Lag deposits
Mostly large blocks of Agua Zarca sandstone let down by erosion of underlying units; up to 40 feet thick.

TERTIARY

QTg — Gravel
Terrace, pediment, and stream gravel with boulders mostly of Precambrian crystalline rocks; 0 to 30(?) feet thick.

TRIASSIC

Trs — Salitral Shale Member of Chinle Formation
Maroon shale with subordinate green shale; only lower 30 feet present.

Tra — Agua Zarca Member of Chinle Formation
White to light-buff, very thick-bedded, coarse-grained quartzose sandstone; conglomerate; and conglomeratic quartzite; 80 to 120 feet thick.

PERMIAN

Py — Yeso Formation
Tan-brown and orange-buff, even-bedded, fine- to very fine-grained sandstone; 60 to 200 feet thick.

Pa — Abo Formation
Reddish-brown mudstone and lenticular sandstone and arkose; locally light-gray sandstone, arkose, and minor limestone; 450 to 800 feet thick.

PENNSYLVANIAN

IPm — Madera Formation
Light-gray, commonly fossiliferous, limestone; white to buff orthoquartzite; arkose; reddish to light-gray shale; arkosic limestone; 0 to 400(?) feet thick.

PRECAMBRIAN

p€pa — Pegmatite and aplite dikes
Dikes up to 15 feet wide, mainly pink alkali feldspar and quartz.

p€m — Mafic dikes
Discontinuous, up to 15 feet wide, fine-grained hornblende, biotite, and feldspar, commonly altered to chlorite and apidote.

p€lg — Leucogranite
Fine-grained, pink leucogranite mainly microcline-microperthite with subordinate quartz and sericitized plagioclase.

p€qm — Quartz monzonite
Porphyritic biotite quartz monzonite, coarse-grained pink microcline phenocrysts in medium- to coarse-grained matrix.

p€g — Gneiss
Moderately to intensely foliated, fine- to medium-grained, gray to pink, quartz-feldspar gneiss, minor biotite.

Contact of surficial deposit

Bedrock contact
Dashed where approximate

Fault
Dashed where approximate, dotted where concealed; U up ; D down

20 — Strike and dip of bedding

40 — Strike and dip of schistosity or foliation

Strike of vertical schistosity or foliation

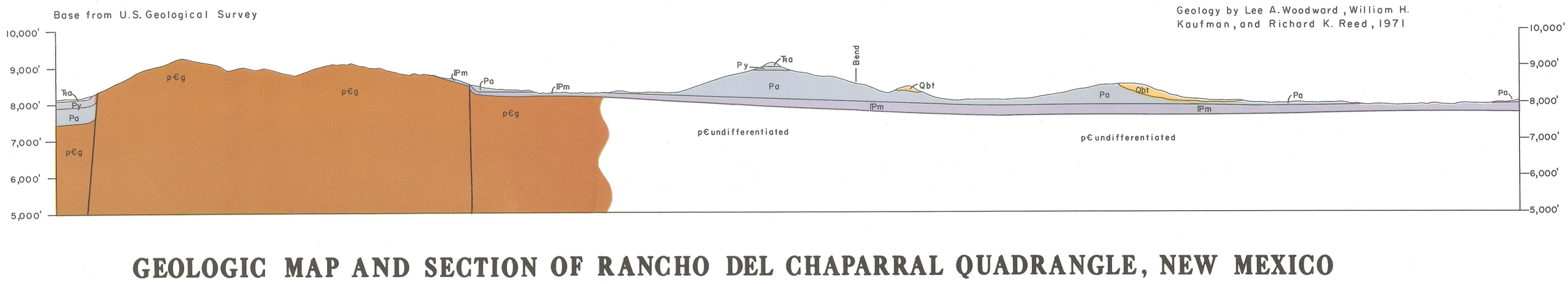
30 — Bearing and plunge of lineation

Bearing of horizontal lineation

Mine or prospect

Base from U.S. Geological Survey

Geology by Lee A. Woodward, William H. Kaufman, and Richard K. Reed, 1971



GEOLOGIC MAP AND SECTION OF RANCHO DEL CHAPARRAL QUADRANGLE, NEW MEXICO

by Lee A. Woodward et al.

0 1 2 Miles

PREVIOUS WORK

The reconnaissance geologic map of the Nacimiento Mountains by Wood and Northrop (1946) included the Rancho del Chaparral quadrangle. A map at 1:125,000 scale by Smith, Ross, and Bailey (1970) included the eastern part of the quadrangle; their map is concerned mainly with the volcanic rocks of the Jemez Mountains and is generalized for the Precambrian, Paleozoic, and Mesozoic rocks.

STRATIGRAPHY

How the Precambrian gneiss relates in age to the quartz monzonite is not known. The gneiss may be a sheared and recrystallized segment of the quartz monzonite, or the gneiss may have formed prior to emplacement of the quartz monzonite. The leucogranite and the dike rocks are younger than the quartz monzonite and the gneiss, but how these younger units relate to one another is not known.

The Madera Formation (Pennsylvanian), the oldest Paleozoic unit, is absent in the northwestern part of the quadrangle where the Abo Formation (Permian) rests directly on the Precambrian surface. Mesozoic strata include only the lower part of the Chinle Formation (Triassic); the lower members of the Chinle, the Agua Zarca Sandstone Member, and the basal part of the Salitral Shale Member are present in the western part of the quadrangle.

Thin gravel deposits are present locally beneath the Bandelier Tuff near Rio de las Vacas. At many localities these deposits are too limited to be shown on the map. In the western part of the quadrangle, a pediment is capped by a similar deposit of gravel. Lag deposits consist of large blocks of Agua Zarca sandstone let down during erosion of the underlying softer units.

Bandelier Tuff lies unconformably on the Paleozoic strata and, locally, on Tertiary-Quaternary gravel near Rio de las Vacas. The Bandelier Tuff was mapped as one unit although Smith and others (1970) divided it into two members.

STRUCTURE

Precambrian Deformation

The oldest episodes of deformation in this quadrangle are the emplacement of the quartz monzonite and the synkinematic metamorphism of the gneiss. If the gneiss is metamorphosed quartz monzonite, then the emplacement of the quartz monzonite occurred earlier. On the other hand, the gneiss could have been formed during regional metamorphism prior to emplacement of the quartz monzonite. The critical contact between these two crystalline units is not exposed. Radiometric dates are needed to resolve this question. Dikes were emplaced by dilation in the gneiss and the quartz monzonite.

Paleozoic Deformation

In the northwestern part of the quadrangle the Madera Formation (Pennsylvanian) is absent and Permian rocks lie directly on Precambrian rocks. Isopach maps by Wood and Northrop (1946) show that the Nacimiento area was mostly a positive structural element during Pennsylvanian time. The Permian strata are also thinner here than in adjacent areas, indicating that this positive element continued.

Cenozoic Deformation

This quadrangle covers the central part of the north-trending Nacimiento uplift which is about 50 miles long and 6-10 miles wide. Uplift began in early Tertiary and probably continued into middle Tertiary. The eastern part of the uplift is unconformably overlain by the Bandelier Tuff (Quaternary) derived from the Jemez volcanic center to the east (Smith and others, 1970).

The principal structural feature in this quadrangle is the northwest-trending Blue Bird Mesa sag (Baltz, 1967) which cuts obliquely across the Nacimiento uplift. This sag was formed by differential uplift of the several segments comprising the uplift. The northern margin of the sag is marked by Precambrian quartz monzonite exposures; the southwestern margin, by the Trail Creek fault.

The high-angle faults along the northern edge of the Blue Bird Mesa sag have small displacement, a few hundred feet at the most. The Trail Creek fault, however, has up to 1,000 feet of stratigraphic separation at its northern end; displacement dies out to the southeast along this fault.

The arcuate faults that cut the Triassic rocks north of the Trail Creek fault appear to be curved slip surfaces along which the blocks slid downhill. Sliding occurred as San Pablo Creek was incised into the Abo Formation (Permian) and these weak mudstones developed slip surfaces. Rotation of the blocks occurred because of movement along curved fault surfaces and because of apparent flowage of the underlying Abo mudstones.

ECONOMIC GEOLOGY

Several small copper prospects were noted in the northeastern part of the quadrangle. The copper occurs as sulfides associated with carbonaceous fossil wood in the Abo Formation (Permian). Malachite and chrysocolla occur adjacent to the sulfides in interstices of the sandstone. These prospects do not appear to be significant commercially; however, larger stratiform copper deposits may occur in the Abo. Copper mineralization in Abo float along Trail Creek, in the southern part of the quadrangle, was also observed. Geochemical study of stream waters and sediments may provide more detailed exploration targets.

GROUND WATER

Many of the smaller, gravel-filled valleys that head in the high area of Precambrian rock in the southwestern part of the quadrangle are potential sources of shallow ground water. The loose ash that is locally present at the base of the Bandelier Tuff is an aquifer yielding small amounts of water. This horizon is commonly marked at the outcrop by small springs and seeps.

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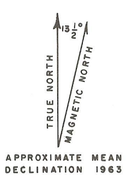

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