

Geologic Map of the Ranchos de Taos Quadrangle, Taos County, New Mexico

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*Open-file Digital Geologic Map OF-GM 033***

Scale 1:24,000

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DESCRIPTION OF MAP UNITS

SURFICIAL DEPOSITS

- Qal **Stream channel and valley-floor alluvium, and active floodplains (Holocene)**-poorly to well-sorted, poorly sorted sand, pebbles, and boulders
- Qc **Colluvial mantle on slopes (middle Pleistocene to Holocene)**
- Qls **Landslide deposit (late Pleistocene to Holocene)**-poorly sorted sand to boulders, includes large rotational slide blocks within the Rio Grande and Rio Pueblo de Taos gorges, which include large, rotated and detached beds of Servilleta Basalt (Tb)
- QfyQty **Young alluvial-fan and stream terrace deposits (late Pleistocene to Holocene)**-poorly sorted silt, sand, pebbles, and boulders; stage I to II calcium carbonate development; clasts primarily of quartzite, slate, schist, granite, and (rarely) volcanic rock types
- Qf4Qt4 **Alluvial-fan and stream terrace deposits (middle to Late Pleistocene)**-poorly sorted silt, sand, pebbles, and boulders
- Qf3 **Alluvial-fan and stream terrace deposits (middle to Late Pleistocene)**-poorly sorted silt, sand, pebbles, and boulders; stage II to III calcium carbonate development; clasts primarily of quartzite, slate, and schist
- Qf2Qt2 **Alluvial-fan and stream terrace deposits(middle Pleistocene)**; poorly sorted silt, sand, pebbles, and boulders; clasts primarily of quartzite, slate, and schist; granitic clasts also present east of Arroyo del Alamo; finer grained to the north, away from the Picuris Mountains range front; stage III to IV calcium carbonate development
- Qf1 **Alluvial-fan deposits (middle Pleistocene)**-poorly sorted silt, sand, pebbles, and boulders; clasts primarily of quartzite, slate, and schist; granitic clasts also present east of Arroyo del Alamo; finer grained to the north, away from the Picuris Mountains range front; stage III to IV calcium carbonate development; ash probably within Qf1 deposits at locality near Stakeout Road dated at 1.27+/-0.02 Ma (⁴⁰Ar-³⁹Ar method, W. McIntosh, personal communication, 1996)
- Qfo? **Alluvial-fan deposits (early? to middle Pleistocene)**-poorly sorted silt, sand, pebbles, and boulders; clasts primarily of quartzite, slate, and schist; fan surface is highly dissected and eroded, soil characteristics unknown
- Qfu **Undifferentiated alluvial fan deposits**-probably correlative with units Qf1 through Qf3

MIOCENE AND PLIOCENE ROCKS RELATED TO THE RIO GRANDE RIFT

- Tb **Servilleta Formation, basalt (Pliocene)**-In cross section only. Dark-gray, diktytaxitic olivine tholeiite which forms thin, fluid, widespread pahoehoe basalt flows of the Taos Plateau volcanic field. These flows commonly form columnar-jointed cliffs in the Rio Grande Gorge. Tabular plagioclase and sparse olivine are the only phenocrysts. Individual flows, which are up to 12 m thick, are grouped into packages of from one to ten flows. These packages are separated by 0.3-4.5 m thick sedimentary intervals (Leininger, 1982). Five central volcanic vents to the north are sources for the Servilleta Formation (Lipman and Mehnert, 1979). K-Ar ages generally range between 3.5-4.5 Ma (Lipman and Mehnert, 1979), although an age of 2.8 Ma was reported from a flow west of the map area on Black Mesa (Manley, 1976)

- Tch **Chamita Formation of Santa Fe Group (Miocene and Pliocene)**-In cross section only. Composition ranges vertically. Lower section consists of buff-colored, moderate to poorly sorted sands with clasts of intermediate volcanic rock, quartzite, and other metamorphic rocks. Middle section contains fewer volcanic clasts and more metamorphic clasts. Upper section is devoid of volcanic clasts. Overall, unit coarsens upwards. On Pilar Mesa, dips decrease from 30°NW at base to horizontal at top, with an internal angular unconformity of about 15° near top of exposure. Interfingering contact with Ojo Caliente Sandstone. Thickness about 230 m
- To **Ojo Caliente Sandstone of Tesuque Fm of Santa Fe Group (Miocene)**-In cross section only. Buff to white, well-sorted eolian sandstone. Dominant grain size is fine sand. Abundant 1.3-5.0 cm thick brown CaCo₃ concretions. QFL proportions average 62% quartz, 28% feldspar, and 10% lithics. LvLsLm ratio averages 82% Lv, 8% Ls, and 10% Lm. Thin reddish-brown, finely laminated siltstone horizons are found locally. Tabular crossbeds are common, with sets over 4 m in height. Transport was from southwest to northeast. Conformably overlies and interfingers with Chama-EI Rito member. Deposited at 13-12 Ma (Steinpress, 1980). About 250 m thick
- Tce **Chama-EI Rito Member of Tesuque Fm of Santa Fe Group (Middle Miocene)**-In cross section only. Volcanic-rich, non-fossiliferous sandstone (50%) and conglomerate (42%), with minor mudrock interbeds (8%). Conglomerates are generally purplish to gray due to predominance of pebble-size Tertiary volcanic clasts. Sandstones are pinkish-gray to buff, poorly to moderately sorted, with highly variable grain size. Sandstones are transitional between arkoses and volcanic arenites. White beds of calcareous, pyroclastic volcanic ash, less than 2 m thick, are found locally. Fluvial and alluvial sedimentary structures are common. Represents braided stream deposits on a distal alluvial fan derived from a volcanic terrain to the northeast. Age is about 18-14 Ma (Steinpress, 1980). Pinches out to the southeast. Thickness up to 480 m

OLIGOCENE VOLCANIC AND SEDIMENTARY ROCKS

- Tpu **Picuris Formation, upper member (Oligocene)**-Light gray to pinkish gray, immature, pumice-rich, ashy, poly lithologic, conglomeratic sandstone. Consists mainly of sandstones with gravel-sized clasts of pumice and silicic volcanic rocks (mostly 26 Ma Amalia Tuff), and minor Precambrian quartzite and intermediate composition volcanic rocks (including the Latir Peak quartz latite). Most of gravel-sized fraction is pumice, with some clasts up to 25cm in diameter. Most clasts are rounded to well rounded. Imbrication of clasts is common, although bedding features are indistinct due to the homogeneous nature of lithology and grain size, and the weak induration. Mostly, unit is matrix cemented, with local minor silica cement. Poorly to well lithified. Contains layers and lenses of resistant, well cemented, cobble conglomerates interlayered with easily eroded, weakly cemented pebble conglomerates. Generally gray weathering. Paleoflow measurements indicate source to the north (Rehder, 1986). Total thickness of upper member is 200-250 m. Interpreted as an alluvial fan deposit derived from the Latir volcanic field at around 26 Ma (Rehder, 1986).
- Tplq **Picuris Formation, Llano Quemado breccia member (Oligocene)**-Light gray to red, monolithologic volcanic breccia of distinctive extremely angular, poorly sorted, light-gray, recrystallized rhyolite clasts in a generally reddish matrix. Rhyolite clasts contain phenocrysts of biotite, sanidine, and quartz. Highly lithified, due to partial welding of the matrix rather than silica or carbonate cement. Ridge-former. Unit shows both clast and matrix support. Beds are generally 1-8m thick. Clasts are up to 15cm in diameter, and overall clast size decreases southward. Less than 1% of clasts are Proterozoic slate and weathered Tertiary volcanic rocks. 5-45m thick. Described by Rehder (1986). New 40Ar/39Ar date on sanidine from a rhyolite clast from exposure 1 km southwest of Ponce de Leon spring is 28.35±0.11 Ma. The breccia is interpreted as a series of flows from a now-buried, nearly rhyolite vent (Rehder, 1986).

Tpl **Picuris Formation, lower member (Oligocene)**-Boulder and cobble conglomerates and conglomeratic sandstones interbedded with thinly bedded sandstones. Boulder unit is distinctive, composed of well rounded, poorly sorted, mostly clast supported, Proterozoic quartzite clasts, with minor altered, intermediate Tertiary volcanics (Latir volcanics) and Paleozoic sedimentary rocks. The boulder unit grades (fines) upward to less indurated pebble conglomerate and conglomeratic sandstone, and variegated green, red, and white siltstone and claystone. Bedding is locally discontinuous, with multiple minor erosional unconformities. Carbonate cement is pervasive. Local layers of primary air fall ash that are well sorted, contain biotite crystals, and are yellow-gray to light olive brown, to gray-white. 20-50 m thick. New $^{40}\text{Ar}/^{39}\text{Ar}$ ages of ashes from near Pete Tafoyas house and 1 km southwest of Ponce de Leon springs are ___ Ma and 27.93 ± 0.08 Ma. Interpreted as a sequence of debris flow and alluvial fan deposits derived from Sangre de Cristo Mountains and Latir volcanic field to north and northeast (Rehder, 1986).

PALEOZOIC ROCKS

- /Pa **Alamitos Formation (Pennsylvanian, late Desmoinesian)**-Consists chiefly of coarse-grained arkosic sandstone with lesser amounts of conglomerate, limestone, and gray and red shales. Grades upward from clastic-rich to limestone-rich. Equivalent to the "upper arkosic limestone member" of the Madera Formation to the south. Approximately 1200m thick.
- /Pf **Flechado Formation (Pennsylvanian, Morrowan-Atokan-Desmoinesian)**-Thick sequence of olive, brown, and dark gray shales and siltstones, with low-feldspar sandstones and conglomerates. Limestone is only 5-10% of the formation. Equivalent to La Posada Formation to the south, which is equivalent to the Sandia Formation and the "lower gray limestone member" of the Madera Formation. Approximately 760m thick
- Mt **Tererro Formation of Arroyo Penasco Group (Mississippian, Meramecian and Chesterian)**-Near Ponce de Leon springs, consists of 1-2 m of basal stromatolitic limy sandstone overlain by about 7m of dolomitic limestone, overlain by about 12m of calcitic dolomite with stromatolites and bedded and nodular chert (Armstrong and Mamet, 1990). Thickness is approximately 20m.
- Mes **Espiritu Santo Formation of Arroyo Penasco Group (Mississippian, Osagean)**-Consists of basal Del Padre Sandstone member of thin basal conglomerate, quartz sandstone, and minor limestone beds at top. Grades into overlying Tererro Formation. Upper, carbonate-rich part of Espiritu Santo Formation is mostly absent from the Ponce de Leon springs area.

PROTEROZOIC ROCKS

- xxx **Pegmatite**-Simple pegmatites of quartz-K-feldspar-plagioclase-muscovite. Pegmatite bodies typically are dikes or lenses, locally aligned parallel to country rock foliation and fold hinges. Thicknesses range from a few cms to several meters
- Xm **Miranda granite (new informal name)**-East of the Picuris-Pecos fault. Generally consists of pink to white, medium-grained, mica-rich granitic rock with euhedral megacrysts of feldspar. These granitic rocks are everywhere weathered looking, fairly equigranular, and commonly crumbly. Pegmatites are locally voluminous. Contains at least one tectonic foliation. Age unknown, but probably part of 1.6 Ga intrusive complex.