

Unit Descriptions for Taos Area Geologic Quadrangle Maps
(Carson, Taos SW, Ranchos de Taos, Taos, Los Cordovas Quads)Paul W. Bauer and Keith I. Kelson
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Cenozoic Deposits

At Artificial fill and disturbed ground (Recent) - Poorly sorted sand, silt and pebbles, primarily associated with drainage control and storage facilities along piedmont east of Taos.

Qal Stream channel and valley-floor alluvium, and active floodplains (Holocene) - Poorly to well-sorted, poorly sorted sand, pebbles, and boulders; clasts primarily of quartzite and slate in the Carson and Taos SW quadrangles, clasts of granitic, metamorphic, volcanic, and sandstone rock types in the Taos, Ranchos de Taos, and Los Cordovas quadrangles, with clasts along Rio Lucero dominated by granitic lithologies and quartzite; clasts along Rio Pueblo de Taos dominated by granitic, quartzite and sandstone lithologies; clasts south of east of Rio Pueblo de Taos dominated by sandstone and other sedimentary rock types.

Qc11 (Taos): Colluvial mantle on slopes, undifferentiated middle Pleistocene to Holocene - Poorly-sorted sand, pebbles and boulders, prevalent along bases of mountain-front facies, north of Rio Pueblo de Taos dominated by granitic lithologies and quartzite; south of Rio Pueblo de Taos dominated by sandstone and pebble conglomerate with minor limestone clasts; not shown in Rio Pueblo de Taos gorge in Carson and Taos SW quadrangles.

Qm Marsh deposits (Holocene) - Silt, sand and clay in low relief, saturated flatlands; probable high organic content; primarily between Highway 64 and Taos Pueblo, bordering Rio Lucero.

Qp Playa deposits (Holocene and latest Pleistocene) - Small playa deposits located on Quaternary landslide deposits along the northern canyon of the Rio Grande generally downstream of the village of Pilar.

Qe Eolian deposits (late Pleistocene to Holocene) - Poorly to well-sorted sand and silt occurring primarily as a mantle or blanket; locally contains pebbles of basal and intermediate volcanic rock types; predominant wind direction from southwest; where unit Qe mantles units Td, Q2trg, and Q2g, shown as units QeTb, QeQ2trg, and QeQ2g, respectively.

Qtr Travertine deposits (late Pleistocene to Holocene) - Small travertine deposits that are located along faults. Travertine probably formed along now-extinct springs.

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 involve large, rotated and detached beds of Servilleta Basalt (?) boulders.

Qy 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 volcanic rock types; includes unit Q66 of Kelson (1986).

Q4 Alluvial-fan and stream terrace deposits (late Pleistocene) - Poorly sorted silt, sand, pebbles, and boulders; associated Q4 soils have stage III to IV calcium carbonate development, argillic Bt soil horizons and 10YR hues in Bt horizons; clasts primarily of granitic and metamorphic rocks north of Rio Pueblo de Taos, and granitic, metamorphic, and sedimentary rock types south of Rio Pueblo de Taos; clasts also include basaltic rock types along Arroyo Seco and along Rio Pueblo de Taos downstream of Los Cordovas; modified from Kelson (1986).

Q3 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; granitic clasts also present east of Arroyo del Alamo; possible Q3 remnant inset into terrace Q2 on western side of Taos may be artificial terrace related to residential development; modified from Kelson (1986).

Q2 Alluvial-fan and stream terrace deposits flanking Rio Pueblo de Taos and tributaries (middle Pleistocene) - Poorly sorted silt, sand, pebbles, and boulders; clasts primarily of granitic, metamorphic, volcanic, and sedimentary rocks; associated soils have stage III to IV calcium carbonate development, thick argillic Bt soil horizons, and 7.5YR to 10YR hues in soil Bt horizons; upper soil horizons may be affected by surface erosion; modified from Kelson (1986).

Q2g Stream terrace deposits flanking Rio Grande (middle Pleistocene) - Poorly sorted silt, sand, pebbles, and boulders; clasts primarily of granitic, metamorphic, intermediate volcanic, basalt, and sedimentary rocks; locally may contain clasts of Tertiary Amalia Tuff; associated soils have stage III to IV calcium carbonate development, thick argillic Bt soil horizons, and 7.5YR to 10YR hues in soil Bt horizons; upper soil horizons may be affected by surface erosion; may be mantled locally by unit Qe; modified from Kelson (1986).

Q1 Alluvial-fan deposits (middle Pleistocene) - Poorly sorted silt, sand, pebbles, and boulders; stage III to IV calcium carbonate development, although soil horizons are commonly affected by surface erosion; clasts primarily of quartzite, slate, and schist; granitic clasts also present east of Arroyo del Alamo; finer grained to the north, away from the Pajarito Mountains range front; in Taos SW quadrangle, ash probably within Q1 deposits at locality near Stakeout Road dated at 1.27 ± 0.02 Ma (⁴⁰Ar/³⁹Ar method, W. McIntosh, personal communication, 1998); in Los Cordovas quadrangle, clasts primarily of granitic, intermediate volcanic, basalt, and metamorphic rock types; in Los Cordovas quad, Q1 is correlative with Unit Q1a of Kelson (1986). Q1 surface on the Los Cordovas quadrangle is dissected by numerous southwesterly-trending arroyos; deposit is more than 12 m thick in northeastern part of quadrangle, and is thinner from northeast to southwest, directly southwest of Taos Municipal Airport. Q1 deposit is less than about 1 m thick and unconformably overlies unit Td. Elsewhere, Q1 appears to overlie unit Q2b or unit Td; in Taos quadrangle, clasts primarily of granitic and metamorphic rock types; slope of Q1 surface on the Taos quad is southwesterly, and is dissected by numerous southwesterly-trending arroyos; deposit is more than 12 m thick in northwestern part of quad, and is thinner from northeast to southwest; on Blueberry Hill, Q1 deposit is about 3 m thick at Highway 64, but is thinner (about 2 m) to the southwest, where it unconformably overlies unit Q2b. Q1 is differentiated from Q2b by larger clast size (Kelson, 1986), less oxidation, poor sorting, absence of abundant manganese oxide staining, and clasts that are less weathered.

Q1a Older 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; on Pilar Mesa in Carson quadrangle, deposit is dominated by slate pebbles and cobbles.

Q1u Undifferentiated alluvial fan deposits (middle to late Pleistocene) - Probably correlative with units Q1 through Q1a; poorly sorted silt, sand, pebbles, and cobbles; mapped along majority of Sangre de Cristo range front, but not correlated to other fan units because of lack of well-defined age control or distinct lithologic characteristics.

Q1u Undifferentiated stream terrace deposits (middle to late Pleistocene) - Probably correlative with units Q1 through Q1a; poorly sorted silt, sand, pebbles and boulders; mapped in Taos quad only locally at mouth of Rio Pueblo de Taos near Taos Pueblo, and at the mouth of the Rio Fendado.

Q1trg Fluvial gravel deposited by ancestral Rio Grande (early to middle? Pleistocene) - Poorly sorted sand, pebbles, and cobbles; clasts of basalt, quartzite, slate, schist, other metamorphic rock types, and (rarely) sandstone and limestone; overlies Td north of Pilar Mesa, but is inset into Td on Pilar Mesa in Carson quadrangle; locally may contain clasts of Tertiary Amalia Tuff; where preserved, associated relict soils have stage III to IV calcium carbonate development, thick argillic Bt soil horizons, and 7.5YR to 10YR hues in soil Bt horizons; upper soil horizons commonly affected by surface erosion, may be mantled locally by unit Qe.

Q1tb Blueberry Hill deposit (late Tertiary? to middle Pleistocene) - Poorly sorted silt, sand and pebbles; commonly cross-bedded, and stained with black manganese oxide and yellowish-orange iron oxide coatings; oxidized; clasts are weathered or grassified; contains distinct discontinuous sandy interbeds; clasts are granitic rock types, quartzite, metamorphic rock types, volcanic rock types and rare sandstone; commonly crudely imbricated; imbrication suggests southwesterly flow direction in areas south and east of Taos Municipal Airport; westerly flow direction in area north of Taos Municipal Airport; northwesterly flow direction in area southeast of Rio Pueblo de Taos; based on exposures at southwestern end of Blueberry Hill, unit thickness exceeds 25 m and may be considerably more; deposit may interfinger with unit Q2trg in northwestern part of Los Cordovas quadrangle (relationship unknown); deposit overlies or is inset into unit Td in southern part of quadrangle. Unit also referred to as "Basin Fill deposit" by Kelson (1986).

TG (Carson): Older alluvium (Pliocene and early Pleistocene) - Poorly sorted sand and gravel deposits, preserved as remnant gravel on ridge tops and hill tops, commonly composed of large, rounded to subrounded quartzite boulders up to several meters in diameter; in Carson quadrangle, present on high erosional surfaces, and along the Pilar-Valdeto fault; maximum thickness unknown but at least 10 m.

Tertiary Rocks

Tr Rhyodacite cone of Tres Orejas (Pliocene) - Dark, phenocryst-poor, locally flow layered rhyodacite that crops out in northern Carson Quadrangle. Phenocrysts of augite and hypersthene are sparse and small; SiO₂ is 62-64% (Lipman and Mehner, 1979). Uppermost Td flows locally overlap the flanks of Tres Orejas. Older Td flows lie below rhyolitic volcanoes elsewhere on the Taos Plateau, so rhyodacite and olivine basalt (Tb) eruptions overlapped in time. ⁴⁰Ar/³⁹Ar ages from pyroxene dikes of Tres Orejas are 4.84 ± 0.02 Ma (Appelt, 1998).

Tb (Carson and Taos SW): Servilleta Formation, basalt (Pliocene) - Dark-gray, diktytaxitic olivine tholeiite which forms thin, fluid, widespread patchwork 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). The mesa east of Pilar displays four basalt flows north of the Embudo fault and only one flow south of the fault. Five central volcanic vents to the north are sources for the Servilleta Formation (Lipman and Mehner, 1979). ⁴⁰Ar/³⁹Ar ages from basalts exposed in the Rio Grande gorge range in age from 4.81 ± 0.03 Ma for the lowest basalt near the Gorge Bridge, to 3.12 ± 0.13 Ma for the highest basalt flow at the Gorge Bridge (Appelt, 1998).

(Los Cordovas): Basalt (Pliocene) - Primarily Servilleta Basalt of Peterson (1984). Along western edge of quadrangle, may include other Tertiary basaltic rocks derived from Tres Orejas, west of the Los Cordovas quadrangle. In addition to source vents to the north identified by previous workers (Lipman et al., 1979; Peterson 1984; Dungan et al., 1984), newly postulated source vents are located near Taos Municipal Airport (N4034125, E0439650), within Taos Pueblo Tract A (N4033850, E0437550), and in the northeastern part of the Tres Orejas quadrangle (N4033550, E0432475). ⁴⁰Ar/³⁹Ar ages from basalts exposed in the Rio Grande gorge range in age from 4.81 ± 0.03 Ma for the lowest basalt near the Gorge Bridge, to 3.12 ± 0.13 Ma for the highest basalt flow at the Gorge Bridge (Appelt, 1998).

(Ranchos de Taos and Taos): Servilleta Formation, basalt (Pliocene) - In cross section only. Dark-gray, diktytaxitic olivine tholeiite, which forms thin, fluid, widespread patchwork 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 Mehner, 1979). ⁴⁰Ar/³⁹Ar ages from basalts exposed in the Rio Grande gorge range in age from 4.81 ± 0.03 Ma for the lowest basalt near the Gorge Bridge, to 3.12 ± 0.13 Ma for the highest basalt flow at the Gorge Bridge (Appelt, 1998).

Chamita Formation of Santa Fe Group (Miocene and Pliocene) - 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 upward, and dips decrease from 30° NW at base to horizontal at top. Exposure just north of Pilar contains an internal angular unconformity of about 15° near top of exposure. Interfingering basal contact with Ojo Caliente Sandstone. Thickness about 230 m.

To (Carson, Taos SW, and Ranchos de Taos): Ojo Caliente Sandstone of Tesuque Fm of Santa Fe Group (Miocene) - Buff to white, well-sorted, well-sorted sandstone. Dominant grain size is fine sand. Abundant 1.5-0.1 mm thick brown CaCO₃ concretions. QFL proportions average 62% quartz, 28% feldspar, and 10% lithics. Lx/Ls/Lm ratio averages 82% Lx, 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. Deposited at 15-12 Ma (Steinpreiss, 1980). Best exposures are in roadcuts along NM-68, northeast of Pilar. About 250 m thick.

Tca Chama-El Rio Member of Tesuque Fm of Santa Fe Group (Middle Miocene) - Volcanic-rich, non-fossiliferous sandstone (50% 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. Conglomerates are transitional between arkoses and volcanic arenites. Siltstone and clayey siltstone beds are reddish-brown and generally less than 1 m thick. Sandstone QFL percentages average 39% quartz, 31% feldspar, and 30% lithics. Lx/Ls/Lm percentage averages 80% volcanic lithics. While beds of calcareous, pyroclastic volcanic ash, less than 2 m thick are found locally. Fluvial and alluvial sedimentary sandstone are common. Represents braided stream deposits on a distal alluvial fan derived from a volcanic terrain to the northeast. Lower part contains 10-m-thick weakly consolidated, coarse, cobble to boulder conglomerate composed of rounded, white to gray quartzite clasts (up to 2 m) and subordinate granite clasts. Age is about 18-14 Ma (Steinpreiss, 1980). Pinches out to the southeast. Thickness up to 480 m.

Tp Picuris Formation, undivided (Oligocene) - Light gray to pinkish gray, immature, pumice-rich conglomeratic sandstone.

(Ranchos de Taos and Taos SW): Picuris Formation, upper member (Oligocene) - Light gray to pinkish gray, immature, pumice-rich, aphy, polytholitic, conglomeratic sandstone. Consists mainly of sandstones with gravel-sized clasts of pumice and silicic volcanic rocks (mostly 26 Ma Amalia Tuff), and minor Permian-triassic and intermediate composition volcanic rocks (including the Late Peak igneous suite). Contains layers and lenses of resistant, well-sorted, 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 Late volcanic field at around 26 Ma (Rehder, 1986).

Tplq (Ranchos de Taos): Picuris Formation, Llano Quemado breccia member (Oligocene) - Light gray to red, monolithic volcanic breccia of distinctive extremely angular, poorly sorted, light-gray, recrystallized rhyolite clasts in a generally reddish matrix. Rhyolite clasts contain phenocrysts of biotite, sandstone, and quartz. Highly infilled, 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 1-8 m thick. Clasts are up to 15 cm in diameter, and overall clast size decreases southward. Less than 1% of clasts are Proterozoic slate and weathered Tertiary volcanic rocks. 0-45 m thick. Described by Rehder (1986). New ⁴⁰Ar/³⁹Ar data on sandstone 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 (Ranchos de Taos): 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, basally cobbly sandstone. Proterozoic quartzite clasts, with minor altered, intermediate Tertiary volcanics (Late volcanic) 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 ⁴⁰Ar/³⁹Ar ages of ashes from near Pete Tafay's house and 1 km southwest of Ponce de Leon springs are 34.64 ± 0.16 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 Late volcanic field to north and northeast (Rehder, 1986).

Tpa Picuris Formation, andesite (Oligocene) - Andesite porphyry exposed in small outcrop south of Llano Quemado in the Ranchos de Taos quadrangle.

Tpc (Carson and Taos SW): Picuris Formation, quartzite-boulder conglomerate (Oligocene) - Weakly consolidated, coarse, cobble to boulder conglomerate composed of rounded, white to gray quartzite clasts (up to 2 m) and subordinate granite clasts. Poorly sorted and unstratified. Sand matrix ⁴⁰Ar/³⁹Ar age of 34.5 ± 1.2 Ma for a white ash adjacent to a conglomerate layer is a good estimate of the depositional age of the unit. Probably equivalent to a Picuris Formation quartzite conglomerate that is near a 34.6 Ma white ash in the Ranchos de Taos quadrangle. Equivalent to the Bradley Conglomerate of Leininger (1982). Estimated thickness is 450m (Leininger, 1982).

Paleozoic Rocks

IP (Taos): Undivided Pennsylvanian sedimentary rocks of the Alamitos Formation (late Desmoinesian) and Flechado Formation (Morrowan-Atokan-Desmoinesian) - Consists chiefly of poorly exposed, olive brown, red, and dark gray shale and siltstone plus fine- to coarse-grained sandstone with lesser amounts of conglomerate and limestone. Limestone (IP66) is less than 1% of the formation. Distinctive, rounded quartz cobble conglomerate (IPcon) is less than 1% of the formation. Alamitos Formation is equivalent to the "upper arkosic limestone member" of the Madera Formation to the south. Flechado Formation is 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. Fossils collected from the exposures southeast of Taos Pueblo are Desmoinesian in age (B. Allen, 2000, personal communication). In general, the volume of limestone decreases northward within the map area. Crossbeds examined in the Taos quad in coarse-grained sandstones all show a generally westward paleoflow. Thickness unknown, but a minimum of approximately 2000 m.

IPist Nodular brecciated limestone of the Alamitos(?) Formation - Bluish-gray, packstone with cross-cutting calcite veins. Contains fossils of fusulids, crinoids, brachiopods, bryozoans, rugose corals, and algae. Generally round weathering outcrops. Fusulids are Desmoinesian in age (B. Allen, 2000, personal communication). Interpreted as cyclic deposits in shallow, fully marine environment within the photic zone.

IPcq Distinctive conglomerate - Poorly sorted, clast-supported, thin, isolated beds of conglomerate containing 99% round quartzite pebbles (2-20 cm in diameter) with a fine-grained matrix. Lodge former. Discontinuous along strike due to channel- and lens-shapes. Occurs as isolated beds that range from 2-10 m in thickness.

IPa 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 1200 m thick.

IPi 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 750 m thick.

MI (Ranchos de Taos): Terreno Formation of Arroyo Penasco Group (Mississippian, Meramecian and Chesterian) - Near Ponce de Leon spring, consists of 1-2 m of basal stromatolitic lime sandstone overlain by about 7 m of dolomitic limestone overlain by about 12 m of calcitic dolomite with stromatolites and bedded and nodular chert (Armstrong and Mather, 1990). Thickness is approximately 20 m.

Mes (Ranchos de Taos): Espiritu Santo Formation of Arroyo Penasco Group (Mississippian, Osagean) - Consists of basal Del Plante Sandstone member of thin basal conglomerate, quartz sandstone, and minor limestone beds at top. Grades into overlying Terreno Formation. Upper, carbonate-rich part of Espiritu Santo Formation is mostly absent from the Ponce de Leon springs area.

Mdp (Taos SW): Del Padre member of Espiritu Santo Formation of Arroyo Penasco Group (Mississippian) - Quartz sandstone, local quartzite conglomerate, siltstone, and shale. Interfingers with Espiritu Santo Formation carbonates.

Proterozoic Rocks

dd (Carson): Dacite dike (age unknown, but probably Middle Proterozoic) - Dark green-gray quartz diorite dikes intruded into Proterozoic rocks only. Dikes are vertical, with strikes clustered around an azimuth of 150°. Composed of pale green clinopyroxene (Cr-diopside?), zoned plagioclase (labradorite?), and minor quartz, magnetite, and ilmenite. Commonly altered to chlorite and clay. Pyroxene and feldspar show normal plutonic textures. Locally, dikes are laced with carbonate veins. Dikes are generally less than 1 m wide. Contacts between diorite and country rock are sharp and commonly contain zones of brecciation and faulting. Faults are sub-vertical with dip slip fault striations. Dikes are parallel to the Pilar-Valdeto fault and other south-east-striking faults.

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 lineages. Thicknesses range from a few centimeters to several meters.

Xmg Miranda granite (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. Appears to intrude the Rio Pueblo schist along southern contact. Pegmatites are locally voluminous. Contains at least one tectonic foliation. Three closely spaced, orthogonal joint sets cause this rock to weather into small, angular blocks. Age unknown, but similar in occurrence and texture to the 1.6 Ga Tres Piedras Granite of east-central Tusas Mountains.

Xu Undifferentiated Proterozoic - Supracrustal metamorphic rocks and plutonic and metaplutonic rocks of the Taos Range.

Xhpl (Carson and Taos SW): Piedra Lumbre Formation, Hondo Group - Exposed only in two small areas northeast of the Pilar-Valdeto fault. Includes quartz-muscovite-biotite-garnet schist with characteristic sheen on crumpled cleavage surfaces, and finely laminated, light gray, phylitic quartz-muscovite-biotite-garnet schist and darker bluish gray fine-grained biotite quartzite to metasilstone. Euhedral garnets are 1 mm, biotite blocks are 2 mm, and scattered anhedral staurolites are up to 5 mm in diameter. Calc-silicate layers exist locally. Original sedimentary structures such as graded bedding are locally preserved. Contact with underlying Pilar Formation is gradational. Apparent thickness is 200-400 m.

Xhplq (Carson and Taos SW): Piedra Lumbre Formation quartzite, Hondo Group - Massive to layered, light-colored, crossbedded micaceous quartzite. Locally garnet-bearing. Approximate thickness of 25 m.

Xhplp (Carson): Piedra Lumbre Formation phyllite, Hondo Group - Dark gray to black, fine-grained, garnet-bearing phyllite. Crops out only in the core of the Hondo syncline east of the Pilar-Valdeto fault.

Xhp (Carson and Taos SW): Pilar Formation, Hondo Group - Exposed northeast of the Pilar-Valdeto fault. Dark gray to black, carbonaceous phyllitic slate. Extremely fine-grained homogeneous rock except for rare 1- to 2-cm thick light colored bands of quartz and muscovite that may represent original sedimentary bedding. In thin section, fine-grained matrix consists of euhedral (50-70%), muscovite (15-30%), and prominent streaky areas of graphitic material. Lenticular porphyroblasts (0.1 to 0.5 mm) are altered to yellow-brown limonite. Sparsely silty cleavage is locally crumpled. Small scindinal folds locally. Basal 1.5 m-thick, black to blue-black, medium-grained, garnet quartzite is distinctive. Garnets are anhedral, oxidized, and red-weathered. Gradational with H6. Thickness unknown due to extreme ductile deformation.

Xhr6 (Carson and Taos SW): Rinconada Formation, R6 schist member, Hondo Group - Tan, silver, silvery quartz-muscovite-biotite-staurolite-garnet schistosity phyllite interlayered with fine-grained gneissiferous muscovite quartzite. Euhedral staurolites (<5 cm) abundant in thin layers. Small euhedral garnets (<2 mm) throughout. Strong parting along well-developed foliation. Sharp contact with H6. Thickness is approximately 50 m.

Xhr5 (Carson and Taos SW): Rinconada Formation, R5 quartzite member, Hondo Group - Variety of white to blue medium-grained quartzites interlayered with fine-grained schistose quartzites and quartzose schists. Measured section by Hall (1988) from an area just to the south, from top to bottom: 1) tan to white, friable, thinly layered, crossbedded micaceous quartzite; 2) blue, medium-grained, thin layers, resistant saccharoidal quartzite; 3) white to tan, friable schistose quartzite; 4) blue to black, medium-grained, blue, medium-grained saccharoidal quartzite, thin layers of fine-grained quartz-muscovite-biotite schist; basal 1.5 m massive blue medium-grained quartzite; 4) tan, thinly layered, micaceous quartzite layered with quartz-rhyolite schist; abundant crossbedding; 5) blue and white streaked, thinly bedded, medium-grained quartzite; abundant crossbedding; 6) blue and white streaked, thinly bedded, medium-grained quartzite; abundant crossbedding. Gradational contact with H6. Thickness is approximately 75 m.

Xhr4 (Carson and Taos SW): Rinconada Formation, R4 schist member, Hondo Group - Medium- to coarse-grained, silvery gray, quartz-muscovite-biotite-staurolite-garnet schist containing one or more restrictive, 0.5-2.0 m thick, layers of glassy blue quartzite, rusty red weathering garnetiferous quartzite, massive, extremely hard, red weathering, olive-brown biotite-staurolite-garnet-orthompholite rock, white, glassy, hornblende quartzite, gray biotite-hornblende calc-schist, mylonitic blue to pink and blue, glassy quartzite, and white to gray calcite marble. In this area, H4 is a transitional sequence of interlayered schist and quartzite, making the contacts with H2 and H3 indistinct. Thicknesses range from 50-175 m.

(Carson and Taos SW): Rinconada Formation, R3 schist member, Hondo Group - White, gray, bluish-green and blue, medium-grained, thinly to thickly bedded, resistant quartzite with abundant crossbeds (H3q). Locally includes two mappable layers of pelitic schist (H3d) that resemble H4 and upper H1/2. Distinctive marker layer near center of unit is 25-m-thick, white, thinly bedded, ridge-forming quartzite. Sharp contact with H4. Thickness is approximately 75 m.

Xhr12 (Carson and Taos SW): Rinconada Formation, R1-R2 schist member, Hondo Group - Lower unit of fine- to medium-grained, tan to silver, quartz-muscovite-biotite-staurolite schist with small euhedral garnets (<mm) and scattered euhedral staurolite (<1 cm). Near base are black biotite beds (<2cm). Locally contains andalusite porphyroblasts up to 8 cm across. Upper unit of quartz to tan, red weathering, coarse-grained quartz-muscovite-biotite-staurolite-albite-garnet schist containing interlayers of 1-1.0 cm, red, gray, or tan sandstone. Fine-grained muscovite-garnet quartzite. Abundant andalusite porphyroblasts, up to 5 mm, abundant garnets are euhedral and small (<2mm). Strong parting along foliation plane. Sharp to gradational contact with H3. Lower and upper units have previously been subdivided into R1 and R2, respectively, based on mineralogy (Nielsen, 1972). Thickness is approximately 250 m.

Xhr (Carson): Rinconada Formation, undivided, Hondo Group - Undivided schists and quartzites near the Pilar-Valdeto fault that are extensively fractured and faulted.

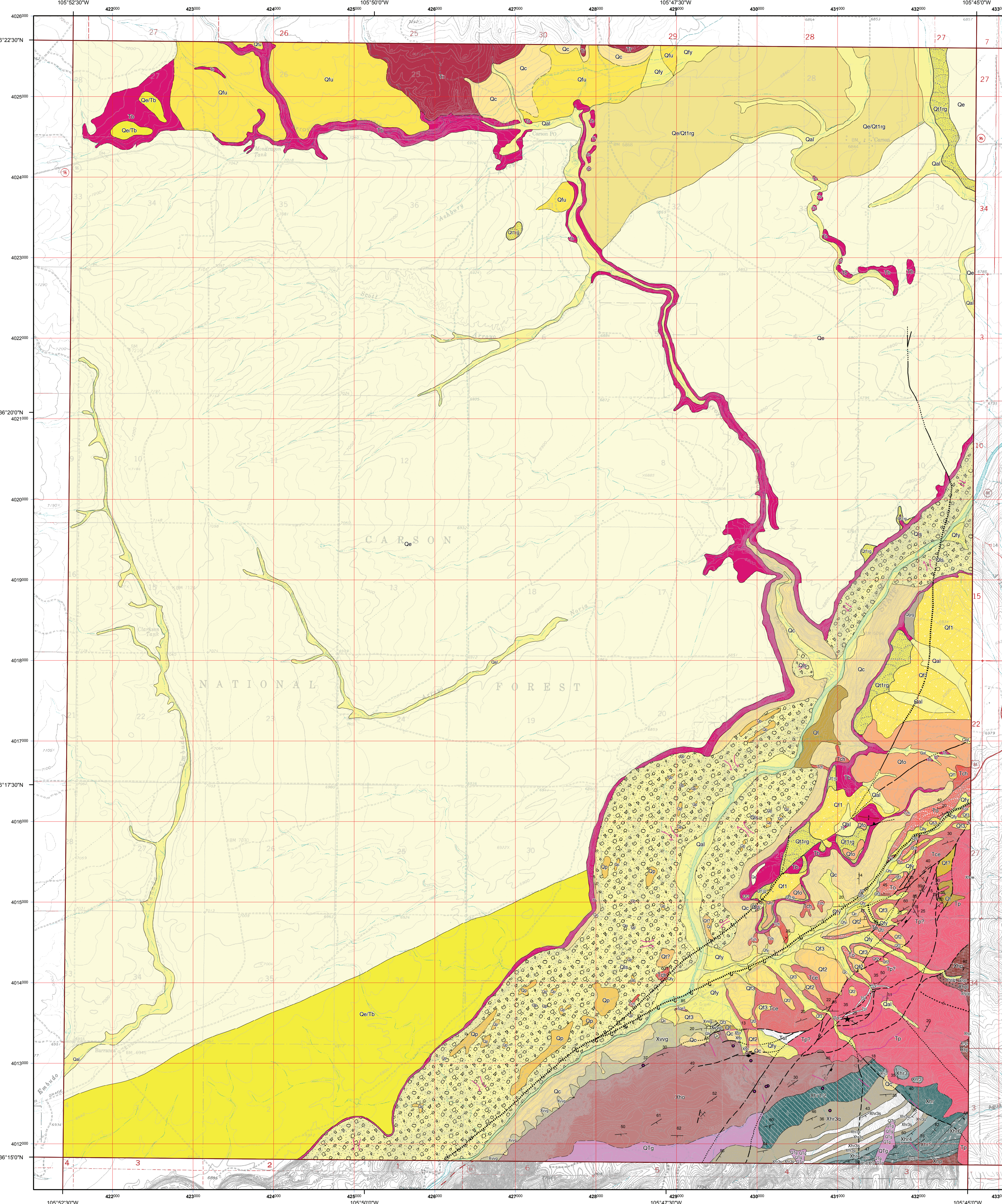
Xho (Carson and Taos SW): Ortega Formation, Hondo Group - Gray to grayish-white, medium- to coarse-grained quartzite. Generally massive and highly resistant to weathering. Locally well-crossbedded, with kyanite- or sillimanite-concentrated in thin, schistose, muscovite-rich horizons. Crossbeds are defined by concentrations of black iron-oxide minerals. Common accessory minerals are ilmenite, hematite, tourmaline, epidote, muscovite, and zircon. Gradational contact with Rinconada Formation. Thickness is approximately 800-1200 m.

(Taos SW): Xh0; Xh0W; Xh0S.

Xvg Glenwoody Formation, Valdeto Group - Feldspathic quartz-muscovite schist and quartzose schist exposed in cliffs southwest of Pilar and locally along the northern flank of the Picuris Range on the west side of the Picuris-Pecos fault. White, light gray, pink, or green. Commonly contains megacrysts of feldspar and rounded and flattened quartz in a fine-grained matrix of quartz, muscovite and feldspar. Contact with overlying Ortega Formation is a south-dipping ductile shear zone. Pervasive extensional lineation in schist plunges south. Upper 40 m of schist is pinkish and contains anomalous manganese and rare earth elements, and unusual minerals such as perminite, thulite, and Mn-andalusite (viridine). L.T. Silver reported a preliminary U-Pb zircon age of ca. 1700 Ma (Bauer and Pollock, 1993). May be equivalent to the ca. 1700 Ma Burned Mountain Formation of the Tusas Mountains. Probably equivalent to the Glenwoody Formation of the southeast Picuris Mountains. Base unexposed; minimum thickness is about 200 m.

Xrp (Taos SW): Rio Pueblo Schist, Valdeto Group - Feldspathic quartz-muscovite schist and quartzose schist exposed in isolated exposures in the southeast map area, on the east side of the Picuris-Pecos fault. White, light gray, pink, or green. Commonly contains megacrysts of feldspar and rounded and flattened quartz in a fine-grained matrix of quartz, muscovite and feldspar. Probably equivalent to the Glenwoody Formation of the northern Picuris Mountains. Thickness unknown.

Xa (Taos SW): Amphibolite - Includes a variety of amphibolite bodies, lenses, and layers within the Miranda granite. The predominant rock type is fine- to medium-grained, dark gray-green to black, weakly foliated amphibolite composed of blue-green to olive-green hornblende, interstitial quartz and plagioclase, sphene, and epidote. Faint compositional layering is formed by 1-2 mm thick white layers. Epidote veins and zones are common.

Geologic map of the Carson
quadrangle, Taos County, New Mexico.

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by
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COMMENTS TO MAP USERS