# Preliminary Geologic Map of the Questa Quadrangle, Taos County, New Mexico (Year 1 of 2-Year)

By

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**June 2012**

**New Mexico Bureau of Geology and Mineral Resources**
*Open-file Digital Geologic Map OF-GM XXX*

**Scale 1:24,000**

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# PRELIMINARY GEOLOGY OF THE QUESTA 7.5-MINUTE QUADRANGLE, TAOS COUNTY, NEW MEXICO

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## Description of Map Units

## QUATERNARY

**Qal** **Stream channel and valley-floor alluvium, and active floodplains** (Holocene)- Poorly to moderately sorted sand, pebbles, and boulders; clasts of granitic, metamorphic, volcanic, and sandstone rock types; clasts along Rio Hondo dominated by granitic rock types, quartzite and basalt; clasts along tributaries draining the western side of the Rio Grande dominated by volcanic rock types; weak to no soil development (correlative with unit QHa of Rawling, 2004).

**Qc** **Colluvial mantle on slopes, undifferentiated** (middle Pleistocene to Holocene)- Poorly-sorted sand, pebbles and boulders; prevalent along bases of mountain-front facets; in northwestern part of Arroyo Hondo quadrangle (west of Rio Grande), consists of thin mantle overlying volcanic bedrock.

**Ql** **Landslide deposit** (Pleistocene to Holocene)- Lobate accumulations of poorly sorted soil and rock debris on slopes marked by hummocky topography and downslope-facing scarps. Derived from bedrock and glacial deposits, and includes small earth flow, block-slump, and block-slide deposits (Lipman and Read, 1989).

**Qfy** **Young alluvial-fan and stream terrace deposits** (latest Pleistocene to Holocene)-Poorly sorted silt, sand, pebbles, cobbles, and boulders; clasts primarily of quartzite, schist, granite, and volcanic rock types; associated soils have stage I calcium carbonate development; includes unit Qt8 of Kelson (1986).

**Qt7** **Stream terrace deposits** (early to middle Holocene)- Poorly sorted silt, sand, pebbles, cobbles, and boulders; clasts primarily of quartzite, schist, granite, and volcanic rock types; associated soils have stage I calcium carbonate development; typically present as thin (< 5 m) alluvial deposit on strath surface cut on volcanic bedrock or Blueberry Hill deposit.

**Qf6** **Alluvial fan deposits** (latest Pleistocene)- Poorly sorted silt, sand, pebbles, and cobbles. Probably correlative with alluvial unit Qt6.

**Qt6** **Stream terrace deposits** (latest Pleistocene)- Poorly sorted silt, sand, pebbles, cobbles, and boulders; clasts primarily of quartzite, schist, granite, and volcanic rock types; associated soils have stage I to II calcium carbonate development; typically present as thin (< 5 m) alluvial deposit on strath surface cut on volcanic bedrock or Blueberry Hill deposit; associated with the Q6 surface of Kelson (1986).

**Qt5** **Stream terrace deposits** (late Pleistocene)- Poorly sorted silt, sand, pebbles, cobbles, and boulders; clasts primarily of quartzite, schist, granite, and volcanic rock types; associated soils have stage II to III calcium carbonate development; typically present as thin (< 5 m) alluvial deposit on strath surface cut on volcanic bedrock or Blueberry Hill deposit; associated with the Q5 surface of Kelson (1986).

**Qt4** **Stream terrace deposits** (middle to late Pleistocene)- Poorly sorted silt, sand, pebbles, cobbles, and boulders; clasts primarily of quartzite, schist, granite, and volcanic rock types; associated soils have stage III calcium carbonate development, argillic Bt soil horizons and 10YR to 7.5YR hues in Bt horizons; typically present as thin (< 5 m) alluvial deposit on strath surface cut on volcanic bedrock or Blueberry Hill deposit; associated with the Q4 surface of Kelson (1986).

**Qfu** **Undifferentiated alluvial fan deposits** (middle to late Pleistocene)- Probably correlative with alluvial units Qt2 through Qt5; poorly sorted silt, sand, pebbles, and cobbles; not correlated to other fan units because of lack of well-defined age control, clear stratigraphic position, and distinct lithologic characteristics.

**Qf1** **Alluvial fan deposits** (middle Pleistocene)- Poorly sorted silt, sand, and rare pebbles; clasts primarily of granitic, intermediate volcanic, basalt, and metamorphic rock types; stage III and IV calcium carbonate development where preserved, although soil horizons are commonly affected by surface erosion; correlative with Unit Q1p of Kelson (1986); ash probably within Qf1 deposits at locality on Ranchos de Taos quadrangle near Stakeout Road dated at 1.27+/-10.02 Ma ($^{40}$Ar-$^{39}$Ar method, W. McIntosh, personal commun., 1996); deposit is more than 5 m thick in northeastern part of quadrangle, and is thinner from northeast to southwest; differentiated from unit QTbh by larger clast size (Kelson, 1986), less oxidation, poor sorting, absence of abundant manganese oxide staining, and clasts that are less weathered.

**QTsf** **Old alluvium** (late Tertiary? to middle? Pleistocene)- Poorly sorted sand, pebbles, and cobbles; clasts of basalt, quartzite, other metamorphic rock types, and volcanic rock types; locally high percentage of angular to subangular quartzite pebbles and cobbles; may be correlative with Blueberry Hill deposit (QTbh), and with unit QTg in the Arroyo Hondo quadrangle just to the west; present along piedmont between Sangre de Cristo range front and Rio Grande gorge north of Rio Hondo; correlative with Lama Formation of Lambert (1966); contains ash layer in road cut near Cerro Negro (UTM 439989, 4044603).

**Qm** **Moraine and till** (Pleistocene)- Terminal and lateral moraines, and thick valley-bottom till. Poorly sorted and generally unstratified clay, silt, and sand containing erratic boulders; characterized by hummocky or ridged topography. Some till was mapped with colluvium (Lipman and Read, 1989).

**QTbh** **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 grussified; contains distinct discontinuous sandy interbeds; clasts are granitic rock types, quartzite, metamorphic rock types, and volcanic rock types; commonly crudely imbricated; imbrication suggests westerly flow direction in area north of Taos Municipal Airport; based on exposures at southwestern end of Blueberry Hill, thickness exceeds 25 m; may be considerably more; deposit may interfinger with unit QTsf; correlative with "Basin Fill deposit" of Kelson (1986).

## TERTIARY

**Tgy** **Lucero Peak Pluton** (Miocene)- White to pale pink, medium to coarse grained equigranular granite to quartz monzonite (Lipman and Read, 1989).

**Tg** **Biotite granite** (Oligocene)- Granitic roof phase of the Rio Hondo pluton emplaced in the Questa caldera at about 26 Ma, during volcanism and caldera formation. Medium-grained and equigranular, with sparse aplite and no hornblende (Lipman and Read, 1989).

**Tgd** **Rio Hondo Pluton** (Oligocene)- White to pale grayish-orange, medium- to fine- grained, massive to locally foliated granodiorite. White to pale orange, aphanitic-porphyritic border facies has quartz phenocrysts and local breccia. Has potassium feldspar phenocrysts up to 4 cm in size. Generally forms rounded outcrops with abundant grus (Lipman and Read, 1989).

**Ta** **Andesitic lava flows** (Oligocene)- Purplish-gray to gray, aphanitic to porphyritic andesite lava flows and flow breccias, with minor interbedded volcaniclastic sediments. Phenocrysts include plagioclase and hornblende (Lipman and Read, 1989).

**Tqi** **Latite and quartz latite** (Miocene and Oligocene)- Light tan to gray latite and quartz latite, often stained rust brown, with 15-30% phenocrysts of sanidine, pyroxene and/or hornblende, sparse quartz, and altered cubes of pyrite. Plagioclase phenocrysts to several centimeters in length are present. Occurs as dikes up to 20 m wide and elongate intrusive masses north of the Lawrence Ranch (Lipman and Read, 1989).

**Trp** **Porphyritic rhyolite** (Miocene and Oligocene)- White to light tan to light gray porphyritic rhyolite typically containing 5-20% phenocrysts of quartz, sanidine, and sparse plagioclase and biotite. Occurs as dikes 1-10 m wide and local irregular and shallow intrusions (Lipman and Read, 1989). Generally only observed as float.

**Tri** **Aphanitic rhyolite** (Miocene and Oligocene)- Aphanitic to sparsely porphyritic rhyolite, otherwise similar to Trp (Lipman and Read, 1989).

**Tapi** **Porphyritic andesite and dacite** (Miocene and Oligocene)- Fine-grained dark gray aphanitic and porphyritic andesite and minor basalt. Where present, phenocrysts include hornblende, plagioclase, biotite, and little or no quartz or sanidine (Lipman and Read, 1989).

**Tqk** **Potassium feldspar quartz latite** (Miocene and Oligocene)- Coarsely porphyritic light-gray quartz latite containing potassium feldspar phenocrysts as long as 5 cm (Lipman and Read, 1989).

**Trt** **Amalia Tuff** (Oligocene)- Pinkish-red welded rhyolite tuff with fiamme to 5 cm in length, abundant phenocrysts of quartz and sanidine, and volcanic lithic fragments. Miggins et al. (2002) reported a $^{40}Ar$-$^{39}Ar$ sanidine age of approximately 25.1 Ma. Erupted from the Questa caldera to the east (Lipman and Reed, 1989).

**Tt** **Tuff of Tetilla Peak** (Oligocene)- Quartz-rich, light-colored, weakly welded, rhyolitic ash-flow tuff containing abundant small volcanic fragments. Contains 10-30% phenocrysts of quartz, sanidine, plagioclase and sparse chloritized biotite. Lithic fragments mostly andesite and quartz-bearing rhyolite (Lipman and Read, 1989).

## PROTEROZOIC

**Xd** **Diabase** (early Paleozoic or late Proterozoic(?))- Nonfoliated dark gray-green medium to fine-grained rocks with well preserved ophitic texture (Lipman and Read, 1989).

**Xqc** **Quartz monzonite of Columbine Creek** (Paleoproterozoic)- White to gray to pale tan, moderately to strongly foliated quartz monzonite. Recrystallized to sugary textured, non foliated rock near Tertiary plutons. Age is 1730 Ma (Lipman and Reed, 1989).

**Xq** **Quartzite** (Paleoproterozoic)- White to gray, massive, vitreous quartzite with crossbeds defined by heavy mineral concentrations. Pervasively fractured into decimeter-scale, angular lozenges by joints, irregular fractures, and bedding (Lipman and Read, 1989).

**Xms** **Biotite muscovite schist and gneiss** (Paleoproterozoic)- Medium- to coarse-grained, thinly layered to massive, lustrous quartz mica schist and gneiss. Commonly contains sillimanite. Locally contains garnet, andalusite and cordierite (Lipman and Read, 1989).

**Xfg** **Felsic gneiss** (Paleoproterozoic)- Pale gray to orange-brown, micaceous, weakly to moderately foliated, quartzofeldspathic gneiss locally grading to micaceous quartzite. Commonly interlayered with amphibolite and amphibole gneiss (Lipman and Read, 1989).

**Xa** **Amphibolite** (Paleoproterozoic)- Thinly layered to massive, fine- to coarse-grained, medium green to dark green to black amphibolite and amphibole gneiss. Locally contains calc-silicate gneiss, biotite-hornblende gneiss, felsic gneiss, and muscovite biotite schist (Lipman and Read, 1989).

**Xu** **Proterozoic undivided** (Paleoproterozoic)- Undivided Proterozoic crystalline rocks shown in cross section only.

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