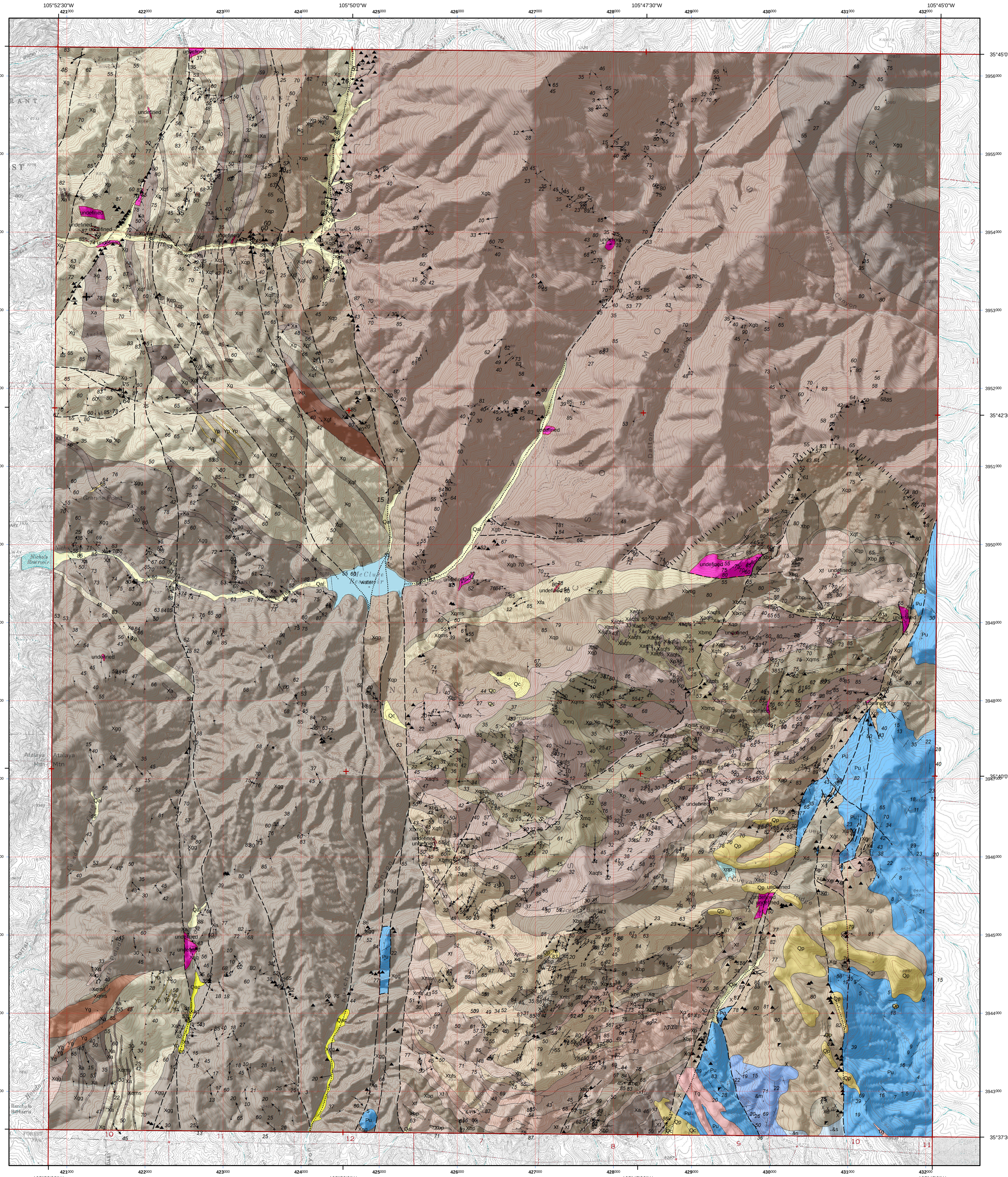
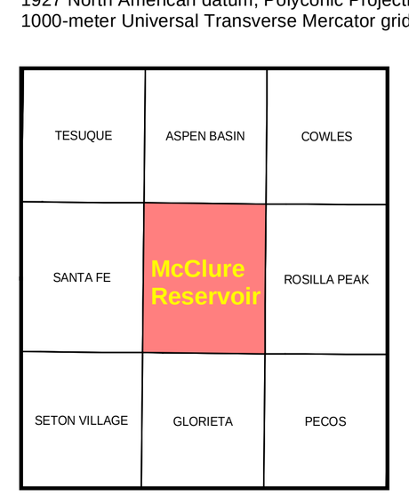
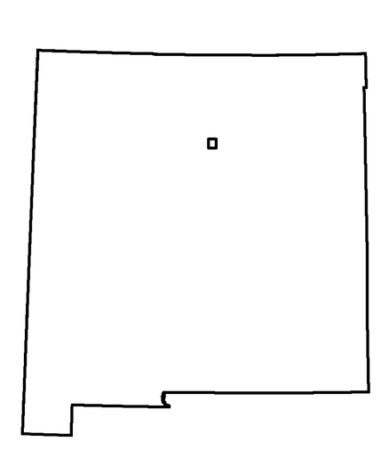


Base map from U.S. Geological Survey 1953, from photographs taken 1948, field checked in 1953, Photoinspected in 1976.
1927 North American datum, Polyconic Projection, Reprojected to UTM projection -- zone 13N
1000-meter Universal Transverse Mercator grid, zone 13, shown in red





QUADRANGLE LOCATION

Magnetic Declination
July, 2010
09º 02' East
At Map Center

1:24,000

1 MILE — 1 0.5 0
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0.5 0 1 KILOMETER

CONTOUR INTERVAL 40 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

New Mexico Bureau of Geology and Mineral Resources
Open-file Geologic Map **07**

This draft geologic map is preliminary and will undergo revision. It was produced from either scans of hand-drafted originals or from digitally drafted original maps and figures using a wide variety of software, and is currently in cartographic production. It is being distributed in this draft form as part of the bureau's Open-file map series (OFGM), due to high demand for current geologic map data in these areas where STATEMAP quadrangles are located, and it is the bureau's policy to disseminate geologic data to the public as soon as possible.

After this map has undergone scientific peer review, editing, and final cartographic production adhering to bureau map standards, it will be released in our Geologic Map (GM) series. This final version will receive a new GM number and will supercede this preliminary open-file geologic map.

DRAFT

Mapping of this quadrangle was funded by a matching-funds grant from the STATEMAP program of the National Cooperative Geologic Mapping Act, administered by the U. S. Geological Survey, and by the New Mexico Bureau of Geology and Mineral Resources, (Dr. Peter A. Scholle, *Director and State Geologist*, Dr. J. Michael Timmons, *Geologic Mapping Program Manager*).

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This and other STATEMAP quadrangles are (or soon will be) available for free download in both PDF and ArcGIS formats at:

http://geoinfo.nmt.edu/publications/maps/geologic/ofgm/home.html

Geologic map of the McClure Reservoir quadrangle, Santa Fe County, New Mexico

May 1996

by
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COMMENTS TO MAP USERS

A geologic map displays information on the distribution, nature, orientation, and age relationships of rock and deposits and the occurrence of structural features. Geologic and fault contacts are irregular surfaces that form boundaries between different types or ages of units. Data depicted on this geologic quadrangle map may be based on any of the following: reconnaissance field geologic mapping, compilation of published and unpublished work, and photogeologic interpretation. Locations of contacts are not surveyed, but are plotted by interpretation of the position of a given contact onto a topographic base map; therefore, the accuracy of contact locations depends on the scale of mapping and the interpretation of the geologist(s). Any enlargement of this map could cause misunderstanding in the detail of mapping and may result in erroneous interpretations. Site-specific conditions should be verified by detailed surface mapping or subsurface exploration. Topographic and cultural changes associated with recent development may not be shown.

Cross sections are constructed based upon the interpretations of the author made from geologic mapping, and available geophysical, and subsurface (drillhole) data. Cross-sections should be used as an aid to understanding the general geologic framework of the map area, and not be the sole source of information for use in locating or designing wells, buildings, roads, or other man-made structures.

The map has not been reviewed according to New Mexico Bureau of Geology and Mineral Resources standards. The contents of the report and map should not be considered final and complete until reviewed and published by the New Mexico Bureau of Geology and Mineral Resources. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the State of New Mexico, or the U.S. Government.

Quaternary Surficial Deposits

Qal **Alluvium -** Holocene valley alluvium (<1 - 6 m thick).Predominantly sand and silt with local gravely or clay rich beds.

Qc **Colluvium -** Holocene colluvium. Coarse grained, poorly sorted, poorly stratified, colluvial deposits.

Ql **Landslide blocks**—Blocks of Paleozoic sedimentary rocks that have slumped into Wild Horse Creek.

Qt **Talus**—Unconsolidated Proterozoic rocks ranging in size from cobbles to boulders, along the northwestern slope of Thompson Peak.

Qp **Pediment gravels**—Locally derived, sand- to cobble-size Precambrian rock fragments found in the southeastern corner of the map area.

Paleozoic Sedimentary Rocks

Pu **Undivided Paleozoic rocks**—Mississippian, Pennsylvanian, and Permian sedimentary rocks that unconformably overlie the Proterozoic basement. Dominated by limestones, with lesser arkosic and quartz sandstone and red to brown mudstone. Located in the southeastern corner of the map, and in fault bounded slivers along the Borrego and the Picuris–Pecos fault zones.

Middle Proterozoic Plutonic Rocks

Yp **Pegmatite -** Simple pegmatites of quartz-feldspar-muscovite, generally several meters thick, although locally up to 10-15 m thick. Typically crosscut foliation in supracrustal rocks. Associated with Yg. Pegmatites are voluminous in several parts of the map area.

Yg **Quartz porphyry granitoid**- Orange, medium-grained, equigranular, muscovite-bearing granitoid. Undeformed. Cross-cuts supracrustal rocks and granitoids in southwestern map area. Associated with abundant pegmatites.

Early Proterozoic Plutonic Rocks

Xp **Pegmatite, aplite and granitic dikes**—Granitic dikes consisting of simple pegmatites, granitoid, aplite, or some combination. Intrude both plutonic and supracrustal rocks. Dikes range in size from centimeters to tens of meters and may be either concordant or discordant to foliation or compositional layering. Numerous undeformed, granitic dikes appear to be associated with the emplacement of the two– mica granitoid (Xbmg) and crosscut the surrounding country rock. Dikes are most common in the southern and western halves of the quadrangle.

Xgg **Gneissic granitoid—**Orange colored, medium– to coarse–grained gneissic granitoid is the dominant rock type exposed south of the Santa Fe river and west of the Borrego fault zone. The unit is composed of plagioclase, K-feldspar, quartz, biotite and iron oxides. The gneiss is strongly deformed and varies from an S–tectonite to an L-tectonite. Locally, feldspar augen are well developed. Contains small lenses and layers of amphibolite, and is intruded by several small bodies of fine–grained granitoids. In the northern map area, gneissic granitoid is in contact with a package of interlayered supracrustal rock and fine–grained biotite granitoid. Locally a distinctive, medium– to coarse–grained, white, strongly foliated gneissic crops out. The contact between white gneissic granitoid and gneissic granitoid appears to be gradational.

Xfg **Fine grained foliated granitoid—**North of McClure reservoir. Composed of fine–grained, foliated granitic rock containing k-feldspar, plagioclase, quartz, biotite, ± muscovite. Is locally interlayered with quartz–rich schist. The granitiod also contains small bodies of medium– to fine–grained granitic rock that intrudes the gneissic granitoid and biotite granite along the Santa Fe River.

Xmg **Megacrystic granitoid**—Megacrystic quartz, plagioclase, K-feldspar, biotite granitoid. Megacrysts of K-feldspar are up to 8 cm long. Located in the northeast corner of the map.

Xbmg **Biotite muscovite granite**—This orange to pink, two–mica granitoid is exposed north of Thompson Peak and crosscuts biotite granite, quartz porphyry and the ThompsonPeak metamorphic suite. Several small, isolated bodies also occur southwest of Thompson Peak near the Borrego fault zone. The rock is medium– to fine–grained and weakly foliated to unfoliated. The granitoid consists of quartz, plagioclase, microcline, muscovite and biotite. A narrow, resistant, silicified aureole is found adjacent to the intrusive contacts (Renshaw, 1984). Numerous inclusions of supracrustal rocks and the discordant contacts indicate an intrusive contact. The discordant contact relations and minor deformation indicate this granitoid is late– to post–kinematic with respect to the deformation and metamorphism experienced by the Thompson Peak Complex. The absolute age of this granitoi is not known. Moench and others (1988) mapped this rock as Xgb, biotite granite.

Xqf **Quartz feldspar aphanite**— East of the Borrego fault zone. This pink to orange rock is interpreted to be the fine–grained border phase of the quartz porphyry (Xqp) and crops out along the northern margin of the Thompson Peak metamorphic suite. The rock consists of quartz, K–feldspar, plagioclase ± epidote, chlorite, biotite, muscovite and iron oxides (Fulp, 1982).

Xqp **Quartz porphyry**—Orange quartz porphyry intrudes the northern margin of the Thompson Peak metamorphic suite, with a separate body exposed southeast of Thompson Peak, along the Picuris–Pecos fault zone. Large, polycrystalline quartz eyes (2–8 mm in length) are in a fine–grained (•0.5 mm) groundmass of quartz, k–feldspar, plagioclase and muscovite with minor biotite and magnetite. The quartz eyes range from round to ellipsoidal. A fine–grain border phase (Xqf), that lacks quartz eyes, crops out locally along the contacts with the supracrustal rocks (Fulp, 1982; Renshaw, 1984). The intensity of deformation within this unit is variable with both low–strain and high–strain domains. S–C fabrics in the northern exposure are well developed and show componens of right–slip and reverse, dip–slip across a south to southeast dipping foliation plane (Daniel, 1995). Inclusions of metasedimentary and metavolcanic rocks are observed within the quartz porphyry, and Renshaw (1984) noted parallel foliations in both rock types. Preliminary U/Pb zircon ages were reported in Fulp (1982) at 1650 ±10 Ma and Renshaw (1984) at 1660 ±10 Ma. The northernmost quartz porphyry grades abruptly into a more biotite–rich granitoid (Xbg) towards the north. Where this unit is cut by the Picuris–Pecos fault zone, it is brecciated with cataclastic zones. This unit was mapped as quartz porphyry and aphanite (Xgq) by Moench and others (1988).

Xbg **Biotite granite**—Red to orange, fine– to medium–grained granitoid is the dominate rock type in north–central part of the quadrangle and is found both east and west of the Borrego fault zone. East of the Borrego fault, the southern margin of this pluton is bounded by both the quartz porphyry and the Thompson Peak metamorphic suite. The granitoid consists of quartz, K-feldspar, and plagioclase with variable amounts of biotite. Typically, this granitoid is well foliated, although both low strain and high strain domains exist. A distinctive feature of this granitoid is the presence of rounded quartz eyes. Although similar in appearance to the quartz porphyry (Xqp), Xbg has more biotite, little muscovite and the matrix grain size is slightly larger. No well defined contact exists between the biotite granite and quartz porphyry, and thus they are distinguished by their differences in biotite content and grain size. Xbg is tentatively interpreted as a deep level of Xqp. The biotite granite is strongly fractured and brecciated where cut by the Borrego and Picuris–Pecos fault zones. Corresponds with Xgb mapped by Moench and others (1988); they assigned this unit to the Santa Fe Baldy batholith.

Xg **Granitoid**—The main body is a coarse–grained, strongly foliated and lineated, biotite granite consisting of k-feldspar and plagioclase phenocrysts, quartz, biotite and iron oxides. Exposed along the southern margin of the quadrangle, just east of the Borrego fault zone, where it bounds the southern margin of the Thompson Peak metamorphic suite. There are no inclusions of supracrustal rock in the granitoid, and no dikes intrude from the granitoid into the supracrustal rocks. The contact dips about 40° to the north. A highly strained, fine– to medium–grained muscovite–bearing border phase (~30 m wide) exists adjacent to the supracrustal rocks (Daniel, 1995). The contact may represent a sheared intrusive contact or a sheared unconformable contact. This unit was mapped as Xgb, biotite granite, by Moench and others (1988); they also referred to this granitic body as the Shaggy Peak batholith. The age of the granitoid is unknown.
West of the Borrego fault zone Xg is a fine- to medium-grained, orange to pink to red, fairly equigranular granitoid. Commonly contains layers and lenses of layered supracrustal rocks, aplites, and pegmatites. Includes a fine-grained granitoid/aplite unit that is exposed west of the Borrego Fault in the northernmost map area. Commonly interlayered with Xqp. Ranges from strongly to weakly foliated.

Xgr **Granodiorite—**Pink, unfoliated, medium–grained, k-feldspar, plagioclase, quartz and lesser amounts of biotite, chlorite, muscovite, epidote, and iron oxides (Renshaw, 1988). This unit is found within, and east of, the Picuris–Pecos fault zone. Granodiorite crosscuts both the diorite (Xd) and leucogranite (Xl), and inclusions of both rock types exist within the granodiorite. Within the fault zone, the rock is highly fractured and brecciated. Moench and others (1988) mapped these rocks as Xgb, biotite granite.

Xl **Leucogranite**—A minor unit that consists of several rock types including biotite trondhjemite, biotite granodiorite and biotite–quartz diorite (Renshaw, 1984). Poorly exposed and commonly highly fractured and brecciated. Moench and others (1988) show a roughly equivalent map unit Xtga, consisting of undivided tonalite, quartz diorite, trondhjemite and gabbro.

Xd **Diorite**—Medium– to fine–grained, dark gray diorite with minor diabase crops out within, and east of, the Picuris–Pecos fault zone. Composed of hornblende and plagioclase with lesser amounts of quartz, biotite, epidote, iron oxides and traces of sphene and apatite (Renshaw, 1984). The diorite is intruded by granodiorite (Xgr) and is unconformably overlain by Paleozoic sedimentary rocks. Moench and others (1988) mapped equivalent rocks as Xt, undivided tonalite, quartz diorite, and trondhjemite and Xga, undivided gabbro and diabase.

Precambrian Supracrustal Rocks

Stratigraphic Note: Daniel (1995) proposed that the interlayered metavolcanic and metasedimentary rocks exposed west of the Picuris–Pecos fault zone, including those west of the Borrego fault zone, be called the Thompson Peak metamorphic suite. This provides a more formal and appropriate designation for these rocks than the previous informal designation of McClure Septum used by Moench and others (1988). Moench and others (1988) show this sequence of rocks as being upright with a defined stratigraphic sequence. However, neither Fulp (1982), Renshaw (1984), nor this study could find any consistent stratigraphic younging indicators. Indeed, the few indicators reported by Renshaw (1984) suggest the Thompson Peak metamorphic suite may be overturned. Given the conflicting younging directions, we follow Fulp (1982) and Renshaw (1984) by not proposing any stratigraphic succession for these rocks.

Xa **Amphibolite**—Amphibolite ranges from black to green in color, coarse– to fine–grained, with blue–green hornblende, plagioclase, quartz, and sphene, ± epidote, ± garnet, ± biotite. Chlorite has replaced biotite, and is interpreted as retrograde. Locally, amphibolite is interlayered with quartzite and/or felsic phyllite and gneisse at the centimeter and meter scales. Continuous layers and discontinuous lenses exist within the gneissic granitoid (Xgg), white gneissic granitoid (Xwg) and fine–grained foliated granitoid (Xfg). The protolith for these amphibolites may include basaltic flows, shallow dikes and sills, and volcaniclastic sediments. Equivalent to the basaltic amphibolite (Xab) unit of Moench and others (1988).

Xf **Felsic schist and phyllite**—Generally fine–grained, orange, brown, or light–gray in color, composed primarily of quartz, muscovite, microcline and plagioclase, with minor biotite and rare garnet. Quartz eye-bearing horizons exist locally. Amphibolite and quartzite layers are interlayered with felsic schists. This unit is interpreted as metamorphosed felsic volcanic and volcaniclastic rocks. Renshaw (1984) mapped these rocks as felsic phyllite.

Xbp **Biotite and pelitic schist**—The biotite and pelitic schist unit is a heterogeneous unit with biotite–rich schist dominant in the southern map area, and pelitic schists, mafic phyllite and feldspar–quartz–magnetite phyllite in the north. Small bodies of two-mica granitoid (Xbmg) intrude Xbp west of Thompson Peak. Green–gray pelitic schist is composed of quartz, muscovite and plagioclase with lesser biotite and chlorite. Co-existing sillimanite (fibrolite), garnet and staurolite have been reported (Renshaw, 1984). A minor component of mafic schist contains hornblende, plagioclase, quartz, oxides, plus minor epidote and biotite. Contacts with muscovite schist (Xms) and quartz–feldspar schist (Xqfs) are gradational and poorly exposed. Aluminous shales are the inferred protolith for the biotite and pelitic schist.

Xms **Muscovite schist**—Strongly foliated and crenulated gray to brown muscovite schist composed of muscovite and quartz with lesser amounts of biotite, plagioclase, chlorite, iron oxides and ± garnet, ± staurolite, ± fibrolite. Exposed in the southern half of the Thompson Peak Metamorphic suite. Contacts with biotite and pelitic schists (Xbp) and quartz–feldspar schist (Xqfs) are gradational and generally poorly defined.

Xq **Quartzite**—Small, discontinuous lenses and pods of quartzite are exposed south of Glorieta Baldy. The quartzite is commonly gray to white, fine-grained, well-foliated, with minor amounts of muscovite and iron oxides. West of the Borrego fault zone, in the southwestern map area, Xq includes gray, coarse-grained, strongly layered quartzite and fine-grained, quartz-rich, finely bedded, dense gneiss with gray and white layers and minor biotite. Protolith is probably quartz sandstone.

Xqfs **Quartz feldspar schist**— Light tan, brown and gray, fine– to medium–grained, interlayered with small lenses of quartzite. The schist consists of quartz, plagioclase and K-feldspar. Iron oxides define compositional layering and crossbeds. The schist is strongly foliated and often crenulated. Although poorly exposed, the best exposure is south of Glorieta Baldy; however, lenses and layers are also mapped within the mixed amphibolite felsic schist unit (Xaqfs). These rocks are intruded by several small bodies of two mica granitoid (Xbmg) southwest of Thompson Peak and quartz porphyry (Xqp) east of Thompson Peak, adjacent to the Picuris–Pecos fault zone. This unit was mapped by Renshaw (1984) as pCqmf, quartz–muscovite–feldspar schist.

Xmq **Muscovite quartzite**—These rocks are characterized by a light–gray color, fine grain size, with quartz and muscovite as the major components, and minor biotite, oxides and locally feldspar. Exposed in the Thompson Peak area. Renshaw (1984) reported ovoid sphene and zircon, which he interpreted as detrital grains. The rock is resistant and serves as a good marker layer. This unit was mapped by Renshaw (1984) as muscovite quartzite (pCmq). Protolith is probably quartz sandstone.

Xqms **Quartz muscovite schist**—Gray, fine– to medium–grained. Ranges from quartz–rich schist to micaceous quartzite with variable amounts of plagioclase, biotite, muscovite and minor amounts of iron oxide, and locally garnet, staurolite and retrograde chlorite. A higher proportion of quartz relative to muscovite distinguishes this rock from other schists. Well-developed foliation. This unit includes the quartz–mica schist (pCqms) and quartz–plagioclase–mica schist (pCmqp) mapped by Renshaw (1984). I nferred protolith is interbedded sandstone and siltstone with minor aluminous shale.

Xaqfs **Interlayered amphibolite and quartz feldspar schist**—Heterogeneous unit that includes two mapable rock packages separated by muscovite quartzite (Xmq) and quartz–muscovite schist (Xqms). Within this mixed unit, amphibolite is intimately interlayered with quartz–mica–feldspar schists, plagioclase–hornblende–biotite schist, feldspathic schist, mafic phyllite and minor quartzite and felsic schists. Amphibolite is the dominant rock type (••50%), and is black, strongly foliated and lineated; grain size ranges from fine (< 1mm) to coarse (1 cm). Amphibolite consists of hornblende, plagioclase with minor amounts of quartz, epidote, iron oxides, ± biotite and rare garnet. Centimeter– to meter–scale kink folds and isoclinal folds are common in the amphibolite exposed along the ridge crest south of Thompson Peak; 10 to 20 cm-long quartz rods are found in the amphibolite in this area. Quartz–feldspar schist is the second most common rock type n this unit; it is fine to medium–grained, well-foliated, and contains quartz, plagioclase, variable amounts of K-feldspar, muscovite, biotite, and iron oxides. Quartz porphyroclasts and crossbeds have been found locally within the quartzite (Renshaw, 1984). Locally quartz–muscovite schist contains garnet, biotite, staurolite, and chlorite. The northernmost unit is intruded by quartz porphyry (Xqp) and two–mica granitoid (Xbmg). The lenses and stringers of schist and quartzite suggest that these rocks originated as clastic and volcaniclastic sediments with coeval mafic to intermediate flows and shallow dikes and sills; an interpretation favored by both Fulp (1982) and Renshaw (1984). These rocks correspond to the Thompson Peak (pCtp) and Long Walk Canyon (pClwc) heterogeneous units of Renshaw (1984).

Xfa **Interlayered felsic schist and amphibolite**—Predominantly orange to red, felsic schist and gneiss interlayered with black amphibolites. Contains thin, discontinuous layers of mica schist and muscovite bearing quartzite. Crosscut by relatively undeformed dikes of two–mica granitoid. Locally, garnets exist in lenses of muscovite schist and within felsic schist and gneisse. This unit may be equivalent to the Xaqfs unit further south.

Xqf **Quartzofeldspathic rock -** Mixed unit that consists predominantly of layered, quartz-rich, fine-grained schist, quartzite, quartz-feldspar-muscovite gneiss, and amphibolite. West of the Borrego fault zone. Commonly associated with Xa. Original sedimentary structures found in northeast map area indicate that at least part of this unit (and probably Xa) is supracrustal.

Correlation of Map Units - McClure Reservoir 7.5-min Quadrangle