

# Geologic Map of the McClure Reservoir Quadrangle, Santa Fe County, New Mexico

By

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*Open-file Digital Geologic Map OF-GM 007***

**Scale 1:24,000**

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## GEOLOGY OF THE McCLURE RESERVOIR 7.5-MIN QUADRANGLE, SANTA FE COUNTY, NEW MEXICO

### GEOLOGICAL MAP UNIT DESCRIPTIONS

#### Quaternary Surficial Deposits

- Qal Alluvium** - Holocene valley alluvium (<1 - 6 m thick). Predominantly sand and silt with local gravelly 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 granitoid 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 Thompson Peak 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 granitoid 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 components 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  $1650 \pm 10$  Ma and Renshaw (1984) at  $1660 \pm 10$  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 dominant 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  $40^\circ$  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 (XI), 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.

**XI 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 gneiss 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 volcanoclastic 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 volcanoclastic 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). Inferred protolith is interbedded sandstone and siltstone with minor aluminous shale.
- Xaqfs Interlayered amphibolite and quartz feldspar schist**—Heterogeneous unit that includes two mappable 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 ( $\geq 50\%$ ), and is black, strongly foliated and lineated; grain size ranges from fine ( $< 1\text{mm}$ ) to coarse (1 cm). Amphibolite consists of hornblende, plagioclase with minor amounts of quartz, epidote, iron oxides,  $\pm$  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 in 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 volcanoclastic 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.

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Wakefield,

# MINERAL RESOURCES OF THE McCLURE RESERVOIR QUADRANGLE SANTA FE COUNTY, NEW MEXICO

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## INTRODUCTION

The McClure Reservoir 7.5-minute quadrangle of north-central New Mexico contains several metallic mineral resources in Precambrian supracrustal rocks. These include polymetallic volcanogenic sulfide prospects in the Dalton Canyon area, tungsten prospects in the Dalton-Wild Horse Creek area, and minor metal occurrences in Wild Horse Creek and Ruiz Canyon. Stream sediment anomalies of lithophile elements exist in the Santa Fe River and Apache Canyon drainages. Previous work on the mineral resources in the quadrangle includes a mineral survey by the U.S. Geological Survey (Moench and Erickson, 1980), an M.S. thesis on the geology and mineralization of the Dalton Canyon area (Fulp, 1982), an M.S. thesis on the geology and mineralization of the Thompson Peak area (Renshaw, 1984), and a manuscript on a tungsten deposit in the Dalton Canyon drainage (Fulp and Renshaw, 1985). The discussion that follows is a summary of these works and previously unpublished data from a mining company that was active in the area in the early 1980s.

## MINERALIZATION

Metallic mineral resources and occurrences in the McClure Reservoir Quadrangle are shown in Figure 1 and discussed in detail below.

### Dalton Canyon Base and Precious Metals Deposits

Numerous base and precious mineral prospects exist in the Dalton Canyon area. The area was prospected in the early 1900s and again in the 1930s when several adits and pits were dug on copper sulfide showings. Minor amounts of ore were reportedly packed out by burro. In the 1960s, a road was built into the prospects and minor assessment work conducted. Renewed interest occurred in the late 1970s following announcement of a massive sulfide discovery by Conoco at Jones Hill, three miles to the northeast of the McClure Reservoir Quadrangle (World Mining, 1978). The author began geologic mapping and sampling in mid-1979 on behalf of a major mining company, and continued throughout the field season of 1980 on behalf of the New Mexico Bureau of Mines and Mineral Resources. Later that year, the claims were optioned to Santa Fe Mining, which conducted extensive exploration including mapping, rock and soil sampling, geophysical surveying, and drilling in 1981-1982.

Several adits and prospects are located near the junction of the north and main forks of Dalton Canyon along the boundary of sections 16 and 21, T 17N, R 11E. Detailed mine maps of these workings are shown in Figure 2. Mineralization consists of disseminated, stringer, and banded chalcopryite-pyrite in biotite-muscovite-quartz-feldspar phyllite. Exposures are partially oxidized to malachite-limonite, and accessory minerals may include magnetite, pyrrhotite, bornite, chalcocite, covellite, chlorite, sericite, and garnet. In addition to the adits, many prospects of similar nature exist in the area. To the south, two adits and a shaft are driven in mainly barren phyllites (Figure 3).

Mapping and sampling by Fulp (1982) delineated two stratabound horizons of spotty, discontinuous, but locally high-grade copper±silver mineralization in the North-Main Fork area and a stratabound horizon of pyrite-silica±sericite mineralization to the south (Figure 1). Soil sampling revealed strong lead-zinc anomalies along the extensions of the north horizons in feldspar-rich phyllite and copper-lead-zinc anomalies along the south horizon in similar host rocks. In 1981, Santa Fe Mining drilled 5 core holes for a total of 4055 ft to test downdip projections of the two copper-silver horizons hosted by epiclastic metasediments (location map, Figure 2). Mineralized horizons were encountered in all holes, but mineralization was weak and discontinuous, as at the surface. In 1982, another core hole was drilled to 1385 ft in the southern horizon to test coincident copper-lead-zinc soil and induced polarization/resistivity anomalies hosted by pyrite-silica±sericite-bearing felsic metatuffs. This hole



encountered disseminated copper-silver mineralization in upper portions, strong pyrite with strongly anomalous zinc in the lower part, and bottomed in pyritic amphibolite. Drilling ceased in mineralized rock due to a combination of factors, including weak base-metal content, steep topography resulting in minimal depth penetration, and inclement weather. Skeletonized core and logs from the drilling program are stored at the New Mexico Bureau of Mines and Mineral Resources core facility in Socorro, New Mexico. Rugged topography and lack of access hinders further exploration on the western section of the northern mineralized horizons and the entire southern horizon.

### **Dalton Canyon-Wild Horse Creek Tungsten Prospects**

In 1981, following publication of a U.S. Geological Survey report (Moench and Erickson, 1980), Santa Fe Mining conducted exploration for tungsten in the area adjacent to, and south of, the Dalton Canyon metavolcanic center. Some of this work was documented by Renshaw (1984). Forty-five tungsten shows were discovered by an exploration program of panned concentrate sampling, geologic mapping, blacklight traverses, and rock chip sampling. Tungsten occurrences, some of which are composites of more than exposure, are shown in Figure 1, with most localized in the S1/2 section 21 and the N1/2 section 22, T 17N, R 11E. All known occurrences are low-molybdenum scheelite; no wolframite was found. All but one are discordant and occur as veins, veinlets, fracture coatings, and alaskite and pegmatite dikelets in mafic host rocks and rarely, two-mica granite. Gangue minerals include quartz, feldspar, biotite, epidote, actinolite, calcite, tourmaline, and trace sulfides. In the Wild Horse Creek drainage, panned concentrate samples with scheelite are anomalous in boron, bismuth, and molybdenum.

The largest tungsten occurrence is known as the Blacklite prospect (Figure 4) and consists of disseminated scheelite and minor pyrite in a stratabound horizon of epidote-amphibole-biotite-potassium feldspar. It is localized along a near-vertical contact of felsic metatuff and amphibolite. This prospect is described in detail by Fulp and Renshaw (1985). Rugged topography and lack of access hinders further exploration, as it is located on the western part of the southern horizon described above.

### **Stream Sediment Anomalies**

The 1980 U.S. Geological Survey reconnaissance mapping and stream sediment sampling program found other anomalies in addition to those in the Dalton Canyon and Wild Horse Creek drainages (Figure 1). On the west side of the Rio Grande-Pecos divide, especially in the Santa Fe River and Apache Canyon drainages, numerous panned concentrate samples contain high values of tungsten, molybdenum, yttrium, beryllium, thorium, niobium and/or tin in areas drained mainly by two-mica granite. No significant exploration has occurred in these areas, because of land withdrawals and inaccessibility.

### **Minor Occurrences**

Several minor prospects occur in the Wild Horse Creek area and consist of quartz veins, fault gouge, or pyritic quartzite. In the Ruiz Canyon drainage, several small veins and shears contain copper oxides.

## **DISCUSSION**

The genesis of the mineral prospects in Dalton Canyon and Wild Horse Creek has been extensively discussed by Moench and Erickson (1980), Fulp (1982), Renshaw (1984), and Fulp and Renshaw (1985), and will be summarized here.

The polymetallic mineral deposits of Dalton Canyon are stratabound, are hosted by epiclastic to volcanoclastic metasediments and felsic metatuffs and metacherts, occur as disseminated, stringer, and banded ores, are closely associated in space and time with a potassically altered metarhyolite flow-dome complex, and are affected by the earliest metamorphic and structural events recognized in the area. They are interpreted as syngenetic to pre-lithification epigenetic ores and belong to the broad class of volcanogenic sulfide deposits related to seafloor hydrothermal processes at water-rock interfaces.

The Blacklite tungsten prospect is composed of disseminated scheelite within calc-silicate rock, exhibits pronounced mineralogic zoning and anomalous metal contents, is stratabound between sulfidic, cherty, felsic metatuffs and barren metabasalts and mafic metasediments, has a potassically altered zone, and exhibits metamorphic grade consistent with areal country rocks. It is interpreted as a

syngenetic tungsten deposit exhaled as a chemical sediment at the close of the Dalton volcanic cycle and subsequently metamorphosed and deformed.

With the above exception, all other known tungsten occurrences in the area are discordant quartz veins and pods, fracture coatings, and pegmatites hosted by mafic country rocks, or rarely, two-mica granite. However, there is no obvious spatial relationship between tungsten and two-mica granite or its contacts. Most of these discordant scheelite-bearing veins and pods crop out near the Blacklite prospect. These occurrences are interpreted to have been remobilized from the Blacklite prospect or similar buried deposits by regional metamorphism and/or minor hydrothermal activity associated with granite intrusion.

The bedrock sources of tungsten, molybdenum, niobium, yttrium, beryllium, thorium, and tin anomalies in the drainage basins of the Santa Fe River and Apache Canyon have not been investigated. However, the common association of lithophile elements with highly differentiated two-mica granites is well-documented. It seems likely that the anomalies are derived from granite country rock and occur as late-stage hydrothermal products in pegmatites, alaskites, or local greisen zones.

#### **MINERAL POTENTIAL**

The Dalton Canyon-Wild Horse Creek area has high potential to host economically important volcanogenic sulfide or tungsten deposits, particularly in the western portion of the northern stratabound horizons and the southern horizon. Exploration is hindered by lack of road access and extremely rugged topography of the area. Lithophile element anomalies west of the divide are mainly in areas of mineral withdrawal.

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1.

MINERAL RESOURCES OF THE MCCLURE RESERVOIR QUADRANGLE  
SANTA FE COUNTY, NEW MEXICO  
Compiled by: Michael S. Fulp

Scale:1:24,000

N

Copper-Silver Horizon

Pyrite-Silica Horizon

Sulfides

Soil Anomaly

Tungsten Occurrence

Panned Concentrate Anomaly

W Tungsten>100 ppm

Mo Molybdenum>100 ppm

Be Beryllium> 20 ppm

Nb Niobium>700 ppm

Th Thorium>500 ppm

Sn Tin>300 ppm

Y Yttrium>700 ppm