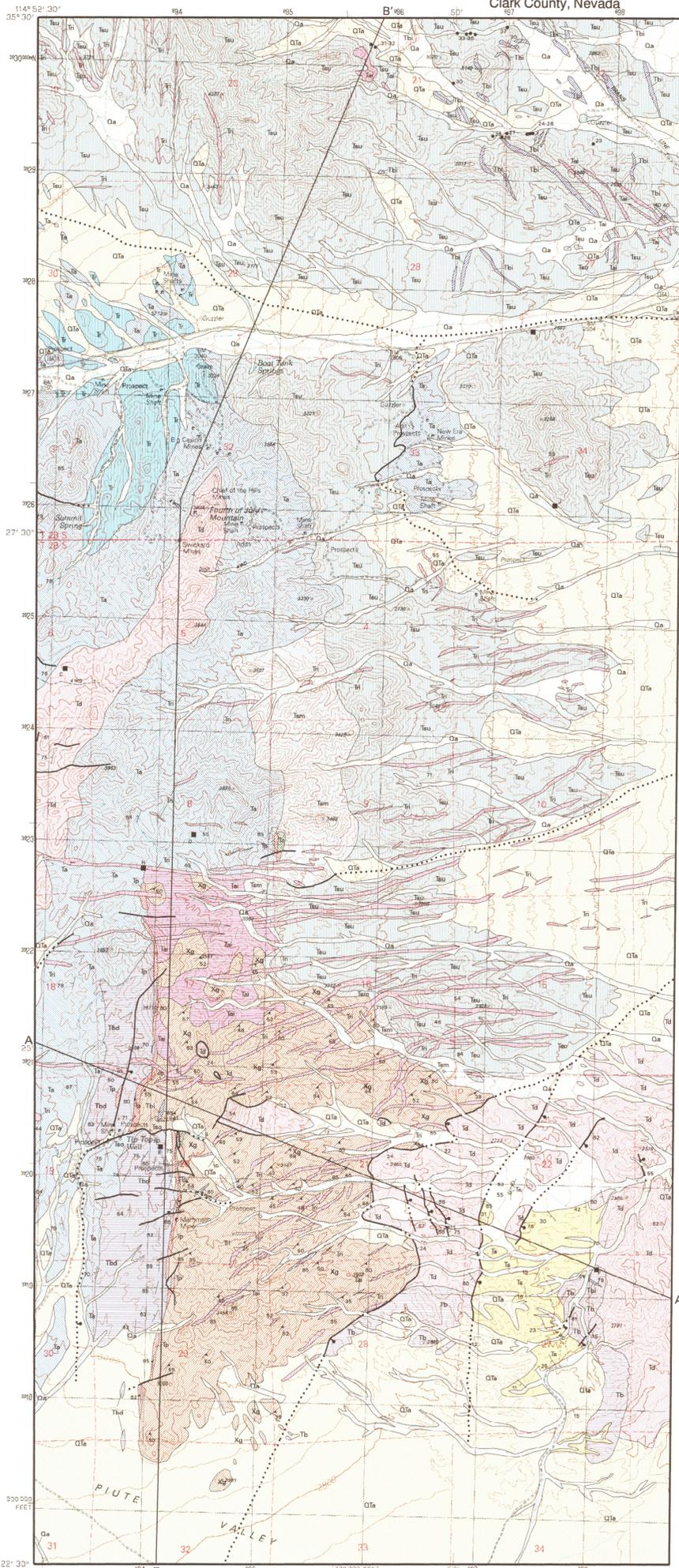


Geologic Map of the Western Half of the Fourth of July Mountain Quadrangle, Clark County, Nevada

Geologic Map of the Western Half, Fourth of July Mountain Quadrangle, Southern Nevada

Ryan F. Ruppert and James E. Faulds

University of Nevada, Reno

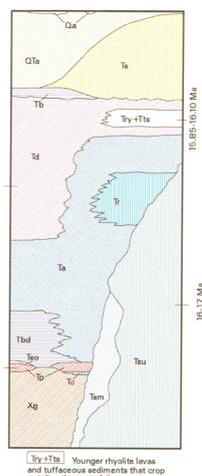


Stratigraphy of the Northern Newberry Mountains

- Oa** Alluvium (Holocene) Tan to gray, poorly sorted, unconsolidated, subangular to subrounded gravel, sand, and silt in recently active washes. Unit is essentially unmet into all older units. Thickness is as much as ~20 m.
- Qta** Alluvium (Pleistocene to late Miocene) Light brown to gray, poorly indurated to unindurated conglomeratic, calcic cemented, matrix supported by a moderately sorted, subangular, fine to coarse grained sand comprising 60-70% of the rock. Subangular to subrounded pebbles to cobble size clasts, up to 30 cm in diameter, make up the other 30-40% of the rock. The clasts are locally derived from Miocene lavas and Proterozoic orthogneiss and are moderately sorted. Beds are 1 to 30 cm thick. Maximum thickness is ~500 m.
- Ti** Conglomerate (late to middle Miocene) Brown to gray, poorly indurated to unindurated conglomeratic, calcic cemented, matrix supported by a moderately sorted, silt to coarse grained sand comprising 60-70% of the rock. Subangular to subrounded pebbles to cobble size clasts make up 30-40% of the rock. Clasts are composed of Proterozoic orthogneiss and Miocene andesites, dacites, basalts, and scoria. Beds range in thickness from 2 to 100 cm. This unit occurs in a developing half graben (i.e., growth fault basin) in the southeastern part of the map area, as evidenced by a progressive decrease in tilt up-section. Thickness is as much as ~800 m.
- Tb** Breccia and basaltic andesite lavas (middle to early Miocene) Reddish-brown to dark gray, basaltic andesite and subordinate basaltic andesite lava and scoria. Clasts in breccia range in size from 5 mm to 50 cm; contains ~10% phenocrysts of plagioclase (andesine), hornblende, olivine, and clinopyroxene. Plagioclase is slightly altered to titanomagnetite and hematite. This unit may correlate with the upper member of the Pease Mine Volcanics or the Mt. Queen Mine of Anderson (1971) and Anderson and others (1972). Individual flows range in thickness from 1 to 10 m. The unit crops out only in the southeastern part of the map area. Thickness is as much as ~75 m.
- Tr** Younger rhyolite lavas and tuffaceous rocks (middle Miocene) A felsic volcanic sequence, which includes a lower section of sandstone-biotite-bearing rhyolite lavas and an upper unit of biotite-bearing non-welded tuffs and tuffaceous sedimentary rocks locally overlain by dacite lavas (Td) directly west of the map area. Although this sequence crops out west of the map area, it represents an important part of the stratigraphic column in the northern Newberry Mountains. Tuffs progressively decrease in thickness within the sequence from >60 deg. in the rhyolite lavas to ~25 deg. in the tuffaceous rocks. A moderately tilted (~60 deg.) rhyolite lava and gently tilted (~25 deg.) non-welded tuff yielded 40Ar/39Ar ages of 16.10 ± 0.07 Ma (sample 1) and 16.85 ± 0.12 Ma (sample 2), respectively (table 1, samples A and B). These data indicate that significant extension occurred between 16.10 and 16.85 Ma in the northern Newberry Mountains. This felsic volcanic sequence probably correlates with the 16.89 to 16.2 Ma felsic volcanic sequence in the Highland Spring Range to the northeast (Olson, 1998) and the volcanic of Doe Mine to the northeast (Faulds and others, 1995; Faulds, 1995).
- Td** Dacite lavas with interbedded andesites and rhyolite (early Miocene) Red to purplish gray, weathering reddish, porphyritic dacite lavas containing ~35-45% phenocrysts composed of 25-40% plagioclase (oligoclase-andesine), 15-40% biotite, 0-30% hornblende, 0-15% quartz, 0-15% titanomagnetite, and 0-10% apatite. Feldspars are partially to mostly altered to sericite and the mafic minerals are slightly to highly altered to titanomagnetite and hematite. Secondary quartz and calcite locally form veinlets, ranging in width from 0.5 mm to 5 mm. This unit is found in both the hanging wall and footwall of the major low-angle normal fault in the southeastern part of the map area. Biotite from a sample collected southwest of Fourth of July Mountain (sample "D" on map) yielded a 40Ar/39Ar age of 16.10 Ma (40Ar/39Ar age 1M; Heizer, unpub. data). This unit probably correlates with the lower member of the Pease Mine Volcanics of Anderson (1971) and Anderson and others (1972) and the 16.10 to 15.8 Ma volcanics of Doe Queen Mine of Faulds and others (1995) and Faulds (1995). Overall thickness ranges up to ~900 m.
- Ta** Andesite lavas with subordinate rhyolite (early Miocene) Purplish gray to brown, weathering dark brown, porphyritic andesite lavas and in the northeast part of the map area, subordinate interbedded light gray to light purplish gray porphyritic rhyolite lavas most commonly consist of massive conformable lava flows. The andesite lavas contain ~10-35% phenocrysts consisting of plagioclase (oligoclase-andesine), biotite, hornblende, clinopyroxene (augite), and titanomagnetite. Locally, feldspars and mafic minerals are partially to largely altered to sericite and titanomagnetite, respectively. Hornblende is locally altered to chlorite. The rhyolite lavas contain 7-10% phenocrysts composed of 40-50% quartz, 30-35% biotite, and 20-25% plagioclase. The plagioclase is partially to largely altered to sericite. This unit probably correlates with the lower member of the Pease Mine Volcanics of Anderson (1971) and Anderson and others (1972) and the 16.10 to 15.8 Ma volcanics of Doe Queen Mine of Faulds and others (1995) and Faulds (1995). A whole-rock sample from the middle part of the map area, in the central part of the map area (sample "D" on map) yielded a 40Ar/39Ar age of 17.28 ± 0.35 Ma (table 1, sample 1). Flow range in thickness from 1 m to 40 m; overall thickness is as much as ~1,600 m.
- Ti** Rhyolite lavas with subordinate andesite and dacite (middle to early Miocene) Light pink to purple gray, weathering brown, porphyritic rhyolite lavas containing ~15-20% phenocrysts of feldspar, biotite, hornblende, and quartz. The rhyolite section is locally interbedded with Ta and Td lavas. Rocks within this unit are hydrothermally altered, feldspar and mafic minerals are mostly altered to sericite and titanomagnetite, respectively. The more resistant rhyolite lavas typically form a series of ridges separated by alluvium-filled valleys. This unit is probably time correlative to the lower member of the Pease Mine Volcanics of Anderson (1971) and Anderson and others (1972) and the 16.10 to 15.8 Ma volcanics of Doe Queen Mine of Faulds and others (1995) and Faulds (1995). In the basal part of this unit, biotite from a dacite flow breccia (sample "E" on map) yielded a 40Ar/39Ar age of 16.57 ± 0.05 Ma (table 1). Thickness is as much as ~400 m.
- Tbd** Flow breccias with interbedded andesite lavas (early Miocene) Purple to brownish-red volcanic breccia, including both andesite and flow breccia, containing 80-90% pebbles to cobble size clasts of dacites and andesites consisting of sericitized feldspars, biotite, hornblende, and quartz. Mafic constituents are locally altered to chlorite and titanomagnetite. Near the base of the unit, the breccias contain less matrix and the flows have a rolled, pillow-like appearance. Further up-section, the matrix becomes more abundant as do flows of andesite. The transition into the overlying andesite section (Ta) is gradational with the contact marked by the last occurrence of thick volcanic breccia. This unit probably correlates to the lower member of the Pease Mine Volcanics of Anderson (1971) and Anderson and others (1972) and the 16.10 to 15.8 Ma volcanics of Doe Queen Mine of Faulds and others (1995) and Faulds (1995). In the basal part of this unit, biotite from a dacite flow breccia (sample "E" on map) yielded a 40Ar/39Ar age of 16.57 ± 0.05 Ma (table 1). Thickness is as much as ~400 m.
- Tso** Sandstone and conglomerate with interbedded tuffaceous sediment (early Miocene) Pale red to dark reddish-brown, matrix supported, hematite cemented, fine-grained sandstone to pebble conglomerate. Both the conglomerate and sandstone contain 30-70% clasts of Proterozoic gneiss and Miocene lava. The matrix consists of 40-50% feldspar, 35-45% quartz, 5-15% biotite, and 5-10% titanomagnetite. The feldspars and biotite are largely altered to sericite and chlorite, respectively; secondary calcite is locally present. The unit is locally interbedded with light blue-gray, weathering to dark gray, matrix supported, tuffaceous sediment consisting of 95-90% very fine to fine grained sand composed of 50-60% feldspar, 36-45% quartz, and minor biotite and titanomagnetite. The feldspars and biotite are generally altered to sericite and chlorite, respectively. This unit is restricted to the area directly south of the transverse fault near Tip Top Hill in the south-western part of the map area. Individual beds range in thickness from 1 to 30 cm; overall thickness is as much as ~35 m.
- Ts** Peach Springs Tuff (early Miocene) Pale purple, weathering orange-brown, moderately welded, rhyolite ash-flow tuff containing ~10-20% phenocrysts, composed of 80-90% feldspar (andesine and andesine), 10% biotite, and minor quartz, zircon, and apatite. Feldspars are commonly largely altered to sericite, whereas the mafic constituents are largely altered to titanomagnetite. This unit correlates with 16.5 Ma Peach Springs Tuff (cf. Glaner and others, 1996; Nielson and others, 1990; Faulds and others, 1995), as evidenced by stratigraphic position, lithology, and phenocryst composition. The tuff is a prominent ridge former but locally pinches out in the southern part of the map area. Thickness is as much as ~75 m.
- Tc** Conglomerate (early Miocene) Reddish-brown, poorly sorted, pebbles to cobble, pre-volcanic arkosic conglomerate. This unit is calcic cemented and matrix supported, consisting of 50-50% angular to subangular clasts of Proterozoic orthogneiss and gneiss. The matrix is a poorly sorted silt to subangular medium-grained sandstone and comprises 40-50% of the rock. The conglomerate is thickest directly south of the transverse fault near Tip Top Hill and is absent in the northern part of the map area. This unit correlates with the ~20 Ma conglomerate of Cottonwood Pass of Faulds (1995). Thickness is as much as ~10 m.
- Xg** Orthogneiss (Early Proterozoic) Olive gray, weathering to dark brown, quartz-feldspathic orthogneiss containing 30% quartz, 25% potassium-feldspar (microcline), 20% plagioclase (oligoclase-andesine), 15% biotite, 10% titanomagnetite, and accessory epidote, zircon, garnet (almandine), and hornblende. The feldspars and biotite are locally altered to sericite and chlorite, respectively; hornblende is largely altered to actinolite. Maximum exposed thickness is as much as ~3 km.

Intrusive Rocks

- Ti** Rhyolite dikes (middle to early Miocene) Light gray to purplish gray, weathering to brownish-gray, porphyritic rhyolite dikes containing ~7-30% phenocrysts of quartz, plagioclase, biotite, and/or hornblende. The feldspars are mostly altered to sericite; mafic minerals are locally altered to titanomagnetite and chlorite. Secondary calcite is present locally. Some dikes contain apatite. The rhyolite dikes generally strike east-northeast in the central part of the map area; a few north-striking rhyolite dikes are present in the northwest part of the map area. Potassium feldspar from an east-striking dike in the central part of the map area (sample "H" on map) yielded a 40Ar/39Ar age of 16.20 Ma, but the K-spar probably represents altered sandstone. Thus, the date may record timing of alteration as opposed to emplacement. Biotite from a sample collected from a north-striking dike in the Eldorado Mountains north of the map area yielded a 40Ar/39Ar age of 15.84 ± 0.12 Ma (40Ar/39Ar age table 1, sample G; Heizer, unpub. data).
- Ta** Andesite dikes (early Miocene) Light green to gray, weathering dark brown, porphyritic andesite dikes containing ~30-40% phenocrysts of plagioclase, biotite, clinopyroxene (augite), and +/- hornblende. Feldspar is mostly altered to sericite, biotite and hornblende are partially to totally altered to titanomagnetite and hematite. The andesite dikes strike approximately north and dip gently to the east. Some Ta intrusions may be cognetic with the Searchlight pluton (Tsu).
- Tb** Basaltic andesite dikes (middle to early Miocene) Reddish-brown to dark gray, weathering to dark brown, basaltic dikes containing ~5-10% phenocrysts of plagioclase, clinopyroxene (augite), +/- biotite, and +/- hornblende. Plagioclase is locally altered to sericite, biotite and hornblende are partially to mostly altered to hematite and titanomagnetite.
- Tem** Searchlight pluton: fine grained marginal facies (middle to early Miocene) Light gray quartz monzonite porphyry containing ~60% phenocrysts composed of 40% potassium-feldspar (microcline), 35% plagioclase (oligoclase), 15% biotite, and 10% titanomagnetite. Feldspars and biotite are partially altered to sericite and chlorite, respectively. Groundmass consists of feldspars (mostly altered to sericite), quartz, and lesser biotite and titanomagnetite. Small stacked blocks of Miocene volcanic tuff, Cretaceous two-mica granite, and Proterozoic gneiss are locally engulfed by, and included within, Tem. The large intrusion of Ta in section 17, T285, R44E, is possibly a more fine grained groundmass composed of the quartz monzonite porphyry. Thickness is as much as ~800 m.
- Tsu** Searchlight pluton (middle to early Miocene) Light gray, medium- to coarse-grained, quartz monzonite porphyry containing ~60% potassium-feldspar (microcline), 25% plagioclase (oligoclase), 15% quartz, 10% biotite, 5% titanomagnetite, hornblende, and accessory clinopyroxene (augite) and apatite. The intrusion becomes more mafic in the northeast part of the map area, where hornblende locally makes up as much as 15% of the rock. Clasts in the map area, hornblende is generally found in only trace amounts. Locally, feldspars and biotite are partially altered to sericite and chlorite, respectively. The rock weathers to large rounded boulders. The age of the pluton is constrained to 16.7 ± 0.3 Ma by two ion-probe ages on zircon (C.F. Miller, personal communication, 1998). In addition, two samples from the map area yielded 40Ar/39Ar ages of 16.69 ± 0.20 Ma and 16.34 ± 0.13 Ma on biotite (samples "I" and "J", respectively, on the map; table 1). Paleomagnetic data indicate that the pluton is tilted at least 50 degrees to the west. Overall thickness is estimated between 10 and 15 km.



SYMBOLS

- Approximately located contact
- Approximately located fault showing dip
- Approximately located fault showing dip dotted where concealed
- Strike and dip of inclined bedding
- Strike and dip of overturned bedding
- Strike and dip of foliation in metamorphic and volcanic rocks
- Sample locality for geochronologic age determination
- Paleomagnetic site locality

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