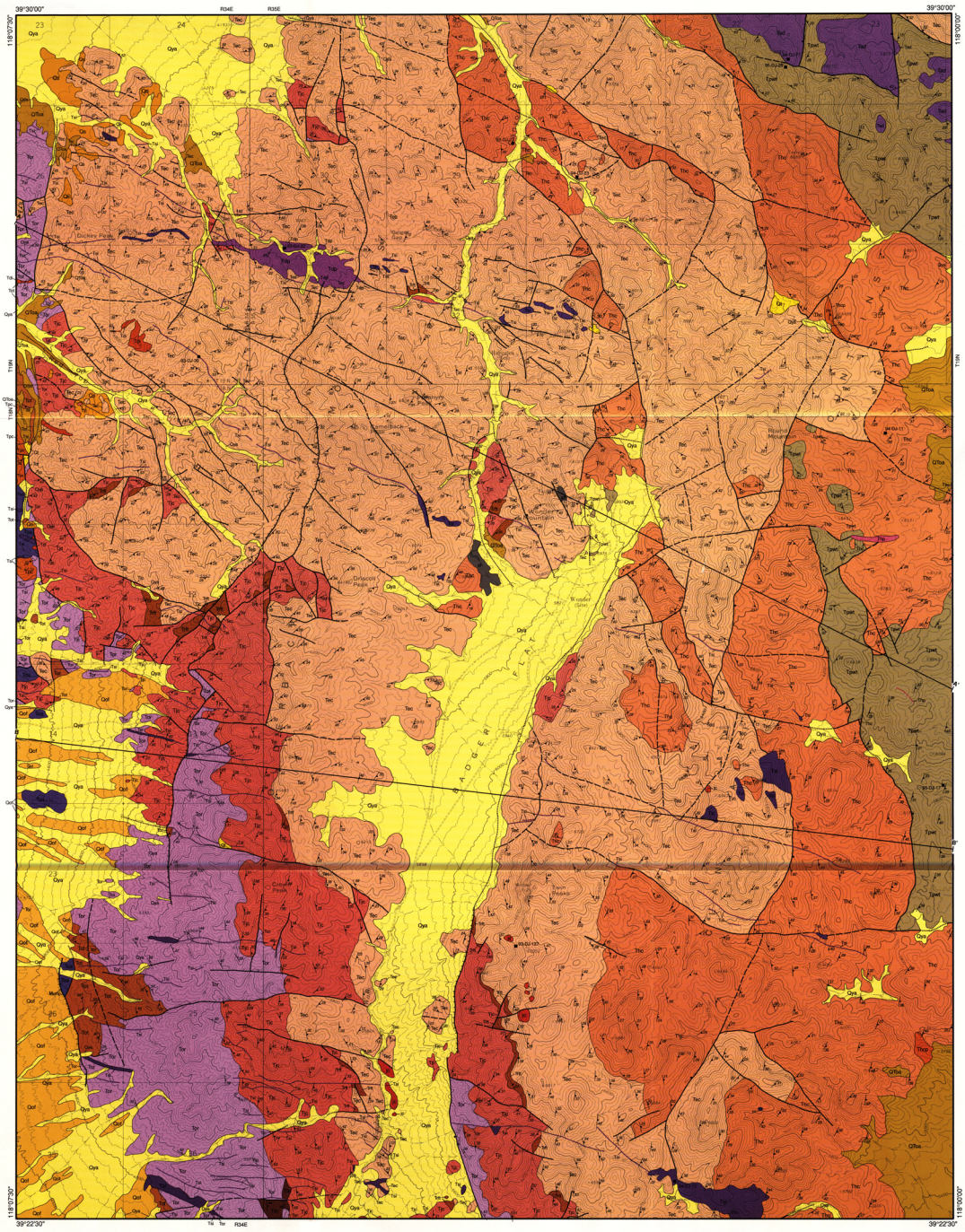


Scale 1:24,000

0 0.5 1 kilometer

0 1000 2000 3000 4000 5000 feet

CONTOUR INTERVAL 40 FEET

Base map: U.S. Geological Survey Wonder Mountain 7.5' Quadrangle, 1980

GEOLOGIC MAP OF THE WONDER MOUNTAIN QUADRANGLE, NEVADA

David A. John

1997

SURFICIAL DEPOSITS

af **Artificial fill (Holocene)** Mine dumps and mine tailings.

Qs **Sand (Quaternary)** Small exposures of unconsolidated eolian sand and sand dunes in northwest corner of quadrangle on east side of Dixie Valley.

Qya **Younger alluvium and alluvial-fan deposits (Quaternary)** Unconsolidated alluvium, colluvium, talus, alluvial-fan, and other surficial deposits. Mostly alluvium in active drainages and weakly dissected alluvial fans on west side of quadrangle and alluvial deposits underlying Badger Flat.

Qt **Talus (Quaternary)** Rubble deposits derived from tuffs of Poco Canyon, Elevenmile Canyon, and Hercules Canyon. Only larger deposits differentiated from unit Qya.

Qof **Older alluvial-fan deposits (Quaternary)** Unconsolidated fluvial and debris-flow deposits consisting of poorly sorted, coarse-grained, sandy pebble to boulder gravel and gravelly sand locally containing angular to rounded blocks as much as 1 m wide. Deeply to moderately dissected. Locally gradational with younger alluvium (Qya) and older alluvium (QTos).

QTos **Older alluvium (Quaternary and/or Tertiary)** Consolidated and unconsolidated alluvium containing well-rounded cobbles of volcanic rocks and jasperoid. Forms hills and ridges as much as 100 m high on east side of quadrangle and dissected gravel terraces in northwest corner of quadrangle and in Hercules Canyon.

VOLCANIC, SEDIMENTARY, AND HYPABYSSAL INTRUSIVE ROCKS

Tsi **Silicic intrusive rocks (Miocene and Oligocene?)** Numerous texturally and compositionally distinct silicic dikes and small intrusions. Includes aphyric felsite, sparsely porphyritic biotite rhyolite and quartz rhyolite, coarsely porphyritic biotite–quartz–plagioclase–K-feldspar rhyolite(?) porphyry, and coarsely porphyritic biotite–hornblende–plagioclase dacite porphyry. Many rocks are strongly argillized or propylitized, although fresh, locally vitric dikes are also present. Unit consists mostly of west-northwest-striking rhyolite and dacite porphyry dikes present in both the Louderback Mountains and the southern Clan Alpine Mountains that are part of a regionally extensive dike swarm which extends westward to the southern Stillwater and northern Sand Springs Ranges (John, 1993a). Two K-Ar ages from dikes in the Louderback Mountains are 20.2±0.6 and 19.5±0.6 Ma and an $^{40}Ar/^{39}Ar$ age from a large dike in the southern Clan Alpine Mountains is 21.5±0.2 Ma (table 1).

Thp **Hornblende dacite porphyry (Miocene)** Dark-gray, coarsely porphyritic hornblende dacite porphyry dikes. Contain about 20% phenocrysts consisting of 1- to 8-mm-wide, tabular pink plagioclase, less abundant hornblende, and minor strongly resorbed quartz and clinopyroxene in a devitrified pilotaxitic groundmass. Forms two west- to northwest-trending dikes that intrude tuff of Hercules Canyon and poorly welded tuff (unit Tpwt) along east side of quadrangle.

Tdp **Dacite porphyry (Miocene)** Large, west-northwest-elongated plug of dacite porphyry that intrudes hydrothermally altered tuff of Elevenmile Canyon (Tec) near Victor in northwest corner of map area. Intrusion is dark-reddish-brown to blue-gray, partly vitric, flow-banded dacite porphyry containing about 30% fine- to medium-grained phenocrysts of plagioclase, hornblende, and less abundant biotite in a glassy to microfelsitic groundmass. Biotite K-Ar age of 21.3±0.6 Ma and $^{40}Ar/^{39}Ar$ age of 20.94±0.13 Ma (table 1).

Tad **Andesite and dacite (Miocene and/or Oligocene)** Dark-gray, greenish-gray, and reddish-brown, fine- to coarse-grained, pilotaxitic to hypidomorphic granular (hornblende)-pyroxene-plagioclase andesite and (biotite)-hornblende–plagioclase dacite. Consists of lava flows and flow breccias uncomformably overlying poorly welded tuff (unit Tpwt) in northeast corner of quadrangle. Biotite $^{40}Ar/^{39}Ar$ age of 23.7±0.1 Ma (table 1).

Td **Dacite intrusions (Oligocene)** Small, northwest to west-northwest elongated intrusions of medium-gray to dark-green, fine- to medium-grained dacite porphyry that crop out on both the north and south sides of Red Top Gulch near west edge of quadrangle. Contain about 25 to 30%, 1- to 5-mm-long phenocrysts consisting of tabular to elongate plagioclase, hornblende, and less abundant biotite and trace amounts of rounded quartz in a fine-grained to microcrystalline felsite groundmass. Generally strongly altered to propylitic or argillic mineral assemblages. Intrudes tuff of Elevenmile Canyon.

Tpwt **Poorly welded tuff (Miocene or Oligocene)** White, pale green, pinkish-gray, and blue-gray, poorly to densely welded, generally lithic-rich rhyolite ash-flow tuff. Contains 20 to 30% phenocrysts consisting of plagioclase, K-feldspar, less abundant smoky quartz, 1 to 3% biotite, and <1% hornblende. Lithic clasts mostly derived from intermediate- to silicic-composition lava flows. Biotite $^{40}Ar/^{39}Ar$ ages of 23.5±0.2 and 23.6±0.2 Ma (table1).

Thc, Thcp **Tuff of Hercules Canyon (Oligocene)** Multiple cooling units of reddish-brown, blue-gray, and lavender-gray, pumice- and biotite-rich dacite to low-silica rhyolite ash-flow tuff. Most tuff is devitrified, moderately to densely welded, crystal rich, and lithic poor. Strongly flattened, biotite-rich pumice clasts commonly are as long as 10 cm. Tuff generally contains 25 to 40% medium-grained phenocrysts consisting of plagioclase, less abundant quartz and sanidine, 2 to 3% biotite, and <1% hornblende. Black to dark-gray vitrophyric zones locally present near base of cooling units contain 35 to 50% phenocrysts consisting of plagioclase, 3 to 7% sanidine, 5 to 8% biotite, <1% quartz, and trace amounts of clinopyroxene. White, lithic-rich crystal-poor (about 10% phenocrysts), poorly welded zones (Thcp) locally mapped between cooling units. Lithologically and compositionally resembles less altered parts of tuff of Elevenmile Canyon, but is more pumice rich, generally contains less abundant quartz phenocrysts, and commonly contains scattered, coarse-grained (5-7 mm), tabular hornblende phenocrysts. Biotite K-Ar age of 24.2±0.7 Ma and biotite $^{40}Ar/^{39}Ar$ age of 24.66±0.08 Ma determined from a sample collected in Hercules Canyon and biotite K-Ar age of 23.0±0.7 Ma determined on sample of crystal-poor vitrophyre in northeast part of quadrangle (table 1).

Tec **Tuff of Elevenmile Canyon (Oligocene)** Black, dark-greenish-gray, and white, crystal-rich low-silica dacite to rhyolite ash-flow tuff. Generally contains 20 to 40% phenocrysts consisting of medium-grained plagioclase, less abundant sanidine and quartz, 1 to 5% biotite, and <1% hornblende. Generally densely welded. Commonly contains abundant dark-green, chloritized, crystal-rich, flattened pumice clasts as long as 6 cm and abundant fragments of pre-Tertiary rocks and the older andesite (Toa) unit. Clasts of tuff of Poco Canyon (Tpc) locally present in Hercules Canyon area. Basal part of unit in northern part of Hercules Canyon commonly contains white, well-bedded surge(?) deposits. Megabreccia blocks consisting of tuff of Job Canyon (jc) and older rhyolite (or) as much as 300 m wide are present locally in the southern half of the quadrangle. Most of tuff is strongly propylitized, argillized, or bleached, although much of the upper part of unit in the Clan Alpine Mountains in eastern third of the quadrangle is only weakly altered. Biotite K-Ar ages of 24.5±0.7, 24.8±0.7, and 23.2±0.7 Ma, and biotite $^{40}Ar/^{39}Ar$ ages of 24.58±0.06, 24.3±0.2, and 23.7±0.2 Ma (table 1).

Tpc **Tuff of Poco Canyon(?) (Oligocene)** Reddish-brown to lavender-gray, densely welded, devitrified crystal-rich rhyolite tuff forming crest of Pirouette Mountain just west of map area (John, 1995b) and extending into the western part of the Wonder Mountain Quadrangle. Tuff is pumice and lithic-fragment poor and contains 35 to 45% medium-grained phenocrysts composed of smoky quartz, K-feldspar, and minor plagioclase. Basal part of unit includes finely laminated siltstone, quartz-rich sandstone, and lithic tuff breccia containing abundant clasts of porphyritic andesite and rhyolite porphyry as much as 1 m wide. Tuff tentatively is correlated with lower cooling unit of tuff of Poco Canyon exposed in southern Stillwater Range on the basis of petrographic and modal similarities (John, 1995b).

Trs **Rheomorphically flowed tuff (Oligocene)** White, greenish-gray, black, and brown, densely welded, rhyolite tuff. Locally vitrophyric. Commonly rheomorphically folded. Contains about 5% medium-grained phenocrysts consisting of subequal amounts of clear quartz, sanidine, and plagioclase. Forms discontinuous erosional remnants between the tuffs of Elevenmile Canyon and Job Canyon.

Tjc **Tuff of Job Canyon (Oligocene)** Multiple cooling units of white, dark-gray, greenish-gray, and dark-brown, densely welded, rhyolite ash-flow tuff. Contains about 20 to 30% phenocrysts consisting of fine-grained plagioclase and less abundant K-feldspar. Hornblende locally present. Devitrified and generally propylitically or argillically altered. Locally lithic-rich containing abundant subrounded clasts of andesite and flow-banded rhyolite (Toa and Tor, respectively) that form as much as 30-40% of unit. Biotite $^{40}Ar/^{39}Ar$ age of 27.64±0.08 Ma from intracaldera tuff collected in the southern Stillwater Range (table 1).

Tor **Older rhyolite (Oligocene)** Red, light-purple, green, black, and gray, generally sparsely porphyritic rhyolite and dacite lava flows, flow breccias, and shallow intrusive rocks. Generally contains 5 to 15% medium-grained phenocrysts composed of plagioclase and K-feldspar, minor strongly resorbed quartz, and trace amounts of altered mafic minerals (hornblende?) in a microfelsite groundmass. Commonly strongly flow banded.

Tot **Tuffaceous sedimentary rocks (Oligocene)** White, waterlaid tuff and fine-grained tuffaceous sandstone, siltstone, mudstone, and minor conglomerate. Conglomerate contains abundant rounded clasts of the older rhyolite (unit Tor). Unit overlies, or is interbedded with, the upper part of the older rhyolite unit (Tor).

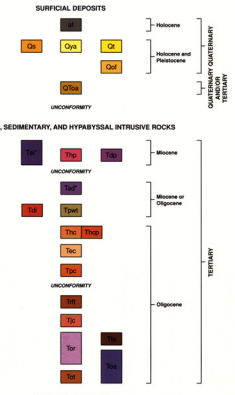
Toa **Older andesite (Oligocene)** Dark-green, dark-gray, and dark-lavender-gray, aphyric to medium-grained, porphyritic andesite and dacite lava flows and minor quartz-bearing dacite(?) tuff. Phenocrysts consist of medium-grained tabular plagioclase, hornblende, and local biotite. Generally altered to propylitic mineral assemblages containing abundant epidote, chlorite, and sericite. Locally flow banded. Gradational contact with older rhyolite (Tor) unit on west side of Pirouette Mountain just west of map area (John, 1995b). Forms several areas of outcrop along west side of quadrangle.

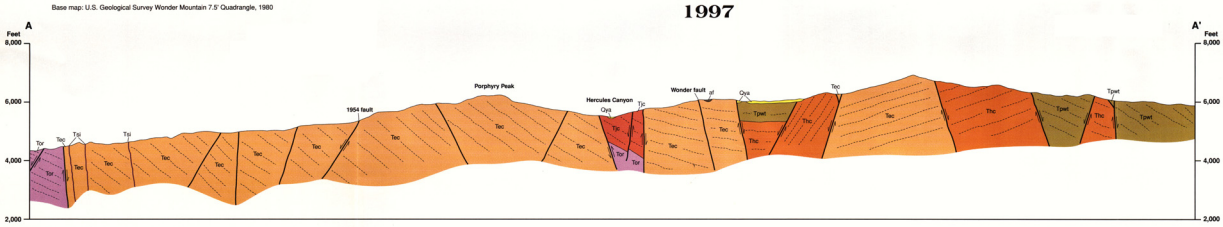
Tot **Older tuff (Oligocene)** White, light-green-gray, and orangish-brown, crystal-rich rhyolite ash-flow tuff. Contains 35 to 55% fine- to medium-grained phenocrysts consisting of K-feldspar, lesser plagioclase and clear to smoky quartz, and 0 to 1.5% biotite. Devitrified, generally densely welded, and commonly argillically altered. Locally contains abundant pre-Tertiary lithic fragments.

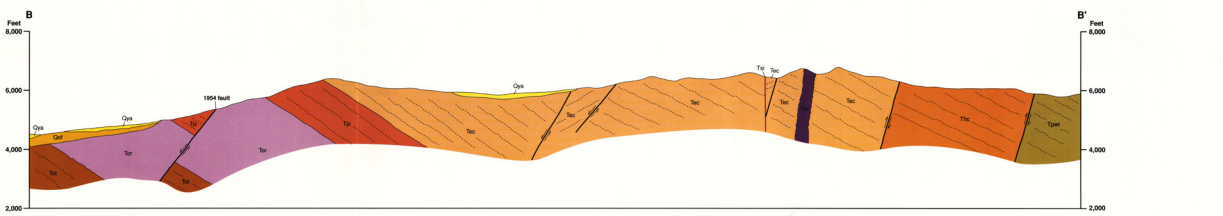
METAMORPHIC ROCKS

Mzmb **Marble and phyllite (Mesozoic)** Small exposure of dark-gray marble, garnet-pyroxene skarn, and less abundant black phyllite along the southwest side of quadrangle in footwall of 1954 fault scarp. Tentatively correlated with Triassic and Jurassic rocks in the Clan Alpine sequence (N.J. Silberling, oral commun., 1993).

See accompanying text for references and a discussion of the geology of the Wonder Mountain Quadrangle.







Contact

High-angle normal fault Dashed where approximately located, dotted where concealed; arrow shows dip. Ball on downthrown side. On cross sections only, arrows show relative displacement.

1954 fault scarp Hachures on downthrown side.

Strike and dip of inclined bedding

Strike and dip of inclined compaction foliation

Strike and dip of inclined flow banding

Dikes Part of silicic intrusive rocks (Tsi), hornblende dacite porphyry (Thp), and dacite intrusions (Td) units. Arrow shows dip.

94-DJ-23 **K-Ar or $^{40}Ar/^{39}Ar$ sample site.** See table 1 for data.

Megabreccia blocks Blocks of tuff of Job Canyon (jc) and older rhyolite (or) enclosed within tuff of Elevenmile Canyon and tuff of Hercules Canyon.

Field work done from 1992 to 1996.

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