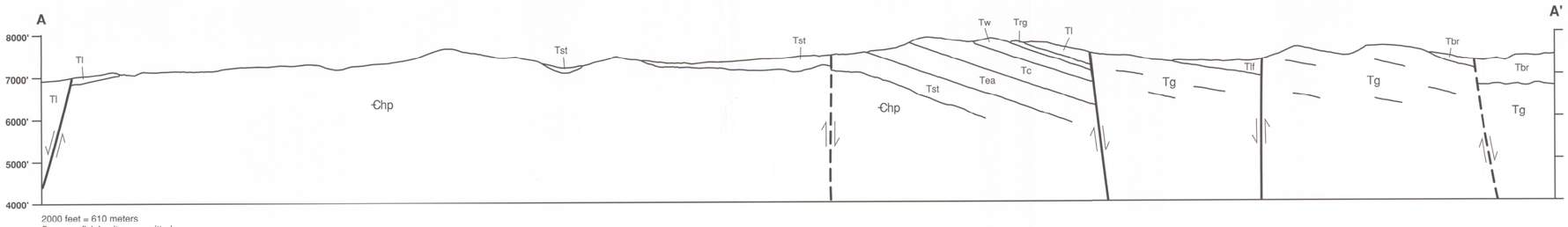
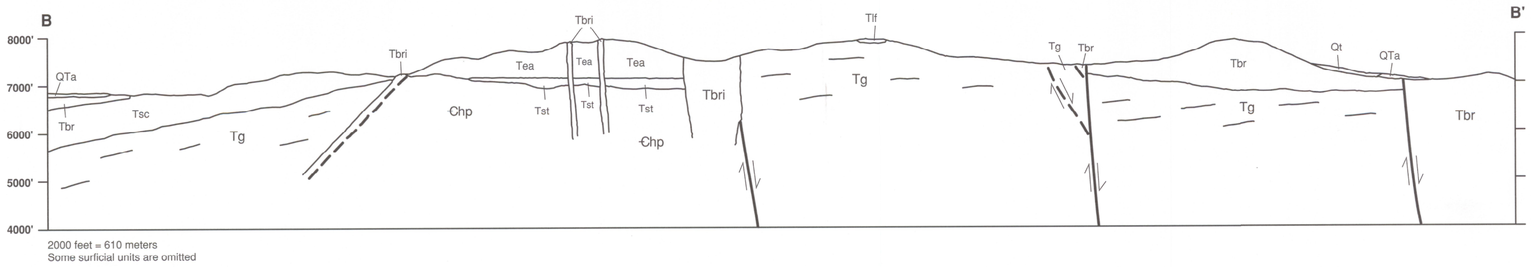


2000 feet = 610 meters
Some surficial units are omitted



2000 feet = 610 meters
Some surficial units are omitted

Base map: U.S. Geological Survey
Rice Mountain 7.5' Quadrangle, 1972

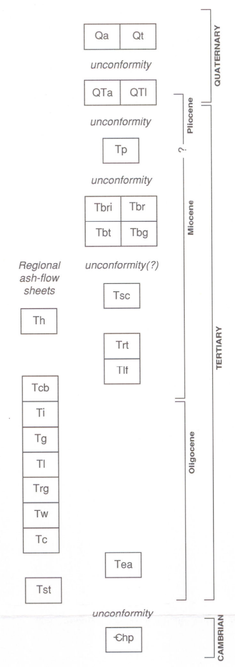
Scale 1:24,000

CONTOUR INTERVAL 40 FEET

0 0.5 1 kilometer

0 0.5 1 mile

0 1000 2000 3000 4000 5000 feet



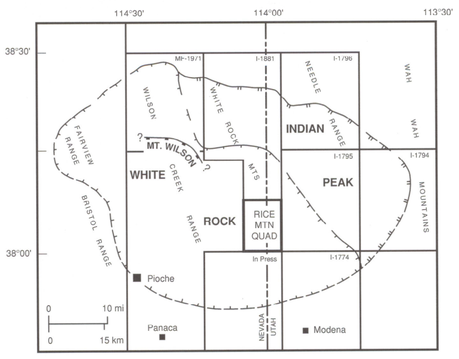


Figure 1. Location of the Rice Mountain Quadrangle in relation to nearby geologic maps published by the U.S.Geological Survey and to the Indian Peak caldera complex consisting of the Indian Peak, White Rock, and Mt.Wilson calderas that collapsed as the Wah Wah Springs, Lund, and Ripgut tuffs, respectively, were erupted (Best and others, 1989a).

MAP SYMBOLS

Contact Dashed where approximately located or inferred.

High-angle fault Ball on downthrown side where relative movement is known. Arrow indicates direction of dip. Dashed where approximately located or inferred. Dotted where concealed.

Vein Chiefly quartz and carbonate; locally contains minor amounts of sulfides and adularia.

Strike and dip of beds

Strike and dip of compaction foliation in welded tuff

Inclined

Horizontal

Strike and dip of flow layering in lava flow and flow breccia

Syncline axial trace Dashed where approximately located or inferred.

Qa **Stream, alluvial-fan, and flood-plain deposits (Holocene and Pleistocene?)** Mostly poorly sorted, unconsolidated deposits of silt, sand, and gravel related to current drainage system. Thickness no more than a few meters.

Qt **Talus deposits (Holocene and Pleistocene?)** Mostly nonsorted, unconsolidated deposits and large blocks of rhyolite lava of the Blawn Formation (unit Tbr). Thickness probably no more than 30 m.

QTa **Older stream and alluvial-fan deposits (Pleistocene? and Pliocene)** Poorly sorted, weakly to nonconsolidated deposits of silt, sand, and gravel incised by current drainage system. Unit was a once thicker and more extensive sheet of coalescing fans; dissection by headward erosion has cut deeply into these fans, leaving topographically high remnants perched on bedrock as it has been exhumed. Thickness at least 150 m in places.

QTl **Landslide deposits (Pleistocene? and Pliocene)** Talus and hummocky terrain underlain chiefly by Isom Formation (Ti) and lesser amounts of tuffs of Ripgut (Tg) and Blawn Formations (Tbt). Similar but much more extensive deposits occur in the White Rock Mountains to the north (Best and others, 1989c). Age is uncertain, but may be as old as Pliocene.

Tp **Fine basin-fill deposits (Pliocene? and upper? Miocene)** Salmon to tan, weakly bedded, clay and silt deposits locally exposed in the northwest corner of the mapped area. About 80 m thick. May correlate with Panaca Formation about 35 km to southwest which is 300 to 400 m thick (Rowley and Shroba, 1991).

Blawn Formation (Miocene) High-silica rhyolite that, in areas to the east and northeast of mapped area (Best, 1987; Best and others, 1987), is associated with potassic mafic lava flows and has isotopic ages ranging between 24 and 18 Ma.

Tbr **Rhyolite lava flow member** White, gray, and pink felsitic rhyolite lava flows and domes. Locally black, brown, and green perlite. Flows contain 10-20% crystals of quartz, plagioclase, sanidine, and a trace of biotite. Commonly weathers to a pavement of angular fragments 1 to 2 cm in diameter. Rare lithophysae and spherulites (5 to 15 cm) are commonly lined with chalcedony or clear quartz. Parts of unit on the north side of State Line Canyon are propylitically and phyllically altered and are probably intrusive. Thickness at least 230 m.

Tbri **Rhyolite intrusive vent member** White, gray to lavender dikes and other intrusions which range in composition from rhyolite to rhyodacite (77 to 68% SiO_2). Phenocryst content ranges from 5 to 45% and averages 33%; phenocrysts include plagioclase, sanidine, quartz, biotite, and accessory titanite, apatite, allanite, zircon, and Fe-Ti oxides (Keith, 1980). An overprint of propylitic alteration or weak to moderate phyllic alteration is present in all of the intrusions with the high-silica rhyolite intrusions being the most significantly altered. A K-Ar date from partially altered biotite suggests an age of 16.5 ± 1.1 Ma (Keith, 1980).

Tbt **Tuff member** Weakly welded, buff to lavender, crystal-poor lapilli ash-flow tuff that contains sparse phenocrysts less than 2 mm in diameter of quartz, feldspar, and biotite. Tuff was probably mostly emplaced during explosive eruptions that preceded extrusion of the Blawn rhyolite lava flows (Tbr). Thickness no more than 150 m.

Tbg **Tuff of Gold Springs member** Moderately welded, violet, pink, tan, and buff lapilli ash-flow tuff and minor epiclastic deposits. Tuff contains about 20% phenocrysts of quartz, sanidine, plagioclase, trace of magnetite, and rare, possibly xenocrystic, biotite. Typically contains 5 to 10% fragments of rhyolite and latite lava flow rock in addition to compacted pumice. Probable source of tuff lies within the adjacent Deer Lodge Quadrangle to the south (Best and others, 1992) near Gold Springs where thickness of unit within the vent is at least 300 m; exposures of unit within map area are no more than 20 m in thickness. Unit occurs in many places below the rhyolite lava flow member of formation (unit Tbr) but is too thin (a few meters) to be shown on map.

Tsc **Dacite of Serviceberry Canyon (Miocene)** Dacite lava flows that are lavender and gray where devitrified and green where glassy. Contain about 25% phenocrysts of plagioclase, sanidine, and biotite and trace amounts of Fe-Ti oxides, titanite, allanite, and zircon. Bulk chemical composition of flows is variable; silica ranges from 65 to 72% by weight. Unit includes 10 to 20 m of ash-flow tuff of similar composition that underlies lava flows south of Tobe Spring where total thickness of unit is at least 300 m.

Th **Harmony Hills Tuff (Miocene)** Gray, tan, and pink crystal-rich, densely to moderately welded, simple cooling unit of potassic andesite ash-flow tuff (Williams, 1967). About one half of rock consists of phenocrysts, mostly plagioclase and lesser amounts of biotite, clinopyroxene, hornblende, quartz, and Fe-Ti oxides. Age is about 22 Ma and source lies to the south in the Caliente caldera complex or to southeast in the Bull Valley Mountains of Utah (Rowley and others, 1991). Thickness possibly as much as 180 m.

Trt **Rhyolite lava flow of Tobe Spring (Miocene)** Similar to the rhyolite lava flow member of the Blawn Formation (unit Tbr) but lies beneath Harmony Hills Tuff and has a lighter colored matrix and more abundant phenocrysts of quartz. Present only along southern edge of map where thickness is as much as 100 m.

Tlf **Latite lava flows (Miocene)** Sequence of generally red-brown lava flows that contain phenocrysts of plagioclase, biotite, and clinopyroxene. To east of map area (Best, 1987), isotopic ages of the unit are about 22 Ma, and flows contain 60 to 65% silica and about 8% total alkali oxides by weight and are latite and trachydacite according to IUGS classification (Le Maitre, 1989). Locally is an aphyric, dark-brown lava flow containing sparse crystals of plagioclase, pyroxene, and embayed quartz. Exposed thickness of unit is 130 m near southern margin of the map area but thickens to several hundred meters in upper Deer Lodge Canyon about 5 km farther south in adjacent quadrangle.

Tcb **Bauers Tuff Member of the Condor Canyon Formation (Miocene)** Densely welded red lapilli ash-flow tuff which contains less than 20% phenocrysts of plagioclase, lesser sanidine and biotite, and a trace of clinopyroxene and Fe-Ti oxides. Source of Bauers is the Clover Creek caldera (Rowley and others, 1991) and age is 22.78 Ma (Best and others, 1989b). Present only along the northern edge of the mapped area; thickness does not exceed 30 m.

Ti **Isom Formation (Oligocene)** As many as three moderately to densely welded simple cooling units of trachytic ash-flow tuff (Christiansen and others, 1988; Rowley and others, 1991). Typically lilac to red-brown. Contains abundant compacted pumice clasts as much as 40 cm long; phenocrysts include about 2% pyroxene and magnetite and 10% plagioclase. Lower cooling units of Isom contain fewer pumice clasts and fewer phenocrysts of plagioclase than upper. Thickness about 400 m.

Needles Range Group (Oligocene)

Tg **Ripgut Formation** One or two cooling units of crystal-poor, pumice-rich, rhyolite ash-flow tuff; units range from densely welded, speckled black-brown vitrophyre to porous, weakly consolidated lapilli ash. Pumice clasts locally make up as much as one third of rock, are mostly of lapilli size, and are commonly varicolored black, gray, white, orange, and brown on a hand-sample scale. Phenocrysts less than 1 mm in diameter of plagioclase and biotite make up a few percent of rock (Best and others, 1989a). Locally, contains clasts of Lund tuff as much as 10 cm in diameter. In vicinity of State Line Canyon and Cottonwood Canyon, unit includes tens of meters of overlying lava of similar composition (Keith, 1980). Unit thins dramatically to north against (and unconformably overlies) possible resurgent block of White Rock caldera(?) but thickens elsewhere in map area to 650 m.

Tl **Lund Formation** Brown, red-brown, pink, and gray moderately to densely welded, compound cooling unit of dacitic lapilli ash-flow tuff. Phenocrysts of plagioclase make up about one-fourth of rock; lesser phenocrysts include quartz, biotite, minor hornblende, and a trace of titanite. Map area lies within the White Rock caldera that was source of the formation. Average K-Ar age is 27.9 Ma (Best and others, 1989a). Thickness several hundred meters along north edge of map area where tuff is in fault contact with a resurgent fault block; adjacent to that fault unit also unconformably overlies Cambrian Highland Peak Formation. Along Chokecherry Creek on resurgent block, tuff lies conformably(?) above the Greens Canyon Tuff Member of Ryan Spring Formation and is only 100 m thick.

Trg **Greens Canyon Tuff Member of Ryan Spring Formation** Crystal-poor, lithic, low-silica rhyolite lapilli ash-flow tuff. Generally pale hues of gray, orange, red, or purple. Phenocrysts of plagioclase and biotite less than 2 mm in diameter make up less than 10% of the rock. The only occurrence of this unit is along the headwaters of Chokecherry Creek where it lies conformably above Wah Wah Springs Tuff and the thickness is about 50 m. Thickness increases to about 1,400 m about 25 km to the north in the northern White Rock Mountains.

Tw **Intracaldera member of Wah Wah Springs Formation** Compound cooling unit of crystal-rich, lithic, dacite lapilli ash-flow tuff. Generally shades of gray and brown and contains as much as 10% lapilli and small blocks of a variety of sedimentary and volcanic rocks, particularly andesite lava flow rock. Phenocrysts make up about 40% of rock and include, in decreasing order of abundance, plagioclase, hornblende, biotite, and lesser quartz and augite. Map area lies within Indian Peak caldera which was the source of formation whose thickness in the northern White Rock Mountains (15 km to the north) is as much as 1 km (Best and others, 1989b); thickness in map area is about 130 m. Average K-Ar age of outflow tuff member is 29.5 Ma (Best and Grant, 1987).

Tc **Cottonwood Wash Tuff** A simple cooling unit of crystal-rich dacite lapilli ash-flow tuff. Generally red brown but locally has a speckled gray vitrophyre at base. About 40% phenocrysts of plagioclase, biotite (books as much as 8 mm in diameter), quartz (angular fragments as much as 5 mm and commonly stained red by hematite), hornblende (inconspicuous in hand sample), and a trace of augite. About 160 m thick. Average K-Ar age is 30.6 Ma (Best and Grant, 1987).

Tea **Andesite flow member of Escalante Desert Formation** Dark-brown lava flow containing sparse phenocrysts of plagioclase, pyroxene, and, locally, biotite. Biotite phenocrysts in lava flows from west side of Limestone Hills 25 km northwest of map area have a K-Ar age of 31.8 ± 1.2 Ma (Best and Grant, 1987). Thickness as much as 350 m.

Tst **Sawtooth Peak Formation (Oligocene)** Light-gray and, where propylitically altered, light-green, crystal-rich ash-flow tuff containing abundant phenocrysts of quartz, plagioclase, biotite, and minor sanidine and hornblende. K-Ar age on biotite and a fission-track age on zircon from the same sample are 33.5 ± 1.2 Ma and 33.6 ± 1.6 Ma, respectively (Best and Grant, 1987). Deposited in paleovalleys carved into Highland Peak Formation; maximum thickness about 150 m.

Chp **Highland Peak Formation (Cambrian)** Light- to dark-gray limestone and dolomite (Tschanz and Pampeyan, 1970). About 300 m section exposed in map area.

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See accompanying text for references and a discussion of geologic history.

GEOLOGIC MAP OF THE RICE MOUNTAIN QUADRANGLE, NEVADA and UTAH

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1994