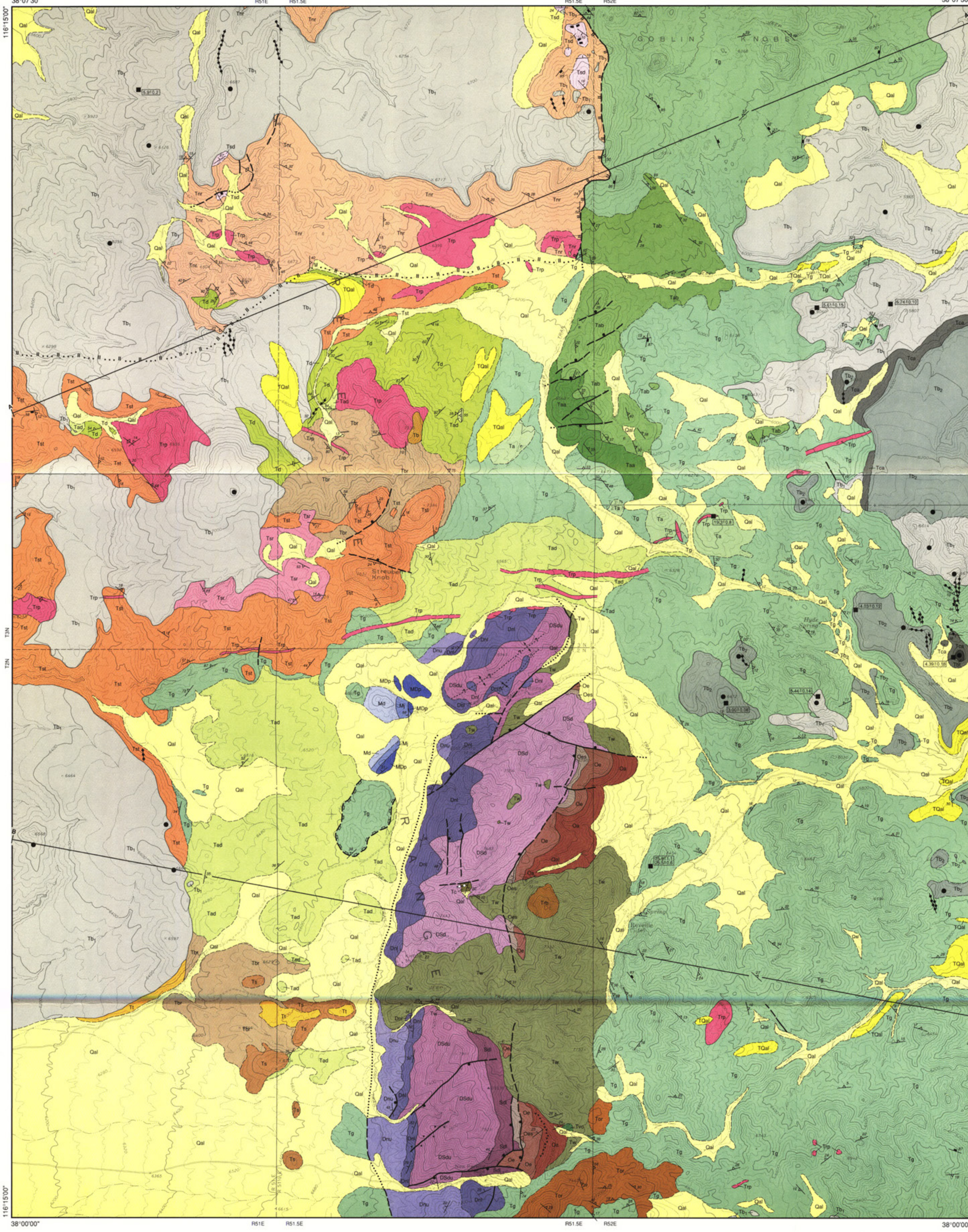
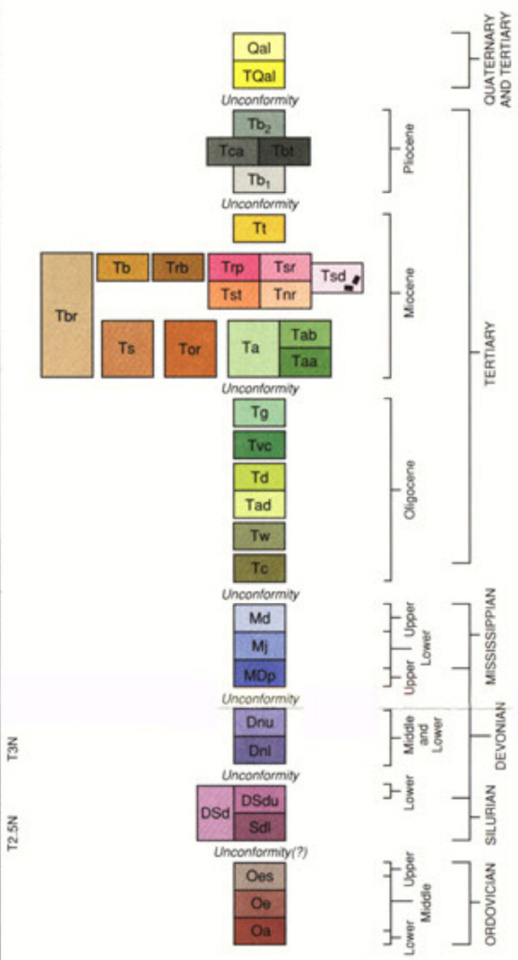
GEOLOGIC MAP OF THE REVEILLE QUADRANGLE, NEVADA

Mark W. Martin
Terry R. Naumann

1995





Contact, dashed where approximately located.

Fault, dashed where approximately located, dotted where concealed, ball on downthrown side.

Low-angle fault, dashed where approximately located, dotted where concealed, box on hanging wall.

Caldera wall of northern Reveille Range, dashed where approximately located, dotted where concealed, bars point into caldera.

Trace of axial surfaces

anticline

syncline

Strike and dip of compaction foliation in ash-flow tuffs or flow foliation in lava flows.

Strike and dip of vertical compaction foliation in ash-flow tuffs or flow foliation in lava flows.

Strike and dip of bedding in sedimentary deposits.

Strike and dip of joints.

Zone of fault breccia

Basalt dikes

Basaltic vents

Felsic dikes

Location and age of basalt samples collected for K-Ar geochronology on plagioclase (Naumann et al., 1991).

Scale 1:24,000

0 0.5 1 kilometer

0 0.5 1 mile

0 1000 2000 3000 4000 5000 feet

CONTOUR INTERVAL 40 FEET
Supplemental contours at 20 feet

Base map: U.S. Geological Survey Reveille 7.5' Quadrangle, 1968

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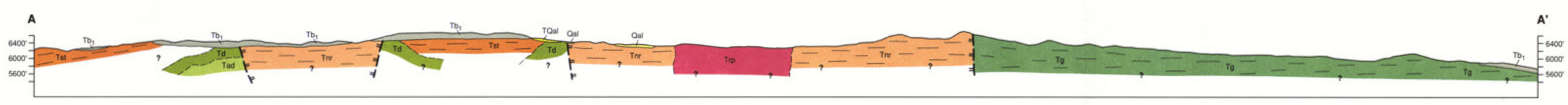
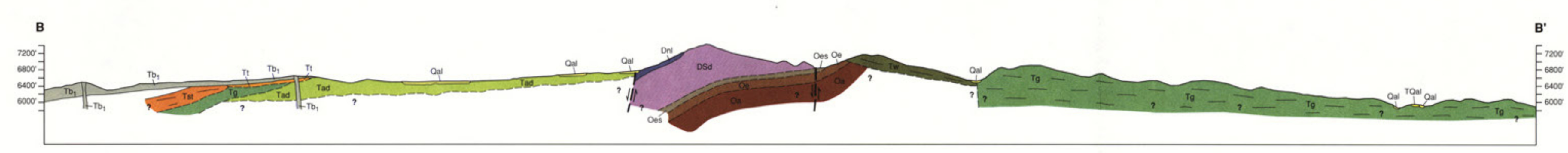
A A'



B B'



Qal **Alluvium and Colluvium (Quaternary)** Unconsolidated sand and gravel. Includes alluvium in washes, talus, alluvial fans, and slope wash. Thickness is 0 to 100 m.

TQal **Alluvium and Colluvium (Quaternary or Tertiary)** Unconsolidated and consolidated sand and gravel perched at higher topographic levels or cut by younger Qal. Includes alluvium in washes and alluvial fans. Thickness is 0 to about 50 m.

Basalt, Colluvium, and Alluvium (Pliocene) Basalts in the Reveille Range were previously mapped as a single unit by Ekren and others (1973). K-Ar ages include 5.9 ± 0.2 Ma (whole rock, northwestern part of range; Marvin and others, 1973), 5.8 ± 0.3 to 5.6 ± 0.3 Ma (western flank), and 3.9 ± 0.2 to 3.8 ± 0.2 (eastern flank; Dohrenwend and others, 1985). Naumann and others (1991) divided these basalts into two units based on field relationships, and petrologic, isotopic, and geochronologic characteristics. Basalts of Episode 1 have $^{87}Sr/^{86}Sr$ values that range from 0.70423 to 0.70611 and eNd values that range from +0.82 to +4.45. Basalts of Episode 2 have $^{87}Sr/^{86}Sr$ values that range from 0.70337 to 0.70359 and eNd values that range from +3.49 to +5.33 (Naumann and others, 1990, 1991; Yogodzinski and others, 1994).

Tb_2 **Lava flows, dikes, vent and near-vent basaltic and sedimentary deposits** Black porphyritic olivine basalt that contains augite, amphibole, and plagioclase megacrysts and range from picrite to trachybasalt (41-56% SiO_2, Naumann and others, 1991). K-Ar ages on plagioclase range from 3.0 to 4.6 Ma (Naumann and others, 1991). Individual lava flows range in thickness from 0 to about 10 m; total unit thickness is 0 to about 100 m.

Tristanite dome and lavas A small dome about 250 m in diameter and 50 m high (approximate volume <0.01 km^3; Naumann and others, 1990) is located along the east-central edge of the map (4212.450 N, 576.650 E). Tristanite lavas (58% SiO_2) contain plagioclase and sanidine and have yielded a K-Ar (plagioclase) age of 4.39 ± 0.18 Ma (Naumann and others, 1991).

Tca **Air-fall deposits, surge deposits, colluvium, and alluvium** This unit is interpreted as a pyroclastic apron associated with eruption of two trachytic to tristanite domes in the area (see text). Lithic ash, air-fall ash, pumice, and lapilli ash are interbedded with debris flow deposits (Naumann and others, 1990), thin- to thick-bedded, poorly to well consolidated sandstone, conglomeratic sandstone, and conglomerate. Clasts are dominantly Tb_1 basalts, but locally include other volcanic rocks. Thickness is 2 to 10 m.

Tb_1 **Lava flows, dikes, vent and near-vent basaltic and sedimentary deposits** Black porphyritic olivine basalt that contains plagioclase megacrysts and range from alkali basalt to hawaiite (44-48% SiO_2, Naumann and others, 1991). Vent areas locally consist of scoria, cinder, bombs, vertical conical magma conduits 1 to 2 m in diameter, and basalt dikes that fed basaltic flows. Banded, vesicular siliceous veins cut basalt at one vent on Dark Peak, suggesting that hydrothermal fluids may have been present during basalt eruption. K-Ar ages on plagioclase range from 5.0 to 5.9 Ma (Naumann and others, 1991). Individual lava flows range in thickness from 0 to 10 m; total thickness is 0 to about 100 m.

Tt **Tuffaceous Rocks (Miocene)** Poorly consolidated tuffaceous sandstone, conglomeratic sandstone, and white, crystal-poor ash-fall and/or ash-flow tuff. These rocks underlie Tb_1 basalt flows and overlie Shingle Pass Tuff(?) (Ts) and volcanic breccias (Tbr) in the southwestern part of the map area. Thickness is 0 to 25 m.

Tb **Breccia (Miocene)** Coarsely bedded breccia contains clasts up to 1 m in diameter of rhyolitic lava and welded tuff in a tuffaceous matrix (Ekren and others, 1973). Clasts are texturally similar and have modal phenocryst assemblages similar to tuff and rhyolite of Streuben Knob. These rocks rest against or on a rhyolitic plug (Trp) north of Streuben Knob. Thickness is 0 to 10 m.

Trb **Rhyolite Breccia (Miocene)** Extremely altered, massive, orange-brown, rhyolitic, autoclastic breccias and flows. Texture and circular outcrop suggest that this unit is a rhyolitic vent. Unit either rests on or intrudes Windous Butte Formation(?), which is the only age constraint (Ekren and others, 1973; this study). Ekren and others (1973) described this unit as similar to Tb, but we could not corroborate any similarities. Possibly related to rhyolitic to rhyodacitic plugs of Trp. Phenocrysts[1] 10-20: q 25-35, af 20-30, pl 30-40, b trace-5. Thickness is 0 to 100 m.

Rhyolitic to Rhyodacitic Porphyry Dikes and Plugs, Rhyolite Flows, Surge Deposits, and Rhyolitic Tuffs of Streuben Knob and Northern Reveille Range (Miocene) (see text for detailed discussion and interpretation.)

Trp **Dikes, plugs, and flow domes** Light gray to buff orange. All bodies locally contain megacrysts of alkali feldspar up to 2 cm (commonly twinned). Glassy chilled margins are common; larger bodies are locally flow-banded and propylitically altered. Intrudes units as young as tuffs of Streuben Knob and northern Reveille Range. Phenocrysts: 15-100: q 15-30, af 10-30, pl 40-50, b 5-25, hb 0- 10. Mapped as three separate units by Ekren and others (1973): Tql (quartz latite dikes and plugs), Trd (rhyodacitic dikes and sills), and Tsr (rhyolite of Streuben Knob). A K-Ar age (sanidine) of 19.3 ± 0.8 for Tql was reported by Ekren and others (1973) and Marvin and others (1973).

Tsr **Rhyolite of Streuben Knob** Buff-orange to grayish-orange, massive to flow-banded, devitrified rhyolite. Flows are generally porphyritic with alkali feldspar phenocrysts up to 2 cm (Ekren and others, 1973; this study). Base locally contains similar lithic clasts (dacitic lava and granitic clasts) as underlying tuff of Streuben Knob (Ekren and others, 1973; this study). Phenocryst assemblage is similar to assemblage in upper cooling unit of tuff of Streuben Knob as noted by Ekren and others (1973). Phenocrysts 10-15: q 20-30, af 30-40, pl 25-40, b trace-5, o trace. Thickness is 0 to 80 m.

Tsd **Surge deposits** Interbedded surge deposits, fluvial sediments, and megabreccia. Surge deposits are tuffaceous and reddish gray to buff, and contain a variety of bedding styles that range from thinly to thickly bedded, massive, wavy- to low-amplitude crossbedding, and planar. Locally, deposits contain rounded accretionary lapilli up to 2 cm in diameter and ballistically emplaced clasts of tuff of northern Reveille Range (< 15 cm in diameter). Locally includes reworked surge deposits and fine- to coarse-grained fluvial sedimentary deposits. Unit is silicified. Includes several large intercalated brecciated blocks (20 m) of tuff of Goblin Knobs. Deposits north of Dark Peak (4218.650 N, 572.300 E) overlie tuff of northern Reveille Range. However, some deposits about 4 km west of Dark Peak (4217.500 N, 568.200 E), are interbedded with the tuff of northern Reveille Range. Thickness is 0 to 30 m.

[1]Phenocryst minerals are listed as percent total phenocrysts: q - quartz; af - alkali feldspar; pl - plagioclase; b - biotite; hb - hornblende; cpx - clinopyroxene; opx - orthopyroxene; o - opaque minerals.

Tst **Tuff of Streuben Knob** Consists of two cooling units of pinkish-orange to buff, rhyolitic, welded ash-flow tuff. Basal vitrophyre (2-3 m thick) of the lower cooling unit contains large, glassy, flattened pumice and clasts of dacitic lava and medium-grained granite up to 15 cm in diameter. Locally rheomorphic. Basal vitrophyre of the upper cooling unit is about 1 m thick but poorly exposed and locally absent. Both cooling units locally contain abundant clasts of andesite and dacite lava and granite and pegmatite up to 0.5 m in diameter (Ekren and others, 1973; this study), suggesting proximity to source. A basal, white, partly welded, brecciated tuff containing clasts of granitic gneiss and medium-grained granite was mapped with Tst because of similar modal phenocryst percentage and lithic content. However, Ekren and others (1973) mapped this basal tuff as a separate unit (dacite tuff (Tdt) - Oligocene). Phenocrysts in lower cooling unit, 25-35: q 20-40, af 20-30, pl 20-35, b trace -5, o trace; in upper cooling unit, 25-35: q 20-35, af 30-40, pl 25-35, b trace-5, o trace. Thickness is 0 to about 125 m.

Tnr **Tuff of northern Reveille Range** A single cooling unit of intracaldera facies rhyolite tuff. The lower part is white and poorly welded and contains abundant white pumice and, locally, numerous blocks of dacitic to andesitic lava, medium- to coarse-grained granite, and tuff of Goblin Knobs up to 1 m across. The lower part grades upward into moderately welded tuff containing noticeably fewer lithic fragments and crystals. A 1- to 2-m subvertical vitrophyre is exposed along the contact with Td northwest of Streuben Knob along the probable caldera wall (4716.500 N, 568.000 E). This vitrophyre contains glassy pumice (up to 8 cm long) and clasts (1-8 cm) of dacitic lava and medium-grained granite. Phenocrysts in lower poorly welded section 15-25: q 15-35, af 10-20, pl 30-50, b 2-7; phenocrysts in upper moderately welded section 10-20: q 15-30, af 15-25, pl 30-45, b trace-5. Thickness is greater than 300 m.

Tbr **Volcanic Breccia (Miocene)** Randomly oriented volcanic blocks of andesitic and dacitic lavas similar in texture to Tad and Td, and tuff of Goblin Knobs, up to 10 m in diameter in a white tuffaceous matrix. Ekren and others (1973) reported clasts of tuff of northern Reveille Range, Monotony Tuff, and Shingle Pass-like tuff within these breccias. North of Streuben Knob, breccia underlies tuff of Streuben Knob. South of Streuben Knob, contacts with Shingle Pass Tuff(?) are uncertain. Because both breccias contain similar clast types and size distribution they are considered to have similar modes and points of origin (see text). Thickness is uncertain because the base is not exposed.

Ts **Shingle Pass Tuff (?) (Miocene)** Moderately to densely welded, pink to buff-orange, ash-flow tuff contains white to pink pumice. Exposed along the western flank of the range in contact with breccias of Tbr and andesitic lavas of Tad, but these contacts are not exposed. The modal phenocryst assemblage is similar to that reported for the Shingle Pass Tuff from the southern Pancake Range (Ekren and others, 1973). The name is queried because its stratigraphic position in the Reveille Quadrangle is uncertain. Phenocrysts 10-15: q 10-20, af 25-35, pl 30-45, b trace. Thickness is 0 to 25 m.

Tor **Tuff of Reveille Range (Miocene)** A single cooling unit of rhyolitic welded ash-flow tuff with 1- to 5-m thick basal vitrophyre (Ekren and others, 1973; this study). Unit is pinkish-red to gray, contains abundant white pumice, and has a platy parting. Tuff was inferred by Ekren and others (1973) to correlate with quartz-rich tuffs in the southern Reveille Range that range in age from 21.5 to 25 Ma. Phenocrysts 25-35: q 35-50, af 30-42, pf 15-25, b trace-2 hb trace, o trace (Ekren and others, 1973). Thickness is 0 to about 100 m.

Tuff of Arrowhead (Miocene)

Ta **Tuff of Arrowhead undivided.**

Tab **Upper tuffs** This rhyolitic ash-flow tuff is poorly exposed but is probably composed of several cooling units based on variable phenocryst abundances, modal phenocryst percentages, and textural differences between exposures. The unit ranges from massive and moderately welded to fissile and poorly welded and from dark brown to reddish purple to greenish white. Biotite and pumice abundances are highly variable (Ekren and others, 1973; this study). Propylitic alteration is locally severe and also highly variable. The tuff rests on unit Taa and locally on the tuff of Goblin Knobs, where unit Taa is absent. Compaction foliation in Taa and Tab are subparallel, so their contact is inferred to be conformable. Although poorly exposed, the contact with tuff of Goblin Knobs appears to be discordant, which suggests it is an angular unconformity or a fault. In one location (4215.000 N, 574.500 E), a 2- to 3-m thick conglomerate at the base of the tuff of Arrowhead contains rounded volcanic cobbles and rests depositionally on the tuff of Goblin Knobs. This observation and the lack of conclusive field evidence for faults separating the two tuffs (see text) indicates the contact is depositional. Phenocrysts 5-30: qtz 0-20, af 0-10, pl 50-75, b 5-15 (altered), 0 trace-3. Thickness is 0 to 30 m; the top is eroded.

Taa **Lower tuff** A single cooling unit(?) of massive, moderately welded, white to pale-yellow, highly altered tuff. In most exposures quartz is the only preserved phenocryst (Ekren and others, 1973; this study). Although the contact is not well exposed, we infer that this unit lies depositionally on the tuff of Goblin Knobs. In contrast, Ekren and others (1973) mapped the contact as a low-angle fault (see text). Phenocrysts 25-35; q 30-35, af 20-35, pl 30-35, b trace. Thickness is 0 to 30 m.

Tg **Tuff of Goblin Knobs (Oligocene)** The tuff of Goblin Knobs, which comprises most of the eastern half of the Reveille Quadrangle, consists of a thick sequence of massive welded tuff containing ubiquitous pumice and lithic clasts. Pumice clasts are white to gray and generally 3 to 8 cm (locally 18 cm) long. Lithic clasts, mostly volcanic fragments with lesser quartzite and carbonate, are typically 5 to 15% of the rock and generally 0.5 to 6 cm in diameter, rarely up to 60 cm. Distinct cooling breaks were not observed, but thin lenses of white air-fall tuff occur locally in the southern part of the area. Ekren and others (1973) suggested two cooling units based on both reverse and normal magnetic polarity within this unit (no data or sample locations given). K-Ar ages of 25.9 ± 1.1 Ma (biotite) and 25.5 ± 0.6 Ma (sanidine) (Ekren and others, 1973; Marvin and others, 1973). Best and others (1993) reported an $^{40}Ar/^{39}Ar$ age of 25.4 Ma on single sanidine crystals (errors not reported and sample location not given). Phenocrysts 25-40; q 15-35, af 10-30, pl 30-45, b trace-10, hb-trace. Thickness on eastern side of range is at least 700 m; minimum thickness on western side of range is about 25 m.

Ekren and others (1973) included two units within the Monotony Tuff: the tuff of Goblin Knobs and a quartz latite tuff. They showed the two units in fault contact in the north-central part of this map area. We combined both units as the tuff of Goblin Knobs because they are indistinguishable in the field; we could not corroborate the fault contacts. The tuff of Goblin Knobs is petrographically similar to what is mapped as Windous Butte Formation(?) and may be correlative.

Tvc **Volcaniclastic Sedimentary Deposits (Oligocene)** Gray to green, thin- to thick-bedded, fine-to coarse-grained conglomerate and volcaniclastic sandstone. Conglomerate contains clasts of Paleozoic carbonate and quartzite, and dacite, andesite, and welded tuff. Contacts with Paleozoic rocks and Windous Butte Formation(?) are not exposed. Ekren and others (1973) described a similar unit that they included in the basal part of the tuff of Williams Ridge and Morey Peak (considered Windous Butte Formation(?) in this study). Thickness is 0 to 20 m.

Td **Dacite Lava Flow (Oligocene)** Brick-red to reddish-gray flow-banded dacite flows. Unit rests depositionally on andesite flows of Tad. Phenocrysts (3-5 mm) 22-29: q trace-2, af 0, pf 60-77, b 13-17, hb 5-8, cpx 8, opx 1, o 2-4 (Ekren and others, 1973). Thickness is 0 to 50 m.

Tad **Andesite Lava Flow (Oligocene)** A massive andesite lava flow underlies unit Td and, although the base is not exposed, is inferred to overlie unit Tw. It is black to dark green where fresh and dark purple, brown, or gray where propylitically altered. Phenocrysts less than 2-3 mm. Phenocryst 28-34: pl 63-76, cpx 6-11, opx 14-18, o 3-7 (Ekren and others, 1973). Minimum thickness is 30 m.

Tw **Windous Butte Formation(?) (Oligocene?)** Poorly exposed, massive, moderately welded ash-flow tuff ranging form dark brown to pale yellow and buff. Number of cooling units is uncertain. Phenocryst assemblage is variable (Ekren and others, 1973). Extensively prophylitically altered. Unit rests depositionally on Paleozoic rocks. Phenocryst 10-45: q 15-40, af 10-35, pl 15-55, b trace-25. Exposed thickness is 0 to 150 m.

Ekren and others (1973) tentatively correlated this unit with the tuff of Williams Ridge and Morey Peak(?), which at the time was considered a probable intracaldera tuff at Morey Peak 50 km north of the Reveille Range. However, Best and others (1989) assigned the tuff of Williams Ridge and Morey Peak to the intracaldera facies of the Windous Butte Formation. In keeping with the new nomenclature, the Windous Butte Formation is adopted here but is queried because correlation is uncertain. In fact, field relations and petrographic data do not preclude correlation of some Tw with Tg (see text). The age of the Windous Butte Formation is 31.3 Ma (Ekren and others, 1974; Best and others, 1989).

Tc **Clastic Sedimentary Deposit (Tertiary?)** Platy, calcareous siltstone and mudstone that grade upward into cross-bedded, coarse sandstone and pebble to cobble conglomerate form an isolated outcrop (4209.650 N, 571.000 E) unconformably overlying Paleozoic rocks near a small, east-striking, high-angle fault. The rocks are pinkish gray to red, fine- to coarse-grained, and thin to thickly bedded. Clasts are almost entirely carbonate fragments, which may be derived from the surrounding Paleozoic section, and sparse volcanic fragments of uncertain origin. Carbonate clasts are more angular up section and towards the fault, and the rocks are silicified close to the fault. The contact with the fault is not exposed. Thickness is 0 to 40 m.

Ekren and others (1973) interpreted these rocks to be Permian(?)-Pennsylvanian(?) in age and in thrust(?) contact with other Paleozoic rocks. Although a Mesozoic or Paleozoic age cannot be precluded, we consider them to be Tertiary because they have been deposited on the Paleozoic rocks, they are noticeably less indurated than the Paleozoic rocks, and they contain some volcanic material (see text). Age relative to other Tertiary rocks is unknown.

Paleozoic Marine Sedimentary Rocks See Ekren and others (1973) for detailed unit descriptions.

Md **Diamond Peak(?) Formation (Upper Mississippian)** Quartzite and minor conglomerate. Thickness is 160 m or more.

Mj **Joana Limestone (Lower Mississippian)** Thickness is 0 to 70 m.

MDp **Pilot Shale (Lower Mississippian and Upper Devonian)** Thickness is 195 m or more.

Nevada Formation (Middle and Lower Devonian) Thickness is 195 m or more.

Dnu **Upper unit limestone and dolomite.** Thickness is 155 m or more.

Dnl **Lower unit limestone and dolomite.** Thickness is 43 m.

DSd **Dolomite (Lower Devonian and Silurian) undifferentiated** Thickness is 460 m or more.

DSdu **Upper unit** (probably correlative with Devonian and Silurian Lone Mountain Dolomite). Thickness is 290 m.

Sdl **Lower unit** (probably correlative with Silurian Roberts Mountains Formation dolomite) Thickness is 170 m or more.

Oes **Ely Springs Dolomite (Upper and Middle Ordovician)** Thickness is about 30 m.

Oe **Eureka Quartzite (Middle Ordovician)** Thickness is about 95 m.

Oa **Antelope Valley Limestone (Middle and Lower Ordovician)** Thickness is about 185 m.

See accompanying text for references and discussion of Tertiary geology of the quadrangle.