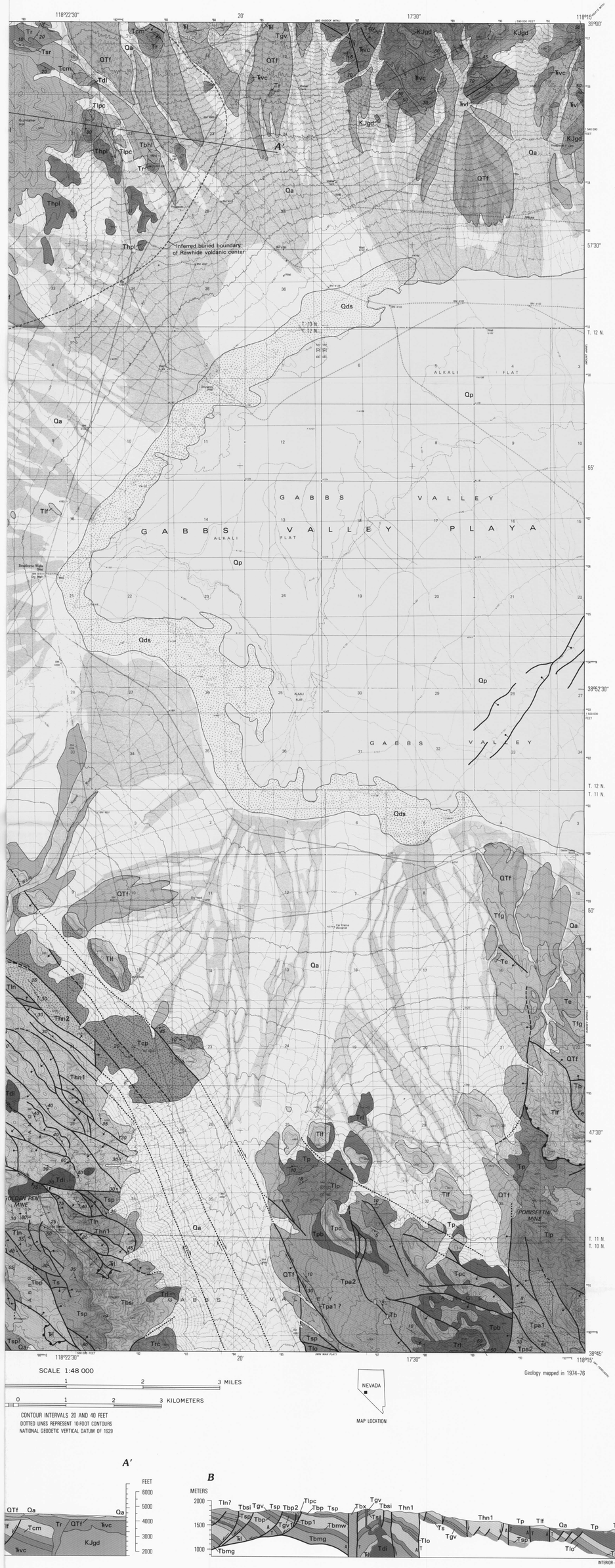
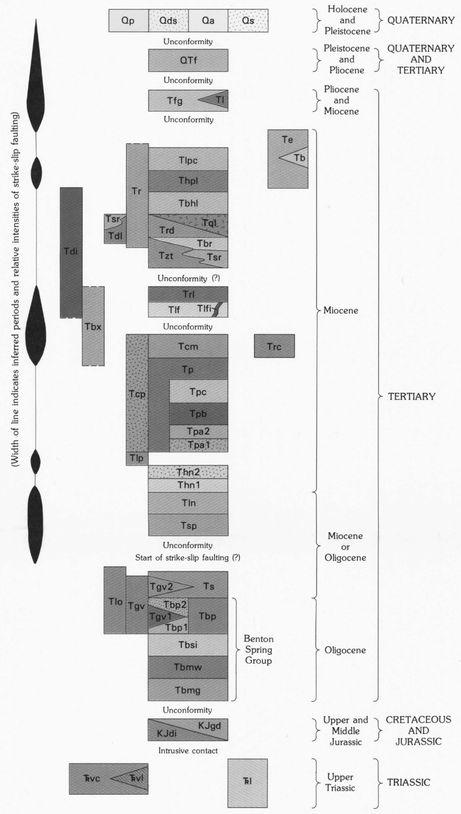


CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

Phenocryst content listed is approximate range of the total rock in modal percent. Phenocryst minerals are listed as percent of total phenocrysts: q, quartz; af, alkali feldspar; pf, plagioclase feldspar; b, biotite; hb, hornblende; pyx, pyroxene; cpx, clinopyroxene; opx, orthopyroxene; o, opaque minerals; and mp, mafic pseudomorphs. Apatite, zircon, and allanite are ubiquitous accessory minerals in the ash-flow tuffs; sphene is indicated where present

Qp PLAYA DEPOSITS (HOLOCENE AND PLEISTOCENE)—Unconsolidated clay, silt, and sand deposited in ephemeral lakes. The Gabbs Valley Playa was the site of a large shallow lake during the Pleistocene Epoch; it is the basin for an extremely large drainage area. The northern part of the playa from the vicinity of Rawhide Hot Spring (4.7 km east of map area at BM4125, Mount Annie quadrangle, see index map) extending westward for several kilometers is the lowest part and the site of an ephemeral lake. When dry, this part is covered with saline efflorescence several centimeters thick. The saline material and the water in the spring were analyzed for lithium, and the abundance was found to be normal for both sediment and hot spring waters (J. R. Davis, U.S. Geological Survey, written commun., 1976). The possibility exists that the playa has been tilted tectonically down toward the north or northwest. The shoreline in the map area and in the adjacent quadrangles to the east (see index map), as defined by beach sands (**Qds**) and by the edge of ancient alkali flats, is higher along the southeastern shore. The elevations there are as high as 1,262 m (4,140 ft); in contrast, elevations along the northwestern and northern shore are as low as 1,250 m (4,102 ft). The southeastern part of the playa is also the scene of youthful (probably Holocene) faulting. Some, or perhaps all, of the apparent differences in elevation could be due to eastward and southward shifting of the beach sands by prevailing westerly winds

Qds DUNE SAND (HOLOCENE AND PLEISTOCENE)—Unconsolidated sand. In the vicinity of the Gabbs Valley Playa, the sand is derived entirely from Pleistocene beach deposits. In a few places the dunes are actively drifting; in most places, however, they are stabilized by desert bushes, and in several areas the sands have been deflated so that only scattered tussock-capped sand mounds remain

Qa ALLUVIUM (HOLOCENE AND PLEISTOCENE)—Unconsolidated silt, sand, gravel, and boulders in washes and alluvial fans; includes talus adjacent to range fronts. Thickness 0–100+ m

Qs WINDBLOWN SAND (HOLOCENE AND PLEISTOCENE)—Subaerial sand and silt interbedded with sheetflood gravel. Thickness 0–30± m

QTf FAN ALLUVIUM (PLEISTOCENE AND PLIOCENE)—Principally subangular boulders, cobbles, and pebbles of Tertiary and Mesozoic rocks in a loose to very slightly indurated matrix of sand, silt, and minor clay. Thickness 0–300+ m

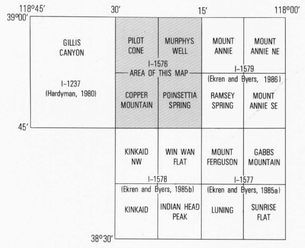
Tfg FANGLOMERATE (PLIOCENE AND MIOCENE)—Subrounded and subangular boulders, cobbles, and pebbles of Tertiary and Mesozoic rocks in a slightly to locally well-indurated matrix of sand, silt, and minor clay. Fanglomerate in southwestern part of the map area, in the vicinity of the westernmost right-lateral strike-slip faults, is characterized by abundant subangular boulders and cobbles of rhyolite, and this fanglomerate in the upper part intertongues with latite (Tl)

Tl LATITE (PLIOCENE AND MIOCENE)—Dark-gray and black intrusive and extrusive latite; aphyric with pf and cpx microlites in a glassy to weakly devitrified groundmass; intertongues with fanglomerate

Te ESMERALDA FORMATION (MIOCENE)—In the southeastern part of the map area, consists of varicolored, mostly yellowish-brown, thin-bedded, frothy-weathering, tuffaceous sandstone and mudstone plus a few beds of conglomeratic sandstone and pumice-rich ash-fall tuff. Similar beds crop out in the west-central part, but there the strata contain abundant, steeply tilted, thin beds of rounded-pebble conglomerate and gravel, the clasts of which are nearly all intermediate lava; the rocks include a thick (30± m) bed of massive-weathering, vitric, pumice-rich tuff, which could be in part a nonwelded ash flow. An age of 15.6 m.y. (R. F. Marvin, written commun., 1983) was obtained from Apache tears in the basal part of the formation in the Mount Annie NE quadrangle to the east (see index map); this date suggests that the Esmeralda is partly contemporaneous with the rocks of Rawhide and could be entirely contemporaneous with those rocks. The name Esmeralda Formation is used herein for reasons outlined by Ross (1961, p. 45) and also because the strata in this region are virtually continuous with the strata at the type locality in Esmeralda County, Nev. Exposed thickness 0–100+ m

Tb BASALT (MIOCENE)—Medium- to dark-gray augite basalt or basaltic andesite containing 40 percent phenocrysts: pf (as long as 0.8 mm), 80; cpx (as long as 3 mm), 10; iddingsite, 10. Holocrystalline groundmass is estimated to contain: pf, 50; cpx, 20; opx, 10; af, 20. Thickness 30± m

ROCKS OF RAWHIDE (MIOCENE)—A complex sequence of mafic, intermediate, and rhyolitic intrusive and extrusive rocks that appear to have been erupted during a very short time interval. The area has been deeply denuded, and in several places, lavas can be traced into their feeder zones. Rhyolite was erupted recurrently throughout accumulation of the sequence. Two K-Ar dates of 14.6±0.4 m.y. and 15.5±0.5 m.y. on rhyolite from Rawhide are listed by Silberman and others (1975)



INDEX MAP SHOWING QUADRANGLES REFERRED TO IN TEXT

Tr Rhyolite of Rawhide—Principally light-gray, pinkish-gray, and crystal-poor (less than 1 percent to as much as 10 percent crystals); pf as long as 3 mm is the principal phenocryst and, in some rocks, the sole phenocryst; a few rocks contain as much as 20 percent phenocrysts (mostly small phenocrysts, rarely pf and af as long as 5 mm), and in these varieties, af and embayed q exceed pf in abundance; b as shreds and tiny books is the sole mafic mineral. The rhyolite in most exposures is intrusive, and these dikelike masses probably fed thick domes and flows that have been mostly stripped away

Tlpc Latite of Pilot Cone—Dense, medium- to dark-gray hornblende latite, mostly intrusive and containing 10–20 percent small, inconspicuous hb prisms as long as 3 mm; locally has hb as long as 1 cm and tiny cpx phenocrysts; in a few places has no phenocrysts. Groundmass is pilotaxitic with pf and cpx microlites and brown glass. Rock on Pilot Cone has conspicuous columnar joints, and columns are nearly horizontal

Thpl Hornblende-pyroxene lava—Dense dark-gray lava that contains 10–20 percent small hb phenocrysts (2–5 mm) in a seriate-pilotaxitic-textured groundmass of pf, which occurs as equant crystals as large as 1.5 mm grading downward in size to tiny microlites; also has microphenocrysts of cpx and interstitial glass

Tbhl Biotite-hornblende lava—Principally conspicuously porphyritic, medium-gray, brownish-gray, or greenish-gray dacite or rhyodacite containing 30–40 percent phenocrysts, which consist of pf that includes clusters of equant crystals as large as 8 mm, b as large as 4 mm, and hb as long as 8 mm. The size of the phenocrysts and the proportions of b and hb vary considerably; in some rocks there is more b than hb; in others the reverse occurs; groundmass is glassy or weakly devitrified. Thickness 200–300 m near vent, elsewhere 0–100 m

Tql Quartz latite lava—The quartz latite has a phenocryst assemblage that is very similar to the biotite-hornblende lava (**Tbhl**); it is distinguished from the latter by the occurrence of sparse q and by an overall lighter color, mostly light gray. The q content is extremely erratic: some thin sections contain as many as six phenocrysts, others contain one grain or none; hb phenocrysts generally exceed b in abundance. The groundmass is a microcrystalline felt of pf, af, and q. The two large masses of quartz latite within and adjacent to the Rawhide volcanic center rest on their feeders, and their contacts with older rocks are mostly intrusive contacts. Rocks mapped as quartz latite in the northwest corner of the map consist of several lava flows. Two thin sections from this sequence contained quartz, but whether the entire pile is quartz bearing is undetermined. Thickness 0–360+ m

Trd Rhyodacite lava—The rhyodacite is medium gray, brownish gray, and conspicuously porphyritic; it contains about 30 percent phenocrysts of pf (commonly as large as 8 mm), hb (rarely as long as 8 mm), and a few grains of opx and b per thin section; the groundmass is pilotaxitic. Thickness 0–200+ m

Tsr Tuffaceous sedimentary rocks—Mostly gray, brown, and white, thin-bedded lacustrine siltstone and mudstone and abundant interbeds of ash-fall tuff; some siltstone is diatomaceous

Tdl Dacite or latite—Dark-gray, weathering brown and brownish gray (black where entirely glassy, light gray where altered), dense lava containing 5–15 percent tiny phenocrysts, which consist of pf (mostly less than 1.5 mm long) and hb (mostly tiny needles less than 2.5 mm long) in a trachytic groundmass of pf microlites and glass. Thickness 0–40± m

Tbr Basaltic rocks—Dark-gray and black vesicular basalt, or basaltic andesite, containing 1–2 percent tiny phenocrysts of cpx and pf in a trachytic or pilotaxitic groundmass of pf microlites and black glass. Mapped at south flank of Rawhide area to include basaltic rock that contains abundant microphenocrysts (mostly less than 0.5 mm long) of cpx and pf in a seriate groundmass of cpx and pf and glass. This rock rests on rhyodacite lava and is, therefore, younger than the basalt to the north that is intercalated with tuffaceous sedimentary rocks

Tzt Zeolitized lithic tuff—Pale-yellowish-brown where zeolitized, light-gray and reddish-gray where unaltered; it is nonwelded and contains abundant fragments of intermediate lava and sparse rhyolite; 10–15 percent phenocrysts: q, 2–10; af, trace; pf, 80–90; b, 2–5; hb, 5–10. Along the northern border, the tuff is locally intensely hydrothermally altered

Tbx BRECCIATED ROCKS (MIOCENE)—Sheared and brecciated rocks mapped locally along the westernmost major right-lateral fault. Rocks are mostly biotite-rich welded tuffs, but may include wedges of sheared dioritic intrusive rocks

Tdi DIORITIC INTRUSIVE ROCKS (MIOCENE)—Includes porphyritic and fine- to medium-grained equigranular rock. At Rawhide, just north of the map area, the rock is hydrothermally altered and porphyritic containing 30 percent small phenocrysts: pf, 80; b, 14; hb, 6. In the Gabbs Valley Range, the rock is mostly equigranular: q, 3 (all interstitial); pf, 70–80; af, trace; b, 13; cpx, 3; o, 2; some equigranular rock contains hb as the dominant mafic mineral. In contrast, some rock in the vicinity of Nugent Wash and southward is conspicuously porphyritic having hb and pf phenocrysts as long as 5 mm set in a finely crystalline groundmass of pf and sparse af. The diorite in the vicinity of the Golden Pen mine is fine grained and equigranular, except for a few hb and pf crystals as large as 4 mm; the rock there contains q, pf, hb, and b and is propylitically altered

Trl RHYOLITE OF GABBS VALLEY RANGE (MIOCENE)—Typically pink or light-gray flow-laminated rhyolite containing 10 percent phenocrysts of small (1–2.5 mm) sodic pf and b in a weakly devitrified groundmass; scattered phenocrysts of hb and moderately embayed q occur locally. In most places this rhyolite exhibits intrusive contacts with country rock and is fresh, but the mass in the vicinity of Nugent Wash includes extrusive breccia and ash and is hydrothermally altered. An age of 19.2±0.7 m.y. was obtained from biotite in the mass exposed in the southeast corner

Tlf LAVAS OF MOUNT FERGUSON (MIOCENE)—Dark-gray, weathering dark brownish gray or greenish gray, porphyritic lavas that range in composition from trachyandesite(?) to silicic quartz latite. Most lavas contain hb as the dominant mafic mineral, but b and pyx are abundant in some flows; pf as long as 1 cm is the dominant phenocryst. K-Ar ages from this and adjacent quadrangles range from 15 m.y. to 22.5 m.y.[1] Thickness 0–1,000± m

Tlfi Intrusive quartz latite—Medium-gray porphyritic quartz latite; forms large plug that intrudes lavas of Mount Ferguson

Trc TUFF OF REDROCK CANYON (MIOCENE)—Compound cooling unit of pink, densely welded tuff containing phenocryst assemblage the same as the Blue Sphinx Tuff (**Tsp**, see below); distinguished from **Tsp** by the presence of numerous fragments of Mesozoic granitic rocks. Age with respect to **Tcm** and **Tp** uncertain. Thickness probably as much as 200 m

Tcp TUFF OF COPPER MOUNTAIN AND POINSETTIA TUFF MEMBER OF HU-PWI RHYODACITE, UNDIVIDED (MIOCENE)—Thickness 0–1,000± m

Tcm TUFF OF COPPER MOUNTAIN (MIOCENE)—Multiple-flow, simple cooling unit of silicic quartz latite and rhyolite tuff; light gray on fresh fracture, weathering brown and brownish gray; in most places grades downward from brown densely welded and devitrified tuff through a black basal vitrophyre (3 mm thick) to partly welded light-gray vitric tuff 5–10 m thick at base. The most distinguishing characteristic of this tuff is abundant accessory sphene, as many as 16 grains per thin section. Phenocrysts 28–44: q, 3–25; af, 20–30; pf, 35–50; b, 6–9; hb, 1–4; cpx, trace–3; o, 1–2. Thickness 0–200 m

HU-PWI RHYODACITE (MIOCENE)—In the map area Hu-pwi Rhyodacite consists of two tuff members, the Poinsettia Tuff Member and the Nugent Tuff Member. In the southeast part, the two members are separated by lavas of intermediate composition (**Tlp**) that are not part of the formation

Tp Poinsettia Tuff Member, undivided—Consists of five cooling units: the uppermost unit is quartz latite, and the underlying four cooling units are rhyodacite. The quartz latite caprock is not mapped separately in the map area, but northeast of Copper Mountain, where it directly underlies the tuff of Copper Mountain (**Tcm**), it is a major, thick (150± m) cooling unit. The quartz latite is light gray and densely to moderately welded; phenocrysts 32–42: q, 2–12; af, 2–12; pf, 65–75; b, 7–13; hb, 2–4; cpx, 1–5; o, 1–3.5; sphene, 0–trace. The four rhyodacite cooling units are characterized by perlitic, gray pumice fragments as long as 20 cm; each unit grades downward from light-reddish-brown or brown, moderately to densely welded tuff in the upper and middle parts to light-gray, partly welded tuff at base; black basal vitrophyres, as thick as 5 m, are present locally. All four cooling units contain the same phenocryst assemblages; phenocrysts 30–50: pf, 75–85; af, 0–trace; b, 6–13; hb, 0–3; cpx, 2–9; opx, 0–3

Tpc Unit C—Uppermost rhyodacite cooling unit, 0–150 m thick

Tpb Unit B—Rhyodacite cooling unit, 0–70 m thick

Tpa2 Unit A2—Rhyodacite cooling unit, 0–200± m thick

Tpa1 Unit A1—Rhyodacite cooling unit, 0–200± m thick

Thn2 Nugent Tuff Member
Unit 2—Multiple-flow, simple cooling unit of densely welded, brownish-gray rhyodacite tuff; characterized by two kinds of pumice: some flows contain abundant light-gray pumice as long as 20 cm, and brown pumice is sparse; other flows contain principally brown pumice that is darker than the matrix; the basal 20 m contains abundant fragments of intermediate lava as long as 10 cm. Phenocrysts are same as those in rhyodacite tuff of the Poinsettia Tuff Member. Thickness 0–100+ m

Thn1 Unit 1—Multiple-flow, compound cooling unit of densely welded, brownish-gray rhyodacite tuff; distinguished from unit 2 by a lack of light-gray pumice. Phenocrysts are same as those in rhyodacite tuff of the Poinsettia Tuff Member. Thickness 0–300 m

Tlp LAVAS OF POINSETTIA MINE AREA (MIOCENE)—Principally gray, propylitically altered rhyodacite lava containing 20–30 percent phenocrysts of pf, hb, cpx, and opx. Some flows contain only pyx phenocrysts; a few contain b and hb as the principal mafic minerals. Thickness 0–400 m

Tln INTERMEDIATE LAVAS OF NUGENT WASH AREA (MIOCENE OR OLIGOCENE)—Dark-gray lavas of intermediate composition; principally hornblende latite, but in some localities, the latite is absent and its place is occupied by dense, nearly black andesitic lava that contains 10 percent small phenocrysts of cpx, opx, and calcic pf

Tsp BLUE SPHINX TUFF (MIOCENE OR OLIGOCENE)—Multiple-flow, simple cooling unit of densely welded quartz latite tuff, typically blue or lavender as a result of mild hydrothermal alteration; bleached to various shades of pink and green where intensely altered. Contains numerous small rock fragments of two types: (1) lavender and purple intermediate lava and (2) green and brown altered welded tuff. Most distinguishing petrographic characteristic is presence of intensely resorbed q phenocrysts that are 2 mm to as long as 6 mm. Phenocrysts 25–45: q, 2–17; af, 1–25; pf, 45–75; b, 4; hb, 3–6; pyx, trace. Thickness 0–100 m. In several fault slices in the map area, the Blue Sphinx Tuff was mapped to include, at the base, as much as 60 m of tuffaceous sedimentary rocks and various thin ash-flow tuffs. In a few localities, these underlying rocks were mapped separately

Tlo LAVAS OF INTERMEDIATE COMPOSITION (MIOCENE OR OLIGOCENE)—Two lithologies: the most common is blue gray or lavender, coarsely porphyritic, having 30–40 percent phenocrysts of pf and hb (both as long as 1 cm); the other type is sparsely porphyritic and has small pf less than 3 mm long and small, completely altered mafic pseudomorphs that possibly are all after pyx. Thickness 0–50+ m. Mapped north of Copper Mountain to include sparsely porphyritic lava that overlies a cooling unit of tuff of Gabbs Valley and underlies the Blue Sphinx Tuff

TUFF OF GABBS VALLEY (MIOCENE OR OLIGOCENE)

Tgv Tuff of Gabbs Valley, undivided—In most places, consists of a single cooling unit of densely welded tuff as thick as 30 m; in several places, mapped to include overlying and underlying tuffaceous sedimentary rocks a few meters thick; locally includes thin (less than 10 m) lavas of intermediate composition. Phenocrysts 27: q, 38; af, 44; pf, 16; b, 2

Tgv2 Unit 2—Upper of two locally mapped, densely welded cooling units of tuff of Gabbs Valley that are separated by thin beds of sedimentary rocks and by a thin cooling unit of biotite-rich welded tuff inferred to be part of the Petrified Spring Tuff (**Tbp**). Phenocrysts same as **Tgv**. Thickness 0–30 m

Tgv1 Unit 1—Lower of two locally mapped, densely welded cooling units of tuff of Gabbs Valley

Ts TUFFACEOUS SEDIMENTARY ROCKS (MIOCENE OR OLIGOCENE)—Thin-bedded, fluviolacustrine, tuffaceous siltstone, claystone, gravel, or conglomerate; locally contains thin-bedded biotite-rich tuff. This sequence locally overlies and underlies unit 2 of tuff of Gabbs Valley (**Tgv2**). Thickness 0–40 m

BENTON SPRING GROUP (OLIGOCENE)

Tbp Petrified Spring Tuff—Mapped to include two biotite-rich cooling units of densely welded tuff; where these units underlie and overlie a thin cooling unit of tuff of Gabbs Valley (**Tgv1**), they are mapped separately. The two units are indistinguishable from each other; they are altered and are various shades of green, red, and blue gray. Phenocrysts 27–33: q, 1–8; pf, 70–80; b, 8–14; hb, 1; mp, 3–5

Tbp2 Unit 2—Thickness 0–30 m

Tbp1 Unit 1—Thickness 0–30 m

Tbsi Singatse Tuff—Multiple-flow, simple cooling unit of densely welded quartz latite tuff; moderately altered in most exposures to purple or purplish gray; light-gray pumice fragments as long as 10 cm are conspicuous in uppermost 50–100 m. Lithic fragments of intermediate lava are fairly abundant throughout. Phenocrysts 30–40: q, 15; af, 20; pf, 40–60; b, 4–10; hb, 3–8. Locally includes thin Guild Mine Member at base. Thickness 0–350 m

Tbmw Mickey Pass Tuff
Weed Heights Member—Recognized only in the extreme southwestern part of map area; simple cooling unit of buff to lavender, moderately welded tuff characterized by small phenocrysts that rarely exceed 2.5 mm and by abundant cpx and opx that exceed b in the thin basal vitrophyre. This tuff is widespread in the adjacent Gillis Canyon quadrangle, and there it shows a gradation downward from rhyolite at the top to rhyodacite at the base. Phenocrysts in the upper part are mostly q, af, and b; in the basal part they are mostly pf and pyx

Tbmg Guild Mine Member—Compound cooling unit of densely welded tuff that in adjacent quadrangles grades downward from rhyolite at the top through quartz latite to rhyodacite at the base. In the map area, the unit consists of reddish-gray rhyolite. Phenocrysts 25–45: q, 25–55; af, 25–45; pf, 15–25; b, 1–3; altered pyx, trace–3. Thickness 0–100+ m exposed. K-Ar ages ranging from 26.3 m.y. to 28.0 m.y.[1] were obtained from several localities in adjacent quadrangles to the south and in the Gillis Canyon quadrangle to the west

INTRUSIVE ROCKS[2] (CRETACEOUS AND JURASSIC)

KJgd Granodiorite—Various shades of medium gray; shows considerable variation in abundance of mafic minerals, and some rocks contain more hb than b; in other rocks, the reverse is true. The granodiorite in the northeastern part of the map area is fine to medium grained and ranges through the granodiorite field of Johannsen (1939): q, 25–32; af (microcline and cloudy orthoclase), 15–25; pf (extensively saussuritized), 40–50; b, 7–13; hb, trace–13; cpx, 0–3. The granodiorite at Copper Mountain is mostly medium grained: q, 19; af, 21; pf, 41; b, 3; hb, 13; o, 2; sphene, trace. K-Ar ages of 158±4 m.y. on b and 155±7 m.y. on hb from this rock indicate a late-Middle or early-Late Jurassic age[1]

KJdi Diorite—Dark-gray and fine- to medium-grained; contains, in places, nearly 50 percent mafic minerals: q, 11; af, 3; pf, 44; b, 18; hb, 23; o, 1

VOLCANICLASTIC AND VOLCANIC ROCKS AND LIMESTONE (UPPER TRIASSIC)—Regional relations suggest that the volcaniclastic and volcanic rocks in this unit, together with the thin interbeds of limestone (**Tkvl**), are laterally equivalent to the predominantly volcanic sequence in the quadrangles to the south and in the Gillis Canyon quadrangle to the west (see index map), and they probably comprise a volcanic facies within the Luning Formation. The sequence in these three areas and in the adjacent quadrangles to the east was mapped as Excelsior Formation of Middle Triassic(?) age by Ferguson and Muller (1949). On the basis of new mollusk discoveries in the Gillis Range to the west (Hardyman, 1980; see index map), the volcanic rocks there are definitely Late Triassic age (N. J. Silberling, written commun., 1971; R. C. Speed, written commun., 1976), and, therefore, the sequence here is also presumably of Late Triassic age. South of the map area, the volcanic rocks are conformably overlain by limestone of the Luning Formation, and just north of the map area, the volcanic and volcaniclastic rocks rest conformably on folded limestone typical of the Luning Formation. The limestone there and also the limestone interbeds here, within the volcaniclastic sequence, contain echinoid spines, which are abundant also in the Gillis Range in the limestone that recently yielded identifiable mollusks of Late Triassic age

Tkvc Volcaniclastic and volcanic rocks—Dark-gray (black-weathering), tightly folded, graded beds of graywacke containing volcanic granules and pebbles; interbedded with massive-weathering dark-gray intermediate lava; olive-gray, blue-gray, and brown, hackly weathering, laminated argillite (mudstone and siltstone); locally occurs with limestone (**Tkvl**), bedded tuff, and possibly ash-flow tuff. Probably 30 percent of the entire sequence is tuff and lava and 70 percent is clastic. Thickness, probably at least 1,000 m exposed

Tkvl Limestone—Gray, thin-bedded, silty limestone in layers as thick as 30 m, interbedded with volcaniclastic rocks (**Tkvc**); mapped only where 30 m thick or where thinner beds are particularly well exposed

Tkl LUNING FORMATION (UPPER TRIASSIC)—Along the northern border, limestone that is inferred to be part of the Luning Formation underlies the volcanic and volcaniclastic sequence (**Tkvc**) described above and consists of isoclinally folded, thin-bedded, dark-gray limestone; near intrusive masses of granodiorite (**KJgd**), the limestone is recrystallized to light-gray and white marble. In the Gabbs Valley Range, the limestone probably lies above the volcanic and volcaniclastic sequence, which is not exposed; there, the Luning consists of thin-bedded limestone interbedded with dark-gray, pyrite-bearing siltstone and graywacke. Thickness 100 m exposed

[1]In this report we use a Miocene-Pliocene boundary age of 5 m.y. and an Oligocene-Miocene boundary age of 26 m.y. For more detailed descriptions of the Tertiary volcanic rocks and K-Ar age data and sources, see Ekren and others (1980) and Proffett and Proffett (1976).
[2]Classification of igneous rocks used herein is that of Johannsen (1939). All contacts between the various types of Mesozoic batholithic rocks shown on this map are approximately located and in places arbitrary.

———?— CONTACT—Approximately located; queried where doubtful

75 FAULT—Showing dip and relative horizontal movement. Dashed where approximately located or inferred; dotted where concealed; queried where doubtful. Bar and ball on downthrown side. Hachures indicate alluvium deposited against fault scarp but not faulted. In cross section, direction of relative movement: T, toward observer; A, away from observer

Detachment fault—Half moons on upper plate. Dotted where concealed

FOLDS—Showing approximate trace of axial surface and direction of plunge where known

Anticline

Syncline

Tightly folded beds—Showing approximate strike of fold axes

STRIKE AND DIP OF BEDS
35 Inclined—Degree of dip given where known
Vertical
80 Overturned

STRIKE AND DIP OF FOLIATION
35 Inclined—Degree of dip given where known
Vertical

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