EXPLANATION

The following descriptions of Tertiary rocks are simplified from Proffett and Proffett (1976) and Proffett (1977); descriptions of pre-Tertiary rocks are from unpublished data. Igneous rocks are classified on a field and petrographic modal basis following the scheme of Williams and others (1955); the IUGS (Streckeisen, 1976) classification for plutonic rocks is noted where it differs from that of Williams and others (1955).

QUATERNARY DEPOSITS

Qal

Undivided alluvial deposits. Recent sand, gravel, fanglomerate, floodplain, and lake deposits; includes some older dissected and tilted pediment gravels that may be as old as late Tertiary.

Qls

Landslide deposits.

TERTIARY VOLCANIC ROCKS

Tba

Basalt. Flows of pyroxene olivine basalt, 300 feet thick; 8–11 m.y. by K-Ar (Proffett, 1977).

Ta Tws Twt

Sediments and tuffs. In part equivalent to the 7.5–12.5-m.y.-old Wassuk Group of Gilbert and Reynolds (1973). **Ta:** conglomerate, fanglomerate, sandstone, and siltstone, up to 400 feet; interbedded with 11-m.y.-old basalt in the Singatse Range; includes limonite-cemented fanglomerate of unknown late Cenozoic age at the north end of Smith Valley. **Tws:** white fluvial tuffaceous siltstone and sandstone with minor thin ash and conglomerate beds. **Twt:** white, unwelded rhyolitic tuff overlying tuff of Gallagher Pass in the northern Wassuk Range.

Tha Thai

Hornblende andesite of Lincoln Flat. Gray andesite with hornblende or hornblende and plagioclase phenocrysts; includes hornblende-pyroxene andesite in the northern Singatse Range; 17–19 m.y. by K-Ar (Proffett and Proffett, 1976). **Tha:** up to 5000 feet of flows, breccias, and sediments. **Thai:** plugs, dikes, and sills; includes minor hornblende-biotite dacite quartz porphyry.

Tb

Olivine-clinopyroxene basalt. Flows up to 600 feet thick; includes small outcrops of intrusive rock of similar composition.

Td

Tuff and breccia of Gallagher Pass. Plagioclase-, biotite-, and augite-bearing dacite ash-flow tuff, tuff-breccia, air-fall tuff, flow, and flow-breccia approximately 24 m.y. by K-Ar (Proffett and Proffett, 1976); correlative with the Hu-Pwi Rhyodacite of Ekren and others (1980).

Tbs

Blue Sphinx Tuff. Thin, pumiceous, white, unwelded, crystal-rich rhyolitic ash-flow tuff up to 100 feet thick with crystals of sanidine, plagioclase, "sieve-textured" resorbed quartz, and biotite; named by Ekren and others (1980) in the Gabbs Valley Range to the southeast of the Yerington district.

Tbm

Bluestone Mine Tuff. White, crystal-poor unwelded rhyolitic tuff, tuff-breccia, and sediments containing two poorly welded, red to brown ash-flow tuffs; up to 980 feet. Correlative with the tuff of Gabbs Valley of Ekren and others (1980, p. 32).

Ts Tsl

Singatse Tuff. Quartz latite ash-flow tuff; 27.2 ± 1.1 m.y. (Proffett and Proffett, 1976). **Ts:** map unit 9 of Proffett and Proffett (1976); 700–1200 feet of strongly to moderately welded, red-brown, crystal-rich tuff with plagioclase, quartz, sanidine, biotite, hornblende, and sparse pumice fragments. **Tsl:** map units 8 and 8A of Proffett and Proffett (1976); similar to Ts, consisting of up to 350 feet of basal buff-weathering, lithic-rich tuff.

Trt Twh Tru Tgm

Mickey Pass Tuff. Trt: white tuff; map unit 7 of Proffett and Proffett (1976). Up to 370 feet of white, pale green, or pale pink rhyolitic unwelded tuffs and tuffaceous sedimentary rocks. **Twh:** Weed Heights Member; map unit 6 of Proffett and Proffett (1976) dated at 27 ± 1 m.y.; buff to lavender to red-brown, moderately welded, moderately crystal-rich ash-flow tuff with plagioclase, sanidine, quartz, biotite, and abundant white pumice. **Tru:** unwelded tuff; map units 4 and 5 of Proffett and Proffett (1976). White, poorly welded rhyolitic tuff and overlying rhyolitic sedimentary rocks up to 160 feet thick. **Tgm:** Guild Mine Member; up to 2660 feet of compositionally zoned quartz latite ash-flow tuff, dated at 27.5 ± 1 m.y. (Proffett and Proffett, 1976); dark brown, strongly welded, crystal-rich tuff with plagioclase, biotite, and augite near base that grades upward to lavender-colored, moderately welded tuff with sanidine, quartz, some plagioclase, biotite, and large white pumice.

Tei

Early ignimbrite. Up to 400 feet of erosional remnants of quartz latite ash-flow tuff; white, poorly to nonwelded, sparsely pumiceous, moderately crystal-rich tuff with plagioclase, sanidine, quartz, and biotite.

Teb

Early basalt. Up to 350 feet of pyroxene basalt flow, breccia, and tuff; intercalated with and lying over conglomerate.

Tcg

Conglomerate. Up to 400 feet of well-rounded pebble, cobble, and boulder conglomerate often lying over red, deeply weathered pre-Tertiary rocks. Clasts consist of 25% pre-Tertiary lithologies and 75% Tertiary pyroxene or hornblende andesite; includes angular unsorted breccia of probable landslide origin and minor basalt.

JURASSIC INTRUSIVE ROCKS

Ja

Andesite dikes. Fine-grained, dark green, phenocryst-poor dikes.

Jr

Rhyolite dikes. Flow-banded, narrow, gray to white dikes with 7%–15% phenocrysts of plagioclase, K-feldspar, biotite, and rare quartz in an aphanitic ground mass.

Jqp Jsa Jqms

Shamrock batholith. A large quartz monzonite batholith in the southern Singatse Range, probably correlative with quartz monzonite in the Pine Nut Range between Mt. Siegel and Mt. Como, where Stewart and Noble (1979) have referred to it as the Mt. Siegel batholith; a sample from the southern Singatse Range has a concordant U-Pb zircon date of 165 m.y. (J. H. Dilles and J. E. Wright, unpub. data). **Jqp:** quartz porphyry dikes. **Jsa:** aplite dikes. **Jqms:** seriate, medium-grained, biotite-hornblende quartz monzonite with a color index of 11–15 and less than 1% magnetite plus sphene.

Jgdp

Granodiorite porphyry. Dark gray dikes and sills of hornblende granodiorite (IUGS quartz monzodiorite); 40%–45% phenocrysts of 1–3 mm plagioclase, hornblende, minor biotite and quartz, and rare 1 cm K-feldspar in a dark ground mass containing macroscopic hornblende; contains 1%–20% fine-grained, 5–20 cm dark andesite inclusions; commonly emplaced along major Jurassic faults.

Jqmp Jpg Jpqm Jqm Jbqm Jgd Jgb

Yerington batholith. A composite, differentiated, shallow-level calc-alkalic/alkali-calcic batholith; large areas are hydrothermally altered. Hosts three porphyry copper deposits and is associated with several copper and magnetite skarns. Concordant U-Pb zircon dates (J. H. Dilles and J. E. Wright, unpub. data) show that early granodiorite is 169 m.y. old and youngest quartz monzonite porphyry is 168 m.y. old (samples from 1.5 to 3 miles SW of Weed Heights). Seven of the batholith intrudes andesite and dacite of Artesia Lake; exposures deeper in the batholith contain a weak igneous mineral foliation and may range to diorite; numerous contacts between different phases suggest multiple plug- or dike-like intrusions. **Jgb:** layered to massive, medium-grained biotite-hornblende gabbro; probably a cumulate, but shows mutually intrusive contact relations with granodiorite.

JURASSIC-TRIASSIC METAVOLCANIC AND METASEDIMENTARY ROCKS

Jal

Andesite of Artesia Lake. Up to 600 feet of hornblende and pyroxene andesite or dacite flow, breccia, and conglomerate with local interbedded tuffaceous sandstone and ash-flow tuff(?); interbedded with the top of quartzitic sandstone (Jq) north of Ludwig.

Jq

Quartzitic sandstone. 1000 feet of well-sorted, subrounded fine- to medium-grained quartz sandstone with minor feldspar; cemented by silica; arkosic near base and top.

Jgy

Gypsum and anhydrite. 40–450 feet thick; bedded.

Jl

Limestone of Ludwig. 150 feet of white massive marble and blue-gray laminated limestone (calcarenite); commonly brecciated; locally with algae-like structures.

JTRcl JTRvc

Volcanic siltstone and limestone. Up to 1700 feet thick. **JTRcl:** interbedded thin-bedded carbonaceous, calcareous argillite, felsitic siltstone and tuff, and limestone; possibly correlative with Noble's (1962) Gardnerville Formation. **JTRvc:** basal unit of fine, white bedded felsitic siltstone and tuff, with minor interbedded limestone and andesite tuff; probably contains the Triassic-Jurassic boundary.

TRlb TRl

Limestone of Mason Valley. TRlb: thin-bedded, blue-black argillaceous limestone; 320 feet thick. **TRl:** 875 feet of massive white to light blue-gray limestone; conformably overlies andesitic tuff at McConnell Canyon; mid-Norian(?). Includes possibly correlative limestone in Guild Canyon in the northern Singatse Range.

TRad

Andesitic to dacitic tuff and tuff-breccia. 300 feet of medium-bedded, dark green, fine-grained andesitic tuff and local basal quartz-bearing sandstone and siltstone at McConnell Canyon; at Schurz Highway includes at least 7000 feet of rocks which overlie unit TRla and consist of thick-bedded andesitic to dacitic sandstone and mudstone, tuffs, and lithic tuffs, intercalated with thin-bedded black argillite and minor limestone. Includes felsitic tuffs and tuffaceous sandstone which underlie limestone in Guild Canyon.

TRvl

Volcanic sandstone and limestone. 500 feet of interbedded felsitic sandstone, light gray limestone, and thin-bedded calcareous argillite; contains the Norian coral *Thecosmilia* sp. (T. L. Britt, written commun., 1968) at McConnell Canyon.

TRla

Black calcareous argillite. Black, thin-bedded carbonaceous and calcareous argillite and limestone; 800 feet thick in McConnell Canyon with a 175-foot-thick interbed of white felsitic sandstone. Pectinoid pelycypods of the *Halobia* sp. of lowermost Norian age (N. J. Silberling, written commun., 1968) occur at 200 feet above the base of the unit. At Schurz Highway the unit is 1250 feet thick and contains late Karnian fossils.

TRll

Dolomitic limestone. Massive, blue-gray, partly dolomitic limestone. In McConnell Canyon it disconformably overlies the volcanics of McConnell Canyon, is 25–250 feet thick, and contains the latest Karnian ammonoid *Anatropites* sp. (N. J. Silberling, written commun., 1968). At Schurz Highway it occurs as 1100 feet of fossiliferous limestone, which contains latest Karnian *Aulacocerus* sp. and *Anatropites* sp. (N. J. Silberling, written commun., 1977, 1975, respectively).

TRr TRa TRv

Volcanics of McConnell Canyon. In McConnell Canyon in the Singatse Range; consists of 3400 feet of andesitic rocks overlain by 900 feet of felsitic rocks, both cut by quartz porphyries. The entire sequence has a whole-rock Rb-Sr date of 214.7 ± 6.8 m.y. (Proffett, Livingston, and Einaudi, in prep.). **TRr:** felsitic rocks; gray, pink, or white felsitic flow, breccia, domes, conglomerate, and sandstone. Felsite consists of fine-grained (0.01–0.1 mm) quartz and feldspar containing sparse phenocrysts of 1 mm oligoclase, K-feldspar, and biotite. **TRa:** andesitic rocks; dark green meta-andesite flow, breccia, conglomerate, and sandstone. Originally hornblende or pyroxene andesite metamorphosed to biotite or hornblende schist or hornfels. Queried outcrops (TRr? and TRa?) are lithologically similar to the volcanics of McConnell Canyon but possibly different and older because they are exposed south of the Jurassic granodiorite porphyry dike that occupies a major fault through Sand Canyon in the southern Singatse Range and at 38°55'N on the east half of the map area. At the latter location TRr? and TRa? are intruded by the Strosnider Ranch pluton. **TRv:** undifferentiated intercalated andesitic and felsitic rocks in the Ludwig fault block.

EARLY MESOZOIC PLUTONIC ROCKS

Mzqp Mzap Mzqm Mzdi

Strosnider Ranch pluton. A quartz monzonite to diorite pluton of unknown age that intrudes TRr? and TRa? south of the Jurassic granodiorite porphyry dike at 38°55'N on the east half of the map; cut by Jurassic(?) andesite and rhyolite dikes. The diorite phase is petrographically similar to the diorite in the northern Wassuk Range that has a concordant U-Pb zircon date of 230 m.y. (J. H. Dilles and J. E. Wright, unpub. data). **Mzqp:** quartz porphyry with 5% quartz, 8% plagioclase, and ½% shreddy biotite in a white, aplitic groundmass. **Mzap:** aplite and pegmatite dikes. **Mzqm:** biotite quartz monzonite to granodiorite (IUGS granite to granodiorite). Contains 30%–35% 1–5 mm "gumdrop" quartz and 10% shreddy biotized mafic minerals; contains accessory magnetite and allanite(?). **Mzdi:** hornblende diorite, with 25%–50% ragged hornblende pseudomorphous after augite; altered and metamorphosed, with abundant epidote.