EXPLANATION

QUATERNARY — Pleistocene and Holocene

- **Qpt** — Placer tailings
- **Qya** — Younger alluvium: Stream gravel and sand unconsolidated and undissected
- **Qhw** — Hillwash deposits
- **Qt** — Talus
- **Qls** — Landslide deposits
- **Qoa** — Older alluvium: Partially dissected upper portions of range front fan deposits in southern and eastern parts of area; partly dissected remnant, near townsite of Galena, of gravel and sand grading into hillwash in upper portions.

TERTIARY OR QUATERNARY

- **QTb** — Basalt flows: Dark-gray to black, fine-grained vesicular olivine basalt

TERTIARY

Oligocene(?)

- **Tc** — Caetano Tuff: Gray quartz latite crystal tuff; correlated by Stewart and McKee (1970) with Caetano tuff of Gilluly and Masursky (1965). Age 30 m.y. (McKee and Silberman, 1970)

Eocene or Oligocene

- **Tag, Tib** — Altered granodiorite of Copper Canyon: Tag, altered granodiorite. Porphyritic biotite (-hornblende) granodiorite; intense secondary potassic alteration; varying intensities of green copper staining in oligoclase-andesine phenocrysts; partly felsic, with abundant quartz phenocrysts. Age 38 m.y. (Theodore and others, 1971) Tib, intrusion breccia. Consists of mottled brown to red-brown, subangular fragments (about 5 to 15 cm across) of recrystallized chert set in a fine-grained biotite-quartz matrix with abundant 0.6 cm long laths of euhedral plagioclase
- **Tak** — Altered granodiorite of Wilson-Independence mine area: Gray to white, slightly porphyritic biotite granodiorite, abundant potassic alteration. Traces of green copper staining in plagioclase phenocrysts. Age 38 m.y. (Theodore and others, 1971)
- **Tq, Tqd, Td** — Quartz monzonite, quartz diorite, diorite: Tq, quartz monzonite. Includes altered granodiorite and weakly to strongly chloritized biotite quartz porphyry dikes. Light to dark gray, medium-grained rocks Tqd, quartz diorite. Chloritized Td, diorite

SONOMA OROGENY

SONOMA OROGENY

Unconformity

PERMIAN

Upper Permian

- **Pes, Pec, Pel** — Edna Mountain Formation: Pes, sandstone; brown to buff, poorly bedded calcareous Pec, chert-pebble conglomerate; fairly well-sorted, drab. Occurs as lenses Pel, limestone; white to gray massive

FAULT CONTACT

Upper Pennsylvanian and Lower Permian

- **PPaq** — Antler Peak Limestone: Gray- to dark-gray well-bedded limestone; locally, sandy gray limestone with well-rounded chert granules

FAULT CONTACT

PENNSYLVANIAN

Middle Pennsylvanian

AUTOCHTHONOUS BLOCK (ANTLER SEQUENCE)

- **Pu, Pm, Pl, Pbl** — Battle Formation: Pu, undifferentiated Pu, upper member; predominantly gray chert and quartzite pebble conglomerate with minor green quartzite interbeds Pm, middle member; chiefly purple, green, and red; thin-bedded to well-laminated calcareous shale where unmetamorphosed; dense, massive tremolitic hornfels where metamorphosed Pl, lower member; brown to reddish-brown chert-pebble conglomerate; predominantly thick-bedded and locally with poorly sorted boulders and cobbles of quartzite, sandstone, limestone, and greenstone. Calcareous and ferruginous matrix. Some gravelly sandstone interbeds Pbl, hematite-rich red beds; irregularly bedded, cobble to boulder sandy conglomerate; calcareous; abundant hematite both in the clay fraction, and in angular detrital chips

ANTLER OROGENY--MAJOR UNCONFORMITY

PENNSYLVANIAN(?)

UPPER THRUST PLATE (GOLCONDA PLATE)

Top Not Mapped

- **Ppu, Ppu, Ppl, Ppl, Pplc** — Pumpernickel Formation: Ppu, upper unit; typically ridge-forming, gray to black chert where unmetamorphosed; laminated to thick-bedded. Includes (Ppu) some less resistant gray chert (weathering to green and brown) with Olive-green argillite interbeds. Mappable outcrops indicated by deeper color tone. Also includes some thin pebble beds of angular chert fragments. Lower contact in part gradational. Chert locally intensely metamorphosed (stippled) to white, medium-grained, granulose hornfels Ppl, lower unit; smooth slope forming, drab gray-brown argillite with some shale where unmetamorphosed; generally, laminated to thin bedded. Some pebble beds. Sparse greenstone (Pplc). Some lensoid chert interbeds (Pplc). Argillite locally metamorphosed to brown, fine-grained, biotite hornfels

BASE NOT EXPOSED

GOLCONDA THRUST

CAMBRIAN

Upper Cambrian

MIDDLE THRUST PLATE (DEWITT PLATE)

- **Ch** — Harmony Formation: Greenish-brown micaceous sandstone, feldspathic sandstone where unmetamorphosed; minor amounts of pebbly sandstone, black shale, and gray limestone; smooth slope forming. Sandstone locally metamorphosed to brown biotite hornfels, and (Ch) white metaquartzite

BASE NOT EXPOSED

DEWITT THRUST

Lower or Middle Cambrian

LOWER THRUST PLATE (ROBERTS MOUNTAINS PLATE)

- **Csc** — Scott Canyon Formation: Interbedded dark-gray to black, well-bedded chert and shaly argillite; carbonaceous. Locally metamorphosed to light-gray metachert and metashale

BASE NOT EXPOSED

ROBERTS MOUNTAINS THRUST (not exposed)

Silicified fault breccia

Unconsolidated fault gouge and breccia

Contact — Dashed where approximately located; dotted where inferred.

Normal or steep reverse fault — Dashed where approximately located; short dashed where inferred; dotted where concealed

Thrust fault — Sawteeth on upper plate. Dashed where approximately located; short dashed where inferred; dotted where concealed

Specimen locality for biotite K-Ar age determination: (sample numbers same as in Theodore, Silberman and Blake (1971))
(6) 38.2±0.8 m.y.
(9) 38.5±0.8 m.y.
(10) 38.7±0.8 m.y.
(11) 38.0±0.8 m.y.
(12) 37.6±0.8 m.y.

Iron oxides

Quartz veins

Anticline — Showing trace of axial plane and plunge of axis. Dashed where approximately located; short dashed where inferred or uncertain

Syncline — Showing trace of axial plane and plunge of axis. Dashed where approximately located; short dashed where inferred or uncertain

Overturned anticline — Showing trace of axial plane, plunge of axis, and direction of dip limbs. Dashed where approximately located; short dashed where inferred or uncertain

Overturned syncline — Showing trace of axial plane, plunge of axis and direction of dip limbs. Dashed where approximately located; short dashed where inferred or uncertain

Contact gradational

Trend and plunge of minor anticline

Trend and plunge of minor syncline

Trend and plunge of minor overturned fold

Trend and plunge of lineation

Strike and dip of beds

Strike and dip of overturned beds

Strike of vertical beds

Horizontal beds

Approximate strike and dip of contorted beds

Trend and plunge of lineation in bedding plane

Horizontal lineation in bedding plane

Strike and dip of schistosity

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McKee, E. H., and Silberman, M. L., 1970, Geochronology of Tertiary igneous rocks in central Nevada: Geol. Soc. America Bull., v. 81, no. 8, p. 2317-2328

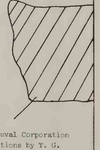
Stewart, J. H., and McKee, E. H., 1970, Geologic map of Lander County, Nevada: U.S. Geol. Survey open-file map, scale 1:250,000

Theodore, T. G., Silberman, M. L., and Blake, D. W., 1971, Geochemistry and K-Ar ages of plutonic rocks in the Battle Mountain mining district, Lander County, Nevada: U.S. Geol. Survey Prof. Paper (in press)

Sheet 2.--Geologic map of the Copper Canyon area, Battle Mountain mining district, Lander County, Nevada by Ted G. Theodore

INDEX MAP SHOWING SOURCES OF GEOLOGIC INFORMATION

Geology by T. G. Theodore, 1968, 1969; assisted by A. H. Barabas, 1966



From maps of Duval Corporation with modifications by T. G. Theodore, 1969

THIS MAP IS PRELIMINARY AND HAS NOT BEEN EDITED OR REVIEWED FOR CONFORMITY WITH U.S. GEOLOGICAL SURVEY STANDARDS

COPPER CANYON AREA··THEODORE