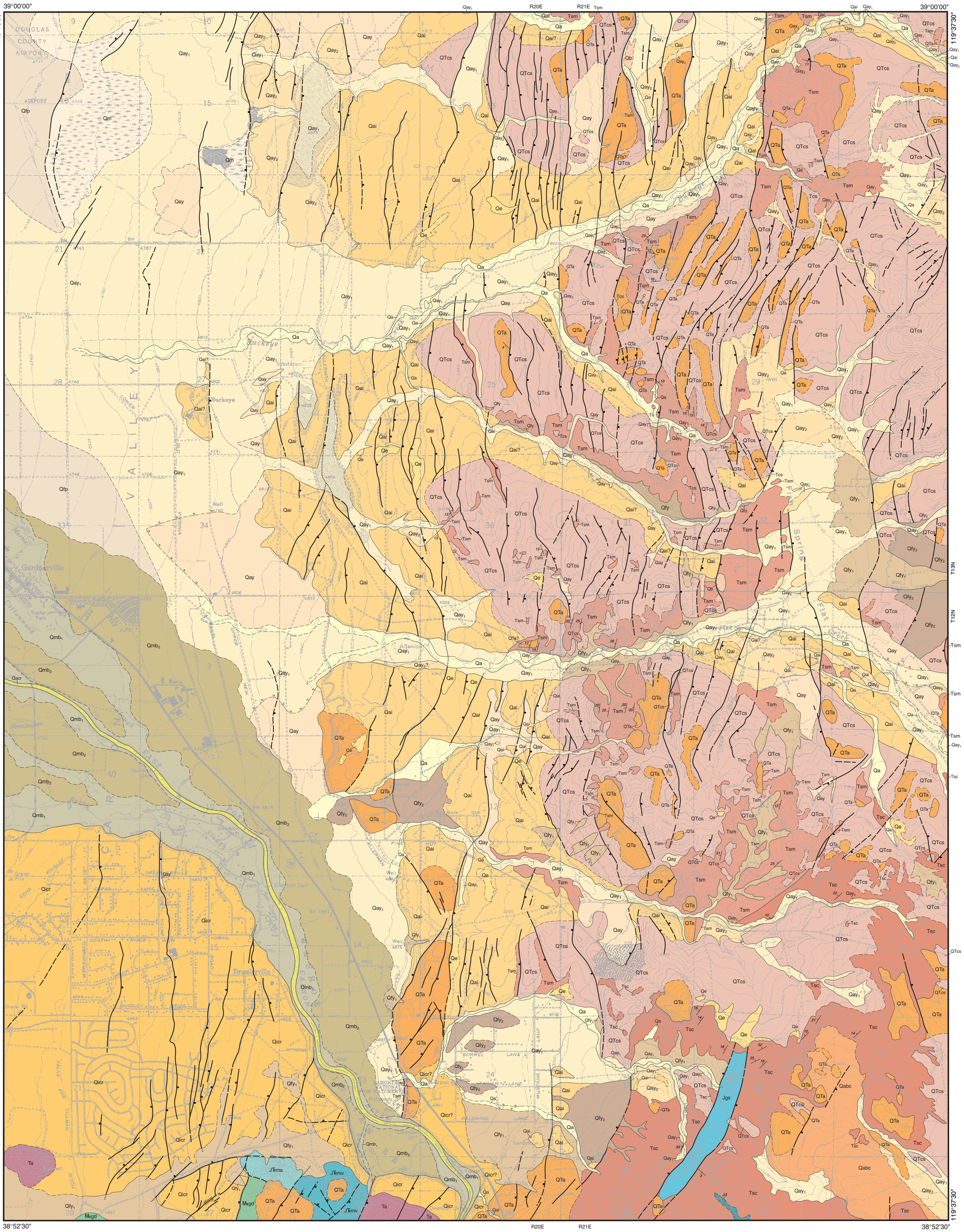
Prepared as part of the STATEMAP component of the National Cooperative Geologic Mapping Program in cooperation with the U.S. Geological Survey



Scale 1:24,000

0 0.5 1 kilometer

0 0.5 1 mile

0 1000 2000 3000 4000 5000 feet

CONTOUR INTERVAL 20 FEET

SUPPLEMENTARY CONTOUR INTERVAL 10 FEET

Base map: U.S. Geological Survey Gardnerville 7.5' Quadrangle, 1982 Digital Raster Graphic (DRG)

PRELIMINARY GEOLOGIC MAP OF THE GARDNERVILLE QUADRANGLE, DOUGLAS COUNTY, NEVADA

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2000

Field work done in 2000.

DRAFT

Preliminary geologic map.
Has not undergone office or field review.
May be revised before publication.

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Qa **Active alluvium** Cobble, pebble, and sand deposits within annually active washes and stream channels. Deposits are matrix and clast supported, poorly to moderately sorted, and are uncemented. Clasts are angular to subrounded. Deposit thicknesses range from 0.5 to 2 m. Surfaces typically have anastomosing bar and swale topography.

Qm **Intermittently active marsh deposits (modern to late Holocene)** Brown clayey, fine to very fine sandy, silt to silty clay deposits. Massive, well-sorted, with angular to subrounded grains; some vesicles and weak platy structure. Locally a thin salt crust covers the surface. Deposits are greater than 0.5 m thick.

Qfp **Floodplain deposits (modern to Holocene)** Light-brown to brown fine-grained sands and silts. Flood deposits from the Carson River and tributaries. Deposits are greater than 1 m thick.

Qb **Basin deposits (modern to Holocene)** Light- brown fine-grained sands and silts. Deposited in small basins adjacent to faults.

Qe **Eolian deposits (modern to Holocene)** Light-brown, well-sorted, angular to rounded fine to very-fine sand and silt in sand dune and dune blanket deposits. Deposits are up to 2 m thick. Low profile, longitudinal dune forms are common.

Deposits of the Western Pine Nut Mountains

Sandy pebble gravel to fine and medium sandy alluvial fan, stream terrace, and flood plain deposits from stream channels originating on the west side of the Pine Nut Mountains. Thinly bedded to massive with gravel lenses up to 70 cm thick. Clasts are up to 70% granitic rocks, 20 to 30% rhyolitic to dacitic volcanic rocks, and up to 10% metavolcanic and meta-sedimentary rocks.

Qay_1 Qfy_1 **Later younger alluvium and fan deposits (late to mid Holocene)** **Qay_1** Younger stream terrace and flood plain deposits. Cobbly, pebble gravels to medium- to fine-grained sands. Surfaces have subdued bar and swale topography and small coppice dunes around bushes. Soil development ranges from A/C to A/Bw/C profiles. A horizons are 2 to 10 cm thick eolian silts and fine sands, and Bw horizons are up to 15 cm thick. Deposits are up to 1.5 m thick. Subject to intermittent flooding in places. **Qfy_1** Younger alluvial fan deposits. Similar to Qay_1, but commonly coarser grained and in discharge areas on alluvial fans.

Qay_2 Qfy_2 **Earlier younger alluvium and fan deposits (early Holocene to latest Pleistocene)** **Qay_2** Earlier younger stream terrace and flood plain deposits. Cobbly, pebble gravels and medium- to fine-grained sands. Surfaces are generally smoothed with a weak pavement. Iron-stained varnish on surface clasts is typical. Soil development ranges from A/Bt/C to A/Bt/Bk/C profiles, commonly with stage I and II carbonate development, but a weak stage III is discontinuously present in some places. Deposits are up to 1.5 m thick. **Qfy_2** Earlier younger alluvial fan deposits. Similar to Qay_2, but commonly coarser grained and in discharge areas on alluvial fans.

Qay Qfy **Younger alluvium and fan deposits (undivided latest Holocene to latest Pleistocene)** **Qay** Undifferentiated Qay_1 and Qay_2 deposits. In some cases, thin deposits of Qay_1 overlie Qay_2 deposits, and in others cases the two deposits are adjacent, but are too small or complicated in pattern to map. **Qfy** Undifferentiated Qfy_1 and Qfy_2 deposits. In some cases, thin deposits of Qfy_1 overlie Qfy_2 deposits, and in others cases the two deposits are adjacent, but are too small or complicated in pattern to map.

Qai **Intermediate age alluvium (late Pleistocene)** Alluvial fan terrace and stream terrace remnants. Cobbly pebble gravels and medium- to fine-grained sands. Typical soils are A/Bt/Bk/C profiles, with structured argillic horizons up to 0.5 m thick and calcic horizons with Stage II to Stage III carbonate development that are up to 1 m thick. Deposits are up to 3-m thick. Surfaces are generally smoothed and range from weak pavements to no pavements where vertisolic action of the argillic horizon churns up the surface soil.

Qabc **Alluvium of Buffalo Canyon (mid to early Pleistocene)** Alluvial fan remnant, terraced by stream incision in its lower reaches but still active in the upper reaches. Deposits are up to 90% metasedimentary and metavolcanic rocks, up to 10% milky and crystal quartz, with minor amounts of rhyolitic and pebble conglomerate clasts. Clasts are angular to subangular. Soil development is generally a Bt/Bk/C profile with well-developed, structured argillic horizons over 55 cm thick.

QTa **Pliocene-Pleistocene alluvium of the western Pine Nut Mountains** Alluvium that caps many hills in the eastern half of the quadrangle and commonly lies in angular unconformity with underlying Tertiary sediments. Bouldery, sandy, cobble and pebble gravels, and occasionally interspersed sands, in well to moderately sorted, commonly clast-supported beds. Clasts are commonly rounded to subrounded, with some angular clasts. Original surfaces are generally eroded away or buried. Relict reddened, argillic horizons are common, and clasts are commonly iron-stained and many have carbonate rinds. Near the southeast part of the quadrangle, these deposits contain a 0.5- m-thick petrocalcic deposit. Deposits are up to 6 m thick.

QTcs **Covered pliocene Sediments and Pliocene-Pleistocene alluvial deposits** Colluvial cover obscures many of the Pliocene deposits, overlying gravels, and the contact between these units. Thus a covered Pliocene-Pleistocene deposits unit is designated. These deposits are overlain by variable thicknesses of colluvium derived from the fine-grained Pliocene sediments and overlying conglomerates ranging from 0.5 to several meters thick. Colluvium is generally matrix-supported, unsorted sands and cobbly sands.

Deposits of the East Fork Carson River

Deposits are dominated by intermediate volcanic rocks with lesser metamorphic rocks, and minor granitic rocks and chert.

Qacr **Deposits of the East Fork Carson River** Sand and gravel deposits within the active channel of the Carson River. Generally subaqueous and rearranged by high river flows.

Qmb_1 **Later meander-belt deposits** Meander-belt and floodplain deposits of the Carson River active prior to construction of flood control levies. Deposits are formed by the lateral accretion of cobbles, pebble gravels, and sands, and local vertical accretion of fine-grained eolian and local organic-rich fine-grained sands and silts.

Qmb_2 **Earlier meander-belt deposits (late Holocene)** Intermittently active, fluvial meander-belt and floodplain deposits. Deposits are formed by the lateral accretion of cobbles, pebble gravels, and sands, and local vertical accretion of fine-grained eolian and local organic-rich fine-grained sands and silts.

Qicr **Intermediate age alluvium** Bouldery, cobbly, sandy pebble gravel in moderately stratified to massive, clast-supported deposits. Clasts rounded to subrounded. Deposits are up to 3 m thick.

Pliocene Sedimentary Deposits

Tsm **Fine- to medium-grained Pliocene alluvial deposits** Deposits of siltstone, sandstone, and conglomerate, with occasional tephra beds, and occasional mammal fossils. Siltstone is deposits of massive to finely laminated silt, typically 1 cm to meters thick. Sandstone and conglomerate are dominantly volcanic rocks, conglomerates also contain minor to locally dominant granitic, metavolcanic, and metasedimentary rocks. Sands are very fine to medium grained, in finely laminated beds, typically 1 cm to several meters thick. Conglomerate is typically clast-supported with pea-sized to small pebble- sized clasts. Conglomerate beds are 10 to 30 cm thick, and occur interbedded with the siltstone and fine sandstones. Conglomerates are also common near the top of coarsening upward sequences of sandstone. Tephras are a up to few centimeters thick and are interbedded with the sandstones and siltstones. Kelly, T.K. (1997, pers. commun.) identified mammal fossils from these deposits and placed them in a North American Mammalian Stage of Upper Early Blancan to Uppermost Late Blancan (Middle to Late Pliocene).

Tsc **Medium- to coarse-grained Pliocene alluvial deposits** Deposits of siltstone, sandstone, and conglomerate, locally with tephras and mammal fossils. Sandstone and conglomerate are dominantly volcanic rocks, conglomerates additionally contain minor to locally dominant granitic, metavolcanic, and metasedimentary rocks. Siltstones are lacking distinct lamination. Sandstone is very fine to coarse-grained, occurring as massive to finely laminated and cross-laminated beds, typically one to several meters thick. Conglomerate occurs typically as a pea-sized gravel to large pebbles, and less commonly as cobble-sized clasts. Conglomerate clasts are typically matrix-supported, where the matrix is a medium to coarse sand. Clast-supported conglomerate is less common, typically in the form of small-scale sedimentary structures, such as channel deposits. Conglomerate is typically interbedded with sandstone. Conglomerate beds are typically 0.5 to 1 m thick, but can be up to several meters in thickness locally. Kelly, T.K. (1997, pers. commun.) identified mammal fossils from these deposits and placed them in a North American Mammalian Stage of Lower Early Blancan (possibly Upper Late Hemphillian) to Middle Early Blancan (Early to Middle Pliocene).

Ta **Tertiary andesitic rocks** Light- to dark- gray andesitic rocks in lava flows, an intrusive neck, and local pyroclastic rocks. Phenocrysts range from 20 to 40% and consist of anhedral to subhedral hornblende, euhedral biotite, and anhedral to subhedral plagioclase. Thickness is as much as 30 m. These rocks are part of a volcanic field extending south of the quadrangle.

Mzgd **Granodiorite of Dresslerville** Gray to light- gray, medium-grained hornblende-plagioclase granodiorite. Contains slightly crushed, anhedral to euhedral crystals of white plagioclase (60-70%), slightly crushed, anhedral crystals of greenish-black hornblende (30-35%), anhedral quartz (5%), anhedral potassium feldspar(?), and minor amounts of biotite and sphene.

Jd **Double Spring Formation** Light- brown to gray, felsic to intermediate pyroclastic tuff, welded tuff, breccia, and flows. Locally contains fiamme structure and flow banding. Flow foliation dips steeply to the east. Tuffs are metamorphosed to a greenschist facies. Fossil evidence and regional context indicate the Double Spring Formation is Late Jurassic or Early Cretaceous (Noble, 1962).

Jgs **Siltstone Member of the Gardnerville Formation** Black, fine-bedded, pyritic, marine metasiltstone, with minor amounts of interbedded limestone. Siltstones are well-indurated and metamorphosed to a greenschist facies. A Phymatoceratinid ammonites and other fossils indicate that the Gardnerville Formation is Early Jurassic (Noble, 1962; Silberling, 1984).

JTRmv **Undivided Jurassic-Triassic metavolcanic rocks** Greenish black to greenish gray, metamorphosed hornblende-plagioclase andesite, with a recrystalized matrix; possibly of a hypabyssal nature. Metamorphosed to greenschist facies with epidote present.

JTRms **Undivided Jurassic-Triassic metasandstones** Very fine-grained, well-sorted greenish-gray meta-sandstone(?). Clasts consist of quartz, plagioclase, mafic minerals, and possible lithic fragments. Metamorphosed to greenschist facies.

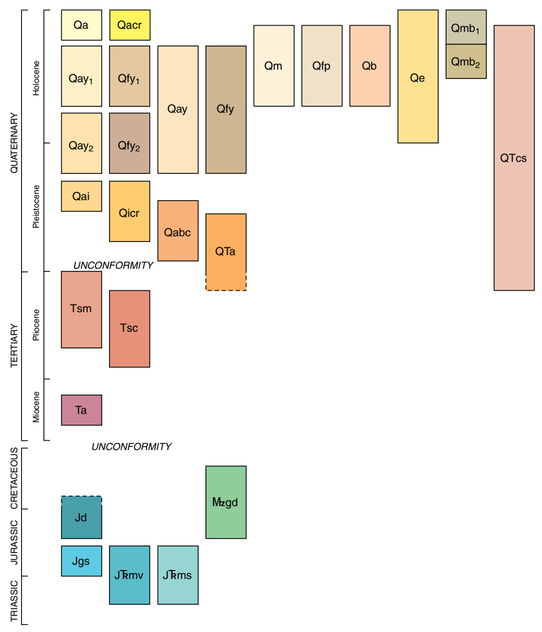
References

Noble, D.C., 1962, Mesozoic geology of the southern Pine Nut Range, Douglas County, Nevada [Ph.D. dissert.], Stanford University.

Silberling, N.J., 1984, Map showing locations and correlation of age-diagnostic lower Mesozoic megafossils, Walker Lake 1°x2° Quadrangle, Nevada and California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1382-0.

Contact Dashed where approximately located; queried where uncertain.

Fault Dashed where approximately located or inferred; dotted where concealed; queried where uncertain; ball on downthrown side.

Strike and dip of beds

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