GEOLOGIC MAP OF THE EUGENE MOUNTAINS, NORTHWESTERN NEVADA

Ronald H. Thole
Douglas W. Prihar

1998

QUATERNARY DEPOSITS

Qal, Qed, Qp — **Recent alluvial deposits Qal:** Undifferentiated, unconsolidated, sorted to unsorted alluvial fan deposits and fluvial gravels, sands, and boulders. **Qed:** Eolian sheet and dune sands. **Qp:** Playa deposits; silt and clay.

Qls — **Lahontan lakebeds** Exposed near-shore deposits of the late Pleistocene pluvial Lake Lahontan include sand, silt, clay, and terrace and beach gravel deposits.

Qoal — **Older alluvium** Fifty feet or more of silt, sand, and gravel deposited by sheet wash and early Pleistocene streams.

TERTIARY AND CRETACEOUS ROCKS

Tsv — **Silicic pyroclastics** Light-gray, cream, and white crystal-vitric to local crystal-lithic ash-flow tuff with quartz (3–7%), plagioclase feldspar (0–10%), sanidine (0–3%), rare biotite, and angular fragments of rhyolite and/or pumice, 5–50 mm in diameter.

Tb — **Basalt flows** Black, dense, vesicular to amygdaloidal olivine-bearing basalt.

Tal — **Older alluvial deposits** Tertiary stream boulder, cobble, and gravel deposits occur in isolated exposures across the Eugene Mountains. These deposits grade laterally into a red regolith.

TKiqp — **Quartz porphyry** Dikes and small plugs of rhyolite to rhyodacite containing small (1–2 mm) and sparse (5%) phenocrysts of quartz in a pale-gray aphanitic matrix.

TKid — **Diabase and gabbro plugs and dikes** These are equigranular and fine to medium grained, and exhibit ophitic intergrowth of albite, augite, and hypersthene.

TKia — **Porphyritic hornblende andesite stocks, dikes, sills, and autobreccia** A cluster of three large volcanic pipes of porphyritic andesite occurs in Bonita Canyon. The plugs are porphyritic andesite with large crystals (2 cm in diameter) of oscillatory zoned plagioclase feldspar, hornblende, and garnet (G).

TKgd — **Equigranular granodiorite** Southwest Springer stock.

Kia, Kgd, Kap — **Granodiorite, porphyritic andesite, and aplite Kia:** Porphyritic andesite and andesite porphyry occur in some places as a chill-border facies on the margins of the granodiorite stocks; andesite dikes and sills are concentrated at and cut across the granodiorite-pelite contact. **Kgd:** Granodiorite; fairly fresh holocrystalline, of medium grain size and indistinctly porphyritic, showing phenocrysts of milky feldspar and large biotite books in a dark, medium- to fine-grained groundmass. **Kap:** Aplite, leucogranite, and pegmatitie occur in the hood zone of differentiated granodiorite stocks and in places as dikes and plugs in hornfels and in granodiorite.

TRIASSIC ROCKS

Ꞧr, Ꞧrls, Ꞧrss — **Raspberry Formation Ꞧr:** Up to 7,000 feet of gray-green, lavender, and black pelitic strata intercalated with thin (about 3 feet to 50 feet thick) lenses of gray to black, somewhat carbonaceous micritic limestone. At least 12 major limestone units (**Ꞧrls**) have been mapped in the district. To the south-southwest, near the base of the Raspberry Formation, the micritic limestone units grade into calcarenite and in places these are interbedded with or grade into calcareous feldspathic sandstone (**Ꞧrss**). Gray shading indicates hornfels alteration facies.

Ꞧs2, Ꞧs2ls, Ꞧs2ss — **Triassic siliciclastics 2 Ꞧs2:** Up to 2,000 feet of black, dark-lavender and green-gray argillite and silty argillite with 2- to 30-foot-thick lenses of limestone (**Ꞧs2ls**), and calcareous feldspathic sandstone and pale laminated fine-grained sandstone (**Ꞧs2ss**). Gray shading indicates hornfels alteration facies.

Ꞧc — **Triassic carbonate clastics** From 50 to 1,500 feet of black to gray calcarenite with beds of calcilutite, micrite, and calcirudite.

Ꞧs1, Ꞧs1ls, Ꞧs1ss — **Triassic siliciclastics 1 Ꞧs1:** Up to 8,000 feet of dark-gray, almost black, chlorite-bearing argillite, slate, and phyllite interlaminated in part with micaceous siltsone or very fine-grained sandstone (**Ꞧs1ss**), some of which weathers to olive black and olive gray to gray. Although largely noncalcareous, **Ꞧs1** contains some laterally discontinu-ous limestone beds and limestone channel deposits (**Ꞧs1ls**). Gray shading indicates hornfels alteration facies.

Ꞧms, Ꞧls, Ꞧss — **Pelitic metasedimentary rocks, limestone, and sandstone Ꞧms:** Up to 3,000 feet of dark-gray to black, argillite, slate, and phyllite, commonly with 0.5% disseminated pyrite, interlaminated in part with micaceous siltstone and fine- to medium-grained, green-gray to light-brown sandstone and quartzite (**Ꞧss**), whose thickness is commonly several inches to 50 feet. Some laterally discontinuous limestone beds and limestone channel deposits (**Ꞧls**) occur intercalated in this unit and are from 2 to 200 feet thick. Gray shading indicates hornfels alteration facies.

Contact Dashed where approximately located.

Fault Showing dip and sense of movement, ball on downthrown side, dashed where approximately located, dotted where concealed.

Thrust fault Sawteeth on upper plate, showing dip, dashed where approximately located, dotted where concealed.

Anticline (left) **and overturned anticline** (right) Showing trace of axial surface and general trend and plunge of hinge line, dashed where approximately located.

Syncline (left) **and overturned syncline** (right) Showing trace of axial surface and general trend and plunge of hinge line, dashed where approximately located.

Quartz vein Showing dip.

Skarn

Breccia

Strike and dip of bedding

Inclined — Vertical — Overturned

Stratigraphic top known from sedimentary structures.

Inclined — Overturned

Strike and dip of joints Inclined.

Strike and dip of foliation Slaty, slip, shear cleavages including parallel semi-penetrative axial plane cleavage.

Trend and plunge of mesoscopic fold Slaty, slip, shear cleavages including parallel semi-penetrative axial plane cleavage.

Form lines On cross sections only.

Mines, prospects, shafts, and workings

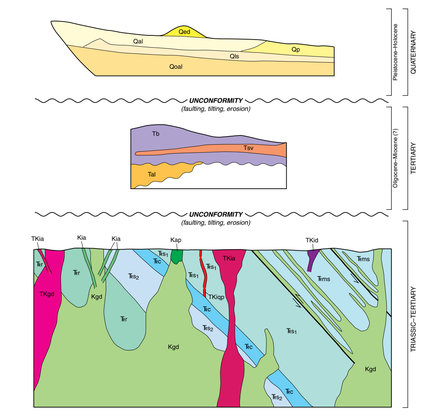
Mine — Prospect — Vertical shaft — Adit — Open pit

K-Ar date site See table for ages.

Rock sample site With major oxide and trace element geochemistry, see table 1 in accompanying text.

Fossil locality 1. *Monotis subcircularis*; 2. corals, enchinoderms, brachiopods; 3. fossiliferous wood fragments; 4. ammonite *Didymites* (USGS M-5015); 5. ammonite *Metacarnites* (USGS JW-65)

Note: In northern part of the map, swarms of Cretaceous granodiorite dikes and sills, and intercalated metasedimentary rocks are grouped for map depiction. Bedding and foliation symbols shown within these intrusive bodies record the attitude of the intercalated metasedimentary rocks.



1:24,000

0 — 0.5 — 1 mile

0 — 5000 feet

0 — 0.5 — 1 kilometer

0 — 500 — 1000 meters

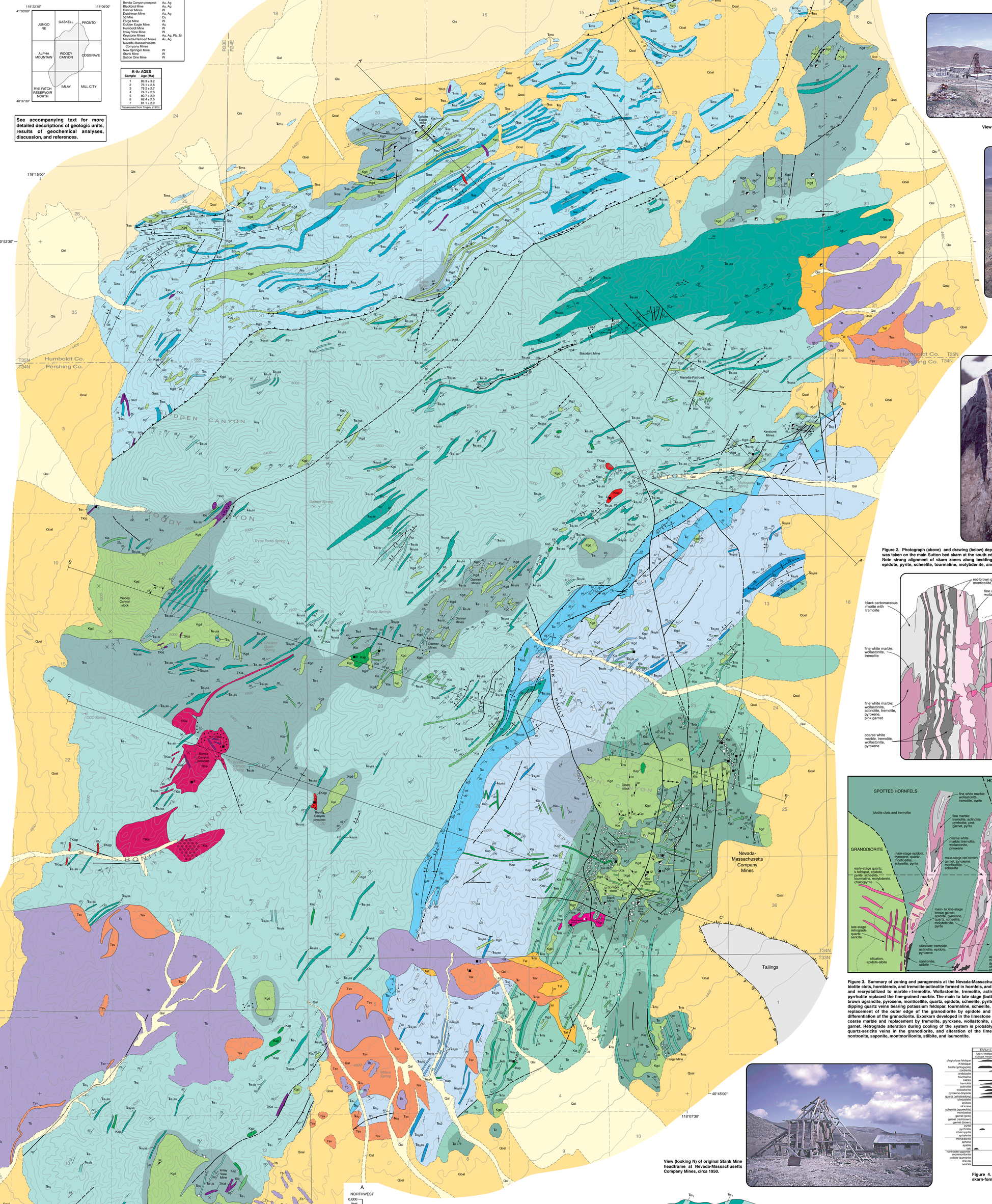
Mine name	Commodities
Bonita Canyon prospect	Au, Ag
Blackbird Mine	Au, Ag
Danner Mines	W
Dutchman Mine	Au, Ag
56 Mile	Cu
Forge Mine	W
Golden Eagle Mine	Au
Humboldt Mine	W
Imlay View Mine	W
Keystone Mines	Au, Ag, Pb, Zn
Marietta-Railroad Mines	Au, Ag
Nevada-Massachusetts Company Mines	
New Springer Mine	W
Stank Mine	W
Sutton One Mine	W

K-Ar AGES

Sample	Age (Ma)
1	89.3 ± 3.2
2	76.1 ± 2.8
3	78.2 ± 2.7
4	74.1 ± 2.6
5	80.7 ± 2.9
6	68.4 ± 2.5
7	81.1 ± 2.9

Recalculated from Tingley (1975)

See accompanying text for more detailed descriptions of geologic units, results of geochemical analyses, discussion, and references.



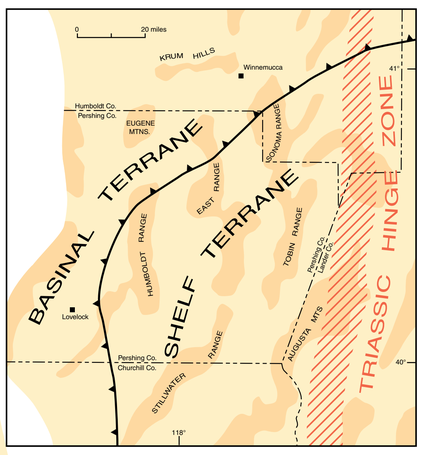
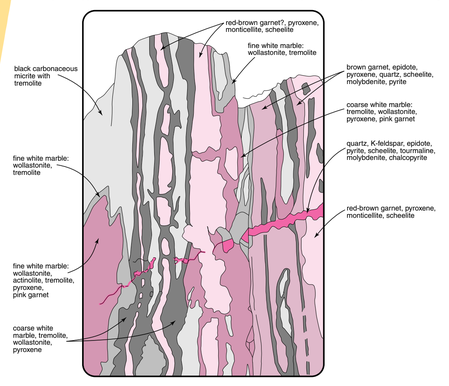


Figure 1. Paleogeographic terranes of early Mesozoic marine province of the western Great Basin.

View (looking NE) of the New Springer Mine in 1981.

View (looking S) of Sutton 1 pit, Springer Tungsten Mine with Star Peak of the Humboldt Range in background.

Figure 2. Photograph (above) and drawing (below) depict skarn mineral assemblage zonations. Photo was taken on the main Sutton bed skarn at the south edge of the Sutton 1 pit, Springer Tungsten Mine. Note strong alignment of skarn zones along bedding and crosscutting vein of quartz. K-feldspar, epidote, pyrite, scheelite, tourmaline, molybdenite, and chalcopyrite. Pencil in photo is 14 cm long.



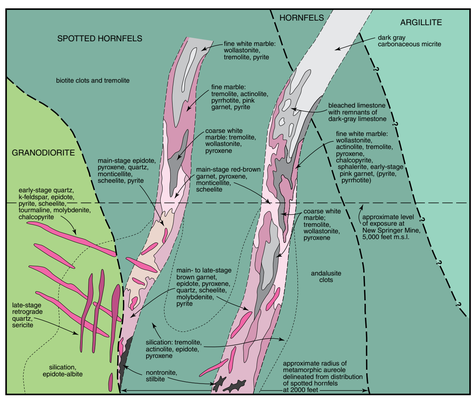


Figure 3. Summary of zoning and paragenesis at the Nevada-Massachusetts Company Mines. In the early stage (top), biotite clots, hornblende, and tremolite-actinolite formed in hornfels, and dark-gray carbonaceous micrite was bleached and recrystallized to marble + tremolite. Wollastonite, tremolite, actinolite, pyroxene, pink ugrandite, pyrite, and pyrrhotite replaced the fine-grained marble. The main to late stage (bottom) includes the introduction of red-brown to brown ugrandite, pyroxene, monticellite, quartz, epidote, scheelite, pyrite, and molybdenite; the formation of shallowly dipping quartz veins bearing potassium feldspar, tourmaline, scheelite, pyrite, molybdenite, and chalcopyrite; and the replacement of the outer edge of the granodiorite by epidote and albite. Endoskarn formed during late-stage differentiation of the granodiorite. Exoskarn developed in the limestone during the main stage by recrystallization to a coarse marble and replacement by tremolite, pyroxene, wollastonite, and pyroxene with or without pink ugrandite garnet. Retrograde alteration during cooling of the system is probably associated with the development of vertical quartz-sericite veins in the granodiorite, and alteration of the limestone-skarn assemblages to talc, tremolite, nontronite, saponite, montmorillonite, stilbite, and laumontite.

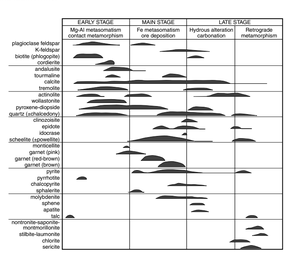
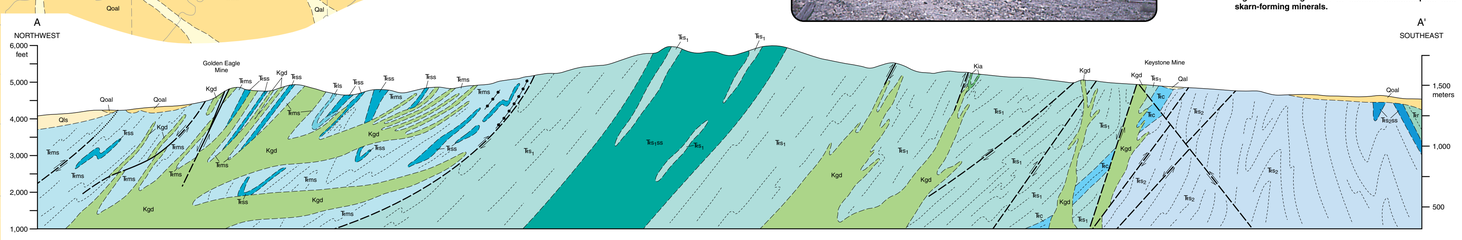


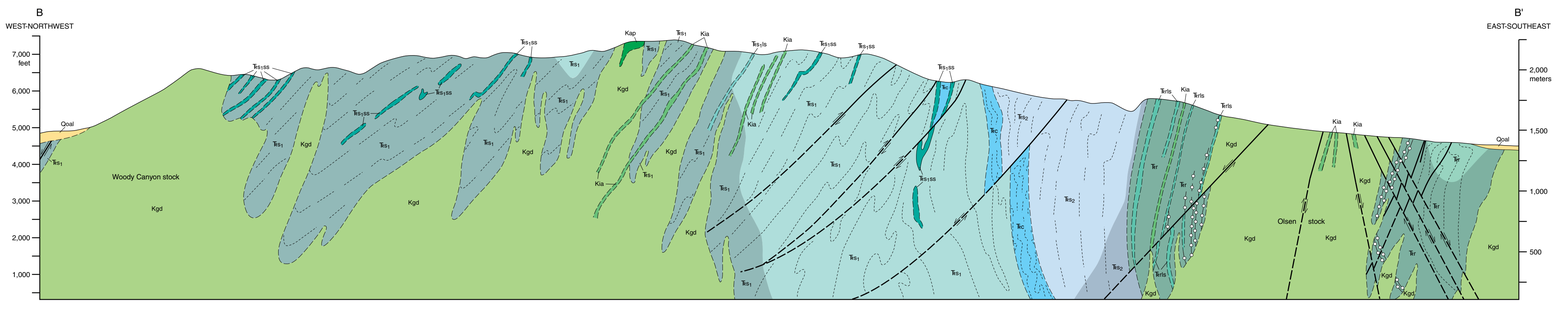
Figure 4. Paragenesis of contact metamorphic and skarn-forming minerals.

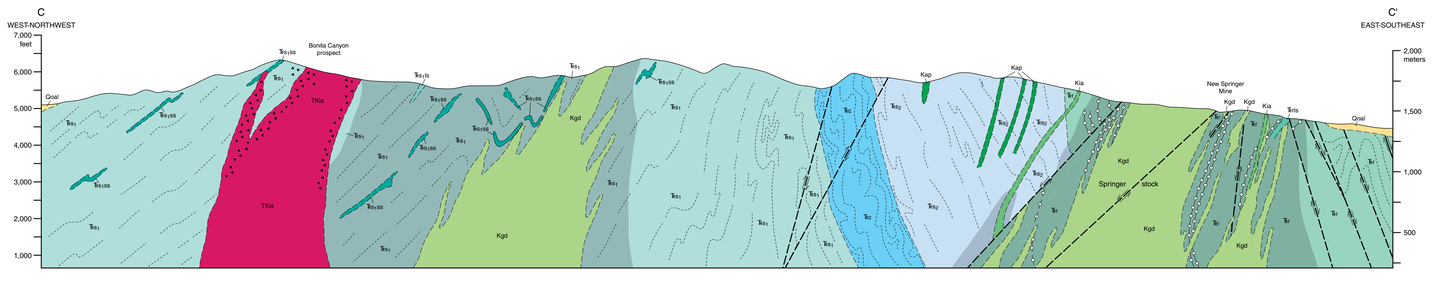
View (looking N) of original Stank Mine headframe at Nevada-Massachusetts Company Mines, circa 1950.

View (looking WSW) of drill set-up on DDH NM-49, in foreground, and snow covered mine dump below Stank headframe in background.

View (looking ENE) of drill set-up on DDH NM-49 in foreground, and Humboldt River valley and East Range in background. DDH NM-49 located as pilot hole for New Springer Mine main shaft. The hole is vertical and 2,897 feet deep.







Topography from:

1. Sloan & Assoc., 80-foot contour interval
2. USGS Eugene Mountains Area Quadrangle, 1:62,500, 1939, 100-foot contour interval
3. USGS Imlay Quadrangle, 1:62,500, 1956, 80-foot contour interval

The topographic base on this map was produced in 1981 by Utah International Inc., using the best sources and methods available at the time. Because the geology was originally mapped on this base, it is used in this map instead of the 7.5-minute quandrangle topographic maps available now. The user should be aware that there are several discrepancies between this base and the more recent 7.5-minute topographic maps.

Field work done in 1980 to 1982.

Office review by:
Mark Elison, Northwestern University
Dick Hardyman, USGS, Reno
Chris Henry, NBMG
Norman J. Silberling, USGS
Robert Speed, Northwestern University
Joseph V. Tingley, NBMG

Field review by:
Harold F. Bonham, Jr., NBMG
Joseph V. Tingley, NBMG

First edition, first printing, 1998
Printed by The Pikes Peak Lithographing Co.

Geologic mapping was supported by Utah International Inc.

Nevada Bureau of Mines and Geology
University of Nevada, Mail Stop 178
Reno, Nevada 89557-0088
(775) 784-6691, ext. 2; nbmgsales@unr.edu
www.nbmg.unr.edu