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THE ELLISON DISTRICT: ALTERATION-MINERALIZATION ASSOCIATED WITH A MID-TERTIARY INTRUSIVE COMPLEX AT SAWMILL CANYON, WHITE PINE COUNTY, NEVADA

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The Ellison mineral district is located in the Southern Egan Range of White Pine County, Nevada. Alteration-mineralization there is centered on the western side of an intrusive complex consisting of a rhyolite intrusion breccia cut by a younger 36.2 ± 1.2 m.y. quartz monzonite porphyry. A small exposure of quartz stockwork quartz monzonite porphyry is surrounded by concentric bands of silicification and silication. The surface exposure represents only the top of a cupola of the quartz monzonite porphyry stock which underlies most of the Sawmill Canyon complex. The surface hematite-coated quartz vein stockwork grades outward into a quartz shell which is in turn surrounded by a halo silication. The skarn is hedenbergite-garnet rich. Small but high-grade quartz-calcite precious metal veins are located at the skarn-limestone contact. Weakly developed quartz-chalcopyrite-pyrite veins and quartz-molybdenite veins cut the quartz monzonite porphyry at depth below the stockwork. Similar features of mineralization and alteration are also observed in some of the core rhyolite; however, the geochemical zoning pattern of metallic elements suggests that mineralization is associated with the quartz monzonite porphyry, not the rhyolite breccia. The extensive high-density rock fracturing characteristic of porphyry copper and porphyry skarn deposits is not present at Ellison.

(Sawmill Canyon)
White Pine County General

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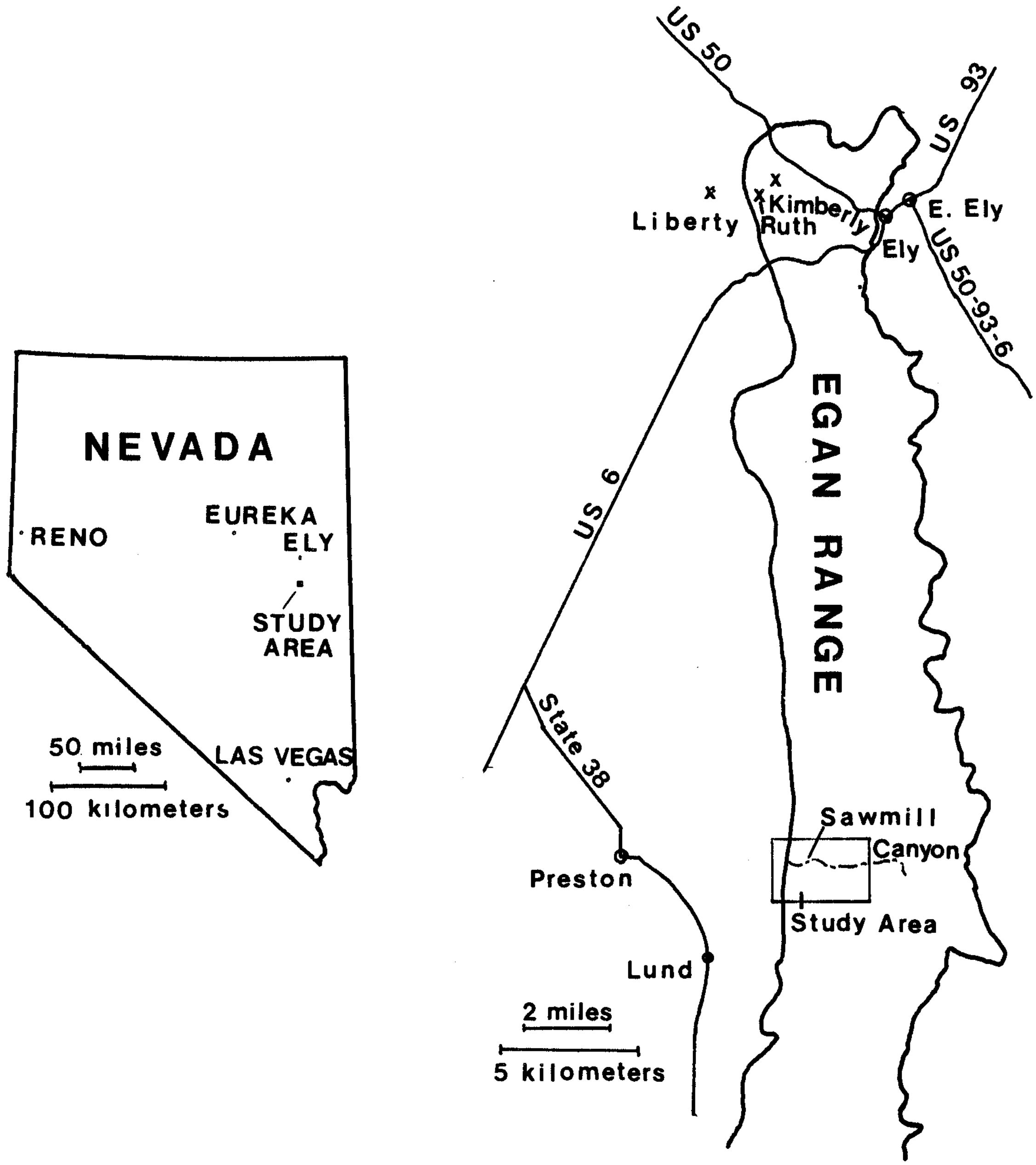

Figure 1. Location map for study area. X's are open pit mines of the Robinson district.

Mid-Tertiary Geologic History

Intrusion and mineralization at Sawmill Canyon is broadly bracketed between deposition of the Sheep Pass Formation in Early Oligocene time and the end of regional calc-alkaline volcanism at 34 m.y. It is suspected but not proved that the rhyolite complex is only slightly older than the quartz monzonite porphyry. The following proposed history covers the period 38-36 m.y.

(1) Rhyolite forcefully intruded the Sawmill Canyon area in mid-Tertiary time. The rhyolite was auto-brecciated at the time of intrusion and formed a contact breccia on the western side.

(2) Northwest-trending rhyolite dikes cut the rhyolite complex and surrounding limestones.

(3) An episode of disseminated pyrite-chalcopyrite mineralization may have followed dike emplacement.

(4) Intrusion of the quartz monzonite porphyry and related rocks occurred at 36.2 ± 1.2 m.y. Depth of emplacement is estimated to be 2-3.7 km.

(5) An episode of alteration-mineralization that followed intrusion of the western quartz monzonite porphyry included the formation of a silicification halo and rings of prograde silication around the quartz monzonite porphyry. Fracture density necessary to develop elements of porphyry

style alteration-mineralization were not realized, and a full porphyry system did not ensue.

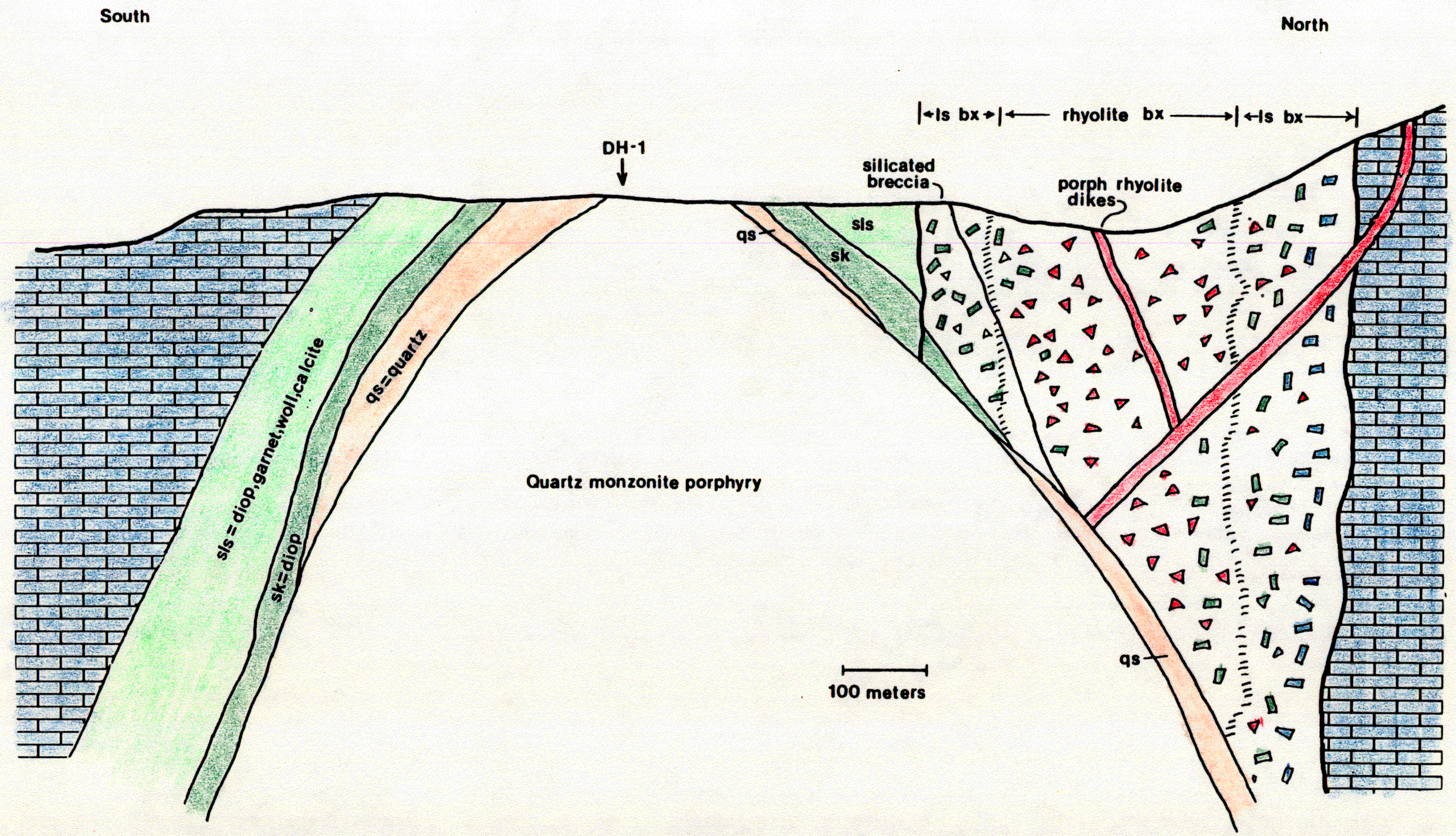

Figure 27. Diagrammatic north-south cross section depicting inferred alteration and contact relations at Sawmill Canyon. An aureole of silicified (qs) and silicated (sk, sls) rock is located at the contact between the western quartz monzonite porphyry and limestone. The contact between the limestone and the rhyolite breccia complex is silicated where the outer edges of the rhyolite breccia are limestone rich (ls bx). The figure is idealized and does not correspond exactly to Figure 2.

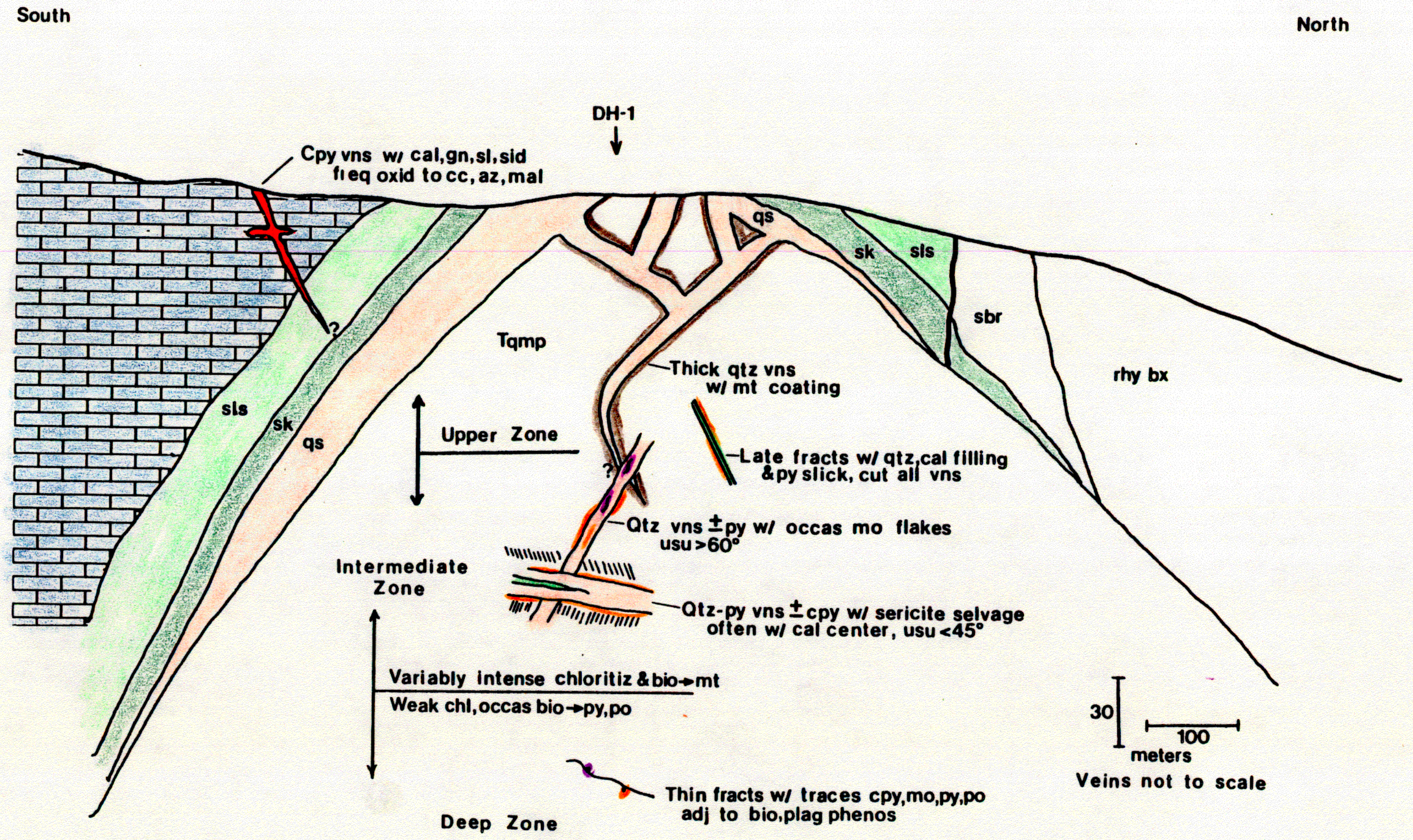

Figure 28. A schematic diagram of alteration and mineralization relationships in the western quartz monzonite porphyry. Scale and orientation are the same as for Figure 27.

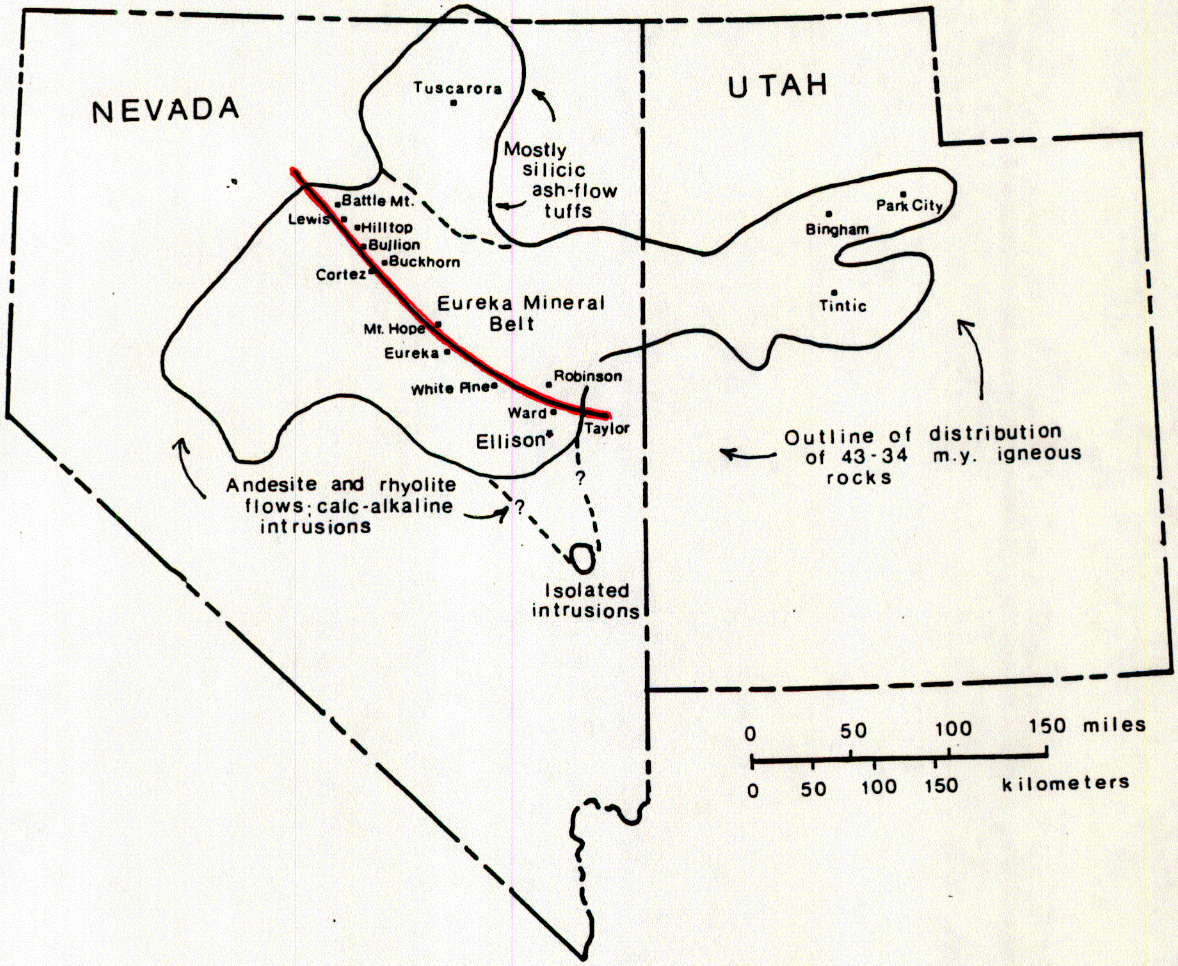

Figure 52. Distribution of mid-Tertiary igneous rocks and selected mineral districts in Nevada and Utah. The outlined area encloses the 43-34 m.y. igneous rocks of Nevada and western Utah (after Shawe and others, 1978; Stewart, 1980). Mineral districts of similar age and mineral districts of the Eureka mineral belt are labeled. The Eureka mineral belt is shown in red (Stewart and others, 1977). Isolated intrusions southeast of the main area of mid-Tertiary volcanic rock activity are shown connected with a dashed line.

Table 1. Potassium-Argon Age Date for the Eastern Quartz Monzonite Porphyry. Concentrate is from biotite phenocrysts.

Material Analyzed: Biotite concentrate, -40/+100 mesh.

Ar^{40*}/K^{40} = .002139 AGE = 36.2 ± 1.4 M.Y.

Argon Analyses:

Ar^{40*}, ppm.	Ar^{40*}/ Total Ar^{40}	Ave. Ar^{40*}, ppm.
.01749	.689	.01770
.01791	.725	

Potassium Analyses:

% K	Ave. %K	K^{40}, ppm
6.786	6.783	8.275
6.781		

Constants Used:

$\lambda_\beta = 4.72 \times 10^{-10}$/ year

$\lambda_e = 0.585 \times 10^{-10}$/ year

$K^{40}/K = 1.22 \times 10^{-4}$ g./g.

$$AGE = \frac{1}{\lambda_e + \lambda_\beta} \ln\left[\frac{\lambda_\beta + \lambda_e}{\lambda_e} \times \frac{Ar^{40*}}{K^{40}} + 1\right]$$

Note: Ar^{40*} refers to radiogenic Ar^{40}.
M.Y. refers to millions of years.

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— IF YOU WISH, I CAN SEND AN EXACT DESCRIPTION & LOCATION OF THE MATERIAL DATED.