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CRETACEOUS K-AR AGE OF HYDROTHERMAL ALTERATION AT THE NORTH FISH CREEK PORPHYRY COPPER PROSPECT, FISH CREEK MOUNTAINS, LANDER COUNTY, NEVADA

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Analytical procedures are the same as those reported in Silberman and McKee (1971). The uncertainty in the reported age ($\pm 3\%$) represents estimated analytical uncertainty only, at one standard deviation. The constants used in age calculation are: $\lambda_{\epsilon} = 0.572 \times 10^{-10} \text{ yr}^{-1}$, $\lambda_{\epsilon'} = 8.78 \times 10^{-13} \text{ yr}^{-1}$, $\lambda_{\beta} = 4.963 \times 10^{-10} \text{ yr}^{-1}$, $K^{40}/K_{\text{total}} = 1.167 \times 10^{-4}$ atom percent. Financial support for this age determination was provided in large part by the Nevada Bureau of Mines and Geology.

GEOLOGIC DISCUSSION

The north Fish Creek porphyry copper prospect is at the extreme north end of the Fish Creek Mountains approximately 35 km southwest of the town of Battle Mountain, Nevada.

Country rocks in the prospect area comprise a heterogeneous section of marine sedimentary rocks, assigned to the Havallah Formation of Pennsylvanian and Permian age (Ferguson and others, 1951), containing dikes and plugs of quartz monzonite porphyry that crop out within a northwest-trending belt approximately 900 m wide and 2,000 m long. Individual bodies range in exposed dimension from several centimeters to almost 300 m. Two breccia pipes are also exposed in the area. Regional high-angle faulting and fracturing, trending N. 40° - 50° W. and N. 80° - 90° E., are prominent at the prospect and were important in localizing intrusion and associated alteration and mineralization.

Hydrothermal alteration occurs in both intrusive and sedimentary rocks forming a zone that is generally coincident with the belt of intrusive rocks. Alteration in the quartz monzonite porphyry is propylitic (actinolite), quartz-sericitic (quartz and sericite), and potassic (biotite and potassium feldspar). Alteration and metamorphism in the sedimentary rocks include, in addition to the above-mentioned types, garnet-clinzoisite-wollastonite-tactite and biotite hornfels. Pyrite and chalcopyrite occur as disseminations and in veinlets, forming 1 to 4 percent, and locally as much as 20 percent, of the rock. Molybdenite occurs sporadically near the center of the altered area. Pyrrhotite is common near the margins of the hydrothermally altered area. Hypogene copper contents are as high as 0.1 percent over wide areas of the prospect; higher values were found locally. Much of the area is covered by postmineralization volcanic rocks.

The K-Ar age of 89.5 ± 2.7 m.y., determined for coarse-grained hydrothermal sericite that completely replaced original magmatic biotite in altered quartz

monzonite porphyry, probably is the age of the alteration and mineralization, and also the approximate age of intrusive emplacement, as previous K-Ar age studies of porphyry copper deposits demonstrate that mineralization generally occurs within the cooling history of the igneous host rocks (Damon and Mauger, 1966; Theodore and others, 1973). Silberman and McKee (1971) report a biotite K-Ar age of 153 ± 3 m.y. from the McCoy pluton, 10 km south of the Fish Creek prospect. The nearest pluton of approximately the same age as the Fish Creek quartz monzonite is at Trenton Canyon, in the western part of the Antler Peak range, 25 km north of the Fish Creek prospect. Silberman and McKee (1971) report two biotite K-Ar ages of 87.2 ± 1.7 and 87.0 ± 1.7 (with new K-Ar constants, these ages became 89.3 and 89.1, respectively).

The mineralized Fish Creek quartz monzonite falls within one of the four intrusive epochs (epoch II, 87-105 m.y.) defined for plutonic rocks in north-central Nevada by Silberman and McKee (1971).

SAMPLE DESCRIPTION

1. M151A K-Ar
Altered quartz monzonite porphyry ($40^{\circ}25'03''\text{N.}$, $117^{\circ}12'50''\text{W.}$; NE $\frac{1}{4}$ sec. 2, T. 29 N., R. 42 E.; McCoy quad.; Lander Co., NV). From small stock of highly sericitized, slightly iron-stained quartz monzonite porphyry. Sericite occurs as complete replacements of biotite books and in the groundmass. Analytical data: $K_2O = 10.06\%$, $*Ar^{40} = 1.328 \times 10^{-9}$ mole/gm, $*Ar^{40}/\Sigma Ar^{40} = 92\%$; collected by: B. W. Miller; mineral separate prepared by: A. B. Wallace; dated by: M. L. Silberman, U. S. Geological Survey.
(sericite) 89.5 ± 2.7 m.y.

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