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Isochron/West, Bulletin of Isotopic Geochronology, v. 16, pp. 11

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LATE CRETACEOUS AND EOCENE AGES FOR HYDROTHERMAL ALTERATION AND MINERALIZATION, BAYHORSE DISTRICT AND VICINITY, CUSTER COUNTY, IDAHO

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New K-Ar ages document two distinct stages of mineralization in the Bayhorse district (fig. 1). An age of 92.9 ± 3.3 m.y. (Late Cretaceous) for very fine grained hydrothermal sericite in vein selvage material at the Skylark Mine dates the mineralization in the Ramshorn-Skylark silver-bearing vein system and suggests it is related to late-stage hydrothermal activity associated with the nearby Juliette quartz monzonite-granodiorite stock, an Idaho batholith satellite, now dated at 95.9 ± 3.3 m.y. The 3-m.y. difference in age between the exposed portion of the stock and the veins, although marginally significant, is in harmony with the observation that the veins cut the contact aureole of the stock when it was cold and nonreactive.

A younger hydrothermal event is evidenced by altered (kaolinite, quartz, minor sericite) Tertiary rhyodacitic lava that is part of the Challis Volcanics (Ross, 1937) in fault contact with altered quartz monzonite of the Juliette stock, and by fluorspar mineralization near Daugherty Gulch (Anderson, 1954). Fluorspar at Keystone Mountain and the Pacific Mine presumably was also deposited during this younger event. Biotite from unaltered lava of the same unit that is altered near the Juliette stock yielded an age of about 49.9 m.y. (early Eocene), providing an older limit for the alteration event. Near Daugherty Gulch olivine basalt that overlies volcanic breccia altered at the Chalspar No. 1 fluorspar property, gave a K-Ar age of about 49 m.y. (Armstrong, 1974). The alteration of volcanic rocks west of the Juliette stock and the fluorspar mineralization in the Daugherty Gulch area are two aspects of an intravolcanic hydrothermal event that occurred during a short time interval in the early Eocene. Evidence supporting this conclusion includes: (1) an unaltered olivine basalt dike that occurs adjacent to, and presumably cuts, the altered rhyodacitic lava west of the Juliette stock; (2) unaltered and nonmineralized lava units stratigraphically higher than the basalt flow dated by Armstrong near Daugherty Gulch; and (3) the age data of Armstrong (1974), which indicate a total time span of about 5 m.y. for the entire volcanic sequence in the Bayhorse district and vicinity.

Small, but probably anomalous, amounts of Sb, Cu, and Pb in the Eocene altered zone west of the Juliette stock may have been reworked from an unexposed Upper Cretaceous deposit of the Ramshorn-Skylark type; because of this possibility of recycling, similar geochemical anomalies that might be present elsewhere in pre-Eocene rocks of the district could be either Cretaceous or Eocene in age.

Constants used in the calculation of the ages are: $\lambda_\epsilon = 0.585 \times 10^{-10}$ yr^{-1}; $\lambda_\beta = 4.72 \times 10^{-10}$ yr^{-1}; $K^{40}/K_{total} = 1.22 \times 10^{-4}$ gm/gm. The analytical error is quoted at 2 standard deviations. Abbreviations used are: $*Ar^{40}$ = radiogenic argon-40; ΣAr^{40} = total argon-40.

SAMPLE DESCRIPTIONS

1. USGS(D)-D2313B — K-Ar — (biotite) 95.9 ± 3.3 m.y.

Biotite from quartz monzonite of Juliette stock. (44°23′30″N, 114°22′W, outcrop on slope W of Juliette Creek, el. 8100 ft; Custer Co., ID). Analytical data: K_2O = 8.86% and 8.83%; $*Ar^{40} = 12.83 \times 10^{-10}$ moles/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 94%; collected by: E. A. Rehbein, U. S. Geological Survey; mineral separation by: H. R. Covington, U. S. Geological Survey; analyzed by: R. F. Marvin, H. H. Mehnert, and Violet Merritt, U. S. Geological Survey.

2. USGS(D)-D2314B — K-Ar — (biotite) 49.9 ± 1.7 m.y.

Biotite from rhyodacitic lava. (44°24.6′N, 114°23.1′W, outcrop alongside jeep trail to Little Bayhorse Lake; Custer Co., ID). Analytical data: K_2O = 7.48% and 7.42%; $*Ar^{40} = 5.557 \times 10^{-10}$ moles/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 94%; collected by: W. H. Hays, U. S. Geological Survey; mineral separation by: H. R. Covington, U. S. Geological Survey; analyzed by: R. F. Marvin, H. H. Mehnert, and Violet Merritt, U. S. Geological Survey.

3. USGS(D)-D2340M K-Ar (sericite) 92.9 ± 3.3 m.y.

Very fine-grained sericite from vein selvage material. (44°24.9'N, 114°22.3'W, dump opposite portal of tunnel no. 5, Skylark Mine, Bayhorse district; Custer Co., ID). Analytical data: K_2O = 5.43% and 5.41%; $*Ar^{40}$ = 7.616 x 10^{-10} moles/gm ; $*Ar^{40}/\Sigma Ar^{40}$ = 91%; collection and sample preparation by: D. H. McIntyre, U. S. Geological Survey; analyzed by: R. F. Marvin, H. H. Mehnert, and Violet Merritt, U. S. Geological Survey. Comment: Sericite concentrate was essentially pure, as no extraneous peaks (other than minor quartz) were obtained on the diffractogram when the sericite was x-rayed. Sample behavior during fusion suggested a higher-than-usual H_2O content. Na_2O content of the sericite is 0.88% and 0.83%.

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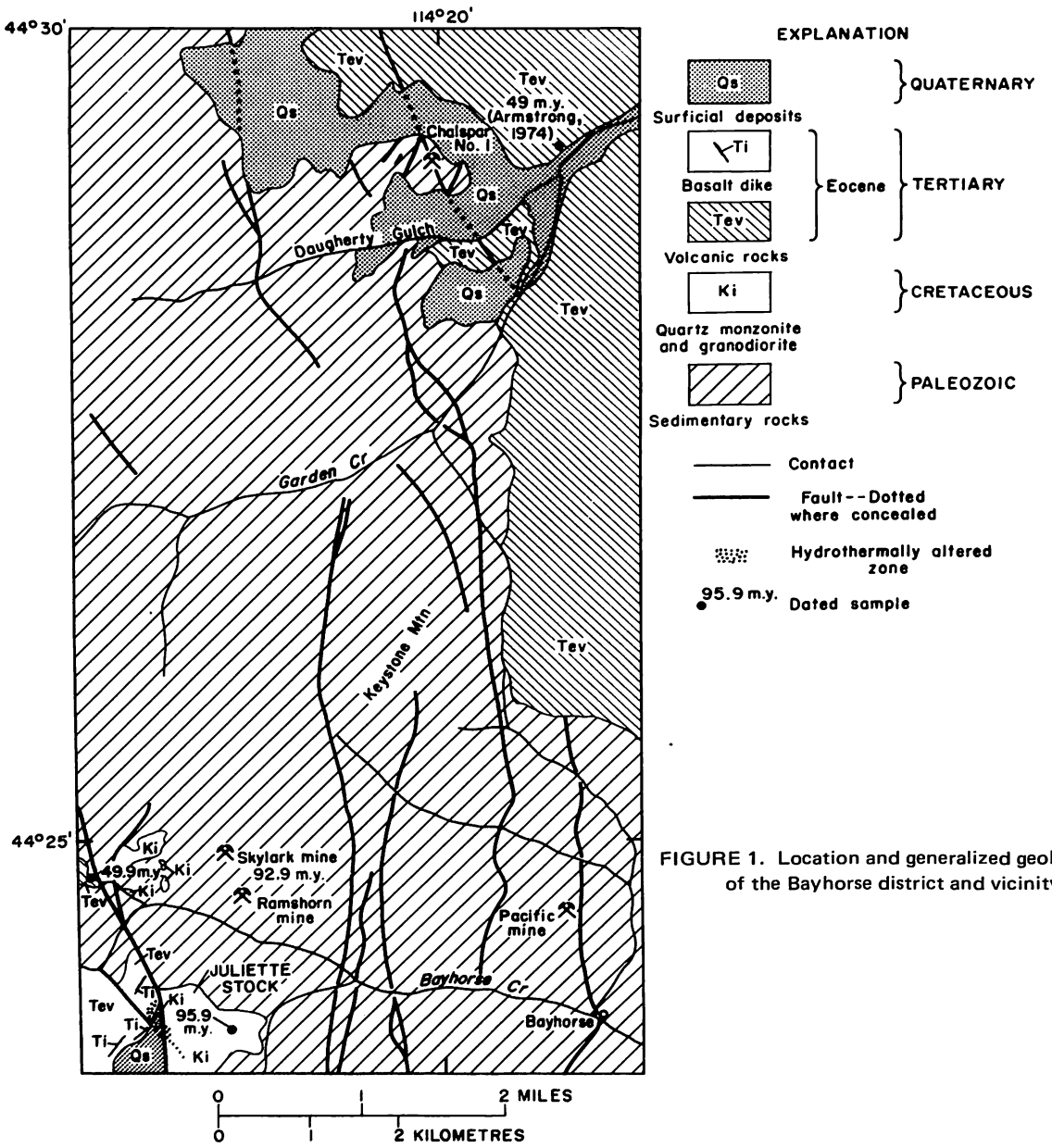

FIGURE 1. Location and generalized geologic map of the Bayhorse district and vicinity.