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N.J. Wolverson

Isochron/West, Bulletin of Isotopic Geochronology, v. 45, pp. 12-13

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ISOCHRON/WEST
A Bulletin of Isotopic Geochronology

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AGE OF HYDROTHERMAL ALUNITE, PALMETTO PROJECT, ESMERALDA COUNTY, NEVADA

NANCY J. WOLVERSON *MSM, University of Nevada-Reno, P.O. Box 8427, Reno, NV 89507*

INTRODUCTION

This note reports the age of hydrothermal activity on the north flank of the Palmetto Mountains, Esmeralda County, Nevada. One K-Ar age determination was obtained on coarse alunite from a quartz-alunite rib in porphyritic andesite (PM1112-1, fig. 1). The sample was selected because the association with rib structures, the large size (> 1 mm) of the alunite crystals, and the +19 per mil difference of sulfur isotopic composition between the alunite and hypogene pyrite from the district indicate a hypogene origin for the alunite.

GEOLOGIC DISCUSSION

The host rocks were previously mapped as andesitic tuff breccias by Dover (1962). Albers and Stewart (1972) indicate the approximate age of these rocks as 16.2–12.7 m.y. based solely on stratigraphic position.

Within the 1 mi² area of altered volcanic rocks mapped, andesite lavas and flow breccias host numerous prominent east-west-trending silica-alunite ribs. The silica varies from quartz in the north to cristobalite in the south with an intermediate zone of chalcedony. Extending outward from the ribs is a zone of halloysite-dominant argillic alteration that locally contains bodies composed largely of montmorillonite plus secondary biotite and two small areas of illite-bearing argillically altered rock. This zone grades outward into propylitically altered and unaltered rock. The sample dated is from an alunite-quartz rib.

The alunite has a K-Ar age of 16.1 ± 0.7 m.y. The host volcanic rocks have not been dated but it is likely that the hydrothermal episode occurred in the waning stages of volcanic activity. The Goldfield, Nevada (Ashley and Silberman, 1976) and Julcani, Peru (Noble and Silberman, 1984) mining districts, among others characterized by abundant coarse hypogene alunite, show this relationship.

Two volcanic units and one thermal event in Esmeralda County have ages within 1 m.y. of the age determined for this period of hydrothermal activity. Albers and Stewart (1972) report an age of 16.2 ± 0.4 m.y. for the Brougher Dacite near Tonopah and a 15.1 ± 0.6 m.y. age for the Gilbert Andesite near South Gilbert, and McKee (1983) reports a 16.7 ± 0.3 m.y. age for coarse mica from a garnet-mica schist at Mineral Ridge near Silver Peak. The similarity of the age date on alunite and reset mica may alternately indicate a relationship between the hydrothermal system at Palmetto and the thermal event at Silver Peak.

ANALYTICAL PROCEDURES

The alunite was separated from the rock using standard density and electromagnetic methods. The K-Ar age was determined by the Geochron Laboratories Division of Krueger Enterprises Inc., Cambridge, Massachusetts. The constants used in the age calculations are: $(\lambda_e + \lambda_g) = 0.581 \times 10^{-10} \text{ yr}^{-1}$; $\lambda_\beta = 4.962 \times 10^{-10} \text{ yr}^{-1}$; $^{40}\text{K}/\Sigma\text{K} = 1.193 \times 10^{-4} \text{ gg}^{-1}$.

ACKNOWLEDGMENTS

E. S. Rugg and Dome Exploration (US) Limited made the study possible through financial support of the author's thesis studies.

SAMPLE DESCRIPTION

1. *PM1112-1* K-Ar
Quartz-alunite rib in porphyritic andesite ($37^\circ 33' 50''$ N, $117^\circ 40' 25''$ W; S29, T4S, R39E [unsurveyed]; Palmetto Mountains; Esmeralda Co., NV). *Analytical data:* K₂O = 4.87%, 4.76%; $^{40}\text{Ar}^* = 1.15 \times 10^{-10}$ mol/g; $^{40}\text{Ar}^*/\Sigma^{40}\text{Ar} = 18.7\%$, 15.7%. *Comment:* The 2θ angle (30.08°) of the alunite (102) peak suggests a Na:K ratio of about 1.4 (Cunningham and Hall, 1976), similar to ratios of about 1.55 calculated from the measured K content. *Collected by:* N. J. Wolverson.

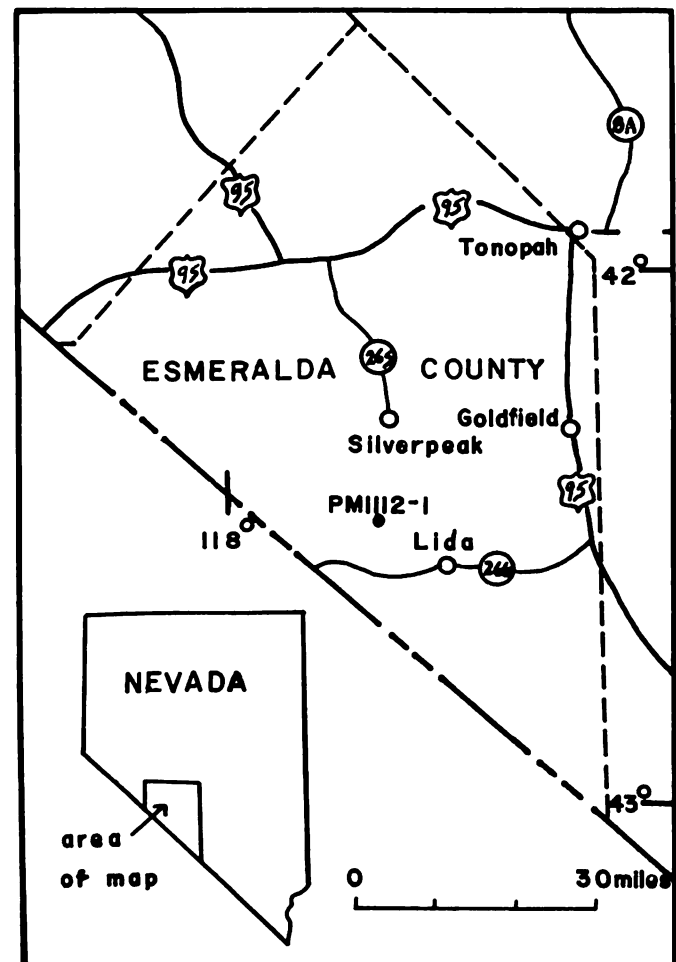


FIGURE 1. Map showing location of dated rock sample.

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