New K-Ar dates from the Springerville volcanic field, central Jemez zone, Apache County, Arizona

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NEW K-Ar DATES FROM THE SPRINGERVILLE VOLCANIC FIELD, CENTRAL JEMEZ ZONE, APACHE COUNTY, ARIZONA

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Six new K-Ar dates have been obtained on basaltic flows of the Springerville volcanic field, Apache County, Arizona. Other dates, whole rock chemistry, and $^{87}Sr/^{85}Sr$ ratios from flows in this field, which forms part of the Jemez Zone (Mayo, 1958) have recently been reported by Laughlin et al. (1979). These new dates confirm the age of an intense period of basaltic volcanism in this area between roughly 4 m.y. and 0.8 m.y.

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DISCUSSION

For several years the Los Alamos Scientific Laboratory has been investigating the geothermal potential of the central Jemez Zone or Lineament i.e. that portion of the lineament between Grants, New Mexico and Show Low, Arizona. As part of this investigation, the age and duration of the youngest basaltic volcanism are being examined. Prior work (Laughlin et al., 1979) indicated that in the Springerville area an intense period of basaltic volcanism occurred between approximately 3 m.y. and 0.8 m.y. ago. This earlier work indicated that both tholeiitic and alkalic basalts were erupted during this interval and that there was no correlation between age and basalt composition.

Potassium-argon ages have been obtained on six additional flows from the Springerville volcanic field. These ages range from 6.03 m.y. to 0.75 m.y. The new ages and those reported by Laughlin et al. (1979) are located on the index map of the volcanic field. LANDSAT imagery of the area indicates that the older dates (6.03 m.y. to 2.94 m.y.) are from flow lobes related to the White Mountains volcanic activity to the south (Merrill and Pewe, 1977). The two new dates of 0.75 and 0.84 m.y. are for flows from vents penetrating the older mesa capping basalts.

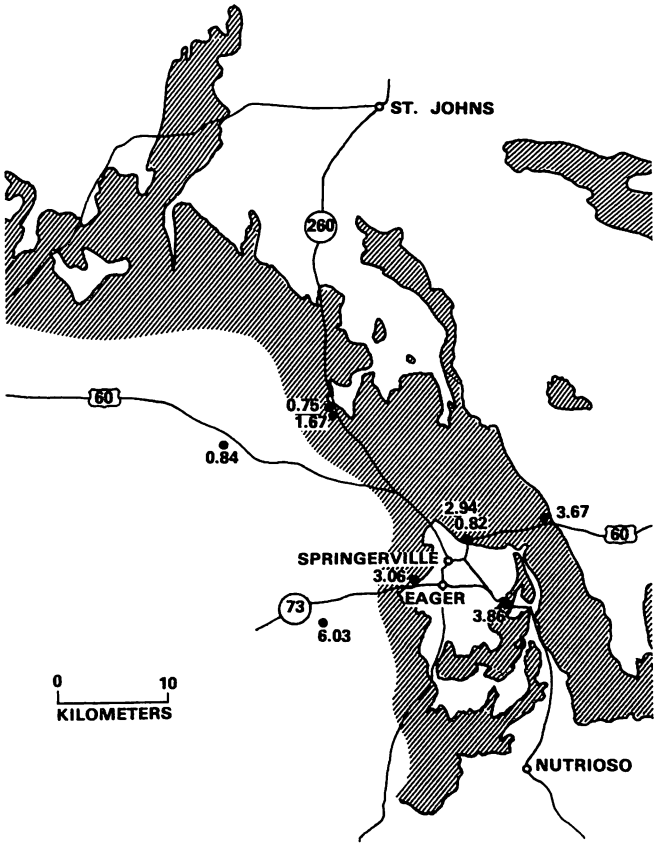
SAMPLE DESCRIPTIONS

1. *AWL-3-77*
   Basalt flow (34°08'N, 109°13'W; road cut along U. S. 60; elevation 1980 m, Apache Co., AZ). Rests on gravel and overlies oxidized top of either an older flow or the lobe of same flow which has been overrun. *Analytical data:* K = 0.596, 0.600, 0.601, 0.602, radiogenic ^{40}Ar = 3.75, 3.84, 3.88 x 10^{-12} m/g, atmospheric ^{40}Ar = 73.8, 73.1, 72.9%.
   (whole rock) 3.67 ± 0.12 m.y.

2. *AWL-4-77*
   Basalt flow lobe (34°14'N, 109°30'W; quarry in cinder cone 8175 S side of U. S. 60; elevation 2347 m; Apache Co., AZ). *Analytical data:* K = 1.194, 1.195, 1.197%, radiogenic ^{40}Ar = 1.55, 1.82, 1.84 x 10^{-12} m/g, atmospheric ^{40}Ar = 91.0, 89.6, 89.5%.
   (whole rock) 0.84 ± 0.07 m.y.

3. *AWL-5-77*
   Basalt flow (34°12'N, 109°19'W; road cut along Highway 260-666 west of Springerville; elevation 2057 m, Apache Co., AZ). Flow caps mesa. *Analytical data:* K = 0.629, 0.624, 0.623, 0.625%, radiogenic ^{40}Ar = 1.77, 1.80, 1.88 x 10^{-12} m/g, atmospheric ^{40}Ar = 83.9, 83.8, 83.0%.
   (whole rock) 1.67 ± 0.09 m.y.

4. *AWL-6-77*
   Basalt flow (34°14'N, 109°23'W; road cut along Highway 260-666; Apache Co., AZ). Overlies flow



LOCATION MAP OF DATED SAMPLES
● 3.86 - AGE (m.y.)

AWL-5-77. *Analytical data:* K = 0.857, 0.856, 0.854, 0.851, 0.851%, radiogenic ^{40}Ar = 1.04, 1.10, 1.18 x 10^{-12} m/g, atmospheric ^{40}Ar = 95.4, 95.1, 94.8%.
(whole rock) 0.75 ± 0.13 m.y.

5. *AWL-7-77*
Basalt flow (34°03'N, 109°25'W; mesa side above South Fork campground, Apache Co., AZ). Basal flow overlying gravel beds. *Analytical data:* K = 1.124, 1.111%, radiogenic ^{40}Ar = 11.44, 11.95 x 10^{-12} m/g, atmospheric ^{40}Ar = 92.4, 92.1%.
(whole rock) 6.03 ± 0.43 m.y.

6. *AWL-8-77*
Basalt flow (34°05'N, 109°14'W; road cut along Highway 260-666 on road to Nutrioso, Apache Co., AZ). Overlies gravels. *Analytical data:* K = 1.326, 1.323%, radiogenic ^{40}Ar = 8.84, 8.91, 8.92 x 10^{-12} m/g, atmospheric ^{40}Ar = 62.9, 62.7, 63.4%.
(whole rock) 3.87 ± 0.10 m.y.

REFERENCES

Laughlin, A. W., Brookins, D. G., Damon, P. E., and Shafiqullah, M. (1979) Late Cenozoic volcanism of the central Jemez Zone, Arizona—New Mexico: Isochron/West, no. 25, p. 5—8.

Mayo, E. B. (1958) Lineament tectonics and some ore districts of the southwest: Am. Inst. Mining, Metall. and Petroleum Engineers Trans., p. 1169—1175.

Merrill, R. K., and Pewe, T. L. (1977) Late Cenozoic geology of the White Mountains, Arizona: Arizona Bureau of Geology and Mineral Technology Special Paper No. 1.