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K-AR AGES OF BASALT FLOWS AT CANJILON HILL, ISLETA VOLCANO, AND THE CAT HILLS VOLCANIC FIELD, ALBUQUERQUE-BELEN BASIN, CENTRAL NEW MEXICO

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Volcanism within the Rio Grande rift zone in New Mexico has been dominated by eruptions of basaltic magma for the last 5 m.y. The southern basins of the rift are dominated by alkali basalt eruptions, but northern basins of the rift contain olivine tholeiites in abundance (Lipman, 1969; Aoki, 1967; Lipman and Mehnert, 1975). The middle basin of the rift, the Albuquerque-Belen Basin, appears to be a transitional zone in which olivine tholeiites and andesites occur together with the alkali basalts (Kelley and Kudo, in press). This report on the volcanic rocks of the Albuquerque-Belen Basin is a part of our continuing study on the chronology, correlation and chemical identity of the Pliocene-Holocene volcanics within the Rio Grande rift zone in New Mexico.

Several volcanic centers in the Albuquerque-Belen Basin have been dated recently, but of particular interest was the age of the Albuquerque volcanoes (Bachman and others, 1975). Basalts of the Albuquerque volcanoes (fig. 1) that erupted and flowed on the erosional surface are low potash olivine tholeiites. Bachman and others (1975) dated the basalt from one eruptive center at 0.19 m.y. and concluded that the erosional surface is not younger than 0.19 m.y. However, the Cat Hills volcanoes, another eruptive center, appeared to be younger than this on the basis of morphology of flows and characteristics of soil development.

The Cat Hills volcanoes, about 30 km southwest of Albuquerque, consist of 23 cinder cones aligned slightly east of north in a manner indicating control of fissures. About seven alkali basaltic flow units can be mapped; of these, the first two have the widest distribution and have probably erupted from fissures. The 0.140 ± 0.038 m.y. K-Ar age on the first or oldest flow confirms the geomorphic evidence.

Isleta volcano lies about 20 km south of Albuquerque just above the floodplain on the west side of the Rio Grande. The volcano is a low shield composed of three alkali basalt flow units with an interbedded ash bed. The whole volcano sits within a maar crater which is almost completely buried except for the northeastern and eastern sides. The 2.78 ± 0.12 m.y. age dates the second flow above the maar.

Canjilon Hill lies 30 km north of Albuquerque on the western edge of the Rio Grande floodplain. It is a good example of a dissected maar which is oval in outline with its long axis oriented N. 5° W. The maar consists of four principal parts each of which is composed of centroclinal maar deposits. Three of these are aligned along the length of the structure consisting of a small circular sag basin to the north end, a central sag and

collapse basin with a peripheral cone sheet of basalt, and a southern collapse basin filled with a lava lake. The lake flow yields a 2.61 ± 0.09 m.y. age of the alkali olivine basalts.

The youngest dated volcanism within the Albuquerque-Belen Basin is alkali basaltic; this occurred at Cat Hills about 0.140 ± 0.038 m.y. ago. The ages for the flows at Isleta volcano and Canjilon Hill are respectively 2.78 ± 0.12 and 2.61 ± 0.09 m.y. The 2.6 and 2.8 m.y. ages appear to confirm a widespread volcanic event during this time in central New Mexico. Constants used: $\lambda_e = 0.575 \times 10^{-10}$ yr⁻¹, $\lambda_\beta = 4.905 \times 10^{-10}$ yr⁻¹, $\lambda = 5.480 \times 10^{-10}$ yr⁻¹, $^{40}\text{K}/\text{K} = 1.18 \times 10^{-4}$ atom ratio.

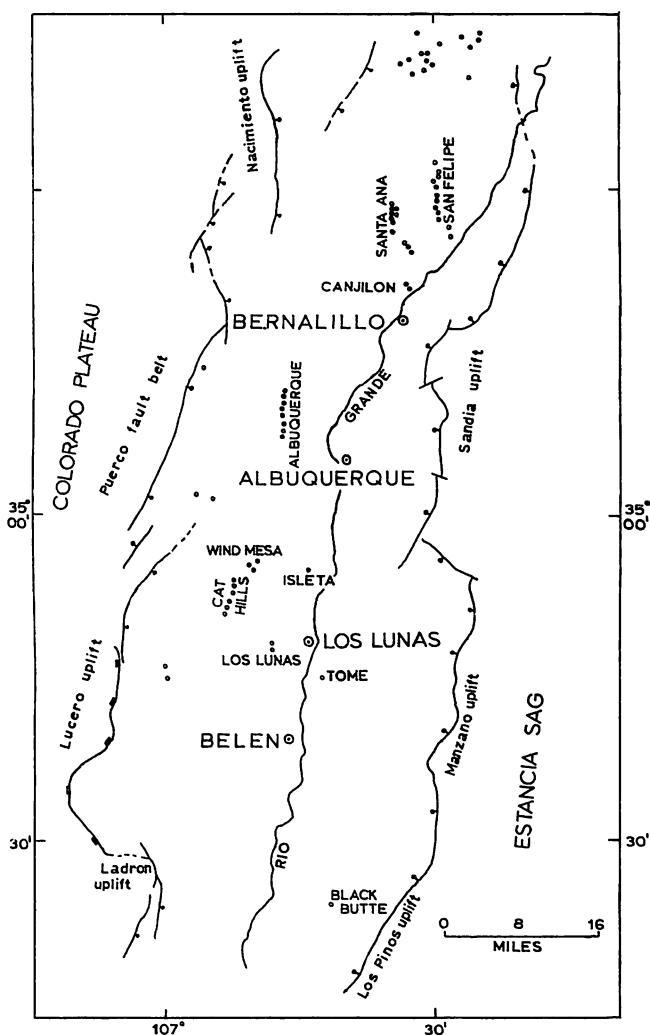


FIGURE 1 — Location map of Canjilon Hill, Albuquerque volcanoes, Isleta volcano, and Cat Hills volcanic field, within the Albuquerque Basin.

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SAMPLE DESCRIPTIONS

1. UAKA-75-81 K-Ar
Alkali olivine basalt (flow #1 from Cat Hills (#CH-1); 34°51'45"N., 106°47'36"W.; Bernalillo Co., NM).
Analytical data: K = 0.785%; *⁴⁰Ar = 0.195 and 0.199

x 10⁻¹² m/g; % atmospheric ⁴⁰Ar = 95.2 and 94.8.
(whole rock) 0.140±0.038 m.y.

2. UAKA-75-82 K-Ar
Alkali olivine basalt (flow #2 from Isleta volcano (#I-2); 34°55'30"N., 106°43'00"W.; Bernalillo Co., NM).
Analytical data: K = 0.856%; *⁴⁰Ar = 4.25 and 4.06 x 10⁻¹² m/g; % atmospheric ⁴⁰Ar = 74.7 and 75.6
(whole rock) 2.78±0.12 m.y.
3. UAKA-75-83 K-Ar
Alkali olivine basalt (lake flow in maar crater in Canjilon Hill (#CAN); 35°21'30"N., 106°32'30"W.; Sandoval Co., NM). Analytical data: K = 0.512%; *⁴⁰Ar = 2.30 and 2.36 x 10⁻¹² m/g; % atmospheric ⁴⁰Ar = 64.1 and 63.6.
(whole rock) 2.61±0.09 m.y.

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