# K-AR DATING OF YOUNG VOLCANIC ROCKS

### **FINAL REPORT**

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### SUMMARY

Potassium-Argon (K-Ar) age dates were determined for forty two young geologic samples by the Laboratory of Isotope Geochemistry, Department of Geosciences, in the period February 1, 1986 to June 30, 1989. Under the terms of Department of Energy Grant No. DE-FG07-86ID12622, The University of Arizona was to provide state-of-the-art K-Ar age dating services, including sample preparation, analytical procedures, and computations, for forty two young geologic samples submitted by DOE geothermal researchers. We billed only for forty samples.

Age dates were determined for geologic samples from five regions with geothermal potential: the Cascade Mountains (Oregon); the Cascade Mountains (Washington); Ascension Island, South Atlantic Ocean; Cerro Prieto, Mexico; and Las Azufres, Mexico. The ages determined varied from 5.92 m.a. to 0.62 m.a. The integration of K-Ar dates with geologic data and the interpretation in terms of geologic and geothermal significance has been reported separately by the various DOE geothermal researchers.

Table 1 presents a detailed listing of all samples dated, general sample location, researcher, researcher's organization, rock type, age, and probably error (1 standard deviation). Additional details regarding the geologic samples may be obtained from the respective geothermal researcher.

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# K-Ar dating Procedure at the University of Arizona

## Sample preparation

For groundmass feldspar concentrate, large phenocrysts, if any, were removed by hand picking. Samples were then ground to 100-150 um. Glass and altered minerals were separated by floatation on a heavy liquid of specific gravity 2.50 -2.55. K-poor minerals such as olivine and pyroxene were separated using a heavy liquid of specific gravity 2.90-2.96. The concentrate of feldspar and feldspar rich composite grains were leached in dilute HF to remove any adhering glass, clay and carbonate and then resieved to remove the finer grains. The resultant culled groundmass was used for K-Ar dating. Pure feldspar was separated using standard magnetic and heavy liquid separation techniques.

### K-Analysis

Potassium is analyzed on a Perkin-Elmer model 403 atomic absorption spectrophotometer. Three splits of each sample are taken in solution with HF, buffered with NaCl, and brought to a standard volume. A rock standard is run concurrently with each sample to monitor precision. Analyses are repeated if the spread between extreme measured values exceeded 1.5 % and/or the measured potassium content of the standard differ by more than 2% from the accepted value.

### Ar-Analysis

Samples for argon analyses are fused in induction-heated molybdenum crucibles suspended in 90 mm air cooled pyrex fusion envelopes, which have first been evacuated and baked for 2 days at 257°C. The gas resulting from each fusion, after being thoroughly purified, is divided into two or more aliquot for separate analyses by static mode using our 6 inch (15.24 cm), 60° sector field, Nier type gas source mass spectrometer. A dedicated table top micro computer changes the magnetic field to focus each ion beam, in turn, on a Faraday cup collector and then measures and stores the voltages generated. Measurements are time regressed to the time gas is introduced, using both linear and parabolic least squares regression routines, and also on mass intensity ratios. If analyses in different aliquot do not fall within expected statistical limits, additional fusions and analyses are performed until satisfactory results are obtained.

#	Researcher	Roc	Sample locality	Sample Nu Researcher	ımber UAKA	Reported Ma	Date +/-
1	DL Nielson	ва	Ascension Island	AI-86-107	87040	0.80	0.03
2	DL Nielson	T	Ascension Island	AI-86-102	87041		0.02
3	DL Nielson	R	Ascension Island	AI-86-103	87042		0.03
4	DL Nielson		Ascension Island	AI-86-103	87042	1.15	0.04
5	DL Nielson	0	Ascension Island	AI-86-104	87043		0.02
6	DL Nielson	R	Ascension Island	AI-86-105	87044		0.01
7	DL Nielson	R	Ascension Island	AI-86-107	87045		0.02
8	DL Nielson		Ascension Island	AI-88-16	88046		0.02
9	G Priest	BA	Oregon Cascade		87016		0.08
10	G Priest	В	Oregon Cascade	ET-104	87021		0.14
11	G Priest	BA	Oregon Cascade	HC-180	87022	4.96	0.37
12	<b>G</b> Priest	В	Oregon Cascade	BHS-20	87198	0.86	0.06
13	G Priest	В	Oregon Cascade	BHS-21	87199	1.47	0.06
14	G Priest	В	Oregon Cascade	BHS-22	87200	0.65	0.05
15	G Priest	В	Oregon Cascade	PP-2	87218	0.94	0.05
16	<b>G</b> Priest	BA	Oregon Cascade	CTGH-1-3195	88017	5.15	0.25
17	G Priest	BA	Oregon Cascade	CTGH-1-4633	88018	4.64	0.12
18	G Priest	В	Oregon Cascade	35-015	88019	0.63	0.09
19	G Priest	BA	Oregon Cascade	CTGH-1-3152	88040	4.95	0.23
20	G Priest	BA	Oregon Cascade	CTGH-1-4740	88041	4.65	0.12
21	G Priest	В	Oregon Cascade	88-2-1819	89063	0.15	0.05
22	G Priest	B	Oregon Cascade	88-4-810	89064	0.07	0.03
23	G Priest	В	Oregon Cascade	88-3-1240	89065	1.35	0.07
24	G Priest	В	Oregon Cascade	88-3-1741	89066		0.06
25	J Moore	D	Los Azufres	#1	87238		0.03
26	J Moore	A	Los Azufres	#2	87239		0.14
27	J Moore	R	Los Azufres	#3	87240		0.03
28	J Moore	D	Los Azufres	#4	87241		0.03
29	J Moore	A	Los Azufres	#5	87242		0.06
30	J Moore	R	Los Azufres	#6	87243		0.01
31	M Korosec	В	Washington Cascade		88163		0.01
32	M Korosec	BA	Washington Cascade	MK-87-9-75	88164		0.05
33	M Korosec	В	Washington Cascade	MK-88-8-8	88165	0.22	0.12
34	M Korosec	В	Washington Cascade	MK-88-8-9	88166		0.08
35	M Korosec	В	Washington Cascade	MK-88-8-10	88167	0.49	0.08
36	M Korosec	BA	Washington Cascade	MK-88-8-11	88168	0.28	0.02
37	M Korosec	В	Washington Cascade	MK-88-8-14	88169	1.67	0.23
38	M Korosec	A	Washington Cascade	MK-88-8-18	88170	0.20	0.04
39	M Korosec	A	Washington Cascade	MK-88-8-20	88171	0.29	0.03
40	M Korosec	В	Washington Cascade	MK-88-8-24	88172	0.39	0.04
41	M Reed	В	Cerro Prieto	CP-1	86252	0.10	0.06
42	M Reed	В	Cerro Prieto	CP-2	86253	0.12	0.07

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Sample type dated - groundmass feldspar concentrate or feldspar separate

Rock type

A = Andesite B = Basalt

D = Dacite BA = Basaltic andesite

O = Obsidian R = Rhyolite T = Trachyte R-F = Feldspar T-F = Feldspar

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