OPEN-FILE REPORT

SUMMARY OF POTASSIUM/ARGON DATING - 1982

by

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September 1982

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Prepared for
U.S. Department of Energy
Division of Geothermal Energy

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open-file report
DOE/ID/12079-82

INTRODUCTION

The purpose of this open-file report is to tabulate the results of the potassium/argon dating program which has been supported by the U. S. Department of Energy during Fiscal Year 1982. During this period dating was done for state teams being supported by the State Low Temperature Resource Assessment Program, for the case study of the Beowawe KGRA being conducted here at Earth Science Laboratory, and for the Mineral Mountains intrusive complex study.

During FY-82 about 40 samples were dated. Ten calibration runs and discrimination checks were also completed in order to maintain the laboratory in an operational status.

Procedures used for dating remain as in the past. These have been reported previously in Evans (1980), Evans and Brown (1980) and Evans and Brown (1981). We have slightly modified the procedure for treating whole-rock samples by crushing samples to -20, +30 mesh and then leaching the samples in 10% nitric acid and then 10% hydrofluoric acid to remove any easily soluble weathering products. This seems to enhance results on young whole-rock basalt samples by reducing atmospheric argon contents and thereby improving precision of the dates.

RESULTS

Three samples from the Mineral Mountains plutonic complex were dated as part of a study of the thermal and tectonic history of the complex. The results of this study have been reported in Evans and Nielson (1982). The data for the three dates are included in Table 1.

Three samples were dated as part of the case study of the Beowawe, Nevada KGRA under the Industry Coupled Program. These samples were dated to try and clarify the volcanic stratigraphy of the area and details of this study will be reported elsewhere. The analytical results of the dating for this project are given in Table 2.

A number of samples have been dated for various state agencies as part of the State Low Temperature Resource Assessment Program. Three samples were dated for Ms. Dulcy Berri who is a subcontractor to the Washington State Geological Survey. The results of this work are given in Table 3.

Four samples were dated for the California Division of Mines and Geology. These samples all came from the Bodie Hills area of eastern California. The analytical data for these samples is recorded in Table 4.

Twenty-three samples were dated for the Oregon Department of Geology and Mineral Industries. These samples came from various study areas being mapped in the Cascades of Oregon. The results of the dating are given in Table 5. Many of these dates are scheduled to be released in reports to be issued by Oregon.

ACKNOWLEDGEMENTS

Funding for the dating reported herein was provided by the Department of Energy, Division of Geothermal Energy under contract DE-AC07-80ID12079.

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Table 1. Samples Dated from the Mineral Mountains Intrusive Complex, Utah.

Sample No.	Unit	Material Dated	Weight (gms)	%K	$^{40}\text{Ar}_{\text{Rad}} (\times 10^{11})$	% $^{40}\text{Ar}_{\text{atm}}$	Age (m.y. $\pm 1\sigma$)
MR 81-2/UT-266	-	Biotite	0.30229	7.23	12.105	72	9.63 $\pm$ 0.52
MR 81-3/AH-95	-	Biotite	0.32181	6.25	8.896	83	8.19 $\pm$ 0.67
MR 81-4/UT-276	-	Biotite	0.42198	6.72	10.917	81	9.34 $\pm$ 0.69

Constants Used:

$$\lambda_{\beta} = 4.962 \times 10^{-10} / \text{yr.}$$

$$\lambda_{\epsilon} = 0.581 \times 10^{-10} / \text{yr.}$$

$$^{40}\text{K}/\text{K}_{\text{Tot.}} = 1.167 \times 10^{-4} \text{ Mole/Mole.}$$

Table 2. Samples Dated from Beowawe, Nevada.

Sample No.	Unit	Material Dated	Weight (gms)	%K	$^{40}\text{Ar}_{\text{Rad}} (\times 10^{11})$	% $^{40}\text{Ar}_{\text{atm}}$	Age (m.y. $\pm 1\sigma$)
BN-5/UT-285	-	Whole Rock	1.06373	0.93	2.727	90	16.8 $\pm$ 2.5
BN-7/AH-110	-	Plagioclase	1.00882	0.88	2.149	74	14.0 $\pm$ 0.8
BN-13B/AH-112	-	Whole Rock	1.00936	1.32	3.740	82	16.3 $\pm$ 1.6

Constants Used:

$$\lambda_{\beta} = 4.962 \times 10^{-10} / \text{yr.}$$

$$\lambda_{\epsilon} = 0.581 \times 10^{-10} / \text{yr.}$$

$$^{40}\text{K}/\text{K}_{\text{Tot.}} = 1.167 \times 10^{-4} \text{ Mole/Mole.}$$

Table 3. Samples dated for Ms. Dulcy Berri.

Sample No.	Unit	Material Dated	Weight (gms)	%K	$^{40}\text{Ar}_{\text{Rad}}(\times 10^{11})$	% $^{40}\text{Ar}_{\text{atm}}$	Age (m.y. $\pm 1\sigma$)
SR/UT-287	-	Whole Rock	1.01964	0.60	1.644	85	15.7 $\pm$ 1.5
WAR/UT-289	-	Whole Rock	1.44479	1.20	4.868	58	23.2 $\pm$ 1.0
TCB/UT-290	-	No Radiogenic argon detected.					

Constants Used:

$$\lambda_{\beta} = 4.962 \times 10^{-10}/\text{yr.}$$

$$\lambda_{\epsilon} = 0.581 \times 10^{-10}/\text{yr.}$$

$$\text{K}^{40}/\text{K}_{\text{Tot.}} = 1.167 \times 10^{-4} \text{ Mole/Mole.}$$

Table 4. Samples from Bodie Hills, California, dated for California Division of Mines and Geology.

Sample No.	Unit	Material Dated	Weight (gms)	%K	$^{40}\text{Ar}_{\text{Rad}} (\times 10^{11})$	% $^{40}\text{Ar}_{\text{atm}}$	Age (m.y. $\pm 1\sigma$)
B-2/UT-283	-	Plagioclase	1.54100	1.06	1.696	81	9.20 $\pm$ 0.68
B-13/AH-108	-	Plagioclase	1.15849	1.30	1.748	74	7.73 $\pm$ 0.44
B-22/AH-109	-	Plagioclase	1.01505	0.69	1.292	86	10.8 $\pm$ 1.1
B-23/UT-284	-	Whole Rock	2.03718	1.30	1.252	89	5.55 $\pm$ 0.69

Constants Used:

$$\lambda_{\beta} = 4.962 \times 10^{-10} / \text{yr.}$$

$$\lambda_{\epsilon} = 0.581 \times 10^{-10} / \text{yr.}$$

$$K^{40}/K_{\text{Tot.}} = 1.167 \times 10^{-4} \text{ Mole/Mole.}$$

Table 5. Samples Dated for the Oregon Department of Geology and Mineral Industries.

Sample No.	Unit	Material Dated	Weight (gms)	%K	$^{40}\text{Ar}_{\text{Rad}} (\times 10^{11})$	% $^{40}\text{Ar}_{\text{atm}}$	Age (m.y. $\pm 1\sigma$)
P-616/AH-91	-	Whole Rock	0.72258	1.25	0.937	85	4.32 $\pm$ 0.40
P-624/UT-269	-	Whole Rock	0.70688	0.89	2.095	82	13.5 $\pm$ 1.1
P-626/AH-92	-	Whole Rock	0.74436	0.87	1.985	68	13.1 $\pm$ 0.6
P-PHL/UT-270	-	Whole Rock	0.96181	0.90	0.869	76	5.56 $\pm$ 0.34
PD-86/AH-93	-	Whole Rock	2.05152	0.88	0.407	81	2.66 $\pm$ 0.20
P-509/UT-267	-	Whole Rock	0.95046	0.67	2.022	62	17.3 $\pm$ 0.8
BB-PPAT/UT-273	-	Whole Rock	2.03613	0.91	0.918	70	5.81 $\pm$ 0.30
B-32/UT-275	-	Anorthoclase	0.94069	1.50	4.303	53	16.5 $\pm$ 0.6
B-46/AH-96	-	Whole Rock	2.01098	1.49	2.237	44	8.64 $\pm$ 0.31
Dbl. Mtn. Sc./AH-97	-	Whole Rock	2.02659	0.78	1.412	90	10.4 $\pm$ 1.4
OBf-17/UT-274	-	Whole Rock	1.53695	0.91	2.804	57	15.3 $\pm$ 0.6
P-21/AH-98	-	Plagioclase	1.16057	0.09	0.199	97	12.7 $\pm$ 6.0
DC-4/UT-277	-	Whole Rock	1.55257	0.66	1.089	90	9.5 $\pm$ 1.3
DC-14/AH-101	-	Whole Rock	1.52703	0.49	0.514	91	6.0 $\pm$ 0.9
DC-114/UT-278	-	Whole Rock	2.00298	1.61	1.762	37	6.30 $\pm$ 0.22
Devils 440/AH-102	-	Whole Rock	2.064631	0.53	0.492	87	5.34 $\pm$ 0.58
FM-207/UT-279	-	Plagioclase	2.50789	0.22	1.299	85	33.7 $\pm$ 3.1
RI-62/AH-104	-	Whole Rock	2.01301	0.48	0.651	86	7.80 $\pm$ 0.77
RI-64/UT-280	-	Whole Rock	1.53029	1.39	2.274	64	9.41 $\pm$ 0.42
CG-80A/AH-103	-	Whole Rock	0.99926	1.23	3.212	73	15.0 $\pm$ 0.8
RI-22/UT-282	-	Whole Rock	1.01921	1.32	3.029	72	13.2 $\pm$ 0.7
PD-34D/AH-107	-	Whole Rock	3.01147	1.23	0.443	88	2.08 $\pm$ 0.24
OBR-1a/UT-286	-	Plagioclase	2.00672	0.44	1.751	88	22.8 $\pm$ 2.6

Constants Used:

$$\lambda_{\beta} = 4.962 \times 10^{-10}/\text{yr.}$$

$$\lambda_{\epsilon} = 0.581 \times 10^{-10}/\text{yr.}$$

$$^{40}\text{K}/\text{K}_{\text{Tot.}} = 1.167 \times 10^{-4} \text{ atom/atom.}$$