

K-Ar Geochronology Results for the Grayback Hills Quadrangle, Utah

by

*Utah Geological Survey and
Krueger Enterprises, Inc., Geochron Laboratories Division*

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OPEN-FILE REPORT 685
UTAH GEOLOGICAL SURVEY
a division of
Utah Department of Natural Resources
2018

INTRODUCTION

This open-file report makes available raw analytical data from laboratory procedures completed to determine the age of rock samples collected during geologic investigations funded or partially supported by the Utah Geological Survey (UGS). Table 1 provides sample numbers and locations for the age data. The references listed in table 1 generally provide additional information such as sample location, geologic setting, and significance or interpretation of the samples in the context of the area where they were collected. This report was prepared by Krueger Enterprises, Inc., Geochron Laboratories Division in 1992 under contract to the UGS. These data are highly technical in nature and proper interpretation requires considerable training in the applicable geochronologic techniques.

Table 1. Sample numbers and locations.

Sample #	7.5' quadrangle	UTM83-12 E	UTM83-12 N	Reference
GBH 1-9A	Grayback Hills	317386.622	4519724.892	Doelling and others, 1994, 2018
GBH 2-2	Grayback Hills	318247.123	4515096.190	Doelling and others, 1994, 2018

Notes:

Location data taken from sample points in UGS Open-File Report 679DM (Doelling and others, 2018).
Sample GBH 1-9A corresponds to sample B, and sample GBH 2-2 corresponds to sample C of Doelling and others (1994, 2018).

DISCLAIMER

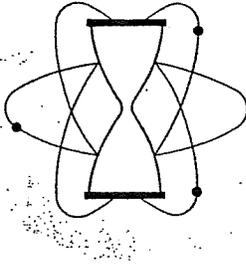
This open-file release is intended as a data repository for information gathered in support of various UGS projects. The data are presented as received from Krueger Enterprises, Inc., and do not necessarily conform to UGS technical, editorial, or policy standards; this should be considered by an individual or group planning to take action based on the contents of this report. The Utah Department of Natural Resources, Utah Geological Survey, makes no warranty, expressed or implied, regarding the suitability of this product for a particular use. The Utah Department of Natural Resources, Utah Geological Survey, shall not be liable under any circumstances for any direct, indirect, special, incidental, or consequential damages with respect to claims by users of this product.

REFERENCES

- Doelling, H.H., Solomon, B.J., and Davies, S.F., 1994, Geologic map of the Grayback Hills quadrangle, Tooele County, Utah: Utah Geological Survey Map 166, 22 p., 2 plates, scale 1:24,000.
- Doelling, H.H., Solomon, B.J., and Davies, S.F., 2018, Geologic map of the Grayback Hills quadrangle, Tooele County, Utah (GIS Reproduction of UGS Map 166 [1994]): Utah Geological Survey Open-File Report 679DM, 1 plate, GIS data, scale 1:24,000.

APPENDIX

**Analytical data for samples GBH 1-9A (B) sanidine and
GBH 2-2 (C) plagioclase and groundmass**



KRUEGER ENTERPRISES, INC.
GEOCHRON LABORATORIES DIVISION

24 BLACKSTONE STREET • CAMBRIDGE, MASSACHUSETTS 02139 • (617) 876-3691

POTASSIUM-ARGON AGE DETERMINATION

REPORT OF ANALYTICAL WORK

Our Sample No. F-9594

Date Received: 1/23/92

Your Reference: Letter of 1/16/92

Date Reported: 2/25/92

Submitted by: Hellmut Doelling
Utah Geological Survey
2363 South Foothill Drive
Salt Lake City, UT 84109-1491

Sample Description & Locality: Sample #GBH 1-9A, loosely consolidated tuff.

Material Analyzed: Sanidine concentrate, -80/+200 mesh.
Treated with dilute HF and HNO₃.

⁴⁰*Ar/⁴⁰K = .002268

AGE = 38.6 +/- 1.0 M.Y.

Argon Analyses:

⁴⁰ *Ar, ppm	⁴⁰ *Ar/Total ⁴⁰ Ar	Ave. ⁴⁰ *Ar, ppm
.02145	.812	.02153
.02160	.858	

Potassium Analyses:

% K	Ave. % K	⁴⁰ K, ppm
7.876	7.955	9.490
8.034		

Constants Used:

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

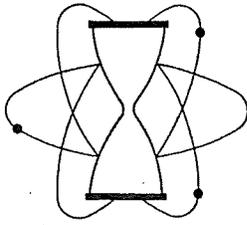
$$(\lambda_e + \lambda'_e) = 0.581 \times 10^{-10}/\text{year}$$

$$^{40}\text{K}/\text{K} = 1.193 \times 10^{-4} \text{ g/g}$$

$$\text{AGE} = \frac{1}{\lambda_{\beta} + (\lambda_e + \lambda'_e)} \ln \left[\frac{\lambda_{\beta} + (\lambda_e + \lambda'_e)}{(\lambda_e + \lambda'_e)} \times \frac{^{40}\text{Ar}}{^{40}\text{K}} + 1 \right]$$

Note: ⁴⁰*Ar refers to radiogenic ⁴⁰Ar.

M.Y. refers to millions of years.



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POTASSIUM-ARGON AGE DETERMINATION

REPORT OF ANALYTICAL WORK

Our Sample No. F-9595

Date Received: 1/23/92

Your Reference: Letter of 1/16/92

Date Reported: 2/25/92

Submitted by: Hellmut Doelling
Utah Geological Survey
2363 South Foothill Drive
Salt Lake City, UT 84109-1491

Sample Description & Locality: Sample #GBH 2-2, flow banded lava.

Material Analyzed: Albite/oligoclase concentrate, -80/+200 mesh.
Treated with dilute HF and HNO₃.

⁴⁰*Ar/⁴⁰K = .002608

AGE = 44.3 +/- 2.3 M.Y.

Argon Analyses:

⁴⁰ *Ar, ppm	⁴⁰ *Ar/Total ⁴⁰ Ar	Ave. ⁴⁰ *Ar, ppm
.000789	.227	.000733
.000671	.173	
.000738	.229	

Potassium Analyses:

% K	Ave. % K	⁴⁰ K, ppm
0.231	0.236	0.281
0.240		

Constants Used:

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

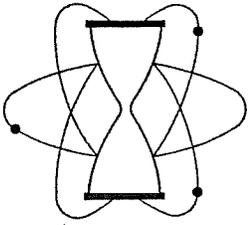
$$(\lambda_e + \lambda'_e) = 0.581 \times 10^{-10}/\text{year}$$

$$^{40}\text{K}/\text{K} = 1.193 \times 10^{-4} \text{ g/g}$$

$$\text{AGE} = \frac{1}{\lambda_{\beta} + (\lambda_e + \lambda'_e)} \ln \left[\frac{\lambda_{\beta} + (\lambda_e + \lambda'_e)}{(\lambda_e + \lambda'_e)} \times \frac{^{40}\text{*Ar}}{^{40}\text{K}} + 1 \right]$$

Note: ⁴⁰*Ar refers to radiogenic ⁴⁰Ar.

M.Y. refers to millions of years.



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February 25, 1992

Hellmut H. Doelling
Utah Geological Survey
2363 South Foothill Drive
Salt Lake City, UT 84109-1491

Dear Dr. Doelling,

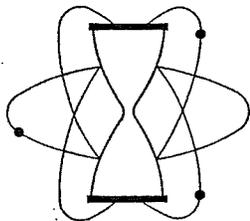
Enclosed are the results of K-Ar age determination performed on your two volcanic samples. Sample GBH 1-9A yielded a nice sanidine concentrate, while sample #GBH 2-2 yielded a plagioclase in the albite/oligoclase range. There was nothing unusual about these samples or their analyses.

The measured ages paint a slightly different picture from that described in your letter. The tuff sample is concordant in age with your expectation of the lava age. The lava is somewhat older than the tuff, which is the opposite of what would be expected from the suspected stratigraphy. Granted, you had mentioned some uncertainty in the stratigraphic relationship.

Please let me know if you have any questions about any of this. I would also be interested to know to what degree these ages serve to clarify or obscure your understanding of the field evidence.

Sincerely,

Thomas M. Bills
K-Ar Laboratory Manager



KRUEGER ENTERPRISES, INC.

GEOCHRON LABORATORIES DIVISION

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March 6, 1992

Hellmut Doelling
Utah Geological Survey
2363 South Foothill Drive
Salt Lake City, UT 84109-1491

Dear Dr. Doelling,

Enclosed is the result of K-Ar age determination of the groundmass whole rock from your sample #GBH 2-2. It is the same sample for which we reported a plagioclase age last week. This preparation represents the mesostasis of the rock after removal of the plagioclase phenocrysts.

As we discussed earlier this week, our usual strategy is to perform K-Ar analyses on mineral concentrates, if available. We use whole rock analysis in the case of fine-grained, homogeneous rocks that lack a separable potassic phase. Occasionally we run into a case, as we seem to have here, where the separated mineral component suffers from "excess" radiogenic argon, and yields a measured age which is too old.

To circumvent this problem, we have analyzed this whole rock, minus the offending material. The measured age is concordant with the sanidine age reported last week from your sample #GBH 1-9A. I hope that this clears up the apparent discrepancy to your satisfaction. Please give me a call when you have a chance.

Sincerely,

Thomas M. Bills
K-Ar Laboratory Manager