POTASSIUM-ARGON AGES OF MAFIC AND INTERMEDIATE-COMPOSITION LAVA FLOWS IN THE GREAT BASIN OF NEVADA AND UTAH

E.H. McKEE — *U.S. Geological Survey, Menlo Park, CA 94025*

M.G. BEST, D.L. BARR, D.G. TINGEY — *Dept. of Geology, Brigham Young University, Provo, UT 84602*

In an investigation of the space-time-composition relations of widely distributed Oligocene and early Miocene potassic calc-alkaline lava flows and shallow intrusions in the Great Basin by Barr and others (1992), ages of 300 chemically analyzed rocks were determined by a variety of methods. Many radiometric ages have been published in various geologic reports; other approximate ages were determined by stratigraphic relationships with dated units, especially widespread ash-flow sheets. In addition, the general age could be estimated for most rocks by their regional position in the southward sweep of volcanic activity in the province (McKee, 1971; Best and others, 1989a) which has proved to be remarkably consistent. Many rocks, however, have no adequate age control, and these were dated by K-Ar methods as part of the study and are reported here. Particularly important rocks in the study are those that record the regional transitions in magma composition, and dating was focused on these rocks. All ages are whole rock determinations. Figure 1 shows sample locations and figure 2 shows the alkali-silica contents of the dated lava flows and their IUGS classification (Le Maitre, 1989); samples 21 and 22 have been given names more appropriate to their intrusive origin.

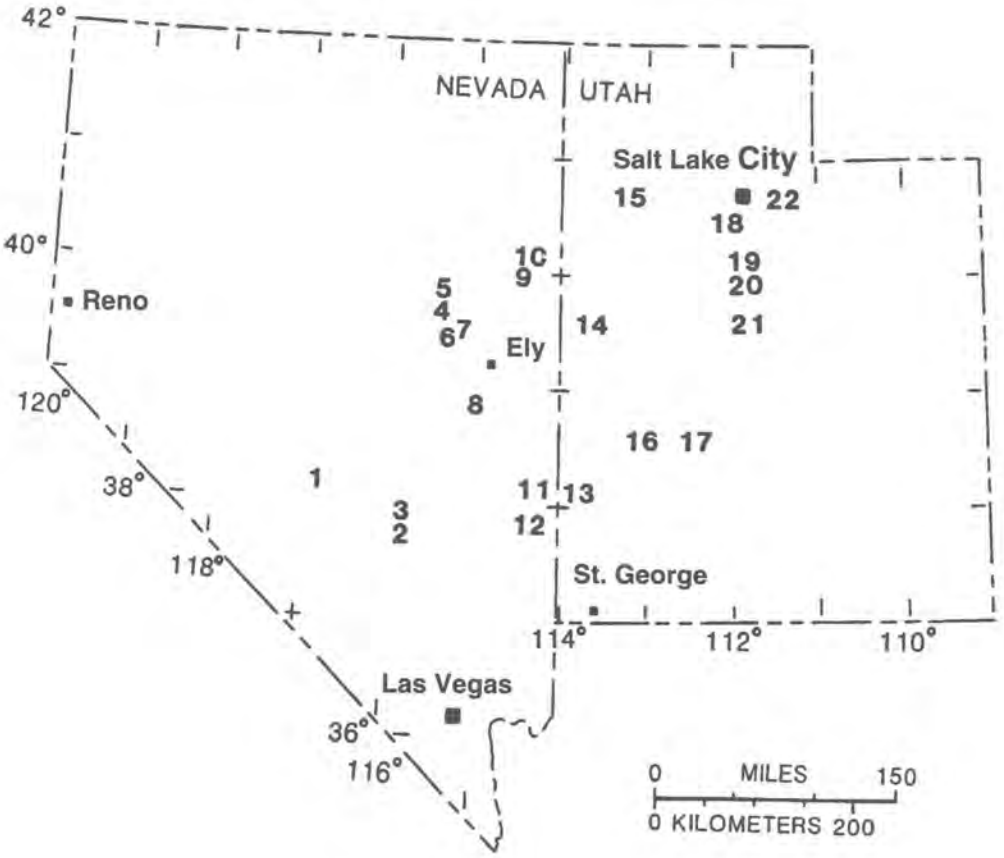

FIGURE 1. Locations of dated samples.

Constants used are $\lambda_\varepsilon + \lambda_\varepsilon' = 0.581 \times 10^{-10}$ yr^{-1}; $\lambda_\beta = 4.962 \times 10^{-11}$ yr^{-1}; $^{40}K = 1.167 \times 10^{-4}$ mole/mole.

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SAMPLE DESCRIPTIONS

1. *GRGES-2* K-Ar
Basalt (38.257°N, 116.696°W, Georges Canyon Rim, NV, 7.5′ quad.). *Analytical data:* K_2O = 0.482 wt. %, ^{40}Ar rad % = 2.12, ^{40}Ar rad (10^{-11} mol/g) = 1.06044. *Comments:* Lava flow contains phenocrysts of olivine, pyroxene, and plagioclase in a black aphanitic matrix.
(whole rock) 15.7 ± 1.8 Ma

2. *WHBLTCH-1BC* K-Ar
Andesite (37.728°N, 115.869°W, White Blotch Springs NE, NV, 7.5′ quad.). *Analytical data:* K_2O = 2.72 wt. % , ^{40}Ar rad % = 24.3, ^{40}Ar rad (10^{-11} mol/g) = 8.3402. *Comments:* Lava flow contains phenocrysts of pyroxene in gray aphanitic matrix.
(whole rock) 21.2 ± 0.7 Ma

3. *QUINN-2C* K-Ar
Basalt (37.947°N, 115.811°W, Quinn Canyon Springs, NV, 7.5′ quad.). *Analytical data:* K_2O = 1.272 wt. %, ^{40}Ar rad % = 31.4, ^{40}Ar rad (10^{-11} mol/g) = 3.60241. *Comments:* Aphyric lava flow.
(whole rock) 19.6 ± 0.7 Ma

4. *BUCKM-5* K-Ar
Basaltic trachyandesite (39.624°N, 115.586°W, Buck Mountain East, NV, 7.5′ quad.). *Analytical data:* K_2O = 3.23 wt. %, ^{40}Ar rad % = 74.3, ^{40}Ar rad (10^{-11} mol/g) = 14.897. *Comments:* Aphyric lava flow.
(whole rock) 31.8 ± 1.0 Ma

5. *BUCKM-2* K-Ar
Basaltic trachyandesite (39.739°N, 115.562°W, Buck Mountain East, NV, 7.5′ quad.). *Analytical data:* K_2O = 3.53 wt. %, ^{40}Ar rad % = 84.3, ^{40}Ar rad (10^{-11} mol/g) = 13.741. *Comments:* Aphyric lava flow.
(whole rock) 26.8 ± 0.8 Ma

6. *ILL-4* K-Ar
Transitional between andesite and basaltic andesite (39.400°N, 115.473°W, Antelope Mountain, NV, 7.5′ quad.). *Analytical data:* K_2O = 1.785 wt. %, ^{40}Ar rad % = 89.1, ^{40}Ar rad (10^{-11} mol/g) = 9.6786. *Comments:* Lava flow contains sparse small phenocrysts of clinopyroxene and minor plagioclase.
(whole rock) 37.3 ± 1.2 Ma

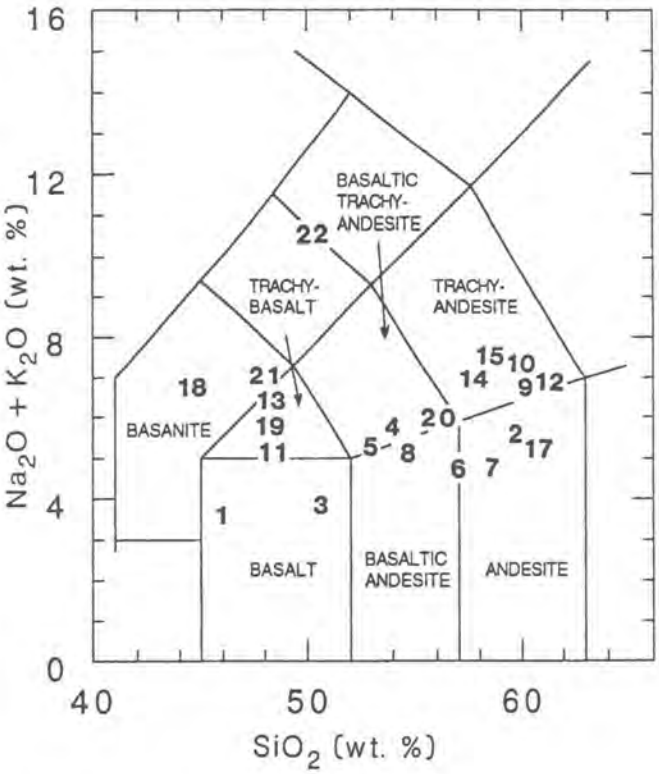

FIGURE 2. Alkali-silica content and IUGS classification (after Le Maitre, 1989) of dated samples.

7. *ILL-1* K-Ar
Andesite (39.456°N, 115.370°W, Sammys Summit, NV, 7.5′ quad.). *Analytical data:* K_2O = 3.08 wt. %, ^{40}Ar rad % = 88.8, ^{40}Ar rad (10^{-11} mol/g) = 13.809. *Comments:* Lava flow contains sparse small phenocrysts of orthopyroxene and corroded plagioclase.
(whole rock) 30.9 ± 0.9 Ma

8. *WHRN-3.126-430* K-Ar
Basaltic andesite (38.784°N, 115.033°W, White River Narrows, NV, 7.5′ quad.). *Analytical data:* K_2O = 1.65 wt. %, ^{40}Ar rad % = 58.4, ^{40}Ar rad (10^{-11} mol/g) = 43.392. *Comments:* Lava flow contains altered olivine phenocrysts.
(whole rock) 18.2 ± 0.5 Ma

9. *BECKY-1* K-Ar
Trachyandesite (39.993°N, 114.516°W, Becky Peak, NV, 7.5′ quad.). *Analytical data:* K_2O = 3.58

wt. %, ^{40}Ar rad % = 88.6, ^{40}Ar rad (10-11 mol/g) = 16.347. *Comments:* Lava flow contains abundant phenocrysts, commonly clotted, of plagioclase, two pyroxenes, and Fe-Ti oxide in a very fine grained matrix.

(whole rock) 31.4 ± 0.9 Ma

10. *BOON-2* K-Ar
Trachyandesite (40.202°N, 114.438°W, Boone Canyon, NV, 7.5′ quad.). *Analytical data:* K_2O = 4.87 wt. %, ^{40}Ar rad % = 89.0, ^{40}Ar rad (10^{-11} mol/g) = 22.364. *Comments:* Lava flow contains sparse small phenocrysts of altered amphibole.

(whole rock) 33.4 ± 1.0 Ma

11. *PIERSON-2* K-Ar
Trachybasalt (38.075°N, 114.293°W, Pierson Summit, NV, 7.5′ quad.). *Analytical data:* K_2O = 1.655 wt. %, ^{40}Ar rad % = 46.3, ^{40}Ar rad (10^{-11} mol/g) = 43.599. *Comments:* Lava flow in Blawn Formation that contains phenocrysts of plagioclase and olivine.

(whole rock) 18.2 ± 0.6 Ma

12. *MOSEY-1A* K-Ar
Trachyandesite (37.713°N, 114.265°W, Mosey Mountain, NV, 7.5′ quad.). *Analytical data:* K_2O = 3.69 wt. %, ^{40}Ar rad % = 54.4, ^{40}Ar rad (10^{-11} mol/g) = 8.2982. *Comments:* Lava flow contains abundant large phenocrysts of plagioclase, smaller clino- and ortho-pyroxene, and lesser Fe-Ti oxide, amphibole, and biotite, all commonly clotted.

(whole rock) 15.6 ± 0.5 Ma

13. *BBS-7-88-1* K-Ar
Trachybasalt (38.001°N, 113.750°W, Bible Spring, UT, 7.5′ quad.). *Analytical data:* K_2O = 2.438 wt. %, ^{40}Ar rad % = 42.7, ^{40}Ar rad (10^{-11} mol/g) = 4.4647. *Comments:* Lava flow in Steamboat Mountain Formation (Best and others, 1987) that contains phenocrysts of plagioclase and olivine.

(whole rock) 12.7± 0.4 Ma

14. *GRANMT-6* K-Ar
Trachyandesite (39.643°N, 113.744°W, Granite Mountain, UT, 7.5′ quad.). *Analytical data:* K_2O = 4.53 wt. %, ^{40}Ar rad % = 70.7, ^{40}Ar rad (10^{-11} mol/g) = 21.868. *Comments:* Lava flow contains small clotted phenocrysts of clinopyroxene in an olivine-rich matrix.

(whole rock) 33.2 ± 1.0 Ma

15. *ARAGON-1* K-Ar
Trachyandesite (40.738°N, 113.149°W, Aragonite NW, UT, 7.5′ quad.). *Analytical data:* K_2O = 3.97 wt. %, ^{40}Ar rad % = 72.0, ^{40}Ar rad (10^{-11} mol/g) = 18.253. *Comments:* Lava flow contains phenocrysts of two pyroxenes, plagioclase, amphibole, and olivine.

(whole rock) 31.7 ± 0.9 Ma

16. *MIL-2* K-Ar
Andesitic rock (38.421°N, 113.109°W, Milford, UT, 7.5′ quad.). *Analytical data:* K_2O = 2.33 wt. %, ^{40}Ar rad % = 55.5, ^{40}Ar rad (10^{-11} mol/g) = 6.7916. *Comments:* Not chemically analyzed. Dike containing plagioclase phenocrysts in aphanitic matrix intruded into granite (Best and others, 1989b).

(whole rock) 20.1 ± 0.6 Ma

17. *COVE-1* K-Ar
Andesite (38.653°N, 112.594°W, Dog Valley Peak, UT, 7.5′ quad.). *Comments:* Lava flow in volcanic rocks of Dog Valley (Cunningham and others, 1983) containing abundant phenocrysts of plagioclase, two pyroxenes, and amphibole.

Analytical data:

K_2O = 1.87 wt. %, ^{40}Ar rad % = 34.1, ^{40}Ar rad (10^{-11} mol/g) = 3.2951.

(whole rock) 12.2 ± 0.4 Ma

K_2O = 1.70 wt. %, ^{40}Ar rad % = 45.9, ^{40}Ar rad (10^{-11} mol/g) = 3.0811.

(whole rock) 12.5 ± 0.4 Ma

K_2O = 1.72 wt. %, ^{40}Ar rad % = 34.5, ^{40}Ar rad (10^{-11} mol/g) = 3.1528.

(whole rock) 12.8 ± 0.4 Ma

18. *TICK-2* K-Ar
Basanite (40.432°N, 112.099°W, Tickville Spring, UT, 7.5′ quad.). *Analytical data:* K_2O = 1.17 wt. %, ^{40}Ar rad % = 66.1, ^{40}Ar rad (10^{-11} mol/g) = 6.4154. *Comments:* Lava flow containing abundant phenocrysts of olivine in a matrix of phlogopite, clinopyroxene, and Fe-Ti oxides. Probably same flow as dated by Moore and McKee (1983; sample 35) at 38.5 ± 0.3 Ma.

(whole rock) 37.7 ± 1.2 Ma

19. *SOLDPASS-2* K-Ar
Trachybasalt (40.167°N, 111.983°W, Soldier Pass, UT, 7.5′ quad.). *Analytical data:* K_2O = 2.293 wt. %, ^{40}Ar rad % = 70, ^{40}Ar rad (10^{-11} mol/g) = 5.62677. *Comments:* Lava flow containing sparse plagioclase and olivine phenocrysts in a matrix of the same plus clinopyroxene, Fe-Ti oxides, and phlogopite.

(whole rock) 17.0 ± 0.5 Ma

20. *SOLDPASS-1B* K-Ar
Basaltic trachyandesite (40.158°N, 111.971°W, Soldier Pass, UT, 7.5′ quad.). *Analytical data:* K_2O = 2.479 wt. %, ^{40}Ar rad % = 70.8, ^{40}Ar rad (10^{-11}

mol/g) = 11.735. *Comments:* Aphyric lava flow containing abundant olivine.

(whole rock) 32.6 ± 1.0 Ma

21. *LEVAN-4* K-Ar
Hornblende porphyry (39.542°N, 111.783°W, Levan, UT, 7.5′ quad.). *Analytical data:* K_2O = 3.43 wt. %, ^{40}Ar rad % = 69.1, ^{40}Ar rad (10^{-11} mol/g) = 1.12253. *Comments:* Shallow intrusion containing abundant large hornblende phenocrysts and smaller phenocrysts of clinopyroxene in a groundmass of altered plagioclase and lesser biotite, Fe-Ti oxides, and sparse apatite.

(whole rock) 22.6 ± 0.7 Ma

22. *WC-2* K-Ar
Minette (40.772°N, 111.261°W, Crandall Canyon, UT, 7.5′ quad.). *Analytical data:* K_2O = 10.31 wt. %, ^{40}Ar rad % = 41.6, ^{40}Ar rad (10^{-11} mol/g) = 17.475. *Comments:* Shallow intrusion containing abundant phenocrysts of phlogopite in a matrix of phlogopite, diopside, and sanidine. Ages published by Best and others (1968) are 12.8 and 13.7 Ma.

(whole rock) 11.7 ± 0.4 Ma

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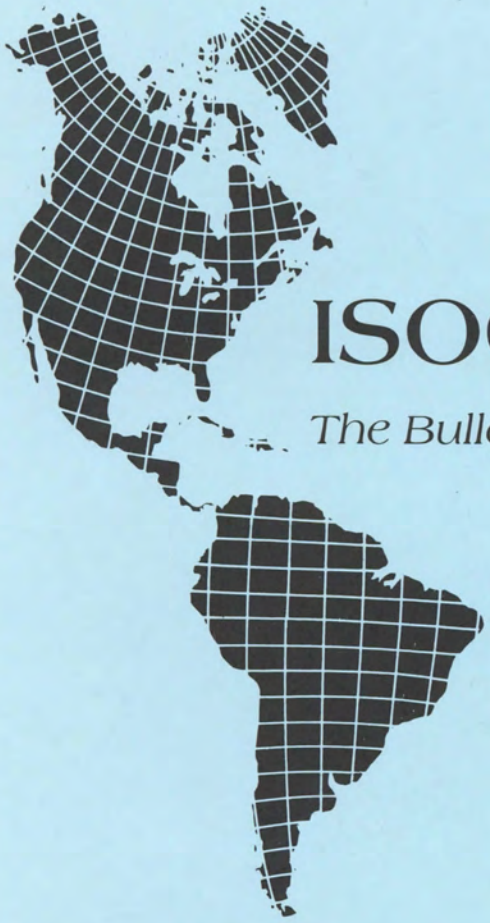

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