

GEOCHRON/NEVADA BUREAU OF MINES K/Ar AGE DETERMINATIONS -  
LIST 1\*

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This list covers potassium-argon isotopic age determinations run by Geochron Laboratories, Inc. (24 Blackstone St., Cambridge, Mass. 02139) from December 1965 to July 1970 on mineral concentrates prepared by the Mineral Preparation Laboratory of the Nevada Bureau of Mines (University of Nevada, Reno, Nev. 89507) under the direction of J. B. Murphy. Determinations run earlier by Geochron for the Bureau are listed in Schilling (1965).

The argon analyses were made by standard isotope dilution techniques; the samples were fused by RF induction heating and the extracted argon was analyzed with a MS-10 mass spectrometer in the static mode. Potassium analyses were performed by differential flame photometry using a Beckman DU spectrophotometer.

All analyses are in duplicate on separate aliquots of the samples and averages are reported. Analytical errors are reported at the 68-percent confidence level. The errors are based upon a statistical analysis of more than 500 pairs of duplicate argon and potassium analyses and include all analytical uncertainties. The constants used in the age calculations are:  $\lambda_{\epsilon} = 0.585 \times 10^{-10}/\text{yr}$ ;  $\lambda_{\beta} = 4.72 \times 10^{-10}/\text{yr}$ ;  $K^{40}/K_{\text{total}} = 1.22 \times 10^{-4} \text{ gm/gm}$ .

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## SAMPLE DESCRIPTIONS

## A. Intrusive Rocks - Nevada

G-B0547/NBM-AD9*N of Sun* *Emidio*  
K/Ar(biotite)  $88.8 \pm 2.6$  m. y.

Granite Range pluton. Medium-grained biotite-hornblende granodiorite (NE/4 Sec. 16, T. 32 N., R. 23 E.;  $40^{\circ}39'39''$ N.,  $119^{\circ}23'03''$ W.; 1 1/4 mi NW of Gerlach; Washoe Co., NV). Analytical data: K = 7.43%;  $\dot{A}r^{40} = 0.0473$  ppm;  $\dot{A}r^{40}/\Sigma Ar^{40} = 55, 75, 84\%$ . Collected by: H. F. Bonham, Nev. Bur. Mines. Cited: Bonham, 1969, p. 131.

G-B0548/NBM-AD10

K/Ar

(biotite)  $31.3 \pm 1.2$  m. y.

South Willow Formation dike. Dacite porphyry from a 25-foot-wide dike (N central Sec. 35, T. 37 N., R. 23 E.;  $41^{\circ}03'05''$ N.,  $119^{\circ}21'54''$ W.; E side of State Hwy. 34, 6 mi by road N of mouth of Cottonwood Canyon; Washoe Co., NV); one of a swarm of dikes that intrudes "Leadville" andesite flows. Analytical data: K = 7.03%;  $\dot{A}r^{40} = 0.0159$  ppm;  $\dot{A}r^{40}/\Sigma Ar^{40} = 61, 56\%$ . Collected by: H. F. Bonham, Nev. Bur. Mines. Cited: Bonham, 1969, p. 131.

G-B0553/NBM-AD11*SE of Parrish*  
K/Ar(biotite)  $79.6 \pm 2.0$  m. y.

Belmont pluton. Porphyritic quartz monzonite from within a few tens of feet of the contact of the large pluton (near NW corner T. 9 N., R. 45 E.;  $38^{\circ}39'05''$ N.,  $116^{\circ}57'49''$ W.; 6 mi NW of Belmont, Nye Co., NV). Analytical data: K = 7.6%;  $\dot{A}r^{40} = 0.0438$  ppm;  $\dot{A}r^{40}/\Sigma Ar^{40} = 69, 73\%$ . Collected by: W. Ervine, Stanford Univ. Comment: Compare with B-B0836/NBM-AD19 below.

G-B0642/NBM-AD13

K/Ar

(biotite)  $11.3 \pm 1.2$  m. y.

Gabbs pluton. Medium-grained biotite-hornblende granodiorite (NW/4 Sec. 2, T. 11 N., R. 36 E.;  $38^{\circ}51'48''$ N.,  $117^{\circ}54'18''$ W.; 1 1/2 mi SE of Gabbs; Nye Co., NV). Analytical data: K = 6.94%;  $\dot{A}r^{40} = 0.00533$  ppm;  $\dot{A}r^{40}/\Sigma Ar^{40} = 30, 40\%$ . Collected by: J. H. Schilling, Nev. Bur. Mines. Comment: A dike swarm cuts this pluton; age may reflect reheating.

G-B0805/NBM-AD17

K/Ar

(biotite)  $46.9 \pm 2.0$  m. y.

Lodi Hills pluton. Granite (NW/4 Sec. 13, T. 13 N., R. 37 E.;  $38^{\circ}59'30''$ N.,  $117^{\circ}53'12''$ W.; Nye Co., NV). Analytical data: K = 3.21%;  $\dot{A}r^{40} = 0.0109$  ppm;  $\dot{A}r^{40}/\Sigma Ar^{40} = 56, 58\%$ . Collected by: J. H. Schilling, Nev. Bur. Mines.

G-B0835/NBM-AD18 K/Ar (biotite)  $88.1 \pm 2.7$  m. y.

Lincoln stock. Porphyritic quartz monzonite (E line Sec. 36, T. 3 S., R. 56 E.;  $37^{\circ}38'10''\text{N.}$ ,  $115^{\circ}38'03''\text{W.}$ ; on ridge just S of Lincoln mine open pit; Lincoln Co., NV) approx. 20 ft from contact. Analytical data: K = 7.66%;  $\dot{\text{A}}\text{r}^{40} = 0.0494$  ppm;  $\dot{\text{A}}\text{r}^{40}/\Sigma\text{Ar}^{40} = 91$ , 95%. Collected by: J. H. Schilling, Nev. Bur. Mines. Comment: Compare with G-B1291/NBM-AD33 below.

G-B0836/NBM-AD19 *52 of* K/Ar *Enough* (biotite)  $76.4 \pm 2.8$  m. y.

Toquima pluton. Quartz monzonite porphyry (near NW corner T. 9 N., R. 45 E.;  $38^{\circ}39'06''\text{N.}$ ,  $116^{\circ}57'50''\text{W.}$ ; 6 miles NW of Belmont; Ney Co., NV) intrudes the Belmont pluton (see G-B0553/NBM-AD11 above). Analytical data: K = 7.38%;  $\dot{\text{A}}\text{r}^{40} = 0.0410$  ppm;  $\dot{\text{A}}\text{r}^{40}/\Sigma\text{Ar}^{40} = 86$ , 93%. Collected by: W. Ervine, Stanford Univ.

G-B0837/NBM-AD20 K/Ar (biotite)  $157 \pm 6$  m. y.

Austin pluton. Quartz monzonite (center Sec. 20, T. 19 N., R. 44 E.;  $39^{\circ}29'23''\text{N.}$ ,  $117^{\circ}03'14''\text{W.}$ ; U. S. Hwy. 40 roadcut 1 mi E of Austin; Lander Co., NV) previously dated as 140 m. y. (Armstrong, 1963, p. 173). Analytical data: K = 5.81%;  $\dot{\text{A}}\text{r}^{40} = 0.0678$  ppm;  $\dot{\text{A}}\text{r}^{40}/\Sigma\text{Ar}^{40} = 88$ , 95%. Collected by: J. B. Murphy and J. H. Schilling, Nev. Bur. Mines.

G-B0920/NBM-AD23 K/Ar (biotite)  $14.0 \pm 0.6$  m. y.

Searchlight pluton. Quartz monzonite (SW/4 Sec. 35, T. 28 S., R. 63 E.;  $35^{\circ}27'49''\text{N.}$ ,  $114^{\circ}54'48''\text{W.}$ ; SE edge of Searchlight; Clark Co., NV). Analytical data: K = 6.20%;  $\dot{\text{A}}\text{r}^{40} = 0.00618$  ppm;  $\dot{\text{A}}\text{r}^{40}/\Sigma\text{Ar}^{40} = 60$ , 61%. Collected by: J. H. Schilling, Nev. Bur. Mines.

G-B0921/NBM-AD24 K/Ar (biotite)  $87.0 \pm 2.7$  m. y.

Pine Grove Hills pluton. Porphyritic quartz monzonite (center SE/4 Sec. 4, T. 8 N., R. 25 E.;  $38^{\circ}34'47''\text{N.}$ ,  $119^{\circ}11'12''\text{W.}$ ; Pine Grove Hills; Lyon Co., NV), one phase of the composite pluton, intruded by a second phase of quartz monzonite porphyry (G-B0922/NBM-AD25 below). Analytical data: K = 7.34%;  $\dot{\text{A}}\text{r}^{40} = 0.0466$  ppm;  $\dot{\text{A}}\text{r}^{40}/\Sigma\text{Ar}^{40} = 89$ , 90%. Collected by: M. J. Hibbard, Univ. Nev., Reno.

G-B0922/NBM-AD25 K/Ar (biotite)  $90.0 \pm 2.7$  m. y.

Pine Grove Hills pluton. Quartz monzonite porphyry (SE/4 Sec. 4, T. 8 N., R. 25 E.;  $38^{\circ}34'47''\text{N.}$ ,  $119^{\circ}11'12''\text{W.}$ ; 200 ft NNE of G-B0921/NBM-AD24 above; Lyon Co., NV), another phase of the composite pluton (see

G-B0921/NBM-AD24 above). Analytical data: K = 6.97%; Ar<sup>40</sup> = 0.0459 ppm; Ar<sup>40</sup>/ΣAr<sup>40</sup> = 90, 93%. Collected by: M. J. Hibbard, Univ. Nev., Reno.

G-B0997/NBM-AD28 *NE of Humboldt* K/Ar (biotite) 90.0 ± 2.7 m. y.

Springer stock. Quartz monzonite (SE/4 SE/4 Sec. 27, T. 34 N., R. 34 E.; 40°47'15"N., 118°08'29"W.; Springer mine dump; Pershing Co., NV). Analytical data: K = 7.16%;  $\bar{A}r^{40}$  = 0.0472 ppm;  $\bar{A}r^{40}/\Sigma Ar^{40}$  = 81, 82%. Collected by: J. H. Schilling, Nev. Bur. Mines.

G-B1291/NBM-AD33 K/Ar (biotite) 92.7 ± 2.9 m. y.

Lincoln stock. Quartz monzonite from depth of 600 feet in core hole at Lincoln mine (Sec. 31, T. 3 S., R. 57 E.; 37°38'10"N., 115°38'03"W.; Lincoln Co., NV). Analytical data: K = 7.08%;  $\bar{A}r^{40}$  = 0.4803 ppm;  $\bar{A}r^{40}/\Sigma Ar^{40}$  = 92, 93%. Collected by: P. Galli, Union Carbide Corp. Comment: Same intrusive body as G-B0835/NBM-AD18 above.

G-A1328/NBM-AD36 *W of Bolinas* K/Ar (hornblende) 102 ± 6 m. y.

Ashdown pluton. Gneissic granodiorite at the Ashdown mine (T. 45 N., R. 29 E.; 41°50'01"N., 118°42'00"W.; Humboldt Co., NV) 12 mi SSW of Denio. Analytical data: K = 0.88%;  $\bar{A}r^{40}$  = 0.00662 ppm;  $\bar{A}r^{40}/\Sigma Ar^{40}$  = 74, 79%. Collected by: D. L. Evans, geol. consultant, Reno.

G-B1329/NBM-AD38 K/Ar (biotite) 95.5 ± 3.0 m. y.

North Tempiute stock. Quartz monzonite (Sec. 30?, T. 3 S., R. 57 E.; 37°38'15"N., 115°38'03"W.; Lincoln Co., NV). Analytical data: K = 6.512%;  $\bar{A}r^{40}$  = 0.0455 ppm;  $\bar{A}r^{40}/\Sigma Ar^{40}$  = 81, 84%. Collected by: P. Galli, Union Carbide Corp. Comment: This intrusive is just north of the intrusive dated by G-B0835/NBM-AD18 and G-B1291/NBM-AD33 above.

G-A1525/NBM-SCP28 K/Ar (hornblende) 124 ± 9 m. y.

Quartz monzonite porphyry dike (center SE/4 Sec. 14, T. 14 N., R. 22 E.; 39°04'31"N., 119°28'47"W.; Douglas Co., NV). Analytical data: K = 0.355%;  $\bar{A}r^{40}$  = 0.00324 ppm;  $\bar{A}r^{40}/\Sigma Ar^{40}$  = 33, 36%. Collected by: S. Castor, Univ. Nev., Reno. Comment: Intrudes G-A1526/NBM-SCP120 below.

G-A1526/NBM-SCP120 K/Ar (hornblende) 146 ± 8 m. y.

Mt. Como pluton. Porphyritic quartz monzonite (SE/4 NE/4 Sec. 15, T. 14 N., R. 22 E.; 39°04'43"N., 119°29'45"W.; Douglas Co., NV). Analytical data: K = 0.346%;  $\bar{A}r^{40}$  = 0.00376 ppm;  $\bar{A}r^{40}/\Sigma Ar^{40}$  = 49, 55%. Col-

lected by: S. Castor, Univ. Nev., Reno. Comment: Intruded by G-A1525/NBM SCP28 above.

### B. Extrusive Rocks - Nevada

G-F0673/NBM-AD12                      K/Ar                      (plagioclase) 12.8 $\pm$ 0.8 m. y.

Kate Peak Formation. Dacite flow approximately 200 ft stratigraphically above the base of the formation (NE/4 Sec. 9, T. 16 N., R. 21 E.; 39°16'29"N., 119°38'21"W.; W slope of Kate Peak; Storey Co., NV). Analytical data: K = 0.62%;  $\checkmark\text{Ar}^{40}$  = 0.00057 ppm;  $\checkmark\text{Ar}^{40}/\Sigma\text{Ar}^{40}$  = 45, 55%. Collected by: H. F. Bonham, Nev. Bur. Mines. Cited: Bonham, 1969, p. 131.

✓ G-R0674/NBM-AD15                      K/Ar                      (whole rock) 14.5 $\pm$ 1.5 m. y.

Chloropagus Formation. Olivine basalt flow (SE/4 Sec. 4, T. 21 N., R. 23 E.; 39°42'49"N., 119°24'03"W.; Washoe Co., NV), at base of formation. Analytical data: K = 1.06%;  $\text{Ar}^{40}$  = 0.00109 ppm;  $\text{Ar}^{40}/\Sigma\text{Ar}^{40}$  = 46, 49%. Collected by: H. F. Bonham, Nev. Bur. Mines. Cited: Bonham, 1969, p. 131.

G-F0677/NBM-AD16                      K/Ar                      (plagioclase) 15.2 $\pm$ 2.4 m. y.

Pyramid Formation. Basalt flow (NE/4 NW/4 Sec. 3, T. 23 N., R. 21 E.; 39°53'30"N., 119°36'30"W.; Washoe Co., NV) directly overlying the diatomite unit containing the Pyramid Flora and is unconformably overlain by the ash-flow unit dated as 12.4 m. y. (Evernden and James, 1964, p. 969). Analytical data: K = 0.29%;  $\checkmark\text{Ar}^{40}$  = 0.00031 ppm;  $\checkmark\text{Ar}^{40}/\Sigma\text{Ar}^{40}$  = 55%. Collected by: H. F. Bonham, Nev. Bur. Mines. Cited: Bonham, 1969, p. 131.

### C. Alteration and Mineralization - Nevada

G-F0689/NBM-AD14                      K/Ar                      (adularia) 12.6 $\pm$ 0.6 m. y.

Occidental vein. From outcrop of the Occidental lode (Sec. 33, T. 17 N., R. 21 E., 39°18'59"N., 119°37'51"W.; near a Suro tunnel air shaft; Storey Co., NV), which consists mainly of quartz and some calcite and adularia. Analytical data: K = 1.82%;  $\checkmark\text{Ar}^{40}$  = 0.00164 ppm;  $\checkmark\text{Ar}^{40}/\Sigma\text{Ar}^{40}$  = 28, 39%. Collected by: H. F. Bonham and L. Garside, Nev. Bur. Mines. Cited: Bonham, 1969, p. 131.

G-B0919/NBM-AD22

K/Ar

(biotite) 98.9 ± 3.0 m. y.

Crescent Peak Stockwork veins. Hydrobiotite from quartz-pyrite-molybdenite stockwork veinlets and wallrock adjacent to veinlets (405-460 ft depth, diamond-drill core hole no. 1, Homestake Mining Co., SW/4 NE/4 Sec. 35, T. 28 S., R. 61 E.; 35°28'24"N., 115°07'36"W.; on the south slope of Crescent Peak; Clark Co., NV), in a stock of highly-altered quartz monzonite. Analytical data: K = 7.11%;  $\bar{A}r^{40} = 0.0519$  ppm;  $\bar{A}r^{40}/\Sigma Ar^{40} = 92\%$ . Comment: The alteration and mineralization probably occurred as an end stage of the emplacement of the intrusive; thus this date probably also is the age of the quartz monzonite. Collected by: J. H. Schilling, Nev. Bur. Mines.

## REFERENCES

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