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SUMMARY OF RADIOMETRIC AGES OF TERTIARY VOLCANIC ROCKS
IN NEVADA. PART IV: NORTHWESTERN NEVADA ¹

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A total of 36 ages for 32 samples are summarized; sample localities are shown on map (fig. 1). All ages are K-Ar ages except for one fission-track age. Sixteen ages are published ages; 20 are unpublished. Analytical data is included in the sample-description section for each of the unpublished ages and, if possible, a comment of the significance of the age is added. Analytical techniques used for K-Ar age determinations are essentially those described by Dalrymple and Lanphere (1969) and are used in the following laboratories: The U. S. Geological Survey in Menlo Park, California, and Denver, Colorado; the University of California at Berkeley; and Geochron Laboratories, Inc., Cambridge, Massachusetts.

The region covered by this report in the northwestern part of Nevada (fig. 1), lies between longitudes 120° and 117°W and latitudes 42° and 40°N; it encompasses an area of about 17,000 square miles that includes parts of Washoe, Humboldt, and Pershing Counties. One sample, no. 8, near longitude 118°00', was collected ¼ mile north of the state line in Oregon.

Most of the rocks dated are volcanic; a few vein or intrusive rocks closely related to the volcanic rocks are included. The rocks range in composition from basalt to rhyolite, but most are rhyolite flows or welded tuffs. This reflects, in a general way, the greater abundance of silicic to mafic volcanic rocks in the region.

Most of the ages were determined on mineral separates that include sanidine, adularia, anorthoclase, biotite, plagioclase, and hornblende; seven samples of nonhydrated glass (one for fission track) two on whole-rock basalt. Mineral ages are considered more reliable than glass or whole rock ages although anomalous ages from mineral separates are possible due to contamination, alteration, or other phenomena difficult to evaluate. An explanatory comment is made, if possible, for those samples that have an age that appears anomalous on the basis of the known geologic setting or have ages for coexisting minerals that do not agree within the limits of the analytical uncertainty.

SAMPLE DESCRIPTIONS

Number shown on Figure 1.

1. Evernden and James (1964) K-Ar (plagioclase) 19.8 m.y.
p. 955, 957, 959, 971
Schilling (1965) p. 70
Rhyolite welded ash-flow tuff (NE¼ sec. 35, T43N, R18E; 41°36'56"N; 119°56'24"W; Fortynine Camp; Washoe Co., NV). Collected by: J. F. Evernden and G. T. James, Univ. Calif., Berkeley; dated by: Univ. Calif., Berkeley. Comment: Maximum age of overlying flora; true age may be younger. From upper 200 feet of diatomite and tuffaceous shale containing Cedarville flora. See Bonham, 1969, p. 19.
2. Evernden and others (1964) K-Ar (sanidine) 15.6 m.y.
p. 189
Summit Lake Tuff, rhyolite welded ash-flow tuff (Big Basin, E side of Long Valley; 119°44'48"W; 41°39'30"N; Washoe Co., NV). Collected by: G. T. James, Univ. Calif., Berkeley; dated by: Univ. Calif., Berkeley. Comment: See Bonham, 1969, p. 18.

¹ Part I, Central Nevada, published in Isochron/West, no. 2, pages 21-42, 1971
Part II, Western Nevada, published in Isochron/West, no. 4, pages 7-28, 1972
Part III, Eastern Nevada, published in Isochron/West, no. 6, pages 1-30, 1973

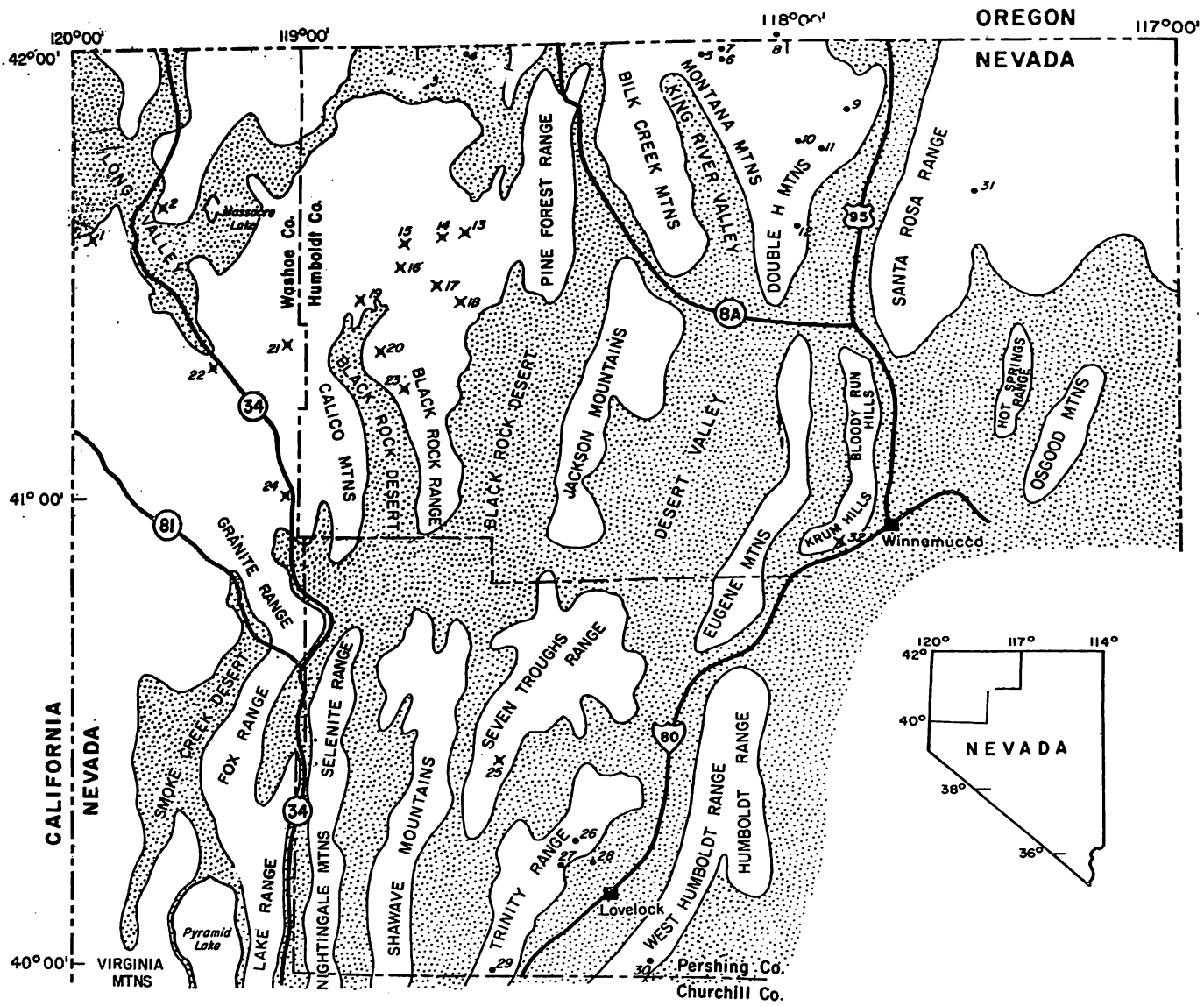


Figure 1. Localities of radiometrically dated Tertiary rocks in northwestern Nevada. Published dates are indicated by x's, unpublished dates by dots. Numbers are keyed to the sample descriptions.

3. (unpublished data) K-Ar (glass) 13.7±1.4 m.y.
(sanidine) 16.3±1.3 m.y.
(alkali feldspar) 22.3±1.8 m.y.
Canyon Rhyolite of Merriam (1910), rhyolite flow (118°57'W, 41°54'N; Thousand Creek Gorge, Humboldt Co., NV). Analytical data: (glass) K₂O = 6.06%, *Ar⁴⁰ = 1.27 x 10⁻¹⁰ mole/gm, *Ar⁴⁰/ΣAr⁴⁰ = 24%; (sanidine) K₂O = 7.31%, *Ar⁴⁰ = 1.76 x 10⁻¹⁰ mole/gm, *Ar⁴⁰/ΣAr⁴⁰ = 31%; (alkali feldspar) K₂O = 5.35%, *Ar⁴⁰ = 1.77 x 10⁻¹⁰ mole/gm, *Ar⁴⁰/ΣAr⁴⁰ = 31%. Collected by: H. F. Bonham, Nevada Bureau Mines & Geology; dated by: J. D. Obradovich, U. S. Geological Survey. Comment: In the light of stratigraphic and structural relations and dates of other units the 22.3 m.y. age is unreasonable. The unit overlies the Idaho Canyon Tuff, which is considered by Noble and others (1970) to be about 15 m.y. old. Also see Bonham, 1969, p. 15.
4. (unpublished data) K-Ar (whole rock) 1.2±.05 m.y.
Basalt flow (118°52'30"W, 41°59'00"N; Humboldt Co., NV). Analytical data: K₂O = 0.905%, *Ar⁴⁰ = 2.114 x 10⁻¹⁰ mole/gm, *Ar⁴⁰/ΣAr⁴⁰ = 23.4%. Collected by: G. W. Walker, U. S. Geological Survey; dated by: G. H. Curtis, Univ. Calif., Berkeley. Comment: Noted in Walker and Swanson (1969).
5. (unpublished data) K-Ar (plagioclase) 16.5±1.5 m.y.
Basaltic-andesite flow (118°13'06"W, 41°58'50"N; Humboldt Co., NV). Analytical data: K₂O = 0.54%, *Ar⁴⁰ = 1.334 x 10⁻¹⁰ mole/gm; *Ar⁴⁰/ΣAr⁴⁰ = 14.3%. Collected by: R. C. Greene, U. S. Geological Survey; dated by: E. H. McKee, U. S. Geological Survey. Comment: R. C. Greene, U. S. Geological Survey unpublished map of Disaster Peak quadrangle, Nevada-Oregon. This age has a large analytical uncertainty (±) but seems reasonable on the basis of stratigraphic position and other radiometric ages.
6. (unpublished data) K-Ar (plagioclase) 24.6±2.0 m.y.
Basaltic-andesite flow (118°09'48"W, 41°58'40"N; Humboldt Co., NV). Analytical data: K₂O = 0.52%; *Ar⁴⁰ = 1.907 x 10⁻¹⁰ mole/gm; *Ar⁴⁰/ΣAr⁴⁰ = 6.6%. Collected by: R. C. Greene, U. S. Geological Survey; dated by: E. H. McKee, U. S. Geological Survey. Comment: R. C. Greene, U. S. Geological Survey unpublished map of Disaster Peak quadrangle, Nevada-Oregon. This age has a large analytical uncertainty (±) and may be considerably too old.
7. (unpublished data) K-Ar (alkali feldspar) 16.1±0.5 m.y.
Rhyolite welded tuff (?) (NE/4 sec. 4, T47N, R34E; 118°09'48"W; 41°59'13"N; Humboldt Co., NV). Analytical data: K₂O = 6.13%; *Ar⁴⁰ = 1.46 x 10⁻¹⁰ mole/gm; *Ar⁴⁰/ΣAr⁴⁰ = 69.6%. Collected by: R. C. Greene, U. S. Geological Survey; dated by: E. H. McKee, U. S. Geological Survey. Comment: R. C. Greene, U. S. Geological Survey unpublished map of Disaster Peak quadrangle, Nevada-Oregon.
8. (unpublished data) K-Ar (alkali feldspar) 17.9±0.5 m.y.
Rhyolite welded tuff (118°01'00"W, 42°00'10"N; Harney Co., OR). Analytical data: K₂O = 5.43%; *Ar⁴⁰ = 1.44 x 10⁻¹⁰ mole/gm; *Ar⁴⁰/ΣAr⁴⁰ = 69.6%. Collected by: R. C. Greene, U. S. Geological Survey; dated by: E. H. McKee, U. S. Geological Survey. Comment: alkali rhyolite of Reiser Creek of Greene (1972).
9. (unpublished data) K-Ar (sanidine) 17.8±0.5 m.y.
Rhyolite vitrophyre (flow) (T46N, R37E; 41°52'18"W, 117°50'N; 3 mi SW of Cordero Mine; Humboldt Co., NV). Analytical data: K₂O = 8.22%; *Ar⁴⁰ = 2.18 x 10⁻¹⁰ mole/gm; *Ar⁴⁰/ΣAr⁴⁰ = 71%. Collected by: R. C. Greene, U. S. Geological Survey; dated by: E. H. McKee, U. S. Geological Survey. Comment: rhyolite vitrophyre of Greene (1972).
10. (unpublished data) K-Ar (alkali feldspar) 17.6±0.5 m.y.
Quartz latite flow (SE¼ sec. 6, T45N, R36E; 117°58'00"W, 41°48'18"N; Humboldt Co., NV). Analytical data: K₂O = 2.37%; *Ar⁴⁰ = 0.62 x 10⁻¹⁰ mole/gm; *Ar⁴⁰/ΣAr⁴⁰ = 55.7%. Collected by: R. C. Greene, U. S. Geological Survey; dated by: E. H. McKee, U. S. Geological Survey. Comment: quartz latite of McDermitt Creek (Green, 1972).

11. (unpublished data) K-Ar (alkali feldspar) 17.5±0.5 m.y.
Rhyolite welded tuff (SW¼ sec. 11, T45N, R36E; 117°54'15"W, 41°47'20"N, Humboldt Co., NV). Analytical data: K₂O = 5.45%; *Ar⁴⁰ = 1.42 x 10⁻¹⁰ mole/gm; *Ar⁴⁰ = 66.9%. Collected by: R. C. Greene, U. S. Geological Survey; dated by: E. H. McKee, U. S. Geological Survey. Comment: alkali rhyolite of Long Ridge of Greene (1972).
12. (unpublished data) K-Ar (nonhydrated glass) 13.5±0.6 m.y.
Rhyolite dike (NE cor. of NW¼ sec. 6, T43N, R36E; 117°58'50"W, 41°38'20"N; Humboldt Co., NV). Analytical data: K₂O = 4.5%; *Ar⁴⁰ = 9.09 x 10⁻¹⁰ mole/gm; *Ar⁴⁰/ΣAr⁴⁰ = 11.3%. Collected by: D. C. Noble, Univ. Nevada; dated by: E. H. McKee, U. S. Geological Survey. Comment: See Noble and others, 1969.
13. Noble and others (1970) K-Ar (sanidine) 23.7±.7 m.y.
(sanidine) 25.3±.9 m.y.
Ashdown Tuff; rhyolite ash-flow tuff (118°51'00"W, 41°35'40"N; Humboldt Co., NV). Collected by: D. C. Noble, Univ. Nevada; dated by: E. H. McKee, U. S. Geological Survey. Comment: Two argon analysis from same sanidine separate.
14. Noble and others (1970) K-Ar (sanidine) 15.7±.5 m.y.
Rhyolite ash-flow tuff, Crain Creek (118°55'00"W, 41°35'15"N; Humboldt Co., NV). Collected by: D. C. Noble, Univ. Nevada; dated by: E. H. McKee, U. S. Geological Survey.
15. Noble and others (1970) K-Ar (sanidine) 15.1±.5 m.y.
Summit Lake Tuff; rhyolite ash-flow tuff (119°01'15"W, 41°34'10"N; Humboldt Co., NV). Collected by: D. C. Noble, Univ. Nevada; dated by: E. H. McKee, U. S. Geological Survey.
16. Noble and others (1970) K-Ar (sanidine) 23.9±.7 m.y.
Ashdown Tuff; rhyolite ash-flow tuff (119°01'00", 41°30'00"N; Humboldt Co., NV). Collected by: D. C. Noble, Univ. Nevada; dated by: E. H. McKee, U. S. Geological Survey.
17. Noble and others (1973) K-Ar (sanidine) 25.0±0.9 m.y.
Rhyolite of Black Rock Range (118°55'W, 41°29'N; Humboldt Co., NV). Collected by: D. C. Noble, Univ. Nevada; dated by: E. H. McKee, U. S. Geological Survey.
18. Noble and others (1973) K-Ar (whole rock) 24.5±0.9 m.y.
Olivine basalt (118°53'W, 41°27'N; Humboldt Co., NV). Collected by: D. C. Noble, Univ. Nevada; dated by: E. H. McKee, U. S. Geological Survey.
19. Marvin and others (1970) K-Ar (nonhydrated glass) 15.6±1.7 m.y.
Noble and others (1970)
Soldier Meadow Tuff; rhyolite ash-flow (119°09'15"W, 41°27'00"N; Humboldt Co., NV). Collected by: D. C. Noble, Univ. Nevada; dated by: R. F. Marvin, U. S. Geological Survey.
20. Noble and others (1970) K-Ar (sanidine) 14.7±.5 m.y.
Soldier Meadow Tuff; rhyolite ash-flow (119°04'40"W, 41°11'25"N; Humboldt Co., NV). Collected by: D. C. Noble, Univ. Nevada; dated by: E. H. McKee, U. S. Geological Survey.
21. Noble and others (1970) K-Ar (nonhydrated glass) 15.3±.5 m.y.
Rhyolite (comendite) lava flow (119°21'55"W, 41°21'40"N; Washoe Co., NV). Collected by: D. C. Noble, Univ. Nevada; dated by: E. H. McKee, U. S. Geological Survey.
22. Noble and others (1970) K-Ar (nonhydrated glass) 15.1±0.5 m.y.
Rhyolite (comendite) lava flow (119°35'00"W, 41°18'20"N; Washoe Co., NV). Collected by: D. C. Noble, Univ. Nevada; dated by: E. H. McKee, U. S. Geological Survey.

23. Noble and others (1973) K-Ar (nonhydrated glass) 26.3±0.9 m.y.
Rhyolite of Black Rock Range (119°01'W, 41°15'N; Humboldt Co., NV). Collected by: D. C. Noble, Univ. Nevada; dated by: E. H. McKee, U. S. Geological Survey.
24. Bonham (1969) K-Ar (biotite) 31.3±1.2 m.y.
Krueger and Schilling (1971)
South Willow Formation of Bonham (1969), dacite porphyry dike (N central sec. 35, T37N, R23E; 119°21' 24"W, 41°03'00"N; along E side of State Highway 34, 6 mi. by road N of mouth of Cottonwood Canyon; Washoe Co., NV). Collected by: H. F. Bonham and L. H. Beal, Nevada Bureau of Mines; dated by: Geochron Labs. Inc., no. P-0548.
25. Silberman and others (1973) K-Ar (orthoclase structure adularia) 13.7±0.4 m.y.
Rhyolite breccia vein cemented by quartz, adularia, and sulphides (118°49'00"W, 40°26'00"N; Kindergarden shaft; Seven Troughs Range; Pershing Co., NV). Collected by: M. L. Silberman, U. S. Geological Survey; dated by: M. L. Silberman, U. S. Geological Survey. Comment: Age considered by Silberman and others (1973) to be the age of mineralization of the Seven Troughs mining district.
26. (unpublished data) Fission Track (glass) 23±2 m.y.
Obsidian nodule in perlite (118°33'49", 40°17'20"N; U. S. Gypsum pit, 8 mi. NW of Lovelock; Pershing Co., NV). Collected by: D. B. Tatlock, U. S. Geological Survey; dated by: C. W. Naeser, U. S. Geological Survey.
27. (unpublished data) K-Ar (biotite) 14.4±0.7 m.y.
Rhyolite flow (118°35'36"W, 40°14'12"N; Trinity Range; Pershing Co., NV). Analytical data: K₂O = 7.98%; *Ar⁴⁰ = 1.71 x 10⁻¹⁰ mole/gm; *Ar⁴⁰/ΣAr⁴⁰ = 84%. Collected by: D. B. Tatlock, U. S. Geological Survey; dated by: R. F. Marvin, U. S. Geological Survey.
28. (unpublished data) K-Ar (biotite) 14.8±0.7 m.y.
(hornblende) 13.7±1.7 m.y.
Quartz latite flow (118°30'54"W, 40°13'54"N; Pershing Co., NV). Analytical data: Biotite K₂O = 7.96%; *Ar⁴⁰ = 1.75 x 10⁻¹⁰ mole/gm; *Ar⁴⁰/ΣAr⁴⁰ = 77%; Hornblende K₂O = 0.88%; *Ar⁴⁰ = 0.179 x 10⁻¹⁰ mole/gm; *Ar⁴⁰/ΣAr⁴⁰ = 61%. Collected by: D. B. Tatlock, U. S. Geological Survey; dated by: R. F. Marvin, U. S. Geological Survey.
29. (unpublished data) K-Ar (biotite) 12.7 m.y.
Latite dike (NE¼ sec. 30, T25N, R29E; 118°45'40"W, 40°00'30"N; Trinity Range; Pershing Co., NV). Analytical data: K₂O = 8.28%; *Ar⁴⁰ = 1.55 x 10⁻¹⁰ mole/gm; *Ar⁴⁰/ΣAr⁴⁰ = 50%. Collected by: R. W. Willden; dated by: R. W. Kistler, U. S. Geological Survey. Comment: Willden and Speed (in press) sample 67W85.
30. (unpublished data) K-Ar (biotite) 28.0±0.8 m.y.
Rhyolite ash-flow tuff (118°22'06"W, 40°02'06"N; West Humboldt Range; Pershing Co., NV). Analytical data: K₂O = 7.03%; *Ar⁴⁰ = 2.92 x 10⁻¹⁰ mole/gm; *Ar⁴⁰/ΣAr⁴⁰ = 30.2%. Collected by: R. C. Speed, Northwestern Univ.; dated by: E. H. McKee, U. S. Geological Survey. Comment: Basal Tertiary unit in the West Humboldt Range.
31. (unpublished data) K-Ar (plagioclase) 14.7±0.5 m.y.
Rhyolite (NW¼ sec. 17, T44N, R40E; 117°30'00"W, 41°42'00"N; Santa Rosa Range; Humboldt Co., NV). Analytical data: K₂O = 1.32%; *Ar⁴⁰ = 2.89 x 10⁻¹¹ mole/gm; *Ar⁴⁰/ΣAr⁴⁰ = 76.2%. Collected by: F. J. Kleinhampl, U. S. Geological Survey; dated by: M. L. Silberman, U. S. Geological Survey.
32. Silberman and others (1973) K-Ar (sanidine structure adularia) 16.3±0.5 m.y.
Quartz-adularia vein (SW¼ sec. 22, T36N, R36E; 117°54'24"W, 40°58'42"N; Reo Mine shaft, southern Krumm Hills; Humboldt Co., NV). Collected by: R. J. Roberts, U. S. Geological Survey; dated by: M. L. Silberman, U. S. Geological Survey. Comment: Age considered by Silberman and others (1973) to be the age of mineralization of the Ten Mile mining district.

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