

MAP SHOWING COMPILATION OF ISOTOPIC AGES OF CENOZOIC ROCKS IN THE RENO 1° × 2° QUADRANGLE, NEVADA AND CALIFORNIA

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INTRODUCTION

This compilation includes all known potassium-argon (K-Ar), fission-track, and $^{40}\text{Ar}/^{39}\text{Ar}$ ages from the Reno 1° × 2° quadrangle. The compilation is part of a study of the geology and mineral resources of the Reno quadrangle, which has been done as part of the Conterminous United States Mineral Assessment Program (CUSMAP) of the U.S. Geological Survey. A review of the geology of the quadrangle is given by John, Stewart, and others (1993).

All ages are by the K-Ar methods unless otherwise indicated, and they have been calculated using the new decay constants and isotopic abundances given by the International Union of Geological Sciences Subcommittee on Geochronology (Steiger and Jager, 1977). Ages are grouped by 15' quadrangle (labeled A, B, C, and so forth, on the map). With one exception, ages of unaltered rocks are listed in chronological order (youngest to oldest) within each quadrangle; the exception is the Virginia City quadrangle, in which some ages are grouped chronologically by formation and so the age range of one formation may overlap that of another. Ages from alteration minerals, hydrothermal minerals, and vein material are grouped under a separate heading at the end of each quadrangle's listing.

For new and (or) previously unpublished ages, the following analytical data are given: the K₂O content (in weight percent), the amount of radiogenic argon ($^{40}\text{Ar}^*$), and the ratio of radiogenic argon to total argon ($^{40}\text{Ar}^*/\Sigma^{40}\text{Ar}$). Analyses by E.H. McKee were carried out in the U.S. Geological Survey laboratories, Menlo Park, Calif. Potassium analyses were performed by a lithium metaborate flux fusion-flame photometry technique, the lithium serving as an internal standard. Argon analyses were performed by standard isotope dilution procedures using a 60° sector, 15.2-cm radius Neir-type mass spectrometer operated in the static mode for mass analysis or using a five-collector system for simultaneous measurement of argon-isotope ratios also with a Neir-type mass spectrometer. The precision of the ages, shown as the plus or minus value in millions of years, is the estimated analytical uncertainty at one standard deviation. It represents uncertainty in the measurement of radiogenic argon and K₂O contents in the sample and is based on experience with replicate analyses in the Menlo Park laboratories.

For previously published ages, the first publication cited is the primary source of information; other references list the same data, although some of these additional references contain information not covered in the original reference. In addition, the plus or minus value and the mineral analyzed are not listed when they were not cited in the original publication. At some localities, multiple chemical or isotopic analyses were made of the same mineral or different fractions of the same mineral.

The geology shown on this map has been highly generalized; therefore the rock descriptions or units may not correspond exactly to what is shown on the map.

SAMPLE LOCALITIES AND AGES

DOGSKIN MOUNTAIN 15' QUADRANGLE (A)

- A1. **Rock description:** Tuff of Chimney Spring
Location: NW¼SW¼NW¼ sec. 34, T. 24 N., R. 18 E.
Age (mineral): 23.0±5 Ma (sanidine)
Reference: Deino (1985, p. 346)
- A2. **Rock description:** Nine Hill Tuff
Location: SE¼NE¼NW¼ sec. 32, T. 23 N., R. 18 E.
Age (mineral): 23.8±1.4 Ma (plagioclase), 25.6±1.2 Ma (sanidine), 27.0±0.7 Ma (sanidine)
Reference: Deino (1985, p. 346)
- A3. **Rock description:** Tuff of Porcupine Mountain
Location: NE¼SE¼NW¼ sec. 32, T. 23 N., R. 18 E.
Age (mineral): 27.9±2.6 Ma (biotite)
Reference: Deino (1985, p. 346)
- A4. **Rock description:** Tuff of Harrys Spring
Location: SW¼SW¼SE¼ sec. 29, T. 24 N., R. 18 E.
Age (mineral): 28.6±0.7 Ma (sanidine), 29.4±0.9 Ma (biotite)
Reference: Deino (1985, p. 346)
- A5. **Rock description:** Tuff of Long Valley
Location: NW¼SW¼SE¼ sec. 29, T. 24 N., R. 18 E.
Age (mineral): 29.8±5.8 Ma (sanidine)
Reference: Deino (1985, p. 346)
- A6. **Rock description:** Tuff of Costantia
Location: NW¼SW¼SE¼ sec. 29, T. 24 N., R. 18 E.
Age (mineral): 29.8±1.0 Ma (biotite), 30.2±0.6 Ma (sanidine)
Reference: Deino (1985, p. 346)

- A7. Rock description:** Tuff of Zamboni
Location: NE $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 29, T. 24 N., R. 18 E.
Age (mineral): 29.9 $\pm$ 0.7 Ma (sanidine), 31.3 $\pm$ 1.7 Ma (plagioclase)
Reference: Deino (1985, p. 346)

RENO 15' QUADRANGLE (B)

- B1. Rock description:** Andesite tuff in sandstone of Hunter Creek
Location: lat 39°31'30"N., long 119°57'48"; north-central part of sec. 16, T. 19 N., R. 18 E.
Age (mineral): 5.9 Ma (plagioclase)
Reference: Evernden and James (1964); Silberman and McKee (1972)
Comments: Andesitic tuff interbedded with leaf-bearing tuffaceous shale that contains Verdi flora (Axelrod, 1958)
- B2. Rock description:** Olivine basalt near base of sandstone of Hunter Creek
Location: lat 39°30'51.5"N., long 119°56'53.5"W.; SW $\frac{1}{4}$ NW $\frac{1}{4}$ SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 15, T. 19 N., R. 18 E.
Age (mineral): 8.6 $\pm$ 0.3 Ma (whole rock)
Reference: Garside and others (1993)
- B3. Rock description:** Olivine basalt
Location: lat 39°31'N., long 119°56'W.; sec. 14, T. 19 N., R. 18 E.
Age (mineral): 11.3 Ma (whole rock)
Reference: Evernden and James (1964); Silberman and McKee (1972)
Comments: Flow is 400 ft below fossil-mammal horizon of possible Clarendonian age
- B4. Rock description:** Kate Peak Formation; biotite-hornblende andesite flow
Location: lat 39°33'35"N., long 119°49'17"W.; NE $\frac{1}{4}$ NE $\frac{1}{4}$ SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 35, T. 20 N., R. 19 E.
Age (mineral): 14.3 $\pm$ 0.5 Ma (biotite)
Reference: Garside and others (1993)
Comments: Unaltered flow over rocks that have advanced argillic alteration in underlying Alta Formation
- B5. Rock description:** Hornblende andesite
Location: lat 39°35'29"N., long 119°59'51"W.; NW $\frac{1}{4}$ NW $\frac{1}{4}$ NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 19, T. 20 N., R. 18 E.
Age (mineral): 16.0 $\pm$ 0.5 Ma (biotite)
Reference: Garside and others (1993)
Comments: Andesite lithologically resembles Kate Peak Formation but was correlated with Alta Formation by Bell and Garside (1987)

Alteration ages

- B6. Rock description:** Alunite
Location: lat 39°34'36.5"N., long 119°53'50"W.; NW $\frac{1}{4}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 30, T. 20 N., R. 19 E.
Age (mineral): 11.8 $\pm$ 1.2 Ma (alunite)
Comments: Alunitic alteration of metavolcanic rocks of Jurassic(?) Peavine sequence
Collected by: D.M. Hudson

Isotopic data and age by: M.L. Silberman and C.L. Conner, U.S. Geological Survey
Analytical data: K₂O=1.37%, 1.39%; ⁴⁰Ar*=0.235 $\times$ 10⁻¹⁰ mole/g; ⁴⁰Ar*/ Σ ⁴⁰Ar=0.16

- B7. Rock description:** Sericite
Location: lat 39°33'48.5"N., long 119°53'03"W.; SW $\frac{1}{4}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 30, T. 20 N., R. 19 E.
Age (mineral): 14.6 $\pm$ 0.4 Ma (sericite)
Comments: Quartz-sericite alteration of intrusion of Miocene Kate Peak Formation
Collected by: D.M. Hudson
Isotopic data and age by: M.L. Silberman and C.L. Conner, U.S. Geological Survey
Analytical data: K₂O=6.39%, 6.48%; ⁴⁰Ar*=1.360 $\times$ 10⁻¹⁰ mole/g; ⁴⁰Ar*/ Σ ⁴⁰Ar=0.34

MOUNT ROSE 15' QUADRANGLE (C)

- C1. Rock description:** Rhyolite dome
Location: Steamboat Hills; SW $\frac{1}{4}$ sec. 1, T. 17 N., R. 19 E.
Age (mineral): 1.17 $\pm$ 0.05 Ma (sanidine)
Reference: Silberman and others (1979)
- C2. Rock description:** Hornblende-pyroxene andesite
Location: lat 39°28'23"N., long 119°52'48"W.; SW $\frac{1}{4}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 32, T. 19 N., R. 19 E.
Age (mineral): 18.9 $\pm$ 1.1 Ma (hornblende); 20.2 $\pm$ 1.1 Ma (augite)
Comments: From first flow rock overlying large hydrothermal system at north end of Carson Range (Hudson, 1983). Unit mapped as Kate Peak Formation by Thompson and White (1964), but according to D.M. Hudson (oral commun., 1993), unit is lithologically dissimilar to Kate Peak Formation or Alta Formation. Plagioclase also was analyzed but had very erratic argon-extraction values, possibly because plagioclase contained some glass inclusions; calculated ages from plagioclase range from 13 to 77 Ma
Collected by: D.M. Hudson
Isotopic data and age by: K.A. Foland, Ohio State University
Analytical data: Hornblende, K₂O=0.488%, 0.493%, 0.490%; ⁴⁰Ar*=0.1651 $\times$ 10⁻¹⁰ mole/g; ⁴⁰Ar*/ Σ ⁴⁰Ar=0.175. Augite, K₂O=0.076%, 0.077%; ⁴⁰Ar*=0.0270 $\times$ 10⁻¹⁰ mole/g; ⁴⁰Ar*/ Σ ⁴⁰Ar=0.172
- C3. Rock description:** Porphyritic basaltic andesite
Location: lat 39°22.6'N., long 119°46.0'W.; SW $\frac{1}{4}$ sec. 32, T. 18 N., R. 20 E.
Age (mineral): 29.6 $\pm$ 2.0 Ma (plagioclase), 0.21 $\pm$ 0.07 Ma (whole rock)
Reference: Bell and others (1984); Fultz and others (1984)
Comments: Highly discordant ages

Alteration ages

- C4. Rock description:** Basaltic andesite altered to

adularia

Location: SW¼ sec. 29, T. 18 N., R. 20 E.

Age (mineral): 1.13±0.11 Ma (whole rock)

Reference: Silberman and others (1979)

C5. Rock description: Alunite from altered andesite

Location: lat 39°26'58"N., long 119°53'43"W.; NE¼SW¼SW¼ sec. 6, T. 18 N., R. 19 E.

Age (mineral): 6.55±0.15 Ma (alunite)

Comments: Age appears to be much too young. Oxidized sample, but very coarse alunite; may be supergene

Collected by: D.M. Hudson

Isotopic data and age by: K.A. Foland, Ohio State University

Analytical data: K₂O=0.892%; ⁴⁰Ar* = 0.1009×10⁻¹⁰ mole/g; ⁴⁰Ar*/Σ⁴⁰Ar=0.242. K₂O=0.883%; ⁴⁰Ar* = 0.1011×10⁻¹⁰ mole/g; ⁴⁰Ar*/Σ⁴⁰Ar=0.193

C6. Rock description: Alunite from altered Tertiary volcanic rocks

Location: Carson Range; lat 39°28'07"N., long 119°51'00"W.

Age (mineral): 11.2±0.1 Ma (alunite)

Reference: Russell and others (1989)

C7. Rock description: Alunite from altered Tertiary volcanic rocks

Location: Carson Range; lat 39°28'00"N., long 119°51'00"W.

Age (mineral): 11.4±0.4 Ma (alunite)

Reference: Russell and others (1989)

CARSON CITY 15' QUADRANGLE (D)

D1. Rock description: Andesite

Location: Near Glendale; lat 39°5.33'N., long 119°54.67'W.; SW¼ sec. 12, T. 14 N., R. 18 E.

Age (mineral): 8.7±0.3 Ma (biotite)

Reference: Morton and others (1977)

SUTCLIFFE 15' QUADRANGLE (E)

E1. Rock description: Dacite tuff

Location: lat 39°53'12"N., long 119°36'12"W.; south-central part of sec. 4, T. 23 N., R. 21 E.

Age (mineral): 12.7 Ma (plagioclase)

Reference: Evernden and James (1964); Silberman and McKee (1972)

Comments: Unconformably overlies olivine basalt listed below (see loc. E2)

E2. Rock description: Pyramid Formation; olivine basalt

Location: lat 39°53'30"N., long 119°36'30"W.; NE¼NW¼ sec. 3, T. 23 N., R. 21 E.

Comments: Overlies diatomite unit in which Pyramid flora is present (Axelrod, 1966, 1992) and is unconformably overlain by dacite tuff sample listed above (see loc. E1)

a. Method: K-Ar

Age (mineral): 15.6±2.4 Ma, (plagioclase)

Reference: Bonham (1969); Krueger and Schilling (1971); Silberman and McKee (1972)

b. Method: ⁴⁰Ar/³⁹Ar

Age (mineral): 13.836±0.148 Ma, (plagioclase)

Reference: Swisher (1992)

E3. Rock description: Dacite intrusion

Location: NE¼SW¼NE¼ sec. 23, T. 23 N., R. 21 E.

Age (mineral): 19.8±0.8 Ma (plagioclase)

Reference: Wallace (1975)

E4. Rock description: Dacite lava flow

Location: SE¼NE¼SW¼ sec. 15, T. 23 N., R. 21 E.

Age (mineral): 21.2±0.6 Ma (plagioclase)

Reference: Wallace (1975)

E5. Rock description: Nine Hill Tuff; rhyolite ash-flow tuff

Location: lat 39°45'50"W., long 119°45'50"W.; NE¼ sec. 24, T. 22 N., R. 21 E.

Age (mineral): 21.8±0.7 Ma (alkali feldspar), 22.3±0.7 Ma (alkali feldspar)

Reference: Garside and others (1981)

Comments: Age too young in comparison with other ages on Nine Hill Tuff (see locs. A2, E7, and H6)

E6. Rock description: Cooling unit 6 of Hartford Hill Rhyolite of Wallace (1975, 1976)

Location: SW¼NW¼NE¼ sec. 1, T. 23 N., R. 21 E.

Age (mineral): 22.2±0.6 Ma (plagioclase), 23.2±0.7 Ma (biotite)

Reference: Wallace (1975)

Comments: According to Deino (1985, p. 185), unit is above Nine Hill Tuff

E7. Rock description: Nine Hill Tuff

Location: NW¼SE¼SW¼ sec. 8, T. 22 N., R. 21 E.

Age (mineral): 24.71±0.82 Ma (sanidine)

Reference: Deino (1985, p. 182)

E8. Rock description: Cooling unit 1 of Hartford Hill Rhyolite of Wallace (1975, 1976)

Location: NW¼SE¼SW¼ sec. 36, T. 24 N., R. 20 E.

Age (mineral): 28.6±0.8 Ma (biotite)

Reference: Wallace (1975)

Comments: According to Deino (1985, p. 185), unit is tuff of Porcupine Mountain or tuff of Coyote Spring

E9. Rock description: Tuff of Whiskey Spring (from unit locally referred to as tuff of Rattlesnake Canyon); unit erroneously called tuff of Piute Canyon by Garside and others (1981) (L.J. Garside, written commun., 1993); rhyolite ash-flow tuff

Location: lat 39°45'52"N., long 119°33'30"W.; NW¼ sec. 19, T. 22 N., R. 22 E.

Age (mineral): 28.7±0.9 Ma (alkali feldspar), 29.3±0.9 Ma (alkali feldspar)

Reference: Garside and others (1981)

Comments: Age probably minimum; tuff of

Whiskey Spring unconformably overlies tuff of Coyote Spring

- E10. Rock description:** Tuff of Coyote Spring; rhyodacite ash-flow tuff

Location: lat 39°45'45"N., long 119°34'04"W.; SW¼NE¼ sec. 24, T. 22 N., R. 21 E.

Age (mineral): 27.8±0.8 Ma (biotite), 28.3±0.8 Ma (biotite), 29.2±0.9 Ma (plagioclase), 29.8±0.9 Ma (plagioclase)

Reference: Garside and others (1981)

- E11. Rock description:** Tuff of Axe Handle Canyon

Location: lat 39°45'31"N., long 119°38'25"W.; SE¼ sec. 20, T. 22 N., R. 21 E.

Age (mineral): 31.8±1.0 Ma (biotite), 30.5±0.8 Ma (sanidine)

Reference: Garside and others (1993)

Comments: Tuff is local erosional remnant below tuff of Whiskey Spring and rests on Mesozoic granodiorite

Alteration age

- E12. Rock description:** Sericite produced during hydrothermal alteration

Location: Nevada Dominion adit; NE¼NW¼SW¼ sec. 15, T. 23 N., R. 21 E.

Age (mineral): 21.8±0.7 Ma (sericite)

Reference: Wallace (1975)

SPANISH SPRINGS VALLEY 15' QUADRANGLE (F)

- F1. Rock description:** Rhyolite dome

Location: Near Mustang; NE¼ sec. 8, T. 19 N., R. 21 E.

Age (mineral): 8.4±0.3 Ma (plagioclase)

Reference: Silberman and others (1979)

- F2. Rock description:** Mustang Andesite; porphyritic hornblende andesite

Location: lat 39°31.0'N., long 119°32.9'W.; NE¼ sec. 18, T. 19 N., R. 22 E.

Age (mineral): 9.1±0.3 Ma (whole rock)

Reference: Morton and others (1977, 1980); Fultz and others (1984)

- F3. Rock description:** Mustang Andesite; porphyritic hornblende andesite

Location: lat 39°30.6'N., long 119°32.9'W.; SE¼ sec. 18, T. 19 N., R. 22 E.

Age (mineral): 9.2±0.3 Ma (whole rock)

Reference: Morton and others (1977, 1980); Fultz and others (1984)

Alteration age

- F4. Rock description:** Quartz-alunite alteration

Location: NW¼ sec. 21, T. 19 N., R. 21 E.

Age (mineral): 10.0±0.8 Ma (alunite-quartz)

Reference: Vikre and McKee (1987)

- F5. Rock description:** Alunite

Location: lat 39°33'52"N, long 119°44'21"W.; SE¼SE¼ sec. 28, T. 20 N., R. 20 E.

Age (mineral): 16.3±0.5 Ma (alunite)

Reference: Garside and others (1993)

Comments: Alunitic alteration of Alta Formation associated with mineralization in Wedekind mining district

VIRGINIA CITY 15' QUADRANGLE (G)

- G1. Rock description:** McClellan Peak basalt; olivine basalt

Location: lat 39°15'36"N., long 119°38'47"W.; SE¼ sec. 8, T. 16 N., R. 21 E.

Age (mineral): 1.17±0.04 Ma (whole rock)

Reference: Doell and others (1966); Silberman and McKee (1972)

- G2. Rock description:** McClellan Peak basalt; olivine basalt

Location: NE¼ sec. 7, T. 18 N., R. 22 E.

Age (mineral): 1.51±0.18 Ma (whole rock)

Reference: Morton and others (1980); Fultz and others (1984)

- G3. Rock description:** McClellan Peak basalt; olivine basalt

Location: NE¼ sec. 12, T. 18 N., R. 21 E.

Age (mineral): 1.54±0.13 Ma (whole rock)

Reference: Morton and others (1980); Fultz and others (1984)

- G4. Rock description:** Rhyolite dome

Location: Truckee Meadows; NW¼ sec. 27, T. 18 N., R. 20 E.

Age (mineral): 1.24±0.06 Ma (sanidine)

Reference: Silberman and others (1979)

- G5. Rock description:** Sutro rhyolite dome

Location: Virginia Range; NW¼ sec. 16, T. 17 N., R. 22 E.

Age (mineral): 1.51±0.22 Ma (alkali feldspar), 1.55±0.06 Ma (feldspar), 1.55±0.06 Ma (obsidian)

Reference: Silberman and others (1979)

- G6. Rock description:** Basaltic andesite

Location: Steamboat Hills; SW¼ sec. 33, T. 18 N., R. 20 E.

Age (mineral): 2.59±0.19 Ma (plagioclase, An₅₈₋₆₂), 2.62±0.11 Ma (alkali feldspar and plagioclase), 2.60±0.10 Ma (alkali feldspar), 2.21±0.10 Ma (whole rock)

Reference: Silberman and others (1979)

- G7. Rock description:** Rhyolite dome

Location: Truckee Meadows; NW¼ sec. 23, T. 18 N., R. 20 E.

Age (mineral): 3.05±0.09 Ma (whole rock), 3.11±0.12 Ma (whole rock), 1.19±0.05 Ma (sanidine)

Reference: Silberman and others (1979)

- G8. Rock description:** Lousetown Formation; basalt

Location: Lousetown Creek; NE¼ sec. 15, T. 18 N., R. 21 E.

Age (mineral): 6.83±0.16 Ma (whole rock)

Reference: Morton and others (1980); Fultz and

others (1984)

- G9. Rock description:** Lousetown Formation
Location: lat 39°22'00"N., long 119°37'57"W.; NW¼ sec. 21, T. 18 N., R. 21 E.
Age (mineral): 7.08±0.19 Ma (whole rock)
Reference: Dalrymple and others (1967); Silberman and McKee (1972)
Comments: Second flow above creek bed; lower part of Lousetown Formation
- G10. Rock description:** Lousetown Formation
Location: Clark Mountain; NW¼ sec. 26, T. 19 N., R. 21 E.
Age (mineral): 7.35±0.70 Ma (whole rock)
Reference: Morton and others (1980); Fultz and others (1984)
- G11. Rock description:** Lousetown Formation
Location: Clark Mountain; central part of NW¼ sec. 26, T. 19 N., R. 21 E.
Age (mineral): 9.66±0.30 Ma (whole rock)
Reference: Morton and others (1980); Fultz and others (1984)
- G12. Rock description:** Black dike
Location: SW¼ sec. 29, T. 17 N., R. 21 E.; New Savage Mine
Age (mineral): 365-ft level, 8.6±0.3 Ma (whole rock); 465-ft level, 8.2±0.4 Ma (whole rock)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G13. Rock description:** Mustang Andesite
Location: NE¼ sec. 26, T. 19 N., R. 21 E.
Age (mineral): 8.65±0.26 Ma (hornblende)
Reference: Morton and others (1980); Fultz and others (1984)
- G14. Rock description:** Rhyolite dome
Location: Washington Hill; south half of sec. 34, T. 19 N., R. 21 E.
Age (mineral): 11.2±0.3 Ma (biotite), 10.0±0.3 Ma (plagioclase)
Reference: Silberman and others (1979); Vikre and others (1988)
- G15. Rock description:** Tuff in sedimentary rocks; called Coal Valley Formation by Axelrod (1962) and Truckee Formation by Thompson and White (1964)
Location: NE¼ sec. 36, T. 18 N., R. 21 E.
Age (mineral): 12.6±0.5 Ma (biotite)
Collected by: D.I. Axelrod, University of California, Davis
Isotopic data and age by: Geochron Laboratories, Inc., Cambridge, Mass.
Analytical Data: K₂O=6.928%; ⁴⁰Ar* = 0.00612×10⁻⁶ mole/g; ⁴⁰Ar*/Σ⁴⁰Ar=0.171
- G16. Rock description:** Pumiceous rhyolite tuff breccia; called Coal Valley Formation by Axelrod (1962) and Truckee Formation by Thompson and White (1964)
Location: lat 39°23'34"N., long 119°33'12"W.; south-central part of sec. 30, T. 18 N., R. 22 E.
Age (mineral): 12.6±0.5 Ma (biotite)
Reference: Silberman and McKee (1972)
Comments: Mineral separate from large pumice block; in this area, Kate Peak Formation is interbedded with Truckee Formation (Thompson and White, 1964; Vikre and others, 1988)
- G17. Rock description:** Knickerbocker Andesite
Location: Virginia City reservoir; SE¼ sec. 1, T. 16 N., R. 20 E.
Age (mineral): 13.6±0.6 Ma (plagioclase), 10.6±0.4 Ma (whole rock)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G18. Rock description:** Knickerbocker Andesite
Location: Knickerbocker shaft; SE¼ sec. 6, T. 16 N., R. 21 E.
Age (mineral): 13.2±1.3 Ma (plagioclase), 14.3±0.5 Ma (whole rock)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G19. Rock description:** Knickerbocker Andesite
Location: Alta shaft; SW¼ sec. 5, T. 16 N., R. 21 E.
Age (mineral): 13.3±0.7 Ma (plagioclase)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G20. Rock description:** Knickerbocker Andesite
Location: North slope Mount Grosh; SW¼ sec. 34, T. 17 N., R. 21 E.
Age (mineral): 13.6±0.8 Ma (plagioclase)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G21. Rock description:** Knickerbocker Andesite
Location: Basaltic andesite flow; lat 39°16'50"N., long 119°40'48"W.; SE¼SW¼NE¼ sec. 6, T. 16 N., R. 21 E.
Age (mineral): 13.6±0.6 Ma (plagioclase)
Collected by: D.M. Hudson
Analytical data: K₂O=0.293%; ⁴⁰Ar* = 0.0575353×10⁻¹⁰ mole/g; ⁴⁰Ar*/Σ⁴⁰Ar=0.203
- G22. Rock description:** Davidson Granodiorite
Location: New Savage Mine, 365-ft level; SW¼ sec. 29, T. 17 N., R. 21 E.
Age (mineral): 11.6±0.4 Ma (feldspar)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G23. Rock description:** Davidson Granodiorite
Location: Mount Davidson; SW¼ sec. 30, T. 17 N., R. 21 E.
Age (mineral): 12.4±1.1 Ma (chloritized hornblende)
Reference: Vikre and others (1988)
- G24. Rock description:** Davidson Granodiorite
Location: Hale and Norcross Tunnel dump; SW¼ sec. 29, T. 17 N., R. 21 E.
Age (mineral): 13.4±0.4 Ma (feldspar)
Reference: Vikre and McKee (1987); Vikre and

- others (1988)
- G25. Rock description:** Davidson Granodiorite
Location: Mount Davidson; sec. 30, T. 17 N., R. 21 E.
Age (mineral): 13.9±0.5 Ma (potassium feldspar), 13.0±0.8 Ma (choritized hornblende), 10.8±0.8 Ma (plagioclase)
Reference: Vikre and others (1988)
- G26. Rock description:** Davidson Granodiorite
Location: Hale and Norcross Tunnel; SW¼ sec. 29, T. 17 N., R. 21 E.
Age (mineral): 14.4±0.4 Ma (biotite)
Reference: Vikre and others (1988)
- G27. Rock description:** Davidson Granodiorite
Location: Mount Davidson; NW¼ sec. 32, T. 17 N., R. 21 E.
Age (mineral): 14.7±0.4 Ma (plagioclase)
Reference: Vikre and others (1988)
- G28. Rock description:** Davidson Granodiorite
Location: Mount Davidson; sec. 30, T. 17 N., R. 21 E.
Age (mineral): 17.6±2.1 Ma (zircon), 16.9±2.1 Ma (zircon), 10.5±0.1 Ma (apatite)
Method: Fission track
Reference: Vikre and others (1988)
- G29. Rock description:** Kate Peak Formation
Location: Washington Hill; NE¼ sec. 5, T. 18 N., R. 21 E.
Age (mineral): 12.6±0.2 Ma (biotite)
Reference: Whitebread (1976, table 1); Vikre and others (1988)
- G30. Rock description:** Kate Peak Formation; intrusive rock
Location: Upper Lousetown Creek; SW¼ sec. 4, T. 17 N., R. 21 E.
Age (mineral): 12.7±0.3 Ma (biotite)
Reference: Whitebread (1976, table 1); Vikre and others (1988)
- G31. Rock description:** Vitrophyre; glassy rhyolite flow assigned to Kate Peak Formation by Silberman and McKee (1972) and to Coal Valley Formation by Vikre and others (1988)
Location: Chalk Hills area; lat 39°23'32"N., long 119°32'32"W.; west-central part of sec. 29, T. 18 N., R. 22 E.
Age (mineral): 12.7±0.2 Ma (biotite)
Reference: Silberman and McKee (1972); Vikre and others (1988)
- G32. Rock description:** Kate Peak Formation; porphyritic dacite flow
Location: Kate Peak; lat 39°16'29"N., long 119°38'21"N.; NE¼ sec. 9, T. 16 N., R. 21 E.
Age (mineral): 13.1±0.8 Ma (biotite)
Reference: Bonham (1969); Krueger and Schilling (1971); Silberman and McKee (1972); Vikre and others (1988)
Comments: About 60 m stratigraphically above base of formation
- G33. Rock description:** Kate Peak Formation; intrusive rock
Location: NE¼ sec. 33, T. 17 N., R. 21 E.
Age (mineral): 13.2±0.4 Ma (hornblende), 13.0±0.4 Ma (biotite)
Reference: Whitebread (1976, table 1); Vikre and others (1988)
- G34. Rock description:** Kate Peak Formation; intrusive rock
Location: Sierra Nevada mine; SE¼ sec. 20, T. 17 N., R. 21 E.
Age (mineral): 13.3±0.6 Ma (alkali feldspar)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G35. Rock description:** Extrusive rock
Location: Ophir Ravine; SW¼ sec. 20, T. 17 N., R. 21 E.
Age (mineral): 13.5±0.4 Ma (whole rock)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G36. Rock description:** Extrusive rock
Location: Scorpion shaft; SE¼ sec 21, T. 17 N., R. 21 E.
Age (mineral): 13.7±0.5 Ma (whole rock)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G37. Rock description:** Kate Peak Formation
Location: NW¼ sec. 32, T. 18 N., R. 21 E.
Age (mineral): 14.1±1.6 Ma (hornblende)
Reference: Whitebread (1976, table 1); Vikre and others (1988)
- G38. Rock description:** Kate Peak Formation
Location: NW¼SE¼ sec. 9, T. 17 N., R. 21 E.
Age (mineral): 14.2±0.3 Ma (biotite)
Reference: Whitebread (1976, table 1); Vikre and others (1988)
- G39. Rock description:** Kate Peak Formation; intrusive rock
Location: Quarry, Utah shaft; SW¼ sec. 16, T. 17 N., R. 21 E.
Age (mineral): 14.3±0.5 Ma (plagioclase)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G40. Rock description:** Kate Peak Formation; intrusive rock
Location: Utah mine; NE¼ sec. 20, T. 17 N., R. 21 E.
Age (mineral): 15.3±0.4 Ma (hornblende), 14.5±0.4 Ma (biotite)
Reference: Whitebread (1976, table 1); Vikre and others (1988)
- G41. Rock description:** Kate Peak Formation; intrusive rock
Location: NE¼ sec. 20, T. 17 N., R. 21 E.
Age (mineral): 15.0±1.6 Ma (plagioclase)
Reference: Vikre and McKee (1987); Vikre and

- others (1988)
- G42. Rock description:** Intrusive part of Kate Peak Formation
Location: Quarry, Utah shaft; SW¼ sec. 16, T. 17 N., R. 21 E.
Age (mineral): 16.9±1.8 Ma (plagioclase)
Reference: Vikre and others (1988)
- G43. Rock description:** Alta Formation
Location: Central-western part of sec. 4, T. 16 N., R. 21 E.
Age (mineral): 14.8±0.4 Ma (plagioclase)
Reference: Whitebread (1976); Vikre and others (1988)
- G44. Rock description:** Alta Formation
Location: Ophir Hill; SW¼ sec. 19, T. 17 N., R. 21 E.
Age (mineral): 16.6±0.6 Ma (hornblende)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G45. Rock description:** Alta Formation
Location: lat 39°16'27"N., long 119°37'41"W.; SW¼SE¼ sec. 4, T. 16 N., R. 21 E.
Age (mineral): 16.9±0.5 Ma (plagioclase)
Reference: Silberman and McKee (1972); Vikre and others (1988)
- G46. Rock description:** Alta Formation
Location: Woodville shaft; NE¼ sec. 8, T. 16 N., R. 21 E.
Age (mineral): 18.1±0.8 Ma (hornblende)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G47. Rock description:** Alta Formation
Location: Twin Peaks, Gold Hill; SW¼ sec. 32, T. 17 N., R. 21 E.
Age (mineral): 20.1±1.4 Ma (hornblende)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G48. Rock description:** Santiago Canyon Tuff
Location: American Flat; SE¼ sec. 7, T. 16 N., R. 21 E.
Age (mineral): 23.1±0.7 Ma (biotite)
Reference: Whitebread (1976, table 1); Vikre and others (1988)
- G49. Rock description:** Hartford Hill Rhyolite of Evernden and James (1964); rhyolitic welded tuff
Location: NW¼ sec. 31, T. 17 N., R. 21 E.
Age (mineral): 23.3 Ma (sanidine)
Reference: Evernden and James (1964); Silberman and McKee (1972)
Comments: Evernden and James (1964) describe locality as "3 miles northwest of Sutro Flora at Silver City, Nevada;" however, according to Silberman and McKee (1972), the location given by Evernden and James (1964) does not match their description of the geology at the supposedly same place. For this reason, Silberman and McKee (1972) believe the location given by Evernden and James (1964) is incorrect
- G50. Rock description:** Lenihan Canyon Tuff
Location: South of McClelland Peak; NE¼NW¼NW¼ sec. 14, T. 16 N., R. 20 E.
Age (mineral): 26.7±0.8 Ma (biotite), 25.1±0.8 Ma (sanidine)
Reference: Bingler and others (1978)
- Vein material or alteration age**
- G51. Rock description:** Quartz-alunite alteration
Location: Base of Geiger Grade; NW¼ sec. 35, T. 18 N., R. 20 E.
Age (mineral): 9.4±0.8 Ma (alunite-quartz)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G52. Rock description:** Vein
Location: Root Mine; NE¼ sec. 5, T. 18 N., R. 21 E.
Age (mineral): 11.7±0.4 Ma (alunite)
Reference: Vikre and others (1988)
- G53. Rock description:** Vein quartz that has calcite and euhedral crystals of adularia
Location: Occidental Lode, near Sutro Tunnel air shaft; lat 39°18'59"N., long 119°37'51"W.; NE¼ sec. 33, T. 17 N., R. 21 E.
Age (mineral): 12.5±0.6 Ma (adularia)
Reference: Bonham (1969, p. 131); Krueger and Schilling (1971); Vikre and others (1988)
- G54. Rock description:** Vein material
Location: Flowery lode, Sixmile Canyon; SW¼ sec. 24, T. 17 N., R. 21 E.
Age (mineral): 12.9±0.4 Ma (adularia)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G55. Rock description:** Vein material
Location: Flowery lode, Sixmile Canyon; SE¼ sec. 23, T. 17 N., R. 21 E.
Age (mineral): 13.1±0.4 Ma (adularia)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G56. Rock description:** Occidental vein
Location: Sixmile Canyon; SE¼NW¼NE¼ sec. 33, T. 17 N., R. 21 E.
Age (mineral): 13.1±0.4 Ma (adularia)
Reference: Whitebread (1976); Vikre and others (1988)
- G57. Rock description:** Vein material
Location: Cedar Hill Canyon; NW¼ sec. 20, T. 17 N., R. 21 E.
Age (mineral): 13.5±0.4 Ma (muscovite)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G58. Rock description:** Vein material
Location: Comstock lode; 2,340-ft level, Ward Mine; NW¼ sec. 32, T. 17 N., R. 21 E.
Age (mineral): 13.6±0.4 Ma (muscovite)
Reference: Vikre and McKee (1987); Vikre and others (1988)

- G59. Rock description:** Vein material
Location: Silver City Fault, Keystone Mine; SW¼ sec. 5, T. 16 N., R. 21 E.
Age (mineral): 13.7±0.4 Ma (muscovite)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G60. Rock description:** Quartz-alunite alteration
Location: Upper Lousetown Creek; SW¼ sec. 4, T. 17 N., R. 21 E.
Age (mineral): 13.8±0.4 Ma (alunite-quartz)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G61. Rock description:** Cedar Hill vein
Location: Cedar Hill Canyon; SW¼ sec. 20, T. 17 N., R. 21 E.
Age (mineral): 14.0±0.4 Ma (muscovite)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G62. Rock description:** Comstock vein
Location: Gold Hill; central-western part of sec. 32, T. 17 N., R. 21 E.
Age (mineral): 14.1±0.4 Ma (adularia)
Reference: Whitebread (1976); Vikre and others (1988)
- G63. Rock description:** Sericite in Kate Peak Formation, upper member
Location: lat 39°19'17"N., long 119°38'34"W.; SW¼NE¼SE¼ sec. 20, T. 17 N., R. 21 E.
Age (mineral): 14.1±0.4 Ma (sericite)
Comments: Overlies altered rocks of Alta Formation in hanging wall of Comstock Lode directly northeast of Cedar Hill pit
Collected by: D.M. Hudson and E.H. McKee
Isotopic data and age by: E.H. McKee
Analytical data: K₂O=7.88%; ⁴⁰Ar*=1.6096×10⁻¹⁰ mole/g; ⁴⁰Ar*/Σ⁴⁰Ar=0.79
- G64. Rock description:** Vein material, Flowery lode
Location: Sixmile Canyon; SE¼ sec. 23, T. 17 N., R. 21 E.
Age (mineral): 14.1±0.4 Ma (muscovite)
Reference: Vikre and others (1988)
- G65. Rock description:** Quartz-alunite alteration
Location: Upper Lousetown Creek; SW¼ sec. 4, T. 17 N., R. 21 E.
Age (mineral): 14.1±0.7 Ma (alunite-quartz)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G66. Rock description:** Quartz-sericite alteration
Location: Mount Davidson; SW¼ sec. 30, T. 17 N., R. 21 E.
Age (mineral): 14.9±0.6 Ma (sericite-quartz)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G67. Rock description:** Quartz-alunite alteration
Location: Mount Grosh; NE¼ sec. 4, T. 16 N., R. 21 E.
Age (mineral): 15.0±0.6 Ma (alunite-quartz)

Reference: Vikre and McKee (1987); Vikre and others (1988)

- G68. Rock description:** Quartz-alunite alteration
Location: Ward shaft; SW¼ sec. 33, T. 17 N., R. 21 E.
Age (mineral): 15.4±1.0 Ma (alunite-quartz)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G69. Rock description:** Quartz-alunite alteration
Location: Orleans Hill; SW¼ sec. 17, T. 17 N., R. 21 E.
Age (mineral): 15.9±1.0 Ma (alunite-quartz)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G70. Rock description:** Quartz-alunite alteration
Location: Base of Geiger Grade; NW¼ sec. 35, T. 18 N., R. 20 E.
Age: 16.0±1.6 Ma (alunite-quartz)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- G71. Rock description:** Quartz-alunite alteration
Location: 1.6 km west of Mount Davidson; SE¼ sec. 25, T. 17 N., R. 20 E.
Age: 16.3±0.5 Ma (alunite-quartz)
Reference: Vikre and McKee (1987); Vikre and others (1988)

DAYTON 15' QUADRANGLE (H)

- H1. Rock description:** Basalt flow
Location: North of Carson City; central-eastern part of sec. 22, T. 16 N., R. 20 E.
Age (mineral): 1.39±0.29 Ma (whole rock)
Reference: Bingler (1977)
- H2. Rock description:** Dacite
Location: lat 39°09'47"N., long 119°30'53"W.
Age (mineral): 4.6±0.2 Ma (whole rock)
Reference: Vikre and McKee (1994)
- H3. Rock description:** Andesite
Location: lat 39°10'13"N., long 119°30'02"W.
Age (mineral): 6.6±0.5 Ma (whole rock)
Reference: Vikre and McKee (1994)
- H4. Rock description:** Eureka Canyon Tuff
Location: SE¼NW¼SW¼ sec. 33, T. 16 N., R. 21 E.
Age (mineral): 17.75±0.40 Ma (sanidine)
Reference: Deino (1985, p. 182)
Comments: Much younger than other age from rocks called Eureka Canyon Tuff listed below (see loc. H7)
- H5. Rock description:** Santiago Canyon Tuff
Location: lat 39°10'33"N., long 119°38'11"W.; NE¼SW¼SW¼ sec. 9, T. 15 N., R. 21 E.
Age (mineral): 21.6±0.9 Ma (sanidine), 22.8±0.7 Ma (biotite)
Reference: Bingler and others (1978)
- H6. Rock description:** Nine Hill Tuff
Location: Central part of NW¼SW¼NW¼ sec. 12, T. 15 N., R. 20 E.

Age (mineral): 24.29±0.80 Ma (devitrified matrix)

Reference: Deino (1985, p. 182)

H7. Rock description: Eureka Canyon Tuff

Location: lat 39°12'49"W., long 119°43'34"W.;
central part of NE¼NW¼ sec. 34, T. 16 N., R. 20 E.

Age (mineral): 26.1±0.2 Ma (sanidine)

Reference: Bingler and others (1978)

Comments: Much older than other age from rocks listed above as Eureka Canyon Tuff (see loc. H4)

H8. Rock description: Mickey Pass Tuff

Location: lat 39°11'42"N., long 119°39'47";
NE¼SW¼NE¼ sec. 6, T. 15 N., R. 21 E.

Age (mineral): 28.0±0.8 Ma (biotite), 28.6±0.9 Ma (plagioclase)

Reference: Bingler and others (1978)

Vein age

H9. Rock description: Potassium feldspar in vein

Location: lat 39°10'09"N., long 119°30'01"W.

Age (mineral): 7.0±0.3 Ma (potassium feldspar)

Reference: Vikre and McKee (1994)

NIXON 15' QUADRANGLE (I)

Alteration age

I1. Rock description: Sericite and quartz produced during hydrothermal alteration of Guanomi pluton

Location: Guanomi Mine dump; SE¼NW¼SE¼ sec. 24, T. 23 N., R. 22 E.

Age (mineral): 24.0±0.7 Ma (quartz, sericite)

Reference: Wallace (1975)

WADSWORTH 15' QUADRANGLE (J)

J1. Rock description: Ash associated with diatomite

Location: Eagle-Picher diatomite mine; north-central part of sec. 34, T. 20 N., R. 23 E.

Age: 11.2±0.3 Ma

Reference: Krebs and Bradbury (1984; in press)

J2. Rock description: Rhyolite ash-flow tuff within Pyramid sequence

Location: Pierson Canyon; lat 39°38'05"N., long 119°25'59"W.; NE¼NE¼ sec. 6, T. 20 N., R. 23 E.

Age (mineral): 11.7±0.4 Ma (biotite)

Reference: Garside and others (1993)

Comments: Age is younger than 16- to 13-Ma age of Pyramid sequence elsewhere in western Nevada

J3. Rock description: Basaltic andesite

Location: Center part of NE¼NW¼ sec. 26, T. 20 N., R. 23 E.

Age (mineral): 12.02±0.18 Ma (groundmass feldspar concentrate)

Comments: Flows interbedded with sedimentary rocks bearing fossil flora (Upper Purple Mountain flora of D.I. Axelrod, oral commun., 1993)

Collected by: D.I. Axelrod, University of California,

Davis

Isotopic data and age by: University of Arizona, Tucson, Isotope Geochemistry Laboratory

Analytical data: K₂O=1.844%; ⁴⁰Ar*=38.56×10⁻⁶ mole/g; ⁴⁰Ar*/Σ⁴⁰Ar=0.219

J4. Rock description: Chloropagus Formation (Axelrod, 1956), upper part; andesite or basalt

Location: Pierson Canyon; NE¼NE¼NE¼ sec. 6, T. 20 N., R. 23 E.

Age (mineral): 13.3±0.7 Ma (biotite)

Collected by: D.I. Axelrod, University of California, Davis

Isotopic data and age by: Geochron Laboratories, Inc., Cambridge, Mass.

Analytical data: K₂O=5.829%; ⁴⁰Ar*=0.0541×10⁻⁶ mole/g; ⁴⁰Ar*/Σ⁴⁰Ar=0.541

J5. Rock description: Chloropagus Formation (Axelrod, 1956); olivine basalt flow

Location: lat 39°42'49"N., long 119°24'03"W.; SE¼ sec. 4, T. 21 N., R. 23 E.

Age (mineral): 14.9±1.5 Ma (whole rock)

Reference: Bonham (1969); Krueger and Schilling (1971); Silberman and McKee (1972)

Comments: Bonham (1969) indicated that basalt flow is near base of Chloropagus Formation and in Fort Defiance Canyon

J6. Rock description: Rhyolite welded tuff

Location: lat 39°36'12"N., long 119°21'54"W.; SW¼NE¼ sec. 14, T. 20 N., R. 23 E.

Age (mineral): 23.4 Ma (sanidine), 23.3 Ma (plagioclase)

Reference: Evernden and James (1964); Silberman and McKee (1972)

CHURCHILL BUTTE 15' QUADRANGLE (K)

K1. Rock description: Basalt

Location: Churchill Butte; sec. 25, T. 17 N., R. 23 E.

Age (mineral): 3.3±0.2 Ma (whole rock)

Reference: Nichols-Tingley (1981); Fultz and others (1984)

K2. Rock description: Basalt

Location: Churchill Butte; sec. 25, T. 17 N., R. 23 E.

Age (mineral): 3.5±0.2 Ma (whole rock)

Reference: Nichols-Tingley (1981); Fultz and others (1984)

K3. Rock description: Porphyritic olivine-bearing basaltic andesite

Location: Churchill Butte; lat 39°18.9'N., long 119°20.7'W.; NE¼NE¼ sec. 25, T. 17 N., R. 23 E.

Age (mineral): 4.3±0.6 Ma (whole rock)

Reference: Fultz and others (1984); Bell and others (1984)

K4. Rock description: Basaltic andesite

Location: Table Mountain; lat 39°17.2'N., long 119°23.5'W.; NW¼ sec. 3, T. 16 N., R. 23 E.

Age (mineral): 6.7±0.7 Ma (whole rock)
Reference: Fultz and others (1984); Bell and others (1984)

Vein material and alteration ages

- K5. Rock description:** Quartz-alunite alteration
Location: San Juan Hill, Ramsey district; SE¼ sec. 33, T. 19 N., R. 23 E.
Age (mineral): 9.3±0.5 Ma (quartz-alunite)
Reference: Vikre and McKee (1987); Vikre and others (1988)
- K6. Rock description:** Quartz-adularia-calcite vein
Location: 1,000-ft level, Gooseberry Mine; lat 39°29.2'N., long 119°27.8'W.; NW¼ sec. 25, T. 19 N., R. 22 E.
Age (mineral): 10.3±0.3 Ma (adularia)
Reference: Morton and others (1977); Vikre and others (1988)
- K7. Rock description:** Adularia
Location: Talaposa mining district; SE¼SE¼NW¼ sec. 3, T. 18 N., R. 24 E.
Age (mineral): 10.8±0.3 Ma (adularia)
Reference: Garside and Silberman (1973)
- K8. Rock description:** Quartz and adularia
Location: 1.5 km southeast of Ramsey townsite; lat 39°26'37.1"N., long 119°22'41.2"W.; SW¼NW¼ sec. 11, T. 18 N., R. 23 E.
Age (mineral): 10.8±0.3 Ma (adularia)
Reference: Garside and others (1993)
Comments: Quartz-adularia alteration associated with precious metal mineralization in Ramsey district

COMO 15' QUADRANGLE (L)

- L1. Rock description:** Dacite
Location: lat 39°11'50"N., long 119°29'22"W.
Age (mineral): 2.8±0.1 Ma (whole rock)
Reference: Vikre and McKee (1994)
- L2. Rock description:** Dacite
Location: lat 39°11'42"N., long 119°27'56"W.
Age (mineral): 4.6±0.2 Ma (whole rock)
Reference: Vikre and McKee (1994)
- L3. Rock description:** Basalt flow; underlain by porphyritic andesite and overlain by thin sedimentary unit, which is in turn overlain by another porphyritic andesite
Location: About 2 km northeast of Hercules Mine; lat 39°14'27"N., long 119°26'10"W.
Age (mineral): 5.2±0.2 Ma (whole rock, acid treated)
Collected by: J.H. Stewart
Isotopic data and age by: E.H. McKee
Analytical data: K₂O=1.603%; ⁴⁰Ar* = 1.20549×10⁻¹¹ mole/g; ⁴⁰Ar*/Σ⁴⁰Ar=0.27
- L4. Rock description:** Porphyritic andesite clast from monolithologic volcanic breccia
Location: Along powerline road west of Churchill

Canyon; NW¼NE¼NW¼ sec. 3, T. 14 N., R. 23 E.
Age (mineral): 6.0±0.2 Ma (whole rock, acid treated)

Collected by: J.H. Stewart

Isotopic data and age by: E.H. McKee

Analytical data: K₂O=2.181%; ⁴⁰Ar* = 1.89875×10⁻¹¹ mole/g; ⁴⁰Ar*/Σ⁴⁰Ar=0.38

- L5. Rock description:** Dacite intrusion
Location: lat 39°10'05"N., long 119°27'46"W.
Age (mineral): 6.0±0.3 Ma (whole rock)
Reference: Vikre and McKee (in press)
- L6. Rock description:** Andesite
Location: lat 39°10'09"N., long 119°28'13"W.
Age (mineral): 6.0±0.2 Ma (whole rock)
Reference: Vikre and McKee (1994)
- L7. Rock description:** Andesite
Location: lat 39°10'00"N., long 119°28'50"W.
Age (mineral): 6.0±0.7 Ma (whole rock)
Reference: Vikre and McKee (1994)
- L8. Rock description:** Dacite intrusion
Location: lat 39°09'50"N., long 119°27'28"W.
Age (mineral): 6.3±0.7 Ma (whole rock)
Reference: Vikre and McKee (1994)
- L9. Rock description:** Andesite
Location: lat 39°10'12"W., long 119°29'20"W.
Age (mineral): 6.6±0.3 Ma (whole rock)
Reference: Vikre and McKee (1994)
- L10. Rock description:** Andesite
Location: lat 39°10'04"N., long 119°28'41"W.
Age (mineral): 6.6±0.3 Ma (whole rock)
Reference: Vikre and McKee (1994)
- L11. Rock description:** Andesite
Location: lat 39°10'43"N., long 119°29'08"W.
Age (mineral): 7.5±0.3 Ma (whole rock)
Reference: Vikre and McKee (1994)
- L12. Rock description:** Porphyritic andesite lava flow
Location: Central Pine Nut Mountains, about 1 km west of Sunrise Pass; NE¼SW¼NE¼ sec. 10, T. 14 N., R. 22 E.
Age (mineral): 15.2±0.7 Ma.
Collected by: J.H. Stewart
Isotopic data and age by: E.H. McKee
Analytical data: K₂O=2.810%; ⁴⁰Ar* = 6.15591×10⁻¹¹ mole/g; ⁴⁰Ar*/Σ⁴⁰Ar=0.73
- L13. Rock description:** Biotite-hornblende porphyry
Location: Southern part of Buckskin Range; eastern part of sec. 11 or western part of sec. 12, T. 13 N., R. 23 E.
Age (mineral): 15.7±1.5 Ma (hornblende)
Reference: Hudson and Oriel (1979)
- L14. Rock description:** Andesite
Location: lat 39°09'57"N., long 119°28'54"W.
Age (mineral): 17.6±0.5 Ma (whole rock)
Reference: Vikre and McKee (1994)
- L15. Rock description:** Porphyritic hornblende-biotite dacite intrusion; related to hornblende-andesite sequence of Lincoln Flat

Location: lat 39°00'10"N., long 119°19'41"W.

a. Method: K–Ar

Age (mineral): 19.2±2.5 Ma (hornblende),
14.6±0.6 Ma (biotite)

Reference: Proffett and Proffett (1976)

Comments: Redating (Dilles and Gans, 1993; see also, in press) using more reliable $^{40}\text{Ar}/^{39}\text{Ar}$ methods gives 12.64±0.07 Ma (see below)

b. Method: $^{40}\text{Ar}/^{39}\text{Ar}$

Age (mineral): 12.64±0.07 Ma (biotite),
12.12±0.36.7 Ma (hornblende)

Reference: Dilles and Gans (1993; see also, in press)

L16. Rock description: Porphyritic hornblende andesite dike; cuts and intrudes one of oldest Basin and Range normal faults in Yerington district

Location: lat 39°02'28"N., long 119°16'48"W.

Age (mineral): 19.4±2.8 Ma (plagioclase), 19.0±2.5 Ma (hornblende)

Reference: Proffett and Proffett (1976)

L17. Rock description: Tuff and breccia of Gallagher Pass; pumice block

Location: lat 39°05'40"N., long 119°17'01"W.

Age (mineral): 24.7±0.9 Ma (biotite), 24.2±2.0 Ma (plagioclase)

Reference: Proffett and Proffett (1976)

L18. Rock description: Mickey Pass Tuff, Weed Heights Member

Location: lat 39°05'33"N., long 119°15'46"W.

Age (mineral): 28.5±1.0 Ma (biotite), 26.8±0.9 Ma (sanidine)

Reference: Proffett and Proffett (1976)

L19. Rock description: Singaste Tuff

Location: lat 39°08'19"N., long 119°19'42"W.

Age (mineral): 32.5±1.8 Ma (hornblende), 27.9±1.1 Ma (biotite)

Reference: Proffett and Proffett (1976)

Alteration and vein ages

L20. Rock description: Alunite and kaolinite alteration

Location: lat 39°11'38"N., long 119°28'48"W.

Age (mineral): 6.0±1.0 Ma (alunite)

Reference: Vikre and McKee (1994)

L21. Rock description: Potassium feldspar in vein

Location: lat 39°11'11"N., long 119°26'53"W.

Age (mineral): 6.6±0.2 Ma (potassium feldspar)

Reference: Vikre and McKee (1994)

FIREBALL RIDGE 15' QUADRANGLE (M)

M1. Rock description: Basalt

Location: sec. 22, T. 22 N., R. 26 E.

Age: 11.2 Ma

Reference: B. Myers and E.S. Sims, U.S. Geological Survey, *quoted in Voegtly* (1981)

TWO TIPS 15' QUADRANGLE (N)

N1. Rock description: Basalt

Location: lat 39°30.67'N., long 119°3.06'W.

Age (mineral): 9.6±0.3 Ma (whole rock)

Collected by: J.H. Stewart

Isotopic data and age by: E.H. McKee

Analytical data: $\text{K}_2\text{O}=2.581\%$; $^{40}\text{Ar}^*=3.587\times 10^{-11}$ mole/g; $^{40}\text{Ar}^*/\Sigma^{40}\text{Ar}=0.44$

N2. Rock description: Basalt

Location: sec. 3, T. 20 N., R. 26 E.

Age: 9.6 Ma

Reference: B. Myers and E.S. Sims, U.S. Geological Survey, *quoted in Voegtly* (1981)

N3. Rock description: Ash bed associated with diatomite

Location: lat 39°31'03"N., long 119°05'28"W.

Age (mineral): 9.79±0.12 Ma (biotite)

Reference: F.H. Brown (written commun., 1993); see also, Krebs and Bradbury (in press)

N4. Rock description: Ash bed associated with diatomite

Location: lat 39°31'10"N., long 119°06'14"W.

Age (mineral): 9.75±0.31 Ma (plagioclase)

Reference: F.H. Brown (written commun., 1993); see also, Krebs and Bradbury (in press)

SILVER SPRINGS 15' QUADRANGLE (O)

O1. Rock description: Hornblende andesite

Location: lat 39°25.15'N., long 119°8.15'W.; about 2 km north of The Narrows of Lahontan Reservoir

Age (mineral): 6.7±0.18 Ma (whole rock)

Collected by: J.H. Stewart

Isotopic data and age by: E.H. McKee

Analytical data: $\text{K}_2\text{O}=2.648\%$; $^{40}\text{Ar}^*=2.556\times 10^{-11}$ mole/g; $^{40}\text{Ar}^*/\Sigma^{40}\text{Ar}=0.47$

O2. Rock description: Flow-banded rhyolite dome

Location: About 5.5 km due south of Lahontan Well on north flank of Desert Mountains; lat 39°15.25'N.; long 119°5.25'W.

Age (mineral): 8.3±0.25 Ma (biotite)

Collected by: J.H. Stewart

Isotopic data and age by: E.H. McKee

Analytical data: $\text{K}_2\text{O}=8.48\%$; $^{40}\text{Ar}^*=1.015\times 10^{-10}$ mole/g; $^{40}\text{Ar}^*/\Sigma^{40}\text{Ar}=0.42$

O3. Rock description: Porphyritic basaltic andesite

Location: Silver Springs; lat 39°28.5'N., long 119°13.4'W.; NE¼NW¼ sec. 31, T. 19 N., R. 25 E.

Age (mineral): 11.8±0.7 Ma (whole rock)

Reference: Fultz and others (1984); Bell and others (1984)

O4. Rock description: Flow-banded rhyolite dome

Location: About 5 km southeast of The Narrows of Lahontan Reservoir; lat 39°22.04'N., long 119°3.97'W.

Age (mineral): 13.4±0.4 Ma (biotite)

Collected by: J.H. Stewart

Isotopic data and age by: E.H. McKee

Analytical data: $\text{K}_2\text{O}=8.81\%$; $^{40}\text{Ar}^*=1.707\times 10^{-10}$

mole/g; $^{40}\text{Ar}^*/\Sigma^{40}\text{Ar}=0.61$

- O5. Rock description:** Glassy rhyolite dome
Location: lat $39^\circ 26.91'\text{N.}$, long $119^\circ 13.41'\text{W.}$
Age (mineral): 14.4 ± 0.4 Ma (biotite)
Collected by: J.H. Stewart
Isotopic data and age by: E.H. McKee
Analytical data: $\text{K}_2\text{O}=8.62\%$; $^{40}\text{Ar}^*=1.791 \times 10^{-10}$ mole/g; $^{40}\text{Ar}^*/\Sigma^{40}\text{Ar}=0.55$

WABUSKA 15' QUADRANGLE (P)

- P1. Rock description:** Basaltic andesite
Location: Cleaver Peak; lat $39^\circ 12.8'\text{N.}$; long $119^\circ 11.6'\text{W.}$; NW $\frac{1}{4}$ sec. 33, T. 16 N., R. 25 E.
Age (mineral): 9.2 ± 0.6 Ma (whole rock)
Reference: Fultz and others (1984); Bell and others (1984)

DESERT PEAK 15' QUADRANGLE (Q)

- Q1. Rock description:** Volcanic rock above diatomite
Location: NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 33, T. 23 N., R. 27 E.
Age: 9.8 ± 0.7 Ma
Reference: Krebs and Bradbury (1984; in press); Krebs and others (1987, loc. 55)
- Q2. Rock description:** Basaltic andesite
Location: Desert Peak; lat $39^\circ 47.2'\text{N.}$, long $118^\circ 56.8'\text{W.}$; NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 10, T. 22 N., R. 27 E.
Age (mineral): 10.2 ± 0.7 Ma
Reference: Fultz and others (1984); Bell and others (1984)
- Q3. Rock description:** Dacite flow
Location: lat $39^\circ 56'24''\text{N.}$, long $118^\circ 50'24''\text{W.}$; SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 21, T. 24 N., R. 28 E.
Age (mineral): 12.3 Ma (hornblende)
Reference: Silberman and McKee (1972); Willden and Speed (1974)
Comments: Columnar-jointed flow along road from Interstate 80 to Jessup in southern Trinity Range
- Q4. Rock description:** Chloropagus Formation (Axelrod, 1956); andesite tuff
Location: About 2.1 km north of Desert Peak; lat $39^\circ 48'\text{N.}$, long $118^\circ 56'\text{W.}$; sec. 3, T. 22 N., R. 27 E.
Age (mineral): 14.3 Ma (plagioclase)
Reference: Silberman and McKee (1972); Evernden and James (1964)
Comments: Andesite tuff interbedded with leaf-bearing tuffaceous shales containing Chloropagus flora (Axelrod, 1956)

SODA LAKE 15' QUADRANGLE (R)

- R1. Rock description:** Basalt from core of U.S.G.S. drill hole CD-64A
Location: About 340 m west of southeast corner of sec. 30, T. 21 N., R. 29 E.
Collected by: F.H. Olmsted

Isotopic data and age by: E.H. McKee

- a. Sample number:** CD-DH 403, depth=403 ft
Age (mineral): 4.7 ± 1.0 Ma (whole rock)
Analytical data: $\text{K}_2\text{O}=0.877\%$; $^{40}\text{Ar}^*=5.878 \times 10^{-12}$ mole/g; $^{40}\text{Ar}^*/\Sigma^{40}\text{Ar}=0.084$
- b. Sample number:** CD-DH 86C, depth=860 ft
Age (mineral): 4.7 ± 1.6 Ma (whole rock)
Analytical data: $\text{K}_2\text{O}=1.971\%$; $^{40}\text{Ar}^*=1.324 \times 10^{-11}$ mole/g; $^{40}\text{Ar}^*/\Sigma^{40}\text{Ar}=0.053$
- c. Sample number:** CD-DH 863.1, depth=863.1 ft
Age (mineral): 4.4 ± 2.0 Ma (whole rock)
Analytical data: $\text{K}_2\text{O}=1.871\%$; $^{40}\text{Ar}^*=1.196 \times 10^{-11}$ mole/g; $^{40}\text{Ar}^*/\Sigma^{40}\text{Ar}=0.043$ ft
- R2. Rock description:** Black glassy rhyolite inclusion in basalt flow
Location: Upsal Hogback; lat $39^\circ 37.4'\text{N.}$, long $118^\circ 48.2'\text{W.}$; SE $\frac{1}{4}$ sec. 2, T. 20 N., R. 28 E.
Age (mineral): 6.3 ± 0.3 Ma (whole rock)
Reference: Fultz and others (1984); Bell and others (1984)
- R3. Rock description:** Vitrophiic part of ash-flow tuff
Location: lat $39^\circ 44.7'\text{N.}$, long $118^\circ 53.0'\text{W.}$; SW $\frac{1}{4}$ sec. 30, T. 22 N., R. 28 E.
Comments: Ages are highly discordant, and so age of unit is uncertain
- a. Age (mineral):** 14.3 ± 1.1 Ma (plagioclase)
Reference: Fultz and others (1984); Bell and others (1984)
- b. Age (mineral):** 12.0 ± 1.1 Ma (plagioclase)
Reference: Bell and others, 1984; see also, W.R. Benoit, Phillip Petroleum Co., *quoted in* Voegtly, 1981
- c. Age (mineral):** 4.6 Ma (hornblende)
Reference: F.K. Miller, U.S. Geological Survey, written commun., 1978, *quoted in* Voegtly, 1981
- d. Age (mineral):** 2.3 Ma (plagioclase)
Reference: Hiner, 1979; Benoit and others, 1982
- R4. Rock description:** Gabbro
Location: lat $39^\circ 44.3'\text{N.}$, long $118^\circ 58.0'\text{W.}$; SE $\frac{1}{4}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 29, T. 22 N., R. 27 E.
Age (mineral): 9.5 ± 0.6 Ma (plagioclase), 26.2 ± 1.2 Ma (hornblende)
Reference: Morton and others (1977)
Comments: Morton and others (1977) noted that high atmospheric-argon content of both minerals is typical of some rocks that have undergone hydrothermal alteration; discordance may indicate resetting of plagioclase, and perhaps both minerals, by postcrystallization thermal activity. The 26-Ma hornblende age is typical of andesites in region

FALLON 15' QUADRANGLE (S)

- S1. Rock description:** Basalt
Location: Rattlesnake Hill; NW $\frac{1}{4}$ sec. 29, T. 19 N., R. 29 E.

Age (mineral): 1.03±0.05 Ma (whole rock)

Reference: Evans (1980), *quoted in* Fultz and others (1984)

S2. Rock description: Basalt

Location: Red Mountain; SW¼ sec. 20, T. 18 N., R. 27 E.

Age (mineral): 6.96±0.42 Ma (whole rock)

Reference: Evans (1980) and Sibbitt (oral commun., 1983), *both quoted in* Fultz and others (1984)

WEBER RESERVOIR 15' QUADRANGLE (T)

T1. Rock description: Ash bed in Wassuk Group

Location: lat 39°00'15"N., long 118°59'43.5"W.

Age (mineral): 9.5±1.2 Ma (hornblende)

Reference: Dilles and Gans (1993); John, Dilles, and Hardyman (1993, fig. 7 and p. 446)

T2. Rock description: Hornblende-andesite lapilli tuff

Location: Northeastern Desert Mountains; lat 39°13'21"N., long 118°45'24"W.; SW¼NW¼ sec. 29 (unsurveyed), T. 16 N., R. 29 E.

Age (mineral): 12.5 Ma (hornblende)

Reference: Silberman and McKee (1972); Willden and Speed (1974)

Comments: Lapilli tuff interbedded in top of diatomaceous shale sequence, northeastern Desert Mountains

T3. Rock description: Intrusion related to andesite of Lincoln Flat

Location: lat 39°00'09.5"N., long 118°53'52"W.

Age (mineral): 12.85±0.33 Ma (hornblende)

Method: $^{40}\text{Ar}/^{39}\text{Ar}$

Reference: Dilles and Gans (1993; see also, in press)

T4. Rock description: Andesite of Lincoln Flat; lava flow

Location: lat 39°00'35"N., long 118°56'08"W.

Age (mineral): 14.08±0.23 Ma (hornblende)

Method: $^{40}\text{Ar}/^{39}\text{Ar}$

Reference: Dilles and Gans (1993; see also, in press)

T5. Rock description: Pyroxene-andesite dike

Location: lat 39°00'46"N., long 118°56'38"W.

Age (mineral): 22.16±0.27 Ma (whole rock)

Method: $^{40}\text{Ar}/^{39}\text{Ar}$

Reference: Dilles and Gans (1993; see also, in press)

T6. Rock description: Ash block in breccia

Location: lat 39°02'24"N., long 118°56'40"W.

Age (mineral): 23.734±0.039 Ma (sanidine)

Method: $^{40}\text{Ar}/^{39}\text{Ar}$

Reference: Dilles and Gans (1993; see also, in press)

Comments: Age considered too old because of incorporation of fragments and minerals of older rocks

T7. Rock description: Tuff of Bluestone Mine; ash-

flow tuff

Location: lat 39°02'04"N., long 118°57'48"W.

Age (mineral): 24.604±0.025 Ma (sanidine)

Method: $^{40}\text{Ar}/^{39}\text{Ar}$

Reference: Dilles and Gans (1993; see also, in press)

T8. Rock description: Tuff of Bluestone Mine; ash-flow tuff

Location: lat 39°02'11"N., long 118°57'43"W.

Age (mineral): 24.659±0.020 Ma (sanidine)

Method: $^{40}\text{Ar}/^{39}\text{Ar}$

Reference: Dilles and Gans (1993; see also, in press)

T9. Rock description: Rhyolite ash-flow tuff

Location: lat 39°01'57"N., long 118°57'37"W.

Age (mineral): 28.579±0.038 Ma (sanidine)

Method: $^{40}\text{Ar}/^{39}\text{Ar}$

Reference: Dilles and Gans (1993; see also, in press)

ALLEN SPRINGS 15' QUADRANGLE (X)

X1. Rock description: Hornblende dacite

Location: lat 39°06'00"N., long 118°42'36"W.; NW¼SW¼ sec. 2, T. 14 N., R. 29 E.

Age (mineral): 21.8 Ma (hornblende)

Reference: Silberman and McKee (1972); Willden and Speed (1974)

Comments: Plug intruding rhyolite tuffs along northeastern front of Terrill Mountains

LONE ROCK NW, LONE ROCK, LONE ROCK SW, AND LONE ROCK SE 7½' QUADRANGLES (Y)

Y1. Rock description: Very coarse grained olivine basalt; sample from Amoco S.P. Land Co. drill hole #1

Location: Central part of NW¼ sec. 32, T. 24 N., R. 33 E.

Age (mineral): 4.2±0.1 Ma (whole rock, acid treated)

Comments: Sample made up of chips from core from 5,156 to 5,168 ft (specific depth and weight of chip fractions: 5,156 ft, 1.9 g; 5,160 ft, 5.75 g; 5,164 ft, 17.02 g; 5,168 ft, 24.2 g). Basalt is considered to be a sill by Hastings (1979) but could be a lava flow. From surface down to 6,900 ft, drill hole consists of largely lacustrine clays and silts that contain a few tuff beds; from 6,900 to 7,500 ft, it consists of "capping basalt" (Hastings, 1979), from which sample loc. Y2 was collected

Sample material from: Drill-core and chip library, Nevada Bureau of Mines and Geology, Reno, Nev.

Isotopic data and age by: E.H. McKee

Analytical data: $\text{K}_2\text{O}=1.188\%$; $^{40}\text{Ar}^*=7.23799\times 10^{-12}$ mole/g; $^{40}\text{Ar}^*/\Sigma^{40}\text{Ar}=0.37$

- Y2. Rock description:** Basalt; sample from Amoco S.P. Land Co. drill hole #1
Location: Central part of NW¼ sec. 33, T. 24 N., R. 33 E.
Age (mineral): 7.7 ± 0.2 Ma (whole rock, acid treated)
Comments: Sample made up of drill chips from 7,480 to 7,430 ft (specific depth and weight of chip fractions: 7,430 to 7,440 ft, 13.99 g; 7,440 to 7,450 ft, 14.98 g; 7,450 to 7,460 ft, 15.99 g; 7,460 to 7,470 ft, 14.99 g; 7,470 to 7,480 ft, 9.70 g; 7,480 to 7,490 ft, 5.65 g). Basalt is referred to as "capping basalt" by Hastings (1979) and is main widespread reflector on seismic reflection line
Sample material from: Drill-core and chip library, Nevada Bureau of Mines and Geology, Reno, Nev.
Isotopic data and age by: E.H. McKee
Analytical data: $K_2O = 2.838\%$; $^{40}Ar^* = 3.15479 \times 10^{-11}$ mole/g; $^{40}Ar^*/\Sigma^{40}Ar = 0.45$

PINTAIL BAY, COX CANYON, FOXTAIL LAKE, AND TABLE MOUNTAIN 7½' QUADRANGLES (Z)

- Z1. Rock description:** Fine-grained, microcrystalline olivine-clinopyroxene-plagioclase basalt lava flow unconformably overlying ash-flow tuff
Location: Southern end of Table Mountain in southern Stillwater Range; lat $39^\circ 30' 37''$ N., long $118^\circ 19' 05''$ W.
Age (mineral): 13.3 ± 0.4 Ma (whole rock)
Collected by: D.A. John
Isotopic data and age by: E.H. McKee
Analytical data: $K_2O = 1.907\%$; $^{40}Ar^* = 3.667 \times 10^{-11}$ mole/g; $^{40}Ar^*/\Sigma^{40}Ar = 0.61$
- Z2. Rock description:** Microcrystalline olivine-clinopyroxene-plagioclase basalt lava flow unconformably overlying Miocene sedimentary rocks
Location: Near mouth of West Lee Canyon in southern Stillwater Range; lat $39^\circ 35' 32''$ N., long $118^\circ 19' 00''$ W.
Age (mineral): 14.4 ± 0.6 Ma (whole rock)
Collected by: D.A. John
Isotopic data and age by: E.H. McKee
Analytical data: $K_2O = 1.651\%$; $^{40}Ar^* = 3.442189 \times 10^{-11}$ mole/g; $^{40}Ar^*/\Sigma^{40}Ar = 0.29$
- Z3. Rock description:** Sparsely porphyritic rhyolite intrusion
Location: lat $39^\circ 37'$ N., long $118^\circ 19'$ W.
Age (mineral): 20.9 ± 0.6 Ma (sanidine)
Collected by: D.A. John
Isotopic data and age by: E.H. McKee
Analytical data: $K_2O = 7.53\%$; $^{40}Ar^* = 2.27447 \times 10^{-10}$ mole/g; $^{40}Ar^*/\Sigma^{40}Ar = 0.721$
- Z4. Rock description:** Sparsely porphyritic rhyolite lava flow unconformably overlying tuff of Poco Canyon
Location: lat $39^\circ 37' 00''$ N., long $118^\circ 16' 53''$ W.
Age (mineral): 22.4 ± 0.7 Ma (sanidine)
Collected by: D.A. John
Isotopic data and age by: E.H. McKee
Analytical data: $K_2O = 4.21\%$; $^{40}Ar^* = 1.36655 \times 10^{-10}$ mole/g; $^{40}Ar^*/\Sigma^{40}Ar = 0.65$
- Z5. Rock description:** Biotite-hornblende-plagioclase dacite porphyry intruding the tuff of Poco Canyon
Location: Poco Canyon; lat $39^\circ 36' 47''$ N., long $118^\circ 16' 08''$ W.
Age (mineral): 22.6 ± 0.7 Ma (hornblende)
Collected by: D.A. John
Isotopic data and age by: E.H. McKee
Analytical data: $K_2O = 0.697\%$; $^{40}Ar^* = 2.276 \times 10^{-11}$ mole/g; $^{40}Ar^*/\Sigma^{40}Ar = 0.31$
- Z6. Rock description:** Tuff of Poco Canyon (intracaldera)
Location: Poco Canyon; lat $39^\circ 36' 40''$ N., long $118^\circ 15' 35''$ W.
Age (mineral): 23.3 ± 0.7 Ma (sanidine)
Collected by: D.A. John
Isotopic data and age by: E.H. McKee
Analytical data: $K_2O = 8.44\%$; $^{40}Ar^* = 2.699 \times 10^{-10}$ mole/g; $^{40}Ar^*/\Sigma^{40}Ar = 0.92$
- Z7. Rock description:** Glassy biotite-rhyolite dome intruding tuff of Lee Canyon
Location: West side of Stillwater Range in Poco Canyon; lat $39^\circ 37' 19''$ N., long $118^\circ 17' 17''$ W.
Age (mineral): 24.2 ± 0.8 Ma (biotite)
Collected by: D.A. John
Isotopic data and age by: E.H. McKee
Analytical data: $K_2O = 8.54\%$; $^{40}Ar^* = 2.991 \times 10^{-10}$ mole/g; $^{40}Ar^*/\Sigma^{40}Ar = 0.56$
- Z8. Rock description:** Tuff of Poco Canyon (intracaldera)
Location: Poco Canyon; lat $39^\circ 36' 40''$ N., long $118^\circ 15' 35''$ W.
Age (mineral): 24.5 ± 0.8 Ma (biotite)
Collected by: D.A. John
Isotopic data and age by: E.H. McKee
Analytical data: $K_2O = 8.38\%$; $^{40}Ar^* = 2.979 \times 10^{-10}$ mole/g; $^{40}Ar^*/\Sigma^{40}Ar = 0.77$
- Z9. Rock description:** Tuff of Elevenmile Canyon
Location: West side of Stillwater Range in Long Canyon; lat $39^\circ 34' 20''$ N., long $118^\circ 17' 20''$ W.
Age (mineral): 24.5 ± 0.9 Ma (biotite)
Collected by: D.A. John
Isotopic data and age by: E.H. McKee
Analytical data: $K_2O = 8.21\%$; $^{40}Ar^* = 2.922 \times 10^{-10}$ mole/g; $^{40}Ar^*/\Sigma^{40}Ar = 0.68$
- Z10. Rock description:** Tuff of Lee Canyon
Location: West side of Stillwater Range in Poco Canyon; lat $39^\circ 37' 19''$ N., long $118^\circ 17' 30''$ W.
Age (mineral): 24.6 ± 0.8 Ma (biotite)
Collected by: D.A. John
Isotopic data and age by: E.H. McKee
Analytical data: $K_2O = 8.30\%$; $^{40}Ar^* = 2.956 \times 10^{-10}$

mole/g; $^{40}\text{Ar}^*/\Sigma^{40}\text{Ar}=0.78$

Z11. Rock description: Vitrophyric, fine-grained biotite-rhyolite dome intruding tuff of Lee Canyon

Location: Long Canyon, southern Stillwater Range; lat $39^{\circ}35'02''\text{N.}$, long $118^{\circ}18'28''\text{W.}$

Age (mineral): 24.8 ± 0.6 Ma (biotite)

Collected by: D.A. John

Isotopic data and age by: E.H. McKee

Analytical data: $\text{K}_2\text{O}=8.22\%$; $^{40}\text{Ar}^* = 2.97053 \times 10^{-10}$ mole/g; $^{40}\text{Ar}^*/\Sigma^{40}\text{Ar}=0.74$

Z12. Rock description: Coarsely porphyritic dacite flow breccia; caldera fill from younger dacite and andesite sequence

Location: Job Canyon caldera; lat $39^{\circ}38'10''\text{N.}$, long $118^{\circ}17'46''\text{W.}$

Age (mineral): 27.3 ± 0.9 Ma (plagioclase)

Collected by: D.A. John

Isotopic data and age by: E.H. McKee

Analytical data: $\text{K}_2\text{O}=0.481\%$; $^{40}\text{Ar}^* = 1.90329 \times 10^{-11}$ mole/g; $^{40}\text{Ar}^*/\Sigma^{40}\text{Ar}=0.402$

DIAMOND CANYON, LA PLATA CANYON, FOURMILE FLAT, AND FRESHMAN $7\frac{1}{2}'$ QUADRANGLES (AA)

AA1. Rock description: Reworked, hornblende-rich andesite tuff interbedded near top of sequence of lacustrine and fluvial sedimentary rocks

Location: lat $39^{\circ}26'58''\text{N.}$, long $118^{\circ}23'15''\text{W.}$

Age (mineral): 12.6 ± 0.5 Ma (hornblende)

Collected by: D.A. John

Isotopic data and age by: E.H. McKee

Analytical data: $\text{K}_2\text{O}=0.752\%$; $^{40}\text{Ar}^* = 1.36459 \times 10^{-11}$ mole/g; $^{40}\text{Ar}^*/\Sigma^{40}\text{Ar}=0.211$

AA2. Rock description: Fine-grained basaltic andesite depositionally overlying reworked tuff listed above (loc. AA1)

Location: lat $39^{\circ}26'57''\text{N.}$, long $118^{\circ}23'33''\text{W.}$

Age (mineral): 13.0 ± 0.4 Ma (whole rock)

Collected by: D.A. John

Isotopic data and age by: E.H. McKee

Analytical data: $\text{K}_2\text{O}=2.053\%$; $^{40}\text{Ar}^* = 3.85813 \times 10^{-11}$ mole/g; $^{40}\text{Ar}^*/\Sigma^{40}\text{Ar}=0.712$

AA3. Rock description: Biotite-hornblende dacite tuff interbedded near top of sequence of lacustrine and fluvial sedimentary rocks

Location: lat $39^{\circ}28'23''\text{N.}$, long $118^{\circ}24'33''\text{W.}$

Age (mineral): 13.5 ± 0.4 Ma (biotite)

Collected by: D.A. John

Isotopic data and age by: E.H. McKee

Analytical data: $\text{K}_2\text{O}=8.04\%$; $^{40}\text{Ar}^* = 1.568848 \times 10^{-10}$ mole/g; $^{40}\text{Ar}^*/\Sigma^{40}\text{Ar}=0.668$

AA4. Rock description: Reworked dacitic tuff interbedded near top of sequence of lacustrine and fluvial sedimentary rocks

Location: lat $39^{\circ}26'42''\text{N.}$, long $118^{\circ}23'28''\text{W.}$

Age (mineral): 13.9 ± 0.4 Ma (biotite)

Collected by: D.A. John

Isotopic data and age by: E.H. McKee

Analytical data: $\text{K}_2\text{O}=7.93\%$; $^{40}\text{Ar}^* = 1.59614 \times 10^{-10}$ mole/g; $^{40}\text{Ar}^*/\Sigma^{40}\text{Ar}=0.605$

AA5. Rock description: Porphyritic basalt dike intruding Miocene sedimentary rocks

Location: Southern Stillwater Range, about 1 km north of Mountain Well; lat $39^{\circ}27'28''\text{N.}$, long $118^{\circ}22'17''\text{W.}$

Age (mineral): 13.9 ± 0.5 Ma (whole rock)

Collected by: D.A. John

Isotopic data and age by: E.H. McKee

Analytical data: $\text{K}_2\text{O}=1.352\%$; $^{40}\text{Ar}^* = 2.616 \times 10^{-4}$ mole/g; $^{40}\text{Ar}^*/\Sigma^{40}\text{Ar}=0.45$

AA6. Rock description: Fine- to medium-grained, porphyritic hornblende andesite lava flow overlying Miocene sedimentary rocks

Location: East of Mountain Well, southern Stillwater Range; lat $39^{\circ}26'43''\text{N.}$, long $118^{\circ}20'57''\text{W.}$

Age (mineral): 15.3 ± 0.5 Ma (hornblende)

Collected by: D.A. John

Isotopic data and age by: E.H. McKee

Analytical data: $\text{K}_2\text{O}=0.541\%$; $^{40}\text{Ar}^* = 1.197 \times 10^{-11}$ mole/g; $^{40}\text{Ar}^*/\Sigma^{40}\text{Ar}=0.25$

AA7. Rock description: Porphyritic biotite-quartz-potassium-feldspar-plagioclase rhyolite dike intruding tuff of Elevenmile Canyon

Location: lat $39^{\circ}26'36''\text{N.}$, long $118^{\circ}16'12''\text{W.}$

Age (mineral): 18.3 ± 0.5 Ma (biotite+chlorite)

Collected by: D.A. John

Isotopic data and age by: E.H. McKee

Analytical data: $\text{K}_2\text{O}=2.526\%$; $^{40}\text{Ar}^* = 6.67666 \times 10^{-11}$ mole/g; $^{40}\text{Ar}^*/\Sigma^{40}\text{Ar}=0.344$

Alteration age

AA8. Rock description: Hydrothermal alkali feldspar in sugary vein quartz; some vein material appears to be replacement of lamellar calcite

Location: lat $39^{\circ}16'12''\text{N.}$, long $118^{\circ}21'06''\text{W.}$; $\text{N}\frac{1}{2}\text{NE}\frac{1}{4}\text{NE}\frac{1}{4}$ sec. 11, T. 16 N., R. 32 E.

Age (mineral): 19.5 ± 0.5 Ma (alkali feldspar), 20.0 ± 0.5 Ma (alkali feldspar)

Reference: Garside and others (1981)

Comments: Sample is from main, east-trending quartz vein in Sand Springs mining district; age is believed to be that of mineralization in district

FOURMILE CANYON, CHUKAR CANYON, RAWHIDE, AND BIG KASOCK MOUNTAIN $7\frac{1}{2}'$ QUADRANGLES (BB)

BB1. Rock description: Porphyritic rhyolite

Location: lat $39^{\circ}01.0'\text{N.}$, long $118^{\circ}25.9'\text{W.}$; north-central part of T. 13 N., R. $31\frac{1}{2}'\text{E.}$

Age (mineral): 15.0 ± 0.4 Ma (biotite), 15.1 ± 0.4 Ma (sanidine)

Reference: Silberman and others (1975)

BB2. Rock description: Hornblende andesite

Location: lat 39°08'48"N., long 118°27'42"W.; SE¼ sec. 24, T. 15 N., R. 31 E.

Age (mineral): 18.1 Ma (hornblende)

Reference: Silberman and McKee (1972); Willden and Speed (1974)

Comments: Flow in southwestern Cocoon Mountains

BB3. Rock description: Aplite-pegmatite dike

Location: lat 39°12'00"N., long 110°23'00"W.

Age (mineral): 33.4±3.0 Ma (biotite)

Reference: Nevada Bureau of Mines and Geology (1964)

Comments: Biotite shows considerable alteration to chlorite, and unaltered biotite from another dike in area gives Cretaceous K-Ar age; thus, age is not considered reliable

Alteration ages

BB4. Rock description: Adularia associated with mineralization

Location: NE¼ sec. 8, T. 13 N., R. 32 E.

Age (mineral): 15.7±0.6 Ma (adularia)

Reference: Black and others (1991)

Comments: Rawhide mining district; vein adularia from large mine dump adjacent to prominent open slope of Truett Mine, south side of Hooligan Hill

BB5. Rock description: Altered rhyolite

Location: lat 39°01.0'N., long 118°23.6'W.; NE¼ sec. 8, T. 13 N., R. 32 E.

Age (mineral): 15.9±0.5 Ma (muscovite)

Reference: Silberman and others (1975)

Comments: Portal of adit of Yellowstone tunnel, east end of Hooligan Hill within Rawhide townsite. Rock consists of altered porphyritic rhyolite recrystallized to assemblage of sericite, quartz, potassium-feldspar, and limonite (after pyrite). Potassium-feldspar is present mostly in groundmass that contains quartz and fine-grained mica. Feldspar phenocrysts are now mostly sericite and quartz. Mica flakes, which probably were originally biotite, now consist of muscovite lamellae that contain iron-oxide minerals. Mica flakes are coarser grained than potassium-mica grains in groundmass

DIXIE HOT SPRINGS 15' QUADRANGLE (CC)

CC1. Rock description: Altered gabbro

Location: Dixie Comstock Mine; lat 39°52'12"N., long 118°01'00"W.

Age (mineral): 13.6±0.4 Ma (whole rock)

Reference: Russell and others (1989)

CC2. Rock description: Volcanic rock associated with diatomite

Location: Copper Kettle Canyon; sec. 26, T. 24 N., R. 34 E.

Age: 18.9±1.9 Ma

Reference: Krebs and Bradbury (1984; see also, in

press)

CC3. Rock description: Biotite-rich tuff

Location: White Rock Canyon, Stillwater Range; lat 39°54'32"N., long 118°02'24"W.

Age (mineral): 27.2±0.7 Ma (biotite)

Comments: Tentatively correlated by Hudson and Geissman (1991) with tuff of McCoy mine (McKee and Stewart, 1971)

Collected by: D.A. John

Isotopic data and age by: E.H. McFee

Analytical data: K₂O=8.21%; ⁴⁰Ar*=3.244×10⁻¹⁰ mole/g; ⁴⁰Ar*/Σ⁴⁰Ar=0.78

IXL CANYON, DIXIE VALLEY, JOB PEAK, AND DIXIE VALLEY SE 7½' QUADRANGLES (DD)

DD1. Rock description: Freeman Creek pluton; coarse-grained biotite granite

Location: Mouth of Freeman Creek, along east side of southern Stillwater Range; lat 39°35'11"N., long 118°12'18"W.

Age (mineral): 19.5±0.6 Ma (biotite)

Collected by: D.A. John

Isotopic data and age by: E.H. McFee

Analytical data: K₂O=5.54%; ⁴⁰Ar*=1.566×10⁻¹⁰ mole/g; ⁴⁰Ar*/Σ⁴⁰Ar=0.42

DD2. Rock description: Freeman Creek pluton; medium-grained biotite-hornblende granodiorite

Location: lat 39°35'19"N., long 118°11'47"W.

Age (mineral): 22.8±0.6 Ma (biotite)

Collected by: D.A. John

Isotopic data and age by: E.H. McFee

Analytical data: K₂O=7.76%; ⁴⁰Ar*=2.56004×10⁻¹⁰ mole/g; ⁴⁰Ar*/Σ⁴⁰Ar=0.679

DD3. Rock description: Biotite-rhyolite dike intruding tuff of Elevenmile Canyon

Location: lat 39°30'36"N., long 118°13'09"W.

Age (mineral): 25.6±1.1 Ma (biotite)

Collected by: D.A. John

Isotopic data and age by: E.H. McFee

Analytical data: K₂O=8.13%; ⁴⁰Ar*=3.016737×10⁻¹⁰ mole/g; ⁴⁰Ar*/Σ⁴⁰Ar=0.156

DD4. Rock description: IXL Canyon pluton; biotite-hornblende granodiorite

Location: Along crest of Stillwater Range, at head of East Job Canyon; lat 39°39'14"N., long 118°14'12"W.

Age (mineral): 27.8±0.8 Ma (biotite)

Collected by: D.A. John

Isotopic data and age by: E.H. McFee

Analytical data: K₂O=7.69%; ⁴⁰Ar*=3.099×10⁻¹⁰ mole/g; ⁴⁰Ar*/Σ⁴⁰Ar=0.75

DD5. Rock description: IXL Canyon pluton; quartz monzonite

Location: Floor of IXL Canyon, about 180 m upstream from canyon mouth; lat 39°39'42"N., long 118°11'27"W.

Age (mineral): 28.7±2 Ma (biotite)

Reference: Speed and Armstrong (1971)

Alteration ages

- DD6. Rock description:** Sericitic replacement of feldspar in granite

Location: lat 39°33'22"N., long 118°12'10"W.

Age (mineral): 21.8±0.9 Ma (muscovite)

Reference: Parry and others (1991)

- DD7. Rock description:** Sericite completely replacing feldspar in granite

Location: lat 39°33'20"N., long 118°12'08"W.

Age (mineral): 25.0±1 Ma (muscovite)

Reference: Parry and others (1991)

PIROUETTE MOUNTAIN, WONDER MOUNTAIN, DRUMM SUMMIT, AND WEST GATE 7½' QUADRANGLES (EE)

- EE1. Rock description:** Fine-grained, porphyritic biotite-rhyolite dike

Location: lat 39°28'42"N., long 118°07'53"W.

Age (mineral): 19.5±0.6 Ma (biotite)

Collected by: D.A. John

Isotopic data and age by: E.H. McKee

Analytical data: K₂O=8.23%; $^{40}\text{Ar}^* = 2.31883 \times 10^{-10}$ mole/g; $^{40}\text{Ar}^*/\Sigma^{40}\text{Ar}=0.465$

- EE2. Rock description:** Biotite-hornblende dacite ash-flow tuff

Location: lat 39°26'37"N., long 118°03'55"W.

Age (mineral): 21.5±0.6 Ma (sanidine)

Collected by: D.A. John

Isotopic data and age by: E.H. McKee

Analytical data: K₂O=8.18%; $^{40}\text{Ar}^* = 2.53304 \times 10^{-10}$ mole/g; $^{40}\text{Ar}^*/\Sigma^{40}\text{Ar}=0.830$

- EE3. Rock description:** Medium-grained biotite-hornblende-plagioclase dacite porphyry intruding propylitized intracaldera rocks of tuff of Elevenmile Canyon

Location: About 3 km east of Elevenmile Canyon, in southern Stillwater Range; lat 39°28'59"N., long 118°14'46"W.

Age (mineral): 24.3±0.6 Ma (biotite)

Collected by: D.A. John

Isotopic data and age by: E.H. McKee

Analytical data: K₂O=8.22%; $^{40}\text{Ar}^*=2.9705 \times 10^{-10}$ mole/g; $^{40}\text{Ar}^*/\Sigma^{40}\text{Ar}=0.735$

Alteration Age

- EE4. Rock description:** Quartz-adularia vein; fine- to medium-grained, white intergrowths of quartz and adularia that contain minor amounts of limonite-stained fractures

Location: SW¼ sec. 4, T. 18 N., R. 35 E. (unsurveyed); ore bin of Nevada Wonder Mine

Age (mineral): 22.2±0.6 Ma (adularia, orthoclase structure)

Reference: Silberman and others (1973)

- EE5. Rock description:** Vein in Gold King Group fault

Location: Wonder mining district; lat 39°28'49"N., 118°04'59"W.; SW¼NW¼SE¼ sec. 30, T. 19 N., R. 35 E.

Age (mineral): 23.0±0.7 Ma (adularia)

Reference: Garside and others (1993)

BELL CANYON, BELL MOUNTAIN, SLATE MOUNTAIN, AND BROKEN HILLS 7½' QUADRANGLES (FF)

- FF1. Rock description:** Andesite

Location: lat 39°05'24"N., long 118°02'30"W.; SE¼ sec. 8, T. 14 N., R. 35 E.

Age (mineral): 27.7 Ma (hornblende)

Reference: Silberman and McKee (1972); Willden and Speed (1974)

Comments: Flow in older volcanic unit, in hills about 1.6 km west of State Highway 23 along road from Fairview Peak earthquake fault scarp

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