U.S. geological survey radiometric ages- compilation "C" part II; Arizona and New Mexico

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Isochron/West was published at irregular intervals from 1971 to 1996. The journal was patterned after the journal *Radiocarbon* and covered isotopic age-dating (except carbon-14) on rocks and minerals from the Western Hemisphere. Initially, the geographic scope of papers was restricted to the western half of the United States, but was later expanded. The journal was sponsored and staffed by the New Mexico Bureau of Mines *(now Geology)* & Mineral Resources and the Nevada Bureau of Mines & Geology.

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U.S. GEOLOGICAL SURVEY RADIOMETRIC AGES—COMPILATION "C"
Part two: Arizona and New Mexico

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This is part two of the third compilation of a planned series of age determinations by the U.S. Geological Survey appearing in Isochron/West. It contains both unpublished and published dates. However, the latter ages lacked either a specific sample location, petrologic information, or analytical data in their published form. Such specifics are often needed for evaluation and utilization of an isotopic age. That, we believe, is the value of this compilation—it supplies such information for most of the listed samples. Users are warned to use these ages with discretion as they constitute only a part of the total geologic picture in any particular area. For ease of reference, samples are grouped together by state.

Some of the listed ages are spurious due to the presence of xenocrystic material, excess radiogenic argon, mineral alteration, diffusion of radiogenic argon, etc. If the age is recognized as being spurious, this fact is mentioned. In a number of cases, we have insufficient information, geologic or otherwise, to accurately evaluate the listed age. The spurious mineral ages are of value in that they may indicate to future geochronologists and geologists that there are potential problems in dating certain rocks in that sampled locality.

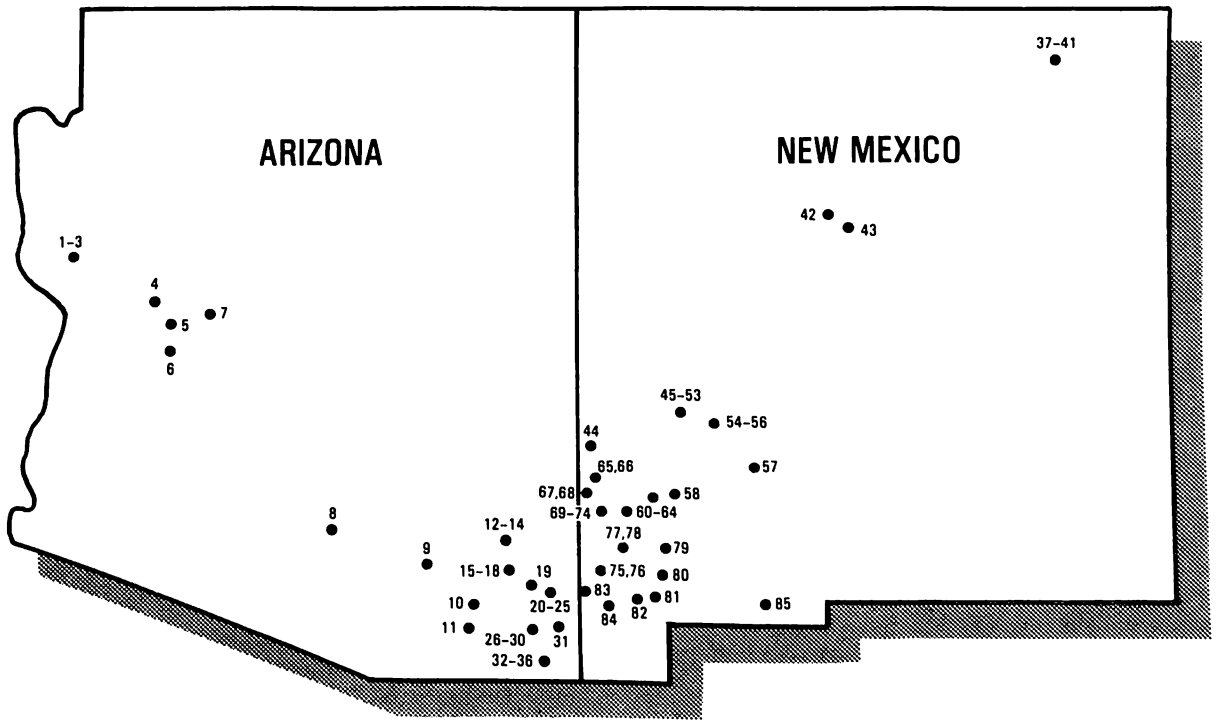
All the ages were determined by U.S. Geological Survey personnel in Denver, Colorado. Analysts are R. F. Marvin, H. H. Mehnert, and E. A. Brandt for K-Ar ages; C. E. Hedge and K. Futa or R. E. Zartman and W. T. Henderson for Rb-Sr ages; R. E. Zartman and M. D. Gallego or L. M. Kwak for U-Th-Pb ages; and C. W. Naeser for fission-track ages. Analytical techniques are not described as these dating methods are fairly common knowledge to most geologists.

The following decay constants, recommended by the IUGS Subcommission on Geochronology were used.

Potassium-40: $\lambda\epsilon = 0.581 \times 10^{-10}$/yr, $\lambda\beta = 4.962 \times 10^{-10}$/yr; atomic abundance is 0.01167 atomic percent

Rubidium-87: $\lambda\beta = 1.42 \times 10^{-11}$/yr

Fission-track: $\lambda = 7.03 \times 10^{-17}$/yr for U^{238}



Geologic index to sample localities in Arizona and New Mexico.

SAMPLE DESCRIPTIONS

ARIZONA

1. *USGS(D)KH78-100* K-Ar
Medium-grained, equigranular, biotite syenogranite (34°51′24″N, 114°05′27″W; SE¼NE¼ S17,T17N,R17W; Sacramento Valley near the Hualapai Mountains, Yucca SE 7.5′ quad., Mohave Co., AZ). *Analytical data:* K_2O = 9.03, 9.07%; $*Ar^{40}$ = 195.9 × 10^{10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 97%. *Collected by:* K. A. Howard. *Comments:* The calculated age is probably a minimum age for this syenogranite pluton.

biotite 1090 ± 40 Ma

2. *USGS(D)H80Hu-346* Rb-Sr
Biotite monzogranite (34°58′45″N, 114°01′05″W; SW¼SW¼SW¼ S31,T19N,R16W; Hualapai Mountains, Yucca NE 7.5′ quad., Mohave Co., AZ). *Analytical data:* Rb = 1207 ppm, Sr = 19.7 ppm, Rb^{87}/Sr^{86} = 245.1, Sr^{87}/Sr^{86} = 4.5982. *Submitted by:* K. A. Howard. *Comments:* Calculated age is a minimum age for this monzogranite pluton.

biotite 1110 Ma

3. *USGS(D)H80Hu-344* K-Ar, Rb-Sr
Biotite-hornblende granodiorite (34°55′05″N, 113°59′30″W; NE¼ S29,T18N,R16W; Hualapai Mountains, Wabayuma Peak SW 7.5′ quad., Mohave Co., AZ). *Analytical data:* K-Ar (hornblende) K_2O = 0.90, 0.91%; $*Ar^{40}$ = 30.91 × 10^{10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 97%; Rb-Sr (biotite) Rb = 836 ppm, Sr = 12.5 ppm, Rb^{87}/Sr^{86} = 268.2, Sr^{87}/Sr^{86} = 4.6189. *Submitted by:* K. A. Howard. *Comments:* The biotite Rb-Sr age is a minimum age for this granodiorite pluton; however, the hornblende K-Ar age may be a more reliable age of emplacement. The latter age needs to be substantiated.

K-Ar: hornblende 1510 ± 90 Ma
Rb-Sr: biotite 1020 Ma

4. *USGS(D)735*
Porphyry extrusive (34°24′43″N, 113°17′11″; center of N½ S3,T12N,R10W; 40-m from spring in Cottonwood Canyon, Arrastra Mountain NE 7.5′ quad., Yavapai Co., AZ). *Analytical data:* K_2O = 7.49, 7.42%; $*Ar^{40}$ = 2.379 × 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 69%. *Collected by:* Bruce Bryant. K-Ar

biotite 22.0 ± 0.8 Ma

5. *E-210-79*
(Brooks, 1985; Brooks and Marvin, 1985) K-Ar
Rhyodacite flow (34°13′39″N, 113°10′48″W; NE¼ S10,T10N,R9W; at elevation 2,800-ft on SE side of Hill 2889, Dale Creek Ranch NW 7.5′ quad., Yavapai Co., AZ). *Analytical data:* K_2O = 8.14, 8.14%; $*Ar^{40}$ = 2.608 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 78%. *Collected by:* W. E. Brooks. *Comments:* The rhyodacite flow from McLendon volcano is aphanitic with biotite, plagioclase, and amphibole phenocrysts. Brooks (1985) and Brooks and Marvin (1985) also reported two fission-track ages—19.2 ± 1.4 Ma (zircon) and 17.1 ± 2.7 Ma (apatite). This K-Ar biotite age is a minimum age for the rhyodacite.

biotite 22.1 ± 0.8 Ma

6. *E-191B* K-Ar
(Brooks, 1985, 1986; Brooks and Marvin, 1985)
Vitrophyre (34°00′56″N, 113°06′55″W; S29,T8N,R8W; Harcuvar Mountains, Date Creek Ranch SE 7.5′ quad., Yavapai Co., AZ). *Analytical data:* K_2O = 6.94, 6.90%; $*Ar^{40}$ = 2.392 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar$ = 79%. *Collected by:* W. E. Brooks. *Comments:* Porphyritic basal vitrophyre of an ash-flow tuff. Two fission-track ages were reported also by Brooks (1985) and Brooks and Marvin (1985)—18.6 ± 1.0 Ma (zircon) and 18.3 ± 4.0 Ma (apatite). K-Ar age is minimum age for vitrophyre.

biotite 23.9 ± 0.9 Ma

7. *USGS(D)Route 89-285.2* K-Ar
Basalt (34°19′21″N, 112°41′53.4″W; NW¼SW¼ S5,T11N,R4W; Peeples Valley 7.5′ quad., Yavapai Co., AZ). *Analytical data:* K_2O = 0.82, 0.81%; $*Ar^{40}$ = 0.1463 × 10^{-10} mol/gm, $*Ar^{40}$ = 47%. *Collected by:* J. K. Otton.

whole-rock 12.4 ± 0.8 Ma

8. *USGS(D)PP-8* K-Ar
Dacite-rhyodacite (32°32′57″N, 111°27′53″W; S18,T10S,R9E; Red Rock 15′ quad., Pinal Co., AZ). *Analytical data:* K_2O = 4.30, 4.26%; $*Ar^{40}$ = 1.381 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 82%. *Collected by:* W. E. Brooks.

whole-rock 22.3 ± 0.8 Ma

9. *USGS(D)77D54* (Drewes, 1981a) Fission-track
Latite porphyry (32°15′30″N, 110°34′00″W; S36,T13S,R17E; in bottom of canyon, Bellota Ranch 15′ quad., Pima Co., AZ). *Analytical data:* (zircon) Ps = 7.24 × 10^6 tracks/cm² (834), Pi = 14.96 × 10^6 tracks/cm² (861), 0 = 1.03 × 10^{15} n/cm², U = 420 ppm; (apatite) Ps = 0.087 × 10^6 tracks/cm² (109), Pi = 0.234 × 10^6 tracks/cm² (293), 0 = 1.11 × 10^{15} n/cm², U = 6.1 ppm. *Collected by:* H. Drewes. *Comments:* A latite porphyry dike, part of a dike swarm, consisting of andesine and chloritized biotite phenocrysts in a finely-granular to cryptocrystalline groundmass. The zircon age is the apparent age of the dike.

zircon 29.8 ± 3.2 Ma
apatite 24.7 ± 5.5 Ma

10. *USGS(D)81D83* K-Ar
Medium-grained quartz monzonite pluton (31°58′05″N, 110°02′30″W; SW¼SW¼ S7,T17S,R23E; W side of Dragoon Mountains, Knob Hill 7.5′ quad., Cochise Co., AZ). *Analytical data:* K_2O = 9.26, 9.31%; $*Ar^{40}$ = 5.013 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 74%. *Collected by:* H. Drewes.

biotite 37.1 ± 1.3 Ma

11. *USGS(D)84D31* K-Ar
Granodiorite (31°43′18″N, 110°04′27″W; SE¼ S2,T20S,R22E; in gully 250-m west of Lookout Lodge, Tombstone 7.5′ quad., Cochise Co., AZ). *Analytical data:* K_2O = 0.74, 0.73%; $*Ar^{40}$ = 0.6741 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 65%. *Collected by:* H. Drewes. *Comments:* Granodiorite pluton may be a late-phase of the Schieffelin Granodiorite.

hornblende 62.6 ± 2.8 Ma

12. *USGS(D)78T105* K-Ar
Porphyritic latite dike (32°30′30″N, 109°44′18″W; NW¼SW¼NW¼ S6,T11S,R26E; Gillespie Mountain 7.5′ quad., Graham Co., AZ). *Analytical data:* K_2O = 0.72, 0.76, 0.68, 0.70%; $*Ar^{40}$ = 0.2757 × 10^{-10}

mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 64%. *Collected by:* C. H. Thorman.

hornblende 26.6 ± 3.1 Ma

13. *USGS(D)78T104* K-Ar
Andesite (32°30′30″N, 109°44′15″W; NW¼SW¼NW¼ S6,T11S,R26E; Gillespie Mountain 7.5′ quad., Graham Co., AZ). *Analytical data:* K_2O = 1.13, 1.16, 1.06, 1.06%; $*Ar^{40}$ = 0.3507×10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 61%. *Collected by:* C. H. Thorman. *Comments:* Probably a minimum age for turkey-track-type andesite porphyry in this area.

plagioclase 22.0 ± 2.1 Ma

14. *USGS(D)78T106* K-Ar
Quartz latite (32°30′53″N, 109°44′W; SW¼SW¼SW¼ S31,T10S,R26E; Gillespie Mountain 7.5′ quad., Graham Co., AZ). *Analytical data:* K_2O = 9.72, 9.75%; $*Ar^{40}$ = 3.683×10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 70%. *Collected by:* C. H. Thorman. *Comments:* Age of a porphyritic quartz latite dike; aphanitic quartz latite has quartz, K-feldspar, and biotite phenocrysts.

K-feldspar 26.1 ± 0.9 Ma

15. *USGS(D)81D135* (Erickson and Drewes, 1984) K-Ar
Very fine-grained olivine basalt (32°17′00″N, 109°41′55″W; NE¼NE¼ S28,T12S,R26E; 100-m W of ranch road and 1-km NW of junction of I-10 and US-666, N side of Dos Cabezas Mountains, Railroad Pass 7.5′ quad., Cochise Co., AZ). *Analytical data:* K_2O = 0.96, 0.96%; $*Ar^{40}$ = 0.1112×10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 54%. *Collected by:* H. Drewes.

whole-rock 8.0 ± 0.5 Ma

16. *USGS(D)79D321* (Drewes, 1985) Fission-track
Rhyolite (32°12′38″N, 109°36′38″W; SE¼SW¼ S17,T14S,R27E; 1.5-km S of Dos Cabezas Peaks, Dos Cabezas Mountains, Dos Cabezas 7.5′ quad., Cochise Co., AZ). *Analytical data:* (6 grains) Ps = 1.44×10^6 tracks/cm² (273), Pi = 4.39×10^6 tracks/cm² (417), D = 1.05×10^{15} n/cm², U = 120 ppm. *Collected by:* H. Drewes. *Comments:* Rhyolite breccia from the Dos Cabezas volcanic pile of Oligocene-Miocene age.

zircon 20.5 ± 3.3 Ma

17. *USGS(D)79D299* K-Ar
Pegmatite (32°14′52″N, 109°34′06″W; NE¼NE¼ S3,T14S,R27E; below Cement Spring in Cement Canyon, Dos Cabezas Mountains, Dos Cabezas 7.5′ quad., Cochise Co., AZ). *Analytical data:* K_2O = 10.29, 10.22%; $*Ar^{40}$ = 291.9×10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 95%. *Collected by:* H. Drewes. *Comments:* Pegmatite is in a granodiorite porphyry pluton.

muscovite 1340 ± 30 Ma

18. *USGS(D)79D296* (Drewes, 1985) Fission-track
Dacite (32°12′49″N, 109°34′15″W; SE¼ S15,T14S,R27E; E flank of Cooper Peak, Dos Cabezas Mountains, Dos Cabezas 7.5′ quad., Cochise Co., AZ). *Analytical data:* (6 grains) Ps = 2.29×10^6 tracks/cm² (635), Pi = 5.31×10^6 tracks/cm² (737), D = 1.05×10^{15} n/cm², U = 150 ppm. *Collected by:* H. Drewes. *Comments:* Dacite breccia from the Dos Cabezas volcanic pile of Oligocene-Miocene age.

zircon 27.0 ± 3.2 Ma

19. *USGS(D)79D341* (Drewes, 1985) (Fission-track)
Rhyolite dike (32°09′16″N, 109°31′45″W; SW¼ S6,T15S,R28E; in draw SW of White Rock Spring, Dos Cabezas Mountains, Dos Cabezas 7.5′ quad., Cochise Co., AZ). *Analytical data:* (6 grains) Ps = 3.23×10^6 tracks/cm² (463), Pi = 8.10×10^6 tracks/cm² (581), D = 1.05×10^{15} n/cm², U = 220 ppm. *Collected by:* H. Drewes.

zircon 25.0 ± 3.3 Ma

20. *USGS(D)78D81* (Drewes, 1982) K-Ar
Granodiorite, Emigrant Canyon stock (32°07′29″N, 109°21′55″W; NE¼SW¼ S14,T15S,R29E; Emigrant Canyon area in northern Chiricahua Mountains, Little Wood Canyon 7.5′ quad., Cochise Co., AZ). *Analytical data:* (biotite) K_2O = 7.38, 7.26%; $*Ar^{40}$ = 3.640×10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 85%; (hornblende) K_2O = 0.93, 0.92%; $*Ar^{40}$ = 0.4390×10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 63%. *Collected by:* H. Drewes.

biotite 34.2 ± 1.2 Ma
hornblende 32.7 ± 2.0 Ma

21. *USGS(D)79D317* (Drewes, 1981b) Fission-track
Tuff (32°05′13″N, 109°22′38″W; Dug Road Mountain, Chiricahua Mountains, Bowie Mountain South 7.5′ quad., Cochise Co., AZ). *Analytical data:* (6 grains) Ps = 3.14×10^6 tracks/cm² (582), Pi = 6.91×10^6 tracks/cm² (640), D = 1.05×10^{15} n/cm², U = 190 ppm. *Collected by:* H. Drewes. *Comments:* Rhyolite ash-flow tuff (Oligocene) caps Dug Road Mountain.

zircon 28.5 ± 3.5 Ma

22. *USGS(D)78D147* (Drewes, 1982) K-Ar, Fission-track
Rhyolite (32°05′56″N, 109°19′54″W; at about 6,790-ft elevation near crest of NE spur on Rough Mountain in northern Chiricahua Mountains, Cochise Head 7.5′ quad., Cochise Co., AZ). *Analytical data:* (biotite) K_2O = 8.35, 8.36%; $*Ar^{40}$ = 3.116×10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 66%; (zircon—6 grains) Ps = 2.91×10^6 tracks/cm² (635), Pi = 6.89×10^6 tracks/cm² (750), D = 1.01×10^{15} n/cm², U = 200 ppm. *Collected by:* H. Drewes. *Comments:* A rhyolite porphyry dike that cuts both stock and mineralized volcanics.

K-Ar: biotite 25.7 ± 0.9 Ma
Fission-track: zircon 25.5 ± 3.0 Ma

23. *USGS(D)78D132* (Drewes, 1982) K-Ar, Fission-track
Dacite (32°04′08″N, 109°17′48″W; S5,T15S,R30E; N spur of Cochise Head at 7,160-ft elevation, northern Chiricahua Mountains, Cochise Head 7.5′ quad., Cochise Co., AZ). *Analytical data:* (biotite) K_2O = 6.08, 6.13%; $*Ar^{40}$ = 2.836×10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 76%; (zircon—6 grains) Ps = 4.18×10^6 tracks/cm² (1967), Pi = 8.11×10^6 tracks/cm² (939). D = 1.02×10^{15} n/cm², U = 230 ppm; (apatite—50 grains) Ps = 0.184×10^6 tracks/cm² (68), Pi = 1.63×10^6 tracks/cm² (302), D = 4.76×10^{15} n/cm², U = 9.9 ppm. *Collected by:* H. Drewes. *Comment:* Dacite porphyry flow (andesite of Silver Spur Ranch).

K-Ar: biotite 32.0 ± 1.1 Ma
Fission-track: zircon 31.3 ± 3.2 Ma
apatite 32.0 ± 8.7 Ma

24. *USGS(D)78D124a* (Drewes, 1982) Fission-track
Latite porphyry (32°02′06″N, 109°17′37″W; S17,T16S,R30E; on east side of Indian Creek, north-

ern Chiricahua Mountains; Cochise Head 7.5' quad., Cochise Co., AZ). *Analytical data:* (zircon—6 grains) Ps = 5.27 × 10^6 tracks/cm² (829), Pi = 12.03 × 10^6 tracks/cm², (947), 0 = 1.02 × 10^{15} n/cm², U = 340 ppm; (apatite—50 grains) Ps = 0.077 × 10^6 tracks/cm² (160), Pi = 0.141 × 10^6 tracks/cm² (294), 0 = 1.03 × 10^{15} n/cm², U = 3.9 ppm. *Collected by:* M. Sekulich. *Comments:* Zircon age is the apparent age of the latite porphyry intrusion.

zircon 26.7 ± 2.8 Ma
apatite 33.5 ± 12.3 Ma

25. *USGS(D)78D152* (Drewes, 1982) K-Ar
Vitrophyre (32°00'44"N, 109°16'W; NW¼ S27,T16S,R30E; S ridge of Maverick Peak at 6,080-ft elevation, Chiricahua Mountains, Cochise Head 7.5' quad., Cochise Co, AZ). *Analytical data:* K_2O = 3.64, 3.65%; $*Ar^{40}$ = 1.519 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 64%. *Collected by:* H. Drewes. *Comments:* An impure biotite concentrate from the basal vitrophyre of a rhyodacite lava flow in the uppermost member of the Faraway Ranch(?) Formation.

biotite 28.7 ± 1.0 Ma

26. *USGS(D)84D85* K-Ar
Andesite flow (31°43'23"N, 109°32'08"W; NW¼SE¼NE¼ S1,T20S,R27E; at base of steep slope N of road and S of major gully, Swisshelm Mountains, Swisshelm Mountains 15' quad., Cochise Co., AZ). *Analytical data:* K_2O = 0.77, 0.75%; $*Ar^{40}$ = 0.3702 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 62%. *Collected by:* H. Drewes.

hornblende 33.5 ± 1.9 Ma

27. *USGS(D)83D44a* K-Ar
Olivine basalt (31°44'40"N, 109°27'25"W; SW¼NE¼ S34,T19S,R28E; 1-km E of junction of Rucker Canyon and Leslie Canyon Roads, Pedregosa Mountains, Pedregosa Mountains 15' quad., Cochise Co., AZ), *Analytical data:* K_2O = 0.82, 0.84%; $*Ar^{40}$ = 0.1079 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 46%. *Collected by:* H. Drewes.

whole-rock 9.0 ± 0.4 Ma

28. *USGS(D)84D103* K-Ar
Rhyolite dike (31°46'22"N, 109°20'37"W; SE corner of S23,T19S,R29E; southernmost bold outcrop N of Rucker Canyon Road near low saddle E of Ranger Station, Chiricahua Peak 15' quad., Cochise Co., AZ). *Analytical data:* K_2O = 5.35, 5.42%; $*Ar^{40}$ = 2.139 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 74%. *Collected by:* H. Drewes.

sanidine 27.4 ± 1.0 Ma

29. *USGS(D)83D130* K-Ar
Rhyodacite dike (31°38'17"N, 109°22'10"W; NW¼NW¼ S2,T21S,R29E; Pedregosa Mountains, Pedregosa Mountains 15' quad., Cochise Co., AZ). *Analytical data:* K_2O = 7.44, 7.59%; $*Ar^{40}$ = 8.205 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 81%. *Collected by:* H. Drewes.

biotite 74.3 ± 2.7 Ma

30. *USGS(D)83D144* K-Ar
Rhyodacite porphyry ash-flow (31°38'12"N, 109°23'47"W; NE¼NW¼ S4,T21S,R29E; Pedregosa Mountains, Pedregosa Mountains 15' quad., Cochise Co., AZ). *Analytical data*: K_2O = 8.60, 8.55%; $*Ar^{40}$ = 4.254 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 79%. *Collected by:* H. Drewes.

biotite 34.1 ± 1.2 Ma

31. *USGS(D)82R198* K-Ar
Rhyolite vitrophyre (31°40'08"N, 109°17'21"W; SE¼SW¼ S21,T20S,R30E; Pedregosa Mountains, Pedregosa 15' quad., Cochise Co., AZ). *Analytical data:* K_2O = 3.46, 3.43, 3.46%; $*Ar^{40}$ = 0.9664 × 10^{-10} mol/gm, $Ar^{40}/\Sigma Ar^{40}$ = 74%. *Submitted by:* H. Drewes.

whole-rock 19.3 ± 0.7 Ma

32. *USGS(D)E-28-84* K-Ar
Porphyritic rhyolite (31°33'37"N, 109°28'34"W; S34,T21S,R28E; Pedregosa Mountains, Pedregosa Mountains 15' quad., Cochise Co., AZ). *Analytical data:* K_2O = 7.50, 7.66%; $*Ar^{40}$ = 2.651 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 71%. *Submitted by:* H. Drewes.

sanidine 24.1 ± 0.9 Ma

33. *USGS(D)E-119-83* K-Ar
Fine-grained, garnet-bearing, porphyritic-rhyolite intrusive (31°36'22"N, 109°25'W; S17,T21S,R29E; Pedregosa Mountains, Pedregosa Mountains 15' quad., Cochise Co., AZ). *Analytical data*: K_2O = 4.10, 4.06%; $*Ar^{40}$ = 1.356 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 84%. *Submitted by:* H. Drewes.

sanidine 22.9 ± 0.8 Ma

34. *USGS(D)82M87* K-Ar
Vitrophyre (31°37'45"N, 109°20'00"W; NW¼NW¼ S6,T21S,R30E; E of Saner Spring, southern Chiricahua Mountains, Swede Peak 7.5' quad., Cochise Co., AZ). *Analytical data:* K_2O = 1.11, 1.14%; $*Ar^{40}$ = 0.1590 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 57%. *Submitted by:* H. Drewes. *Comments:* Nonhydrated glass from a reddish-brown rhyolitic vitrophyric dike. Calculated age is probably a minimum age.

glass 9.8 ± 0.4 Ma

35. *USGS(D)83D104* K-Ar
Rhyodacite porphyry ash-flow (31°31'30"N, 109°29'55"W; SE¼NW¼ S16,T22S,R28E; just S of road at Mud Springs, Pedregosa Mountains West 7.5' quad., Cochise Co., AZ). *Analytical data:* biotite) K_2O = 7.39, 7.38%; $*Ar^{40}$ = 3.684 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 79%; (hornblende) K_2O = 0.75, 0.75%; $*Ar^{40}$ = 0.3730 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 77%. *Collected by:* H. Drewes.

biotite 34.3 ± 1.2 Ma
hornblende 34.2 ± 2.1 Ma

36. *USGS(D)83D88* K-Ar
Rhyodacite porphyry ash-flow (31°30'10"N, 109°24'50"W; NE¼SW¼ S20,T22S,R29E; Pedregosa Mountains, West 7.5' quad., Cochise Co., AZ). *Analytical data:* K_2O = 8.63, 8.61%; $*Ar^{40}$ = 9.316 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 95%. *Collected by:* H. Drewes.

biotite 73.6 ± 2.6 Ma

NEW MEXICO

37. *MHS-114-80* (Staatz, 1985, 1986) K-Ar
Trachyte sill (36°36'30"N, 104°14'30"W; SE¼NE¼ S2,T27N,R25E; Pine Buttes 7.5' quad.,

Colfax Co., NM). *Analytical data:* K_2O = 1.52, 1.53%; $*Ar^{40}$ = 0.8155 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 68%. *Collected by:* M. Staatz. *Comments:* A fine-grained porphyritic trachyte with plagioclase, hornblende, and augite phenocrysts.

hornblende 36.7 ± 1.3 Ma

38. *MHS-133-80* (Staatz, 1985) K-Ar
Trachyandesite dike (30°36'N, 104°12'40"W; SE¼SW¼ S6,T27N,R26E; small knoll 300-m; N of Tinaja Creek, Pines Butte 7.5' quad., Colfax Co., NM). *Analytical data:* K_2O = 1.30, 1.24%; $*Ar^{40}$ = 0.5965 and 0.5951 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 67, 76%. *Collected by:* M. Staatz. *Comments:* Porphyritic trachyandesite has a glassy groundmass containing hornblende, plagioclase, and augite phenocrysts.

hornblende 32.3 ± 1.5 Ma
32.3 ± 1.5 Ma

39. *MHS-18-81* (Staatz, 1986) K-Ar
Rhyodacite (36°36'N, 104°10'W; S3,T27N,R26E; knoll at N end of SW Pine Butte dome, Pine Buttes 7.5' quad., Colfax Co., NM). *Analytical data:* K_2O = 0.54, 0.55%; $*Ar^{40}$ = 0.0603 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 34%. *Collected by:* M. Staatz. *Comments:* A fine-grained, porphyritic rhyodacite with plagioclase and oxyhornblende phenocrysts.

hornblende 7.7 ± 0.5 Ma

40. *MHS-67-80* (Staatz, 1985, 1986) K-Ar
Rhyodacite plug (36°34'30"N, 104°12'30"W; S7,T27N,R26E; NE side of Raspberry Peak, Pine Buttes 7.5' quad., Colfax Co, NM). *Analytical data:* K_2O = 0.54, 0.53%; $*Ar^{40}$ = 0.06235 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 29%. *Collected by:* M. Staatz. *Comments*: A fine-grained porphyritic rhyodacite with plagioclase and oxyhornblende phenocrysts (rhyodacite of Raspberry Mountain).

hornblende 8.1 ± 0.6 Ma

41. *MHS-86-81* (Staatz, 1986) K-Ar
Phonotephrite (36°32'30"N, 104°11'30"W; NE¼SE¼ S29,T27N,R26E; W of Joe Cabin Arroyo, Pine Buttes 7.5' quad., Colfax Co., NM). *Analytical data:* K_2O = 1.21, 1.22%; $*Ar^{40}$ = 0.4457 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 74%. *Collected by:* M. Staatz. *Comments:* Porphyritic phonotephrite has an aphanitic matrix containing hornblende, plagioclase, and magnetite phenocrysts with minor grains of augite, biotite, and apatite.

hornblende 25.3 ± 0.9 Ma

42. *USGS(D)PI-39-81* Rb-Sr
Highly-foliated biotite-muscovite gneiss (35°16'15"N, 106°28'45"W; NE¼ S14,T12N,R4E; along Rincon Ridge, Placitas 7.5' quad., Sandoval Co., NM). *Analytical data:* Rb = 263 ppm. Sr = 106.5 ppm, Rb^{87}/Sr^{86} = 7.241, Sr^{87}/Sr^{86} = 0.8599, assumed initial Sr^{87}/Sr^{86} = 0.703. *Collected by:* D. C. Hedlund.

muscovite 1520 Ma

43. *USGS(D)SP-55-81* (Hedlund, 1985a) Rb-Sr
Fine-grained porphyoblastic sillimanite-quartz-sericite schist (35°11'15"N, 106°16'07.5"W; SW¼ S11,T11N,R6E; Monte Largo, Sandia Peak 7.5' quad., Bernalillo Co., NM). *Analytical data:* Rb = 342 ppm, Sr = 61.2 ppm, Rb^{87}/Sr^{86} = 17.00, Sr^{87}/Sr^{86} = 1.0568, assumed initial Sr^{87}/Sr^{86} = 0.703. *Collected by:* D. C. Hedlund. *Comments*: Published age was mistakenly listed as a whole-rock age by Hedlund (1985a).

muscovite 1450 Ma

44. *USGS(D)Fanny-A* K-Ar
Vein gangue (33°24'11"N, 108°47'50"W; Queen Vein, 500-ft S of Fanny Mine, Mogollon mining district, Mogollon 7.5' quad., Catron Co., NM). *Analytical data:* K_2O = 14.61, 14.20%; $*Ar^{40}$ = 3.346 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 86%. *Collected by:* J. C. Ratte. *Comments*: This age appears to be a minimum age for vein growth and associated mineral deposits.

adularia 16.1 ± 0.7 Ma

45. *IPE-A1* (Maxwell and others, 1986) K-Ar
Rhyolite-flow dome (33°34'45"N, 107°59'30"W; on road at drainage divide, Indian Peaks East 7.5' quad., Catron Co., NM). *Analytical data:* K_2O = 6.01, 6.23%; $*Ar^{40}$ = 2.338 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 84%. *Collected by:* C. H. Maxwell. *Comment:* This porphyritic rhyolite with sanidine and quartz phenocrysts in a glassy groundmass is grouped with other rhyolite-flow domes under the name Taylor Creek Rhyolite.

sanidine 26.3 ± 1.7 Ma

46. *TP-83-43* (Maxwell and others, 1986) K-Ar
Rhyolite-flow dome (33°29'N, 107°57'30"W; ridge N of Squaw Creek mines, Taylor Peak 7.5' quad., Catron Co., NM). *Analytical data:* K_2O = 7.70, 7.74%; $*Ar^{40}$ = 2.894 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 88%. *Collected by:* C. H. Maxwell. *Comments:* This porphyritic rhyolite with sanidine and quartz phenocrysts in a glassy groundmass is grouped with other rhyolite-flow domes under the name Taylor Creek Rhyolite.

sanidine 25.9 ± 0.9 Ma

47. *82-101* (Maxwell and others, 1986) K-Ar
Rhyolite-flow dome (33°27'N, 107°56'W; SW¼ S12,T10S,R11W; on road from Boiler Peak to Squaw Creek, Taylor Peak 7.5' quad., Sierra Co., NM). *Analytical data:* K_2O = 6.79, 7.09; $*Ar^{40}$ = 2.606 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 84%. *Collected by:* C. H. Maxwell. *Comments:* This porphyritic rhyolite with sanidine and quartz phenocrysts in a glassy groundmass is grouped with other rhyolite-flow domes under the name Taylor Creek Rhyolite.

sanidine 25.9 ± 21. Ma

48. *TP-83-38* (Maxwell and others, 1986) K-Ar
Rhyolite-flow dome (33°26'N, 107°55'W; SW¼SW¼NE¼ S18,T10S,R10W; Boiler Peak guard station, Taylor Peak 7.5' quad., Sierra Co., NM). *Analytical data:* (original sanidine separate) K_2O = 4.07, 4.38%, $*Ar^{40}$ = 1.661 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 67%; (up-graded sanidine separate) K_2O = 6.85, 6.85%; $*Ar^{40}$ = 2.479 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 60%. *Collected by:* C. H. Maxwell. *Comments:* This porphyritic rhyolite with sanidine and quartz phenocrysts in a glassy groundmass is grouped with other rhyolite-flow domes under the name Taylor Creek Rhyolite. The discordant ages obtained for these two sanidine concentrates illustrate the age variability possible when one or more heterogeneous samples are dated. The K-Ar age for

the up-graded sanidine is analytically the more reliable age for this sample.

original sanidine 27.1 ± 3.8 Ma
up-graded sanidine 25.0 ± 0.9 Ma

49. *TP-83-45* (Maxwell and others, 1986) K-Ar
Rhyolite-flow dome (33°25'N, 107°57'W; NW¼NW¼ S25(?),T10S,R11W; junction of Taylor Creek and a tributary creek, Taylor Peak 7.5' quad., Sierra Co., NM). *Analytical data:* K_2O = 6.18, 6.29%; $*Ar^{40}$ = 2.335 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 87%. *Collected by:* C. H. Maxwell. *Comments:* This porphyritic rhyolite with sanidine and quartz phenocrysts in a glassy groundmass is grouped with other rhyolite-flow domes under the name Taylor Creek Rhyolite.

sanidine 25.7 ± 0.9 Ma

50. *USGS(D)TP-83-24* K-Ar
Vein gangue (33°22'56"N, 107°58'07"W; NE¼SE¼ S3,T11S,R11W; upper Alexander Canyon, Taylor Peak 7.5' quad., Sierra Co., NM). *Analytical data:* K_2O = 8.66%, $*Ar^{40}$ = 3.666 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 92%. *Collected by:* C. H. Maxwell. *Comments:* Late stage gangue collected from a tin/hematite vein showing in an adit in a rhyolite-flow dome. K-Ar ages for rhyolite-flow domes range from 25 to 27 Ma, thus the calculated age of 29.2 Ma is apparently too old. E. E. Foord (USGS) obtained a K_2O value of 9.05% for the sanidine with microprobe techniques. A. 9.05% value gives a calculated K-Ar age of 27.9 Ma.

sanidine 29.2 ± 1.6 Ma

51. *TP-38-41* (Maxwell and others, 1986) K-Ar
Rhyolite-flow dome (33°23'N, 107°56'W; SW¼NE¼ S1,T11S,R11W; Taylor Peak 7.5' quad., Sierra Co., NM). *Analytical data:* (original sanidine) K_2O = 6.15, 5.95%; $*Ar^{40}$ = 1.873 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 88%; (up-graded sanidine) K_2O = 7.97, 7.95%; $*Ar^{40}$ = 3.156 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 85%. *Collected by:* H. Maxwell. *Comments:* This porphyritic rhyolite with sanidine and quartz phenocrysts in a glassy groundmass is grouped with other rhyolite-flow domes under the name Taylor Creek Rhyolite. The discordant ages obtained for these two sanidine concentrates illustrate the age variability possible when one or more heterogeneous samples are dated. The K-Ar age for the up-graded sanidine is probably the more reliable age for this sample.

original sanidine 21.4 ± 1.3 Ma
up-graded sanidine 27.3 ± 1.0 Ma

52. *TP-83-44* (Maxwell and others, 1986) K-Ar
Rhyolite-flow dome (33°22'30"N, 107°53'W; SE¼SW¼ S4,T11S,R10W; on road to Lookout Mountain, Taylor Peak 7.5' quad., Sierra Co., NM). *Analytical data:* K_2O = 7.01, 6.99%; $*Ar^{40}$ = 2.699 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 88%. *Collected by:* C. H. Maxwell. *Comments:* This porphyritic rhyolite with sanidine and quartz phenocrysts in a glassy groundmass is grouped with other rhyolite-flow domes under the name Taylor Creek Rhyolite.

sanidine 26.6 ± 1.0 Ma

53. *TP-83-42* (Maxwell and others, 1986) K-Ar
Rhyolite-flow dome (33°29'N, 107°53'W; SE¼NW¼ S33,T9S,R10W; Hardcastle Canyon, Taylor Peak 7.5' quad., Catron Co., NM). *Analytical data:* K_2O = 4.55, 4.66%; $*Ar^{40}$ = 1.716 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 88%. *Collected by:* C. H. Maxwell. *Comments:* This porphyritic rhyolite with sanidine and quartz phenocrysts in a glassy groundmass is grouped with other rhyolite-flow domes under the name Taylor Creek Rhyolite.

sanidine 25.7 ± 0.9 Ma

54. *USGS(D)84-039* K-Ar
Porphyritic fine-grained basalt dike (33°26'37"N, 107°38'10"W; S14,T10S,R8W; Iron Mountain 7.5' quad., Sierra Co., NM). *Analytical data:* K_2O = 0.16, 0.17%; $*Ar^{40}$ = 0.09854 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 23%. *Comments:* Calculated age is a minimum age of formation; the large age uncertainty is based, in large part, on the very small potassium content of the basalt.

whole-rock 41.0 ± 7.4 Ma

55. *USGS(D)84-031* K-Ar
Monzonite/quartz monzonite (33°26'24"N, 107°37'59"W; S14,T10S,R8W; Iron Mountain 7.5' quad., Sierra Co., NM). *Analytical data:* K_2O = 2.48, 2.52%; $*Ar^{40}$ = 1.309 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 77%. *Comments:* A fine-grained monzonite/quartz monzonite intrusive of Reilly Peak; calculated age is a minimum age for the intrusive.

whole-rock 36.0 ± 1.4 Ma

56. *USGS(D)84-064* K-Ar
Rhyolite dike (33°25'32"N, 107°37'28"W; S24,T10S,R8W; Jaralosa Mountain 7.5' quad., Sierra Co., NM). *Analytical data:* K_2O = 8.60, 8.68%; $*Ar^{40}$ = 2.836 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 80%. *Comments:* This perthitic K-feldspar separate was obtained from a rhyolite with rapakivi texture. Calculated age represents a minimum age of formation.

K-feldspar 22.6 ± 0.8 Ma

57. *MS-18* (Maxwell and Oakman, 1986) K-Ar
Rhyolite (approx. 33°10'30"N, 107°18'45"W; NE¼SW¼SW¼ S13,T13S,R5W; on the W side of the middle Mud Springs Mountain; Cuchillo 7.5' quad., Sierra Co., NM). *Analytical data:* K_2O = 8.62, 8.63%; $*Ar^{40}$ = 5.127 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 86%. *Collected by:* C. H. Maxwell.

biotite 40.8 ± 1.5 Ma

58. *USGS(D)AC-8-A-80* K-Ar
Ash-flow tuff (32°53'00"N, 108°03'30"W; S26,T16S,R12W; near Shingle Canyon, Allie Canyon 7.5' quad., Grant Co., NM). *Analytical data:* K_2O = 8.04, 8.05%; $*Ar^{40}$ = 3.718 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 82%. *Collected by:* D. C. Hedlund. *Comments:* This tuff may correlate with the Caballo Blanco(?) Tuff.

biotite 31.8 ± 1.1 Ma

59. *USGS(D)78S25* K-Ar
Quartz monzonite, Eighty Mountain stock (32°50'35"N, 108°17'W; S10,T17S,R14W; Gomez Peak, N of Silver City, Silver City 7.5' quad., Grant Co., NM). *Analytical data:* K_2O = 1.53, 1.51%; $*Ar^{40}$ = 1.372 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 85%. *Collected by:* W. N. Sharp.

hornblende 61.6 ± 2.2 Ma

60. *USGS(D)Wm-2-77* (Hedlund, 1978, 1985b) K-Ar
Ash-flow tuff (32°43'45"N, 108°24'20"W; SW¼NW¼ S21,T18S,R15W; Little Burro Mountains, Wind Mountain 7.5' quad., Grant Co., NM). *Analytical data:* (biotite) K_2O = 8.04, 7.99%; $*Ar^{40}$ = 3.687 × 10^{-10} °mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 59%; (sanidine) K_2O = 8.16, 8.18%; $*Ar^{40}$ = 3.212 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 85%. *Collected by:* D. C. Hedlund. *Comments:* A possibly altered specimen of the ash-flow tuff of Wind Mountain; the K-Ar ages indicate that the tuff is around 32 Ma old.
biotite 31.7 ± 1.1 Ma
sanidine 27.1 ± 0.9 Ma

61. *USGS(D)T-1-83* (Hedlund, 1985b) K-Ar
Rhyodacite porphyry (32°39'30"N, 108°21'00"W; SW¼SW¼SE¼ S12,T19S,R15W; Tyrone 7.5' quad., Grant Co., NM). *Analytical data:* K_2O = 8.83, 8.88%; $*Ar^{40}$ = 6.466 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 82%. *Collected by:* D. C. Hedlund. *Comments:* Rhyodacite porphyry, containing plagioclase, quartz, and biotite phenocrysts, forms a sill or stock.
biotite 50.0 ± 1.8 Ma

62. *USGS(D)R-75-78* (Hedlund, 1980) K-Ar
Gneiss (32°42'N, 108°31'W; S32,T18S,R16W; Big Burro Mountains, Redrock 15' quad., Grant Co., NM). *Analytical data:* K_2O 5.33, 5.35%; $*Ar^{40}$ = 164.3 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 99%. *Collected by:* D. C. Hedlund. *Comments:* Middle Proterozoic micaceous gneiss of Bullard Peak (Hewitt, 1959).
biotite 1410 ± 50 Ma

63. *USGS(D)R-34A-78* (Hedlund, 1980) K-Ar
Twin Peaks monzonite porphyry stock (Hewitt, 1959) (32°43'30"N, 108°31'W; S20,T18S,R16W; Big Burro Mountains, Redrock 15' quad., Grant Co., NM). *Analytical data:* K_2O = 0.59, 0.58%; $*Ar^{40}$ = 0.6232 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 74%. *Collected by:* D. C. Hedlund.
hornblende 72.5 ± 4.7 Ma

64. *USGS(D)R-229-78* (Hedlund, 1980) K-Ar
Medium- to coarse-grained granodiorite pluton (32°45'N, 108°33'W; S12,T18S,R17W; Big Burro Mountains, Redrock 15' quad., Grant Co., NM). *Analytical data:* K_2O = 7.69, 7.69%; $*Ar^{40}$ = 228.8 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 96%. *Collected by:* D. C. Hedlund.
biotite 1380 ± 45 Ma

65. *USGS(D)T-1-79* K-Ar
Rhyolite (32°55'N, 108°44'30"W; S18,T16S,R18W; Cliff 15' quad., Grant Co., NM). *Analytical data:* K_2O = 8.78, 8.77%; $*Ar^{40}$ = 2.712 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 83%. *Collected by:* T. L. Finnell. *Comments:* Age will be reported in the map explanation for "Geologic Map of the Cliff Quadrangle, Grant County, New Mexico: U.S. Geological Survey Miscellaneous Investigations Map I-1768" by T. L. Finnell.
biotite 21.3 ± 0.7 Ma

66. *USGS(D)SR-6-79* K-Ar
Andesite (32°48'40"N, 109°00'00"W; S27,T17S,R21W; Charlie Hill area, Steeple Rock 15' quad., Grant Co., NM). *Analytical data:* K_2O = 4.87, 4.87%; $*Ar^{40}$ = 1.594 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 77%. *Collected by:* D. C. Hedlund. *Comments:* The andesite porphyry of Charlie Hill is composed of about 25% sodic andesine phenocrysts in a very fine-grained groundmass with only traces of quartz, biotite, and hornblende phenocrysts. Calculated age is probably a minimum age.
whole-rock 22.6 ± 0.8 Ma

67. *USGS(D)SR-59-78* K-Ar
Rhyolite of Steeple Rock (32°48'N, 108°56'W; S29,T17S,R20W; Steeple Rock 15' quad., Grant Co., NM). *Analytical data:* (biotite) K_2O = 7.85, 7.80%; $*Ar^{40}$ = 3.763 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 88%; (sanidine) K_2O = 7.55, 7.57%; $*Ar^{40}$ = 2.216 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 86%. *Collected by:* D. C. Hedlund. *Comments:* Calculated ages are very discordant; but the reason for the age difference is not known. Tentatively, the biotite age is considered the more reliable age.
biotite 33.1 ± 1.1 Ma
sanidine 20.3 ± 0.7 Ma

68. *USGS(D)SR-109-78* K-Ar
Welded, devitrified ash-flow tuff (32°45'20"N, 108°52'40"W; S11,T18S,R20W; Steeple Rock 15' quad., Grant Co., NM). *Analytical data:* K_2O = 7.05, 7.00%; $*Ar^{40}$ = 3.456 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 79%. *Collected by:* D. C. Hedlund.
biotite 33.8 ± 1.1 Ma

69. *USGS(D)SR-4-79* K-Ar
Ash-flow tuff (32°48'50"N, 108°47'00"W; S22,T17S,R19W; Steeple Rock 15' quad., Grant Co., NM). *Analytical data:* K_2O = 7.86, 7.79%; $*Ar^{40}$ = 3.788 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 78%. *Collected by:* D. C. Hedlund. *Comments:* A densely welded ash-flow tuff (ash-flow tuff of Redrock Basin) containing 5–10% phenocrysts of sanidine, plagioclase, and accessory biotite.
biotite 33.3 ± 1.1 Ma

70. *USGS(D)SR-SE-1-RR* K-Ar
Ash-flow tuff (32°47'25"N, 108°45'05"W; NE¼ S36,T17S,R19W; E side of Redrock Canyon Steeple Rock 15' quad., Grant Co., NM). *Analytical data:* K_2O = 8.00, 7.98%; $*Ar^{40}$ = 3.993 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 78%. *Collected by:* D. C. Hedlund. *Comments:* A crystal-rich welded tuff—upper ash-flow tuff of Redrock Canyon
biotite 34.4 ± 1.2 Ma

71. *USGS(D)T-24-78* K-Ar
Tuff of Mangas Creek (32°47'32"N, 108°43'48"W; SE¼SW¼ S30,T17S,R18W; Burro Mountains, Cliff 15' quad., Grant Co., NM). *Analytical data:* K_2O = 7.86, 7.65%; $*Ar^{40}$ = 3.891 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 76%. *Collected by:* T. L. Finnell. *Comments:* A vitric quartz-latite ash-flow tuff containing medium-grained sanidine, quartz, plagioclase, and altered(?) biotite phenocrysts. The sanidine K-Ar age is in good agreement with a published fission-track age (zircon) of 32.8 ± 1.8 Ma for this tuff.
sanidine 34.5 ± 1.6 Ma

72. *USGS(D)CP-24-79* K-Ar
Dacite porphyry (32°39'00"N, 108°54'05"W; S15,T19S,R20W; near summit road to Canador Peak, Canador Peak 15' quad., Hidalgo Co., NM).

Analytical data: K_2O = 0.69, 0.71%; $*Ar^{40}$ = 0.3502 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 51%. *Collected by:* D. C. Hedlund. *Comments:* Dacite porphyry from the dacite dome of Canador Peak; dacite porphyry consists of hornblende phenocrysts (5%) in a fine-grained pilotaxitic groundmass.

hornblende 34.4 ± 2.2 Ma

73. *USGS(D)CP-74-79* K-Ar
Ash-flow tuff (32°38'00"N, 108°55'02"W; NW¼SW¼ S21,T19S,R20W; along N side of Gila River near quarry, Canador Peak 15' quad., Hidalgo Co., NM). *Analytical data:* K_2O = 7.94, 7.92, 7.99%; $*Ar^{40}$ = 3.851 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 76%. *Collected by:* D. C. Hedlund.

biotite 33.3 ± 1.1 Ma

74. *USGS(D)SR-2-79* K-Ar
Ash-flow tuff (32°50'40"N, 108°48'00"W; S9,T17S,R19W; 1.5 miles N of Keith Ranch (Blakey), Steeple Rock 15' quad., Grant Co., NM). *Analytical data:* K_2O = 7.67, 7.64%; $*Ar^{40}$ = 3.606 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 90%. *Collected by:* D. C. Hedlund. *Comments:* Dated biotite was golden colored.

biotite 32.4 ± 1.1 Ma

75. *USGS(D)77D197* K-Ar
(Marvin and Cole, 1978; Marvin and others, 1978)
Granodiorite, Lordsburg stock (32°16'30"N, 108°46'20"W; S26,T23S,R19W; Gary 7.5' quad., Hidalgo Co., NM). *Analytical data:* (hornblende) K_2O = 0.35, 0.35%; $*Ar^{40}$ = 0.3061 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 59%. *Collected by:* H. Drewes. *Comments:* The analytical data for the biotite concentrate were published by Marvin and Cole (1978) and Marvin and others (1978) and will not be repeated here.

biotite 58.8 ± 2.0 Ma
hornblende 59.8 ± 4.4 Ma

76. *USGS(D)77D8* K-Ar
Vitrophyre (32°14'30"N, 108°45'20"W; SW¼SW¼ S1,T19W,R24S; perlite prospect along Swallow Fork Peak 7.5' quad., Hidalgo Co., NM). *Analytical data:* K_2O = 7.87, 7.89%; $*Ar^{40}$ = 4.091 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 81%. *Collected by:* H. Drewes. *Comments:* A rhyolite vitrophyre composed of oligoclase, biotite, magnetite, and apatite phenocrysts in a brown glass groundmass.

biotite 35.7 ± 1.2 Ma

77. *USGS(D)GH-MG-75* K-Ar
Diabase dike (32°29'05"N, 108°33'10"W; SE¼SW¼ S11,T21S,R17W; roadcut on New Mexico Highway 90, Gold Hill 7.5' quad., Hidalgo Co., NM). *Analytical data:* (plagioclase) K_2O = 0.56, 0.56%; $*Ar^{40}$ = 156.4 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 99%; (augite) K_2O = 0.32, 0.31, 0.34, 0.35%; $*Ar^{40}$ = 93.18 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 98%. *Collected by:* D. C. Hedlund. *Comment:* Diabase composed of andesine-labradorite (~65%), augite (15–22%), chlorite (~6%), magnetite-ilmenite (4–5%) and accessories. The K-Ar ages are spurious; excess radiogenic argon is present.

plagioclase 4460 ± 300 Ma
augite 4460 ± 450 Ma

78. *USGS(D)SF-138-77* K-Ar
Andesite (32°21'55"N, 108°21'50"W; SW¼NW¼ S26,T22S,R15W; Solders Farewell Hill 7.5' quad., Grant Co., NM). *Analytical data:* K_2O = 1.12, 1.13%; $*Ar^{40}$ = 0.5149 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ 574%. *Collected by:* D. C. Hedlund.

plagioclase 31.5 ± 1.1 Ma

79. *USGS(D)AH-2-77* K-Ar
Ash-flow tuff (32°25'10"N, 108°05'15"W; center of SW¼ S4,T22S,R12W; West Antelope Draw, Antelope Hill 7.5' quad., Luna Co., NM). *Analytical data:* (biotite) K_2O = 6.69, 6.75%; $*Ar^{40}$ = 3.294 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 77%; (hornblende) K_2O = 0.66, 0.66, 0.75, 0.78%; $*Ar^{40}$ = 0.3811 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 42%. *Collected by:* D. C. Hedlund. *Comments*: The biotite age is the more reliable age.

biotite 33.7 ± 1.1 Ma
hornblende 36.9 ± 8.0 Ma

80. *USGS(D)77D192* Fission-track
(Thorman and Drewes, 1980)
Dacite flow-breccia (32°12'28"N, 108°07'37"W; NE¼ S24,T24S,R13W; roadcut on road to microwave relay station on west peak of Victorio Mountains, Gage NW 7.5' quad., Luna Co., NM). *Analytical data:* Ps = 7.44 × 10^6 tracks/cm² (1,110), Pi = 10.97 × 10^6 tracks/cm² (818), θ = 1.03 × 10^{15} n/cm², U = 310 ppm. *Collected by:* H. Drewes.

zircon 41.7 ± 4.3 Ma

81. *USGS(D)76T142* (Thorman and Drewes, 1979) K-Ar
Latite vitrophyre flow (32°00'10"N, 108°15'30"W; S34,T26S,R14W; Cedar Mountains, The Saltys 7.5' quad., Grant Co., NM). *Analytical data:* K_2O = 8.31, 8.30%; $*Ar^{40}$ = 3.807 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 70%. *Collected by:* C. H. Thorman.

biotite 31.6 ± 1.1 Ma

82. *USGS(D)76T151* (Thorman and Drewes, 1979) K-Ar
Andesite (approx. 32°01'N, 108°22'W; NW¼SW¼ S27,T26S,R15W; SW side of Black Mountain, The Saltys 7.5' quad., Grant Co., NM). *Analytical data*: K_2O = 3.54, 3.56%; $*Ar^{40}$ = 0.9189 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 87%. *Collected by:* C. H. Thorman. *Comments*: Olivine andesite, with a rather high potassium content, is from a volcanic pile.

whole-rock 17.9 ± 0.6 Ma

83. *USGS(D)77T60* Fission-track
(Drewes and Thorman, 1980)
Hypidiomorphic granular quartz-monzonite stock (32°05'10"N, 108°58'10"W; S35,T25S,R21W; roadcut at Granite Gap, Peloncillo Mountains, Cotton City 7.5' quad., Hidalgo Co., NM). *Analytical data:* Ps = 8.40 × 10^6 tracks/cm² (1,103), Pi = 14.17 × 10^6 tracks/cm² (930), θ = 1.03 × 10^{15} n/cm², U = 400 ppm. *Collected by:* C. H. Thorman.

zircon 36.5 ± 3.6 Ma

84. *USGS(D)81D154* (Drewes, 1986) K-Ar
Altered biotite quartz-monzonite (31°53'55"N, 108°43'55"W; 1-km WNW of "North Pass" at N end of Animas Mountains, Playas 15' quad., Hidalgo Co., NM). *Analytical data:* K_2O = 4.41, 4.39%;

$*Ar^{40}$ = 2.233 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 53%. *Collected by:* H. Drewes.

biotite-chlorite 34.9 ± 1.3 Ma

85. *USGS(D)83D180* K-Ar
Rhyolite (31°55'00"N, 107°04'00"W; S32,T27S,R2W; in wash at foot of S slope of Mount Riley, Mount Riley 7.5' quad., Dona Ana Co., NM). *Analytical data:* K_2O = 3.54, 3.54%; $*Ar^{40}$ = 1.629 × 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 80%. *Collected by:* H. Drewes. *Comments:* Calculated age is a minimum age for a stock composed of very fine-grained rhyolite.

whole-rock 31.7 ± 1.1 Ma

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