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RADIOMETRIC AGES: COMPILATION B, U. S. GEOLOGICAL SURVEY

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Radiometric ages are reported for 264 samples from 23 states, and Puerto Rico. Sample location, geologic information, and analytical data are given for each sample.

Radiometric ages are of great value to U. S. Geological Survey geologists in mapping, mineral-resources studies, geothermal-potential investigations, geologic evaluation of special energy problems, etc. Geologists in other government agencies, in the mineral industries, in nongovernment research insitutes, and in consulting and teaching positions also have frequent need of current radiometric-age information. Although it would be ideal for all radiometric ages originating within the Survey to be promptly published or otherwise made available to the public, many singular ages and limited studies do not warrant direct publication. This compilation lists 352 ages: 230 unpublished ages and 122 published ages that were reported without complete location, petrologic, and/or analytical data. Such data are often needed for evaluation and utilization of a radiometric age. Users of this compilation are asked to use these ages with discretion as they constitute only a small part of the total geologic picture in any particular area. The small map, figure 1, shows the approximate localities of all the U. S. samples included in this compilation. In this compilation samples are grouped together by State, and the States are listed alphabetically.

Not all the listed radiometric ages are valid, and ages that are erroneous are so indicated. However, they are included to alert persons, interested in obtaining radiometric ages in a particular area, that confusing and/or spurious radiometric ages are possible due to the presence of xenocrystic material, excess radiogenic argon, undetected mineral alteration, "leaky" minerals, etc.

Analytical data for 140 K-Ar, 12 Rb-Sr, 132 Pb-alpha, 45 U-Th-Pb, and 24 fission-track ages are given. All the ages were determined by the U. S. Geological Survey, except in a few cases as noted. The analytical techniques are not described, as these are common knowledge to most geologists. Any nonconventional techniques used to determine rock or mineral ages are briefly stated with the analytical data. Persons desiring additional information about individual samples and/or analytical data should contact the person(s) listed as collector or analyzer of the sample. Unless otherwise stated, persons named in the descriptive material are geologists, geophysicists, or chemists of the U. S. Geological Survey.

Survey samples are indicated by the prefix letters USGS(D), USGS(M), or USGS(W); the letters D, M, and W indicate that the analyzing laboratory was in Denver, Colorado; Menlo Park, California; or Washington, D.C., respectively. Analysts in Denver were R. F. Marvin, H. H. Mehnert, and V. M. Merritt (K-Ar ages); Z. E. Peterman, R. A. Hildreth, and W. T. Henderson (Rb-Sr ages); and C. W. Naeser (fission-track ages). Analysts in Menlo Park are R. W. Kistler, H. C. Whitehead, and L. B. Schlocker (K-Ar). Analysts in Washington, D.C., were H. H. Thomas, R. F. Marvin, and F. C. Walthall (K-Ar ages); and T. W. Stern and H. Westley (Pb-alpha ages). If an analyst is not listed above, his or her name is listed with the analytical data for the dated sample.

The decay constants used in the age calculations are as follows:

Potassium-40
$\lambda_\beta = 4.962 \times 10^{-10}$/yr, $\lambda_\epsilon = 0.581 \times 10^{-10}$/yr, and $K^{40}/\Sigma K$ = 0.01167 atomic percent. The quoted analytical error for the calculated age of a sample represents 2 standard deviations (2σ).

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

Uranium-238
$\lambda = 15.4 \times 10^{-11}$/yr.

Uranium-235
$\lambda = 97.1 \times 10^{-11}$/yr.

Thorium-232
$\lambda = 4.99 \times 10^{-11}$/yr. Initial lead isotopic composition used for lead corrections: 206/204 = 18.1, 207/204 = 15.6, 208/204 = 38.0.

Fission-track
$\lambda_F = 7.03 \times 10^{-11}$/yr, spontaneous fission of U-238. ρ_s = fossil-track density–number of fossil tracks counted is in parentheses. ρ_i = induced-track density–number of induced tracks counted is in parentheses. The quoted analytical error for the calculated age is 2 standard deviations (2σ).

The above decay constants and isotopic abundances are slightly different from the ones previously used by the U. S. Geological Survey: these constants are the ones recommended by the IUGS Subcommission on Geochronology (Steiger and Jager, 1977). To avoid confusion concerning recalculated ages and published ages, the published age is included under "comments."

This compilation is the second of a planned series. The first compilation, "Radiometric Ages: Compilation A, U.S. Geological Survey" was published by R. F. Marvin and J. C. Cole in Isochron/West, no. 22, p. 3–14, 1978.

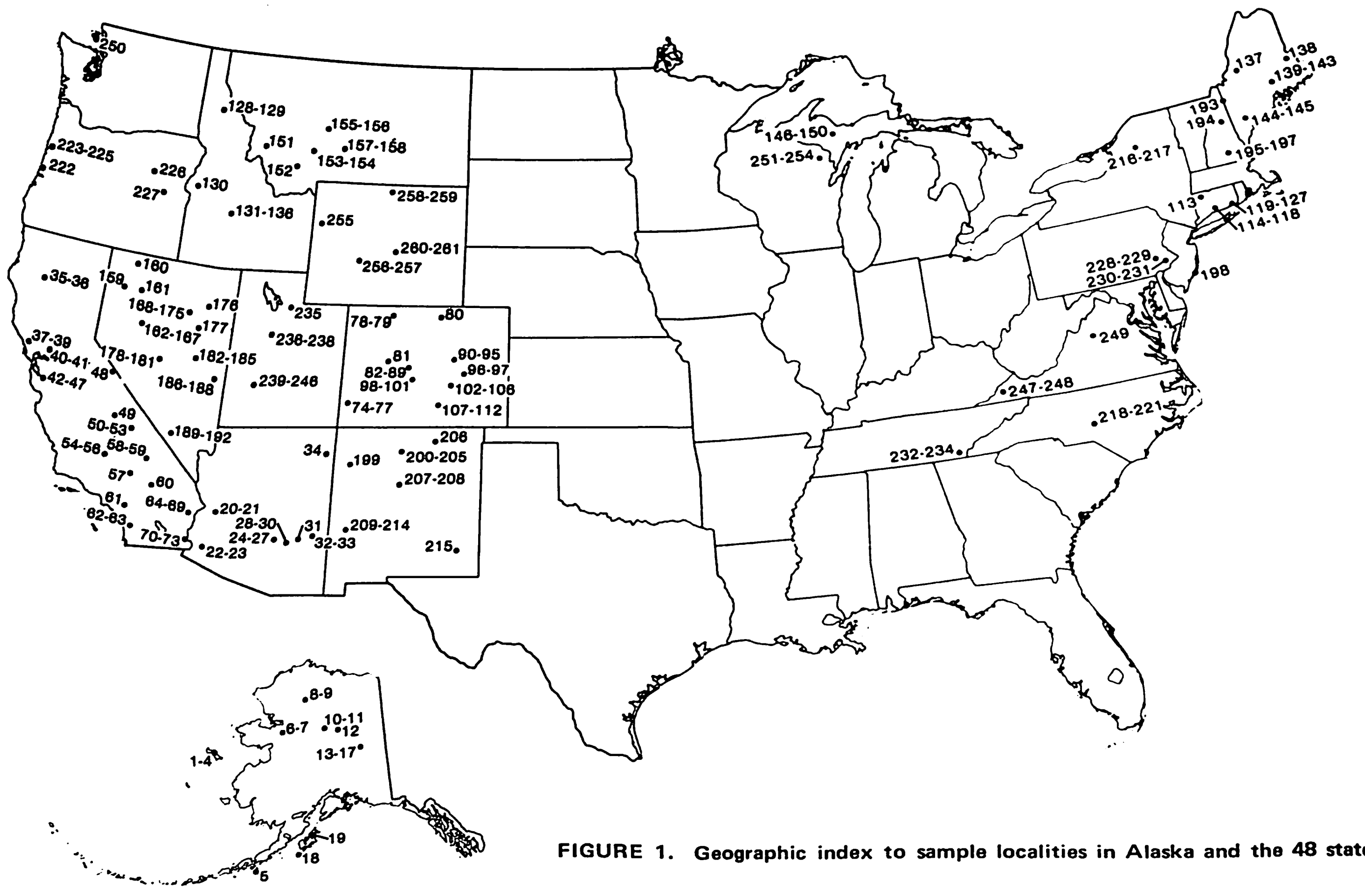

FIGURE 1. Geographic index to sample localities in Alaska and the 48 states.

SAMPLE DESCRIPTIONS

ALASKA

1. *USGS(M)-66AHR-136B* K-Ar
Basalt (low cliff on E side of Koozata River; 63° 35′48″N, 170°33′36″W; Kookooligit Mtns., St. Lawrence Island, AK). A massive, alkali olivine basalt flow (reversely magnetized). *Analytical data:* K_2O = 0.777, 0.798, 0.798, 0.801%; $^*Ar^{40}$ = 0.004166 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 16%. *Collected by:* J. M. Hoare,; *analyzed by:* L. B. Schlocker, A. L. Berry, S. J. Kover.
(whole-rock) 0.365±0.060 m.y.

2. *USGS(M)-66AHR-217B* K-Ar
Basalt (sea cliff on NW coast; 63°37′27″N, 170° 42′00″W; St. Lawrence Island, AK). Basalt on Kookooligit Mtns.; highest of 3 reversely magnetized flows exposed above sea level (Matuyama reversed interval). *Analytical data:* K_2O = 0.704, 0.708, 0.708, 0.703%; $^*Ar^{40}$ = 0.01488 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 19%. *Collected by:* J. M. Hoare; *analyzed by:* L. B. Schlocker, A. L. Berry, S. J. Kover.
(whole-rock) 1.46±0.13 m.y.

3. *USGS(M)-66AHR-218A* K-Ar
Basalt (bottom of western most deep gully in uplifted sea cliff, S of Koomlangeelkuk Bay; 63°43′ 12″N, 170°37′18″W; N side St. Lawrence Island, AK). *Analytical data:* K_2O = 1.027, 1.023, 0.980, 1.000%; $^*Ar^{40}$ = 0.00951 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 4%. *Collected by:* J. M. Hoare; *analyzed by:* L. B. Schlocker, A. L. Berry, S. J. Kover. *Comment:* Reversely magnetized basalt flow lies between normally magnetized flows; reversed magnetization suggests that this flow is considerably older than 0.655 m.y.
(whole-rock) 0.655±0.188 m.y.

4. *USGS(M)-71AHR-134A* K-Ar
Basalt (uplifted sea cliff, 63°27′48″N, 170°21′21″W; SE side Kookooligit Mtns., St. Lawrence Island, AK). Normally magnetized massive basalt flow overlying crystal-vitric and lithic tuffs of early to middle Tertiary age. *Analytical data:* K_2O = 0.806, 0.799, 0.803, 0.806%; $^*Ar^{40}$ = 0.002759 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 5%. *Collected by:* J. M. Hoare; *analyzed by:* L. B. Schlocker, A. L. Berry, S. J. Kover.
(whole-rock) 0.238±0.135 m.y.

5. *USGS(M)-62AGZ-7* K-Ar
Granodiorite (N coast Simeonof Island, 54°55′00″N, 159°13′30″W; Simeonof Island D-1 quad.; Shumagin Islands, Aleutian Islands, AK). Light-gray, medium-grained biotite granodiorite. *Analytical data:* K_2O = 6.60%; $^*Ar^{40}$ = 5.784 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 72%. *Collected by:* A. Grantz; *analyzed by:* M. A. Lanphere, H. C. Whitehead, L. B. Schlocker.

Comment: Age agrees with two other biotite K-Ar ages from granodiorite plutons on other Shumagin Islands (Kienle and Turner, 1976), suggesting considerable plutonic activity during the Paleocene.

(biotite) 59.9±3.0 m.y.

6. *USGS(W)-61APA118* Pb-alpha
Monzonite (66°08'18"N, 160°08'42"W, Buckland Hills, Koyukuk Basin, Selawik A-3 quad., AK). *Analytical data:* alpha/mg-hr = 454; lead = 14.0 ppm. *Collected by:* W. W. Patton, Jr. *Comment:* Age too young; hornblende from this sample gave a K-Ar of 100 m.y. (Miller and others, 1966).

(zircon) 80±10 m.y.

7. *USGS(W)-61APA208* Pb-alpha
Granite (66°08'18"N, 160°08'42"W, Buckland Hills, Koyukuk Basin, Selawik A-3 quad., AK). *Analytical data:* alpha/mg-hr = 370; lead = 13.7 ppm. *Collected by:* W. W. Patton, Jr. *Comment:* Age is similar to other Pb-alpha ages for rocks of Koyukuk Basin (Patton, 1967).

(zircon) 90±10 m.y.

8. *USGS(W)-62ARR192* K-Ar, Pb-alpha
Granite (67°22'15"N, 154°11'00"W, Arrigetch Peaks area, Survey Pass quad., AK). Foliated, porphyritic biotite granite. *Analytical data:* (biotite): K_2O = 9.10%, $^*Ar^{40}$ = 11.88 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 96%; (zircon): alpha/mg-hr = 547; lead = 63.5 ppm. *Collected by:* W. P. Brosge. *Comment:* Discordancy between the K-Ar and Pb-alpha ages suggests that granite formed during late Paleozoic, then was disturbed by an orogenic event during late Mesozoic. Ages of 86 m.y. (biotite) and 280 m.y. (zircon) were mentioned by Brosge and Reiser (1971) for this sample; biotite age has been recalculated with new decay constants for K^{40}.

K-Ar (biotite) 88±4 m.y.
Pb-alpha (zircon) 280±30 m.y.

9. *USGS(W)-62ABE264* K-Ar, Pb-alpha
Quartz monzonite (67°23'30"N, 154°01'30"W, Arrigetch Peaks area, Survey Pass quad., AK). Faintly foliated porphyritic biotite quartz monzonite. *Analytical data:* (biotite): K_2O = 8.85%; $^*Ar^{40}$ = 11.78 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 94%; (muscovite): K_2O = 10.30%; $^*Ar^{40}$ = 14.34 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 96% (zircon): alpha/mg-hr = 551; lead = 54.0 ppm. *Collected by:* W. P. Brosge. *Comment:* Discordancy between K-Ar and Pb-alpha ages suggests that granite formed during late Paleozoic, then was disturbed by an orogenic event during late Mesozoic. Ages of 88 m.y. (biotite), 92 m.y. (muscovite), and 240 m.y. (zircon) were mentioned by Brosge and Reiser (1971). Mica ages were recalculated with new decay constants for K^{40}.

K-Ar (biotite) 90±4 m.y.
(muscovite) 94±5 m.y.
Pb-alpha (zircon) 240±30 m.y.

10. *USGS(W)-60ATB104* K-Ar, Pb-alpha
Quartz monzonite (65°10'00"N, 150°45'00"W, Roughtop Mtn., Tanana A-2 quad., AK). *Analytical data:* (biotite): K_2O = 8.28%; $^*Ar^{40}$ = 11.33 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 90%; (zircon): alpha/mg-hr = 368; lead = 13.5 ppm. *Collected by:* Bond Taber.

K-Ar (biotite) 93±5 m.y.
Pb-alpha (zircon) 90±10 m.y.

11. *USGS(W)-60ATB105* K-Ar
Granite (65°03'00"N, 150°45'00"W, Manley Hot Springs Dome, Tanana A-2 quad., AK). *Analytical data:* K_2O = 9.05%; $^*Ar^{40}$ = 7.756 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 92%. *Collected by:* Bond Taber.

(biotite) 59±3 m.y.

12. *USGS(M)-62ACH-65* K-Ar
Quartz monzonite (65°15'30"N, 148°55'12"W; Tolovana Hot Springs Dome, Livengood B-4 quad., AK). *Analytical data:* K_2O = 8.53, 8.40%; $^*Ar^{40}$ = 8.051 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 90%. *Collected by:* R. M. Chapman; *analyzed by:* M. A. Lanphere, H. C. Whitehead, L. B. Schlocker. *Comment:* Chapman and others (1971) quote age of 63.3 m.y. for this sample; age has been recalculated with new decay constants for K^{40}.

(biotite) 64.9±2.5 m.y.

13. *USGS(W)-G115* Pb-alpha
Quartz diorite (63°43'24"N, 144°03'48"W, Tanana River, Mt. Hayes C-1 quad., AK). *Analytical data:* alpha/mg-hr = 663; lead = 31 ppm. *Collected by:* G. W. Holmes. *Comment:* Probable time of emplacement, as age agrees with other radiometric ages for samples in this area (Holmes and Foster, 1968).

(zircon) 115±15 m.y.

14. *USGS(W)-G3* Pb-alpha
Granodiorite (63°40'24"N, 144°03'12"W, Dot Lake, Mt. Hayes C-1 quad., AK). *Analytical data:* alpha/mg-hr = 783; lead = 34 ppm. *Collected by:* G. W. Holmes. *Comment:* Probable time of emplacement as age agrees with other radiometric ages for samples in this area (Holmes and Foster, 1968).

(zircon) 110±10 m.y.

15. *USGS(W)-G-4* Pb-alpha
Andesine porphyry (63°40'24"N, 144°02'48"W, Dot Lake, Mt. Hayes C-1 quad., AK). *Analytical data:* alpha/mg-hr = 452; lead = 29 ppm. *Collected by:* G. W. Holmes. *Comment:* Age is anomalously old; andesine porphyry intrudes 110-m.y.-old granodiorite (sample USGS(W)-G3, above).

(zircon) 160±20 m.y.

16. *USGS(W)-17(G-51)* Pb-alpha
Granite (63°38'24"N, 144°46'24"W, Mt. Horn, Mt. Hayes C-2 quad., AK). *Analytical data:* alpha/mg-hr = 852; lead = 30 ppm. *Collected by:* G. W. Holmes.

Comment: Age mentioned by Holmes (1965).

(zircon) 90±10 m.y.

17. *USGS(W)-16(G-1)* Pb-alpha
Granite (63°49'00"N, 144°54'00"W, Gerstle Quarry, Mt. Hayes D-2 quad., AK). *Analytical data:* alpha/mg-hr = 718; lead = 30 ppm. *Collected by:* G. W. Holmes. *Comment:* Age mentioned by Holmes (1965).

(zircon) 105±10 m.y.

18. *USGS(M)-62AME-120* K-Ar
Quartz diorite (56°55'00"N, 154°13'00"W, Trinity Islands D-1 quad., S part Kodiak Island, AK). *Analytical data:* (biotite): K_2O = 6.76%; $*Ar^{40}$ = 6.016 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 45%; (muscovite): K_2O = 8.39%; $*Ar^{40}$ = 7.604 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 90%. *Collected by:* G. W. Moore; *analyzed by:* M. A. Lanphere, H. C. Whitehead, L. B. Schlocker.

(biotite) 60.8±3.0 m.y.
(muscovite) 61.9±2.5 m.y.

19. *USGS(M)-63AME-66* K-Ar
Quartz diorite (57°54'00"N, 153°43'00"W, Kodiak D-6 quad., N part Kodiak Island, AK). *Analytical data:* K_2O = 7.63, 7.69%; $*Ar^{40}$ = 6.519 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 72%. *Collected by:* G. W. Moore; *analyzed by:* M. A. Lanphere, J. C. Engels, H. C. Whitehead, L. B. Schlocker.

(biotite) 58.2±1.5 m.y.

ARIZONA

20. *USGS(D)-MWC-55-74* K-Ar
Basalt (34°11'00"N, 114°13'30"W; NW¼ S27,T10N, R19W, Cross Roads quad., Yuma Co., AZ). Olivine basalt from upper flow in fanglomerate of Osborne Wash. *Analytical data:* K_2O = 2.12, 2.11%; $*Ar^{40}$ = 0.2594 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 73%. *Collected by:* W. J. Carr. *Comment:* Minimum age of extrusion.

(whole-rock) 8.5±0.2 m.y.

21. *USGS(D)-MWC-56-74* K-Ar
Basalt (34°10'00"N, 114°16'30"W; NE¼ S31,T10N, R20W, Parker quad., Yuma Co., AZ). "Headgate Rock" olivine basalt; lower basalt in fanglomerate of Osborne Wash. *Analytical data:* K_2O = 0.88, 0.87%; $*Ar^{40}$ = 0.1631 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 49%. *Collected by:* W. J. Carr. *Comment:* Minimum age of extrusion.

(whole-rock) 12.9±0.6 m.y.

22. *USGS(W)-VAW-60-29* K-Ar
Ash (32°45'58"N, 114°26'10"W; S5,T8S,R21W, Laguna Mtns., Laguna Dam quad., Yuma Co., AZ). A 0.6- to 1.2-m-thick bed of pink bentonitic ash in lower part of upper member of Kinter Formation. *Analytical data:* K_2O = 7.34%; $*Ar^{40}$ = 2.577 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 54%. *Analyzed by:* H. H. Thomas, R. F. Marvin, P. L. D. Elmore, H. Smith. *Comment:* Olmsted and others (1973) published age of 23 m.y. for this biotite; age recalculated with new decay constants for K^{40}.

(biotite) 24.2±1.2 m.y.

23. *5-15-55A(PED-4-65)* K-Ar
Tuff (32°48'13"N, 114°28'50"W, Laguna Mtns., Laguna Dam quad., Yuma Co., AZ). Top of pale-purple, porous soft vitric-crystal tuff bed overlain by fanglomerate of Kinter Formation. *Analytical data:* K_2O = 7.73%, $*Ar^{40}$ = 3.02 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 48%. *Analyzed by:* staff, Univ. Ariz., Geochronology Laboratory (Damon and others, 1965). *Comment:* Oligocene volcanism. Olmsted and others (1973) published age of 26.3 m.y. for this biotite; age recalculated with new decay constants for K^{40}.

(biotite) 26.9±1.0 m.y.

24. *USGS(D)-W-65A* K-Ar
Granodiorite, porphyritic (32°57'39"N, 110°51'33"W; SE corner S25,T5S,R14E, Winkelman quad., Pinal Co., AZ). *Analytical data:* K_2O = 7.88, 7.89%; $*Ar^{40}$ = 7.802 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 90%. *Collected by:* M. H. Krieger. *Comment:* Krieger (1974a) reported age of 66.0 m.y. for this sample; age recalculated with new decay constants for K^{40}.

(biotite) 67.3±2.0 m.y.

25. *USGS(D)-W-86* K-Ar
Rhyodacite (32°57'28"N, 110°51'08"W; NW¼ S31, T5S,R15E; Winkelman quad., Pinal Co., AZ). A chilled granodiorite or rhyodacite dike. *Analytical data:* K_2O = 8.56, 8.58%; $*Ar^{40}$ = 8.456 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 91%. *Collected by:* M. H. Krieger. *Comment:* Krieger (1974a) reported age of 65.7 m.y. for this sample; age recalculated with new decay constants for K^{40}.

(biotite) 67.3±2.0 m.y.

26. *USGS(D)-W-38* K-Ar, Rb-Sr
Granite (32°45'30"N, 110°52'00"W; NE¼ S11,T8S, R14E, Putnam Wash quad., Pinal Co., AZ). *Analytical data:* (muscovite): K_2O = 10.46, 10.50%; $*Ar^{40}$ = 292.5 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 99%; (whole-rock): Rb = 301 ppm; Sr = 33.6 ppm; $*Sr^{87}$ = 1.855 ppm; $*Sr^{87}/\Sigma Sr^{87}$ = 45%; assumed initial Sr^{87}/Sr^{86} = 0.703. *Collected by:* M. H. Krieger; *analyzed by:* C. E. Hedge, R. A. Hildreth, W. T. Henderson (Rb-Sr analysis). *Comment:* Krieger (1974b) reported ages of 1310 m.y. (K-Ar) and 1550 m.y. (Rb-Sr) for this sample; ages recalculated with new decay constants for K^{40} and Rb^{87}. The younger K-Ar age may be the result of thermal effects from nearby Laramide intrusives.

K-Ar (muscovite) 1320±40 m.y.
Rb-Sr (whole-rock) 1520±80 m.y.

27. *USGS(D)-W-10* K-Ar
Rhyolite dike (32°50'00"N, 110°45'30"W, SE¼ SE¼ S12,T7S,R15E, Putnam Wash quad., Pinal Co., AZ). *Analytical data:* K_2O = 8.67, 8.62%; $*Ar^{40}$ = 2.855 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 74%. *Collected by:* M. H. Krieger. *Comment:* Krieger (1974b) reported age of 22.3 m.y. for this sample; age recalculated with new decay constants for K^{40}.

(biotite) 22.8±0.7 m.y.

28. *USGS(W)-SQM-1* Pb-alpha
Quartz monzonite (32°41'00"N, 110°40'30"W, San Manuel area, Mammoth quad., Pinal Co., AZ). Quartz monzonite (Oracle Granite of Peterson, 1938) cores from drill-hole 15 at 378.0–379.5 and 394.8–396.3 m depths. *Analytical data:* alpha/mg-hr = 100; lead = 54 ppm. *Comment:* Reconnaissance age.

(zircon) 1200±130 m.y.

29. *USGS(W)-SQM-2* Pb-alpha
Quartz monzonite (32°41'00"N, 110°40'30"W, San Manuel area, Mammoth quad., Pinal Co., AZ). Quartz monzonite (Oracle Granite) cores from drill-hole "O" at 329.0–330.5 and 332.2–333.7 m depths. *Analytical data:* alpha/mg-hr = 80; lead = 48 ppm. *Comment:* Reconnaissance age.

(zircon) 1320±150 m.y.

30. *USGS(W)-SQM-3* Pb-alpha
Quartz monzonite (32°41'00"N, 110°40'30"W, San Manuel area, Mammoth quad., Pinal Co., AZ). Quartz monzonite (Oracle Granite) cores from drill-hole "P" at 426.8–428.3 m depths and drill-hole "Q" at 338.0–339.5 m depths. *Analytical data:* alpha/mg-hr = 103; lead = 58 ppm. *Comment:* Reconnaissance age.

(zircon) 1250±140 m.y.

31. *USGS(W)-60K-S-G2* Pb-alpha
Santa Teresa Granite (32°52'00"N, 110°17'00"W, Santa Teresa Mtns., Klondyke quad., Graham Co., AZ). *Analytical data:* alpha/mg-hr = 2202; lead = 543 ppm. *Collected by:* F. S. Simons. *Comment:* Age published (Simons, 1964).

(zircon) 60±10 m.y.

32. *USGS(W)-YT-133* Pb-alpha
Rhyolite (32°45'56"N, 109°30'39"W, Safford quad., Graham Co., AZ). *Analytical data:* alpha/mg-hr = 238; lead = 6.4 ppm. *Collected by:* S. C. Creasey. *Comment:* Reconnaissance age.

(zircon) 65±10 m.y.

33. *USGS(W)-YT-138* Pb-alpha
Granite (32°45'55"N, 109°30'34"W, Safford quad., Graham Co., AZ). *Analytical data:* alpha/mg-hr = 133; lead = 3.5 ppm. *Collected by:* S. C. Creasey. *Comment:* Reconnaissance age.

(zircon) 65±10 m.y.

34. *USGS(D)-67-JDS-1* K-Ar
Vogesite(?) (36°28'50"N, 109°09'20"W; Kerr-McGee No. 2 Navajo Well, Dineh bi Keyeh Oil Field; S32, T36N,R30E (unsurveyed), Lukachukai quad., Apache Co., AZ). A biotitic vogesite sill or diopsidic minette sill represented by 20-cm piece of core from depth of 967 m. *Analytical data:* (biotite): K_2O = 9.21, 9.19%; $*Ar^{40}$ = 3.409 x 10^{-10}, 3.434 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 84, 77%; (sanidine): K_2O = 9.50, 9.52, 9.66%; $*Ar^{40}$ = 5.857 x 10^{-10}, 5.817 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 91, 91%. *Analyzed by:* R. F. Marvin, H. H. Mehnert, V. M. Merritt, R. Wilkey. *Comment:* Biotite ages agree with Miocene ages obtained from nearby intrusions. The much older sanidine ages are probably due to excess radiogenic argon; the older sanidine ages probably account for spurious 30–31 m.y. whole-rock K-Ar age reported by Pohlmann (1967).

(biotite) 25.5±0.6 m.y.
(biotite) 25.7±0.6 m.y.
(sanidine) 42.1±1.0 m.y.
(sanidine) 41.8±1.0 m.y.

CALIFORNIA

35. *USGS(D)-P-522* K-Ar
Metabasalt (40°17'00"N, 123°17'00"W, Pickett Peak quad., Trinity Co., CA). Chinquapin Metabasalt Member, South Fork Mountain Schist. *Analytical data:* K_2O = 0.068%; $*Ar^{40}$ = 0.1362 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 25%. *Analyzed by:* R. F. Marvin, H. H. Mehnert, H. C. Whitehead, L. B. Schlocker. *Comment:* Age apparently too young; probable age of metamorphism is 150 m.y. (Coleman and Lanphere, 1971).

(crossite) 134±20 m.y.

36. *USGS(D)-63-YB-107* K-Ar
Metabasalt (40°12'00"N, 122°59'00"W; N Yolla Bolly Mtns., Yolla Bolly quad., Trinity Co., CA). Chinquapin Metabasalt Member, South Fork Mtn. Schist. *Analytical data:* K_2O = 0.050%; $*Ar^{40}$ = 0.06533 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 27%. *Analyzed by:* R. F. Marvin, H. H. Mehnert, H. C. Whitehead, L. B. Schlocker. *Comment:* Age anomalously young; probable age of metamorphism is 150 m.y. (Coleman and Lanphere, 1971).

(crossite) 89±13 m.y.

37. *USGS(D)-26-CZ-59* K-Ar
Schist (38°32'00"N, 123°07'00"W, Cazadero quad., Sonoma Co., CA). Glaucophane-phengite schist, Franciscan assemblage. *Analytical data:* K_2O = 0.37%; $*Ar^{40}$ = 0.7181 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 81%. *Collected by:* R. G. Coleman; *analyzed by:* R. F. Marvin, H. H. Mehnert, P. L. D. Elmore. *Comment:* Age indicates the time of metamorphism; is in agreement with 131 m.y. age for coexisting phengite (Lee and others, 1964; phengite

age recalculated with new decay constants for K^{40}).

(glaucophane) 130±12 m.y.

38. *USGS(D)-57-RGC-58B* K-Ar
Schist (38°32'00"N, 123°07'00"W; Cazadero quad., Sonoma Co., CA). Glaucophane schist, Franciscan assemblage. *Analytical data:* K_2O = 0.11%; $*Ar^{40}$ = 0.1394 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 54%. *Collected by:* R. G. Coleman; *analyzed by:* R. F. Marvin, H. H. Mehnert, P. L. D. Elmore. *Comment:* Age is anomalously young.

(glaucophane) 86±8 m.y.

39. *USGS(M)-KA-399* K-Ar
Quartz diorite (approx. 38°18'24"N, 123°03'30"W; Bodega Head quad., Sonoma Co., CA). Biotite-hornblende quartz diorite, Bodega Head pluton. *Analytical data:* K_2O = 1.00%; $*Ar^{40}$ = 1.414 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 87%. *Collected by:* J. Schlocker. *Comment:* Marvin (1968) reported age of 92 m.y. for this sample; age recalculated with new decay constants for K^{40}.

(hornblende) 96±3 m.y.

40. *USGS(M)-9-FS-1* K-Ar
Tuff (38°15'14"N, 122°08'15"W; pumice quarry about 90 m SW of BM428, Mount George quad., Solano Co., CA). Pumice-lapilli tuff, Sonoma Volcanics. *Analytical data:* K_2O = 0.745, 0.768%; $*Ar^{40}$ = 0.04534 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 14%. *Collected by:* A. M. Sarna-Wojcicki and K. F. Fox; *analyzed by:* L. B. Schlocker, B. M. Myers, J. C. von Essen. *Comment:* Age agrees with other ages on tuffs in region (Sarna-Wojcicki, 1976).

(plagioclase) 4.16±0.41 m.y.

41. *USGS(M)-7-218E-2* K-Ar
Tuff (38°06'24"N, 122°06'08"W; long roadcut on frontage road, W side of Calif. Hwy. 21, about 61 m E of VABM-Goodyear 212; Port Chicago quad., Solano Co., CA). A 37 m-thick ash-flow tuff, Sonoma Volcanics. *Analytical data:* K_2O = 0.725, 0.727%; $*Ar^{40}$ = 0.03488 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 23%. *Collected by:* A. M. Sarna-Wojcicki and K. F. Fox; *analyzed by:* L. B. Schlocker, S. J. Kover, J. C. von Essen. *Comment:* Plagioclase concentrate from pumice bombs gave an age younger than other ages from tuffs of west-central California (Sarna-Wojcicki, 1976).

(plagioclase) 3.33±0.23 m.y.

42. *USGS(W)-San Bruno-200* Pb-alpha
Graywacke (37°40'00"N, 122°26'00"W, San Bruno Mtn., San Francisco South quad., San Mateo Co., CA). Graywacke, Franciscan assemblage. *Analytical data:* alpha/mg-hr = 208; lead = 28.5 ppm. *Collected by:* R. G. Coleman. *Comment:* Since zircons are detrital, Pb-alpha age is a mixed age of source rocks.

(zircon, –200 mesh) 330±35 m.y.

43. *USGS(M)-1-KA-1* K-Ar
Tuff (37°42'30"N, 122°28'33"W; abandoned quarry, Olympic Club Golf Course, San Francisco South quad., San Mateo Co., CA). A 2.7-m-thick, water-lain, vitric-crystal tuff interbedded with upper part of Merced Formation; sample taken 8–15 cm above base of tuff. *Analytical data:* K_2O = 0.441, 0.440%; $*Ar^{40}$ = 0.0 mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 0%. *Collected by:* A. M. Sarna-Wojcicki, G. B. Dalrymple, M. A. Lanphere; *analyzed by:* L. B. Schlocker, B. M. Myers, J. C. von Essen. *Comment:* Insufficient argon for age calculation. Correlation of this tuff with other radiometrically dated tuffs (Sarna-Wojcicki, 1976) suggests probable age of 0.4–1.1 m.y.

(plagioclase) ―――――――― m.y.

44. *USGS(M)-2-KA-1* K-Ar
Tuff (37°42'20"N, 122°29'53"W, San Francisco South quad., San Mateo Co., CA). A 2.7-m-thick water-lain, vitric-crystal tuff interbedded within upper part of Merced Formation; sample taken 8–15 cm above base of tuff. *Analytical data:* K_2O = 0.444, 0.444%; $*Ar^{40}$ = 0.00291 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 6%. *Collected by:* A. M. Sarna-Wojcicki, G. B. Dalrymple, M. A. Lanphere; *analyzed by:* L. B. Schlocker, B. M. Myers, J. C. von Essen. *Comment:* Age agrees with other ages obtained from correlated tuffs (Sarna-Wojcicki, 1976).

(plagioclase) 0.46±0.19 m.y.

45. *USGS(M)-3-KA-1* K-Ar
Tuff (37°42'20"N, 122°28'53"W; San Francisco South quad., San Mateo Co., CA). A 2.7-m-thick water-lain vitric-crystal tuff interbedded within upper part of Merced Formation; sample taken 8–15 cm above base of tuff. *Analytical data:* K_2O = 0.2975%; $*Ar^{40}$ = 0.0 mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 0%. *Collected by:* A. M. Sarna-Wojcicki, G. B. Dalrymple, M. A. Lanphere; *analyzed by:* L. B. Schlocker, B. M. Myers, J. C. von Essen. *Comment:* Insufficient argon for age determination; stratigraphic relations suggest that the tuff is less than 2.2 m.y. old.

(hornblende)―――――――――m.y.

46. *USGS(M)-4-KA-3* K-Ar
Tuff (37°42'20"N, 122°28'53"W; San Francisco South quad., San Mateo Co., CA). A 2.7 m-thick water-lain, vitric-crystal tuff interbedded within upper part of Merced Formation; sample from top of tuff. *Analytical data:* K_2O = 0.404, 0.406%; $*Ar^{40}$ = 0.00681 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 3%. *Collected by:* A. M. Sarna-Wojcicki, G. B. Dalrymple, M. A. Lanphere; *analyzed by:* L. B. Schlocker, B. M. Myers, J. C. von Essen. *Comment:* Age agrees with other radiometric ages obtained from correlated tuffs (Sarna-Wojcicki, 1976). Other samples of this tuff strongly suggest that the plagioclase

may be detrital in part. Thus, calculated age is a maximum for the tuff.

(plagioclase) 1.2±0.5 m.y.

47. *USGS(M)-5-KA-4 and 6-KA-4* K-Ar
Tuff (37°43′02″N, 122°30′10″W; 5–7 m above base of sea cliffs, above concrete storm sewer outlets, San Francisco South quad., San Mateo Co., CA). A 0.5-m-thick, water-lain, crystal-vitric tuff interbedded with upper part of Merced Formation; sample from lower 10–13 cm of tuff. *Analytical data:* (clear grains and chalky discolored grains): K_2O = 0.430, 0.429%; $^*Ar^{40}$ = 0.01358 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 10%; (clear grains): K_2O = 0.431, 0.428%; $^*Ar^{40}$ = 0.00442 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 3%. *Collected by:* A. M. Sarna-Wojcicki, G. B. Dalrymple, M. A. Lanphere; *analyzed by:* L. B. Schlocker, B. M. Myers, J. C. von Essen. *Comment:* Chalky discolored grains are detrital plagioclase which causes the 2.2 m.y. age to be too old. Clear grains give an age that agrees with other radiometric ages obtained from correlated tuffs (Sarna-Wojcicki, 1976).

(clear to chalky discolored plagioclase) 2.2±0.3 m.y.
(clear plagioclase) 0.7±0.5 m.y.

48. *USGS(D)-742-45* K-Ar
Andesite (38°05′00″N, 119°09′00″W; S25,T3N, R25E, N of Mono Lake, Bodie quad., Mono Co., CA). Andesite-basalt plug. *Analytical data:* K_2O = 1.24, 1.27, 1.22%; $^*Ar^{40}$ = 0.2104 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 62%. *Comment:* Miocene andesite plug or volcanic neck (Bateman and Wones, 1972).

(whole-rock) 11.7±0.5 m.y.

49. *USGS(W)-54-EM-1* Pb-alpha
Quartz monzonite (36°31′00″N, 117°44′00″W; Ubehebe Peak quad., Inyo Co., CA). Quartz monzonite, Hunter Mtn. batholith. *Analytical data:* alpha/mg-hr = 151; lead = 11.8 ppm. *Collected by:* W. E. Hall. *Comment:* Age published (Marvin, 1968). Age is in good agreement with other radiometric ages for rocks correlated by W. E. Hall with Hunter Mtn. batholith. Jaffe and others (1959) reported Pb-alpha age of 103 m.y. for this zircon sample; that age is in error.

(zircon) 190±20 m.y.

50. *USGS(M)-JFM74421A* K-Ar
Basalt (36°14′40″N, 116°29′39″W; W side, N tip of basalt cap on ridge of Lila C. Borate Mine (inactive), Eagle Mtn. quad., Inyo Co., CA). Fine-grained clinopyroxene-olivine basalt in the Furnace Creek Formation. *Analytical data:* K_2O = 0.838%; $^*Ar^{40}$ = 0.0889 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 33%. *Collected by:* J. F. McAllister; *analyzed by:* L. B. Schlocker, S. J. Kover, J. C. von Essen.

(whole-rock) 7.35±0.22 m.y.

51. *USGS(M)-JFM75513A* K-Ar
Vitrophyre (36°19′53″N, 116°44′17″W; NE flank Black Mtns., Death Valley Natl. Monument, Ryan quad., Inyo Co., CA). Perlitic vitrophyre with plagioclase, hornblende, and biotite phenocrysts; lower section Furnace Creek Formation. *Analytical data:* K_2O = 8.10, 8.04%; $^*Ar^{40}$ = 0.7039 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 52%. *Collected by:* J. F. McAllister; *analyzed by:* J. H. Christie, S. J. Kover, J. C. von Essen. *Comment:* Vitrophyre is lowest unaltered rock in volcanic facies of Furnace Creek Formation (type section); age appears reliable. A vitrophyre in upper part of the volcanic facies gives biotite age of 5.18± 0.15 m.y. (McAllister, 1973).

(biotite) 6.05±0.18 m.y.

52. *USGS(W)-1(56D240)* Pb-alpha
Quartz monzonite (36°01′09″N, 116°40′24″W; Smith Mtn., Black Mtns., Funeral Peak quad., Inyo Co., CA). Altered, gray, hypidiomorphic granular porphyritic quartz monzonite cut by veinlets of calcite and sericite. *Analytical data:* alpha/mg-hr = 195; lead = 3.5 ppm. *Collected by:* H. Drewes. *Comment:* Age mentioned (Drewes, 1963).

(zircon) 45±10 m.y.

53. *USGS(W)-2(56D106)* Pb-alpha
Quartz monzonite (36°11′28″N, 116°41′36″W; N side of Knob 5357, S of Coffin Canyon, Black Mtns., Funeral Peak quad., Inyo Co., CA). Altered hypidiomorphic, granular to granophyric quartz monzonite. *Analytical data:* alpha/mg-hr = 225; lead = 2.7 ppm. *Collected by:* H. Drewes. *Comment:* Age mentioned (Drewes, 1963).

(zircon) 30±10 m.y.

54. *USGS(W)-EMM-1-C* Pb-alpha
Isabella Granodiorite (Miller, 1931) (35°34′00″N, 118°34′00″W; Miracle Hot Springs quad., Kern Co., CA). *Analytical data:* alpha/mg-hr = 377; lead = 15 ppm. *Collected by:* E. M. MacKevett, Jr. *Comment:* Age published (Marvin, 1968). Jaffee and others (1959) reported Pb-alpha ages of 83, 89, and 96 m.y. for similar zircon concentrates from same locality.

(zircon) 100±10 m.y.

55. *USGS(M)-GV-72-2* K-Ar
Tuff (35°20′19″N, 118°43′02″W; bluff, S side Walker Basin Creek, Bena quad., Kern Co., CA). Pumice tuff, about 160 m above base of continental Walker Formation at type section. *Analytical data:* K_2O = 0.503, 0.509%; $^*Ar^{40}$ = 0.1561 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 49%. *Collected by:* J. A. Barstow and M. P. Doukas; *analyzed by:* J. H. Tillman, J. Christie, M. J. Cremer, A. L. Berry, S. E. Sims, J. C. von Essen.

(plagioclase) 21.3±0.6 m.y.

56. *USGS(D)-74FP-1* K-Ar
Phyllite (35°24′58″N, 117°49′31″W; W side Mesquite Canyon along road at boundary between S17, and S18,T29S,R39E, Garlock quad., Kern Co., CA).

Sericite, quartz-plagioclase(?), epidote(?) rock: Mesquite Schist (Dibblee, 1952). *Analytical data:* K_2O = 3.94, 3.94%; $^*Ar^{40}$ = 11.30 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 95%. *Collected by:* F. G. Poole. *Comment:* Age is a minimum for the time of metamorphism; age may have been lowered by thermal effects from nearby large granitoid plutons.

(whole-rock) 189±5 m.y.

57. *USGS(W)-RCE-54-7-15D* Pb-alpha
Granite (35°12'00"N, 117°28'00"W; Fremont Peak quad., San Bernardino Co., CA). *Analytical data:* (zircon): alpha/mg-hr = 1392; lead = 48 ppm; (monazite): alpha/mg-hr = 8616; lead = 380 ppm. *Collected by:* D. F. Hewett. *Comment:* Ages published (Marvin, 1968).

(zircon) 85±10 m.y.
(monazite) 90±10 m.y.

58. *USGS(W)-RCE-54-7-17B* Pb-alpha
Quartz monzonite (35°30'00"N, 116°45'00"W, Granite Mtns.(?), Trona quad., San Bernardino Co., CA). *Analytical data:* alpha/mg-hr = 582; lead = 30 ppm. *Collected by:* D. F. Hewett. *Comment:* Reconnaissance age; probable time of emplacement.

(zircon) 130±10 m.y.

59. *USGS(W)-RCE-54-7-19A* Pb-alpha
Quartz monzonite (35°32'00"N, 116°45'00"W, Granite Mtns., Trona quad., San Bernardino Co., CA). *Analytical data:* alpha/mg-hr = 381; lead = 17.0 ppm. *Comment:* Reconnaissance age; probable time of emplacement.

(zircon) 110±10 m.y.

60. *USGS(W)-RCE-54-7-26A* Pb-alpha
Quartz monzonite (34°52'00"N, 116°21'40"W; SW¼ S16,T9N,R6E, Cady Mtns. quad., San Bernardino Co., CA). *Analytical data:* alpha/mg-hr = 203; lead = 9.4 ppm. *Collected by:* D. F. Hewett. *Comment:* Age published (Dibblee and Bassett, 1966). Previous Pb-alpha age of 155 m.y. for betafite (niobate and titanite of uranium) from a pegmatite in the quartz monzonite is now thought to be spurious; age published (Hewett and Glass, 1953).

(zircon) 115±10 m.y.

61. *USGS(W)-BL-60-1B* Pb-alpha
Xenolith (Val Verde Tunnel dump; 33°50'15"N, 117°19'00"W; Steele Peak quad., Riverside Co., CA). Coarse-grained xenolith in Bonsall Tonalite. *Analytical data:* alpha/mg-hr = 244; lead = 11.0 ppm. *Collected by:* B. Levin. *Comment:* Age not evaluated.

(zircon) 110±10 m.y.

62. *USGS(W)-BL-60-4* Pb-alpha
Granite, Roblar Leucogranite (33°23'00"N, 117°19'00"W, DeLuz, Fallbrook quad., San Diego Co., CA). *Analytical data:* alpha/mg-hr = 487; lead = 19 ppm. *Collected by:* B. Levin. *Comment:* Reconnaissance age; probable time of emplacement.

(zircon) 100±20 m.y.

63. *USGS(W)-BL-60-6* Pb-alpha
Green Valley Tonalite (approx. 33°05'15"N, 116°58'00"W; San Pasqual quad., San Diego Co., CA). *Analytical data:* alpha/mg-hr = 213; lead = 7.8 ppm. *Collected by:* B. Levin. *Comment:* Reconnaissance age; probable time of emplacement.

(zircon) 90±10 m.y.

64. *USGS(D)-M-Q-4* K-Ar
Rhyodacite (34°13'30"N, 114°41'30"W; NW¼ S29, T2N,R22E; SE end Mopah Range, Vidal NW quad., San Bernardino Co., CA). Rhyodacite vitrophyre with plagioclase, biotite, and hornblende phenocrysts (20% of rock). *Analytical data:* (biotite): K_2O = 8.83, 8.78%; $^*Ar^{40}$ = 2.471 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 71%; (hornblende): K_2O = 0.77, 0.79%; Ar^{40} = 0.2102 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 27%. *Collected by:* W. J. Carr.

(biotite) 19.4±0.5 m.y.
(hornblende) 18.6±0.8 m.y.

65. *USGS(D)-MWC-30-76* K-Ar
Basalt (34°21'00"N, 114°38'00"W; Savahia Peak SW quad., San Bernardino Co., CA). Holocrystalline lava with intergranular texture—rare olivine and pyroxene phenocrysts, scattered K-feldspar clots. *Analytical data:* K_2O = 2.49, 2.50, 2.37, 2.47%; $^*Ar^{40}$ = 0.6202 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 48%. *Collected by:* W. J. Carr. *Comments:* This is a minimum age for the basalt. Since sampled unit directly underlies Peach Springs Tuff (Young and Brennan, 1974) (18.9 m.y. old—see sample USGS(D)-MWC-79-74, this tabulation, no. 69) calculated age is too young, probably due to diffusion loss of radiogenic argon.

(whole-rock) 17.4±0.4 m.y.

66. *USGS(D)-MWC-31-76* K-Ar
Basalt (34°21'00"N, 114°38'00"W; S11,T3N,R22E, Savahia Peak SW quad., San Bernardino Co., CA). Fine-grained, holocrystalline, trachytic lava with conspicuous olivine (iddingsitized), plagioclase, and minor pyroxene phenocrysts. *Analytical data:* K_2O = 1.57, 1.56, 1.52, 1.56%; $^*Ar^{40}$ = 0.3331 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 58%. *Collected by:* W. J. Carr. *Comment:* Basalt directly underlies Peach Springs Tuff (18.9 m.y. old—see sample USGS(D)-MWC-79-74, this tabulation, no. 69); thus calculated age is much too young.

(whole-rock) 14.9±0.3 m.y.

67. *USGS(D)-MWC-72-74* K-Ar
Basalt (34°13'30"N, 114°19'00"W; NE¼ S35,T2N, R25E, Parker quad., San Bernardino Co., CA). Basalt or basaltic andesite: basalt of West Portal (informal name). *Analytical data:* K_2O = 2.08, 2.10%; $^*Ar^{40}$ =

0.1835×10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 28%. *Collected by:* W. J. Carr.

(whole-rock) 6.1±0.2 m.y.

68. *USGS(D)-MWC-39-74* K-Ar
Quartz monzonite (34°13'00"N, 114°24'00"W; S36, T2N,R24E, Parker NW quad., San Bernardino Co., CA). Coarse-grained, holocrystalline quartz monzonite. *Analytical data:* (biotite): K_2O = 9.65, 9.66%; $*Ar^{40}$ = 12.52×10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 96%; (orthoclase): K_2O = 13.66, 13.72%; $*Ar^{40}$ = 18.33×10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 92%. *Collected by:* W. J. Carr.

(biotite) 87.9±2.1 m.y.
(orthoclase) 90.7±1.4 m.y.

69. *USGS(D)-MWC-79-74* K-Ar
Peach Springs Tuff (34°11'30"N, 114°16'30"W; SW¼ S8,T1N,R26E, Parker quad., San Bernardino Co., CA). Nonwelded ash-flow tuff with sanidine and minor biotite, hornblende, sphene phenocrysts (15% of tuff). *Analytical data:* (biotite): K_2O = 8.17, 8.23%; $*Ar^{40}$ = 2.282×10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 67%; (sanidine) K_2O = 9.12, 9.15%; $*Ar^{40}$ = 2.459×10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 85%. *Collected by:* W. J. Carr.

(biotite) 19.2±0.5 m.y.
(sanidine) 18.6±0.4 m.y.

70. *COL2-35-1A* K-Ar
Tuff (32° 55'15"N, 114°31'12"W; SE corner S25, T14S,R23E (SBBM); Little Picacho Peak quad., Chocolate Mtns., Imperial Co., CA). Hard, grayish-purple, slightly welded felsic tuff. *Analytical data:* K_2O = 4.66%; $*Ar^{40}$ = 1.826×10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 32%. *Analyzed by:* Geochron Laboratories, Cambridge, Mass. *Comment:* Olmsted and others (1973) published age of 26.2 m.y. for this sample; age recalculated with new decay constant for K^{40}.

(sanidine) 27.0±1.6 m.y.

71. *PED-1-67* K-Ar
Andesite, hornblende (32°56'56"N, 114°33'12"W; Little Picacho Peak quad., Chocolate Mtns., Imperial Co., CA). *Analytical data:* K_2O = 0.887%; $*Ar^{40}$ = 0.326×10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 22%. *Analyzed by:* staff, Univ. Ariz. Geochronology Lab. (Damon and others, 1968). *Comment:* Olmsted and others (1973) published age of 24.7 m.y. for this sample; recalculated with new decay constants for K^{40}.

(hornblende) 25.4±2.2 m.y.

72. *HC2-15-35B* K-Ar
Andesite (32°49'53"N, 114°31'39"W; 1400 m N, 1385 m W of SE corner S26,T15S,R23E; Bard quad., Chocolate Mtns., Imperial Co., CA). Base of basalt-to-basaltic-andesite flows. *Analytical data:* K_2O = 1.84%; $*Ar^{40}$ = 0.686×10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 17%. *Analyzed by:* staff, Univ. Ariz. Geochronology Lab. (Dammon and others, 1970, sample PED-8-68). *Comment:* Olmsted and others (1973) published age of 25.1 m.y. for this sample; age recalculated with new decay constants for K^{40}.

(whole-rock) 25.8±1.6 m.y.

73. *COL2-7-38A* K-Ar
Tuff (32°56'37"N, 114°32'52"W; Little Picacho Peak quad., Chocolate Mtns., Imperial Co., CA). Pumiceous andesite(?) tuff underlying 25.4 m.y.-old hornblende andesite (see sample PED-1-67, this tabulation, no. 71). *Analytical data:* (biotite—40-100 mesh, less than 5% impurities): K_2O = 7.08%; $*Ar^{40}$ = 2.752×10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 31, 21%. *Analyzed by:* Geochron Laboratories, Cambridge, Mass. *Comment:* Olmsted and others (1973) published age of 25.9 m.y. for this sample; age recalculated with new decay constants for K^{40}.

(biotite) 26.8±0.9 m.y.

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74. *USGS(W)-HD-1-366* Pb-alpha
Sandstone (38°00'30"N, 108°52'20"W; Slick Rock district; Hamm Canyon quad., San Miguel Co., CO). Unaltered sandstone in Salt Wash Member of Morrison Formation. *Analytical data:* (-150 +200 mesh zircon): alpha/mg-hr = 121; lead = 37 ppm; (-200 mesh zircon): alpha/mg-hr = 150; lead = 48.5 ppm. *Collected by:* D. R. Shawe. *Comment:* Age does not indicate age of sandstone (Jurassic) but is a composite age inherited from source rocks for the zircon; age published and discussed (Shawe and others, 1968).

(-150 +200 mesh, zircon) 715±80 m.y.
(-200 mesh, zircon) 755±85 m.y.

75. *USGS(W)-SH-4-55* Pb-alpha
Sandstone (38°03'10"N, 108°54'00"W; Veta Mad Mine area, Slick Rock district; Horse Range Mesa quad., San Miguel Co., CO). Unaltered sandstone in Salt Wash Member of Morrison Formation. *Analytical data:* (well-rounded zircon); alpha/mg-hr = 180; lead = 42 ppm. *Collected by:* D. R. Shawe. *Comment:* Age does not indicate age of sandstone (Jurassic) but is a composite age inherited from source rocks for the zircons; age published and discussed (Shawe and others, 1968).

(zircon) 555±60 m.y.

76. *USGS(W)-DVR-1-1303.2* Pb-alpha
Sandstone (37°57'30"N, 108°41'08"W; Disappointment Valley, Dawson Draw quad., San Miguel Co., CO). Slightly altered sandstone in Brushy Basin Member of Morrison Formation. *Analytical data:* (well-rounded zircon): alpha/mg-hr = 137; lead = 34 ppm. *Collected by:* D. R. Shawe. *Comment:* Age does not indicate age of sandstone (Jurassic) but is a

composite age inherited from source rock of the zircons; age published and discussed (Shawe and others, 1968).

(zircon) 585±65 m.y.

77. *USGS(W)-SH-10-57A* Pb-alpha
Sandstone (38°04'05"N, 108°55'40"W; Cougar Canyon area, Slick Rock district; Horse Range Mesa quad., San Miguel Co., CO). Unaltered sandstone in Salt Wash Member of Morrison Formation. *Analytical data:* alpha/mg-hr = 134; lead = 35.7 ppm. *Collected by:* D. R. Shawe. *Comment:* Age does not indicate age of sandstone (Jurassic) but is a composite age inherited from source rocks of the zircons; age published and discussed (Shawe and others, 1968).

(zircon) 630±70 m.y.

78. *USGS(W)-CO-R-GOO* Pb-alpha
Pegmatite (40°42'N, 106°54'W, Clark quad., Park Range, Routt Co., CO). *Analytical data:* alpha/mg-hr = 1904; lead = 1450 ppm. *Collected by:* R. S. Cannon, Jr. *Comment:* Reconnaissance age.

(monzonite) 1510±170 m.y.

79. *USGS(W)-CO-R-S1* Pb-alpha
Granite, porphyry (40°47'N, 106°42'W; Mount Zirkel quad., Park Range, Routt Co., CO). *Analytical data:* alpha/mg-hr = 251; lead = 135 ppm. *Collected by:* R. S. Cannon, Jr. *Comment:* Reconnaissance age.

(zircon) 1200±130 m.y.

80. *USGS(D)-SLOAN-2* K-Ar
Carbonatite (40°50'33"N, 105°27'22"W; Sloan diatreme, Haystack Gulch quad., Larimer Co., CO). *Analytical data:* K_2O = 7.72, 7.72%; $^*Ar^{40}$ = 222.9 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 99%. *Comment:* The carbonatite blocks in the Devonian(?) diatreme are apparently from the Precambrian basement.

(biotite) 1350±30 m.y.

81. *USGS(D)-A* K-Ar, Fission-track
Ash (39°20'47"N, 107°06'02"W; talus slope, S22, T8S,R87W; Basalt quad., Pitkin Co., CO). Fine-grained, lavender-colored, rhyolitic ash flow with 1-mm phenocrysts of quartz and biotite. *Analytical data:* (biotite): K_2O = 8.81, 8.81%; $^*Ar^{40}$ = 4.655 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 94%; (zircon): ρ_s = 3.9 x 10^6 tracks/cm² (1623); ρ_i = 6.83 x 10^6 tracks/cm² (1623); Φ = 0.857 x 10^{15} n/cm; uranium = 250 ppm; (zircon): ρ_s = 2.81 x 10^6 tracks/cm² (729); ρ_i = 6.04 x 10^6 tracks/cm² (783); Φ = 1.05 x 10^{15} n/cm; uranium = 180 ppm. *Collected by:* R. H. Moench and C. G. Cunningham. *Comment:* An Oligocene ash. The 6-m.y. difference between K-Ar and fission-track ages is not understood. K-Ar age suggests that this ash flow may be an early extrusive phase of Mount Sopris igneous center; Mount Sopris stock dated at 34 m.y. (Cunningham and others, 1977).

K-Ar (biotite) 36.3±0.9 m.y.
Fission-track (zircon) 30.2±2.1 m.y.
(zircon) 30.1±3.0 m.y.

82. *USGS(W)-2-D-62* K-Ar
Gneiss (39°23'50"N, 106°30'15"W; Mount Jackson quad., Sawatch Range, Eagle Co., CO). *Analytical data:* K_2O = 8.72%; $^*Ar^{40}$ = 69.56 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 99%. *Collected by:* O. Tweto. *Comment:* Age is a reduced age; gneiss probably formed about 1700 m.y. ago. Igneous intrusive activity in vicinity about 65 m.y. ago caused loss of radiogenic argon in the biotite and thus a younger age.

(biotite) 483±24 m.y.

83. *USGS(D)-91* K-Ar
Silver Plume Granite (39°27'30"N, 106°20'00"W; S10,T7S,R80W; Pando quad., Eagle Co., CO). *Analytical data:* K_2O = 6.14, 6.20%; $^*Ar^{40}$ = 143.6 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 99%. *Comment:* Silver Plume Granite is 1450 m.y. old (Peterman and others, 1968); this age may indicate a time of uplift and cooling. It does not date time of intrusion.

(biotite) 1150±30 m.y.

84. *USGS(D)-72-92* K-Ar
Quartz latite (39°26'N, 106°19'W; outcrop at right-angle bend Eagle River, S end of Camp Hale; Pando quad., Eagle Co., CO). Altered quartz latite porphyry below Cambrian Sawatch Quartzite. *Analytical data:* K_2O = 2.48, 2.47%; $^*Ar^{40}$ = 2.285 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 81%. *Comment:* Age probably indicates time of alteration; time of emplacement is somewhat older.

(sericite) 63.0±1.5 m.y.

85. *USGS(D)-D96* K-Ar
Quartz monzonite, Humbug stock (39°27'N, 106°09'W; Tenmile Range, Copper Mtn. quad., Summit Co., CO). *Analytical data:* K_2O = 9.03, 9.02%; $^*Ar^{40}$ = 5.577 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 86%. *Collected by:* M. A. Kuntz. *Comment:* K-Ar ages for Humbug stock range from 47 to 35 m.y. (Marvin and others, 1974, p. 14–15).

(biotite) 42.4±1.0 m.y.

86. *USGS(D)-K150* K-Ar
Quartz monzonite, Humbug stock (39°27'N, 106°06'W; 92 m S of Peak 9, Tenmile Range; Breckenridge quad., Summit Co., CO). *Analytical data:* K_2O = 7.95, 7.92%; $^*Ar^{40}$ = 4.796 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 87%. *Collected by:* M. A. Kuntz. *Comment:* K-Ar ages for Humbug stock range from 47 to 35 m.y. (Marvin and others, 1974, p. 14–17).

(biotite) 41.5±1.0 m.y.

87. *USGS(D)-MG-4* K-Ar
Melagranodiorite (39°19'00"N, 106°07'35"W; W side of Buckskin Creek (elev. 3600 m), Mosquito Range; Climax quad., Park Co., CO). Melagranodiorite (early phase) from intrusive complex of Buckskin Gulch. *Analytical data:* K_2O = 6.93, 6.94%; $^*Ar^{40}$ = 7.251 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 82%. *Collected by:*

M. A. Kuntz. *Comment:* Age supersedes ages listed by Marvin and others (1974, entry 203, p. 28).

(biotite) 71.2±1.7 m.y.

88. *USGS(D)-HBD-4* K-Ar

Dacite (39°19'00"N, 106°07'45"W; W side Buckskin Creek (elev. 3660 m), Mosquito Range, Climax quad., Park Co., CO). Hornblende-biotite dacite dike (late phase) from intrusive complex of Buckskin Gulch. *Analytical data:* K_2O = 4.96, 5.00%; $^*Ar^{40}$ = 5.110 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 83%. *Collected by:* M. A. Kuntz. *Comment:* Age supersedes ages listed by Marvin and others (1974, entry 203, p. 28); age appears slightly too old as dike cuts granodiorite which is 66.7 m.y. old (see USGS(D)-LG-15 below).

(biotite) 69.9±1.7 m.y.

89. *USGS(D)-LG-15* K-Ar

Leucogranodiorite (39°20'00"N, 106°07'20"W; elev. 3825 m, Mosquito Range, Alma quad., Park Co., CO). Leucogranodiorite from intrusive complex of Buckskin Gulch. *Analytical data:* K_2O = 7.47, 7.38%, $^*Ar^{40}$ = 7.268 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 86%. *Collected by:* M. A. Kuntz. *Comment:* Age supersedes ages listed by Marvin and others (1974, entry 203, p. 28).

(biotite) 66.7±1.6 m.y.

90. *USGS(D)-D2377F* K-Ar

Gangue (39°50'40"N, 105°16'50"W; SW¼ S25,T2S, R71W, 9th level Schwartzwalder Mine, Ralston Buttes quad., Jefferson Co., CO). K-feldspar gangue within uranium vein network. A few K-feldspar grains show grid-twinning. X-ray scans of the analyzed feldspar indicate presence of orthoclase and plagioclase (Alan Wallace, written commun., July, 1979). *Analytical data:* K_2O = 12.92, 12.76%; $^*Ar^{40}$ = 160.6 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 99%. *Collected by:* R. F. Marvin. *Comment:* Age suggests that gangue is composed of mixture of Precambrian host-rock feldspar and minor feldspar (adularia?) from mineralizing solution. Age does not indicate the time of mineralization. An age of 700 m.y. reported by Young (1977) for this sample; age recalculated with new decay constants for K^{40}.

(K-feldspar) 709±12 m.y.

91. *USGS(D)-D2378F* K-Ar

Gangue (39°50'40"N, 105°16'50"W; SW¼ S25,T2S, R71W, 9th level, Schwartzwalder Mine, Ralston Buttes quad., Jefferson Co., CO). *Analytical data:* K_2O = 14.33, 14.34%; $^*Ar^{40}$ = 37.92 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 96%. *Collected by:* R. F. Marvin. *Comment:* K-feldspar gangue within uranium vein network; a few K-feldspar grains show grid-twinning. X-ray scans of analyzed feldspar indicate presence of orthoclase and adularia (Allan Wallace, written commun., July, 1979). Age reflects this mixture of Precambrian host-rock feldspar and adularia from mineralizing solution. Age is not time of mineralization. Age of 171 m.y. reported by Young (1977) for this sample; age has been recalculated with new decay constants for K^{40}.

(K-feldspar— 175±3 m.y.

92. *USGS(D)-Sch-74* K-Ar

Pegmatite (39°51'N, 105°17'W; SW¼ S25,T2S,R71W, 5th level, Schwartzwalder Mine, Ralston Buttes quad., Jefferson Co., CO). The 0.6- to 1.2-m-thick pegmatite intrudes Idaho Springs Formation and is in intimate contact with uraninite and sulfides. *Analytical data:* K_2O = 9.56, 9.34%; $^*Ar^{40}$ = 304.9 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 99%. *Collected by:* E. J. Young. *Comment:* A minimum age of intrusion.

(muscovite) 1455±35 m.y.

93. *USGS(D)-Sch-164* K-Ar

Pegmatite (39°51'N, 105°17'W; S25,T2S,R71W, Ralston Butte quad., Jefferson Co., CO). A sheared 0.3- to 1.0-m-thick pegmatite intruding Idaho Springs Formation. *Analytical data:* K_2O = 9.43, 9.52%; $^*Ar^{40}$ = 292.6 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 100%. *Collected by:* E. J. Young. *Comment:* Minimum age; shearing may have caused some loss of radiogenic argon.

(muscovite) 1415±35 m.y.

94. *USGS(D)-FT-01* Fission-track

Pegmatite (39°50'N, 105°16'W; S31,T2S,R70W, just E of Ralston Creek, Ralston Buttes quad., Jefferson Co., CO). Small coarse-grained pegmatite in mica schist. *Analytical data:* ρ_s = 0.207 x 10^6 tracks/cm^2 (432); ρ_i = 0.199 x 10^6 tracks/cm^2 (415); Φ = 1.03 x 10^{15} n/cm^2; uranium = 5.6 ppm. *Collected by:* A. R. Wallace. *Comment:* Age is a cooling age, an indication of time of uplift in Front Range. Pegmatite probably formed 1400 m.y. ago.

(apatite) 63.9±9.0 m.y.

95. *USGS(D)-FT-02* Fission-track

Gneiss (39°46'00"N, 105°15'45"N; S19,T3S,R70W; roadcut along Golden Gate Canyon road, Ralston Buttes quad., Jefferson Co., CO). Foliated, medium-grained, microcline-quartz-biotite-plagioclase gneiss of Idaho Spring Formation. *Analytical data:* ρ_s = 0.444 x 10^6 tracks/cm^2 (926); ρ_i = 0.249 x 10^6 tracks/cm^2 (518); Φ = 1.03 x 10^{15} n/cm^2; uranium = 7 ppm. *Collected by:* A. R. Wallace. *Comment:* Age is a cooling age, an indication of time of uplift in Front Range. Gneiss was probably formed about 1700 m.y. ago.

(apatite) 109±12 m.y.

96. *USGS(D)-MC-15-74* K-Ar

Tuff (39°35'39"N, 104°35'51"W; N½ NE¼ NW¼ S30,T5S,R64W; Watkins SE quad., Arapahoe Co., CO). Crystal tuff in the Dawson Arkose. *Analytical* *data:* K_2O = 4.34, 4.36%; $^*Ar^{40}$ = 4.751 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 73%. *Collected by:* L. W. McGrew. *Comment:* Spurious age; Paleocene flora occur a bit lower in section.

(weathered biotite) 74.3±1.8 m.y.

97. *USGS(D)-MC-31-74* K-Ar
Tuff (39°36'53"N, 104°42'56"W; SW¼ S18,T5S, R65W; Piney Creek quad., Arapahoe Co., CO). Crystal tuff in Dawson Arkose. *Analytical data:* K_2O = 5.83, 5.94%; $^*Ar^{40}$ = 4.859 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 53%. *Collected by:* L. W. McGrew. *Comment:* Age agrees with stratigraphic and paleontologic evidence. Soister and Tschudy (1978, p. 234) reported age of 54 m.y. for a volcanic tuff in the Dawson Arkose.

(weathered biotite) 56.4±1.4 m.y.

98. *USGS(D)-73-N7* Fission-track
Granite (39°04'17"N, 106°27'01"W; S slope Monitor Rock, Sawatch Range, Mount Elbert quad., Lake Co., CO). Granite intruding Twin Lakes stock. *Analytical data:* zircon: ρ_S = 8.75 x 10^6 tracks/cm^2 (1094), ρ_i = 15.15 x 10^6 tracks/cm^2 (947); Φ = 0.973 x 10^{15} n/cm^2, U = 450 ppm, 3 grains counted; sphene: ρ_S = 5.08 x 10^6 tracks/cm^2 (862), ρ_i = 9.55 x 10^6 tracks/cm^2 (641), Φ = 1.14 x 10^{15} n/cm^2, U = 240 ppm, 3 grains counted. *Collected by:* C. W. Naeser. *Comment:* Age of granite is about 35 m.y., about 10 m.y. younger than Twin Lakes stock.

(zircon) 33.6±3.0 m.y.
(sphene) 36.2±4.0 m.y.

99. *USGS(D)-73-N8* Fission-track
Porphyritic granodiorite, Twin Lakes stock (39°04'14"N, 106°30'35"W; roadcut Colorado Highway 82, Sawatch Range, Independence Pass quad., Lake Co., CO). *Analytical data:* zircon: ρ_S = 12.72 x 10^6 tracks/cm^2 (119); ρ_i = 18.14 x 10^6 tracks/cm^2 (798); Φ = 1.06 x 10^{15} n/cm^2, U = 490 ppm, 3 grains counted; sphene: ρ_S = 7.40 x 10^6 tracks/cm^2 (1234); ρ_i = 10.68 x 10^6 tracks/cm^2 (890); Φ = 1.11 x 10^{15} n/cm^2, U = 280 ppm, 4 grains counted. *Collected by:* C. W. Naeser. *Comment:* Age of predominant rock-type of Twin Lakes stock.

(zircon) 44.2±4.0 m.y.
(sphene) 45.9±4.0 m.y.

100. *USGS(D)-TL-F6-16* Fission-track
Porphyritic granodiorite, Twin Lakes stock (39°04'15"N, 106°24'49"W; on ridge at 2926 m, Sawatch Range, Mount Elbert quad., Lake Co., CO). *Analytical data:* ρ_S = 4.95 x 10^6 tracks/cm^2 (710); ρ_i = 7.75 x 10^6 tracks/cm^2 (556); Φ = 1.19 x 10^{15} n/cm^2, U = 190 ppm, 4 grains counted. *Comment:* Age indicates age of Twin Lakes stock.

(zircon) 45.5±5.1 m.y.

101. *USGS(D)-73-N9* Fission-track
Aplite, Twin Lakes stock (39°03'56"N, 106°23'59"W; roadcut Colorado Highway 82, Sawatch Range, Mount Elbert quad., Lake Co., CO). *Analytical data:* ρ_S = 5.62 x 10^6 tracks/cm^2 (1172); ρ_i = 8.33 x 10^2 tracks/cm^2 (868); Φ = 1.08 x 10^{15} n/cm^2, U = 220 ppm, 5 grains counted. *Collected by:* C. W. Naeser. *Comment:* Age of aplite.

(sphene) 43.4±1.8 m.y.

102. *USGS(D)-E-628* Rb-Sr
Augen gneiss (38°56'N, 105°28'W; Elevenmile Canyon quad., Park Co., CO). *Analytical data:* Rb = 219 ppm; Sr = 104 ppm; $^*Rb^{87}$ = 1.414 ppm; $^*Rb^{87}/\Sigma Rb^{87}$ = 16.7%; initial Sr^{87}/Sr^{86} = 0.703. *Analyzed by:* C. E. Hedge, R. A. Hildreth, W. T. Henderson; *collected by:* C. C. Hawley. *Comment:* Minimum age of metamorphic crystallization.

(whole-rock) 1590±100 m.y.

103. *USGS(D)-E-129* Rb-Sr
Quartz monzonite (38°54'N, 105°28"W; Elevenmile Canyon quad., Park Co., CO). *Analytical data:* Rb = 187 ppm; Sr = 371 ppm; $^*Sr^{87}$ = 1.087 ppm; $^*Sr^{87}/\Sigma Sr^{87}$ = 4.2%; initial Sr^{87}/Sr^{86} = 0.703. *Analyzed by:* C. E. Hedge, R. A. Hildreth, W. T. Henderson; *collected by:* C. C. Hawley. *Comment:* Age indicates pluton is part of Silver Plume orogenic event.

(whole-rock) 1430±150 m.y.

104. *USGS(W)-P-4* Pb-alpha
Pikes Peak Granite (38°52'N, 105°07'W; Teller(?) Co., CO). *Analytical data:* alpha/mg-hr = 64; lead = 37.5 ppm. *Collected by:* D. Gottfried. *Comment:* Age too old for 1000-m.y.-old Pikes Peak Granite; age may be result of xenocrystic contamination.

(zircon) 1290±145 m.y.

105. *USGS(W)-P-5* Pb-alpha
Pikes Peak Granite (38°51'N, 105°02'W; Pikes Peak quad., El Paso or Teller Co., CO). *Analytical data:* (zircon, −60 to +100 mesh): alpha/mg-hr = 86; lead = 40 ppm; (zircon, −100 +200 mesh): alpha/mg-hr = 73; lead = 32 ppm; (zircon, −200 mesh): alpha/mg-hr = 77; lead = 36 ppm. *Collected by:* D. Gottfried. *Comment:* Age of Pikes Peak Granite is approx. 1000 m.y. Ages published by Marvin (1968).

(zircon, −60 +100 mesh) 1050±115 m.y.
(zircon, −100 +200 mesh) 995±110 m.y.
(zircon, −200 mesh) 1055±115 m.y.

106. *USGS(W)-Mt. Rosa* Pb-alpha
Mount Rosa Granite (38°44'50"N, 104°57'00"W; Mount Rosa, Pikes Peak area, Mount Big Chief quad., Teller or El Paso Co., CO). *Analytical data:* alpha/mg-hr = 824; lead = 406 ppm. *Collected by:* E. B. Gross, Univ. Mich. *Comment:* Age of Mount Rosa Granite is near 1000 m.y.; Pb-alpha age mentioned by Gross and Heinrich (1965).

(zircon) 1110±125 m.y.

107. *USGS(W)-6-B-77A* Pb-alpha
Metasediment (38°12'48"N, 105°22'18"W; Mount Tyndall quad., Wet Mtns., Custer Co., CO). *Analytical data:* alpha/mg-hr = 2155; lead = 1400 ppm. *Collected by:* M. R. Brock. *Comment:* Reconnaissance age; age published (Marvin, 1968).
(monazite) 1295±145 m.y.

108. *USGS(W)-6-B-84* Pb-alpha
Gneiss (38°13'11"N, 105°21'45"W; Mount Tyndall quad., Wet Mtns., Custer Co., CO). *Analytical data:* alpha/mg-hr = 136; lead = 88 ppm. *Collected by:* M. R. Brock. *Comment:* Reconnaissance age; age published (Marvin, 1968).
(zircon) 1405±155 m.y.

109. *USGS(W)-6-Q-28* Pb-alpha
Gneiss (38°13'13"N, 105°17'17"W; Mount Tyndall quad., Wet Mtns., Custer Co., CO). Alaskitic facies of biotite-quartz-plagioclase gneiss. *Analytical data:* (zircon): alpha/mg-hr = 313; lead = 239 ppm; (leached zircon): alpha/mg-hr = 325; lead = 245 ppm. *Collected by:* Q. Singewald. *Comment:* Ages published (Marvin, 1968) but not evaluated.
(zircon) 1615±180 m.y.
(leached zircon) 1600±180 m.y.

110. *USGS(W)-6-Q-52* Pb-alpha
Granite, alaskitic (38°13'16"N, 105°16'44"W; Mount Tyndall quad., Wet Mtns., Custer Co., CO). *Analytical data:* alpha/mg-hr = 872; lead = 542 ppm. *Collected by:* Q. Singewald. *Comment:* Reconnaissance age; age published (Marvin, 1968).
(zircon) 1360±150 m.y.

111. *USGS(W)-6-B-85* Pb-alpha
Granite (38°08'52"N, 105°15'39"W; Mount Tyndall quad., Wet Mtns., Custer Co., CO). *Analytical data:* alpha/mg-hr = 248; lead = 157 ppm. *Collected by:* M. R. Brock. *Comment:* Reconnaissance age; age published (Marvin, 1968).
(zircon) 1380±155 m.y.

112. *USGS(W)-6-B-86* Pb-alpha
Granite(?) (38°10'N, 105°16'W; Mount Tyndall quad., Wet Mtns., Custer Co., CO). *Analytical data:* alpha/mg-hr = 31; lead = 18.5 ppm. *Collected by:* M. R. Brock. *Comment:* Reconnaissance age.
(zircon) 1315±145 m.y.

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113. *USGS(W)-356-1* Rb-Sr
Schist (41°59'45"N, 73°25'00"W; Sharon quad., Litchfield Co., CT). Staurolite-garnet schist, Walloomsac Formation (Middle Ordovician). *Analytical data:* Rb = 678 ppm; Sr = 18.7 ppm, $^*Sr^{87}$ = 1.005 ppm; $^*Sr^{87}/\Sigma Sr^{87}$ = 44%; initial Sr^{87}/Sr^{86} = 0.703. *Collected by:* E-an Zen; *analyzed by:* C. E. Hedge and F. G. Walthall. *Comment:* Zen and Hartshorn (1966) published age of 355 m.y. for this sample; age recalculated with new decay constant for Rb^{87}. Muscovite concentrate from same sample gave K-Ar age of 390 m.y. (Zartman and others, 1970). Initial age of schist disturbed by later metamorphism.
(biotite) 368±19 m.y.

114. *USGS(W)-CEF-3* Pb-alpha
Woodbridge Granite (41°23'00"N, 72°59'35"W; Mt. Carmel quad., New Haven Co., CT). *Analytical data:* alpha/mg-hr = 570; lead = 221 ppm. *Collected by:* C. E. Fritts. *Comment:* Age published (Fritts, 1962); age too old.
(zircon) 890±100 m.y.

115. *USGS(W)-FPGM* Pb-alpha
Gneiss (41°31'25"N, 72°56'05"W; Southington quad., New Haven Co., CT). Hydrothermally altered zone of Prospect Gneiss. *Analytical data:* (A) (−150 +200 mesh): alpha/mg-hr = 130; lead = 24.5 ppm; (B) (−200 mesh): alpha/mg-hr = 124; lead = 23.5 ppm. *Collected by:* C. E. Fritts. *Comment:* Age published (Fritts, 1962). Reconnaissance age; zircons may be detrital.
(A) (zircon) 450±50 m.y.
(B) (zircon) 450±50 m.y.

116. *USGS(W)-FPG* Pb-alpha
Granodiorite gneiss (41°31'27"N, 72°57'15"W; Southington quad., New Haven, Co., CT). Prospect Gneiss. *Analytical data:* (−200 mesh): alpha/mg-hr = 337; lead = 64 ppm. *Collected by:* C. E. Fritts. *Comment:* Reconnaissance age; some or all of the zircons may be detrital. Age published (Fritts, 1962).
(zircon) 450±50 m.y.

117. *USGS(W)-FWG* Pb-alpha
Quartz diorite gneiss (41°35'15"N, 72°57'50"W; Southington quad., New Haven Co., CT). Woodtick Gneiss. *Analytical data:* (−250 mesh): alpha/mg-hr = 556; lead = 118 ppm. *Collected by:* C. E. Fritts. *Comment:* Age published (Fritts, 1962); reconnaissance age.
(zircon) 510±50 m.y.

118. *USGS(W)-CEF-1* Pb-alpha
Quartz diorite gneiss (41°34'25"N, 72°57'50"W; Southington quad., New Haven Co., CT). Woodtick Gneiss. *Analytical data:* alpha/mg-hr = 30; lead = 9.5 ppm. *Collected by:* C. E. Fritts. *Comment:* Age published (Fritts, 1962). Reconnaissance age; zircons may be detrital.
(zircon) 740±160 m.y.

119. *USGS(W)-1121* Pb-alpha
Alaskite gneiss (41°30'32"N, 72°12'11"W; Fitchville quad., New London Co., CT). *Analytical data:* alpha/mg-hr = 167; lead = 37 ppm. *Collected by:* G. L. Snyder; *analyzed by:* T. W. Stern and N. B. Sheffey. *Comment:* Age published (Snyder, 1964).
(zircon) 530±60 m.y.

120. *USGS(W)-255* Pb-alpha
Schist (41°34′38″N, 72°04′26″W; Norwich quad., New London Co., CT). Sillimanite-pinite schist phase of Putnam Group. *Analytical data:* (single lead analysis; Th/U = 25.0, assumed): alpha/mg-hr = 4680; lead = 1080 ppm. *Collected by:* G. L. Snyder; *analyzed by:* T. W. Stern and N. B. Sheffey. *Comment:* Age published (Snyder 1964); reconnaissance age.

(monazite) 475±55 m.y.

121. *USGS(W)-136* Pb-alpha
Pegmatite (41°35′26″N, 72°04′58″W; Norwich quad., New London Co., CT). Pegmatite in Fly Pond Member of Tatnic Hill Formation (Putnam Group). *Analytical data:* (zircon): alpha/mg-hr = 469; lead = 74 ppm; (monazite-1), (single lead analysis; Th/U = 25.0, assumed): alpha/mg-hr = 5550; lead = 1420 ppm; (monazite-2) (monazite was leached before analysis: single lead anlaysis Th/U = 25.0, assumed): alpha/mg-hr = 5720; lead = 1490 ppm. *Collected by:* G. L. Snyder; *analyzed by:* T. W. Stern and N. B. Sheffey. *Comment:* Ages published (Snyder, 1964); reconnaissance ages.

(zircon) 380±45 m.y.
(monazite-1) 525±60 m.y.
(monazite-2) 535±60 m.y.

122. *USGS(W)-87* Pb-alpha
Gneiss (41°31′26″N, 72°03′10″W; Norwich quad., New London Co., CT). Biotite gneiss phase of Putnam Group. *Analytical data:* alpha/mg-hr = 87; lead = 12 ppm. *Collected by:* G. L. Snyder; *analyzed by:* T. W. Stern and N. B. Sheffey. *Comment:* Age published (Snyder, 1964); reconnaissance age.

(zircon) 335±40 m.y.

123. *USGS(W)-150* Pb-alpha
Pegmatite (41°35′44″N, 72°02′44″W; Norwich quad., New London Co., CT). Pegmatite in schist of Putnam Group. *Analytical data:* (Th/U = 25.0, assumed): alpha/mg-hr = 6365; lead = 1040 ppm. *Collected by:* G. L. Snyder; *analyzed by:* T. W. Stern and N. B. Sheffey. *Comment:* Age published (Snyder, 1964); reconnaissance age.

(monazite) 340±40 m.y.

124. *USGS(W)-1149* Pb-alpha
Gneiss (41°31′46″N, 72°02′02″W; Norwich quad., New London Co., CT). Bates Pond Lentil (hornblende, soda orthoclase of Tatnic Hill Formation, Putnam Group). *Analytical data:* alpha/mg-hr = 135; lead = 15.5 ppm. *Collected by:* G. L. Snyder; *analyzed by:* T. W. Stern and N. B. Sheffey. *Comment:* Reconnaissance age; published (Snyder, 1964).

(zircon) 280±30 m.y.

125. *USGS(W)-346* Pb-alpha
Schist (41°30′47″N, 72°01′57″W; Norwich quad., New London Co., CT). Graphite schist phase of Putnam Group. *Analytical data:* (single lead analysis; Th/U = 25.0, assumed): alpha/mg-hr = 4870; lead = 1040 ppm. *Collected by:* G. L. Snyder; *analyzed by:* T. W. Stern and N. B. Sheffey. *Comment:* Reconnaissance age; published (Snyder, 1964).

(monazite) 440±50 m.y.

126. *USGS(W)-582* Pb-alpha
Schist (41°35′26″N, 72°01′04″W; Norwich quad., New London Co., CT). Graphite schist phase of Putnam Group. *Analytical data:* (A) (single lead analysis; Th/U = 25.0, assumed): alpha/mg-hr = 4400; lead = 960 ppm; (B) (Monazite concentrate leached before analysis; single lead analysis; Th/U = 25.0, assumed): alpha/mg-hr = 3960; lead = 860 ppm. *Collected by:* G. L. Snyder; *analyzed by:* T. W. Stern and N. B. Sheffey. *Comment:* Reconnaissance ages; published (Snyder, 1964).

(A) (monazite) 450±50 m.y.
(B) (monazite) 445±50 m.y.

127. *USGS(W)-RD-1-61* Pb-alpha
Gneiss (41°42′00″N, 71°59′00″W; Canterbury Plainfield quad., Windham Co., CT). Garnet-plagioclase-quartz gneiss from lower member Tatnic Hill Formation, Putnam Group. *Analytical data:* alpha/mg-hr = 336; lead = 53 ppm. *Collected by:* R. H. Dixon. *Comment:* Reconnaissance age.

(zircon) 380±40 m.y.

IDAHO

128. *USGS(D)-WGJH-2* K-Ar
Lamprophyre (47°15′N, 115°47′W; S14,T45N,R5E; roadcut at confluence of St. Joe River and North Fork of St. Joe River, Wallace 15′ quad., Mineral Co., ID). Dike intruding Wallace Formation, Belt Supergroup. *Analytical data:* K_2O = 1.02, 1.02, 1.07%; $^*Ar^{40}$ = 0.8749 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 89%. *Collected by:* J. E. Harrison. *Comment:* Apparent age.

(hornblende) 57.5±2.0 m.y.

129. *USGS(D)-WGJH-1* K-Ar
Gabbro (47°11′N, 115°29′30″W; S6,T44N,R8E, roadcut on Bluff Creek, Simmons Peak 15′ quad., Shoshone Co., ID). Coarse-grained dike in Wallace Formation, Belt Supergroup. *Analytical data:* K_2O = 0.16, 0.18%; $^*Ar^{40}$ = 74.09 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 98%. *Collected by:* J. E. Harrison. *Comment:* Calculated age is spurious; plagioclase is loaded with excess argon; actual age probably Cretaceous or Paleocene.

(plagioclase) 5190±940 m.y.

130. *USGS(D)-MW-48* K-Ar
Basalt (44°20′24″N, 116°55′00″W; N of Highway 95 in T12N,R5W, Mann Creek quad., Washington Co., ID). Olivine basalt dike in arkosic sandstone. *Analytical data:* K_2O = 0.79%; $^*Ar^{40}$ = 0.1167 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 41%. *Collected by:* D. H.

McIntyre. *Comment:* Shown as "biotite andesite dike" by Ross (1956, fig. 9). McIntyre (1976) published age of 10 m.y. for this sample; age recalculated with new decay constants for K^{40}.

(whole-rock) 10.2±0.4 m.y.

131. *USGS(D)-BL-128* K-Ar
Vitrophyre (44°27'24"N, 114°29'06"W; ridge S of Mill Creek Summit, Clayton 7.5 quad., Custer Co., ID). Perlitic vitrophyre from brecciated margin of rhyolite flow (reversed magnetic polarity), Challis Volcanics; flow named "Rhyolite flows at Mill Creek Summit" (Hobbs and others, 1975). *Analytical data:* K_2O = 7.77, 7.74%; $^*Ar^{40}$ = 5.488 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 78%. *Collected by:* D. H. McIntyre. *Comment:* Age of volcanism; age consistent with present stratigraphic interpretation in complexly faulted flows.

(biotite) 48.5±1.2 m.y.

132. *USGS(D)-B-64* K-Ar
Tuff (44°29'54"N, 114°16'36"W; N slope John Gulch, Bayhorse quad., Custer Co., ID). Rhyolitic ash-flow tuff with quartz and sanidine phenocrysts, interbedded with rhyodacite flows; Challis Volcanics. *Analytical data:* K_2O = 8.18, 8.16%; $^*Ar^{40}$ = 5.097 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 83%. *Collected by:* D. H. McIntyre. *Comment:* Age appears too young if recently mapped stratigraphic relationships are correct.

(sanidine) 42.8±1.0 m.y.

133. *USGS(D)-T118A* K-Ar
Tactite (44°04'04"N, 114°33'49"W, Boulder Chain Lakes quad., Custer Co., ID). Diopside-hornblende-plagioclase-quartz-calcite tactite in eastern contact zone of White Cloud stock. *Analytical data:* K_2O = 0.444, 0.446%; $^*Ar^{40}$ = 1.074 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 65%. *Collected by:* C. M. Tschanz. *Comment:* Age too old; excess radiogenic argon probably present. (See sample USGS(D)-876A, below, no. 135).

(hornblende) 160±4 m.y.

134. *USGS(D)-C-226* K-Ar
Rhyodacite (44°19'42"N, 114°25'42"W; Clayton 7.5' quad., Custer Co., ID). Reversed magnetic polarity, porphyritic rhyodacite lava, Challis Volcanics; lava named "Rhyodacite of Upper Second Creek" (Hobbs and others, 1975). *Analytical data:* K_2O = 7.50, 7.57%; $^*Ar^{40}$ = 5.408 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 80%. *Collected by:* D. H. McIntyre. *Comment:* Age of volcanism; age consistent with present stratigraphic interpretation in complexly faulted flows.

(biotite) 49.2±1.2 m.y.

135. *USGS(D)-876A* K-Ar
Quartz monzonite (44°07'30"N, 114°34'48"W, N side of White Cloud Stock, Livingston Creek, Custer Co., ID). *Analytical data:* K_2O = 7.29, 7.31%; $^*Ar^{40}$ = 9.212 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 88%. *Collected by:* D. A. Seeland. *Comment:* Age indicates stock emplaced during Late Cretaceous.

(biotite) 85.6±2.1 m.y.

136. *USGS(D)-74-T-ID* K-Ar
Granodiorite (43°39'00"N, 114°30'46"W; W side road up Rooks Creek, S26,T4N,R16E, Boyle Mtn. mining district, Boyle Mtn. quad., Blaine Co., ID). Border facies of stock of Boyle Mtn. *Analytical data:* K_2O = 7.74, 7.76%; $^*Ar^{40}$ = 10.55 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 34%. *Collected by:* C. M. Tschanz.

(biotite) 92.2±2.2 m.y.

MAINE

137. *USGS(D-M)-CM-5* K-Ar, Rb-Sr
Vein (45°32'00"N, 70°13'00"W; Long Pond quad., Somerset Co., ME). Gangue muscovite in vein cutting Attean Quartz Monzonite. *Analytical data:* K_2O = 10.37, 10.31%; $^*Ar^{40}$ = 74.21 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 95%: Rb = 496 ppm, Sr = 50.0, $^*Sr^{87}$ = 0.896 ppm, $^*Sr^{87}/\Sigma Sr^{87}$ = 22%, $^*Sr^{87}/Rb^{87}$ = 0.00637, assumed initial Sr^{87}/Sr^{86} = 0.705. *Analyzed by:* H. H. Mehnert, J. von Essen, V. M. Merritt (K-Ar), and R. E. Zartman (Rb-Sr); *collected by:* F. C. Canney. *Comment:* Cady (1969) published age of 433 m.y. for this sample; age recalculated with new decay constants for K^{40}.

K-Ar (muscovite) 440±14 m.y.
Rb-Sr (muscovite) 448±20 m.y.

138. *USGS(D)-Me23* U-Th-Pb
Granite (45°28'20"N, 67°44'54"W; 4.8 km N of Topsfield along U.S. Route 1; Waite quad., Washington Co., ME). This coarse-grained granite belongs to Topsfield granitic facies of Bottle Lake Quartz Monzonite (Larrabee and others, 1965). *Analytical data:* zircon (−150 +250 mesh): U = 1864 ppm, Th = 518 ppm, Pb = 114.6 ppm; isotopic composition of lead (atomic percent): Pb^{204} = 0.0412, Pb^{206} = 85.45, Pb^{207} = 5.268, Pb^{208} = 9.237; zircon (−250 +325 mesh): U = 2019 ppm, Th = 576 ppm, Pb = 126.5 ppm; isotopic composition of lead (atomic percent): Pb^{204} = 0.0714, Pb^{206} = 83.88, Pb^{207} = 5.639, Pb^{208} = 10.41. *Collected by:* Henry Faul, Univ. Pa. *Analyzed by:* R. E. Zartman and M. D. Gallego. *Comment:* Age of granite is about 400 m.y.; reported by Faul and others (1963) to have biotite K-Ar age of 380 m.y. (recalculated to decay constants of this paper) and zircon lead-alpha age of 400 m.y. Locality lies at eastern edge of broad area of central Maine that may have experienced delayed cooling and, con-

sequently, delayed argon retention in the biotite.

zircon (–150 +250 mesh) Pb^{206}/U^{238} = 379±4 m.y.
Pb^{207}/U^{235} = 381±4 m.y.
Pb^{207}/Pb^{206} = 397±4 m.y.
Pb^{208}/Th^{232} = 383±4 m.y.
zircon (–250 +325 mesh) Pb^{206}/U^{238} = 377±4 m.y.
Pb^{207}/U^{235} = 380±4 m.y.
Pb^{207}/Pb^{206} = 404±5 m.y.
Pb^{208}/Th^{232} = 381±4 m.y.

139. *USGS(D)-BUB-8* U-Th-Pb

Granite (44°30'30"N, 68°48'08"W; Bucksport quad., Hancock Co., ME). Coarse, nonfoliated, muscovite-bearing granite intruding Passagassawakeag Gneiss. *Analytical data:* zircon (–60 +100 mesh): U = 2126 ppm, Th = 28.5 ppm, Pb = 126.0 ppm; isotopic composition of lead (atomic percent): Pb^{204} = 0.0256, Pb^{206} = 93.09, Pb^{207} = 5.517, Pb^{208} = 1.367; zircon (–150 +200 mesh): U = 1760 ppm, Th = 37.3 ppm, Pb = 104.6 ppm; isotopic composition of lead (atomic percent): Pb^{204} = 0.0106, Pb^{206} = 93.60, Pb^{207} = 5.351, Pb^{208} = 1.307. *Collected by:* D. R. Wones, Virginia Polytechnic Institute and State University. *Analyzed by:* R. E. Zartman and M. D. Gallego. *Comment:* Concordia intercept age of 412 m.y. (fig. 2) records approx. time of migmatization and granite intrusion in this area.

zircon (–60 +100 mesh) Pb^{206}/U^{238} = 399±4 m.y.
Pb^{207}/U^{235} = 403±4 m.y.
Pb^{207}/Pb^{206} = 422±4 m.y.
Pb^{208}/Th^{232} = 393±4 m.y.
zircon (–150 +200 mesh) Pb^{206}/U^{238} = 404±4 m.y.
Pb^{207}/U^{235} = 408±4 m.y.
Pb^{207}/Pb^{206} = 433±3 m.y.
Pb^{206}/U^{238} = 401±4 m.y.
Concordia intercept age = 412±14 m.y.

140. *USGS(D)-BUB-9* U-Th-Pb

Granite (44°39'45"N, 68°47'26"W; Bucksport quad., Hancock Co., ME). Small 2-m-wide dike of muscovite-bearing granite in augen gneiss (Passagassawakeag Gneiss). *Analytical data:* zircon (–60 +100 mesh): U = 1865 ppm, Th = 251.8 ppm, Pb = 100.0 ppm; isotopic composition of lead (atomic percent): Pb^{204} = 0.0133, Pb^{206} = 91.20, Pb^{207} = 5.173, Pb^{208} = 3.612; zircon (–100 +200 mesh): U = 3993 ppm, Th = 205.4 ppm, Pb = 126.6 ppm; isotopic composition of lead (atomic percent): Pb^{204} = 0.0024, Pb^{206} = 92.17, Pb^{207} = 5.098, Pb^{208} = 2.726. *Collected by:* D. R. Wones, Virginia Polytechnic Institute

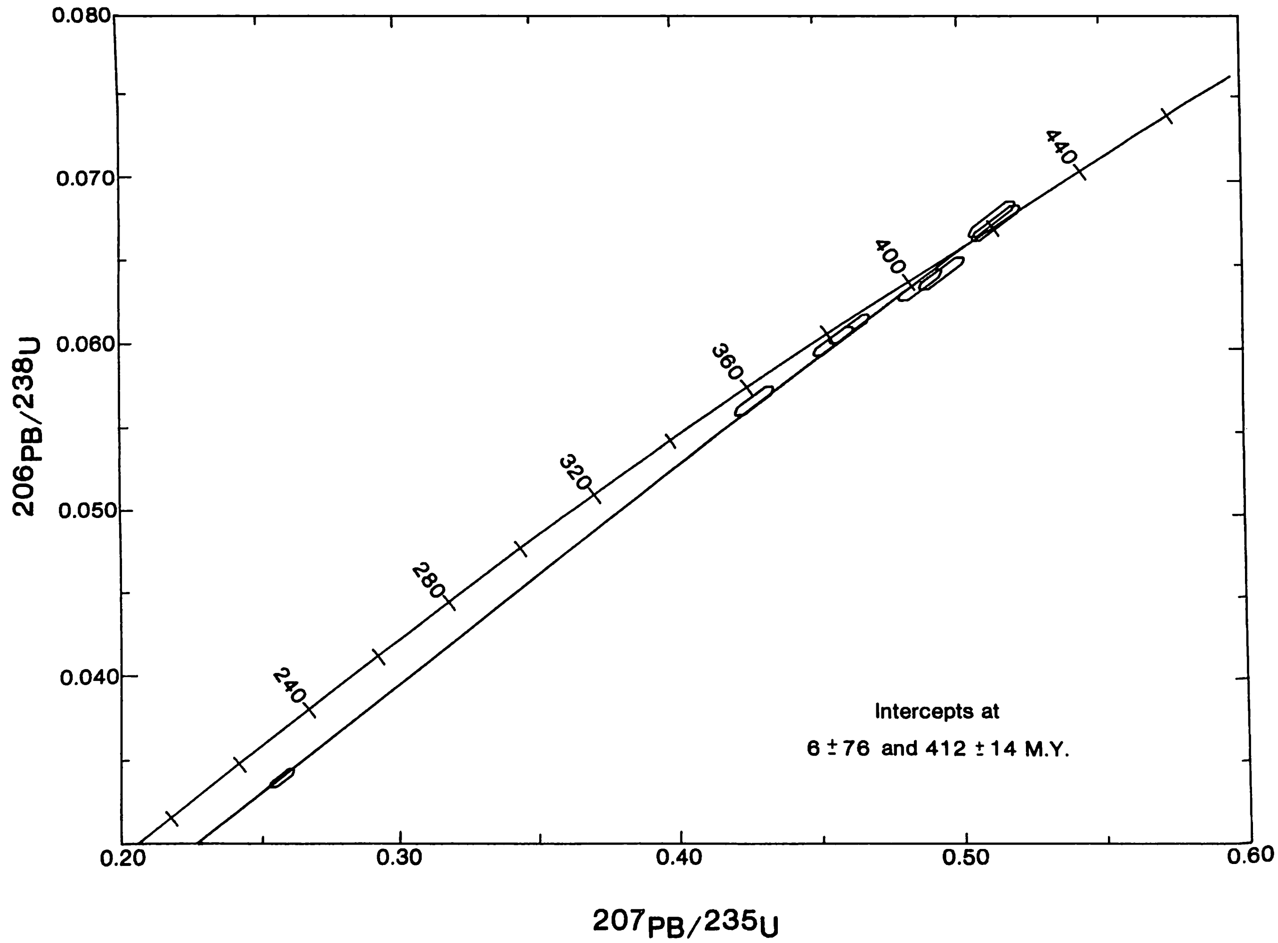

FIGURE 2. Analytical data from samples USGS(D)-BUB-8, USGS(D)-BUB-9, USGS(D)-BUB-10, and USGS(D)-ORA-301 (numbers 139–142 in this compilation) have been plotted on a Pb-207/U-235 versus Pb-206/U238 graph. Cord through data points intercepts concordia curve at 412 m.y.

and State University. *Analyzed by:* R. E. Zartman and M. D. Gallego. *Comment:* Concordia intercept age of 412 m.y. (fig. 2) records approx. time of migmatization and granite intrusion in this area.

zircon (−60 +100 mesh) Pb^{206}/U^{238} = 356±4 m.y.
Pb^{207}/U^{235} = 361±4 m.y.
Pb^{207}/Pb^{206} = 396±3 m.y.
Pb^{208}/Th^{232} = 279±3 m.y.
zircon (−100 +200 mesh) Pb^{206}/U^{238} = 215±2 m.y.
Pb^{207}/U^{235} = 233±2 m.y.
Pb^{207}/Pb^{206} = 409±3 m.y.
Pb^{208}/Th^{232} = 366±4 m.y.
Concordia intercept age = 412±16 m.y.

141. *USGS(D)-BUB-10* U-Th-Pb
Quartz diorite (44°40′38″N, 68°52′08″W; Bucksport quad., Waldo Co., ME). Lineated, recrystallized, medium-grained quartz diorite (Winterport Granite of Stewart and Wones, 1974). *Analytical data:* zircon (−250 +325 mesh): U = 772.6 ppm, Th = 372.6 ppm, Pb = 48.90 ppm; isotopic composition of lead (atomic percent): Pb^{204} = 0.0186, Pb^{206} = 82.44, Pb^{207} = 4.747, Pb^{208} = 12.80; zircon (−325 +400 mesh): U = 876.7 ppm, Th = 470.3 ppm, Pb = 56.50 ppm; isotopic composition of lead (atomic percent): Pb^{204} = 0.0065, Pb^{206} = 81.74, Pb^{207} = 4.584, Pb^{208} = 13.67. *Collected by:* D. R. Wones, Virginia Polytechnic Institute and State University. *Analyzed by:* R. E. Zartman and M. D. Gallego. *Comment:* Concordia intercept age of 412 m.y. (fig. 2) records the approx. time of migmatization and granite intrusion in this area.

zircon (−250 +325 mesh) Pb^{206}/U^{238} = 378±4 m.y.
Pb^{207}/U^{235} = 381±4 m.y.
Pb^{207}/Pb^{206} = 402±3 m.y.
Pb^{208}/Th^{232} = 361±4 m.y.
zircon (−325 +400 mesh) Pb^{206}/U^{238} = 383±4 m.y.
Pb^{207}/U^{235} = 385±4 m.y.
Pb^{207}/Pb^{206} = 405±3 m.y.
Pb^{208}/Th^{238} = 363±4 m.y.
Concordia intercept age = 412±14 m.y.

142. *USGS(D)-ORA-301* U-Th-Pb
Granite (44°42′28″N, 68°42′55″W; E side Brewer Lake, Orland quad., Penobscot Co., ME). Pegmatitic to aplitic muscovite-garnet granite; part of migmatite zone related to Stricklen Ridge pluton and involving Passagassawakeag Gneiss and Copeland Formation of Wing (1957). *Analytical data:* zircon (−100 +150 mesh, nonmagnetic): U = 2586 ppm, Th = 516 ppm, Pb = 167.3 ppm; isotopic composition of lead (atomic percent): Pb^{204} = 0.0177, Pb^{206} = 90.42, Pb^{207} = 5.224, Pb^{208} = 4.335; zircon (−100 +150 mesh, magnetic): U = 1896 ppm, Th = 1450 ppm, Pb = 130.5 ppm; isotopic composition of lead atomic percent): Pb^{204} = 0.0152, Pb^{206} = 84.78, Pb^{207} = 4.906, Pb^{208} = 10.30. *Collected by:* D. R. Wones, Virginia Polytechnic Institute and State University. *Analyzed by:* R. E. Zartman and M. D. Gallego. *Comment:* Concordia intercept age of 412 m.y. (fig. 2) records approx. time of migmatization and granite intrusion in this area.

zircon (−100 +150 mesh, nonmagnetic)
Pb^{206}/U^{238} = 423±4 m.y.
Pb^{207}/U^{235} = 420±4 m.y.
Pb^{207}/Pb^{206} = 405±3 m.y.
Pb^{208}/Th^{232} = 268±3 m.y.
zircon (−100 +150 mesh, magnetic)
Pb^{206}/U^{238} = 422±4 m.y.
Pb^{207}/U^{235} = 421±4 m.y.
Pb^{207}/Pb^{206} = 418±3 m.y.
Pb^{208}/Th^{232} = 198±2 m.y.
Concordia intercept age = 412±16 m.y.

143. *USGS(D)-ORB-18* U-Th-Pb
Quartz monzonite (44°41′39″N, 68°35′34″W; N end Phillips Lake, Orland quad., Hancock Co., ME). Coarse-grained quartz monzonite (Lucerne Granite of Wing, 1958). *Analytical data:* U = 2581 ppm, Th = 602 ppm, Pb = 145.8 ppm; isotopic composition of lead (atomic percent): Pb^{204} = 0.0436, Pb^{206} = 87.97, Pb^{207} = 5.407, Pb^{208} = 6.575. *Collected by:* D. R. Wones, Virginia Polytechnique Institute and State University. *Analyzed by:* R. E. Zartman and M. D. Gallego. *Comment:* Age of the Lucerne Granite is considered to be about 380 m.y.

zircon (−100 +200 mesh) Pb^{206}/U^{238} = 359±4 m.y.
Pb^{207}/U^{235} = 362±4 m.y.
Pb^{207}/Pb^{206} = 380±4 m.y.
Pb^{208}/Th^{232} = 269±3 m.y.

144. *USGS(W)-JBH-4919-56* Pb-alpha
Pegmatite (44°06′20″N, 70°16′10″W, Poland quad., Androscoggin Co., ME). *Analytical data:* (zircon): alpha/mg-hr = 241; lead = 35.5 ppm; (monazite): alpha/mg-hr = 3557; lead = 675 ppm. *Collected by:* J. B. Hanley. *Comment:* Ages indicate Paleozoic plutonic activity.

(zircon) 355±40 m.y.
(monazite) 390±40 m.y.

145. *USGS(W)-JBH-645-56* Pb-alpha
Binary granite (44°07′40″N, 70°26′00″W; Welchville Quarry, Poland quad., Oxford Co., ME). *Analytical data:* alpha/mg-hr = 6551; lead = 1000 ppm. *Collected by:* J. B. Hanley. *Comment:* Age indicates Paleozoic plutonic activity.

(zircon) 315±35 m.y.

MICHIGAN

146. *USGS(D)-M-9* Rb-Sr
Gneiss (46°13′39″N, 87°00′04″W; S9,T44N,R22W, Rock quad., Alger Co., MI). Gneiss core is from the Cleveland-Cliffs Iron Company hole DDH1, 323–333 m interval. *Analytical data:* (whole-rock): Rb = 115 ppm, Sr = 47.5 ppm, $*Sr^{87}$ = 0.873, $*Sr^{87}/\Sigma Sr^{87}$

= 21%, assumed initial Sr^{87}/Sr^{86} = 0.703; (microcline): Rb = 192 ppm, Sr = 72.7 ppm, $*Sr^{87}$ = 1.44 ppm, $*Sr^{87}/\Sigma Sr^{87}$ = 23%, assumed initial Sr^{87}/Sr^{86} = 0.703. *Comment:* Apparent minimum age of metamorphism.

(whole-rock) 1890±90 m.y.
(microcline) 1870±90 m.y.

147. *USGS(D)-M-1* Rb-Sr
Meta-argillite (46°05'14"N, 87°06'15"W; S31,T43N, R22W, Rock quad., Delta Co., MI). Meta-argillite core is from Cleveland-Cliffs Iron Co. No. 1 hole, 220–243 m interval. *Analytical data:* Rb = 179 ppm, Sr = 37.5 ppm, $*Sr^{87}$ = 1.05 ppm, $*Sr^{87}/\Sigma Sr^{87}$ = 29%, assumed initial Sr^{87}/Sr^{86} = 0.705. *Comment:* Age is maximum age for metamorphism as sediments may not have completely re-equilibrated.

(whole-rock) 1470±90 m.y.

148. *USGS(D)-M-2* Rb-Sr
Metagraywacke (46°05'14"N, 87°06'15"W; S31, T43N,R22W, Rock quad., Delta Co., MI). Core is from Cleveland-Cliffs Iron Co. No. 1 hole, 409–424 m interval. *Analytical data:* Rb = 31.8 ppm, Sr = 11.8 ppm, $*Sr^{87}$ = 0.133 ppm, $*Sr^{87}/\Sigma Sr^{87}$ = 14%, assumed initial Sr^{87}/Sr^{86} = 0.705. *Comment:* Apparent minimum age of metamorphism in this area.

(whole-rock) 1050±100 m.y.

149. *USGS(D)-M-11* Rb-Sr
Schist (46°00'21"N, 87°10'00"W; S22,T42N,R23W, Rock quad., Delta Co., MI). Mica schist core from Cleveland-Cliffs Iron Co. hole DDH2, 435–446 m interval. *Analytical data:* Rb = 203 ppm, Sr = 17.1 ppm, $*Sr^{87}$ = 0.757 ppm, $*Sr^{87}/\Sigma Sr^{87}$ = 40%, assumed initial Sr^{87}/Sr^{86} = 0.705. *Comment:* Apparent minimum age of metamorphism.

(whole-rock) 940±50 m.y.

150. *USGS(D)-M-4* Rb-Sr
Meta-argillite (45°53'45"N, 87°10'30"W; S5,T40N, R23W, Gladstone quad., Delta Co., MI). Meta-argillite (contains garnet) core from Cleveland-Cliffs Iron Co. No. 2 hole, 493–647 m interval. *Analytical data:* Rb = 129 ppm; Sr = 20.9 ppm, $*Sr^{87}$ = 0.681 ppm, $*Sr^{87}/\Sigma Sr^{87}$ = 33%, assumed initial Sr^{87}/Sr^{86} = 0.705. *Comment:* Age may be a maximum age of metamorphism as sediments may not have completely re-equilibrated.

(whole-rock) 1320±80 m.y.

MONTANA

151. *USGS(W)-CPR369* K-Ar
Granite (45°50'19"N, 113°58'52"W; NW¼ S16,T1N, R19W, near Sula, Ravalli Co., MT). *Analytical data:* K_2O = 10.46, $*Ar^{40}$ = 8.83 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 86%. *Collected by:* C. P. Ross. *Comment:* Minimum age of intrusion.

(muscovite) 58±3 m.y.

152. *USGS(D)-KW-39-74* K-Ar
Andesite (45°16'N, 111°57'W; El Fleeda Mine in S34,T6S,R3W; Virginia City quad., Madison Co., MT). The basaltic andesite forms a plug which cuts mineralized veins within mine; andesite is composed of microcrystalline feldspar, corroded hornblende phenocrysts, magnetite, and rare quartz and feldspar xenocrysts. *Analytical data:* K_2O = 2.64, 2.65%; $*Ar^{40}$ = 1.973 x 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 90%. *Collected by:* K. L. Wier. *Comment:* Eocene intrusive.

(whole-rock) 51.1±1.2 m.y.

153. *USGS(D)-63R6* K-Ar
Pegmatite (45°45'39"N, 111°43'22"W; SE¼ SE¼ S9,T1S,R1W, Three Forks quad., Madison Co., MT). *Analytical data:* K_2O = 10.32%; $*Ar^{40}$ = 426 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 99%. *Analyzed by:* R. F. Marvin, H. H. Mehnert, P. L. D. Elmore; *collected by:* D. G. Robinson. *Comment:* Minimum age for pegmatite emplacement.

(muscovite) 1720±50 m.y.

154. *USGS(D)-63R8* K-Ar
Gneiss (45°45'39"N, 111°43'22"W; SE¼ SE¼ S9,T1S,R1W, 45 m W of pegmatite prospect, Three Forks quad., Madison Co., MT). Biotite-hornblende-microcline-oligoclase gneiss. *Analytical data:* K_2O = 0.96%; $*Ar^{40}$ = 40.5 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 99%. *Analyzed by:* R. F. Marvin, H. H. Mehnert, P. L. D. Elmore; *collected by:* D. G. Robinson. *Comment:* Minimum age of metamorphism.

(hornblende) 1740±90 m.y.

155. *USGS(D)-63R4* K-Ar
Gabbro (46°43'16"N, 111°36'13"W; SE¼ S9,T11N, R1E, Hellgate Gulch quad., Broadwater Co., MT). Biotitic gabbro sill which intrudes Newland Limestone of Belt Supergroup. *Analytical data:* K_2O = 0.38%, $*Ar^{40}$ = 5.73 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 89%. *Analyzed by:* R. F. Marvin, H. H. Mehnert, P. L. D. Elmore; *collected by:* D. G. Robinson. *Comment:* Sill belongs to a widespread group of mafic dikes and sills which give late Proterozoic-Y to early Proterozoic-Z ages.

(pyroxene with minor biotite) 826±41 m.y.

156. *USGS(D)-63R5* K-Ar
Diabase (46°39'12"N, 111°32'53"W; SW¼ S1,T10N, R1E, Hellgate Gulch quad., Broadwater Co., MT). Biotitic diabase sill which intrudes Empire Formation of Belt Supergroup. *Analytical data:* K_2O = 0.42%, $*Ar^{40}$ = 5.57 x 10^{-10} mol/gm, $*Ar^{40}/\Sigma Ar^{40}$ = 92%. *Analyzed by:* R. F. Marvin, H. H. Mehnert, P. L. D. Elmore; *collected by:* G. D. Robinson. *Comment:* Sill belongs to a widespread group of mafic dikes and sills which give late Proterozoic-Y to early Proterozoic-Z ages.

(pyroxene with minor biotite) 744±37 m.y.

157. *A-2929* K-Ar
Andesite dike (45°41'20"N, 109°54'25"W; NW¼ SW¼ S5,T2S,R15E, Ross Canyon quad., Sweetgrass Co., MT). *Analytical data:* K_2O = 0.834; $^*Ar^{40}$ = 1.012 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 19%. *Analyzed by:* Geochron Laboratories, Cambridge, MA; *submitted by:* L. A. McPeek for Barlow and Haun, Inc., Casper, WY.

(amphibole) 82.4±4.1 m.y.

158. *B-2930* K-Ar
Diorite (45°36'40"N, 109°56'25"W; SW¼ SE¼ S36, T2S,R14E, Iron Mtn., Sliderock Mtn. quad., Sweetgrass Co., MT). *Analytical data:* K_2O = 6.426%; $^*Ar^{40}$ = 7.739 x 10^{-10} mol/gm, $^*Ar^{40}/\Sigma Ar^{40}$ = 58%. *Analyzed by:* Geochron Laboratories, Cambridge, MA; *submitted by:* L. A. McPeek for Barlow and Haun, Inc., Casper, WY.

(biotite) 81.8±3.1 m.y.

NEVADA

159. *USGS(W)-60WH2* Pb-alpha
Granodiorite (41°16'N, 119°06'W; Black Rock Range, Humboldt Co., NV). *Analytical data:* alpha/mg-hr = 377, lead = 25.3 ppm. *Collected by:* R. Willden. *Comment:* Reconnaissance age; probable time of emplacement.

(zircon) 170±20 m.y.

160. *USGS(W)-60WH4* Pb-alpha
Foliated granodiorite (41°57'N, 118°39'W; Denio quad., Pine Forest Range, Humboldt Co., NV). *Analytical data:* alpha/mg-hr = 238; lead = 15.5 ppm. *Collected by:* R. Willden. *Comment:* Reconnaissance age; most K-Ar ages in Pine Forest Range indicate intrusive activity somewhat later, during the Cretaceous (Smith and others, 1971).

(zircon) 160±20 m.y.

161. *USGS(W)-60WH5* Pb-alpha
Granodiorite (41°23'N, 118°29'W; Bottle Creek quad., Jackson Mtns., Humboldt Co., NV). *Analytical data:* alpha/mg-hr = 199; lead = 14.0 ppm. *Collected by:* R. Willden. *Comment:* Reconnaissance age; probable time of emplacement.

(zircon) 170±20 m.y.

162. *USGS(W)-59-W-769* Pb-alpha
Quartz monzonite (40°24'30"N, 118°15'W; Unionville or Oreana quad., Humboldt Range, Pershing Co., NV). *Analytical data:* alpha/mg-hr = 1207; lead = 61 ppm. *Collected by:* R. E. Wallace. *Comment:* Age suggests possible Jurassic-Early Cretaceous emplacement of quartz monzonite pluton.

(zircon) 125±15 m.y.

163. *USGS(W)-59-W-770* Pb-alpha
Quartz monzonite (40°23'30"N, 118°13'30"W; Unionville quad., Humboldt Range, Pershing Co., NV). *Analytical data:* alpha/mg-hr = 952; lead = 58 ppm. *Collected by:* R. E. Wallace. *Comment:* Reconnaissance age.

(zircon) 150±15 m.y.

164. *USGS(D)-T-158* K-Ar
Quartz monzonite, Rocky Canyon pluton (40°23' 18"N, 118°13'54"W; Unionville quad., Humboldt Range, Pershing Co., NV). *Analytical data:* K_2O = 7.77%; $^*Ar^{40}$ = 8.341 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 88%. *Analyzed by:* J. D. Obradovich; *collected by:* D. B. Tatlock. *Comment:* Age may have been reduced by later igneous activity; pluton probably emplaced in Jurassic time.

(biotite) 73.1±3.1 m.y.

165. *USGS(W)-59-W-766* Pb-alpha
Aplite (40°19'N, 118°11'30"W; Unionville quad., Humboldt Range, Pershing Co., NV). *Analytical data:* alpha/mg-hr = 678; lead = 100 ppm. *Collected by:* R. E. Wallace. *Comment:* Age anomalously old.

(zircon) 355±40 m.y.

166. *USGS(D+W)-T-1043* K-Ar, Pb-alpha
Granodiorite (40°17'30"N, 117°48'18"W; near Kennedy Kyle Hot Springs quad., East Humboldt Range, Pershing Co., NV). *Analytical data:* (biotite): K_2O = 8.91%; $^*Ar^{40}$ = 3.916 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 72%; (zircon): alpha/mg-hr = 585; lead = 7.0 ppm. *Analyzed by:* J. D. Obradovich (biotite) and T. W. Stern and H. Westley (zircon); *collected by:* D. B. Tatlock. *Comment:* Age of intrusion.

(biotite) 30.3±2.6 m.y.
(zircon) 30±10 m.y.

167. *USGS(D+W)-63T1029* K-Ar, Pb-alpha
Leucogranite (40°15'42"N, 117°48'54"W; Ladd Canyon, East Humboldt Range, Kyle Hot Springs quad., Pershing Co., NV). *Analytical data:* (biotite): K_2O = 8.37%; $^*Ar^{40}$ = 3.538 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 74%; (zircon): alpha/mg-hr = 1446; lead = 107 ppm. *Analyzed by:* J. D. Obradovich (biotite) and T. W. Stern and H. Westley (zircon); *collected by:* D. B. Tatlock. *Comment:* Pb-alpha age suggests that pluton was emplaced during the Jurassic, but K-Ar age reflects thermal effects of a nearby 30-m.y. intrusive event. (see sample USGS(D+W)-T-1043, above).

(biotite)29±1 m.y.
(zircon) 180±30 m.y.

168. *USGS(W)-JG-GM-1* K-Ar, Pb-alpha
Quartz monzonite, Granite Mtn. stock (40°22'32"N, 116°44'20"W; Crescent Valley quad., Shoshone Range, Lander Co., NV). *Analytical data:* (biotite 1): K_2O = 7.36%; $^*Ar^{40}$ = 4.303 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 85%; (biotite 2): K_2O = 7.36%; $^*Ar^{40}$ = 4.328 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 89%; (zircon): alpha/mg-hr = 393; lead = 7.9 ppm.

Collected by: J. Gilluly. *Comment:* Pb-alpha age was reported by Gilluly and Gates (1965), but unpublished K-Ar ages are probably a more accurate age of Granite Mtn. stock.

(biotite-1) 40±2 m.y.
(biotite-2) 40±2 m.y.
(zircon) 50±10 m.y.

169. *USGS(W)-1679* Pb-alpha
Quartzite (40°20'N, 116°48'W, Utah Mine, Shoshone Range, Mount Lewis, Lander Co., NV). In Valmy Formation. *Analytical data:* alpha/mg-hr = 56; lead = 56 ppm. *Collected by:* K. B. Ketner. *Comment:* Age of detrital zircons indicates the average age of source rocks for the quartzite; age published (Ketner, 1977).

(zircon) 2030±300 m.y.

170. *USGS(D)-Sr-476* K-Ar
Quartz latite tuff (40°30'N, 116°11'W; NE¼ S11, T30N,R51E, Carlin quad., Eureka Co., NV). *Analytical data:* K_2O = 7.09, 7.06%; $*Ar^{40}$ = 3.285 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 90%. *Collected by:* J. F. Smith, Jr. *Comment:* Age of volcanism. Smith and Ketner (1976) reported age of 31.2 m.y. for this sample; age has been recalculated with new decay constants for K^{40}.

(sanidine) 32.0±1.0 m.y.

171. *USGS(D)-Sr-425* K-Ar
Basalt (40°30'30"N, 116°11'W; E½ S2,T30N,R51E; Carlin quad., Eureka Co., NV). *Analytical data:* K_2O = 2.47, 2.48%; $*Ar^{40}$ = 1.174 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 86%. *Collected by:* J. F. Smith, Jr. *Comment:* Time of volcanism. Smith and Ketner (1976) published age of 31.9 m.y. for this sample; age has been recalculated with new decay constants for Ar^{40}.

(whole-rock) 32.6±1.1 m.y.

172. *USGS(D)-SR-377* K-Ar
Tuff (40°35'N, 116°10'W; NE¼ S12,T31N,R51E; Carlin quad., Eureka Co., NV). A basal lapilli-tuff in Indian Well Formation. *Analytical data:* K_2O = 6.61, 6.59%; $*Ar^{40}$ = 3.698 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 85%. *Collected by:* J. F. Smith, Jr. *Comment:* Time of volcanism. Smith and Ketner (1976) published age of 37.6 m.y. for this sample; age has been recalculated with new decay constants for K^{40}.

(biotite) 38.5±1.3 m.y.

173. *USGS(W)-667* K-Ar
Granite stock (40°31'06"N, 116°01'04"W; Railroad mining district, Pinon Range, Carlin quad., Elko Co., NV). *Analytical data:* K_2O = 8.58%; $*Ar^{40}$ = 4.654 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 83%. *Analyzed by:* H. H. Thomas, R. F. Marvin, P. L. D. Elmore, H. Smith; *collected by:* J. F. Smith, Jr. *Comment:* Age of emplacement.

(biotite) 37.3±1.9 m.y.

174. *USGS(D)-SR-442* K-Ar
Granite (40°31'06"N, 116°01'07"W; NW¼ S4,T30N, R53E; Railroad mining district, Pinon Range, Carlin quad., Elko Co., NV). Granite outer shell of a stock. *Analytical data:* (sanidine): K_2O = 11.76%; $*Ar^{40}$ = 6.21 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 92%; (biotite): K_2O = 8.79%; $*Ar^{40}$ = 4.83 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 82%. *Analyzed by:* R. F. Marvin, H. H. Mehnert, J. D. Mensik; *collected by:* J. F. Smith. *Comment:* Time of intrusion is around 37 m.y. Smith and Ketner (1976) reported ages of 35.4 m.y. (sanidine) and 36.8 m.y. (biotite) for this sample; ages have been recalculated with new decay constants for K^{40}.

(sanidine) 36.3±1.1 m.y.
(biotite) 37.8±1.1 m.y.

175. *USGS(D)-BJS-2* Fission-track
Tuff (40°48'20"N, 115°44'03"W; Elko East quad., Elko Co., NV). Glassy tuff in Indian Well Formation. *Analytical data:* ρ_s = 5.09 x 10^6 tracks/cm^2 (825), ρ_i = 13.95 x 10^6 tracks/cm^2 (1130); Φ = 1.24 x 10^{15} n/cm^2, U = 320 ppm. *Collected by:* E. H. McKee and B. J. Solomon. *Comment:* Age of volcanism.

(zircon) 27.0±1.2 m.y.

176. *USGS(W)-RWB* Pb-alpha
Gneiss(?) (40°52'N, 115°15'W; near Secret Pass, Ruby Range, Elko Co., NV). *Analytical data:* alpha/mg-hr = 967; lead = 44.3 ppm. *Collected by:* R. W. Bayley. *Comment:* Age may represent a composite age of detrital zircons.

(zircon) 1040±120 m.y.

177. *USGS(W)-YT-227* Pb-alpha
Granite(?) (40°01'N, 115°50'W; Jacobs Peak, Railroad Pass quad., Diamond Range, Eureka or White Pine Co., NV). *Analytical data:* alpha/mg-hr = 190; lead = 3.3 ppm. *Collected by:* R. J. Roberts. *Comment:* Reconnaissance age published by Adair and Stringham (1960).

(zircon) 45±10 m.y.

178. *USGS(W)-1840* Pb-alpha
Quartzite (39°12'N, 116°50'W; Petes Canyon, Toquima Range, Wildcat Peak quad., Lander Co., NV). Quartzite in Vinini Formation. *Analytical data:* alpha/mg-hr = 59; lead = 65 ppm. *Collected by:* K. B. Ketner. *Comment:* Age of detrital zircons indicates average age of source rocks for the quartzite; age has been published (Ketner, 1977).

(zircon) 2190±320 m.y.

179. *USGS(D)-74FP-890B* K-Ar
Vein (38°56'45"N, 117°15'30"W; E½ S33,T13N, R42E, Ophir Canyon Mine, Toiyabe Range, Nye Co., NV). Scheelite-quartz vein in border of granitic pluton. *Analytical data:* K_2O = 10.10, 10.08, 9.86, 9.61%; $*Ar^{40}$ = 10.12 x 10^{-10} mol/gm; $*Ar^{40}/$

ΣAr^{40} = 87%. *Collected by:* F. G. Poole. *Comment:* Age indicates latest Cretaceous mineralization.

(muscovite) 69.5±1.7 m.y.

180. *USGS(D)-DRS-122-67* K-Ar
Vein (38°42'N, 117°02'W; S22(?),T10N,R44E; Round Mtn. quad., Nye Co., NV). Heubnerite-muscovite-quartz vein cutting microcline granite pluton. *Analytical data:* K_2O = 10.89, 10.92%; $*Ar^{40}$ = 12.71 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 88%. *Collected by:* D. R. Shawe. *Comment:* Age of mineralization. Shawe (1977) reported age of 77.4 m.y. for this sample; age has been recalculated with new decay constants for K^{40}.

(muscovite) 79.2±1.6 m.y.

181. *USGS(W)-11923-5* Pb-alpha
Quartz monzonite (38°30'N, 117°48'W; Mineral Co., NV). *Analytical data:* alpha/mg-hr = 330; lead = 5.3 ppm. *Collected by:* D. C. Ross. *Comment:* Reconnaissance age reported (Ross, 1961).

(zircon) 40±10 m.y.

182. *USGS(W)-YT-226* Pb-alpha
Quartz monzonite, Seligman stock (39°15'N, 115° 32'W; Pancake Summit quad., White Pine Range, White Pine Co., NV). *Analytical data:* alpha/mg-hr = 304; lead = 15.7 ppm. *Collected by:* R. J. Roberts. *Comment:* Reconnaissance age published (Adair and Stringham, 1960).

(zircon) 128±15 m.y.

183. *USGS(W)-YT-136* Pb-alpha
Altered and mineralized monzonite porphyry (39° 16'N, 115°01'W; Liberty Open Pit—porphyry copper—near Ruth Riepetown quad., White Pine Co., NV). *Analytical data:* alpha/mg-hr = 252; lead = 16.2 ppm. *Collected by:* R. J. Roberts. *Comment:* Age published by Adair and Stringham (1960) but it may be too old as it is not in agreement with Cretaceous age that was determined by K-Ar ages (McDowell, 1971) for this intrusive.

(zircon) 160±20 m.y.

184. *USGS(W)-YT-229* Pb-alpha
Granite (39°24'N, 114°52'W; Heuser Peak, McGill quad., White Pine Co., NV). *Analytical data:* alpha/mg-hr = 717; lead = 8.9 ppm. *Collected by:* R. J. Roberts. *Comment:* Reconnaissance age published (Adair and Stringham, 1960).

(zircon) 30±10 m.y.

185. *USGS(W)-60D450* Pb-alpha
Quartz latite vitrophyre (39°09'30"N, 114°39'W; Connors Pass quad., Schell Creek Range, White Pine Co., NV). *Analytical data:* alpha/mg-hr = 454; lead = 8.7 ppm. *Collected by:* H. Drewes. *Comment:* Age is too old; extrusives in this area are Oligocene or younger (Drewes, 1967).

(zircon) 50±10 m.y.

186. *USGS(W)-56-G-46* Pb-alpha
Quartz monzonite (38°55'N, 114°15'W; Garrison quad., southern Snake Range, White Pine Co., NV). *Analytical data:* alpha/mg-hr = 620; lead = 36 ppm. *Collected by:* D. H. Whitebread. *Comment:* Apparent age of intrusion; age reported (Adair and Stringham, 1960).

(zircon)145±20 m.y.

187. *USGS(W)-56-G-44* Pb-alpha
Quartz monzonite (38°52'N, 114°12'W; Garrison quad., southern Snake Range, White Pine Co., NV). *Analytical data:* alpha/mg-hr = 669, lead = 46 ppm (single analysis). *Collected by:* D. H. Whitebread. *Comment:* Maximum age for this intrusive (Lee and others, 1970). Age reported (Adair and Stringham, 1960).

(zircon) 170±20 m.y.

188. *USGS(W)-56-G-45* Pb-alpha
Quartz monzonite (38°52'N, 114°12'W; Garrison quad., southern Snake Range, White Pine Co., NV). *Analytical data:* alpha/mg-hr = 573, lead = 52 ppm (single analysis). *Collected by:* D. H. Whitebread. *Comment:* Age reported (Adair and Stringham, 1960) is too old in comparison with other published radiometric ages (Lee and others, 1970).

(zircon) 225±25 m.y.

189. *USGS(D)-TSV-103-78* Fission-track
Microgranite (37°01'30"N, 116°23'45"W, Timber Mtn. quad., Nye Co., NV). Microgranite porphyry ring dike, central dome, Timber Mtn. caldera. *Analytical data:* (zircon): ρ_s = 0.740 x 10^6 tracks/cm^2 (128); ρ_i = 4.25 x 10^6 tracks/cm^2 (367); Φ = 0.969 x 10^{15} n/cm^2, U = 130 ppm; (apatite): ρ_s = 0.015 x 10^6 tracks/cm^2 (43); ρ_i = 0.065 x 10^6 tracks/cm^2 (184); Φ = 1.01 x 10^{15} n/cm^2, U = 1.9 ppm. *Collected by:* W. J. Carr. *Comment:* Zircon age is the more reliable age.

(zircon) 10.1±0.9 m.y.
(apatite) 14.8±4.8 m.y.

190. *USGS(D)-TSV-102-78* Fission-track
Microgranite (37°01'30"N, 116°23'30"W, Timber Mtn. quad., Nye Co., NV). Microgranite porphyry ring dike, central dome, Timber Mountain caldera. *Analytical data:* ρ_s = 1.05 x 10^6 tracks/cm^2 (195); ρ_i = 6.36 x 10^6 tracks/cm^2 (593); Φ = 0.973 x 10^{15} n/cm^2, U = 190 ppm. *Collected by:* W. J. Carr.

(zircon) 9.6±0.7 m.y.

191. *USGS(D)-TSV-107-78* Fission-track
Pumice (36°44'30"N, 116°30'30"W; T14S,R49E; Big Dune quad., Nye Co., NV). Rhyolite pumice lumps containing 1% phenocrysts—biotite, plagioclase, and green pyroxene; there is calcite in vesicles. *Analytical data:* ρ_s = 0.755 x 10^6 tracks/cm^2 (133); ρ_i = 6.86 x 10^6 tracks/cm^2 (605); Φ = 0.965 x 10^{15}

n/cm², U = 200 ppm. *Collected by:* W. J. Carr.

(zircon) 6.3±0.8 m.y.

192. *USGS(D)-TSV-58-77* Fission-track
Ash (36°34'N, 116°06'W; S14,T16S,R52E; 1 km S of U.S. 95 Highway, 2 km w of Point-of-Rocks; Specter Range quad., Nye Co., NV). Well-sorted, bedded ash-fall containing K-feldspar, plagioclase, biotite, clinopyroxene, opaques, allanite, apatite, and zircon. Ash-fall material occurs in a fanglomerate. *Analytical data:* ρ_s = 0.489 x 10^6 tracks/cm² (111); ρ_i = 2.84 x 10^6 tracks/cm² (322); Φ = 1.12 x 10^{15} n/cm²; U = 70 ppm. *Collected by:* W. J. Carr.

(zircon) 11.5±1.3 m.y.

NEW HAMPSHIRE

193. *USGS(W)-ER-310* Pb-alpha
Granodiorite (44°47'35"N, 71°02'21"W; Pine Point, Umbagog Lake, Errol quad., Coos Co., NH). Foliated border zone of Umbagog Granodiorite. *Analytical data:* alpha/mg-hr = 151; lead = 22.4 ppm. *Collected by:* J. B. Lyons. *Comment:* This reconnaissance age, as reported by Green (1964), indicates a Devonian age for the pluton.

(zircon) 360±40 m.y.

194. *USGS(W)-Crawford Notch* Pb-alpha
Syenite, White Mountain Plutonic-Volcanic Series (44°05'40"N, 71°21'15"W; Harts location, Crawford Notch quad., Carrol Co., NH). *Analytical data:* alpha/mg-hr = 145; lead = 10.5 ppm. *Collected by:* J. B. Lyons. *Comment:* Age is in good agreement with Rb-Sr ages for biotites from Conway Granite (Foland and Faul, 1977).

(zircon) 180±20 m.y.

195. *USGS(W)-WV-1-56* Pb-alpha
Concord Granite (43°13'N, 71°33'30"W; quarry at Concord, Concord quad., Merrimack Co., NH). *Analytical data:* (zircon): alpha/mg-hr = 390; lead = 90 ppm; (monazite): alpha/mg-hr = 7090; lead = 1200 ppm; *Collected by:* W. W. Vernon.

(zircon) 370±40 m.y.
(monazite) 350±40 m.y.

196. *USGS(W)-WV-4A-56* Pb-alpha
Granite (43°00'20"N, 71°21'10"W; quarry at Auburn, Candia quad., Rockingham Co., NH). *Analytical data:* alpha/mg-hr = 5175; lead = 707 ppm. *Collected by:* W. W. Vernon. *Comment:* Reconnaissance age.

(monazite) 280±30 m.y.

197. *USGS(W)-WV-5-56* Pb-alpha
Granite (43°07'30"N, 71°24'30"W; Hooksett Quarry at Suncook, Suncook quad., Merrimack Co., NH). *Analytical data:* alpha/mg-hr = 358; lead = 71.6 ppm. *Collected by:* W. W. Vernon. *Comment:* Reconnaissance age.

(zircon) 480±50 m.y.

NEW JERSEY

198. *USGS(W)-BT-30* K-Ar
Gneiss (39°47'00"N, 74°07'00"W; 2.4 m drill core from test well at 1180–1182.9 m depth, Island Beach State Park; Barnegat Light quad., Ocean Co., NJ). Strongly foliated garnet-microcline-biotite-quartz-plagioclase veined gneiss of crystalline basement. *Analytical data:* K_2O = 8.69%; $^*Ar^{40}$ = 32.28 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 95%. *Collected by:* D. L. Southwich. *Comment:* Age published as 236 m.y. (Southwich, 1964) has been recalculated with new decay constants for K^{40}. Initial age disturbed by later metamorphism. Microcline was not dated because of an unsuitable Rb/Sr ratio.

(biotite) 241±12 m.y.

NEW MEXICO

199. *USGS(W)-HBNM* Pb-alpha
Sandstone (35°22'N, 107°55'W; Haystack Butte, Bluewater quad., McKinley Co., NM). Sandstone is part of Westwater Canyon Member, Morrison Formation. *Analytical data:* alpha/mg-hr = 134; lead = 26.8 ppm. *Collected by:* R. A. Cadigan. *Comment:* Pb-alpha age reported (Cadigan, 1967) but does not date the sandstone; the detrital zircons, varying from euhedral to moderately well rounded, may be a mixture from late Precambrian and Paleozoic crystalline terranes.

(zircon) 480±55 m.y.

200. *USGS(D)-3149-10* Fission-track
Rhyolite (35°54'N, 106°38'W; San Antonio Dome, Jemez Mtns., Seven Springs quad., Sandoval Co., NM). Pumiceous rock from Valle Grande Member of Valles Rhyolite. *Analytical data:* ρ_s = 0.126 x 10^6 tracks/cm² (21); ρ_i = 8.86 x 10^6 tracks/cm² (738); Φ = 0.92 x 10^{15} n/cm²; U = 280 ppm. *Collected by:* R. L. Smith, I. Friedman, D. Gottfried.

(zircon) 0.78±0.21 m.y.

201. *USGS(D)-3149-11* Fission-track
Rhyolite (35°54'N, 106°38'W; Seven Springs quad., Jemez Mtns., Sandoval Co., NM). A pumiceous rock from Redondo Creek Member of Valles Rhyolite. *Analytical data:* ρ_s = 0.321 x 10^6 tracks/cm² (61); ρ_i = 10.59 x 10^6 tracks/cm² (1005); Φ = 0.912 x 10^{15} n/cm²; U = 330 ppm. *Collected by:* R. L. Smith, I. Friedman, D. Gottfried.

(zircon) 1.7±0.12 m.y.

202. *USGS(D)-3149-2* Fission-track
Rhyolite (35°49'N, 106°35'W; Redondo Peak quad., Jemez Mtns., Sandoval Co., NM). Pumiceous rock from South Mountain flow in the Valle Grande Member of the Valles Rhyolite. *Analytical data:* ρ_s = 0.088 x 10^6 tracks/cm² (20); ρ_i = 7.03 x 10^6 tracks/cm² (994); Φ = 0.951 x 10^{15} n/cm²; U =

270 ppm. *Collected by:* R. L. Smith, I. Friedman, D. Gottfried.

(zircon) 0.57±0.08 m.y.

203. *USGS(D)-3149-7* Fission-track
Quartz latite (35°58'N, 106°20'W; Guaje Mtn. quad., Jemez Mtns., Sandoval Co., NM). *Analytical data:* ρ_s = 1.02 x 10^6 tracks/cm^2 (226); ρ_i = 13.99 x 10^6 tracks/cm^2 (1554); Φ = 0.935 x 10^{15} n/cm^2; U = 430 ppm. *Collected by:* R. L. Smith, I. Friedman, D. Gottfried.

(zircon) 4.1±0.2 m.y.

204. *USGS(D)-3149-5* Fission-track
Rhyolite (35°49'N, 106°38'W; Jemez Spring quad., Jemez Mtns., Sandoval Co., NM). Glassy flow in Banco Bonito Member of Valles Rhyolite. *Analytical data:* ρ_s = 0.0251 x 10^6 tracks/cm^2 (5); ρ_i = 10.55 x 10^6 tracks/cm^2 (1050); Φ = 0.943 x 10^{15} n/cm^2; U = 320 ppm. *Collected by:* R. L. Smith, I. Friedman, D. Gottfried.

(zircon) 0.13±0.10 m.y.

205. *USGS(D)-3149-9* Fission-track
Quartz latite, Bear Spring(?) Formation (35°39'N, 106°32'W; Bear Springs Peak quad., Jemez Mtns., Sandoval Co., NM). *Analytical data:* ρ_s = 0.597 x 10^6 tracks/cm^2 (130); ρ_i = 4.87 x 10^6 tracks/cm^2 (530); Φ = 0.928 x 10^{15} n/cm^2; U = 150 ppm. *Collected by:* R. L. Smith, I. Friedman, D. Gottfried.

(zircon) 6.8±0.7 m.y.

206. *USGS(W)-VADITO* Pb-alpha
Conglomerate (36°11'N, 105°47'30"W; near Harding Mine, Trampas quad., Taos Co., NM). Conglomerate of Vadito Formation (Montgomery, 1953). *Analytical data:* alpha/mg-hr = 83; lead = 60 ppm. *Collected by:* L. R. Stieff. *Comment:* Age reported (Marvin, 1968); reconnaissance age.

(zircon) 1550±175 m.y.

207. *USGS(W)-MM-SC-SR* Pb-alpha
Rhyolite, Sevilleta Rhyolite (Stark and Dapples, 1946) (34°28'N, 106°30'W, Becker quad., Los Pinos Mtns., Valencia Co., NM). *Analytical data:* alpha/mg-hr = 56; lead = 39 ppm. *Collected by:* R. S. Cannon. *Comment:* Reconnaissance age.

(zircon) 1500±250 m.y.

208. *USGS(D)-JIC-50* K-Ar
Monzonite (33°55'N, 105°38'W; SE¼ S36,T4S, R12E, Jicarillo Mtns., Lincoln Co., NM). *Analytical data:* K_2O = 7.13, 7.08%; *Ar^{40} = 3.952 x 10^{-10} mol/gm; *$Ar^{40}/\Sigma Ar^{40}$ = 80%. *Collected by:* K. Segerstrom. *Comment:* Age of 37.3 m.y. was reported (Segerstrom and Ryberg, 1974) for this sample; age recalculated with revised decay constants for K^{40}

(biotite) 38.2±1.5 m.y.

209. *USGS(D)-SA-5* K-Ar, Fission-track
Rhyolite of Diablo Range (33°08'06"N, 108°33'21"W; N½ NW¼ S36,T13S,R17W; Skelley Peak quad., Grant Co., NM). *Analytical data:* (sanidine): K_2O = 7.84, 7.75%; *Ar^{40} = 3.034 x 10^{-10} mol/gm; *$Ar^{40}/\Sigma Ar^{40}$ = 84%; (biotite): K_2O = 6.70, 6.62%; *Ar^{40} = 2.728 x 10^{-10} mol/gm; *$Ar^{40}/\Sigma Ar^{40}$ = 67%; (sphene): ρ_s = 0.259 x 10^6 tracks/cm^2 (195); ρ_i = 1.354 x 10^6 tracks/cm^2 (507); Φ = 2.41 x 10^{15} n/cm^2; U = 18 ppm. *Collected by:* J. C. Ratte. *Comment:* Oligocene volcanism. Ratte and Gaskill (1975) reported ages of 26.2 m.y. (sanidine); 27.6 (biotite); and 27.6 m.y. (sphene) for this sample. K-Ar and fission-track ages both recalculated with revised decay constants.

K-Ar (sanidine) 26.8±0.6 m.y.
(biotite) 28.2±0.7 m.y.
Fission-track (sphene) 27.8±1.4 m.y.

210. *USGS(D)-SA-3* Fission-track
Latite (33°03'17'N, 108°30'12"W; Canteen Canyon quad., Grant Co., NM). Porphyritic latite from volcanic complex of Brock Canyon. *Analytical data:* ρ_s = 1.01 x 10^6 tracks/cm^2 (247); ρ_i = 2.16 x 10^6 tracks/cm^2 (265); Φ = 1.12 x 10^{15} n/cm^2; U = 60 ppm. *Collected by:* J. C. Ratte. *Comment:* Oligocene volcanism. Age of 30.2 m.y. was reported (Ratte and Gaskill, 1975) for this sample; age recalculated because of revised decay constant for uranium.

(zircon) 31.2±3.3 m.y.

211. *USGS(D)-SA-3* K-Ar
Latite (33°02'18"N, 108°30'05"W; 55 m N and 21 m W of Clum Shaft in SW¼ S33,T14S,R16W; Canteen Canyon quad., Grant Co., NM). Porphyritic latite from volcanic complex of Brock Canyon. *Analytical data:* K_2O = 7.72, 7.79%; *Ar^{40} = 3.575 x 10^{-10} mol/gm; *$Ar^{40}/\Sigma Ar^{40}$ = 60%. *Collected by:* J. C. Ratte. *Comment:* Age of 31.0 m.y. was reported for this sample (Ratte and Gaskill, 1975); age recalculated with revised decay constants for K^{40}. Age of Oligocene volcanism.

(biotite) 31.7±0.8 m.y.

212. *USGS(D)-SA-4* K-Ar
Latite (33°02'18"N, 108°30'06"W; about 183 m W of quartz-fluorite vein at Clum Shaft; SW¼ S33,T14S, R16W; Canteen Canyon quad., Grant Co., NM). Porphyritic latite from volcanic complex of Brock Canyon. *Analytical data:* K_2O = 8.11, 8.15%; *Ar^{40} = 3.956 x 10^{-10} mol/gm; *$Ar^{40}/\Sigma Ar^{40}$ = 74%. *Collected by:* J. C. Ratte. *Comment:* Oligocene volcanism. Age of 32.7 m.y. was reported for this sample (Ratte and Gaskill, 1975); age recalculated with revised decay constants for K^{40}.

(biotite) 33.5±0.8 m.y.

213. *USGS(D)-SA-2* K-Ar
Granite dike (33°04'31"N, 108°21'26"W; gulch

about 0.4 km W of N.M. Hwy. 756; S½ S17,T14S, R13W; Copperas Peak quad., Grant Co., NM). The fine-grained dike is part of volcanic complex of Alum Mtn. *Analytical data:* K_2O = 8.66, 8.61%; $*Ar^{40}$ = 3.814 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 74%. *Collected by:* J. C. Ratte. *Comment:* Age of 29.7 m.y. reported (Ratte and Gaskill, 1975) for this sample; age recalculated with revised decay constants for K^{40}.

(K-feldspar) 30.4±0.7 m.y.

214. *USGS(D)-SA-1* K-Ar
Quartz latite (33°02'24"N, 108°13'28"W; top of knob W side of N.M. Hwy. 255; SE¼ NW¼ S31,T14S, R13W; Copperas Peak quad., Grant Co., NM). Quartz latite is from latitic lava flows of Gila Flat. *Analytical data:* (sanidine): K_2O = 9.52, 9.58%; $*Ar^{40}$ = 4.157 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 92%; (biotite): K_2O = 8.71, 8.75%; $*Ar^{40}$ = 3.838 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 84%. *Collected by:* J. C. Ratte. *Comment:* Oligocene volcanism. Ratte and Gaskill (1975) reported ages of 29.3 (sanidine) and 29.6 m.y. (biotite); ages recalculated with revised decay constants for K^{40}.

(sanidine) 30.0±0.7 m.y.
(biotite) 30.3±0.7 m.y.

215. *USGS(D)-J-1-71* K-Ar
Lamprophyre (32°31'47"N, 103°48'06"W; 466 m below surface at Kerr-McGee Mine; S31,T20S,R32E; Clayton Basin quad., Lea Co., NM). Lamprophyre dike intrudes salt beds of Salado Formation (Permian). *Analytical data:* K_2O = 5.50, 5.43%; $*Ar^{40}$ = 2.760 x 10^{-20} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 65%. *Collected by:* C. L. Jones.

(whole-rock) 34.8±0.8 m.y.

NEW YORK

216. *USGS(D)-AZ-9* K-Ar
Alaskite (43°51'00"N, 75°21'00"W; roadcut along secondary road 0.88–0.89 km W of Strifts School; Crystal Dale quad., Lewis Co., NY). Gneissoid biotite hornblende mesoperthite alaskite. *Analytical data:* K_2O = 8.02, 8.00%; $*Ar^{40}$ = 137.5 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 98%. *Collected by:* R. E. Zartman. *Comment:* Minimum age.

(biotite) 915±33 m.y.

217. *USGS(D)-AZ-6* K-Ar
Granite (44°10'00"N, 75°10'00"W; railroad cut just W of Briggs; Fine quad., St. Lawrence Co., NY). Gneissoid hornblende biotite mesoperthite granite. *Analytical data:* K_2O = 7.08, 7.06%; $*Ar^{40}$ = 117.6 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 97%. *Collected by:* R. E. Zartman. *Comment:* Minimum age.

(biotite) 893±32 m.y.

NORTH CAROLINA

218. *USGS(W)-SU-MPG* Pb-alpha
Granitic saprolite (35°24'20"N, 80°27'22"W; near Mount Pleasant, Mount Pleasant quad., Cabarrus Co., NC). *Analytical data:* alpha/mg-hr = 138; lead = 33 ppm. *Collected by:* A. M. White. *Comment:* Reconnaissance age.

(zircon) 570±100 m.y.

219. *USGS(W)-S-229Z* Pb-alpha
Granitic saprolite (35°36'01"N, 80°19'08"W; NE of Liberty, Gold Hill quad., Rowan Co., NC). *Analytical data:* alpha/mg-hr = 156; Pb = 37.5 ppm. *Collected by:* A. M. White. *Comment:* Reconnaissance age.

(zircon) 570±60 m.y.

220. *USGS(W)-ZS-1* Pb-alpha
Granitic saprolite (35°41'41"N, 80°17'43"W; Southmount quad., Davidson Co., NC). *Analytical data:* alpha/mg-hr = 572; lead = 163 ppm. *Collected by:* A. M. White. *Comment:* Reconnaissance age.

(zircon) 670±80 m.y.

221. *USGS(W)-ST-527S* Pb-alpha
Granitic saprolite (35°43'49"N, 80°14'29"W; High Rock Lake, Denton quad., Davidson Co., NC). *Analytical data:* alpha/mg-hr = 159; lead = 32 ppm. *Collected by:* A. M. White. *Comment:* Reconnaissance age.

(zircon) 480±60 m.y.

OREGON

222. *USGS(D)-SR-63-45* K-Ar
Alkalic basalt (44°16'N, 124°07'W; Devils Churn, Waldport quad., Lane Co., OR). *Analytical data:* K_2O = 0.23, 0.23%; $*Ar^{40}$ = 0.124 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 41%. *Collected by:* P. D. Snavely; *analyzed by:* J. D. Obradovich. *Comment:* Tatsumoto and Snavely (1969) published age of 36.6 m.y. for this sample; age recalculated with new decay constants for Ar^{40}.

(plagioclase) 37.1±3.6 m.y.

223. *USGS(D)-Sr-59-9* K-Ar
Camptonite (44°51'N, 123°56'W; Euchre Mtn., quad., Lincoln Co., OR). *Analytical data:* K_2O = 5.81, 5.89, 5.85, 5.82%; $*Ar^{40}$ = 2.82 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 81%. *Collected by:* P. D. Snavely; *analyzed by:* J. D. Obradovich. *Comment:* Tatsumoto and Snavely (1969) published age of 32.6 m.y. for this sample; age recalculated with new decay constants for K^{40}.

(biotite) 33.2±1.0 m.y.

224. *USGS(D)-Sr-60-60* Rb-Sr
Sandstone (44°41'N, 123°52'W; Toledo quad.,

Lincoln Co., OR). Tyee Formation (middle Eocene). *Analytical data:* Rb = 409 ppm; Sr = 35.2 ppm; $*Sr^{87}$ = 0.277 ppm; $*Sr^{87}/\Sigma Sr^{87}$ = 10%; Rb^{87}/Sr^{86} = 33.6; Sr^{87}/Sr^{86} = 0.7874; initial Sr^{87}/Sr^{86} = 0.707. *Collected by:* P. D. Snavely. *Comment:* Average age of detrital muscovite.

(muscovite) 168±15 m.y.

225. *USGS(D)-SR-59-9* K-Ar
Biotite camptonite dike (44°57'N, 123°49'W; NE¼ S20,T8S,R10W; Siletz River, Euchre Mtn. quad., Lincoln Co., OR). Pegmatitic camptonite carrying barkevikitic hornblende. *Analytical data:* K_2O = 1.00%; $*Ar^{40}$ = 0.5029 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 59%. *Collected by:* P. D. Snavely; *analyzed by:* R. F. Marvin, H. H. Mehnert, W. Montjoy. *Comment:* Tatsumoto and Snavely (1969) published age of 33.6 m.y. for this sample; age recalculated with new decay constants for K^{40}.

(hornblende) 34.6±1.2 m.y.

226. *USGS(W)-CEB-61-75* K-Ar
Quartz diorite (44°31'30"N, 118°42'W; Bates quad., Grant Co., OR). Overlain by fossiliferous beds of mid-Cretaceous age. *Analytical data:* K_2O = 8.02%; $*Ar^{40}$ = 17.6 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 95%. *Collected by:* C. E. Brown; *analyzed by:* H. H. Thomas, R. F. Marvin, P. L. D. Elmore. *Comment:* Thayer and Brown (1964) reported age of 145 m.y. for this sample; age recalculated with new decay constants for K^{40}.

(biotite) 146±7 m.y.

227. *USGS(W)-CEB-61-76* K-Ar, Pb-alpha
Mica diorite (44°11'42"N, 118°11'30"W; Castle Rock quad., Malheur Co., OR). *Analytical data:* (biotite): K_2O = 8.78%; $*Ar^{40}$ = 15.8 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 91%; (zircon): alpha/mg-hr = 79; lead = 3.2 ppm. *Collected by:* C. E. Brown; *analyzed by:* H. H. Thomas, R. F. Marvin, P. L. D. Elmore (K-Ar) and T. W. Stern and H. Westley (Pb-alpha). *Comment:* Thayer and Brown (1964) reported ages of 120 m.y. (biotite) and 100 m.y. (zircon) for this sample; K-Ar biotite age recalculated with revised decay constants for K^{40}. The diorite intrudes Triassic and Jurassic sedimentary rocks. Biotite age is more reliable of two ages.

K-Ar (biotite) 121±6 m.y.
Pb-alpha (zircon) 100±15 m.y.

PENNSYLVANIA

228. *USGS(W)-HB-1* Pb-alpha
Quartz monzonite (40°06'N, 75°47'W; Wagontown quad., Chester Co., PA). Weathered quartz monzonite of Honeybrook upland. *Analytical data:* alpha/mg-hr = 190; lead = 107 ppm. *Collected by:* D. Gottfried. *Comment:* Reconnaissance age.

(zircon) 1245±140 m.y.

229. *USGS(W)-HB-2* Pb-alpha
Quartz monzonite (40°06'N, 75°47'W; Wagontown quad., Chester Co., PA). Quartz monzonite of Honeybrook upland. *Analytical data:* alpha/mg-hr = 228; lead = 118 ppm. *Collected by:* D. Gottfried. *Comment:* Reconnaissance age.

(zircon) 1155±130 m.y.

230. *USGS(W)-P-12-56* Pb-alpha
Wissahickon Formation (39°59'N, 75°23'W; Fox Croft quarry, Philadelphia area, Media quad., Delaware Co., PA). *Analytical data:* alpha/mg-hr = 180; lead = 54.5 ppm. *Collected by:* A. W. Postel. *Comment:* Reconnaissance age.

(zircon) 710±80 m.y.

231. *USGS(W)-DBG-1* Pb-alpha
Baltimore Gneiss (40°02'N, 75°19'W; Bryn Mawr, Norristown quad., Montgomery or Delaware Co., PA). *Analytical data:* alpha/mg-hr = 182; lead = 66 ppm. *Collected by:* D. Gottfried. *Comment:* Reconnaissance age.

(zircon) 840±95 m.y.

TENNESSEE

232. *USGS(W)-DD491(350)* K-Ar
Hornblendite (approx. 35°03'N, 84°22'W; drill core from mine wall, Eureka Mine, Ducktown, Ducktown or Isabella quad., Polk Co., TN). *Analytical data:* K_2O = 0.33%; $*Ar^{40}$ = 2.627 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 79%. *Collected by:* A. R. Kinkel, Jr. *Comment:* Age published as 478 m.y. (Kinkel, 1967); has been recalculated with new decay constants for K^{40}. Age may indicate time of last metamorphic event in this region.

(hornblende) 482±24 m.y.

233. *USGS(W+D)-CALLOWAY No. 1 (349)* K-Ar
Ore zone (approx. 35°03'N, 84°22'W; Calloway Mine, Ducktown, Ducktown or Isabella quad., Polk Co., TN). *Analytical data:* (A) K_2O = 0.24%; $*Ar^{40}$ = 4.904 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 93%; (B) K_2O = 0.28%; $*Ar^{40}$ = 5.354 x 10^{-10} = mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 93%. *Collected by:* A. R. Kinkel, Jr.; *analyzed by:* (A) H. H. Thomas, R. F. Marvin, F. C. Walthall; (B) R. F. Marvin, H. H. Mehnert, and W. Mountjoy. *Comment:* Age (A) published (Kinkel, 1967) as 1045 m.y.; age (B) not previously published. Both ages appear spurious, probably due to excess radiogenic argon.

(A) hornblende 1047±50 m.y.
(B) hornblende 995±34 m.y.

234. *USGS(W)-BOYD No. 1 (348)* K-Ar
Ore zone (approx. 35°03'N, 84°22'W; Boyd Mine, Ducktown, Ducktown or Isabella quad., Polk Co., TN). *Analytical data:* K_2O = 0.50%; $*Ar^{40}$ = 3.203 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 91%. *Collected*

by: A. R. Kinkel, Jr. *Comment:* Age published as 387 m.y. (Kinkel, 1967); it has been recalculated with new decay constants for K^{40}. Age is minimum age for vein.

(hornblende) 398±20 m.y.

UTAH

235. *USGS(W)-RJR-161* Pb-alpha
Diorite porphyry (40°29'N, 112°12'W; Bingham area, Lowe Peak quad., Tooele Co., UT). *Analytical data:* alpha/mg-hr = 284; lead = 4.4 ppm. *Collected by:* R. J. Roberts. *Comment:* Probable age of emplacement; agrees fairly well with other ages in this region.

(zircon) 40±10 m.y.

236. *USGS(D+W)-26-HM-64(600)* K-Ar, Pb-alpha
Monzonite (39°50'05"N, 112°25'40"W; SE¼ NW¼ SE¼ S29,T11S,R5W, SLBM; West Tintic district, Cherry Creek quad., Juab Co., UT). Monzonite porphyry of West Tintic. *Analytical data:* (biotite): K_2O = 8.93%; $^*Ar^{40}$ = 5.079 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 47%; (zircon): alpha/mg-hr = 632; lead = 48.7 ppm. *Collected by:* H. T. Morris; *analyzed by:* R. F. Marvin, H. H. Mehnert, W. Mountjoy (K-Ar—Denver). *Comment:* K-Ar age is minimum age for monzonite porphyry; Pb-alpha age is anomalously old; zircons may be, in part, xenocrystic.

K-Ar (biotite) 39.1±2.0 m.y.
Pb-alpha (zircon) 190±20 m.y.

237. *USGS(D)-21-HM-64(601)* K-Ar
Andesite (39°49'30"N, 112°24'50"W; N½ SE¼ NW¼ S33,T11S,R5W, SLBM; West Tintic district, Cherry Creek quad., Juab Co., UT). Hornblende-bearing andesite flow; it covers monzonite porphyry stock of West Tintic. *Analytical data:* K_2O = 0.95%; $^*Ar^{40}$ = 0.5029 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 66%. *Collected by:* H. T. Morris; *analyzed by:* R. F. Marvin, H. H. Mehnert, and W. Mountjoy. *Comment:* Age of volcanism and minimum age of uplift and erosion of monzonite porphyry of West Tintic.

(hornblende) 36.4±1.8 m.y.

238. *USGS(D+W)-11-HM-64(602)* K-Ar, Pb-alpha
Tuff (39°45'35"N, 112°24'30"W; E½ SW¼ SE¼ S21,T12S,R5W, SLBM, West Tintic district, Cherry Creek quad., Juab Co., UT). Quartz-rich welded tuff of Rockwell Hills; covers hornblende andesite flow (see sample USGS(D)-21-HM-64(601)). *Analytical data:* (biotite) K_2O = 9.00%; $^*Ar^{40}$ = 4.529 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 55%; (zircon): alpha/mg-hr = 587; lead = 207.5 ppm. *Collected by:* H. T. Morris; *analyzed by:* R. F. Marvin, H. H. Mehnert, W. Mountjoy (K-Ar—Denver lab). *Comment:* The K-Ar age (biotite) indicates time of volcanism. Pb-alpha age is anomalously old; zircons may be dominantly xenocrystic.

K-Ar (biotite) 34.6±1.7 m.y.
Pb-alpha (zircon) 820±90 m.y.

239. *USGS(W)-1841(690)* Pb-alpha
Quartzite (38°45'N, 113°40'W; IBEX well, Crystal Peak quad., Millard Co., UT). Eureka Quartzite (Ordovician). *Analytical data:* alpha/mg-hr = 79; lead = 88 ppm. *Collected by:* K. B. Ketner. *Comment:* Detrital zircons indicate average age of source rocks.

(zircon) 2370±300 m.y.

240. *USGS(M)-61-282* K-Ar
Quartz monzonite (38°26'58"N; 113°04'34"W; NW¼ S22,T27S,R11W; prospect dump on N edge road; 1.1 km W of Old Hickory Mine, San Francisco district, Milford quad., Beaver Co., UT). *Analytical data:* (biotite): K_2O = 8.15%; $^*Ar^{40}$ = 2.527 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 75%; (hornblende) K_2O = 0.35%; $^*Ar^{40}$ = 0.1391 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 34%. *Collected by:* D. M. Lemmon. *Comment:* Ages published as 20.8 m.y. (biotite) and 27.0 m.y. (hornblende) by Marvin (1968); have been recalculated with new decay constants for K^{40}. Biotite age appears to be a reduced age and may indicate time of hydrothermal activity.

(biotite) 21.4±0.6 m.y.
(hornblende) 27.4±0.8 m.y.

241. *USGS(M)-61-283* K-Ar
Granodiorite (38°29'14"N, 113°07'14"W; SE¼ S6, T27S,R11W; dump of the Mary I inclined shaft, San Francisco district, Milford quad., Beaver Co., UT). Granodiorite of the OK stock. *Analytical data:* K_2O = 0.36%; $^*Ar^{40}$ = 0.1504 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 34%. *Collected by:* D. M. Lemmon. *Comment:* Age published as 28.4 m.y. (Marvin, 1968); has been recalculated with new decay constants for K^{40}.

(hornblende) 28.8±0.9 m.y.

242. *USGS(M)-61-285* K-Ar
Porphyritic quartz monzonite (38°24'10"N, 113°06'57"W; SW¼ S5,T28S,R11W; Copper King shaft dump, San Francisco district, Milford quad., Beaver Co., UT). *Analytical data:* K_2O = 8.77%; $^*Ar^{40}$ = 2.727 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 78%. *Collected by:* D. M. Lemmon. *Comment:* Age published as 20.9 m.y. (Marvin, 1968); has been recalculated with new decay constants for K^{40}.

(biotite) 21.5±0.6 m.y.

243. *USGS(M)-63-17* K-Ar
Granodiorite (38°29'03"N, 113°18'46"W; NE¼ S9, T27S,R13W; Portal Cactus Mine adit, San Francisco district; Frisco quad., Beaver Co., UT). Granodiorite of the Cactus stock. *Analytical data:* K_2O = 8.88%; $^*Ar^{40}$ = 3.703 x 10^{-10} mol/gm; $^*Ar^{40}/\Sigma Ar^{40}$ = 86%. *Collected by:* D. M. Lemmon. *Comment:* Age published as 28.0 m.y. (Marvin, 1968); has been recalculated with new decay constants for K^{40}.

(biotite) 28.7±0.9 m.y.

244. *USGS(M)-61-284* K-Ar
Tuff (38°26'46"N, 113°15'34"W; SE¼ S24,T27S, R13W; S of Utah Highway No. 21 at Squaw Pass; Frisco quad., Beaver Co., UT). Vitric-crystal ash-flow tuff, red ignimbrite. *Analytical data:* K_2O = 9.06%; $*Ar^{40}$ = 2.952 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 95%. *Collected by:* D. M. Lemmon. *Comment:* Age published as 21.9 m.y. (Marvin, 1968); has been recalculated with new decay constant for K^{40}

(sanidine) 22.5±0.7 m.y.

245. *USGS(M)-63-16* K-Ar
Tuff (38°26'39"N, 113°14'26"W; SE¼ S19,T27S, R12W; Milford quad., Beaver Co., UT). Crystal-vitric biotite tuff, stratigraphically above red ignimbrite (see sample USGS(M)-61-284). *Analytical data:* K_2O = 8.73, 8.79%; $*Ar^{40}$ = 2.927 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 80%. *Collected by:* D. M. Lemmon. *Comment:* Age published as 22.4 m.y. (Marvin, 1968); has been recalculated with new decay constants for K^{40}

(biotite) 23.1±0.7 m.y.

246. *USGS(M)-61-85* K-Ar
Tuff (38°16'48"N, 113°16'18"W; SE¼ S14,T29S, R13W; Frisco quad., Beaver Co., UT). Biotite-hornblende crystal-vitric ash-flow tuff. Needles Range Formation. *Analytical data:* (biotite): K_2O = 8.66%; $*Ar^{40}$ = 3.753 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 79%; (hornblende): K_2O = 0.91%; $*Ar^{40}$ = 0.3953 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 66%. *Collected by:* D. M. Lemmon. *Comment:* Ages published as 29.0 (biotite) and 29.2 m.y. (hornblende) (Marvin, 1968); have been recalculated with new decay constants for K^{40}

(biotite) 29.8±0.9 m.y.
(hornblende) 29.9±0.9 m.y.

VIRGINIA

247. *USGS(W)-VA4A* Pb-alpha
Bentonite (37°02'N, 82°41'W; Critical Fork coal mine, Flat Gap quad., Wise Co., VA). 20 cm-thick bed of bentonite in upper part of Wise Formation. *Analytical data:* alpha/mg-hr = 129; lead = 23 ppm; (Th/U = 0.5, X-ray fluorescence by F. J. Flanagan). *Collected by:* H. Faul. *Comment:* Age too old; detrital zircons may be present in the volcanic ash.

(zircon) 440±50 m.y.

248. *USGS(W)-VA4* Pb-alpha
Bentonite (37°02'N, 82°41'W; Critical Fork coal mine, Flat Gap quad., Wise Co., VA). 20 cm-thick bed of bentonite in upper part of Wise Formation. *Analytical data:* alpha/mg-hr = 131; lead = 27 ppm; (Th/U = 0.5, X-ray fluorescence by F. J. Flanagan). *Collected by:* H. Faul. *Comment:* Age too old; detrital zircons may be present in the volcanic ash.

(zircon) 500±55 m.y.

249. *USGS(D)-D1033B and H* K-Ar
Teschenite (38°14'10"N, 79°02'35"W; Scott L. Wenger Farm on State Road 742, Staunton quad., Augusta Co., VA). Alkalic dike complex. *Analytical data:* (biotite): K_2O = 6.88, 6.95%; $*Ar^{40}$ = 16.14 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 98%; (hornblende): K_2O = 1.67, 1.68%; $*Ar^{40}$ = 3.90 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 96%. *Collected by:* C. Milton; *analyzed by:* R. F. Marvin, H. H. Mehnert, W. Mountjoy. *Comment:* Ages published as 152 m.y. (biotite) and 151 m.y. (hornblende) (Marvin, 1968); have been recalculated with new decay constants for K^{40} Ages indicate time of emplacement.

(biotite) 155±5 m.y.
(hornblende) 155±10 m.y.

WASHINGTON

250. *USGS(M)-SJ-13A* K-Ar
Pegmatite (48°40'48"N, 122°53'06"W; coastal outcrop on small headland, NE side East Sound, Orcas Island quad., San Juan Co., WA). Pegmatitic hornblende dike, Turtleback Complex of McLellan (1927). *Analytical data:* K_2O = 0.346, 0.341%; $*Ar^{40}$ = 3.207 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 78%. *Collected by:* W. Glassley and J. Whetten; *analyzed by:* J. Christie, A. L. Berry, B. M. Myers. *Comment:* Age not evaluated.

(hornblende) 554±16 m.y.

WISCONSIN

251. *USGS(W)-WCP-37-56* Pb-alpha
Quartz diorite (45°45'50"N, 88°02'40"W; Iron Mtn., quad., Marinette Co., WI). *Analytical data:* alpha/mg-hr = 255; lead = 255 ppm. *Collected by:* W. C. Prinz and R. W. Bayley. *Comment:* Reconnaissance age.

(zircon) 1820±205 m.y.

252. *USGS(W)-WCP-38-56* Pb-alpha
Granite porphyry (45°46'10"N, 88°02'25"W; Iron Mtn. quad., Marinette Co., WI). *Analytical data:* alpha/mg-hr = 500; lead = 382.5 ppm. *Collected by:* W. C. Prinz and R. W. Bayley. *Comment:* Reconnaissance age.

(zircon) 1620±185 m.y.

253. *USGS(W)-WCP-39-56* Pb-alpha
Augen gneiss (45°46'45"N, 88°03'20"W; Iron Mtn. quad., Marinette or Florence Co., WI). *Analytical data:* alpha/mg-hr = 568; lead = 366 ppm. *Collected by:* W. C. Prinz and R. W. Bayley. *Comment:* Reconnaissance age.

(zircon) 1400±160 m.y.

254. *USGS(W)-WCP-40-56* Pb-alpha
Aplite (45°46'40"N, 88°04'50"W; Iron Mtn. quad., Florence Co., WI). *Analytical data:* alpha/mg-hr = 214; lead = 187 ppm. *Collected by:* W. C. Prinz and

R. W. Bayley. *Comment:* Reconnaissance age.
(zircon) 1810±205 m.y.

WYOMING

255. *USGS(W)-463* Pb-alpha
Sandstone (43°16'29"N, 110°31'48"W; Bull Creek quad., Sublette Co., WY). Stump Formation (Late Jurassic). *Analytical data:* alpha/mg-hr = 181; lead = 20 ppm. *Collected by:* J. F. Murphy. *Comment:* Zircons have no distinctive color or morphological groups. Age is average age of the source rocks; not age of Stump Formation.
(zircon) 270±30 m.y.

256. *USGS(W)-337* K-Ar, Pb-alpha
Quartz diorite (42°34'N, 108°52'W; S14,T30N, R101W; South Pass area, Wind River Range, Louis Lake quad., Fremont Co., WY). Biotite-hornblende-quartz diorite, Louis Lake batholith. *Analytical data:* (biotite): K_2O = 9.52%, $*Ar^{40}$ = 59.3 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 100%; (hornblende): K_2O = 0.93%; $*Ar^{40}$ = 79.56 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 100%; (zircon-1, nonmagnetic fraction), alpha/mg-hr = 164; lead = 297 ppm; (zircon-2, magnetic fraction) alpha/mg-hr = 216; lead = 595 ppm. *Collected by:* R. W. Bayley; *analyzed by:* H. H. Thomas, R. F. Marvin, P. L. D. Elmore, H. Smith (K-Ar). *Comment:* Bayley and others (1973) reported ages of 2640 m.y. (hornblende) and 2210 m.y. (biotite) for this sample; these ages have been recalculated with revised decay constants for K^{40}. Hornblende age is in good agreement with a 2600-m.y. age for Louis Lake batholith (Naylor and others, 1970). Biotite age is too young; radiogenic argon has been lost. Pb-alpha ages are too old.
(K-Ar) (biotite) 2210±110 m.y.
(hornblende) 2630±130 m.y.
(Pb-alpha) (zircon-1) 3000±340 m.y.
(zircon-2) 3300±370 m.y.

257. *USGS(W)-338* K-Ar
Granite (42°31'45"N, 108°46'00"W; S34,T30N, R100W; South Pass area, Wind River Range, Louis Lake quad., Fremont Co., WY). Granite (mylonite) border facies of Louis Lake batholith. *Analytical data:* K_2O = 5.12%; $*Ar^{40}$ = 160.4 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 99%. *Collected by:* R. W. Bayley; *analyzed by:* H. H. Thomas, R. F. Marvin, P. L. D. Elmore, H. Smith. *Comment:* Age published as 1420 m.y. (Bayley and others, 1973); has been recalculated with new decay constants for K^{40}. This is a reduced age, and may date a time of faulting. Published Pb-alpha age of 1240 m.y. (zircon) for this same sample is spurious (Bayley and others, 1973).
(biotite) 1430±70 m.y.

258. *USGS(W)-BH-5* Pb-alpha
Granite (44°48'N, 107°25'W; Bighorn Mtns., Sheridan quad., Sheridan Co., WY). *Analytical data:* alpha/mg-hr = 186; lead = 217 ppm. *Collected by:* D. Gottfried. *Comment:* Reconnaissance age.
(zircon) 2280±255 m.y.

259. *USGS(W)-BH-7* Pb-alpha
Granite (44°40'N, 107°30'W; Bighorn Mtns., Sheridan quad., Sheridan Co., WY). *Analytical data:* alpha/mg-hr = 210; lead = 295 ppm. *Collected by:* D. Gottfried. *Comment:* Reconnaissance age.
(zircon) 2595±290 m.y.

260. *USGS(W)-310-61* Pb-alpha
Bentonite (42°43'N, 106°28'W; Emigrant Gap, Freeland quad., Natrona Co., WY). Bentonite bed within the Mowry Formation. *Analytical data:* (-150 +230 mesh zircon): alpha/mg-hr = 328; lead = 16.9 ppm. *Collected by:* R. E. Folinsbee. *Comment:* Age too old; detrital zircon may be present in the bentonite bed; biotite and sanidine separates from the bentonite beds of Mowry Formation give K-Ar ages averaging 90–96 m.y. (Folinsbee and others, 1963).
(zircon) 130±20 m.y.

261. *USGS(W)-311-61* Pb-alpha
Bentonite (42°43'N, 106°28'W; Emigrant Gap, Freeland quad., Natrona Co., WY). Bentonite bed within Mowry Formation. *Analytical data:* (-230 +270 mesh zircon): alpha/mg-hr = 533; lead = 30.5 ppm. *Collected by:* R. E. Folinsbee. *Comment:* Age too old; detrital zircons may be present in the bentonite bed; biotite and sanidine separates from the bentonite beds of the Mowry Formation give K-Ar ages averaging 90–96 m.y. (Folinsbee and others, 1963).
(zircon) 140±20 m.y.

PUERTO RICO

262. *USGS(W)-JM-1-382* Pb-alpha
Quartz diorite (18°12'40"N, 66°34'50"W; Jayuya quad., Puerto Rico). *Analytical data:* alpha/mg-hr = 112; lead = 2.7 ppm. *Collected by:* P. H. Mattson and W. H. Monroe. *Comment:* Age published (Mattson, 1968). Minimum age of intrusion.
(zircon) 60±10 m.y.

263. *USGS(W)-AM-1-405* Pb-alpha
Granodiorite (18°13'05"N, 66°38'15"W; Adjuntas quad., Puerto Rico). *Analytical data:* alpha/mg-hr = 247; lead = 5.6 ppm. *Collected by:* P. H. Mattson and W. H. Monroe. *Comment:* Minimum age of intrusion.
(zircon) 60±10 m.y.

264. *USGS(W)-JM-1-415* K-Ar, Pb-alpha
Granodiorite (18°13'00"N, 66°34'10"W; Jayuya quad., Puerto Rico). Utuado batholith. *Analytical data:* (biotite): K_2O = 6.57%; $*Ar^{40}$ = 6.380 x 10^{-10} mol/gm; $*Ar^{40}/\Sigma Ar^{40}$ = 84%; (zircon):

alpha/mg-hr = 227; lead = 4.2 ppm. *Analyzed by:* H. H. Thomas, R. F. Marvin, P. L. D. Elmore (K-Ar). *Comment:* Mattson (1968) reported K-Ar age of 65 m.y. for the biotite from this sample; age recalculated with revised decay constants for K^{40}. Age is in good agreement with other published ages for the Utuado batholith (Cox and others, 1977). Pb-alpha age reported (Nelson 1968); is too young.

K-Ar (biotite) 66±3 m.y.
Pb-alpha (zircon) 50±10 m.y.

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