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# Table 2. Estes Park 1:100,000-scale quadrangle isotopic ages.

| No. EP- | Unit name | Sample No. | Latitude (N) | Longitude (W) | 71/2-minute quadrangle | Method | Mineral | Age in Ma | Analytical uncertainty in Ma | Reference | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 001 | Quartzo-feldspathic schist | CL1-96 | 40°22'19"[1] | 105°14'32" | Carter Lake Reservoir | U-Pb | Zircon (detrital) | 1,758 to ~3,450; distribu-tion of ages peaks at 1,800 | [6] | Selverstone and others (2000) | N. of Moose Mtn. shear zone. SHRIMP[7] data, 51 determinations |
| 002 | Quartzo-feldspathic schist | BT150LY | 40°14'45"[1] | 105°19'25" | Lyons | U-Pb | Zircon (detrital) | Distribu-tion of ages peaks at 1,825; none >2,650 | [6] | Selverstone and others (2000)[5] | S of Moose Mtn. shear zone. SHRIMP[7] data, 47 determinations |
| 003 | Metagraywacke | R4-1130 | 40°22'34" | 105°13'50" | Masonville | U-Pb | Zircon (detrital) | four fractions range from 1,852 to 1,973 | [6] | Aleinikoff and others (1993) | Rock cut by 1,726±15 Ma trondhjemite. $^{207}Pb/^{206}Pb$ reported |
| 004 | Hornblende-biotite granodiorite | HP-17R | 40°00'18"[1] | 105°22'54" | Gold Hill | Rb/Sr | Whole-rock | 1,664[3] | 40 | Peterman and others (1968) | Isochron, four samples from Boulder Creek pluton |
| 005 | Biotite quartz monzonite | HP-18R | 40°00'42"[1] | 105°19'48" | Boulder | Rb/Sr | Whole-rock | 1,664[3] | 40 | Peterman and others (1968) | Isochron, four samples from Boulder Creek pluton |
| 006 | Biotite quartz monzonite | 14-A-12R | 40°24'30"[1] | 105°23'48" | Glen Haven | Rb/Sr | Whole-rock | 1,664[3] | 40 | Peterman and others (1968) | Approximate fit to Boulder Creek isochron |
| 007 | Biotite granodiorite | 14-A-20R | 40°24'18"[1] | 105°24'54" | Glen Haven | Rb/Sr | Whole-rock | 1,664[3] | 40 | Peterman and others (1968) | Approximate fit to Boulder Creek isochron |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 008 | Trondhjemite | 50 | 40°26'00"[1] | 105°18'57" | Drake | U-Pb | Zircon | 1,726[4] | 15 | Barovich (1986) | Date of Palisade Mountain plug puts minimum age on latest stages of Early Proterozoic deformation |
| 009 | Biotite granodiorite gneiss | 63GP99 | 40°00'01"[1] | 105°30'12" | Ward | U-Pb | Zircon | 1,725[8] | [6] | Stern and others (1971) | Concordia based on six samples of Boulder Creek Granodiorite |
| 010 | Hornblende-bearing biotite quartz diorite | 63GP40 | 40°02'21"[1] | 105°23'38" | Gold Hill | U-Pb | Zircon | 1,725[8] | [6] | Stern and others (1971) | Concordia based on six samples of Boulder Creek Granodiorite |
| 011 | Muscovite-biotite granite | 63GP-41 | 40°04'12"[1] | 105°23'38" | Gold Hill | U-Pb | Zircon | 1,415[8] | [6] | Stern and others (1971) | Dike intruding quartz diorite of Boulder Creek pluton |
| 012 | Mafic hornblende-bearing biotite quartz monzonite gneiss | 58GP1 | 40°04'12"[1] | 105°23'33" | Gold Hill | U-Pb | Zircon | 1,725[8] | [6] | Stern and others (1971) | Concordia based on six samples of Boulder Creek Granodiorite |
| 013 | Hornblende-bearing leuco-quartz monzonite gneiss | 63GP15 | 40°05'19"[1] | 105°21'58" | Boulder | U-Pb | Zircon | 1,725[8] | [6] | Stern and others (1971) | Concordia based on six samples of Boulder Creek Granodiorite |
| 014 | Granodiorite | 83-01 | 40°02'00"[1] | 105°18'54" | Boulder | U-Pb | Zircon | 1,714 | 6 | Premo and Van Schmus (1989) | Boulder Creek pluton |
| 015 | Disseminated uraninite | [6] | 40°03'06"[1] | 105°39'46" | Monarch Lake | U-Pb | 7 uraninite 4 monazite | 1,446 | 20 | Ludwig and Young (1975) | Concordia; disturbed at 880±130 Ma |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 016 | Granite | D1206R | 40°10'30"[1] | 105°26'06" | Raymond | Rb/Sr | Whole-rock | 1.419[3] | 30 | Peterman and others (1968) | Isochron, eight samples from Longs Peak-St. Vrain pluton |
| 017 | Quartz monzonite | D1208R | 40°10'42"[1] | 105°21'12" | Lyons | Rb/Sr | Whole-rock | 1,419[3] | 30 | Peterman and others (1968) | Isochron, eight samples from Longs Peak-St. Vrain pluton |
| 018 | Quartz monzonite | D1209R | 40°11'00"[1] | 105°21'18" | Lyons | Rb/Sr | Whole-rock | 1,419[3] | 30 | Peterman and others (1968) | Isochron, eight samples from Longs Peak-St. Vrain pluton |
| 019 | Granite | D1210R | 40°12'12"[1] | 105°20'24" | Lyons | Rb/Sr | Whole-rock | 1,419[3] | 30 | Peterman and others (1968) | Isochron, eight samples from Longs Peak-St. Vrain pluton |
| 020 | Quartz monzonite | D1196R | 40°15'30"[1] | 105°20'36" | Pinewood Lake | Rb/Sr | Whole-rock | 1,419[3] | 30 | Peterman and others (1968) | Isochron, eight samples from Longs Peak-St. Vrain pluton |
| 021 | Quartz monzonite | D1198R | 40°14'18"[1] | 105°19'12" | Lyons | Rb/Sr | Whole-rock | 1,419[3] | 30 | Peterman and others (1968) | Isochron, eight samples from Longs Peak-St. Vrain pluton |
| 022 | Quartz monzonite | D1199R | 40°18'48"[1] | 105°18'18" | Pinewood Lake | Rb/Sr | Whole-rock | 1,419[3] | 30 | Peterman and others (1968) | Isochron, eight samples from Longs Peak-St. Vrain pluton |
| 023 | Granite | D1200R | 40°14'54"[1] | 105°17'24" | Lyons | Rb/Sr | Whole-rock | 1,419[3] | 30 | Peterman and others (1968) | Isochron, eight samples from Longs Peak-St. Vrain pluton |
| 024 | Biotite-quartz monzonite | D1192R | 40°23'30"[1] | 105°26'18" | Glen Haven | Rb/Sr | Whole-rock | 1,419[3] | 20 | Peterman and others (1968) | Isochron, three samples of Mount Olympus Granite |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 025 | Biotite-quartz monzonite | GH-40R | 40°22'42"[1] | 105°28'42" | Glen Haven | Rb/Sr | Whole-rock | 1,419[3] | 20 | Peterman and others (1968) | Isochron, three samples of Mount Olympus Granite |
| 026 | Biotite quartz monzonite | PAP-1R | 40°22'24"[1] | 105°29'18" | Panorama Peak | Rb/Sr | Whole-rock | 1,419[3] | 20 | Peterman and others (1968) | Isochron, three samples of Mount Olympus Granite |
| 027 | Gabbro | 30-1-9B | 40°27'43" | 105°45'36" | Fall River Pass | Rb/Sr | Whole-rock<br>Granophyre<br>Plagioclase<br>Biotite | 1,316 | 50 | Braddock and Peterman (1989) | Iron Dike. Four point isochron taken as age of dike |
| 028 | Amphibolite | NFR-128Hb | 40°25'06"[1] | 105°14'36" | Masonville | K-Ar | Hornblende | 1516[3] | 50 | Peterman and others (1968) | |
| 029 | Granodiorite, Boulder Creek pluton | BCG | 40°02'31"[1] | 105°22'51" | Gold Hill | $^{40}Ar/^{39}Ar$<br>$^{40}Ar/^{39}Ar$<br>$^{40}Ar/^{39}Ar$ | Microcline<br>Biotite<br>Hornblende | 1,110<br>1,321<br>1,414 | 10<br>10<br>4 | Kane (1988) | Preferred age, thermally disturbed<br>Preferred age; some Ar loss<br>Preferred age |
| 030 | Micaceous schist | BTCR30409-1a | 40°22'19"[1] | 105°14'32" | Carter Lake Reservoir | $^{40}Ar/^{39}Ar$ | Muscovite | 1,395 | 2 | Shaw and others (1999) | Preferred/Plateau age |
| 031 | Quartzo-feldspathic schist | BTCR30409-1b | 40°22'19"[1] | 105°14'32" | Carter Lake Reservoir | $^{40}Ar/^{39}Ar$ | Biotite | 1,377 | 2 | Shaw and others (1999) | Preferred/Plateau age |
| 032 | Micaeous schist | BTCR30409-2c | 40°25'19"[1] | 105°13'29" | Masonville | $^{40}Ar/^{39}Ar$ | Muscovite | 1,389 | 2 | Shaw and others (1999) | Preferred/Plateau age |
| 033 | Trondhjemite | BTCR30409-3a | 40°26'07"[1] | 105°13'43" | Masonville | $^{40}Ar/^{39}Ar$ | Biotite<br>Microcline | 1,401<br>1,312 | 2<br>1 | Shaw and others (1999) | Preferred/Plateau age |
| 034 | Amphibolite | BTCR30409-3b | 40°26'07"[1] | 105°13'43" | Masonville | $^{40}Ar/^{39}Ar$ | Hornblende | 1,594 | 2 | Shaw and others (1999) | Preferred/Plateau age. Actinolite cores |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 035 | Amphibolite | BTCR30409-3c | 40°26'07"[1] | 105°13'43" | Masonville | $^{40}Ar/^{39}Ar$ | Hornblende | 1,464 | 2 | Shaw and others (1999) | Preferred/Plateau age. 5–10 pct. actinolite cores |
| 036 | Amphibolite | BTCR30409-4a | 40°25'06"[1] | 105°14'37" | Masonville | $^{40}Ar/^{39}Ar$ | Hornblende | 1,520 | 2 | Shaw and others (1999) | Preferred/Plateau age. High K hornblende |
| 037 | Micaceous schist | BTCR30409-4b | 40°25'06"[1] | 105°14'37" | Masonville | $^{40}Ar/^{39}Ar$ | Biotite<br>Muscovite | 1,385<br>1,382 | 2<br>2 | Shaw and others (1999) | Preferred/Plateau age. Metamict biotite |
| 038 | Amphibolite | BTCBT12D-a | 40°25'21"[1] | 105°17'08" | Drake | $^{40}Ar/^{39}Ar$ | Hornblende<br>Biotite | 1,523<br>1,370 | 2<br>2 | Shaw and others (1999) | Preferred/Plateau age. High Mg hornblende. High Ti biotite |
| 039 | Micaceous schist | BTCR39409-5a | 40°25'49"[1] | 105°18'41" | Drake | $^{40}Ar/^{39}Ar$ | Muscovite<br>Biotite | 1,386<br>1,370 | 2<br>2 | Shaw and others (1999) | Preferred/Plateau age. Low Fe biotite |
| 040 | Quartz-feldspar schist | BTCR30409-6a | 40°25'10"[1] | 105°21'29" | Drake | $^{40}Ar/^{39}Ar$ | Muscovite<br>Biotite | 1,349<br>1,282 | 1<br>1 | Shaw and others (1999) | Preferred/Plateau age. High Fe biotite |
| 041 | Micaceous schist | BTCR30409-6b | 40°25'10"[1] | 105°21'37" | Drake | $^{40}Ar/^{39}Ar$ | Muscovite<br>Biotite | 1,368<br>1,343 | 2<br>1 | Shaw and others (1999) | Preferred/Plateau age |
| 042 | Mafic inclusion | ISSZR30416-3 | 40°00'16"[1] | 105°21'38" | Boulder | $^{40}Ar/^{39}Ar$ | Biotite | 1,358 | 2 | Shaw and others (1999) | In Boulder Creek Granodiorite |
| 043 | Kimberlite | Estes Park diatreme | 40°19'46"[1] | 105°31'11" | Longs Peak | Rb/Sr | Phlogopite | 404 | 18 | Smith (1979) | Isochron |
| 044 | Rhyolitic ash fall | 72G-52 | 40°08'40" | 105°57'14" | Trail Mtn. | Fission-track | Zircon | 22.7 | 2.3 | Marvin and others (1974); Izett (1974) | Lowest part of Troublesome Formation |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 045 | Basalt | 72G-42 | 40°08'45"[1] | 105°56'40" | Trail Mtn | K-Ar | Whole-rock | 26.8[3] | 0.4 | Marvin and others (1974); Izett (1974) | Flow in lowest part of Troublesome Formation. Analytical uncertainty 0.9 in Marvin and others (1974) is incorrect |
| 046 | Latite | [6] | 40°13'22"[1] | 105°56'18" | Trail Mtn | Fission-track | Zircon | 28.4 | 2.9 | Marvin and others (1974): Izett (1974); recalculated by Braddock and Cole (1990) | Plug intrudes basal Troublesome Formation |
| 047 | Rhyolite flow | 71G 103 | 40°14'20"[1] | 105°53'15" | Trail Mtn | Fission-track | Zircon | 25.5 | 2.4 | Marvin and others (1974) | |
| 048 | Rhyolite | 72N7 | 40°16'45"[1] | 105°56'15' | Bowen Mountain | Fission-track | Zircon | 24.9 | 2.0 | Marvin and others (1974): Braddock and Cole (1990) | Stock |
| 049 | Quartz latite flow | 307B | 40°28'00" | 105°51'30" | Fall River Pass | K-Ar | Biotite | 28.7[3] | 3 | Marvin and others (1974); Corbett (1968) | |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 050 | Granodiorite | 305B | 40°27'00"[1] | 105°54'00" | Mount Richthofen | K-Ar | Biotite | 28.7[3] | 3 | Marvin and others (1974); Corbett (1968) | Mount Richthofen stock |
| 051 | Rhyolite porphyry | [6] | 40°24'36"[1] | 105°54'08" | Mount Richthofen | Fission-track | Zircon | 28.2 | 0.7 | Braddock and Cole (1990); Gamble (1979) | Mount Cumulus stock, central part |
| 052 | Granite | [6] | 40°23'57"[1] | 105°52'30" | Mount Richthofen | Fission-track | Zircon | 28.8 | 1.5 | Braddock and Cole (1990); Gamble (1979) | Mount Cumulus stock, outer part |
| 053 | Audubon stock | AOA | 40°04'20"[1] | 105°37'00" | Ward | K-Ar | Biotite | 71.7[3] | 2 | Marvin and others (1974) | |
| 054 | Audubon stock | [6] | 40°04'20"[1] | 105°37'00" | Ward | K-Ar | Biotite | 68.0[3] | 1.1 | Hart (1960); Marvin and others (1974) | Composite data. Average of biotite ages from stock and four samples of country rock in contact zone |
| 055 | Diorite-monzonite stock | [6] | 40°02'00"[1] | 105°27'00" | Gold Hill | K-Ar | Hornblende | 45.1[3] | [6] | Marvin and others (1974) | No rock of this composition is shown at this location on detailed map. Possibly Long Gulch stock 1.5 miles NE |
| 056 | Granodiorite | L-1031 | 40°07'00"[1] | 105°24'00" | Gold Hill | K-Ar | Hornblende | 79.6[3]<br>73.6[3] | 2.3<br>2.2 | McDowell (1971) | Jamestown stock |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 057 | Granodiorite | [6] | 40°06'54" | 105°21'53" | Boulder | K-Ar<br>Fission-track<br>Fission-track | Biotite<br>Apatite<br>Zircon | 55.9[3]<br>52.9<br>51.1 | 1.9<br>8<br>4.2 | Marvin and others (1974) | |
| 058 | Quartz latite | B743 | 40°06'26" | 105°21'07" | Boulder | K-Ar | Biotite | 65.8[3] | 2.2 | Marvin and others (1974) | Dike |
| 059 | Monzonite porphyry | B1382 | 40°05'42" | 105º19'42" | Boulder | K-Ar<br>Fission-track | Hornblende<br>Sphene | 46.6[3]<br>50.6 | 1.0<br>7.1 | Marvin and others (1974) | Stock |
| 060 | Quartz latite | B1379 | 40°02'10" | 105°19'16" | Boulder | K-Ar | Biotite | 66.2[3] | 2.2 | Marvin and others (1974) | Dike |
| 061 | Quartz latite | B204 | 40°01'20" | 105°18'13" | Boulder | K-Ar | Biotite | 67.0[3] | 2.2 | Marvin and others (1974) | Dike |
| 062 | Latite | Flag 28-65 | 40°00'11" | 105°17'50" | Boulder | K-Ar<br>Fission-track | Biotite<br>Zircon | 66.2[3]<br>64.0 | 2.4<br>3.5 | Hoblitt and Larson (1975) | Flagstaff Mountain sill |
| 063 | Latite | [6] | 40°08'49"[1] | 105°17'56" | Lyons | Fission-track | Zircon | 62.2 | 3 | Hoblitt and Larson (1975) | Left Hand Canyon sill |
| 064 | Latite | [6] | 40°12'03"[1] | 105°17'49" | Lyons | Fission-track | Zircon | 62.6 | 3 | Hoblitt and Larson (1975) | Lyons quarry sill |
| 065 | Quartz monzonite | 75C88 | 40°12'05" | 105°17'46" | Lyons | Rb/Sr | Whole-rock | 64.0 | [6] | Simmons and Hedge (1978 | Lyons quarry sill |
| 066 | Mafic monzonite | 76CS96 | 40°04'15" | 105°36'53" | Ward | Rb/Sr | Whole-rock | 66.0 | [6] | Simmons and Hedge (1978) | Audubon-Albion stock |
| 067 | Porphyritic monzonite | 76CS97 | 40°03'11" | 105°36'47" | Ward | Rb/Sr | Whole-rock | 60.0 | [6] | Simmons and Hedge (1978) | Isochron, four samples from Audubon-Albion stock |

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| 068 | Quartz-bearing monzonite | 76CS98 | 40°05'23" | 105°35'48" | Ward | Rb/Sr | Whole-rock | 60.0 | [6] | Simmons and Hedge (1978) | Isochron, four samples from Audubon-Albion stock |
| 069 | Quartz-bearing monzonite | 76CS99 | 40°04'46" | 105°36'09" | Ward | Rb/Sr | Whole-rock | 60.0 | [6] | Simmons and Hedge (1978) | Isochron, four samples from Audubon-Albion stock |
| 070 | Leucocratic monzonite | 76CS100 | 40°04'36" | 105°35'28" | Ward | Rb/Sr | Whole-rock | 60.0 | [6] | Simmons and Hedge (1978) | Isochron, four samples from Audubon-Albion stock |
| 071 | Leucocratic monzonite | BC-3 | 40°03'28" | 105°24'26" | Gold Hill | Rb/Sr | Whole-rock | 51.0 | [6] | Simmons and Hedge (1978) | |
| 072 | Quartz syenite | 75CS73 | 40°04'46" | 105°26'52" | Gold Hill | Rb/Sr | Whole-rock | 51.0 | [6] | Simmons and Hedge (1978) | |
| 073 | Mafic monzonite | 76CS94 | 40°01'65" | 105°11'25" | Niwot | Rb/Sr | Whole-rock | 64.0 | [6] | Simmons and Hedge (1978) | Valmont dike |
| 074 | Biotite-fluorite vein | JS-1 | 40°07'00"[1] | 105°24'00" | Gold Hill | K-Ar | Biotite | 58.8 | 2.0 | Cunningham and others (1994) | Cuts granodiorite stock |
| 075 | Biotite-quartz-plagioclase porphyry | [6] | 40°08'39" | 105°36'41" | Allens Park | Fission-track | Zircon | 52.6 | 5.6 | Pearson and USBM (1980) | Dike |
| 076 | Sodic granite | JS-2a | 40°07'12" | 105°23'15" | Gold Hill | Fission-track | Zircon | 44.8 | 5.7 | Cunningham and others (1994) | Vertical drill core 12.5 m depth, Porphyry Mountain stock |
| 077 | Sodic granite | JS-2B | 40°07'12" | 105°23'15" | Gold Hill | Fission-track | Zircon | 45.1 | 7.7 | Cunningham and others, (1994) | Vertical drill core 1,024 m depth, Porphyry Mountain stock |

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| 078 | Granodiorite | JS-3 | 40°06'40" | 105°23'30" | Gold Hill | Fission-track<br>Fission-track | Zircon<br>Apatite | 48.4<br>47.1 | 7.5<br>5.8 | Cunning-ham and others (1994) | Jamestown stock |
| 079 | Bostonite | Bos 1 | 40°02'18" | 105°27'09" | Gold Hill | $^{40}Ar/^{39}Ar$ | Orthoclase | 48.19 | 0.29 | Kane (1988); Kane and others (1988) | Bald Mountain stock; plateau age |
| 080 | Alkali syenite | Tas 2 | 40°01'33"[1] | 105°25'06" | Gold Hill | $^{40}Ar/^{39}Ar$ | Hornblende | 43.47 | 1.0 | Kane (1988); Kane and others (1988) | Sugarloaf stock; total fusion age |
| 081 | Hydrothermal breccia zone | CPR 4 | 40°02'11"[1] | 105°26'19" | Gold Hill | $^{40}Ar/^{39}Ar$ | Adularia | 46 | 1.0 | Kane (1988); Kane and others (1988) | Probably cored by Precambrian feldspar |
| 082 | Pb/Ag vein | Log 19A | 40°02'03"[1] | 105°22'37" | Gold Hill | $^{40}Ar/^{39}Ar$ | Adularia | 62.06 | 0.37 | Kane (1988); Kane and others (1988) | The Mud vein; plateau age |
| 083 | Granitic gneiss | 96BT01 | 40°22'25" | 105°29'17" | Panorama Peak | Fission-track | Apatite | 48.7 | 6.8 | Kelley and Chapin (2004) | Laramide annealing zone |
| 084 | Granitic gneiss | 96BT02 | 40°22'53" | 105°28'07" | Glen Haven | Fission-track | Apatite | 57.9 | 6.7 | Kelley and Chapin (2004) | Laramide annealing zone |
| 085 | Granite | 96BT03 | 40°25'47" | 105°19'07" | Drake | Fission-track | Apatite | 55.3 | 9.8 | Kelley and Chapin (2004) | Laramide annealing zone |
| 086 | Granite | 96BT04 | 40°25'21" | 105°13'56" | Masonville | Fission-track | Apatite | 45.4 | 3.4 | Kelley and Chapin (2004) | Laramide annealing zone[2] |

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| 087 | Granite porphyry | 96BT05 | 40°25'50" | 105°13'54" | Masonville | Fission-track | Apatite | 64.8 | 8.4 | Kelley and Chapin (2004) | Laramide annealing zone |
| 088 | Muscovite-biotite granite | 96BT06 | 40°25'21" | 105°21'17" | Drake | Fission-track | Apatite | 62.5 | 4.7 | Kelley and Chapin (2004) | Laramide annealing zone[2] |
| 089 | Granite porphyry | 96SV01 | 40°12'17" | 105°18'23" | Lyons | Fission-track | Apatite | 47.5 | 5.2 | Kelley and Chapin (2004) | Laramide annealing zone |
| 090 | Granite | 99SV02 | 40°08'29" | 105°30'08" | Allens Park | Fission-track | Apatite | 57.6 | 4.7 | Kelley and Chapin (2004) | Laramide annealing zone[2] |
| 091 | Sandstone, Fountain Formation | 99SV03 | 40°12'55" | 105°16'34" | Lyons | Fission-track | Apatite | 49.5 | 3.4 | Kelley and Chapin (2004) | Laramide annealing zone[2] |
| 092 | Granite | 99SV05 | 40°10'56" | 105°20'30" | Lyons | Fission-track | Apatite | 53.1 | 5.8 | Kelley and Chapin (2004) | Laramide annealing zone[2] |
| 093 | Granite | 99SV06 | 40°10'17" | 105°22'47" | Raymond | Fission-track | Apatite | 54.6 | 4.5 | Kelley and Chapin (2004) | Laramide annealing zone[2] |
| 094 | Granite | 99SV07 | 40°10'05" | 105°26'52" | Raymond | Fission-track | Apatite | 60.2 | 9.3 | Kelley and Chapin (2004) | Laramide annealing zone |
| 095 | Granite | 99SV08 | 40°10'09" | 105°27'47" | Raymond | Fission-track | Apatite | 46.9 | 5.9 | Kelley and Chapin (2004) | Laramide annealing zone[2] |
| 096 | Granitic gneiss | 99TS01 | 40°17'34" | 105°31'21" | Longs Peak | Fission-track | Apatite | 50.9 | 4.2 | Kelley and Chapin (2004) | Laramide annealing zone[2] |
| 097 | Granitic gneiss | 99TS02 | 40°17'43" | 105°31'54" | Longs Peak | Fission-track | Apatite | 54.1 | 4.2 | Kelley and Chapin (2004) | Laramide annealing zone[2] |
| 098 | Granite | 99LP01 | 40°15'17" | 105°36'54" | Longs Peak | Fission-track | Apatite | 51.7 | 4.3 | Kelley and Chapin (2004) | Laramide annealing zone[2] |

| No. EP- | Unit name | Sample No. | Latitude (N) | Longitude (W) | 71/2-minute quadrangle | Method | Mineral | Age in Ma | Analytical uncertainty in Ma | Reference | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 099 | Granite | 99LP02 | 40°15'18" | 105°37'08" | Longs Peak | Fission-track | Apatite | 55.1 | 4.2 | Kelley and Chapin (2004) | Laramide annealing zone[2] |
| 100 | Granite | 99LP03 | 40°15'37" | 105°37'18" | Longs Peak | Fission-track | Apatite | 45.1 | 8.5 | Kelley and Chapin (2004) | Laramide annealing zone |
| 101 | Granite | 99LP04 | 40°16'29" | 105°36'19" | Longs Peak | Fission-track | Apatite | 53.3 | 5.4 | Kelley and Chapin (2004) | Laramide annealing zone |
| 102 | Granite | 99LP05 | 40°16'18" | 105°35'11" | Longs Peak | Fission-track | Apatite | 49.2 | 5.1 | Kelley and Chapin (2004) | Laramide annealing zone[2] |
| 103 | Granite | 99LP06 | 40°16'17" | 105°33'17" | Longs Peak | Fission-track | Apatite | 47.3 | 4.2 | Kelley and Chapin (2004) | Laramide annealing zone |
| 104 | Pegmatite in schist | 99CP01 | 40°26'02" | 105°42'01" | Trail Ridge | Fission-track | Apatite | 57.6 | 3.4 | Kelley and Chapin (2004) | Laramide annealing zone[2] |
| 105 | Mica schist | 99CP02b | 40°26'02" | 105°43'32" | Trail Ridge | Fission-track | Apatite | 54.5 | 3.7 | Kelley and Chapin (2004) | Laramide annealing zone[2] |
| 106 | Granodiorite in granite pluton | 99FF01 | 40°20'52" | 105°40'00" | McHenrys Peak | Fission-track | Apatite | 51.1 | 5.2 | Kelley and Chapin (2004) | Laramide annealing zone[2] |
| 107 | Granitic gneiss | 00IP02 | 40°08'17" | 105°40'26" | Isolation Peak | Fission-track | Apatite | 41.0 | 5.4 | Kelley and Chapin (2004) | Laramide (?) annealing zone |
| 108 | Granitic gneiss | 00IP03 | 40°08'27" | 105°40'20" | Isolation Peak | Fission-track | Apatite | 67.4 | 6.0 | Kelley and Chapin (2004) | Laramide annealing zone[2] |
| 109 | Granitic gneiss | 00IP04 | 40°07'58" | 105°40'08" | Isolation Peak | Fission-track | Apatite | 58.8 | 4.3 | Kelley and Chapin (2004) | Laramide annealing zone[2] |
| 110 | Granitic gneiss | 00IP05 | 40°07'32" | 105°40'19" | Isolation Peak | Fission-track | Apatite | 53.0 | 4.3 | Kelley and Chapin (2004) | Laramide annealing zone[2] |

| No. EP- | Unit name | Sample No. | Latitude (N) | Longitude (W) | 71/2-minute quadrangle | Method | Mineral | Age in Ma | Analytical uncertainty in Ma | Reference | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 111 | Granite gneiss | 96BC01 | 40º00'47" | 105º18'06" | Boulder | Fission-track | Apatite | 62.3 | 3.8 | Kelley and Chapin (2004) | Laramide annealing zone[2] |
| 112 | Clinopyroxene latite porphyry | [6] | 40º02'56"[1] | 105º54'09" | Granby | Fission-track | Apatite | 66.0 | 4.2 | Schroeder (1995) | Sill in Benton Shale; cooling age |

[1] Location approximate.
[2] Track lengths determined.
[3] Age recalculated using currently accepted decay and abundance constants recommended by the IUGS Subcommission on Geochronology (Steiger and Jäger, 1977). For Rb/Sr ages based on the $^{87}Rb$ decay constant ($\lambda=1.39x10^{-11}$/yr) used for the earlier determinations were converted to ages based on the currently accepted decay constant ($\lambda=1.42x10^{-11}$/yr) by multiplying the earlier age by 0.9788. The K-Ar ages based on the previously used decay constant ($^{40}K/K=1.19x10^{-4}$ mol/mol) were recalculated to ages using the presently accepted decay constant ($^{40}K/K=1.167x10^{-4}$ mol/mol) with the tables of Dalrymple (1979).
[4] This unpublished age is a common reference in published papers.
[5] Latitude and longitude on fig. 2 (map) of Selverstone and others (2000) not exact. Location made on advice from Jane Selverstone (personal commun., 2004).
[6] No data.
[7] SHRIMP, Sensitive High Resolution Ion MicroProbe.
[8] Dates reported by Stern and others (1971) have not been recalculated using IUGS decay constants.

## References for isotopic ages in the Estes Park 1:100,000-scale quadrangle


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