

Table 4. Bailey 1:100,000-scale quadrangle isotopic ages.

No. BA-	Unit name	Sample No.	Latitude (N)	Longitude (W)	71/2-minute quadrangle	Method	Mineral	Age in Ma	Analytical uncertainty in Ma	Reference	Comment
001	Granite	94SPRO7	39°28'06"	105°44'49"	Mt. Logan	Fission-track	Apatite	71.5	6.9	Kelley and Chapin (2004)	Laramide annealing zone(?)
002	Granite	94SPR08	39°27'43"	105°40'42"	Mt. Logan	Fission-track	Apatite	57.6	4.1	Kelley and Chapin (2004)	Laramide annealing zone ²
003	Granitic gneiss	96SPR44	39°29'44"	105°37'51"	Mt. Logan	Fission-track	Apatite	134.7	12.7	Kelley and Chapin (2004)	Laramide partial annealing zone
004	Granitic gneiss	96SPR48	39°28'58"	105°41'34"	Mt. Logan	Fission-track	Apatite	66.0	4.5	Kelley and Chapin (2004)	Laramide annealing zone ²
005	Gneiss	00BenTy01	39°26'10"	105°35'27"	Shawnee	Fission-track	Apatite	78.9	5.6	Kelley and Chapin (2004)	Laramide annealing zone ²
006	Gneiss	00BenTy03	39°24'48"	105°39'22"	Mt. Logan	Fission-track	Apatite	104.5	7.6	Kelley and Chapin (2004)	Laramide partial annealing zone ²
007	Quartz monzonite	00BenTy04	39°24'56"	105°40'49"	Mt. Logan	Fission-track	Apatite	115.9	8.4	Kelley and Chapin (2004)	Laramide partial annealing zone ²
008	Gneiss	00BenTy05	39°24'56"	105°38'26"	Mt. Logan	Fission-track	Apatite	55.1	11.2	Kelley and Chapin (2004)	Laramide annealing zone
009	Granite	94SPR10	39°24'52"	105°31'07"	Shawnee	Fission-track	Apatite	60.5	6.8	Kelley and Chapin (2004)	Laramide annealing zone
010	Schist	94SPR11	39°23'00"	105°26'43"	Bailey	Fission-track	Apatite	115.7	9.3	Kelley and Chapin (2004)	Laramide partial annealing zone ²
011	Diorite	94SPR12	39°24'22"	105°28'20"	Bailey	Fission-track	Apatite	59.6	7.7	Kelley and Chapin (2004)	Laramide annealing zone ²
012	Granite	94SPR13	39°25'26"	105°27'59"	Bailey	Fission-track	Apatite	117.1	12.8	Kelley and Chapin (2004)	Laramide partial annealing zone
013	Gneiss	96SPR38	39°25'35"	105°07'32"	Platte Canyon	Fission-track	Apatite	69.2	11.8	Kelley and Chapin (2004)	Laramide annealing zone
014	Granite	94SPR14	39°28'08"	105°14'26"	Platte Canyon	Fission-track	Apatite	65.9	5.7	Kelley and Chapin (2004)	Laramide annealing zone ²
015	Granite	94SPR15	39°26'20"	105°13'35"	Platte Canyon	Fission-track	Apatite	114.1	7.6	Kelley and Chapin (2004)	Laramide partial annealing zone ²
016	Amphibolite	94SPR16	39°24'39"	105°09'51"	Platte Canyon	Fission-track	Apatite	51.0	5.6	Kelley and Chapin (2004)	Laramide annealing zone ²
017	Sandstone dike float	97SPR37	39°26'01"	105°07'07"	Kassler	Fission-track	Apatite	69.5	5.3	Kelley and Chapin (2004)	Laramide annealing zone ²

No. BA-	Unit name	Sample No.	Latitude (N)	Longitude (W)	71/2-minute quadrangle	Method	Mineral	Age in Ma	Analytical uncertainty in Ma	Reference	Comment
018	Gneiss	96SPR39	39°25'42"	105°07'19"	Kassler	Fission-track	Apatite	70.6	5.2	Kelley and Chapin (2004)	Laramide annealing zone ²
019	Gneiss	96SPR40	39°25'32"	105°07'16"	Kassler	Fission-track	Apatite	70.8	9.3	Kelley and Chapin (2004)	Laramide annealing zone ²
020	Gneiss	96SPR42	39°25'43"	105°07'05"	Kassler	Fission-track	Apatite	74.2	4.8	Kelley and Chapin (2004)	Laramide annealing zone ²
021	Granodiorite	94SPR17	39°29'07"	105°06'27"	Kassler	Fission-track	Apatite	194.4	12.7	Kelley and Chapin (2004)	Laramide partial annealing zone ²
022	Gneiss	94SPR19	39°26'20"	105°07'25"	Kassler	Fission-track	Apatite	47.1	6.4	Kelley and Chapin (2004)	Laramide annealing zone
023	Gneiss	94SPR20	39°26'46"	105°07'18"	Kassler	Fission-track	Apatite	65.2	4.5	Kelley and Chapin (2004)	Laramide annealing zone ²
024	Granite	94SRP21	39°28'39"	105°07'46"	Platte Canyon	Fission-track	Apatite	64.4	4.1	Kelley and Chapin (2004)	Laramide annealing zone ²
025	Gneiss	95SPR22	39°24'48"	105°28'23"	Bailey	Fission-track	Apatite	122.8	10.1	Kelley and Chapin (2004)	Laramide partial annealing zone ²
026	Granite	95SPR23B	39°25'08"	105°28'19"	Bailey	Fission-track	Apatite	151.9	16.1	Kelley and Chapin (2004)	Laramide partial annealing zone ²
027	Granite	95SPR24	39°22'09"	105°32'47"	Topaz Mountain	Fission-track	Apatite	155.8	11.0	Kelley and Chapin (2004)	Laramide partial annealing zone ²
028	Granodiorite	95SPR25	39°22'06"	105°32'34"	Topaz Mountain	Fission-track	Apatite	130.9	9.4	Kelley and Chapin (2004)	Laramide partial annealing zone ²
029	Granitic gneiss	95SPR26	39°23'37"	105°31'50"	Shawnee	Fission-track	Apatite	149.9	8.4	Kelley and Chapin (2004)	Laramide partial annealing zone ²
030	Granitic gneiss	95SPR27	39°23'50"	105°31'14"	Shawnee	Fission-track	Apatite	119.6	10.7	Kelley and Chapin (2004)	Laramide partial annealing zone ²
031	Granite	95SPR29	39°26'59"	105°07'05"	Kassler	Fission-track	Apatite	111.9	7.7	Kelley and Chapin (2004)	Laramide partial annealing zone ²
032	Granitic gneiss	95SPR30	39°27'02"	105°07'07"	Kassler	Fission-track	Apatite	118.9	8.8	Kelley and Chapin (2004)	Laramide partial annealing zone ²
033	Granite	95SPR31	39°28'37"	105°08'46"	Platte Canyon	Fission-track	Apatite	76.8	6.0	Kelley and Chapin (2004)	Laramide annealing zone ²
034	Granitic gneiss	95SPR32	39°28'30"	105°08'26"	Platte Canyon	Fission-track	Apatite	79.8	5.8	Kelley and Chapin (2004)	Laramide annealing zone ²
035	Schist	95SPR33	39°28'19"	105°08'04"	Platte Canyon	Fission-track	Apatite	66.1	6.2	Kelley and Chapin (2004)	Laramide annealing zone ²

No. BA-	Unit name	Sample No.	Latitude (N)	Longitude (W)	71/2-minute quadrangle	Method	Mineral	Age in Ma	Analytical uncertainty in Ma	Reference	Comment
036	Granitic gneiss	95SPR34	39°28'46"	105°07'37"	Platte Canyon	Fission-track	Apatite	93.4	8.8	Kelley and Chapin (2004)	Laramide partial annealing zone ²
037	Gneiss and schist	95SPR35	39°29'00"	105°07'09"	Kassler	Fission-track	Apatite	119.6	12.2	Kelley and Chapin (2004)	Laramide partial annealing zone ²
038	Monzonite	94TAR01	39°13'21"	105°37'38"	Eagle Rock	Fission-track	Apatite	74.9	9.3	Kelley and Chapin (2004)	Laramide annealing zone
039	Monzonite	94TAR02	39°14'09"	105°36'15"	Farnum Peak	Fission-track	Apatite	78.4	4.9	Kelley and Chapin (2004)	Laramide partial annealing zone ²
040	Pyroxene amphibolite	501	39°27'34"	105°54'21"	Boreas Pass	Fission-track	Apatite	79	38	Bryant and Naeser (1980)	Laramide annealing zone; location corrected from original reference
041	Muscovite-biotite monzogranite	A-1	39°24'49"	105°45'32"	Jefferson	Fission-track	Apatite	49.8	4.0	Bryant and Naeser (1980)	Laramide annealing zone
042	Muscovite-biotite monzogranite	A-2	39°19'22"	105°45'30"	Milligan Lakes	Fission-track	Apatite	148	19	Bryant and Naeser (1980)	Laramide partial annealing zone
043	Muscovite-biotite monzogranite	A-3	39°18'25"	105°45'10"	Milligan Lakes	Fission-track	Apatite	124	18	Bryant and Naeser (1980)	Laramide partial annealing zone
044	Muscovite-biotite monzogranite	A-4	39°17'50"	105°42'30"	Observatory Rock	Fission-track	Apatite	130	25	Bryant and Naeser (1980)	Laramide partial annealing zone
045	Muscovite-biotite monzogranite	A-5	39°18'33"	105°46'05"	Milligan Lakes	Fission-track	Apatite	245	30	Bryant and Naeser (1980)	Laramide partial annealing zone
046	Biotite-muscovite monzogranite	A-7	39°11'10"	105°47'52"	Elkhorn	Fission-track	Apatite	473	100	Bryant and Naeser (1980)	Laramide and (or) late Paleozoic partial annealing zone
047	Muscovite-biotite granite	A-9	39°05'29"	105°43'05"	Sulpur Mountain	Fission-track	Apatite	352	18	Bryant and Naeser (1980)	Laramide and (or) late Paleozoic partial annealing zone

No. BA-	Unit name	Sample No.	Latitude (N)	Longitude (W)	71/2-minute quadrangle	Method	Mineral	Age in Ma	Analytical uncertainty in Ma	Reference	Comment
048	Pyroxene-bearing hornblende-biotite granodiorite	222	39°29'33"	105°56'31"	Boreas Pass	Fission-track Fission-track Fission-track K-Ar K-Ar K-Ar	Zircon Zircon Zircon Biotite Biotite Biotite ⁴	38.3 36.6 36.2 50.6 45.5 49.1	1.8 2.0 1.6 1.7 1.5 1.6	Bryant and others (1981)	Plug in Pierre Shale and Williams Range thrust
049	Brecciated and contact metamorphosed gneiss	466	39°29'31"	105°56'14"	Boreas Pass	Fission-track	Zircon	38.2	1.8	Bryant and others (1981)	Williams Range thrust zone
050	Biotite monzogranite	74	39°27'34"	105°55'44"	Boreas Pass	K-Ar	Biotite	44.0	1.5	Bryant and others (1981)	Mount Guyot plug
051	Porphyritic biotite granodiorite	233	39°21'37"	105°56'12"	Como	Fission-track Fission-track Fission-track	Apatite Zircon Sphene	41.1 35.5 39.9	10 1.4 2.0	Bryant and others (1981)	South end of Boreas Mountain pluton (Bald Mtn. sill)
052	Porphyritic hornblende-biotite monzogranite	503	39°20'40"	105°55'37"	Como	Fission-track Fission-track K-Ar K-Ar	Apatite Zircon Biotite ⁵ Biotite	40.6 40.3 40.7 43.2	5.8 1.8 1.4 1.5	Bryant and others (1981)	South end of Boreas Mountain pluton (Bald Mtn. sill)
053	Altered porphyritic monzogranite	502	39°17'54"	105°53'50"	Como	Fission-track	Zircon	41.5	1.8	Bryant and others (1981)	Probably sill in Pierre Shale
054	Porphyritic Hornblende-biotite trachydacite	328	39°25'19"	105°50'04"	Jefferson	Fission-track Fission-track	Apatite ⁷ Zircon	56.4 37.6	7.4 1.5	Bryant and others (1981)	Sill in Benton Group

No. BA-	Unit name	Sample No.	Latitude (N)	Longitude (W)	71/2-minute quadrangle	Method	Mineral	Age in Ma	Analytical uncertainty in Ma	Reference	Comment
055	Dacite flow breccia	430a	39°00'48"	105°53'55"	Garro	Fission-track Fission-track K-Ar	Apatite Zircon Biotite	42.8 41.5 37.8	5.1 1.8 1.3	Bryant and others (1981)	Underlies Wall Mountain Tuff
056	Dacite ash flow tuff	420	39°22'44"	105°43'38"	Mt. Logan	Fission-track	Zircon	36.4	1.9	Bryant and others (1981)	Fills paleovalley graded to Elkhorn surface
057	Hornblende-biotite-plagioclase-quartz crystal tuff	W-1-75	39°13'49"	105°48'31"	Elkhorn	Fission-track Fission-track K-Ar	Apatite Zircon Biotite	66.5 55.5 56.3	11.6 2.7 1.9	Bryant and others (1981)	About 1,600 m above base of South Park Formation
058	Hornblende-biotite-plagioclase-quartz crystal tuff	150	39°15'27"	105°49'32"	Milligan Lakes	Fission-track Fission-track K-Ar	Apatite Zircon Biotite	66.4 54.7 59.7	12 4.8 2.0	Bryant and others (1981)	Link Springs Tuff Member of the South Park Formation
059	Felsic crystal tuff	444	39°08'58"	105°48'55"	Elkhorn	Fission-track Fission-track K-Ar	Apatite Zircon Biotite	59.3 64.1 65.5	8.1 3.7 2.2	Bryant and others (1981)	Base of South Park Formation
060	Dacite flow	325	39°17'51"	105°51'10"	Milligan Lakes	Fission-track Fission-track	Apatite Zircon	63.3 60.9	8.5 3.2	Bryant and others (1981)	About 160 m above base of South Park Formation
061	Andesite	⁶	39°15'17"	105°55'01"	Como	K-Ar	Whole rock	57.4 ³	2.6	Sawatsky (1967); Bryant and others (1981)	Lowest outcrop in South Park Formation at this locality

No. BA-	Unit name	Sample No.	Latitude (N)	Longitude (W)	71/2-minute quadrangle	Method	Mineral	Age in Ma	Analytical uncertainty in Ma	Reference	Comment
062	Welded ash flow tuff	⁶	39°08' ¹	105°43'45"	Eagle Rock	K-Ar	Sanidine ⁸	41.0 ⁵	1.2	Epis and Chapin (1968); Sawatzky (1967)	Wall Mountain Tuff contaminated by Proterozoic basement rock
063	Pyroxene-hornblende trachydacite	SB-1	39°03'30"	105°13'20"	Signal Butte	Fission-track	Sphene	43.3	3.9	Marvin and others (1974)	Plug rises 150 m above well-developed erosion surface
064	Pyroxene-hornblende trachydacite	SB-8	39°04'20"	105°13'27"	Signal Butte	Fission-track Fission-track	Zircon Sphene	42.2 45.2	2.1 3.4	C.W.Naeser (unpub.); sample collected by R.B. Colton	Plug rises 150 m above well-developed erosion surface
065	Tuffaceous sands	1315	39°07'33"	105°43'04"	Eagle Rock	⁴⁰ Ar/ ³⁹ Ar	Sanidine	33.76	0.12	McIntosh and Chapin (2004)	Antero Formation ⁹
066	Pumiceous sandstone	1318	39°06'01"	105°41'09"	Sulphur Mountain	⁴⁰ Ar/ ³⁹ Ar	Sanidine	33.78	0.09	McIntosh and Chapin (2004)	Antero Formation ⁹
067	Fayalite-quartz syenite	B65D	39°11'29"	105°10'23"	Westcreek	U-Pb	Zircon	1,085.6	2.5	Smith and others (1999)	Pluton in the Pikes Peak batholith ¹⁰
068	Quartz-fayalite syenite	⁶	39°11'29"	105°10'23"	Westcreek	U-Pb	Zircon	1,093	20	Scharer and Allegre (1982)	Based on 12 fragments of a single grain
069	Biotite granite	rlg-1	39°27'03"	105°26'25"	Bailey	Rb/Sr	Whole-rock	1,025 ³	⁶	Hedge (1970)	Lone Rock pluton of the Pikes Peak batholith ¹¹
070	Biotite granite	rig-2	39°27'52"	105°28'25"	Bailey	Rb/Sr	Whole-rock	1,039 ³	⁶	Hedge (1970)	Lone Rock pluton of the Pikes Peak batholith ¹¹
071	Biotite granite	rig-3	39°29'01"	105°28'16"	Bailey	Rb/Sr	Whole-rock	1,031 ³	⁶	Hedge (1970)	Lone Rock pluton of the Pikes Peak batholith ¹¹
072	Hornblende syenite	1222	39°10'08"	105°09'53"	Westcreek	Rb/Sr	Whole-rock	1,023 ³	⁶	Hedge (1970)	Pluton in Pikes Peak batholith ¹¹
073	Biotite granite; Aplite dike	1223A 1223B	39°15'18"	105°15'48"	Green Mountain	Rb/Sr Rb/Sr	Whole-rock Whole-rock	1,011 ³ 1,032 ³	⁶	Hedge (1970)	Pikes Peak batholith ¹¹

No. BA-	Unit name	Sample No.	Latitude (N)	Longitude (W)	71/2-minute quadrangle	Method	Mineral	Age in Ma	Analytical uncertainty in Ma	Reference	Comment
074	Porphyritic granite	PP-2	39°19'28"	105°07'33"	Deckers	Rb/Sr	Whole-rock	1,086 ³	⁶	Hedge (1970)	Pikes Peak batholith ¹¹
075	Hornblende-bearing biotite granite	P-4	39°24'51" ¹	105°15'27"	Pine	K-Ar	Biotite	1,060 ³	⁶	Hutchinson (1960)	Outer zone of Pikes Peak batholith
076	Hornblende-biotite monzo-granite ¹²	P-5	39°22'45" ¹	105°16'44"	Pine	K-Ar	Biotite	1,060 ³	⁶	Hutchinson (1960)	Intermediate zone of Pikes Peak batholith.
077	Hornblende-biotite monzo-granite ¹²	P-9	39°19'13" ¹	105°21'33"	Green Mountain	K-Ar	Biotite	1,060 ³	⁶	Hutchinson (1960)	Granodiorite wedge in outer zone of Pikes Peak batholith
078	Biotite-muscovite granite	P-10	39°18'05"	105°43'13"	Observatory Rock	K-Ar	Biotite	1,308 ³	⁶	Hutchinson (1960)	Cooling age in Kenosha pluton
079	Porphyritic granite	Pprs-lb	39°06'00" ¹	105°25'00"	Tarryall	K-Ar	Biotite	995 ³	⁶	Hawley and others (1966)	Porphyritic facies of Redskin stock
080	Greisen	Pprs-lmg	39°05'00" ¹	105°24'00"	Tarryall	K-Ar	Muscovite	1,035 ³	⁶	Hawley and others (1966)	Greisen in Redskin stock
081	Granite aplite	Ppb-lm	39°04'34" ¹	105°26'55"	Tarryall	K-Ar	Muscovite	1,005 ³	⁶	Hawley and others (1966)	Granite-aplite facies in Boomer cupola of Redskin stock
082	Greisen	Ppb-lmg	39°04'34" ¹	105°26'55"	Tarryall	K-Ar	Muscovite	1,015 ³	⁶	Hawley and others (1966)	Boomer cupola of Redskin Granite
083	Porphyritic granite	Pprs-1K	39°06'00" ¹	105°25'00"	Tarryall	Rb/Sr	Microcline	896 ³	50	Hawley and others (1966)	Porphyritic facies of Redskin stock
084	Granite aplite	Ppb-1K	39°04'34" ¹	105°26'55"	Tarryall	Rb/Sr	Microcline	930 ³	50	Hawley and others (1966)	Granite-aplite facies of Boomer cupola

¹Location approximate.

²Track lengths determined.

³ Age recalculated using currently accepted decay and abundance constants recommended by the IUGS Subcommittee on Geochronology (Steiger and Jäger, 1977). For Rb/Sr ages based on the ⁸⁷Rb decay constant ($\lambda=1.39\times10^{-11}/\text{yr}$) used for the earlier determinations were converted to ages based on the currently accepted decay constant ($\lambda=1.42\times10^{-11}/\text{yr}$) by multiplying the earlier age by 0.9788. The K-Ar ages based on the previously used decay constant ($^{40}\text{K}/\text{K}=1.19\times10^{-4}$ mol/mol) were recalculated to ages using the presently accepted decay constant ($^{40}\text{K}/\text{K}=1.167\times10^{-4}$ mol/mol) with the tables of Dalrymple (1979).

⁴ Biotite mixed with hornblende.

⁵ Biotite mixed with minor chlorite and hornblende.

⁶ No data.

⁷ Has many defects; age only approximate.

⁸ 2 percent rock fragments and impurities.

⁹ Samples 65 and 66 (sample numbers 1315 and 1318) and six others from the Antero Formation give a mean age of 33.76 Ma (McIntosh and Chapin, 2004).

¹⁰ D.M. Unruh (USGS) has many data on the age of the various parts of the Pikes Peak batholith. This date on the syenite at Westcreek is the only one documented in a publication. The results of his work and work by L.W. Snee on the cooling history of the Pikes Peak Granite have been summarized (Unruh and others, 1995), but no specific data on sample locations or analytical values other than that given here have been published. Some other dated samples probably came from the Bailey quadrangle.

¹¹ These and nine other samples produced a Rb/Sr isochron of $1,019\pm13$ Ma for the age of the Pikes Peak batholith (Hedge, 1970).

¹² Modes and chemical analyses in Hutchinson (1960) show these rocks to be monzogranite rather than granodiorite as stated in the article.

References for isotopic ages in the Bailey 1:100,000-scale quadrangle

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