

APPENDIX-Table 1A- Results of Ar-Ar step furnace heating determinations, Crystal Basin volcanic rocks, at New Mexico Geochronology Research Laboratory

ID	Temp (°C)	⁴⁰ Ar/ ³⁹ Ar	³⁷ Ar/ ³⁹ Ar	³⁶ Ar/ ³⁹ Ar (x 10 ⁻³)	³⁹ Ar/ _K (x 10 ⁻¹⁵ mol)	K/Ca	⁴⁰ Ar* (%)	³⁹ Ar (%)	Age (Ma)	±1σ (Ma)
03CA FL-2 gm , K3:176, Groundmass Concentrate, 34.26 mg, J=0.0015606±0.09%, D=1.0032±0.0005, NM-176, Lab#=54834-01										
A	650	10000	7.847	34225	0.413	0.065	-1.1	0.2	-352	103
B	725	33.60	1.204	107.7	7.8	0.42	5.6	3.9	5.25	0.57
C	775	4.841	1.126	13.96	8.4	0.45	16.7	7.8	2.28	0.20
D	825	2.054	1.235	4.573	24.2	0.41	39.2	19.3	2.265	0.067
E	900	1.455	1.107	2.651	46.7	0.46	52.5	41.3	2.150	0.036
F	1000	3.315	1.007	8.820	63.8	0.51	23.9	71.5	2.229	0.048
G	1100	1.866	0.9047	3.884	39.8	0.56	42.5	90.3	2.234	0.050
H	1285	15.53	11.50	52.81	16.8	0.044	5.6	98.2	2.48	0.19
I	1735	25.95	5.315	85.50	3.74	0.096	4.3	100.0	3.18	0.65
Integrated age ± 1σ			n=9		211.7		K ₂ O=1.52 %		1.74	0.19
Plateau ± 1σ			steps C-I	n=7	MSWD=1.39	203.5	0.45	96.1	2.207	0.027
03CA 4P-1 gm , K4:176, Groundmass Concentrate, 94.10 mg, J=0.0015592±0.09%, D=1.0032±0.0005, NM-176, Lab#=54835-01										
A	650	11811	3.832	40101	1.59	0.13	-0.3	0.7	-113	108
B	725	63.90	2.958	207.4	11.3	0.17	4.5	5.4	8.02	0.80
C	775	7.749	2.541	20.62	10.0	0.20	24.1	9.6	5.25	0.24
D	825	3.009	3.127	5.860	33.9	0.16	51.1	23.7	4.326	0.064
E	900	2.349	3.404	3.946	65.2	0.15	62.3	50.8	4.123	0.032
F	1000	3.361	3.986	7.275	75.4	0.13	45.8	82.2	4.341	0.047
G	1100	4.866	5.511	12.87	28.5	0.093	31.2	94.1	4.283	0.089
H	1285	28.02	44.32	103.3	11.5	0.012	4.1	98.9	3.37	0.44
I	1735	28.60	29.37	100.4	2.61	0.017	4.8	100.0	3.91	0.72
Integrated age ± 1σ			n=9		240.0		K ₂ O=0.63 %		3.68	0.70
Plateau ± 1σ			steps D-I	n=6	MSWD=4.57	217.0	0.13	90.4	4.214	0.050
Isotopic ratios corrected for blank, radioactive decay, and mass discrimination, not corrected for interfering reactions.										
Ages calculated relative to FC-2 Fish Canyon Tuff sanidine interlaboratory standard at 27.84 Ma.										
Errors quoted for individual analyses include analytical error only, without interfering reaction or J uncertainties.										
Integrated age calculated by recombining isotopic measurements of all steps.										
Integrated age error calculated by recombining errors of isotopic measurements of all steps.										
Plateau age is inverse-variance-weighted mean of selected steps.										
Plateau age error is inverse-variance-weighted mean error (Taylor, 1982) times square root MSWD where MSWD>1.										
Plateau and integrated ages incorporate uncertainties in interfering reaction corrections and J factors.										
Decay constants and isotopic abundances after Steiger and Jäger (1977).										
# symbol preceding sample ID denotes analyses excluded from plateau age calculations.										
Discrimination = 1.0032 ± 0.0005										
Correction factors:										
³⁹ Ar/ ³⁷ Ar) _{ca} = 0.0007 ± 2e-05										
³⁹ Ar/ ³⁷ Ar) _{ca} = 0.00028 ± 5e-06										
³⁸ Ar/ ³⁹ Ar) _K = 0.0124										
⁴⁰ Ar/ ³⁹ Ar) _K = 0.0002 ± 0.0003										

Appendix- Table 2, Results of Ar-Ar Laser Step Heating of Quincy-Beckworth area volcanic rocks, US Geological Survey, Denver, CO

CO ₂ power Watts	Relative Isotopic Abundances									Derived Results								
	⁴⁰ Ar ±1σ	³⁹ Ar ±1σ	³⁸ Ar ±1σ	³⁷ Ar ±1σ	³⁶ Ar ±1σ	³⁹ Ar Mol × 10 ⁻¹⁶	³⁹ Ar % of total	%(³⁶ Ar) _c	Ca/K ±1σ	% ⁴⁰ Ar ^r	Age (Ma) ±1σ							
FR09-25 - whole rock																		
J = .0004349 ± 0.000002																		
0.2	9.935	0.018	3.542	0.010	0.064	0.001	6.619	0.025	0.029	0.001	7.9	0.8	6.3	3.66	0.02	19.3	4.26	0.50
0.4	18.827	0.032	20.819	0.039	0.326	0.003	47.240	0.076	0.039	0.001	46.1	4.8	33.5	4.45	0.01	59.5	4.23	0.10
0.6	30.812	0.058	41.561	0.087	0.571	0.004	108.059	0.152	0.043	0.001	92.1	9.5	69.9	5.10	0.01	87.7	5.10	0.05
0.8	42.409	0.069	58.839	0.093	0.774	0.005	126.152	0.154	0.045	0.001	130.4	13.5	76.6	4.20	0.01	92.6	5.24	0.04
1.0	40.362	0.074	58.214	0.120	0.774	0.006	115.247	0.182	0.039	0.001	129.0	13.3	80.8	3.88	0.01	94.5	5.14	0.04
1.3	39.456	0.065	58.095	0.120	0.767	0.005	117.001	0.223	0.038	0.001	128.8	13.3	83.8	3.95	0.01	95.3	5.08	0.04
1.6	29.308	0.053	42.693	0.068	0.583	0.002	100.891	0.221	0.037	0.001	94.6	9.8	75.7	4.63	0.01	91.0	4.90	0.05
1.9	21.693	0.052	30.648	0.068	0.441	0.002	78.332	0.147	0.029	0.001	67.9	7.0	75.6	5.01	0.01	90.5	5.03	0.07
2.2	20.548	0.047	28.369	0.059	0.413	0.003	62.755	0.135	0.026	0.001	62.9	6.5	67.5	4.34	0.01	88.0	5.00	0.07
2.5	21.603	0.050	28.898	0.075	0.450	0.003	57.348	0.094	0.026	0.001	64.0	6.6	60.1	3.89	0.01	85.7	5.02	0.07
2.8	22.065	0.051	28.472	0.076	0.458	0.005	59.225	0.170	0.031	0.001	63.1	6.5	52.2	4.08	0.02	80.0	4.87	0.07
3.1	15.923	0.027	19.313	0.036	0.319	0.003	52.238	0.081	0.027	0.001	42.8	4.4	53.7	5.30	0.01	76.9	4.98	0.10
3.5	14.640	0.021	17.127	0.032	0.279	0.002	70.496	0.148	0.034	0.001	38.0	3.9	57.7	8.07	0.02	71.3	4.79	0.11
FR09-24 - whole rock																		
J = .0004349 ± 0.000002																		
0.2	9.184	0.029	8.008	0.014	0.115	0.001	10.046	0.033	0.012	0.001	17.7	2.3	23.3	2.46	0.01	70.8	6.37	0.24
0.4	59.337	0.091	67.274	0.093	0.888	0.003	104.851	0.434	0.059	0.001	149.1	19.0	48.9	3.05	0.01	85.0	5.88	0.04
0.6	62.991	0.094	79.964	0.089	1.031	0.004	185.861	0.255	0.074	0.001	177.2	22.6	69.1	4.56	0.01	89.3	5.52	0.03
0.8	51.919	0.080	69.044	0.100	0.912	0.003	201.585	0.409	0.074	0.001	153.0	19.5	75.4	5.72	0.01	89.7	5.29	0.04
1.0	37.728	0.058	49.982	0.068	0.662	0.003	163.567	0.256	0.060	0.001	110.8	14.1	75.4	6.41	0.01	88.5	5.24	0.05
1.3	27.567	0.056	33.869	0.120	0.463	0.003	125.348	0.225	0.051	0.001	75.1	9.6	67.2	7.25	0.03	81.9	5.24	0.07
1.6	20.776	0.051	21.845	0.047	0.313	0.002	102.976	0.358	0.052	0.001	48.4	6.2	55.0	9.24	0.04	67.0	5.01	0.10
1.9	13.766	0.022	11.700	0.020	0.184	0.002	75.984	0.307	0.042	0.001	25.9	3.3	50.4	12.73	0.06	55.7	5.16	0.18
2.2	12.509	0.020	8.085	0.024	0.140	0.001	79.107	0.251	0.048	0.001	17.9	2.3	45.4	19.18	0.08	37.8	4.62	0.28
2.5	8.845	0.018	4.647	0.012	0.083	0.001	57.899	0.115	0.034	0.001	10.3	1.3	47.4	24.42	0.08	40.7	6.13	0.45
FR09-22 - whole rock																		
J = .0004349 ± 0.000002																		
0.4	15.710	0.026	22.247	0.051	0.300	0.002	46.408	0.085	0.023	0.001	49.3	8.9	55.2	4.09	0.01	80.5	4.46	0.10
0.6	35.234	0.056	56.974	0.110	0.723	0.003	105.458	0.230	0.045	0.001	126.3	22.9	63.9	3.63	0.01	86.2	4.18	0.04
0.8	32.236	0.047	51.090	0.084	0.648	0.003	83.144	0.204	0.040	0.001	113.2	20.5	57.0	3.19	0.01	84.2	4.17	0.04
1.0	21.969	0.050	36.114	0.084	0.462	0.002	67.583	0.176	0.026	0.001	80.0	14.5	71.2	3.67	0.01	89.9	4.29	0.06
1.3	14.920	0.027	27.673	0.070	0.364	0.002	61.586	0.204	0.018	0.001	61.3	11.1	93.2	4.36	0.02	97.5	4.13	0.08
1.6	13.081	0.021	24.661	0.037	0.321	0.002	65.571	0.153	0.020	0.001	54.7	9.9	92.0	5.21	0.01	96.4	4.02	0.09
1.9	9.381	0.025	16.504	0.029	0.220	0.002	53.221	0.143	0.016	0.001	36.6	6.6	94.4	6.32	0.02	97.2	4.34	0.14
2.2	5.743	0.013	9.532	0.015	0.136	0.002	47.478	0.075	0.018	0.001	21.1	3.8	73.5	9.76	0.02	75.7	3.59	0.22
2.5	2.861	0.013	4.461	0.010	0.068	0.001	59.409	0.096	0.017	0.001	9.9	1.8	97.8	26.10	0.07	96.2	4.88	0.46
FR09-19 - whole rock																		
J = .0004349 ± 0.000002																		
0.2	7.286	0.015	9.778	0.020	0.161	0.002	12.526	0.052	0.018	0.001	21.7	3.8	18.9	2.51	0.01	40.1	2.35	0.21
0.4	30.129	0.061	46.489	0.066	0.609	0.002	53.132	0.104	0.031	0.001	103.0	18.0	47.0	2.24	0.01	83.9	4.26	0.05
0.6	33.197	0.060	55.039	0.077	0.672	0.002	66.701	0.227	0.025	0.001	122.0	21.3	73.7	2.38	0.01	94.2	4.46	0.04
0.8	32.496	0.088	55.231	0.100	0.693	0.003	100.803	0.340	0.042	0.001	122.4	21.4	65.9	3.58	0.01	87.0	4.02	0.04
1.0	19.457	0.053	31.407	0.140	0.413	0.002	90.436	0.136	0.039	0.001	69.6	12.2	64.1	5.64	0.03	78.8	3.83	0.08
1.3	13.292	0.015	20.373	0.032	0.283	0.002	86.245	0.471	0.035	0.001	45.1	7.9	68.6	8.30	0.05	75.8	3.88	0.11
1.6	7.968	0.017	12.138	0.019	0.177	0.002	63.117	0.175	0.023	0.001	26.9	4.7	76.5	10.19	0.03	80.1	4.14	0.18
1.9	4.702	0.014	6.588	0.012	0.098	0.002	32.420	0.042	0.015	0.001	14.6	2.6	59.1	9.65	0.02	61.0	3.43	0.32
2.2	4.426	0.012	6.579	0.010	0.097	0.001	30.665	0.050	0.015	0.001	14.6	2.5	56.7	9.14	0.02	56.9	3.01	0.32

CO ₂ power Watts	Relative Isotopic Abundances										Derived Results							
	⁴⁰ Ar ±1σ		³⁹ Ar ±1σ		³⁸ Ar ±1σ		³⁷ Ar ±1σ		³⁶ Ar ±1σ		³⁹ Ar Mol × 10 ⁻¹⁶	³⁹ Ar % of total	³⁶ Ar) _c %	Ca/K ±1σ	% ⁴⁰ Ar ^r	Age (Ma) ±1σ		
4.0	3.600	0.014	4.627	0.009	0.073	0.001	56.996	0.095	0.022	0.001	10.3	1.8	72.2	24.15	0.06	50.2	3.09	0.46
5.0	7.426	0.016	9.940	0.021	0.149	0.002	132.836	0.474	0.046	0.001	22.0	3.8	79.6	26.19	0.11	62.7	3.70	0.24

FR09-16 - whole rock

J = .0004349 ± 0.000002

0.1	1.751	0.011	0.240	0.003	0.004	0.001	0.273	0.004	0.004	0.001	0.5	0.1	1.9	2.22	0.05	34.4	19.70	8.85
0.2	3.166	0.014	0.932	0.004	0.013	0.001	1.093	0.009	0.002	0.001	2.1	0.2	18.1	2.30	0.02	87.3	23.32	2.29
0.4	9.142	0.017	4.331	0.009	0.069	0.001	5.816	0.027	0.010	0.001	9.6	1.0	16.3	2.63	0.01	73.5	12.24	0.51
0.6	22.672	0.050	14.070	0.022	0.205	0.002	23.247	0.059	0.017	0.001	31.2	3.4	38.5	3.24	0.01	86.7	11.03	0.16
0.8	56.810	0.073	38.086	0.074	0.499	0.002	64.446	0.196	0.022	0.001	84.4	9.1	79.7	3.32	0.01	97.6	11.50	0.07
1.0	79.126	0.100	55.752	0.084	0.714	0.003	90.182	0.123	0.028	0.001	123.6	13.3	87.7	3.17	0.01	98.7	11.06	0.05
1.2	88.236	0.100	63.061	0.078	0.826	0.003	88.107	0.134	0.026	0.001	139.8	15.1	94.2	2.74	0.01	99.5	10.99	0.04
1.4	75.560	0.099	54.746	0.075	0.718	0.003	69.103	0.226	0.019	0.001	121.4	13.1	98.6	2.47	0.01	99.9	10.88	0.05
1.6	69.665	0.085	50.284	0.083	0.664	0.003	64.059	0.113	0.019	0.001	111.5	12.0	93.8	2.50	0.01	99.5	10.88	0.05
1.8	58.613	0.077	41.989	0.067	0.561	0.002	56.856	0.081	0.020	0.001	93.1	10.0	78.5	2.65	0.01	97.8	10.78	0.06
2.1	46.694	0.089	33.176	0.059	0.455	0.003	48.101	0.086	0.016	0.001	73.6	7.9	83.1	2.84	0.01	98.3	10.92	0.08
2.5	49.307	0.077	33.913	0.078	0.502	0.002	55.070	0.135	0.026	0.001	75.2	8.1	58.6	3.18	0.01	93.6	10.74	0.08
3.0	43.064	0.067	27.697	0.060	0.456	0.002	60.958	0.119	0.033	0.001	61.4	6.6	50.5	4.31	0.01	88.7	10.89	0.09

FR09-13 - whole rock

J = .0004349 ± 0.000002

1.0	65.550	0.086	10.642	0.017	0.199	0.002	20.780	0.035	0.209	0.001	23.6	1.2	2.7	3.83	0.01	8.2	3.99	0.31
1.2	121.617	0.120	24.387	0.047	0.406	0.003	55.532	0.138	0.389	0.002	54.1	2.6	3.9	4.46	0.01	9.1	3.61	0.18
1.4	181.150	0.230	42.108	0.073	0.654	0.003	114.354	0.239	0.561	0.002	93.4	4.6	5.6	5.32	0.01	13.6	4.64	0.14
1.6	203.536	0.130	48.893	0.066	0.752	0.002	143.597	0.231	0.641	0.002	108.4	5.3	6.2	5.76	0.01	12.6	4.17	0.11
1.8	211.440	0.160	47.982	0.093	0.741	0.003	132.735	0.250	0.663	0.002	106.4	5.2	5.5	5.42	0.01	12.5	4.36	0.12
2.5	369.052	0.230	81.741	0.087	1.292	0.003	178.757	0.381	1.150	0.002	181.2	8.8	4.3	4.29	0.01	11.9	4.24	0.10
3.0	438.880	0.310	86.734	0.110	1.397	0.004	131.806	0.226	1.360	0.002	192.3	9.4	2.7	2.98	0.01	10.8	4.34	0.11
3.2	410.049	0.300	86.189	0.160	1.393	0.004	104.330	0.225	1.250	0.002	191.1	9.3	2.3	2.37	0.01	12.0	4.50	0.11
3.5	354.192	0.230	71.206	0.110	1.165	0.003	91.729	0.189	1.089	0.002	157.9	7.7	2.3	2.52	0.01	11.2	4.41	0.12
4.0	357.477	0.260	79.556	0.085	1.286	0.004	115.776	0.275	1.093	0.002	176.4	8.6	2.9	2.85	0.01	12.2	4.35	0.10

FR09-11 - whole rock

J = .0004349 ± 0.000002

0.1	17.293	0.029	9.157	0.020	0.133	0.002	8.906	0.025	0.043	0.001	20.3	1.0	5.6	1.91	0.01	30.0	4.48	0.30
0.2	9.908	0.036	4.768	0.016	0.065	0.002	5.555	0.024	0.017	0.001	10.6	0.5	8.9	2.28	0.01	53.6	8.80	0.55
0.4	22.980	0.101	9.742	0.020	0.136	0.002	13.908	0.047	0.026	0.001	21.6	1.1	14.9	2.80	0.01	71.9	13.38	0.28
0.7	128.828	0.130	56.738	0.088	0.729	0.004	86.780	0.183	0.050	0.002	125.8	6.1	48.0	3.00	0.01	94.1	16.84	0.07
1.0	310.412	0.200	143.975	0.110	1.860	0.005	266.184	0.355	0.093	0.001	319.1	15.6	79.0	3.62	0.01	98.1	16.68	0.03
1.3	149.183	0.120	70.340	0.079	0.934	0.004	150.542	0.519	0.050	0.001	156.0	7.6	82.4	4.19	0.02	98.3	16.43	0.05
1.6	67.000	0.079	31.301	0.071	0.435	0.002	79.009	0.202	0.029	0.001	69.4	3.4	74.7	4.95	0.02	96.8	16.34	0.10
1.9	28.784	0.064	12.801	0.019	0.202	0.002	50.013	0.126	0.025	0.001	28.4	1.4	54.9	7.66	0.02	88.4	15.69	0.22
2.2	15.989	0.037	6.554	0.017	0.115	0.002	42.733	0.101	0.022	0.001	14.5	0.7	54.9	12.78	0.05	82.1	15.84	0.40

FR09-06 - whole rock

J = .0004349 ± 0.000002

0.1	40.939	0.075	5.237	0.017	0.102	0.001	5.297	0.013	0.122	0.001	11.6	1.0	1.2	1.98	0.01	13.3	8.18	0.60
0.2	55.796	0.084	10.838	0.021	0.206	0.002	10.013	0.027	0.160	0.001	24.0	2.0	1.7	1.81	0.01	16.6	6.74	0.31
0.4	64.223	0.081	22.048	0.045	0.369	0.002	26.897	0.058	0.136	0.001	48.9	4.1	5.4	2.39	0.01	40.8	9.39	0.16
0.6	70.333	0.091	37.737	0.067	0.530	0.003	55.023	0.074	0.080	0.001	83.7	7.0	19.0	2.86	0.01	72.9	10.72	0.09
0.8	77.525	0.086	46.820	0.087	0.589	0.002	69.051	0.185	0.050	0.001	103.8	8.7	38.1	2.89	0.01	88.2	11.53	0.07
1.0	97.772	0.110	61.259	0.089	0.768	0.003	106.756	0.265	0.065	0.001	135.8	11.4	44.9	3.42	0.01	89.1	11.23	0.06
1.2	194.385	0.150	131.352	0.150	1.654	0.005	220.331	0.331	0.090	0.001	291.1	24.4	67.6	3.29	0.01	95.6	11.17	0.03

CO ₂ power Watts	Relative Isotopic Abundances										Derived Results							
	⁴⁰ Ar ±1σ		³⁹ Ar ±1σ		³⁸ Ar ±1σ		³⁷ Ar ±1σ		³⁶ Ar ±1σ		³⁹ Ar Mol × 10 ⁻¹⁶	³⁹ Ar % of total	%(³⁶ Ar) _c	Ca/K ±1σ	% ⁴⁰ Ar ^r	Age (Ma) ±1σ		
1.5	158.276	0.130	108.467	0.140	1.379	0.004	168.855	0.387	0.063	0.001	240.4	20.1	74.2	3.05	0.01	97.0	11.17	0.04
1.8	99.248	0.110	65.792	0.089	0.861	0.003	110.808	0.210	0.055	0.001	145.8	12.2	55.4	3.30	0.01	92.7	11.04	0.05
2.5	80.111	0.100	49.485	0.069	0.689	0.003	97.411	0.213	0.063	0.001	109.7	9.2	42.3	3.86	0.01	86.5	11.06	0.07

TR09-02 - whole rock

J = .0004349 ± 0.000002

0.1	214.302	0.150	14.506	0.021	0.343	0.002	4.257	0.011	0.676	0.002	32.1	1.8	0.2	0.58	0.00	6.9	8.07	0.43
0.2	99.260	0.100	19.256	0.025	0.339	0.002	7.222	0.026	0.282	0.002	42.7	2.4	0.7	0.74	0.00	16.5	6.73	0.21
0.4	127.361	0.140	47.877	0.081	0.769	0.004	20.075	0.056	0.313	0.001	106.1	5.8	1.7	0.82	0.00	28.6	6.01	0.08
0.6	103.324	0.120	72.199	0.100	1.106	0.004	45.262	0.125	0.189	0.001	160.0	8.8	6.5	1.23	0.00	49.3	5.58	0.05
0.8	105.109	0.140	84.301	0.100	1.289	0.005	71.851	0.225	0.179	0.001	186.8	10.3	11.0	1.67	0.01	55.2	5.44	0.04
1.0	145.394	0.170	98.426	0.140	1.527	0.005	97.222	0.239	0.287	0.002	218.1	12.0	9.3	1.94	0.01	47.1	5.50	0.05
1.2	167.262	0.170	97.047	0.150	1.528	0.004	98.111	0.234	0.371	0.002	215.0	11.9	7.3	1.98	0.01	39.2	5.35	0.05
1.4	167.407	0.110	86.370	0.120	1.378	0.004	88.607	0.214	0.389	0.002	191.4	10.6	6.2	2.01	0.01	35.6	5.46	0.05
1.6	162.826	0.160	77.045	0.069	1.249	0.005	85.576	0.214	0.396	0.002	170.7	9.4	5.9	2.18	0.01	32.4	5.42	0.06
1.8	185.944	0.140	69.963	0.100	1.145	0.004	79.279	0.178	0.479	0.002	155.0	8.5	4.5	2.22	0.01	27.3	5.73	0.07
2.4	255.064	0.160	80.504	0.100	1.353	0.004	81.027	0.215	0.693	0.002	178.4	9.8	3.2	1.97	0.01	22.2	5.57	0.08
2.7	211.432	0.160	71.047	0.110	1.176	0.004	72.757	0.154	0.560	0.002	157.5	8.7	3.6	2.01	0.01	24.5	5.75	0.08

FR09-26 - amphibole

J = .0004349 ± 0.000002

1.8	7.334	0.021	4.118	0.006	0.093	0.001	59.083	0.050	0.022	0.001	9.1	4.0	73.5	28.12	0.05	76.3	10.74	0.47
2.0	17.502	0.044	6.978	0.010	0.152	0.001	97.888	0.179	0.051	0.001	15.5	6.7	53.4	27.49	0.06	60.2	11.92	0.31
2.2	15.377	0.043	8.338	0.022	0.156	0.002	113.623	0.304	0.040	0.001	18.5	8.0	79.2	26.71	0.10	84.2	12.26	0.26
2.4	29.723	0.130	16.221	0.038	0.294	0.003	228.452	0.626	0.083	0.001	35.9	15.6	76.2	27.60	0.10	80.4	11.64	0.20
2.6	37.496	0.250	20.437	0.046	0.357	0.002	269.685	0.543	0.103	0.001	45.3	19.7	72.0	25.86	0.08	77.2	11.18	0.19
2.8	34.935	0.130	21.041	0.041	0.368	0.002	287.521	0.800	0.095	0.001	46.6	20.3	83.4	26.78	0.09	86.7	11.36	0.16
3.0	40.026	0.270	20.855	0.054	0.346	0.003	262.823	0.505	0.096	0.001	46.2	20.1	75.4	24.70	0.08	82.5	12.50	0.18
3.3	12.499	0.069	5.904	0.015	0.101	0.001	75.460	0.253	0.034	0.001	13.1	5.7	60.7	25.05	0.11	68.1	11.38	0.34

NOTES:

Samples were irradiated for 20 hours using Cadmium shielding. Sanidine from the Fish Canyon Tuff was used as the neutron fluence monitor with a reference age of 28.201 Ma (Renne *et al.*, 1998).

Nucleogenic production ratios:

$$(^{36}\text{Ar}/^{37}\text{Ar})_{\text{Ca}} = 2.764 \pm 0.02766$$

$$(^{39}\text{Ar}/^{37}\text{Ar})_{\text{Ca}} = 6.971 \pm 0.04356$$

$$(^{38}\text{Ar}/^{37}\text{Ar})_{\text{Ca}} = 0.196 \pm 0.00816$$

$$(^{40}\text{Ar}/^{39}\text{Ar})_{\text{K}} = 0 \times 1 \quad 0^4$$

$$(^{38}\text{Ar}/^{39}\text{Ar})_{\text{K}} = 1.31238 \pm 0.00461$$

$$(^{36}\text{Ar}/^{38}\text{Ar})_{\text{Cl}} = 3.2 \times 1 \quad 0^2$$

$$^{37}\text{Ar}/^{39}\text{Ar} \text{ to Ca/K} = 1.96$$

Isotopic constants and decay rates:

$$\times 10^{-4} \quad \lambda(^{40}\text{K}_{\text{c}})/\text{yr} = 5.81 \pm 0.17 \times 10^{-11}$$

$$\times 10^{-4} \quad \lambda(^{40}\text{K}_{\text{p}})/\text{yr} = 4.962 \pm 0.086 \times 10^{-10}$$

$$\times 10^{-4} \quad \lambda(^{37}\text{Ar})/\text{d} = 1.975 \times 10^{-2}$$

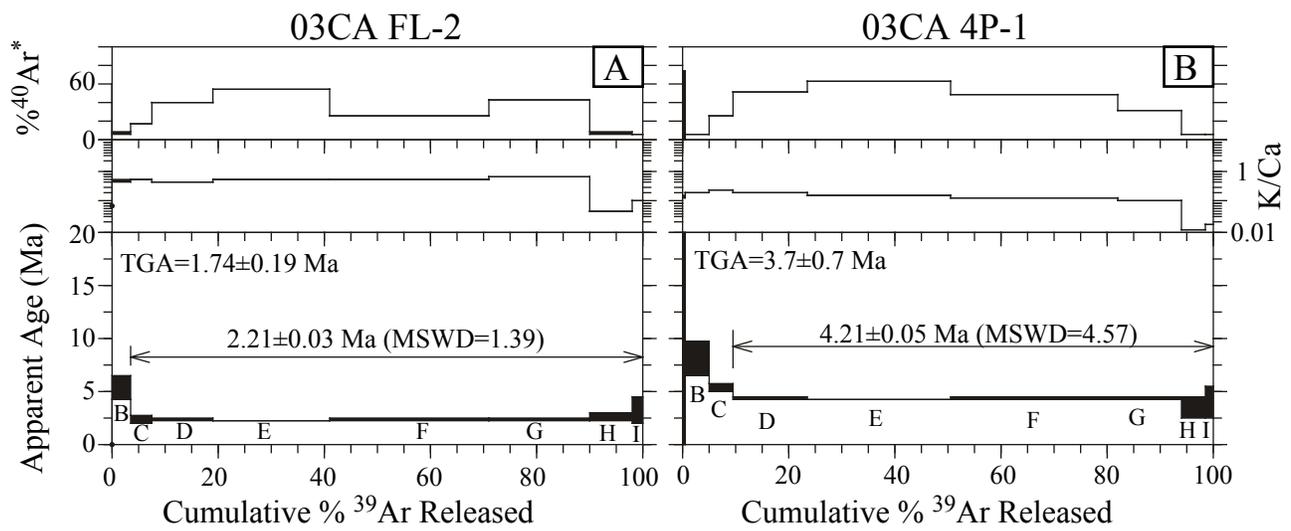
$$\lambda(^{39}\text{Ar})/\text{d} = 7.068 \times 10^{-6}$$

$$\times 10^{-2} \quad \lambda(^{36}\text{Cl})/\text{d} = 6.308 \times 10^{-9}$$

$$(^{40}\text{Ar}/^{36}\text{Ar})_{\text{Atm}} = 295.5 \pm 0.5$$

$$(^{40}\text{Ar}/^{38}\text{Ar})_{\text{Atm}} = 1575 \pm 2$$

$$^{40}\text{K}/\text{K}_{\text{Total}} = 0.01167$$



Supplementary Information-Fig. 1
 Ar release spectra for furnace step heating of
 Crystal Basin volcanic rocks 03CA FL-2 and
 03CA 4P-1