TABLE DR1. MAJOR AND TRACE ELEMENT GEOCHEMICAL RESULTS

Sample	BD001	BD002	BD003	TH001	TH002	TH003	HS002	LB011	ND004	PP004
Name	Boondawari dolerite	Boondawari dolerite	Boondawari dolerite	Table Hill Volcanics	Table Hill Volcanics	Table Hill Volcanics	Helen Springs Volcanics	Antrim Plateau Volcanics	Antrim Plateau Volcanics	Antrim Plateau Volcanics
SiO_2	52.02	52.84	52.41	51.45	53.17	52.43	52.24	52.19	52.29	53.45
TiO_2	0.89	0.91	0.92	0.76	0.76	0.87	0.99	1.32	1.22	1.72
Al_2O_3	14.67	14.80	14.73	14.96	15.53	15.41	14.72	15.15	14.39	13.46
Fe_2O_{3t}	10.72	11.03	10.93	10.06	8.46	9.72	10.79	11.73	11.85	13.29
FeOt	9.65	9.93	9.83	9.05	7.62	8.75	9.71	10.55	10.66	11.96
MnO	0.18	0.18	0.18	0.16	0.15	0.13	0.17	0.16	0.17	0.13
MgO	6.87	7.07	6.96	6.59	6.93	6.42	7.08	4.50	5.73	4.55
CaO	10.39	10.65	10.53	8.56	6.82	8.66	10.32	8.75	8.25	7.53
Na_2O	2.15	2.25	2.21	2.78	2.22	1.95	2.11	2.41	3.01	2.44
K_2O	0.90	0.91	0.89	1.62	2.31	1.21	0.79	1.35	1.22	1.50
P_2O_5	0.11	0.13	0.12	0.07	0.08	0.09	0.10	0.14	0.12	0.15
LOI	1.34	-1.08	-0.17	2.88	3.44	3.00	1.17	2.61	2.01	1.92
Total	99.16	98.59	98.61	98.88	99.02	98.90	99.40	99.14	99.08	98.80
Mg#.15*	59.3	59.35	59.2	59.9	65.09	60.06	59.89	46.63	52.42	43.82
Ti	5312	5479	5485	4550	4550	5210	5935	7931	7326	10305
P	7429	7554	7371	13448	19159	10003	6591	11190	10102	12427
K	489	550	537	305	345	371	432	607	532	672
Sc	38.9	39.3	39.8	40	33.7	34.8	36.8	38.1	38.4	35.5
V	257	258	260	252	205	225	261	264	292	393
Cr	85	87	77	64	183	130	49	32	64	25
Ni	75	29	41	36	69	63	48	49	54	30
Co	42.21	19.13	29.64	43.48	36.41	39.12	N.D.#	40.22	N.D.#	N.D.#
Cu	97.3	33.6	51.8	42.1	74.1	76.3	72.7	54.9	47.6	44.3
Ga	16.4	12.5	13.9	16.9	16.4	17.5	17	19.3	18.4	20.2
Rb	32.6	32	30.1	30.3	36.8	23.4	32.2	52	52.5	64.1
Sr	188.6	195.7	194.9	133.4	124	118.1	140.2	147.1	136.1	186
Y	22.93	22.72	23.29	24.45	27.49	32.15	24.68	30.03	31.49	37.26
Zr	96.9	91.9	100	83.3	109.6	124.6	100.9	142.8	134.6	182.6
Nb	4.71	4.68	4.88	4.25	6.19	7.1	5.32	8.01	7.56	8.98
Sn	1.05	N.D.#	N.D.#	N.D.#	N.D.#	N.D.#	1.53	1.8	1.85	2.38
Cs	0.84	0.83	0.71	0.5	0.45	0.27	0.35	0.64	0.76	0.93
Ba	236.5	236.6	244.7	212.2	281	303.5	150.2	252	184.3	346.3
La	16.36	16.43	16.9	13.86	19.24	22	12.28	21.95	18.45	23.93
Ce	32.5	33.02	33.9	28.25	39.7	45.78	24.74	44.47	38.24	48.02
Pr	3.88	3.91	3.96	3.31	4.61	5.36	3.13	5.26	4.64	5.74
Nd	15.33	15.3	15.65	12.92	17.31	20.26	13.19	21.65	19.04	22.61
Sm	3.44	3.44	3.45	3.23	4.07	4.73	3.32	4.85	4.5	5.19
Eu	0.99	1.02	0.99	0.85	0.91	1.04	0.98	1.26	1.19	1.41
Gd	3.69	3.64	3.71	3.62	4.32	5.03	3.68	5.2	4.88	5.5
Tb	0.595	0.608	0.618	0.626	0.723	0.837	0.65	0.838	0.823	0.935
Dy	3.9	3.84	3.87	4.03	4.6	5.36	4.07	5.59	5.23	5.73
Ho	0.825	0.815	0.827	0.856	0.975	1.136	0.867	1.147	1.1	1.212
Er	2.38	2.33	2.4	2.46	2.83	3.21	2.44	3.34	3.1	3.38
Tm	0.338	0.339	0.346	0.36	0.408	0.469	N.D.#	0.484	N.D.#	N.D.#
Yb	2.2	2.18	2.2	2.28	2.65	2.97	2.39	3.24	3.01	3.23
Lu	0.331	0.327	0.329	0.344	0.39	0.44	0.37	0.471	0.458	0.498
Hf	2.48	2.32	2.5	2.22	2.85	3.31	2.64	3.75	3.57	4.37
Ta	0.33	0.314	0.336	0.4	0.585	0.664	0.355	0.554	0.508	0.583
Pb	8	0.7	0.8	33.3	10.1	13.3	6	10.4	10	10
Th	4.74	4.6	4.95	7.16	10.84	12.88	4.86	8	7.97	9.24
U	0.78	0.8	0.83	1.36	1.5	1.62	0.82	1.26	1.35	1.63

Note: Major elements were determined by XRF using facilities in the Department of Geology, The Australian National University. Trace elements were analysed by laser ablation-ICPMS on lithium borate fusion beads at the Research School of Earth Sciences, The Australian National University.

*Mg#.15 = molar[100*Mg/(Mg+Fe^{2+})] for Fe_2O_3/FeO = 0.15.

#N.D. = not determined.

TABLE DR2. $^{40}Ar/^{39}Ar$ ANALYTICAL RESULTS

Temp (°C)	Cum ^{39}Ar (%)	^{36}Ar (moles)*	^{37}Ar (moles)*	^{39}Ar (moles)*	^{40}Ar (moles)*	%Rad. ^{40}Ar	Ca/K	$^{40}Ar^*/^{39}Ar^{\#}$	Age# (Ma)	±1σ** (Ma)
HS002(1) Plagioclase Feldspar										
Mass = 5.85 mg										
J-value = 0.009458 ± 0.000011##										
650	0.8	4.182E-17	3.437E-15	2.012E-16	1.841E-14	34.8	32.9	32.24	480.3	13.6
725	2.2	1.699E-17	7.454E-15	3.609E-16	1.666E-14	74.4	39.9	34.91	514.8	8.0
800	6.0	2.640E-17	2.155E-14	1.001E-15	3.950E-14	85.8	41.6	34.44	508.9	2.6
850	12.2	2.909E-17	3.402E-14	1.600E-15	5.958E-14	91.4	41.1	34.60	510.9	2.9
900	22.4	3.746E-17	5.507E-14	2.646E-15	9.487E-14	94.2	40.2	34.34	507.6	1.3
950	35.4	3.889E-17	6.929E-14	3.368E-15	1.177E-13	96.2	39.7	34.18	505.5	1.4
1000	50.4	4.227E-17	7.768E-14	3.879E-15	1.354E-13	96.6	38.7	34.27	506.6	1.2
1050	64.9	3.722E-17	7.101E-14	3.735E-15	1.303E-13	97.1	36.7	34.38	508.1	1.2
1100	76.1	2.813E-17	5.020E-14	2.908E-15	1.023E-13	96.8	33.2	34.54	510.1	1.5
1150	84.3	2.133E-17	2.935E-14	2.100E-15	7.466E-14	95.5	26.9	34.33	507.5	1.8
1200	91.5	2.012E-17	2.409E-14	1.865E-15	6.683E-14	94.7	24.8	34.29	506.9	1.5
1250	96.8	2.170E-17	2.629E-14	1.348E-15	4.918E-14	92.4	37.6	34.23	506.1	1.6
1300	100.0	1.974E-17	1.871E-14	8.430E-16	3.244E-14	87.9	42.9	34.41	508.5	2.2
Total		3.812E-16	4.881E-13	2.585E-14	9.379E-13			34.34	507.6	1.7
HS002(2) Plagioclase Feldspar										
Mass = 3.73 mg										
J-value = 0.009458 ± 0.000011##										
650	1.0	2.408E-17	3.116E-15	1.915E-16	1.421E-14	52.1	31.3	39.17	568.7	10.4
725	2.8	1.469E-17	7.643E-15	3.832E-16	1.818E-14	80.4	38.5	38.75	563.4	4.2
800	7.4	2.388E-17	1.928E-14	9.276E-16	3.866E-14	86.8	40.2	36.78	538.7	2.8
850	13.9	2.405E-17	2.778E-14	1.320E-15	4.979E-14	91.4	40.7	35.05	516.6	1.9
900	23.8	2.631E-17	4.118E-14	2.008E-15	7.419E-14	95.1	39.6	35.73	525.3	1.7
950	35.3	2.869E-17	4.704E-14	2.333E-15	8.373E-14	95.6	38.9	34.85	514.1	1.4
1000	47.2	2.824E-17	4.722E-14	2.397E-15	8.538E-14	95.8	38.0	34.68	511.9	1.1
1050	58.5	2.781E-17	4.221E-14	2.301E-15	8.186E-14	95.2	35.4	34.36	507.8	1.4
1100	67.6	2.580E-17	3.023E-14	1.831E-15	6.651E-14	93.1	31.8	34.27	506.7	1.6
1150	74.4	2.399E-17	1.853E-14	1.382E-15	5.195E-14	89.9	25.7	34.16	505.2	2.2
1200	80.2	2.750E-17	1.465E-14	1.169E-15	4.578E-14	85.5	24.1	33.81	500.7	2.3
1250	84.4	2.958E-17	1.502E-14	8.467E-16	3.587E-14	79.9	34.2	34.31	507.1	3.0
1300	87.0	3.396E-17	1.137E-14	5.289E-16	2.646E-14	66.4	41.5	33.81	500.6	5.7
1350	89.0	4.256E-17	8.766E-15	3.896E-16	2.471E-14	52.7	43.5	34.03	503.6	8.6
1400	92.6	5.835E-17	1.767E-14	7.325E-16	3.981E-14	61.2	46.7	33.91	501.9	4.6
1450	100.0	9.455E-17	3.662E-14	1.515E-15	7.535E-14	67.9	46.8	34.40	508.3	2.8
Total		5.340E-16	3.883E-13	2.026E-14	8.124E-13			34.78	513.2	2.3
LB011(1) Plagioclase Feldspar										
Mass = 3.64 mg										
J-value = 0.009458 ± 0.000011##										
650	0.9	2.159E-17	3.034E-15	1.503E-16	1.079E-14	43.7	39.0	31.92	476.1	15.1
725	2.4	1.667E-17	5.924E-15	2.633E-16	1.288E-14	66.4	43.5	33.08	491.3	6.0
800	5.7	2.349E-17	1.339E-14	5.697E-16	2.453E-14	77.2	45.5	33.88	501.6	3.2
850	10.3	2.153E-17	1.871E-14	7.780E-16	3.055E-14	85.4	46.6	34.18	505.4	2.3
900	16.4	2.240E-17	2.527E-14	1.052E-15	3.930E-14	89.7	46.5	34.17	505.3	2.1
950	24.0	2.268E-17	3.105E-14	1.295E-15	4.736E-14	92.5	46.4	34.47	509.2	3.6
1000	32.5	2.580E-17	3.445E-14	1.462E-15	5.283E-14	92.2	45.6	33.94	502.4	1.8
1050	40.3	2.609E-17	3.117E-14	1.334E-15	4.886E-14	90.7	45.2	33.85	501.2	2.5
1100	45.5	2.517E-17	2.015E-14	8.929E-16	3.492E-14	84.6	43.7	33.67	498.8	2.3
1150	48.5	2.403E-17	1.074E-14	5.125E-16	2.262E-14	73.4	40.5	32.96	489.6	3.9
1200	50.9	2.542E-17	8.820E-15	4.152E-16	2.045E-14	67.6	41.0	33.87	501.5	6.6
1250	54.9	3.333E-17	1.606E-14	6.822E-16	3.063E-14	73.2	45.6	33.48	496.4	4.0
1300	60.7	4.044E-17	2.421E-14	9.997E-16	4.276E-14	77.8	46.9	33.92	502.1	2.9
1350	65.8	4.901E-17	2.111E-14	8.712E-16	4.157E-14	70.3	46.9	34.21	505.8	3.3
1400	82.8	8.209E-17	7.078E-14	2.931E-15	1.158E-13	85.3	46.8	34.34	507.6	1.5
1450	100.0	1.063E-16	6.972E-14	2.944E-15	1.226E-13	80.2	45.9	34.03	503.5	1.7
Total		5.656E-16	4.046E-13	1.715E-14	6.985E-13			34.01	503.3	2.6
DR021 Plagioclase Feldspar										
Mass = 4.33 mg										
J-value = 0.009458 ± 0.000011##										
650	0.7	2.173E-17	1.919E-15	1.208E-16	1.023E-14	39.1	30.6	33.56	497.5	17.5
725	1.7	1.287E-17	4.037E-15	1.899E-16	9.846E-15	65.5	41.1	34.56	510.3	8.4
800	8.8	5.782E-17	4.033E-14	1.309E-15	5.649E-14	77.0	60.0	34.08	504.2	2.6
850	11.4	1.259E-17	1.545E-14	4.722E-16	1.809E-14	88.2	63.8	34.66	511.7	4.8
900	18.9	2.638E-17	4.338E-14	1.380E-15	4.942E-14	93.2	61.2	34.21	505.9	2.0
950	26.6	2.402E-17	4.375E-14	1.426E-15	4.980E-14	94.7	59.7	33.89	501.8	1.8
1000	37.6	2.886E-17	5.525E-14	2.016E-15	6.895E-14	95.8	53.2	33.48	496.4	1.5
1050	50.6	2.826E-17	5.324E-14	2.373E-15	8.045E-14	96.3	43.4	33.25	493.4	2.6
1100	61.5	2.385E-17	3.938E-14	1.998E-15	6.871E-14	95.5	38.0	33.38	495.1	1.4
1150	69.5	1.925E-17	2.712E-14	1.458E-15	5.106E-14	94.2	35.9	33.49	496.5	1.6
1200	75.4	1.781E-17	1.932E-14	1.071E-15	3.870E-14	91.4	34.8	33.54	497.2	2.3
1250	79.5	2.386E-17	1.979E-14	7.620E-16	3.074E-14	83.6	50.4	34.43	508.7	2.8
1300	99.4	2.057E-16	1.349E-13	3.673E-15	1.693E-13	72.2	71.9	34.29	506.9	2.0
1350	100.0	1.911E-16	4.801E-15	1.149E-16	5.932E-14	5.6	82.1	30.01	450.8	115.9
Total		6.941E-16	5.027E-13	1.836E-14	7.611E-13			33.79	500.5	2.9
KT001 Plagioclase Feldspar										
Mass =4.36 mg										
J-value = 0.009458 ± 0.000011##										
650	1.1	4.163E-17	2.340E-15	2.991E-16	2.078E-14	41.9	15.0	29.32	441.6	12.2
700	2.0	1.095E-17	2.468E-15	2.404E-16	1.080E-14	72.3	19.7	32.77	487.2	7.3
775	4.5	1.914E-17	9.148E-15	6.889E-16	2.790E-14	83.0	25.5	33.98	502.9	3.5
850	9.8	2.848E-17	2.165E-14	1.434E-15	5.452E-14	88.6	29.0	34.09	504.3	2.1
925	19.8	4.388E-17	4.323E-14	2.725E-15	1.007E-13	91.5	30.5	34.22	506.0	1.8
975	29.6	2.667E-17	4.093E-14	2.685E-15	9.330E-14	96.0	29.3	33.76	500.0	1.6
1025	40.3	2.388E-17	4.014E-14	2.906E-15	9.781E-14	96.9	26.5	32.97	489.8	1.1
1075	50.5	2.246E-17	3.510E-14	2.791E-15	9.382E-14	96.7	24.1	32.82	487.9	1.6
1125	59.2	1.907E-17	2.479E-14	2.357E-15	7.988E-14	96.0	20.2	32.81	487.8	1.4
1175	68.8	2.277E-17	2.504E-14	2.617E-15	8.967E-14	95.3	18.3	32.89	488.7	1.4
1225	77.3	2.795E-17	3.215E-14	2.324E-15	8.164E-14	93.8	26.6	33.33	494.4	1.6
1275	81.5	2.211E-17	2.188E-14	1.130E-15	4.217E-14	89.8	37.4	34.01	503.3	2.3
1325	84.0	2.413E-17	1.304E-14	6.860E-16	2.842E-14	79.6	36.7	33.46	496.2	3.4
1375	86.7	3.158E-17	1.484E-14	7.480E-16	3.238E-14	75.8	38.3	33.34	494.7	3.7
1425	93.6	5.552E-17	3.808E-14	1.897E-15	7.295E-14	82.8	38.7	32.34	481.6	2.1
1450	100.0	7.632E-17	3.471E-14	1.747E-15	7.392E-14	74.2	38.3	31.91	476.0	2.3
Total		4.965E-16	3.996E-13	2.728E-14	1.001E-12			33.16	492.3	2.0

Note: Isotopic intereferncе corrections: $(^{36}Ar/^{37}Ar)_{Ca}$ = 3.49 (±0.14) x 10^{-4}, $(^{39}Ar/^{37}Ar)_{Ca}$ = 7.86 (±0.08) x 10^{-4} (Spell et al. (1996); $(^{40}Ar/^{39}Ar)_K$ = 0.035 ± 0.005.

*Data corrected for mass spectrometer backgrounds, discrimination and radioactive decay, but not isotopic interferences.

#Data corrected for mass spectrometer backgrounds, discrimination, radioactive decay, isotopic interferences and fluence gradients.

**Errors are one sigma uncertainties and exclude uncertainties in the J-value.

##J-value is based on an age of 98.8 ± 0.5 Ma for GA-1550 biotite (Renne et al., 1998).