

**Textural, mineralogical and geochemical variation in the Zoned Timbarra  
Tablelands Pluton, Australia\***

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**SUPPLEMENTARY PAPERS**

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\* Appendices 1–3 [indicated by an asterisk (\*) in the text and listed at the end of the paper] are Supplementary Papers; copies may be obtained from the Geological Society of Australia's website ([www.gsa.org.au](http://www.gsa.org.au)) or from the National Library of Australia's Pandora archive (<http://nla.gov.au/nla.arc-25194>).

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**Appendix 1:** Whole-rock data.

**Appendix 2:** Trace-element modelling. (a) Calculation of trace element fractional crystallisation models for Surface equilibrium (SEQ) and Total equilibrium (TEQ). (b) Calculated Trace element Concentration in the liquid (ppm) (c) Mineral/melt partition coefficients for trace elements used for trace element modelling (from Rollinson, 1993).

**Appendix 3:** Electron microprobe data. The electron microprobe data were obtained using a JEOL-840A EM Microanalyzer at the James Cook University Advanced Analytical Centre operating in quantitative energy dispersive mode. The operating conditions during analysis were as follows: accelerating voltage 15kV, beam current 10 nA, magnification >75000 unless stated otherwise, and beam diameter 1-2 micron. Each mineral composition was determined by averaging the results of three to five 40 second analyses. (a) Feldspar mineral chemistry data. (b) Hornblende mineral chemistry data. (c) Biotite mineral chemistry data.

**Appendix 1. Whole rock data.**

Sample	RM0285	RM0287	AS45*	AS46*	AS50*	AS55*	AS60*	AS56*	RM0289
Zone	1	1	1	1	1	1	1	1	2
Easting (m)	439670	439651	439810	440100	443800	442380	444200	445540	438820
Northing (m)	6792048	6792185	6793460	6792800	6788220	6790580	6786500	6786790	6789910
SiO <sub>2</sub> , wt%	69.15	69.12	61.02	69.2	69.14	69.75	69.64	69.13	67.42
TiO <sub>2</sub>	0.4	0.34	0.72	0.31	0.41	0.38	0.37	0.39	0.53
Al <sub>2</sub> O <sub>3</sub>	15.49	15.56	19.7	15.99	15.03	15.07	14.76	15.69	15.22
Fe <sub>2</sub> O <sub>3</sub>	1.14	0.87	3.45	1.36	1.38	1.39	1.09	1.44	1.58
FeO	1.13	0.96	1.12	0.78	1.43	1.17	1.8	0.91	1.56
MnO	0.13	0.12	0.05	0.1	0.04	0.07	0.04	0.08	0.1
MgO	0.62	0.58	3.17	0.48	0.98	0.84	0.82	0.58	1.22
CaO	1.93	1.23	1.32	1.31	2.49	1.94	2.16	1.69	2.87
Na <sub>2</sub> O	4.15	3.96	3.88	4.07	3.39	3.63	3.65	4.26	3.61
K <sub>2</sub> O	5.15	5.44	4.25	5.43	4.58	4.78	4.04	4.76	4.3
P <sub>2</sub> O <sub>5</sub>	0.11	0.08	0.12	0.06	0.16	0.13	0.13	0.09	0.19
H <sub>2</sub> O	-	-	1.23	0.54	0.58	0.56	0.64	0.5	-
CO <sub>2</sub>	-	-	0.24	0.14	0.25	0.23	0.78	0.06	-
LOI	0.35	1.5	0.11	0.1	0.07	0.09	0.07	0.18	1.16
Total	99.75	99.76	100.38	99.87	99.93	100.03	99.99	99.76	99.76
Cr (ppm)	0.5	0.5	37	3	17	8	10	4	8
Ni	4	5	10	2	5	4	3	3	8
Sc	6	5	-	-	-	-	-	-	8
V	28	20	145	20	51	38	38	24	60
Cu	5	5	3	1	4	9	51	3	6
Pb	21.5	27	20	19	17	18	17	21	20
Zn	55	57	101	55	37	49	37	105	48
Bi	0.05	0.05	-	-	-	-	-	-	0.1
Sn	3	2	-	-	-	-	-	-	3
Mo	0.4	0.05	-	-	-	-	-	-	0.5
S	70	70	-	-	-	-	-	-	80
As	1.7	1.8	-	-	-	-	-	-	2.4
Sb	0.2	0.4	-	-	-	-	-	-	0.4
Ag	0.25	0.25	-	-	-	-	-	-	0.25
Rb	193	182	120	173	185	191	207	171	175
Cs	5.2	7.6	-	-	-	-	-	-	7.2
Ba	815	788	245	858	722	748	505	717	745
Sr	374	278	142	317	381	365	350	345	426
Ga	17.6	16.5	21	15	14	16	15	18	17.6
Li	18.5	17.5	-	-	-	-	-	-	25
Ta	1	1	-	-	-	-	-	-	1
Nb	10.1	10.1	3	12	9	11	11	13	8.8
Hf	6.7	6.7	-	-	-	-	-	-	5.5
Zr	245	243	183	298	178	219	194	355	181
Y	35.6	35.1	26	62	26	33	27	69	26.3
Th	13.5	8	4	5	22	19	25	23	19.7
U	2.5	2.2	0	3	1	1	5	6	4
La	39.1	42.1	-	-	-	-	-	-	35.2
Ce	86.7	93.4	-	-	-	-	-	-	74.2
Pr	10.7	11.4	-	-	-	-	-	-	8.6
Nd	42	44.6	-	-	-	-	-	-	32.5
Sm	8.4	8.8	-	-	-	-	-	-	6.1
Eu	1.5	1.5	-	-	-	-	-	-	1.3
Gd	7.3	7.3	-	-	-	-	-	-	5.3
Tb	1.1	1.1	-	-	-	-	-	-	0.8
Dy	5.7	5.6	-	-	-	-	-	-	4.2
Ho	1.1	1.1	-	-	-	-	-	-	0.8
Er	3.3	3.2	-	-	-	-	-	-	2.5
Yb	3	3.3	-	-	-	-	-	-	2.4
Lu	0.4	0.5	-	-	-	-	-	-	0.3
F	637	651	-	-	-	-	-	-	612
Be	3.3	3	-	-	-	-	-	-	3.2
Ge	1.6	1.5	-	-	-	-	-	-	1.6
ASI	0.974	1.063	1.472	1.069	0.998	1.027	1.032	1.030	0.963
Eu/Eu*	0.6	0.6	-	-	-	-	-	-	0.7
La <sub>N</sub> /Yb <sub>N</sub>	9.1	8.9	-	-	-	-	-	-	10.2
Rb/Sr	0.5	0.7	0.8	0.5	0.5	0.5	0.6	0.5	0.4
K/Rb	221.5	248.1	294.0	260.6	205.5	207.7	162.0	231.1	204.0

**Appendix 1**

Sample	RM0292	RM0225	AS14*	AS64*	AS71*	AS75*	AS76*	AS80*	AS6*
Zone	2	2	2	2	2	2	2	2	2
Easting (m)	442940	430600	443670	444430	442745	444852	443575	443115	443347
Northing (m)	6787704	6792452	6778027	6784770	6780901	6781036	6779751	6778489	6773545
SiO <sub>2</sub> , wt%	68.06	69.7	73.44	70.08	72.32	74.11	72.05	70.26	71.16
TiO <sub>2</sub>	0.53	0.45	0.23	0.43	0.43	0.28	0.4	0.42	0.37
Al <sub>2</sub> O <sub>3</sub>	14.66	13.88	13.66	14.53	13.43	13.56	14.12	14.4	14.43
Fe <sub>2</sub> O <sub>3</sub>	1.72	1.19	0.58	1.42	1.49	0.96	1.5	1.45	1.41
FeO	1.52	1.14	0.87	1.37	1.18	0.79	1.05	1.23	1.14
MnO	0.1	0.08	0.03	0.06	0.06	0.06	0.07	0.08	0.04
MgO	1.24	0.86	0.38	0.97	0.91	0.51	0.83	0.99	0.81
CaO	2.84	1.86	1.19	2.47	1.78	1.5	1.68	2.33	2.13
Na <sub>2</sub> O	3.48	3.48	3.27	3.4	3.02	3.39	3.19	3.47	3.4
K <sub>2</sub> O	4.32	4.37	4.93	4.35	4.71	4.56	4.67	4.35	4.37
P <sub>2</sub> O <sub>5</sub>	0.19	0.14	0.08	0.15	0.16	0.08	0.12	0.15	0.14
H <sub>2</sub> O	-	-	0.5	0.55	0.62	0.45	0.63	0.64	0.43
CO <sub>2</sub>	-	-	0.28	0.4	0.11	0.1	0.06	0.24	0.01
LOI	1.1	2.63	0.08	0.06	0.15	0.15	0.25	0.17	0.07
Total	99.76	99.78	99.52	100.24	100.37	100.5	100.62	100.18	99.91
Cr (ppm)	9	3	3	11	7	3	7	7	7
Ni	8	7	2	5	6	3	4	5	4
Sc	11	7	-	-	-	-	-	-	-
V	57	39	23	49	42	26	47	47	41
Cu	6	5	1	4	1	1	2	2	2
Pb	18	18.5	15	18	19	17	20	19	15
Zn	44	39	15	36	35	21	43	33	27
Bi	0.1	0.1	-	-	-	-	-	-	-
Sn	4	3	-	-	-	-	-	-	-
Mo	0.6	0.4	-	-	-	-	-	-	-
S	70	80	-	-	-	-	-	-	-
As	2	2.1	-	-	-	-	-	-	-
Sb	0.2	0.2	-	-	-	-	-	-	-
Ag	0.25	0.25	-	-	-	-	-	-	-
Rb	184	183	230	199	252	278	257	265	210
Cs	9	6.1	-	-	-	-	-	-	-
Ba	603	341	235	526	250	206	382	450	518
Sr	384	263	178	316	233	185	246	230	316
Ga	17.2	16.1	14	15	15	13	16	17	17
Li	23.5	28.5	-	-	-	-	-	-	-
Ta	1	1.5	-	-	-	-	-	-	-
Nb	9.6	10.8	9	11	8	10	10	11	9
Hf	5.2	4.5	-	-	-	-	-	-	-
Zr	180	161	113	175	188	132	159	160	159
Y	31.2	32.4	21	26	16	13	33	39	24
Th	33.9	29	35	27	40	34	35	30	28
U	4	6.4	4	6	3	8	6	8	4
La	36.1	40.4	-	-	-	-	-	-	-
Ce	79.3	76.6	-	-	-	-	-	-	-
Pr	9.3	8.7	-	-	-	-	-	-	-
Nd	35.7	31.2	-	-	-	-	-	-	-
Sm	6.9	5.9	-	-	-	-	-	-	-
Eu	1.3	1.1	-	-	-	-	-	-	-
Gd	6	5.4	-	-	-	-	-	-	-
Tb	0.9	0.9	-	-	-	-	-	-	-
Dy	4.9	4.7	-	-	-	-	-	-	-
Ho	1	1	-	-	-	-	-	-	-
Er	2.9	3.1	-	-	-	-	-	-	-
Yb	2.8	3.1	-	-	-	-	-	-	-
Lu	0.4	0.4	-	-	-	-	-	-	-
F	703	775	-	-	-	-	-	-	-
Be	3.1	3.9	-	-	-	-	-	-	-
Ge	1.6	1.5	-	-	-	-	-	-	-
ASI	0.942	1.003	1.061	0.982	1.010	1.024	1.057	0.983	1.017
Eu/Eu*	0.6	0.6	-	-	-	-	-	-	-
La <sub>N</sub> /Yb <sub>N</sub>	9.0	9.1	-	-	-	-	-	-	-
Rb/Sr	0.5	0.7	1.3	0.6	1.1	1.5	1.0	1.2	0.7
K/Rb	194.9	198.2	177.9	181.5	155.2	136.2	150.8	136.3	172.7

**Appendix 1**

Sample	AS63*	AS49*	RM0290	RM0291	RM0260	AS90B*	92Z*	AS91*	AS92A*
Zone	2	2	3	3	3	3	3	3	3
<i>Easting (m)</i>	444730	440930	437610	436605	429880	434129	436690	436400	436690
<i>Northing (m)</i>	6785340	6784710	6787332	6784295	6777015	6767950	6784700	6783500	6784700
SiO <sub>2</sub> , wt%	70.36	68.74	67.23	65.72	65.74	66.42	67.62	67.22	54.97
TiO <sub>2</sub>	0.35	0.49	0.64	0.67	0.61	0.68	0.53	0.56	0.99
Al <sub>2</sub> O <sub>3</sub>	14.57	14.76	14.96	15.04	15.47	15.16	15.46	15.51	16.77
Fe <sub>2</sub> O <sub>3</sub>	0.82	1.62	1.78	1.67	1.75	1.97	1.64	1.65	2.94
FeO	1.78	1.59	1.82	2.1	1.88	2.16	1.72	1.65	4.2
MnO	0.03	0.04	0.1	0.1	0.09	0.09	0.07	0.06	0.17
MgO	0.84	1.12	1.51	1.65	1.6	1.67	1.26	1.21	3.63
CaO	1.97	2.73	3.27	3.38	3.36	3.56	3	3.07	6.12
Na <sub>2</sub> O	3.36	3.42	3.66	3.54	3.5	3.43	3.38	3.64	4.02
K <sub>2</sub> O	4.56	4.11	3.54	3.85	4.28	3.94	4.13	4.26	2.78
P <sub>2</sub> O <sub>5</sub>	0.12	0.2	0.24	0.25	0.24	0.27	0.2	0.2	0.46
H <sub>2</sub> O	0.59	0.69	-	-	-	0.93	0.71	0.8	2.2
CO <sub>2</sub>	0.84	0.3	-	-	-	0.3	0.01	0.38	1.14
LOI	0.05	0.09	1.02	1.71	1.22	0.21	0.04	0.13	0.08
Total	100.24	99.9	99.77	99.68	99.74	100.79	99.77	100.34	100.47
Cr (ppm)	14	11	13	15	17	21	14	12	56
Ni	3	8	11	13	13	11	11	9	27
Sc	-	-	9	11	9	-	-	-	-
V	42	57	70	78	71	81	60	62	156
Cu	72	3	8	9	5	9	4	5	9
Pb	16	16	17.5	18.5	14.5	16	19	20	17
Zn	32	42	55	55	35	58	46	46	117
Bi	-	-	0.2	0.1	0.05	-	-	-	-
Sn	-	-	3	2	2	-	-	-	-
Mo	-	-	0.6	0.7	0.4	-	-	-	-
S	-	-	150	300	100	-	-	-	-
As	-	-	3.5	3	2.5	-	-	-	-
Sb	-	-	0.6	0.4	0.1	-	-	-	-
Ag	-	-	0.25	0.25	0.25	-	-	-	-
Rb	227	176	158	148	154	142	162	167	223
Cs	-	-	9.1	8.8	4.4	-	-	-	-
Ba	647	577	448	571	687	583	572	691	109
Sr	303	403	426	468	502	500	453	465	420
Ga	15	17	17.4	17.5	17.4	16	16	17	21
Li	-	-	27.5	27	17	-	-	-	-
Ta	-	-	1	1	1	-	-	-	-
Nb	10	10	9.1	9.3	8.1	10	9	9	14
Hf	-	-	5.8	6.2	5.4	-	-	-	-
Zr	166	191	204	190	189	198	198	194	142
Y	27	21	22.9	25.5	21.7	26	20	22	26
Th	28	21	19.3	20.2	20.2	20	21	22	13
U	5	4	4.8	4.3	3.4	2	6	7	16
La	-	-	35.4	33.6	31.8	-	-	-	-
Ce	-	-	69.9	69.4	63.1	-	-	-	-
Pr	-	-	7.9	8.1	7.2	-	-	-	-
Nd	-	-	29.8	31.4	27.4	-	-	-	-
Sm	-	-	5.6	6	5.3	-	-	-	-
Eu	-	-	1.4	1.4	1.3	-	-	-	-
Gd	-	-	4.9	5.3	4.6	-	-	-	-
Tb	-	-	0.8	0.8	0.7	-	-	-	-
Dy	-	-	3.8	4.2	3.5	-	-	-	-
Ho	-	-	0.7	0.8	0.7	-	-	-	-
Er	-	-	2.2	2.4	2	-	-	-	-
Yb	-	-	2.1	2.3	1.9	-	-	-	-
Lu	-	-	0.3	0.3	0.3	-	-	-	-
F	-	-	706	726	655	-	-	-	-
Be	-	-	3.3	3.1	2.9	-	-	-	-
Ge	-	-	1.6	1.5	1.6	-	-	-	-
ASI	1.037	0.982	0.947	0.932	0.938	0.926	0.998	0.959	0.808
Eu/Eu*	-	-	0.8	0.7	0.8	-	-	-	-
La <sub>N</sub> /Yb <sub>N</sub>	-	-	11.8	10.2	11.7	-	-	-	-
Rb/Sr	0.7	0.4	0.4	0.3	0.3	0.3	0.4	0.4	0.5
K/Rb	166.8	193.9	186.0	215.9	230.7	230.3	211.6	211.8	103.5

**Appendix 1**

Sample	ASA*	AS83*	AS86*	AS87*	RM0226	RM0227	RM0228	RM0080	RM0081
Zone	3	3	3	3	4A	4A	4A	4B	4B
<i>Easting (m)</i>	437521	437810	436890	436800	430600	430590	430490	432839	432790
<i>Northing (m)</i>	6776654	6788100	6785600	6774800	6792300	6792200	6792110	6776868	6776864
SiO <sub>2</sub> , wt%	65.96	67.01	66.08	66.13	74.93	74.47	74.95	75.6	74.12
TiO <sub>2</sub>	0.66	0.6	0.66	0.61	0.22	0.25	0.24	0.18	0.27
Al <sub>2</sub> O <sub>3</sub>	15.64	15.52	15.6	15.31	12.65	13.01	12.82	12.66	12.86
Fe <sub>2</sub> O <sub>3</sub>	1.83	1.73	1.88	1.96	0.44	0.49	0.49	0.31	0.47
FeO	1.94	1.84	2.06	1.85	0.61	0.67	0.61	0.61	0.81
MnO	0.09	0.08	0.07	0.07	0.05	0.07	0.06	0.06	0.07
MgO	1.41	1.38	1.5	1.67	0.31	0.4	0.37	0.28	0.45
CaO	3.08	3.14	3.47	3.43	0.86	0.94	0.79	0.67	1.17
Na <sub>2</sub> O	3.43	3.66	3.68	3.24	3.23	3.29	3.3	3.49	3.35
K <sub>2</sub> O	4.5	4.18	4.11	4.22	4.88	4.91	4.92	4.98	4.76
P <sub>2</sub> O <sub>5</sub>	0.23	0.21	0.25	0.24	0.05	0.06	0.05	0.04	0.07
H <sub>2</sub> O	1.02	0.84	0.71	1.02	-	-	-	-	-
CO <sub>2</sub>	0.6	0.18	0.17	0.22	-	-	-	-	-
LOI	0.1	0.13	0.07	0.1	1.61	1.32	1.24	0.98	1.41
Total	100.49	100.5	100.31	100.07	99.84	99.88	99.84	99.86	99.81
Cr (ppm)	14	4	16	21	0.5	0.5	0.5	0.5	2
Ni	9	4	10	13	4	4	4	4	4
Sc	-	-	-	-	3	2	4	4	3
V	71	26	69	79	14	14	12	9	20
Cu	5	2	6	6	3	3	3	2	3
Pb	18	23	21	15	21.5	21	20.5	22.5	21
Zn	46	18	53	51	18	19	17	17	25
Bi	-	-	-	-	0.05	0.05	0.05	0.05	0.05
Sn	-	-	-	-	2	2	3	2	2
Mo	-	-	-	-	2.3	4.1	2.2	0.2	0.5
S	-	-	-	-	60	90	70	60	60
As	-	-	-	-	1.4	1.2	1.6	2.7	3.7
Sb	-	-	-	-	0.2	0.1	0.2	0.2	0.1
Ag	-	-	-	-	0.25	0.25	0.25	0.25	0.25
Rb	155	170	157	147	263	260	271	293	269
Cs	-	-	-	-	9.1	6.9	7.6	13.6	11.3
Ba	841	690	809	697	189	216	171	111	178
Sr	461	462	497	529	116	131	105	69	112
Ga	18	13	19	17	14.3	14.5	14.4	15.5	15.3
Li	-	-	-	-	33.5	27.5	22.5	28.5	40.5
Ta	-	-	-	-	1.5	1.5	1.5	2	1.5
Nb	10	9	11	10	9.6	8.8	10.6	11.5	10.3
Hf	-	-	-	-	3	3.3	3.3	3.2	3.7
Zr	210	113	214	196	99	107	107	106	116
Y	28	13	24	24	25.9	25.1	31	22.7	24.7
Th	19	38	21	22	31.1	28.8	39.8	37	33.3
U	3	5	6	3	11.3	6.6	4.7	6	7.3
La	-	-	-	-	32.9	28.4	26.6	31.9	29.6
Ce	-	-	-	-	59.4	55.7	61.1	59	59.2
Pr	-	-	-	-	6.9	6.1	5.9	6.3	6.3
Nd	-	-	-	-	23.8	20.9	20.7	20.8	21.8
Sm	-	-	-	-	4.5	4.1	4.3	3.6	3.9
Eu	-	-	-	-	0.6	0.6	0.5	0.4	0.6
Gd	-	-	-	-	3.9	3.7	4.1	3.1	3.5
Tb	-	-	-	-	0.6	0.6	0.7	0.5	0.6
Dy	-	-	-	-	3.7	3.6	4.2	2.8	3.4
Ho	-	-	-	-	0.7	0.7	0.9	0.6	0.7
Er	-	-	-	-	2.5	2.4	2.8	2.2	2.3
Yb	-	-	-	-	2.8	2.6	3	2.8	2.9
Lu	-	-	-	-	0.4	0.4	0.4	0.5	0.5
F	-	-	-	-	642	555	497	371	711
Be	-	-	-	-	4.6	3.5	4.1	4.2	4.3
Ge	-	-	-	-	1.7	1.6	1.7	2	1.9
ASI	0.971	0.955	0.928	0.949	1.040	1.046	1.052	1.025	1.005
Eu/Eu*	-	-	-	-	0.4	0.5	0.4	0.4	0.5
La <sub>N</sub> /Yb <sub>N</sub>	-	-	-	-	8.2	7.6	6.2	8.0	7.1
Rb/Sr	0.3	0.4	0.3	0.3	2.3	2.0	2.6	4.2	2.4
K/Rb	241.0	204.1	217.3	238.3	154.0	156.8	150.7	141.1	146.9

**Appendix 1**

Sample	RM0082	RM0093	RM0017	RM0043	RM0261A	RM0261B	RM0061	RM0063	RM0138
Zone	4B	4B	4C	4C	4C	4C	4C	4C	5
<i>Easting (m)</i>	432749	432673	432968	432951	432988	432988	432981	432950	433221
<i>Northing (m)</i>	6776870	6776585	6777331	6777261	6777331	6777331	6777575	6777755	6777016
SiO <sub>2</sub> , wt%	75.26	74.78	76.69	76.63	75.96	76.13	76.72	76.29	75.88
TiO <sub>2</sub>	0.21	0.25	0.15	0.15	0.15	0.15	0.16	0.16	0.13
Al <sub>2</sub> O <sub>3</sub>	12.66	12.73	12.36	12.38	12.24	12.37	12.39	12.29	12.39
Fe <sub>2</sub> O <sub>3</sub>	0.29	0.3	0.005	0.32	0.14	0.27	0.03	0.005	0.24
FeO	0.76	0.86	0.66	0.48	0.58	0.5	0.63	0.75	0.62
MnO	0.06	0.07	0.05	0.03	0.05	0.05	0.05	0.06	0.07
MgO	0.36	0.45	0.19	0.14	0.17	0.25	0.13	0.19	0.17
CaO	1	0.84	0.45	0.4	0.88	0.37	0.48	0.52	0.57
Na <sub>2</sub> O	3.45	3.32	3.39	3.31	3.58	3.34	3.36	3.37	3.52
K <sub>2</sub> O	4.8	4.76	5	4.91	4.54	4.95	4.93	4.87	4.66
P <sub>2</sub> O <sub>5</sub>	0.05	0.06	0.02	0.02	0.02	0.03	0.02	0.03	0.02
H <sub>2</sub> O	-	-	-	-	-	-	-	-	-
CO <sub>2</sub>	-	-	-	-	-	-	-	-	-
LOI	0.95	1.44	0.92	1.09	1.55	1.45	0.96	1.35	1.59
Total	99.85	99.86	99.885	99.86	99.86	99.86	99.86	99.885	99.86
Cr (ppm)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Ni	4	7	3	3	3	4	3	3	3
Sc	2	3	2	2	2	2	3	3	4
V	15	18	5	6	5	7	5	7	5
Cu	3	3	3	3	3	3	2	2	3
Pb	21.5	21.5	21	20	18.5	20	17	17	25.5
Zn	20	20	13	15	12	14	11	12	17
Bi	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Sn	2	3	1	2	1	0.5	2	3	3
Mo	0.3	0.4	0.1	0.1	0.2	0.05	0.3	0.3	0.5
S	70	70	60	70	60	70	100	60	60
As	3.1	7.8	2.9	5.2	3.3	8.1	12.1	5	12.4
Sb	0.2	0.2	0.1	0.2	0.1	0.1	0.2	0.2	0.6
Ag	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Rb	278	308	310	321	293	284	315	340	309
Cs	13.3	14	6.6	7.4	6.6	4.3	10.2	13.4	9.5
Ba	171	158	73	66	65	76	59	77	64
Sr	82	94	32	29	32	36	30	36	35
Ga	14.7	15.2	15.2	16.2	15.6	15.1	15.9	16.2	16.4
Li	35	35	19.5	18	22	20.5	18	26	26.5
Ta	1.5	1.5	2.5	2.5	2.5	2	2.5	2	2.5
Nb	9.5	10.5	14.4	15.3	15.6	11.4	12.8	12.6	15.2
Hf	2.9	2.8	2.9	3.3	2.9	3.1	2.6	3.2	2.9
Zr	106	107	90	101	98	99	85	99	95
Y	27	40.8	32.1	42	46.4	35.3	28.6	31.6	49.4
Th	34.3	35.4	36.4	38.7	39.8	40.7	36.6	37.9	36.6
U	5.3	9.2	7.4	9.6	18.4	10.2	9.3	10.5	11.6
La	31.2	43.9	23.6	31.8	26.8	30	28.9	28.6	22.9
Ce	60.3	62.5	52.4	54.7	55.6	58.4	52.7	53.5	52.4
Pr	6.2	7.1	5.8	7.2	6.5	6.8	6.4	6.4	6.4
Nd	20.7	23.9	20.7	25.4	23.5	24	21.9	22.4	23.6
Sm	3.6	4.4	4.5	5.2	5.3	5	4.4	4.7	5.6
Eu	0.5	0.6	0.3	0.4	0.3	0.3	0.3	0.4	0.3
Gd	3.1	5.4	4	5	5.3	4.7	3.8	4.3	5.8
Tb	0.5	0.9	0.7	0.9	1	0.8	0.7	0.8	1.1
Dy	3	5.1	4.2	5.7	5.7	4.6	3.8	4.4	6.4
Ho	0.6	1.1	0.9	1.3	1.2	1	0.8	0.9	1.5
Er	2.2	3.7	3	4.2	4.2	3.2	2.7	3	4.7
Yb	2.8	4.5	3.7	5.1	5	3.3	3.4	3.4	5.3
Lu	0.4	0.8	0.6	0.8	0.7	0.5	0.5	0.5	0.8
F	463	664	269	302	366	258	436	618	573
Be	4.4	4.3	5.9	5.7	6.9	5.6	6.1	7.3	7.1
Ge	1.9	2	1.9	2.1	2	2	2.1	2.3	2
ASI	0.998	1.049	1.047	1.078	0.987	1.073	1.056	1.045	1.044
Eu/Eu*	0.4	0.4	0.2	0.2	0.2	0.2	0.2	0.3	0.2
La <sub>N</sub> /Yb <sub>N</sub>	7.8	6.8	4.5	4.4	3.7	6.3	5.9	5.9	3.0
Rb/Sr	3.4	3.3	9.7	11.1	9.2	7.9	10.5	9.4	8.8
K/Rb	143.3	128.3	133.9	127.0	128.6	144.7	129.9	118.9	125.2

## Appendix 1

Sample	RM0145	RM0184	RM0196	RM0198	RM0219	RM0236	RM0217	RM0233	RM0188A
Zone	5	5	5	5	5	5	5	6	6
Easting (m)	433515	432550	429584	428700	428990	430710	428764	429940	432573
Northing (m)	6777211	6787375	6786310	6786283	6781485	6791485	6782111	6791475	6787333
SiO <sub>2</sub> , wt%	75.89	76.04	75.61	75.82	76.2	76.86	75.6	77.38	78.49
TiO <sub>2</sub>	0.13	0.16	0.13	0.14	0.13	0.22	0.14	0.1	0.06
Al <sub>2</sub> O <sub>3</sub>	12.23	12.48	12.25	12.41	12.28	12.92	12.25	12.26	11.33
Fe <sub>2</sub> O <sub>3</sub>	0.19	0.5	0.57	0.64	0.5	0.61	0.08	0.18	0.03
FeO	0.6	0.28	0.53	0.29	0.36	0.43	0.71	0.24	0.49
MnO	0.07	0.05	0.07	0.07	0.07	0.06	0.06	0.03	0.03
MgO	0.14	0.16	0.11	0.15	0.13	0.26	0.14	0.07	0.06
CaO	0.5	0.28	0.32	0.52	0.17	0.53	0.58	0.24	0.28
Na <sub>2</sub> O	3.56	3.17	3.51	3.51	3.35	3.54	3.42	3.53	3.46
K <sub>2</sub> O	4.6	5.12	4.61	4.74	4.56	4.86	4.49	4.72	4.24
P <sub>2</sub> O <sub>5</sub>	0.02	0.02	0.02	0.02	0.02	0.04	0.02	0.01	0.01
H <sub>2</sub> O	-	-	-	-	-	-	-	-	-
CO <sub>2</sub>	-	-	-	-	-	-	-	-	-
LOI	1.93	1.62	2.08	1.54	2.09	-0.51	2.38	1.14	1.34
Total	99.86	99.88	99.81	99.85	99.86	99.82	99.87	99.9	99.82
Cr (ppm)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Ni	2	3	3	4	3	4	3	3	3
Sc	3	2	3	2	3	2	2	3	4
V	5	8	4	6	4	10	6	0.5	2
Cu	2	3	3	3	4	4	3	3	5
Pb	26.5	21	21.5	29.5	32	20	26	16.5	28
Zn	17	13	18	19	28	18	21	5	10
Bi	0.05	0.2	1	1.1	0.8	0.05	0.2	0.05	1.4
Sn	3	1	0.5	3	2	3	2	1	1
Mo	0.6	2.7	3.7	3.3	1.2	0.05	0.4	0.1	21.8
S	60	60	130	60	90	60	60	60	200
As	23.8	0.8	31.4	12.4	118.9	4	1.7	149.9	26.9
Sb	0.6	0.2	0.4	1.8	0.2	0.2	0.1	0.6	1.2
Ag	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Rb	372	280	350	330	355	274	324	312	313
Cs	10.6	9.3	11	18.1	12.7	6.5	10.3	5.8	7.7
Ba	51	79	77	79	83	123	77	23	11
Sr	28	39	30	36	33	74	33	18	6
Ga	17	15.3	16.4	16.2	15.8	14.6	15.7	16	18.7
Li	25	31	16	44	38.5	15	59	7.5	18.5
Ta	2.5	2	3	2	3	1.5	2	2.5	10.5
Nb	18.2	13.5	16.4	14.5	14.8	10	14.3	20.5	51.4
Hf	3	3.4	3.5	2.5	3.1	2.9	3.2	3.3	4.5
Zr	95	91	97	99	100	105	99	87	119
Y	42.6	18.8	48.3	46.7	47.7	31.4	46.1	17.9	42.1
Th	36.7	33.9	39.2	40.5	37.2	37.1	39	33.8	36.1
U	9.8	4.8	15.8	12.1	10.2	5.1	8.4	9.7	38.4
La	19.5	13.4	22.6	23.2	22.7	35.1	21.4	12.9	9.3
Ce	46.1	37.2	52.1	53.3	51.6	62.1	49	24.2	28.8
Pr	5.8	3	6.6	6.6	6.4	7.3	6.1	2.6	4.5
Nd	21.9	9.8	24.4	24.4	23.5	25.2	23.1	8.3	18.5
Sm	5.5	1.9	6	5.7	5.8	4.8	5.8	1.8	6.2
Eu	0.2	0.3	0.3	0.3	0.3	0.5	0.3	0.1	0.05
Gd	5.4	1.7	6	5.5	5.7	4.3	5.8	1.7	5.7
Tb	1	0.4	1.2	1.1	1.1	0.7	1.1	0.3	1.2
Dy	5.7	2.2	6.5	6.2	6.3	4.1	6.3	2.2	7.3
Ho	1.3	0.5	1.4	1.4	1.4	0.9	1.3	0.5	1.6
Er	4.1	1.9	4.5	4.5	4.5	2.8	4.3	1.8	5.3
Yb	4.7	2.5	5.3	5	5.3	3.2	4.8	2.6	7.5
Lu	0.7	0.4	0.8	0.8	0.8	0.5	0.7	0.4	1.1
F	822	100	849	445	428	203	527	100	100
Be	7.6	3.6	6.8	5	6.4	5.1	5.9	5	8
Ge	2.2	2	2.1	2.1	1.9	1.7	1.9	2.3	2.8
ASI	1.041	1.108	1.080	1.047	1.142	1.072	1.061	1.080	1.050
Eu/Eu*	0.1	0.5	0.2	0.2	0.2	0.3	0.2	0.17	0.03
La <sub>N</sub> /Yb <sub>N</sub>	2.9	3.7	3.0	3.2	3.0	7.7	3.1	3.5	0.9
Rb/Sr	13.3	7.2	11.7	9.2	10.8	3.7	9.8	17.3	52.2
K/Rb	102.7	151.8	109.3	119.2	106.6	147.2	115.0	125.6	112.5

## Appendix 1

Sample	RM0188B	RM0058	RM0094	RM0095	RM0078	RM0036	RM0032	RM0040	RM0055
Zone	6	6	6	6	6	6	6	6	6
Easting (m)	432573	433083	432690	432703	432859	433057	433063	433050	433228
Northing (m)	6787333	6777395	6776546	6776538	6776807	6777473	6777503	6777267	6777268
SiO <sub>2</sub> , wt%	76.35	76.29	76.86	77.71	77.3	77.1	76.09	77.29	76
TiO <sub>2</sub>	0.08	0.09	0.08	0.06	0.07	0.08	0.07	0.08	0.06
Al <sub>2</sub> O <sub>3</sub>	12.42	12.82	12.42	12.46	12.18	12.37	12.6	12.77	13.07
Fe <sub>2</sub> O <sub>3</sub>	0.18	0.005	0.03	0.01	0.02	0.03	0.16	0.06	0.005
FeO	0.46	0.6	0.4	0.3	0.66	0.67	0.54	0.1	0.57
MnO	0.03	0.03	0.02	0.02	0.07	0.01	0.05	0.02	0.02
MgO	0.05	0.05	0.07	0.06	0.06	0.04	0.05	0.06	0.06
CaO	0.32	0.28	0.18	0.17	0.3	0.23	0.35	0.19	0.24
Na <sub>2</sub> O	3.91	4.33	3.52	4.25	3.98	4.04	4.02	4.19	4.03
K <sub>2</sub> O	4.41	3.93	4.87	3.77	4.24	4.29	4.7	3.59	4.9
P <sub>2</sub> O <sub>5</sub>	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.02	0.01
H <sub>2</sub> O	-	-	-	-	-	-	-	-	-
CO <sub>2</sub>	-	-	-	-	-	-	-	-	-
LOI	1.52	1.73	1.42	1.05	0.94	0.98	1.14	1.49	1.05
Total	99.74	100.185	99.88	99.87	99.83	99.85	99.78	99.86	100.015
Cr (ppm)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Ni	3	4	8	7	3	4	4	3	4
Sc	4	7	3	3	3	3	8	5	11
V	0.5	0.5	3	3	1	1	1	3	0.5
Cu	8	3	4	3	2	3	3	2	2
Pb	27.5	37	36.5	25	38	27.5	39	21	38.5
Zn	8	5	5	4	16	8	19	6	10
Bi	1.3	1.3	0.5	0.6	1.1	0.3	1.6	9.6	2
Sn	1	6	3	2	4	3	4	3	5
Mo	13.9	2.9	5.2	0.4	1.6	1.6	3.9	0.05	2.4
S	320	80	70	80	110	70	170	70	80
As	52.3	75.7	1241	848.4	7.2	12.8	68.4	7.1	175.8
Sb	0.8	1.6	2.2	1.6	0.6	0.6	1.8	0.6	1.4
Ag	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Rb	330	582	399	304	492	424	642	294	600
Cs	4.6	53.6	8.8	5.8	11.4	11.5	49.8	5.7	51.1
Ba	15	5	12	11	12	13	11	19	3
Sr	6	6	12	12	6	7	7	11	9
Ga	18.9	22.5	20.1	20.8	19.3	21.5	21.1	21.1	21.9
Li	16.5	6	6.5	6	14	8.5	13.5	8	7
Ta	5.5	5.5	7	8	2.5	5	5.5	6.5	5.5
Nb	34.8	48.6	46.1	34.9	37.1	50.5	38	21.3	34.8
Hf	4.9	3.1	4.6	4.4	3	3.3	3.2	2.6	3.6
Zr	138	88	115	113	94	90	88	52	93
Y	42.5	177.3	44	35.1	130.9	100.7	151.9	74.4	92.1
Th	55.3	27.7	32.5	31.3	23.9	28.9	22.9	20.3	24.9
U	27.5	22.7	29.3	20	31.8	32.6	34.2	24.2	22.2
La	6.2	6.9	1.9	2.6	6	5.4	9	10.9	5.9
Ce	17.6	23.9	4	6.1	22.8	17.8	27.2	34.7	17
Pr	2.7	4.4	0.8	0.8	4	3.4	4.9	5.1	3.1
Nd	11.7	20.3	3.2	2.5	19.6	15.6	22.2	22.4	14.8
Sm	4.2	9	1.6	1.1	8.8	6.6	9.9	8.7	6.4
Eu	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.05
Gd	4.1	12	2.1	1.6	11.9	8.4	14.4	9.9	8.1
Tb	1	2.8	0.7	0.5	2.7	2	3.2	2	1.9
Dy	6.3	18.4	5.5	4.3	16.9	13.1	19.5	11.4	12.2
Ho	1.5	4.4	1.4	1.1	3.8	3.1	4.3	2.4	2.7
Er	5.3	15.3	5.5	4.5	12.3	10.9	13.5	7.7	9.2
Yb	7.8	18.2	8.8	7.5	13.2	13.9	14.9	9.9	11.8
Lu	1.2	2.7	1.4	1.2	1.9	2.1	2.2	1.5	1.7
F	100	100	100	100	100	340	1505	298	339
Be	7.7	9.8	7.8	7.6	6.9	8.8	12.4	8.7	10.2
Ge	2.6	3.5	3.3	3.2	2.9	3.4	3.4	3.2	3.4
ASI	1.054	1.079	1.091	1.095	1.043	1.057	1.021	1.148	1.057
Eu/Eu*	0.04	0.01	0.08	0.12	0.02	0.02	0.01	0.03	0.02
La <sub>N</sub> /Yb <sub>N</sub>	0.6	0.3	0.2	0.2	0.3	0.3	0.4	0.8	0.3
Rb/Sr	55.0	97.0	33.3	25.3	82.0	60.6	91.7	26.7	66.7
K/Rb	110.9	56.1	101.3	102.9	71.5	84.0	60.8	101.4	67.8

**Appendix 1**

Sample	RM0294	RM0107	RM0107B	RM0107C	RM0182	RM0199	RM0111	RM0112	RM0116
Zone	6	6	6	6	6	6	6	6	6
<i>Easting (m)</i>	429200	432986	432986	432986	427432	428125	432875	432880	432777
<i>Northing (m)</i>	679270	6776475	6776475	6776475	6788330	6786340	6776384	6776370	6776313
SiO <sub>2</sub> , wt%	75.89	77.28	77.25	76.27	76.78	76.77	76.49	76.94	76.73
TiO <sub>2</sub>	0.07	0.06	0.09	0.08	0.12	0.09	0.08	0.09	0.08
Al <sub>2</sub> O <sub>3</sub>	12.47	12.47	12.82	12.8	12.65	12.54	12.73	12.36	12.42
Fe <sub>2</sub> O <sub>3</sub>	0.16	0.03	0.005	0.005	0.3	0.15	0.005	0.005	0.005
FeO	0.53	0.12	0.14	0.36	0.28	0.36	0.27	0.38	0.26
MnO	0.13	0.02	0.02	0.02	0.03	0.02	0.03	0.02	0.01
MgO	0.06	0.05	0.04	0.06	0.06	0.05	0.05	0.07	0.06
CaO	0.37	0.25	0.21	0.19	0.24	0.3	0.28	0.22	0.22
Na <sub>2</sub> O	4.3	3.88	4.23	3.79	3.59	3.92	3.73	3.98	3.77
K <sub>2</sub> O	3.98	4.33	3.82	4.19	4.36	4.45	4.06	4.21	4.58
P <sub>2</sub> O <sub>5</sub>	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
H <sub>2</sub> O	-	-	-	-	-	-	-	-	-
CO <sub>2</sub>	-	-	-	-	-	-	-	-	-
LOI	1.86	1.36	1.21	2.08	1.43	1.17	2.14	1.56	1.67
Total	99.83	99.86	99.845	99.855	99.85	99.83	99.875	99.845	99.815
Cr (ppm)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Ni	2	7	5	6	4	4	6	8	8
Sc	6	5	4	6	5	4	7	7	2
V	2	2	1	2	2	2	2	3	2
Cu	2	2	2	3	7	3	3	3	3
Pb	45	40.5	42.5	65	28	20	35	43.5	85.5
Zn	22	6	5	6	5	5	6	5	25
Bi	3	0.6	2.6	4.1	11.6	8.6	0.3	2.2	4.1
Sn	9	3	6	5	0.5	0.5	3	4	2
Mo	38.5	1.2	4.2	10.7	8.2	3.9	0.8	4.9	5.7
S	100	60	60	70	80	70	120	170	180
As	20.8	58.7	119.1	649.9	40.6	14.9	343.3	1123	694.6
Sb	2.2	0.8	1.4	2.6	0.8	0.2	1	2.4	1.2
Ag	0.25	0.25	0.25	0.5	0.25	0.25	0.25	0.25	2
Rb	732	621	545	536	388	471	424	478	440
Cs	77.6	39.1	45.7	45.1	12.4	14.7	26.1	33.9	14.3
Ba	13	7	8	3	27	17	15	9	9
Sr	7	7	6	7	17	10	7	7	8
Ga	22.7	19.3	20.7	22.2	19.5	19.6	22.1	21	20.4
Li	59.5	5	7	5.5	9	11.5	6	6	8
Ta	9.5	4.5	6	10.5	4.5	6	6.5	7	6
Nb	49.8	28.2	29.9	50.2	21.3	37.1	47.1	40.8	42.7
Hf	4.5	1.9	2.8	5.3	3.4	3.5	3.5	2.6	3.1
Zr	109	44	63	126	93	116	82	68	73
Y	132.1	30.3	26.6	38.7	22.3	51.8	44.8	120.7	99.1
Th	28.1	14.9	27.4	30.8	34.4	30	23.7	24.1	27.7
U	32.7	8.8	7.4	27.6	7.2	12.3	18.1	28.3	23.1
La	9	1.2	2.2	13.7	4.7	5.2	2.6	7	7.8
Ce	28.9	3.8	8	27	13	15.1	9.8	25.8	22.4
Pr	4.4	0.4	0.7	2.9	1.6	2.3	1	5	3.5
Nd	19.4	1.8	2.9	9.3	5.9	9.6	4	25	14.6
Sm	8	1	1.2	3.2	1.8	3.9	2	13.8	6.3
Eu	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Gd	10	1.7	1.5	2.7	1.7	4.7	3	17.9	7.9
Tb	2.3	0.6	0.5	0.8	0.4	1.2	1	3.9	2
Dy	14.5	4.2	3.4	5.6	2.7	7.2	7	21.4	12.8
Ho	3.3	1.1	0.9	1.5	0.6	1.6	1.7	4.3	3.1
Er	11.3	4.1	3.7	6	2.2	5.4	6.5	13	10.3
Yb	14.7	5.4	5.6	10.1	3.3	7.2	9.4	14.2	11.8
Lu	2.2	0.8	0.9	1.6	0.6	1.1	1.4	2.1	1.7
F	1787	100	100	100	100	100	100	100	100
Be	17.2	5.6	7.4	10	6	5.4	7.9	11.3	8.6
Ge	3.7	3.1	3.2	3.7	2.7	3	3.4	3.3	3.3
ASI	1.034	1.082	1.117	1.152	1.144	1.062	1.153	1.074	1.074
Eu/Eu*	0.02	0.12	0.11	0.05	0.09	0.04	0.06	0.01	0.02
La <sub>N</sub> /Yb <sub>N</sub>	0.4	0.2	0.3	0.9	1.0	0.5	0.2	0.3	0.5
Rb/Sr	104.6	88.7	90.8	76.6	22.8	47.1	60.6	68.3	55.0
K/Rb	45.1	57.9	58.2	64.9	93.3	78.4	79.5	73.1	86.4

### Appendix 1

Sample	RM0142	RM0160	RM0103	RM0104	RM0136	RM0139	RM0268A	RM0268B	RM0122
Zone	6	6	6	6	6	6	6	6	7
<i>Easting (m)</i>	433422	433715	432840	432850	433082	433224	433098	433098	433024
<i>Northing (m)</i>	6777225	6776535	6776370	6776370	6776758	6777018	6777508	6777508	6776199
SiO <sub>2</sub> , wt%	76.67	75.95	77.46	76.77	76.74	76.84	76.82	76.35	76.14
TiO <sub>2</sub>	0.08	0.07	0.08	0.07	0.08	0.07	0.09	0.13	0.14
Al <sub>2</sub> O <sub>3</sub>	12.48	13.26	12.41	12.53	12.52	12.29	12.33	12.35	12.52
Fe <sub>2</sub> O <sub>3</sub>	0.01	0.01	0.005	0.24	0.39	0.005	0.09	0.08	0.45
FeO	0.5	0.3	0.44	0.41	0.31	0.23	0.44	0.67	0.4
MnO	0.02	0.02	0.02	0.02	0.03	0.02	0.05	0.05	0.09
MgO	0.05	0.07	0.04	0.05	0.06	0.07	0.09	0.13	0.13
CaO	0.21	0.12	0.24	0.29	0.25	0.23	0.54	0.6	0.26
Na <sub>2</sub> O	3.91	3.21	4.2	4.21	4.03	3.81	4.07	3.55	3.56
K <sub>2</sub> O	4.43	4.17	4.07	4.36	4.48	4.52	4.18	4.5	4.82
P <sub>2</sub> O <sub>5</sub>	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
H <sub>2</sub> O	-	-	-	-	-	-	-	-	-
CO <sub>2</sub>	-	-	-	-	-	-	-	-	-
LOI	1.45	2.66	0.87	0.87	0.93	1.8	1.01	1.43	1.32
Total	99.82	99.85	99.845	99.83	99.83	99.895	99.72	99.86	99.85
Cr (ppm)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Ni	4	3	4	8	3	4	3	3	6
Sc	7	3	5	5	4	4	5	4	3
V	0.5	4	0.5	3	2	0.5	0.5	4	5
Cu	2	2	3	3	3	3	2	2	3
Pb	67	14	41	33.5	27	34	31.5	23.5	22.5
Zn	8	25	7	6	8	4	28	13	15
Bi	2.2	0.1	1.6	0.6	0.2	1.2	1	1.5	0.05
Sn	5	1	4	3	2	2	5	3	2
Mo	2.4	0.05	5.1	6.4	2.3	0.4	2.1	1.5	1.1
S	100	60	100	260	170	60	420	140	100
As	388.3	36.9	273.1	459.5	107.7	779.6	452.6	14.1	66.5
Sb	1.2	1.2	1.4	1.6	0.6	1.6	1.2	0.4	0.4
Ag	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Rb	546	321	523	446	394	370	388	352	367
Cs	38.7	7.2	42.9	28.2	10.9	8	9.8	6.7	6.6
Ba	12	36	8	9	12	8	13	46	72
Sr	7	13	7	7	10	12	13	28	31
Ga	21	24	20.4	20.6	19.7	20.2	19	16.5	17.3
Li	8	7	5.5	7	9	5	12.5	19.5	16
Ta	6	14	5.5	6	3	6.5	7.5	4	3
Nb	33.7	51.4	37.7	44.3	33.8	32.7	36.9	20	18.1
Hf	3.2	4.6	3.4	5.3	5.9	2.4	7.8	3.1	3.1
Zr	68	104	90	162	197	71	154	90	100
Y	98.3	57.3	59.9	97.2	123.7	149.9	132.1	47.7	46.8
Th	20.8	28.8	24.2	42.2	45.6	23.1	36.8	32	36.4
U	32.2	17.1	23.8	36.1	36.9	30.7	51.1	20.2	13.5
La	8.2	2	4.7	5.6	10.4	34.3	10.6	16.1	21.7
Ce	29.3	12	16.2	19.4	32.9	48.8	34.5	38.8	50.8
Pr	5.1	0.9	3	3.3	5.2	14.9	6	5	6.5
Nd	24.5	4.3	14.3	15.7	23.9	66.4	30.1	19.2	24.2
Sm	11.4	2.4	6.4	6.8	9.9	21.3	12.4	4.7	6.1
Eu	0.05	0.05	0.05	0.05	0.05	0.2	0.2	0.2	0.3
Gd	14.6	3.4	7.1	8.3	13.2	26.2	15.3	5.3	6.2
Tb	3.2	1	1.6	1.9	3	4.7	3	1	1.2
Dy	17.2	6.6	9.6	12.1	17.8	23.2	17.5	6.2	6.7
Ho	3.5	1.6	2	2.9	4.1	4.7	3.7	1.4	1.5
Er	10.3	5.9	6.9	10.6	13.7	13.7	12.3	4.7	4.7
Yb	11.4	9.2	10	14.4	15.9	14.2	15.4	5.9	5.4
Lu	1.7	1.5	1.5	2.2	2.5	2.2	2.4	0.9	0.8
F	315	308	220	562	410	100	994	720	925
Be	9.4	13.7	9.6	10.1	8.5	10.4	9.2	7.3	10.5
Ge	3.3	3.6	3.1	3.2	2.8	3.3	3.1	2.2	2.5
ASI	1.075	1.324	1.056	1.029	1.049	1.061	1.011	1.046	1.084
Eu/Eu*	0.01	0.05	0.02	0.02	0.01	0.03	0.04	0.12	0.15
La <sub>N</sub> /Yb <sub>N</sub>	0.5	0.2	0.3	0.3	0.5	1.7	0.5	1.9	2.8
Rb/Sr	78.0	24.7	74.7	63.7	39.4	30.8	29.8	12.6	11.8
K/Rb	67.4	107.8	64.6	81.2	94.4	101.4	89.4	106.1	109.0

## Appendix 1

Sample	RM0120	RM0146	RM0163	RM0164	RM0171	RM0178	RM0179	RM0180	RM0195
Zone	7	7	7	7	7	7	7	7	7
Easting (m)	432980	433510	433647	433700	434062	430025	429966	429005	430493
Northing (m)	6776299	6777291	6776520	6776670	6776845	6789885	6789551	6789392	6787100
SiO <sub>2</sub> , wt%	76.58	75.82	75.82	76.18	76.12	76.15	75.68	76	76.14
TiO <sub>2</sub>	0.13	0.13	0.13	0.12	0.13	0.13	0.13	0.13	0.14
Al <sub>2</sub> O <sub>3</sub>	12.16	12.5	12.9	12.34	12.49	12.5	12.39	12.43	12.66
Fe <sub>2</sub> O <sub>3</sub>	0.28	0.29	0.31	0.26	0.23	0.56	0.28	0.3	0.55
FeO	0.47	0.51	0.43	0.54	0.54	0.3	0.55	0.52	0.33
MnO	0.08	0.07	0.05	0.06	0.06	0.04	0.04	0.07	0.04
MgO	0.12	0.12	0.14	0.14	0.18	0.13	0.15	0.16	0.14
CaO	0.23	0.43	0.31	0.28	0.36	0.43	0.45	0.41	0.43
Na <sub>2</sub> O	3.44	3.63	3.71	3.58	3.49	3.57	3.61	3.62	3.55
K <sub>2</sub> O	4.68	4.72	5.09	4.75	4.87	4.67	4.64	4.58	4.79
P <sub>2</sub> O <sub>5</sub>	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
H <sub>2</sub> O	-	-	-	-	-	-	-	-	-
CO <sub>2</sub>	-	-	-	-	-	-	-	-	-
LOI	1.65	1.6	0.93	1.58	1.38	1.35	1.94	1.61	1.06
Total	99.84	99.84	99.84	99.85	99.87	99.85	99.88	99.85	99.85
Cr (ppm)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Ni	6	3	4	3	3	4	3	3	4
Sc	2	3	3	3	3	3	4	3	3
V	4	3	4	5	7	5	6	5	5
Cu	3	3	2	3	3	3	4	3	3
Pb	20.5	24.5	20	21	20.5	22	21.5	26	23
Zn	11	16	12	11	11	20	17	20	14
Bi	0.1	0.6	0.05	0.1	0.1	0.1	0.1	0.5	1.9
Sn	2	3	2	2	2	2	2	3	0.5
Mo	1.8	2.8	0.05	0.4	0.05	0.05	0.05	0.1	2.5
S	110	80	60	60	50	60	60	60	60
As	133.4	52.6	6.1	10.4	6.9	1.3	1.3	1.1	32.3
Sb	0.6	0.4	0.4	0.6	0.4	0.4	0.6	0.4	0.4
Ag	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Rb	359	377	362	323	339	359	353	352	392
Cs	6.7	8.7	7.6	7.3	8.4	8.4	7.2	13.7	17.2
Ba	64	75	84	72	75	72	79	64	70
Sr	27	31	35	33	30	32	32	35	31
Ga	17	17.2	16.7	16.8	16.8	17	16.9	17	17
Li	15.5	19	13.5	14	14.5	30.5	27.5	28.5	39
Ta	3.5	3.5	3	3	3.5	3	3	3	4
Nb	18.4	19.5	16.8	16.1	17	18	18.8	18.8	18.9
Hf	2.9	3.1	2.9	3.5	2.5	3.3	3.6	3.1	3.1
Zr	99	97	96	101	98	98	97	97	100
Y	54.2	52.9	54.2	51.5	63.6	40.5	53.8	53.2	54.8
Th	35.1	36.7	34.5	37.8	36.3	37.1	37.4	37.3	40.8
U	20	9.1	15.1	12.3	10.1	14.2	16.7	15.2	14
La	20.3	19.7	22.2	23.9	20.9	21.4	22.2	27	23.8
Ce	48.2	46.6	50.7	53.5	47.9	50.4	51.7	56	54.9
Pr	6	5.9	6.2	6.7	6.1	6	6.5	7.3	7.4
Nd	22.7	22.2	23.4	24.6	23.1	22.3	24.7	27.7	27.6
Sm	5.9	5.7	6	6.2	5.9	5.4	6.4	6.9	7
Eu	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Gd	6.2	5.9	6.3	6.4	6.4	5.3	6.8	7	6.6
Tb	1.2	1.2	1.3	1.3	1.3	1	1.4	1.3	1.3
Dy	7	6.9	7.2	7	7.4	5.6	7.6	7.4	7.2
Ho	1.6	1.5	1.6	1.5	1.7	1.2	1.6	1.6	1.6
Er	5	5	5.2	4.9	5.4	4	5.3	5	5.1
Yb	5.9	6.1	6	5.7	6.3	4.8	6.2	5.7	6
Lu	0.9	0.9	0.9	0.9	1	0.7	0.9	0.9	0.9
F	325	917	100	227	297	337	310	276	337
Be	9	9.8	7.7	7.9	8.1	5.2	8.2	6.6	5.7
Ge	2.5	2.4	2.3	2.3	2.3	2.4	2.4	2.2	2.4
ASI	1.091	1.054	1.059	1.069	1.071	1.068	1.052	1.066	1.072
Eu/Eu*	0.10	0.11	0.15	0.15	0.15	0.17	0.14	0.13	0.13
La <sub>N</sub> /Yb <sub>N</sub>	2.4	2.3	2.6	2.9	2.3	3.1	2.5	3.3	2.8
Rb/Sr	13.3	12.2	10.3	9.8	11.3	11.2	11.0	10.1	12.6
K/Rb	108.2	103.9	116.7	122.1	119.3	108.0	109.1	108.0	101.4

**Appendix 1**

Sample	RM0201	RM0208	RM0220	RM0234	AS88*	AS89*	ALZ*	AL4*	SA*	SB*
Zone	7	7	7	7	Enclave	Enclave	Enclave	Enclave	Enclave	Enclave
<i>Easting (m)</i>	428890	427375	428670	429800	no	no	no	no	no	no
<i>Northing (m)</i>	6787610	6793420	6781035	6791315	data	data	data	data	data	data
SiO <sub>2</sub> , wt%	76.63	76.79	75.8	75.36	48.52	55.86	61.85	53.43	57.86	58.26
TiO <sub>2</sub>	0.11	0.14	0.14	0.17	1.54	1.1	0.79	0.97	1.28	1.09
Al <sub>2</sub> O <sub>3</sub>	12.29	12.31	12.49	12.7	18.47	17.53	16.49	14.35	17.15	16.85
Fe <sub>2</sub> O <sub>3</sub>	0.26	0.45	0.34	0.65	4.29	3.15	2.21	2.12	3.05	2.79
FeO	0.51	0.3	0.53	0.28	5.16	4.59	2.87	5.32	3.91	3.96
MnO	0.06	0.06	0.07	0.05	0.18	0.16	0.08	0.2	0.13	0.13
MgO	0.11	0.11	0.15	0.2	4.21	3.84	2.23	6.82	3.05	3.44
CaO	0.44	0.18	0.56	0.57	8.4	6.63	4.48	7.38	5.91	5.51
Na <sub>2</sub> O	3.66	3.63	3.57	3.54	3.61	4.12	3.4	2.37	3.69	3.5
K <sub>2</sub> O	4.71	4.36	4.78	4.77	2.16	1.84	4.07	4.57	2.09	2.72
P <sub>2</sub> O <sub>5</sub>	0.01	0.02	0.02	0.03	0.74	0.42	0.43	0.72	0.55	0.46
H <sub>2</sub> O	-	-	-	-	2.28	1.32	0.98	1.36	1.49	1.47
CO <sub>2</sub>	-	-	-	-	0.48	0.03	0.04	0.09	0.04	0.03
LOI	1.07	1.49	1.38	1.54	0.12	0.1	0.06	0.08	0.15	0.13
Total	99.86	99.84	99.83	99.86	100.16	100.69	99.98	99.78	100.35	100.34
Cr (ppm)	0.5	0.5	0.5	0.5	8	37	17	300	36	58
Ni	3	3	3	4	11	19	15	130	23	30
Sc	3	3	3	3	-	-	-	-	-	-
V	4	8	6	9	307	207	107	195	160	145
Cu	2	3	3	3	50	7	11	6	3	8
Pb	20.5	30.5	23	20	0	0	0	0	7	10
Zn	15	24	21	16	117	85	62	84	85	88
Bi	0.05	2.3	0.05	0.05	678	218	1037	1861	211	450
Sn	3	5	2	2	-	-	-	-	-	-
Mo	0.05	0.7	2.5	0.2	-	-	-	-	-	-
S	60	60	60	60	-	-	-	-	-	-
As	2.4	1.1	3.9	2.2	-	-	-	-	-	-
Sb	0.4	0.8	0.1	0.2	-	-	-	-	-	-
Ag	0.25	0.25	0.25	0.25	-	-	-	-	-	-
Rb	368	317	392	313	165	110	130	150	148	166
Cs	6.6	14.5	16.9	8.9	-	-	-	-	-	-
Ba	36	127	85	108	678	218	1037	1861	211	450
Sr	21	68	36	57	880	631	810	603	625	704
Ga	16.9	15.8	16.3	15.6	24	21	17	18	22	20
Li	17.5	9	42	31	-	-	-	-	-	-
Ta	3.5	2.5	3	2	-	-	-	-	-	-
Nb	17	14.3	16.8	14.2	14	6	8	11	10	8
Hf	2.7	3.3	3	3	-	-	-	-	-	-
Zr	94	95	98	96	245	143	210	322	216	230
Y	63.6	38.3	48.6	39.6	51	26	22	32	23	25
Th	41	32.5	36.3	33.6	7	11	19	10	8	12
U	11.3	8.6	9.2	8.6	2	3	4	3	3	4
La	19.6	25.3	21.4	26.1	-	-	-	-	-	-
Ce	47.3	44.2	49	55.3	-	-	-	-	-	-
Pr	6.2	7	6	6.7	-	-	-	-	-	-
Nd	23.7	26.1	22.5	24.6	-	-	-	-	-	-
Sm	6.5	6.2	5.7	5.8	-	-	-	-	-	-
Eu	0.2	0.3	0.3	0.4	-	-	-	-	-	-
Gd	6.8	5.6	5.8	5.5	-	-	-	-	-	-
Tb	1.4	1	1.1	1	-	-	-	-	-	-
Dy	7.8	5.1	6.5	5.6	-	-	-	-	-	-
Ho	1.7	1.1	1.4	1.2	-	-	-	-	-	-
Er	5.6	3.5	4.7	3.8	-	-	-	-	-	-
Yb	6.5	4	5.4	4.2	-	-	-	-	-	-
Lu	1	0.6	0.8	0.6	-	-	-	-	-	-
F	100	376	1023	402	-	-	-	-	-	-
Be	8.5	3.9	7.4	5.1	-	-	-	-	-	-
Ge	2.5	2	2.2	2	-	-	-	-	-	-
ASI	1.031	1.117	1.035	1.056	0.784	0.842	0.909	0.645	0.899	0.900
Eu/Eu*	0.09	0.15	0.16	0.21	-	-	-	-	-	-
La <sub>N</sub> /Yb <sub>N</sub>	2.1	4.4	2.8	4.3	-	-	-	-	-	-
Rb/Sr	17.5	4.7	10.9	5.5	0.2	0.2	0.2	0.2	0.2	0.2
K/Rb	106.2	114.2	101.2	126.5	108.7	138.9	259.9	252.9	117.2	136.0

**Appendix 1**

<b>Sample</b>	<b>SC*</b>	<b>SD*</b>	<b>SE*</b>	<b>SF*</b>	<b>SG*</b>	<b>SH*</b>	<b>E100*</b>	<b>112*</b>
<b>Zone</b>	Enclave	Enclave	Enclave	Enclave	Enclave	Enclave	Enclave	Enclave
<i>Easting (m)</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>	427262	<i>no</i>
<i>Northing (m)</i>	<i>data</i>	<i>data</i>	<i>data</i>	<i>data</i>	<i>data</i>	<i>data</i>	6768117	<i>data</i>
SiO <sub>2</sub> , wt%	56.18	51.93	54.41	54.37	55.29	49.79	57.34	54.97
TiO <sub>2</sub>	1.02	1.26	1.21	1.14	1.05	1.26	1.38	1.14
Al <sub>2</sub> O <sub>3</sub>	16.67	16.94	17.9	17.73	15.22	17.78	17.29	17.19
Fe <sub>2</sub> O <sub>3</sub>	3.01	3.02	3.83	3.32	2.95	3.95	3.57	2.59
FeO	3.33	5.84	4.4	3.66	3.62	5.51	3.83	4.41
MnO	0.23	0.17	0.17	0.09	0.16	0.2	0.22	0.19
MgO	3.15	5.73	3.7	3.23	4.24	5.89	2.81	4.52
CaO	5.7	7.82	7.2	6.21	6.31	8.32	4.99	6.11
Na <sub>2</sub> O	5.89	3.66	3.98	4.22	2.57	3.47	4.72	3.9
K <sub>2</sub> O	1.3	1.95	1.89	3.48	6.1	1.68	1.72	2.47
P <sub>2</sub> O <sub>5</sub>	0.27	0.56	0.36	0.58	1.03	0.47	0.56	0.51
H <sub>2</sub> O	1.85	1.45	1.42	1.81	1.33	1.54	1.35	1.47
CO <sub>2</sub>	0.42	0.07	0.01	0.07	0.07	0.05	0.05	0.09
LOI	0.3	0.13	0.12	0.17	0.16	0.08	0.13	0.15
Total	99.32	100.53	100.6	100.08	100.1	99.99	99.96	99.71
Cr (ppm)	53	108	18	4	107	80	8	108
Ni	11	55	16	19	59	52	8	57
Sc	-	-	-	-	-	-	-	-
V	147	256	253	175	155	285	155	172
Cu	4	19	6	3	9	13	11	28
Pb	11	36	7	7	18	14	15	15
Zn	81	109	76	33	74	112	121	104
Bi	96	229	101	360	1079	191	208	508
Sn	-	-	-	-	-	-	-	-
Mo	-	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-	-
As	-	-	-	-	-	-	-	-
Sb	-	-	-	-	-	-	-	-
Ag	-	-	-	-	-	-	-	-
Rb	158	121	109	152	192	111	156	182
Cs	-	-	-	-	-	-	-	-
Ba	96	229	101	360	1079	191	208	508
Sr	339	622	620	591	634	711	419	526
Ga	24	20	22	23	18	18	25	19
Li	-	-	-	-	-	-	-	-
Ta	-	-	-	-	-	-	-	-
Nb	19	8	9	17	23	5	17	15
Hf	-	-	-	-	-	-	-	-
Zr	152	176	156	293	354	127	282	243
Y	36	22	5	32	30	19	27	25
Th	11	15	13	18	19	4	15	16
U	10	1	4	6	6	2	8	7
La	-	-	-	-	-	-	-	-
Ce	-	-	-	-	-	-	-	-
Pr	-	-	-	-	-	-	-	-
Nd	-	-	-	-	-	-	-	-
Sm	-	-	-	-	-	-	-	-
Eu	-	-	-	-	-	-	-	-
Gd	-	-	-	-	-	-	-	-
Tb	-	-	-	-	-	-	-	-
Dy	-	-	-	-	-	-	-	-
Ho	-	-	-	-	-	-	-	-
Er	-	-	-	-	-	-	-	-
Yb	-	-	-	-	-	-	-	-
Lu	-	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-	-
Be	-	-	-	-	-	-	-	-
Ge	-	-	-	-	-	-	-	-
ASI	0.777	0.758	0.826	0.806	0.682	0.785	0.925	0.851
Eu/Eu*	-	-	-	-	-	-	-	-
La <sub>N</sub> /Yb <sub>N</sub>	-	-	-	-	-	-	-	-
Rb/Sr	0.5	0.2	0.2	0.3	0.3	0.2	0.4	0.3
K/Rb	68.3	133.8	143.9	190.1	263.7	125.6	91.5	112.7

**Appendix 2a.**

Calculation of trace element fractional crystallisation models for Surface equilibrium (SEQ) and Total equilibrium (TEQ)

Weight proportion of minerals fractionated

Mineral	Modal %	Recalculated
K-feldspar	34.35	43.75%
Plagioclase	33.7	42.90%
Hornblende	2.9	3.69%
Biotite	6.9	8.78%
Zircon	0.2	0.25%
Magnetite	0.3	0.38%
Apatite	0.2	0.25%

Appendix 2b. Calculated Trace element Concentration in the liquid (ppm)

% XSTAL	La	Ce	Pr	Nd	K	Rb	Sr	Ba	Cr	Ni	Ti	Sc	Y	Nb	Zr	V	U	Th	
Initial Conc'n	30.90	69.30	7.30	28.65	35779	179	405	674	8.60	8.10	3177	9.40	27.05	6.80	180	58.45	5.05	34.40	
5 (SEQ)	32.06	71.78	7.54	29.49	35761	185	313	588	8.26	8.53	3264	9.06	27.75	7.02	187	60.37	5.31	36.11	
5 (TEQ)	32.05	71.76	7.54	29.48	35761	185	323	595	8.27	8.53	3262	9.07	27.74	7.02	187	60.35	5.31	36.11	
10 (SEQ)	33.33	74.49	7.80	30.41	35742	191	238	509	7.91	9.00	3357	8.71	28.51	7.26	194	62.45	5.60	38.01	
10 (TEQ)	33.29	74.40	7.79	30.37	35744	191	269	532	7.97	9.00	3352	8.76	28.47	7.25	193	62.37	5.59	38.00	
15 (SEQ)	34.73	77.46	8.09	31.40	35723	198	179	437	7.56	9.53	3458	8.35	29.34	7.52	201	64.74	5.92	40.12	
15 (TEQ)	34.64	77.24	8.06	31.30	35727	198	231	482	7.68	9.53	3447	8.48	29.24	7.50	201	64.54	5.91	40.10	
20 (SEQ)	36.28	80.75	8.40	32.50	35702	206	132	372	7.20	10.13	3570	7.99	30.24	7.81	210	67.26	6.27	42.50	
20 (TEQ)	36.09	80.30	8.35	32.30	35710	205	202	440	7.42	10.13	3547	8.21	30.06	7.76	209	66.86	6.27	42.44	
25 (SEQ)	38.00	84.40	8.75	33.70	35680	215	95	313	6.84	10.80	3692	7.63	31.24	8.13	219	70.04	6.68	45.17	
25 (TEQ)	37.67	83.62	8.66	33.36	35693	212	179	405	7.17	10.80	3654	7.95	30.92	8.04	217	69.35	6.67	45.07	
30 (SEQ)	39.93	88.48	9.14	35.04	35656	224	68	261	6.48	11.57	3827	7.25	32.33	8.48	230	73.15	7.14	48.22	
30 (TEQ)	39.40	87.23	9.00	34.49	35676	221	161	375	6.94	11.57	3767	7.72	31.83	8.35	226	72.04	7.13	48.05	
35 (SEQ)	42.12	93.09	9.57	36.54	35631	235	47	214	6.10	12.46	3978	6.87	33.55	8.88	241	76.64	7.68	51.73	
35 (TEQ)	41.29	91.16	9.36	35.71	35659	229	147	349	6.73	12.46	3887	7.49	32.79	8.68	236	74.94	7.66	51.46	
40 (SEQ)	44.61	98.34	10.07	38.23	35604	247	31	173	5.73	13.50	4147	6.48	34.93	9.33	255	80.59	8.30	55.80	
40 (TEQ)	43.37	95.46	9.76	37.01	35642	239	135	326	6.52	13.50	4015	7.28	33.82	9.04	247	78.09	8.26	55.38	
45 (SEQ)	47.49	104.38	10.64	40.16	35574	260	20	137	5.34	14.73	4340	6.08	36.48	9.84	270	85.12	9.03	60.60	
45 (TEQ)	45.68	100.19	10.19	38.41	35625	249	124	307	6.33	14.73	4152	7.08	34.91	9.42	259	81.52	8.98	59.95	
50 (SEQ)	50.86	111.42	11.29	42.38	35542	276	12	106	4.95	16.20	4561	5.68	38.26	10.44	288	90.38	9.91	66.32	
50 (TEQ)	48.24	105.41	10.65	39.92	35608	261	115	289	6.15	16.20	4298	6.89	36.07	9.85	272	85.25	9.83	65.34	
55 (SEQ)	54.86	119.76	12.07	44.97	35506	295	7	80	4.56	18.00	4819	5.26	40.33	11.15	309	96.57	10.98	73.28	
55 (TEQ)	51.11	111.20	11.17	41.56	35591	273	108	273	5.98	18.00	4456	6.71	37.32	10.31	287	89.35	10.86	71.80	
60 (SEQ)	59.71	129.82	13.00	48.07	35466	318	4	59	4.15	20.25	5124	4.83	42.78	11.99	335	3.99	12.31	81.93	
60 (TEQ)	54.34	117.67	11.73	43.33	35574	287	101	259	5.82	20.25	4625	6.54	38.65	10.82	303	93.86	12.12	79.68	
65 (SEQ)	65.73	142.26	14.14	51.83	35420	346	2	41	3.73	23.14	5494	4.38	45.73	13.02	367	13.10	14.02	92.98	
65 (TEQ)	58.01	124.93	12.36	45.27	35557	302	95	247	5.67	23.14	4807	6.38	40.08	11.38	322	98.85	13.72	89.49	
70 (SEQ)	73.43	158.10	15.58	56.55	35368	380	1	27	3.30	27.00	5954	3.92	49.40	14.32	407	24.62	16.28	107.59	
70 (TEQ)	62.20	133.15	13.05	47.38	35540	319	90	235	5.52	27.00	5005	6.23	41.62	12.00	342	4.41	15.81	102.07	
75 (SEQ)	83.71	179.14	17.47	62.68	35306	426	0	17	2.85	32.40	6548	3.43	54.12	16.03	460	39.75	19.44	127.87	
75 (TEQ)	67.06	142.53	13.83	49.70	35523	337	85	225	5.39	32.40	5219	6.08	43.29	12.69	366	10.62	18.65	118.75	
80 (SEQ)	98.28	208.73	20.11	71.10	35231	490	0	9	2.39	40.50	7356	2.92	60.51	18.41	535	60.80	24.15	157.96	
80 (TEQ)	72.73	153.34	14.71	52.26	35506	359	81	215	5.26	40.50	5453	5.94	45.10	13.47	393	17.62	22.74	141.95	
85 (SEQ)	120.86	254.20	24.10	83.64	35134	587	0	4	1.90	54.00	8547	2.36	69.87	22.00	650	92.69	31.95	207.43	
85 (TEQ)	79.45	165.91	15.70	55.10	35489	382	77	206	5.13	54.00	5708	5.81	47.06	14.35	424	25.56	29.11	176.43	
90 (SEQ)	161.76	335.58	31.11	105.16	34997	756	0	1	1.38	81.000	1	560	1.76	85.58	28.27	855	48.65	47.39	304.54
90 (TEQ)	87.54	180.73	16.84	58.26	35472	410	73	198	5.01	81.00	5989	5.68	49.20	15.35	461	34.65	40.44	233.03	
95 (SEQ)	266.25	539.54	48.12	155.54	34765	1166	0	0	0.79	62.000	1	5159	1.06	121.04	43.41	1367	84.48	92.98	587.15
95 (TEQ)	97.47	198.46	18.16	61.81	35456	441	70	191	4.90	62.00	6298	5.56	51.54	16.50	504	45.17	66.23	343.08	

**Appendix 2c.** Mineral/melt partition coefficients for trace elements used for trace element modelling (from Rollinson, 1993).

Element	Titanite	Allanite	Hbl	Ilmenite	Kspar	Plag	Biotite	Magnetite	Apatite	Zircon
La	0.22	0.32	0.7	7.1	0	0	0	1	25	2.8
Ce	0.15	0.5	1.52	7.8	0	0	0	1	34.7	2.64
Pr	0.17	0.75	2.9	0	0	0	0	1	44	2.4
Nd	0.22	1.11	4.26	7.6	0	0	0	1	57.1	2.2
Sm	0.27	1.67	7.77	6.9	0	0	0	1	62.8	3.14
Eu	0.17	1.56	5.14	2.5	1	2	0	1	30.4	3.14
Gd	0.34	1.85	10	0	0	0	0	1	56.3	12
Dy	0.46	1.93	13	0	0	0	0	1	50.7	45.7
Ee	0.65	1.66	12	4.9	0	0	0	1	37.2	135
Yb	0.86	1.58	8.4	4.1	0	0	0	1	23.9	270
Lu	0.9	1.54	5.5	3.6	0	0	0	0	20.2	323
K	0.0023	0.037	0.081	0	1	0	4	0	0	0
Rb	0.0027	0.032	0.014	0	0	0	2	0	0	0
Sr	0.085	0.516	0.22	0	9	4	0	0	0	0
Ba	0.0029	0.131	0.044	0	6	0	10	0	0	0
Cr	2	90	0	3	0	0	19	11	0	0
Ni	0	0	0	0	0	0	0	0	0	0
Ti	0.25	0.35	7	0	0	0	2	6	0.1	0
Sc	7	22	20	5.9	0	0	11	4	0	0
Yb	0.8	2	6	0	0	0	2	1	40	0
Nb	0.5	0.4	4	0	0	0	2	2	0.1	0
Zr	0.15	0.3	4	0	0	0	2	0	0.1	0
V	7	0	8	0	0	0	0	20	0	0
U	0.09	0.25	0.4	3.2	0	0	0	0	0	0
Th	0.16	0.13	0.22	7.5	0	0	0	0	0	0

### Appendix 3a. Feldspar mineral chemistry data

<b>Sample</b>	<b>285a1p</b>	<b>285a3e</b>	<b>285a9e</b>	<b>285k1w</b>	<b>285k2h</b>	<b>285k9h</b>	<b>285k9w</b>
Zone	1	1	1	1	1	1	1
Mineral	albite	albite	albite	kspar	kspar	kspar	kspar
<i>Easting (m)</i>	<i>439670</i>	<i>439670</i>	<i>439670</i>	<i>439670</i>	<i>439670</i>	<i>439670</i>	<i>439670</i>
<i>Northing (m)</i>	<i>6792048</i>	<i>6792048</i>	<i>6792048</i>	<i>6792048</i>	<i>6792048</i>	<i>6792048</i>	<i>6792048</i>
SiO <sub>2</sub>	64.42	73.04	67.85	65.41	65.42	65.30	66.75
TiO <sub>2</sub>	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Al <sub>2</sub> O <sub>3</sub>	22.04	17.07	19.90	18.23	17.98	18.19	17.48
FeO	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.24
MnO	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
MgO	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
CaO	3.71	1.82	1.15	0.30	<0.20	0.37	0.31
Na <sub>2</sub> O	9.59	8.60	10.96	3.35	1.39	2.97	4.53
K <sub>2</sub> O	0.25	<0.20	<0.20	12.25	15.54	12.70	10.51
Cl	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
TOTAL	100.01	100.53	99.86	99.54	100.33	99.53	99.82
Number of cations based on 32 Oxygens							
Si	11.37	12.53	11.88	12.00	12.04	12.00	12.13
Al	4.58	3.45	4.10	3.94	3.90	3.94	3.74
Ti	-	-	-	-	-	-	-
Fe2	-	-	-	-	-	-	0.04
Mn	-	-	-	-	-	-	-
Mg	-	-	-	-	-	-	-
Ca	0.70	0.33	0.22	0.06	-	0.07	0.06
Na	3.28	2.86	3.72	1.19	0.50	1.06	1.60
K	0.06	-	-	2.87	3.65	2.98	2.44
Cations	20.00	19.17	19.92	20.06	20.08	20.04	20.01
X	15.96	15.98	15.99	15.94	15.94	15.94	15.88
Z	4.04	3.19	3.94	4.12	4.14	4.11	4.13
Composition							
Ab	81.2	89.5	94.5	28.9	12.0	25.8	39.0
An	17.4	10.5	5.5	1.4	0.0	1.8	1.5
Or	1.4	0.0	0.0	69.6	88.0	72.5	59.5

<b>285p4c</b>	<b>285p4m</b>	<b>285p4r</b>	<b>285p5r</b>	<b>285p6r</b>	<b>285p7c</b>	<b>285p7m</b>	<b>285p7m</b>	<b>285p7r</b>
1	1	1	1	1	1	1	1	1
plag	plag	plag	plag	plag	plag	plag	plag	plag
<i>439670</i>	<i>439670</i>	<i>439670</i>	<i>439670</i>	<i>439670</i>	<i>439670</i>	<i>439670</i>	<i>439670</i>	<i>439670</i>
<i>6792048</i>	<i>6792048</i>	<i>6792048</i>	<i>6792048</i>	<i>6792048</i>	<i>6792048</i>	<i>6792048</i>	<i>6792048</i>	<i>6792048</i>
62.65	64.76	66.10	66.05	65.98	58.21	60.59	64.47	66.87
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
23.35	21.71	21.13	21.21	21.09	25.94	24.69	21.81	20.61
0.20	0.20	<0.20	0.34	0.35	<0.20	0.30	0.37	<0.20
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
5.47	3.86	2.77	2.68	2.66	8.86	6.95	3.60	2.21
8.64	8.97	10.09	10.27	10.06	7.05	7.82	9.76	10.28
0.35	0.49	0.22	<0.20	<0.20	<0.20	0.21	0.24	0.20
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
100.66	99.99	100.31	100.55	100.14	100.06	100.56	100.25	100.17
11.06	11.44	11.59	11.57	11.59	10.43	10.76	11.38	11.72
4.86	4.52	4.36	4.38	4.36	5.47	5.16	4.53	4.25
-	-	-	-	-	-	-	-	-
0.03	0.03	-	0.05	0.05	-	0.05	0.06	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
1.04	0.73	0.52	0.50	0.50	1.70	1.32	0.68	0.42
2.96	3.07	3.43	3.49	3.43	2.45	2.69	3.34	3.49
0.08	0.11	0.05	-	-	-	0.05	0.05	0.05
20.02	19.89	19.96	19.98	19.93	20.05	20.03	20.05	19.92
15.92	15.95	15.96	15.94	15.95	15.90	15.92	15.91	15.97
4.10	3.94	4.00	4.04	3.98	4.15	4.11	4.13	3.95
72.6	78.5	85.8	87.4	87.2	59.0	66.3	82.0	88.4
25.4	18.7	13.0	12.6	12.8	41.0	32.5	16.7	10.5
1.9	2.8	1.2	0.0	0.0	0.0	1.2	1.3	1.1

<b>285p8r</b>	<b>289a1e</b>	<b>289a5e</b>	<b>289a8p</b>	<b>289k1h</b>	<b>289k4h</b>	<b>289k7h</b>	<b>289p10c</b>	<b>289p10m</b>
1	2	2	2	2	2	2	2	2
plag	albite	albite	albite	kspar	kspar	kspar	plag	plag
<i>439670</i>	<i>438820</i>	<i>438820</i>	<i>438820</i>	<i>438820</i>	<i>438820</i>	<i>438820</i>	<i>438820</i>	<i>438820</i>
<i>6792048</i>	<i>6789910</i>	<i>6789910</i>	<i>6789910</i>	<i>6789910</i>	<i>6789910</i>	<i>6789910</i>	<i>6789910</i>	<i>6789910</i>
65.45	68.49	69.08	65.37	64.87	64.93	64.54	60.70	60.84
<0.20	<0.20	<0.20	<0.20	<0.20	0.20	0.28	<0.20	<0.20
21.60	18.79	19.23	21.20	17.95	18.02	18.04	23.63	24.04
0.28	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.23	<0.20
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
3.10	0.37	<0.20	2.06	<0.20	0.27	0.21	6.34	6.44
10.01	11.17	11.42	10.05	1.27	1.34	0.98	8.01	7.85
<0.20	0.43	0.20	0.66	15.83	15.57	15.93	0.22	0.50
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
100.44	99.25	99.93	99.34	99.92	100.33	99.98	99.13	99.67
11.49	12.06	12.06	11.58	12.01	11.97	11.96	10.91	10.88
4.46	3.90	3.95	4.42	3.91	3.91	3.94	5.00	5.06
-	-	-	-	-	0.03	0.04	-	-
0.04	-	-	-	-	-	-	0.04	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.58	0.07	-	0.39	-	0.05	0.04	1.22	1.23
3.41	3.81	3.86	3.45	0.46	0.48	0.35	2.79	2.72
-	0.10	0.05	0.15	3.74	3.66	3.77	0.05	0.11
19.98	19.94	19.92	20.00	20.12	20.11	20.09	20.01	20.00
15.95	15.96	16.01	16.01	15.93	15.91	15.93	15.91	15.94
4.03	3.98	3.91	3.99	4.20	4.20	4.16	4.10	4.07
85.4	95.8	98.8	86.5	10.9	11.4	8.5	68.7	66.9
14.6	1.8	0.0	9.8	0.0	1.3	1.0	30.1	30.3
0.0	2.4	1.2	3.7	89.1	87.3	90.5	1.2	2.8

<b>289p10r</b>	<b>289p2r</b>	<b>289p3r</b>	<b>289p6m</b>	<b>289p9c</b>	<b>289p9r</b>	<b>260bp1</b>	<b>260Bp1m</b>	<b>260Bp1r</b>
2	2	2	2	2	2	3	3	3
plag	plag	plag	plag	plag	plag	plag	plag	plag
<i>438820</i>	<i>438820</i>	<i>438820</i>	<i>438820</i>	<i>438820</i>	<i>438820</i>	<i>429880</i>	<i>429880</i>	<i>429880</i>
<i>6789910</i>	<i>6789910</i>	<i>6789910</i>	<i>6789910</i>	<i>6789910</i>	<i>6789910</i>	<i>6777015</i>	<i>6777015</i>	<i>6777015</i>
62.55	63.43	61.10	62.06	60.97	60.99	63.94	65.09	64.89
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
22.97	22.35	23.31	23.86	24.15	23.73	21.43	17.63	17.82
0.27	0.20	<0.20	<0.20	<0.20	0.20	0.26	0.33	<0.20
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
5.45	4.51	5.93	6.22	6.72	6.36	3.56	0.29	0.24
8.57	9.02	8.53	8.29	7.57	7.89	9.35	1.38	1.06
0.43	0.22	0.21	0.37	0.26	0.27	0.30	15.18	15.95
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
100.24	99.73	99.08	100.80	99.67	99.44	98.84	99.90	99.96
11.10	11.26	10.97	10.96	10.88	10.92	11.43	12.04	12.02
4.80	4.67	4.93	4.96	5.07	5.00	4.51	3.84	3.89
-	-	-	-	-	-	-	-	-
0.04	0.03	-	-	-	0.03	0.04	0.05	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
1.04	0.86	1.14	1.18	1.29	1.22	0.68	0.06	0.05
2.95	3.11	2.97	2.84	2.62	2.74	3.24	0.50	0.38
0.10	0.05	0.05	0.08	0.06	0.06	0.07	3.58	3.77
20.02	19.98	20.06	20.02	19.92	19.97	19.97	20.07	20.11
15.90	15.93	15.90	15.92	15.95	15.92	15.94	15.88	15.91
4.12	4.04	4.16	4.10	3.96	4.05	4.03	4.19	4.20
72.2	77.4	71.4	69.3	66.1	68.1	81.2	12.0	9.1
25.4	21.4	27.4	28.7	32.4	30.3	17.1	1.4	1.1
2.4	1.2	1.2	2.0	1.5	1.5	1.7	86.7	89.8

<b>260bp2</b>	<b>260bp3</b>	<b>260Bp3r</b>	<b>260Bp5c</b>	<b>260Bp5r</b>	<b>260k6h</b>	<b>260p7ci</b>	<b>10p1</b>	<b>10p2</b>
3	3	3	3	3	3	3	4A	4A
plag	plag	plag	plag	plag	kspar	plag	plag	plag
<i>429880</i>	<i>429880</i>	<i>429880</i>	<i>429880</i>	<i>429880</i>	<i>429880</i>	<i>429880</i>	<i>432968</i>	<i>432968</i>
<i>6777015</i>	<i>6777015</i>	<i>6777015</i>	<i>6777015</i>	<i>6777015</i>	<i>6777015</i>	<i>6777015</i>	<i>6777331</i>	<i>6777331</i>
64.88	61.27	61.61	61.54	61.10	64.71	60.92	65.10	62.31
<0.20	<0.20	<0.20	<0.20	<0.20	0.33	<0.20	<0.20	<0.20
20.61	23.88	24.39	23.84	24.16	18.27	24.05	21.40	23.24
<0.20	0.21	<0.20	0.32	0.26	<0.20	0.33	<0.20	<0.20
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
<0.20	0.00	<0.20	<0.20	<0.20	<0.20	<0.20	0.31	0.23
2.70	6.20	6.65	6.29	6.45	0.29	6.55	3.52	5.56
9.54	7.88	7.89	8.13	7.79	1.80	8.21	9.23	7.96
0.29	0.29	0.37	0.66	0.45	14.76	0.27	0.23	0.20
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
98.02	99.73	100.91	100.78	100.21	100.16	100.33	99.79	99.50
11.63	10.93	10.87	10.91	10.87	11.92	10.84	11.49	11.09
4.35	5.02	5.07	4.98	5.06	3.96	5.04	4.45	4.87
-	-	-	-	-	0.05	-	-	-
-	0.03	-	0.05	0.04	-	0.05	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	0.08	0.06
0.52	1.19	1.26	1.19	1.23	0.06	1.25	0.67	1.06
3.32	2.73	2.70	2.79	2.69	0.64	2.83	3.16	2.75
0.07	0.07	0.08	0.15	0.10	3.47	0.06	0.05	0.05
19.88	19.95	19.98	20.07	19.99	20.10	20.08	19.89	19.87
15.98	15.94	15.94	15.88	15.93	15.93	15.88	15.93	15.96
3.90	4.01	4.04	4.18	4.06	4.17	4.19	3.96	3.91
85.0	68.5	66.8	67.5	66.9	15.4	68.4	81.5	71.3
13.3	29.8	31.1	28.9	30.6	1.4	30.1	17.2	27.5
1.7	1.7	2.1	3.6	2.5	83.2	1.5	1.3	1.2

<b>10p3</b>	<b>10p4</b>	<b>20p1</b>	<b>20p2</b>	<b>20p3</b>	<b>20p4</b>	<b>81ba2e</b>	<b>81ba4e</b>	<b>81bk1h</b>
4A	4A	4B	4B	4B	4B	4C	4C	4C
plag	plag	plag	plag	plag	plag	albite	albite	kspar
432968	432968	432968	432968	432968	432968	432790	432790	432790
6777331	6777331	6777331	6777331	6777331	6777331	6776864	6776864	6776864
66.57	69.24	62.08	64.08	65.66	63.71	67.95	68.90	64.98
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
20.31	18.90	22.90	22.19	21.03	22.14	19.45	19.45	17.78
<0.20	<0.20	<0.20	<0.20	0.46	0.25	<0.20	<0.20	<0.20
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
0.22	0.40	0.39	0.30	0.28	0.28	<0.20	<0.20	<0.20
2.17	1.38	5.26	4.16	3.31	4.54	0.92	0.49	0.22
10.00	10.18	7.84	8.66	9.45	8.78	11.05	11.30	1.22
0.20	<0.20	0.30	0.09	0.20	0.42	<0.20	0.31	16.07
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
99.47	100.10	98.77	99.48	100.39	100.12	99.37	100.45	100.27
11.74	12.05	11.12	11.34	11.54	11.27	11.95	11.99	12.02
4.22	3.87	4.83	4.63	4.35	4.61	4.03	3.99	3.87
-	-	-	-	-	-	-	-	-
-	-	-	-	0.07	0.04	-	-	-
-	-	-	-	-	-	-	-	-
0.06	0.10	0.10	0.08	0.07	0.07	-	-	-
0.41	0.26	1.01	0.79	0.62	0.86	0.17	0.09	0.04
3.42	3.44	2.72	2.97	3.22	3.01	3.77	3.81	0.44
0.05	-	0.07	0.02	0.05	0.10	-	0.07	3.79
19.88	19.72	19.85	19.83	19.91	19.97	19.92	19.95	20.16
15.95	15.93	15.95	15.97	15.89	15.89	15.98	15.98	15.89
3.93	3.80	3.91	3.86	4.03	4.08	3.94	3.97	4.27
88.3	93.0	71.6	78.6	82.8	75.9	95.6	96.0	10.2
10.6	7.0	26.5	20.9	16.0	21.7	4.4	2.3	1.0
1.2	0.0	1.8	0.5	1.2	2.4	0.0	1.7	88.7

<b>81bp3ci</b>	<b>81bp5r</b>	<b>81bp6c</b>	<b>81bp7r</b>	<b>81bp8c</b>	<b>81bp8m</b>	<b>81bp9c</b>	<b>81bp9m</b>	<b>81bp9r</b>
4C	4C	4C	4C	4C	4C	4C	4C	4C
plag	kspar	kspar	plag	plag	plag	plag	plag	plag
<i>432790</i>	<i>432790</i>	<i>432790</i>	<i>432790</i>	<i>432790</i>	<i>432790</i>	<i>432790</i>	<i>432790</i>	<i>432790</i>
<i>6776864</i>	<i>6776864</i>	<i>6776864</i>	<i>6776864</i>	<i>6776864</i>	<i>6776864</i>	<i>6776864</i>	<i>6776864</i>	<i>6776864</i>
62.98	65.10	65.60	67.49	61.74	64.46	64.30	65.51	68.90
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
22.77	17.90	18.22	19.88	23.88	21.89	21.88	20.93	19.05
0.25	<0.20	0.24	0.31	0.23	0.26	0.32	<0.20	<0.20
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
4.87	0.29	0.23	1.28	5.93	3.55	3.91	2.85	0.18
8.77	1.19	1.45	11.08	7.89	9.41	9.17	9.80	11.57
0.35	16.20	15.60	0.36	0.46	0.44	0.66	0.68	0.21
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
99.99	100.68	101.34	100.40	100.13	100.01	100.24	99.77	99.91
11.17	12.00	11.98	11.82	10.96	11.39	11.36	11.58	12.05
4.76	3.89	3.92	4.10	4.99	4.56	4.55	4.36	3.92
-	-	-	-	-	-	-	-	-
0.04	-	0.04	0.05	0.03	0.04	0.05	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.93	0.06	0.05	0.24	1.13	0.67	0.74	0.54	0.03
3.02	0.43	0.51	3.76	2.72	3.23	3.14	3.36	3.92
0.08	3.81	3.64	0.08	0.10	0.10	0.15	0.15	0.05
19.99	20.17	20.13	20.05	19.94	19.98	20.00	19.99	19.97
15.93	15.88	15.90	15.92	15.96	15.95	15.92	15.94	15.97
4.06	4.29	4.23	4.13	3.98	4.03	4.08	4.05	4.00
75.0	9.9	12.2	92.2	68.8	80.7	78.0	82.9	98.0
23.0	1.3	1.1	5.9	28.6	16.8	18.4	13.3	0.8
2.0	88.8	86.7	2.0	2.6	2.5	3.7	3.8	1.2

<b>261Ap1</b>	<b>261Ap2</b>	<b>198a3e</b>	<b>198k3h</b>	<b>198k3w</b>	<b>198k5c</b>	<b>198k5m</b>	<b>198k5r</b>	<b>198p1c</b>
4C	4C	5	5	5	5	5	5	5
plag	plag	alb	kspar	kspar	kspar	kspar	kspar	plag
<i>432988</i>	<i>432988</i>	<i>428700</i>	<i>428700</i>	<i>428700</i>	<i>428700</i>	<i>428700</i>	<i>428700</i>	<i>428700</i>
<i>6777331</i>	<i>6777331</i>	<i>6786283</i>	<i>6786283</i>	<i>6786283</i>	<i>6786283</i>	<i>6786283</i>	<i>6786283</i>	<i>6786283</i>
69.51	70.03	73.99	65.10	65.20	65.36	65.09	65.05	65.37
<0.20	<0.20	<0.20	<0.20	<0.20	0.20	<0.20	<0.20	<0.20
19.40	19.08	15.91	18.13	17.94	17.85	17.65	17.71	20.98
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
<0.20	0.22	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
0.51	<0.20	0.38	0.29	0.33	0.48	0.22	0.24	3.11
11.67	12.02	9.24	1.19	1.20	3.06	1.21	1.02	9.64
0.25	<0.20	<0.20	14.87	15.66	13.01	15.55	16.21	0.50
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
101.34	101.35	99.52	99.58	100.33	99.96	99.72	100.23	99.60
12.00	12.07	12.77	12.03	12.02	12.00	12.06	12.03	11.57
3.95	3.87	3.23	3.95	3.89	3.86	3.85	3.86	4.37
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	0.03	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.09	-	0.07	0.06	0.07	0.09	0.04	0.05	0.59
3.91	4.02	3.09	0.43	0.43	1.09	0.44	0.37	3.31
0.06	-	-	3.51	3.68	3.05	3.68	3.83	0.11
20.00	20.00	19.16	19.96	20.09	20.08	20.06	20.13	19.95
15.95	15.95	16.00	15.97	15.91	15.88	15.91	15.89	15.94
4.06	4.05	3.16	3.99	4.18	4.23	4.15	4.24	4.01
96.3	100.0	97.8	10.7	10.3	25.8	10.5	8.6	82.5
2.3	0.0	2.2	1.4	1.6	2.2	1.1	1.1	14.7
1.4	0.0	0.0	87.9	88.2	72.0	88.5	90.2	2.8

<b>198p1m</b>	<b>198p1m</b>	<b>198p1r</b>	<b>198p2c</b>	<b>198p2r</b>	<b>198p4c</b>	<b>198p4m</b>	<b>198p4ma</b>	<b>198p6c</b>
5	5	5	5	5	5	5	5	5
plag	plag	plag	plag	plag	plag	plag	plag	plag
<i>428700</i>	<i>428700</i>	<i>428700</i>	<i>428700</i>	<i>428700</i>	<i>428700</i>	<i>428700</i>	<i>428700</i>	<i>428700</i>
<i>6786283</i>	<i>6786283</i>	<i>6786283</i>	<i>6786283</i>	<i>6786283</i>	<i>6786283</i>	<i>6786283</i>	<i>6786283</i>	<i>6786283</i>
66.43	64.76	67.55	66.41	67.33	65.77	64.61	67.32	65.83
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
20.64	21.50	20.37	20.68	19.89	21.02	21.48	20.35	20.80
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2.45	3.35	1.78	2.03	1.33	2.44	3.36	1.78	2.84
9.91	9.07	10.38	10.03	10.57	9.70	9.30	10.63	9.76
0.00	0.29	0.21	0.37	0.29	0.38	0.30	0.29	0.36
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
99.43	98.97	100.29	99.52	99.41	99.31	99.05	100.37	99.59
11.71	11.51	11.80	11.71	11.86	11.63	11.49	11.77	11.63
4.28	4.50	4.19	4.29	4.13	4.38	4.50	4.19	4.33
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.46	0.64	0.33	0.38	0.25	0.46	0.64	0.33	0.54
3.39	3.13	3.52	3.43	3.61	3.33	3.21	3.60	3.34
0.00	0.07	0.05	0.08	0.07	0.09	0.07	0.07	0.08
19.84	19.83	19.88	19.89	19.91	19.88	19.90	19.96	19.91
15.99	16.01	15.99	16.00	15.99	16.01	15.98	15.96	15.95
3.85	3.83	3.90	3.89	3.93	3.87	3.91	4.00	3.96
88.0	81.6	90.2	88.0	92.0	85.9	81.9	90.1	84.4
12.0	16.7	8.5	9.8	6.4	11.9	16.4	8.3	13.6
0.0	1.7	1.2	2.1	1.7	2.2	1.7	1.6	2.0

<b>198p6r</b>	<b>16Aa2e</b>	<b>16Ak1h</b>	<b>16Ak1h</b>	<b>16Ak1w</b>	<b>16Ak4h</b>	<b>16Ak5c</b>	<b>16Ak6h</b>	<b>16Ap2ci</b>
5	6	6	6	6	6	6	6	6
plag	alb	kspar	kspar	kspar	kspar	kspar	kspar	plag
428700	432968	432968	432968	432968	432968	432968	432968	432968
6786283	6777331	6777331	6777331	6777331	6777331	6777331	6777331	6777331
66.80	68.46	68.05	64.29	64.13	64.72	65.07	63.96	65.69
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
20.37	19.46	19.62	17.68	17.83	18.07	18.22	17.66	20.33
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.28	<0.20	<0.20
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
<0.20	<0.20	<0.20	<0.20	<0.20	0.20	0.22	<0.20	<0.20
2.04	0.27	0.38	0.31	0.33	0.31	<0.20	0.45	1.99
10.34	11.50	11.43	1.40	4.06	1.00	1.36	1.08	10.21
0.25	<0.20	<0.20	15.51	11.40	16.13	15.22	15.93	0.72
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
99.80	99.69	99.48	99.19	97.75	100.43	100.37	99.08	98.94
11.75	11.99	11.95	12.00	11.98	11.95	11.97	11.98	11.69
4.22	4.01	4.06	3.89	3.92	3.93	3.95	3.90	4.26
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	0.04	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	0.06	0.06	-	-
0.38	0.05	0.07	0.06	0.07	0.06	-	0.09	0.38
3.53	3.90	3.89	0.51	1.47	0.36	0.49	0.39	3.52
0.06	-	-	3.69	2.72	3.80	3.57	3.81	0.16
19.93	19.95	19.96	20.15	20.15	20.16	20.08	20.17	20.02
15.96	16.00	16.00	15.89	15.90	15.88	15.92	15.88	15.95
3.97	3.96	3.96	4.26	4.25	4.27	4.16	4.29	4.07
88.9	98.7	98.2	11.9	34.6	8.5	12.0	9.1	86.7
9.7	1.3	1.8	1.5	1.6	1.4	0.0	2.1	9.3
1.4	0.0	0.0	86.7	63.9	90.1	88.0	88.8	4.0

<b>16Ap3m</b>	<b>16Ap7r</b>	<b>16Ap8ci</b>	<b>16Ap8m</b>	<b>16Ap9r</b>	<b>192a4e</b>	<b>192k1ca</b>	<b>192k4h</b>	<b>192k4w</b>
6	6	6	6	6	7	7	7	7
plag	plag	plag	plag	plag	alb	kspar	kspar	kspar
432968	432968	432968	432968	432968	432380	432380	432380	432380
6777331	6777331	6777331	6777331	6777331	6787080	6787080	6787080	6787080
66.39	64.86	66.55	64.44	64.99	68.89	65.18	65.05	65.30
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
20.23	20.29	19.82	20.45	20.75	18.93	17.61	17.58	17.29
<0.20	<0.20	0.20	0.24	<0.20	0.21	<0.20	<0.20	0.25
0.22	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1.80	2.16	1.29	2.25	2.14	0.26	<0.20	<0.20	<0.20
10.37	9.88	10.65	9.72	10.10	11.29	1.16	1.20	3.16
0.31	0.39	0.51	0.78	0.55	0.00	15.65	15.69	12.34
<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
99.32	97.58	99.02	97.88	98.53	99.58	99.60	99.52	98.34
11.74	11.68	11.81	11.61	11.61	12.07	12.08	12.08	12.13
4.21	4.30	4.14	4.34	4.37	3.91	3.85	3.84	3.78
-	-	-	-	-	-	-	-	-
-	-	0.03	0.04	-	0.03	-	-	0.04
0.03	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.34	0.42	0.25	0.43	0.41	0.05	-	-	-
3.56	3.45	3.66	3.40	3.50	3.84	0.42	0.43	1.14
0.07	0.09	0.12	0.18	0.13	-	3.70	3.72	2.92
19.96	19.94	20.00	20.00	20.01	19.89	20.05	20.07	20.01
15.96	15.98	15.95	15.95	15.98	15.98	15.93	15.92	15.91
4.00	3.96	4.05	4.05	4.03	3.92	4.12	4.15	4.10
89.6	87.2	91.1	84.7	86.7	98.7	10.1	10.4	28.0
8.6	10.5	6.1	10.8	10.2	1.3	0.0	0.0	0.0
1.8	2.3	2.9	4.5	3.1	0.0	89.9	89.6	72.0

<b>192p2ca</b>	<b>192p3c</b>	<b>192p3r</b>	<b>192p5c</b>	<b>192p5r</b>
7	7	7	7	7
plag	plag	plag	plag	plag
<i>432380</i>	<i>432380</i>	<i>432380</i>	<i>432380</i>	<i>432380</i>
<i>6787080</i>	<i>6787080</i>	<i>6787080</i>	<i>6787080</i>	<i>6787080</i>
67.05	66.41	66.61	65.30	66.76
<0.20	<0.20	<0.20	<0.20	<0.20
20.28	20.20	19.71	21.14	19.99
<0.20	<0.20	<0.20	0.23	0.29
<0.20	<0.20	<0.20	<0.20	<0.20
<0.20	<0.20	<0.20	<0.20	<0.20
2.08	2.24	1.93	2.99	2.05
9.99	9.83	10.15	9.56	10.21
0.42	0.32	0.33	0.33	0.32
<0.20	<0.20	<0.20	<0.20	<0.20
99.82	99.00	98.73	99.55	99.62
11.78	11.76	11.83	11.55	11.78
4.20	4.21	4.12	4.41	4.15
-	-	-	-	-
-	-	-	0.03	0.04
-	-	-	-	-
-	-	-	-	-
0.39	0.43	0.37	0.57	0.39
3.40	3.38	3.50	3.28	3.49
0.09	0.07	0.08	0.07	0.07
19.87	19.85	19.89	19.91	19.92
15.98	15.98	15.95	15.96	15.93
3.89	3.87	3.94	3.96	3.99
87.5	87.2	88.8	83.7	88.4
10.1	11.0	9.3	14.5	9.8
2.4	1.9	1.9	1.9	1.8

**Appendix 3b. Hornblende mineral chemistry data**

<b>Sample</b>	<b>285h1r</b>	<b>285h2r</b>	<b>285h3r</b>	<b>289h1r</b>	<b>289h2c</b>	<b>289h2r</b>	<b>289h3c</b>	<b>289h4c</b>	<b>289h4r</b>	<b>260bh1r</b>	<b>260bh2r</b>	<b>260bh3r</b>	<b>260Ch1c</b>
Zone	1	1	1	2	2	2	2	2	2	3	3	3	3
Mineral	hornblende	hornblende	hornblende	hornblende	hornblende	hornblende	hornblende	hornblende	hornblende	hornblende	hornblende	hornblende	hornblende
Location	rim	rim	rim	rim	core	rim	core	core	rim	rim	rim	rim	core
<i>Easting (m)</i>	439670	439670	439670	438820	438820	438820	438820	438820	438820	429880	429880	429880	429880
<i>Northing (m)</i>	6792048	6792048	6792048	6789910	6789910	6789910	6789910	6789910	6789910	6777015	6777015	6777015	6777015
SiO <sub>2</sub>	50.41	50.14	50.14	52.79	48.11	48.15	48.30	48.74	48.51	49.94	49.95	50.92	48.20
TiO <sub>2</sub>	0.54	0.36	0.63	0.40	1.20	0.96	1.09	1.16	1.14	0.82	0.57	<0.20	1.23
Al <sub>2</sub> O <sub>3</sub>	4.70	4.61	4.99	3.35	6.43	6.15	5.95	6.44	6.71	3.98	4.27	2.82	6.36
FeO	14.18	14.13	14.40	12.64	15.20	15.54	14.88	15.23	15.63	16.44	16.04	15.98	14.56
MnO	2.14	2.15	2.04	1.00	0.86	0.76	0.84	0.65	0.83	0.62	0.68	0.48	0.54
MgO	14.07	14.48	14.17	15.59	13.29	13.17	13.30	13.58	13.21	14.35	14.53	15.26	13.56
CaO	11.29	11.19	11.07	11.70	11.51	11.73	11.53	11.85	11.59	11.75	11.91	12.04	11.54
Na <sub>2</sub> O	1.34	1.66	1.41	1.03	1.37	1.24	1.21	1.45	1.51	<0.40	0.54	0.59	1.31
K <sub>2</sub> O	0.57	0.58	0.55	0.32	0.74	0.77	0.73	0.69	0.86	0.42	0.39	0.25	0.71
Cl	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
TOTAL	99.24	99.30	99.40	98.82	98.71	98.47	97.83	99.79	99.99	98.32	98.88	98.34	98.01
Number of cations determined using 13CNK													
TSi	7.20	7.16	7.13	7.48	6.96	7.00	7.05	6.98	6.95	7.14	7.13	7.29	7.00
TAI	0.79	0.78	0.84	0.52	1.04	1.00	0.95	1.02	1.05	0.67	0.72	0.48	1.00
TFe3 <sup>+</sup>	0.01	0.07	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.15	0.23	0.00
CAI	0.00	0.00	0.00	0.04	0.06	0.06	0.07	0.07	0.08	0.00	0.00	0.00	0.09
CFe3 <sup>+</sup>	0.75	0.78	0.87	0.49	0.63	0.58	0.56	0.53	0.59	1.01	0.88	0.80	0.54
CMg	3.00	3.08	3.01	3.30	2.87	2.86	2.89	2.90	2.82	3.06	3.09	3.26	2.94
CFe2 <sup>+</sup>	0.94	0.84	0.81	1.01	1.21	1.31	1.25	1.30	1.29	0.77	0.88	0.88	1.23
CMn	0.26	0.26	0.25	0.12	0.11	0.09	0.10	0.08	0.10	0.08	0.08	0.06	0.07
BCa	1.73	1.71	1.69	1.78	1.79	1.83	1.80	1.82	1.78	1.80	1.82	1.85	1.80
BNa	0.27	0.29	0.31	0.22	0.22	0.17	0.20	0.18	0.22	0.00	0.15	0.15	0.20
ANa	0.10	0.17	0.08	0.06	0.17	0.18	0.15	0.22	0.20	0.00	0.00	0.01	0.17
AK	0.10	0.11	0.10	0.06	0.14	0.14	0.14	0.13	0.16	0.08	0.07	0.05	0.13
TOTAL	15.20	15.28	15.18	15.12	15.31	15.32	15.28	15.35	15.36	14.88	15.04	15.06	15.30
(O)	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
Mg/(Mg+Fe+Mn)	0.61	0.62	0.61	0.67	0.60	0.59	0.60	0.60	0.59	0.62	0.63	0.65	0.62
Zaphr													
Si	7.33	7.29	7.28	7.57	7.06	7.09	7.13	7.06	7.04	7.32	7.30	7.45	7.09
Ti	0.06	0.04	0.07	0.04	0.13	0.11	0.12	0.13	0.12	0.09	0.06	0.00	0.14
Al	0.80	0.79	0.85	0.57	1.11	1.07	1.04	1.10	1.15	0.69	0.73	0.49	1.10
Fe	1.72	1.72	1.75	1.51	1.86	1.91	1.84	1.85	1.90	2.01	1.96	1.95	1.79
Ca	1.76	1.74	1.72	1.80	1.81	1.85	1.82	1.84	1.80	1.85	1.86	1.89	1.82
Mg	3.04	3.14	3.06	3.33	2.91	2.89	2.93	2.93	2.86	3.13	3.16	3.33	2.97
Mn	0.26	0.26	0.25	0.12	0.11	0.09	0.10	0.08	0.10	0.08	0.08	0.06	0.07
Na	0.38	0.47	0.39	0.29	0.39	0.35	0.35	0.41	0.42	0.00	0.15	0.17	0.38
K	0.10	0.11	0.10	0.06	0.14	0.14	0.14	0.13	0.16	0.08	0.07	0.05	0.13
TOTAL	15.45	15.56	15.48	15.28	15.52	15.51	15.47	15.53	15.55	15.25	15.39	15.38	15.48

Appendix 3b. I

Sample	260Ch1r	10h1r	10h2r	10h3r	10h4r	20h1r	20h1r	20h2r	20h3r	20h4r	20h5r	81bh1r
Zone	3	4A	4A	4A	4A	4B	4B	4B	4B	4B	4B	4C
Mineral	hornblende	hornblende	hornblende	hornblende	hornblende	hornblende	hornblende	hornblende	hornblende	hornblende	hornblende	hornblende
Location	rim	rim	rim	rim	rim	rim	rim	rim	rim	rim	rim	rim
Easting (m)	429880	432968	432968	432968	432968	432968	432968	432968	432968	432968	432968	432968
Northing (m)	6777015	6777331	6777331	6777331	6777331	6777331	6777331	6777331	6777331	6777331	6777331	6777331
SiO <sub>2</sub>	48.74	47.99	48.68	53.33	53.56	47.79	47.66	48.10	48.39	48.21	47.92	51.21
TiO <sub>2</sub>	1.27	0.97	0.99	<0.20	0.20	1.25	1.23	1.01	1.06	1.14	1.15	<0.20
Al <sub>2</sub> O <sub>3</sub>	6.50	5.94	5.81	2.54	2.39	6.26	5.81	5.39	5.24	5.88	6.14	3.12
FeO	14.89	17.06	16.63	14.91	14.31	18.70	18.37	18.68	18.74	19.46	19.23	19.22
MnO	0.51	0.97	1.05	1.40	1.30	0.84	1.14	1.05	1.20	1.12	1.13	1.70
MgO	13.79	11.73	12.05	13.70	14.10	11.36	11.66	10.78	10.36	10.58	10.60	11.95
CaO	11.56	10.98	11.20	11.28	11.49	10.95	10.96	10.96	10.85	10.71	10.85	11.30
Na <sub>2</sub> O	1.37	1.87	1.57	0.87	0.73	1.69	1.67	1.76	1.71	2.06	1.81	1.06
K <sub>2</sub> O	0.70	0.71	0.61	0.26	<0.20	0.68	0.75	0.72	0.63	0.65	0.66	0.44
Cl	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
TOTAL	99.33	98.22	98.59	98.29	98.08	99.52	99.25	98.45	98.18	99.81	99.49	100.00
Number of cations												
TSi	6.98	7.07	7.11	7.67	7.68	6.95	6.95	7.12	7.19	7.04	7.01	7.38
TAI	1.02	0.93	0.89	0.33	0.32	1.05	1.00	0.88	0.81	0.96	0.99	0.53
TFe3 <sup>+</sup>	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.09
CAI	0.08	0.10	0.11	0.10	0.09	0.02	0.00	0.06	0.11	0.06	0.07	0.00
CFe3 <sup>+</sup>	0.62	0.49	0.50	0.47	0.45	0.74	0.74	0.47	0.40	0.60	0.63	0.75
CMg	2.94	2.58	2.62	2.94	3.02	2.46	2.54	2.38	2.30	2.30	2.31	2.57
CFe2 <sup>+</sup>	1.17	1.61	1.53	1.33	1.27	1.54	1.45	1.84	1.93	1.78	1.72	1.47
CMn	0.06	0.12	0.13	0.17	0.16	0.10	0.14	0.13	0.15	0.14	0.14	0.21
BCa	1.77	1.73	1.75	1.74	1.77	1.71	1.71	1.74	1.73	1.68	1.70	1.75
BNa	0.23	0.27	0.25	0.24	0.20	0.29	0.29	0.26	0.27	0.32	0.30	0.26
ANa	0.15	0.27	0.20	0.00	0.00	0.18	0.19	0.24	0.22	0.26	0.21	0.04
AK	0.13	0.13	0.11	0.05	0.00	0.13	0.14	0.14	0.12	0.12	0.12	0.08
TOTAL	15.28	15.40	15.31	15.03	14.97	15.31	15.32	15.38	15.34	15.38	15.34	15.12
(O)	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
Mg/Mg+Fe+Mn	0.61	0.54	0.55	0.60	0.62	0.51	0.52	0.49	0.48	0.48	0.48	0.51
Zaphr												
Si	7.07	7.14	7.19	7.74	7.76	7.06	7.07	7.20	7.26	7.14	7.11	7.51
Ti	0.14	0.11	0.11	0.00	0.02	0.14	0.14	0.11	0.12	0.13	0.13	0.00
Al	1.11	1.04	1.01	0.43	0.41	1.09	1.02	0.95	0.92	1.03	1.07	0.54
Fe	1.81	2.12	2.05	1.81	1.73	2.31	2.28	2.34	2.35	2.41	2.39	2.35
Ca	1.80	1.75	1.77	1.75	1.78	1.73	1.74	1.76	1.74	1.70	1.72	1.77
Mg	2.98	2.60	2.65	2.96	3.04	2.50	2.58	2.40	2.31	2.33	2.34	2.61
Mn	0.06	0.12	0.13	0.17	0.16	0.10	0.14	0.13	0.15	0.14	0.14	0.21
Na	0.39	0.54	0.45	0.24	0.20	0.48	0.48	0.51	0.50	0.59	0.52	0.30
K	0.13	0.14	0.11	0.05	0.00	0.13	0.14	0.14	0.12	0.12	0.13	0.08
TOTAL	15.49	15.56	15.48	15.16	15.11	15.56	15.59	15.54	15.47	15.58	15.55	15.38

**Appendix 3c. Biotite mineral chemistry data**

<b>Sample</b>	<b>285-b1</b>	<b>285-b2</b>	<b>285-b3</b>	<b>285-b4</b>	<b>289-b1</b>	<b>289-b2</b>	<b>289-b3</b>	<b>289-b4</b>	<b>260b-b1</b>	<b>260b-b2</b>	<b>260b-b3</b>	<b>260c-b1</b>	<b>260c-b2</b>
<b>Zone</b>	1	1	1	1	2	2	2	2	3	3	3	3	3
<i>Easting (m)</i>	439670	439670	439670	439670	438820	438820	438820	438820	429880	429880	429880	429880	429880
<i>Northing (m)</i>	6792048	6792048	6792048	6792048	6789910	6789910	6789910	6789910	6777015	6777015	6777015	6777015	6777015
SiO <sub>2</sub>	38.09	37.59	38.08	38.94	37.99	37.9	37.56	37.97	38.21	37.93	38.26	37.87	37.5
TiO <sub>2</sub>	3.48	3.66	3.33	2.79	3.65	3.13	3.44	3.51	3.91	3.75	3.87	3.46	3.76
Al <sub>2</sub> O <sub>3</sub>	13.29	13.09	13.08	12.78	13.27	13.44	13.17	12.98	13.35	13.56	13.2	13.35	13.23
FeO	17.68	17.68	17.53	16.42	18.66	18.71	19.29	18.79	20.7	21.05	20.34	20.75	20.57
CaO	0	0	0	0	0	0.22	0	0	0	0	0	0	0.2
MgO	13.58	13.39	13.88	14.43	12.68	13.01	12.8	12.82	11.55	11.52	11.85	11.99	11.97
MnO	1.3	1.56	0.92	1.28	0.61	0.64	0.55	0.65	0.27	0.34	0.26	0.3	0.47
Na <sub>2</sub> O	0	0	0	0	0	0	0	0	0	0	0	0	0
K <sub>2</sub> O	10.2	10.2	9.81	10.08	10.15	9.89	10.18	10.04	10.31	10.06	9.98	10.13	9.85
Cl	0	0	0	0	0	0	0.23	0	0	0	0	0	0
TOTAL	97.61	97.16	96.63	96.74	97.02	96.92	97.24	96.76	98.29	98.21	97.77	97.86	97.55
Number of cations determined using 13CNK													
Si	5.94	5.91	5.97	6.08	5.97	5.95	5.93	5.98	5.97	5.94	5.99	5.95	5.91
AlIV	2.06	2.10	2.03	1.93	2.03	2.05	2.07	2.02	2.03	2.06	2.01	2.05	2.09
AlVI	0.38	0.33	0.39	0.42	0.42	0.44	0.37	0.39	0.43	0.44	0.42	0.41	0.36
Ti	0.41	0.43	0.39	0.33	0.43	0.37	0.41	0.42	0.46	0.44	0.46	0.41	0.45
Fe <sup>2+</sup>	2.31	2.32	2.30	2.14	2.45	2.46	2.55	2.48	2.70	2.76	2.66	2.72	2.71
Mn	0.17	0.21	0.12	0.17	0.08	0.09	0.07	0.09	0.04	0.05	0.03	0.04	0.06
Mg	3.16	3.14	3.24	3.36	2.97	3.05	3.01	3.01	2.69	2.69	2.77	2.81	2.81
Ca	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Na	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
K	2.03	2.04	1.96	2.01	2.03	1.98	2.05	2.02	2.06	2.01	1.99	2.03	1.98
TOTAL	16.45	16.47	16.41	16.42	16.39	16.42	16.46	16.40	16.37	16.37	16.33	16.42	16.41
CCl	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00
(O)	24	24	24	24	24	24	24	24	24	24	24	24	24
Fe/Fe+Mg	0.42	0.43	0.41	0.39	0.45	0.45	0.46	0.45	0.50	0.51	0.49	0.49	0.49
Mg/Fe+Mg	0.58	0.57	0.59	0.61	0.55	0.55	0.54	0.55	0.50	0.49	0.51	0.51	0.51
Zapfr													
Si	5.66	5.64	5.71	5.8	5.69	5.69	5.66	5.72	5.7	5.67	5.73	5.68	5.64
Ti	0.39	0.41	0.38	0.31	0.41	0.35	0.39	0.4	0.44	0.42	0.43	0.39	0.43
Al	2.33	2.31	2.31	2.24	2.34	2.38	2.34	2.3	2.35	2.39	2.33	2.36	2.35
Fe	2.2	2.22	2.19	2.04	2.34	2.35	2.43	2.37	2.58	2.63	2.55	2.6	2.59
Ca	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.01	0.01	0.02	0	0.02	0.03
Mg	3.01	2.99	3.1	3.2	2.83	2.91	2.87	2.88	2.57	2.57	2.64	2.68	2.68
Mn	0.16	0.2	0.12	0.16	0.08	0.08	0.07	0.08	0.03	0.04	0.03	0.04	0.06
Na	0.09	0.03	0.01	0.04	0.05	0.06	0.01	0.02	0.06	0.05	0.01	0.04	0.08
K	1.93	1.95	1.87	1.91	1.94	1.89	1.96	1.93	1.96	1.92	1.91	1.94	1.89
Cl	0.04	0.03	0.03	0.03	0.05	0.05	0.06	0.05	0.04	0.02	0.03	0.03	0.03
TOTAL	15.83	15.81	15.73	15.77	15.76	15.79	15.82	15.75	15.73	15.72	15.66	15.77	15.78

Appendix 3c

Sample	260c-b3	260c-b4	260c-b5	81-b1	81-b2	81-b2	81-b3	81-b4	261A-b1	198-b1	198-b2	198-b3	198-b4
Zone	3	3	3	4B	4B	4B	4B	4B	4C	5	5	5	5
Easting (m)	429880	429880	429880	432790	432790	432790	432790	432790	432988	428700	428700	428700	428700
Northing (m)	6777015	6777015	6777015	6776864	6776864	6776864	6776864	6776864	6777331	6786283	6786283	6786283	6786283
SiO <sub>2</sub>	37.23	37.73	36.66	37.85	38.75	38.61	38.85	38.95	38.37	36.49	35.55	36.62	38.96
TiO <sub>2</sub>	3.7	3.78	4.22	3.27	3.3	3.1	3.04	3.42	3.16	3.65	3.62	3.45	3.46
Al <sub>2</sub> O <sub>3</sub>	13.37	13.12	13.96	12.56	12.44	12.87	12.26	12.52	12.42	12.09	12.66	12.44	13.07
FeO	21.3	20.63	21.67	23.08	22.58	22.94	21.58	22.37	22.94	30.67	28.58	27.52	20.93
CaO	0	0	0	0	0	0	0	0	0	0	0	0	0
MgO	11.22	12.32	10.82	11.01	10.95	11.57	11.49	11.28	10.64	4.88	4.17	4.44	8.39
MnO	0.32	0.44	0.41	0.9	1.1	0.97	0.82	0.83	1.48	1.39	1.21	1.35	0.54
Na <sub>2</sub> O	0	0	0	0	0	0	0	0	0	0	0.2	0	0
K <sub>2</sub> O	9.73	10.26	10	9.96	10.42	9.78	10.37	10.29	10.09	9.67	9.76	9.98	10.43
Cl	0	0	0	0	0	0.2	0	0	0	0	0	0	0
TOTAL	96.87	98.28	97.74	98.62	99.54	100.04	98.42	99.65	99.09	98.84	95.74	95.8	95.78
Number of cation													
Si	5.92	5.91	5.80	5.98	6.05	6.00	6.10	6.05	6.04	5.99	5.99	6.12	6.25
AlIV	2.08	2.09	2.20	2.02	1.95	2.01	1.90	1.95	1.96	2.01	2.01	1.88	1.75
AlVI	0.42	0.33	0.40	0.31	0.34	0.35	0.37	0.35	0.34	0.33	0.50	0.57	0.72
Ti	0.44	0.45	0.50	0.39	0.39	0.36	0.36	0.40	0.37	0.45	0.46	0.43	0.42
Fe <sup>2+</sup>	2.83	2.70	2.87	3.05	2.95	2.98	2.84	2.91	3.02	4.21	4.03	3.85	2.81
Mn	0.04	0.06	0.06	0.12	0.15	0.13	0.11	0.11	0.20	0.19	0.17	0.19	0.07
Mg	2.66	2.88	2.55	2.59	2.55	2.68	2.69	2.61	2.50	1.19	1.05	1.11	2.01
Ca	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00
K	1.97	2.05	2.02	2.01	2.08	1.94	2.08	2.04	2.03	2.03	2.10	2.13	2.14
TOTAL	16.37	16.46	16.40	16.47	16.45	16.43	16.44	16.42	16.45	16.40	16.37	16.28	16.16
CCl	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(O)	24	24	24	24	24	24	24	24	24	24	24	24	24
Fe/Fe+Mg	0.52	0.48	0.53	0.54	0.54	0.53	0.51	0.53	0.55	0.78	0.79	0.78	0.58
Mg/Fe+Mg	0.48	0.52	0.47	0.46	0.46	0.47	0.49	0.47	0.45	0.22	0.21	0.22	0.42
Zaphr													
Si	5.65	5.64	5.54	5.71	5.78	5.73	5.83	5.78	5.76	5.72	5.73	5.85	5.97
Ti	0.42	0.42	0.48	0.37	0.37	0.35	0.34	0.38	0.36	0.43	0.44	0.41	0.4
Al	2.39	2.31	2.49	2.23	2.19	2.25	2.17	2.19	2.2	2.23	2.4	2.34	2.36
Fe	2.7	2.58	2.74	2.91	2.82	2.85	2.71	2.77	2.88	4.02	3.85	3.67	2.68
Ca	0.01	0.02	0.02	0.02	0.02	0	0.02	0.02	0.02	0.03	0.01	0.03	0.02
Mg	2.54	2.74	2.44	2.47	2.44	2.56	2.57	2.49	2.38	1.14	1	1.06	1.91
Mn	0.04	0.05	0.05	0.11	0.14	0.12	0.1	0.11	0.19	0.18	0.16	0.18	0.07
Na	0.04	0.07	0.06	0.01	0.01	0	0.03	0.05	0.08	0.02	0.06	0	0.04
K	1.88	1.96	1.93	1.92	1.98	1.85	1.98	1.95	1.93	1.93	2.01	2.03	2.04
Cl	0.03	0.02	0.04	0.05	0.04	0.05	0.03	0.05	0.04	0.04	0.04	0.04	0.04
TOTAL	15.72	15.82	15.77	15.82	15.79	15.77	15.78	15.79	15.83	15.75	15.71	15.62	15.53

Appendix 3c

Sample	198-b5	198-b6	198-b7	16A-b1	16A-b2	16A-b3	16A-b4	192-b1	192-b2	192-b3	192-b4	192-b5
Zone	5	5	5	6	6	6	6	7	7	7	7	7
Easting (m)	428700	428700	428700	432968	432968	432968	432968	432380	432380	432380	432380	432380
Northing (m)	6786283	6786283	6786283	6777331	6777331	6777331	6777331	6787080	6787080	6787080	6787080	6787080
SiO <sub>2</sub>	36.48	35.56	36.46	38.11	39.58	38.23	37.8	36.14	37.63	35.73	36.37	36.72
TiO <sub>2</sub>	2.97	3.75	3.48	2.44	2.71	2.17	2.38	2.65	3.15	3.84	2.92	2.91
Al <sub>2</sub> O <sub>3</sub>	12.21	12.29	12.36	13.26	13.23	12.24	12.63	11.66	11.98	12.38	11.47	11.6
FeO	27.08	28.3	26.88	22.14	16.58	22.34	21.75	30.67	23.84	26.02	30.16	29.81
CaO	0.21	0.24	0	0	0	0	0.23	0	0	0	0	0
MgO	4.36	3.94	4.25	9.81	11.22	9.76	10.29	3.45	8.01	6.37	4.2	4.2
MnO	1.46	1.56	1.42	1.89	1.27	1.72	1.79	1.46	1.64	1.4	1.63	1.61
Na <sub>2</sub> O	0.21	0	0.24	0	0.65	0	0	0	0	0	0	0
K <sub>2</sub> O	9.85	10.12	10.2	9.48	10.29	9.8	10.07	9.77	10.31	10.15	9.73	9.73
Cl	0.29	0	0.2	0	0	0	0	0.3	0	0	0.29	0.36
TOTAL	95.11	95.77	95.48	97.13	95.53	96.27	96.93	96.11	96.57	95.89	96.77	96.93
Number of cation												
Si	6.16	6.01	6.13	6.08	6.26	6.18	6.07	6.15	6.14	5.95	6.13	6.16
AlIV	1.84	1.99	1.87	1.92	1.74	1.82	1.93	1.85	1.86	2.05	1.87	1.84
AlVI	0.59	0.46	0.58	0.57	0.72	0.51	0.46	0.49	0.44	0.38	0.41	0.45
Ti	0.38	0.48	0.44	0.29	0.32	0.26	0.29	0.34	0.39	0.48	0.37	0.37
Fe <sup>2+</sup>	3.83	4.00	3.78	2.96	2.19	3.02	2.92	4.37	3.25	3.63	4.25	4.18
Mn	0.21	0.22	0.20	0.26	0.17	0.24	0.24	0.21	0.23	0.20	0.23	0.23
Mg	1.10	0.99	1.07	2.33	2.64	2.35	2.46	0.88	1.95	1.58	1.06	1.05
Ca	0.04	0.04	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
Na	0.07	0.00	0.08	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
K	2.12	2.18	2.19	1.93	2.08	2.02	2.06	2.12	2.15	2.16	2.09	2.08
TOTAL	16.34	16.38	16.33	16.34	16.32	16.40	16.48	16.40	16.40	16.43	16.41	16.37
CCl	0.17	0.00	0.11	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.17	0.21
(O)	24	24	24	24	24	24	24	24	24	24	24	24
Fe/Fe+Mg	0.78	0.80	0.78	0.56	0.45	0.56	0.54	0.83	0.63	0.70	0.80	0.80
Mg/Fe+Mg	0.22	0.20	0.22	0.44	0.55	0.44	0.46	0.17	0.37	0.30	0.20	0.20
Zaphr												
Si	5.9	5.74	5.86	5.8	5.98	5.89	5.8	5.88	5.87	5.68	5.86	5.89
Ti	0.36	0.46	0.42	0.28	0.31	0.25	0.27	0.32	0.37	0.46	0.35	0.35
Al	2.33	2.34	2.34	2.38	2.36	2.23	2.28	2.23	2.2	2.32	2.18	2.19
Fe	3.66	3.82	3.61	2.82	2.09	2.88	2.79	4.17	3.11	3.46	4.06	4
Ca	0.04	0.04	0.03	0.02	0.03	0.02	0.04	0.01	0.01	0.04	0.02	0.01
Mg	1.05	0.95	1.02	2.23	2.52	2.24	2.35	0.84	1.86	1.51	1.01	1
Mn	0.2	0.21	0.19	0.24	0.16	0.22	0.23	0.2	0.22	0.19	0.22	0.22
Na	0.07	0.05	0.07	0.07	0.19	0.08	0.07	0.04	0.01	0.03	0	0.01
K	2.03	2.08	2.09	1.84	1.98	1.93	1.97	2.03	2.05	2.06	2	1.99
Cl	0.08	0.04	0.05	0.02	0.04	0.03	0.02	0.08	0.02	0.05	0.08	0.1
TOTAL	15.71	15.73	15.69	15.7	15.66	15.77	15.83	15.8	15.71	15.79	15.78	15.76