Table DR1. Electron Microprobe Analyses - Magmatic and hydrothermal minerals at Olympic Dam

	Magmatic			Hydrothermal		
	Biotite	**Amphibole**	**Sphene**	**Sericite**	**Chlorite**	**Apatite**
	n=177	**n=76**	**n=30**	**n=1260**	**n=415**	**n=178**
SiO2	38.03	43.83	29.09	49.10	23.47	0.26
TiO2	2.27	1.25	31.63	0.07	0.03	n.a.
Al2O3	11.77	6.78	2.59	30.27	20.11	0.25
Fe2O3					1.47	
FeO	20.82	23.00	2.87	3.94	37.98	0.54
MnO	0.27	0.59	0.09	0.02	0.17	n.a.
MgO	12.02	7.94	0.15	1.10	3.67	n.a.
CaO	0.03	10.77	25.66	0.05	0.06	56.07
BaO	0.00	0.00	0.00	0.08	0.03	n.a.
SrO	n.a.	n.a.	n.a.	n.a.	n.a.	0.35
Na2O	0.20	2.10	0.05	0.15	0.05	0.08
K2O	9.05	1.14	0.00	9.89	0.10	0.04
P2O5	B.D.L.	B.D.L.	B.D.L.	B.D.L.	B.D.L.	42.34
F	3.68	2.01	1.80	0.82	0.43	5.25
Cl	0.27	0.25	0.00	0.07	0.02	0.00
S	B.D.L.	B.D.L.	B.D.L.	B.D.L.	B.D.L.	0.05
Total	98.41	99.68	93.93	95.56	87.59	105.22

not adjusted for O=F,Cl

n.a. = not analysed
B.D.L. = below detection limit

Analyses performed on a Cameca SX-50 at Adelaide Microscopy
15kV, 20nA

Elements and Crystals	**Standards**	**Count time (sec, on-peak/off-peak)**
Si Kα (TAP)	garnet	20/10
Ti Kα (PET)	rutile	10/5
Al Kα (TAP)	garnet	20/10
Fe Kα (LiF)	garnet	10/5
Mn Kα (LiF)	rhodonite	10/5
Mg Kα (TAP)	garnet	10/5
Ca Kα (PET)	wollastonite	10/5
Ba Lα (PET)	barite	10/5
Sr Lα (TAP)	celestite	10/5
Na Kα (TAP)	albite	10/5
P Kα (PET)	apatite	10/5
F Kα (PCO)	fluorite	10/5
Cl Kα (PET)	tugtupite	10/5
S Kα (PET)	marcasite	10/5

Table DR2. Major (wt%) and trace element (ppm) compositions of the Gawler Range Volcanics and Hiltaba Suite

Samples	HG1	HG2	GC4	GC5	GC8	GC11	GC14	GC15	GC16	GC17	YD189
	XRF and ICP-MS										
	HILTABA GRANITE		GAWLER RANGE VOLCANICS								
SiO_2 (oxide wt%)	77.39	74.97	69.97	73.78	73.76	74.51	70.32	69.81	73.98	69.60	68.61
TiO_2	0.13	0.17	0.45	0.26	0.25	0.26	0.41	0.43	0.26	0.41	0.72
Al_2O_3	11.10	12.00	13.60	12.42	12.83	12.29	13.59	13.45	12.46	13.34	13.41
MnO	0.03	0.03	0.11	0.09	0.07	0.06	0.06	0.12	0.06	0.10	0.10
MgO	0.30	0.32	0.89	0.25	0.31	0.40	0.73	0.89	0.41	0.67	0.85
Fe_2O_3	1.13	1.68	4.07	3.34	2.43	2.40	3.66	4.28	2.64	3.95	4.96
CaO	0.57	0.58	0.44	0.33	0.59	0.40	0.41	0.57	0.46	1.07	1.92
Na_2O	2.64	2.73	2.96	2.20	2.94	2.22	3.27	2.97	2.60	2.77	3.02
K_2O	4.87	5.38	5.43	5.78	5.48	6.13	5.26	5.50	5.49	5.64	5.10
P_2O_5	0.02	0.03	0.09	0.02	0.03	0.01	0.07	0.09	0.01	0.08	0.20
Cl											
F	0.045	0.11	0.12	0.15	0.165	0.13	0.145	0.13	0.17	0.145	0.11
SO_3			0.07	0.07	0.08	0.07	0.08	0.07	0.07	0.07	
LOI	1.79	1.98	1.34	1.04	0.73	0.86	1.53	1.17	1.01	1.56	1.08
Total	99.96	99.87	99.42	99.58	99.50	99.61	99.39	99.35	99.45	99.26	99.98
Li (ppm)	4.50	5.56	14.89	7.02	9.69	11.46	11.80	15.83	13.61	16.91	14.87
Be	6.36	7.01	3.44	6.87	5.60	3.57	3.93	4.91	5.25	5.22	4.29
B											
Ti	721	1035	2784	1687	1499	1603	2620	2817	1662	2619	4566
Zn	14.0	20.0	81.0	111.4	55.0	60.0	80.0	121.0	51.0	95.0	87.5
Rb	284	340	261	283	319	366	255	304	338	331	241
Sr	21.1	26.1	72.4	27.9	47.8	41.5	83.7	91.9	37.2	77.0	174.3
Y	28.9	51.4	61.6	58.6	69.1	65.4	62.4	61.6	65.1	61.1	53.3
Zr	137	131	475	385	376	398	488	499	400	482	452
Nb	11.1	15.5	25.4	25.8	27.1	28.4	25.8	26.5	29.4	25.9	17.8
Mo	0.43	0.58	1.56	0.71	1.40	1.30	1.17	1.59	1.60	1.19	2.08
Sn	9.28	7.91	4.61	5.38	5.49	5.55	4.53	4.78	5.85	4.50	4.62
Ba	118	99	1163	708	726	756	1026	1054	631	1060	867
La	84.8	136.4	87.6	102.8	112.4	96.7	81.4	82.2	98.1	87.8	73.1
Ce	164.9	263.4	166.7	201.5	197.6	188.3	161.5	165.3	190.4	171.8	148.6
Nd	52.3	86.8	73.2	78.8	85.9	78.1	70.7	71.8	80.3	74.7	63.1
Sm	7.78	14.09	13.83	14.08	15.46	14.37	13.26	13.53	14.41	13.94	11.95
Eu	0.38	0.55	2.34	1.23	1.39	1.23	2.28	2.27	1.13	2.29	1.90
Gd	5.4	10.0	11.9	11.4	13.5	12.3	11.9	11.7	12.1	12.0	10.2
Dy	4.9	9.1	11.0	10.4	11.9	11.7	11.0	11.0	11.4	11.1	9.5
Er	3.3	5.2	6.6	6.2	6.9	6.9	6.6	6.7	6.8	6.7	5.6
Yb	3.4	5.2	6.2	6.1	6.5	6.5	6.3	6.4	6.5	6.2	5.4
W			0.97		0.36	0.26	0.51	0.90	0.76	1.12	
Pb	16.4	18.6	10.9	7.5	34.7	7.5	5.4	11.1	8.4	7.5	30.6
Th	80.3	114.7	30.1	37.4	37.7	39.2	30.7	31.8	40.6	33.1	26.3
U	18.9	19.0	6.2	3.2	9.0	7.4	6.0	6.8	7.2	6.3	5.6

Microprobe analyses (15 kV, 10 nA) and laser anlation ICPMS

MELT INCLUSIONS

Samples	GC11 m2_1	GC11 m2_10	GC11 m2_11	GC11 m2_2	GC11 m2_4	GC11 m2_5	GC11 m2_6	GC11 m2_7	GC11 m2_8	GC11 m2_9	GC11m1	GC11m10	GC11m11	GC11m12	GC11m2	GC11m3	GC11m4a	GC11m7	GC11m8	GC11m9a	GC14m1
SiO_2 (oxide wt%)		72.92				73.20	74.27	73.59			73.62	71.74	71.26	74.80		71.58	74.23	71.26	72.18	71.90	72.85
TiO_2		0.25				0.34	0.22	0.32			0.34	0.32	0.24	0.28		0.28	0.32	0.28	0.28	0.26	0.36
Al_2O_3		13.94				13.76	13.07	13.39			14.21	12.87	13.12	12.07		12.71	11.94	12.90	13.15	12.87	12.88
MnO											0.03	0.06	0.07	0.07		0.09	0.25	0.07	0.02		0.08
MgO		0.07				0.06	0.05	0.08			0.04	0.05	0.05	0.07		0.09	0.05	0.05	0.05	0.08	0.06
Fe_2O_3		1.27				1.47	1.23	1.08			1.25	1.55	1.84	1.51		4.02	1.64	1.84	1.50	1.32	2.18
CaO		0.62				0.73	0.58	0.87			0.85	0.98	0.65	0.80		0.71	0.54	0.76	0.64	0.75	0.79
Na_2O		2.90				2.68	2.52	2.69			3.10	3.71	3.22	3.14		2.82	3.40	3.22	3.13	3.17	2.89
K_2O		6.51				6.21	6.32	5.99			6.71	6.21	6.26	5.81		5.98	5.82	6.26	6.09	6.27	6.04
P_2O_5																					
Cl		0.15				0.21	0.23	0.25			0.18	0.20	0.18	0.20		0.17	0.22	0.18	0.30	0.20	0.23
F		1.14				1.03	1.19	1.24											1.14		0.92
SO_3																					
LOI																					
Total		95.43				94.40	96.89				99.67	99.52	95.93	98.56		99.00	99.93	98.40	99.90	97.10	98.29
Li (ppm)																					
Be	8.53	5.40	5.48	8.28	6.14	7.57	4.47	7.90	8.74	4.52	6.90	5.55	4.81	8.05	5.53	5.88	5.58	6.39	6.75	6.13	6.42
B	28.12	12.29	14.69	10.79	19.42	14.65	10.02	19.49	14.63	4.04	15.80	16.33	13.32	15.19	12.94	14.25	21.28	15.67	20.73	17.10	12.30
Ti	1815	1509	1488	1507	1795	2035	1295	1909	1409	1248	2056	1921	1418	1669	1592	1653	1903	1649	1653	1549	2183
Zn	104.9	104.9	71.0	98.4	84.0	68.6	71.2	122.0	84.3	25.6	124.0	101.5	79.7		88.3	83.6	113.7	94.9	107.4	84.5	102.5
Rb	355	323	566	355	639	352	267	379	796	332	397	364	309		335	350	350	351	399	358	352
Sr	6.8	17.3	15.2	10.4	19.9	20.9	19.2	17.5	7.6	18.0	25.1	21.7	20.6		21.3	20.8	10.8	12.9	9.6	12.6	26.9
Y	93.5	66.9	58.9	99.5	70.6	79.4	67.5	89.9	101.5	65.6	81.6	80.5	63.9		73.9	70.1	79.0	83.6	87.0	77.5	78.1
Zr	418	277	258	403	396	436	277	404	383	285	382	435	282		334	327	365	372	378	343	463
Nb	43.0	26.0	26.4	39.6	34.3	29.5	27.2	39.8	40.3	28.3	36.1	35.1	28.1		32.1	31.8	36.9	36.4	40.2	36.0	33.4
Mo	6.27	1.54	1.39	4.73	9.64	2.95	3.25	3.02	3.67	0.57	2.95	4.33	2.05		2.88	2.61	4.82	2.83	3.33	2.98	2.85
Sn	8.82	6.21	6.21	9.30	6.74	7.13	6.76	9.87	9.60	4.92	7.36	7.36	6.18	6.71	6.71	6.49	9.04	7.93	8.51	9.44	6.64
Ba	26	208	154	77	219	278	244	153	38	225	323	273	257	152	239	227	74	116	46	116	359
La	161.5	115.8	100.3	158.4	116.6	127.6	116.5	156.6	158.7	113.2	142.6	135.6	110.0	157.4	125.1	120.1	134.3	140.9	151.8	131.1	126.6
Ce	322.9	236.9	206.7	317.6	237.9	256.1	237.7	310.2	324.1	224.8	291.6	276.1	229.1	328.4	252.5	244.8	278.7	286.3	305.9	280.9	249.4
Nd	120.4	86.9	75.0	120.4	88.2	94.7	85.2	111.8	124.8	87.3	105.9	104.1	87.1	119.9	94.5	89.4	102.4	105.1	112.1	99.9	95.4
Sm	17.75	15.95	12.68	23.69	15.81	18.49	16.55	22.25	19.44	12.62	16.66	18.75	13.84	20.51	15.95	15.21	16.04	18.36	20.66	17.01	16.68
Eu	0.41	0.65	0.58	0.47	0.70	0.93	0.66	0.50	0.32	0.59	0.66	0.82	0.61	0.52	0.68	0.68	0.51	0.48	0.45	0.47	0.93
Gd	14.9	13.0	10.2	17.9	11.9	15.1	13.0	18.4	19.9	11.7	15.1	13.8	12.3	17.8	14.0	13.3	16.2	15.4	14.7	14.0	14.9
Dy	18.8	11.9	10.3	17.5	14.3	13.9	12.6	17.4	17.7	12.0	15.2	15.6	12.3	18.5	13.6	12.3	13.2	14.9	15.3	14.7	14.7
Er	9.4	6.4	6.3	10.1	7.2	8.2	6.6	10.4	12.1	7.8	8.9	8.6	6.6	9.5	7.7	7.4	7.4	8.8	8.8	8.2	8.2
Yb	11.2	7.5	6.6	11.0	8.0	9.0	7.6	9.4	10.4	8.6	9.4	9.0	7.1	9.5	8.0	7.6	8.8	9.0	8.8	8.4	7.9
W	4.79	2.37	3.11	4.20	3.94	3.94	3.90	2.83	5.45	3.56	3.91	3.95	3.12	4.10	3.52	3.53	5.46	4.46	5.17	4.54	3.96
Pb	75.0	52.4	28.2	59.5	68.5	52.1	43.4	57.4	34.0	48.1	66.1	58.2	48.6	63.1	57.7	54.3	60.5	60.3	68.1	57.1	55.6
Th	72.8	47.3	40.9	67.5	49.3	55.4	48.4	65.8	70.7	49.7	58.4	54.9	47.6	66.4	54.1	50.4	62.8	61.3	66.1	57.3	54.5
U	17.7	9.3	8.9	14.0	12.3	11.9	9.9	13.1	16.0	10.2	13.4	12.5	9.4	14.4	11.3	11.6	14.1	13.6	15.2	13.7	11.7

Samples	GC16m1	GC16m2	GC16m3	GC16m4	GC16m7	GC17m1	GC4m1	GC4m3	GC4m4	GC4m5	GC4m6	GC4m7a	GC4m2_10	GC4m2_4a	GC4m2_7b	GC5m2
SiO_2 (oxide wt%)		73.82	72.54	71.28	72.42	74.82		78.20	74.22		75.78	75.77	75.55	75.43		72.45
TiO_2		0.34	0.24	0.34	0.41	0.31		0.24	0.28		0.23	0.25	0.27	0.32		0.20
Al_2O_3		13.24	13.24	13.48	13.24	11.90		9.89	11.76		11.83	12.12	11.43	12.04		14.51
MnO			0.08	0.07	0.05	0.07		0.05	0.04		0.04					
MgO		0.06	0.06	0.08	0.05	0.03		0.04	0.05		0.04	0.06	0.06	0.05		0.05
Fe_2O_3		2.28	2.22	0.55	1.76	1.84		1.28	1.78		1.61	1.72	2.39	1.88		1.79
CaO		0.80	0.85	1.32	0.77	0.63		0.67	0.73		0.57	0.70	0.62	0.80		0.83
Na_2O		3.47	2.89	2.65	3.98	3.31		2.62	2.66		2.16	2.77	1.64	2.07		2.99
K_2O		6.22	6.07	7.23	6.55	6.18		5.31	5.88		6.05	5.97	5.97	5.99		6.34
P_2O_5																
Cl		0.27	0.25	0.10	0.18	0.21		0.12	0.21		0.15	0.21	0.44	0.17		0.19
F		0.77	0.99		0.89				0.16		0.21	0.17	0.03	0.04		0.83
SO_3																
LOI																
Total		98.72	97.64	99.66	99.26	99.61		96.29	96.85	97.91	99.24	98.91				
Li (ppm)																
Be	6.25	7.16	8.16	7.14	6.91	3.30	5.50	5.38	6.51	5.76	4.83	7.13	5.28	7.13	6.75	13.45
B	17.07	20.38	16.98	19.94	21.10	32.68	9.01	18.45	16.66	12.05	18.11	20.31	11.37	18.54	13.23	24.95
Ti	1796	2026	1418	2019	2457	1833	1685	1429	1687	1493	1379	1479	1621	1947	1409	1223
Zn	91.0	115.5	122.1	127.0	125.5	117.5	80.5	67.0	95.3	79.0	78.0	119.0	83.7	113.8	77.0	110.7
Rb	362	346	400	397	391	297	333	309	352	440	301	327	297	585	324	388
Sr	14.2	21.8	8.5	14.4	15.9	13.0	20.2	2.5	10.7	13.3	15.9	10.0	16.8	18.9	4.7	26.3
Y	80.4	75.8	110.7	116.1	71.7	77.3	71.5	57.2	84.7	66.3	59.0	74.8	66.3	78.2	79.2	148.7
Zr	370	373	454	564	398	391	317	224	381	313	269	339	356	413	370	315
Nb	34.8	32.8	42.5	47.0	37.0	34.4	29.7	22.9	36.7	32.6	26.9	32.1	28.7	36.4	33.0	57.3
Mo	3.46	2.87	4.39	2.77	3.21	1.98	2.54	0.43	3.33	2.33	2.30	3.22	2.66	4.81	3.67	6.23
Sn	18.11	9.11	9.83	11.60	9.63	7.31	6.32	6.95	7.69	6.49	9.13	9.30	5.46	8.36	6.85	8.82
Ba	146	269	21	51	143	148	253	5	93	144	176	101	211	237	28	332
La	137.9	130.8	189.8	194.4	78.7	130.7	117.8	93.8	134.3	106.3	98.2	122.0	103.1	128.3	128.1	190.2
Ce	281.7	258.6	384.4	404.4	157.9	286.2	237.1	190.7	276.1	208.5	204.7	251.2	212.2	256.5	259.4	379.5
Nd	103.9	106.5	142.8	152.0	66.8	96.6	87.3	67.8	103.7	80.5	76.9	93.2	81.1	98.6	97.7	136.7
Sm	16.47	17.91	25.01	26.19	14.26	14.23	14.65	11.51	18.52	14.31	13.38	16.65	15.99	16.28	17.22	24.61
Eu	0.61	0.76	0.35	0.43	0.73	0.59	0.56	0.06	0.43	0.38	0.47	0.46	0.73	0.31	0.31	0.86
Gd	14.7	15.3	19.0	24.3	12.1	16.6	13.0	8.1	15.3	11.7	10.4	12.9	12.6	13.2	14.7	22.2
Dy	13.9	14.7	20.0	21.3	12.8	15.0	12.8	11.0	15.5	11.8	10.6	13.0	11.8	16.5	14.3	24.2
Er	8.7	8.3	11.6	12.2	7.9	7.7	7.4	7.0	8.4	6.8	6.3	7.4	6.9	8.5	8.6	14.8
Yb	8.3	9.2	12.2	14.2	7.5	8.8	7.3	5.7	8.5	7.3	6.3	8.3	7.7	9.3	8.7	16.9
W	4.64	3.33	5.67	6.05	4.45	4.45	3.43	2.50	3.97	5.22	2.66	4.17	2.83	3.39	3.74	11.45
Pb	65.5	80.2	75.4	79.8	68.0	59.0	52.4	45.8	57.3	48.8	45.2	54.9	45.3	54.7	48.9	76.4
Th	62.9	59.9	81.3	85.6	54.8	73.9	51.0	39.7	61.1	49.8	40.9	52.1	44.4	52.3	55.0	126.3
U	13.4	12.7	19.0	20.7	13.6	13.9	11.3	8.0	13.4	11.2	9.5	12.7	10.0	11.6	12.1	35.0

Samples	GC5m3	GC5m5	GC5m6	GC5m7	GC5m8	GC5m9	GC5m2_1b	GC5m2_2a	GC5m2_2b	GC5m2_3	GC5m2_5	GC8m2	GC8m4	GC8m7a	GC8m8	GC8m9	GC8m11	GC8m2_1a	GC8m2_1b	GC8m2_2a	GC8m2_2b	GC8m2_3	GC8m2_5a	GC8m2_8a	GC8m2_8b	GC8 m2_10a	GC8 m2_10b	GC8 m2_11a	GC8 m2_11b	GC8 m2_11c	GC8m2_12a
SiO_2 (oxide wt%)	75.56	77.13	75.70	74.47	75.68	75.56		76.76				71.88	73.59	72.13	72.61	72.89	73.24	75.05			73.93				74.19	72.03	72.56	75.20	69.56	71.88	70.73
TiO_2	0.25	0.27	0.30	0.26	0.26	0.25		0.18				0.29	0.28	0.33	0.33	0.25	0.28	0.26			0.27				0.28	0.30	0.31	0.16	0.27	0.27	0.35
Al_2O_3	11.60	11.75	11.47	11.41	11.45	11.56		11.16				12.50	12.01	13.56	13.58	12.07	13.56	12.63			13.21				12.67	13.63	13.63	12.75	12.75	12.75	15.40
MnO	0.06			0.02	0.08	0.06							0.05	0.01	0.08																
MgO	0.04	0.06	0.14	0.03	0.04	0.04		0.05				0.06	0.05	0.02	0.05	0.05	0.03	0.02			0.03				0.03	0.05	0.03	0.03	0.05	0.06	0.06
Fe_2O_3	1.68	1.49	1.98	1.69	1.83	1.68		1.55				1.64	1.96	0.35	1.36	1.63	1.49	0.91			1.48				1.37	1.28	1.27	1.43	1.46	1.64	1.93
CaO	0.71	0.71	0.72	0.54	0.69	0.59		0.47				0.60	0.75	0.64	0.77	0.79	0.73	0.56			0.73				0.73	0.71	0.87	0.60	0.66	0.71	1.08
Na_2O	2.45	1.40	2.21	2.61	2.69	2.45		2.26				2.01	3.39	2.52	3.41	3.26	2.99	2.47			2.49				2.17	2.52	2.50	2.64	1.89	2.01	3.03
K_2O	5.99	6.07	5.40	5.83	5.80	5.99		5.35				5.50	5.75	6.38	6.56	5.90	6.24	6.27			6.40				6.01	6.49	6.49	5.29	6.65	5.50	6.58
P_2O_5																															
Cl	0.13	0.05	0.17	0.18	0.19	0.13		0.10				0.26	0.20	0.06	0.19	0.28	0.20	0.14			0.18				0.15	0.23	0.19	0.21	0.21	0.26	0.35
F		0.01	0.24					0.25				0.83			1.06		0.86	0.71			0.79				0.56	0.87	0.80	0.70	1.12	0.83	1.02
SO_3																															
LOI																															
Total	98.96	99.81	98.33	99.60	97.81			97.11					97.90	97.74	100.59	97.38	98.74	97.46			99.52				98.26	97.09	97.76	98.50	99.11	99.40	100.49
Li (ppm)																															
Be	5.46	4.97	5.70	3.60	6.10	5.63	5.10	4.40	4.81	4.67	3.60	4.73	5.41	5.52	5.95	7.95	6.44	4.65	5.33	6.71	6.29	5.51	4.76	5.99	5.33	6.96	6.65	6.07	5.23	6.47	5.53
B	17.58	25.41	16.91	17.29	21.19	15.41	13.31	13.61	11.17	10.67	19.48	14.85	12.73	18.24	16.04	17.59	15.46	13.84	13.52	16.15	17.81	12.07	11.98	12.02	9.48	10.32	15.17	14.22	15.76	12.30	7.46
Ti	1516	1641	1808	1530	1564	1524	1505	1108	1190	1778	1498	1751	1692	1970	1964	1486	1680	1576	1585	1712	1616	1783	2190	1627	1693	1799	1834	940	1615	1589	2079
Zn	82.5	106.1	90.8	80.1	109.6	82.7	79.8	73.5	70.2	83.4	76.4	80.1	86.3	78.5	110.9	113.2	111.6	59.8	18.3	89.0	85.5	77.3	46.9	61.2	89.5	79.8	90.8	93.9	86.6	95.7	123.8
Rb	302	336	335	225	318	338	559	268	278	342	300	350	362	507	385	347	354	332	486	350	345	378	938	316	339	362	411	372	322	388	466
Sr	16.4	19.1	17.3	11.0	13.0	15.0	9.5	12.1	11.9	22.4	15.3	18.9	13.9	18.2	23.7	5.9	17.5	22.5	12.2	16.3	12.3	20.3	21.0	25.6	25.8	21.7	18.5	15.9	15.1	13.7	36.8
Y	65.8	61.1	69.7	54.0	74.9	63.8	69.8	49.2	53.9	61.3	56.6	62.6	80.8	59.0	79.7	108.3	86.8	50.1	55.7	238.6	78.0	66.0	59.2	62.8	64.1	70.2	83.3	64.2	73.2	73.7	72.8
Zr	278	279	404	279	382	308	322	218	222	372	273	284	364	384	431	440	366	368	342	355	328	395	405	406	402	413	450	384	364	363	348
Nb	25.9	26.9	32.3	23.8	32.9	29.6	31.9	22.0	23.2	28.0	28.1	27.9	35.6	32.8	35.8	43.6	34.8	25.6	27.7	34.8	30.3	32.2	30.0	28.4	28.7	29.8	35.9	17.7	31.1	30.7	29.3
Mo	1.61	0.82	3.44	2.66	2.04	3.99	2.43	1.80	2.01	3.26	0.92	2.29	3.56	2.55	3.81	3.67	3.32	2.24	2.48	2.06	3.02	2.71	2.98	2.12	3.35	2.30	3.60	2.54	2.90	2.37	8.25
Sn	12.56	7.31	6.47	4.19	13.90	11.30	6.81	10.82	5.43	5.78	5.85	6.16	9.15	7.88	11.25	9.82	13.49	4.75	4.78	10.22	7.83	7.21	7.18	5.70	5.36	5.54	11.57	5.74	6.64	7.31	7.65
Ba	169	195	200	110	78	200	90	124	126	317	145	218	143	221	299	20	161	305	64	122	112	238	98	325	371	256	184	146	163	128	283
La	111.5	111.6	109.1	87.5	124.0	105.4	118.1	90.1	96.5	100.8	102.0	109.3	132.5	95.9	132.3	177.5	148.3	87.3	91.9	369.9	130.5	110.5	106.7	111.1	108.3	116.6	141.0	114.8	119.9	122.6	172.0
Ce	223.4	240.8	222.5	192.9	257.4	215.7	247.6	186.2	198.6	213.5	203.6	224.2	271.1	200.2	268.8	365.4	299.4	181.2	188.3	861.6	269.2	218.1	217.1	218.3	221.4	231.3	280.9	213.6	242.4	253.5	353.3
Nd	84.7	83.2	80.2	68.6	96.0	78.0	92.2	68.2	73.1	84.1	75.7	82.1	99.1	70.2	98.4	134.2	116.0	63.4	67.7	414.0	103.3	77.8	81.3	81.8	80.1	87.6	102.7	72.0	90.9	93.5	125.4
Sm	15.08	17.02	14.41	11.87	15.96	13.04	15.59	11.97	12.79	14.09	13.10	12.84	17.46	12.94	17.61	21.81	21.11	11.32	11.21	73.44	17.89	14.26	13.33	13.54	14.02	15.00	17.13	14.09	16.18	16.55	21.08
Eu	0.43	0.64	0.71	0.36	0.50	0.58	0.26	0.41	0.52	0.73	0.42	0.49	0.55	0.57	0.79	0.31	0.59	0.78	0.32	1.38	0.62	0.82	0.64	0.95	1.00	0.92	0.70	0.44	0.55	0.62	0.64
Gd	11.4	9.0	11.8	10.2	12.4	12.2	12.5	9.0	10.0	11.3	10.8	10.8	13.9	10.5	13.9	19.2	14.3	8.8	10.2	63.9	12.2	11.3	11.3	12.0	11.4	12.3	15.3	13.6	13.3	14.0	14.4
Dy	12.2	9.1	12.5	10.4	11.1	11.8	12.9	9.3	9.9	11.9	12.3	11.2	14.2	10.4	14.5	20.1	16.0	9.1	9.9	50.6	13.5	12.0	10.2	10.4	11.9	12.6	15.2	12.6	13.1	13.5	11.8
Er	6.8	7.3	7.1	7.1	8.5	6.8	7.6	5.2	5.7	6.7	5.5	6.4	8.7	6.4	7.9	10.8	9.1	5.7	5.6	22.8	8.3	7.2	6.4	7.0	8.0	7.8	9.2	8.3	7.9	8.1	6.7
Yb	7.0	5.6	7.7	6.2	7.6	6.8	7.7	5.4	6.1	6.7	6.2	6.3	9.3	7.0	8.2	11.1	9.2	6.2	6.3	17.0	7.9	7.4	6.4	7.3	7.2	7.6	9.9	7.2	8.4	7.8	8.6
W	3.09	2.92	3.74	3.32	3.69	3.02	3.30	2.56	2.78	2.94	2.94	2.48	4.63	3.58	3.72	5.36	3.77	2.78	3.35	4.25	3.85	3.45	3.82	3.14	3.15	3.95	4.69	4.02	3.97	3.80	2.31
Pb	49.0	45.5	49.3	40.2	55.2	51.7	47.2	41.7	42.7	48.3	45.2	52.4	59.0	49.4	58.6	70.1	62.1	46.4	30.6	58.0	52.5	50.8	268.3	48.3	50.8	53.6	62.1	59.8	51.5	56.1	91.3
Th	48.3	41.9	48.0	40.4	58.4	45.6	50.2	36.0	38.7	42.7	43.3	44.4	58.1	52.1	54.0	79.0	63.1	40.9	40.1	66.5	55.9	49.1	45.4	47.6	48.1	50.3	60.9	51.7	53.3	53.4	122.3
U	9.5	9.2	11.5	9.2	13.6	10.0	12.0	7.7	8.6	10.3	9.8	9.3	13.7	13.0	12.6	18.0	13.3	10.0	10.6	15.0	12.0	11.7	11.3	10.2	10.8	11.1	13.4	12.5	11.6	11.6	12.6

UNHEATED MELT INCLUSIONS

Samples	GC11 B1_2	GC11 B1_4	GC11 B1_5	GC11 B1_8	GC11 UH11	GC11 UH12a	GC11 UH12b	GC11 UH2	GC11 UH3	GC11 UH4	GC11 UH6	GC11 UH9
SiO_2 (oxide wt%)	74.43	72.79	70.16	72.97								
TiO_2	0.28	0.24	0.27	0.18								
Al_2O_3	12.63	13.36	14.56	12.88								
MnO												
MgO	-0.01	-0.02	0.02	0.01								
Fe_2O_3	0.21	0.72	0.49	0.31								
CaO	0.17	0.15	0.17	0.15								
Na_2O	2.63	2.97	3.96	2.99								
K_2O	6.32	6.53	5.65	6.60								
P_2O_5												
Cl	0.15	0.17	0.37	0.15								
F	0.58	0.66	0.74	0.63								
SO_3												
LOI												
Total	97.37	97.56	96.39	96.87								
Li (ppm)												
Be												
B												
Ti												
Zn					87.1	74.0	88.7	71.3	91.9	76.8	88.6	60.5
Rb					359	336	359	378	423	367	373	371
Sr					22.5	15.4	25.4	20.6	15.5	11.7	22.2	20.1
Y					76.4	61.3	61.2	72.9	81.2	80.3	75.9	67.9
Zr					423	284	270	418	327	394	339	405
Nb					33.2	28.4	30.8	34.2	39.1	35.1	33.2	30.6
Mo					3.36	2.37	2.66	2.99	3.57	2.66	3.63	3.31
Sn					6.04	5.72	5.94	6.45	8.15	6.49	6.58	5.63
Ba					293	141	182	240	122	95	283	244
La					117.2	110.0	112.2	116.8	129.6	132.8	127.2	105.7
Ce					240.6	227.9	254.9	245.0	278.5	269.1	261.4	217.6
Nd					93.5	82.3	85.7	91.9	96.7	99.7	97.6	80.7
Sm					16.58	14.01	15.01	16.03	17.24	16.73	18.58	14.55
Eu					0.88	0.51	0.58	0.74	0.48	0.45	0.66	0.61
Gd					13.9	11.2	11.4	13.5	14.4	14.2	12.7	12.1
Dy					14.0	11.6	11.7	13.6	14.7	14.8	12.3	12.1
Er					8.3	7.1	6.7	7.9	8.5	8.4	8.2	7.1
Yb					8.5	7.3	6.9	8.0	8.7	8.6	8.0	7.3
W					3.66	2.54	3.32	3.75	5.37	4.85	3.81	3.39
Pb					51.8	48.5	56.4	48.9	60.1	53.3	49.4	47.5
Th					52.5	45.1	43.4	49.6	62.9	56.0	51.0	49.5
U					12.1	9.7	10.7	12.6	16.1	12.8	10.9	11.1

Samples	GRVN11B-2	GRVN11B-3	GRVN11B-4	GRVN11B-6	GRVN11B-6	NY4B-7-A	NY4B-8-A	GRV7-9-A	GRV7-10-A	GC8-12-A	GC8-13-A	GC8-14-A	GC8-15-A	GC8-17-A	GC8-17-B	PE2-18-A	PE2-18-B	PE2-18-C	PE2-19-A	PE2-23-A	PE2-27-A	GC4-28-A	GC4-29-A	GC4-29-A	GC4-30-A	GC4-30-A	GC4-32-A	GC4-32-A
SiO_2 (oxide wt%)	71.59	67.09	72.08	71.52	71.17	68.09	64.15	72.60	69.16	70.57	71.51	69.26	67.96	63.84	70.36	69.36	69.98	70.48	71.02	71.35	69.73	74.95	74.07	73.35	73.65	74.78	75.05	75.30
TiO_2	0.15	0.17	0.17	0.15	0.19	0.24	0.41	0.14	0.27	0.22	0.23	0.27	0.22	0.19	0.23	0.27	0.19	0.27	0.19	0.25	0.20	0.18	0.21	0.18	0.21	0.20	0.17	0.15
Al_2O_3	14.01	19.08	13.49	13.45	12.88	13.84	16.03	12.29	11.47	13.26	13.03	13.24	14.34	22.16	13.98	13.41	13.21	13.62	13.75	12.61	12.74	12.02	11.82	12.37	11.46	11.37	11.64	11.52
MnO																												
MgO	0.02	0.03	0.02	0.04	0.02	0.06	0.03	0.05	0.10	0.08	0.03	0.03	0.05	0.02	0.05	0.07	0.07	0.08	0.04	0.02	0.05	0.02	0.07	0.05	0.08	0.05	0.03	0.05
Fe_2O_3	0.86	0.71	0.80	0.92	0.66	1.28	3.45	0.74	5.94	0.92	1.06	0.92	1.34	1.25	1.30	1.18	1.30	1.71	1.30	1.09	1.80	1.36	1.98	1.83	1.62	1.62	1.36	1.38
CaO	0.66	0.57	0.57	0.35	0.34	0.61	0.55	0.23	0.18	0.61	0.37	0.68	0.65	0.77	0.51	0.62	0.89	0.64	0.43	0.51	0.18	0.45	0.49	0.56	0.55	0.55	0.50	0.43
Na_2O	3.67	3.02	3.26	3.57	3.30	4.37	4.64	3.43	3.64	3.40	3.70	3.60	4.12	3.58	4.10	3.75	3.88	3.92	4.04	3.40	4.35	1.77	2.30	2.45	2.59	2.45	2.80	2.77
K_2O	6.40	5.67	6.41	6.16	6.30	6.52	7.51	5.91	5.42	6.91	6.70	6.45	6.92	6.02	6.53	6.37	6.31	6.21	6.12	6.29	6.44	6.35	6.22	6.64	6.06	6.13	5.70	5.90
P_2O_5	0.03	0.03	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.00	0.04	0.01	0.02	0.04	0.04	0.02	0.01	0.02	0.00	0.02	-0.02	-0.03	0.02	0.01	0.01	-0.02	-0.01	0.00
Cl	0.23	0.24	0.27	0.24	0.23	0.17	0.08	0.08	0.07	0.23	0.21	0.20	0.19	0.28	0.24	0.22	0.23	0.23	0.17	0.17	0.21	0.13	0.15	0.18	0.16	0.15	0.10	0.11
F	1.18	1.11	1.12	1.31	1.24	0.69	1.06	1.02	0.87	1.08	0.81	1.04	0.93	0.86	0.89	0.91	1.07	0.89	1.02	0.99	1.00	0.17	0.11	0.16	0.23	0.14	0.43	0.34
SO_3																												
LOI																												
Total	98.79	97.71	98.20	97.71	96.35	95.89	97.94	96.49	97.12	97.28	97.69	95.70	96.73	99.02	98.23	96.18	97.11	98.06	98.09	96.72	96.68	97.39	97.44	97.79	96.63	97.44	97.78	97.95

Major average values from microprobe anayses, trace, LA-ICPMS

GROUNDMASS

Samples	GC17	GC14	GC5	GC8 D1	GC11	GC16	
SiO_2 (oxide wt%)	76.48	80.05		79.52	80.67		
TiO_2	0.04	0.11		0.04	0.02		
Al_2O_3	11.78	10.37		10.54	9.68		
MnO	0.02	0.02		0.04	0.02		
MgO	0.04	0.06		0.02	0.06		
Fe_2O_3	1.06	0.80		0.77	0.70		
CaO	0.16	0.09		0.29	0.18		
Na_2O	2.60	2.58		2.72	2.01		
K_2O	6.27	4.82		4.93	5.07		
							det. limit
Li (ppm)							0.012
Be							0.013
Ti	188	1301	1413	793	2182	1672	35, 0.26
Zn	59.0	45.8	59.4	74.5	58.1	59.0	1
Rb	302	252	254	372	293	213	1
Sr	25.6	29.0	23.9	42.9	58.1	50.7	1
Y	56.9	46.7	49.6	52.0	63.6	50.7	1, 0.003
Zr	271	243	294	141	395	312	1
Nb	4.5	17.3	19.4	15.2	19.2	14.4	1
Mo	0.23	0.34	0.65	0.63	0.20	0.15	0.107
Sn	2.77	3.58	4.68	2.96	4.44	2.79	0.014
Ba	501	486	591	744	1032	969	4
La	39.9	18.4	68.8	104.4	95.7	20.0	0.004
Ce	75.6	37.9	141.2	185.5	191.6	46.3	0.008
Nd	31.8	14.9	52.6	82.9	72.3	21.3	0.010
Sm	6.44	3.18	9.58	13.66	12.51	5.37	0.012
Eu	0.60	0.30	0.93	0.97	1.87	1.10	0.005
Gd	6.8	3.7	7.9	10.6	10.7	6.7	0.016
Dy	9.6	7.5	8.5	9.0	11.3	9.0	0.006
Er	6.2	5.4	5.1	5.0	6.8	5.4	0.004
Yb	6.5	5.8	5.2	4.7	7.0	5.5	0.005
W	0.23	0.72	1.04	0.79	1.08	0.64	
Pb	6.1	6.9	4.8	43.0	9.6	4.0	1.5
Th	34.8	35.6	30.1	24.8	35.6	25.9	1.5, 0.002
U	5.7	5.4	6.1	5.3	5.7	3.7	1.5, 0.003

Major element compositions of the whole rocks were obtained by x-ray fluorescence (XRF) at the University of Tasmania, Australia.
F compositions of the whole rocks were obtained by Ion Specific Electrode, SGS Welshpool Minerals, Western Australia DL 50 ppm
Trace elements compositions of the whole rocks were obtained by inductively coupled plasma emission mass spectrometer (ICPMS)
Major element composition of the melt inclusions were obtained using an electron microprobe Cameca SX100 at the University of Tasmania, with an accelerating voltage of 15 kV and a low beam current of 15 nA
Trace element copositions of the melt inclusions were analysed by laser ablation ICPMS (LA-ICPMS) at the University of Tasmania, using a beam size of 55μm and a frequency of 5 Hz.