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Supporting Material Online for

**POST-MAGMATIC ALTERATION IN THE KABELIAI GRANITE (LITHUANIA):
EVIDENCE FROM PETROGRAPHY, MINERAL CHEMISTRY, AND ACCESSORY
MINERALS**

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Supplements 1 – 11

Supplement 1

Amphibole mineral chemistry from the dioritic part of M7A obtained by SEM-EDS

Amphibole mineral formula unit calculations based on 23 oxygen atoms (according to Leake *et al.* 1997)

Description Spot	Core M7Ad_9_9	Inclusion M7Ad_15_8	Core M7Ad_15_24	Core M7Ad_15_25
SiO ₂	43.01	43.95	42.78	43.00
TiO ₂	0.85	0.74	0.80	0.96
Al ₂ O ₃	9.32	9.99	9.49	9.41
FeO	19.17	18.89	18.65	18.89
MgO	10.56	10.04	10.03	10.26
MnO	0.52	0.74	0.64	0.62
CaO	12.05	11.98	11.85	11.69
Na ₂ O	1.54	1.59	1.77	1.64
K ₂ O	1.42	1.52	1.44	1.53
F	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Cl	0.33	0.30	0.41	0.32
Total	98.45	99.44	97.45	98.00
O=F,Cl (calc)	-0.07	-0.07	-0.09	-0.07
Initial Total	98.70	99.67	97.77	98.25
#Mg	0.50	0.49	0.49	0.49
Formulae based on 23 oxygen atoms	magnesio-hastingsite	magnesio-hastingsite	magnesio-hastingsite	magnesio-hastingsite
Formula	assignments			
T (ideally 8 apfu)				
Si	6.453	6.538	6.508	6.493
Al	1.547	1.462	1.492	1.507
Ti				
Fe ³⁺				
T subtotal	8.000	8.000	8.000	8.000
C (ideally 5 apfu)				
Ti	0.096	0.083	0.092	0.109

Zr				
Al	0.100	0.289	0.210	0.167
Mn ³⁺				
Fe ³⁺	0.603	0.357	0.370	0.463
Mn ²⁺	0.037	0.051	0.051	0.029
Fe ²⁺	1.802	1.994	2.003	1.923
Mg	2.362	2.227	2.275	2.310
Li				
C subtotal	5.000	5.001	5.001	5.001
B (ideally 2 apfu)				
Mn ²⁺	0.029	0.042	0.032	0.051
Fe ²⁺				
Mg				
Li				
Ca	1.937	1.909	1.932	1.891
Na	0.034	0.048	0.037	0.058
B subtotal	2.000	1.999	2.001	2.000
A (from 0 to 1 apfu)				
Ca				
Na	0.414	0.410	0.486	0.422
K	0.272	0.288	0.279	0.295
A subtotal	0.686	0.698	0.765	0.717
O (non-W)	22.000	22.000	22.000	22.000
W (ideally 2 apfu)				
OH	1.916	1.924	1.894	1.918
F				
Cl	0.084	0.076	0.106	0.082
O				
W subtotal	2.000	2.000	2.000	2.000
Sum T,C,B,A	15.686	15.698	15.767	15.718

b.d.l. = below detection limit

Supplement 2

A. Feldspar mineral chemistry from dioritic and leucocratic granitic parts of sample M7A obtained by SEM-EDS.

Description	Feldspar M7A granite near contact		Feldspar M7A diorite					
Comment			Inclusion in Amph					
Spot	M7A.C3_7	M7A.C3_9	M7A.D19_31	M7A.D_9_2	M7A.D_9_11	M7A.D_15_22	M7A.D_19_28	M7A.D_19_31
SiO ₂	64.51	65.54	62.49	61.57	61.93	62.28	61.17	62.49
TiO ₂	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Al ₂ O ₃	17.95	18.56	23.91	23.25	23.33	23.7	23.21	23.91
FeO	b.d.l.	b.d.l.	b.d.l.	0.26	b.d.l.	0.26	0.29	b.d.l.
MnO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
MgO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
CaO	b.d.l.	b.d.l.	5.19	5.32	5.18	5.19	5.17	5.19
Na ₂ O	1.27	0.74	8.97	8.65	8.81	8.87	8.64	8.97
K ₂ O	14.64	15.72	0.21	0.20	0.15	0.17	0.18	0.21
BaO	0.61	0.59	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	98.98	101.15	100.76	99.24	99.4	100.47	98.66	100.76
Formulae units based on 8 atoms of oxygen								
Si	3.01	3.00	2.75	2.75	2.76	2.76	2.75	2.75
Al	0.99	1.00	1.24	1.23	1.23	1.23	1.23	1.24
Ti	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Fe	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Mn	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Mg	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Ca	b.d.l.	b.d.l.	0.24	0.25	0.26	0.25	0.25	0.24
Na	0.11	0.07	0.77	0.77	0.75	0.76	0.75	0.77
K	0.87	0.92	0.01	0.01	0.01	0.01	0.01	0.01
Ba	0.01	0.01	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	4.99	4.99	5.02	5.02	5.00	5.01	5.00	5.02
Or	88.35	93.32	1.15	1.27	1.12	0.84	1.02	1.15
Ab	11.65	6.68	74.90	74.38	73.80	74.84	74.38	74.90
An	0.00	0.00	23.95	24.35	25.08	24.32	24.60	23.95

b.d.l. = below detection limit

Description	Feldspar M7A leucocratic granite									
Spot	M7A.G	M7A.G	M7A.G	M7A.G	M7A.G	M7A.G	M7A.G	M7A.G	M7A.G	M7A.G
	_2_12	_2_13	_2_17	_13_1	_13_3	_13_8	_13_9	_21_6	_21_8	_21_10
SiO ₂	64.18	67.31	66.66	61.9	65.94	67.68	61.94	68.31	69.08	62.97
TiO ₂	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Al ₂ O ₃	17.92	19.83	20.27	23.27	20.00	19.26	23.65	19.51	19.27	23.13
FeO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.21	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
MgO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
MnO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
CaO	b.d.l.	0.84	1.35	5.07	1.21	0.51	5.37	0.65	0.20	5.07
Na ₂ O	0.65	11.6	11.05	9.05	10.76	11.24	8.95	11.48	11.92	8.97
K ₂ O	15.18	0.12	0.12	0.15	0.27	b.d.l.	b.d.l.	0.22	b.d.l.	0.22
BaO	0.47	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	98.41	99.7	99.44	99.44	98.39	98.69	99.9	100.17	100.47	100.36
Formula units based on 8 atoms of oxygen										
Si	3.01	2.96	2.94	2.76	2.94	2.99	2.75	2.98	3.00	2.78
Al	0.99	1.03	1.05	1.22	1.05	1.00	1.24	1.00	0.99	1.20
Ti	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Fe	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Mn	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Mg	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Ca	b.d.l.	0.04	0.06	0.24	0.06	0.02	0.26	0.03	0.01	0.24
Na	0.06	0.99	0.94	0.78	0.93	0.96	0.77	0.97	1.00	0.77
K	0.91	0.01	0.01	0.01	0.02	b.d.l.	b.d.l.	0.01	b.d.l.	b.d.l.
Ba	0.01	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	4.98	5.02	5.01	5.02	5.00	4.99	5.02	5.01	5.01	5.01
Or	93.89	0.65	0.66	0.83	1.53	0.00	0.00	1.21	0.00	1.21
Ab	6.11	95.53	93.05	75.73	92.71	97.55	75.10	95.80	99.08	75.27
An	0.00	3.82	6.28	23.44	5.76	2.45	24.90	3.00	0.92	23.51

b.d.l. = below detection limit

Description	Feldspar M7A leucocratic granite					
Comment	Inclusion	Pertite	Core	Rim	Rim	Core
Spot	M7A.G_22_5	M7A.G_22_28	M7A.G_23_19	M7A.G_23_20	M7A.G_23_21	M7A.G_24_14
SiO ₂	66.92	64.08	61.65	66.67	63.8	62.4
TiO ₂	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Al ₂ O ₃	19.69	18.28	22.80	19.76	17.79	23.68
FeO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
MgO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
MnO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
CaO	0.61	b.d.l.	5.11	0.72	b.d.l.	5.24
Na ₂ O	11.44	0.81	8.87	11.26	0.44	9.04
K ₂ O	0.20	15.05	0.27	b.d.l.	16.03	0.14
BaO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	98.87	98.22	98.7	98.42	98.06	100.49
Formula units based on 8 atoms of oxygen						
Si	2.97	3.00	2.77	2.96	3.01	2.76
Al	1.03	1.01	1.21	1.04	0.99	1.23
Ti	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Fe	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Mn	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Mg	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Ca	0.03	b.d.l.	b.d.l.	0.03	b.d.l.	b.d.l.
Na	0.98	0.07	0.77	0.97	0.04	0.77
K	0.01	0.90	0.02	b.d.l.	0.96	0.01
Ba	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	5.02	4.98	5.02	5.00	5.00	5.02
Or	1.10	92.44	1.50	0.00	95.99	0.77
Ab	96.06	7.56	74.72	96.59	4.01	75.16
An	2.83	0.00	23.79	3.41	0.00	24.07

b.d.l. = below detection limit

B. Feldspar mineral chemistry from sample M7C (pegmatitic and leucogranitic parts) obtained by SEM-EDS.

Description Comment Spot	Feldspar M7C leucogranitic part											
	Pertite	Myrmekite	Pertite	Rim	Core	Altered	Altered	Rim	Rim	Core	Rim	Near bt
	M7C.G	M7C.G	M7C.G	M7C.G	M7C.G	M7C.G	M7C.G	M7C.G	M7C.G	M7C.G	M7C.G	M7C.G
	9 2	9 13	9 18	11 1	11 14	12.1 4	12.1 6	12.1 7	12.2 16	12.2 18	12.2 20	12.2 35
SiO ₂	65.13	62.27	69.71	66.30	63.15	65.65	69.33	65.07	63.17	62.30	66.22	65.17
TiO ₂	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Al ₂ O ₃	18.28	23.22	19.44	21.54	23.82	18.24	19.46	21.93	23.52	23.40	21.40	18.32
FeO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.52	b.d.l.	1.30	b.d.l.	b.d.l.	b.d.l.	0.24
MgO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
MnO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
CaO	b.d.l.	5.25	0.22	2.24	5.08	b.d.l.	b.d.l.	2.86	4.86	5.27	1.75	b.d.l.
Na ₂ O	0.40	8.84	9.07	10.62	9.08	0.89	11.89	10.16	9.23	8.92	10.70	0.56
K ₂ O	16.48	b.d.l.	3.15	0.15	b.d.l.	15.54	0.43	0.26	0.17	0.19	0.17	16.40
BaO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
F	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	2.03	3.29	2.81	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Cl	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	100.29	99.59	101.59	100.86	101.13	100.84	101.49	101.58	100.94	100.08	100.25	100.69
Formula units based on 8 atoms of oxygen												
Si	3.00	2.77	3.02	2.89	2.77	2.90	2.84	2.71	2.77	2.76	2.90	3.00
Al	0.99	1.22	0.99	1.11	1.23	0.95	0.94	1.08	1.22	1.22	1.10	0.99
Ti	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Fe	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.02	b.d.l.	0.05	b.d.l.	b.d.l.	b.d.l.	0.01
Mn	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Mg	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Ca	b.d.l.	0.25	0.01	0.10	0.24	b.d.l.	b.d.l.	0.13	0.23	0.25	0.08	b.d.l.
Na	0.04	0.76	0.76	0.90	0.77	0.08	0.94	0.82	0.79	0.77	0.91	0.05
K	0.97	b.d.l.	0.17	0.01	b.d.l.	0.88	0.02	0.01	0.01	0.01	0.01	0.96
Ba	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
F	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.28	0.43	0.37	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Cl	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	5.00	5.00	4.95	5.01	5.00	5.10	5.17	5.17	5.02	5.01	5.01	5.01
Or	96.44	0.00	18.40	0.83	0.00	91.99	2.32	1.44	0.93	1.05	0.95	95.07
Ab	3.56	75.29	80.52	88.82	76.38	8.01	97.68	85.30	76.74	74.60	90.84	4.93
An	0.00	24.71	1.08	10.35	23.62	0.00	0.00	13.27	22.33	24.36	8.21	0.00

b.d.l. = below detection limit

Description Comment Spot	Feldspar M7C leucogranitic part				
	Unaltered	Altered grain			
	M7C.G_16_7	M7C.G_16_14	M7C.G_17_9	M7C.G_17_10	M7C.G_17_13
SiO ₂	65.45	64.52	65.31	63.16	68.66
TiO ₂	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Al ₂ O ₃	17.92	17.93	17.97	23.09	19.95
FeO	b.d.l.	0.23	b.d.l.	b.d.l.	b.d.l.
MgO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
MnO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
CaO	b.d.l.	b.d.l.	b.d.l.	5.04	0.50
Na ₂ O	0.47	0.50	0.43	9.14	11.68
K ₂ O	15.90	15.74	16.12	b.d.l.	b.d.l.
BaO	0.49	0.60	b.d.l.	b.d.l.	b.d.l.
F	b.d.l.	b.d.l.	1.21	1.46	1.24
Cl	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	100.23	99.52	99.83	100.44	100.79
Formula units based on 8 atoms of oxygen					
Si	3.02	3.01	2.95	2.72	2.92
Al	0.97	0.98	0.96	1.17	1.00
Ti	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Fe	b.d.l.	0.01	b.d.l.	b.d.l.	b.d.l.
Mn	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Mg	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Ca	b.d.l.	b.d.l.	b.d.l.	0.23	0.02
Na	0.04	0.05	0.04	0.76	0.96
K	0.94	0.94	0.93	b.d.l.	b.d.l.
Ba	0.01	0.01	b.d.l.	b.d.l.	b.d.l.
F	b.d.l.	b.d.l.	0.17	0.20	0.17
Cl	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	4.98	4.99	5.05	5.08	5.07
Or	95.70	95.39	96.10	0.00	0.00
Ab	4.30	4.61	3.90	76.64	97.69
An	0.00	0.00	0.00	23.36	2.31

b.d.l. = below detection limit

Description	Feldspar M7C pegmatitic part									
Comment	Core	Inclusion	Altered	Core	Core	Rim	Rim	Rim	Rim	Core
Spot	M7C.P	M7C.P	M7C.P	M7C.P	M7C.P	M7C.P	M7C.P	M7C.P	M7C.P	M7C.P
	24 1	24 3	27 1	27 2	30 1	30 5	30 10	31 1	31 4	31 18
SiO ₂	64.54	69.12	65.47	65.68	64.98	69.28	64.75	65.77	61.67	66.36
TiO ₂	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Al ₂ O ₃	17.84	19.64	18.39	18.10	18.40	19.04	17.99	18.49	23.49	18.50
FeO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.40	0.26	b.d.l.	b.d.l.	b.d.l.
MnO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
MgO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
CaO	b.d.l.	1.94	b.d.l.	b.d.l.	b.d.l.	0.21	b.d.l.	b.d.l.	5.07	b.d.l.
Na ₂ O	0.41	10.38	0.72	0.88	0.49	10.70	0.38	1.15	9.11	3.47
K ₂ O	15.90	0.15	15.48	15.39	15.86	1.36	15.54	15.57	0.14	13.43
BaO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
F	b.d.l.	3.60	3.83	3.18	1.19	2.12	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Cl	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.14
Total	98.69	101.23	100.94	100.05	99.74	100.98	99.96	100.98	99.48	101.77
Formula units based on 8 atoms of oxygen										
Si	3.02	2.81	2.81	2.85	2.94	2.91	3.02	3.00	2.75	2.99
Al	0.98	0.94	0.93	0.93	0.98	0.94	0.99	0.99	1.24	0.98
Ti	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Fe	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.01	0.01	b.d.l.	b.d.l.	b.d.l.
Mn	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Mg	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Ca	b.d.l.	0.08	b.d.l.	b.d.l.	b.d.l.	0.01	b.d.l.	b.d.l.	0.24	b.d.l.
Na	0.04	0.82	0.06	0.07	0.04	0.87	0.03	0.10	0.79	0.30
K	0.95	0.01	0.85	0.85	0.92	0.07	0.92	0.91	0.01	0.77
Ba	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
F	b.d.l.	0.46	0.52	0.44	0.17	0.28	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Cl	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.01
Total	4.98	5.13	5.17	5.15	5.05	5.09	4.97	5.00	5.03	5.06
Or	96.23	0.85	93.40	92.00	95.51	7.64	96.42	89.91	0.77	71.80
Ab	3.77	89.86	6.60	8.00	4.49	91.37	3.58	10.09	75.89	28.20
An	0.00	9.28	0.00	0.00	0.00	0.99	0.00	0.00	23.34	0.00

b.d.l. = below detection limit

C. Feldspar mineral chemistry from sample M7E (leucocratic plagiogranitic and biotite pegmatitic parts) obtained by SEM-EDS.

Description Comment Spot	Feldspar M7E leucocratic plagiogranite part								
	Rim M7E.LP _19_7	Rim M7E.LP _19_8	M7E.LP _19_16	Rim M7E.LP _21_12	Rim M7E.LP _21_13	M7E.LP _21_19	M7E.LP _23_4	Rim M7E.LP _23_5	M7E.LP _23_7
SiO ₂	63.41	61.98	64.43	61.86	64.01	64.23	61.13	65.42	66.66
TiO ₂	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Al ₂ O ₃	22.99	23.23	17.86	22.89	21.60	17.97	23.28	21.02	20.86
FeO	b.d.l.	b.d.l.	b.d.l.	0.43	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
MgO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
MnO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
CaO	4.39	5.21	b.d.l.	4.99	3.45	b.d.l.	5.16	2.53	2.41
Na ₂ O	9.55	8.70	0.35	8.74	9.76	0.55	8.75	9.85	10.76
K ₂ O	0.24	b.d.l.	15.96	0.22	0.34	15.83	b.d.l.	0.31	0.31
F	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Cl	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	100.57	99.10	98.60	99.14	99.16	98.58	98.32	99.14	101.00
Formula units based on 8 atoms of oxygen									
Si	2.79	2.77	3.02	2.77	2.85	3.01	2.76	2.90	2.91
Al	1.19	1.22	0.99	1.21	1.13	0.99	1.24	1.10	1.07
Ti	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Fe	b.d.l.	b.d.l.	b.d.l.	0.02	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Mn	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Mg	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Ca	0.21	0.25	b.d.l.	0.24	0.16	b.d.l.	0.25	0.12	0.11
Na	0.82	0.75	0.03	0.76	0.84	0.05	0.76	0.85	0.91
K	0.01	b.d.l.	0.95	0.01	0.02	0.95	b.d.l.	0.02	0.02
Cl	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	5.02	5.00	4.98	5.01	5.01	4.99	5.01	4.98	5.02
Or	1.30	0.00	96.77	1.24	1.88	94.98	0.00	1.78	1.66
Ab	78.71	75.14	3.23	75.07	82.08	5.02	75.42	86.01	87.51
An	19.99	24.86	0.00	23.69	16.03	0.00	24.58	12.21	10.83

b.d.l. = below detection limit

Description	Feldspar M7E biotite pegmatitic part								
Comment	Rim	Rim		Core	Rim	Core	Near epidote	Near altered titanite	
Spot	M7E.BP	M7E.BP	M7E.BP	M7E.BP	M7E.BP	M7E.BP	M7E.BP	M7E.BP	M7E.BP
	1 17	1 19	1 29	1 30	3.1 7	3.1 10	4.2 26	16 9	16 11
SiO ₂	68.22	67.57	62.85	62.37	65.38	62.54	66.48	66.88	64.46
TiO ₂	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Al ₂ O ₃	19.65	20.12	23.66	23.68	21.59	23.28	20.38	21.04	18.27
FeO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.30	b.d.l.	b.d.l.
MgO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
MnO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
CaO	0.46	1.37	5.15	5.35	3.03	5.30	1.85	1.97	b.d.l.
Na ₂ O	11.80	11.31	8.89	8.83	10.39	8.53	10.68	10.94	0.53
K ₂ O	b.d.l.	b.d.l.	0.19	b.d.l.	b.d.l.	0.16	b.d.l.	b.d.l.	16.11
F	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Cl	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	100.14	100.38	100.75	100.23	100.40	99.82	99.69	100.84	99.37
Formula units based on 8 atoms of oxygen									
Si	2.98	2.95	2.77	2.76	2.87	2.78	2.93	2.91	3.00
Al	1.01	1.04	1.23	1.23	1.12	1.22	1.06	1.08	1.00
Ti	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Fe	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.01	b.d.l.	b.d.l.
Mn	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Mg	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Ca	0.02	0.06	0.24	0.25	0.14	0.25	0.09	0.09	b.d.l.
Na	1.00	0.96	0.76	0.76	0.88	0.73	0.91	0.92	0.05
K	b.d.l.	b.d.l.	0.01	b.d.l.	b.d.l.	0.01	b.d.l.	b.d.l.	0.96
Cl	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	5.01	5.01	5.01	5.00	5.01	4.99	5.00	5.01	5.00
Or	0.00	0.00	1.05	0.00	0.00	0.91	0.00	0.00	95.24
Ab	97.89	93.73	74.95	74.92	86.12	73.76	91.26	90.95	4.76
An	2.11	6.27	23.99	25.08	13.88	25.33	8.74	9.05	0.00

b.d.l. = below detection limit

Supplement 3

A. Biotite mineral chemistry from M7A obtained by SEM-EDS. Biotite formula unit calculations based on 22 oxygen atoms according to Li *et al* 2020; Henry *et al* 2005; Tindle & Webb 1990. OH* and H₂O* were calculated assuming full OH site occupancy (Tindle & Webb, 1990); log (fO₂/fH₂) and log (fO₂/fH₂O) after Munoz (1984, 1992).

Description	Biotite M7A Diorite near contact					Biotite M7A Diorite							
Comments	Inclusion	Altered	Altered	Rim	Core	Core	Rim	Core	Rim	Rim	Core	Rim	Core
Spot	M7A.CD	M7A.CD	M7A.CD	M7A.CD	M7A.CD	M7A.D	M7A.D	M7A.D	M7A.D	M7A.D	M7A.D	M7A.D	M7A.D
	3.1 6	12 12	20 2	20 7	9 21	15 17	19 4	19 6	19 10	19 19	19 21	19 23	19 32
SiO ₂	37.64	38.07	38.80	38.75	37.54	37.92	39.28	38.86	38.66	37.34	37.82	38.47	38.53
TiO ₂	2.14	1.65	1.62	1.66	1.82	1.38	1.37	1.22	1.66	1.67	1.89	2.15	1.54
Al ₂ O ₃	13.08	13.37	13.69	13.31	12.78	13.14	13.22	13.59	13.94	13.01	13.22	13.50	12.76
FeO	17.03	16.49	16.85	16.63	17.53	17.25	16.48	17.15	16.72	16.97	17.17	16.97	17.08
MgO	13.85	14.79	15.16	15.10	14.24	14.72	14.85	15.35	14.70	13.74	14.45	13.84	14.78
MnO	0.29	0.44	0.33	0.30	0.42	0.40	0.48	0.44	0.36	0.32	0.50	0.42	0.43
CaO	b.d.l.	0.19	b.d.l.	b.d.l.	0.24	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Na ₂ O	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
K ₂ O	9.57	9.22	9.79	9.74	9.47	9.77	9.63	9.82	10.09	9.77	9.60	9.70	9.62
F	1.46	1.53	1.48	1.92	1.72	1.73	1.37	2.16	1.64	1.30	1.55	1.02	1.77
Cl	0.30	b.d.l.	0.23	0.27	0.33	0.33	0.27	0.28	0.24	0.21	0.34	0.18	0.22
H ₂ O*	2.72	2.72	2.91	2.70	2.58	2.80	2.90	2.72	2.84	2.87	2.74	2.89	2.73
Total	98.65	99.24	101.42	100.74	99.11	99.83	100.33	101.86	101.41	97.92	99.71	99.99	99.92
Formulae based on 22 oxygen													
Si	5.81	5.75	5.81	5.84	5.78	5.80	5.90	5.82	5.81	5.80	5.79	5.84	5.85
Al ^{iv}	1.46	1.97	1.58	1.49	1.52	1.43	1.39	1.52	1.60	1.55	1.46	1.60	1.49
Al ^{vi}	0.92	0.41	0.84	0.87	0.79	0.94	0.95	0.88	0.88	0.83	0.93	0.81	0.79
Ti	0.25	0.20	0.18	0.19	0.22	0.16	0.16	0.14	0.19	0.21	0.22	0.25	0.18
Fe	2.20	2.08	2.11	2.10	2.26	2.21	2.07	2.15	2.10	2.20	2.20	2.15	2.17
Mn	0.04	0.06	0.04	0.04	0.05	0.05	0.06	0.06	0.05	0.04	0.06	0.05	0.06
Mg	3.41	3.24	3.52	3.56	3.41	3.58	3.50	3.59	3.44	3.34	3.53	3.25	3.49
Ca	b.d.l.	0.03	b.d.l.	b.d.l.	0.04	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Na	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
K	1.72	1.85	1.74	1.72	1.74	1.72	1.70	1.72	1.79	1.82	1.69	1.78	1.75
OH*	2.81	2.74	2.90	2.72	2.65	2.86	2.91	2.72	2.85	2.97	2.80	2.93	2.77

F	0.91	0.62	0.83	1.07	0.96	1.04	0.82	1.18	0.93	0.79	0.97	0.61	0.97
Cl	0.08	0.01	0.06	0.07	0.09	0.09	0.07	0.07	0.06	0.06	0.09	0.05	0.06
Total	19.61	18.95	19.61	19.69	19.50	19.88	19.54	19.83	19.70	19.60	19.74	19.32	19.58
Al _{total}	2.38	2.38	2.42	2.37	2.32	2.37	2.34	2.40	2.47	2.38	2.39	2.41	2.28
Mg#	0.61	0.61	0.63	0.63	0.60	0.62	0.63	0.63	0.62	0.60	0.62	0.60	0.62
T° C	663	622	610	621	633	587	588	549	615	628	640	658	609
Log(Cl/OH) _{Bt}	1.55	2.44	1.70	1.60	1.49	1.52	1.63	1.58	1.67	1.73	1.50	1.80	1.69
iv _{Cl}	0.03	0.00	0.02	0.02	0.03	0.03	0.02	0.03	0.02	0.02	0.03	0.02	0.02
Munoz (1984)													
log(<i>f</i> _{H2O} / <i>f</i> _{HCl}) _{fluid}	4.00	4.15	4.04	4.02	3.98	4.00	4.03	4.01	4.04	4.05	3.99	4.07	4.04
Munoz (1992)													
log(<i>f</i> _{H2O} / <i>f</i> _{HCl}) _{fluid}	4.25	4.40	4.29	4.26	4.22	4.24	4.27	4.26	4.28	4.30	4.23	4.31	4.29

Table continued

Description Comments Spot	Biotite M7A leucocratic granite			
	Rim	Rim	Core	Core
	M7A.G 13 12	M7A.G 13 21	M7A.G 13 16	M7A.G 13 17
SiO ₂	37.03	37.35	38.00	37.58
TiO ₂	1.69	2.05	2.07	2.02
Al ₂ O ₃	13.69	13.89	13.15	13.08
FeO	18.43	19.23	18.71	19.18
MgO	12.86	12.41	13.40	13.29
MnO	b.d.l.	0.25	0.21	b.d.l.
Na ₂ O	b.d.l.	b.d.l.	b.d.l.	b.d.l.
K ₂ O	9.63	9.73	9.74	9.73
F	1.30	0.96	1.26	1.35
Cl	0.59	0.71	0.54	0.48
H ₂ O*	2.92	2.96	2.86	2.88
Total	98.59	100.03	100.42	100.17
Formula based on 22 oxygen atoms				
Si	5.80	5.81	5.85	5.81
Al ^{iv}	1.09	0.96	1.10	1.17
Al ^{vi}	1.43	1.59	1.29	1.21
Ti	0.20	0.23	0.23	0.23
Fe	2.45	2.50	2.41	2.48
Mn	b.d.l.	0.03	0.03	b.d.l.
Mg	3.43	3.40	3.45	3.40
Ca	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Na	b.d.l.	b.d.l.	b.d.l.	b.d.l.
K	1.57	1.51	1.59	1.63
OH*	3.06	3.08	2.94	2.97
F	1.06	0.98	0.99	0.99
Cl	0.16	0.19	0.14	0.13
Total	20.25	20.28	20.01	20.01
Al _{total}	2.53	2.55	2.38	2.38
Mg#	0.58	0.58	0.59	0.58
T° C	616	638	644	639
Log(Cl/OH) _{Bt}	1.29	1.22	1.32	1.37

ivCl	0.05	0.06	0.05	0.04
Munoz (1984) $\log(f_{\text{H}_2\text{O}}/f_{\text{HCl}})_{\text{fluid}}$	3.89	3.84	3.91	3.93
Munoz (1992) $\log(f_{\text{H}_2\text{O}}/f_{\text{HCl}})_{\text{fluid}}$	4.12	4.08	4.14	4.17

b.d.l. = below detection limit; OH* – calculated values after Tindal & Webb (1990), assuming full OH site occupancy; Al iv - tetrahedrally coordinated Al; Al vi - octahedrally coordinated Al; Fe²⁺/Fe³⁺ - calculated stoichiometrically from charge balance; iv_{Cl} - calculated structural chlorine content (apfu).

B. Biotite mineral chemistry from M7C obtained by SEM-EDS.

[illegible]

Na	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.08	b.d.l.	b.d.l.	0.12
K	1.73	1.81	1.81	1.74	1.62	1.66	1.57	1.61
OH*	2.77	2.85	2.75	2.85	2.36	2.90	2.31	3.03
F	0.80	0.73	0.78	0.80	1.57	0.91	1.43	b.d.l.
Cl	0.07	0.05	0.05	0.07	0.11	0.10	0.13	0.10
Total	19.42	19.42	19.38	19.54	20.05	19.70	19.72	18.98
Al _{total}	2.61	2.46	2.44	2.45	2.65	2.71	2.65	2.56
Mg#	0.55	0.57	0.57	0.55	0.54	0.53	0.54	0.53
T° C	672	669	676	672	636	622	686	706
Log(Cl/OH) _{Bt}	1.60	1.72	1.75	1.58	1.31	1.47	1.26	1.47
iv _{Cl}	0.02	0.02	0.02	0.03	0.05	0.03	0.05	0.03
Munoz (1984)								
log(<i>f</i> _{H2O} / <i>f</i> _{HCl}) _{fluid}	4.02	4.05	4.06	4.01	3.90	3.97	3.87	3.98
Munoz (1992)								
log(<i>f</i> _{H2O} / <i>f</i> _{HCl}) _{fluid}	4.26	4.29	4.30	4.26	4.14	4.21	4.11	4.21

b.d.l. = below detection limit; OH* – calculated values after Tindle & Webb (1990), assuming full OH site occupancy; Al iv - tetrahedrally coordinated Al; Al vi - octahedrally coordinated Al; Fe²⁺/Fe³⁺ - calculated stoichiometrically from charge balance; iv_{Cl} - calculated structural chlorine content (apfu).

C. Biotite mineral chemistry from M7E obtained by SEM-EDS.

Rock	Biotite M7E biotite granite									Biotite M7E leucocratic plagiogranite Inclusion
Description Spot	Core M7E.BP 2 15	Core M7E.BP 2 16	Rim M7E.BP 2 19	Rim M7E.BP 2 20	Core M7E.BP 6 3	Rim M7E.BP 6 7	M7E.BP 6 10	Rim M7E.BP 13 9	Core M7E.BP 13 11	M7E.LP_19_4
SiO ₂	37.72	37.39	38.25	38.36	37.67	37.36	35.45	38.64	38.18	37.11
TiO ₂	2.27	2.27	2.13	2.08	2.78	2.56	1.58	1.85	1.79	2.01
Al ₂ O ₃	15.03	15.68	15.40	15.32	14.50	15.02	15.46	15.00	14.90	14.69
FeO	20.06	19.69	19.39	19.80	19.75	19.86	21.54	18.65	18.95	20.52
MgO	10.71	10.66	10.79	10.78	10.41	10.26	10.01	11.79	12.35	9.99
MnO	0.25	0.51	0.34	0.38	0.42	0.34	0.52	b.d.l.	b.d.l.	b.d.l.
CaO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Na ₂ O	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
K ₂ O	9.48	8.91	9.83	9.82	9.70	9.60	9.12	9.51	9.71	9.60
F	b.d.l.	0.64	1.07	1.06	0.77	b.d.l.	b.d.l.	1.18	b.d.l.	b.d.l.
Cl	0.44	0.43	0.48	0.38	0.43	0.42	0.52	0.35	0.40	0.46
H ₂ O*	3.28	2.99	2.93	2.95	2.85	3.19	3.35	2.98	3.46	3.33
Total	100.51	100.17	101.48	101.94	100.32	99.93	98.80	100.80	100.93	99.04
Formula based on 22 oxygen atoms										
Si	5.79	5.74	5.85	5.83	5.84	5.79	5.60	5.86	5.79	5.80
Al ^{iv}	1.31	1.49	1.31	1.42	1.33	1.37	1.39	1.39	1.32	1.20
Al ^{vi}	1.41	1.35	1.46	1.32	1.31	1.37	1.48	1.29	1.34	1.50
Ti	0.26	0.26	0.24	0.24	0.32	0.30	0.19	0.22	0.20	0.24
Fe	2.58	2.53	2.49	2.52	2.56	2.57	2.85	2.40	2.40	2.69
Mn	0.03	0.07	0.04	0.05	0.06	0.04	0.07	b.d.l.	b.d.l.	b.d.l.
Mg	2.77	2.75	2.80	2.71	2.74	2.69	2.78	2.90	3.06	2.70
Ca	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Na	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
K	1.60	1.53	1.63	1.68	1.66	1.65	1.55	1.64	1.64	1.63
OH*	3.37	3.06	2.99	2.99	2.95	3.30	3.54	3.02	3.51	3.48
F	b.d.l.	0.60	0.85	0.77	0.69	b.d.l.	b.d.l.	0.79	b.d.l.	b.d.l.
Cl	0.11	0.11	0.12	0.10	0.11	0.11	0.14	0.09	0.10	0.12
Total	19.24	19.49	19.79	19.63	19.58	19.20	19.59	19.60	19.37	19.36

Al _{total}	2.72	2.84	2.77	2.75	2.65	2.74	2.88	2.68	2.66	2.71
Mg#	0.39	0.40	0.40	0.40	0.52	0.51	0.49	0.55	0.56	0.50
T° C	642	643	633	626	676	662	575	618	609	626
Log(Cl/OH) _{Bt}	1.47	1.44	1.38	1.49	1.42	1.48	1.40	1.52	1.53	1.46
iv _{Cl}	0.03	0.04	0.04	0.03	0.04	0.03	0.04	0.03	0.03	0.03
Munoz (1984)										
log(<i>f</i> _{H2O} / <i>f</i> _{HCl}) _{fluid}	3.97	3.96	3.94	3.98	3.95	3.98	3.95	4.00	4.00	3.97
Munoz (1992)										
log(<i>f</i> _{H2O} / <i>f</i> _{HCl}) _{fluid}	4.21	4.20	4.17	4.22	4.19	4.22	4.19	4.24	4.24	4.21

b.d.l. = below detection limit; OH* – calculated values after Tindle & Webb (1990), assuming full OH site occupancy; Al iv - tetrahedrally coordinated Al; Al vi - octahedrally coordinated Al; Fe²⁺/Fe³⁺ - calculated stoichiometrically from charge balance; iv_{Cl} - calculated structural chlorine content (apfu).

Supplement 4

Mineral chemistry of accessory minerals

A. Apatite mineral chemistry from sample M7A obtained by SEM-EDS. Calculations were performed using the Apatite Formula Unit Calculator spreadsheet provided by GabbroSoft (<http://www.gabbrosoft.org>).

Description	Apatite M7A diorite near contact		Apatite M7A diorite						Apatite M7A granite
Comment Spot	Core M7A_DC 10 12	Rim M7A_DC 12 14	Inclusion M7A_D 9 3 15 14		Inclusion M7A_D 16 17 16 18		Inclusion M7A_D 16 24	Inclusion M7A_D 16 25	M7A G 22
CaO	55.90	54.58	55.10	55.77	53.01	52.84	52.08	51.21	55.71
Na ₂ O	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.21	b.d.l.
FeO	b.d.l.	b.d.l.	0.28	0.43	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
MnO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
La ₂ O ₃	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Ce ₂ O ₃	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Pr ₂ O ₃	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Nd ₂ O ₃	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
P ₂ O ₅	43.33	43.47	43.60	44.12	41.14	41.95	40.43	40.00	43.83
SiO ₂	b.d.l.	0.25	b.d.l.	b.d.l.	0.26	0.26	0.30	b.d.l.	0.46
F	4.03	4.05	3.95	4.15	4.37	3.86	3.89	4.90	4.02
Cl	b.d.l.	b.d.l.	b.d.l.	0.12	b.d.l.	b.d.l.	b.d.l.	0.13	0.16
Total	103.26	102.35	102.93	104.59	98.78	98.91	96.70	96.45	100.17
O=F,Cl	1.70	1.71	1.66	1.77	1.84	1.63	1.64	2.09	1.73
Total	101.56	100.64	101.27	102.82	96.94	97.28	95.06	94.36	98.44
No. anions O,OH,Cl,F on basis of 25									
Ca	9.48	9.29	9.35	9.33	9.38	9.31	9.42	9.29	9.33
Na	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.07	b.d.l.
Mn	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Fe	b.d.l.	b.d.l.	0.04	0.06	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
La	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Ce	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Pr	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Nd	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
P	5.81	5.85	5.85	5.83	5.76	5.84	5.78	5.74	5.80

Si	b.d.l.	0.04	b.d.l.	b.d.l.	0.04	0.04	0.05	b.d.l.	0.07
Cl	b.d.l.	b.d.l.	b.d.l.	0.03	b.d.l.	b.d.l.	b.d.l.	0.04	0.04
F	2.02	2.03	1.98	2.05	2.28	2.01	2.08	2.62	1.99
OH	-1.02	-1.03	-0.98	-1.08	-1.28	-1.01	-1.08	-1.66	-1.03
Total	16.28	16.17	16.24	16.21	16.18	16.19	16.25	16.10	16.21
log(fOH/fCl)	-	-	-	9.61	-	-	-	9.37	9.30

b.d.l. = below detection limit

B. Titanite mineral chemistry from sample M7A obtained by SEM-EDS.

Description Comment Spot	Titanite M7A granite			Titanite M7A diorite	
	Core		Rim		
	M7A.G 2 1	M7A.G 2 2	M7A.G 2 3	M7A.D 19 11	M7A.D 19 12
SiO ₂	30.41	30.06	30.34	31.91	31.74
TiO ₂	32.73	32.42	36.28	35.50	35.10
Al ₂ O ₃	2.77	2.41	2.01	2.71	2.93
FeO Total	2.00	1.84	0.66	1.72	1.77
MgO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
MnO	0.32	b.d.l.	b.d.l.	b.d.l.	b.d.l.
CaO	27.18	27.43	28.16	29.08	28.75
Na ₂ O	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
K ₂ O	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
P ₂ O ₅	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
F	b.d.l.	b.d.l.	b.d.l.	1.37	1.28
Cl	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	95.41	94.16	97.45	102.29	101.57
Formulae on the basis of 5					
Coef.	2.06	2.09	2.01	1.94	1.95
Si	1.04	1.04	1.01	1.03	1.03
Ti	0.84	0.85	0.91	0.86	0.86
Al	0.11	0.10	0.08	0.10	0.11
Fe ²⁺ all ferrous	0.06	0.05	0.02	0.05	0.05
Mn	0.01	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Mg	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Ca	1.00	1.02	1.01	1.01	1.00
Na	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
K	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.

Fe/Al	0.29	0.16	0.25	0.34	0.16	0.24	0.16
b.d.l. = below detection limit							

D. Titanite chemistry from sample M7E obtained by SEM-EDS.

Description	M7E biotite pegmatite																
Comment																	
Spot	M7E.BP 2 8	M7E.BP 2 9	Rim M7E.BP 2 26	Core M7E.BP 2 27	Rim M7E.BP 3.1 19	Rim M7E.BP 13 12	Core M7E.BP 13 16	Rim M7E.BP 13 19	Rim M7E.BP 13 27	Core M7E.BP 13 30	M7E.BP 15 3	M7E.BP 15.1 9	Rim M7E.BP 15.1 29	Core M7E.BP 16 5	Core M7E.BP 16 6	Core M7E.PB 24 3	Core M7E.PB 24 4
SiO ₂	31.43	30.85	30.85	31.31	30.79	31.44	32.35	30.97	30.56	30.75	31.05	30.76	31.27	31.03	30.91	30.53	30.71
TiO ₂	34.91	34.82	34.60	33.47	33.62	34.91	35.83	35.48	35.08	36.16	35.22	35.10	35.39	34.49	34.41	36.43	37.20
Al ₂ O ₃	2.27	2.45	2.55	2.91	3.16	2.44	2.65	2.26	2.42	2.27	2.17	2.85	2.35	2.37	2.35	1.06	1.17
FeO	1.73	1.75	1.60	1.78	1.36	1.53	1.22	1.59	1.14	1.66	1.76	0.88	1.33	1.89	2.05	1.18	1.05
MnO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.28	0.43
MgO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
CaO	28.31	28.60	28.98	28.79	28.07	27.98	29.03	28.60	28.65	28.99	28.76	28.68	28.75	28.04	28.31	28.75	28.40
Na ₂ O	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
K ₂ O	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
F	1.03	1.41	1.47	1.76	1.38	1.02	1.06	1.01	b.d.l.	1.04	0.91	1.61	1.81	1.33	1.18	b.d.l.	0.75
Cl	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
La	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	1.27	b.d.l.	1.10	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	99.68	99.88	100.05	100.02	98.38	99.32	102.14	101.18	97.85	101.97	99.87	99.88	100.90	99.15	99.21	98.23	99.71
Formulae based on 5 oxygen atoms																	
Si	1.04	1.02	1.02	1.04	1.03	1.04	1.04	1.02	1.02	1.01	1.03	1.02	1.03	1.04	1.03	1.02	1.02
Ti	0.87	0.87	0.86	0.84	0.85	0.87	0.87	0.88	0.88	0.89	0.88	0.88	0.88	0.87	0.86	0.91	0.93
Al	0.09	0.10	0.10	0.11	0.13	0.10	0.10	0.09	0.10	0.09	0.08	0.11	0.09	0.09	0.09	0.04	0.05
Fe ³⁺	0.05	0.05	0.04	0.05	0.04	0.04	0.03	0.04	0.03	0.05	0.05	0.02	0.04	0.05	0.06	0.03	0.03
Mn	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.01	0.01
Mg	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Ca	1.00	1.02	1.03	1.03	1.01	0.99	1.00	1.01	1.02	1.02	1.02	1.02	1.01	1.00	1.01	1.03	1.01
Na	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
K	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
F	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.14	0.12	b.d.l.	b.d.l.
Cl	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	3.05	3.06	3.06	3.07	3.06	3.04	3.04	3.05	3.05	3.05	3.05	3.05	3.05	3.19	3.18	3.05	3.04
Fe/Al	0.54	0.51	0.45	0.43	0.31	0.44	0.33	0.50	0.33	0.52	0.58	0.22	0.40	0.57	0.62	0.79	0.64

b.d.l. = below detection limit

E. Barite mineral chemistry from sample M7C obtained by SEM-EDS.

Description Spot	Barite M7C granite			Barite M7C pegmatite
	M7C.G_16_8	M7C.G_16_15	M7C.G_16_21	M7C.P_29_5
BaO	62.79	63.79	64.94	60.45
SO ₃	33.41	33.53	34.59	32.26
SiO ₂	b.d.l.	0.45	b.d.l.	1.66
TiO ₂	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Al ₂ O ₃	b.d.l.	0.30	b.d.l.	b.d.l.
FeO	0.49	0.93	0.32	1.00
MgO	b.d.l.	b.d.l.	b.d.l.	b.d.l.
MnO	b.d.l.	b.d.l.	b.d.l.	b.d.l.
CaO	2.54	0.23	0.90	0.19
Na ₂ O	b.d.l.	b.d.l.	b.d.l.	b.d.l.
K ₂ O	b.d.l.	b.d.l.	b.d.l.	b.d.l.
P ₂ O ₅	b.d.l.	b.d.l.	b.d.l.	b.d.l.
PbO	b.d.l.	b.d.l.	b.d.l.	1.40
ZrO ₂	b.d.l.	b.d.l.	0.62	b.d.l.
Cl	b.d.l.	b.d.l.	b.d.l.	b.d.l.
F	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	99.23	99.23	101.36	96.96
Formulae based on 4 oxygen atoms				
BaO mol	0.41	0.42	0.42	0.39
SO ₃ mol	0.42	0.42	0.43	0.40
Ba/S ratio	0.98	0.99	0.98	0.98

b.d.l. = below detection limit

F. Zircon mineral chemistry from the granitic part of M7C obtained by SEM-EDS.

Description Comments Spot	Zircon of M7C				
	Core M7C.G 12_1	Core M7C.G 12_11	Core M7C.G 16_1	Core M7C.GC 4.2_2	Core M7C.GC 4.2_3
SiO ₂	32.23	32.27	31.81	33.14	33.01
TiO ₂	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Al ₂ O ₃	0.21	b.d.l.	b.d.l.	b.d.l.	0.21
FeO	b.d.l.	0.28	b.d.l.	b.d.l.	b.d.l.
MgO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
MnO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
CaO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Na ₂ O	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
K ₂ O	b.d.l.	b.d.l.	0.15	b.d.l.	b.d.l.
P ₂ O ₅	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
SO ₃	b.d.l.	0.78	b.d.l.	0.72	b.d.l.
ZrO ₂	64.73	65.76	65.35	64.88	65.74
HfO ₂	1.90	1.81	1.82	1.58	2.02
ThO ₂	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
UO ₂	0.71	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Cl	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
F	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	99.78	100.91	99.14	100.32	100.98
Formulae units based on 4 atoms of oxygen					
Si	1.00	1.00	0.99	1.02	1.01
Zr	0.98	0.99	0.99	0.97	0.98
Hf	0.02	0.02	0.02	0.01	0.02
U	0.01	b.d.l.	b.d.l.	b.d.l.	b.d.l.

b.d.l. = below detection limit

Supplement 5

A. Chlorite mineral chemistry of M7A obtained by SEM-EDS (after Deer, Howie & Zussman, 2013).

Description	Diorite M7A		Granite M7A near contact		
Comments	Inclusion	Core	Core	Inclusion	Rim on iron Oxide
Spot	M7A.D 9 12	M7A.D 9 15	M7A.GC 6 4	M7A.GC 6 6	M7A.GC 6 9
SiO ₂	47.76	42.58	25.20	26.25	25.67
TiO ₂	2.92	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Al ₂ O ₃	11.59	12.81	20.07	20.15	20.00
FeO	19.37	12.95	27.54	31.02	29.60
MnO	b.d.l.	b.d.l.	0.60	0.82	0.74
MgO	3.76	15.08	11.87	11.73	11.61
CaO	1.50	0.88	b.d.l.	b.d.l.	b.d.l.
Na ₂ O	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
K ₂ O	0.44	0.14	b.d.l.	b.d.l.	b.d.l.
F	b.d.l.	0.61	b.d.l.	b.d.l.	b.d.l.
Cl	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	87.67	84.44	85.29	89.97	87.62
Fe ³⁺ /ΣFe used	1.05	1.04	0.03	0.01	0.02
Fe ₂ O ₃	20.38	13.44	0.94	0.45	0.65
FeO	1.03	0.86	26.69	30.61	29.02
H ₂ O*	12.34	11.63	10.89	11.33	11.08
Total	100.01	96.07	96.18	101.30	98.70
28 oxygen atoms per formula unit					
Si	8.80	7.99	5.54	5.55	5.54
Al ^{iv}	b.d.l.	0.01	2.46	2.45	2.46
Al ^{vi}	2.65	2.94	2.75	2.58	2.65
Ti	0.40	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Fe ³⁺	2.82	1.90	0.16	b.d.l.	b.d.l.
Fe ²⁺	0.16	0.13	4.90	5.41	5.24
Mn	b.d.l.	b.d.l.	0.11	0.15	0.14
Mg	1.03	4.22	3.89	3.70	3.74

Ca	0.30	0.18	b.d.l.	b.d.l.	b.d.l.
Na	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
K	0.21	0.07	b.d.l.	b.d.l.	b.d.l.
F	b.d.l.	0.72	b.d.l.	b.d.l.	b.d.l.
Cl	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
OH*	16.00	15.28	16.00	16.00	16.00
Total	32.37	33.44	35.80	35.91	35.87
Mg#	0.26	0.67	0.43	0.40	0.41
	chamosite	clinochlore	chamosite	chamosite	chamosite

b.d.l. = below detection limit; Al iv - tetrahedrally coordinated Al; Al vi - octahedrally coordinated Al; H₂O* - calculated structurally bound water (wt.%) assuming full occupancy of OH sites; not measured analytically, OH* - calculated number of hydroxyl groups in the structural formula; not measured analytically (after Deer, Howie & Zussman, 2013).

B. Chlorite mineral chemistry of M7C obtained by SEM-EDS (after Deer, Howie & Zussman, 2013).

Description Comments Spot	Chlorite M7C leucogranite						Chlorite M7C leucogranite near contact				
			Inclusion		Rim of Th		Near crack		Inclusion		
	M7C.G 9 16	M7C.G 12 15	M7C.G 12.2 13	M7C.G 12.2 22	M7C.G 15 6	Near Th M7C.G 20 3	M7C.GC 4 13	M7C.GC 4 34	M7C.GC 4.2 5	M7C.GC 4.2 11	
SiO ₂	25.70	33.49	27.90	26.49	35.39	29.32	44.56	34.80	36.06	30.09	31.60
TiO ₂	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	1.05	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Al ₂ O ₃	18.99	13.30	19.26	20.79	12.07	15.31	15.22	12.83	12.42	12.38	11.95
FeO	38.65	21.74	23.99	25.65	19.66	29.98	12.37	20.29	23.21	42.17	25.30
MnO	4.11	0.43	0.57	0.56	0.30	0.97	b.d.l.	b.d.l.	0.57	0.57	0.22
MgO	2.49	17.17	16.90	13.55	19.67	9.53	12.22	19.51	15.09	1.98	15.19
CaO	b.d.l.	0.52	b.d.l.	b.d.l.	0.64	0.58	2.37	0.36	0.32	0.61	0.77
Na ₂ O	b.d.l.	0.28	b.d.l.	b.d.l.	b.d.l.	0.46	1.86	b.d.l.	1.00	0.40	b.d.l.
K ₂ O	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.86	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
F	b.d.l.	b.d.l.	b.d.l.	b.d.l.	1.15	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Cl	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.17	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	89.94	86.93	88.61	87.04	87.73	88.05	88.60	87.81	88.68	88.19	86.20
Fe ³⁺ /ΣFe used	0.01	0.02	b.d.l.	0.01	0.04	0.01	0.13	0.03	0.03	0.01	0.01
Fe ₂ O ₃	0.30	0.48	0.11	0.23	0.80	0.30	1.65	0.54	0.61	0.50	0.38
FeO	37.07	18.93	23.38	24.37	14.71	28.33	1.40	17.03	19.57	39.55	23.21
H ₂ O*	10.66	11.60	11.62	11.30	10.84	10.97	12.76	11.88	11.80	10.43	11.06

Total	100.60	98.53	100.23	98.34	98.57	99.02	101.36	99.69	100.48	98.62	97.26
28 oxygen atoms per formula unit											
Si	5.75	6.85	5.75	5.60	6.86	6.27	8.03	6.96	7.20	6.83	6.81
Al ^{iv}	2.25	1.15	2.25	2.40	1.14	1.73	b.d.l.	1.04	0.80	1.17	1.19
Al ^{vi}	2.78	2.09	2.44	2.81	1.69	2.18	3.37	2.01	2.17	2.19	1.86
Ti	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.17	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Fe ³⁺	0.30	0.48	0.11	0.23	0.80	0.30	1.65	0.54	0.61	0.50	0.38
Fe ²⁺	6.94	3.24	4.03	4.31	2.38	5.06	0.21	2.85	3.27	7.51	4.18
Mn	0.78	0.07	0.10	0.10	0.05	0.18	b.d.l.	b.d.l.	0.10	0.11	0.04
Mg	0.83	5.23	5.19	4.27	5.68	3.04	3.28	5.81	4.49	0.67	4.88
Ca	b.d.l.	0.11	b.d.l.	b.d.l.	0.13	0.13	0.46	0.08	0.07	0.15	0.18
Na	b.d.l.	0.22	b.d.l.	b.d.l.	b.d.l.	0.38	1.30	b.d.l.	0.77	0.35	b.d.l.
K	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.47	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
F	b.d.l.	b.d.l.	b.d.l.	b.d.l.	1.41	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Cl	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.12	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
OH*	16.00	16.00	16.00	16.00	14.59	15.88	16.00	16.00	16.00	16.00	16.00
Total	35.63	35.45	35.87	35.71	34.74	35.90	34.31	35.29	35.48	35.48	35.51
Mg#	0.10	0.58	0.56	0.48	0.64	0.36	0.64	0.63	0.54	0.08	0.52
	chamosite	clinochlore	clinochlore	intermediate chlorite	clinochlore	chamosite	clinochlore	clinochlore	clinochlore	chamosite	clinochlore

Table continued

Description Comments Spot	Pegmatite near contact M7C			
	Inclusion M7C.PC_4.2.2_1	Inclusion M7C.PC_4.2.2_3	M7C.PC_4.2.2_10	M7C.PC_4.2.2_13
SiO ₂	31.74	32.08	34.50	22.49
TiO ₂	b.d.l.	b.d.l.	0.70	0.45
Al ₂ O ₃	12.19	12.33	12.51	21.94
FeO	25.87	24.41	20.20	41.80
MnO	b.d.l.	0.27	b.d.l.	1.33
MgO	14.99	15.22	18.48	0.72
CaO	0.59	0.88	0.69	0.18

Na ₂ O	b.d.l.	0.40	b.d.l.	0.42
K ₂ O	b.d.l.	b.d.l.	b.d.l.	b.d.l.
F	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Cl	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	85.98	86.16	87.08	89.33
Fe ³⁺ /ΣFe used	0.02	0.01	0.03	b.d.l.
Fe ₂ O ₃	0.40	0.35	0.64	0.10
FeO	23.62	22.45	16.43	41.28
H ₂ O*	11.11	11.19	11.77	10.47
Total	97.09	97.35	98.85	99.80

28 oxygen atoms per formula unit

Si	6.81	6.81	6.95	5.13
Al ^{iv}	1.19	1.19	1.05	2.87
Al ^{vi}	1.91	1.93	1.96	3.05
Ti	b.d.l.	b.d.l.	0.11	0.08
Fe ³⁺	0.40	0.35	0.64	0.10
Fe ²⁺	4.24	3.99	2.77	7.87
Mn	b.d.l.	0.05	b.d.l.	0.26
Mg	4.79	4.82	5.55	0.24
Ca	0.14	0.20	0.15	0.04
Na	b.d.l.	0.33	b.d.l.	0.37
K	b.d.l.	b.d.l.	b.d.l.	b.d.l.
F	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Cl	b.d.l.	b.d.l.	b.d.l.	b.d.l.
OH*	16.00	16.00	16.00	16.00
Total	35.47	35.66	35.17	36.01
Mg#	0.51	0.53	0.62	0.03

intermediate
chlorite

clinochlore

clinochlore

chamosite

b.d.l. = below detection limit; Al^{iv} - tetrahedrally coordinated Al; Al^{vi} - octahedrally coordinated Al; H₂O* - calculated structurally bound water (wt.%) assuming full occupancy of OH sites; not measured analytically, OH* - calculated number of hydroxyl groups in the structural formula; not measured analytically (after Deer, Howie & Zussman, 2013).

C. Chlorite mineral chemistry of M7E obtained by SEM-EDS (after Deer, Howie & Zussman, 2013).

[illegible]

K	b.d.l.	1.45	b.d.l.	b.d.l.	0.89	0.20	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
F	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Cl	b.d.l.	0.11	b.d.l.	0.11	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
OH*	16.00	15.89	16.00	15.89	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Total	34.27	34.83	34.15	34.21	35.57	34.52	34.39	34.30	34.31	34.32	34.49
Mg#	0.03	0.03	0.03	0.03	0.05	0.04	0.03	0.04	0.04	0.05	0.04
	chamosite	chamosite	chamosite	chamosite	chamosite	chamosite	chamosite	chamosite	chamosite	chamosite	chamosite

Table continued

Description Comments Spot	M7E Leucocratic plagiogranite								
	Inclusion	Inclusion	Bt rim	Bt rim	Bt rim	Bt rim	Inclusion	Inclusion	Inclusion
	M7E.LP	M7E.LP	M7E.LP	M7E.LP	M7E.LP	M7E.LP	M7E.LP	M7E.LP	M7E.LP
	18 2	18 3	21 1	22 9	22 10	22 11	23 8	23 9	23 10
SiO ₂	25.43	26.47	25.36	25.08	24.30	25.92	34.19	28.28	26.66
TiO ₂	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.25	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Al ₂ O ₃	8.20	9.14	19.98	20.89	18.78	19.76	12.18	10.95	9.73
FeO	49.27	48.89	29.09	27.70	27.25	26.44	38.23	45.28	45.16
MnO	3.15	2.34	0.72	0.41	0.56	0.79	1.04	0.80	0.80
MgO	1.94	1.82	11.34	13.13	12.00	13.40	3.29	2.22	2.17
CaO	0.66	0.57	b.d.l.	0.22	b.d.l.	b.d.l.	1.12	0.43	0.57
Na ₂ O	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	1.72	0.34	b.d.l.
K ₂ O	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.15
F	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Cl	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	88.65	89.23	86.49	87.43	83.14	86.31	91.77	88.30	85.24
Fe ³⁺ /ΣFe used	b.d.l.	b.d.l.	0.23	0.27	0.25	0.30	0.12	0.03	0.02
Fe ₂ O ₃	b.d.l.	b.d.l.	6.80	7.37	6.90	7.88	4.47	1.50	0.83
FeO	49.27	48.89	22.97	21.07	21.04	19.35	34.21	43.93	44.42
H ₂ O*	9.82	9.94	9.60	9.55	9.10	9.49	10.90	9.98	9.50
Total	98.47	99.17	96.09	96.98	92.24	95.80	102.67	98.28	94.74
28 oxygen atoms per formula unit									
Si	6.08	6.31	6.20	6.15	6.25	6.38	7.33	6.75	6.71
Al ^{iv}	1.92	1.69	1.80	1.85	1.75	1.62	0.67	1.25	1.29
Al ^{vi}	0.44	0.91	4.08	4.33	4.08	4.27	2.49	1.85	1.60
Ti	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.05	b.d.l.	b.d.l.	b.d.l.	b.d.l.

Fe ³⁺	b.d.l.	b.d.l.	1.25	1.36	1.33	1.46	0.72	0.27	0.16
Fe ²⁺	10.45	10.07	4.69	4.32	4.53	3.99	6.14	8.77	9.35
Mn	0.64	0.47	0.15	0.09	0.12	0.16	0.19	0.16	0.17
Mg	1.12	0.83	0.26	0.15	0.21	0.29	0.33	0.28	0.30
Ca	0.17	0.15	b.d.l.	0.06	b.d.l.	b.d.l.	0.26	0.11	0.15
Na	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	1.43	0.31	b.d.l.
K	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.10
F	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Cl	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
OH*	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Total	36.82	36.43	34.43	34.30	34.33	34.17	35.56	35.76	35.83
Mg#	0.10	0.08	0.04	0.03	0.04	0.05	0.05	0.03	0.03
	chamosite	chamosite	chamosite	chamosite	chamosite	chamosite	chamosite	chamosite	chamosite

b.d.l. = below detection limit; Al iv - tetrahedrally coordinated Al; Al vi - octahedrally coordinated Al; H₂O* - calculated structurally bound water (wt.%) assuming full occupancy of OH sites; not measured analytically, OH* - calculated number of hydroxyl groups in the structural formula; not measured analytically (after Deer, Howie & Zussman, 2013).

D. Muscovite mineral chemistry of M7A obtained by SEM-EDS. Muscovite formula unit calculations based on 22 oxygen atoms according to Tindle & Webb (1990).

Description	Granite M7A		
Spot	M7A.G 23 3	M7A.G 23 4	M7A.G 23 5
SiO ₂	45.19	46.69	47.14
TiO ₂	b.d.l.	0.25	b.d.l.
Al ₂ O ₃	30.60	32.39	33.44
FeO	8.06	3.31	3.83
MnO	b.d.l.	b.d.l.	b.d.l.
MgO	0.99	0.77	0.32
CaO	b.d.l.	b.d.l.	b.d.l.
Na ₂ O	0.20	0.25	0.23
K ₂ O	10.54	11.27	11.32
F	b.d.l.	b.d.l.	b.d.l.
Cl	0.61	b.d.l.	b.d.l.
Li ₂ O	b.d.l.	b.d.l.	b.d.l.
H ₂ O*	4.20	4.43	4.48
SubTotal	100.39	99.36	100.76
O=F,Cl	0.14	b.d.l.	b.d.l.
Total	100.25	99.36	100.76
22 oxygen atoms per formula unit			
Si	6.23	6.33	6.30
Al ^{iv}	1.77	1.67	1.70
Al ^{vi}	3.20	3.50	3.57
Ti	b.d.l.	0.03	b.d.l.
Fe	0.93	0.38	0.43
Mn	b.d.l.	b.d.l.	b.d.l.
Mg	0.20	0.16	0.06
Ca	b.d.l.	b.d.l.	b.d.l.
Na	0.05	0.07	0.06
K	1.85	1.95	1.93
OH*	3.86	4.00	4.00
F	b.d.l.	b.d.l.	b.d.l.
Cl	0.14	b.d.l.	b.d.l.
Total	18.24	18.07	18.06
Y Total	4.33	4.06	4.07

X Total	1.91	2.01	1.99
Al Total	4.97	5.17	5.27
Fe/Fe+Mg	0.82	0.71	0.87
Mn/Mn+Fe	b.d.l.	b.d.l.	b.d.l.
Total Al	4.97	5.17	5.27

b.d.l. = below detection limit; H₂O* and OH* – calculated values after Tindle & Webb (1990), assuming full OH site occupancy, Fe+Mn+Ti-AlVI - substitution parameter representing replacement of octahedral Al by Fe, Mn, and Ti.

E. Muscovite mineral chemistry of M7C obtained by SEM-EDS. Muscovite formula unit calculations based on 22 oxygen atoms according to Tindle & Webb (1990).

Description Comments Spot	Granite near contact M7C							Granite M7C		Pegmatite M7C
	Rim	Core	Rim	Inclusion	Inclusion	Inclusion	Inclusion	Inclusion		Inclusion
	M7C.GC	M7C.GC	M7C.GC	M7C.GC	M7C.GC	M7C.GC	M7C.GC	M7C.G	M7C.G	M7C.P
	13 1	13 2	13 5	4 1	4 2	4 5	4 6	12.2 30	21 12	26 7
SiO ₂	45.97	45.57	46.58	45.58	46.00	45.64	44.49	49.05	46.44	48.37
TiO ₂	0.68	0.67	0.28	0.61	0.61	0.54	0.34	b.d.l.	0.51	b.d.l.
Al ₂ O ₃	31.36	31.29	31.33	31.76	31.01	31.49	31.45	30.94	30.47	31.16
FeO	4.40	4.59	2.94	4.52	4.5	4.55	7.72	2.15	5.49	7.13
MnO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
MgO	1.36	1.44	1.17	0.54	b.d.l.	b.d.l.	b.d.l.	1.61	1.39	0.46
CaO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Na ₂ O	0.31	0.22	0.23	0.27	0.19	0.29	0.23	b.d.l.	0.30	b.d.l.
K ₂ O	10.88	10.8	11.05	10.29	10.82	10.96	10.3	11.28	11.11	10.72
BaO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.46	b.d.l.	b.d.l.	b.d.l.
HfO ₂	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.84	b.d.l.
F	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	1.59	b.d.l.
Cl	0.13	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.21	b.d.l.
Li ₂ O	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
H ₂ O*	4.36	4.38	4.37	4.35	4.32	4.33	4.32	4.48	3.60	4.51
Total	99.45	98.96	97.95	97.92	97.45	97.80	99.31	99.51	101.95	102.35
22 oxygen atoms per formula unit										
Si	6.27	6.24	6.39	6.28	6.38	6.32	6.18	6.57	6.32	6.44
Al ^{iv}	1.73	1.76	1.61	1.72	1.62	1.68	1.82	1.43	1.68	1.56
Al ^{vi}	3.31	3.30	3.45	3.44	3.45	3.46	3.33	3.46	3.21	3.32
Ti	0.07	0.07	0.03	0.06	0.06	0.06	0.04	b.d.l.	0.05	b.d.l.
Cr	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Fe	0.50	0.53	0.34	0.52	0.52	0.53	0.90	0.24	0.63	0.79

Mn	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Mg	0.28	0.29	0.24	0.11	b.d.l.	b.d.l.	b.d.l.	0.32	0.28	0.09
Zn	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Sn	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Ga	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Ni	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Cu	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Li	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Ca	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Na	0.08	0.06	0.06	0.07	0.05	0.08	0.06	b.d.l.	0.08	b.d.l.
K	1.89	1.89	1.93	1.81	1.91	1.94	1.83	1.93	1.93	1.82
Sr	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Ba	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Rb	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Cs	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
OH*	3.97	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.27	4.00
F	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.68	b.d.l.
Cl	0.03	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.05	b.d.l.
Total	18.13	18.13	18.05	18.02	18.00	18.06	18.15	17.95	18.18	18.03
Al Total	5.04	5.05	5.06	5.16	5.07	5.14	5.15	4.89	4.89	4.89
Fe/Fe+Mg	0.64	0.64	0.59	0.82	1.00	1.00	1.00	0.43	0.69	0.90
Total Al	5.04	5.05	5.06	5.16	5.07	5.14	5.15	4.89	4.89	4.89

b.d.l. = below detection limit; H₂O* and OH* – calculated values after Tindle & Webb (1990), assuming full OH site occupancy, Fe+Mn+Ti-AlVI - substitution parameter representing replacement of octahedral Al by Fe, Mn, and Ti.

F. Muscovite mineral chemistry of M7E obtained by SEM-EDS. Muscovite formula unit calculations based on 22 oxygen atoms according to Tindle & Webb (1990).

Description Comments Spot	Muscovite of biotite pegmatitic part of M7E										
	Inclusion	Inclusion	Rim		Core	Inclusion	Rim		Core	Rim	Core
	M7E.BP	M7E.BP	M7E.BP	M7E.BP	M7E.BP	M7E.BP	M7E.BP	M7E.BP	M7E.BP	M7E.BP	M7E.BP
	1 11	1 12	1 20	1 21	1 26	2 3	2 35	4.1 1	4.1 18	4.2 6	4.2 10
SiO ₂	46.05	47.95	46.93	46.17	46.63	47.15	46.08	45.73	45.74	47.64	45.93
TiO ₂	b.d.l.	b.d.l.	0.25	0.30	0.21	0.28	0.22	0.54	0.26	b.d.l.	0.45
Al ₂ O ₃	31.87	27.57	29.41	29.31	29.38	28.92	29.58	30.84	30.53	31.15	30.34
FeO	3.74	3.36	4.88	4.85	3.99	6.36	4.55	3.26	4.13	3.29	4.47
MnO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
MgO	0.44	2.61	2.15	2.02	2.00	3.02	2.09	1.12	1.42	1.49	1.31

CaO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Na ₂ O	0.22	b.d.l.	0.26	b.d.l.	b.d.l.	b.d.l.	0.21	b.d.l.	0.19	0.21	0.26
K ₂ O	10.95	11.08	11.08	10.98	11.02	10.99	10.93	11.14	10.88	10.99	11.21
F	b.d.l.	0.60	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Cl	b.d.l.	b.d.l.	b.d.l.	0.17	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Li ₂ O	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
H ₂ O*	4.35	4.03	4.38	4.28	4.33	4.43	4.33	4.31	4.32	4.43	4.34
Total	97.62	97.20	99.34	98.08	97.56	101.15	97.99	96.94	97.47	99.20	98.31
Formulae based on 22 oxygen atoms											
Si	6.35	6.66	6.42	6.40	6.46	6.38	6.38	6.36	6.35	6.45	6.34
Al ^{iv}	1.65	1.34	1.58	1.60	1.54	1.62	1.62	1.64	1.65	1.55	1.66
Al ^{vi}	3.54	3.17	3.16	3.19	3.25	2.99	3.21	3.41	3.34	3.42	3.28
Ti	b.d.l.	b.d.l.	0.03	0.03	0.02	0.03	0.02	0.06	0.03	b.d.l.	0.05
Cr	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Fe	0.43	0.39	0.56	0.56	0.46	0.72	0.53	0.38	0.48	0.37	0.52
Mn	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Mg	0.09	0.54	0.44	0.42	0.41	0.61	0.43	0.23	0.29	0.30	0.27
Li	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Ca	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Na	0.06	b.d.l.	0.07	b.d.l.	b.d.l.	b.d.l.	0.06	b.d.l.	0.05	0.06	0.07
K	1.93	1.96	1.93	1.94	1.95	1.90	1.93	1.97	1.93	1.90	1.98
OH*	4.00	3.74	4.00	3.96	4.00	4.00	4.00	4.00	4.00	4.00	4.00
F	b.d.l.	0.26	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Cl	b.d.l.	b.d.l.	b.d.l.	0.04	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	18.05	18.07	18.19	18.14	18.10	18.24	18.18	18.05	18.12	18.04	18.16
Al Total	5.18	4.51	4.74	4.79	4.80	4.61	4.83	5.05	4.99	4.97	4.94
Fe/Fe+Mg	0.83	0.42	0.56	0.57	0.53	0.54	0.55	0.62	0.62	0.55	0.66
Total Al	5.18	4.51	4.74	4.79	4.80	4.61	4.83	5.05	4.99	4.97	4.94
Mg-Li	0.09	0.54	0.44	0.42	0.41	0.61	0.43	0.23	0.29	0.30	0.27
Fe+Mn+Ti-Alvi	-3.11	-2.78	-2.58	-2.60	-2.77	-2.24	-2.66	-2.97	-2.83	-3.05	-2.72

Table continued

Description		Muscovite M7E biotite pegmatitic part near contact			
Spot	Core	Rim	M7E.CBP 10.2 29	M7E.PB 27 17	M7E.PB 27 18
	M7E.CBP 10 25	M7E.CBP 10 31			
SiO ₂	45.90	45.59	46.44	46.83	50.05
TiO ₂	0.32	b.d.l.	0.26	0.71	0.67
Al ₂ O ₃	29.41	30.51	30.52	31.67	33.47
FeO	4.52	5.52	3.88	4.39	3.77
MnO	b.d.l.	b.d.l.	3.88	b.d.l.	b.d.l.
MgO	2.00	2.10	1.45	1.08	1.28
CaO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Na ₂ O	0.20	0.20	b.d.l.	0.31	0.44
K ₂ O	10.74	10.92	10.75	11.03	11.51
F	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Cl	0.22	0.14	b.d.l.	b.d.l.	b.d.l.
Li ₂ O	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
H ₂ O*	4.25	4.33	4.44	4.45	4.72
Total	97.56	99.31	101.62	100.47	105.91
Formulae based on 22 oxygen atoms					
Si	6.39	6.27	6.28	6.31	6.36
Al ^{iv}	1.61	1.73	1.72	1.69	1.64
Al ^{vi}	3.21	3.21	3.14	3.34	3.37
Ti	0.03	b.d.l.	0.03	0.07	0.06
Cr	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Fe	0.53	0.63	0.44	0.49	0.40
Mn	b.d.l.	b.d.l.	0.44	b.d.l.	b.d.l.
Mg	0.41	0.43	0.29	0.22	0.24
Li	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Ca	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Na	0.05	0.05	b.d.l.	0.08	0.11
K	1.91	1.91	1.85	1.89	1.87
OH*	3.95	3.97	4.00	4.00	4.00
F	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Cl	0.05	0.03	b.d.l.	b.d.l.	b.d.l.
Total	18.15	18.24	18.19	18.09	18.06
Al Total	4.82	4.94	4.86	5.03	5.01
Fe/Fe+Mg	0.56	0.60	0.60	0.70	0.62

Total Al	4.82	4.94	4.86	5.03	5.01
Mg-Li	0.41	0.43	0.29	0.22	0.24
Fe+Mn+Ti- Alvi	-2.65	-2.58	-2.23	-2.77	-2.91

b.d.l. = below detection limit; H₂O* and OH* – calculated values after Tindle & Webb (1990), assuming full OH site occupancy, Fe+Mn+Ti-Alvi - substitution parameter representing replacement of octahedral Al by Fe, Mn, and Ti.

Supplement 6

A. Biotite electron probe microanalysis data from sample M7A. Biotite formula unit calculations based on 22 oxygen atoms according to Tindle & Webb (1990). Temperatures estimated using Ti-in-biotite thermometry (Henry et al., 2005). OH* and H₂O* were calculated assuming full OH site occupancy (Tindle & Webb, 1990); log (fO₂/fH₂) and log (fO₂/fH₂O) after Munoz (1984, 1992).

Spot	M7A (Line) Pt 2	M7A (Line) Pt 3	M7A (Line) Pt 4	M7A (Line) Pt 5	M7A (Line) Pt 6	M7A (Line) Pt 7	M7A (Line) Pt 8	M7A (Line) Pt 9
Analysis	74 / 1 .	75 / 1 .	76 / 1 .	77 / 1 .	78 / 1 .	79 / 1 .	80 / 1 .	81 / 1 .
SiO ₂	38.02	38.09	38.01	38.27	37.64	37.96	37.82	37.52
TiO ₂	1.43	1.40	1.65	1.45	1.58	1.37	1.54	1.14
Al ₂ O ₃	13.22	13.25	13.32	13.08	13.42	13.32	13.27	13.25
FeO	17.39	17.22	17.55	17.28	17.83	17.42	16.78	17.27
MnO	0.44	0.34	0.42	0.35	0.46	0.41	0.29	0.42
MgO	14.14	13.99	14.02	14.08	13.96	13.81	13.70	13.77
Cr ₂ O ₃	0.03	0.03	0.03	0.03	0.03	0.06	0.03	0.01
V ₂ O ₃	b.d.l.	b.d.l.	0.01	0.04	0.04	b.d.l.	b.d.l.	0.02
CaO	0.02	0.03	b.d.l.	b.d.l.	0.01	0.01	0.01	b.d.l.
Na ₂ O	0.04	0.01	0.10	0.01	0.11	0.06	0.06	0.09
K ₂ O	9.20	9.24	9.38	9.23	9.37	9.19	9.32	9.37
BaO	0.08	0.10	0.12	0.08	0.07	0.09	0.10	0.14
NiO	0.02	0.08	0.03	0.02	0.09	b.d.l.	b.d.l.	b.d.l.
P ₂ O ₅	b.d.l.	0.04	b.d.l.	0.01	b.d.l.	b.d.l.	b.d.l.	b.d.l.
F	2.49	2.34	2.59	2.39	2.27	2.29	2.55	2.51
Cl	0.30	0.25	0.20	0.21	0.26	0.23	0.19	0.28
H ₂ O	2.54	2.63	2.53	2.62	2.67	2.65	2.50	2.49
Total	99.37	99.04	99.96	99.17	99.80	98.86	98.16	98.27
O=F, Cl	1.12	1.04	1.14	1.06	1.01	1.01	1.12	1.12
Total	98.26	98.00	98.82	98.12	98.79	97.84	97.04	97.15
22 oxygen atoms per formula unit								
Si	5.82	5.83	5.80	5.85	5.77	5.82	5.83	5.81
Al ^{iv}	1.49	1.52	1.63	1.54	1.59	1.56	1.60	1.51
Al ^{vi}	0.90	0.87	0.77	0.81	0.83	0.85	0.81	0.91
Ti	0.17	0.18	0.20	0.18	0.19	0.17	0.20	0.15
Fe	2.23	2.21	2.24	2.21	2.29	2.23	2.18	2.24
Mn	0.06	0.04	0.05	0.05	0.06	0.05	0.04	0.06
Mg	3.43	3.36	3.33	3.34	3.36	3.31	3.29	3.38

Ca	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Na	0.01	b.d.l.	0.03	b.d.l.	0.03	0.02	0.02	0.03
K	1.66	1.69	1.73	1.71	1.70	1.70	1.74	1.71
F	1.35	1.25	1.34	1.25	1.23	1.21	1.33	1.37
Cl	0.08	0.06	0.05	0.05	0.07	0.06	0.05	0.07
OH*	2.48	2.56	2.41	2.53	2.55	2.57	2.46	2.55
Total	19.68	19.58	19.58	19.53	19.68	19.55	19.55	19.78
Al _{total}	2.39	2.39	2.40	2.36	2.42	2.41	2.41	2.42
Mg#	0.61	0.60	0.60	0.60	0.60	0.60	0.60	0.60
T° C	596	595	617	601	608	591	618	563
Log(Cl/OH) _{Bt}	-1.50	-1.60	-1.66	-1.68	-1.59	-1.64	-1.69	-1.55
iv _{Cl}	0.03	0.02	0.02	0.02	0.03	0.02	0.02	0.03
Munoz (1984)								
log(<i>f</i> _{H₂O} / <i>f</i> _{HCl}) _{fluid}	3.99	4.02	4.04	4.04	4.02	4.03	4.04	4.00
Munoz (1992)								
log(<i>f</i> _{H₂O} / <i>f</i> _{HCl}) _{fluid}	4.23	4.26	4.28	4.28	4.26	4.27	4.29	4.24
log(F/OH)	-0.26	-0.31	-0.26	-0.31	-0.32	-0.33	-0.27	-0.27
log(Cl/OH)	-1.50	-1.60	-1.66	-1.68	-1.59	-1.64	-1.69	-1.55

b.d.l. = below detection limit; OH* – calculated values after Tindle & Webb (1990), assuming full OH site occupancy; Al iv - tetrahedrally coordinated Al; Al vi - octahedrally coordinated Al; Fe²⁺/Fe³⁺ - calculated stoichiometrically from charge balance; iv_{Cl} - calculated structural chlorine content (apfu).

B. Chlorite electron probe microanalysis data from granitic part near contact of M7E and the granitic part of sample M7A near the contact (after Deer, Howie & Zussman, 2013).

Description	Dissolved anhedral near alt Ttn	Filling cracks between Fe-Oxides and Sulfides
Spot	M7E-7A 7 / 1 .	M7A-6I 72 / 1 .
SiO ₂	25.17	25.64
TiO ₂	0.05	0.19
Al ₂ O ₃	20.69	20.55
FeO	28.98	28.11
MnO	0.72	0.77
MgO	12.21	11.56
Cr ₂ O ₃	0.03	0.03
V ₂ O ₃	0.05	b.d.l
CaO	0.02	0.02
BaO	b.d.l.	0.03
Na ₂ O	0.08	0.07
K ₂ O	b.d.l.	b.d.l.
NiO	b.d.l.	0.96
P ₂ O ₅	0.01	b.d.l.
F	0.89	0.04
Cl	0.06	0.05
H ₂ O	10.60	11.11
Total	99.56	99.12
O=F, Cl	0.39	0.03
Total	99.17	99.09
28 oxygen atoms per formula unit		
Si	5.27	5.49
Al ^{iv}	2.73	2.51
Al ^{vi}	2.46	2.69
Ti	0.01	0.03
Fe ³⁺	0.25	0.15
Fe ²⁺	4.82	4.88
Mn	0.13	0.14
Mg	3.81	3.69
Ca	b.d.l.	b.d.l.

Na	0.06	0.06
K	b.d.l.	b.d.l.
Ba	b.d.l.	0.01
Cr	b.d.l.	b.d.l.
Ni	b.d.l.	0.16
Zn	b.d.l.	b.d.l.
Rb	b.d.l.	b.d.l.
F	1.18	0.05
Cl	0.04	0.04
OH*	14.78	15.91
Total	35.55	35.82
Oxidized	yes	yes
Fe/Fe+Mg	0.57	0.58
Variety	Chamosite	Chamosite
Al total	5.19	b.d.l.
Si	5.27	5.49
FeO calc	27.56	27.25
Fe ₂ O ₃ calc	1.58	0.96

b.d.l. = below detection limit; Al iv - tetrahedrally coordinated Al; Al vi - octahedrally coordinated Al; H₂O* - calculated structurally bound water (wt.%) assuming full occupancy of OH sites; not measured analytically, OH* - calculated number of hydroxyl groups in the structural formula; not measured analytically (after Deer, Howie & Zussman, 2013).

Supplement 7

Electron probe microanalysis data on the chemistry of Fe-Ti accessory phases from samples M7A and M7E

A. Iron Oxides chemistry from sample M7A and M7E (EPMA data).

Description	Iron Oxides M7E biotite pegmatitic part								Iron Oxides M7A granite	
Comments		Rim	Near crack	Core						
Spot	M7E-7A	M7E-13E	M7E-13E	M7E-13E	M7E-8C	M7E-8C	M7E-8C	M7E-8C	M7A-6I	M7A-6I
	10 / 1 .	12 / 1 .	13 / 1 .	14 / 1 .	69 / 1 .	70 / 1 .	71 / 1 .	72 / 1 .	69 / 1 .	70 / 1 .
SiO ₂	b.d.l.	0.06	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.15
TiO ₂	b.d.l.	0.22	0.14	b.d.l.	0.03	b.d.l.	b.d.l.	0.07	0.03	b.d.l.
Al ₂ O ₃	0.09	0.11	0.11	0.14	0.12	0.13	0.10	0.08	0.04	0.06
FeO	92.99	88.58	88.57	92.61	88.18	88.62	92.09	92.16	92.14	88.79
MgO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.01
MnO	b.d.l.	0.05	0.09	0.07	0.03	0.10	0.04	0.07	0.06	0.06
Cr ₂ O ₃	0.04	0.12	0.12	0.12	0.07	0.06	0.06	0.07	b.d.l.	b.d.l.
V ₂ O ₃	0.24	0.20	0.17	0.12	0.17	0.09	0.14	0.15	0.06	b.d.l.
CaO	b.d.l.	0.09	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Na ₂ O	0.03	0.03	0.04	b.d.l.	0.03	0.08	b.d.l.	b.d.l.	0.03	b.d.l.
K ₂ O	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
SO ₂	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.04	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
P ₂ O ₅	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
NiO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.08	0.03
CoO	0.06	0.10	0.13	0.03	0.09	0.12	b.d.l.	b.d.l.	0.14	0.10
CuO	b.d.l.	b.d.l.	b.d.l.	0.08	0.08	b.d.l.	0.03	b.d.l.	b.d.l.	0.06
ZnO	0.12	b.d.l.	b.d.l.	0.09	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.01
Nb ₂ O ₅	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
ZrO ₂	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.03	b.d.l.	b.d.l.	b.d.l.
Total	93.62	89.59	89.45	93.29	88.85	89.25	92.57	92.64	92.65	89.33
Structural formulae are normalized to 32 O atoms per formula unit, corresponding to a total of 24 cations										
Si	0.04	0.02	b.d.l.	b.d.l.	b.d.l.	0.01	b.d.l.	b.d.l.	0.01	0.05
Ti	b.d.l.	0.05	0.03	b.d.l.	0.01	b.d.l.	b.d.l.	0.02	0.01	b.d.l.
Al	0.03	0.04	0.04	0.05	0.05	0.05	0.04	0.03	0.01	0.02
Cr	0.01	0.03	0.03	0.03	0.02	0.02	0.01	0.02	b.d.l.	b.d.l.
V	0.01	0.05	0.04	0.03	0.04	0.02	0.03	0.04	0.01	b.d.l.

Fe(iii)	15.87	15.73	15.82	15.89	15.88	15.90	15.91	15.88	15.94	15.87
Fe(ii)	8.02	7.96	7.97	7.99	8.00	7.99	8.00	8.00	8.03	8.03
Mn	0.02	0.01	0.02	0.02	0.01	0.03	0.01	0.02	0.02	0.02
Mg	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Ca	b.d.l.	0.03	0.01	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Zn	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.01	b.d.l.	b.d.l.	b.d.l.
Total	24.00	23.93	23.97	24.01	24.00	24.01	24.02	24.01	24.03	24.00
Fe(ii)	8.02	7.96	7.97	7.99	8.00	7.99	8.00	8.00	8.03	8.03
Fe(iii)	15.87	15.73	15.82	15.89	15.88	15.90	15.91	15.88	15.94	15.87
Fe2/(Fe2+Fe3)	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34
Fe3/(Fe3+Fe2)	0.66	0.66	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.66

b.d.l. = below detection limit

B. Titanite chemistry from sample M7E (EPMA data).

Description Spot Analysis	Titanite M7E biotite pegmatitic part							
	Core ME-7A	Rim ME-7A	Rim M7E-7A	Core M7E-13E	M7E-13E	M7E-13E	Rim M7E-13E	Rim M7E-13E
	1 / 1 .	3 / 1 .	4 / 1 .	17 / 1 .	19 / 1 .	20 / 1 .	21 / 1 .	22 / 1 .
SiO ₂	30.33	30.37	30.06	30.14	30.56	30.97	30.47	30.72
TiO ₂	33.08	34.37	34.14	32.28	33.39	33.55	33.70	33.84
Al ₂ O ₃	2.45	2.43	2.61	2.29	2.35	2.63	2.52	2.62
FeO Total	2.25	1.57	1.30	2.23	1.78	1.88	1.91	1.74
MgO	0.04	b.d.l.	b.d.l.	0.04	b.d.l.	b.d.l.	b.d.l.	b.d.l.
MnO	0.10	0.13	0.04	0.20	0.15	0.13	0.14	0.08
V ₂ O ₃	0.05	0.11	0.16	0.06	0.15	0.08	0.08	0.09
Cr ₂ O ₃	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
CaO	27.69	28.26	28.29	27.06	28.78	28.70	28.21	28.75
Na ₂ O	0.05	0.04	0.18	0.06	0.03	b.d.l.	0.03	0.04
SrO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Y ₂ O ₃	0.07	0.04	0.12	0.70	b.d.l.	b.d.l.	b.d.l.	b.d.l.
La ₂ O ₃	0.10	0.02	b.d.l.	0.06	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Ce ₂ O ₃	0.48	0.21	0.10	0.56	0.11	0.10	0.15	0.09
Pr ₂ O ₃	0.08	0.05	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.05	b.d.l.

Nd ₂ O ₃	0.20	0.03	0.04	0.40	b.d.l.	0.02	b.d.l.	b.d.l.
ZrO ₂	b.d.l.	b.d.l.	b.d.l.	b.d.l.	0.03	b.d.l.	b.d.l.	b.d.l.
Nb ₂ O ₅	0.27	0.08	0.13	0.75	0.45	0.19	0.23	0.10
F	1.15	1.14	1.28	0.98	1.08	1.17	0.98	1.15
Cl	b.d.l.	b.d.l.	0.08	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	98.40	98.85	98.54	97.89	98.88	99.47	98.54	99.25

Formulae based on 5 oxygen atoms

Coef.	2.05	2.02	2.03	2.08	2.03	2.01	2.03	2.01
Si	1.03	1.02	1.02	1.05	1.03	1.03	1.03	1.03
Ti	0.85	0.87	0.87	0.84	0.85	0.84	0.85	0.85
Al	0.10	0.10	0.10	0.09	0.09	0.10	0.10	0.10
Fe ²⁺ all ferrous	0.06	0.04	0.04	0.06	0.05	0.05	0.05	0.05
Mn	b.d.l.	b.d.l.	b.d.l.	0.01	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Mg	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Ca	1.01	1.02	1.02	1.01	1.04	1.03	1.02	1.03
Na	b.d.l.	b.d.l.	0.01	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
K	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Cr	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
V	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Ni	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
P	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
F	0.12	0.12	0.14	0.11	0.11	0.12	0.10	0.12
Cl	0.07	0.06	0.07	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	3.26	3.24	3.28	3.17	3.19	3.19	3.17	3.19
Fe/Al	0.65	0.46	0.35	0.69	0.54	0.51	0.54	0.47

b.d.l. = below detection limit

C. Anatase chemistry from sample M7A (EPMA data).

Description	Inside dissolved sponge Ttn
Spot	63 / 1 . M7A-8D
SiO ₂	1.26
TiO ₂	86.26
Al ₂ O ₃	0.17
Fe ₂ O ₃	2.23

MgO	0.03
MnO	b.d.l.
V ₂ O ₃	0.22
Cr ₂ O ₃	b.d.l.
CaO	0.50
Na ₂ O	0.09
SrO	b.d.l.
Y ₂ O ₃	0.05
La ₂ O ₃	b.d.l.
Ce ₂ O ₃	0.23
Pr ₂ O ₃	0.03
Nd ₂ O ₃	b.d.l.
ZrO ₂	0.11
Nb ₂ O ₅	2.23
F	0.03
Cl	b.d.l.
H ₂ O	b.d.l.
Total	93.47
O=F , Cl	0.02
Total	93.45
Formulae on the basis of 2	
Ti	0.94
Cr	b.d.l.
Al	b.d.l.
Nb	0.01
Fe	0.03
Mn	b.d.l.
Mg	b.d.l.
Ca	0.01
Si	0.02
Total	1.01

b.d.l. = below detection limit

Supplement 8

Electron probe microanalysis data on REE-rich mineral chemistry from sample M7A

Description	M7A-8D
Spot	64 / 1 .
SiO ₂	1.59
TiO ₂	36.70
Al ₂ O ₃	0.23
FeO	1.33
MgO	b.d.l.
MnO	b.d.l.
V ₂ O ₃	0.22
CaO	10.44
Na ₂ O	b.d.l.
BaO	0.49
K ₂ O	b.d.l.
SO ₃	0.13
SrO	0.24
Y ₂ O ₃	3.39
La ₂ O ₃	3.97
Ce ₂ O ₃	11.75
Nd ₂ O ₃	8.21
Sm ₂ O ₃	1.89
Pr ₂ O ₃	2.13
ThO ₂	0.83
UO ₂	0.12
Yb ₂ O ₃	0.28
P ₂ O ₅	0.08
F	7.29
Total	91.30

b.d.l. = below detection limit

Supplement 9

Electron probe microanalysis data on sulphide chemistry from samples M7A and M7E

Description	M7E	M7A				
Comments	Rim	Inclusion	Inclusion	Core	Rim	Inclusion
Spot	8 / 1 . M7E-7A	61 / 1 . M7A-8D	65 / 1 . M7A-6I	66 / 1 . M7A-6I	67 / 1 . M7A-6I	68 / 1 . M7A-6I
SiO ₂	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Al ₂ O ₃	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
FeO	46.33	11.48	11.42	46.38	45.98	29.90
MgO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
CaO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
SO ₃	53.72	23.81	22.80	50.11	50.62	31.63
P ₂ O ₅	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
NiO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
CoO	0.13	b.d.l.	b.d.l.	0.21	b.d.l.	b.d.l.
CuO	b.d.l.	60.90	61.75	b.d.l.	b.d.l.	34.48
ZrO ₂	b.d.l.	0.08	b.d.l.	b.d.l.	0.13	b.d.l.
As ₂ O ₃	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
PbO	0.31	b.d.l.	0.03	b.d.l.	b.d.l.	0.11
Ag ₂ O	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
CdO	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Sb ₂ O ₃	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Total	100.80	96.45	96.23	96.96	96.87	96.34
	Pyrite	Bornite	Bornite	Pyrite	Pyrite	Chalcopyrite
Ag	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Pb	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Bi	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Fe	0.83	0.21	0.20	0.83	0.82	0.54
Mo	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Cu	b.d.l.	0.96	0.97	b.d.l.	b.d.l.	0.54
Zn	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Cd	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Au	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Sb	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Co	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
Ni	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.	b.d.l.
S	1.68	0.74	0.71	1.56	1.58	0.99
Total	2.51	1.91	1.89	2.40	2.41	2.07

b.d.l. = below detection limit

Supplement 10

A. Maximum element-specific detection limits (ppm) for selected minerals for Cameca SX100 Electron Microprobe Analyser.

Mineral	Apatite	Mica	Feldspar	Sulphide	Iron-oxide	Titanite	thorite
Element							
F	2810	1990				1390	2690
Na	350	750	590		560	370	
Mg	150	330	250	390	340	240	420
Al		340	280	420	230	280	560
Si	220	430	330	440	280	310	550
P	350	450		360	280		230
S	200		240	470	290		370
Cl	230	430				210	
K		550	290		260		390
Ca	650	380	380	360	260	440	520
Ti		2030	1190		1410	1190	1870
V		1000			910	650	1400
Cr		450			220	730	
Mn	370	1000	900		970	850	
Fe	660	1140	1160	1660	1240	980	
Co				1390	1370		
Ni		1550		1470	1140		
Cu				2620	1390		
Zn				2670	2300		
As	420			1330			
Sr	330		920			910	900
Y	380					420	1020
Zr					870	1000	
Nb					590	730	
Ag				890			
Cd				910			
Ba		660	510				1030
La	390					570	1210
Ce	350					780	1220
Pr	380					540	620
Nd	390					680	1300
Sm	980						3260
Pb				2300			
Yb							3280
Th							1520
U							1340

C. Natural and synthetic standards used for electron microprobe analyses (EMPA) during calibration of major, minor, and trace elements in different analytical sessions.

Standard	Chlorite	Iron-Oxide	Titanite	Mica-chlorite	REE-Thorite phases	Sulphide 1 session	Sulphide 2 session
Diopside (Si, Ca)	+	+		+	+	+	+
Diopside (Si, Mg, Ca)			+				
Orthoclase (Al, K)	+			+	+	+	+
Orthoclase (Al)			+			+	+
Orthoclase (K)		+					
Corundum (Al)		+					
Rutile (Ti)	+	+	+	+			
Fe ₂ O ₃ (Fe)	+	+	+	+	+		+
Haematite (Fe)						+	
MgO (Mg)	+	+		+	+	+	+
Rhodonite (Mn)	+	+	+	+	+	+	+
Albite (Na)	+	+	+	+	+		
Barite (Ba, S)	+			+	+		
Topaz-F (F)	+			+			
Ca ₅ P ₃ O ₁₂ F (F)			+		+		
Tugtupite (Cl)	+		+	+			
NdPO ₄ (P, Nd)					+		
NdPO ₄ (P)						+	+
NdPO ₄ (Nd)			+				
LaPO ₄ (P)	+	+		+			
LaPO ₄ (La)			+		+		
Cr ₂ O ₃ (Cr)	+	+	+	+			
V ₂ O ₅ (V)	+	+	+	+	+		
NiO (Ni)	+	+		+		+	+
Cuprite (Cu)		+				+	+
Sphalerite (Zn, S)		+					
Sphalerite (Zn)							+
ZnS (Zn, S)						+	
ZnS (S)							+
Zircon ED (Zr)		+	+				
ZnAs ₂ (As)						+	+
PbTe (Pb)						+	+
Ag ₂ Te (Ag)						+	+
CdS (Cd)						+	+
Stibnite (Sb)						+	+
YPO ₄ (Y)			+				
YAG (Y)					+		
Celestine (Sr)			+		+		
LiNbO ₃ (Nb)		+	+				
UO ₂ (U)					+		

CePO ₄ (Ce)			+		+		
SmPO ₄ (Sm)					+		
PrPO ₄ (Pr)			+		+		
YbPO ₄ (Yb)					+		
ThO ₂ (Th)					+		
CoO (Co)		+				+	+

D. Analytical conditions, detection limits and standards used for SEM-EDS analyses.

Analytical detection limits were calculated in INCA software and correspond to approximately 0.1 wt.% for major and 0.2-0.5 wt.% for minor elements, depending on background counts and acquisition parameters.

Element	Average 1 σ (wt%)	Standart used	Line measured
Si	0.13	Kyanite	K α
Ti	0.07	Rutile	K α
Al	0.04	Corundum	K α
Fe	0.14	Almandine	K α
Mn	0.06	Rhodonite	K α
Mg	0.07	Periclase	K α
Ca	0.04	Wollastonite	K α
Na	0.06	Jadeite	K α
K	0.04	Orthoclase	K α
F	0.23	Fluorite	K α
Cl	0.04	Sylvite	K α
S	0.03	Pyrite	K α
Ba	0.71	Baryte	L α
P	0.23	Apatite	K α
Zr	0.75	Zircon	L α
Hf	0.45	Hf	L α
La	0.54	LaB ₆	L α

Supplement 11

Raman spectroscopic data and reference spectra

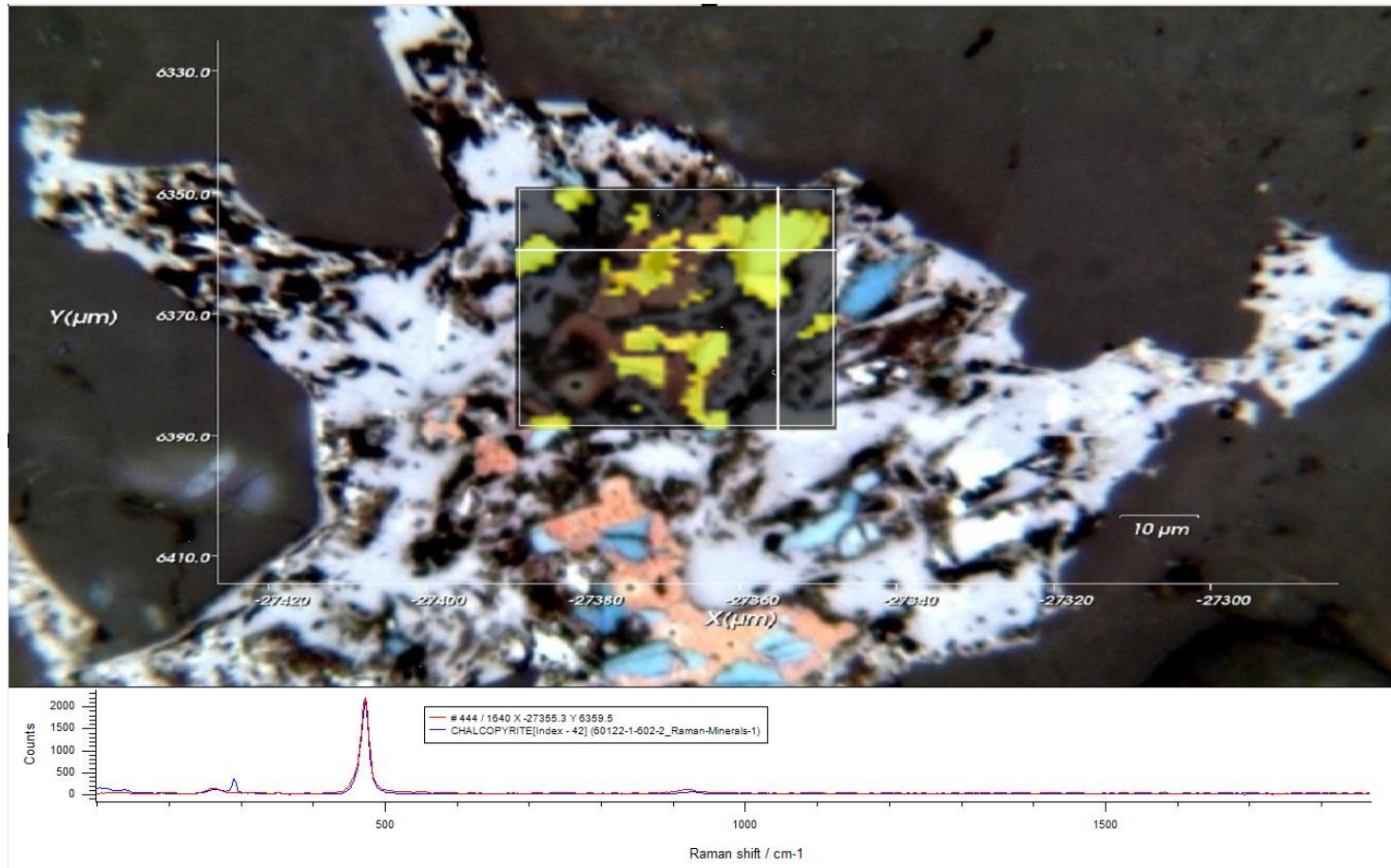
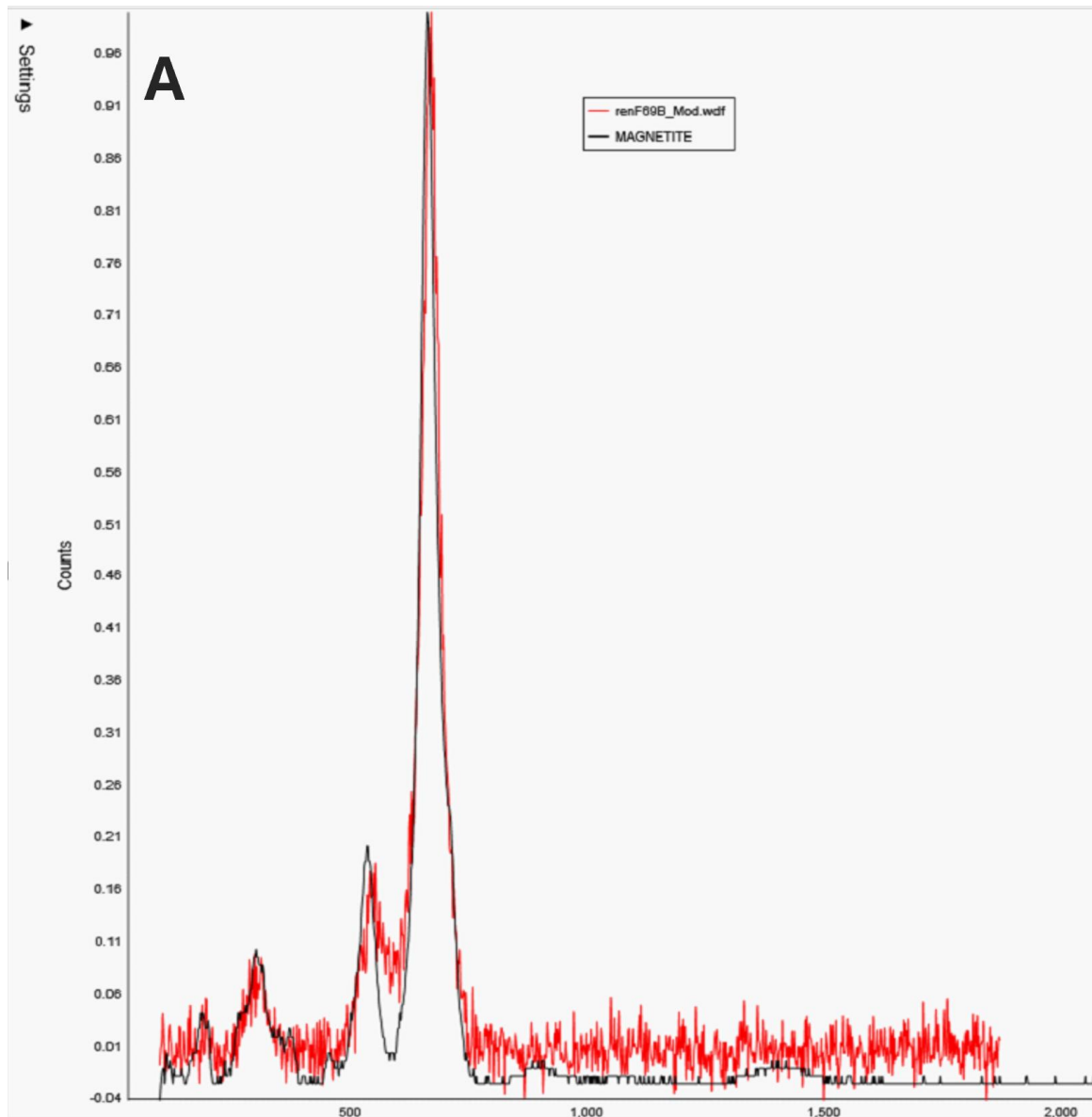
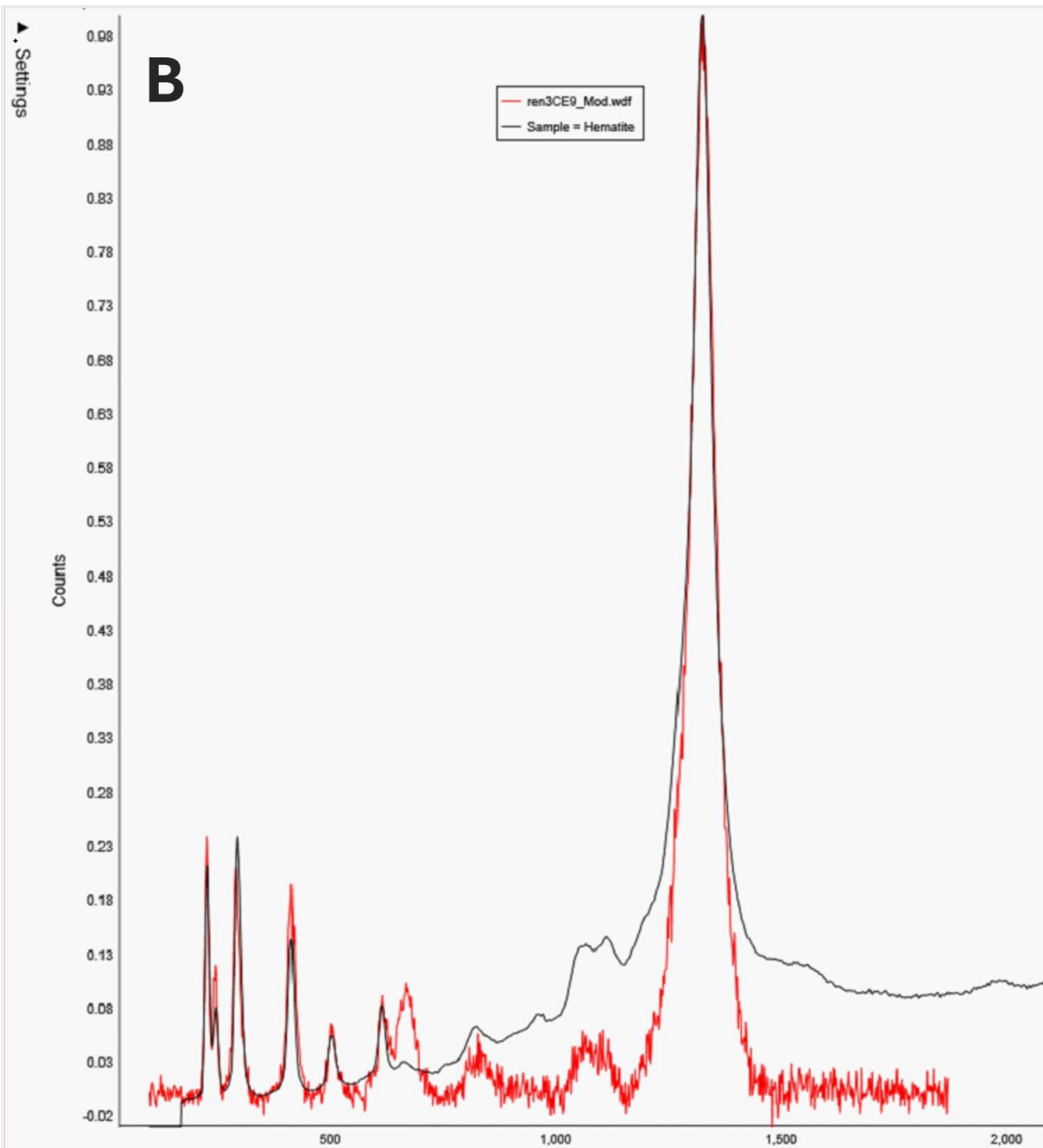


Fig. 1 Reflected light image of chalcopyrite grains in sample M7A (upper part) with Raman intensity map (lower part). Bright yellow zones correspond to high Raman signal intensity matching reference chalcopyrite. The associated spectrum shows a near-perfect fit with standard chalcopyrite, confirming the mineral identification. The chalcopyrite occurs as disseminated blebs within a feldspar-rich matrix





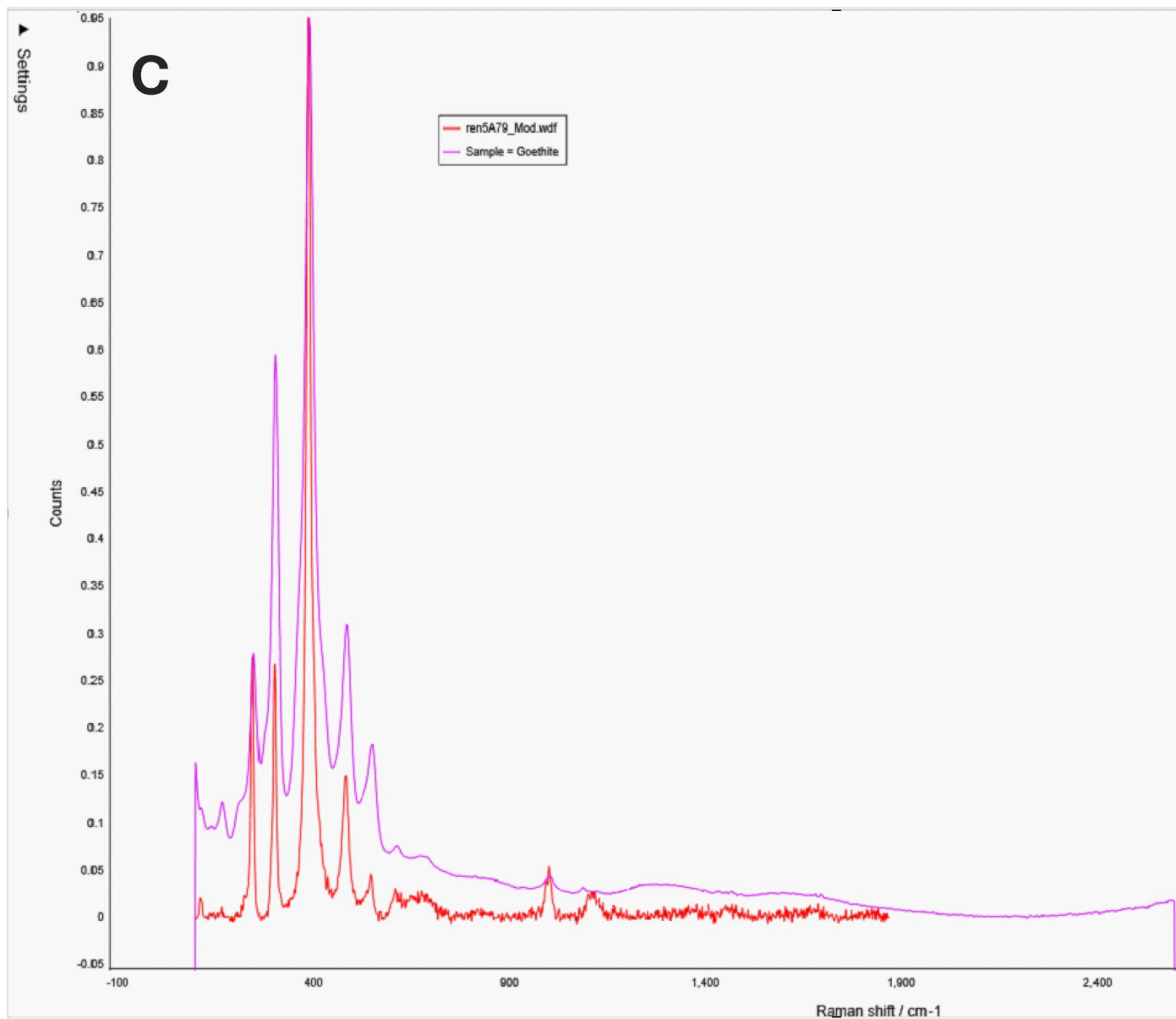
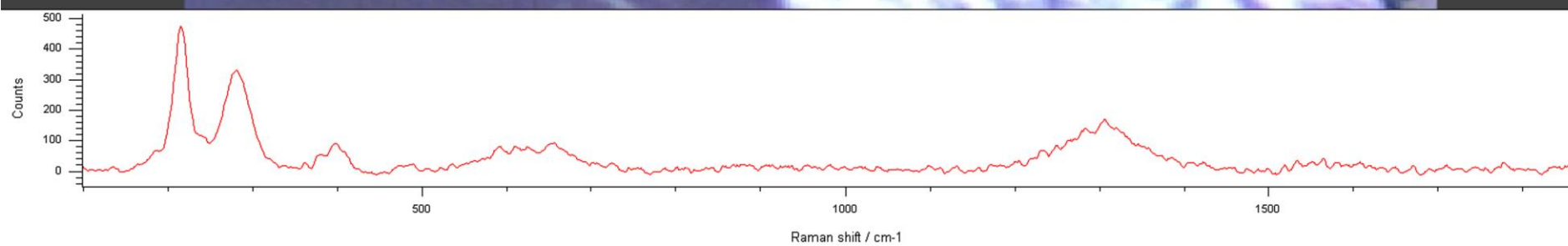
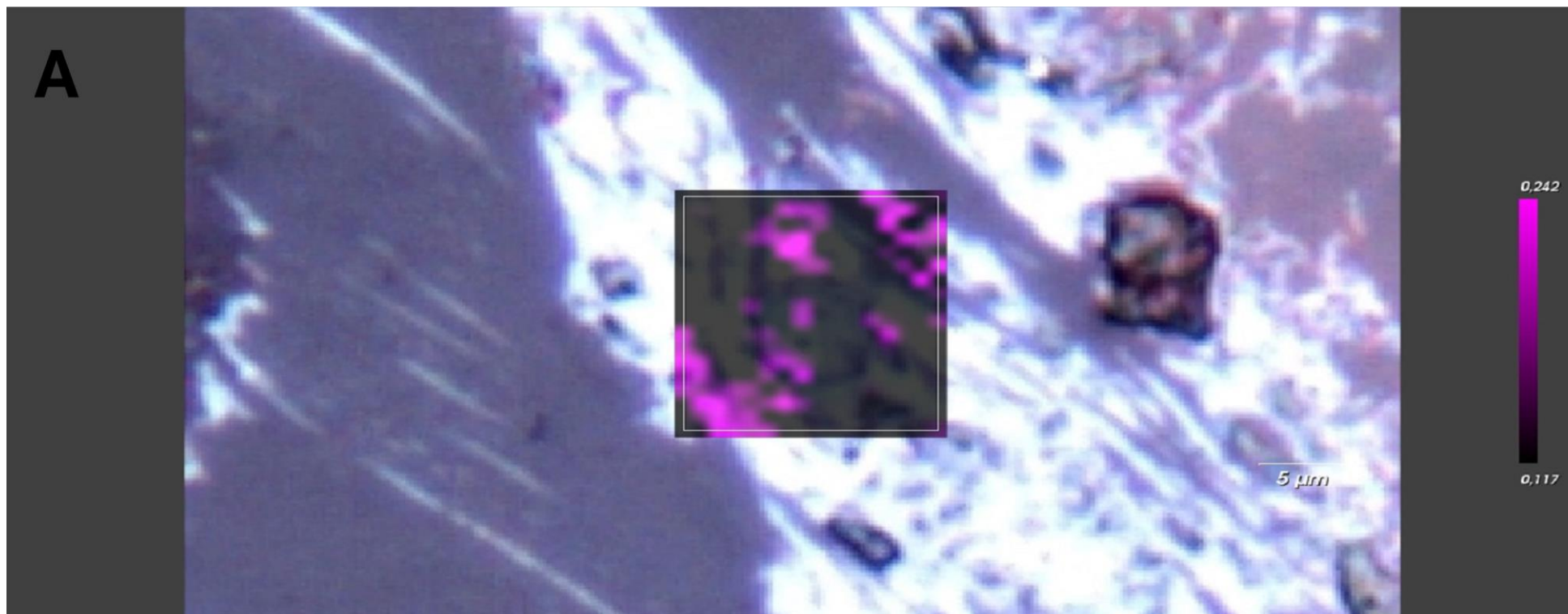


Fig. 2 Raman spectra of the same grain from M7C thin section: (A) magnetite from the core, (B) hematite from the rim, and (C) goethite inclusion within the rim.



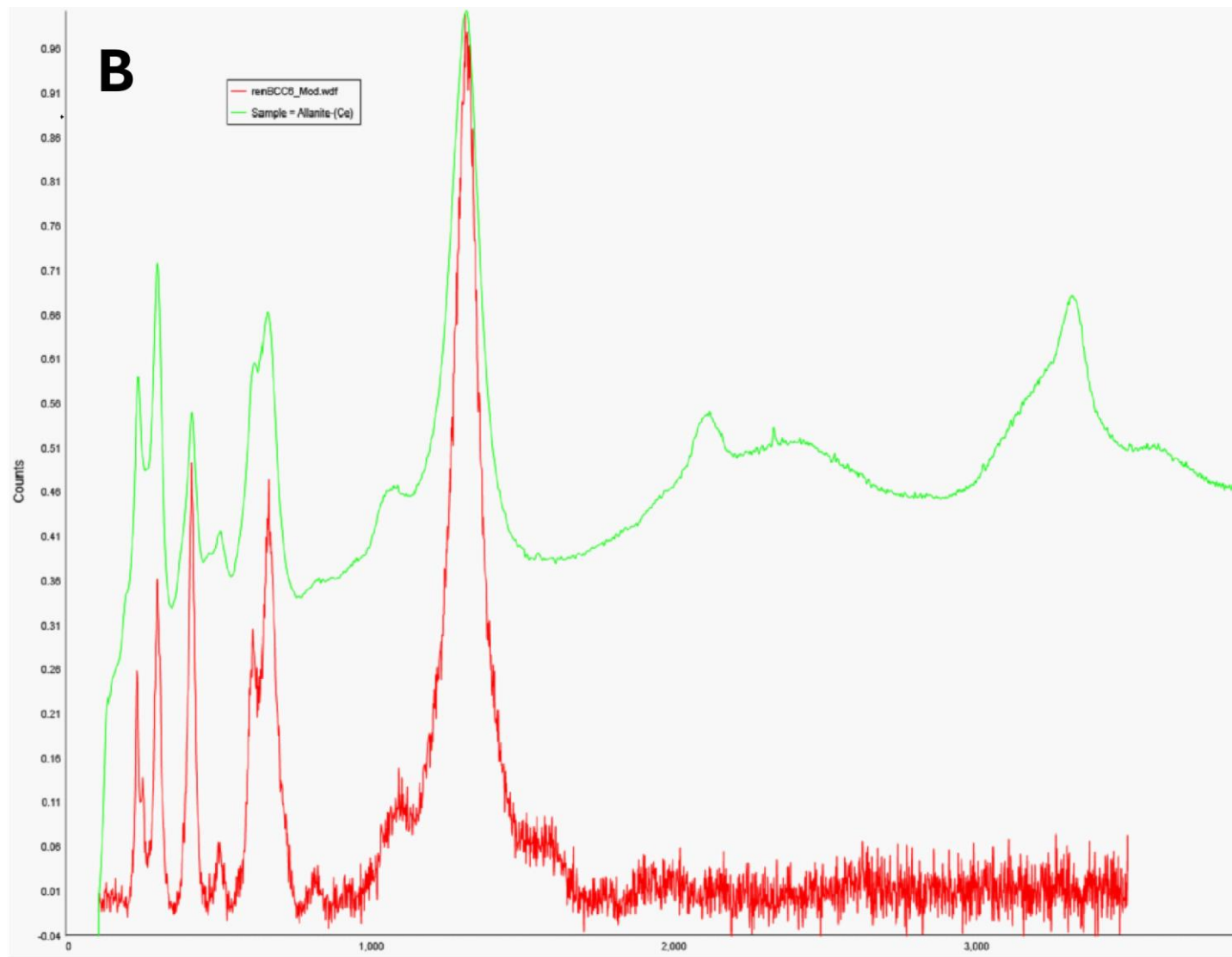
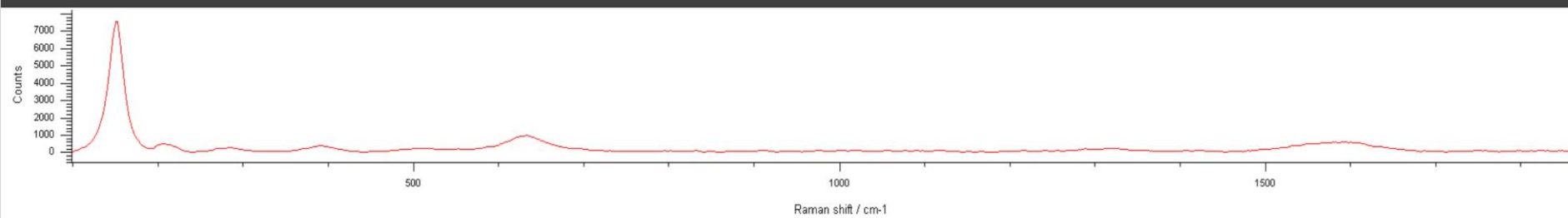


Fig. 3 Reflected light image showing a patchy distribution of allanite near a bright, isotropic grain tentatively identified as thorite (upper part). Raman intensity map with Raman Spectrum confirming the presence of allanite through its characteristic vibrational modes in the $160\text{--}600\text{ cm}^{-1}$ and $\sim 1200\text{--}1500\text{ cm}^{-1}$ ranges (lower part) in the leucocratic granite (sample M7C) (A). Comparison between the Raman spectrum of the analyzed mineral and the reference spectrum of allanite-(Ce). The positions of the main peaks coincide, confirming the identification of allanite (B).

A



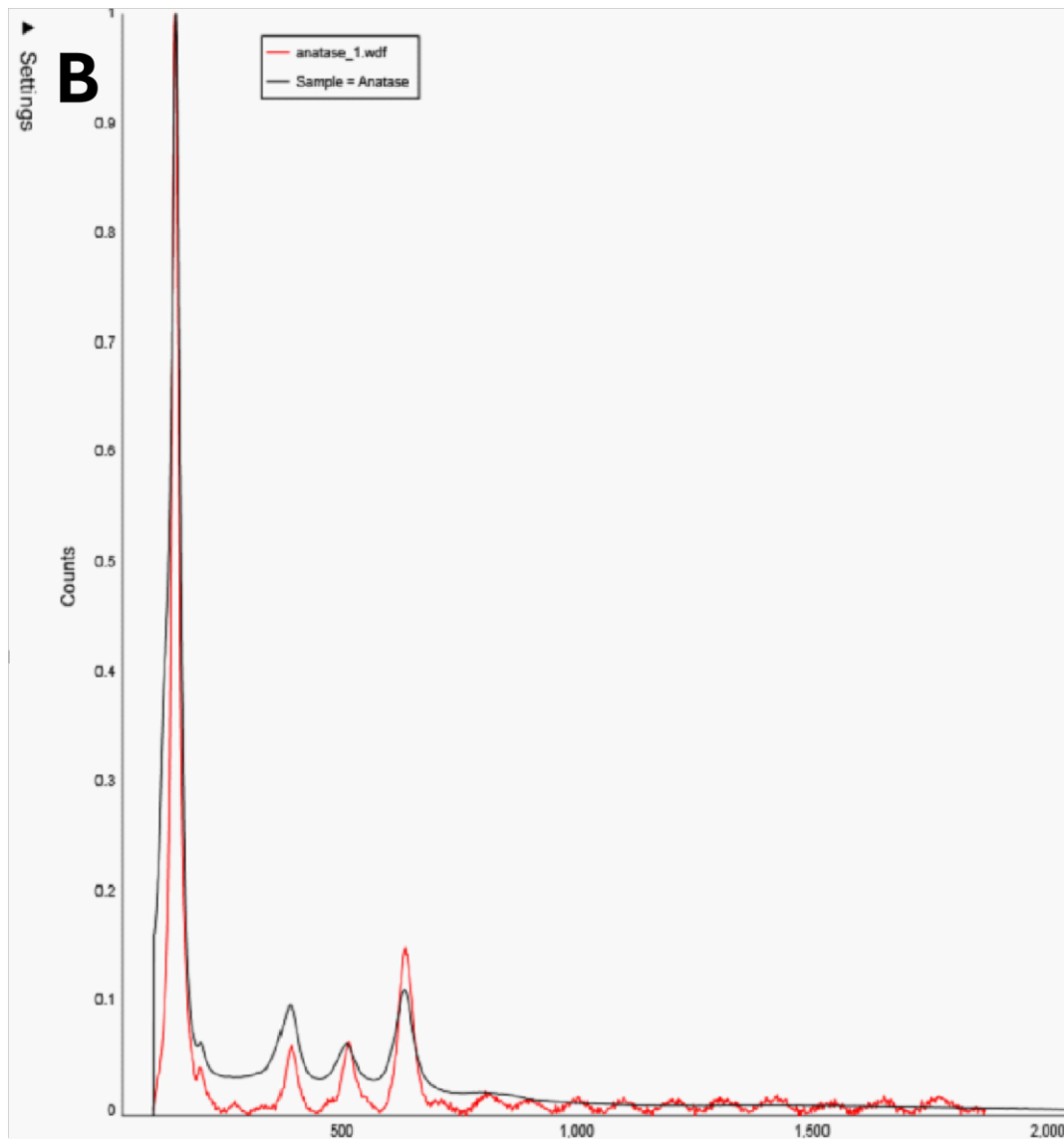


Fig. 4 Reflected light image with bright red zones corresponding to high Raman signal matching characteristic peaks of anatase (TiO_2 ; upper part), and Raman map confirming the presence of anatase in the leucocratic granite (sample M7C) (A). Comparison between the Raman spectrum of the analyzed mineral and the reference spectrum of anatase. The coincidence of the main peaks confirms the identification of TiO_2 as anatase (B).