GSA Data Repository Item 2015179

Bulk rock composition used for phase equilibria modelling

Bulk rock chemistry for all oxides, except for H_2O and Fe_2O_3, was determined by X-ray fluorescence spectrometry at the Saskatchewan Research Council for KA064A and at ACTLabs (Ancaster) for specimens KA007 and KA044. In order to best represent the composition of the thin section, thin section cut offs were used for analysis. Manganese and phosphorous were subtracted from the bulk as they are not included in the model system and all values were normalized to 100%. As phosphorous occurs mainly in apatite [$(Ca_5(PO_4)_3(F,Cl,OH)$], a proportionate amount of calcium was also removed. Water content was calculated based on the modal abundance and composition of biotite and muscovite (the only hydrous phases present) as determined by EMP spot analyses (White et al., 2007). To determine the proportion of ferric iron, a T- XFe^{3+} [$XFe^{3+}=(Fe^{3+}/(Fe^{2+}+Fe^{3+})$] pseudosection was made for each specimen. In each, only the Fe-Ti oxide equilibria are significantly affected by changing XFe^{3+}. XFe^{3+} was set at 1% for all pseudosections because this resulted in the stability of the oxide assemblage (rutile and ilmenite) observed in thin section. As this value is poorly constrained, the position of rutile and ilmenite equilibria are not used for interpreting P-T conditions.

Methodology for Petrochronology

A Cameca SX100 electron microprobe (EMP) housed at the Saskatchewan Research Council (SRC) was used to generate full thin section maps for major elements and Ce for each specimen in order to help locate monazite grains and determine their textural relationships. These element maps were made using a 30 µm step-size, 20 kV accelerating voltage, and a 60 nA beam current utilizing both energy dispersive (EDS) and wavelength dispersive X-ray spectroscopy (WDS). Each monazite located was then mapped (0.3 µm step-size) for U, Th, Pb, Y and Ca to identify compositional zoning to help guide laser spot placement and elucidate relationships between age and monazite composition. Backscattered electron images of each grain selected for dating were captured using a Tescan Mira3 XMU Field Emission Scanning Electron Microscope at the University of British Columbia SEM Lab in order to locate grains during LASS-ICP-MS analyses.

Monazite isotopic age and trace element analyses were carried out at the University of California, Santa Barbara (UCSB) LASS Facility following the procedures of Cottle et al. (2012, 2013) and Kylander-Clark et al. (2013). A 7.2 µm spot size with a pit depth of ~3-4 µm was ablated using a Photon Machines 193 nm ArF excimer. The aerosol was then split between an Agilent 7700S quadrupole ICP-MS (equipped with an additional interface pump) for trace element analyses and a Nu Instruments Plasma high resolution multi-collector ICP-MS for isotopic analyses (U-Th-Pb). Each analysis was preceded by two preablation (cleaning) shots followed by a 15

second gap to allow the system to return to background. Laser repetition rate was 4 Hz and run over 25 seconds for a total of 100 shots at an energy of 3 mJ. 1-12 spot analyses were collected on each grain with ~ 10 grains analyzed in each specimen. Primary, secondary and tertiary reference monazites (RM) were analyzed after approximately every 6 unknowns. The primary RM"44069" $^{207}Pb/^{235}U$ age of 424.9 Ma as determined by isotope dilution-thermal ionization mass spectrometry, ID-TIMS; Aleinikoff et al., 2006), was used to correct for mass bias as well as Pb/U and Pb/Th fractionation. Bananeira monazite (supplied by Richard Stern) [512.1 ± 1.9 Ma Kylander-Clark *et al.*, 2013; Palin *et al.*, 2013]; was used as the primary RM for trace-element analyses. Bananeira and "Manangotry" RM's (554 ± 1 Ma, ID-TIMS ^{238}U-^{206}Pb age; Horstwood et al., 2003) were treated as unknowns and used to monitor data accuracy. Data reduction was carried out using Igor Pro version 6.24 with Iolite Software version 2.5 as per the methods of Paton et al. (2011). All concordia plots were generated using Isoplot version 2.4 (Ludwig, 2000) as an add-in for Excel version 2003 with the decay constants of Steiger and Jäger (1977). With young monazite, low levels of radiogenic ^{207}Pb (from low initial levels and low natural abundance of ^{235}U) can result in imprecise $^{207}Pb/^{235}U$ dates. As Th levels are typically orders of magnitude higher than U (Chang et al. 1998), U-Th-Pb concordia diagrams ($^{206}Pb/^{238}U$-$^{208}Pb/^{232}U$) are better suited for young monazite. Unsupported ^{206}Pb from the decay of ^{230}Th, an intermediate decay product of ^{238}U, can result in reversely discordant, age plots (Scharer, 1984). Therefore, although U-Th-Pb concordia plots are useful for visualizing data, the most robust ages for young monazite are typically considered to be those calculated from $^{232}Th/^{208}Pb$ ratios.

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B.3. EMP Spot Locations and Composition Data

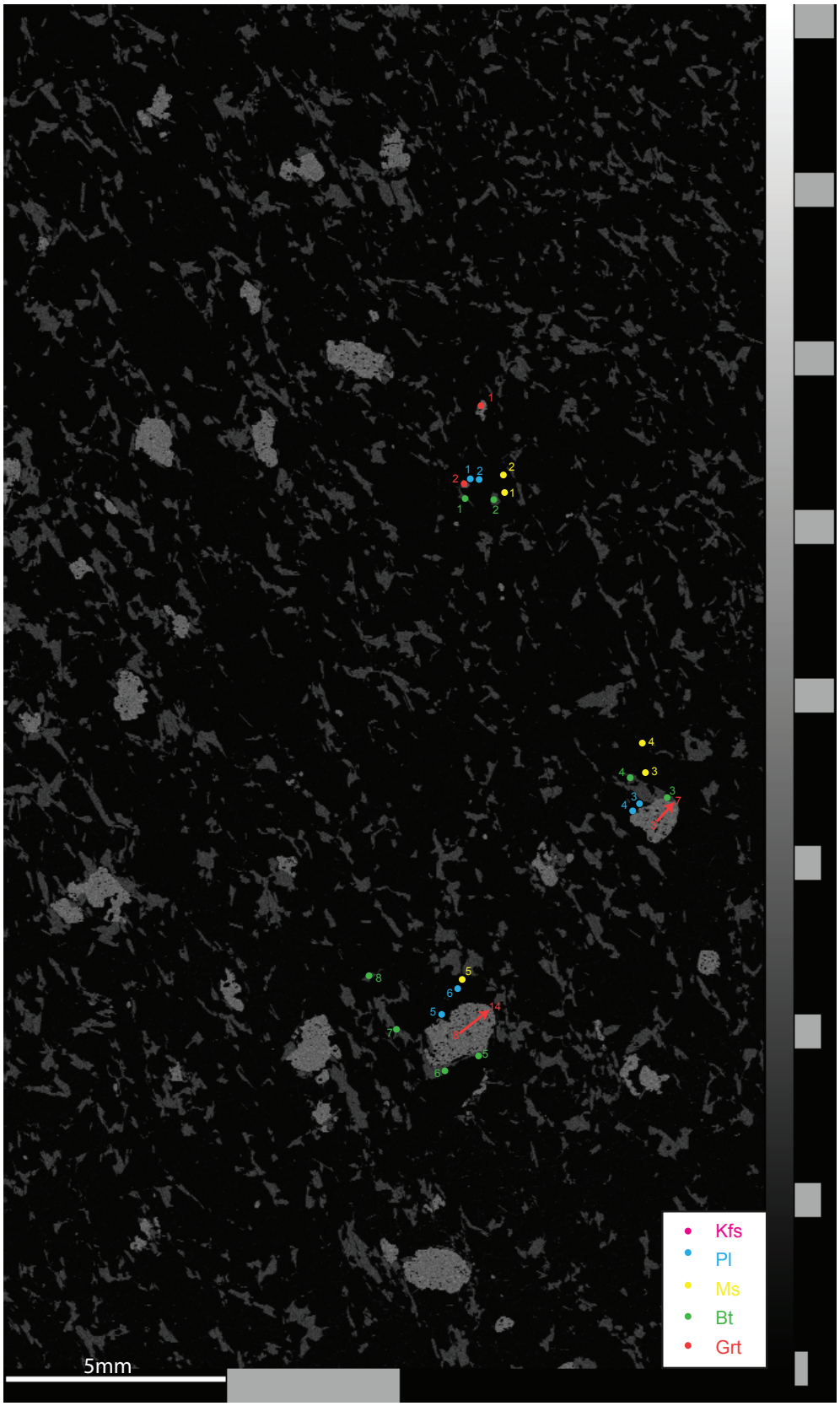


Figure B.13. KA007 EMP mineral spot analysis locations shown on an iron EMP map..

Table. B.1. Garnet compositions from specimen KA007. Corresponding locations are shown in B.13.

wt %	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SiO2	37.84	37.67	37.71	37.86	37.87	37.92	37.92	37.90	38.01	37.98	37.81	38.01	37.72	37.59
TiO2	0.24	0.01	0.04	0.02	0.01	0.01	0.02	0.03	0.04	0.03	0.00	0.00	0.02	0.00
Al2O3	21.69	21.58	21.81	21.63	21.78	21.93	21.84	21.93	21.98	21.76	21.79	21.78	21.77	21.58
FeO	33.31	32.98	33.30	32.94	33.18	33.18	33.15	32.88	33.32	33.27	33.75	33.24	32.90	33.35
MnO	4.36	4.28	2.98	3.01	2.97		3.26	2.61	2.71	2.86	3.09	3.17	3.54	4.25
MgO	2.97	2.98	3.66	3.57	3.57	3.59	3.57	3.80	3.74	3.66	3.63	3.51	3.41	2.92
CaO	1.01	1.23	1.25	1.31	1.25	1.29	1.21	1.60	1.47	1.50	1.21	1.22	1.21	0.94
Cr2O3	0.03	0.00	0.02	0.03	0.03	0.00	0.00	0.00	0.00	0.01	0.00	0.03	0.03	0.00
Total	101.46	100.72	100.76	100.38	100.66	97.91	100.96	100.75	101.28	101.07	101.29	100.96	100.59	100.63
ions														
Si	2.99	3.00	2.98	3.00	2.99	2.99	2.99	2.99	2.99	2.99	2.99	3.00	2.99	2.99
Ti	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Al	2.03	2.03	2.04	2.03	2.04	2.04	2.04	2.04	2.04	2.03	2.03	2.03	2.04	2.03
Fe	2.24	2.23	2.24	2.23	2.24	2.23	2.23	2.21	2.23	2.23	2.25	2.24	2.22	2.26
Mn	0.29	0.29	0.20	0.20	0.20	0.20	0.22	0.17	0.18	0.19	0.21	0.21	0.24	0.29
Mg	0.35	0.35	0.43	0.42	0.42	0.42	0.42	0.45	0.44	0.43	0.43	0.41	0.40	0.35
Ca	0.09	0.10	0.11	0.11	0.11	0.11	0.10	0.14	0.12	0.13	0.10	0.10	0.10	0.08
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	7.99	8.00	8.00	7.99	8.00	8.00	8.00	8.00	8.00	8.00	8.00	7.99	8.00	8.00
O	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Alm	75.49	74.90	75.25	75.16	75.55	75.24	75.08	74.54	75.00	74.85	75.34	75.43	74.96	75.98
Grs	2.80	3.52	3.49	3.65	3.46	3.67	3.45	4.56	4.17	4.24	3.43	3.40	3.37	2.71
Prp	11.79	11.90	14.51	14.26	14.18	14.22	14.13	15.03	14.75	14.46	14.31	13.93	13.56	11.65
Sps	9.83	9.69	6.70	6.82	6.70	6.87	7.34	5.87	6.07	6.42	6.91	7.15	8.01	9.66
Total	99.91	100.00	99.94	99.89	99.90	100.00	100.00	99.99	100.00	99.97	100.00	99.91	99.90	100.00
Alm (-Mn)	0.84	0.83	0.81	0.81	0.81	0.81	0.81	0.79	0.80	0.80	0.81	0.81	0.82	0.84
Grs (-Mn)	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.04	0.05	0.04	0.04	0.04	0.03
Fe#	0.86	0.86	0.84	0.84	0.84	0.84	0.84	0.83	0.84	0.84	0.84	0.84	0.85	0.87

Table. B.2. Biotite compositions from specimen KA007. Corresponding locations are shown in B.13.

wt %	1	2	3	4	5	6	7	8
SiO2	35.51	36.73	37.13	35.54	37.05	35.42	32.55	36.43
TiO2	4.27	4.00	3.30	3.21	3.32	3.49	3.96	3.87
Al2O3	19.90	20.30	21.97	20.01	20.65	20.41	18.22	19.78
FeO	20.51	21.02	20.08	20.92	21.21	20.61	20.96	20.14
MgO	6.58	7.37	7.74	7.40	7.84	7.43	6.18	7.13
CaO	0.05	0.05	0.20	0.14	0.02	0.01	0.13	0.15
Na2O	0.11	0.13	0.34	0.27	0.12	0.09	0.19	0.31
K2O	8.50	9.31	9.04	9.23	8.50	9.18	9.29	9.16
F	0.043	0.449	0.414	0.15	0.4	0.226	0.149	0.26
Cl	0.006	0.006	0.026	0.03	0.008	0.002	0.019	0.031
Total	95.48	99.36	100.23	96.90	99.12	96.86	91.64	97.26
ions								
Si	5.33	5.31	5.27	5.30	5.34	5.28	5.26	5.37
Ti	0.48	0.44	0.35	0.36	0.36	0.39	0.48	0.43
Al	3.52	3.46	3.68	3.52	3.51	3.58	3.47	3.44
Fe	2.58	2.54	2.38	2.61	2.55	2.57	2.83	2.48
Mg	1.47	1.59	1.64	1.65	1.68	1.65	1.49	1.57
Ca	0.01	0.01	0.03	0.02	0.00	0.00	0.02	0.02
Na	0.03	0.04	0.09	0.08	0.03	0.03	0.06	0.09
K	1.63	1.72	1.64	1.76	1.56	1.74	1.91	1.72
Fe	0.02	0.21	0.19	0.07	0.18	0.11	0.08	0.12
Cl	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01
Total	15.06	15.11	15.09	15.30	15.04	15.24	15.52	15.12
O	22	22	22	22	22	22	22	22
Mg#	0.36	0.38	0.41	0.39	0.40	0.39	0.34	0.39

Table. B.3. Plagioclase compositions from specimen KA007. Corresponding locations are shown in B.13.

wt %	1	2	3	4	5	6
SiO2	67.21	66.22	66.07	66.01	67.37	66.20
Al2O3	23.68	23.26	23.14	23.13	23.57	22.96
CaO	3.14	3.16	3.11	3.33	3.07	3.03
Na2O	6.77	7.53	7.27	7.32	6.22	7.60
K2O	0.32	0.38	0.37	0.36	0.35	0.38
Total	101.12	100.56	99.96	100.14	100.57	100.17
ions						
Si	2.88	2.87	2.88	2.87	2.90	2.88
Al	1.20	1.19	1.19	1.19	1.20	1.18
Ca	0.14	0.15	0.15	0.16	0.14	0.14
Na	0.56	0.63	0.61	0.62	0.52	0.64
K	0.02	0.02	0.02	0.02	0.02	0.02
Total	4.80	4.86	4.85	4.85	4.77	4.86
O	8	8	8	8	8	8
An	0.20	0.18	0.19	0.20	0.21	0.18
Ab	0.78	0.79	0.79	0.78	0.76	0.80
Or	0.02	0.03	0.03	0.03	0.03	0.03

Table B.4. Muscovite compositions from specimen KA007. Corresponding locations are shown in B.13.

wt %	1	2	3	4	5
SiO2	51.10	48.76	47.33	42.81	50.43
TiO2	2.55	1.75	1.74	1.74	2.06
Al2O3	35.78	34.46	35.75	27.86	36.90
FeO	1.27	1.30	1.41	1.32	1.26
MgO	0.94	0.99	0.96	0.72	0.90
Na2O	0.25	0.35	0.26	0.19	0.46
K2O	7.59	8.35	7.98	7.15	7.80
F	0.15	0.15	0.26	0.10	0.39
Cl	0.00	0.01	0.02	0.01	0.02
Total	99.63	96.11	95.70	81.90	100.21
ions					
Si	6.36	6.33	6.18	6.52	6.26
Ti	0.24	0.17	0.17	0.20	0.19
Fe	0.13	0.14	0.15	0.17	0.13
Mg	0.17	0.19	0.19	0.16	0.17
Na	0.06	0.09	0.07	0.06	0.11
K	1.20	1.38	1.33	1.39	1.24
F	0.06	0.06	0.11	0.05	0.15
Cl	0.00	0.00	0.01	0.00	0.00
Al total	5.25	5.28	5.50	5.00	5.40
Fe#	0.43	0.42	0.45	0.51	0.44

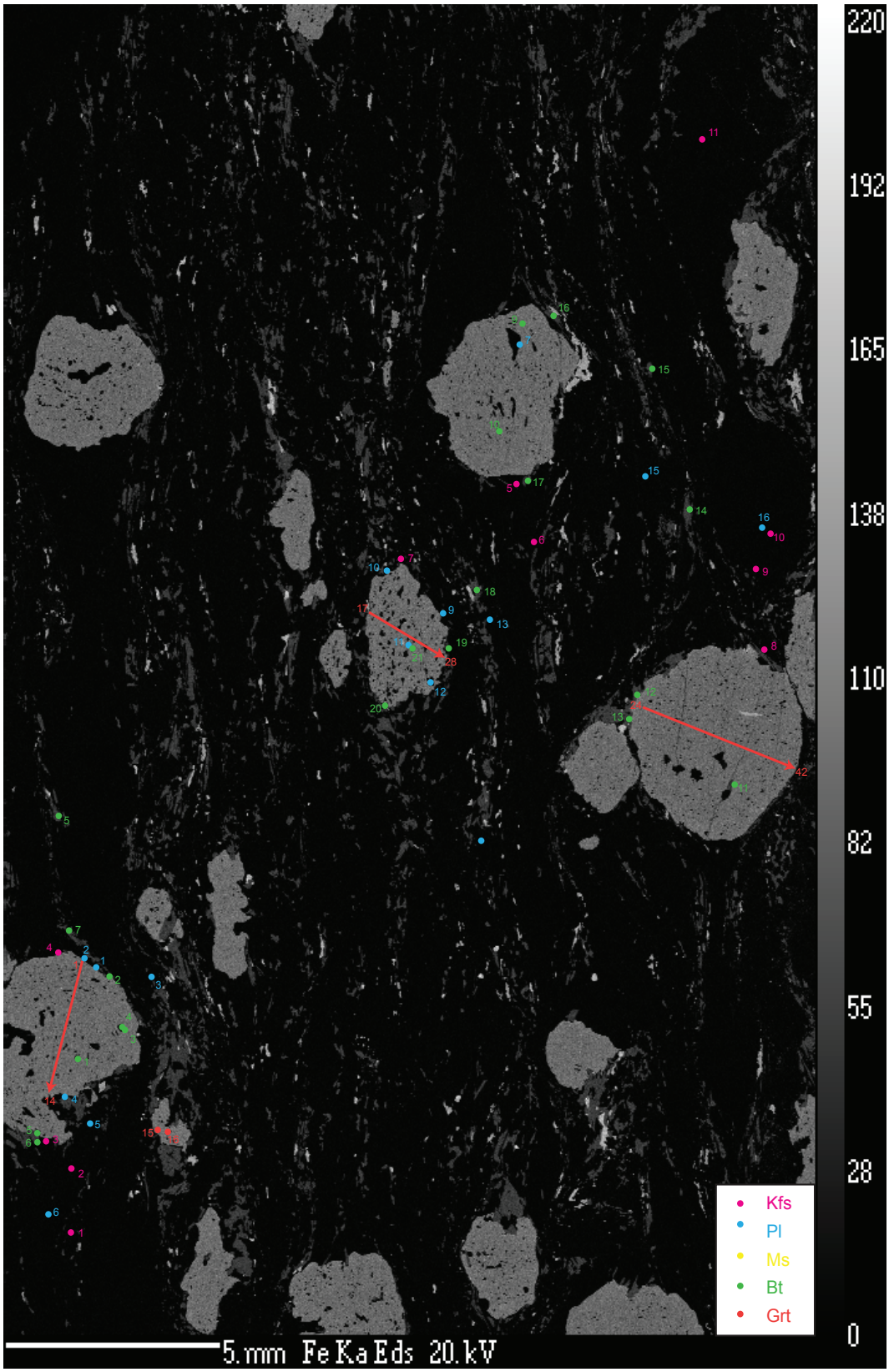


Figure B.14 KA044 EMP mineral spot analysis locations shown on an iron EMP map.

Table B.5. Garnet compositions from specimen KA044. Corresponding locations are shown in B.14.

wt %	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SiO2	39.22	39.23	39.35	39.43	39.31	39.24	39.32	39.22	39.36	39.12	39.16	39.25	39.55	38.93
TiO2	0.02	0.03	0.06	0.01	0.04	0.02	0.02	0.04	0.05	0.04	0.14	0.03	0.03	0.00
Al2O3	22.24	22.60	22.62	22.73	22.52	22.69	22.73	22.80	22.64	22.63	22.76	22.88	22.51	22.58
FeO	32.36	31.67	30.82	30.04	30.76	31.07	30.84	31.08	31.24	31.15	31.38	30.85	31.19	33.37
MnO	0.63	0.58	0.42	0.41	0.46	0.46	0.46	0.45	0.45	0.45	0.43	0.41	0.45	0.63
MgO	5.06	5.22	5.54	5.66	5.71	5.78	5.68	5.74	5.80	5.79	5.76	5.65	5.52	4.48
CaO	1.88	2.59	3.22	3.11	2.82	2.19	2.63	2.18	2.06	2.09	2.10	2.38	2.51	1.60
Cr2O3	0.03	0.01	0.02	0.05	0.02	-0.01	0.02	-0.01	0.01	0.06	0.01	0.07	0.06	0.04
Total	101.45	101.93	102.06	101.44	101.64	101.46	101.70	101.50	101.60	101.33	101.75	101.50	101.83	101.63
ions														
Si	3.02	3.00	3.00	3.00	3.00	3.00	3.00	2.99	3.00	3.00	2.99	2.99	3.02	3.00
Ti	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Al	2.03	2.05	2.04	2.06	2.04	2.06	2.06	2.07	2.05	2.06	2.06	2.07	2.04	2.07
Fe	2.15	2.09	2.03	2.00	2.03	2.06	2.04	2.07	2.07	2.07	2.08	2.06	2.06	2.24
Mn	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04
Mg	0.58	0.60	0.63	0.64	0.65	0.66	0.65	0.65	0.66	0.66	0.66	0.64	0.63	0.51
Ca	0.16	0.21	0.26	0.25	0.23	0.18	0.22	0.18	0.17	0.17	0.17	0.19	0.20	0.13
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	7.98	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.98	7.99
O	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Alm	73.48	71.24	68.78	68.39	69.01	70.39	69.64	70.59	70.73	70.63	70.85	70.47	70.54	76.51
Grs	5.20	7.20	8.84	8.56	7.82	6.14	7.27	6.12	5.72	5.65	5.83	6.42	6.80	4.38
Prp	19.83	20.26	21.39	22.01	22.12	22.46	22.02	22.31	22.54	22.54	22.34	21.97	21.46	17.58
Sps	1.39	1.28	0.92	0.91	1.00	1.02	1.01	0.99	0.98	0.99	0.95	0.91	1.00	1.40
Total	99.90	99.98	99.93	99.86	99.95	100.02	99.93	100.02	99.98	99.80	99.98	99.78	99.81	99.87
Alm(-Mn)	74.59	72.18	69.47	69.11	69.75	71.10	70.39	71.29	71.45	71.48	71.55	71.28	71.40	77.70
Grs(-Mn)	5.37	7.31	9.00	8.78	7.94	6.19	7.41	6.16	5.80	5.90	5.91	6.70	7.07	4.58
Fe#	0.79	0.78	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.77	0.81

Table B.5. continued

15	16	17	18	19	20	21	22	23	24	25	26	27	28
39.05	39.34	38.87	38.92	39.26	39.12	39.34	39.30	39.29	39.46	39.43	39.27	39.15	39.18
0.02	0.02	0.01	0.01	0.05	0.04	0.03	0.03	0.02	0.03	0.05	0.01	0.03	0.02
22.63	22.59	22.38	22.50	22.60	22.65	22.69	22.75	22.82	22.77	22.51	22.71	22.56	22.46
32.34	32.19	33.34	32.24	31.20	31.68	30.93	32.07	31.85	31.75	31.48	32.02	32.07	33.28
0.67	0.61	0.66	0.59	0.52	0.47	0.51	0.51	0.53	0.56	0.57	0.51	0.62	0.66
5.06	5.25	4.51	5.04	5.40	5.57	5.70	5.72	5.60	5.52	5.51	5.48	5.26	4.75
1.67	2.04	1.70	1.93	2.26	2.27	2.01	1.83	1.89	2.30	2.18	1.86	1.92	1.75
0.01	0.00	0.05	0.06	0.00	0.01	0.00	0.02	0.05	0.04	0.00	0.00	0.07	0.02
101.44	102.05	101.52	101.28	101.29	101.80	101.21	102.24	102.04	102.42	101.73	101.86	101.68	102.11
3.00	3.01	3.00	3.00	3.01	2.99	3.01	2.99	2.99	3.00	3.01	3.00	3.00	3.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.06	2.05	2.05	2.06	2.05	2.05	2.06	2.05	2.06	2.05	2.04	2.06	2.05	2.04
2.16	2.13	2.23	2.16	2.08	2.09	2.07	2.11	2.11	2.09	2.09	2.12	2.13	2.21
0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.03	0.04	0.04
0.58	0.60	0.52	0.58	0.62	0.63	0.65	0.65	0.64	0.63	0.63	0.62	0.60	0.54
0.14	0.17	0.14	0.16	0.19	0.19	0.16	0.15	0.15	0.19	0.18	0.15	0.16	0.14
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7.99	7.99	7.99	7.99	7.98	7.99	7.98	7.99	7.99	7.99	7.98	7.99	7.99	7.99
12	12	12	12	12	12	12	12	12	12	12	12	12	12
74.00	72.58	76.02	73.52	71.37	71.10	70.94	71.72	71.88	71.12	71.21	72.41	72.75	75.13
4.65	5.70	4.64	5.25	6.36	6.29	5.64	5.03	5.13	6.24	6.10	5.19	5.16	4.84
19.81	20.37	17.71	19.73	21.12	21.56	22.28	22.08	21.70	21.29	21.43	21.26	20.50	18.52
1.49	1.35	1.48	1.32	1.16	1.04	1.14	1.12	1.15	1.22	1.27	1.13	1.36	1.46
99.96	100.00	99.84	99.81	100.00	99.98	100.00	99.95	99.86	99.88	100.00	99.99	99.78	99.95
75.15	73.57	77.28	74.64	72.20	71.85	71.76	72.57	72.82	72.09	72.12	73.24	73.92	76.28
4.77	5.77	4.87	5.51	6.43	6.37	5.71	5.14	5.33	6.44	6.17	5.25	5.46	4.97
0.79	0.78	0.81	0.79	0.77	0.77	0.76	0.76	0.77	0.77	0.77	0.77	0.78	0.80

Table B.5. continued

29	30	31	32	33	34	35	36	37	38	39	40	41	42
38.59	39.31	39.36	39.47	39.24	39.11	39.10	38.94	39.40	39.33	39.43	39.38	39.46	39.26
0.04	0.03	0.05	0.05	0.04	0.03	0.05	0.05	0.05	0.05	0.04	0.02	0.04	0.05
22.33	22.52	22.53	22.61	22.41	22.59	22.42	22.55	22.50	22.48	22.63	22.68	22.52	22.07
33.18	30.03	29.97	29.31	30.14	30.05	30.68	30.21	30.30	30.30	29.48	30.05	31.58	34.09
0.79	0.56	0.50	0.61	0.58	0.55	0.56	0.57	0.54	0.53	0.44	0.50	0.67	0.85
4.01	5.27	5.26	5.07	4.98	4.98	4.89	5.04	5.12	5.20	5.27	5.25	4.86	3.70
1.73	2.95	3.43	3.82	3.93	3.90	3.94	3.73	3.83	3.75	3.61	3.50	3.11	1.82
0.00	0.00	0.04	0.03	0.05	0.04	0.00	0.00	0.00	0.00	0.02	0.02	0.04	0.02
100.66	100.68	101.12	100.98	101.38	101.24	101.64	101.09	101.74	101.63	100.90	101.39	102.28	101.86
3.00	3.02	3.01	3.02	3.01	3.00	3.00	3.00	3.01	3.01	3.01	3.01	3.01	3.03
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.06	2.05	2.05	2.05	2.04	2.06	2.04	2.06	2.04	2.04	2.06	2.06	2.04	2.02
2.25	2.02	2.00	1.97	2.00	2.01	2.03	2.02	2.00	2.00	1.98	2.00	2.08	2.28
0.05	0.04	0.03	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.04	0.06
0.47	0.60	0.60	0.58	0.57	0.57	0.56	0.58	0.58	0.59	0.60	0.60	0.55	0.43
0.14	0.24	0.28	0.31	0.32	0.32	0.32	0.31	0.31	0.31	0.30	0.29	0.25	0.15
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7.99	7.98	7.98	7.98	7.99	7.99	7.99	7.99	7.99	7.99	7.98	7.99	7.99	7.97
12	12	12	12	12	12	12	12	12	12	12	12	12	12
77.32	69.63	68.68	67.96	68.29	68.43	68.77	68.59	68.26	68.17	68.18	68.63	71.02	78.30
4.95	8.36	9.52	10.68	10.85	10.81	11.00	10.47	10.69	10.46	10.13	9.74	8.55	5.10
15.95	20.75	20.58	19.90	19.40	19.42	18.99	19.68	19.87	20.19	20.66	20.47	18.84	14.61
1.78	1.26	1.10	1.36	1.29	1.23	1.24	1.25	1.18	1.17	0.98	1.11	1.46	1.91
100.00	100.00	99.88	99.91	99.83	99.89	100.00	100.00	100.00	100.00	99.95	99.95	99.87	99.92
78.72	70.52	69.53	68.96	69.30	69.36	69.63	69.46	69.08	68.98	68.89	69.43	72.17	79.89
5.04	8.46	9.75	10.92	11.17	11.06	11.14	10.61	10.82	10.59	10.28	9.90	8.80	5.27
0.83	0.77	0.77	0.77	0.78	0.78	0.78	0.78	0.77	0.77	0.77	0.77	0.79	0.84

Table B.6. Biotite compositions from specimen KA044. Corresponding locations are shown in B.14.

wt %	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
SiO2	38.16	35.67	38.43	36.39	36.27	35.97	36.67	34.84	34.18	36.39	33.71	35.34	34.74	35.63	35.97	35.76	35.63	35.47	36.29	35.07	36.88
TiO2	0.13	3.69	0.69	0.86	4.43	4.51	4.67	5.13	1.43	0.04	3.04	4.18	4.11	4.94	4.92	4.03	4.07	4.61	3.06	4.48	4.51
Al2O3	20.83	19.58	23.61	21.78	18.78	19.01	18.53	17.99	20.09	24.41	19.65	17.68	17.63	18.81	18.73	18.62	18.30	17.87	19.60	18.66	19.99
FeO	13.39	17.55	17.72	15.71	18.62	18.55	18.88	19.27	17.79	14.68	16.17	18.51	17.90	18.26	18.87	18.17	18.00	18.90	16.21	17.65	17.81
MgO	15.55	10.62	11.58	13.60	10.07	10.10	10.04	9.55	11.57	13.17	11.53	10.03	9.64	9.66	9.62	10.30	9.86	9.43	11.36	9.48	10.23
CaO	0.05	0.01	0.13	0.07	0.00	0.00	0.02	0.01	0.10	0.11	0.03	0.05	0.04	0.01	0.01	0.04	0.05	0.02	0.03	0.04	0.03
Na2O	0.23	0.11	0.10	0.48	0.11	0.14	0.09	0.11	0.21	0.21	0.30	0.14	0.11	0.13	0.12	0.10	0.14	0.09	0.13	0.16	0.12
K2O	8.72	9.85	7.92	8.49	9.84	9.88	9.88	9.85	8.57	8.49	9.38	9.56	9.45	9.75	9.86	9.65	9.62	9.74	9.84	9.83	9.71
F	0.99	0.44	0.46	0.09	0.56	0.55	0.41	0.40	0.08	0.26	0.83	0.51	0.40	0.82	0.44	0.65	0.64	0.56	0.79	0.45	0.56
Cl	0.02	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.03	0.01	0.01	0.02	0.01	0.00	0.01	0.02	0.03	0.01	0.01	0.01	0.01
Total	98.14	97.61	100.66	97.51	98.81	98.88	99.26	97.27	94.07	97.80	94.73	96.08	94.09	98.17	98.62	97.45	96.45	96.91	97.41	96.01	99.97
ions																					
Si	5.46	5.28	5.38	5.27	5.34	5.29	5.37	5.25	5.22	5.21	5.16	5.36	5.37	5.29	5.31	5.33	5.37	5.35	5.36	5.31	5.32
Ti	0.01	0.41	0.07	0.09	0.49	0.50	0.51	0.58	0.16	0.00	0.35	0.48	0.48	0.55	0.55	0.45	0.46	0.52	0.34	0.51	0.49
Al	3.52	3.42	3.90	3.72	3.26	3.30	3.20	3.19	3.62	4.12	3.54	3.16	3.21	3.29	3.26	3.27	3.25	3.18	3.41	3.33	3.40
Fe	1.60	2.17	2.08	1.90	2.29	2.28	2.31	2.43	2.27	1.76	2.07	2.35	2.31	2.27	2.33	2.27	2.27	2.38	2.00	2.23	2.15
Mg	3.32	2.35	2.42	2.93	2.21	2.21	2.19	2.14	2.64	2.81	2.63	2.27	2.22	2.14	2.12	2.29	2.22	2.12	2.50	2.14	2.20
Ca	0.01	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01
Na	0.06	0.03	0.03	0.14	0.03	0.04	0.03	0.03	0.06	0.06	0.09	0.04	0.03	0.04	0.04	0.03	0.04	0.03	0.04	0.05	0.03
K	1.59	1.86	1.42	1.57	1.85	1.85	1.84	1.89	1.67	1.55	1.83	1.85	1.86	1.85	1.86	1.84	1.85	1.87	1.85	1.90	1.79
F	0.45	0.21	0.20	0.04	0.26	0.26	0.19	0.19	0.04	0.12	0.40	0.25	0.19	0.38	0.21	0.31	0.31	0.26	0.37	0.21	0.26
Cl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Total	16.03	15.74	15.52	15.68	15.72	15.74	15.64	15.71	15.71	15.64	16.07	15.76	15.69	15.81	15.66	15.80	15.78	15.72	15.89	15.68	15.64
O	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Mg#	0.67	0.52	0.54	0.61	0.49	0.49	0.49	0.47	0.54	0.62	0.56	0.49	0.49	0.49	0.48	0.50	0.49	0.47	0.56	0.49	0.51

Table B.7. Plagioclase compositions from specimen KA044. Corresponding locations are shown in B.14.

wt %	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SiO2	60.38	59.72	60.30	59.82	59.72	60.18	59.43	58.83	60.98	59.33	60.05	60.33	60.41	58.44	59.68	60.04
Al2O3	27.20	26.91	26.33	27.00	27.19	26.32	27.09	26.94	26.94	26.80	26.44	26.05	27.15	27.27	26.74	26.23
CaO	7.50	7.37	6.95	7.37	7.62	6.88	7.62	7.70	7.16	7.33	7.30	6.74	7.47	7.98	7.34	7.00
Na2O	6.72	7.15	7.02	7.12	6.41	7.29	6.81	6.72	5.72	6.41	6.68	6.84	6.10	6.63	6.87	7.12
K2O	0.25	0.16	0.30	0.23	0.29	0.27	0.27	0.25	0.26	0.20	0.18	0.15	0.26	0.22	0.25	0.28
Total	102.05	101.31	100.90	101.53	101.22	100.93	101.22	100.44	101.06	100.07	100.64	100.10	101.38	100.54	100.89	100.67
ions																
Si	2.63	2.62	2.66	2.62	2.62	2.65	2.62	2.61	2.67	2.63	2.65	2.67	2.64	2.59	2.63	2.65
Al	1.40	1.39	1.37	1.40	1.41	1.37	1.40	1.41	1.39	1.40	1.37	1.36	1.40	1.43	1.39	1.37
Ca	0.35	0.35	0.33	0.35	0.36	0.32	0.36	0.37	0.34	0.35	0.34	0.32	0.35	0.38	0.35	0.33
Na	0.57	0.61	0.60	0.61	0.55	0.62	0.58	0.58	0.49	0.55	0.57	0.59	0.52	0.57	0.59	0.61
K	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02
Total	4.96	4.98	4.97	4.98	4.95	4.98	4.98	4.98	4.89	4.94	4.94	4.94	4.92	4.98	4.97	4.97
O	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
An	0.38	0.36	0.35	0.36	0.39	0.34	0.38	0.38	0.40	0.38	0.37	0.35	0.40	0.39	0.37	0.35
Ab	0.61	0.63	0.63	0.63	0.59	0.65	0.61	0.60	0.58	0.61	0.62	0.64	0.59	0.59	0.62	0.64
Or	0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.02

Table B.8. K-feldspar compositions from specimen KA044. Corresponding locations are shown in B.14.

wt %	1	2	3	4	5	6	7	8	9	10	11
SiO2	65.27	65.47	66.42	65.63	64.50	66.73	64.49	64.52	65.07	67.42	65.83
Al2O3	19.70	19.92	20.29	19.74	19.63	20.10	19.60	19.59	19.63	20.13	20.10
CaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na2O	1.41	1.49	1.44	1.25	1.36	1.43	1.27	1.23	1.13	1.33	2.34
K2O	14.40	13.37	12.95	14.11	13.37	12.33	13.86	14.09	14.09	12.01	12.11
BaO	0.39	0.42	0.41	0.39	0.44	0.45	0.49	0.38	0.38	0.33	0.23
Total	101.23	100.70	101.58	101.15	99.32	101.09	99.79	99.86	100.33	101.28	100.63
ions											
Si	2.96	2.97	2.98	2.97	2.97	2.99	2.97	2.97	2.97	3.00	2.97
Al	1.05	1.07	1.07	1.05	1.07	1.06	1.06	1.06	1.06	1.06	1.07
Ca	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na	0.12	0.13	0.12	0.11	0.12	0.12	0.11	0.11	0.10	0.12	0.20
K	0.83	0.77	0.74	0.82	0.78	0.70	0.81	0.83	0.82	0.68	0.70
Ba	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Total	4.99	4.95	4.92	4.96	4.95	4.89	4.97	4.97	4.96	4.87	4.95
O	8	8	8	8	8	8	8	8	8	8	8
An	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ab	0.13	0.14	0.14	0.12	0.13	0.15	0.12	0.12	0.11	0.14	0.23
Or	0.87	0.86	0.86	0.88	0.87	0.85	0.88	0.88	0.89	0.86	0.77

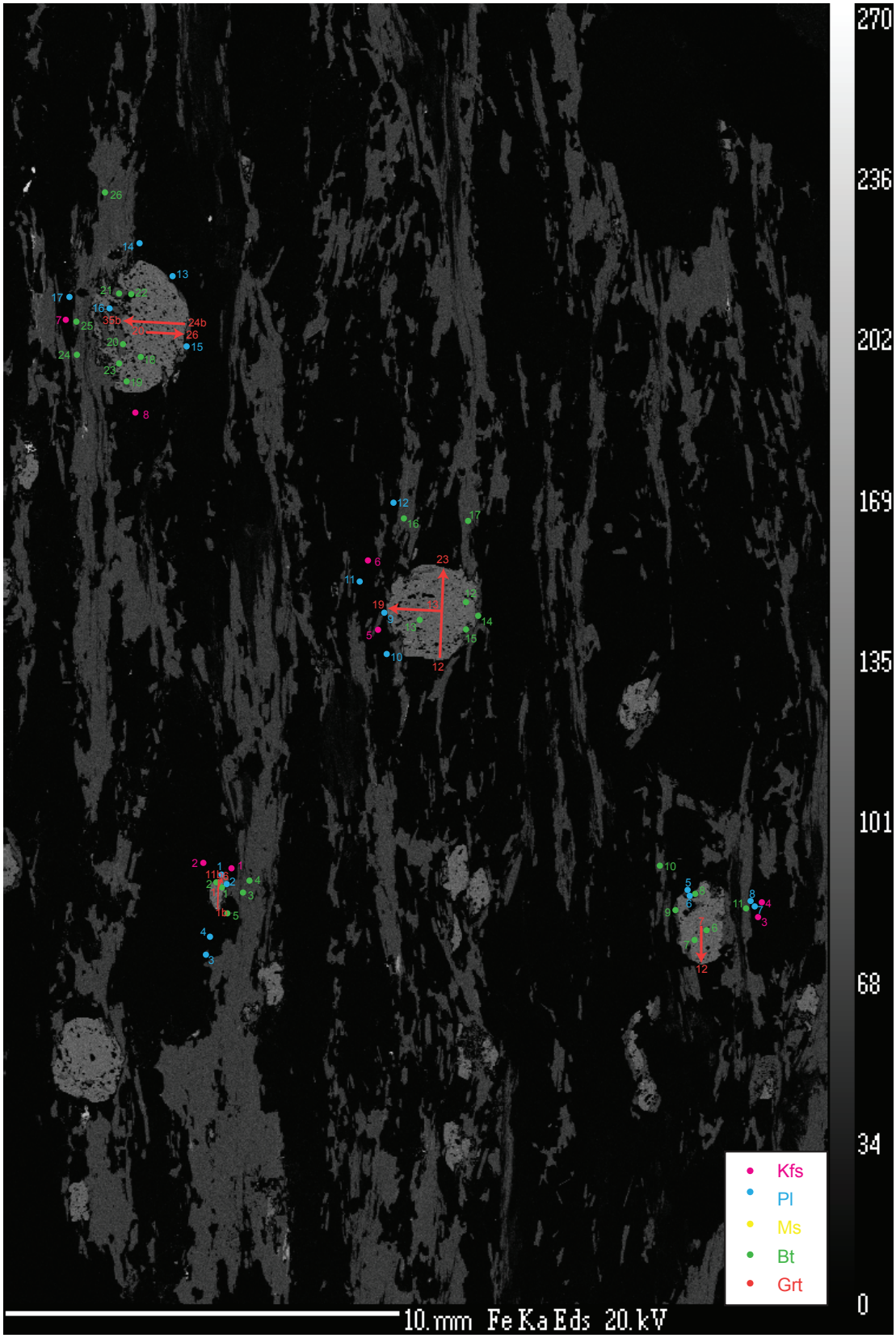


Figure B.15. KA064A EMP mineral spot analysis locations shown on an iron EMP map.

Table B.9. Garnet compositions from specimen KA064A. Corresponding locations are shown in B.15.

wt%	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
SiO2	37.66	37.56	37.64	37.61	37.70	37.16	37.70	37.97	37.95	37.67	37.50	37.76	37.98	37.82	37.74	37.69	38.07
TiO2	0.00	0.02	0.00	0.01	0.00	0.01	0.02	0.01	0.00	0.01	0.00	0.01	0.00	0.02	0.02	0.00	0.03
Al2O3	22.33	21.85	22.06	22.06	21.78	21.75	22.11	21.95	21.90	21.80	21.80	21.74	21.90	22.05	21.96	22.03	21.81
FeO	34.13	33.63	34.48	33.88	33.79	33.39	34.20	34.59	33.70	33.85	34.61	34.01	34.06	33.39	33.46	34.15	33.64
MnO	3.26	3.73	4.25	4.36	4.73	4.73	2.20	2.29	2.50	3.18	3.48	4.12	1.99	2.04	1.96	2.14	2.25
MgO	3.16	2.96	2.72	2.69	2.67	2.63	3.60	3.57	3.51	3.25	3.19	2.83	4.06	4.09	3.98	3.81	3.68
CaO	1.00	0.90	0.77	0.87	0.84	0.78	1.41	1.40	1.12	1.21	0.77	1.26	1.17	1.27	1.34	1.36	1.30
Cr2O3	0.00	0.02	0.02	0.02	0.00	0.04	0.00	0.00	0.00	0.00	0.01	0.00	0.03	0.01	0.03	0.01	0.01
Total	101.54	100.68	101.94	101.50	101.51	100.47	101.23	101.79	100.68	100.98	101.35	101.72	101.19	100.67	100.48	101.20	100.79
ions																	
Si	2.96	2.98	2.97	2.97	2.99	2.97	2.97	2.98	2.99	2.98	2.97	2.99	2.99	2.98	2.98	2.97	3.00
Ti	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Al	2.08	2.05	2.06	2.06	2.04	2.06	2.06	2.04	2.05	2.04	2.04	2.03	2.04	2.05	2.05	2.05	2.03
Fe	2.30	2.28	2.31	2.29	2.27	2.28	2.29	2.30	2.28	2.28	2.32	2.27	2.27	2.25	2.26	2.28	2.27
Mn	0.22	0.25	0.28	0.29	0.32	0.32	0.15	0.15	0.17	0.21	0.23	0.28	0.13	0.14	0.13	0.14	0.15
Mg	0.37	0.35	0.32	0.32	0.32	0.31	0.42	0.42	0.41	0.38	0.38	0.33	0.48	0.48	0.47	0.45	0.43
Ca	0.08	0.08	0.06	0.07	0.07	0.07	0.12	0.12	0.09	0.10	0.07	0.11	0.10	0.11	0.11	0.11	0.11
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	8.01	8.00	8.01	8.01	8.00	8.01	8.01	8.01	8.00	8.00	8.01	8.00	8.00	8.00	8.00	8.01	7.99
O	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Alm	77.30	77.10	77.50	77.05	76.35	76.46	76.84	76.90	77.16	76.49	77.27	76.03	76.26	75.65	75.97	76.25	76.61
Grs	2.83	2.52	2.12	2.40	2.39	2.12	3.98	3.96	3.20	3.45	2.18	3.57	3.21	3.57	3.74	3.83	3.67
Prp	12.52	11.84	10.75	10.65	10.59	10.53	14.22	14.03	13.99	12.90	12.66	11.16	15.99	16.16	15.78	15.07	14.62
Sps	7.34	8.47	9.57	9.83	10.66	10.77	4.95	5.11	5.66	7.16	7.86	9.24	4.44	4.58	4.42	4.81	5.08
Total	99.99	99.93	99.94	99.93	100.00	99.88	99.99	100.00	100.01	99.99	99.98	100.00	99.90	99.96	99.91	99.96	99.97
Alm (-Mn)	83.43	84.30	85.76	85.52	85.47	85.81	80.85	81.04	81.78	82.40	83.88	83.77	79.89	79.32	79.56	80.14	80.73
Grs (-Mn)	3.06	2.76	2.34	2.66	2.67	2.38	4.19	4.17	3.39	3.71	2.37	3.94	3.36	3.75	3.91	4.02	3.87
Fe#	0.86	0.87	0.88	0.88	0.88	0.88	0.84	0.85	0.85	0.86	0.86	0.87	0.83	0.82	0.83	0.84	0.84

Table B.9. continued

wt%	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
SiO2	37.66	37.56	37.64	37.61	37.70	37.16	37.70	37.97	37.95	37.67	37.50	37.76	37.98	37.82	37.74	37.69	38.07
TiO2	0.00	0.02	0.00	0.01	0.00	0.01	0.02	0.01	0.00	0.01	0.00	0.01	0.00	0.02	0.02	0.00	0.03
Al2O3	22.33	21.85	22.06	22.06	21.78	21.75	22.11	21.95	21.90	21.80	21.80	21.74	21.90	22.05	21.96	22.03	21.81
FeO	34.13	33.63	34.48	33.88	33.79	33.39	34.20	34.59	33.70	33.85	34.61	34.01	34.06	33.39	33.46	34.15	33.64
MnO	3.26	3.73	4.25	4.36	4.73	4.73	2.20	2.29	2.50	3.18	3.48	4.12	1.99	2.04	1.96	2.14	2.25
MgO	3.16	2.96	2.72	2.69	2.67	2.63	3.60	3.57	3.51	3.25	3.19	2.83	4.06	4.09	3.98	3.81	3.68
CaO	1.00	0.90	0.77	0.87	0.84	0.78	1.41	1.40	1.12	1.21	0.77	1.26	1.17	1.27	1.34	1.36	1.30
Cr2O3	0.00	0.02	0.02	0.02	0.00	0.04	0.00	0.00	0.00	0.00	0.01	0.00	0.03	0.01	0.03	0.01	0.01
Total	101.54	100.68	101.94	101.50	101.51	100.47	101.23	101.79	100.68	100.98	101.35	101.72	101.19	100.67	100.48	101.20	100.79
ions																	
Si	2.96	2.98	2.97	2.97	2.99	2.97	2.97	2.98	2.99	2.98	2.97	2.99	2.99	2.98	2.98	2.97	3.00
Ti	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Al	2.08	2.05	2.06	2.06	2.04	2.06	2.06	2.04	2.05	2.04	2.04	2.03	2.04	2.05	2.05	2.05	2.03
Fe	2.30	2.28	2.31	2.29	2.27	2.28	2.29	2.30	2.28	2.28	2.32	2.27	2.27	2.25	2.26	2.28	2.27
Mn	0.22	0.25	0.28	0.29	0.32	0.32	0.15	0.15	0.17	0.21	0.23	0.28	0.13	0.14	0.13	0.14	0.15
Mg	0.37	0.35	0.32	0.32	0.32	0.31	0.42	0.42	0.41	0.38	0.38	0.33	0.48	0.48	0.47	0.45	0.43
Ca	0.08	0.08	0.06	0.07	0.07	0.07	0.12	0.12	0.09	0.10	0.07	0.11	0.10	0.11	0.11	0.11	0.11
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	8.01	8.00	8.01	8.01	8.00	8.01	8.01	8.01	8.00	8.00	8.01	8.00	8.00	8.00	8.00	8.01	7.99
O	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Alm	77.30	77.10	77.50	77.05	76.35	76.46	76.84	76.90	77.16	76.49	77.27	76.03	76.26	75.65	75.97	76.25	76.61
Grs	2.83	2.52	2.12	2.40	2.39	2.12	3.98	3.96	3.20	3.45	2.18	3.57	3.21	3.57	3.74	3.83	3.67
Prp	12.52	11.84	10.75	10.65	10.59	10.53	14.22	14.03	13.99	12.90	12.66	11.16	15.99	16.16	15.78	15.07	14.62
Sps	7.34	8.47	9.57	9.83	10.66	10.77	4.95	5.11	5.66	7.16	7.86	9.24	4.44	4.58	4.42	4.81	5.08
Total	99.99	99.93	99.94	99.93	100.00	99.88	99.99	100.00	100.01	99.99	99.98	100.00	99.90	99.96	99.91	99.96	99.97
Alm (-Mn)	83.43	84.30	85.76	85.52	85.47	85.81	80.85	81.04	81.78	82.40	83.88	83.77	79.89	79.32	79.56	80.14	80.73
Grs (-Mn)	3.06	2.76	2.34	2.66	2.67	2.38	4.19	4.17	3.39	3.71	2.37	3.94	3.36	3.75	3.91	4.02	3.87
Fe#	0.86	0.87	0.88	0.88	0.88	0.88	0.84	0.85	0.85	0.86	0.86	0.87	0.83	0.82	0.83	0.84	0.84

Table B.9. continued

wt%	18	19	20	21	22	23	24	25	26	1b	2b	3b	4b	5b	6b	7b	8b
SiO2	37.79	37.43	37.72	37.98	37.83	37.79	37.97	37.95	37.51	38.64	38.24	38.68	38.11	38.58	38.17	38.27	38.26
TiO2	0.01	0.02	0.00	0.02	0.00	0.01	0.02	0.00	0.01	0.02	0.02	0.01	0.03	0.00	0.00	-0.01	0.01
Al2O3	21.73	21.55	21.83	21.88	22.02	21.88	21.98	21.97	21.61	22.18	22.18	22.37	22.28	22.13	22.11	22.25	22.26
FeO	33.36	33.79	34.23	33.41	33.43	33.62	33.84	34.28	33.39	32.87	33.66	33.87	34.06	33.77	33.67	33.85	33.97
MnO	2.59	4.30	2.34	2.07	1.99	2.06	2.30	2.96	4.44	4.75	4.60	4.18	3.52	3.52	3.74	3.40	3.41
MgO	3.53	2.42	3.72	3.71	3.79	3.76	3.64	3.43	2.68	2.65	2.77	2.89	3.04	3.14	2.99	3.13	3.07
CaO	1.26	0.97	1.23	1.19	1.39	1.28	1.36	0.77	1.05	1.14	0.88	0.91	1.00	1.02	1.08	1.16	0.97
Cr2O3	0.01	0.00	0.00	0.02	0.00	0.03	0.00	0.01	0.04	0.04	0.01	-0.01	0.03	0.03	-0.01	-0.02	0.00
Total	100.28	100.47	101.08	100.27	100.46	100.43	101.10	101.38	100.73	102.29	102.36	102.89	102.07	102.18	101.74	102.03	101.94
ions																	
Si	3.00	2.99	2.98	3.00	2.98	2.99	2.99	2.99	2.99	3.01	2.99	3.00	2.98	3.00	2.99	2.99	2.99
Ti	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Al	2.04	2.04	2.04	2.05	2.06	2.05	2.05	2.05	2.04	2.05	2.05	2.05	2.06	2.04	2.05	2.06	2.06
Fe	2.26	2.30	2.29	2.27	2.26	2.27	2.27	2.30	2.26	2.21	2.26	2.26	2.29	2.26	2.27	2.27	2.28
Mn	0.17	0.29	0.16	0.14	0.13	0.14	0.15	0.20	0.30	0.31	0.30	0.27	0.23	0.23	0.25	0.22	0.23
Mg	0.42	0.29	0.44	0.44	0.45	0.44	0.43	0.40	0.32	0.31	0.32	0.33	0.35	0.36	0.35	0.36	0.36
Ca	0.11	0.08	0.10	0.10	0.12	0.11	0.11	0.07	0.09	0.09	0.07	0.08	0.08	0.08	0.09	0.10	0.08
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	8.00	8.00	8.01	7.99	8.00	8.00	8.00	8.00	8.00	7.99	8.00	7.99	8.00	7.99	8.00	8.00	8.00
O	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Alm	76.39	77.67	76.54	77.06	76.45	76.70	76.58	77.58	76.18	75.57	76.30	76.79	77.31	76.86	76.70	76.78	77.48
Grs	3.60	2.79	3.50	3.36	3.98	3.57	3.85	2.17	2.88	3.12	2.45	2.61	2.74	2.80	3.12	3.36	2.76
Prp	14.11	9.72	14.70	14.82	15.07	14.97	14.40	13.58	10.73	10.51	10.91	11.34	11.98	12.38	11.82	12.33	12.12
Sps	5.87	9.82	5.26	4.69	4.50	4.66	5.16	6.66	10.09	10.68	10.30	9.31	7.89	7.89	8.40	7.61	7.65
Total	99.97	100.00	100.00	99.94	100.00	99.91	99.99	99.98	99.88	99.88	99.96	100.04	99.92	99.92	100.04	100.08	100.01
Alm (-Mn)	81.18	86.13	80.80	80.91	80.06	80.53	80.76	83.13	84.84	84.72	85.10	84.63	84.00	83.51	83.70	83.04	83.89
Grs (-Mn)	3.83	3.10	3.69	3.53	4.16	3.75	4.06	2.32	3.21	3.50	2.73	2.87	2.98	3.04	3.40	3.63	2.99
Fe#	0.84	0.89	0.84	0.84	0.84	0.84	0.84	0.85	0.88	0.88	0.87	0.87	0.87	0.86	0.87	0.86	0.86

Table B.9. continued

wt%	9b	10b	11b	12b	13b	14b	15b	16b	17b	18b	19b	20b	21b	22b	23b	24b	25b
SiO2	38.30	38.10	38.25	38.41	38.88	38.62	38.83	38.69	38.90	38.63	38.78	38.59	38.68	38.50	38.70	38.28	38.48
TiO2	0.02	-0.01	0.03	0.00	0.00	0.04	-0.02	-0.01	-0.02	0.01	0.02	0.02	-0.02	0.00	0.00	0.02	0.01
Al2O3	22.08	22.09	22.02	22.26	22.26	22.35	22.37	22.48	22.27	22.28	22.23	22.35	22.29	22.24	22.28	22.09	22.24
FeO	33.55	33.56	33.54	33.13	33.62	33.23	33.11	33.13	33.78	33.36	33.80	33.43	33.27	33.90	33.28	33.61	33.46
MnO	3.63	4.12	4.33	2.96	2.15	2.07	2.07	2.03	2.04	2.05	2.04	2.04	2.47	2.74	3.50	4.91	3.40
MgO	3.01	2.75	2.69	3.50	3.79	3.88	3.93	4.07	4.12	4.00	3.80	3.74	3.49	3.27	3.06	2.66	3.35
CaO	1.05	0.88	1.04	1.13	1.19	1.36	1.31	1.09	1.08	1.32	1.35	1.38	1.38	1.29	1.29	0.93	0.87
Cr2O3	-0.02	-0.01	0.06	0.01	0.05	0.01	0.00	-0.04	-0.02	0.01	0.01	-0.01	0.00	0.02	-0.01	-0.01	0.06
Total	101.62	101.48	101.96	101.39	101.95	101.55	101.62	101.44	102.15	101.66	102.02	101.54	101.57	101.95	102.10	102.50	101.87
ions																	
Si	3.00	2.99	3.00	3.00	3.01	3.00	3.01	3.00	3.01	3.00	3.01	3.00	3.01	3.00	3.01	2.99	3.00
Ti	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Al	2.05	2.06	2.04	2.06	2.04	2.06	2.06	2.07	2.04	2.05	2.04	2.06	2.06	2.05	2.05	2.04	2.05
Fe	2.26	2.27	2.26	2.24	2.25	2.23	2.23	2.23	2.25	2.23	2.26	2.25	2.24	2.27	2.24	2.25	2.25
Mn	0.24	0.27	0.29	0.20	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.13	0.16	0.18	0.23	0.33	0.22
Mg	0.35	0.32	0.31	0.41	0.44	0.45	0.45	0.47	0.47	0.46	0.44	0.43	0.40	0.38	0.35	0.31	0.39
Ca	0.09	0.07	0.09	0.09	0.10	0.11	0.11	0.09	0.09	0.11	0.11	0.11	0.12	0.11	0.11	0.08	0.07
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	8.00	7.99
O	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Alm	76.87	77.24	76.64	76.25	76.87	76.19	76.11	76.30	76.28	75.93	76.72	76.74	76.68	77.31	76.37	75.88	76.65
Grs	3.08	2.53	2.77	3.19	3.24	3.84	3.72	3.22	3.11	3.72	3.76	3.94	3.94	3.59	3.70	2.67	2.31
Prp	11.94	10.94	10.64	13.88	14.93	15.31	15.52	16.05	16.13	15.74	14.92	14.77	13.82	12.91	12.11	10.49	13.25
Sps	8.19	9.31	9.75	6.66	4.81	4.63	4.65	4.56	4.54	4.59	4.56	4.58	5.56	6.13	7.86	10.99	7.62
Total	100.08	100.03	99.81	99.98	99.86	99.98	99.99	100.13	100.06	99.98	99.96	100.02	100.00	99.94	100.03	100.03	99.83
Alm (-Mn)	83.66	85.15	85.10	81.71	80.88	79.91	79.82	79.84	79.86	79.60	80.42	80.40	81.19	82.42	82.85	85.22	83.13
Grs (-Mn)	3.35	2.79	3.08	3.41	3.41	4.03	3.90	3.37	3.26	3.90	3.94	4.13	4.17	3.82	4.01	3.00	2.50
Fe#	0.87	0.88	0.88	0.85	0.84	0.83	0.83	0.83	0.83	0.83	0.84	0.84	0.85	0.86	0.86	0.88	0.85

Table B.9. continued

wt%	26b	27b	28b	29b	30b	31b	32b	33b	34b	34b
SiO2	38.65	38.72	38.61	39.01	38.72	38.60	38.65	38.86	38.75	38.22
TiO2	0.01	0.02	0.00	0.01	0.00	0.00	0.00	0.01	0.018	0.005
Al2O3	22.41	22.36	22.42	22.24	22.28	22.41	22.33	22.10	22.43	22.17
FeO	33.51	33.75	33.84	33.74	33.71	33.69	34.19	33.64	34	33.75
MnO	2.46	2.12	2.15	2.09	2.37	2.23	2.33	2.49	2.819	4.578
MgO	3.65	3.77	3.89	3.84	3.63	3.80	3.71	3.55	3.402	2.27
CaO	1.36	1.21	1.19	1.30	1.28	1.19	1.20	1.30	1.304	1.051
Cr2O3	-0.01	-0.02	0.03	0.01	0.00	0.03	-0.01	0.02	0.029	0.033
Total	102.04	101.90	102.14	102.24	102.00	101.93	102.40	101.97	102.74	102.08
ions										
Si	2.99	3.00	2.99	3.01	3.00	2.99	2.99	3.02	2.993	2.993
Ti	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.001	3E-04
Al	2.06	2.06	2.06	2.04	2.05	2.06	2.05	2.03	2.053	2.059
Fe	2.24	2.26	2.26	2.25	2.26	2.26	2.27	2.25	2.262	2.283
Mn	0.16	0.14	0.14	0.14	0.16	0.15	0.15	0.16	0.184	0.304
Mg	0.42	0.44	0.45	0.44	0.42	0.44	0.43	0.41	0.392	0.265
Ca	0.11	0.10	0.10	0.11	0.11	0.10	0.10	0.11	0.108	0.088
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.002	0.002
Total	7.99	7.99	8.00	7.98	7.99	7.99	8.00	7.98	7.995	7.994
O	12	12	12	12	12	12	12	12	12	12
Alm	76.33	77.02	76.62	76.59	76.76	76.76	76.95	76.72	76.77	77.66
Grs	3.87	3.48	3.27	3.63	3.64	3.25	3.39	3.63	3.57	2.90
Prp	14.34	14.82	15.23	15.08	14.30	14.92	14.51	14.01	13.30	9.01
Sps	5.50	4.75	4.79	4.67	5.31	4.97	5.18	5.57	6.26	10.33
Total	100.03	100.08	99.91	99.97	100.01	99.90	100.03	99.93	99.91	99.90
Alm (-Mn)	80.74	80.80	80.55	80.37	81.06	80.86	81.12	81.31	81.98	86.70
Grs (-Mn)	4.09	3.66	3.44	3.81	3.84	3.42	3.58	3.85	3.82	3.23
Fe#	0.84	0.84	0.83	0.84	0.84	0.84	0.84	0.85	0.85	0.90

Table B.10. Biotite compositions from specimen KA064A. Corresponding locations are shown in B.15.

wt %	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
SiO2	34.23	35.66	35.44	33.57	36.48	36.04	25.77	33.92	36.43	35.47	35.31	35.89	35.07	35.84	33.71	35.32	35.49	35.93
TiO2	0.11	0.66	3.60	3.71	3.43	4.20	0.03	1.92	1.91	3.96	3.83	4.20	1.92	0.88	1.58	3.69	3.42	3.62
Al2O3	22.99	22.76	20.43	19.76	21.13	20.59	21.29	19.53	22.12	20.05	20.08	20.45	20.27	23.95	20.40	20.35	20.19	20.35
FeO	25.04	23.06	22.17	21.20	22.22	18.74	38.37	22.23	22.97	23.20	22.70	18.52	24.01	23.50	23.05	22.66	23.50	22.65
MgO	7.12	7.42	6.48	6.38	7.08	8.05	6.66	6.24	7.38	6.94	6.98	8.49	8.56	7.13	6.34	6.86	6.80	7.25
CaO	0.02	0.04	-0.01	0.04	0.02	0.01	0.06	0.01	0.01	-0.01	-0.01	0.08	0.10	0.02	0.07	0.00	0.00	0.02
Na2O	0.20	0.24	0.22	0.29	0.22	0.36	0.06	0.17	0.23	0.22	0.24	0.33	0.26	0.21	0.23	0.20	0.20	0.36
K2O	8.21	9.21	8.68	9.25	8.92	8.02	0.01	7.68	7.87	8.70	9.12	8.72	8.02	8.21	8.88	8.58	8.29	8.88
F	0.15	0.19	0.20	0.05	0.35	0.13	0.03	0.20	0.21	0.32	0.00	0.10	0.32	0.12	0.10	0.21	0.30	0.37
Cl	0.04	0.04	0.04	0.05	0.04	0.03	0.01	0.05	0.06	0.05	0.04	0.03	0.03	0.05	0.04	0.04	0.05	0.04
Total	98.09	99.28	97.24	94.30	99.88	96.17	92.28	91.94	99.18	98.88	98.29	96.80	98.57	99.91	94.39	97.91	98.25	99.45
ions																		
Si	5.15	5.26	5.33	5.23	5.33	5.36	4.32	5.40	5.33	5.28	5.27	5.32	5.24	5.22	5.28	5.29	5.31	5.30
Ti	0.01	0.07	0.41	0.43	0.38	0.47	0.00	0.23	0.21	0.44	0.43	0.47	0.22	0.10	0.19	0.42	0.39	0.40
Al	4.08	3.96	3.62	3.63	3.64	3.61	4.20	3.66	3.82	3.52	3.54	3.57	3.57	4.11	3.76	3.59	3.56	3.54
Fe	3.15	2.85	2.79	2.76	2.72	2.33	5.37	2.96	2.81	2.89	2.84	2.30	3.00	2.86	3.02	2.84	2.94	2.80
Mg	1.60	1.63	1.45	1.48	1.54	1.78	1.66	1.48	1.61	1.54	1.55	1.88	1.91	1.55	1.48	1.53	1.52	1.59
Ca	0.00	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.01	0.00	0.00	0.00
Na	0.06	0.07	0.06	0.09	0.06	0.10	0.02	0.05	0.06	0.06	0.07	0.10	0.08	0.06	0.07	0.06	0.06	0.10
K	1.58	1.73	1.66	1.84	1.66	1.52	0.00	1.56	1.47	1.65	1.74	1.65	1.53	1.52	1.77	1.64	1.58	1.67
F	0.07	0.09	0.09	0.02	0.16	0.06	0.02	0.10	0.10	0.15	0.00	0.05	0.15	0.05	0.05	0.10	0.14	0.17
Cl	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Total	19.62	19.59	19.32	19.48	19.33	19.18	19.59	19.34	19.32	19.38	19.43	19.29	19.56	19.42	19.58	19.35	19.35	19.41
O	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00
Mg #	0.34	0.36	0.34	0.35	0.36	0.43	0.24	0.33	0.36	0.35	0.35	0.45	0.39	0.35	0.33	0.35	0.34	0.36

Table B.10. Biotite compositions from specimen KA064A. Corresponding locations are shown in B.15.

wt %	19	20	21	22	23	24	25	26
SiO2	35.91	35.69	35.71	35.17	45.41	34.91	35.88	35.30
TiO2	2.70	2.56	3.35	1.54	0.44	3.33	3.48	3.56
Al2O3	20.61	19.96	20.50	22.16	28.08	19.94	20.41	20.24
FeO	22.87	24.20	23.63	21.43	7.47	23.03	23.61	22.86
MgO	6.88	6.77	6.44	7.32	3.14	6.68	6.73	6.82
CaO	0.03	0.02	0.00	0.05	0.12	-0.01	-0.01	0.00
Na2O	0.28	0.22	0.17	0.24	0.04	0.20	0.20	0.20
K2O	8.99	8.84	8.12	8.90	5.63	9.04	8.39	8.90
F	0.21	0.21	0.29	0.23	0.63	0.08	0.09	0.10
Cl	0.05	0.04	0.07	0.04	0.01	0.04	0.04	0.04
Total	98.52	98.53	98.27	97.08	90.95	97.25	98.82	98.02
ions								
Si	5.35	5.35	5.33	5.28	6.41	5.29	5.32	5.29
Ti	0.30	0.29	0.38	0.17	0.05	0.38	0.39	0.40
Al	3.62	3.53	3.61	3.92	4.67	3.56	3.57	3.57
Fe	2.85	3.03	2.95	2.69	0.88	2.92	2.93	2.86
Mg	1.53	1.51	1.43	1.64	0.66	1.51	1.49	1.52
Ca	0.01	0.00	0.00	0.01	0.02	0.00	0.00	0.00
Na	0.08	0.06	0.05	0.07	0.01	0.06	0.06	0.06
K	1.71	1.69	1.55	1.70	1.01	1.75	1.59	1.70
F	0.10	0.10	0.14	0.11	0.28	0.04	0.04	0.05
Cl	0.01	0.01	0.02	0.01	0.00	0.01	0.01	0.01
Total	19.44	19.47	19.29	19.48	17.72	19.46	19.33	19.40
O	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00
Mg #	0.35	0.33	0.33	0.38	0.43	0.34	0.34	0.35

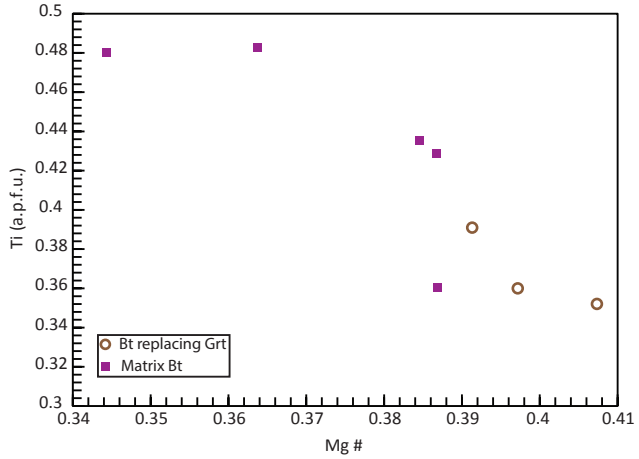
Table B.11. Plagioclase compositions from specimen KA064A. Corresponding locations are shown in B.15.

wt %	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
SiO2	63.02	62.31	64.08	63.40	62.34	62.24	63.96	62.85	63.13	62.95	63.96	63.63	62.50	62.66	63.66	62.54	63.23
Al2O3	25.83	25.76	25.29	25.00	25.56	25.14	24.82	24.93	25.28	25.37	25.56	25.08	25.80	24.81	25.62	25.58	25.39
CaO	5.36	5.52	4.95	4.59	5.45	5.19	4.21	4.83	5.17	5.17	4.91	4.63	5.29	4.85	5.23	5.30	4.95
Na2O	6.40	7.63	6.38	7.81	7.69	7.88	7.95	7.59	7.23	7.60	5.86	7.60	7.35	7.76	6.11	7.16	7.25
K2O	0.29	0.24	0.43	0.34	0.24	0.26	0.42	0.32	0.24	0.35	0.33	0.34	0.33	0.43	0.19	0.25	0.31
Total	100.91	101.45	101.13	101.14	101.27	100.70	101.36	100.52	101.05	101.45	100.61	101.28	101.26	100.51	100.81	100.84	101.13
ions																	
Si	2.74	2.71	2.78	2.76	2.72	2.73	2.78	2.75	2.75	2.74	2.78	2.76	2.72	2.75	2.76	2.73	2.75
Al	1.32	1.32	1.29	1.28	1.31	1.30	1.27	1.29	1.30	1.30	1.31	1.28	1.32	1.28	1.31	1.32	1.30
Ca	0.25	0.26	0.23	0.21	0.25	0.24	0.20	0.23	0.24	0.24	0.23	0.22	0.25	0.23	0.24	0.25	0.23
Na	0.54	0.64	0.54	0.66	0.65	0.67	0.67	0.64	0.61	0.64	0.49	0.64	0.62	0.66	0.51	0.61	0.61
K	0.02	0.01	0.02	0.02	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.02
Total	4.87	4.95	4.86	4.94	4.95	4.96	4.94	4.93	4.91	4.94	4.82	4.92	4.93	4.95	4.85	4.92	4.91
O	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
An	0.31	0.28	0.29	0.24	0.28	0.26	0.22	0.25	0.28	0.27	0.31	0.25	0.28	0.25	0.32	0.29	0.27
Ab	0.67	0.70	0.68	0.74	0.71	0.72	0.75	0.72	0.71	0.71	0.67	0.73	0.70	0.72	0.67	0.70	0.71
Or	0.02	0.01	0.03	0.02	0.01	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.01	0.02	0.02

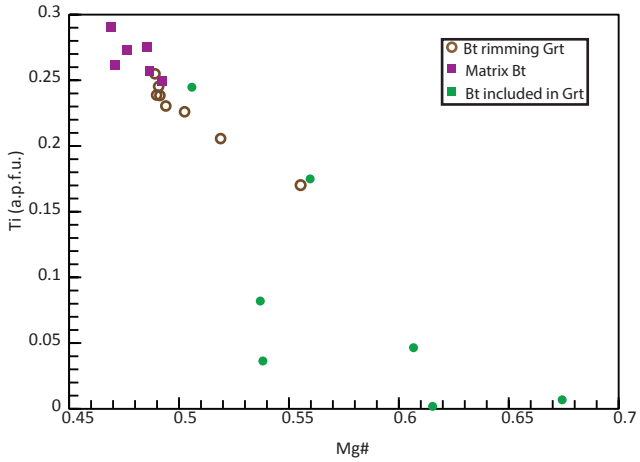
Table B.12. K-feldspar compositions from specimen KA064A. Corresponding locations are shown in B.15.

wt%	1	2	3	4	5	6	7	8
SiO2	66.75	65.88	67.38	65.80	65.38	65.90	66.01	66.35
Al2O3	20.58	20.45	21.03	20.43	19.88	20.15	20.27	20.29
CaO	0.10	0.07	0.08	0.07	0.05	0.06	0.09	0.05
Na2O	2.64	2.36	2.02	2.04	1.86	2.27	2.12	1.43
K2O	10.96	11.88	10.46	12.30	13.63	12.53	10.82	11.96
BaO	0.73	0.66	0.79	0.84	0.81	0.72	0.76	0.91
Total	101.75	101.31	101.75	101.48	101.61	101.62	100.07	100.99
ions								
Si	2.97	2.96	2.98	2.96	2.96	2.96	2.98	2.98
Al	1.08	1.08	1.10	1.08	1.06	1.07	1.08	1.07
Ca	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na	0.23	0.21	0.17	0.18	0.16	0.20	0.19	0.12
K	0.62	0.68	0.59	0.71	0.79	0.72	0.62	0.69
Ba	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02
Total	4.92	4.94	4.85	4.94	4.99	4.96	4.89	4.89
O	8	8	8	8	8	8	8	8
An	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00
Ab	0.27	0.23	0.23	0.20	0.17	0.21	0.23	0.15
Or	0.73	0.77	0.77	0.80	0.83	0.78	0.77	0.84

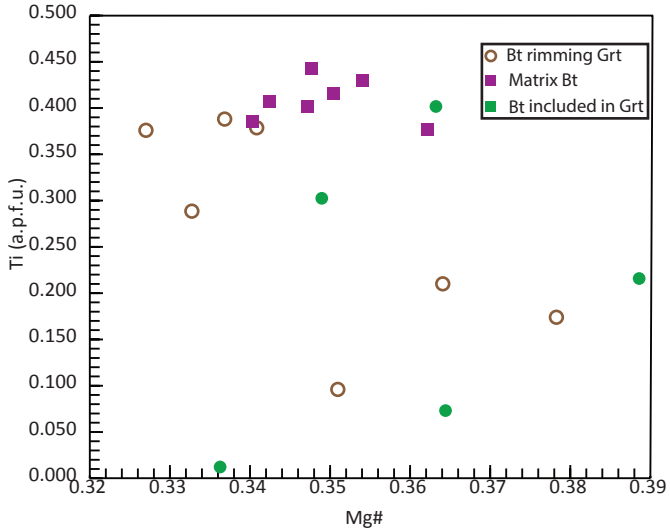
KA007



KA044



KA064A



Biotite spot analyses for specimens used for pseudosection modelling

Pressure-Temperature Data
Temperature-XFe^{3+} Pseudosections

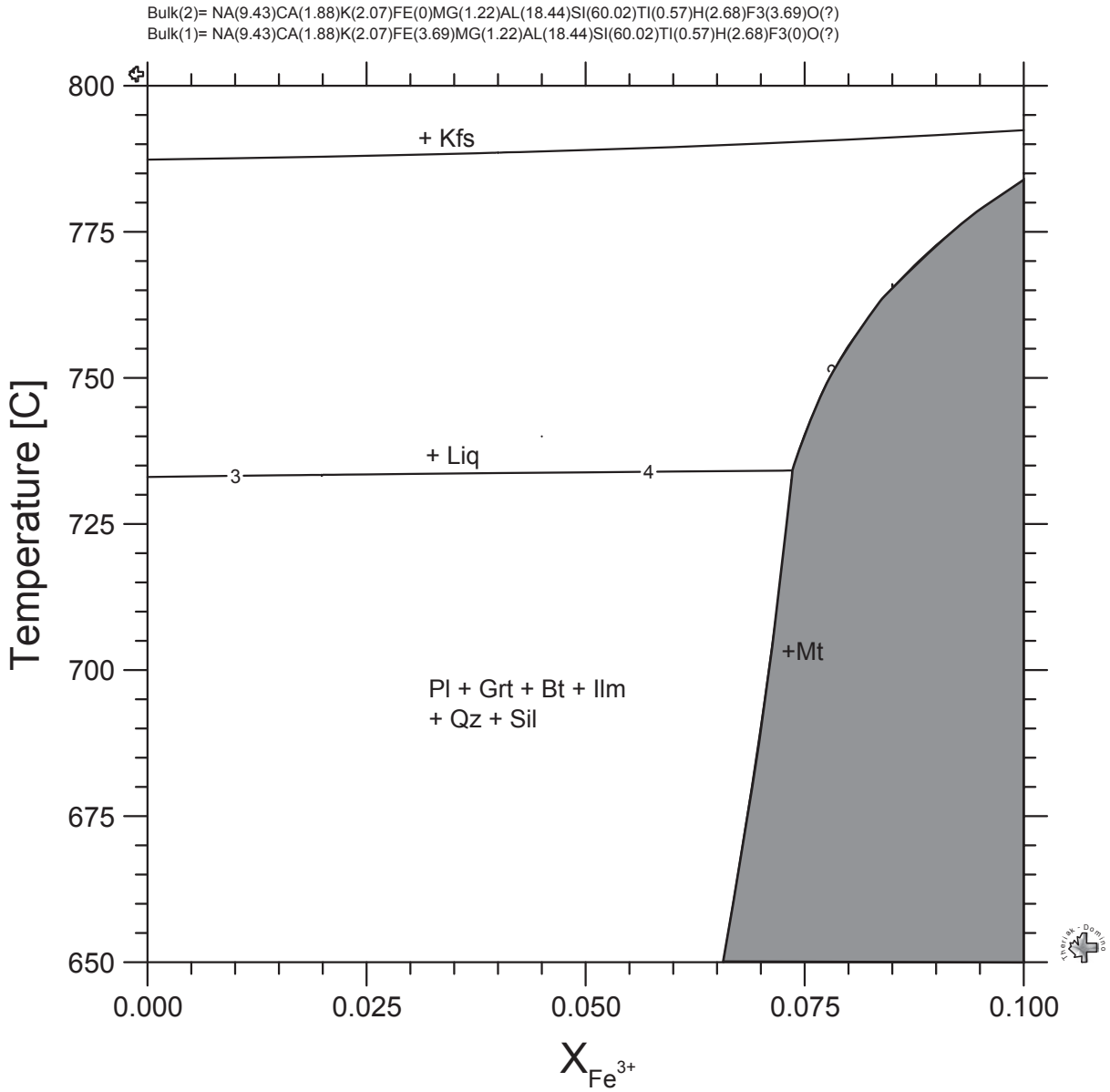


Figure B.1. Temperature versus XFe3+ pseudosection at 6 kbar for specimen KA007

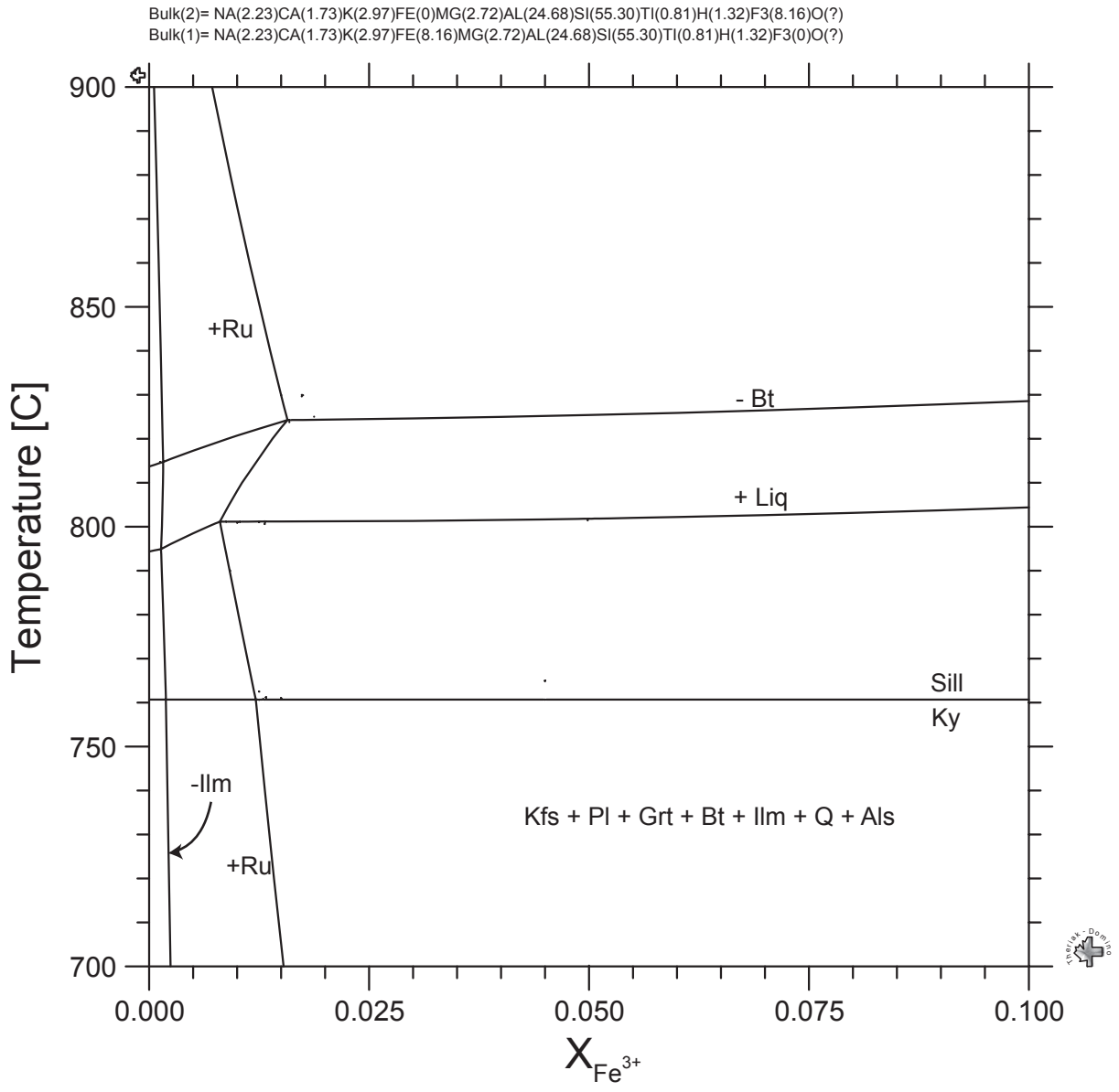


Figure B.2. Temperature versus XFe3+ pseudosection at 9 kbar for specimen KA044

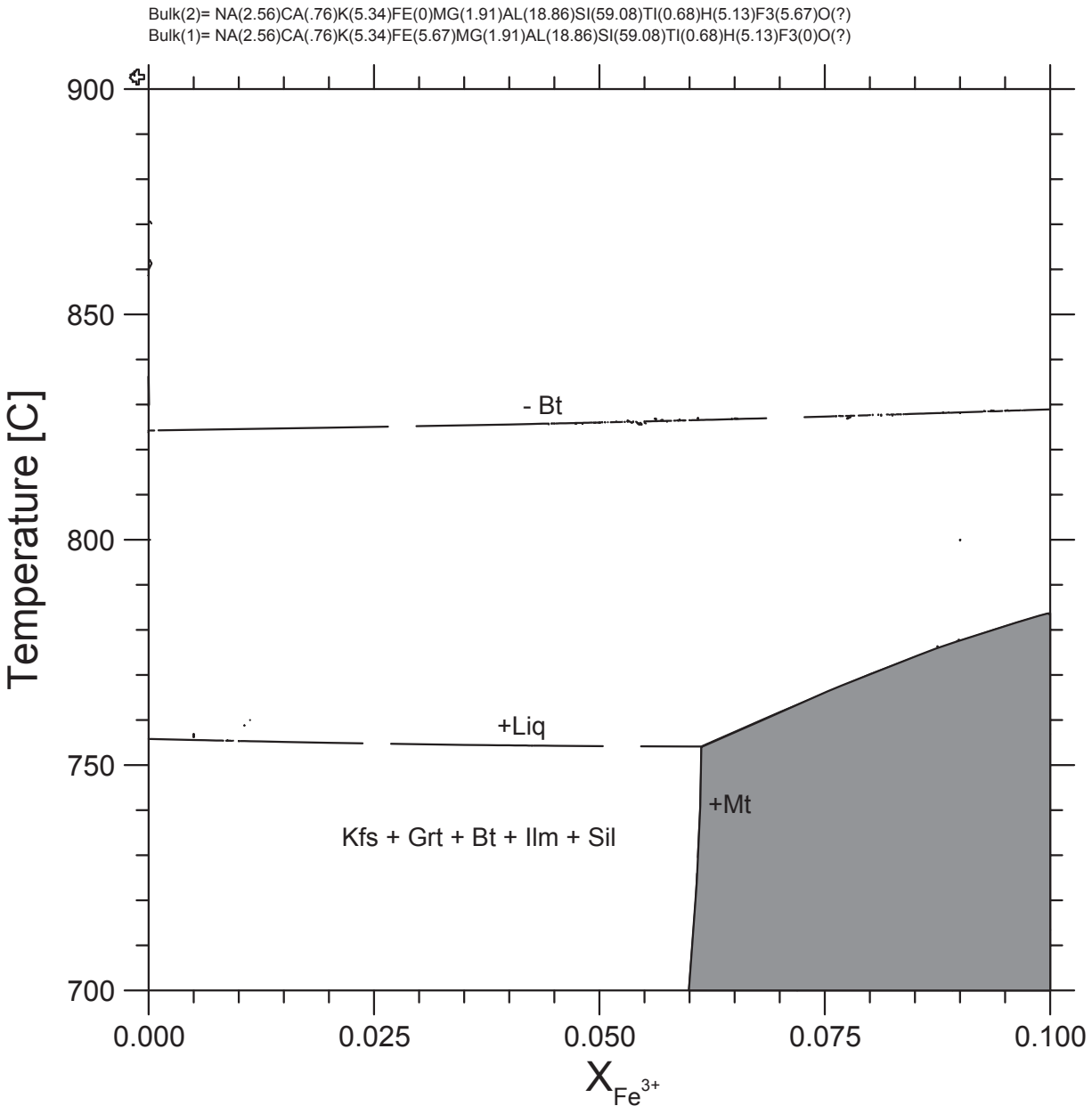


Figure B.3. Temperature versus XFe3+ pseudosection at 7 kbar for specimen KA064A

B.2: Isopleths

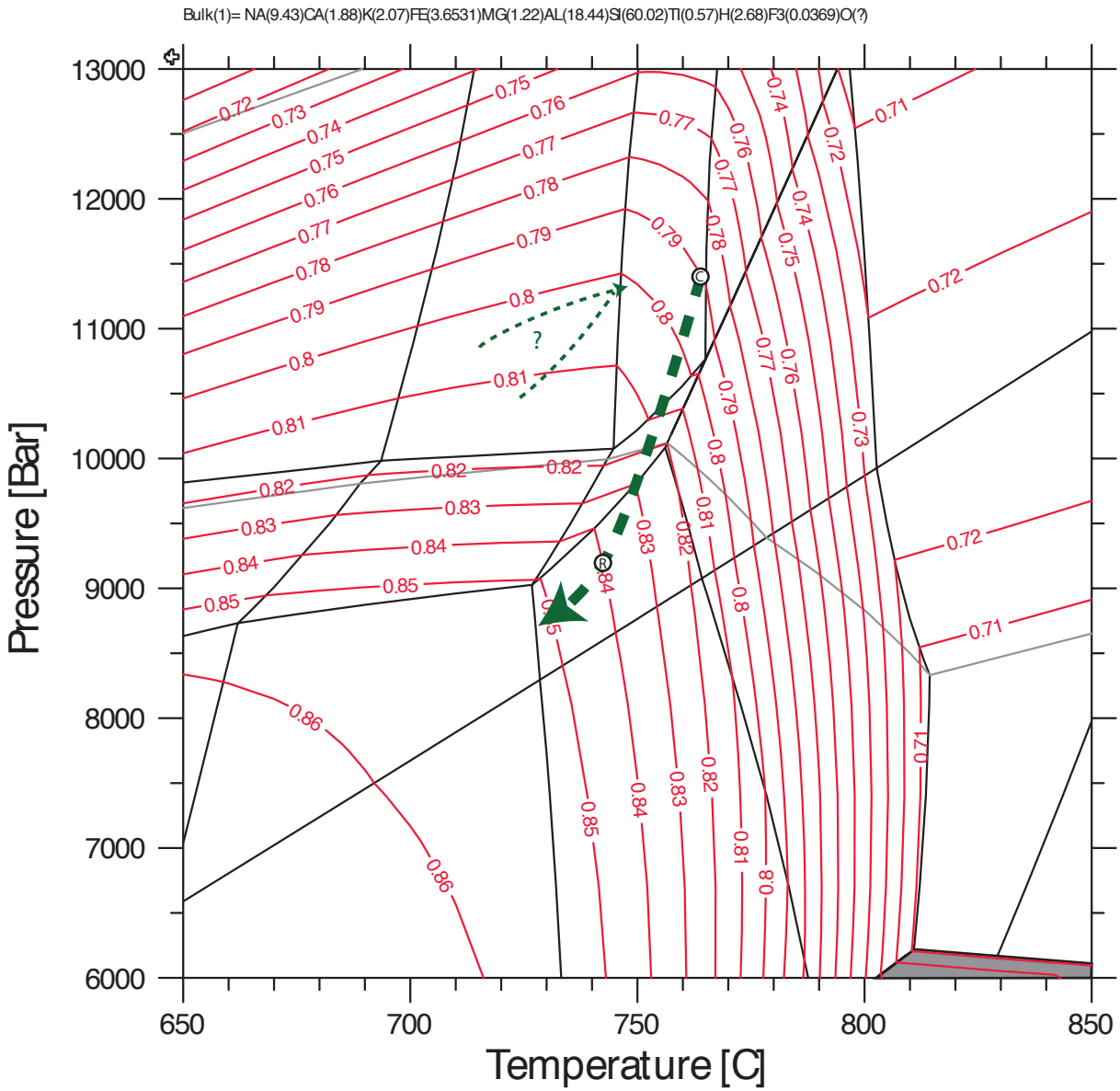


Figure B.4. Almandine isopleths for specimen KA007

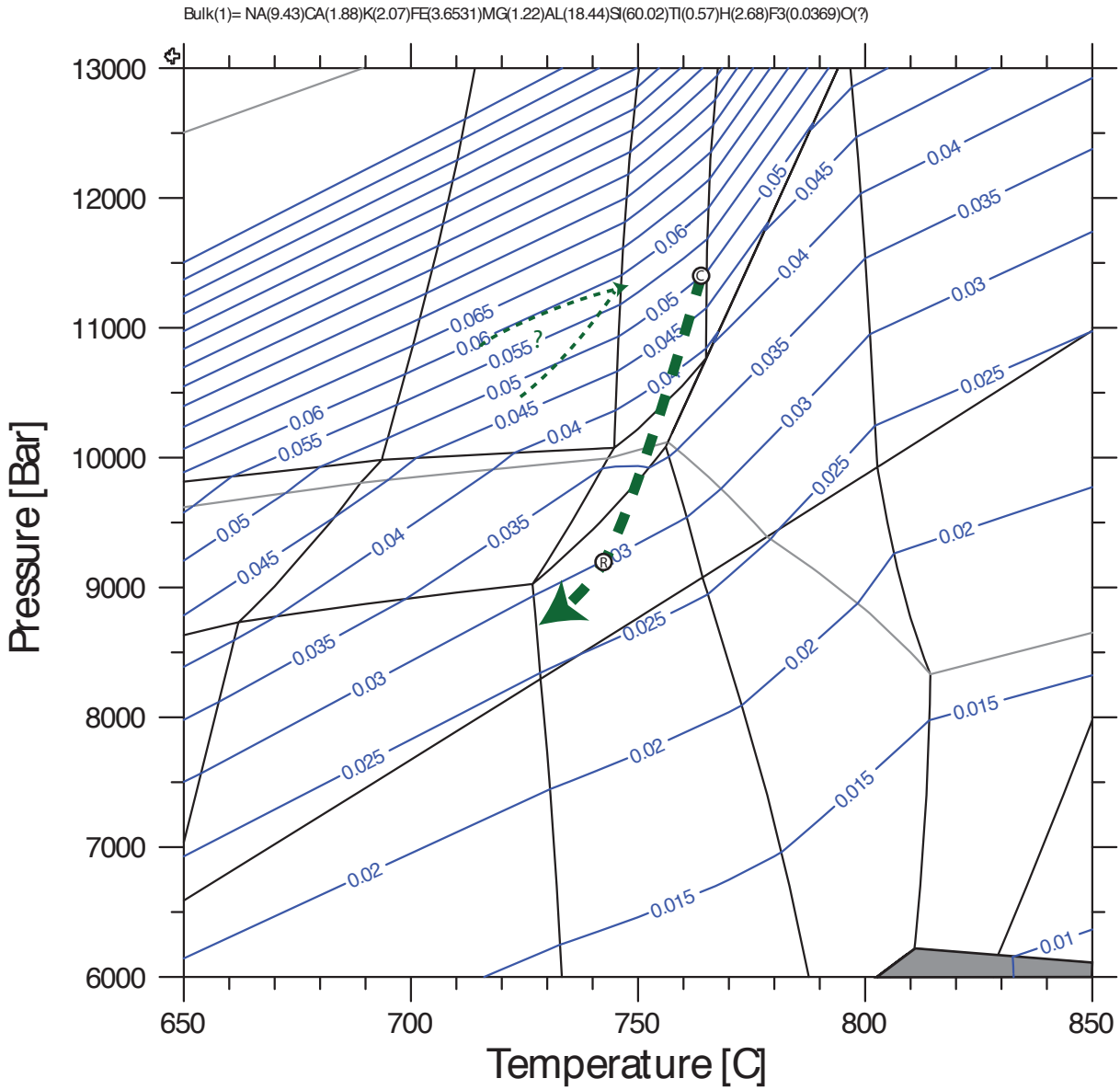


Figure B.5. Grossular isopleths for specimen KA007

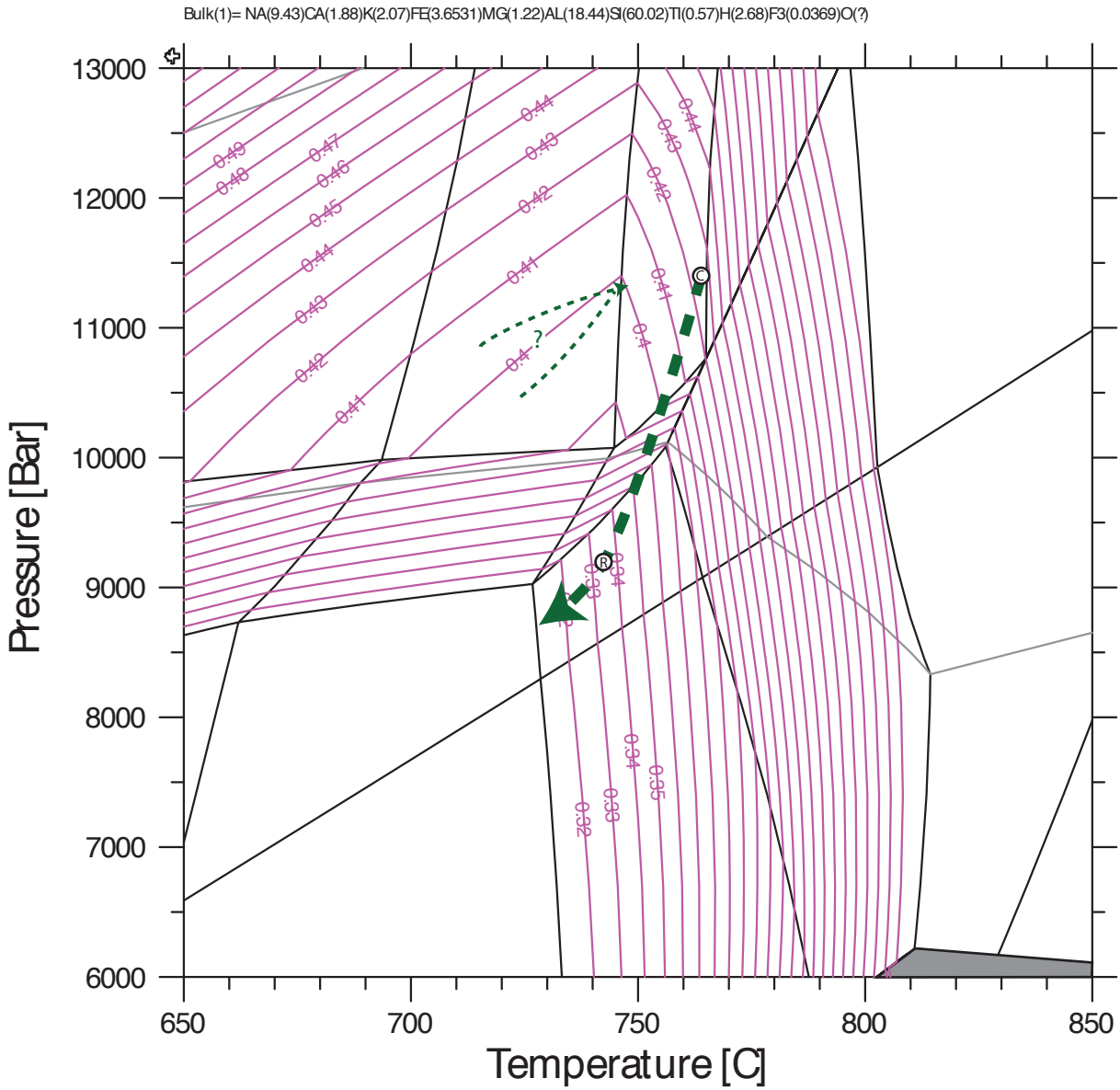


Figure B.6. Biotite Mg# isopleths for KA007

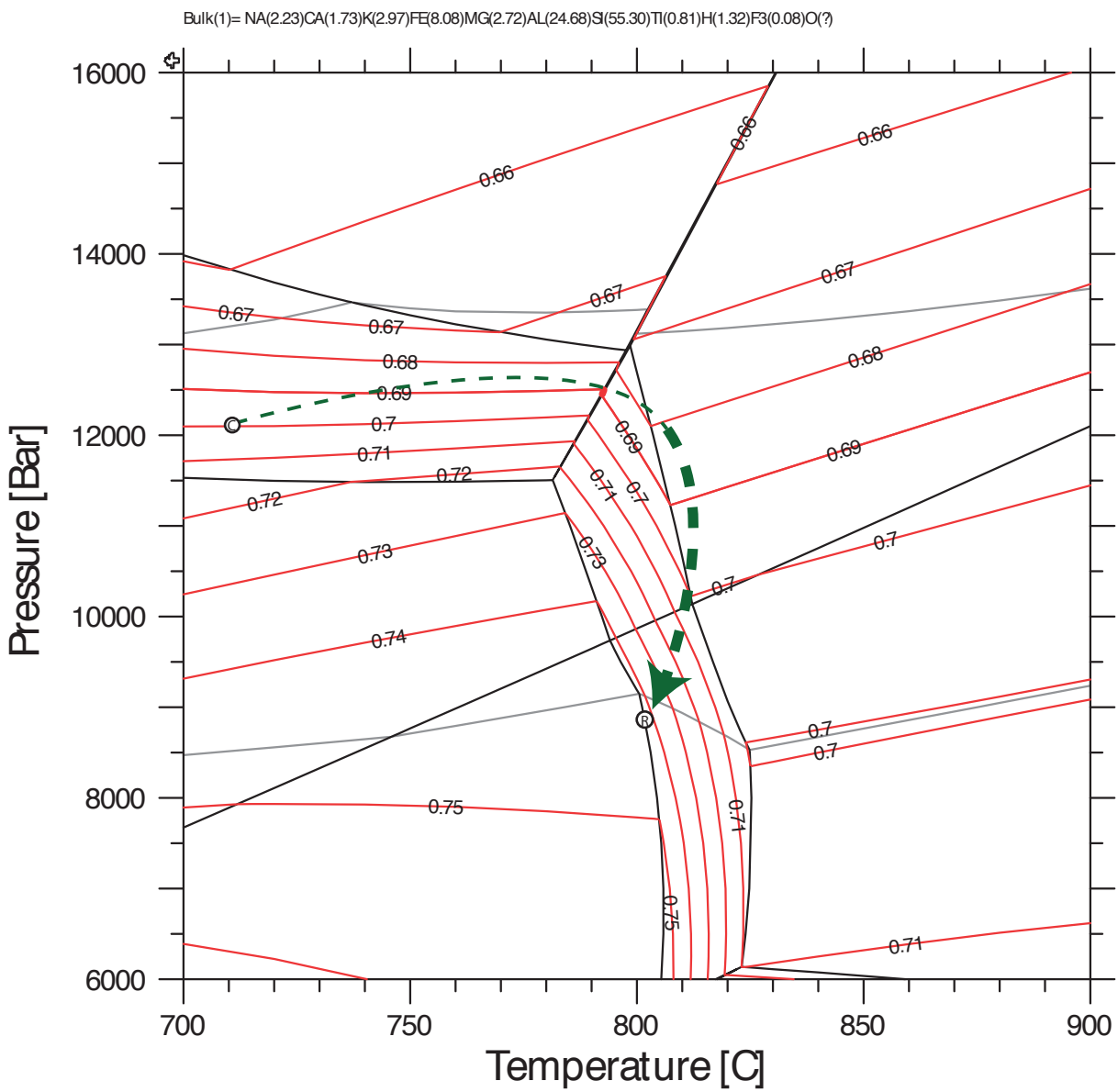


Figure B.7. Almandine isopleths for specimen KA044

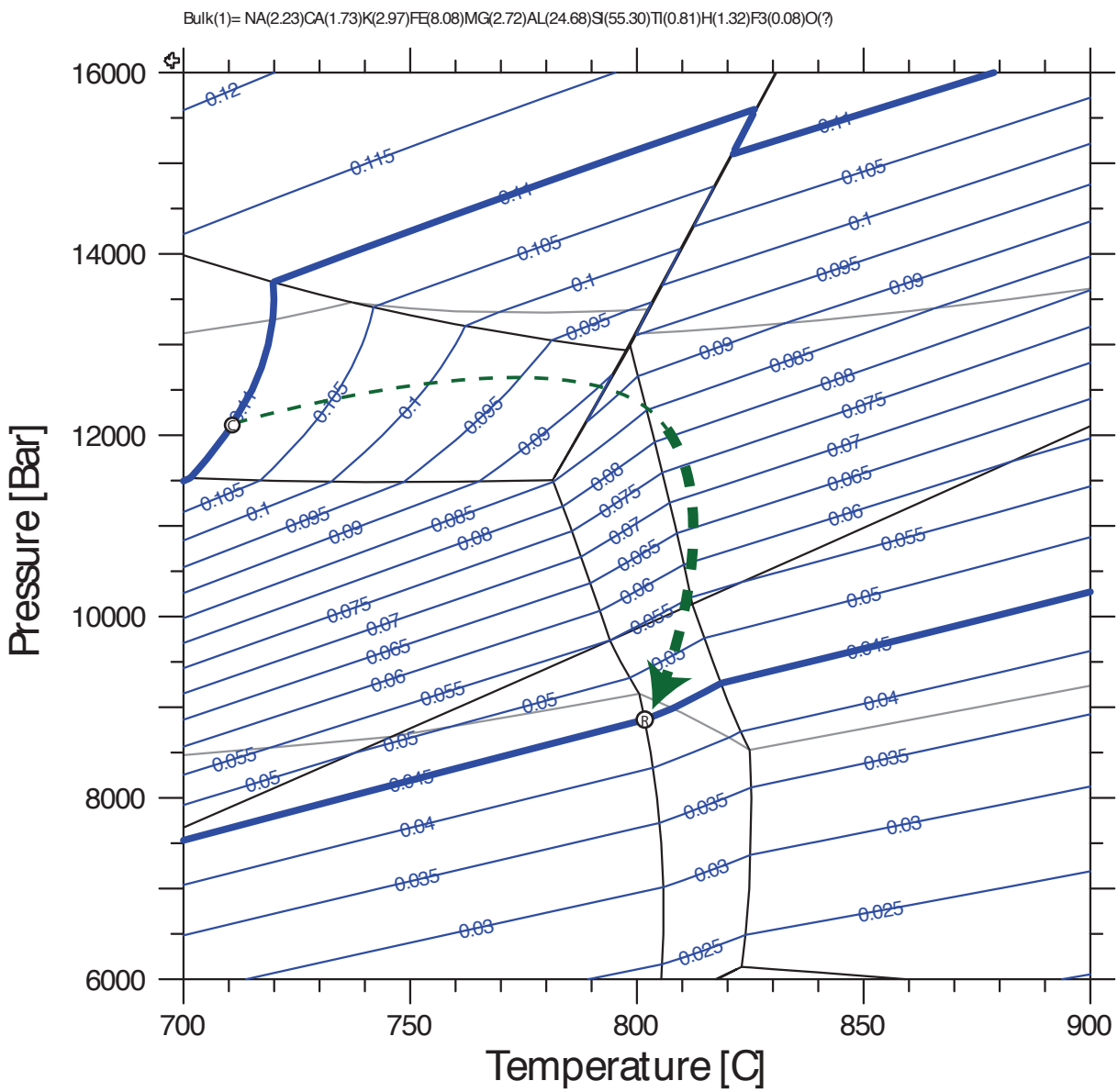


Figure B.8. Grossular isopleths for specimen KA044

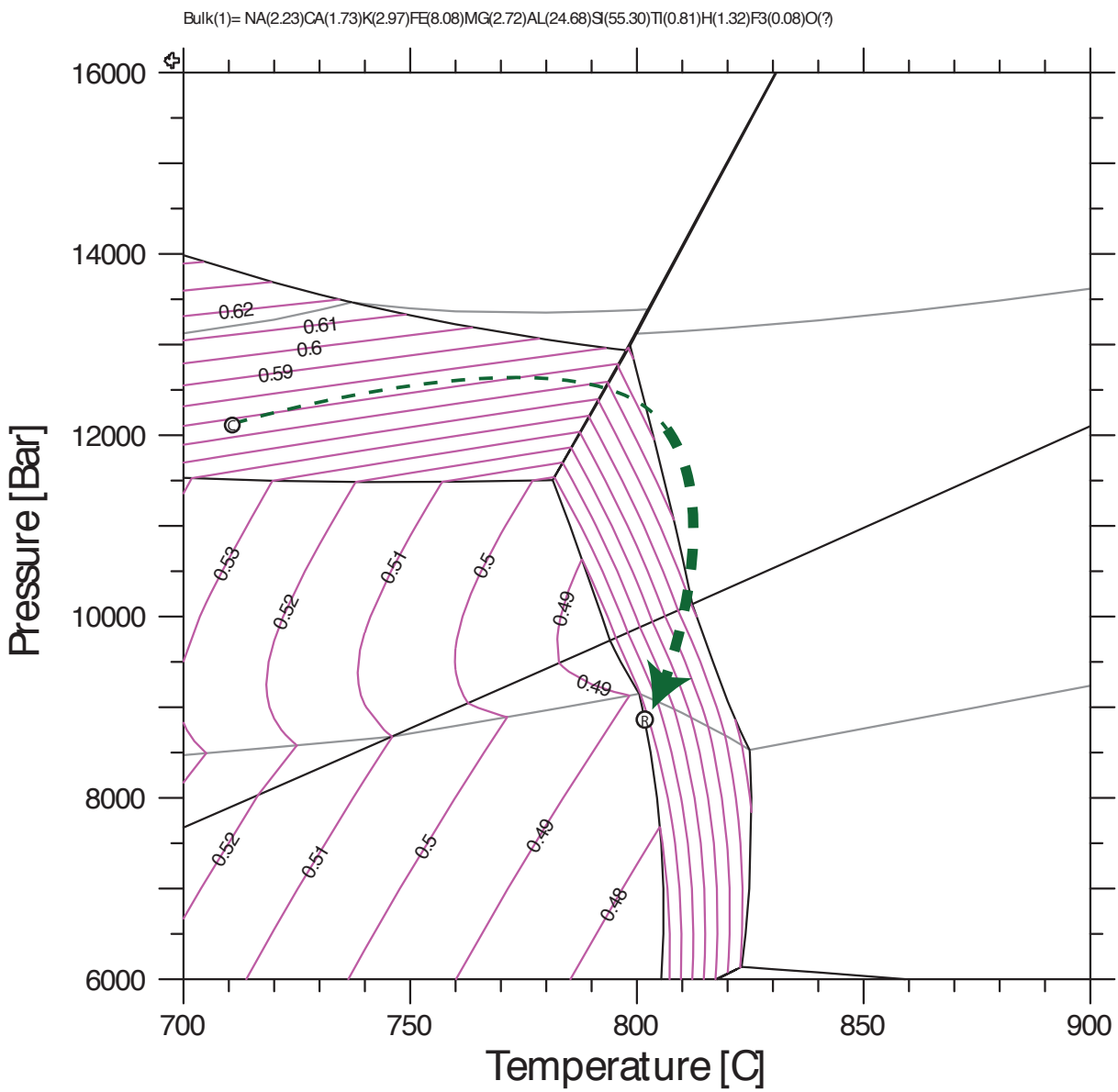


Figure B.9. Biotite Mg# isopleths for specimen KA044

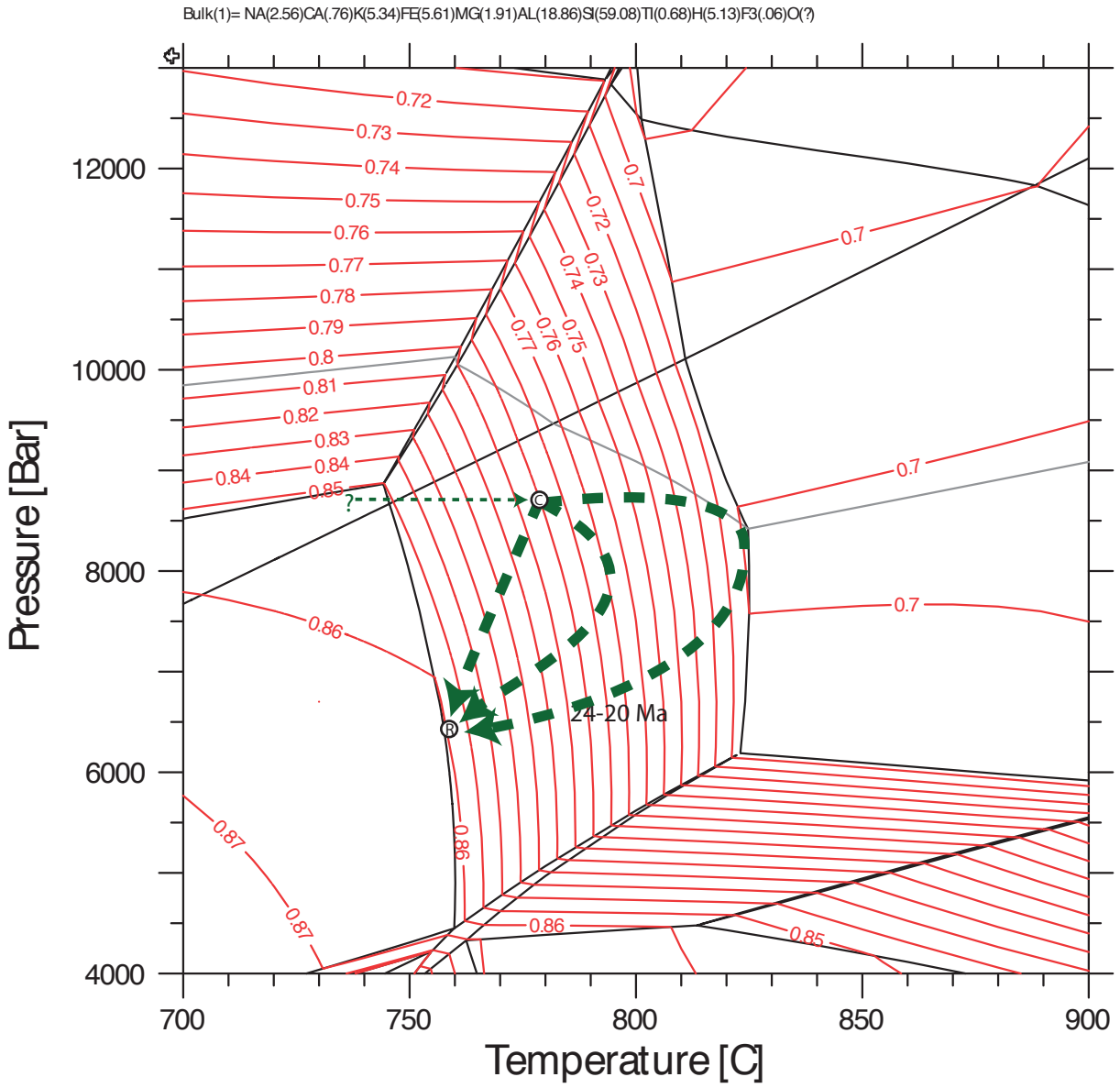


Figure B.10. Almandine isopleths for specimen KA064A

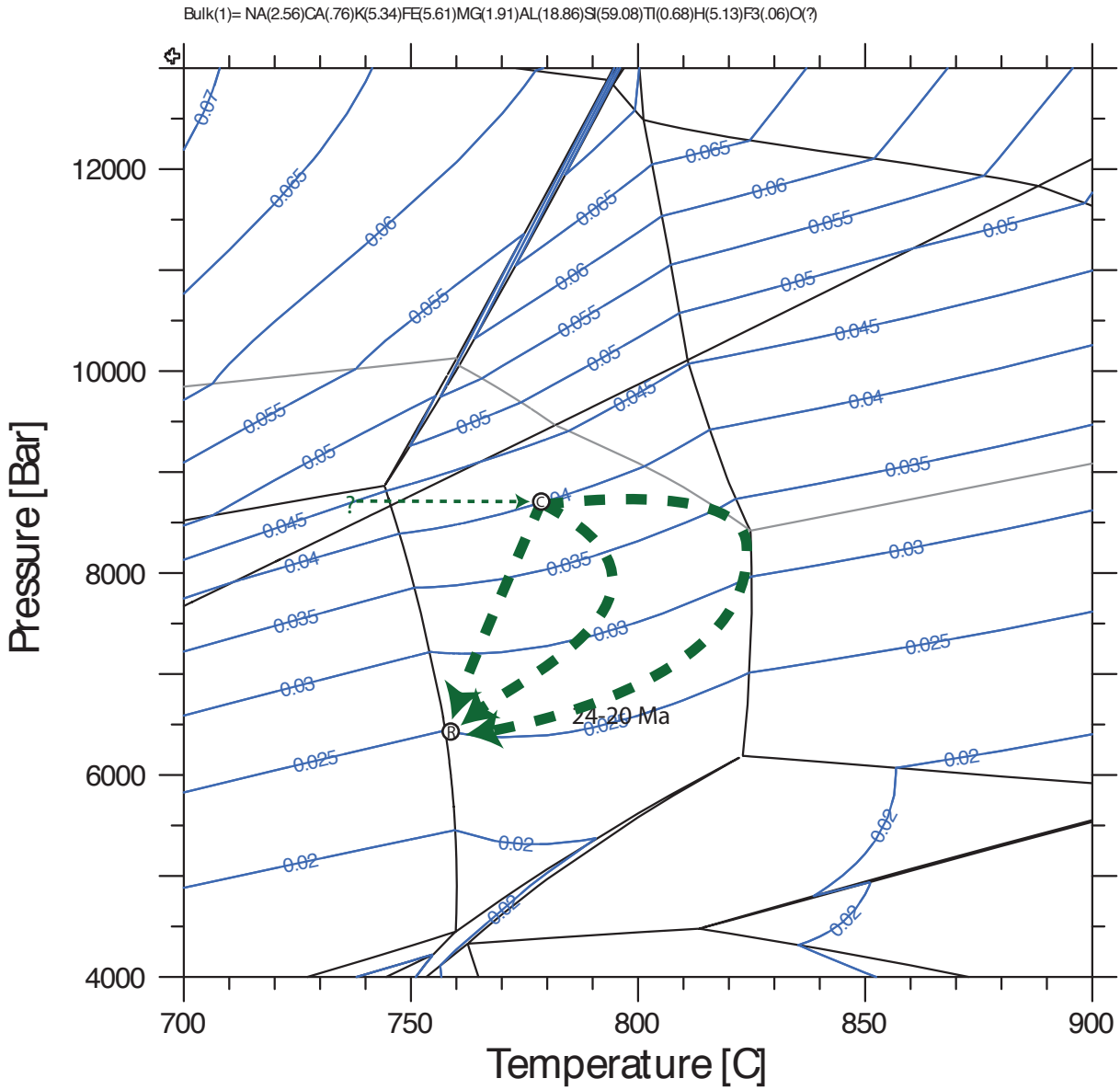
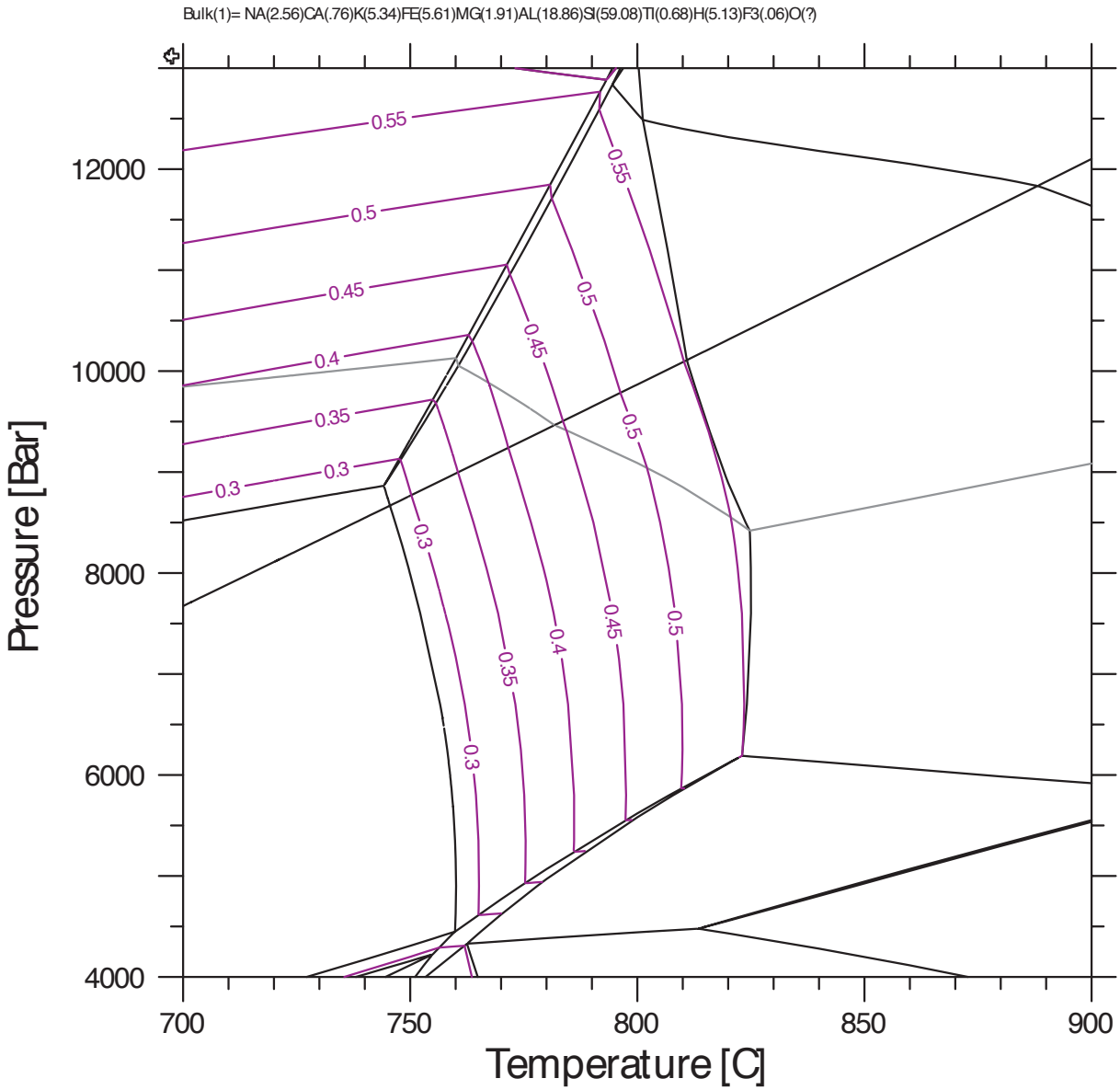


Figure B.11. Grossular isopleths for specimen KA064A



B.12. Biotite Mg# isopleths for specimen KA064A

Table 4.1. Monazite geochronology and geochemistry

Analysis			Concentration (ppm)*						Measured Isotopic Ratios						Ages (Ma)	
Sample	Number	Grain.Spot	Pb (ppm)	U (ppm)	Th (ppm)	Y ppm	Gd/Yb	Th/U	Pb^{207}/Pb^{206}	2s%	Pb^{206}/U^{238}	2s%	Pb^{208}/Th^{232}	2s%	Pb^{208}/Th^{232}	2s abs
KA007	1	1.1	131	13200	78100	34000	368	5.97	0.0796	3.42	0.00383	2.86	0.00122	2.76	24.6	0.7
KA007	2	1.2	95	7370	50200	54400	213	6.93	0.1257	6.26	0.00404	3.06	0.00135	3.31	27.3	0.9
KA007	3	1.3	79	4190	57400	94300	146	13.75	0.1002	3.60	0.00331	2.43	0.00099	2.33	20.0	0.5
KA007	4	1.4	75	4060	54300	94500	149	13.49	0.1287	4.05	0.00350	2.61	0.00099	2.59	20.0	0.5
KA007	5	1.5	113	6710	57300	28100	429	8.59	0.0837	3.28	0.00462	2.26	0.00140	2.29	28.3	0.6
KA007	6	1.6	109	8110	54000	25000	506	6.71	0.0719	3.20	0.00456	2.38	0.00143	2.32	28.9	0.7
KA007	7	2.1	62	6230	46900	121000	106	7.45	0.0693	3.70	0.00288	2.34	0.00093	2.32	18.7	0.4
KA007	8	2.2	60	6630	46900	122000	109	7.11	0.0699	3.61	0.00284	2.31	0.00092	2.26	18.6	0.4
KA007	9	2.3	98	7410	49500	27200	346	6.68	0.0685	3.29	0.00432	2.30	0.00140	2.34	28.2	0.7
KA007	10	2.4	94	8220	47900	32800	306	5.80	0.0687	3.33	0.00423	2.31	0.00140	2.47	28.3	0.7
KA007	11	2.5	80	9200	41300	31500	488	4.49	0.0681	3.34	0.00395	2.29	0.00136	2.32	27.5	0.6
KA007	12	2.6	69	8050	47300	89000	169	6.35	0.0785	3.70	0.00329	2.36	0.00104	2.29	21.0	0.5
KA007	13	3.1	75	5200	46200	80000	154	9.34	0.0831	4.16	0.00357	3.14	0.00112	3.18	22.6	0.7
KA007	14	3.2	82	8120	42800	43500	204	5.33	0.0668	3.30	0.00393	2.28	0.00137	2.36	27.7	0.7
KA007	15	3.3	73	15600	49700	62000	180	3.25	0.0685	3.32	0.00295	2.40	0.00103	2.68	20.9	0.6
KA007	16	3.4^{m}	19	2790	13300	189000	55	4.78	0.2144	5.51	0.00264	3.62	0.00103	3.97	20.7	0.8
KA007	17	3.5	85	24400	52300	46000	281	2.15	0.0626	3.16	0.00318	2.25	0.00117	2.35	23.6	0.6
KA007	18	3.6^{m}	5	215	670	119000	39	2.77	0.4940	6.77	0.00960	8.22	0.00652	13.17	131.0	17.2
KA007	19	4.1	92	10500	52800	37400	179	4.98	0.0695	3.61	0.00379	2.31	0.00127	2.81	25.7	0.7
KA007	20	4.2	105	8540	50100	20900	571	5.56	0.0681	3.33	0.00428	2.36	0.00149	2.32	30.2	0.7
KA007	21	4.3	113	12900	61800	40000	196	4.77	0.0668	3.35	0.00397	2.61	0.00133	2.80	26.9	0.8
KA007	22	4.4	130	8700	61700	18760	615	7.06	0.0881	3.45	0.00455	2.31	0.00151	2.28	30.5	0.7
KA007	23	4.5	110	10960	58700	26600	443	5.31	0.0660	3.27	0.00408	2.34	0.00132	2.30	26.7	0.6
KA007	24	4.6	127	8210	62100	18200	672	7.42	0.0973	3.37	0.00451	2.36	0.00146	2.38	29.5	0.7
KA007	25	5.1	98	7225	61300	66200	191	7.96	0.0703	3.85	0.00388	2.41	0.00112	2.45	22.7	0.6
KA007	26	5.2	114	17660	69900	46400	369	3.86	0.0646	3.31	0.00355	2.43	0.00115	2.37	23.3	0.6
KA007	27	5.3	139	12680	71900	32700	403	5.50	0.0638	3.25	0.00439	2.33	0.00136	2.41	27.5	0.7
KA007	28	5.4	124	11610	70200	62000	155	5.83	0.0633	3.31	0.00404	2.62	0.00124	2.68	25.1	0.7
KA007	29	6.1	119	9840	56900	13600	991	5.60	0.0644	3.29	0.00473	2.54	0.00150	2.54	30.3	0.8
KA007	30	6.2	121	14670	73900	34600	346	4.90	0.0668	3.35	0.00378	2.37	0.00117	2.46	23.7	0.6
KA007	31	7.1	95	12950	55900	36200	329	4.49	0.0934	3.45	0.00370	2.37	0.00122	2.47	24.7	0.6
KA007	32	7.2	96	20580	60000	44000	310	2.95	0.0808	3.66	0.00344	2.35	0.00114	2.43	23.1	0.6
KA007	33	7.3	62	8700	32900	63900	201	3.73	0.1396	4.20	0.00363	2.46	0.00136	2.82	27.4	0.8
KA007	34	7.4	81	5930	60600	76200	179	10.38	0.0811	3.81	0.00311	2.35	0.00096	2.42	19.4	0.5

Table 4.1. (continued)

Analysis			Concentration (ppm)*						Measured Isotopic Ratios						Ages (Ma)	
Sample	Number	Grain.Spot	Pb (ppm)	U (ppm)	Th (ppm)	Y ppm	Gd/Yb	Th/U	Pb^{207}/Pb^{206}	2s%	Pb^{206}/U^{238}	2s%	Pb^{208}/Th^{232}	2s%	Pb^{208}/Th^{232}	2s abs
KA007	35	7.5	73	6250	53200	71200	235	8.55	0.1249	4.00	0.00315	2.42	0.00098	2.54	19.7	0.5
KA007	36	7.6	70	4920	51500	68900	209	10.57	0.1074	5.08	0.00323	2.59	0.00099	2.52	20.0	0.5
KA007	37	8.1^{m}	35	3560	22300	179000	57	6.17	0.2904	3.57	0.00351	2.75	0.00113	2.89	22.7	0.7
KA007	38	8.2^{x}	249	6730	52200	23800	363	7.67	0.0639	3.46	0.00950	3.19	0.00357	3.31	72.0	2.4
KA007	39	8.3	67	4170	46500	77900	185	11.12	0.0811	3.88	0.00347	2.50	0.00103	2.48	20.7	0.5
KA007	40	9.1	68	10610	43300	49200	307	4.33	0.0691	3.54	0.00345	2.39	0.00110	2.53	22.3	0.6
KA007	41	9.2	76	7110	41500	22700	495	5.80	0.0683	3.55	0.00404	2.68	0.00129	2.68	26.0	0.7
KA007	42	9.3	78	13730	50300	46600	320	3.64	0.0653	3.20	0.00345	2.29	0.00111	2.40	22.4	0.5
KA007	43	10.1	98	8180	70800	59000	141	8.36	0.0717	5.04	0.00343	3.40	0.00105	3.32	21.3	0.7
KA007	44	10.2	113	6770	53200	19300	525	7.78	0.0655	3.44	0.00477	2.32	0.00152	2.39	30.7	0.7
KA007	45	10.3	99	6480	61800	94000	34	9.44	0.0878	4.63	0.00359	3.55	0.00109	3.54	22.1	0.8
KA007	46	10.4	86	8010	64900	163000	59	7.97	0.0639	3.81	0.00301	2.34	0.00094	2.31	18.9	0.4
KA007	47	10.5	94	8750	71300	174000	66	8.08	0.0634	3.47	0.00294	2.22	0.00093	2.25	18.9	0.4
KA007	48	10.6	109	9880	78000	148000	68	7.84	0.0675	3.41	0.00322	2.52	0.00099	2.60	19.9	0.5
KA31B	1	1.1	61	7660	44500	4170	525	9.38	0.1888	3.35	0.00338	2.05	0.00098	2.17	19.7	0.4
KA31B	2	1.2	72	10150	47400	980	1440	7.90	0.1666	3.21	0.00356	2.09	0.00108	2.11	21.8	0.5
KA31B	3	1.3	69	9570	45000	715	2649	8.18	0.1729	3.18	0.00362	2.01	0.00110	2.06	22.3	0.5
KA31B	4	1.4	61	10420	38700	562	1377	6.53	0.1356	3.31	0.00341	2.02	0.00111	2.10	22.5	0.5
KA31B	5	1.5	62	9070	41500	2090	508	7.98	0.1579	3.19	0.00340	2.07	0.00104	2.18	20.9	0.5
KA31B	6	1.6	46	7380	41800	21300	84	9.74	0.1408	3.64	0.00259	2.06	0.00078	2.09	15.9	0.3
KA31B	7	2.1	80	9020	53900	1180	1453	8.25	0.1886	3.24	0.00349	2.03	0.00105	2.08	21.1	0.4
KA31B	8	2.2	81	9090	53600	1010	2554	7.78	0.1827	3.21	0.00353	2.08	0.00107	2.11	21.7	0.5
KA31B	9	2.3	91	9690	59400	834	1690	7.53	0.1820	3.18	0.00353	2.10	0.00109	2.16	21.9	0.5
KA31B	10	2.4	99	9800	63200	570	1266	7.50	0.1811	3.20	0.00362	2.06	0.00111	2.10	22.5	0.5
KA31B	11	2.5	105	10300	66900	508	1630	7.16	0.1788	3.18	0.00362	2.06	0.00111	2.14	22.4	0.5
KA31B	12	2.6	86	8400	57900	1010	1242	7.28	0.1889	3.22	0.00347	2.08	0.00106	2.22	21.4	0.5
KA31B	13	3.1^{e}	1	27	149	40	34	5.46	0.8600	68.67	0.00420	66.69	0.00224	41.11	45.0	18.5
KA31B	14	3.2	67	5850	63000	16500	97	9.79	0.1534	3.69	0.00259	2.23	0.00076	2.10	15.4	0.3
KA31B	15	3.3	106	9960	71000	1600	873	6.63	0.1741	3.23	0.00350	2.03	0.00105	2.12	21.3	0.5
KA31B	16	3.4	105	9700	68500	1120	2290	6.65	0.1810	3.16	0.00358	2.08	0.00109	2.15	22.0	0.5
KA31B	17	3.5	100	9510	66300	1090	1710	6.69	0.1768	3.19	0.00354	2.11	0.00108	2.16	21.8	0.5
KA31B	18	3.6	100	10870	68500	1230	2425	6.15	0.1756	3.19	0.00340	2.13	0.00104	2.13	21.0	0.4
KA31B	19	4.1^{Grt}	101	11400	61900	307	2201	5.51	0.1593	3.30	0.00376	2.34	0.00119	2.19	24.1	0.5

Table 4.1. (continued)

	Analysis		Concentration (ppm)*						Measured Isotopic Ratios						Ages (Ma)	
Sample	Number	Grain.Spot	Pb (ppm)	U (ppm)	Th (ppm)	Y ppm	Gd/Yb	Th/U	Pb^{207}/Pb^{206}	2s%	Pb^{206}/U^{238}	2s%	Pb^{208}/Th^{232}	2s%	Pb^{208}/Th^{232}	2s abs
KA31B	20	4.2^{Grt}	86	8270	67900	7100	362	8.38	0.1240	3.71	0.00297	2.91	0.00091	2.87	18.4	0.5
KA31B	21	5.1	63	4930	66200	14900	98	13.56	0.1143	4.16	0.00230	2.25	0.00068	2.15	13.7	0.3
KA31B	22	5.2	94	5290	59200	375	3110	11.14	0.1346	3.38	0.00378	2.14	0.00114	2.17	23.0	0.5
KA31B	23	5.3	111	11440	72600	583	2330	6.26	0.1668	3.13	0.00356	2.03	0.00109	2.15	22.1	0.5
KA31B	24	5.4	102	9970	69900	1110	1697	6.91	0.1819	3.18	0.00345	2.14	0.00105	2.18	21.1	0.5
KA31B	25	6.1	73	7250	61000	7400	165	9.05	0.1827	3.32	0.00294	2.16	0.00086	2.10	17.3	0.4
KA31B	26	6.2	113	9040	77100	518	1486	9.51	0.1594	3.23	0.00361	2.07	0.00106	2.12	21.3	0.5
KA31B	27	6.3	114	9490	75900	334	1242	9.25	0.1514	3.23	0.00357	2.11	0.00107	2.17	21.5	0.5
KA31B	28	6.4	105	8790	74200	1680	1126	9.97	0.1868	3.28	0.00345	2.14	0.00100	2.20	20.3	0.4
KA31B	29	6.5	86	5880	61000	1480	1624	12.57	0.2023	3.26	0.00360	2.15	0.00100	2.20	20.3	0.4
KA31B	30	6.6	94	9250	66400	1470	1049	8.94	0.1780	3.22	0.00339	2.22	0.00102	2.19	20.5	0.5
KA31B	31	7.1	84	7750	63000	3610	447	9.60	0.1790	3.26	0.00315	2.18	0.00093	2.19	18.8	0.4
KA31B	32	7.2	55	6160	57000	18800	94	10.51	0.0751	4.01	0.00215	2.25	0.00068	2.25	13.8	0.3
KA31B	33	7.3	64	6400	59000	11500	107	10.04	0.1299	3.56	0.00262	2.24	0.00077	2.34	15.6	0.4
KA31B	34	7.4	87	8260	72100	5900	464	9.31	0.1876	3.50	0.00293	2.34	0.00088	2.67	17.8	0.5
KA31B	35	7.5	66	7540	58000	13400	140	7.70	0.1525	3.39	0.00266	2.25	0.00081	2.29	16.5	0.4
KA31B	36	7.6	65	7260	58200	16900	115	7.78	0.1483	3.38	0.00256	2.28	0.00079	2.24	16.0	0.4
KA31B	37	8.1^{Grt}	104	5850	70300	659	2042	11.88	0.1465	3.42	0.00362	2.22	0.00105	2.23	21.2	0.5
KA31B	38	8.2^{Grt}	79	6610	49700	600	2789	7.93	0.1194	3.32	0.00355	2.15	0.00111	2.19	22.5	0.5
KA31B	39	9.1^{Grt}	107	4730	66900	467	3059	16.09	0.1772	3.56	0.00406	2.33	0.00113	2.28	22.7	0.5
KA31B	40	9.2^{Grt}	100	5880	63400	516	3638	13.28	0.1519	3.30	0.00387	2.31	0.00111	2.35	22.4	0.5
KA31B	41	10.1	92	10940	59000	688	2267	8.59	0.1682	3.13	0.00352	2.31	0.00110	2.35	22.2	0.5
KA31B	42	10.2	90	10200	56900	494	2147	9.19	0.1688	3.15	0.00363	2.19	0.00112	2.23	22.6	0.5
KA31B	43	10.3	52	5950	45700	8880	115	12.94	0.2131	4.88	0.00295	3.03	0.00082	2.86	16.7	0.5
KA31B	44	10.4	88	9720	59100	1820	790	10.31	0.1829	3.14	0.00349	2.23	0.00106	2.27	21.5	0.5
KA31B	45	10.5	85	9430	56900	2840	376	10.25	0.1641	3.22	0.00341	2.20	0.00105	2.23	21.2	0.5
KA31B	46	10.6	100	10650	61600	342	2009	9.50	0.1563	3.19	0.00363	2.15	0.00114	2.27	23.1	0.5
KA034	1	1.1	45	3950	33600	1450	538	8.66	0.0740	4.52	0.00296	2.71	0.00095	2.80	19.2	0.5
KA034	2	1.2	27	2310	21700	2380	370	9.31	0.1324	5.88	0.00279	2.72	0.00088	2.59	17.8	0.5
KA034	3	1.3	68	7690	53300	2960	265	6.96	0.0828	3.50	0.00280	2.32	0.00091	2.28	18.3	0.4
KA034	4	1.4	64	7700	50400	3320	262	6.58	0.0653	3.69	0.00275	2.32	0.00090	2.42	18.2	0.4
KA034	5	1.5	78	8350	63700	3280	259	7.56	0.0650	3.61	0.00273	2.44	0.00088	2.37	17.7	0.4
KA034	6	1.6	70	8140	57300	3130	325	6.89	0.0714	3.66	0.00269	2.46	0.00088	2.44	17.9	0.4

Table 4.1. (continued)

Analysis			Concentration (ppm)*						Measured Isotopic Ratios						Ages (Ma)	
Sample	Number	Grain.Spot	Pb (ppm)	U (ppm)	Th (ppm)	Y ppm	Gd/Yb	Th/U	Pb^{207}/Pb^{206}	2s%	Pb^{206}/U^{238}	2s%	Pb^{208}/Th^{232}	2s%	Pb^{208}/Th^{232}	2s abs
KA034	7	2.1	59	4800	44600	2140	308	9.11	0.1329	3.67	0.00289	2.69	0.00094	2.74	18.9	0.5
KA034	8	2.2	56	4680	48500	4380	561	10.08	0.0709	4.32	0.00252	2.56	0.00082	2.44	16.6	0.4
KA034	9	2.3	64	5410	51400	3260	471	9.34	0.0731	4.25	0.00269	2.61	0.00088	2.59	17.9	0.5
KA034	10	2.4	44	4140	39000	4360	226	9.29	0.0937	4.55	0.00245	2.57	0.00081	2.62	16.4	0.4
KA034	11	2.5	67	5380	54700	4190	529	10.06	0.0705	3.85	0.00264	2.48	0.00086	2.54	17.4	0.4
KA034	12	2.6^{fx}	34	2960	26500	2200	472	8.70	0.0725	5.68	0.00264	2.76	0.00092	2.61	18.7	0.5
KA034	13	3.1	85	6690	68800	2420	468	10.34	0.0696	3.96	0.00271	2.52	0.00088	2.44	17.8	0.4
KA034	14	3.2	93	7560	75200	2540	460	9.96	0.0685	3.99	0.00271	2.48	0.00088	2.59	17.8	0.5
KA034	15	3.3	97	7530	75900	2500	496	10.22	0.0699	3.77	0.00276	2.38	0.00091	2.34	18.4	0.4
KA034	16	3.4	88	6600	71100	2330	447	10.95	0.0702	3.86	0.00271	2.43	0.00088	2.44	17.7	0.4
KA034	17	3.5	92	6760	73500	2370	354	11.06	0.0705	4.03	0.00276	2.55	0.00088	2.51	17.8	0.4
KA034	18	3.6	118	9840	96600	2580	319	10.09	0.0685	3.63	0.00269	2.29	0.00086	2.32	17.4	0.4
KA034	19	4.1	74	6337	71900	10700	132	11.59	0.0949	5.43	0.00240	2.54	0.00072	2.59	14.5	0.4
KA034	20	4.2	91	12210	79000	2890	381	6.69	0.0626	3.94	0.00256	2.33	0.00082	2.36	16.5	0.4
KA034	21	4.3	63	7300	53600	3010	442	7.56	0.0757	5.73	0.00260	2.55	0.00085	2.40	17.2	0.4
KA034	22	4.4	87	11530	73900	3510	453	6.69	0.0590	3.82	0.00260	2.27	0.00083	2.28	16.7	0.4
KA034	23	4.5	70	8560	59300	3090	564	7.22	0.0613	4.09	0.00262	2.36	0.00084	2.41	16.9	0.4
KA034	24	4.6	29	2979	28850	6340	71	10.04	0.1303	5.69	0.00229	2.76	0.00074	3.06	14.9	0.5
KA034	25	5.1	45	5910	51700	14900	35	9.20	0.0640	6.10	0.00198	3.35	0.00063	3.13	12.8	0.4
KA034	26	5.2	42	4220	43900	11770	54	10.36	0.0678	6.75	0.00216	3.20	0.00068	2.88	13.7	0.4
KA034	27	5.3	65	8780	55500	3470	325	6.61	0.0696	4.25	0.00259	2.61	0.00084	2.65	17.0	0.5
KA034	28	5.4	49	5390	45600	11000	52	8.88	0.1032	8.13	0.00247	4.32	0.00078	4.04	15.7	0.6
KA034	29	5.5^{m}	2	193	2100	220	27	10.99	0.3600	30.70	0.00470	21.35	0.00081	11.33	16.5	1.9
KA034	30	5.6	54	6740	59700	21700	43	9.10	0.0593	4.64	0.00203	2.56	0.00064	2.41	12.9	0.3
KA034	31	6.1	69	5960	56400	3630	455	9.42	0.0698	4.05	0.00278	2.42	0.00088	2.52	17.7	0.4
KA034	32	6.2	62	5160	51100	2860	567	9.84	0.0704	4.33	0.00274	2.56	0.00086	2.63	17.3	0.5
KA034	33	6.3	60	5100	52700	3400	508	10.11	0.0690	4.17	0.00266	2.30	0.00083	2.43	16.7	0.4
KA034	34	6.4	47	4700	47500	17400	60	9.79	0.0646	4.78	0.00223	2.39	0.00071	2.32	14.4	0.3
KA034	35	7.1	49	7610	46200	12300	237	5.83	0.0564	4.13	0.00233	2.40	0.00076	2.52	15.3	0.4
KA034	36	7.2	58	6610	49600	4010	463	7.15	0.0658	3.96	0.00270	2.35	0.00084	2.41	17.0	0.4
KA034	37	7.3	53	7190	44000	4350	370	5.80	0.0602	3.90	0.00259	2.30	0.00087	2.38	17.5	0.4
KA034	38	$8.1^{x, ell}$	33	4258	20440	867	597	4.48	0.0608	4.21	0.00284	2.91	0.00115	3.35	23.2	0.8
KA034	39	$8.2^{x, ell}$	27	3393	16380	800	644	4.48	0.0612	4.81	0.00283	3.20	0.00118	3.64	23.8	0.9
KA034	40	$8.3^{x, ell}$	30	3486	18480	1060	317	4.97	0.0663	4.94	0.00284	3.43	0.00114	3.73	23.1	0.9

Table 4.1. (continued)

Analysis			Concentration (ppm)*						Measured Isotopic Ratios						Ages (Ma)	
Sample	Number	Grain.Spot	Pb (ppm)	U (ppm)	Th (ppm)	Y ppm	Gd/Yb	Th/U	Pb^{207}/Pb^{206}	2s%	Pb^{206}/U^{238}	2s%	Pb^{208}/Th^{232}	2s%	Pb^{208}/Th^{232}	2s abs
KA034	41	8.4[x, ell]	37	4090	24240	1090	355	5.54	0.0609	4.33	0.00284	3.00	0.00109	3.32	21.9	0.7
KA034	42	8.5[x, ell]	30	3404	17900	1000	361	4.97	0.0680	4.75	0.00286	3.53	0.00118	4.08	23.9	1.0
KA034	43	8.6[x, ell]	21	2234	16550	3480	217	6.98	0.0577	6.00	0.00239	2.79	0.00088	3.01	17.8	0.5
KA034	44	8.7[x, ell]	22	2293	12890	694	556	5.46	0.0641	5.30	0.00284	3.34	0.00119	3.83	24.1	0.9
KA034	45	8.8[x, ell]	25	2641	15620	820	405	5.75	0.0601	5.13	0.00284	3.38	0.00114	3.58	23.1	0.8
KA034	46	8.9[x, ell]	20	2145	15000	2940	361	6.89	0.0561	7.25	0.00254	3.39	0.00092	3.74	18.7	0.7
KA034	47	9.1	36	3410	40800	13000	76	11.66	0.0711	4.31	0.00211	2.68	0.00064	2.63	13.0	0.3
KA034	48	9.2	47	5350	44000	5450	396	8.01	0.0589	4.16	0.00244	2.46	0.00077	2.33	15.6	0.4
KA034	49	9.3	49	5170	44600	5690	396	8.43	0.0588	4.17	0.00246	2.48	0.00078	2.49	15.7	0.4
KA034	50	9.4	50	3920	47600	5720	430	11.61	0.0612	4.68	0.00243	2.33	0.00076	2.35	15.3	0.4
KA034	51	10.1	39	3760	33100	3860	491	8.73	0.0653	4.07	0.00264	2.28	0.00084	2.34	16.9	0.4
KA034	52	10.2	43	4100	34200	2890	347	8.32	0.0673	4.02	0.00279	2.39	0.00089	2.43	17.9	0.4
KA034	53	10.3	43	4690	35000	2720	298	7.48	0.0683	3.90	0.00279	2.37	0.00089	2.36	17.9	0.4
KA034	54	10.4	43	4590	34800	3250	269	7.61	0.0682	4.09	0.00280	2.34	0.00089	2.36	18.0	0.4
KA034	55	10.5	38	4240	35300	4680	538	8.36	0.0598	4.37	0.00242	2.50	0.00077	2.51	15.5	0.4
KA034	56	10.6	39	4280	35600	4410	548	8.38	0.0610	4.44	0.00243	2.41	0.00078	2.58	15.7	0.4
KA037	13	3.1	76	6250	56400	1060	1754	9.19	0.0856	3.42	0.00314	2.19	0.00096	2.24	19.3	0.4
KA037	14	3.2	78	6640	57900	1010	1297	8.83	0.0846	3.48	0.00316	2.24	0.00096	2.23	19.4	0.4
KA037	15	3.3	90	7480	66600	800	1150	8.99	0.0930	3.36	0.00312	2.19	0.00096	2.18	19.4	0.4
KA037	16	3.4	73	6870	53800	810	1071	7.90	0.1086	3.43	0.00320	2.25	0.00097	2.22	19.7	0.4
KA037	17	3.5	83	7230	61200	777	2366	8.54	0.0946	3.39	0.00313	2.23	0.00096	2.23	19.5	0.4
KA037	18	3.6	66	6530	52600	5050	339	8.11	0.0853	3.42	0.00289	2.21	0.00089	2.29	18.0	0.4
KA037	19	3.7	75	6470	55100	1020	1150	8.48	0.0862	3.47	0.00319	2.21	0.00097	2.23	19.6	0.4
KA037	20	3.8	102	8840	75400	980	1265	8.55	0.0909	3.28	0.00311	2.25	0.00096	2.23	19.5	0.4
KA037	21	3.9	64	5610	47900	1290	1121	8.57	0.0766	3.66	0.00307	2.20	0.00095	2.24	19.1	0.4
KA037	22	3.10	81	6790	59100	1170	969	8.73	0.0843	3.61	0.00315	2.20	0.00096	2.17	19.5	0.4
KA037	23	3.11	34	1098	25000	5400	205	21.37	0.2240	6.53	0.00344	3.42	0.00097	3.00	19.6	0.6
KA037	24	3.12	64	5000	49000	2970	767	10.08	0.0688	3.80	0.00297	2.27	0.00091	2.27	18.4	0.4
KA037	1	4.1	67	3440	52400	2450	433	16.08	0.0845	4.05	0.00302	2.40	0.00091	2.34	18.4	0.4
KA037	2	4.2	66	2781	50500	2680	411	17.64	0.0893	4.34	0.00305	2.43	0.00094	2.37	19.1	0.5
KA037	3	4.3	76	2378	58400	2920	380	24.88	0.0934	4.55	0.00317	2.54	0.00094	2.38	19.0	0.5
KA037	4	4.4	83	4050	63900	890	990	16.53	0.0955	3.98	0.00307	2.43	0.00095	2.37	19.1	0.5

Table 4.1. (continued)

	Analysis		Concentration (ppm)*						Measured Isotopic Ratios						Ages (Ma)	
Sample	Number	Grain.Spot	Pb (ppm)	U (ppm)	Th (ppm)	Y ppm	Gd/Yb	Th/U	Pb^{207}/Pb^{206}	2s%	Pb^{206}/U^{238}	2s%	Pb^{208}/Th^{232}	2s%	Pb^{208}/Th^{232}	2s abs
KA037	5	4.5	86	4070	64100	569	1920	16.15	0.0951	3.92	0.00313	2.34	0.00096	2.23	19.5	0.4
KA037	6	4.6	68	1685	54500	4700	232	33.21	0.0778	5.95	0.00300	2.48	0.00090	2.34	18.3	0.4
KA037	7	5.1	81	6280	62100	860	936	10.19	0.0914	3.59	0.00306	2.32	0.00093	2.38	18.9	0.4
KA037	8	5.2	57	4670	43900	790	1322	9.62	0.0892	3.81	0.00302	2.34	0.00094	2.51	19.0	0.5
KA037	9	5.3	49	3020	38600	2040	450	13.03	0.0919	4.28	0.00293	2.43	0.00091	2.27	18.4	0.4
KA037	10	5.4	57	4330	43800	1440	1400	10.32	0.0790	3.93	0.00306	2.39	0.00094	2.31	19.1	0.4
KA037	11	5.5	86	8510	63400	760	1148	7.57	0.0837	3.43	0.00306	2.26	0.00097	2.34	19.6	0.5
KA037	12	5.6	79	7240	58000	790	908	8.11	0.0855	3.42	0.00312	2.27	0.00097	2.28	19.6	0.4
KA037	34	6.1	78	7540	55200	850	1068	7.17	0.0894	3.38	0.00318	2.29	0.00100	2.32	20.2	0.5
KA037	25	6.1	50	4760	43700	10800	118	9.14	0.1069	6.45	0.00256	3.24	0.00081	3.10	16.3	0.5
KA037	35	6.11	76	6940	54700	860	1100	7.72	0.0860	3.66	0.00312	2.27	0.00099	2.27	20.0	0.5
KA037	36	6.12	75	6920	54500	840	1090	7.67	0.0839	3.49	0.00318	2.29	0.00099	2.39	20.1	0.5
KA037	26	6.2	61	5220	43300	780	879	8.23	0.0902	3.60	0.00321	2.32	0.00100	2.38	20.2	0.5
KA037	27	6.3	90	7910	65600	820	895	8.24	0.0889	3.50	0.00316	2.40	0.00097	2.35	19.5	0.5
KA037	28	6.4	60	5170	42600	730	1366	8.18	0.0870	3.64	0.00319	2.53	0.00099	2.59	20.0	0.5
KA037	29	6.5^{fx}	102	7060	60900	850	555	8.59	0.2653	3.25	0.00420	2.50	0.00120	2.60	24.3	0.6
KA037	30	6.6	58	2540	44200	3180	435	17.53	0.0828	4.34	0.00321	2.62	0.00092	2.39	18.7	0.4
KA037	31	6.7	53	4670	37800	760	2164	8.01	0.0846	3.82	0.00315	2.40	0.00100	2.38	20.2	0.5
KA037	32	6.8	58	4880	42200	910	1241	8.50	0.0861	3.72	0.00321	2.24	0.00098	2.22	19.9	0.4
KA037	33	6.9	67	5870	48400	820	1314	8.06	0.0875	3.57	0.00316	2.30	0.00098	2.40	19.8	0.5
KA037	37	7.1	64	5900	47000	1190	957	7.78	0.0808	3.66	0.00317	2.39	0.00100	2.45	20.1	0.5
KA037	38	7.2	71	5840	52200	724	1088	8.60	0.0910	3.53	0.00319	2.37	0.00100	2.45	20.1	0.5
KA037	39	7.3	83	6380	59600	800	1263	9.06	0.0955	3.44	0.00315	2.22	0.00100	2.32	20.2	0.5
KA037	40	7.4	73	7410	53300	900	1239	7.03	0.0867	3.65	0.00313	2.39	0.00101	2.37	20.4	0.5
KA037	41	7.5	84	7730	64600	2530	569	8.07	0.0915	3.84	0.00309	2.38	0.00095	2.37	19.1	0.5
KA037	42	7.6	37	4520	33800	12100	167	7.05	0.1326	3.76	0.00251	2.60	0.00079	2.48	15.9	0.4
KA037	43	8.1	54	5210	43300	2290	546	8.00	0.0836	3.91	0.00293	2.55	0.00090	2.49	18.2	0.5
KA037	44	8.2	56	5310	45700	2940	411	8.35	0.0864	4.09	0.00286	2.66	0.00089	2.67	17.9	0.5
KA037	45	8.3	67	4910	50130	1030	2317	9.98	0.1037	3.73	0.00325	2.58	0.00097	2.70	19.5	0.5
KA037	46	8.4	46	4350	33380	1090	938	7.65	0.0930	3.96	0.00318	2.50	0.00099	2.59	20.0	0.5
KA037	47	8.5	42	4540	30570	1240	768	6.70	0.0848	3.97	0.00314	2.79	0.00098	2.76	19.8	0.5
KA037	48	8.6	44	3597	32600	1940	651	8.95	0.0872	4.48	0.00314	2.60	0.00097	2.62	19.6	0.5
KA037	49	9.1	56	2981	44700	3810	403	14.73	0.0716	4.71	0.00302	2.56	0.00088	2.44	17.7	0.4
KA037	50	9.2	66	2660	55400	3410	459	21.12	0.0736	4.95	0.00303	2.63	0.00087	2.53	17.5	0.4
KA037	51	9.3	76	7330	56500	4320	159	7.86	0.0922	3.64	0.00314	2.49	0.00097	2.48	19.5	0.5

Table 4.1. (continued)

Analysis			Concentration (ppm)*						Measured Isotopic Ratios						Ages (Ma)	
Sample	Number	Grain.Spot	Pb (ppm)	U (ppm)	Th (ppm)	Y ppm	Gd/Yb	Th/U	Pb^{207}/Pb^{206}	2s%	Pb^{206}/U^{238}	2s%	Pb^{208}/Th^{232}	2s%	Pb^{208}/Th^{232}	2s abs
KA037	52	9.4	60	4340	47200	3180	653	10.78	0.0750	4.69	0.00300	2.64	0.00091	2.55	18.4	0.5
KA037	53	9.5	68	5770	53800	3280	368	9.55	0.0923	3.90	0.00300	2.82	0.00092	2.70	18.5	0.5
KA037	54	9.6^{m}	4	443	2770	400	600	6.44	0.1510	15.52	0.00266	5.21	0.00101	4.84	20.3	1.0
KA044	1	1.1	43	3600	15930	2010	558	4.42	0.0635	3.72	0.00565	2.22	0.00194	2.29	39.1	0.9
KA044	2	1.2	55	4140	21610	2350	739	5.25	0.0599	3.80	0.00566	2.23	0.00180	2.38	36.4	0.9
KA044	3	1.3	107	2775	53600	640	673	19.23	0.1040	3.51	0.00467	2.28	0.00141	2.25	28.4	0.6
KA044	4	1.4	61	3452	23430	2000	741	6.61	0.0691	3.54	0.00565	2.12	0.00186	2.26	37.5	0.8
KA044	5	1.5	59	5410	22220	2320	589	3.99	0.0679	3.28	0.00578	2.19	0.00188	2.25	37.9	0.9
KA044	6	1.6	123	3160	48000	1300	1546	14.47	0.0739	3.78	0.00575	2.19	0.00179	2.25	36.2	0.8
KA044	7	1.7	55	4850	21450	2160	546	4.24	0.0587	3.54	0.00563	2.22	0.00182	2.27	36.7	0.8
KA044	8	1.8	60	5110	23730	2170	639	4.48	0.0583	3.84	0.00561	2.14	0.00179	2.16	36.2	0.8
KA044	9	1.9	51	4340	19610	1990	661	4.37	0.0592	3.62	0.00568	2.16	0.00184	2.30	37.2	0.9
KA044	10	1.10	127	3630	61400	651	861	16.51	0.0967	3.64	0.00482	2.31	0.00145	2.19	29.2	0.6
KA044	11	1.11	110	2617	64400	737	853	24.15	0.1358	4.00	0.00417	2.53	0.00121	2.32	24.4	0.6
KA044	12	1.12	143	3540	69900	790	1235	19.68	0.0980	3.57	0.00510	2.23	0.00145	2.27	29.3	0.7
KA044	13	2.1	72	840	54000	900	436	63.90	0.1233	6.42	0.00376	2.87	0.00095	2.44	19.1	0.5
KA044	14	2.2	106	861	68200	1600	483	79.05	0.1345	5.88	0.00415	2.87	0.00113	2.23	22.7	0.5
KA044	15	2.3	79	2540	44900	488	1088	17.33	0.1384	4.59	0.00440	2.62	0.00124	2.51	25.1	0.6
KA044	16	2.4	123	4030	63000	682	881	15.23	0.0999	3.55	0.00466	2.32	0.00141	2.37	28.6	0.7
KA044	17	2.5	116	3660	60300	880	420	16.00	0.1213	3.94	0.00466	2.50	0.00135	2.52	27.2	0.7
KA044	18	2.6	112	3400	51300	537	757	14.56	0.1352	4.11	0.00509	2.47	0.00152	2.35	30.8	0.7
KA044	19	2.7	123	3517	57600	497	1211	15.57	0.1897	4.67	0.00560	2.94	0.00153	2.47	30.8	0.8
KA044	20	2.8	125	4120	62600	680	856	14.54	0.1046	3.41	0.00476	2.20	0.00144	2.27	29.1	0.7
KA044	21	2.9	106	3240	57400	940	669	17.45	0.1212	3.69	0.00451	2.42	0.00129	2.37	26.0	0.6
KA044	22	2.1	128	4157	66300	656	1196	15.66	0.1119	3.40	0.00469	2.21	0.00137	2.19	27.8	0.6
KA044	23	2.11	99	3490	51400	652	871	14.59	0.1045	3.66	0.00461	2.44	0.00137	2.50	27.7	0.7
KA044	24	2.12^{m}	12	821	8090	1260	96	9.89	0.2780	8.13	0.00320	4.73	0.00106	3.88	21.4	0.8
KA044	25	3.1	89	1287	66300	816	774	53.91	0.1013	5.86	0.00388	2.32	0.00096	2.30	19.3	0.4
KA044	26	3.2	93	2010	56500	1320	426	30.40	0.0958	4.57	0.00417	2.49	0.00117	2.41	23.6	0.6
KA044	27	3.3	144	5210	64200	2400	580	12.80	0.0740	3.41	0.00549	2.24	0.00163	2.37	32.8	0.8
KA044	28	3.4	142	5590	60100	1970	971	11.28	0.0716	3.51	0.00557	2.31	0.00170	2.36	34.3	0.8
KA044	29	3.5	152	5300	60100	2350	794	11.66	0.0735	3.55	0.00582	2.35	0.00181	2.41	36.6	0.9
KA044	30	3.6	140	5140	58300	2590	848	11.64	0.0727	3.64	0.00562	2.40	0.00172	2.39	34.8	0.8

Table 4.1. (continued)

Analysis			Concentration (ppm)*						Measured Isotopic Ratios						Ages (Ma)	
Sample	Number	Grain.Spot	Pb (ppm)	U (ppm)	Th (ppm)	Y ppm	Gd/Yb	Th/U	Pb^{207}/Pb^{206}	2s%	Pb^{206}/U^{238}	2s%	Pb^{208}/Th^{232}	2s%	Pb^{208}/Th^{232}	2s abs
KA044	31	4.1[fx]	65	2182	21280	361	778	9.67	0.0946	3.93	0.00630	2.62	0.00219	2.63	44.3	1.2
KA044	32	4.2	61	1736	31300	343	546	17.81	0.1285	4.27	0.00446	2.70	0.00140	2.62	28.3	0.7
KA044	33	4.3	88	3006	33400	440	923	11.01	0.0747	3.93	0.00574	2.46	0.00189	2.62	38.2	1.0
KA044	34	4.4	84	3124	31430	501	1597	9.98	0.0735	3.96	0.00579	2.48	0.00195	2.69	39.3	1.1
KA044	35	4.5	32	1837	28000	3230	87	15.03	0.0714	7.62	0.00238	2.80	0.00080	2.55	16.1	0.4
KA044	36	4.6	90	2141	41300	355	962	19.32	0.1115	4.09	0.00493	2.49	0.00154	2.60	31.1	0.8
KA044	37	4.7	84	3190	31600	535	1010	10.01	0.0752	3.76	0.00578	2.50	0.00191	2.64	38.5	1.0
KA044	38	4.8	77	2946	29000	538	721	10.01	0.0780	3.95	0.00565	2.65	0.00189	2.85	38.1	1.1
KA044	39	4.9	99	3750	37100	488	1244	10.27	0.0732	3.79	0.00576	2.75	0.00191	2.87	38.6	1.1
KA044	40	4.10	88	3310	32500	539	1701	10.37	0.0755	3.83	0.00577	2.62	0.00191	2.61	38.5	1.0
KA044	41	4.11	64	2517	25800	558	1359	10.91	0.0822	3.94	0.00539	2.86	0.00173	3.05	34.9	1.1
KA044	42	4.12	75	2466	34100	397	1681	14.68	0.1012	4.01	0.00484	2.43	0.00154	2.46	31.1	0.8
KA044	43	6.1	79	1287	56000	860	529	45.70	0.2480	5.35	0.00447	4.01	0.00105	3.89	21.2	0.8
KA044	44	6.2	64	3050	52400	2280	366	17.76	0.0761	5.06	0.00300	2.52	0.00086	2.62	17.4	0.5
KA044	45	6.3	74	1046	45000	930	700	44.50	0.1483	5.88	0.00409	3.04	0.00115	2.60	23.3	0.6
KA044	46	6.4	81	1698	61000	1210	654	36.78	0.0868	6.60	0.00359	2.40	0.00094	2.51	19.1	0.5
KA044	47	6.5	92	1429	59300	1210	684	41.77	0.0989	5.71	0.00377	3.05	0.00111	2.52	22.4	0.6
KA044	48	6.6	58	5170	50200	6800	142	9.47	0.0629	4.85	0.00249	2.50	0.00084	2.65	17.0	0.5
KA044	49	8.1[Grt]	175	3040	107000	182	2725	32.43	0.1522	3.70	0.00468	2.70	0.00118	2.74	23.9	0.7
KA044	50	9.1[fx]	80	1390	50000	123	738	32.79	0.1537	6.06	0.00468	7.69	0.00116	7.07	23.4	1.7
KA044	51	9.2[fx]	18	400	14300	-	-	32.36	0.1560	8.86	0.00430	13.84	0.00108	13.09	21.9	2.9
KA044	52	9.3[fx]	27	479	4750	43	-	9.27	0.1000	10.34	0.00716	4.56	0.00406	5.49	81.8	4.5
KA044	53	9.4[fx]	32	777	5510	119	3444	6.76	0.0847	7.80	0.00712	4.45	0.00419	5.34	84.4	4.5
KA044	54	9.5[fx]	18	554	3570	23	630	6.39	0.1010	13.22	0.00615	7.85	0.00368	8.89	74.2	6.6
KA044	55	9.6[fx]	9	215	1600	-	-	7.82	0.1410	13.11	0.00734	9.30	0.00381	10.92	76.8	8.4
KA044	56	9.7[fx]	11	267	1970	-	-	7.58	0.1460	16.71	0.00765	9.84	0.00388	11.74	78.2	9.2
KA044	57	9.8[fx]	35	1093	8020	69	905	7.81	0.1130	5.13	0.00572	3.63	0.00311	5.17	62.8	3.2
KA044	58	10.1[x, fx]	112	606	68600	1250	244	115.07	0.3290	6.24	0.00622	4.40	0.00115	2.37	23.3	0.6
KA044	59	10.2	111	831	70000	691	973	89.13	0.1663	6.29	0.00489	2.88	0.00112	2.45	22.5	0.6
KA044	60	10.3	76	1440	43300	355	1059	31.67	0.1451	4.83	0.00448	2.65	0.00123	2.57	24.8	0.6
KA044	61	10.4	91	3900	45500	569	683	11.96	0.1226	3.98	0.00472	2.49	0.00143	2.40	29.0	0.7
KA044	62	10.5	106	3034	66100	890	728	21.51	0.1229	3.77	0.00421	2.60	0.00115	2.60	23.3	0.6

Table 4.1. (continued)

Analysis			Concentration (ppm)*						Measured Isotopic Ratios						Ages (Ma)	
Sample	Number	Grain.Spot	Pb (ppm)	U (ppm)	Th (ppm)	Y ppm	Gd/Yb	Th/U	Pb^{207}/Pb^{206}	2s%	Pb^{206}/U^{238}	2s%	Pb^{208}/Th^{232}	2s%	Pb^{208}/Th^{232}	2s abs
KA044	66	11.2	127	4900	72900	751	788	14.93	0.1176	3.73	0.00439	2.47	0.00123	2.57	24.9	0.6
KA044	67	11.3	129	4380	62700	910	528	14.25	0.1687	3.43	0.00517	2.34	0.00146	2.39	29.4	0.7
KA044	68	11.4	129	4460	69000	684	1083	15.33	0.1101	3.55	0.00466	2.33	0.00133	2.43	26.9	0.7
KA044	69	11.5	146	4740	74300	703	1283	15.56	0.1152	3.56	0.00481	2.29	0.00140	2.29	28.3	0.6
KA044	70	11.6[m]	9	370	5900	-	-	15.57	0.1050	16.47	0.00360	30.61	0.00106	31.19	21.4	6.7
KA055	1	1.1	74	13340	60600	13200	154	4.67	0.0517	3.91	0.00265	2.28	0.00086	2.38	17.5	0.4
KA055	2	1.2	76	12270	60200	9600	194	4.99	0.0521	3.90	0.00272	2.23	0.00089	2.29	18.0	0.4
KA055	3	1.3	82	10370	62600	8600	213	6.20	0.0526	3.77	0.00283	2.22	0.00093	2.32	18.7	0.4
KA055	4	1.4	75	9280	57900	7700	241	6.45	0.0551	3.93	0.00285	2.30	0.00092	2.46	18.7	0.5
KA055	5	1.5	75	9630	60100	7890	237	6.36	0.0512	4.19	0.00277	2.31	0.00089	2.42	18.1	0.4
KA055	6	2.1[x, e]	3	159	483	38	1	2.84	0.1240	46.07	0.00633	8.56	0.00439	14.02	89.0	12.5
KA055	7	2.2[x, e]	9	658	2030	109	201	2.91	0.0728	12.99	0.00437	4.29	0.00338	5.36	68.2	3.7
KA055	8	2.3[x, e]	4	326	1023	80	76	3.00	0.0820	28.21	0.00415	6.98	0.00300	7.24	60.6	4.4
KA055	9	2.4[x, e]	9	672	2020	127	281	2.74	0.0610	16.67	0.00437	4.50	0.00317	5.08	64.1	3.3
KA055	10	2.5[x, e]	9	602	1910	130	166	2.87	0.0690	19.08	0.00529	8.14	0.00333	8.32	67.2	5.6
KA055	11	2.6[x, e]	9	675	1910	74	133	2.56	0.0734	12.62	0.00415	4.92	0.00324	5.56	65.3	3.6
KA055	12	2.7[x, e]	10	678	2180	134	253	2.86	0.0591	12.88	0.00447	5.03	0.00326	5.53	65.7	3.6
KA055	13	3.1	211	14420	143400	3300	276	9.17	0.0550	3.33	0.00351	2.23	0.00109	2.30	22.1	0.5
KA055	14	3.2	138	10920	87200	2930	257	7.59	0.0560	3.59	0.00354	2.42	0.00117	2.47	23.6	0.6
KA055	15	3.3	114	11540	74600	2980	243	6.34	0.0570	3.40	0.00350	2.43	0.00113	2.39	22.7	0.5
KA055	16	3.4	118	10410	78100	3270	347	7.59	0.0589	3.45	0.00349	2.32	0.00112	2.34	22.6	0.5
KA055	17	3.5	134	11060	88500	3590	298	8.32	0.0543	3.46	0.00352	2.31	0.00111	2.40	22.4	0.5
KA055	18	3.6	82	8940	68000	8700	204	8.10	0.0540	3.63	0.00280	2.44	0.00088	2.37	17.8	0.4
KA055	19	3.7	106	9060	71000	4060	274	8.89	0.0624	3.56	0.00342	2.43	0.00108	2.43	21.7	0.5
KA055	20	3.8	89	9980	72800	12200	118	8.27	0.0555	3.60	0.00274	2.27	0.00087	2.38	17.6	0.4
KA055	21	4.1	80	10250	65800	12000	149	7.24	0.0530	3.88	0.00282	2.43	0.00087	2.46	17.5	0.4
KA055	22	4.2	77	7960	58500	5430	227	8.10	0.0557	3.50	0.00306	2.33	0.00094	2.44	19.1	0.5
KA055	23	4.3[m]	6	672	3350	960	54	5.31	0.2140	12.97	0.00325	7.00	0.00131	10.09	26.5	2.7
KA055	24	4.4	109	9650	69700	3220	236	7.73	0.0556	3.59	0.00357	2.26	0.00112	2.29	22.6	0.5
KA055	25	4.5	97	11010	72000	6910	236	6.64	0.0539	3.53	0.00306	2.30	0.00093	2.25	18.9	0.4
KA055	26	4.6	81	12200	68300	12000	162	5.65	0.0536	3.50	0.00267	2.29	0.00083	2.43	16.7	0.4
KA055	27	5.1	124	11610	85100	5800	212	7.39	0.0537	3.46	0.00333	2.32	0.00101	2.37	20.5	0.5

Table 4.1. (continued)

	Analysis		Concentration (ppm)*						Measured Isotopic Ratios						Ages (Ma)	
Sample	Number	Grain.Spot	Pb (ppm)	U (ppm)	Th (ppm)	Y ppm	Gd/Yb	Th/U	Pb^{207}/Pb^{206}	2s%	Pb^{206}/U^{238}	2s%	Pb^{208}/Th^{232}	2s%	Pb^{208}/Th^{232}	2s abs
KA055	28	5.2	85	11990	71900	27400	40	6.20	0.0531	3.76	0.00249	2.49	0.00080	2.55	16.2	0.4
KA055	29	5.3	127	10080	80900	4510	265	8.28	0.0534	3.64	0.00349	2.36	0.00106	2.33	21.4	0.5
KA055	30	5.4[m]	16	2370	12100	8100	40	5.17	0.1070	14.34	0.00276	4.37	0.00091	4.47	18.4	0.8
KA055	31	5.5	129	9970	83000	4260	361	8.65	0.0529	3.76	0.00348	2.22	0.00104	2.28	21.1	0.5
KA055	32	5.6	132	12260	81600	3800	276	7.00	0.0531	3.48	0.00341	2.30	0.00107	2.38	21.6	0.5
KA055	33	6.1	118	13690	72200	3080	288	5.58	0.0544	3.48	0.00339	2.39	0.00110	2.41	22.2	0.5
KA055	34	6.2	124	14200	79800	4380	253	5.92	0.0542	3.52	0.00332	2.39	0.00106	2.39	21.4	0.5
KA055	35	6.3	162	14420	103400	3420	305	7.44	0.0550	3.27	0.00342	2.26	0.00109	2.31	21.9	0.5
KA055	36	6.4	82	16190	72000	16100	99	4.55	0.0525	3.66	0.00250	2.19	0.00080	2.39	16.1	0.4
KA055	37	6.5	146	16540	99980	4800	216	6.07	0.0535	3.37	0.00322	2.28	0.00103	2.30	20.8	0.5
KA055	38	6.6	103	14960	77400	10600	154	5.15	0.0531	3.45	0.00286	2.42	0.00094	2.44	19.1	0.5
KA055	39	7.1	92	7800	59600	2700	314	7.20	0.0664	3.94	0.00359	2.38	0.00115	2.42	23.3	0.6
KA055	40	7.2[m, x]	21	2810	13200	1760	114	4.19	0.1056	5.69	0.00312	2.88	0.00125	3.37	25.1	0.8
KA055	41	7.3[m, x]	4	390	750	-	-	1.83	0.1620	23.04	0.00327	11.46	0.00306	18.39	62.0	11.4
KA055	42	7.4[m, x]	7	169	260	-	-	1.39	0.1790	27.54	0.00400	32.55	0.00409	14.54	83.0	12.1
KA055	43	7.5	111	10150	73700	2770	244	7.10	0.0600	3.91	0.00355	2.30	0.00113	2.33	22.9	0.5
KA055	44	7.6[x]	15	340	2100	3	4	7.69	0.0490	100.04	0.00160	100.02	0.00060	100.02	12.0	12.0
KA055	45	8.1	68	10120	52000	18400	29	5.20	0.0686	4.29	0.00280	2.74	0.00093	2.75	18.8	0.5
KA055	46	8.2	45	6630	37900	7460	140	5.89	0.0925	4.34	0.00263	2.76	0.00085	2.81	17.2	0.5
KA055	47	8.3	95	15070	80700	5860	78	5.54	0.0537	3.63	0.00266	2.47	0.00084	2.49	17.0	0.4
KA055	48	8.4	81	11800	67200	11050	132	6.04	0.0588	4.05	0.00264	2.56	0.00083	2.67	16.8	0.4
KA055	49	8.5	97	13870	75900	8700	142	5.78	0.0571	3.77	0.00273	2.27	0.00088	2.30	17.8	0.4
KA055	50	8.6	62	8040	43900	9060	180	5.76	0.0594	4.26	0.00286	2.79	0.00098	2.83	19.8	0.6
KA055	51	9.1	117	15660	84100	11400	129	5.79	0.0575	3.76	0.00279	2.47	0.00092	2.54	18.5	0.5
KA055	52	9.2	123	18330	97600	16300	91	5.71	0.0663	4.25	0.00261	2.42	0.00083	2.50	16.8	0.4
KA055	53	9.3	36	4350	23800	3500	142	5.94	0.0685	5.80	0.00295	3.12	0.00100	3.36	20.2	0.7
KA055	54	9.4	142	11990	81300	3640	293	7.28	0.0577	3.65	0.00359	2.42	0.00115	2.42	23.2	0.6
KA055	55	9.5[x]	23	1350	11900	560	173	9.79	0.0728	11.13	0.00539	11.83	0.00130	7.62	26.2	2.0
KA055	56	9.6	59	9490	45100	9300	68	5.03	0.0748	5.90	0.00278	3.55	0.00087	4.21	17.6	0.7
KA055	57	9.7	116	14830	87300	9600	115	5.92	0.0561	3.58	0.00285	2.40	0.00091	2.62	18.5	0.5
KA055	58	10.1	130	13740	102200	9700	173	7.41	0.0572	3.46	0.00286	2.32	0.00089	2.43	18.0	0.4
KA055	59	10.2	209	21210	135300	4690	205	6.34	0.0545	3.42	0.00342	2.28	0.00108	2.21	21.7	0.5
KA055	60	10.3	213	21920	137900	4660	225	6.22	0.0538	3.37	0.00341	2.20	0.00109	2.31	21.9	0.5

Table 4.1. (continued)

Analysis			Concentration (ppm)*						Measured Isotopic Ratios						Ages (Ma)	
Sample	Number	Grain.Spot	Pb (ppm)	U (ppm)	Th (ppm)	Y ppm	Gd/Yb	Th/U	Pb^{207}/Pb^{206}	2s%	Pb^{206}/U^{238}	2s%	Pb^{208}/Th^{232}	2s%	Pb^{208}/Th^{232}	2s abs
KA055	61	10.4	187	19210	127300	4350	179	6.42	0.0547	3.42	0.00336	2.41	0.00105	2.52	21.2	0.5
KA055	62	10.5	175	16290	114200	4730	272	6.81	0.0533	3.46	0.00350	2.35	0.00111	2.40	22.5	0.5
KA058B	1	1.1[e]	33	4060	23700	-	#VALUE!	5.53	0.1250	26.57	0.00357	8.32	0.00125	8.99	25.3	2.3
KA058B	2	1.2[m]	19	2590	13500	1860	345	4.86	0.1225	4.93	0.00310	2.84	0.00112	2.97	22.6	0.7
KA058B	3	1.3	70	11620	46100	2820	983	3.83	0.0554	3.81	0.00343	2.32	0.00117	2.46	23.7	0.6
KA058B	4	1.4	110	18910	70500	3800	684	3.67	0.0516	3.42	0.00353	2.22	0.00118	2.45	23.9	0.6
KA058B	5	1.5	89	14580	62600	3630	614	4.27	0.0543	3.62	0.00330	2.19	0.00107	2.50	21.7	0.5
KA058B	6	1.6[m]	1	659	272	66	13	0.21	0.0920	17.65	0.00342	4.47	0.00109	85.34	22.0	18.8
KA058B	7	2.1	149	21970	97800	4480	584	4.37	0.0552	3.60	0.00349	2.09	0.00115	2.42	23.3	0.6
KA058B	8	2.2	68	11320	52800	6560	257	4.48	0.0782	3.78	0.00294	2.52	0.00094	2.67	19.0	0.5
KA058B	9	3.1[Grt]	209	24080	108300	5610	294	4.27	0.0529	3.23	0.00460	3.72	0.00145	2.98	29.3	0.9
KA058B	10	3.2[Grt]	240	26350	115500	5410	353	4.12	0.1409	4.92	0.00463	3.71	0.00173	3.33	34.9	1.2
KA058B	11	3.3[Grt]	168	24360	112100	4810	708	4.23	0.0512	3.33	0.00351	2.13	0.00110	2.19	22.3	0.5
KA058B	12	3.4[Grt]	166	25570	112300	5360	661	3.99	0.0522	3.37	0.00347	2.12	0.00108	2.16	21.8	0.5
KA058B	13	4.1[i]	796	17210	133400	8060	119	7.23	0.0604	3.39	0.01093	3.83	0.00496	5.56	100.1	5.6
KA058B	14	4.2	199	8120	73100	3540	323	8.55	0.1070	3.86	0.00633	2.50	0.00203	3.52	41.0	1.4
KA058B	15	4.3[i]	667	15240	109800	7200	232	7.04	0.0595	3.39	0.01220	2.61	0.00482	2.75	97.1	2.7
KA058B	16	4.4[i]	636	12530	109600	8910	151	8.69	0.0588	3.16	0.01380	8.88	0.00416	8.85	84.7	7.5
KA058B	17	5.1[m, e]	15	2283	7070	1140	261	3.09	0.1134	4.97	0.00313	3.95	0.00155	5.30	31.3	1.7
KA058B	18	5.2[i]	462	4010	13450	3240	65	3.49	0.0575	3.18	0.05570	4.02	0.02380	5.37	476.0	25.6
KA058B	19	5.3[i]	1264	4860	29810	7700	24	6.54	0.0589	3.06	0.08010	2.60	0.02991	3.31	596.0	19.7
KA058B	20	5.4[i]	1245	6660	35000	9700	29	5.51	0.0602	3.05	0.06670	2.44	0.02521	2.92	503.0	14.7
KA058B	21	5.5[i]	832	8220	42500	6300	54	5.38	0.0583	3.09	0.03640	3.76	0.01378	3.50	276.6	9.7
KA058B	22	5.6[i]	1281	2870	29200	9100	38	10.60	0.0647	3.08	0.08380	2.54	0.03114	2.96	620.0	18.4
KA058B	23	5.7[i]	772	1557	15560	6460	23	10.40	0.0627	3.33	0.08670	2.93	0.03460	3.41	687.0	23.4
KA058B	24	5.8[i]	999	2312	18120	5400	25	7.98	0.0601	3.13	0.08780	2.90	0.04030	3.72	797.0	29.6
KA058B	25	6.1	283	28940	110900	5380	616	3.95	0.0537	3.22	0.00541	2.57	0.00181	2.97	36.5	1.1
KA058B	26	6.2	83	14280	58200	3740	448	4.21	0.0991	4.33	0.00314	2.42	0.00101	2.50	20.4	0.5
KA058B	27	6.3[i]	1140	22010	110400	12000	114	5.20	0.0565	3.05	0.02040	7.09	0.00714	7.51	144.0	10.8

Table 4.1. (continued)

Analysis			Concentration (ppm)*						Measured Isotopic Ratios						Ages (Ma)	
Sample	Number	Grain.Spot	Pb (ppm)	U (ppm)	Th (ppm)	Y ppm	Gd/Yb	Th/U	Pb^{207}/Pb^{206}	2s%	Pb^{206}/U^{238}	2s%	Pb^{208}/Th^{232}	2s%	Pb^{208}/Th^{232}	2s abs
KA058B	28	6.4[i]	929	31470	128200	9500	136	4.22	0.0562	3.17	0.01332	3.44	0.00536	3.35	108.0	3.6
KA058B	29	6.5[m]	11	1193	4070	230	299	3.42	0.2190	7.48	0.00411	4.51	0.00200	5.80	40.4	2.3
KA058B	30	6.6	61	10850	44600	3660	473	4.25	0.0998	4.32	0.00288	2.36	0.00097	2.48	19.5	0.5
KA058B	31	7.1[Grt]	3070	21030	100000	16000	38	4.79	0.0580	3.04	0.06940	2.60	0.02345	2.73	468.5	12.8
KA058B	32	8.1[x]	958	15820	147400	7200	195	9.46	0.1422	5.82	0.02670	3.06	0.00499	2.88	100.6	2.9
KA058B	33	8.2[i]	3310	27950	103600	28900	29	3.67	0.0595	3.01	0.07340	2.26	0.02264	2.44	452.6	11.0
KA058B	34	8.3[i]	1678	6200	56900	13200	87	9.00	0.0613	3.19	0.07580	2.77	0.01979	2.89	396.0	11.5
KA058B	35	8.4	165	18940	100100	6400	331	5.10	0.0717	3.58	0.00410	2.86	0.00112	2.77	22.6	0.6
KA058B	36	8.5[m, x]	255	3690	83400	4470	298	20.58	0.1561	5.03	0.02670	6.26	0.00217	4.49	43.9	2.0
KA058B	37	9.1[i]	3233	31520	128300	15300	52	4.19	0.0579	3.05	0.06200	3.15	0.02017	4.11	404.0	16.6
KA058B	38	9.2	271	23500	124900	4210	699	5.83	0.0535	3.28	0.00427	2.92	0.00146	5.14	29.5	1.5
KA058B	39	9.3	164	27060	107200	5220	835	4.33	0.0566	3.57	0.00340	2.18	0.00108	2.43	21.8	0.5
KA058B	40	9.4	91	15310	56900	8090	132	4.11	0.1588	4.00	0.00331	2.49	0.00115	2.54	23.1	0.6
KA058B	41	10.1	285	26630	129300	4000	442	5.54	0.0537	3.24	0.00540	4.97	0.00151	5.23	30.5	1.6
KA058B	42	10.2[i]	1931	35560	129500	13300	95	4.13	0.0567	3.06	0.03600	4.29	0.01128	4.08	226.6	9.2
KA058B	43	10.3[i]	736	26520	126900	8400	126	5.65	0.0571	3.11	0.01050	6.26	0.00424	6.86	85.5	5.9
KA058B	44	10.4	84	11550	48600	1860	212	4.90	0.0937	4.47	0.00364	3.52	0.00136	2.94	27.4	0.8
KA058B	45	10.5	78	17380	60900	3480	634	3.95	0.0639	3.62	0.00291	2.37	0.00095	2.51	19.1	0.5
KA058B	46	10.6	114	21760	82300	3660	860	4.25	0.0524	3.43	0.00317	2.29	0.00102	2.49	20.5	0.5
KA058B	47	10.7	102	16800	80200	7700	413	5.18	0.0948	7.68	0.00296	2.36	0.00092	2.54	18.6	0.5
KA064A	7	1.1	98	3210	69900	27500	73	11.25	0.0672	4.44	0.00330	2.19	0.00101	2.15	20.5	0.4
KA064A	8	1.2	86	3070	62000	29400	71	10.69	0.0661	4.83	0.00333	2.12	0.00102	2.14	20.6	0.4
KA064A	9	1.3	93	3318	67200	29900	71	11.05	0.0650	4.41	0.00331	2.22	0.00102	2.14	20.7	0.4
KA064A	10	1.4	99	3090	70300	28400	63	12.97	0.0671	4.90	0.00337	2.19	0.00103	2.24	20.9	0.5
KA064A	11	1.5	102	3290	72900	30000	72	13.17	0.0638	4.57	0.00330	2.17	0.00103	2.19	20.7	0.5
KA064A	12	1.6	95	3104	67700	26300	73	13.62	0.0609	4.82	0.00328	2.21	0.00103	2.29	20.8	0.5
KA064A	1	2.1	106	6100	38700	13100	220	4.59	0.0611	3.36	0.00627	2.08	0.00197	2.11	39.7	0.8
KA064A	2	2.2	115	7490	42900	14600	190	3.81	0.0585	3.26	0.00614	2.00	0.00192	2.10	38.7	0.8
KA064A	3	2.3	122	7850	44200	16500	186	3.54	0.0580	3.29	0.00626	2.15	0.00198	2.27	40.1	0.9
KA064A	4	2.4	111	6770	41500	17400	174	3.59	0.0562	3.79	0.00607	2.44	0.00191	2.33	38.6	0.9
KA064A	5	2.5[m]	15	415	6150	10340	33	8.47	0.3660	6.72	0.00621	3.55	0.00183	3.30	36.9	1.2

Table 4.1. (continued)

Analysis			Concentration (ppm)*						Measured Isotopic Ratios						Ages (Ma)	
Sample	Number	Grain.Spot	Pb (ppm)	U (ppm)	Th (ppm)	Y ppm	Gd/Yb	Th/U	Pb^{207}/Pb^{206}	2s%	Pb^{206}/U^{238}	2s%	Pb^{208}/Th^{232}	2s%	Pb^{208}/Th^{232}	2s abs
KA064A	6	2.6^{m}	138	9620	46000	16800	151	2.62	0.0572	3.47	0.00617	2.18	0.00222	2.40	44.9	1.1
KA064A	13	3.1^{Grt}	61	2293	35400	13900	58	12.17	0.0822	4.36	0.00362	2.22	0.00124	2.25	25.1	0.6
KA064A	14	3.1^{Grt}	295	5280	113500	8310	385	17.82	0.0697	3.61	0.00628	2.25	0.00191	2.27	38.5	0.9
KA064A	15	3.1^{Grt}	124	2433	49300	4260	105	17.73	0.0716	5.98	0.00573	2.90	0.00185	3.28	37.3	1.2
KA064A	16	3.1^{Grt}	52	1569	24660	7930	68	14.64	0.0704	10.39	0.00411	3.64	0.00154	3.24	31.1	1.0
KA064A	17	$3.1^{Grt, i}$	646	3770	86100	10200	112	22.43	0.0591	3.23	0.02790	4.01	0.00524	4.07	105.6	4.3
KA064A	18	$3.1^{Grt, i}$	347	6960	9980	24300	45	1.43	0.0580	3.03	0.07585	2.09	0.02489	2.14	496.8	10.7
KA064A	19	4.1^{i}	2215	6360	119900	22040	82	19.32	0.0587	3.10	0.03961	2.56	0.01338	2.43	268.6	6.5
KA064A	20	4.2	182	5566	82600	20600	116	17.70	0.0658	3.68	0.00488	4.10	0.00153	3.82	30.8	1.2
KA064A	21	4.3	221	4460	80700	6220	644	22.15	0.0665	3.66	0.00646	2.09	0.00194	2.12	39.1	0.8
KA064A	22	4.4	227	4750	86000	6460	510	22.34	0.0650	3.44	0.00634	2.06	0.00190	2.13	38.3	0.8
KA064A	23	4.5	226	4610	84100	6930	570	22.83	0.0659	3.59	0.00647	2.15	0.00193	2.12	38.9	0.8
KA064A	24	4.6	237	4830	87700	6570	503	22.72	0.0649	3.70	0.00646	2.20	0.00194	2.20	39.2	0.9
KA064A	25	4.7	202	4900	78000	11700	272	20.05	0.0644	3.70	0.00618	2.16	0.00185	2.26	37.4	0.8
KA064A	26	4.8	133	6820	73700	27800	101	13.68	0.0640	3.71	0.00428	2.16	0.00130	2.27	26.2	0.6
KA064A	27	4.9	95	2973	69000	23500	146	29.55	0.0591	5.61	0.00335	2.14	0.00098	2.16	19.9	0.4
KA064A	28	4.10	105	5860	64900	29500	100	13.99	0.0630	3.73	0.00390	2.27	0.00117	2.25	23.7	0.5
KA064A	29	4.11	129	6950	70600	26500	118	12.73	0.0620	3.57	0.00429	2.11	0.00131	2.18	26.5	0.6
KA064A	30	4.12	181	4660	67400	8400	440	18.12	0.0616	3.58	0.00642	2.22	0.00192	2.20	38.9	0.9
KA064A	31	5.1	89	2962	65200	20700	181	27.55	0.0567	5.63	0.00335	2.32	0.00098	2.34	19.8	0.5
KA064A	32	5.2	53	1573	33560	8400	187	26.38	0.2251	5.07	0.00477	3.27	0.00113	2.89	22.7	0.7
KA064A	33	5.3	116	6550	56200	23100	99	10.55	0.0631	3.47	0.00464	2.28	0.00145	2.35	29.4	0.7
KA064A	34	5.4	138	4280	51200	5500	429	14.64	0.0648	4.42	0.00639	2.72	0.00197	2.71	39.8	1.1
KA064A	35	5.5	146	4330	54100	5960	501	15.36	0.0664	3.43	0.00630	2.25	0.00191	2.21	38.6	0.9
KA064A	36	5.6	127	6950	60000	13400	189	10.65	0.0642	5.17	0.00473	2.94	0.00149	2.99	30.1	0.9
KA064A	37	6.1	98	6300	50500	24200	93	9.64	0.0606	3.42	0.00435	2.27	0.00137	2.36	27.6	0.7
KA064A	38	6.2	85	3480	59100	30500	77	18.48	0.0661	4.48	0.00335	2.26	0.00102	2.25	20.5	0.5
KA064A	39	6.3	85	3690	59100	32300	74	16.20	0.0641	4.33	0.00334	2.34	0.00103	2.24	20.7	0.5
KA064A	40	6.4	81	3640	56900	31600	69	15.07	0.0649	4.30	0.00334	2.16	0.00102	2.19	20.7	0.5
KA064A	41	6.5	76	3740	54000	32200	70	13.27	0.0624	4.27	0.00332	2.29	0.00102	2.25	20.5	0.5
KA064A	42	6.6	85	3570	64000	18800	94	15.78	0.0629	6.60	0.00321	3.03	0.00097	2.85	19.5	0.6
KA064A	43	7.1	65	3177	42400	27100	69	11.30	0.0648	4.77	0.00346	2.33	0.00109	2.30	22.1	0.5
KA064A	44	7.2	50	2692	31100	17100	60	9.15	0.1066	3.81	0.00434	2.40	0.00118	2.51	23.9	0.6

Table 4.1. (continued)

Analysis			Concentration (ppm)*						Measured Isotopic Ratios						Ages (Ma)	
Sample	Number	Grain.Spot	Pb (ppm)	U (ppm)	Th (ppm)	Y ppm	Gd/Yb	Th/U	Pb^{207}/Pb^{206}	2s%	Pb^{206}/U^{238}	2s%	Pb^{208}/Th^{232}	2s%	Pb^{208}/Th^{232}	2s abs
KA064A	45	7.3	99	6280	48600	22000	103	6.23	0.0611	3.36	0.00498	2.41	0.00150	2.44	30.4	0.7
KA064A	46	7.4	120	6240	49900	15700	197	6.61	0.0611	3.42	0.00559	2.36	0.00177	2.47	35.7	0.9
KA064A	47	7.5	113	6230	44000	16000	169	5.90	0.0615	3.49	0.00578	2.48	0.00189	2.44	38.2	0.9
KA064A	48	7.6	107	5730	41500	12900	220	6.08	0.0624	3.48	0.00597	2.83	0.00193	2.67	38.9	1.0
KA064A	49	8.1	105	4780	38100	9070	366	6.70	0.0606	3.51	0.00646	2.20	0.00205	2.27	41.5	0.9
KA064A	50	8.2	67	2747	48700	14800	238	13.27	0.0684	5.31	0.00328	2.42	0.00103	2.36	20.7	0.5
KA064A	51	8.3	93	7330	45900	23900	103	4.55	0.0605	3.43	0.00466	2.42	0.00151	2.48	30.5	0.8
KA064A	52	8.4	100	7690	48300	27100	99	4.49	0.0606	3.31	0.00467	2.28	0.00154	2.38	31.0	0.7
KA064A	53	8.5	94	7490	47400	28000	99	4.45	0.0588	3.45	0.00454	2.30	0.00148	2.33	29.9	0.7
KA064A	54	8.6	86	7530	46900	26000	96	4.44	0.0603	3.51	0.00424	2.33	0.00138	2.35	27.9	0.7
KA064A	55	8.7	82	7030	45000	24400	88	4.68	0.0598	3.70	0.00424	2.23	0.00138	2.27	27.8	0.6
KA064A	56	8.8	104	7360	53000	24300	104	6.97	0.0611	3.59	0.00454	2.31	0.00146	2.34	29.5	0.7
KA064A	57	8.9	119	6950	55500	22500	110	8.33	0.0603	3.43	0.00487	2.41	0.00158	2.39	32.0	0.8
KA064A	58	8.1	138	6590	58100	23900	102	9.96	0.0593	3.39	0.00532	2.37	0.00173	2.46	34.9	0.9
KA064A	59	8.11	142	4320	51800	8980	206	14.14	0.0622	3.75	0.00618	2.41	0.00200	2.45	40.3	1.0
KA064A	60	8.12	146	6650	61600	24900	94	11.31	0.0591	3.44	0.00518	2.26	0.00170	2.33	34.3	0.8
KA064A	61	9.1	174	5960	68700	17900	129	14.33	0.0620	3.41	0.00552	2.39	0.00180	2.49	36.4	0.9
KA064A	62	9.2	170	6870	73500	23600	104	12.99	0.0623	3.48	0.00516	2.41	0.00164	2.48	33.0	0.8
KA064A	63	9.3	119	2875	78900	25500	114	31.35	0.0904	9.13	0.00357	2.54	0.00106	2.33	21.5	0.5
KA064A	64	9.4	167	7790	81200	27500	88	11.46	0.0608	3.50	0.00462	2.48	0.00146	2.52	29.5	0.7
KA064A	65	9.5	202	6830	83600	20400	120	13.09	0.0601	3.42	0.00535	2.49	0.00170	2.52	34.3	0.9
KA064A	66	9.6	138	5520	83400	27900	87	15.56	0.0687	3.63	0.00372	2.29	0.00116	2.42	23.4	0.6
KA064A	67	10.1	133	3160	92100	18300	144	29.03	0.0660	4.60	0.00338	2.47	0.00101	2.44	20.3	0.5
KA064A	68	10.2	125	3350	85000	23700	75	22.46	0.0656	4.97	0.00339	2.50	0.00104	2.47	20.9	0.5
KA064A	69	10.3	132	3480	91200	25800	77	22.85	0.0660	4.95	0.00337	2.47	0.00102	2.42	20.7	0.5
KA064A	70	10.4	131	3480	90700	26700	75	22.71	0.0640	4.45	0.00339	2.46	0.00103	2.55	20.8	0.5
KA064A	71	10.5	242	5380	89600	10800	265	14.44	0.0628	3.47	0.00620	2.39	0.00193	2.48	39.0	1.0
KA064A	72	11.1[Grt, m]	186	7120	83100	24000	94	10.04	0.0599	3.52	0.00516	2.41	0.00160	2.55	32.3	0.8

* concentrations normalized to the primary standard

[m] missed grain

[x] high error/ strongly discordant

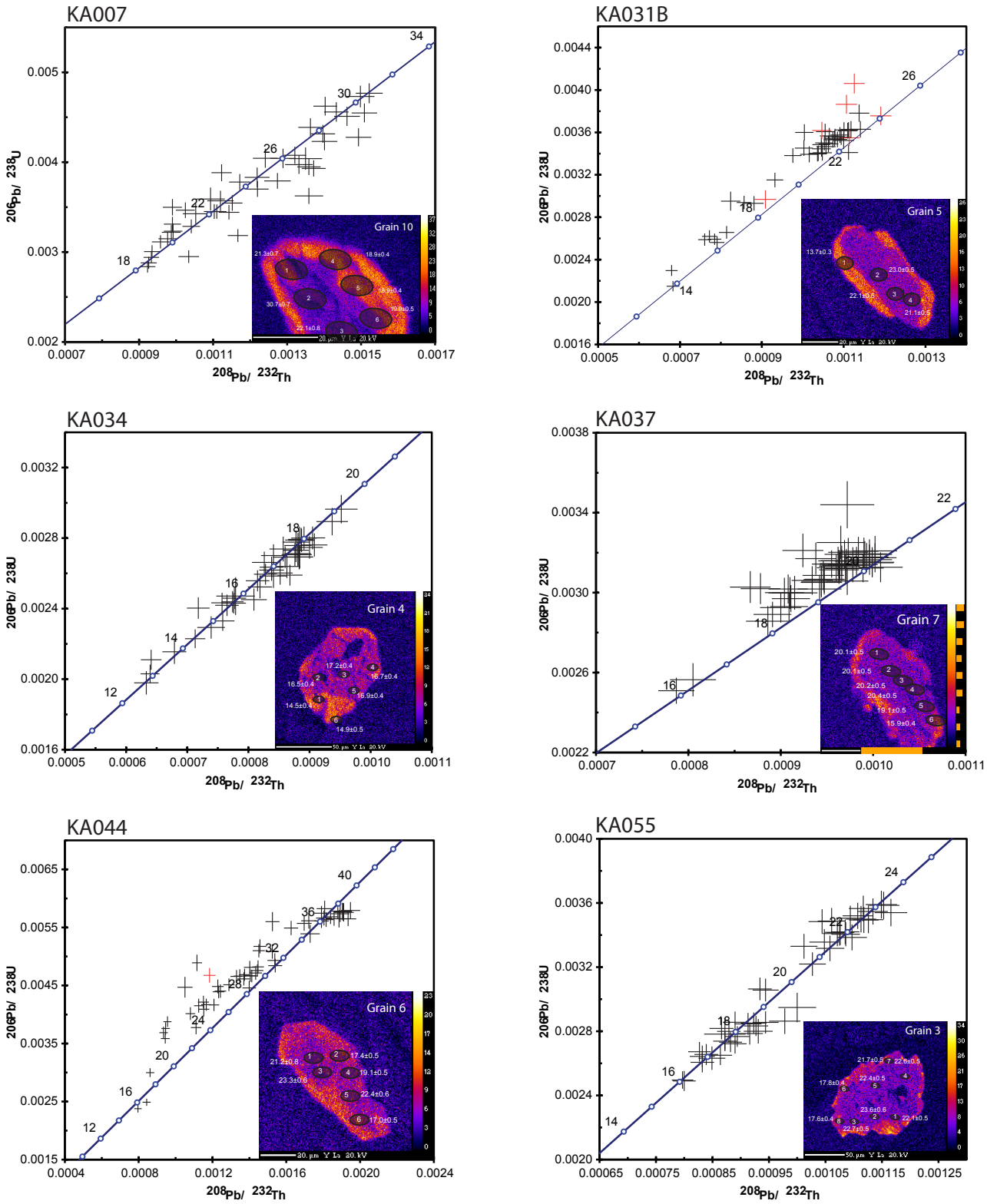
[fx] fracture

[e] instrument error

[ell] elliptical spot

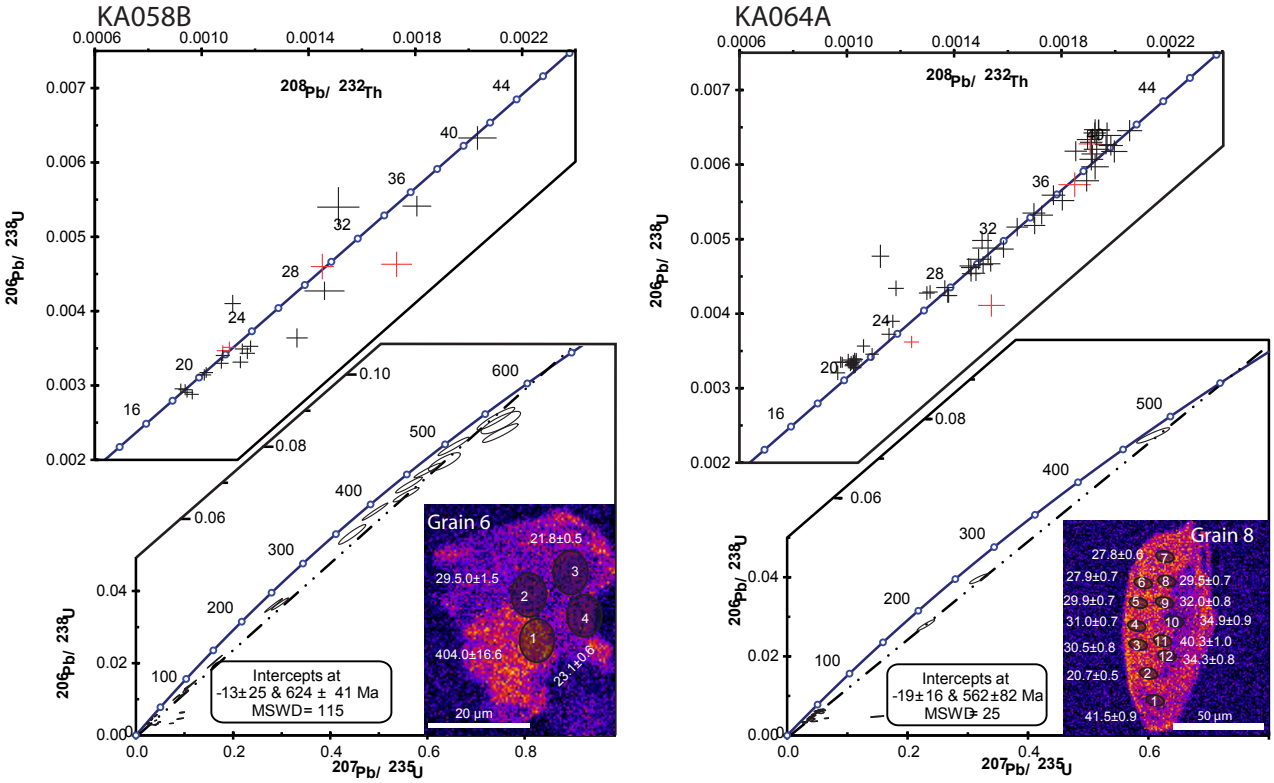
[Grt] grain included in garnet

[I] inherited age

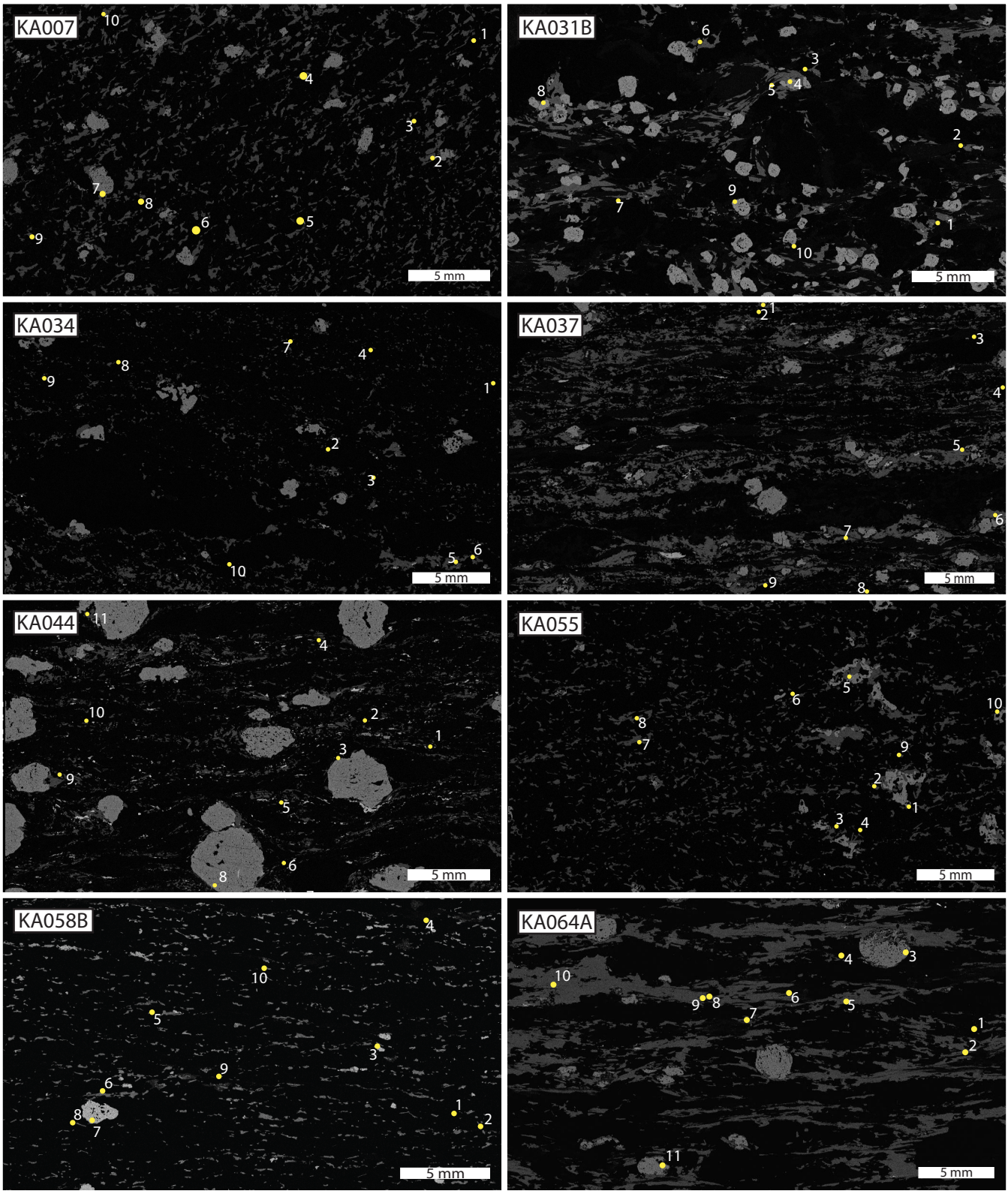


Concordia diagrams, with analyses from grains included in garnet shown as red, and representative monazite maps (Y) showing pit locations and dates.

e

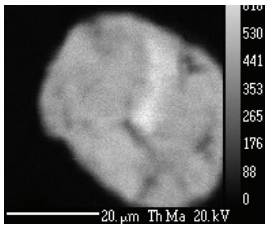
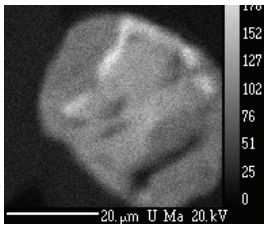
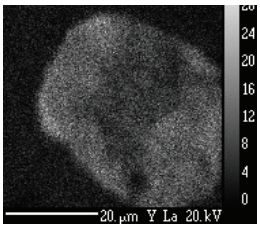
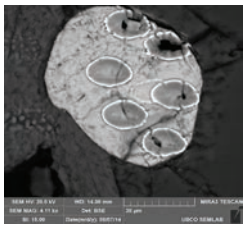


Concordia diagrams, with analyses from grains included in garnet shown as red, and representative monazite maps (Y) showing pit locations and dates.



Location of monazite grains on iron EMP map.

Monazite Elemental Maps and BSE Images

Thorium	Uranium	Yttrium	BSE
			
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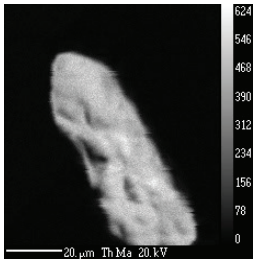	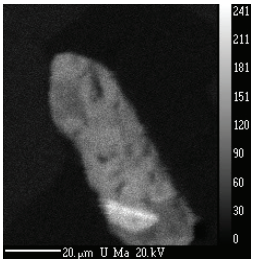	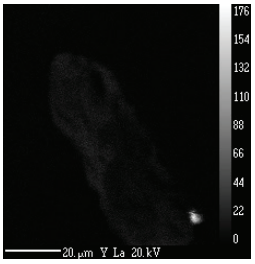	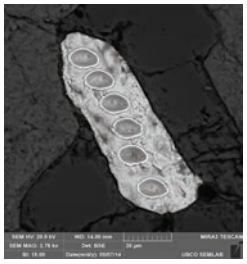
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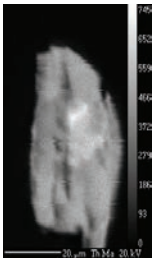	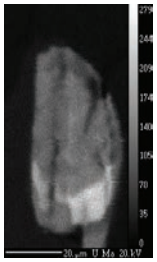	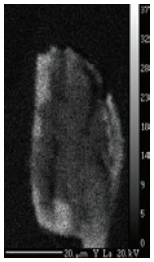	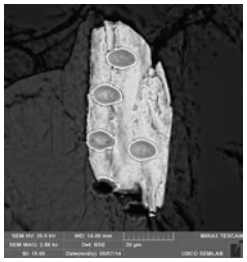
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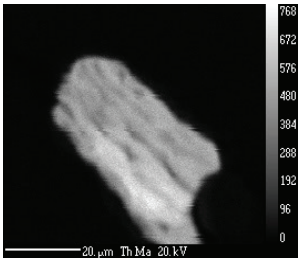	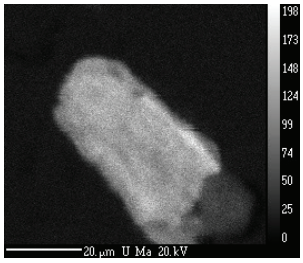	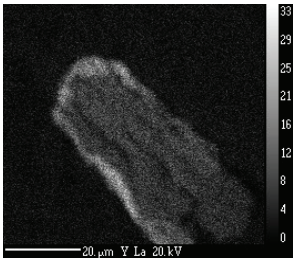	
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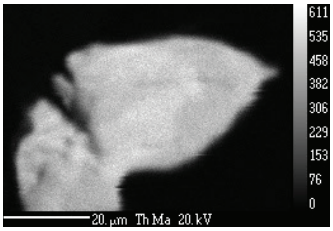
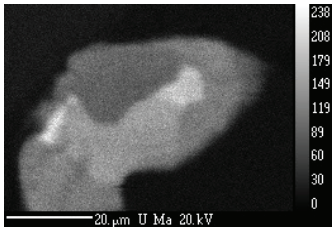
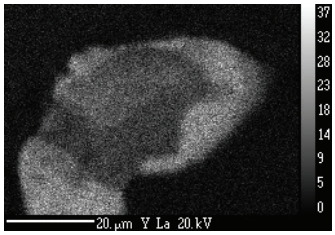
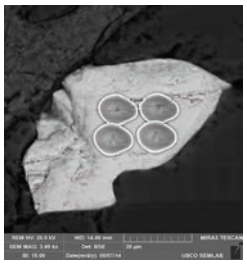
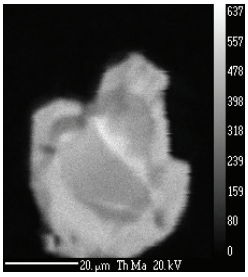
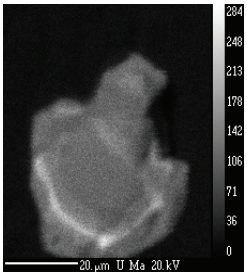
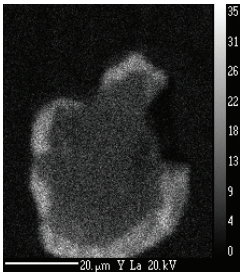
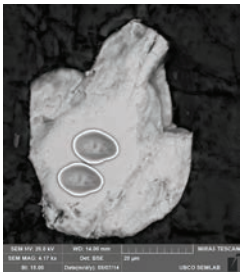
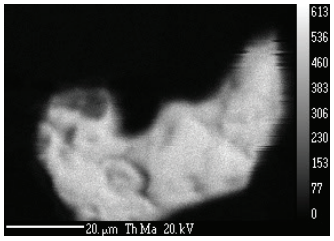
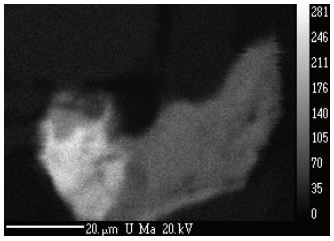
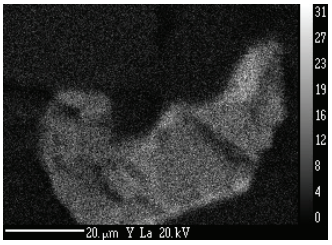
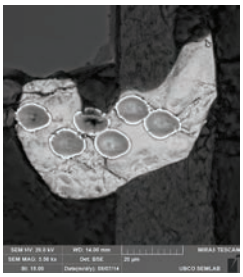
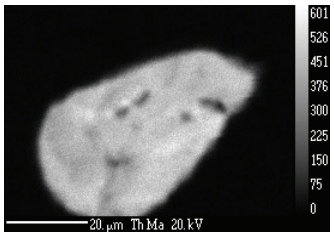
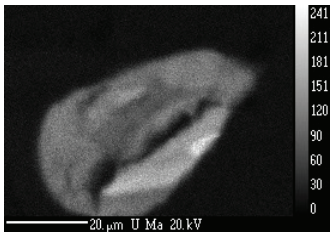
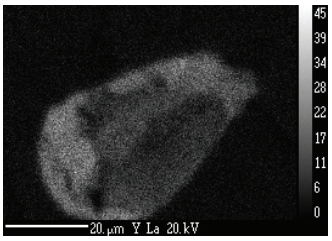
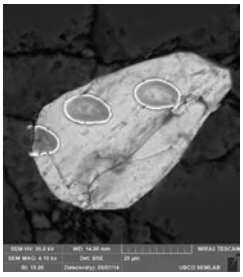
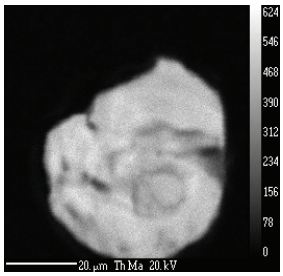
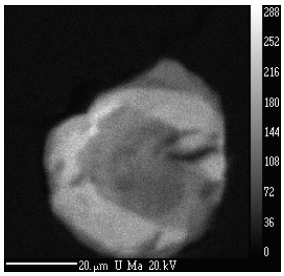
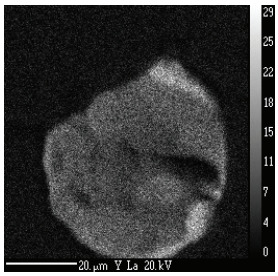
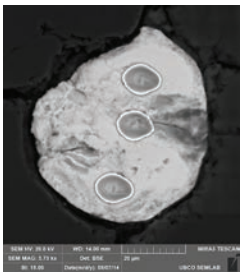
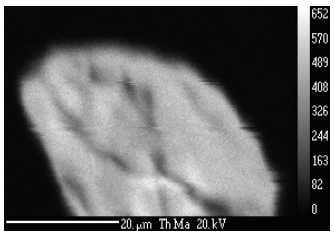
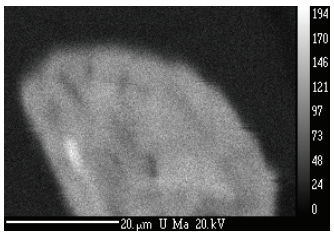
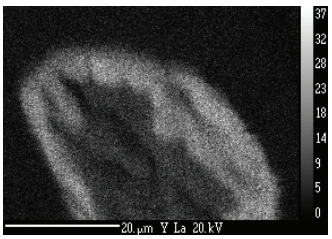
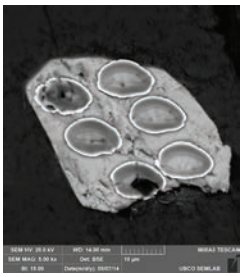
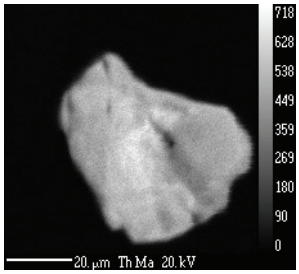
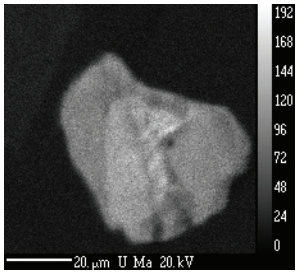
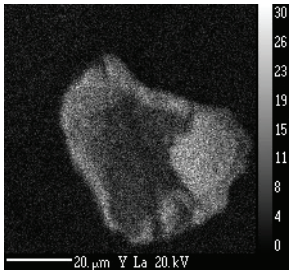
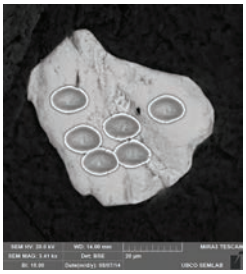
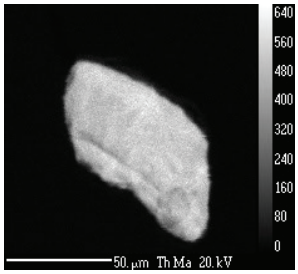
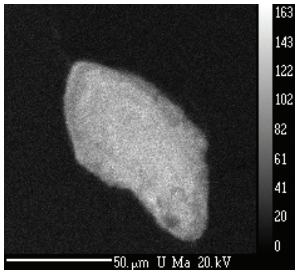
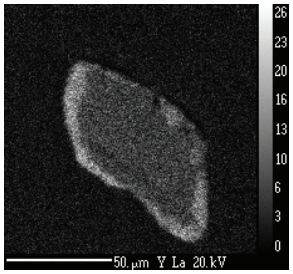
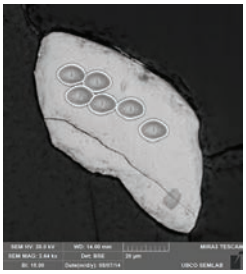
			
KA007_ds5_Th Ma_it2	KA007_ds5_U Ma_it3	KA007_ds5_Y La_it4	KA007_ds5

Figure C.1. Monazite Th, U and Y element maps, and BSE images.

Thorium	Uranium	Yttrium	BSE
			
KA007_ds6_Th Ma_it2	KA007_ds6_U Ma_it3	KA007_ds6_Y La_it4	KA007_ds6
			
KA007_ds7_Th Ma_it2	KA007_ds7_U Ma_it3	KA007_ds7_Y La_it4	KA007_ds7
			
KA007_ds8_Th Ma_it2	KA007_ds8_U Ma_it3	KA007_ds8_Y La_it4	KA007_ds8
			
KA007_ds9_Th Ma_it2	KA007_ds9_U Ma_it3	KA007_ds9_Y La_it4	KA007_ds9
			
KA007_ds10_Th Ma_it2	KA007_ds10_U Ma_it3	KA007_ds10_Y La_it4	KA007_ds10

Thorium	Uranium	Yttrium	BSE
			
KA031B_ds1_Th Ma_it2	KA031B_ds1_U Ma_it3	KA031B_ds1_Y La_it4	KA031B_ds1
			
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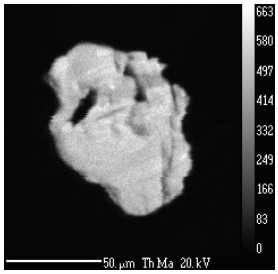
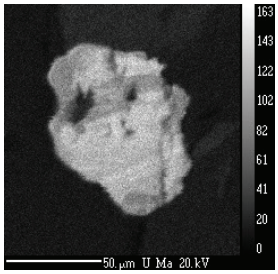
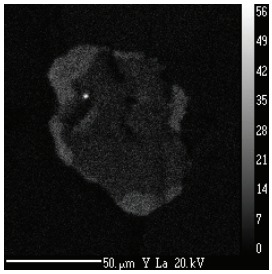
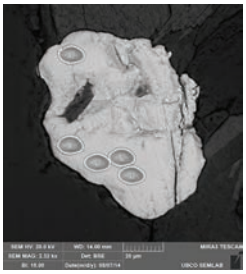
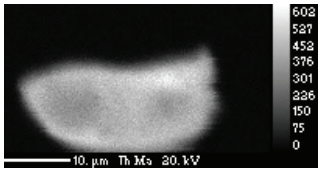
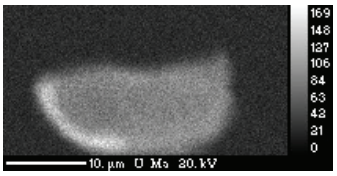
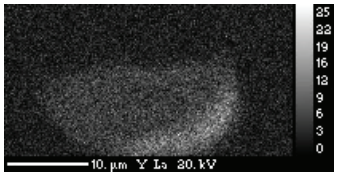
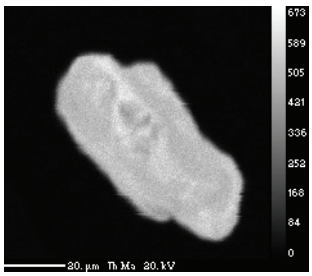
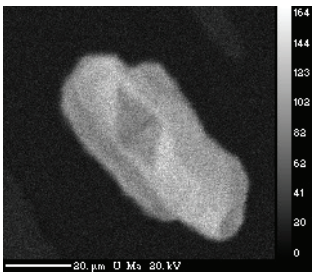
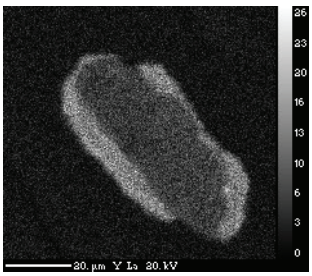
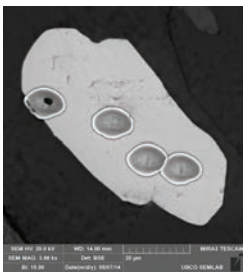
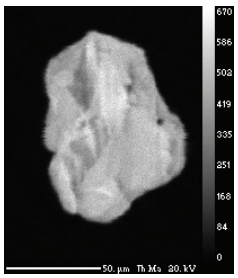
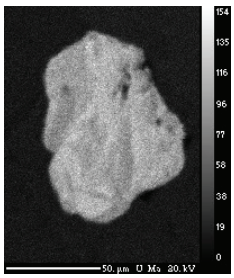
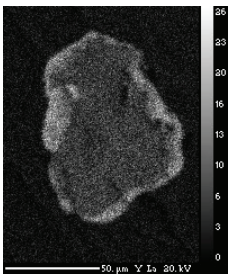
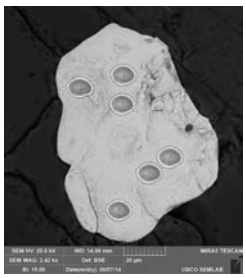
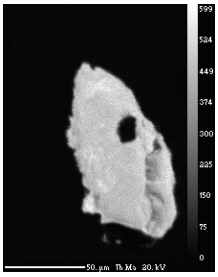
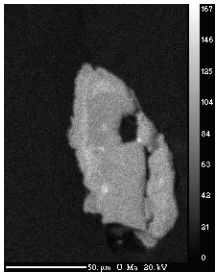
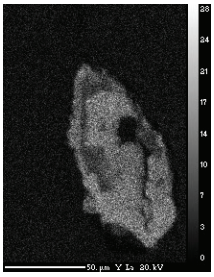
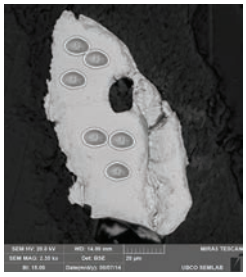
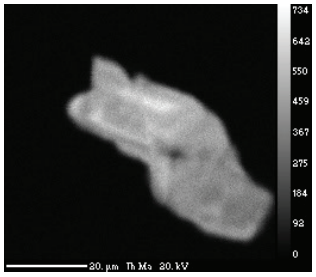
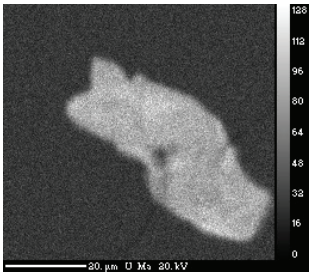
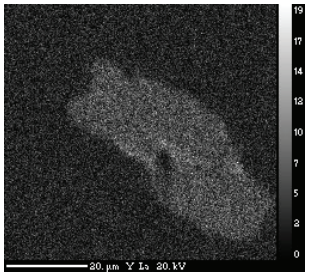
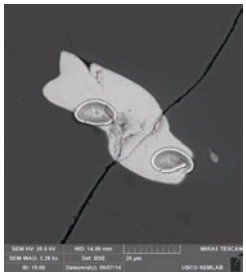
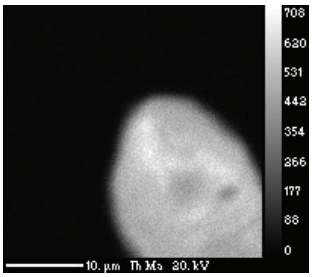
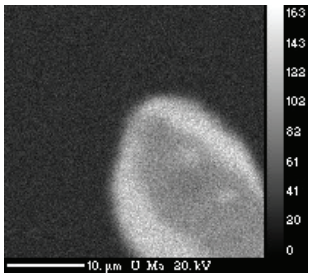
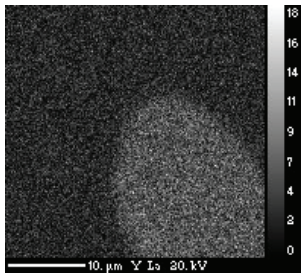
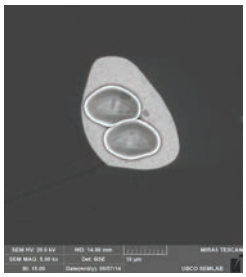
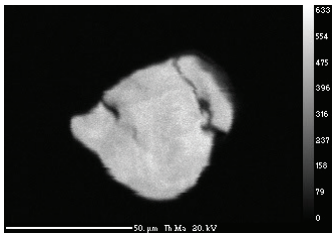
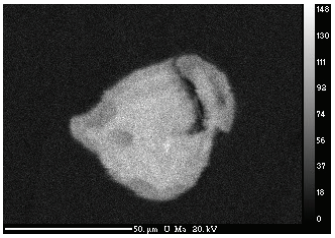
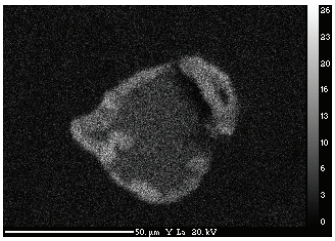
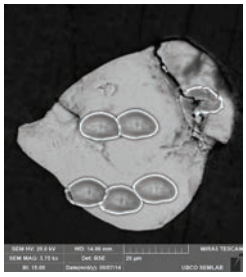
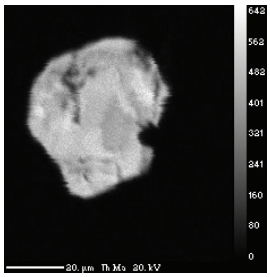
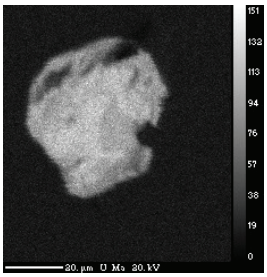
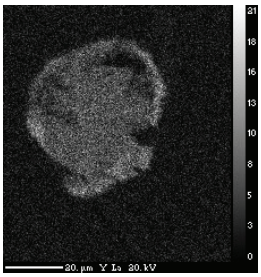
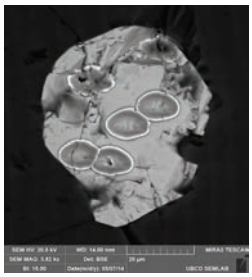
			
KA031B_ds3_Th Ma_it2	KA031B_ds3_U Ma_it3	KA031B_ds3_Y La_it4	KA031b_ds3
			
KA031B_ds4_Th Ma_it2	KA031B_ds4_U Ma_it3	KA031B_ds4_Y La_it4	KA031B_ds4
			
KA031B_ds5_Th Ma_it2	KA031B_ds5_U Ma_it3	KA031B_ds5_Y La_it4	KA031B_ds5

Thorium	Uranium	Yttrium	BSE
			
KA031B_ds6_Th Ma_it2	KA031B_ds6_U Ma_it3	KA031B_ds6_Y La_it4	KA031B_ds6
			
KA031B_ds7_Th Ma_it2	KA031B_ds7_U Ma_it3	KA031B_ds7_Y La_it4	KA031b_ds7
			
KA031B_ds8_Th Ma_it2	KA031B_ds8_U Ma_it3	KA031B_ds8_Y La_it4	KA031b_ds8
			
KA031B_ds9_Th Ma_it2	KA031B_ds9_U Ma_it3	KA031B_ds9_Y La_it4	KA031b_ds9
			
KA031B_ds10_Th Ma_it2	KA031B_ds10_U Ma_it3	KA031B_ds10_Y La_it4	KA031B_ds10

Thorium	Uranium	Yttrium	BSE
			
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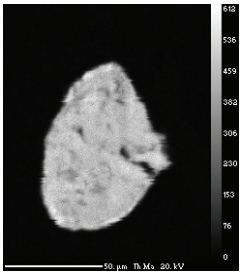
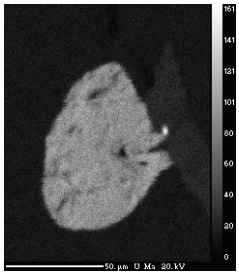
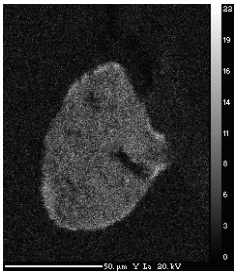
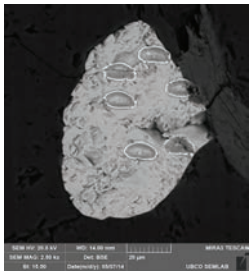
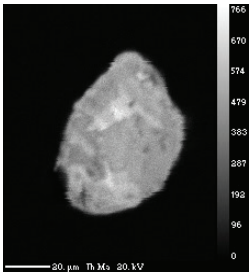
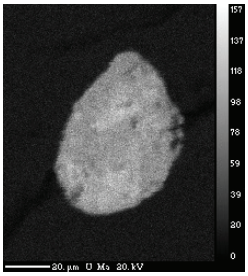
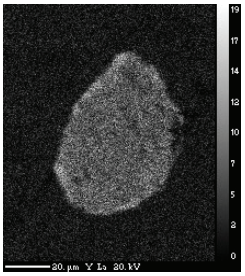
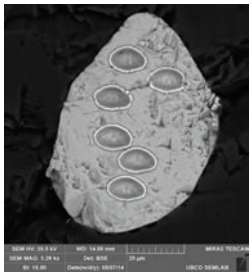
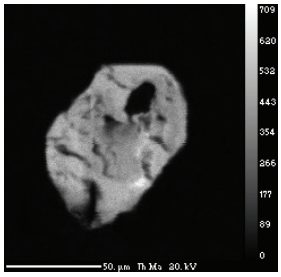
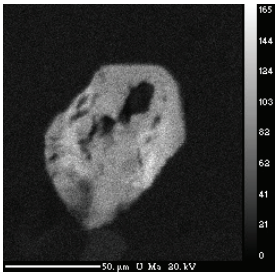
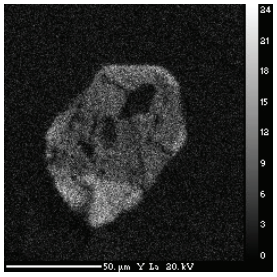
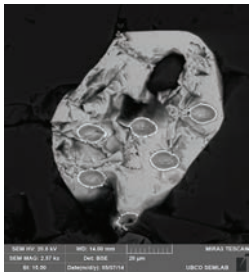
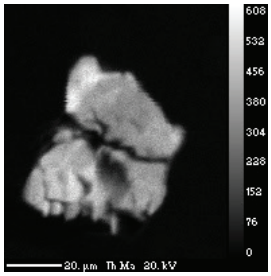
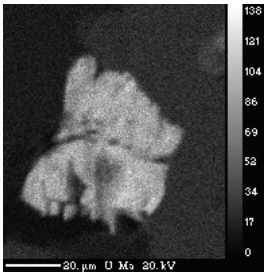
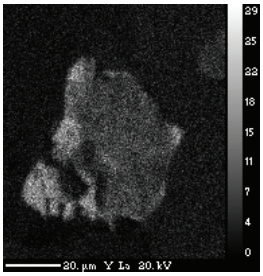
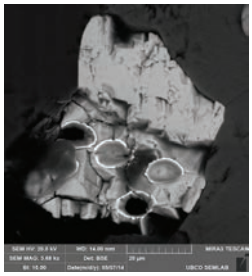
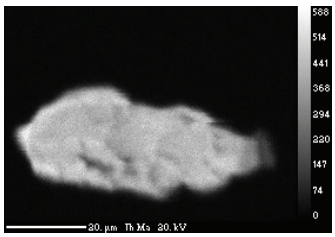
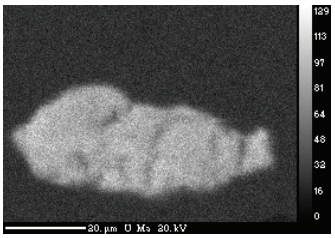
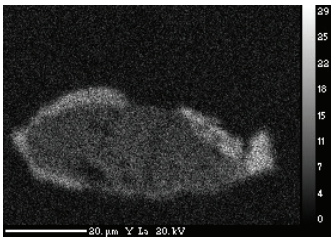
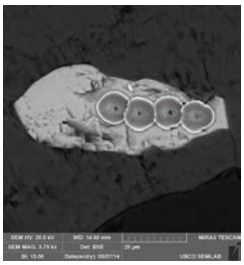
			
KA034_ds2_Th Ma_it2	KA034_ds2_U Ma_it3	KA034_ds2_Y La_it4	KA034_ds2
			
KA034_ds3_Th Ma_it2	KA034_ds3_U Ma_it3	KA034_ds3_Y La_it4	KA034_ds3
			
KA034_ds4_Th Ma_it2	KA034_ds4_U Ma_it3	KA034_ds4_Y La_it4	KA034_ds4
			
KA034_ds5_Th Ma_it2	KA034_ds5_U Ma_it3	KA034_ds5_Y La_it4	KA034_ds5

Thorium	Uranium	Yttrium	BSE
			
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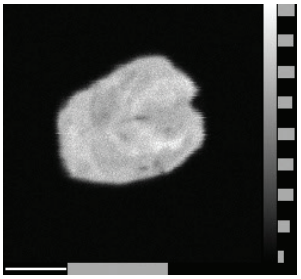	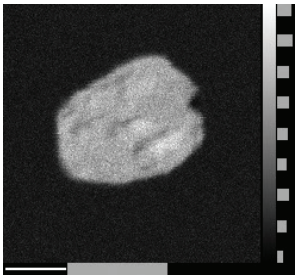	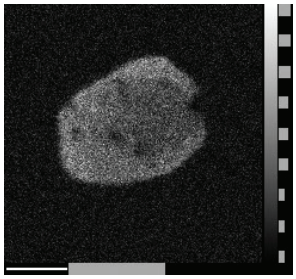	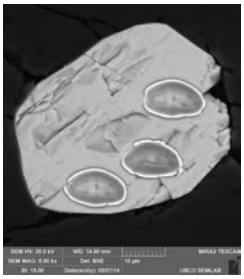
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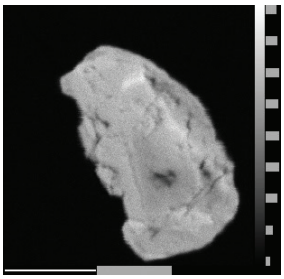
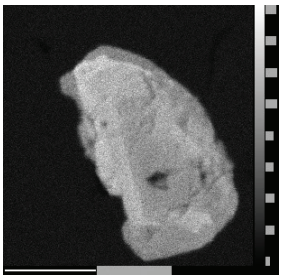
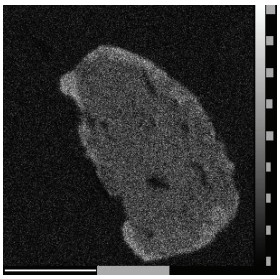
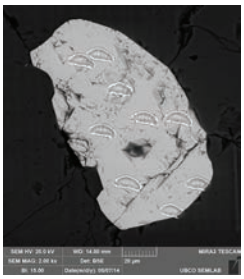
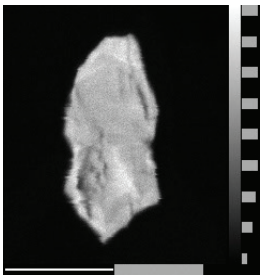
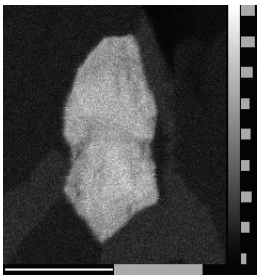
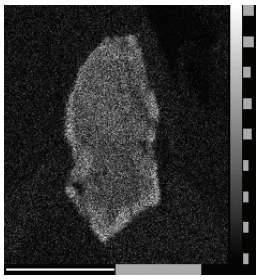
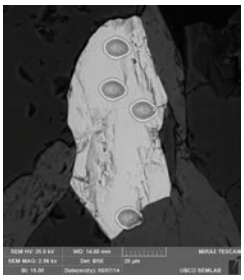
			
KA034_ds8_Th Ma_it2	KA034_ds8_U Ma_it3	KA034_ds8_Y La_it4	KA034_ds8
			
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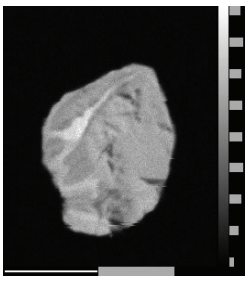
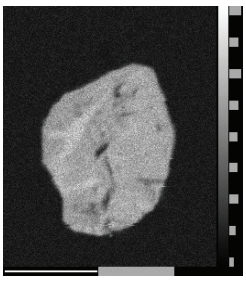
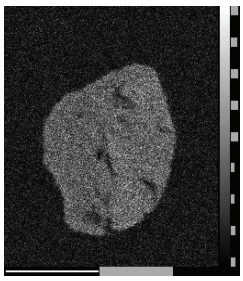
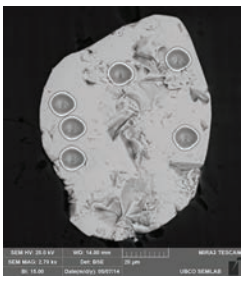
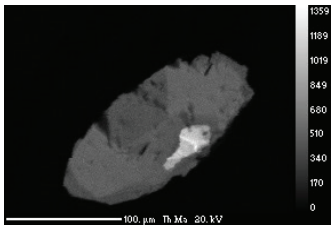
			
KA034_ds10_Th Ma_it2	KA034_ds10_U Ma_it3	KA034_ds10_Y La_it4	KA034_ds10

Thorium **Uranium** **Yttrium** **BSE**



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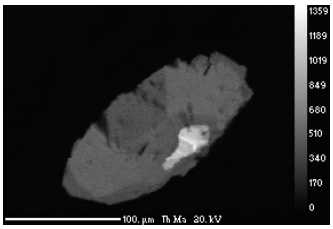
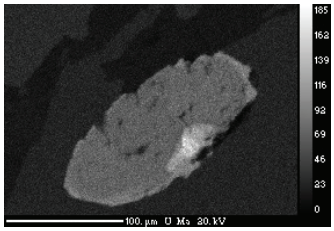


KA037_ds1_Th Ma_it2



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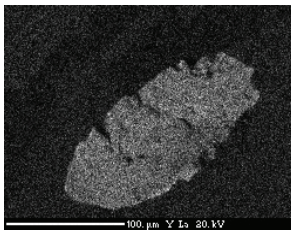

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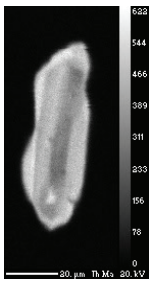

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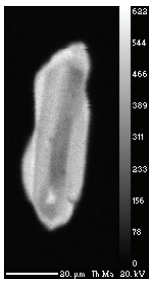
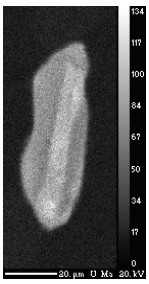


KA037_ds2_Th Ma_it2



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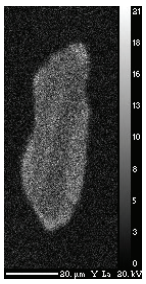

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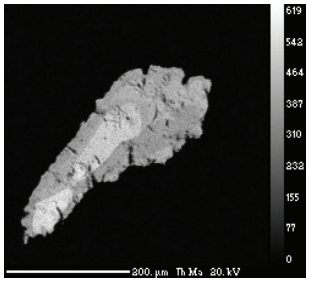

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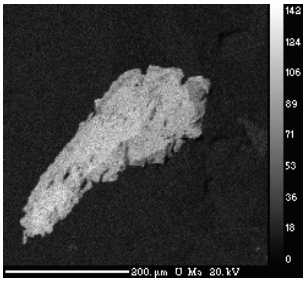

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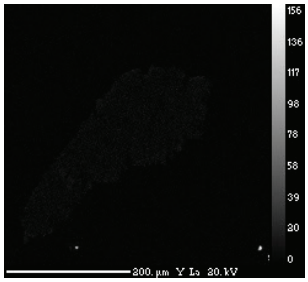

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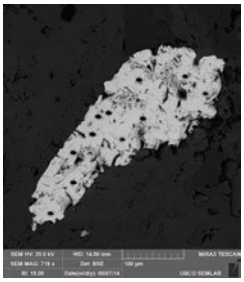

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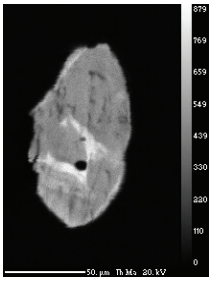

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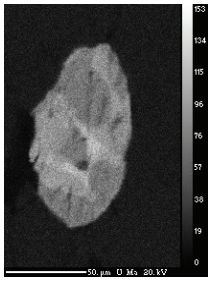

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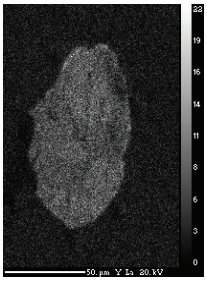

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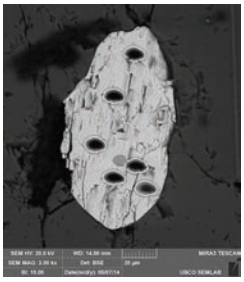

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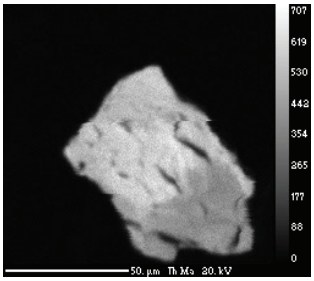

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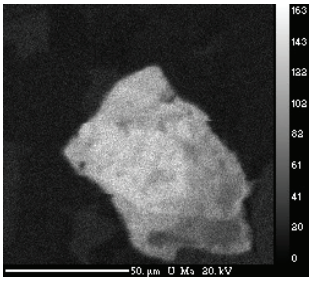

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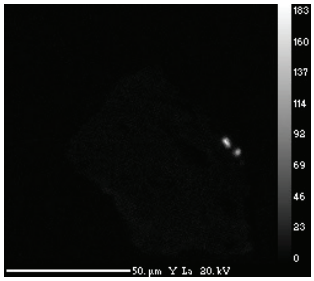

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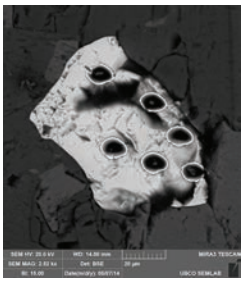
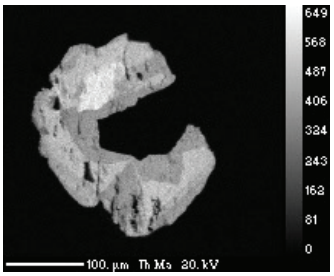
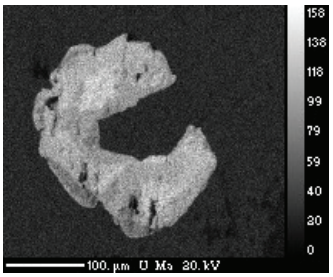
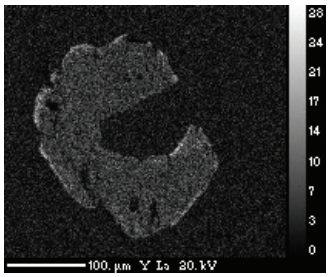


KA037_ds5

Thorium	Uranium	Yttrium	BSE
			
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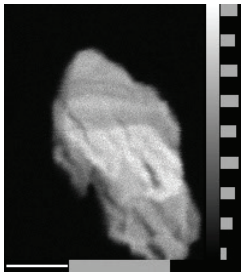	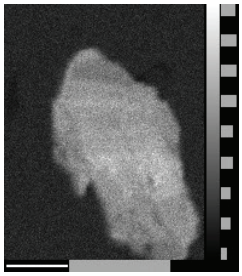	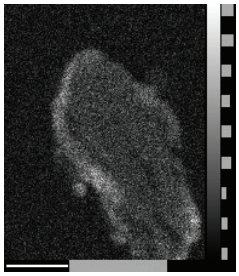	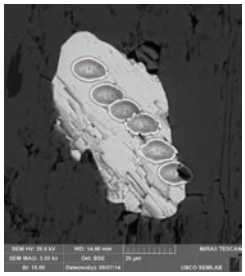
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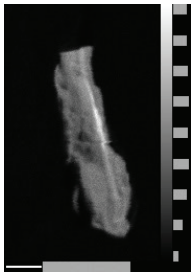	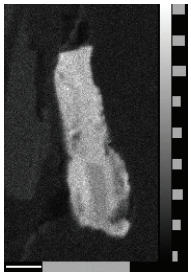	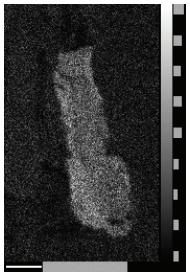	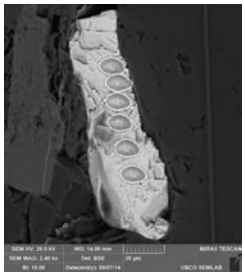
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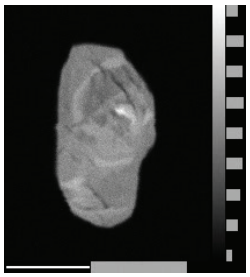	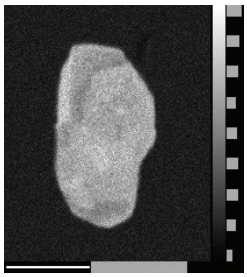	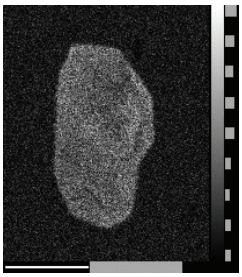	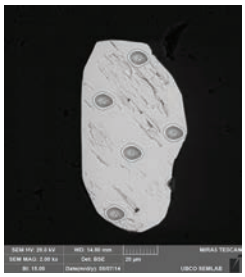
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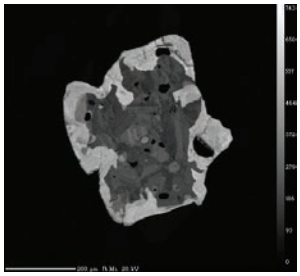
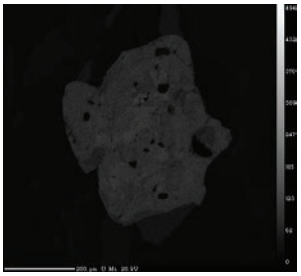
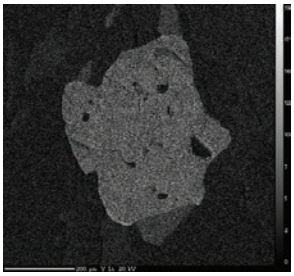
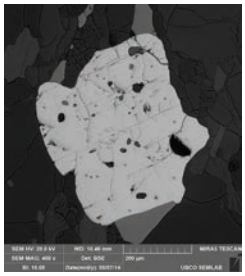
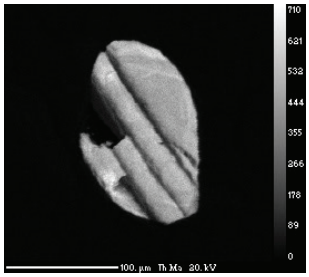
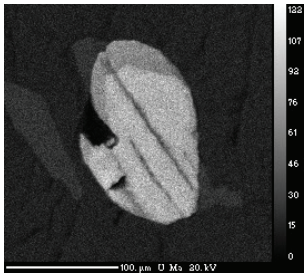
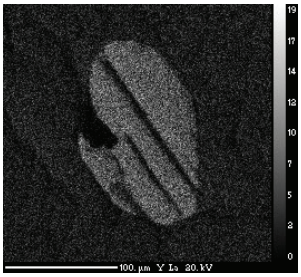
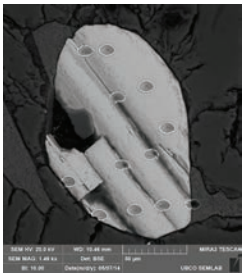
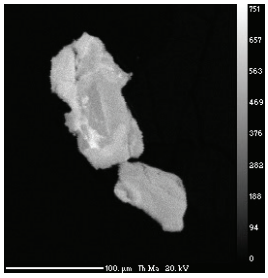
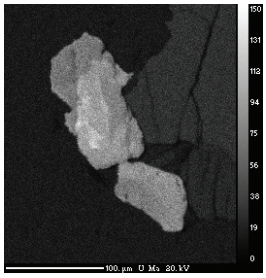
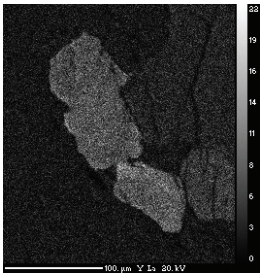
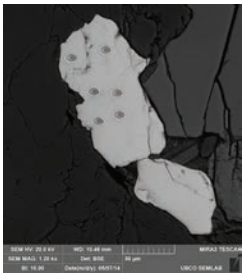
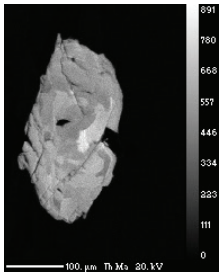
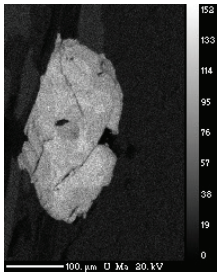
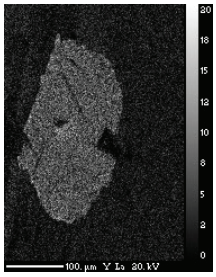
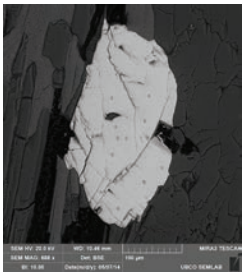
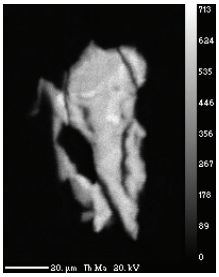
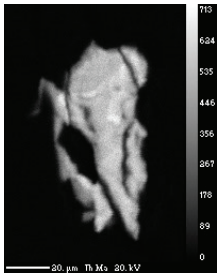
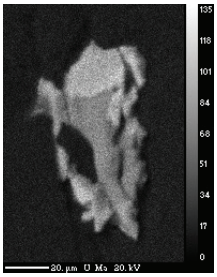
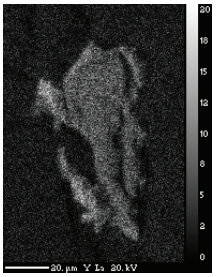
			
KA044_ds1_Th Ma_it2	KA044_ds1_U Ma_it3	KA044_ds1_Y La_it4	KA044_ds1

Thorium	Uranium	Yttrium	BSE
			
KA044_ds2_Th Ma_it2	KA044_ds2_U Ma_it3	KA044_ds2_Y La_it4	KA044_ds2
			
KA044_ds3_Th Ma_it2	KA044_ds3_U Ma_it3	KA044_ds3_Y La_it4	KA044_ds3
			
KA044_ds4_Th Ma_it2	KA044_ds4_U Ma_it3	KA044_ds4_Y La_it4	KA044_ds4
			
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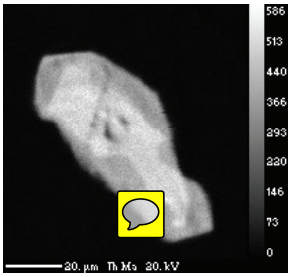
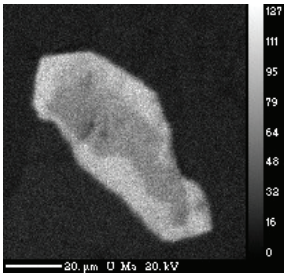
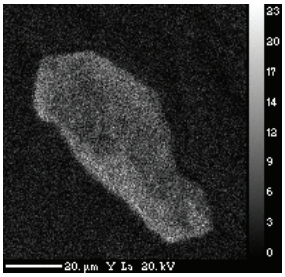
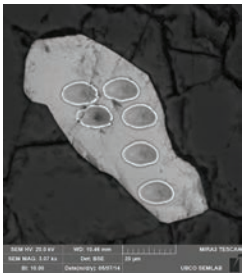
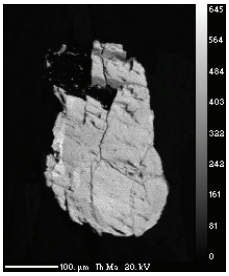
			
KA044_ds6_Th Ma_it2	KA044_ds6_U Ma_it3	KA044_ds6_Y La_it4	KA044_ds6

Thorium **Uranium** **Yttrium** **BSE**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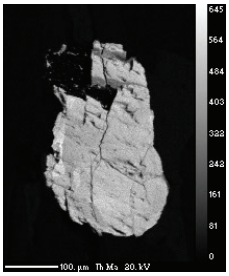
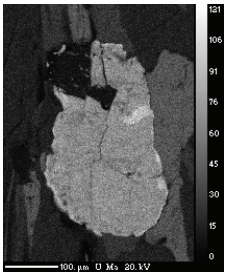
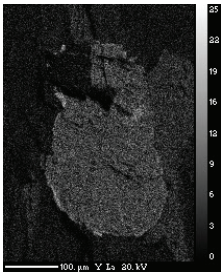

KA044_ds7_Th Ma_it2


KA044_ds7_U Ma_it3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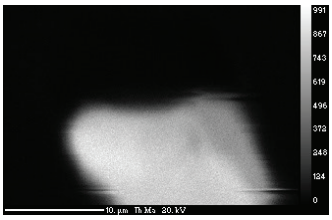
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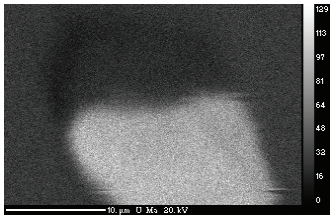
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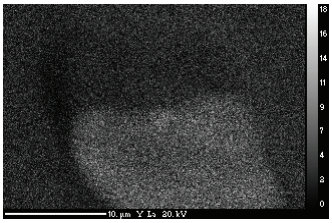
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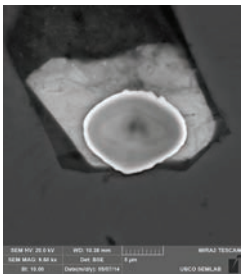
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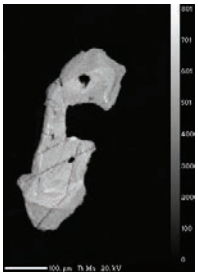
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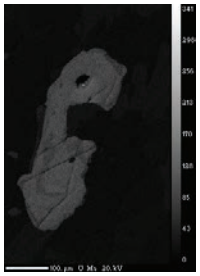
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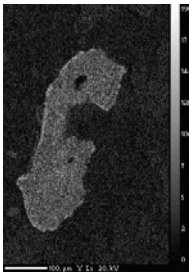
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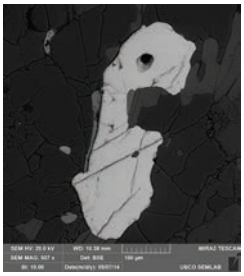
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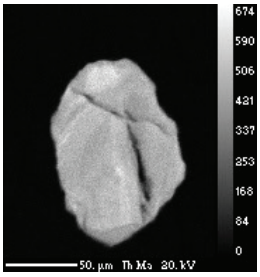
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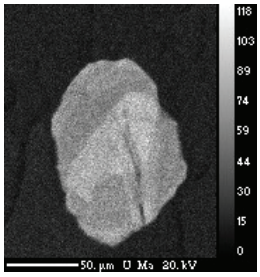
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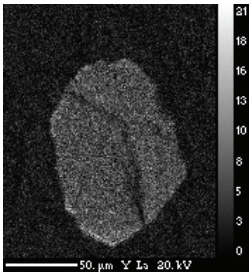
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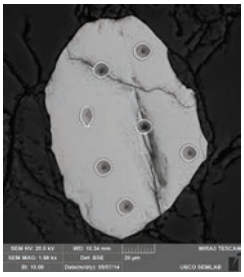
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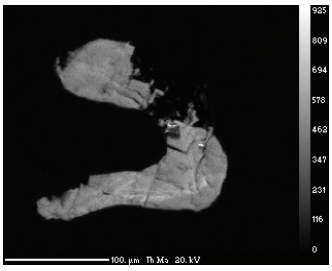
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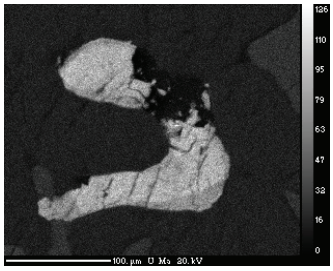
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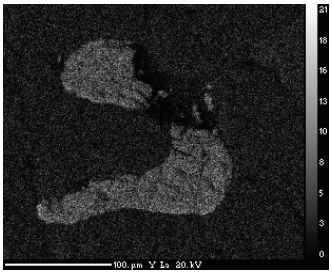
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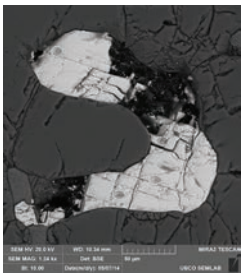
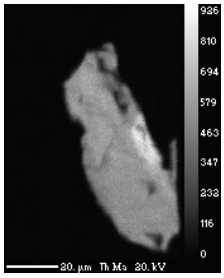
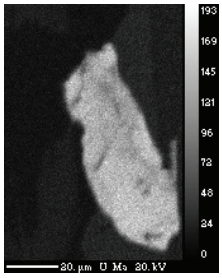
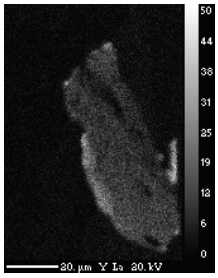
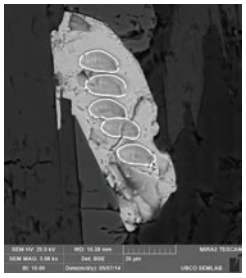

KA044_ds11

Thorium	Uranium	Yttrium	BSE
			
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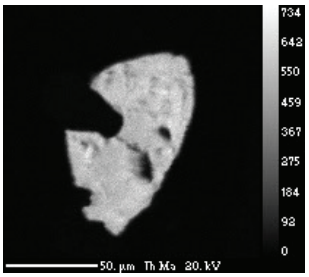	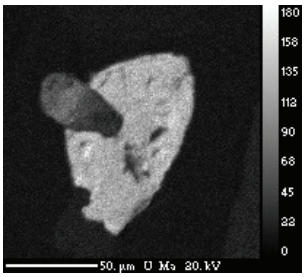	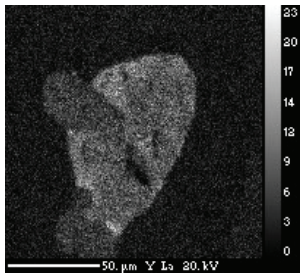	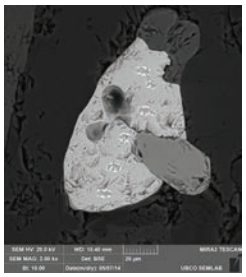
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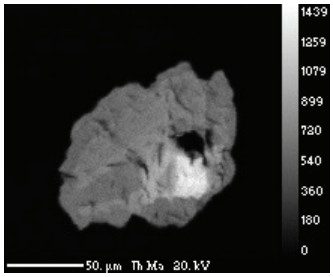	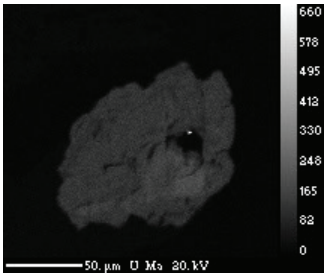	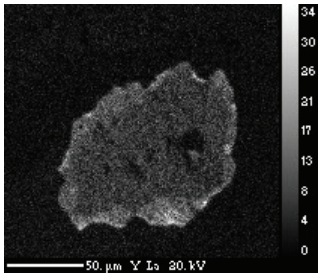	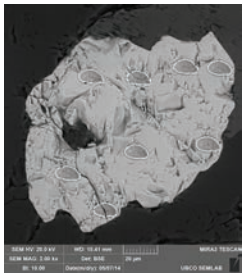
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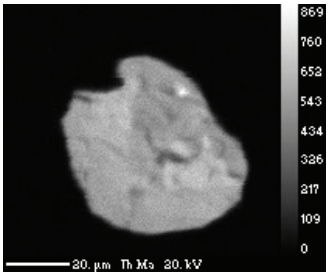	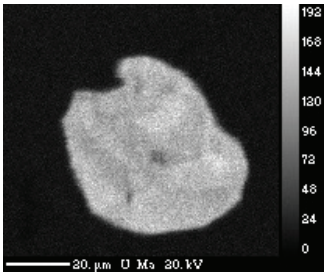	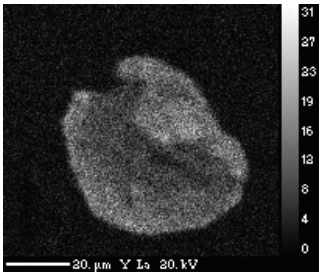	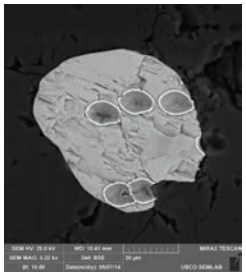
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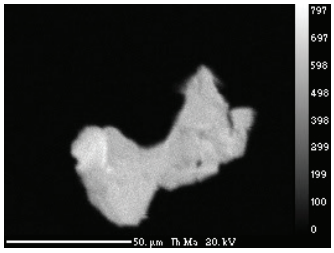
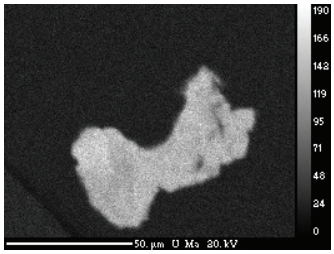
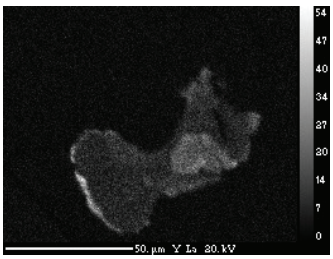
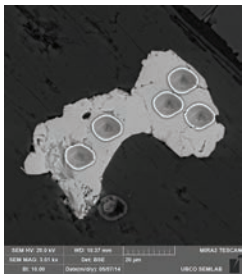
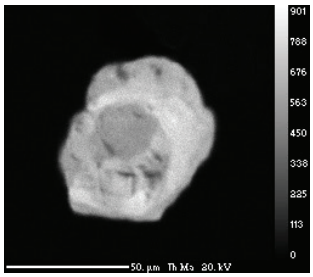
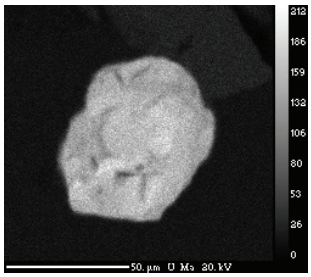
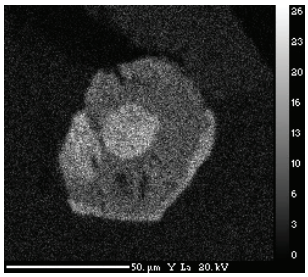
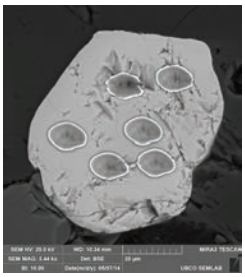
			
KA055_ds5_Th Ma_it2	KA055_ds5_U Ma_it3	KA055_ds5_Y La_it4	KA055_ds5

Thorium	Uranium	Yttrium	BSE
			
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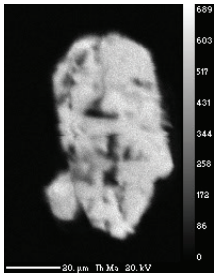	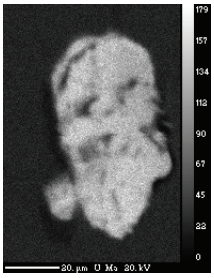	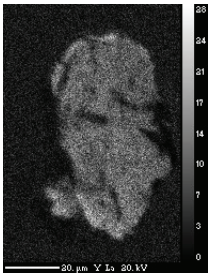	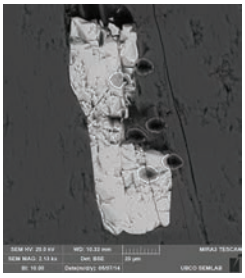
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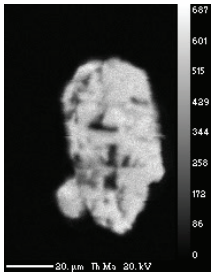
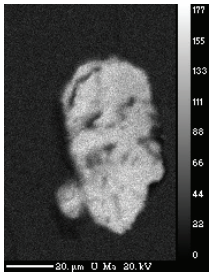
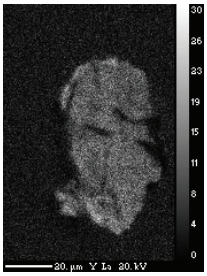
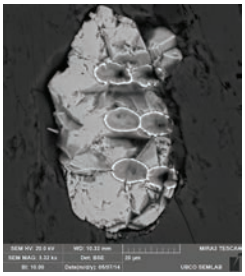
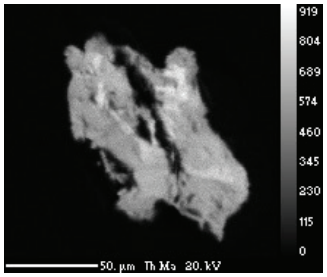
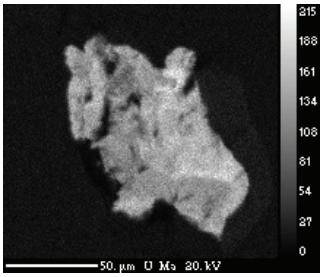
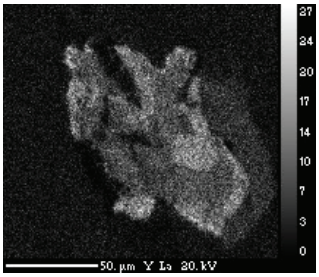
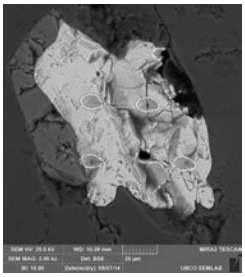
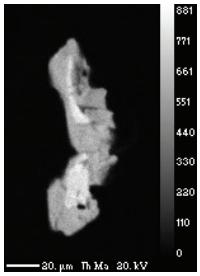
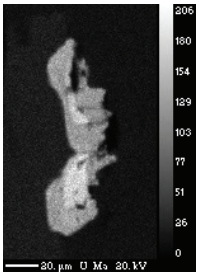
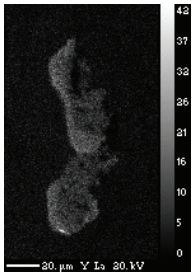
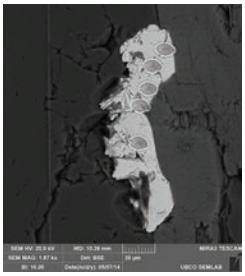
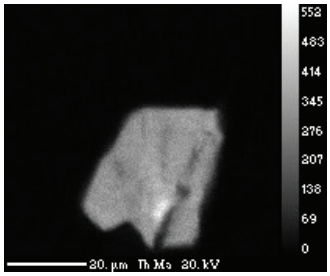
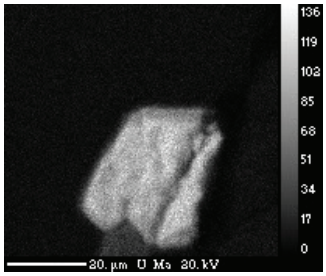
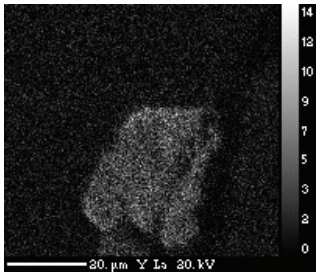
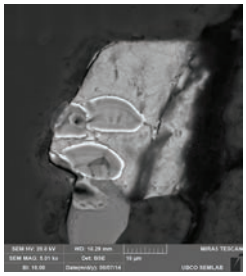
			
KA055_ds8_Th Ma_it2	KA055_ds8_U Ma_it3	KA055_ds8_Y La_it4	KA055_ds8
			
KA055_ds9_Th Ma_it2	KA055_ds9_U Ma_it3	KA055_ds9_Y La_it4	KA055_ds9
			
KA055_ds10_Th Ma_it2	KA055_ds10_U Ma_it3	KA055_ds10_Y La_it4	KA055_ds10

Thorium	Uranium	Yttrium	BSE
			
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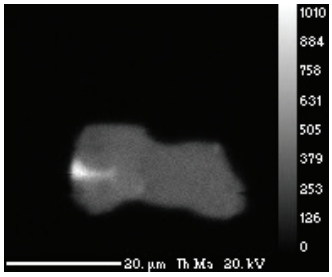	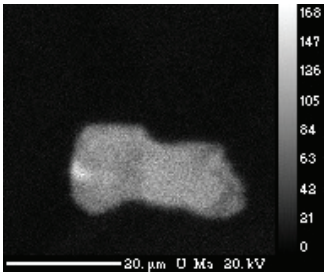	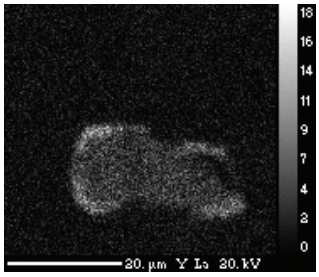	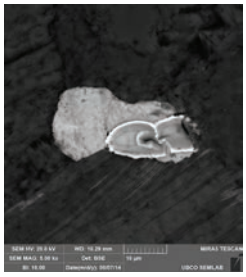
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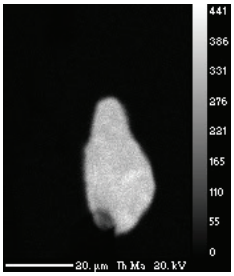
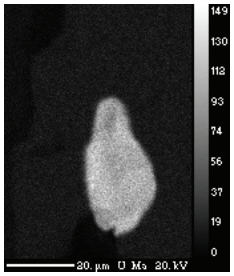
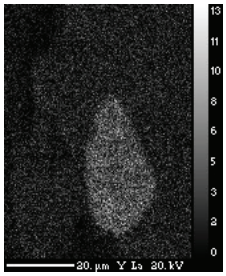
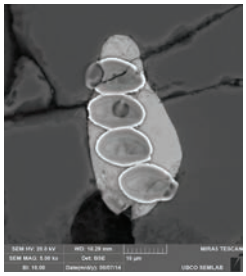
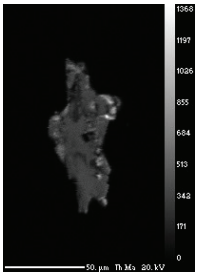
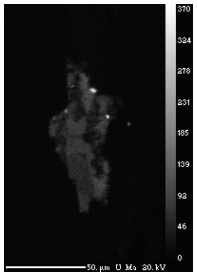
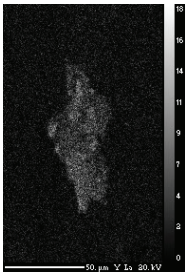
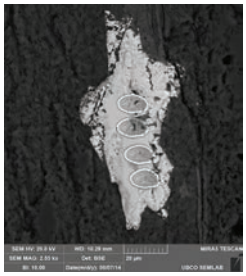
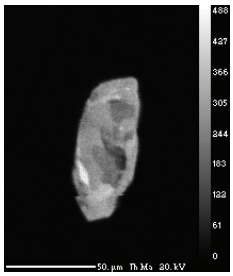
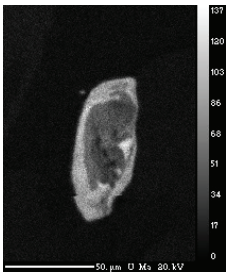
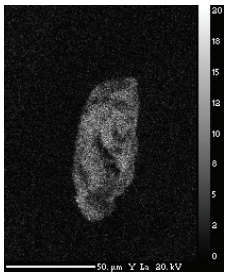
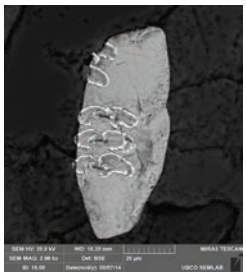
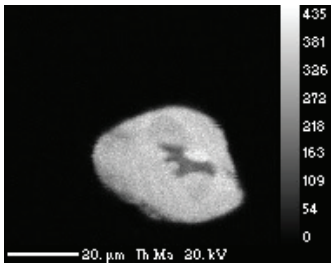
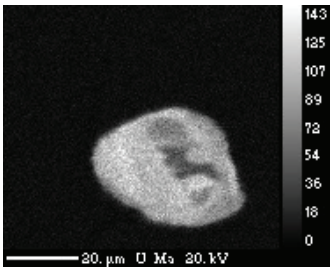
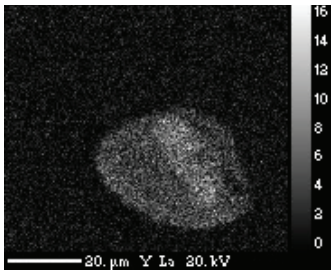
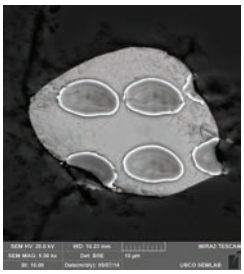
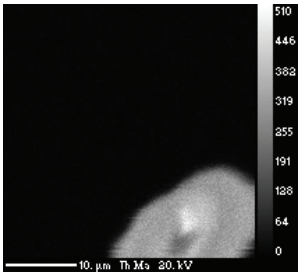
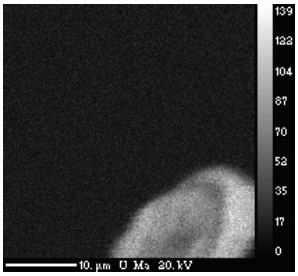
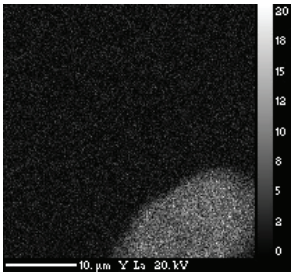
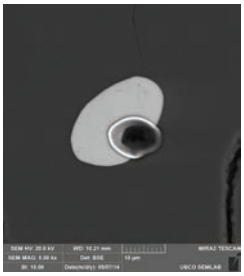
			
KA058B_ds3_Th Ma_it2	KA058B_ds3_U Ma_it3	KA058B_ds3_Y La_it4	KA058B_ds3
			
KA058B_ds4_Th Ma_it2	KA058B_ds4_U Ma_it3	KA058B_ds4_Y La_it4	KA058B_ds4
			
KA058B_ds5_Th Ma_it2	KA058B_ds5_U Ma_it3	KA058B_ds5_Y La_it4	KA058B_ds5

Thorium	Uranium	Yttrium	BSE
			
KA058B_ds6_Th Ma_it2	KA058B_ds6_U Ma_it3	KA058B_ds6_Y La_it4	KA058B_ds6
			
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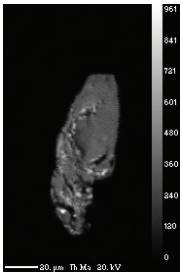	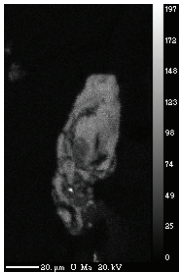	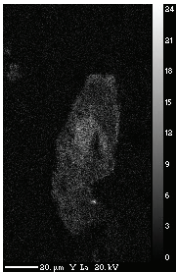	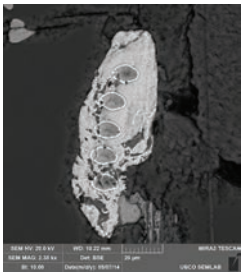
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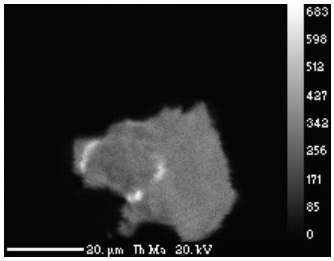	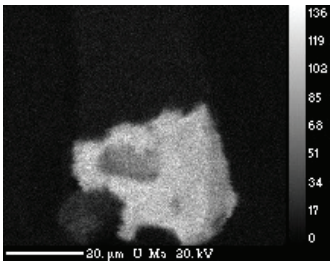	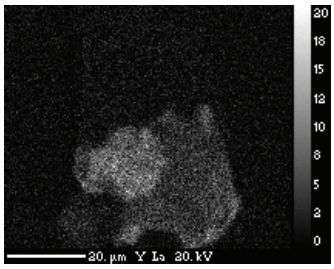	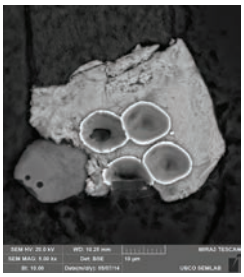
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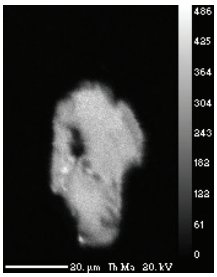
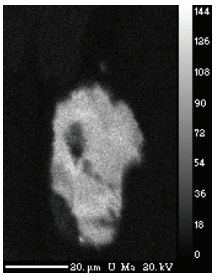
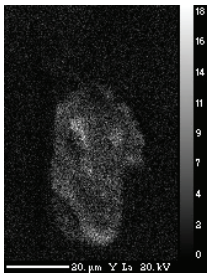
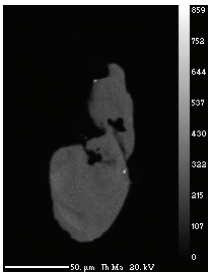
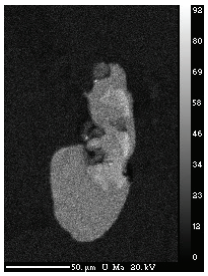
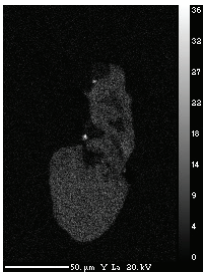
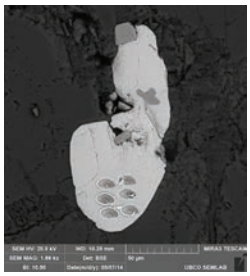
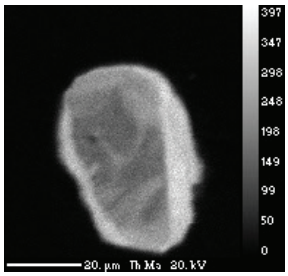
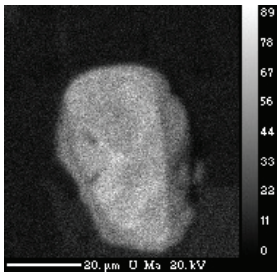
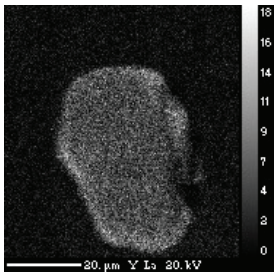
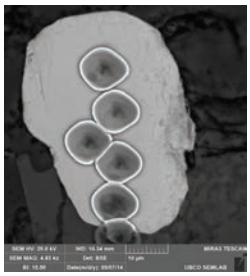
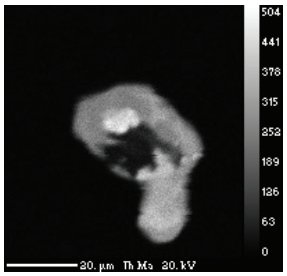
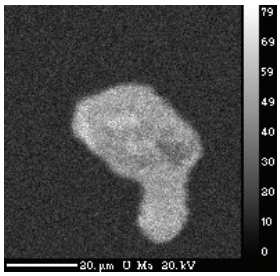
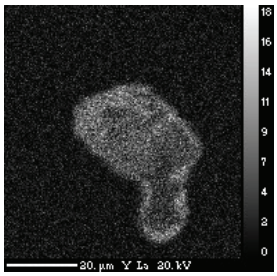
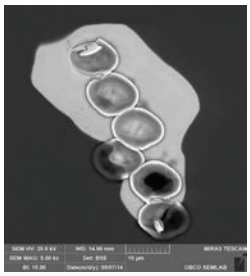
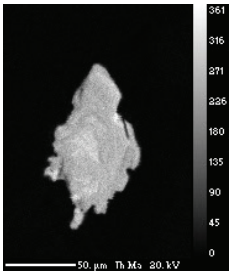
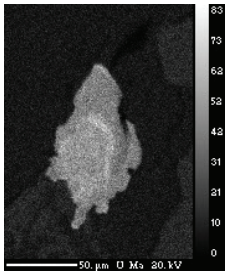
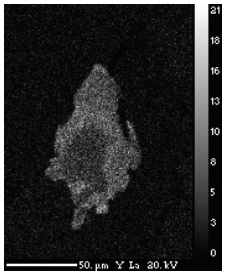
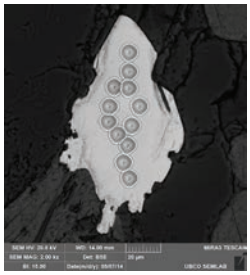
			
KA058B_ds10_Th Ma_it2	KA058B_ds10_U Ma_it3	KA058B_ds10_Y La_it4	KA058B_ds10

Thorium	Uranium	Yttrium	BSE
			
KA064A_ds1_Th Ma_it2	KA064A_ds1_U Ma_it3	KA064A_ds1_Y La_it4	KA064A_ds1
			
KA064A_ds2_Th Ma_it2	KA064A_ds2_U Ma_it3	KA064A_ds2_Y La_it4	KA064A_ds2
			
KA064A_ds3_Th Ma_it2	KA064A_ds3_U Ma_it3	KA064A_ds3_Y La_it4	KA064A_ds3
			
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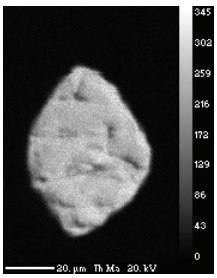	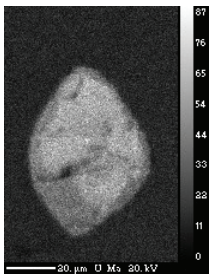	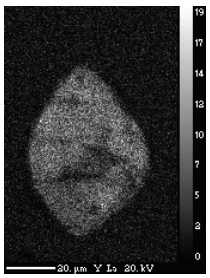	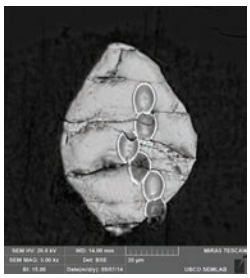
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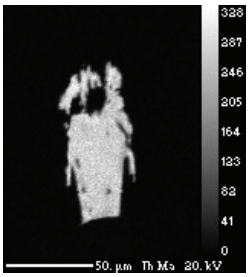
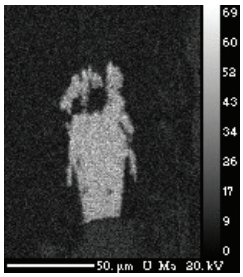
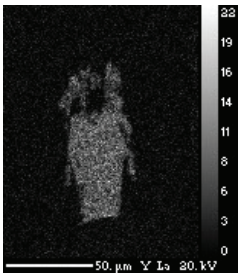
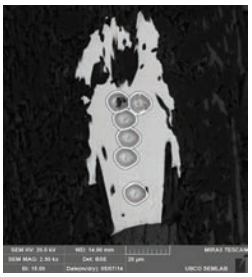
Thorium	Uranium	Yttrium	BSE
			
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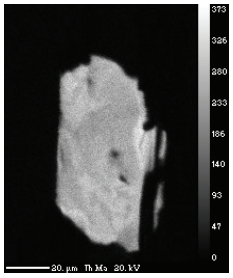	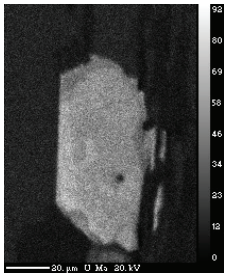	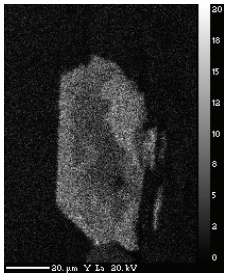	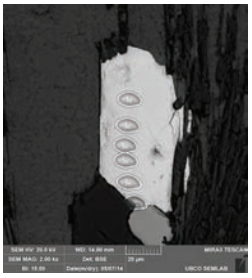
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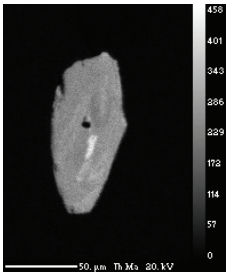	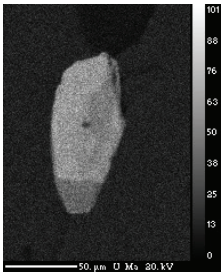	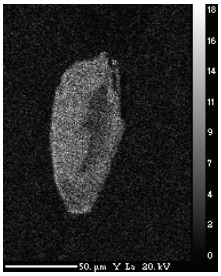	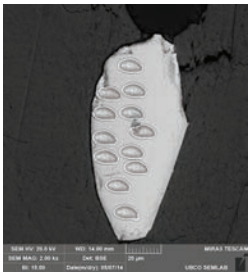
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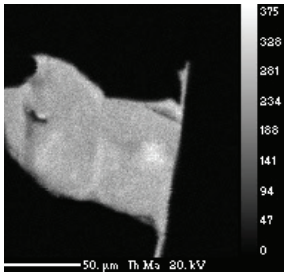	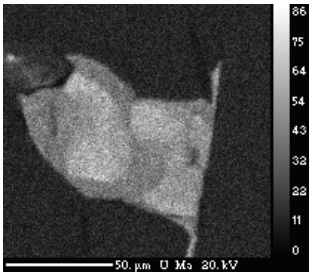	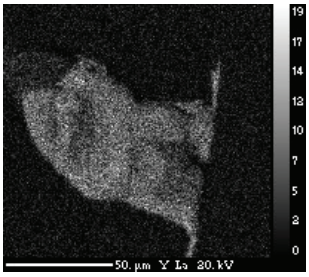	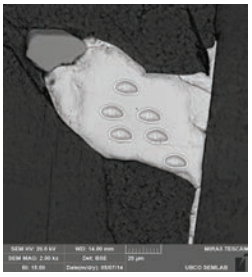
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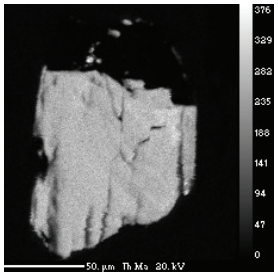	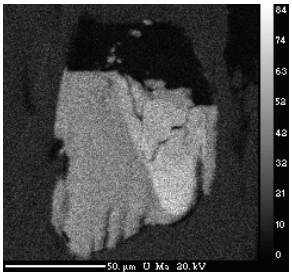	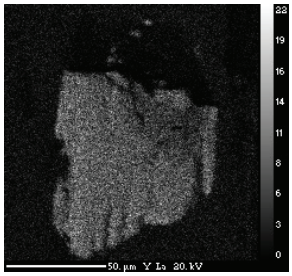	
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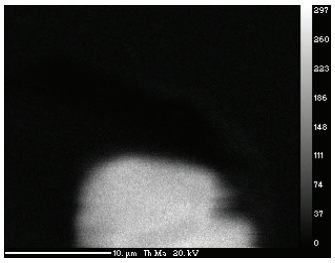
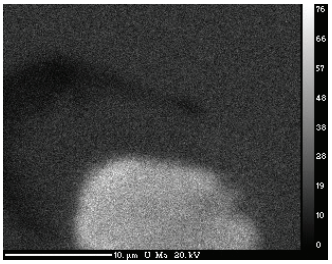
Thorium



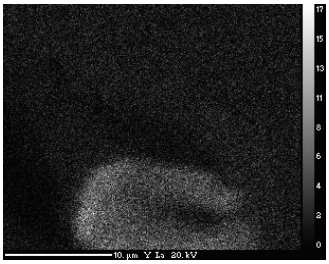
KA064A_ds11_Th Ma_it2

Uranium



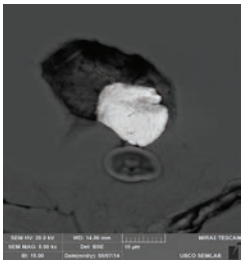
KA064A_ds11_U Ma_it3

Yttrium



KA064A_ds11_Y La_it4

BSE



KA064A_ds11