Appendix 3:3

Illite/sericite

Textural and electron microprobe data

Sample	Rock type
WC-75-1B	Reduced, medium-grained leucocratic phonolite.
WC-78-1A	Cataclastic zone in reduced leucocratic phonolite.
WC-110-1A	Reduced porous leucocratic phonolite.

Textural and some chemical characteristics of the analysed illites/sericites (major element contents (M) were considered to be ≥ 1.0 wt.% and minor element contents (m) to be <1.0 wt.%, of the respective oxides).

Anal. No.	Sample No.	Description	Chemistry
1	78/9-S01	Almost monomineralic illite/sericite pseudomorph of nepheline	Fe - M; Na, Mg - m
2	78/9-S02	As above	Fe - M; Na, Mg - m; Pb-contamination!
3	78/9-S03	Idem	Fe - M; Na, Mg - m
4	78/9-S04	Idem	Fe - M; Na, Mg - m
5	78/9-S05	Idem	Fe, Na, Mg - m
6*	78/9-S06	Idem	Fe - M; Na, Mg, Y - m. Pb-contamination!
7	78/9-S07	Idem	Fe - M; Na, Mg - m; Pb-contamination!
8*	78/9-S08	Idem	Fe - M; Na, Mg, Y - m; Pb-contamination!
9*	78/9-S08A	Idem	Fe - M; Na, Mg - m; Pb-contamination!
10	75/2-S01	Almost monomineralic illite/sericite precipitate in a void	Fe - M; Na, Mg - m
11	75/2-S02	As above	Fe, Na, Mg, Y - m
12	75/2-S03	Idem	Fe, Na - m
13*	75/2-S05	Idem	Fe - M; Na, Mg - m; Pb-contamination!
14*	75/2-S06	Idem	Fe - M; Na, Mg - m; Pb-contamination!
15	75/2-S06A	Idem	Fe - M; Na, Mg - m
16	75/2-S06B	Idem	Fe-M; Na, Mg, Y - m
17	75/5-S08	Zoned illite/sericite-kaolinite aggregate, near border of kaolinite	Fe - M; Na, Mg, Ce - m
18	75/5-S10	As above, internal part of illite/sericite zone	Fe - M; Na, Mg - m
19	75/5-S11	Idem, internal part	Fe - M; Na, Mg - m
20	75/5-S12	Idem, internal part	Fe - M; Na, Mg - m
21	110/1-S72	Illite/sericite-zircon-pyrite precipitate in rock interstices, border of larger single crystal- 1	Fe, Mg - m
22	110/1-S73	As above, internal part of crystal - 1	Mg - m
23	110/1-S74	Idem, internal part of crystal - 1	Fe - m

Anal. No.	Sample No.	Description	Chemistry
24	110/1-S75	Idem, larger single crystal - 2, bordering pyrite	Fe, Mg - m
25	110/1-S76	Idem, larger crystal - 2, bordering zircon and pyrite	Fe - M; Na, Mg - m; Zr-contamination
26	110/1-S76	Idem, repeated analysis without Zr-contamination	Fe - M; Mg - m
27	110/1-S77	Idem, intermediate zone of crystal - 2	Fe, Mg - m
28	110/1-S78	Idem, internal part of crystal - 3	Fe, Na, Mg - m
29	110/1-S79	Idem, crystal - 3, border with pyrite	Fe, Mg - m
30	110/1-S80	Idem, internal part of crystal - 2	Fe, Na - m
31	110/3-S23	Centre of larger individual crystal -1	Fe - M; Mg - m
32*	110/3-S24	Internal part of larger crystal - 1;	Fe - M; Mg - m; Pb-contamination!
33	110/3-S25	Rim of larger crystal - 1	Fe - M; Mg - m
34*	110/3-S26	Rim of larger crystal - 1	Fe - M; Na, Mg - m; Pb-contamination!
35	110/5-SO05	Composed pseudomorph of ne, internal part of illite/sericite zone	Na - m
36	110/5-SO06	As above	Fe, Na, Mg, Y - m
37	110/5-SO07	Idem	Fe - M; Na - m
38	110/6-SO08	Idem	Fe - M; Na, Mg - m
39	110/5-SO09	Idem	Fe - M; Na, Mg - m
40	110/4-S21	Almost monomineralic illite/sericite domain of composed aggregate	Fe - M; Na - m
41	110/4-S22	As above	Fe, Mg - m
42	110/4-S23	Idem	Fe - M; Mg - m
43*	110/4-S24	Idem	Fe - M; Mg - m
44*	110/4-S25	Idem	Fe - M; Na, Mg - m

*Analysis not reported.

	Crystal matrix: illite from nepheline pseudomorphs, central zone													
Sample	78/9-S01	78/9-S02	78/9-S03	78/9-S04	78/9-S05	78/9-S07	110/5-SO05	110/5-SO06	110/5-SO07	110/5-SO08	110/5-SO09	110/4-S21	110/4-S22	110/4-S23
SiO_2	45.46	45.01	45.29	45.78	45.47	44.63	47.62	46.34	47.40	46.41	46.88	45.95	44.81	46.43
FeO	1.55	2.33	2.09	2.52	0.90	2.38	0.00	0.67	1.17	2.19	1.33	1.05	0.95	1.32
Na_2O	0.14	0.13	0.13	0.14	0.15	0.09	0.06	0.09	0.12	0.07	0.13	0.09	0.00	0.00
MgO	0.19	0.29	0.31	0.24	0.14	0.27	0.00	0.08	0.00	0.27	0.29	0.00	0.08	0.21
K_2O	9.91	9.60	9.73	9.37	9.81	9.34	10.87	11.13	11.37	10.60	10.84	10.84	10.38	10.40
Al_2O_3	35.13	33.12	34.31	33.92	35.80	33.52	37.75	36.25	35.48	34.42	35.14	37.08	35.88	35.74
UO_2	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
ThO_2	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
Yb_2O_3	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
Ce_2O_3	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
Y_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.00	0.00	0.00	0.00	0.00	0.00
La_2O_3	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 (wt.%)	92.39	90.48	91.85	91.97	92.26	90.23	96.31	95.16	95.54	93.96	94.61	95.00	92.09	94.09
Normalised on 22 O														
Si	6.21	6.30	6.24	6.29	6.19	6.26	6.20	6.17	6.22	6.27	6.27	6.11	6.14	6.23
Al IV	1.79	1.70	1.76	1.71	1.81	1.74	1.80	1.83	1.78	1.73	1.73	1.89	1.86	1.77
Al VI	3.86	3.76	3.81	3.78	3.93	3.80	3.99	3.86	3.86	3.75	3.81	3.93	3.93	3.88
Fe	0.18	0.27	0.24	0.29	0.10	0.28	0.00	0.07	0.13	0.25	0.15	0.12	0.11	0.15
Mg	0.04	0.06	0.06	0.05	0.03	0.06	0.00	0.02	0.00	0.06	0.06	0.00	0.02	0.04
K	1.73	1.71	1.71	1.64	1.70	1.67	1.81	1.89	1.90	1.83	1.85	1.84	1.81	1.78
Na	0.04	0.04	0.04	0.04	0.04	0.02	0.02	0.02	0.03	0.02	0.03	0.02	0.00	0.00

	Crystal matrix: illite from nepheline pseudomorphs, central zone (contd.)		Crystal matrix: illite from nepheline pseudomorphs, border zone			
Sample	110/4-S25	110/4-S24	75/5-S08	75/5-S10	75/5-S11	75/5-S12
SiO_2	45.83	45.56	46.66	46.60	46.86	46.87
FeO	2.00	2.80	1.56	2.38	1.71	2.29
Na_2O	0.08	0.00	0.12	0.13	0.13	0.11
MgO	0.23	0.47	0.21	0.16	0.15	0.21
K_2O	10.83	10.37	8.34	8.80	8.36	8.69
Al_2O_3	36.26	34.30	35.54	35.63	35.27	35.41
UO_2	0.00	0.00	0.00	0.00	0.00	0.00
ThO_2	0.00	0.00	0.00	0.00	0.00	0.00
Yb_2O_3	0.00	0.00	0.00	0.00	0.00	0.00
Ce_2O_3	0.00	0.00	0.33	0.00	0.00	0.00
Y_2O_3	0.00	0.00	0.00	0.00	0.00	0.00
La_2O_3	0.00	0.00	0.00	0.00	0.00	0.00
Total (wt.%)	95.24	93.50	92.76	93.70	92.48	93.58
Normalised on 22 O						
Si	6.12	6.21	6.28	6.25	6.32	6.28
Al IV	1.88	1.79	1.72	1.75	1.68	1.72
Al VI	3.83	3.72	3.92	3.88	3.92	3.87
Fe	0.22	0.32	0.18	0.27	0.19	0.26
Mg	0.05	0.10	0.04	0.03	0.03	0.04
K	1.84	1.80	1.43	1.50	1.44	1.49
Na	0.02	0.00	0.03	0.03	0.03	0.03

	Crystal matrix: interstitial illite-zircon-pyrite assemblage											
Sample	110/1-S72	110/1-S73	110/1-S74	110/1-S75	110/1-S76	110/1-S76	110/1-S77	110/1-S78	110/1-S79	110/1-S80	110/3-S23	110/3-S25
SiO_2	45.77	46.08	45.61	45.85	45.99	46.67	45.88	46.23	46.31	44.45	45.22	45.50
FeO	0.54	0.00	0.82	0.92	1.38	1.26	0.77	0.47	0.61	0.37	2.28	1.57
Na_2O	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.04	0.00	0.03	0.00	0.00
MgO	0.06	0.05	0.00	0.09	0.22	0.18	0.15	0.36	0.08	0.00	0.20	0.17
K_2O	9.92	10.25	10.43	7.82	9.41	8.24	10.36	10.28	10.11	10.65	9.71	8.94
Al_2O_3	37.62	37.94	37.59	36.72	36.08	36.58	36.83	35.95	37.18	37.00	34.40	35.73
UO_2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ThO_2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yb_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ce_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Y_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
La_2O_3	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 (wt.%)	93.89	94.32	94.45	91.39	93.23	92.93	93.99	93.33	94.29	92.51	91.81	91.92
Normalised on 22 O												
Si	6.11	6.11	6.08	6.21	6.19	6.24	6.14	6.22	6.16	6.06	6.23	6.20
Al IV	1.89	1.89	1.92	1.79	1.81	1.76	1.86	1.78	1.84	1.94	1.77	1.80
Al VI	4.03	4.04	3.99	4.07	3.92	4.00	3.95	3.92	3.99	4.00	3.82	3.94
Fe	0.06	0.00	0.09	0.10	0.15	0.14	0.09	0.05	0.07	0.04	0.26	0.18
Mg	0.01	0.01	0.00	0.02	0.04	0.04	0.03	0.07	0.02	0.00	0.04	0.04
K	1.69	1.73	1.77	1.35	1.62	1.40	1.77	1.76	1.72	1.85	1.71	1.55
Na	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.00

	Crystal matrix: void infilling				
Sample	75/2-S01	75/2-S02	75/2-S03	75/2-S06A	75/2-S06B
SiO_2	45.84	45.29	45.42	45.92	45.50
FeO	1.63	0.96	0.61	2.00	2.36
Na_2O	0.08	0.10	0.04	0.10	0.14
MgO	0.16	0.08	0.00	0.08	0.09
K_2O	9.37	9.73	9.52	8.11	9.49
Al_2O_3	34.67	35.55	35.45	35.07	34.77
UO_2	0.00	0.00	0.00	0.00	0.00
ThO_2	0.00	0.00	0.00	0.00	0.00
Yb_2O_3	0.00	0.00	0.00	0.00	0.00
Ce_2O_3	0.00	0.00	0.00	0.00	0.00
Y_2O_3	0.00	0.11	0.00	0.00	0.06
La_2O_3	0.00	0.00	0.00	0.00	0.00
Total (wt.%)	91.74	91.83	91.05	91.29	92.42
Normalised on 22 O					
Si	6.28	6.20	6.24	6.28	6.22
Al IV	1.72	1.80	1.76	1.72	1.78
Al VI	3.88	3.93	3.98	3.93	3.83
Fe	0.19	0.11	0.07	0.23	0.27
Mg	0.03	0.02	0.00	0.02	0.02
K	1.64	1.70	1.67	1.41	1.66
Na	0.02	0.03	0.01	0.03	0.04

Appendix 3:4

Zircon

Textural and electron microprobe data

Sample	Rock type
WC-78-1A	Cataclastic zone in reduced leucocratic phonolite.

Characteristics of the analysed zircons/ZrO_2-minerals.

Anal. No.	Sample No.	Description	
1*	110/1-ZO15	Large sized (~6 mm) skeletal crystal - 1, population 1; border.	
2*	110/1-ZO16	Idem - 1, population 1; border.	
3*	110/1-ZO14	Idem - 1, population 1; internal part.	
4*	110/1-ZO13	Idem - 1, population 2; border(-1)	profile across crystal
5*	110/1-ZO18	Idem - 1, population 2; centre	
6*	110/1-ZO12	Idem - 1, population 2; intermediate zone	
7*	110/1-ZO11	Idem - 1, population 2; border(-2)	
8*	110/1-ZO38	Idem - 1, population 3; border.	
9*	110/1-ZO37	Idem - 1, population 3; internal part	
10*	110/1-ZO36	Idem - 1, population 3; internal part, inclusions of higher reflectivity.	
11*	110/1-ZO41	Idem - 1, population 3; internal part, inclusions of higher reflectivity	
12*	110/1-ZO10	Idem - 1, population 4; internal border near K-feldspar inclusion.	
13*	110/1-ZO20	Idem - 1, population 4; internal border near K-feldspar inclusion.	
14*	110/1-ZO31	Idem - 1, population 4; internal part.	
15*	110/1-ZO30	Idem - 1, population 4; intermediate zone.	
16*	110/1-ZO09	Idem - 1, population 4; centre.	
17*	110/1-ZO29	Idem - 1, border.	
18*	110/1-ZO08	Idem - 1, population 5; intermediate zone.	
19*	110/1-ZO42	Medium sized skeletal crystal - 2, intermediate zone.	
20*	110/1-ZO43	Idem - 2, intermediate zone near TiO_2-inclusion.	
21*	110/1-ZO48	Idem - 2, internal part, altered: higher reflectivity, strong anisotropy.	
22*	110/1-ZO49	Idem - 2, same as ZO48 – different analytical point.	
23*	110/1-ZO03	Idem - 2, centre.	
24*	110/1-ZO02	Idem - 2, border with K-feldspar, very strong blue cathodoluminescence; weak K-, Al-contamination!	
25*	110/1-ZO02	Repetition of analysis ZO02, without contamination.	
26*	110/1-ZO01	Idem - 2, intermediate zone; very strong yellow cathodoluminescence.	
27*	110/1-ZO45	Idem - 2, centre	
28*	110/1-ZO00	Idem - 2, centre.	
29*	110/1-ZO46	Idem - 2, intermediate zone.	
30*	110/1-ZO47	Idem - 2, border.	
31*	110/1-ZO07	Idem - 1, population 5; intermediate zone.	

Anal. No.	Sample No.	Description
32*	110/1-ZO06	Idem - 1, population 5; internal border near K-feldspar inclusion.
33*	110/1-ZO05	Idem - 1, population 5; internal part.
34*	110/1-ZO04	Idem - 1, population 5; border.
35*	110/2-Z00	Idem - 1, intermediate zone; very strong yellow cathodoluminescence.
36*	110/2-Z06	Idem - 1, intermediate zone.
37*	110/2-Z07	Idem - 1, border; very strong yellow cathodoluminescence.
38*	110/2-Z10	Skeletal crystal - 2, border
39*	110/2-Z09	Idem - 2, border; very strong yellow cathodoluminescence.
40*	110/2-Z08	Idem - 2, border
41*	110/2-Z16	Idem - 2, border; very strong yellow cathodoluminescence.
42*	110/2-Z11	Skeletal crystal - 3, border; very strong yellow cathodoluminescence.
43*	110/2-Z12	Idem - 3, border; very strong yellow cathodoluminescence.
44*	110/2-Z13	Idem - 3, centre.
45*	110/2-Z14	Idem - 3, intermediate zone.
46*	110/2-Z15	Idem - 3, border.
47*	110/2-Z02	Skeletal crystal - 1, border.
48*	110/2-Z01	Idem - 1, border.
49*	110/2-Z03	Idem - 1, centre.
50*	110/2-Z05	Idem - 1, centre.
51*	110/2-Z04	Idem - 1, intermediate zone.
52*	110/4-Z19	Zircon-ZrO_2-mineral intergrowth - 1, border.
53*	110/4-Z15	Idem - 1, border.
54*	110/4-Z17	Idem - 1, internal part.
55*	110/4-Z20	Idem - 1, border; Al-contamination!
56*	110/4-Z0	Idem - 1.
57*	110/4-Z16	Idem - 1, internal part.
58*	110/4-Z18	Idem - 1, internal part.
59*	110/4-Z19A	Idem - 1, border.
60*	110/4-Z14	Idem - 1, border.
61*	110/4-Z13	Idem - 1.
62*	78/2-Z15	Zoned crystal - 3, border.
63*	78/2-15A	Zoned crystal - 3, centre.
64*	78/2-15	Zoned crystal - 3, border.
65*	78/2-Z16	Idem - 3, centre.
66*	78/2-Z19	Idem - 3, border.
67*	78/2-Z15A	Idem - 3, centre.
68*	78/2-Z11	Idem - 3, border.
69*	78/2-Z17	Zoned crystal - 1, border.
70*	78/2-Z17A	Idem - 1, border ~20μ further towards the crystal centre than Z17.

Anal. No.	Sample No.	Description	
71*	78/2-Z18	Idem - 1, centre.	
72*	78/2-Z18A	Idem - 1, centre.	
73*	78/2-Z18B	Idem - 1, intermediate zone.	
74*	78/2-Z18C	Idem - 1, intermediate zone.	
75*	78/2-Z20	Idem - 1, about 40 μ from border.	
76*	78/2-Z21	Idem - 1, border.	
77*	78/2-Z01	Zoned crystal - 2, border zone - 1.	
78*	78/2-Z01A	Idem - 2, border zone - 1.	
79*	78/2-Z02	Idem - 2, border zone - 1.	
80*	78/2-Z03	Idem - 2, border zone - 1; alteration(?)	
81*	78/2-Z04	Idem - 2, intermediate zone - 2; alteration(?)	Profile 1
82*	78/2-Z04A	Idem - 2, intermediate zone - 2; alteration(?)	
83*	78/2-Z04B	Idem - 2, intermediate zone - 2; alteration(?)	
84*	78/2-Z05	Idem - 2, intermediate zone - 3; alteration(?)	
85*	78/2-Z05A	Idem - 2, intermediate zone - 3; alteration(?)	
86*	78/2-Z06	Idem - 2, centre zone - 4; alteration(?)	
87*	78/2-Z08	Idem - 2, centre zone - 6; basis of crystal.	
88*	78/2-Z07	Idem - 2, centre zone - 5.	
89*	78/2-Z07A	Idem - 2, centre zone - 5.	
90*	78/2-Z14	Idem - 2, centre zone -4; alteration(?)	Profile 2
91*	78/2-Z13A	Idem - 2, intermediate zone - 3; alteration(?)	
92*	78/2-Z13	Idem - 2, intermediate zone - 3; alteration(?)	
93*	78/2-Z12	Idem - 2, border zone - 1; alteration(?)	
94*	78/3-Z01	Skeletal crystal - 1, border.	
95	78/3-Z01A	Idem - 1, border.	
96	78/3-Z02	Idem - 1, border.	
97	78/3-Z03	Idem - 1, border.	
98*	78/3-Z04	Idem - 1, border.	
99	78/3-Z05	Idem - 1, border.	
100*	78/3-Z11	Idem - 1, intermediate zone; alteration(?)	
101*	78/3-Z12	Idem - 1, intermediate zone; alteration(?)	border to centre profile
102	78/3-Z10A	Idem - 1, intermediate zone.	
103	78/3-Z10B	Idem - 1, intermediate zone.	
104*	78/3-Z10C	Idem - 1, intermediate zone.	
105	78/3-Z10	Idem - 1, centre.	
106*	78/3-Z09	Idem - 1, centre.	
107	78/3-Z08	Idem - 1, centre.	
108*	78/3-Z08A	Idem - 1, intermediate zone.	
109	78/3-Z07	Idem - 1, centre.	
110	78/3-Z06	Idem - 1, intermediate zone.	
111*	78/5-Z01	Zoned idiomorphic crystal - 1, border.	
112*	78/5-Z02	Idem - 1, intermediate zone - 1.	border to centre profile
113*	78/5-Z03	Idem - 1, intermediate zone - 2.	
114*	78/5-Z04	Idem - 1, centre.	
115*	78/5-Z05	Idem - 1, intermediate zone.	
116*	78/5-Z06	Idem - 1, border.	
117*	78/5-Z07	Idem - 1, border.	

Anal. No.	Sample No.	Description
118*	78/5-Z17	Zoned idiomorphic crystal - 2, centre.
119*	78/5-Z16	Idem - 2, border; very strong yellow cathodoluminescence.
120*	78/5-Z13	Idem - 2, centre.
121*	78/5-Z14	Idem - 2, intermediate zone.
122*	78/6-Z01	Skeletal crystal - 1, border.
123*	78/6-Z02	Idem - 1, internal part.
124	78/6-Z03	Skeletal crystal - 1, border.
125*	78/6-Z05	Idem - 2, border.
126	78/6-Z04	Idem - 2, centre.
127*	78/6-Z06	Idem - 2, border; very strong yellow cathodoluminescence.
128	78/6-Z06A	Idem - 2, centre.
129*	78/6-Z07	Idem - 2, border; very strong yellow cathodoluminescence.
130	78/6-Z09	Idem - 2, border; very strong yellow cathodoluminescence.
131	78/6-Z08	Idem - 2, intermediate zone.
132*	78/6-Z10	Skeletal crystal - 3, centre.
133	78/6-Z10A	Idem - 3, border; very strong yellow cathodoluminescence.
134	78/6-Z11	Idem - 3, centre.
135	78/6-Z15	Idem - 3, sutured border; strong blue cathodoluminescence.
136	78/6-Z14	Idem - 3, border; very strong yellow cathodoluminescence.
137*	78/7-Z01	Skeletal crystal - 1, border; very strong yellow cathodoluminescence.
138*	78/7-Z01A	Idem - 1.
139	78/7-Z02	Idem - 1, intermediate zone; very strong yellow cathodoluminescence.
140*	78/7-Z03	Idem - 1, border.
141	78/7-Z04	Idem - 1, intermediate zone.
142	78/7-Z05	Idem - 1, centre.
143	78/7-Z06	Idem - 1, border.
144*	78/7-Z07	Idem - 1, internal part.

*Analysis not reported.

	Crystal matrix: zircon													
Sample	78/6-Z04	78/6-Z06A	78/6-Z08	78/6-Z03	78/6-Z09	78/6-Z11	78/6-Z10A	78/6-Z14	78/6-Z15	78/7-Z05	78/7-Z02	78/7-Z04	78/7-Z06	78/3-Z07
Location	Centre a	Centre a	Intermed. a	Rim a	Rim a	Centre b	Rim b	Rim b	Rim b	Centre	Intermed.	Intermed.	Rim	Centre
SiO_2	32.77	33.34	33.23	32.90	33.57	33.20	32.33	31.87	33.74	33.13	32.43	32.89	33.11	33.06
FeO	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
Na_2O	0.10	0.10	0.11	0.15	0.07	0.08	0.13	0.11	0.09	0.18	0.07	0.08	0.12	0.06
MgO	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
UO_2	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
ThO_2	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
ZrO_2	67.43	66.77	66.86	66.11	67.20	66.36	65.04	64.80	67.61	67.12	64.44	66.28	67.91	65.73
Yb_2O_3	0.00	0.00	0.12	0.16	0.12	0.12	0.12	0.13	0.16	0.26	0.18	0.14	0.19	0.00
Ce_2O_3	0.07	0.17	0.19	0.11	0.11	0.10	0.09	0.19	0.14	0.15	0.16	0.13	0.10	0.13
Y_2O_3	0.39	0.23	0.36	0.29	0.33	0.62	0.68	0.33	0.46	0.20	0.06	0.31	0.39	0.16
K_2O	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_2O_3	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
La_2O_3	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
HfO_2	0.47	0.72	0.79	0.70	0.00	0.79	0.39	0.69	0.00	0.00	0.80	0.62	0.71	0.57
Total (wt.%)	101.22	101.33	101.66	100.40	101.40	101.28	98.77	98.13	102.21	101.03	98.14	100.46	102.53	99.71
Normalised to 16 O														
Si	3.97	4.02	4.01	4.01	4.04	4.02	4.01	3.99	4.03	4.01	4.04	4.01	3.97	4.04
Fe	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
Na	0.02	0.02	0.03	0.04	0.02	0.02	0.03	0.03	0.02	0.04	0.02	0.02	0.03	0.02
Mg	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
U	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
Th	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
Zr	3.98	3.93	3.93	3.93	3.94	3.91	3.93	3.95	3.94	3.96	3.91	3.94	3.97	3.92
Yb	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Ce	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01
Y	0.03	0.02	0.02	0.02	0.02	0.04	0.05	0.02	0.03	0.01	0.00	0.02	0.03	0.01
K	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	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
La	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
Hf	0.02	0.03	0.03	0.02	0.00	0.03	0.01	0.03	0.00	0.00	0.03	0.02	0.02	0.02

	Crystal matrix: zircon (contd.)							
Sample Location	78/3-Z10 Centre	78/3-Z01A Intermed.	78/3-Z10A Intermed.	78/3-Z10B Intermed.	78/3-Z06 Intermed.	78/3-Z02 Rim	78/3-Z03 Rim	78/3-Z05 Rim
SiO_2	32.19	33.23	33.27	32.99	32.68	32.52	33.18	32.84
FeO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.09	0.08	0.10	0.09	0.08	0.11	0.10	0.14
MgO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO_2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ThO_2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ZrO_2	65.95	66.60	67.77	65.86	64.92	66.64	66.82	65.64
Yb_2O_3	0.00	0.00	0.19	0.00	0.13	0.20	0.13	0.00
Ce_2O_3	0.08	0.18	0.37	0.16	0.08	0.11	0.09	0.29
Y_2O_3	0.05	0.25	0.40	0.18	0.25	0.26	0.32	0.32
K_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Al_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
La_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HfO_2	0.00	0.00	0.00	0.48	0.58	0.41	0.00	0.52
Total (wt.%)	98.35	100.35	102.10	99.77	98.71	100.25	100.64	99.75
Normalised to 16 O								
Si	4.00	4.03	3.99	4.04	4.04	3.98	4.02	4.02
Fe	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.03
Mg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
U	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Zr	3.99	3.94	3.97	3.93	3.91	3.98	3.95	3.92
Yb	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00
Ce	0.00	0.01	0.02	0.01	0.00	0.01	0.00	0.01
Y	0.00	0.02	0.03	0.01	0.02	0.02	0.02	0.02
K	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Al	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
La	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hf	0.00	0.00	0.00	0.02	0.02	0.01	0.00	0.02

Appendix 3:5

Fluorite

Textural and electron microprobe data

Sample	Rock type
WC-78-1A	Cataclastic zone in reduced leucocratic phonolite.

Characteristics of the analysed fluorites.

Anal. No.	Sample No.	Description
1	78/6-Fl16	Colourless crystal - 1, intergrown with skeletal zircon.
2	78/6-Fl17	Colourless crystal - 2, intergrown with skeletal zircon.
3	78/6-Fl18	Colourless crystal - 3, intergrown with skeletal zircon.
4	78/6-Fl19	Light violet coloured crystal - 4, intergrown with skeletal zircon.
5	78/4-Fl01	Heterogeneously coloured crystal - 1, partly deep violet in colour.
6	78/4-Fl02	Idem 1, deep violet colour.
7	78/4-Fl03	Idem 1, light violet – almost colourless.
8	78/4-Fl04	Idem 1, light violet – almost colourless.
9	78/4-Fl06	Idem 1, violet colour, border of crystal.
10	78/4-Fl09	Idem 1, deep violet colour, internal part of the crystal.
11	78/4-Fl10	Idem 1, deep violet colour, intermediate zone of crystal.
12	78/4-Fl11	Idem 1, deep violet colour, border of crystal.

	Crystal matrix: fluorite											
Sample	78/6-Fl16	78/6-Fl17	78/6-Fl18	78/6-Fl19	78/4-Fl01	78/4-Fl02	78/4-Fl03	78/4-Fl04	78/4-Fl06	78/4-Fl09	78/4-Fl10	78/4-Fl11
SiO_2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FeO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na_2O	0.06	0.07	0.09	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.09	0.00
MgO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO_2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ThO_2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ZrO_2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yb_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ce_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.00
Y_2O_3	0.00	0.00	0.00	0.07	0.12	0.15	0.00	0.00	0.07	0.15	0.20	0.10
K_2O	0.93	0.70	0.79	0.83	0.76	0.96	0.87	0.73	0.81	0.79	0.73	0.81
Al_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
La_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hf_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F	48.67	48.67	48.67	48.67	48.67	48.67	48.67	48.67	48.67	48.67	48.67	48.67
CaO	50.51	50.70	50.62	50.54	50.60	50.42	50.61	50.66	50.61	50.12	50.50	50.58
Total (wt.%)	100.17	100.14	100.17	100.17	100.15	100.20	100.15	100.14	100.16	100.23	100.19	100.16

Appendix 3:6

Rutile and Ti-oxides

Electron microprobe data

Sample	Rock
S/N-24	Massive pitchblende nodule (Urânio do Brasil collection).
WC-75-1B	Reduced, medium-grained leucocratic phonolite.
WC-78-1A	Cataclastic zone in reduced leucocratic phonolite.
WC-110-1A	Reduced porous leucocratic phonolite.

Mineralogical characteristics of the analysed TiO_2-minerals (rutiles).

The presented analyses are of sample nos.; 110-1A, 78-1A, 75-1B and SN24 (see Table next page). All analysed grains are microgranular hydrothermal replacement products of aegirine-augites.

Crystal matrix: rutile and Ti-oxides												
Sample	SN24-1RU5	SN24-1RU6	SN24-2RU2	SN24-2RU3	SN24-2RU4	SN24-2RU5	SN24-2RU7	110/1RU4	110/1RU5	110/1RU6	110/1RU7	110/1RU13A
TiO_2	95.42	95.44	94.22	95.85	94.40	93.78	94.81	87.91	91.00	91.62	91.54	92.91
MnO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FeO	0.00	1.95	1.02	1.67	1.08	0.76	0.91	4.77	4.59	2.89	3.55	1.63
Al_2O_3	0.76	0.81	1.10	0.68	0.93	0.94	1.07	0.68	0.64	0.66	0.70	0.98
SiO_2	0.76	1.04	1.11	0.60	0.97	0.76	1.05	1.34	0.57	0.60	0.68	1.35
CaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
K2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.00	0.00	0.00	0.00
Nb_2O_3	0.50	0.00	0.47	0.24	0.36	0.30	0.50	2.07	1.08	1.96	0.87	1.06
UO_2	0.00	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00
ThO_2	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Y_2O_3	0.00	0.10	0.15	0.31	0.07	0.00	0.06	0.46	0.00	0.00	0.21	0.00
Ce_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
La_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yb_2O_3	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 (wt.%)	97.45	99.33	98.27	99.36	97.82	97.18	98.40	97.62	97.88	97.73	97.55	97.92

Crystal matrix: rutile and Ti-oxides											
Sample	78/1RU18A	78/1RU18	78/1RU19	78/10RU7	78/10RU12A	78/10RU13	78/10RU17	75/1RU6	75/1RU5	75/1RU8	75/4RU4A
TiO_2	90.65	95.01	97.74	92.60	94.87	93.90	92.36	93.55	94.27	93.64	91.66
MnO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FeO	1.51	0.86	0.00	1.97	1.16	1.72	2.83	1.49	1.30	1.76	2.21
Al_2O_3	1.17	0.82	0.53	0.63	0.83	0.74	0.95	0.64	0.68	0.59	0.63
SiO_2	1.95	0.65	0.00	0.81	0.81	0.00	0.83	0.53	0.68	0.00	0.63
CaO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
K_2O	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nb_2O_3	2.00	1.87	1.31	1.33	1.11	1.76	0.55	1.86	1.44	1.84	2.04
UO_2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ThO_2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Y_2O_3	0.00	0.07	0.00	0.00	0.00	0.00	0.18	0.06	0.12	0.00	0.00
Ce_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
La_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yb_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total (wt.%)	97.86	99.28	99.58	97.34	98.78	98.11	97.68	98.13	98.49	97.83	97.18

Appendix 3:7

Pyrite

Electron microprobe data

Sample	Rock type
WC-78-1A	Cataclastic zone in reduced leucocratic phonolite.
WC-110-1A	Reduced porous leucocratic phonolite.

	Crystal matrix: pyrite											
Sample	110/1-PY54	110/1-PY55	110/1-PY58	110/1-PY60	110/1-PY01	110/1-PY64	110/-PY	110/1-PY54	110/1-PY55	110/1-PY01	110/1-PY61	110/3-PY12
Fe	46.23	45.20	44.93	46.40	45.97	46.29	46.62	45.07	45.50	46.13	44.91	46.39
S	53.20	52.77	51.83	52.96	53.01	53.36	52.52	51.72	52.51	52.42	52.52	52.63
Pb	0.67	0.94	0.89	0.00	0.00	0.00	1.13	1.41	1.29	1.49	0.75	1.29
As	0.12	0.17	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mo	0.70	0.57	0.74	0.60	0.57	0.56	0.57	0.00	0.00	0.00	0.00	0.00
Ag	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total (wt.%)	100.91	99.81	98.56	99.96	99.56	100.20	100.84	98.19	99.30	100.04	98.18	100.31
S/Fe (atomic)	2.00	2.03	2.01	1.99	2.01	2.01	1.96	2.00	2.01	2.00	2.04	1.98

	Crystal matrix: pyrite (contd.)							
Sample	110/3-PY13	110/5-PY09	78/1-PY15	78/1-PY13	78/1-PY14	78/1-PY10	78/1-PY04	78/2-PY34
Fe	45.69	46.85	45.54	46.31	45.69	45.57	44.48	45.34
S	53.18	52.64	52.92	53.05	52.83	50.97	51.76	52.77
Pb	0.80	0.93	0.00	0.51	0.75	3.73	2.84	0.86
As	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00
Mo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total (wt.%)	99.67	100.41	98.46	99.87	99.27	100.44	99.08	98.98
S/Fe (atomic)	1.97	1.96	2.02	2.00	2.01	1.95	2.04	2.03

Appendix 3:8

Uranium-oxides

Electron microprobe data

Sample	Rock
S/N-24	Massive pitchblende nodule with two pyrite generations and argillised phonolitic core (Urânio do Brasil collection, see Appendix 3:9; Plates 3:9-7 and 3:9-8).

Crystal matrix: uranium-oxides

Sample	SN24-1U1	SN24-1U2	SN24-1U3	SN24-1U4	SN24-1U7	SN24-1U9	SN24-1U11	SN24-1U12	SN24-1U13	SN24-1U14	SN24-2U1	SN24-2U2	SN24-2U3	SN24-2U4
FeO	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
CaO	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
SiO_2	2.42	2.15	2.23	2.09	2.13	2.96	2.59	2.52	2.13	2.87	2.99	2.14	2.88	2.72
Al_2O_3	0.29	0.15	0.00	0.20	0.18	0.53	0.39	0.12	0.16	0.51	0.33	0.11	0.21	0.14
TiO_2	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
MnO	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
K_2O	1.39	1.16	1.01	0.94	0.86	0.84	1.16	1.11	1.16	1.32	1.51	1.23	0.88	1.07
Nb_2O_3	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
Yb_2O_3	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
UO_2	87.17	82.80	82.32	82.66	84.06	84.89	82.16	84.47	82.55	82.04	84.02	85.78	85.97	83.28
Y_2O_3	0.42	0.00	0.30	0.07	0.00	0.14	0.00	0.00	0.00	0.11	0.09	0.13	0.62	0.00
Ce_2O_3	0.32	0.00	0.00	0.00	0.00	0.30	0.00	0.16	0.14	0.12	0.13	0.14	0.00	0.00
La_2O_3	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
ThO_2	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 (wt.%)	92.01	86.26	85.86	85.97	87.23	89.66	86.30	88.39	86.13	86.98	89.08	89.53	90.56	87.21

Crystal matrix: uranium-oxides (contd.)

Sample	SN24-2U5	SN24-2U6	SN24-3U1	SN24-3U2	SN24-3U3	SN24-3U4	SN24-3U5	SN24-3U6	SN24-3U7	SN24-3U8	SN24-3U9	SN24-3U10	SN24-4U2	SN24-4U3
FeO	0.00	0.00	0.00	0.00	0.98	0.00	0.00	0.00	1.19	0.00	0.00	0.00	0.00	0.00
CaO	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
SiO_2	3.23	2.90	2.33	2.23	2.35	2.49	2.26	2.46	2.19	2.87	2.09	2.07	2.67	2.71
Al_2O_3	0.38	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.31	0.88	0.62
TiO_2	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
MnO	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
K_2O	1.52	1.39	1.22	1.51	1.20	1.40	1.01	1.95	1.08	0.00	0.90	1.36	0.84	0.92
Nb_2O_3	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
Yb_2O_3	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
UO_2	84.75	84.80	81.53	81.26	79.94	80.84	79.78	81.92	79.16	81.97	82.71	81.18	79.06	78.62
Y_2O_3	0.11	0.00	0.00	0.05	0.05	0.00	0.16	0.08	0.15	0.00	0.00	0.18	0.00	0.07
Ce_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.12
La_2O_3	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
ThO_2	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 (wt.%)	89.99	89.52	85.08	85.05	84.51	84.72	83.20	86.41	83.77	84.84	85.82	85.23	83.45	83.05

	Crystal matrix: uranium-oxides (contd.)			
Sample	SN24-4U4	SN24-4U5	SN24-4U6	SN24-4U7
FeO	0.00	0.00	0.00	0.00
CaO	0.00	0.00	0.00	0.00
SiO_2	1.67	1.83	4.52	2.38
Al_2O_3	0.10	0.00	2.39	0.00
TiO_2	0.00	0.00	0.00	0.00
MnO	0.00	0.00	0.00	0.00
K_2O	1.19	1.01	1.38	1.10
Nb_2O_3	0.00	0.00	0.00	0.00
Yb_2O_3	0.00	0.00	0.00	0.00
UO_2	80.10	78.97	76.34	80.82
Y_2O_3	0.00	0.00	0.06	0.00
Ce_2O_3	0.00	0.00	0.00	0.00
La_2O_3	0.00	0.00	0.00	0.00
ThO_2	0.00	0.00	0.00	0.00
Total (wt.%)	83.06	81.81	84.69	84.29

	Crystal matrix: uranium-oxides (contd.)														
Sample	2 1-15	3 1-15	4 1-15	5 1-15	6 1-15	7 1-15	8 1-15	9 1-15	10 1-15	11 1-15	12 1-15	13 1-15	14 1-15	15 1-15	16 1-15
SiO_2	0.99	0.98	0.99	0.94	0.98	0.93	1.12	0.94	1.23	1.23	1.18	1.56	1.61	1.61	4.58
CaO	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
P_2O_5	0.20	0.20	0.00	0.18	0.14	0.15	0.22	0.13	0.13	0.17	0.15	0.16	0.16	0.16	0.06
FeO	0.14	0.11	0.17	0.10	0.35	0.00	0.10	0.10	0.00	0.00	0.00	0.00	0.11	0.00	0.00
Na_2O	0.00	0.06	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
MgO	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
UO_2	90.97	89.29	85.74	86.05	89.75	94.28	96.48	94.03	89.82	90.51	92.04	94.05	98.92	99.85	97.86
ThO_2	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
TiO_2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.00	0.00	0.00	0.00	0.00
ZrO_2	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
Yb_2O_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00
Nd_2O_3	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
Ce_2O_3	0.18	0.00	0.00	0.22	0.00	0.00	0.25	0.00	0.00	0.00	0.21	0.00	0.25	0.00	0.17
Y_2O_3	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00
Total (wt.%)	92.47	90.73	86.89	87.49	91.22	95.36	98.18	95.20	91.18	92.47	93.67	95.95	101.06	101.62	102.66

Appendix 3:9

PLATES 3:9-1 – 3:9-8

PLATE 3:9-1. Reduced porphyritic phonolite. Note the white alkali-feldspar phenocrysts, microporosities and medium-grey, nearly rectangular pseudomorphs after nepheline.
Sample no.: F1/69-1A.

PLATE 3:9-2. Reduced medium-grained porphyritic phonolite with massive structures. The dark seams in the left hand corners of the drillcores are hydrothermally altered fractures mineralised with microcrystalline pyrite.

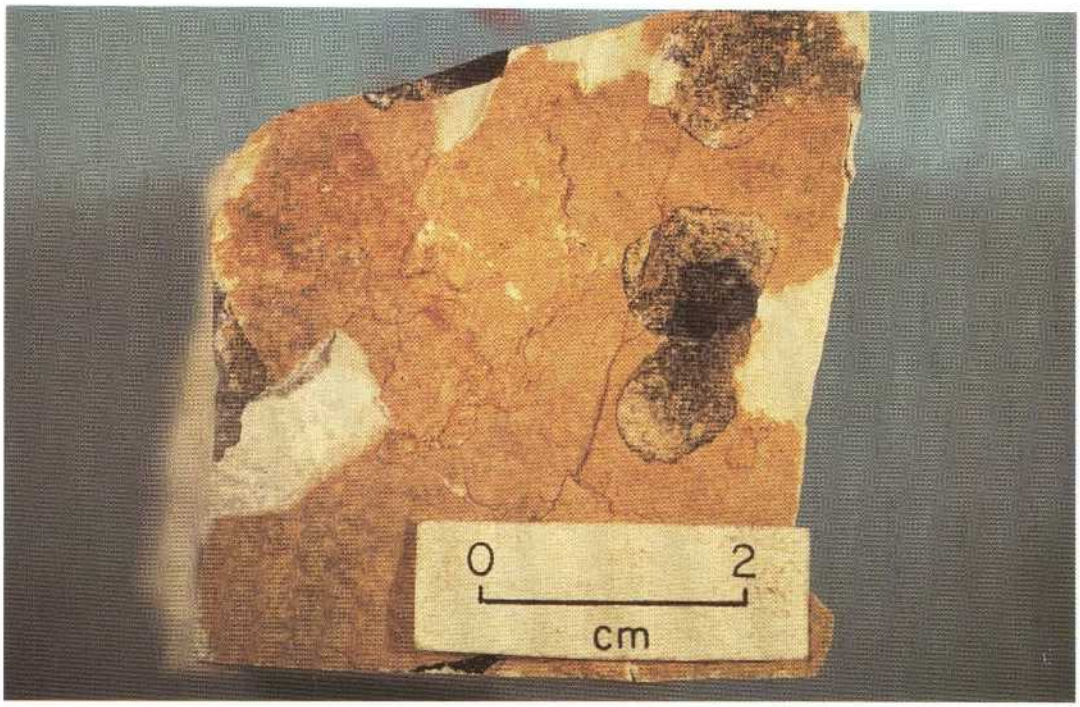

PLATE 3:9-3. Reduced phonolite near redox front. Note the fracture-related formation and dissolution of pitchblende nodules (black). Open pit sample no. S/N-18 (8-2BI 33).

PLATE 3:9-4. Sawn surface of sample illustrated in Plate 3:9-3. Note fine-grained texture of the reduced phonolite and the elongated fracture dependent forms of the black pitchblende nodules.

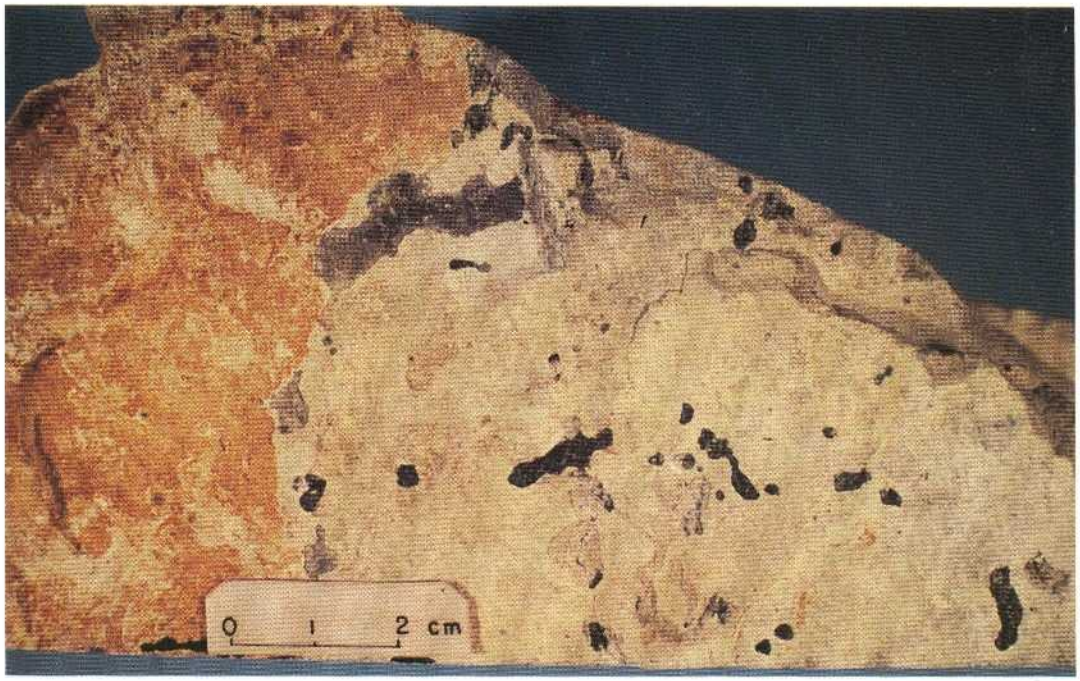

PLATE 3:9-5. Phonolite with redox front. Note the forms of the pitchblende nodules on the

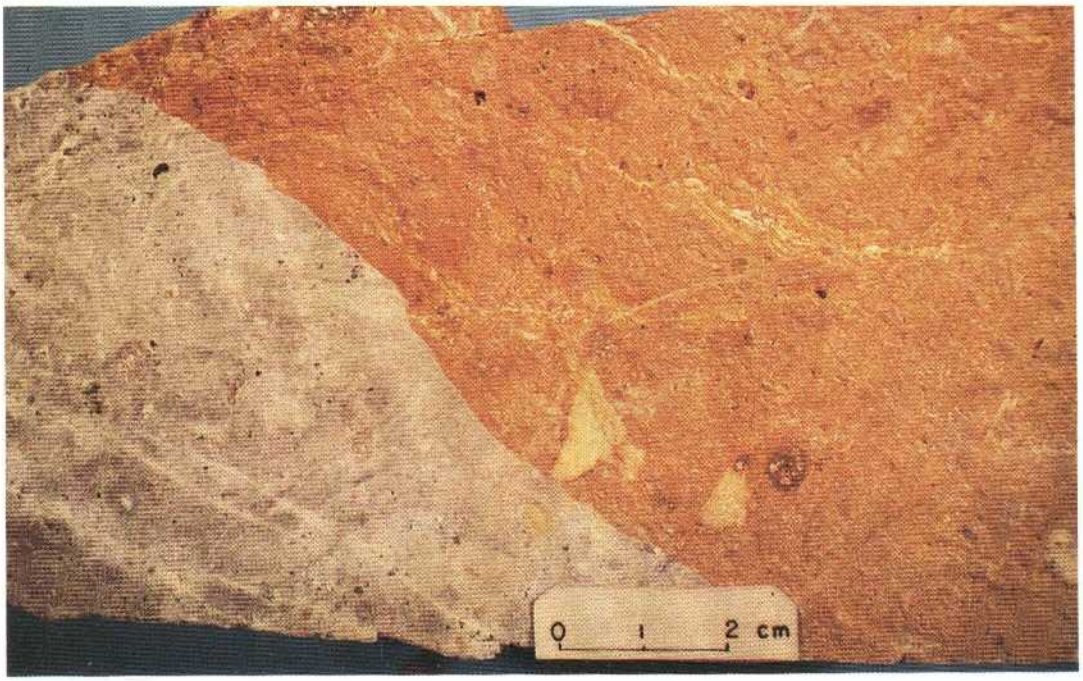

PLATE 3:9-6. Sawn surface of sample illustrated in Plate 3:9-5. Note the sharp redox front in the microxenolithic, fine-grained phonolite. The left-hand part consists of reduced rock, light-grey coloured, and shows microporosities and one (kidney shaped) millimetre-sized pitchblende nodule (upper left, about 1 cm from redox front). The right-hand part of the specimen is oxidised, showing the typical colouration caused by finely disseminated limonite/ HFO-minerals resulting from pyrite oxidation.

PLATE 3:9-7. Massive pitchblende nodule. Note external concretionary "Löss-Kindl" shape.
Specimen no. S/N-24.

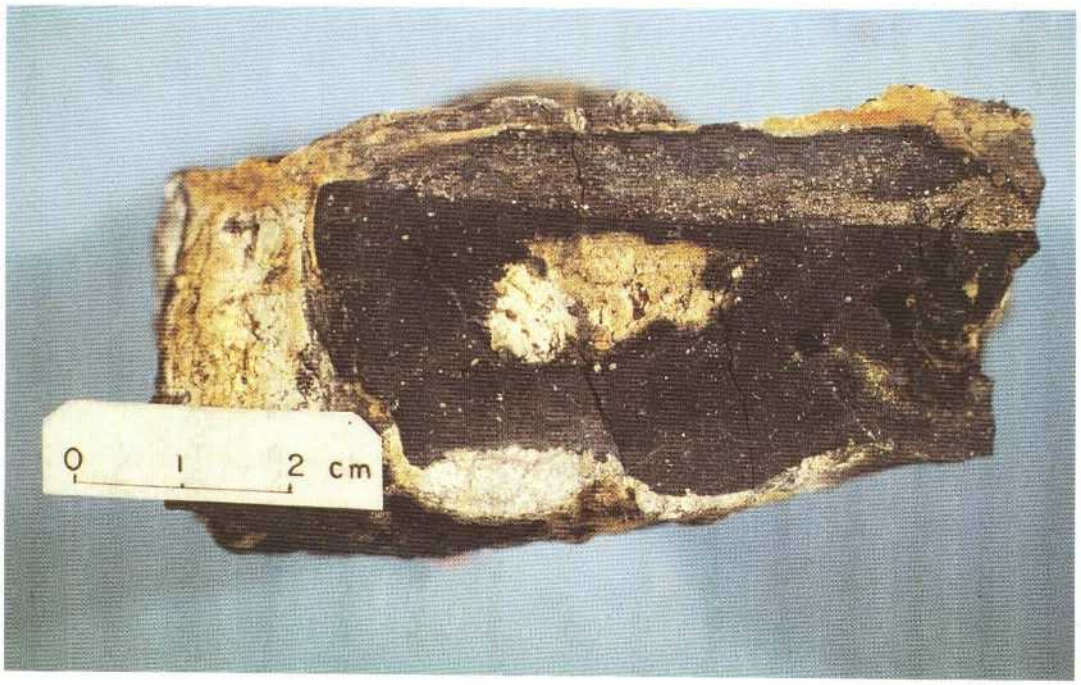

PLATE 3:9-8. Sawn surface of the nodule illustrated in Plate 3:9-7. The nodule consists of a white coloured core of hydrothermally altered and argillised rock (phonolite), surrounded by a black nodule-forming pitchblende zone and a fine external yellowish white clay shell. Note the "horizontal" zone which is extremely rich in secondary coarse-grained pyrites in the top portion of the pitchblende zone (yellow reflectivity). This probably represents a former water table-related phenomenon.