

**Appendix 7**  
**'SEM analysis of quartz sample'**  
**(Work performed by University of Ballarat Vic.)**



## ANALYSIS OF QUARTZ SAMPLE SUPPLIED BY BURNIE RESEARCH LABORATORIES

Attn: John Glen

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### Sample Supplied

Coarse quartz grains labelled **610007 T02 Coarse Sand B +1.18**

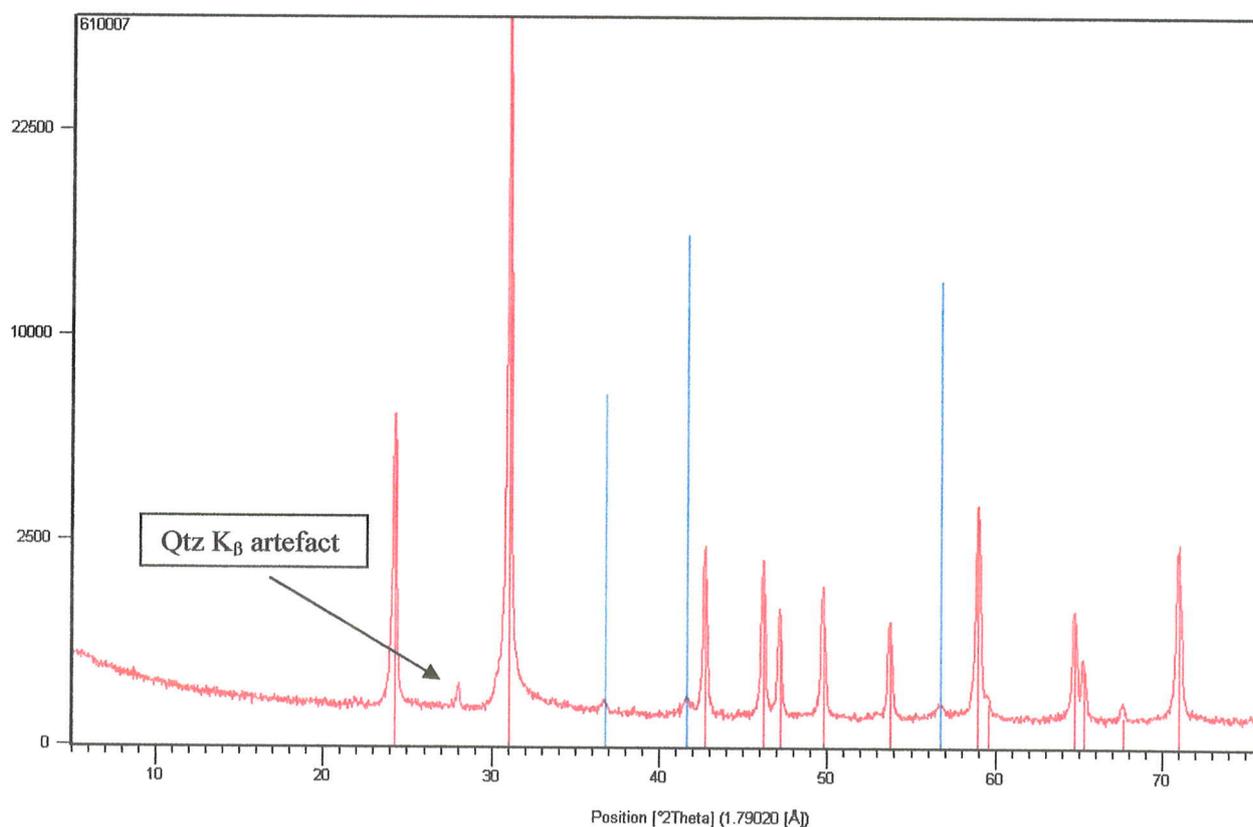
### Results Summary

1. The major non-quartz phase present in the sample is a likely **potash feldspar**, which occurs as free grains to 1.5mm and as smaller inclusions within quartz grains.
2. No other free non-quartz grains have been observed however small (20-50 microns) inclusions of apatite and zircon are observed in a few grains. Zircon contains significant hafnium and uranium; however the abundance of zircon is extremely low.
3. **The light brown translucency of the quartz grains appears to be due to thin films of an unidentified brown substance on fracture planes within the grains** - see thin section images on p9. Despite some effort it has not been possible to find these films in the SEM to enable analysis.

## QXRD Results

Phase	Weight%
Orthoclase	0
Quartz	99.8
Tungsten carbide	0.2

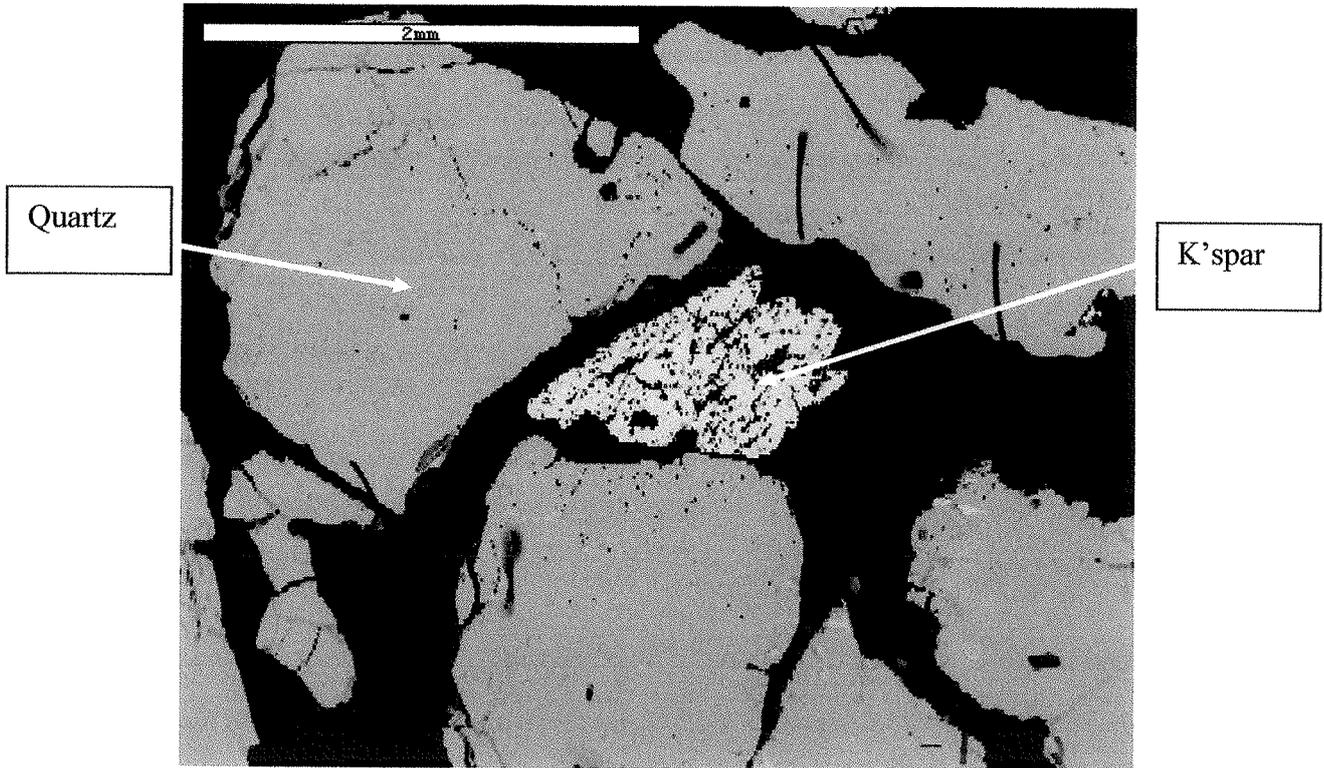
Note the presence of **tungsten carbide** which is contamination from our ring mill and unexpected but an important lesson. No phases other than quartz and the WC are detected by x-ray diffraction analysis. See indexed trace obtained below.



Note log scale on vertical intensity axis quartz peaks indexed with red lines, WC with blue lines.

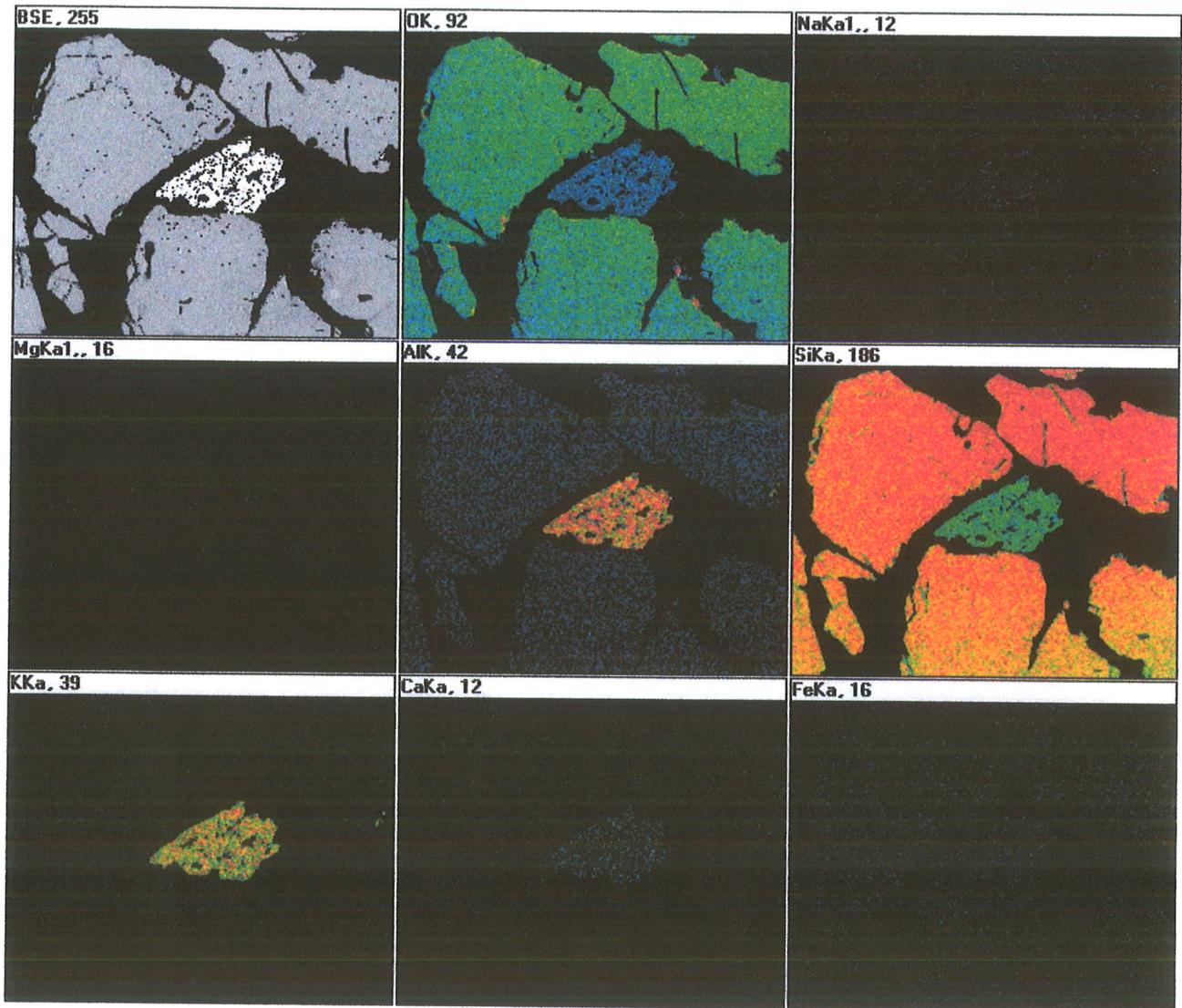
No.	Visible	Compound Name	Chemical Formula
1	<input checked="" type="checkbox"/>	Quartz	Si O <sub>2</sub>
2	<input checked="" type="checkbox"/>	Quasongite, syn	W C

## Scanning Electron Microscopy Results

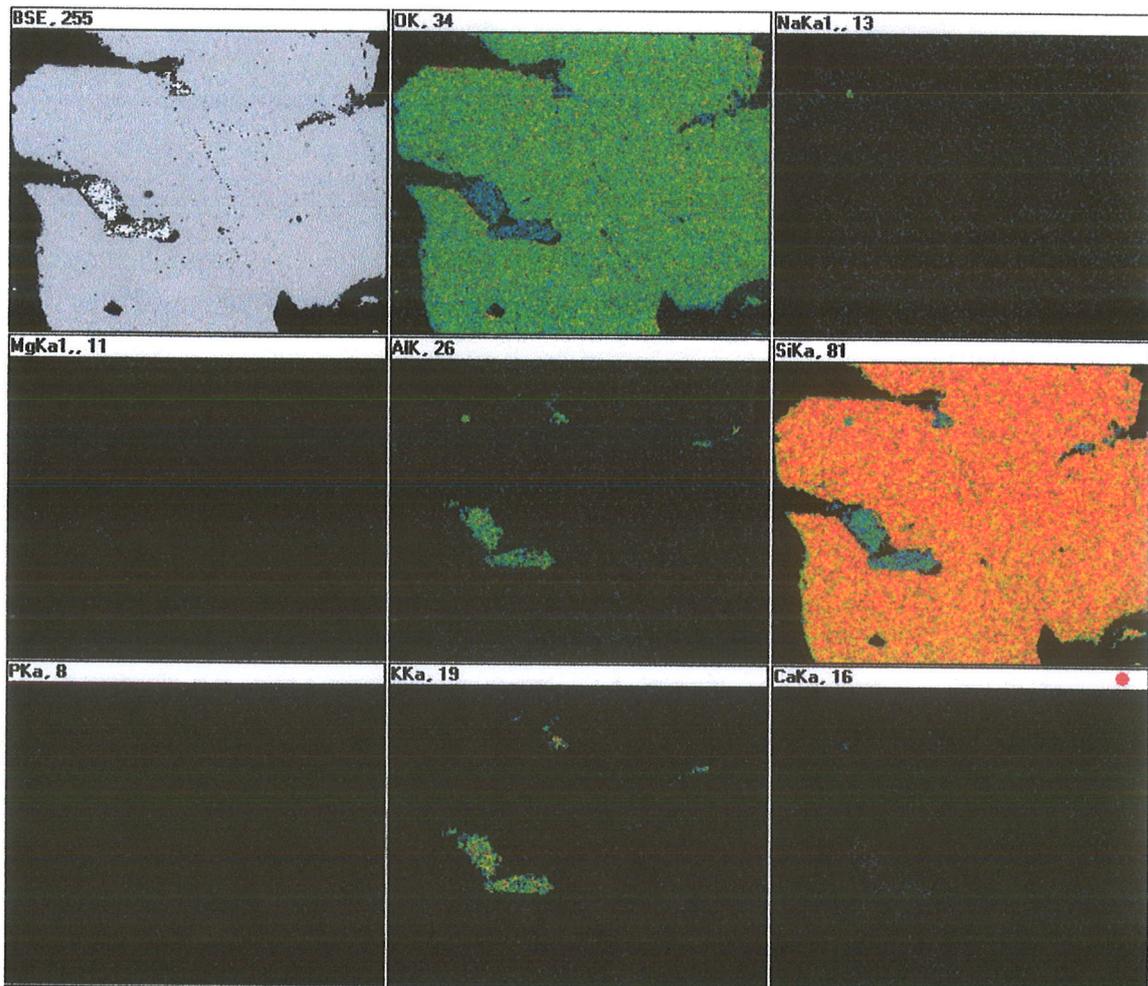
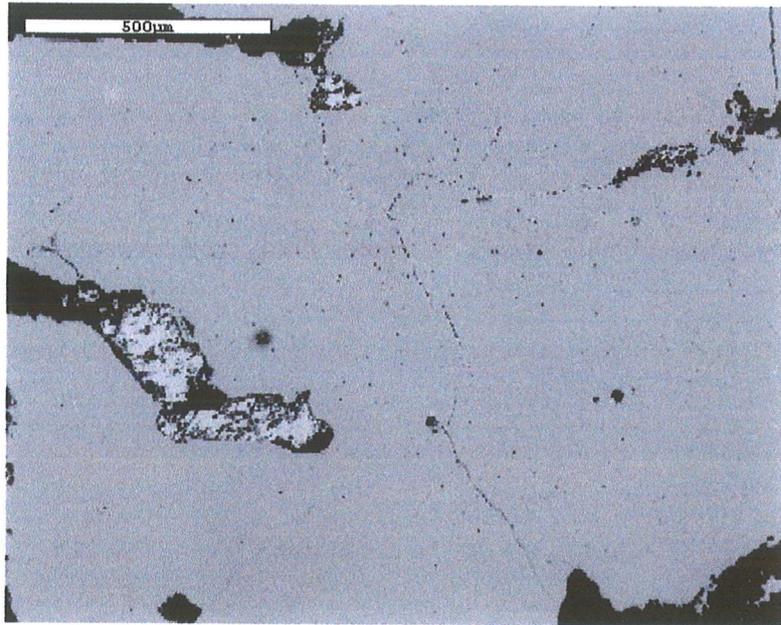


	Compound %	Nos. of ions
Na2O	0.39	0.11
Al2O3	18.86	3.08
SiO2	64.76	8.96
K2O	15.92	2.81
CaO	-0.03*	0.00*
FeO	0.09*	0.01*
		24.00
	100.00	
	Cation sum	14.96

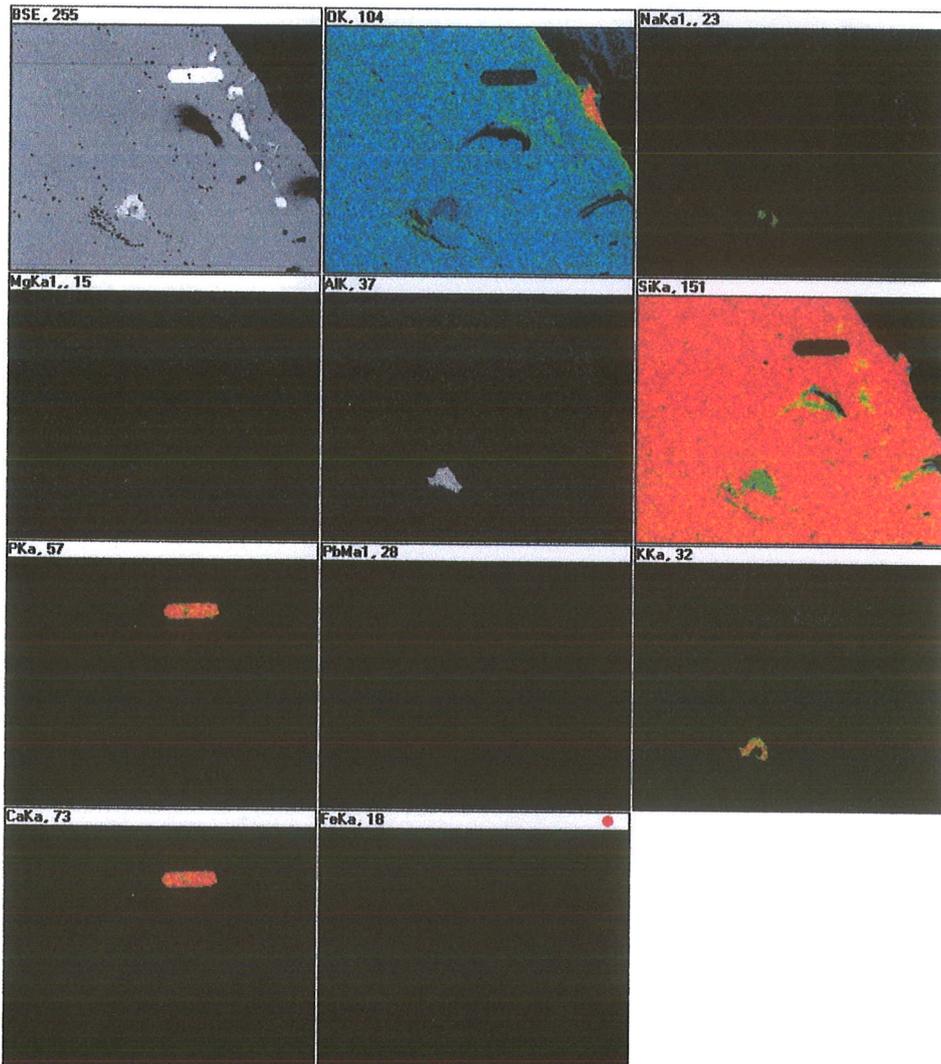
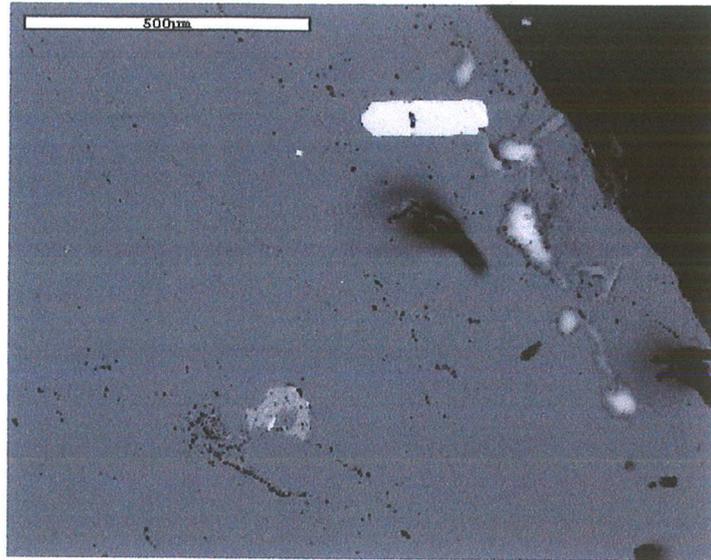
SEM BSE image and normalised EDS analysis of a typical K'feldspar grain seen in the sample provided. The analysis is close o an ideal orthoclase composition.



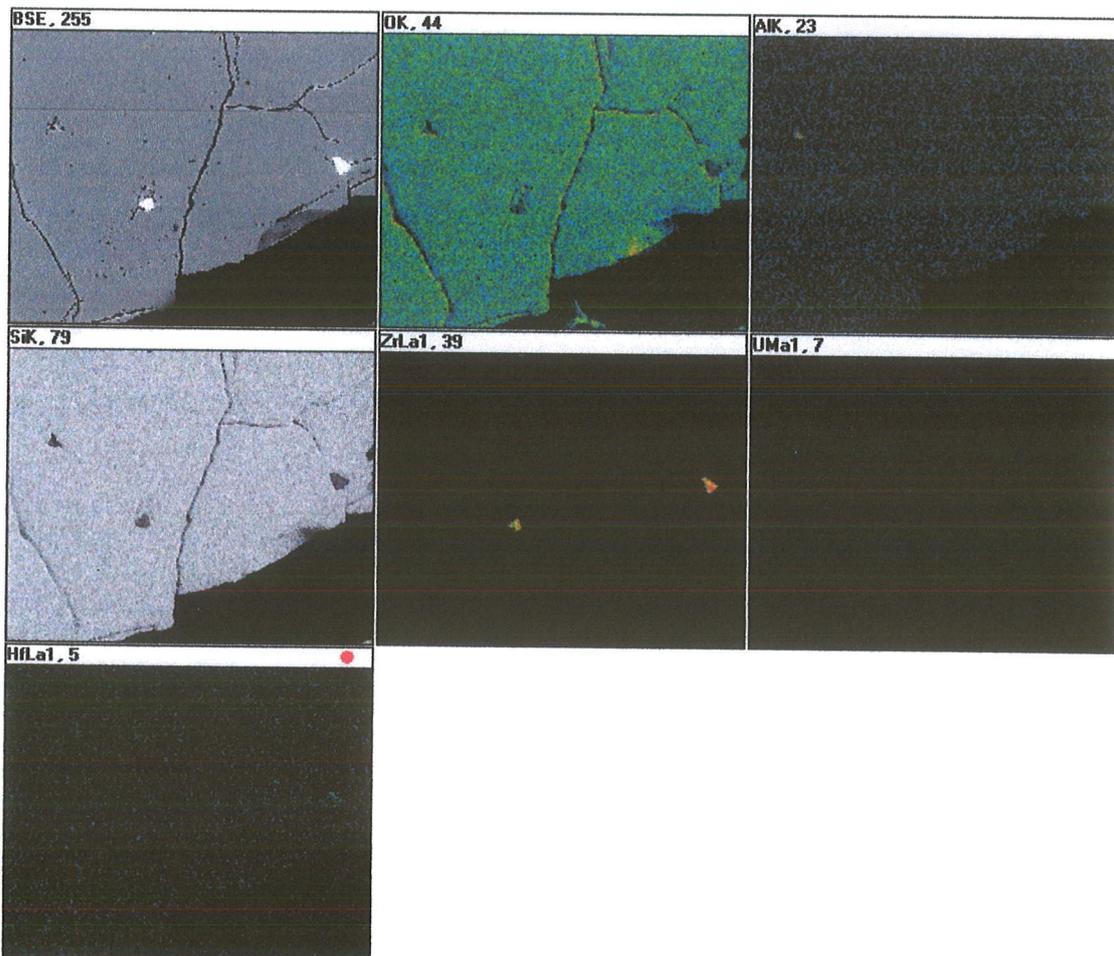
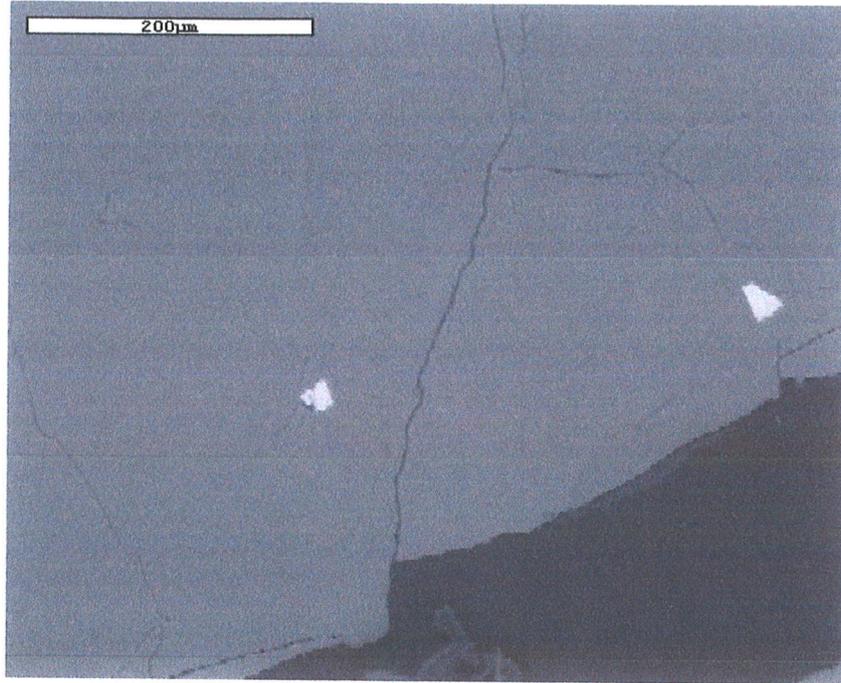
BSE image and element maps obtained from the same field shown on the previous page.



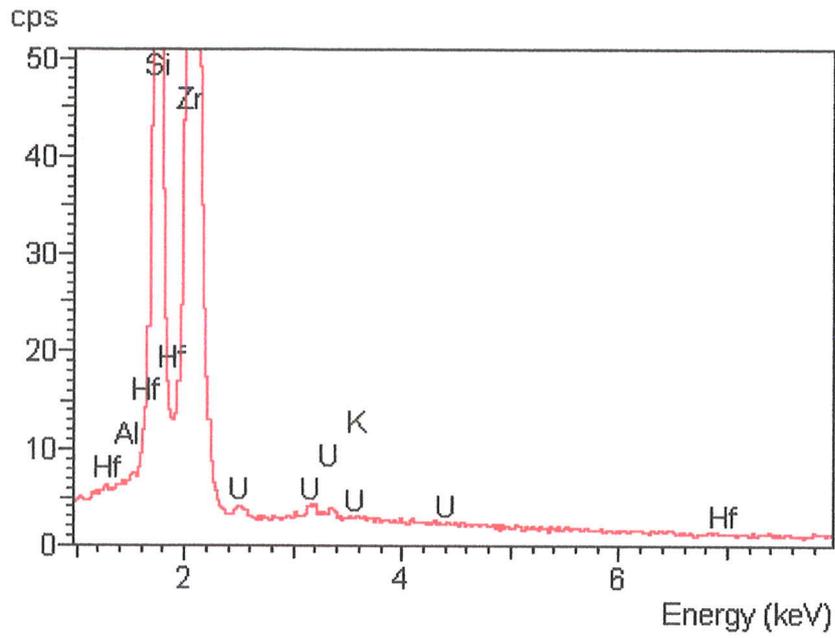
BSE image and corresponding x-ray maps showing inclusions of K'spar in quartz – see K maps.



SEM BSE image of quartz grain containing an apatite and unknown alkali silicate inclusion.



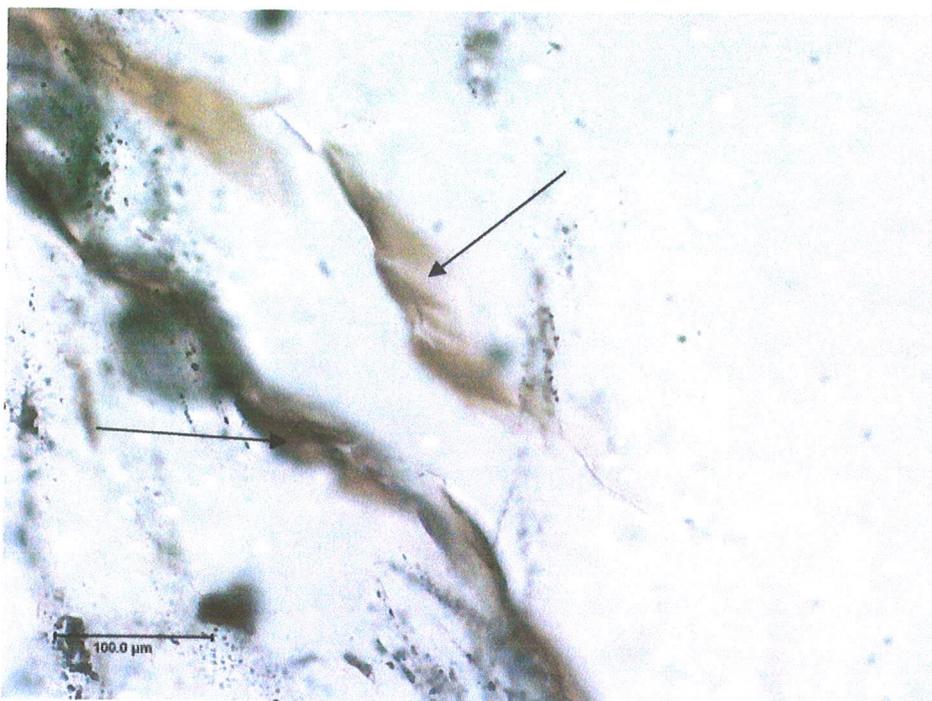
SEM BSE image and element maps of a grain containing small (10-15 micron) zircon inclusions.



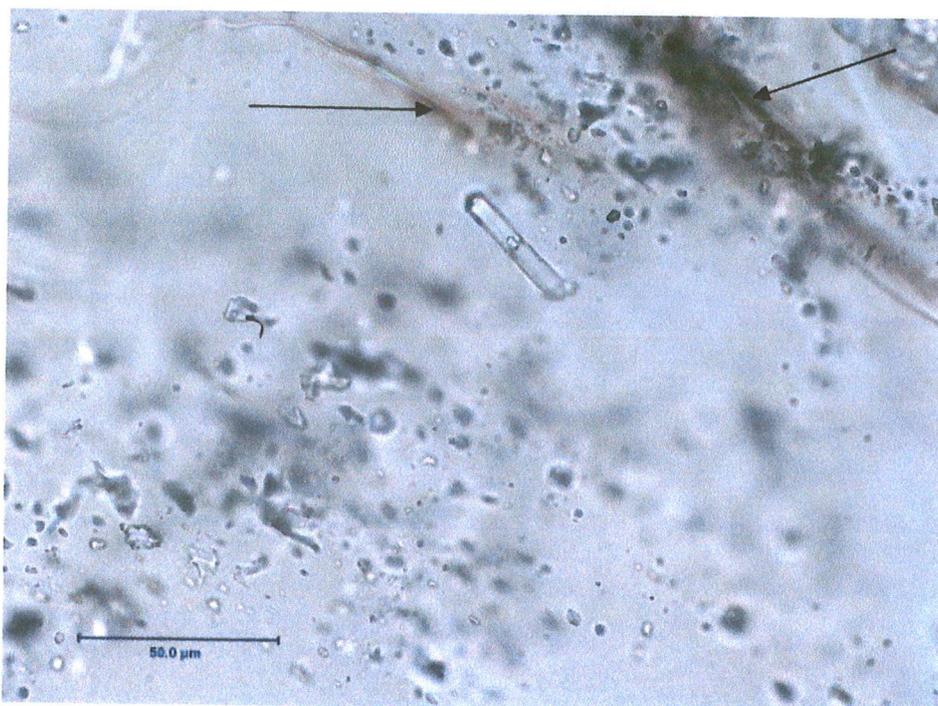
Compound	%	Nos. of ions
SiO <sub>2</sub>	31.64	5.92
ZrO <sub>2</sub>	64.01	5.84
HfO <sub>2</sub>	2.46	0.13
UO <sub>3</sub>	1.88	0.07
		24.00
	100.00	
	Cation sum	11.96

Typical EDS spectrum and normalised analysis of zircon inclusion seen in quartz.

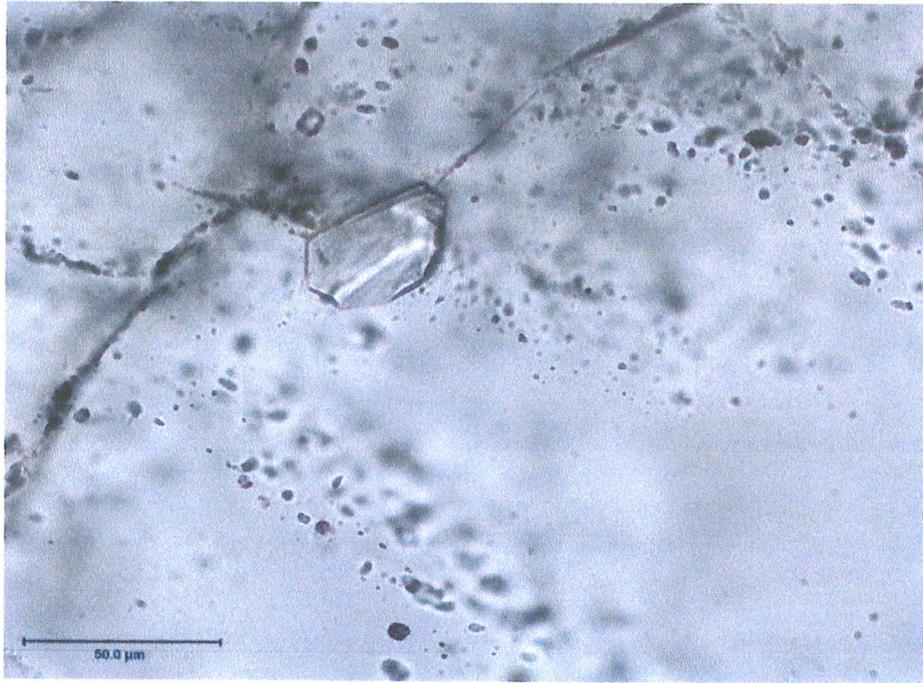
**Optical Microscopy – Thin Sections**



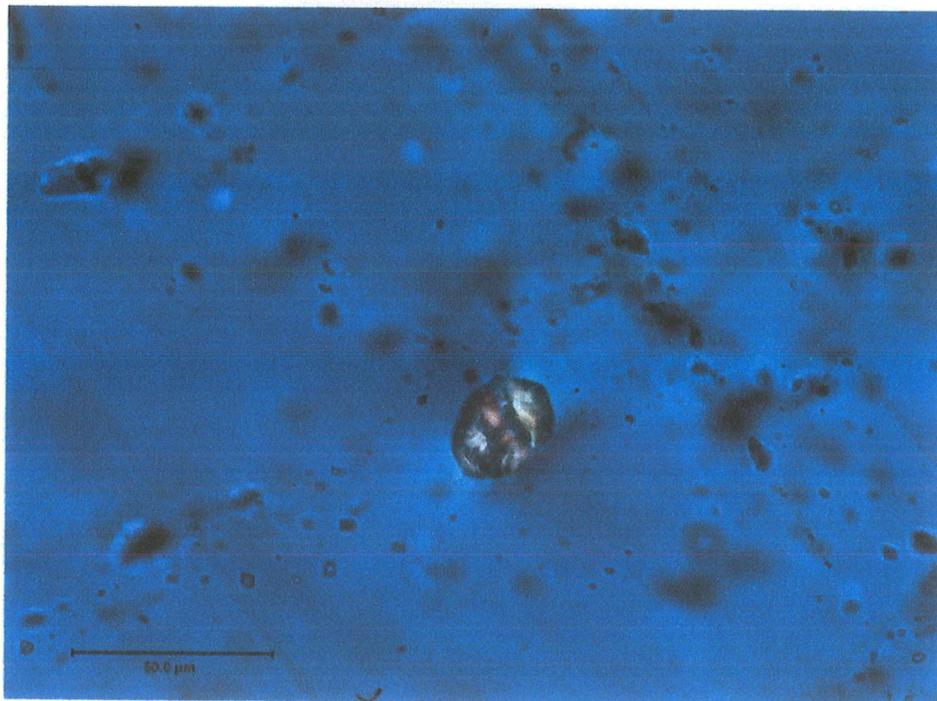
**PPL image showing possible brown film on fractures (arrowed) responsible for the off-colour of the quartz.**



**PPL image: Clear fluid inclusions and stained fractures in quartz grain**



**PPL image showing unknown (apatite?) inclusion in quartz**



**X-polars: Zircon inclusion in quartz**