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APPENDIX 1

JCU rock sample numbers

All samples referred to in this thesis have been given a JCU sample number. Also included is a list of all analyses done on each sample, in addition to thin section cut and photos used in this thesis. Throughout the thesis, for samples taken from the FC12 and FC4NW prospects, sample numbers refer to the depth down hole and drill hole number respectively (e.g. MFC160.5/51).

An outline of the map of outcrop at MFC is also presented giving the locations of all samples taken.

Appendix 1

JCU Sample #	Hole #	Northing	Easting	Down hole depth	Hand sample	Polished section	Photo in thesis	XRF	Microthermo metric analysis	PIXE	Laser Ablation	GADDS	Electron microprobe
JCU sample collection numbers: FC4NW prospect													
71478	MFC97012D	7751426	468285	81.2	*		*						
71479	MFC97027D	7751302	467388	47.2m	*		*						
71480				50.5m	*	*							
71481				52.9m	*								
71482				81.2m	*								
71483				81.9m	*	*	*						
71484				91.1m	*								
71485				98.3m	*								
71486				100.3m	*	*							
71487				108m	*	*	*		*	*			
71488				114.2m	*	*							*
71489				118.5m	*								
71490				121m	*								
71491				125m	*	*	*		*	*			
71492				132.6m	*								
71493				180m		*	*		*	*			
71494	MFC98051D	7750597	466705	90.3m		*							
71495				94.6m	*	*							
71496				125.7m	*								
71497				143.3m	*								
71498				154.3m	*								
71499				160.2m	*	**		*			*		
71500				160.5m	*	**	**	*					*
71501				161.3m	*		*						
71502				168.6m							*		
71503				174.5m	*								
71504				181.9m		*							
71505				182.8m	*								
71506				190.8m	*								
71507				194m	*								
71508				210.9m	*								
71509				214.6m	*								
71510				242m	*								
71511	MFC98052D	7750860	466860	146.2m	*								
71512				165m	*								
71513				211.4m	*	*	*						
71514				220m		*							*
71515				253.3m	*								
71516				256m	*								
71517				256.7m	*								
71518				257.5m	*	*							
71519				259.7m		*	*		*	*			*
71520				260.6m	*	*							
71521				265.9m	*								
71522				268.7m	*	*							*
71523				269m	*	*	**						
71524	MFC98053D	7751358	467020	158.3m	*	*							
71525				180.8m	*								
71526				181.2m	*								
71527				181.4m	*								
71528				212.4m	*	*							
71529				214.4m	*								
71530				215m	*	*							
71531				219.6m	*	*							
71532				224.3m	*								
71533				225m	*								
71534				226.6m	*								
71535				242m	*	*							
71536				254.2m	*								
71537				261.7m	*								
71538				162.6m	*								
71539	MFC98054D	7751110	467130	169.8m	*								
71540				176.8m	*								
71541				178m	*								
71542				194		**							
71543				197.7m	*								
71544				206.6m	*								
71545				208m	*	*							
71546				210.1m	*								
71547				218m	*	*							*
71548				262m	*								

JCU Sample #	Hole #	Northing	Easting	Down hole depth	Hand sample	Polished section	Photo in thesis	XRF	Microthermometric analysis	PIXE	Laser Ablation	GADDS	Electron microprobe
JCU sample collection numbers: FC4NW prospect													
71549	MFC99090D	7750450	466450	74m	*								
71550				144m	*								
71551				176.8m	*	*	*						*
71552				180.9m									
71553				184m	*								
71554				214.8m	*								
71555				224.7m	*	*							
71556				232m	*	*							
71557				234.3m	*								
71558				248m	*								
71559				254.8m	*	***	**				*		*
71560				262m	*	**					*		
71561				266m	*								
71562				272.1m	*								
71563				273m	*								
71564				285.1m	*						*		
71565				315m	*	*							*
71566	MFC99091D	7750410	466300	197.6m	*								
71567				202.9m		*	*		*	*			
71568				224m	*	*	*						*
71569				288m	*								
71570				295.9m	*								
71571				310.3m	*								
71572				325.5m	*								
71573				327.4m	*								
71574				333.8m	*								
71575				335.3m	*	*							
71576				341.6m	*								
71577				344.6m	*								
71578				346.5m	*								
71579				353.6m	*								
71580				362.4m	*								
71581				399.5m	*	*							
71582				430m	*								
71583				440m	*	*							
71584				440.8m	*	**							*
71585				449.3m	*								
71586				469.7m		*	*						
71587				485.4m	*	**							
71588	MFC99092D	7750220	466600	170.5m	*								
71589				176m	*								
71590				183.8m	*								
71591				189m	*	*	*						
71592				195.8m	*								
71593				203.7m	*								
71594				232.9m	*	*							
71595				243m	*								
71596				250m	*	*							
71597				281m	*	**							
71598				285.4m	*	*	*						
71599				301.6m	*								
71600				311m	*	**							
71601				312.9m	*	*							
71602	MFC99093D	7750280	466320	127m	*	*	*						
71603				153m	*								
71604				180.7m	*								
71605				190.6m	*	*							
71606				197.5m	*								
71607				230.4m	*								
71608				236.4m	*								
71609				240m	*	*							
71610				240.1m		*							*
71611				247m	*								
71612				247.8m	*								
71613				251m	*	*							
71614				253.3m	*	*							
71615				254.6m	*	*							
71616				285.4m	*	*							
71617				293.2m	*								
71618				298.4m	*								

Appendix 1

JCU Sample #	Hole #	Northing	Easting	Down hole depth	Hand sample	Polished section	Photo in thesis	XRF	Microthermo metric analysis	PIXE	Laser Ablation	GADDS	Electron microprobe
JCU sample collection numbers: FC12 prospect													
71619	FTCD1081	7757785	470101	136m	*	*							
71620				256.8m		*							
71621				260.8m	*	**		*					
71622				266.3m	*	*	*	*					
71623				275m	*								
71624				284m	*	*							
71625				289.6m	*	*	*						
71626				291m	*	*	*				*		
71627				299.7m	*	*							
71628				302.5m	*	*							
71629				303.8m	*	*							
71630				356.8m	*		*						
71631				358.9m	*	*	*	*					
71632				360.3m	*	*	*	*					
71633				363m	*	*		*					
71634				431m	*	*							*
71635	FTCD1082	7757500	469700	203m	*								
71636				226.8m	*								
71637				253.2m	*	*							
71638				261.3m	*			*					
71639				263m	*			*					
71640				265m	*	*							
71641				256.7m	*	*							
71642				258.3m		*							
71643				327.3m	*								
71644				338m	*	*	*	*			*		
71645				339m	*			*					
71646				346.9m	*	*	*	*					*
71647				346m	*	*	*	*					
71648				356m	*								
71649				384.5m	*	*	*	*					
71650				390.3m	*	*	*	*					
71651				436m	*	*							
71652				441m	\	*							
71653				441.2m	*	*							
71654				447.3m	*	*							
71655				466.6m	*	*		*					
71656				466.8m	*	*		*					
71657				468.1m	*	*		*					
71658				490m	*	*							
71659				501m	*	*							*
71660				501.7m	*	*							
71661				505.9m	*	*							
71662	FTCD1084	7757501	470005	120.7m	*	*	*	*					
71663				121.3m	*			*					
71664				200.2m	*	*							
71665				259.5m	*	*							
71666				271.5m	*								
71667				312.3m	*						*		
71668	FTCD1085	7756600	469950	101.4m	*	*	*						
71669				222.5m	*								
71670				304m	*	*							

Appendix 1

JCU Sample #	Hole #	Northing	Easting	Down hole depth	Hand sample	Polished section	Photo in thesis	XRF	Microthermometric analysis	PIXE	Laser Ablation	GADDS	Electron microprobe
JCU sample collection numbers: FC12 prospect													
71671	FTCD1086	7758101	470205	190.3m	*			*					
71672				193.4m	*								*
71673				203	*	*	*						
71674				209.8m	*	*	*						*
71675				213m	*								
71676				223.6m	*	*							
71677				224.3m	*			*					
71678				228.3m	*	*							
71679				229.2m	*			*					
71680				246m	*	*	*	*					
71681				248.2m	*	*	*	*					
71682				249m	*	*							
71683				262m	*	*							
71684				262.3m	*	*	*	*					
71685				265.4m	*	*	*	*					
71686				280m	*	*							
71687				293.7m	*								
71688				303.8m	*		*						
71689				321.8m	*	*							
71690				327.4m	*	*							
71691				329m	*	*							
71692				360.6m	*	*							
71693				362.2m	*								
71694				362.3m	*	*							
71695				382.4m	*	*							
71696				395.6m	*			*					
71697				399.5m	*			*					
71698				425.1m	*	*							
71699				428.8m	*	*	*						
71700	FTCD1087	7758320	470130	145.9m	*	*							
71701				158.4m	*	*							
71702				183m	*		*						
71703				187m	*	**	*						*
71704				187.1m	*	*							
71705				191m	*								
71706				192.2m	*	*	*						
71707				192.6m	*		*						
71708				192.7m	*	*							
71709				201m	*	*	*						*
71710				203.2m	*	*	*						
71711				204m	*	*	*						
71712				204.2m	*						*		
71713				209m	*	*							
71714				263.8	*		*						
71715				270m	*	*							
71716				291.7m	*	*							
71717				369m	*	*							
71718				371.2m	*	*	*						

JCU Sample #	Hole #	Northing	Easting	Sample name in thesis	Down hole depth	Hand sample	Polished section	Photo in thesis	XRF	Microthermometric analysis	PIXE	Laser Ablation	GADDS	Electron microprobe
JCU sample collection numbers: Ernest Henry														
71719	FTCD004	7763268	439557	FT4B	88m	*	*					*		
71720				FT4A	198m	*	*					*		
71721	FTCD008	7769440	439160	FT8C	144.8m	*	*					*		
71722				FT8A	263.2m	*	*					*		
71723				FT8B	411.5m	*	*					*		
71724	FTCD021	7769278	439480	FT8A	135.3m	*	*					*		
71725	FTCD094	7769580	438600	FT94B	159.3m	*	*					*		
71726				FT94A	244.7m	*	*					*		
71727				FT94C	527.7m	*	*					*		
71728	EH151	7769053	439641	EH151	144m	*	*					*		
71729	EH184			EH184C	120.4m	*	*					*		
71730				EH184A	208.8m	*	*					*		
71731				EH184B	279.1m	*	*					*		
71732				EH184D	425m	*	*					*		
71733	EH201	7769320	439319	EH201B	159.5m	*	*					*		
71734				EH201C	205.9m	*	*	*				*		
71735				EH201C	268.8m	*	*					*		
71736	EH223	7769560	438680	EH223B	102m	*	*					*		
71737				EH223A	170.m	*	*					*		
71738	EH510	7769250	438470	EH235	235.7m	*	*					*		
71739				EH647	647.8m	*	*	*				*		

JCU Sample #	Hole #	Hand sample	Polished section	Photo in thesis	XRF	Microthermometric analysis	PIXE	Laser Ablation	GADDS	Electron microprobe
JCU sample collection numbers: MFC outcrop										
71740	MFC002UN				*					
71741	MFC002A	*	*	*	*					
71742	MFC008	*	*	*						
71743	MFC012	*		*						
71744	MFC013	*	**							
71745	MFC013B	*	*							
71746	MFC013002A	*	*							
71747	MFC013002B	*	*	*						*
71748	MFC013003A	*	*	*						
71749	MFC013007A	*	**	*						*
71750	MFC014	*	*							
71751	MFC016	*	*							
71752	MFC017			*						
71753	MFC019	*	*							
71754	MFC032	*	*							*
71755	MFC046	*	*							*
71756	MFC047	*	*	*						
71757	MFC051	*	*	*						*
71758	MFC070			*						
71759	MFC086	*	*							
71760	MFC089A	*	*							
71761	MFC089B	*	*							
71762	MFC092	*	*							
71763	MFC099		*							
71764	MFC103	*	*							
71765	MFC115	*	*							
71766	MFC121	*	*	*						
71767	MFC143	*	*	*						
JCU sample collection numbers: Roxmere ironstone										
JCU	Sample #	Hand Sample	Polished	Photo in	XRF	microthermometric	PIXE	Laser	GADDS	Electron
sample #			section	thesis		analysis		ablation		microprobe
71768	Roxmere1-55				*					
71769	Roxmere1-30		*		*					
JCU sample collection numbers: Monakoff										
JCU	Sample #	Hand Sample	Polished	Photo in	XRF	microthermometric	PIXE	Laser	GADDS	Electron
sample #			section	thesis		analysis		ablation		microprobe
71770	MonakoffW		*	*	*					
JCU sample collection numbers: Lightning Creek										
JCU	Sample #	Hand Sample	Polished	Photo in	XRF	microthermometric	PIXE	Laser	GADDS	Electron
sample #			section	thesis		analysis		ablation		microprobe
71771	LCD32		*					*		
71772	LCD13	*	*					*		
71773	LCD43		*					*		
71774	LCF12	*	*					*		
71775	LCD106		*					*		
JCU sample collection numbers: Osborne										
JCU	Sample #	Hand Sample	Polished	Photo in	XRF	microthermometric	PIXE	Laser	GADDS	Electron
sample #			section	thesis		analysis		ablation		microprobe
71776	OS1	*	*	*				*		
71777	OS2		*					*		
JCU sample collection numbers: Starra										
JCU	Sample #	Hand Sample	Polished	Photo in	XRF	microthermometric	PIXE	Laser	GADDS	Electron
sample #			section	thesis		analysis		ablation		microprobe
71778	ST1		*					*		
71779	ST2		*					*		
71780	ST3		*					*		
JCU sample collection numbers: Mount Elliott										
JCU	Sample #	Hand Sample	Polished	Photo in	XRF	microthermometric	PIXE	Laser	GADDS	Electron
sample #			section	thesis		analysis		ablation		microprobe
71781	ME		*					*		

APPENDIX 2

Electron microprobe data

All electron microprobe data referred to in this thesis are tabulated here. Sample numbers in this table refers to the depth down hole and hole number respectively, which can thus be used to determine their location in appendix 1. All analyses were performed using WDS. Elements analysed and their lower detection limits include (wt %):

SiO_2 = 0.20
TiO_2 = 0.20
Al_2O_3 = 0.25
FeO = 0.20
MnO = 0.20
MgO = 0.20
CaO = 0.20
Na_2O = 0.40
K_2O = 0.20
Cl = 0.20
BaO = 0.20

Bd = below detection

Analytical technique
Thin sections were polished and examined under the microscope to determine areas of interest. These samples were then coated in a thin layer of carbon. Samples were placed into the JOEL JXA-840A EM microanalyser facility of the James Cook University Advanced Analytical centre. Common rock-forming minerals were in analysed in EDS mode at 15kV, an operating beam current of 10nA and count time of 30 seconds.

Albite

	FC4NW (alteration selvage)								FC4NW (vein)		
	MFC259.7/52	MFC259.7/52	MFC259.7/52	MFC220/52	MFC220/52	MFC220/52	MFC220/52	MFC114.2/27	MFC315/90	MFC118.5/27	MFC232.7/90
Oxide weight percent											
SiO2	62.4	65.78	66.62	66.64	64.11	64.43	65.44	66.05	65.23	66.83	66.42
TiO2	bd	bd	bd	bd	bd	bd	bd	bd	0.24	bd	bd
Al2O3	21.85	18.87	17.78	19.84	19.61	18.97	18.86	18.69	18.95	18.34	18.35
FeO	0.68	bd	0.36	bd	bd	0.34	bd	bd	0.27	0.19	bd
MnO	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	0.22
MgO	0.06	bd	bd	bd	0.32	0	0.44	0.26	bd	bd	bd
CaO	0.49	0.82	0.18	1.51	1.57	1.3	1	0.42	0.8	0.41	bd
Na2O	8.84	10.28	10.95	10.77	9.67	10.19	10.82	10.01	10.28	10.9	10.94
K2O	2.33	0.24	bd	0.2	bd	0.21	bd	bd	bd	bd	bd
Cl	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Total	96.77	95.99	95.89	98.96	95.28	95.44	96.56	95.43	95.77	96.67	95.93
Number of atoms per unit formula (32 Oxygens)											
Si	11.43	11.97	12.13	11.81	11.76	11.84	11.87	12.03	11.90	12.07	12.07
Ti	bd	bd	bd	bd	bd	bd	bd	bd	0.03	bd	bd
Al	4.72	4.05	3.81	4.14	4.24	4.11	4.03	4.01	4.08	3.90	3.93
Fe^{2+}	0.10	bd	0.05	bd	bd	0.05	bd	bd	0.04	0.03	bd
Mn	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	0.03
Mg	0.02	bd	bd	bd	0.09	bd	0.12	0.07	bd	bd	bd
Ca	0.10	0.16	0.04	0.29	0.31	0.26	0.19	0.08	0.16	0.08	bd
Na	3.14	3.63	3.86	3.70	3.44	3.63	3.80	3.53	3.64	3.82	3.85
K	0.54	0.06	bd	0.05	bd	0.05	bd	bd	bd	bd	bd
Cl	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Total	20.08	19.85	19.90	19.99	19.84	19.94	20.02	19.73	19.85	19.89	19.89
Ca No.	2.97	4.16	0.90	7.11	8.23	6.50	4.86	2.27	4.12	2.04	bd

Actinolite

	MFC Outcrop (vein)				MFC Outcrop (alteration)		
	MFC032	MFC051	MFC051	MFC051	MFC051	MFC051	MFC051
Oxide weight percent							
SiO2	52.96	55.04	55.43	53.02	53.97	53.75	54.04
TiO2	0.25	bd	bd	bd	0.27	0.29	bd
Al2O3	1.21	0.63	0.66	2.13	1.6	1.35	1.41
FeO	15.42	14.39	14.22	16.08	15	14.88	14.6
MnO	0.21	bd	bd	bd	bd	0.23	0.32
MgO	14.57	15.58	15.18	14.46	15.04	14.81	14.69
CaO	11.96	12.14	12.27	12.13	12.05	12.08	12.19
Na2O	0.55	0.64	0.82	1.24	bd	bd	0.48
K2O	bd	bd	bd	0.39	0.38	bd	0.35
Cl	bd	0.22	bd	bd	bd	bd	0.23
Total	97.13	98.59	98.58	99.45	98.31	97.39	98.26
Number of atoms per unit formula (23 Oxygens)							
Si	7.78	7.90	7.94	7.66	7.79	7.83	7.82
Ti	0.03	bd	bd	bd	0.03	0.03	bd
Al	0.21	0.11	0.11	0.36	0.27	0.23	0.24
Fe^{2+}	1.89	1.73	1.70	1.94	1.81	1.81	1.77
Mn	0.03	bd	bd	bd	bd	0.03	0.04
Mg	3.19	3.33	3.24	3.11	3.24	3.21	3.17
Ca	1.88	1.87	1.88	1.88	1.86	1.88	1.89
Na	0.16	0.18	0.23	0.35	bd	bd	0.13
K	bd	bd	bd	0.07	0.07	bd	0.06
Cl	bd	0.05	bd	bd	bd	bd	0.06
Total	15.17	15.16	15.11	15.37	15.08	15.03	15.19
Mg No*	62.43	65.87	65.56	61.59	64.13	63.60	63.70

Actinolite

	FC12 (alteration selvage)							FC12 (vein)									
	MFC201/87	**MFC431/81**	**MFC187/87**	**MFC187/87**	**MFC187/87**	**MFC187/87**	**MFC206/86**	**MFC347/82**	**MFC347/82**	**MFC347/82**	**MFC347/82**	**MFC501/82**	**MFC501/82**	**MFC501/82**	**MFC501/82**	**MFC501/82**	**MFC501/82**
Oxide weight percent																	
SiO2	53.28	52.04	53.38	53.92	54.28	54.18	53.82	54.44	54.37	54.71	54.71	54.78	56.04	54.49	53.79	53.91	51.05
TiO2	bd	bd	bd	bd	bd	bd	bd	bd	bd	0.29	bd	bd	bd	bd	0.2	bd	0.3
Al2O3	1.23	0.98	1.46	0.84	0.63	1.21	0.92	1.06	1.59	1.73	1.37	1.95	0.82	2.34	2.53	2.46	4.43
FeO	16.82	18.57	14.36	15	17.22	12.39	18.93	10.48	10.29	10.47	12.97	12.78	11.13	9.82	10.54	9.96	12.81
MnO	bd	bd	bd	bd	bd	0.2	0.28	bd	bd	0.21	bd	0.24	bd	0.22	bd	bd	bd
MgO	13.94	12.86	15.11	15.41	14.24	16.62	12.49	17.49	17.52	17.75	16.09	16.46	17.17	17.35	17.89	17.28	15.05
CaO	11.52	11.19	12.08	11.93	11.84	10.7	11.94	12.36	12.11	12.17	12.27	12.76	13	12.52	12.39	12.61	12.55
Na2O	0.91	0.67	0.54	0.6	1.1	0.72	bd	1.06	bd	0.46	0.68	bd	bd	bd	bd	0.51	bd
K2O	bd	bd	bd	bd	bd	bd	0.24	0.32	bd	0.36	bd	0.25	bd	0.3	0.49	0.23	0.86
Cl	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	0.37	bd	bd	0.9
Total	97.7	96.31	96.93	97.7	99.31	96.02	98.62	97.21	95.88	98.15	98.09	99.22	98.16	97.33	97.83	96.96	97.93
Number of atoms per unit formula (23 Oxygens)																	
Si	7.82	7.82	7.803	7.84	7.85	7.89	7.89	7.82	7.85	7.77	7.84	7.76	7.94	7.77	7.66	7.73	7.41
Ti	bd	bd	bd	bd	bd	bd	bd	bd	bd	0.03	bd	bd	bd	bd	0.02	bd	0.03
Al	0.21	0.17	0.252	0.14	0.11	0.21	0.16	0.18	0.27	0.29	0.23	0.33	0.14	0.39	0.42	0.42	0.76
Fe^{2+}	2.06	2.33	1.755	1.82	2.08	1.51	2.32	1.26	1.24	1.24	1.55	1.51	1.32	1.17	1.26	1.19	1.55
Mn	bd	bd	bd	bd	bd	0.02	0.03	bd	bd	0.03	bd	0.03	bd	0.03	bd	bd	bd
Mg	3.05	2.88	3.293	3.34	3.07	3.61	2.73	3.75	3.77	3.76	3.44	3.48	3.63	3.69	3.80	3.69	3.26
Ca	1.81	1.80	1.892	1.86	1.83	1.67	1.88	1.90	1.87	1.85	1.88	1.94	1.97	1.91	1.89	1.94	1.95
Na	0.26	0.20	0.153	0.17	0.31	0.20	bd	0.30	bd	0.13	0.19	bd	bd	bd	bd	0.14	0.03
K	bd	bd	bd	bd	bd	bd	0.04	0.06	bd	0.07	bd	0.05	bd	0.05	0.09	0.04	0.16
Cl	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	0.09	bd	bd	0.22
Total	15.21	15.20	15.148	15.17	15.25	15.11	15.05	15.26	15.01	15.15	15.14	15.10	14.99	15.11	15.15	15.15	15.38
Mg No*	59.64	55.25	65.229	64.68	59.59	70.18	53.68	74.85	75.22	74.76	68.86	69.26	73.34	75.49	75.16	75.57	67.57

Actinolite

	FC4NW (vein)																
	MFC224/91	**MFC224/91**	**MFC254.8/90**	**MFC254.8/90**	**MFC254.8/90**	**MFC254.8/90**	**MFC254.8/90**	**MFC254.8/90**	**MFC254.8/90**	**MFC254.8/90**	**MFC114.2/27**	**MFC114.2/27**	**MFC114.2/27**	**MFC259.7/52**	**MFC259.7/52**	**MFC259.7/52**	**MFC259.7/52**
Oxide weight percent																	
SiO2	55.76	53.6	52.76	54.59	54.1	54.77	54.42	53.21	53.94	54.43	52.37	54.53	53.79	51.69	53.59	53.59	53.59
TiO2	bd	0.21	bd	0.22	bd	bd	bd	bd	bd	0.31	0.27	bd	bd	bd	bd	bd	bd
Al2O3	0.37	bd	1.4	0.52	0.87	bd	bd	1.21	0.61	0.91	1.88	1.42	1.47	1.07	1.67	1.67	1.67
FeO	10.19	19.35	17.61	11.2	9.26	10.99	11.31	13	11.9	13.22	11.96	12.11	11.2	14.86	12.05	12.05	12.05
MnO	bd	0.25	0.54	0.22	bd	bd	0.24	0.47	0.33	bd	bd	bd	bd	bd	bd	bd	bd
MgO	17.12	11.69	12.78	15.94	17.07	15.41	15.94	15	15.93	15.01	15	15.85	15.88	12.95	15.75	15.75	15.75
CaO	12.65	11.62	12.34	12.54	12.12	12.47	12.25	12.22	12.2	12.52	11.7	11.85	11.34	12.47	12.08	12.08	12.08
Na2O	bd	0.39	bd	bd	bd	bd	bd	bd	bd	bd	1.48	0.82	1.11	0.46	0.44	0.44	0.44
K2O	bd	bd	0.32	bd	0.2	bd	bd	bd	bd	bd	0.39	0.3	0.45	0.22	0.32	0.32	0.32
Cl	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	0.21	bd	bd	bd	bd	bd
Total	96.09	97.11	97.75	95.23	93.62	93.64	94.16	95.11	94.91	96.4	95.05	97.0426093	95.24	93.72	95.9	95.9	95.9
Number of atoms per unit formula (23 Oxygens)																	
Si	8.03	8.00	7.80	7.988	7.97	8.12	8.06	7.88	7.95	7.93	7.77	7.88	7.89	7.88	7.84	7.84	7.84
Ti	bd	0.02	bd	0.024	bd	bd	bd	bd	bd	0.03	0.03	bd	bd	bd	bd	bd	bd
Al	0.06	0	0.24	0.090	0.15	bd	bd	0.21	0.11	0.16	0.33	0.24	0.25	0.19	0.29	0.29	0.29
Fe^{2+}	1.23	2.41	2.18	1.370	1.14	1.36	1.40	1.61	1.47	1.61	1.48	1.46	1.37	1.89	1.47	1.47	1.47
Mn	bd	0.03	0.07	0.027	bd	bd	0.03	0.06	0.04	bd	bd	bd	bd	bd	bd	bd	bd
Mg	3.67	2.60	2.82	3.477	3.75	3.41	3.52	3.31	3.50	3.26	3.32	3.41	3.47	2.94	3.43	3.43	3.43
Ca	1.95	1.86	1.95	1.966	1.91	1.98	1.94	1.94	1.93	1.96	1.86	1.83	1.78	2.04	1.89	1.89	1.89
Na	bd	0.11	bd	bd	bd	bd	bd	bd	bd	bd	0.43	0.23	0.32	0.14	0.12	0.12	0.12
K	bd	bd	0.06	bd	0.04	bd	bd	bd	bd	bd	0.07	0.06	0.08	0.04	0.06	0.06	0.06
Cl	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	0.05	bd	bd	bd	bd	bd
Total	14.94	15.04	15.11	14.943	14.97	14.88	14.94	15.01	14.99	14.95	15.29	15.17	15.18	15.12	15.11	15.11	15.11
Mg No*	74.97	51.53	55.65	71.330	76.67	71.43	71.10	66.49	69.89	66.93	69.10	70.00	71.65	60.84	69.97	69.97	69.97

Actinolite

	FC4NW (vein)							
	MFC259.7/52	**MFC259.7/52**	**MFC240.1/93**	**MFC315/90**	**MFC315/90**	**MFC315/90**	**MFC315/90**	**MFC440.8/91**
Oxide weight percent								
SiO2	53.46	53.15	54.83	53.8	55.02	54.81	53.61	54.57
TiO2	bd	bd	0.22	bd	0.33	bd	bd	bd
Al2O3	2.23	1.43	0.68	1.21	1.04	0.39	0.57	0.37
FeO	11.54	20.3	12.84	11.67	9.89	15.52	16.72	10.98
MnO	bd	bd	bd	0.2	0.22	bd	bd	0.44
MgO	16.41	11.82	16.01	16.4	17.82	14.77	13.46	16.07
CaO	11.65	12.4	12.32	12.08	12.17	12.74	12.59	11.84
Na2O	1.22	bd	bd	0.66	0.66	bd	bd	bd
K2O	0.41	bd	bd	0.39	0.23	bd	bd	bd
Cl	bd	bd	bd	bd	bd	bd	bd	bd
Total	96.92	99.1	96.9	96.41	97.38	98.23	97.27	94.27
Number of atoms per unit formula (23 Oxygens)								
Si	7.74	7.80	7.93	7.83	7.85	7.93	7.90	8.05
Ti	bd	bd	0.02	bd	0.04	bd	bd	bd
Al	0.38	0.25	0.12	0.21	0.17	0.07	0.10	0.06
Fe^{2+}	1.40	2.49	1.55	1.42	1.18	1.88	2.06	1.35
Mn	bd	bd	bd	0.02	0.03	bd	bd	0.05
Mg	3.54	2.59	3.45	3.56	3.79	3.19	2.96	3.53
Ca	1.81	1.95	1.91	1.88	1.86	1.97	1.99	1.87
Na	0.34	bd	bd	0.19	0.18	bd	bd	bd
K	0.08	bd	bd	0.07	0.04	bd	bd	bd
Cl	bd	bd	bd	bd	bd	bd	bd	bd
Total	15.28	15.08	14.99	15.19	15.14	15.04	15.10	14.92
Mg No*	71.71	50.93	68.97	71.12	75.86	62.92	58.94	71.49

Actinolite

	FC4NW (vein)							FC4NW (alteration)
	MFC440.8/91	**MFC440.8/91**	**MFC440.8/91**	**MFC440.8/91**	**MFC268.7/52**	**MFC268.7/52**	**MFC268.7/52**	**MFC114.2/27**
Oxide weight percent								
SiO2	53.52	53.67	53.84	53.83	51.12	52.87	51.83	48.86
TiO2	bd	bd	bd	bd	bd	bd	bd	0.53
Al2O3	bd	bd	bd	bd	1.25	0.56	1.41	4.3
FeO	10.76	10.71	9.42	11.4	16.76	16.88	17.2	12.14
MnO	0.23	bd	bd	bd	0.43	0.21	0.31	0.28
MgO	16.22	16.43	16.77	16.3	11.96	12.28	11.69	15.32
CaO	11.94	12.44	12.13	11.98	12.75	12.55	12.43	11.04
Na2O	bd	bd	bd	bd	bd	bd	bd	1.84
K2O	bd	0.21	bd	bd	bd	bd	bd	0.7
Cl	bd	bd	bd	bd	bd	bd	bd	0.28
Total	92.67	93.46	92.16	93.51	94.27	95.35	94.87	95.23
Number of atoms per unit formula (23 Oxygens)								
Si	8.03	8.00	8.06	8.02	7.82	7.96	7.87	7.31
Ti	bd	bd	bd	bd	bd	bd	bd	0.06
Al	bd	bd	bd	bd	0.23	0.10	0.25	0.76
Fe^{2+}	1.35	1.34	1.18	1.42	2.14	2.12	2.18	1.52
Mn	0.03	bd	bd	bd	0.06	0.03	0.04	0.04
Mg	3.63	3.65	3.74	3.62	2.73	2.76	2.65	3.42
Ca	1.92	1.99	1.95	1.91	2.09	2.02	2.02	1.77
Na	bd	bd	bd	bd	bd	bd	bd	0.53
K	bd	0.04	bd	bd	bd	bd	bd	0.13
Cl	bd	bd	bd	bd	bd	bd	bd	0.07
Total	14.97	15.02	14.94	14.98	15.07	14.99	15.01	15.62
Mg No*	72.46	73.23	76.04	71.82	55.36	56.16	54.34	68.74

Biotite

	FC4NW (vein)		
	MFC160.5/51	MFC160.5/51	MFC160.5/51
Oxide weight percent			
SiO2	38.51	37.59	38.78
TiO2	2.73	2.54	2.59
Al2O3	12.18	12.27	12.59
FeO	13.32	13	13.3
MnO	bd	bd	bd
MgO	16.27	16.99	16.19
CaO	bd	bd	bd
Na2O	0.44	bd	bd
K2O	10.23	9.63	10.03
Cl	0.34	0.25	0.21
Total	94.2	92.58	93.98
Number of atoms per unit formula (22 Oxygens)			
Si	5.84	5.77	5.86
Ti	0.31	0.29	0.29
Al	2.17	2.22	2.24
Fe^{2+}	1.69	1.67	1.68
Mn	bd	bd	bd
Mg	3.67	3.89	3.64
Ca	bd	bd	bd
Na	0.13	bd	bd
K	1.98	1.89	1.93
Cl	0.09	0.06	0.05
Total	15.91	15.86	15.77

Clinopyroxene

	MFC Outcrop (alteration)											
	MFC032	MFC032	MFC032	MFC032	MFC032	MFC032	MFC032	MFC032	MFC032	MFC032	MFC032	MFC032
Oxide weight percent												
SiO2	52.42	52.6	52.12	52.44	52.63	52.45	53.04	52.89	52.07	51.97	53.08	51.7
TiO2	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Al2O3	bd	bd	bd	bd	bd	0.46	bd	0.37	bd	bd	bd	bd
FeO	10.55	10.96	10.53	11.11	9.97	11.07	11.09	10.78	10.61	12.74	11.66	11.15
MnO	bd	bd	bd	bd	bd	bd	bd	0.5	bd	bd	bd	0.15
MgO	11.61	12.04	11.68	11.99	11.95	11.55	11.91	10.61	11.44	10.65	11.56	11.67
CaO	23.38	22.94	22.9	23.44	24.09	22.59	23.39	22.22	23.87	20.41	22.9	23.1
Na2O	bd	bd	bd	0.81	bd	0.85	0.46	1.5	0.51	2.16	0.56	bd
K2O	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Cl	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Total	97.96	98.54	97.23	99.79	98.64	98.97	99.89	98.87	98.5	97.93	99.76	97.77
Number of atoms per unit formula (6 Oxygens)												
Si	2.02	2.01	2.02	1.99	2.01	2.00	2.01	2.02	2.00	2.02	2.01	2.00
Ti	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Al	bd	bd	bd	bd	bd	0.02	bd	0.02	bd	bd	bd	bd
Fe^{2+}	0.34	0.35	0.34	0.35	0.32	0.35	0.35	0.34	0.34	0.41	0.37	0.36
Mn	bd	bd	bd	bd	bd	bd	bd	0.02	bd	bd	bd	bd
Mg	0.67	0.69	0.67	0.68	0.68	0.66	0.67	0.60	0.66	0.62	0.65	0.67
Ca	0.96	0.94	0.95	0.95	0.98	0.92	0.95	0.91	0.98	0.85	0.93	0.96
Na	bd	bd	bd	0.06	bd	0.06	0.03	0.11	0.04	0.16	0.04	bd
K	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Cl	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Total	3.98	3.99	3.98	4.04	3.99	4.02	4.01	4.03	4.02	4.06	4.01	4.00
Mg No*	66.24	66.20	66.42	65.80	68.12	65.04	65.69	63.70	65.78	59.85	63.87	65.11

Clinopyroxene

MFC Outcrop (vein)

	MFC051	MFC051	MFC051	MFC051	MFC051
Oxide weight percent					
SiO2	52.71	52.34	53.96	54.41	52.07
TiO2	bd	bd	bd	bd	bd
Al2O3	bd	bd	bd	bd	bd
FeO	10.93	11.59	9.6	11.61	10.02
MnO	bd	bd	0.22	bd	bd
MgO	11.89	10.87	12.5	11.92	12.18
CaO	23.54	24.08	24.4	24.64	23.45
Na2O	bd	1.33	bd	0.27	0.84
K2O	bd	bd	bd	bd	bd
Cl	bd	bd	bd	bd	bd
Total	99.07	100.21	100.68	102.85	98.56
Number of atoms per unit formula (6 Oxygens)					
Si	2.01	1.99	2.01	2.00	1.99
Ti	bd	bd	bd	bd	bd
Al	bd	bd	bd	bd	bd
Fe^{2+}	0.35	0.37	0.30	0.36	0.32
Mn	bd	bd	0.01	bd	bd
Mg	0.68	0.62	0.69	0.65	0.70
Ca	0.96	0.98	0.97	0.97	0.96
Na	bd	0.10	bd	0.02	0.06
K	bd	bd	bd	bd	bd
Cl	bd	bd	bd	bd	bd
Total	3.99	4.06	3.99	4.01	4.04
Mg No*	65.98	62.58	69.89	64.67	68.43

Clinopyroxene

FC4NW (alteration)

	MFC118.5/27	MFC118.5/27	MFC118.5/27	MFC118.5/27	MFC118.5/27	MFC118.5/27	MFC118.5/27	MFC118.5/27	MFC118.5/27	MFC118.5/27	MFC118.5/27	MFC259.7/52	MFC259.7/52	ID = 220cpx1
Oxide weight percent														
SiO2	52.79	52.73	53.44	53.46	52.26	53.01	52.31	52.83	53.59	52.49	53.31	52.56	53.11	53.49
TiO2	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Al2O3	bd	bd	bd	0.36	0.33	bd	0.3	0.46	0.39	0.23	bd	bd	0.55	0.34
FeO	12.32	10.64	9.72	11.09	9.43	10.19	12.22	11.14	10.27	10.4	9.72	12.34	13.53	14.33
MnO	bd	0.22	0.26	bd	bd	bd	0.26	0.25	bd	bd	bd	0.28	0.27	bd
MgO	10.88	11.45	11.8	11.12	12.17	11.87	10.91	11.14	11.93	11.77	11.96	10.63	10.27	10.01
CaO	22.08	21.75	22.4	22.1	22.37	22.06	21.97	22.2	22.91	23.01	23.25	22.97	22.46	22.29
Na2O	1.18	0.44	0.64	1.02	1.18	1.27	1.17	0.95	bd	1.3	1.09	0.94	1.84	1.26
K2O	bd	bd	bd	bd	bd	bd	bd	bd	bd	0.21	bd	bd	bd	0.07
Cl	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Total	99.25	97.23	98.26	99.15	97.74	98.4	99.14	98.97	99.09	99.41	99.33	99.72	102.03	101.8
Number of atoms per unit formula (6 Oxygens)														
Si	2.02	2.04	2.04	2.03	2.01	2.02	2.01	2.01	2.02	2.00	2.02	2.01	1.99	2.01
Ti	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Al	bd	bd	bd	0.02	0.01	bd	0.01	0.02	0.02	0.01	bd	bd	0.02	0.02
Fe^{2+}	0.39	0.34	0.31	0.35	0.30	0.33	0.39	0.36	0.32	0.33	0.31	0.39	0.42	0.45
Mn	bd	0.01	0.01	bd	bd	bd	0.01	0.01	bd	bd	bd	0.01	0.01	bd
Mg	0.62	0.66	0.67	0.63	0.70	0.68	0.62	0.63	0.67	0.67	0.67	0.61	0.57	0.56
Ca	0.90	0.90	0.91	0.90	0.92	0.90	0.90	0.91	0.93	0.94	0.94	0.94	0.90	0.90
Na	0.09	0.03	0.05	0.08	0.09	0.09	0.09	0.07	bd	0.10	0.08	0.07	0.13	0.09
K	bd	bd	bd	bd	bd	bd	bd	bd	bd	0.01	bd	bd	bd	bd
Cl	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Total	4.03	3.98	3.99	4.00	4.03	4.02	4.03	4.01	3.97	4.05	4.02	4.03	4.06	4.03
Mg No*	61.16	65.74	68.40	64.13	69.71	67.50	61.42	64.07	67.44	66.86	68.69	60.56	57.51	55.46

Clinopyroxene

FC4NW (vein)

	MFC254.8/90	MFC254.8/90	MFC254.8/90	MFC254.8/90	MFC254.8/90	MFC268.7/52	MFC268.7/52	MFC268.7/52	MFC268.7/52	MFC268.7/52	MFC268.7/52
Oxide weight percent											
SiO2	52.07	52.41	51.77	52.42	52.84	52.89	52.38	50.91	53.88	49.77	48.87
TiO2	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Al2O3	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
FeO	10.78	8.68	8.67	9.02	8.96	9.72	11.47	18.93	14.28	11.6	13.08
MnO	0.3	0.31	0.33	bd	bd	0.3	bd	0.27	0.26	0.34	bd
MgO	11.41	11.98	11.26	12.44	12.49	11.78	10.49	6.51	10.38	10.05	9.5
CaO	24.09	24.35	23.4	24.81	24.45	24.25	23.1	21.22	22.17	23.63	22.62
Na2O	bd	0.27	bd	bd	bd	bd	bd	0.23	1.9	bd	0.42
K2O	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Cl	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Total	98.65	98	95.43	98.69	98.74	98.94	97.44	98.07	102.87	95.39	94.49
Number of atoms per unit formula (6 Oxygens)											
Si	2.00	2.01	2.03	2.00	2.01	2.01	2.03	2.03	2.01	1.99	1.99
Ti	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Al	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Fe^{2+}	0.35	0.28	0.28	0.29	0.28	0.31	0.37	0.63	0.45	0.39	0.44
Mn	0.01	0.01	0.01	bd	bd	0.01	bd	0.01	0.01	0.01	bd
Mg	0.65	0.68	0.66	0.71	0.71	0.67	0.61	0.39	0.58	0.60	0.58
Ca	0.99	1.00	0.98	1.01	0.99	0.99	0.96	0.91	0.89	1.01	0.99
Na	bd	0.02	bd	bd	bd	bd	bd	0.02	0.14	bd	0.03
K	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Cl	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Total	4.00	4.00	3.97	4.00	3.99	3.99	3.97	3.98	4.06	4.01	4.03
Mg No*	65.36	71.10	69.84	71.09	71.31	68.36	61.99	38.01	56.45	60.70	56.43

Clinopyroxene

FC4NW (vein)

	MFC315/90	MFC315/90	MFC315/90	MFC315/90	MFC220/52	MFC220/52	MFC220/52	MFC220/52	MFC220/52	MFC220/52
Oxide weight percent										
SiO2	52.68	53.54	52.83	52.01	52.32	52.64	53.43	52.45	52.03	51.06
TiO2	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Al2O3	0.4	0.29	0.4	bd	bd	bd	bd	0.45	bd	bd
FeO	12.72	11.77	9.57	10.52	12.88	14.59	12.85	12.06	14.46	13.53
MnO	bd	bd	0.58	0.35	bd	bd	0.2	bd	0.21	bd
MgO	10.55	11.26	12.44	11.25	10.69	10.02	10.49	11.01	9.47	9.86
CaO	22.03	21.68	22.95	22.61	22.51	21.92	22.23	22.15	21.85	21.47
Na2O	0.4	1.44	1.09	0.93	0.51	0.43	1.25	0.64	0.45	0.73
K2O	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Cl	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Total	98.78	99.98	99.86	97.97	98.91	99.6	100.45	98.76	98.47	96.65
Number of atoms per unit formula (6 Oxygens)										
Si	2.02	2.02	1.99	2.01	2.01	2.02	2.02	2.01	2.02	2.02
Ti	bd	bd	bd	0.01	bd	bd	bd	bd	bd	bd
Al	0.02	0.01	0.02	bd	bd	bd	bd	0.02	bd	bd
Fe^{2+}	0.41	0.37	0.30	0.34	0.41	0.47	0.41	0.39	0.47	0.45
Mn	bd	bd	0.02	0.01	bd	bd	0.01	bd	0.01	bd
Mg	0.60	0.63	0.70	0.65	0.61	0.57	0.59	0.63	0.55	0.58
Ca	0.91	0.88	0.93	0.93	0.93	0.90	0.90	0.91	0.91	0.91
Na	0.03	0.11	0.08	0.07	0.04	0.03	0.09	0.05	0.03	0.06
K	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Cl	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Total	3.99	4.02	4.04	4.02	4.01	4.00	4.02	4.00	3.99	4.01
Mg No*	59.66	63.04	69.86	65.60	59.67	55.04	59.27	61.94	53.87	56.51

Ferro-actinolite

	FC12 (vein)			FC4NW (alteration)			
	FTCD501/82	**FTCD501/82**	**FTCD501/82**	**MFC224/91**	**MFC114.2/27**	**MFC114.2/27**	**MFC114.2/27**
Oxide weight percent							
SiO2	53.88	53.65	54.02	53.79	49.57	52.29	51.96
TiO2	bd	bd	bd	bd	bd	bd	bd
Al2O3	0.27	bd	bd	bd	0.26	0.26	bd
FeO	21.8	23.71	21.19	20.29	22.99	22.29	23.67
MnO	0.29	0.36	0.35	bd	bd	bd	bd
MgO	11.08	9.73	11.2	11.04	7.66	9.65	9.62
CaO	11.72	11.85	12.05	11.32	11.77	11.91	11.67
Na2O	bd	bd	bd	0.88	bd	bd	0.65
K2O	bd	bd	bd	bd	bd	bd	0.3
Cl	bd	bd	bd	bd	bd	bd	bd
Total	99.04	99.3	98.81	97.32	92.54	96.66	97.87
Number of atoms per unit formula (28 Oxygens)							
Si	7.95	7.98	7.98	8.03	7.97	7.96	7.89
Ti	bd	bd	bd	bd	bd	bd	bd
Al	0.05	0	0	0	0.05	0.05	0
Fe^{2+}	2.69	2.95	2.62	2.53	3.09	2.84	3.01
Mn	0.04	0.05	0.04	bd	bd	bd	bd
Mg	2.44	2.16	2.47	2.46	1.84	2.19	2.18
Ca	1.85	1.89	1.91	1.81	2.03	1.94	1.90
Na	bd	bd	bd	0.25	0.09	0.08	0.19
K	bd	bd	bd	bd	bd	bd	0.06
Cl	bd	bd	bd	bd	bd	bd	bd
Total	15.02	15.02	15.02	15.09	15.06	15.05	15.23
Mg No*	47.20	41.88	48.10	49.24	37.27	43.56	42.02

Ferro-actinolite

	FC4NW (vein)									
	MFC259.7/52	**MFC259.7/52**	**MFC259.7/52**	**MFC240.1/93**	**MFC240.1/93**	**MFC240.1/93**	**MFC240.1/93**	**MFC240.1/93**	**MFC268.7/52**	**MFC268.7/52**
Oxide weight percent										
SiO2	49.54	51.48	51.05	49.03	48.25	48.15	48.2	49.3	51.16	49.42
TiO2	bd	bd	bd	bd	0.26	bd	bd	bd	bd	bd
Al2O3	0.73	bd	0.24	1.26	0.88	2.66	2.64	1.42	bd	bd
FeO	21.77	22.65	20.24	26.02	24.23	22.08	22.28	23.87	23.69	26.26
MnO	0.33	0.45	bd	bd	0.58	bd	0.17	bd	bd	0.45
MgO	8.36	8.94	9.89	6.64	7.19	9.33	9.21	7.05	8.36	6.12
CaO	12.38	12.04	11.72	11.69	11.83	11.52	11.21	11.51	11.46	11.62
Na2O	bd	0.56	0.86	bd	0.33	0.98	0.93	bd	bd	bd
K2O	bd	0.21	bd	0.29	bd	bd	bd	bd	bd	bd
Cl	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Total	93.11	96.33	94	94.93	93.55	94.72	94.64	93.15	94.67	93.87
Number of atoms per unit formula (28 Oxygens)										
Si	7.88	7.94	7.96	7.80	7.77	7.55	7.57	7.88	8.01	7.96
Ti	bd	bd	bd	bd	0.03	bd	bd	bd	bd	bd
Al	0.14	bd	0.04	0.24	0.17	0.49	0.49	0.27	bd	bd
Fe^{2+}	2.90	2.92	2.64	3.46	3.26	2.90	2.93	3.19	3.10	3.54
Mn	0.04	0.06	bd	bd	0.08	bd	0.02	bd	bd	0.06
Mg	1.98	2.05	2.30	1.57	1.73	2.18	2.16	1.68	1.95	1.47
Ca	2.11	1.99	1.96	1.99	2.04	1.94	1.89	1.97	1.92	2.01
Na	bd	0.17	0.26	bd	0.10	0.30	0.28	bd	bd	bd
K	bd	0.04	bd	0.06	bd	0	bd	bd	bd	bd
Cl	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Total	15.05	15.17	15.15	15.12	15.17	15.35	15.33	14.99	14.99	15.04
Mg No*	40.27	40.82	46.56	31.27	34.06	42.97	42.24	34.49	38.62	29.00

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Ferro-actinolite

	FC4NW (vein)									
	MFC268.7/52	**MFC268.7/52**	**MFC268.7/52**	**MFC268.7/52**	**MFC268.7/52**	**MFC268.7/52**	**MFC114.2/27**	**MFC114.2/27**	**MFC114.2/27**	**MFC114.2/27**
Oxide weight percent										
SiO2	50.33	50.91	49.57	50.69	50.26	50.24	53.37	50.52	50.52	52.78
TiO2	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Al2O3	bd	bd	0.31	bd	0.27	bd	bd	bd	bd	bd
FeO	26.53	22.3	26.58	25.45	27.27	21.57	23.5	20.41	20.41	24.92
MnO	bd	bd	bd	0.38	0.39	0.48	bd	bd	bd	bd
MgO	6.87	8.41	5.92	7.12	6.11	9.58	9.41	9.37	9.37	9.11
CaO	11.98	12.48	11.49	10.82	11.3	12.16	11.96	11.8	11.8	11.77
Na2O	bd	bd	bd	0.45	bd	bd	0.54	bd	bd	0.49
K2O	bd	bd	bd	bd	bd	bd	bd	0.26	0.26	bd
Cl	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Total	95.79	94.1	93.87	94.91	95.6	94.03	98.78	92.36	92.36	99.07
Number of atoms per unit formula (28 Oxygens)										
Si	7.93	8.00	7.97	8.01	7.95	7.90	7.98	8.02	8.02	7.93
Ti	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Al	0.01	bd	0.06	bd	0.05	bd	bd	bd	bd	bd
Fe^{2+}	3.49	2.93	3.57	3.36	3.61	2.84	2.94	2.71	2.71	3.13
Mn	bd	bd	bd	0.05	0.05	0.06	bd	bd	bd	bd
Mg	1.61	1.97	1.42	1.68	1.44	2.25	2.10	2.22	2.22	2.04
Ca	2.02	2.10	1.98	1.83	1.92	2.05	1.92	2.01	2.01	1.89
Na	bd	bd	bd	0.14	bd	bd	0.16	bd	bd	0.14
K	bd	bd	bd	bd	bd	bd	bd	0.05	0.05	bd
Cl	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Total	15.07	15.00	15.00	15.06	15.02	15.10	15.09	15.01	15.01	15.14
Mg No*	31.59	40.20	28.42	32.95	28.25	43.64	41.65	45.01	45.01	39.46

Hedenbergite

	FC4NW (alteration)	
	MFC218/54	**MFC218/54**
Oxide weight percent		
SiO2	52.2	52.21
TiO2	0.23	bd
Al2O3	0.81	0.28
FeO	18.14	18.84
MnO	bd	bd
MgO	7.96	7.65
CaO	20.06	19.82
Na2O	2.13	2.95
K2O	bd	0.2
Cl	bd	bd
Total	101.53	101.95
Number of atoms per unit formula (6 Oxygens)		
Si	2.00	2.00
Ti	0.01	bd
Al	0.04	0.01
Fe^{2+}	0.58	0.60
Mn	bd	bd
Mg	0.45	0.44
Ca	0.82	0.82
Na	0.16	0.22
K	bd	0.01
Cl	bd	bd
Total	4.06	4.10
Mg No*	43.89	41.99

K-feldspar

	MFC outcrop (vein)								MFC outcrop (alteration)				
	MFC13002B	MFC13002B	MFC13002B	MFC13002B	MFC13002B	MFC13002B	MFC13002B	MFC13002B	MFC13002B	MFC046	MFC046	MFC046	MFC046
Oxide weight percent													
SiO2	64.29	64.13	64.22	63	63.53	63.23	64.71	62.88	63.33	62.67	63.62	63.65	63.38
Al2O3	16.39	16.74	16.37	16.32	16.75	16.65	16.77	16.02	16.33	16.24	16.39	16.17	16.66
Na2O	bd	0.4	0.56	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
K2O	17.36	17.45	17.36	17.21	17.61	17.2	17.27	16.97	17.49	17.73	17.28	17.35	17.5
CaO	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
BaO	0.53	0.62	bd	0.69	0.32	0.86	0.59	0.56	0.2	bd	bd	0.42	0.18
Total	98.57	99.34	98.52	97.23	98.21	98.06	99.34	96.75	97.36	96.79	97.54	97.6	97.72
Number of atoms per unit formula (32 Oxygens)													
Si	12.19	12.10	12.16	12.14	12.10	12.09	12.16	12.16	12.15	12.12	12.16	12.19	12.11
Al	3.66	3.72	3.65	3.70	3.76	3.75	3.71	3.65	3.69	3.70	3.69	3.65	3.75
Na	bd	0.15	0.21	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
K	4.20	4.20	4.19	4.23	4.28	4.20	4.14	4.19	4.28	4.37	4.21	4.24	4.26
Ca	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd	bd
Ba	0.04	0.05	bd	0.05	0.02	0.06	0.04	0.04	0.02	0.01	0.01	0.03	0.01
Total	20.08	20.21	20.21	20.12	20.16	20.15	20.05	20.16	20.14	20.21	20.12	20.11	20.14

Magnesio-hornblende

	FC4NW (vein)					FC4NW (alteration)				
	MFC160.5/51	MFC160.5/51	MFC160.5/51	MFC160.5/51	MFC160.5/51	MFC118.5/27	MFC118.5/27	MFC118.5/27	MFC118.5/27	MFC118.5/27
Oxide weight percent										
SiO2	48.13	46.02	47.53	46.91	47.87	45.55	44.8	45	45.32	47.2
TiO2	1.29	1.33	1.35	1.1	1.36	1.26	1.44	1.1	1.03	0.54
Al2O3	5.39	5.39	5.84	6.35	6.27	6.87	7.2	5.85	6.87	5.97
FeO	13.79	13.5	13.46	13.71	13.46	14.56	14.22	14.68	14.25	15.63
MnO	bd	bd	bd	0.24	bd	bd	0.21	bd	0.29	bd
MgO	13.73	13.35	13.55	13.93	13.59	12.53	12.72	12.73	12.76	13.3
CaO	11.02	10.23	10.83	10.52	10.8	11.18	11.13	11.35	11.12	11.19
Na2O	1.65	1.62	3.02	1.97	2.42	2.2	1.66	1.23	1.45	1.53
K2O	0.79	0.69	0.93	0.7	0.71	1.07	1.04	1.17	1.26	0.8
Cl	bd	0.27	0.27	0.26	bd	bd	0.22	0.25	bd	bd
Total	95.79	92.34	96.72	95.63	96.48	95.22	94.59	93.30	94.35	96.16
Number of atoms per unit formula (28 Oxygens)										
Si	7.21	7.15	7.09	7.05	7.11	6.95	6.87	7.01	6.97	7.11
Ti	0.15	0.16	0.15	0.12	0.15	0.14	0.17	0.13	0.12	0.06
Al	0.95	0.99	1.03	1.13	1.10	1.23	1.30	1.07	1.24	1.06
Fe^{2+}	1.73	1.75	1.68	1.72	1.67	1.86	1.82	1.91	1.83	1.97
Mn	bd	bd	bd	0.03	bd	bd	0.03	bd	0.04	bd
Mg	3.06	3.09	3.01	3.12	3.01	2.85	2.91	2.96	2.92	2.99
Ca	1.77	1.70	1.73	1.69	1.72	1.83	1.83	1.90	1.83	1.81
Na	0.48	0.49	0.87	0.57	0.70	0.65	0.49	0.37	0.43	0.45
K	0.15	0.14	0.18	0.13	0.13	0.21	0.20	0.23	0.25	0.15
Cl	bd	0.07	0.07	0.07	0	bd	0.06	0.07	bd	bd
Total	15.49	15.55	15.81	15.65	15.60	15.72	15.69	15.65	15.63	15.60
Mg No*	63.97	63.81	64.22	64.03	64.29	60.54	61.11	60.72	61.00	60.27

APPENDIX 3

Calculations for chemical composition of Na-Ca-bearing veins

Sample numbers in this table refer to the depth down hole and hole number, which can thus be used to determine their location in appendix 1.

Calculations converting modal mineral proportion (%) of veins to normalised mass (grams)				
FTCD346/82				
	Volume %	Density (gcm3)	Mass (g)	Normalised mass %
Magnetite	15	5.20	78	24.26
Hematite		5.20	0	0.00
Titanite	2	3.45	6.9	2.15
Actinolite	15	3.20	48	14.93
Pyrite	1	5.00	5	1.55
Chalcopyrite	1	4.28	4.28	1.33
Apatite	1	3.20	3.2	1.00
Calcite	45	2.72	122.175	38.00
Albite	20	2.70	54	16.79
Total	100		321.56	100.00
FTCD246/86				
	Volume %	Density	Mass	Normalised mass %
Magnetite	3	5.20	15.6	5.25
Hematite		5.20	0	0.00
Titanite	10	3.45	34.5	11.60
Actinolite	23	3.20	73.6	24.75
Pyrite		5.00	0	0.00
Chalcopyrite		4.28	0	0.00
Calcite	60	2.72	162.9	54.77
Albite	4	2.70	10.8	3.63
Total	100		297.40	100.00
FTCD262/86				
	Volume %	Density	Mass	Normalised mass %
Magnetite	3	5.20	15.6	5.07
Hematite	5	5.20	26	8.45
Titanite	2	3.45	6.9	2.24
Actinolite	4	3.20	12.8	4.16
Pyrite	4	5.00	20	6.50
Chalcopyrite	3	4.28	12.84	4.17
Calcite	22	2.72	59.73	19.41
Albite	57	2.70	153.9	50.00
Total	100		307.77	100.00
FTCD203/86				
	Volume %	Density	Mass	Normalised mass %
Magnetite	4	5.20	20.8	7.24
Hematite		5.20	0	0.00
Titanite	1	3.45	3.45	1.20
Actinolite	3	3.20	9.6	3.34
Pyrite	1	5.00	5	1.74
Chalcopyrite	1	4.28	4.28	1.49
Calcite	65	2.72	176.475	61.47
Albite	25	2.70	67.5	23.51
Total	100		287.11	100.00

Calculations for the conversion of mineral modal % to mass (g) for Na-Ca veins from the FC12 prospect. The density values were obtained from Deer et al (1992).

Calculations for determining the chemical composition of veins at FC12

	FTCD346.9/82	*FTCD246/86*	*FTCD262.3/86*	*FTCD203/86*	*Host Minerals*
Si	9.50	9.08	17.15	8.35	Titanite, actinolite, albite
SiO2	20.32	19.44	36.68	17.87	
Al	1.67	0.36	5.04	2.34	Albite
Al2O3	3.15	0.67	9.52	4.43	
Ca	17.74	26.49	8.80	25.40	Actinolite, titanite, calcite, apatite
CaO	24.82	37.07	12.31	35.54	
Na	1.42	0.30	4.29	2.00	Albite
Na2O	1.92	0.41	5.79	2.69	
K	-	-	-	-	-
K2O	-	-	-	-	
Mg	1.04	1.70	0.29	0.23	Actinolite
MgO	1.72	2.82	0.49	0.39	
Ti	0.78	2.88	0.57	0.30	Titanite, actinolite, albite
TiO2	1.30	4.80	0.95	0.50	
P	0.19	-	-	-	Apatite
P2O5	0.43	-	-	-	
S	0.88	0.00	5.00	1.45	Pyrite, chalcopyrite
SO3	2.20	0.00	12.48	3.63	
SO3-S	1.32	0.00	7.48	2.18	
Cu	0.05	-	1.45	0.51	Chalcopyrite
CuO	0.06	-	1.81	0.64	
CuO-Cu	0.01	-	0.36	0.13	
Fe^{2+}	0.73	0.00	3.08	0.82	Pyrite
Fe2O3	1.04	0.00	4.41	1.17	
Fe2O3 - Fe	0.31	0.00	1.32	0.35	
Fe^{3+}	0.04	0.00	1.27	0.45	Chalcopyrite
Fe2O3	0.06	0.00	1.82	0.64	
Fe2O3-Fe	0.02	0.00	0.55	0.19	
Fe^{2+}	8.27	5.16	1.92	2.30	Actinolite, magnetite
FeO	10.64	6.64	2.47	2.96	
Fe2O3	11.82	7.38	2.75	3.29	
FeO-Fe2O3	1.18	0.74	0.28	0.33	
Fe^{3+}	11.78	2.52	8.53	3.53	Magnetite, hematite
Fe2O3	16.84	3.60	12.19	5.04	
Fe2O3(Total)	29.76	10.98	21.16	10.14	
LOI	15.63	23.81	6.30	26.35	
Total	100.00	100.00	100.00	100.00	

Results of calculations for determining the chemical composition of veins from the FC12 prospect (section 3.4.2 in text) using equation 3.1. The far right column indicates the mineral phases which contain each calculated element. The chemical formulas and atomic weights of each mineral are presented in table 3.4. For Si, Al, Ca, Na, Mg, Ti and P the values obtained from equation 3.1 were converted to oxides. In a typical XRF analysis, S concentrations are given as SO_3, where oxygen is derived from the atmosphere rather than the sample. As such, the calculated oxygen value obtained from this conversion was subtracted from the LOI value. In addition, Cu (in chalcopyrite) will form CuO during XRF combustion, although the oxygen component is again derived from the atmosphere and was also subtracted from the total LOI. Due to the different valence states of Fe in pyrite and actinolite (Fe^{2+}) and chalcopyrite and hematite (Fe^{3+}), all Fe values are converted to Fe_2O_3 and the difference between this value and the original Fe value is subtracted from the LOI. In the case of magnetite, the chemical formula contains both Fe^{2+} and Fe^{3+} and was calculated separately. As was the case for both S and Cu, the Fe component in pyrite and chalcopyrite will bond with oxygen from the atmosphere. Therefore the difference between Fe_2O_3 and Fe^{n+} is also subtracted from the total LOI value.

APPENDIX 4

Calculations for combining the chemical composition of veins and alteration selvage for comparison with unaltered rock

Sample numbers in this table refer to the depth down hole and hole number, which can thus be used to determine their location in appendix 1.

Appendix 4

Bulk weight and density calculations - wall rock alteration			
FTCD246/86	%	Density	Bulk density
chl	0.20	2.95	0.59
cpx	0.25	3.39	0.85
ttn	0.05	3.54	0.18
ab	0.15	2.59	0.39
qtx	0.02	2.65	0.05
hem ab	0.20	2.59	0.52
bt	0.02	3.00	0.06
mnt	0.07	5.20	0.36
illmenite	0.02	4.75	0.09
act	0.02	3.24	0.06
Total	1		
Total bulk density			**3.16**
Width of alteration zone (cm)			5
Bulk weight of alteration zone (g) (*2)			**31.6**
FTCD262/86	%	Density	Bulk density
chl	0.40	2.95	1.18
musc	0.12	2.83	0.34
hem ab	0.14	2.59	0.36
act	0.17	3.24	0.55
mag	0.08	5.20	0.42
py	0.02	4.99	0.10
ttn	0.07	3.54	0.25
Total	1		
Total bulk density			**3.20**
Width of alteration zone (cm)			3.5
Bulk weight of alteration zone (g) (*2)			**22.4**
FTCD346/82	%	Density	Bulk density
ab	0.60	2.59	1.55
chl	0.15	2.95	0.44
act	0.15	3.24	0.49
tit	0.05	3.54	0.18
mnt	0.05	5.20	0.26
Total	1		
Total bulk density			**2.92**
Width of alteration zone (cm)			3.2
Bulk weight of alteration zone (g) (*2)			**18.7**
FTCD203/86	%	Density	Bulk density
chl	0.30	2.95	0.89
hem ab	0.33	2.59	0.85
act	0.20	3.24	0.65
ttn	0.05	3.54	0.18
musc	0.05	2.83	0.14
mag	0.03	5.20	0.16
ill	0.02	4.75	0.09
py	0.02	4.99	0.10
Total	1		
Total bulk density			**3.06**
Width of alteration zone (cm)			8.8
Bulk weight of alteration zone (g) (*2)			**53.8**

Calculations for determining the bulk weight (g) of the alteration selvage based on modal mineralogy, the density of each mineral (Deer et al., 1992) and the width of each sample zone.

Appendix 4

Bulk weight and density calculations - vein			
FTCD246/86	%	Density	Bulk density
ttn	0.10	3.54	0.35
act	0.23	3.24	0.74
calc	0.60	2.72	1.63
ab	0.04	2.59	0.10
mnt	0.03	5.20	0.16
Total	1		
Total bulk density			**2.99**
Vein width (cm)			2.70
Bulk weight of vein (g)			**8.06**
FTCD262/86	%	Density	Bulk density
ab	0.57	2.59	1.48
hem	0.05	5.20	0.26
cpy	0.03	4.20	0.13
act	0.04	3.24	0.13
calcite	0.22	2.72	0.60
magnetite	0.03	5.20	0.16
pyrite	0.04	4.99	0.20
ttn	0.02	3.54	0.07
Total	1		
Total bulk density			**3.02**
Vein width (cm)			2.70
Bulk weight of vein (g)			**8.14**
FTCD346/82	%	Density	Bulk density
mag	0.15	5.20	0.78
calc	0.45	2.72	1.22
py	0.01	4.99	0.05
act	0.15	3.24	0.49
tit	0.02	3.54	0.07
cpy	0.01	4.20	0.04
ap	0.01	3.23	0.03
ab	0.20	2.59	0.52
Total bulk densit	1		**3.20**
Vein width (cm)			2.30
Bulk weight of vein (g)			**7.36**
FTCD203/86	%	Density	Bulk density
calc	0.65	2.72	1.76
act	0.03	3.24	0.10
ab	0.25	2.59	0.65
mag	0.04	5.20	0.21
py	0.01	4.99	0.05
cpy	0.01	4.20	0.04
ttn	0.01	3.54	0.04
Total	1		
Total bulk density			**2.84**
Vein width (cm)			1.80
Bulk weight of vein (g)			**5.12**

Calculations for determining the bulk weight (g) of the vein based on modal mineralogy, the density of each mineral (Deer et al., 1992) and the width of each sample zone.

Appendix 4

A B

Density calculations - Unaltered rock			
FTCD246/86	%	Density	Bulk density
muscovite	0.60	2.83	1.70
apatite	0.04	3.23	0.13
biotite	0.05	3.00	0.15
clinopyroxene	0.05	3.39	0.17
hornblende	0.15	3.31	0.50
illmenite	0.05	4.75	0.24
magnetite	0.04	5.20	0.21
pyrite	0.01	4.99	0.05
chalcopyrite	0.01	4.20	0.04
Total	1		
Total bulk density			**3.18**
FTCD262/86	%	Density	Bulk density
clinopyroxene	0.45	3.39	1.53
biotite	0.02	3.00	0.06
quartz	0.03	2.65	0.08
albite	0.10	2.59	0.26
muscovite	0.30	2.83	0.85
illmenite	0.06	4.75	0.28
magnetite	0.03	5.20	0.16
pyrite	0.01	4.99	0.02
chalcopyrite	0.01	4.20	0.02
Total	1		
Total bulk density			**3.26**
FTCD346/82	%	Density	Bulk density
orthopyroxene	0.40	3.59	1.43
muscovite	0.07	2.83	0.20
albite	0.40	2.59	1.04
biotite	0.03	3.00	0.09
illmenite	0.07	4.75	0.33
magnetite	0.02	5.20	0.10
pyrite	0.01	4.99	0.05
Total	1		
Total bulk density			**3.2**
FTCD203/86	%	Density	Bulk density
clinopyroxene	0.30	3.39	1.02
relict orthopyroxer	0.10	3.59	0.36
biotite	0.04	3.00	0.12
albite	0.27	2.59	0.70
muscovite	0.22	2.83	0.62
magnetite	0.02	5.20	0.10
illmenite	0.04	4.75	0.19
pyrite	0.01	4.99	0.05
Total	1		
Total bulk density			**3.2**

Calculations for determining the bulk weight of the unaltered rock. A. The bulk density is calculated by the overall modal % multiplied by the density. B (overleaf). A value for the volume of the precursor unaltered rock that produced the observed alteration selvage was determined by dividing the volume of the altered rock with the change in volume (Fv) determined for each sample (Fig. 3.5). The bulk weight of the unaltered rock is then determined by the calculated volume of the unaltered rock and the bulk density from table A.

Bulk weight of unaltered rock

Calculations	***FTCD246/86***	***FTCD262/86***	***FTCD346/82***	***FTCD203/86***
Width of altered rock (cm3)	5	3.5	3.2	8.8
Volume change (Fv) between altered and unaltered rock	0.975	1.03	1.18	1.075
Bulk density of unaltered rock	3.1764	3.25815	3.2438	3.16
Width' of unaltered rock - (width of Alt rock / volume change)	5.13	3.40	2.71	9.62
Bulk weight of unaltered rock - ('width of unaltered rock * bulk density of unrock)	16.29	11.07	8.80	30.11
Bulk weight of unaltered rock *2	32.58	22.14	17.59	60.22

APPENDIX 5

Fluid inclusion microthermometric data

Sample numbers in this table refers to the depth down hole and hole number respectively, which can thus be used to determine their location in appendix 1.

Analytical technique is described in text (chapter 4)

P = Present in inclusion but homogenisation temperature was not observed
Dec = present in inclusion but fluid inclusion decrepitated before homogenisation

Type 1 multisolid fluid inclusions

Host mineral	*Initial frezing (Tfr)*	*Initial melting (Ti)*	*Melting of ice*	*T melt: hydrohalite (Thh)*	*Homogenisation temp: halite*	*Vapour homogenisation*	*Salinity*
Qtz					260.6	150	35
Qtz		-50	-25.4	6.8	275.8	~153	36
Qtz			-20.5		dec = 170	dec	
Qtz		-60-50	-26.4	6.2	330.3	293	41
Qtz		-75-65	-31.9		312	171	30
Qtz		>-70	-43.9		dec =140	dec	
Qtz		>-62	-29.7	-6.9	P	P	
Qtz		>-60	-34.4		P	P	
Qtz		>-70	-40.2		P	P	
Qtz		>-70	-27.8	4.1	P	P	
Qtz			-26.7	9.8	P	P	
Qtz		-62.5	-22.3	10.2	P	P	
Qtz		-55	-35		P	P	
Qtz	-89.2	-65	-28.4	3.8	P	110.3	
Qtz	-89.6	-65 to 60	-28	7.4	dec = 223	115	
Qtz	-91.5	>-55	-27.9	3.1	dec = ?	~90(?)	
Qtz		>-60	-30	1.7	dec = 172	115.3	
Qtz	-77.4	>-75	-29.7	2.8	333(?)		41
Qtz			-28.1		dec	147.2	
Qtz	-82.7	-75	-30.5	6	dec	73.4	
Qtz	-91	-75	-28.1	8.9	dec	113.7	
Qtz		-72.3	-25.1	14.5	dec		
Qtz					452.3	133.4	50
	= -77.4 to -91.5 degrees	= -75 to -50 degrees	= -43.9 to -20.5 degrees	= 1.7-14.5 degrees	= 260.6 - 452.3 degrees	= 73.4 - 293 degrees	35 - 50 wt % NaCl

Type 2 CO_2-rich fluid inclusions

Sample number	*initial melting (Ti)*	*Final melting (Tm)*
MFC202.2/91	-56.8	14.9
MFC202.2/91	-56.9	6.6
MFC202.2/91	-56.9	13.4
MFC202.2/91	-56.8	-8
MFC202.2/91	-56.8	1.4
MFC202.2/91	-56.8	8.5
MFC202.2/91	-56.9	-8
MFC202.2/91	-56.9	-1.5
MFC202.2/91	-56.9	-1.5
MFC202.2/91	-56.9	-10
MFC202.2/91	-56.7	-12.1
MFC202.2/91	-56.7	-4.1
MFC202.2/91	-56.8	11
MFC202.2/91	-56.8	2.2
MFC202.2/91	-56.7	4.8
MFC202.2/91	-56.7	4.8
MFC108/27	-56.8	-1
MFC108/27	-56.8	11.6
MFC108/27	-56.8	12.6
MFC108/27	-56.8	13.3
MFC108/27	-56.8	10.6
MFC108/27	-56.8	12.2
MFC108/27	-56.8	13.3
MFC108/27	-56.8	14.3
MFC108/27	-56.8	21.4
MFC108/27	-56.8	21.5
MFC108/27	-56.7	-7.3
MFC108/27	-56.7	1.4
MFC108/27	-56.7	4.3
MFC108/27	-56.7	7.3
MFC108/27	-56.7	-4.2
MFC108/27	-56.7	-4.2
MFC108/27	-56.7	0.2
MFC108/27	-56.8	-3.8
MFC108/27	-56.8	0.1
MFC108/27	-56.8	-3.8
MFC108/27	-56.8	1.8
MFC108/27	-56.8	2.2
MFC108/27	-56.8	-12.2
MFC108/27	-56.8	-2.4
MFC108/27	-56.8	-2.6
MFC108/27	-56.8	-2.6
MFC108/27	-56.8	9.1
MFC108/27	-56.7	-12.2
MFC108/27	-56.7	-7
MFC108/27	-56.7	-2.2
MFC108/27	-56.7	-1
MFC108/27	-56.7	2.7
Range:	= 56.7 to 56.9	= -12.2 to 21.4

Type 3a Halite-bearing fluid inclusions

Sample number	*Host mineral*	*Initial frezing (Tfr)*	*initial melting (Ti)*	*Melting of ice*	*T melt: hydrohalite (Thh)*	*Homogenisation temp: halite*	*Vapour homogenisation*	*Salinity*
MFC125/27	qtz	?	~-60/-50	-26.2		P		
MFC125/27	qtz			-29.2		P		
MFC125/27	qtz			-32	13.6	P		
MFC125/27	qtz		~50	-26.4	9.8	273.5	249.3	34
MFC125/27	qtz		52	-25		dec 229	dec	
MFC125/27	qtz		58	-23		dec 249.3	dec	
MFC125/27	qtz	73.2	61	-25.3		dec		
MFC125/27	qtz			-26.3		264	230	33
MFC125/27	qtz			-24.7		215	157	31
MFC125/27	qtz		65-55	39.1		244	122	33
MFC125/27	qtz			-39.8		dec = 182	dec	
MFC125/27	qtz		>-60	-24.3		dec = 173	dec	
MFC125/27	qtz		>-65	-21.3	9.5	dec = 221	dec	
MFC125/27	qtz		>-65	-36.5		dec = 221	dec	
MFC125/27	qtz		>-60-55	-25.1	7.9	P		
MFC125/27	qtz		>-50	-21.6	10.7	P		
MFC125/27	qtz		>-70	-27.7	5.7	P		
MFC125/27	qtz		-76.6		7.6	P		
MFC125/27	qtz		>-70	-27.7	6.7	P		
MFC125/27	qtz					210	129	31
MFC125/27	qtz		-62.9	-29.1	7.5	231.3	149.2	33
MFC125/27	qtz					259.9	104.5	34
MFC125/27	qtz					P	121.6	
MFC125/27	qtz			-21.3		dec	dec	
MFC108/27	qtz		>-70?	-27.1	12.1	dec	dec	
MFC108/27	qtz		>-65?	-26.1	7.6	dec	dec	
MFC108/27	qtz			-26.1	8	dec	dec	
MFC108/27	qtz			-26.2		P		
MFC108/27	qtz					P	384.5	
MFC108/27	qtz					274.5	142.8	34
MFC202.2/91	qtz			-25.2		212.3	173	32
MFC202.2/91	qtz			-20.4		dec	dec	
MFC202.2/91	qtz			-25.8				
MFC202.2/91	qtz			-24.3		205	209	31
MFC202.2/91	qtz			-26.4			dec	
MFC202.2/91	qtz		-55-45	-20-30	7.3			
MFC202.2/91	qtz		-55-45	-26.6	6.9	278.9	198.5	34
MFC259.7/52	qtz		>-70	-43.7		dec	dec	
MFC259.7/52	qtz		>-70	-38.1		dec	dec	
MFC259.7/52	qtz		>-70	-33.7		dec	dec	
MFC259.7/52	qtz			-35.5		248	143	34
MFC259.7/52	qtz		>-50	-32.6		P		
MFC259.7/52	qtz		>-65	-31.3	0.8?	P		
MFC259.7/52	qtz			-29.3		dec	dec	
MFC259.7/52	qtz		>-80?	-24.3		dec	dec	
Range			= -76.6 to -45 degrees	= -43.7 to -20.4 degrees	= 5.7 to 12.1 degrees	= 210 to 278.9 degrees	= 104.5 to 249.3	31 - 34 wt % NaCl

Type 4a 2 phase fluid inclusions

Sample number	*Host mineral*	*Initial melting (Ti)*	*Final melting (Tm)*	*Vapour homogenisation (Th)*
MFC125/27	qtz		-1.7	165
MFC125/27	qtz		-12	155
MFC125/27	qtz		-3.3	dec = 127
MFC125/27	qtz		-3.9	191.6
MFC125/27	qtz		-1.8	P
MFC125/27	qtz	-40	-14.1	P
MFC125/27	qtz		-17.1	P
MFC125/27	qtz		-9.6	P
MFC125/27	qtz		-4.6	P
MFC125/27	qtz		-1.7	P
MFC125/27	qtz		-1.7	P
MFC125/27	qtz		-1.7	P
MFC125/27	qtz		-1.8	P
MFC125/27	qtz		-2.1	P
MFC125/27	qtz		-1.8	P
MFC125/27	qtz		-1.8	P
MFC125/27	qtz	>-40	-18.7	P
MFC125/27	qtz	>-40	-19.6	P
MFC125/27	qtz		-1.8	P
MFC125/27	qtz		-4.7	P
MFC125/27	qtz			125.5
MFC125/27	qtz			184.5
MFC125/27	qtz			172.9
MFC125/27	qtz			165.5
MFC202.2/91	qtz		-1.1	125
MFC202.2/91	qtz		-4.6	153.3
MFC202.2/91	qtz		-2	dec = 138
MFC202.2/91	qtz	-50 to -45	-23	dec
MFC202.2/91	qtz			162.8
MFC202.2/91	qtz			198.9
MFC259.7/52	qtz		-1.1	P
MFC259.7/52	qtz		-2.3	P
MFC259.7/52	qtz	>-30	-5.3	P
MFC259.7/52	qtz			130
MFC108/27	qtz			P
Range:			= -19.6 to -1.1	= 125 to 191.6

Sample number	*Host mineral*	*initial melting (Ti)*	*Melting of ice*	*T melt: hydrohalite (Thh)*	*Homogenisation temp: Halite*	*Vapour homogenisation*
Type 3b Halite-bearing fluid inclusions						
MFC002	ap	>-70?	-32.1	8	P	dec 172
MFC002	ap	>-60	37.7		P	~114
Range:			= -32.1 to 37.7		P	=-114 to 172
Type 4b 2-phase fluid inclusions				-	-	
MFC002	ap		-24.8	-	-	147.2
MFC002	ap		-26.6	-	-	dec
MFC002	ap		-53.1	-	-	109.6
MFC002	ap		-44.5	-	-	116.6
MFC002	ap	>-70	-37.7	-	-	110.2
MFC002	ap	>-70	-34.6	-	-	114
MFC002	ap		24.1	-	-	~114
MFC002	ap		-2.1	-	-	~114
MFC002	ap			-	-	142.2
MFC002	ap			-	-	142.4
Range:			= -53.1 to -2.1			= 109.6 to 147.2

APPENDIX 6

Tabulated whole rock XRF and INAA data

Sample numbers in the text (e.g. MFC160.5/51) refers to depth down hole and hole number respectively for samples from FC12 and FC4NW.

- = below detection
N/A = not analysed

Element	SiO_2	TiO_2	Al_2O_3	Fe_2O_3T	MnO	MgO	CaO	Na_2O	K2O	P_2O_5	SO_3	Cl	LOI	SUM
FC12: gabbro														
261.3/82UN	37.23	5.13	11.05	22.58	0.31	6.73	9.76	2.12	0.60	3.08	0.09	0.15	1.88	100.6
395.6/86UN	40.06	6.28	11.65	20.69	0.27	7.18	10.17	2.09	0.99	0.08	0.03	0.03	0.50	100.0
121.3/84UN	35.35	7.18	10.62	29.90	0.25	4.39	8.25	2.16	0.69	1.95	0.06	0.19	-	100.8
224.3/86	37.88	4.38	12.41	26.57	0.23	5.04	6.80	2.44	1.35	1.86	0.12	0.11	1.04	100.1
260.8/81UN	44.85	1.96	17.56	12.12	0.13	7.87	7.20	2.20	3.08	0.19	0.06	0.25	2.67	99.9
468.1/82UN	44.30	3.11	13.23	18.91	0.18	6.83	9.78	2.79	0.75	0.25	0.05	0.03	0.29	100.5
339/82A	42.14	3.08	13.04	20.04	0.23	7.36	7.61	2.82	1.42	0.42	0.07	0.11	0.91	100.1
190.3/86	46.39	1.68	16.23	14.95	0.14	7.44	7.35	3.14	1.94	0.08	0.02	0.16	1.53	100.9
466.6/82	39.35	4.58	8.34	27.49	0.21	8.60	9.94	1.50	0.44	0.14	0.05	0.04	-	100.5
384.5/82UN	40.29	4.86	11.54	20.14	0.21	7.08	10.41	2.51	0.93	2.63	0.03	0.12	0.21	100.8
363/81UN	42.44	4.02	11.78	18.94	0.20	5.86	9.59	3.30	1.29	2.05	0.05	0.15	1.16	100.7
FC12: Fe oxide-rich rock														
399.5/86A	26.20	9.92	6.56	42.05	0.27	6.79	7.61	0.69	0.15	0.05	0.03	0.02	-	100.3
120.7/84A	27.46	9.22	2.23	44.59	0.29	9.64	4.52	0.25	0.10	0.45	0.12	0.14	1.41	100.3
266.3/81A	15.16	2.48	2.60	69.57	0.11	6.39	3.84	0.06	0.39	0.54	0.04	0.05	-	100.7
228.3/86A	26.95	7.37	2.01	37.12	0.36	13.70	8.30	0.22	0.13	2.79	0.08	0.33	1.26	100.3
263/82A	28.90	6.90	4.87	41.45	0.31	9.84	3.22	0.54	0.14	0.59	0.21	0.09	3.22	100.2
229.2/86	26.60	7.68	2.24	40.08	0.38	13.22	7.89	0.31	0.08	2.70	0.31	0.15	-	99.7
446.8/82A	7.42	7.84	3.30	77.96	0.27	3.91	0.32	0.00	1.65	0.09	0.08	0.15	-	100.5
338/82UN	30.11	8.62	2.58	40.31	0.35	9.57	7.23	0.17	0.11	0.04	0.09	0.07	0.91	100.1
390.3/82A	13.41	2.25	3.02	68.08	0.17	6.18	2.38	0.11	0.27	0.22	1.27	0.12	3.22	100.6
360.3/81A	5.10	1.71	3.30	85.79	0.08	2.56	0.82	0.00	0.43	0.46	0.08	0.05	-	100.0
358.9/81	16.84	8.13	5.58	58.71	0.23	4.35	3.74	0.68	1.18	1.17	0.10	0.13	-	100.4
FC4NW: metasedimentary rock														
MFC160.5	54.00	1.20	14.42	10.75	0.09	2.13	6.49	5.55	2.27	0.33	-	0.03	2.10	99.4
MFC160.2	53.90	0.82	15.34	13.66	0.06	3.54	3.44	7.40	0.78	0.19	-	0.06	1.70	100.9
FC4NW: Fe oxide-rich rock														
MFC160.2	23.23	0.38	5.13	66.29	0.05	0.76	1.57	2.10	0.19	0.20	-	0.09	-	100
MFC160.5	19.79	0.54	4.24	69.20	0.07	1.42	2.55	1.67	0.46	0.20	-	0.08	0.40	100.6
Regional 'unaltered' rocks														
MFC002U (felsic volcanic rock)	66.91	0.52	13.97	6.71	-	0.73	1.02	8.30	0.18	0.14	-	-	0.54	99.0
Roxmere1-55 (calc-silicate)	1.23	0.51	1.77	15.70	0.10	0.68	38.82	0.72	0.03	18.48	0.08	-	18.51	96.6
MonakoffW (metapelite)	38.72	1.08	14.77	21.09	2.35	4.21	6.41	1.64	4.36	0.13	0.05	-	4.88	99.7
Regional Fe oxide-rich rocks														
MFC002A	4.45	0.33	0.15	86.50	0.02	0.13	4.45	-	0.01	3.65	-	-	1.11	100.8
Roxmere1-30	15.48	1.39	0.63	60.08	0.06	0.75	11.89	-	0.01	2.79	0.02	-	7.14	100.2

Element	Sc	Ba	Ti	V	Cr	Mn	Co	Ni	Cu	Zn	Ga	As	Pb	Rb	Sr	Y	Zr	Nb	Th	U
Detection limit	3	10	5	8	5	8	2	3	3	3	3	10	10	2	2	2	3	2	3	3
FC12: gabbro																				
261.3/82UN	-	196	26820	287	406	1757	50	13	28	85	20	-	5	23	159	56	47	8	-	-
395.6/86UN	-	202	29695	558	-	1286	36	29	101	49	21	3	8	46	456	13	77	7	-	-
121.3/84UN	-	248	37980	152	-	1503	37	20	129	105	26	2	9	28	192	25	49	9	3	-
224.3/86	-	209	20275	432	567	1251	56	29	967	21	25	2	5	57	137	25	12	2	-	-
339/82A	-	259	16163	310	395	1344	64	57	94	104	19	-	1	75	216	21	29	3	-	-
190.3/86	-	292	9097	157	286	893	42	46	50	57	20	-	2	102	297	11	12	1	-	-
384.5/82UN	-	254	26939	321	438	1236	71	13	74	67	20	-	5	59	256	52	54	9	7	-
363/81UN	-	271	20366	275	338	1095	66	24	164	32	57	-	3	60	212	48	67	11	5	3
260.8/81UN	-	926	10411	180	289	860	155	62	47	-	19	-	2	142	275	19	78	9	-	-
468.1/82UN	-	262	18637	429	9	1215	71	38	138	83	20	-	2	35	281	25	43	4	-	-
466.6/82	-	175	24335	720	935	1449	81	44	192	81	23	-	5	21	142	28	58	6	-	-
FC12: Fe oxide-rich rock																				
399.5/86A	-	108	52244	1714	-	1680	76	74	303	219	30	-	12	-	79	9	57	5	-	-
120.7/84A	-	58	42305	142	-	1685	90	39	1353	55	24	2	10	-	14	22	85	16	-	-
266.3/81A	-	48	13221	749	-	951	21	51	29	39	34	-	16	35	11	14	54	14	-	-
228.3/86A	-	88	39895	775	1085	2346	104	69	159	210	16	-	13	-	43	37	22	5	-	-
263/82A	-	93	32818	195	-	1734	100	94	20	132	22	2	16	-	67	10	29	6	-	-
229.2/86	-	78	43020	513	-	2736	105	57	84	108	15	-	11	-	49	17	25	5	5	-
446.8/82A	-	220	46895	930	-	1910	34	27	58	49	49	-	20	146	5	18	59	12	-	-
338/82UN	-	55	41170	801	25	2017	45	55	172	31	24	2	11	-	8	16	58	9	-	-
390.3/82A	-	105	11225	432	226	1222	248	88	267	95	42	-	16	28	13	12	53	12	-	-
360.3/81A	-	122	9696	721	-	720	153	91	444	49	19	-	21	30	9	15	64	6	-	-
358.9/81	-	212	42228	531	-	1431	91	65	480	50	45	-	15	73	66	24	68	13	-	-
FC4NW: Metasedimentary rock																				
MFC160.5/51a	12	833		62	6	646	63	64	294	12	17	6	8	135	121	71	311	39	0	18
MFC160.2/51a	15	470		143	14	425	81	38	181	8	21	3	2	87	84	24	192	10	15	0
FC4NW: Fe oxide-rich rock																				
MFC160.2/51b	N/A	33		312	-	470	204	101	N/A	6	N/A	2	19	-	20	9	98	2	N/A	N/A
MFC160.5/51a	N/A	55		535	-	626	104	145	N/A	14	N/A	2	17	15	17	11	84	-	N/A	N/A
Regional 'unaltered' rock																				
MFC002U (felsic volcanic rock)	12	21001	5146	142	-	6115	74	91	665	205	23	59	92	243	119	31	238	12	14	-
Roxmere1-55 (calc-silicate rock)	12	52	1674	641	12	1365	17	93	177	8	12	161	16	-	156	287	10	-	112	-
MonakoffW (metapelite)	11	27	3937	66	27	99	26	12	13	-	22	6	2	-	15	46	308	18	30	-
Regional Fe oxide-rich rock																				
MFC002A	N/A	11	2750	1400	-	337	37	66	57	-	45	3	21	-	17	69	5	-	14	-
Roxmere1-30	N/A	43	6548	1254	-	717	21	136	206	-	27	3	16	-	35	41	16	-	36	-

Element	*Sb*	*As*	*Br*	*Ce*	*Cs*	*Cr*	*Eu*	*Au*	*Hf*	*La*	*Lu*	*Mo*	*Sm*	*Sc*	*Se*	*Tb*	*W*	*Yb*
Detection limit	0.2	1.0	1.0	2.0	1.0	5.0	0.5	5.0	0.5	0.5	0.2	5.0	0.2	0.1	5.0	0.5	2.0	0.5
FC12: gabbro																		
261.3/82UN	-	-	-	137.0	1.3	7.9	2.9	-	1.6	67.8	0.5	-	14.9	53.1	-	2.4	21.2	3.5
395.6/86UN	0.5	1.3	1.1	14.8	-	20.1	0.9	-	2.6	6.7	-	-	2.5	66.9	-	0.5	63.0	1.3
121.3/84UN	-	-	1.8	113.0	-	10.9	2.8	-	1.5	56.5	0.4	-	12.9	49.4	-	1.9	118.0	3.0
224.3/86	-	11.4	2.0	45.4	1.1	35.0	1.7	12.4	0.7	20.0	0.2	-	6.8	59.2	-	1.0	49.9	1.5
260.8/81UN	-	-	-	29.8	-	319.0	1.1	-	1.3	15.3	0.2	-	3.2	32.0	-	0.6	3790.0	1.5
468.1/82UN	-	-	1.1	31.2	-	21.9	1.3	-	1.8	16.1	0.3	-	4.3	58.8	-	0.8	144.0	2.0
339/82A	-	-	2.3	50.0	-	136.0	1.4	-	1.4	28.6	0.3	5.4	4.8	49.7	-	0.8	74.4	1.9
190.3/86	-	-	-	12.2	-	322.0	0.7	-	0.7	6.2	-	-	1.6	36.9	-	-	68.2	0.6
466.6/82	-	-	-	27.5	-	31.1	1.2	-	2.3	11.4	0.3	-	4.6	81.2	-	0.9	79.8	2.4
384.5/82UN	-	-	-	128.0	-	6.1	2.8	-	2.0	68.8	0.4	-	13.9	54.7	-	2.1	58.9	3.4
363/81UN	-	2.8	1.5	166.0	-	11.6	2.6	-	2.5	98.8	0.5	10.3	12.9	49.4	-	1.9	133.0	3.1
FC12: Fe oxide-rich rock																		
399.5/86A	-	-	-	10.0	-	42.6	0.6	-	2.1	3.8	-	-	1.9	67.6	-	-	73.1	1.0
120.7/84A	-	5.0	-	41.6	-	35.4	0.8	-	2.7	17.6	0.5	-	6.3	109.0	-	1.2	947.0	3.3
266.3/81A	-	1.5	-	50.1	-	49.8	0.7	-	1.6	22.8	-	-	3.3	31.3	-	-	36.0	0.9
228.3/86A	-	-	1.3	71.0	-	63.2	1.8	-	1.1	32.2	0.2	-	9.2	72.7	-	1.3	57.7	1.7
263/82A	-	1.0	-	27.8	-	31.8	0.7	19.7	0.9	14.0	-	-	3.2	39.6	-	0.5	88.9	1.0
229.2/86	-	-	-	67.8	-	134.0	1.7	-	-	30.7	0.2	-	9.4	59.0	-	1.3	2580.0	1.8
446.8/82A	-	-	-	2.2	1.5	72.7	-	-	2.0	1.2	-	-	0.3	31.1	-	-	71.3	-
338/82UN	-	3.9	1.8	11.8	-	246.0	-	-	2.3	3.9	0.3	-	3.1	116.0	-	0.7	93.5	2.3
390.3/82A	-	-	1.4	20.4	-	291.0	-	-	1.4	11.2	-	5.5	1.9	57.5	-	-	44.6	1.1
360.3/81A	-	7.0	-	48.9	1.3	55.3	-	-	1.9	32.0	-	6.5	2.8	47.0	-	-	66.2	1.3
358.9/81	-	3.2	-	68.8	1.6	55.2	1.5	-	2.6	35.4	0.3	7.1	7.2	44.7	-	1.1	110.0	1.8
Regional 'unaltered' rock																		
MFC002U (felsic volcanic rock)	-	1.7	-	57.6	-	N/A	1.5	-	8.4	23.4	0.6	-	7.6	N/A	-	1.4	169.0	4.6
Roxmere1-55 (calc-silicate rock)	-	175.0	2.6	940.0	-	N/A	11.7	-	-	547.0	2.0	-	68.1	N/A	-	7.8	35.5	18.2
MonakoffW (metapelite)	1.7	61.5	-	70.7	9.8	N/A	1.1	47.0	4.9	38.2	0.4	16.6	4.9	N/A	-	0.8	69.6	3.0
Regional Fe oxide-rich rock						N/A								N/A				
MFC002A	-	41.4	-	359.0	-	N/A	2.0	-	-	218.0	1.0	6.8	19.5	N/A	-	2.8	82.3	6.9
Roxmere1-30	0.5	22.2	-	905.0	-	N/A	5.9	-	-	513.0	0.7	-	39.3	N/A	-	3.9	94.9	6.0

APPENDIX 7

Density calculations for Fe oxide-rich rocks from the FC4NW prospect

Sample numbers in this table refer to the depth down hole and hole number, which can thus be used to determine their location in appendix 1.

MFC 160.5/51	Modal proportion	Density of mineral	Contribution to rock density
Unaltered rock			
biotite	0.12	3.00	0.36
actinolite	0.12	3.30	0.40
magnetite	0.05	5.20	0.26
quartz	0.55	2.65	1.46
plagioclase	0.15	2.60	0.39
Total density of rock:			2.86
Altered rock			
magnetite	0.4	5.20	2.08
albite	0.2	2.60	0.52
actinolite	0.15	3.30	0.50
pyrite	0.2	5.00	1.00
muscovite	0.05	2.80	0.14
Total density of rock:			4.24

MFC 160.2/51	Modal proportion	Density of mineral	Contribution to rock density
Unaltered rock			
biotite	0.15	3.00	0.45
actinolite	0.1	3.30	0.33
magnetite	0.05	5.20	0.26
quartz	0.5	2.65	1.33
plagioclase	0.2	2.60	0.52
Total density of rock:			2.89
Altered rock			
magnetite	0.55	5.20	2.86
albite	0.3	2.60	0.78
actinolite	0.1	3.30	0.33
pyrite	0.05	5.00	0.25
Total density of rock:			4.22

APPENDIX 8

Mineralogy of host rocks and alteration assemblages used for Laser Ablation ICP MS

Location	**Sample No**	**Rock Type / mineralogy**	**Host rock mineral assemblage**	**Mineralisation style: mineral association**
Ernest Henry	FT8C EH201B FT8A EH201C EH184D EH9 EH10 647	-Plagioclase-phyric felsic volcanic rocks (1740 Ma).	-Plagioclase phenocrysts with plagioclase + biotite + magnetite + quartz matrix.	-Associated with brecciation of felsic volcanic rocks: magnetite + calcite + biotite + chalcopyrite + pyrite + K-feldspar + quartz + barite. -Rare accessory minerals include: apatite ± fluorite ± amphibole ± molybdenite ± cobaltite ± arsenopyrite ± gold ± coffinite ± rutile ± hematite ± scheelite ± Sb sulphides ± LREE-rich fluorcarbonates ± uraninite
Osborne	OS1	-Contacts between banded ironstone formation and feldspathic psammitic rocks	-*Psammite:* Dominantly plagioclase + quartz with minor biotite + magnetite. -*Banded ironstone formation*: Magnetite + quartz + apatite ± hematite ± pyrite ± chlorite ± siderite ± chalcopyrite ± pyrrhotite.	-Associated with silica flooding + chalcopyrite, + pyrite, + magnetite, + quartz, + pyrrhotite, + hematite ± apatite ± siderite ± talc ± biotite ± chlorite ± molybdenite ± bravoite ± muscovite -Rare accessory phases include: pendlandite ± gold ± bismuth ± wolframite ± stilpnomeline ± costibite.
Starra	ST1	-The Stavely formation: western ironstones	-Magnetite + hematite + quartz ± chlorite ± calcite ± pyrite ± chalcopyrite	-Associated with pyrite + gold + chalcopyrite + anhydrite + bornite + barite ± chlorite ± muscovite ± chalcocite ± hematite ± calcite and anhydrite -Note: Magnetite is associated with the selective hematisation of magnetite-bearing Fe oxide-rich rocks.
Mount Elliott	ME	-Meta-pelitic rocks altered to skarn	-*Skarn*: diopside + scapolite + actinolite ± magnetite ± pyrite ± chalcopyrite	-Associated with brecciation: chalcopyrite + actinolite + scapolite, ±andradite, ±tourmaline, ±allanite, ±apatite, ±magnetite, ±pyrite, ±pyrrhotite and calcite

Location	**Sample No**	**Drill hole No / depth**	**Rock Type**	**Host rock mineral assemblage**	**Mineralisation style: mineral association**
FC4NW	MFC254 (Fe oxide) MFC168 (Fe oxide) MFC161 (Na-Ca alt) MFC262 (Na-Ca alt) MFC273 (Na-Ca alt) MFC222 (Na-Ca alt) MFC243 (Na-Ca alt) MFC217 (Na-Ca alt) MFC125 (Na-Ca alt)	MFC99090D, 254.8m MFC98051D, 168.6m MFC98051D, 160.2m MFC99090D, 262m MFC99090D, 273m	-Metasedimentary rocks -Plagioclase-phyric felsic volcanic rocks -Na-rich granitic rocks	-*Felsic volcanic rocks*: Phenocrysts: plagioclase + quartz Groundmass: plagioclase + quartz +magnetite. -*Metasedimentary rock:* quartz + plagioclase + biotite. -*Na-rich granitic rock*: plagioclase + quartz ± Clinopyroxene ± amphibole	-*Fe oxide-rich rocks:* clinopyroxene + magnetite + chalcopyrite + pyrite ± actinolite ± albite. -*Na-Ca alteration:* actinolite + calcite + magnetite + albite ± pyrite ± chalcopyrite ± quartz ± titanite ± hematite.
FC12	MFC204 (Na-Ca alt) MFC312 (Na-Ca alt) MFC338: (cumulate layering in gabbro) MFC291: (cumulate layering in gabbro)	FTCD1087, 204.2m FTCD1084, 312.3m FTCD1082, 338m FTCD1081, 291m	-Tholeiitic gabbroic rocks -Cumulate Fe oxide - rich layering in gabbroic sequence.	-*Gabbroic rock* plagioclase + horneblende + biotite + magnetite + ilmenite + pyrite + orthopyroxene + clinopyroxene. -*Cumulate Fe oxide-rich rocks*: Magnetite + ilmenite + clinopyroxene ± biotite ± titanite ± microcline ± quartz ± plagioclase ± pyrite ± chalcopyrite	-*Na-Ca alteration:* actinolite + calcite ± titanite ± magnetite ± pyrite ± chalcopyrite ± hematite ± albite

Location	**Sample No**	**Rock Type**	**Host rock mineral assemblage**	**Mineralisation style: mineral association**
Ernest Henry: Pre-mineralisation alteration	EH235 (Na-Ca alt) FT021A (K-Fe alt) EH184A (K-Fe alt) FT94C (K-Fe alt) EH223B (K-Fe alt) FT94B (K-Fe alt) EH223A (K-Fe alt) E151 (K-Fe alt)	-Plagioclase-phyric felsic volcanic rocks	-Plagioclase phenocrysts with plagioclase + biotite + magnetite + quartz matrix.	*-Na-Ca alteration:* actinolite + albite ± magnetite ± pyrite. *-K-Fe alteration* magnetite + biotite ± titanite ± K-feldspar ± pyrite ± chalcopyrite
Ernest Henry: Post-mineralisation alteration.	FT4A1 FT4A2 EH201A FT8B	-Plagioclase-phyric felsic volcanic rocks	(as above)	*-Late carbonate flooding* calcite + dolomite + biotite + magnetite ± pyrite ± chalcopyrite
Guilded Rose area(breccia) (Marshall (2003)	1714	-Calc-silicate rocks	Diopside ± quartz ± albite ± apatite ± biotite ± titanite	*-Na-Ca alteration* actinolite + quartz + magnetite + pyrite + chalcopyrite
Lightning Creek veining	LCD106 LCD13	I-type granitoids and Fe-rich sills	*-Coarse-grained monzodiorite*: plagioclase + K-feldspar (phenocrysts) + amphibole + biotite + K-feldspar + magnetite + plagioclase + quartz + titanite ± apatite ± zircon. *-Fe-rich sills:* K-feldspar + quartz + magnetite ± clinopyroxene ± pyrite ± apatite ± calcite ± chlorite ± titanite ± zircon	*-Cu-Au-bearing veins:* magnetite ± chalcopyrite ± chlorite ± pyrite

Na-Ca assemblages			
Location	**Sample No**	**Host rock mineral assemblage**	**Mineralisation style: mineral association**
Guilded Rose area (breccia) (clasts are a mix of marble and calc-silicate rock) (Marshall, 2003)	1307 1310 1314 1351 1561B	*Calc-silicate rock:* Diopside ± quartz ± albite ± apatite ± biotite ± titanite	*Matrix:* Albite + calcite + quartz + actinolite + chlorite + magnetite + hematite staining
Mount Avarice Quarry Veining (Marshall, 2003)	1375A 1375B	*Gabbro* Quartz + actinolite + pyrite	*Vein:* Quartz + calcite + actinolite + magnetite
Corella breccia (Marshall, 2003)	1808	*Calc-silicate rock:* Diopside ± quartz ± albite ± apatite ± biotite ± titanite	*Matrix:* Actinolite + magnetite + quartz
Mount Angelay: medium-grained equigranular granitoid (Marshall, 2003)	MA2 (Medium-grained granite) MA3 (brecciated granite)	*Medium-grained granite:* plagioclase + quartz + magnetite + biotite + ± apatite ± titanite ± allanite ± zircon ± fluorite ± pyrite	*Matrix:* Actinolite + magnetite

Barren Fe oxide-rich rocks		
Location	**Sample No**	**Associated mineralogy**
Starra	ST2 ST3	Magnetite ± quartz ± calcite
Osborne	OS2	Magnetite ± quartz ± apatite
Guilded Rose: North of the Cloncurry Syncline (Marshall, 2003)	271 176	Magnetite ± quartz ± apatite ± hematite
Guilded Rose (Marshall, 2003)	1356 345 1739 1686 271 176	Magnetite ± quartz ± apatite ± hematite
Mount Philp (Marshall, 2003)	MP011	Hematite replacing magnetite
Camel Hill (Marshall, 2003)	1561A	Hematite

Igneous magnetite		
Rock type / location	**Sample No**	**Associated mineralogy**
Lightning Creek monzogranite and Fe-rich sills	LCD32 (Fe-rich sill) LCD43 (Fe-rich sill) LCF12 (monzogranite)	-*Coarse-grained monzodiorite*: plagioclase + K-feldspar (phenocrysts) + amphibole + biotite + K-feldspar + magnetite + plagioclase + quartz + titanite ± apatite ± zircon. -*Fe-rich sills:* K-feldspar + quartz + magnetite ± clinopyroxene ± pyrite ± apatite ± calcite ± chlorite ± titanite ± zircon
Corella calc-silicate (pristine) (Marshall, 2003)	1735 1785	Diopside ± quartz ± albite ± apatite ± biotite ± titanite ± magnetite
Slaughter Yard	SY	Magnetite + horneblende + quartz + feldspar + biotite

APPENDIX 9

Laser ablation data tables for magnetite, hematite, pyrite and chalcopyrite

All laser ablation inductively coupled mass spectrometer (LA-ICP-MS) analyses of magnetite, hematite, pyrite and chalcopyrite collected for this study are included as several Microsoft Excel spreadsheets under the following titles:

Chalcopyrite
Hematite
Magnetite (barren assemblages)
Magnetite (Ernest Henry only)
Magnetite (weakly mineralised and Cu-Au mineralised assemblages)
Pyrite (Ernest Henry only)
Pyrite (other assemblages)

Notations: ‘bd’ = below detection, ‘-‘ denotes values whereby 1 sigma and MDL cannot be calculated due to below detection values, * denotes likely impurity in analysis.

DATA FOR APPENDIX 9 IS AVAILABLE ON CD-ROM ONLY