

Appendix 1: Chemical compositions of glauconite fractions.

Sample (Depth - m)	F ^a	Major elements (wt.%)										Trace elements (µg.g ⁻¹)										Fe/Mg ^b	Ca/Mg ^b	Sr/Ca ^b (×10 ⁻²)	U/Th ^b	K/Rb ^b		
		Al ₂ O ₃	MgO	CaO	Fe ₂ O ₃	MnO	TiO ₂	Na ₂ O	K ₂ O	P ₂ O ₅	Sr	Ba	Zr	Rb	Pb	Th	U	V	Y	Co	Cr						Zn	Sc
BAG 28 (468.5)	G	6.57	2.90	0.53	26.06	0.002	0.04	0.15	6.58	bdl	207.0	9.00	54.0	219.3	4.97	0.83	0.18	99.0	5.40	8.51	58.5	85.5	9.0	10.4	0.22	5.5	0.22	249
	S	13.68	2.53	0.84	17.19	bdl	0.28	0.42	4.39	0.11	210.5	70.18	70.2	225.2	30.43	4.86	1.12	70.2	10.53	15.67	175.4	105.3	3.5	7.9	0.40	3.5	0.23	162
BAG 47 (790.2)	G	8.68	4.31	0.42	20.26	0.005	0.08	0.02	6.99	0.08	54.9	4.99	69.9	235.9	1.75	0.95	0.34	254.5	7.98	12.50	289.4	74.9	13.5	5.5	0.12	1.8	0.36	246
	S	9.51	4.21	0.45	19.94	0.005	0.10	0.03	7.16	0.11	68.9	4.60	55.2	312.2	3.04	1.80	0.93	243.6	5.97	15.17	317.1	82.7	11.0	5.5	0.13	2.2	0.52	190
BAG 83 (435.0)	G	8.59	2.89	0.58	23.30	0.004	0.07	0.17	5.90	bdl	121.4	9.71	68.0	202.9	5.82	1.45	0.18	116.5	7.28	12.50	97.1	43.7	10.7	9.4	0.24	2.9	0.12	241
	S	10.02	2.77	0.68	20.51	0.000	0.14	0.16	5.08	0.02	139.9	23.31	93.2	229.9	14.62	2.26	0.44	23.3	20.98	15.93	116.6	46.6	2.3	8.6	0.29	2.9	0.19	184
BAG 91 (795.5)	G	10.20	4.68	0.57	18.61	0.004	0.07	0.01	6.79	0.20	89.3	4.25	55.3	241.7	1.18	1.91	0.68	212.5	10.62	12.33	250.7	59.5	10.6	4.6	0.15	2.2	0.36	233
	S	11.02	4.74	0.73	17.32	bdl	0.10	0.04	6.73	0.39	105.0	13.12	65.6	287.9	3.61	4.14	2.62	183.7	22.31	12.88	301.8	52.5	6.6	4.2	0.18	2.0	0.63	194
BAG 114 (468.3)	G	8.07	2.88	0.76	24.70	0.002	0.07	0.12	6.88	0.05	139.4	9.61	72.1	190.0	4.19	1.70	0.17	115.3	8.65	8.76	81.7	52.9	12.0	10.0	0.31	2.6	0.10	301
BAG 115 (498.2)	G	8.33	3.03	0.77	22.93	0.002	0.07	0.13	6.25	0.06	159.0	9.63	62.6	191.1	2.99	1.05	0.11	101.2	5.30	6.68	106.0	53.0	9.2	8.8	0.30	2.9	0.11	272
	S	9.46	3.05	0.73	23.40	bdl	0.12	0.17	5.79	0.05	165.5	23.64	94.6	229.9	7.67	1.42	0.28	47.3	26.00	9.04	94.6	141.8	7.1	8.9	0.28	3.2	0.20	209

Sample (Depth - m)	F ^a	Rare earth elements (µg.g ⁻¹)															Ce ^{*_{pn}}	Eu ^{*_{pn}}	(La/Yb) _{pn} ^c
		La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	ΣREE			
BAG 28 (468.5)	G	1.38	5.90	0.40	1.92	0.48	0.10	0.22	bdl	0.24	0.05	0.08	bdl	0.05	bdl	10.86	1.77	1.46	1.68
	S	12.22	35.12	2.91	11.23	1.65	0.37	1.45	0.20	1.22	0.20	0.59	bdl	0.62	bdl	67.99	1.36	1.14	1.32
BAG 47 (790.2)	G	2.77	9.84	0.73	3.11	0.57	0.14	0.38	0.05	0.40	0.08	0.15	bdl	0.11	bdl	18.36	1.58	1.45	1.79
	S	3.83	13.48	1.13	4.72	0.89	0.21	0.79	0.11	0.57	0.11	0.25	0.03	0.18	0.03	26.33	1.51	1.19	1.56
BAG 83 (435.0)	G	2.39	8.82	0.57	2.29	0.33	0.08	0.17	bdl	0.15	0.03	0.05	bdl	0.04	bdl	14.94	1.73	1.48	2.40
	S	4.86	14.62	1.17	4.34	0.73	0.14	0.56	bdl	0.24	bdl	0.13	bdl	0.21	bdl	27.16	1.44	1.07	9.10
BAG 91 (795.5)	G	12.84	38.05	2.82	11.86	2.38	0.57	1.77	0.25	1.34	0.25	0.53	0.06	0.32	0.05	73.08	1.40	1.30	3.13
	S	15.70	51.13	4.40	17.13	3.21	0.74	2.75	0.38	1.91	0.35	0.80	0.10	0.51	0.07	99.19	1.46	1.18	2.48
BAG 114 (468.3)	G	3.24	13.48	0.94	3.93	0.85	0.18	0.51	0.06	0.39	0.06	0.15	bdl	0.07	bdl	23.90	1.80	1.28	2.67
BAG 115 (498.2)	G	1.44	5.50	0.38	1.57	0.32	bdl	0.11	bdl	0.13	0.03	0.05	bdl	0.05	bdl	9.67	1.71	1.66	1.65
	S	2.68	7.80	0.66	2.10	0.21	0.07	0.21	bdl	0.15	bdl	0.15	bdl	0.13	bdl	14.23	1.45	1.61	4.29

bdl for below detection limit.

^a Fraction: G stands for glauconite grain, S for suspended matter after ultrasonic treatment

^b Elementary ratios in ppm/ppm.

^c Ce^{*_{pn}} and Eu^{*_{pn}} stands for Ce and Eu anomalies, and (La/Yb)_{pn} for the coefficient of fractionation, all calculated from PAAS-normalized REE contents.

Appendix 2 (continued)

Sample	Depth (m)	Rare earth elements ($\mu\text{g}\cdot\text{g}^{-1}$)															$\text{Ce}^*_{\text{pn}}^{\text{b}}$	$\text{Eu}^*_{\text{pn}}^{\text{b}}$	$(\text{La}/\text{Yb})_{\text{pn}}^{\text{b}}$
		La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	ΣREE			
Fraction <2 μm																			
MAR 17297	507	7.89	19.27	2.08	7.80	1.22	0.23	0.91	0.13	0.70	0.14	0.42	0.07	0.45	0.06	41.36	1.13	1.04	1.30
MAR 17306	510	28.61	51.08	5.90	20.63	nd	0.76	2.64	0.42	2.29	0.49	1.30	0.24	1.52	0.24	116.15	0.92	-	1.39
MAR 17341	524	18.82	30.07	3.64	13.05	nd	0.44	1.59	0.25	1.56	0.33	0.95	0.17	1.04	0.16	72.07	0.83	-	1.34
MAR 17376	538	23.71	39.41	4.62	16.07	nd	0.62	2.09	0.35	2.02	0.43	1.19	0.21	1.31	0.20	92.24	0.87	-	1.33
MAR 17430	551	23.81	45.41	5.21	18.36	nd	0.69	2.45	0.40	2.30	0.46	1.33	0.24	1.49	0.23	102.39	0.96	-	1.18
MAR 17494	571	19.79	33.19	3.99	14.32	nd	0.55	2.00	0.32	1.96	0.43	1.19	0.20	1.30	0.19	79.44	0.86	-	1.13
MAR 18818	577	14.48	27.65	3.32	11.97	2.10	0.47	1.58	0.25	1.51	0.33	0.86	0.16	0.98	0.14	65.80	0.94	1.20	1.09
MAR 18858	584	16.32	27.74	3.43	12.16	nd	0.49	1.64	0.28	1.69	0.35	0.95	0.18	1.11	0.17	66.52	0.86	-	1.09
MAR 18870	591	17.72	38.39	3.65	12.86	2.37	0.49	1.77	0.28	1.64	0.34	0.92	0.16	1.03	0.16	81.77	1.11	1.14	1.27
MAR 18891	598	13.40	21.45	2.67	9.50	nd	0.36	1.30	0.22	1.34	0.28	0.78	0.14	0.93	0.14	52.51	0.83	-	1.06
MAR 17502	605	17.61	29.13	3.56	12.74	nd	0.48	1.76	0.29	1.69	0.35	1.01	0.18	1.18	0.18	70.17	0.85	-	1.10
MAR 17521	612	13.79	31.36	2.90	10.36	1.88	0.41	1.44	0.22	1.24	0.26	0.74	0.12	0.77	0.12	65.61	1.15	1.19	1.31
MAR 17543	618	16.43	27.41	3.41	12.11	nd	0.46	1.53	0.26	1.51	0.31	0.91	0.16	1.01	0.15	65.65	0.85	-	1.20
MAR 18970	625	16.06	35.10	3.38	11.70	2.18	0.45	1.60	0.25	1.50	0.34	0.90	0.16	1.00	0.15	74.75	1.12	1.13	1.18
MAR 18986	632	15.53	27.14	3.23	11.51	nd	0.44	1.58	0.26	1.58	0.32	0.93	0.16	1.00	0.17	63.85	0.89	-	1.15
MAR 17576	640	14.94	35.61	3.22	11.99	2.14	0.45	1.62	0.24	1.34	0.28	0.75	0.14	0.84	0.14	73.72	1.18	1.14	1.31
MAR 17581	647	16.27	32.24	3.63	13.44	nd	0.52	1.78	0.29	1.64	0.31	0.97	0.16	1.05	0.16	72.47	0.97	-	1.14
MAR 17602	653	19.09	36.14	3.96	14.25	nd	0.60	1.99	0.30	1.78	0.37	1.04	0.18	1.22	0.18	81.11	0.96	-	1.15
MAR 17588	659	19.23	34.26	4.01	13.91	nd	0.53	1.87	0.29	1.69	0.39	1.16	0.23	1.52	0.24	79.34	0.92	-	0.93
MAR 17622	664	20.64	54.19	5.77	22.64	nd	0.95	3.47	0.51	2.83	0.57	1.61	0.26	1.81	0.28	115.53	1.17	-	0.84
MAR 18926	680	16.33	39.65	4.15	16.16	nd	0.69	2.46	0.37	2.00	0.40	1.04	0.17	0.97	0.15	84.52	1.12	-	1.24
Fraction <0.2-2 μm																			
MAR 17306	510	33.34	65.17	5.02	18.69	3.53	0.76	2.65	0.39	2.21	0.44	1.21	0.21	1.33	0.20	135.18	1.09	1.17	1.84
MAR 17376	538	27.94	51.86	4.20	15.68	3.06	0.64	2.21	0.36	2.01	0.40	1.10	0.20	1.20	0.19	111.03	1.04	1.15	1.71
MAR 17494	571	23.50	42.32	3.60	13.43	2.66	0.56	1.98	0.33	1.90	0.39	1.08	0.18	1.20	0.17	93.30	1.00	1.14	1.45
MAR 18870	591	21.40	36.53	3.12	11.56	2.32	0.50	1.73	0.28	1.63	0.34	0.94	0.17	1.03	0.15	81.72	0.97	1.17	1.53
MAR 18891	598	18.07	31.34	2.69	9.96	1.92	0.40	1.44	0.24	1.39	0.29	0.80	0.15	0.90	0.14	69.72	0.98	1.12	1.49
MAR 18970	625	21.36	38.62	3.20	12.18	2.44	0.55	1.86	0.28	1.68	0.35	0.96	0.16	1.04	0.16	84.84	1.01	1.21	1.52
MAR 17581	647	21.45	42.12	3.32	12.64	2.43	0.53	1.74	0.29	1.69	0.33	0.91	0.17	1.01	0.16	88.79	1.08	1.21	1.57
MAR 17622	664	33.79	95.91	6.57	27.21	5.82	1.24	4.40	0.64	3.59	0.71	1.91	0.34	2.01	0.31	184.45	1.41	1.16	1.24
Fraction <0.2 μm																			
MAR 17306	510	24.61	54.18	4.05	15.00	2.64	0.55	1.83	0.27	1.65	0.34	0.95	0.18	1.05	0.17	107.46	1.20	1.18	1.74
MAR 17376	538	27.11	48.04	3.56	13.05	2.46	0.51	1.84	0.27	1.52	0.31	0.90	0.15	0.96	0.15	100.84	1.04	1.14	2.08
MAR 17494	571	16.24	37.94	2.86	10.55	1.87	0.41	1.33	0.19	1.35	0.28	0.77	0.15	0.90	0.15	74.99	1.24	1.22	1.34
MAR 18870	591	23.91	39.28	3.06	10.83	2.06	0.46	1.55	0.25	1.53	0.31	0.95	0.17	1.09	0.18	85.63	0.99	1.22	1.62
MAR 18891	598	13.43	28.95	2.32	8.45	1.50	0.32	1.05	0.15	1.09	0.22	0.61	0.12	0.79	0.11	59.11	1.16	1.22	1.25
MAR 18970	625	15.67	36.47	2.84	10.16	1.82	0.39	1.28	0.20	1.32	0.25	0.77	0.14	0.89	0.13	72.32	1.24	1.19	1.30
MAR 17581	647	15.96	42.93	3.07	11.69	2.06	0.45	1.37	0.20	1.31	0.26	0.74	0.12	0.83	0.13	81.13	1.38	1.25	1.42
MAR 17622	664	5.27	17.12	1.20	4.74	0.93	0.22	0.64	0.10	0.67	0.14	0.39	0.08	0.47	0.09	32.07	1.55	1.36	0.82

bdl for below detection limit- nd not determined.

^a Elementary ratios in ppm/ppm.

^b Ce^*_{pn} and Eu^*_{pn} stands for Ce and Eu anomalies, and $(\text{La}/\text{Yb})_{\text{pn}}$ for the coefficient of fractionation, all calculated from PAAS-normalized REE contents.