

SUPPLEMENTARY TABLE 2. Chemical analyses of Palaeogene dyke rocks

Dyke Sample	<i>Moneyacres</i>												
	Misty A	Misty B	Murchan A	Murchan B	Maich A	Maich B	Maich C	Maich D	Maich E	MB1	MB2	MB3	MB4
SiO ₂	55.4	54.8			55.1	51.1	55.9	55.8	53.8	55.60	54.18	53.21	54.81
TiO ₂	1.13	1.12			1.15	1.21	1.10	1.08	1.03	1.04	1.06	1.09	1.05
Al ₂ O ₃	14.14	14.17			14.28	14.53	14.52	14.52	14.44	14.32	14.29	14.37	14.30
FeO*	9.87	9.83			9.80	10.93	9.54	9.59	9.53	9.02	9.48	9.60	9.23
MnO	0.22	0.22			0.21	0.24	0.20	0.25	0.26	0.18	0.19	0.20	0.17
MgO	5.81	6.10			5.64	6.96	5.61	5.57	5.75	4.86	5.51	5.71	5.24
CaO	9.00	9.53			8.96	11.33	9.31	9.45	9.76	7.84	8.63	8.84	8.22
Na ₂ O	2.48	2.35			2.58	1.96	2.57	2.60	2.51	2.72	2.52	2.70	2.63
K ₂ O	1.56	1.38			1.51	0.64	1.35	1.29	1.28	1.95	1.50	1.49	1.70
P ₂ O ₅	0.21	0.19			0.20	0.17	0.17	0.17	0.15	0.19	0.18	0.17	0.19
LOI	0.80	0.95			1.27	1.44	0.82	1.01	1.44	1.0	1.1	1.2	1.1
Total	100.62	100.64			100.70	100.51	101.09	101.33	99.95	98.72	98.64	98.58	98.64
Cr	172	145	190	169	138	188	177	174	161				
Ni	54	44	71	50	48	71	49	57	62	52	63	65	61
Rb	40	38	14	40	38	16	38	37	38	55	42	40	47
Sr	184	194	161	188	182	160	163	170	171	213	198	206	199
Ce	62	44	28	56	44	29	53	54	55	53	48	44	50
Nb	10	8	4	10	9	5	8	9	9	9.8	8.0	7.6	8.5
Y	41	35	33	38	36	35	38	39	39	36	36	33	35
Zr	162	151	93	162	157	96	151	150	149	211	179	166	184

Sample localities are given in Supplementary Document 1. FeO* is total Fe as FeO. The table includes analyses from Table 1.

MB5	MB6	MB7	L'head A	L'head B	Middlet'A	E.MoneyA	E.Money1	E.Money2	E.Money3	E.Money4	E.Money5	E.Money6	Newmill A
55.84	55.90	55.73	51.0	51.1		50.5				55.3			52.0
1.04	1.04	1.05	1.14	1.18		1.26				1.05			1.16
14.33	14.21	14.21	14.82	14.90		16.14				14.72			14.52
8.94	8.93	8.96	10.79	10.72		11.63				9.69			10.20
0.18	0.16	0.19	0.27	0.34		0.30				0.27			0.34
4.82	4.70	4.85	6.95	7.01		6.29				5.94			7.13
7.66	7.52	7.67	11.48	11.09		9.90				9.05			11.14
2.70	2.87	2.72	1.96	1.91		2.23				2.41			1.85
1.98	2.01	1.95	0.88	0.98		0.72				1.40			0.65
0.20	0.20	0.19	0.14	0.15		0.16				0.16			0.18
1.0	1.1	1.2	0.77	1.14		1.17				0.66			1.38
98.69	98.64	98.72	100.20	100.52		100.30				100.65			100.55
			209	210	241	248	204	167	181	177	175	168	202
52	52	59	69	71	74	79	70	48	55	79	57	54	70
55	54	54	20	19	18	18	18	40	41	38	39	37	16
208	207	199	148	184	160	170	156	170	166	164	167	173	154
56	54	55	29	29	37	35	36	43	54	45	51	65	44
10.1	9.5	10.0	4	5	5	8	6	10	7	8	8	8	6
35	34	35	31	32	30	30	37	38	36	38	37	38	34
205	203	209	89	88	107	129	99	154	147	149	157	162	101

Newmill B Blair A Pogiven A Pogiven B Pogiven C Pogiven D Pogiven E Drumc'g A Drumc'g B Nutberry2A NutberryA NutberryB NutberryC Nutberry D

53.5	52.3
1.13	1.14
14.82	14.61
10.02	10.55
0.30	0.24
6.23	6.63
10.17	10.71
2.25	2.09
1.03	0.97
0.17	0.16
99.62	99.40

155	183	184	155	182	187	176	177	178	187	180	183	194	195
56	52	58	60	63	57	65	57	54	51	49	60	61	54
30	41	28	35	53	32	44	43	41	31	33	32	35	35
172	170	167	179	185	175	176	181	184	154	157	177	161	159
40	50	38	50	39	51	59	40	46	45	47	40	45	42
9	10	7	7	7	8	9	7	8	8	8	8	8	7
36	38	36	35	35	38	38	37	36	35	37	36	35	33
139	149	126	146	141	149	150	140	142	136	144	129	141	133

							Hawick-Acklington					
Nutberry E	Nethan A	WindrowB	WindrowX	WindrowY	Mossy Dod	Midge Hill	KneesendE	Pedirie N	St Mary	Whiteh'gA	Whiteh'gB	DeanfordA
							55.9		55.0			
							1.26		1.20			
							14.15		14.15			
							11.26		10.55			
							0.22		0.22			
							4.99		5.20			
							8.36		7.68			
							2.68		2.66			
							1.35		1.37			
							0.14		0.13			
							0.91		1.42			
							101.22		99.58			
190	201	201	180	179	210	195	14	11	9	14	14	14
66	74	65	64	51	73	89	8	8	5	8	7	10
26	26	31	36	31	15	15	39	54	44	42	44	43
175	161	160	164	161	164	127	195	197	203	212	212	211
37	35	38	45	38	32	40	30	51	49	55	45	45
8	9	6	7	7	3	4	7	7	8	6	10	9
35	35	37	37	34	28	26	36	38	36	37	35	35
121	121	135	145	127	97	90	129	126	122	121	121	120

DeanfordB	KirktonNC	Kirkton 2	Kirkton 3	KirktonSC	B'plant A	RoughleeA	Rink NC	HS1	HS2	F'hopeNC	Newton A	RothburyA
	55.5		54.4					53.20	54.08	55.3	55.5	53.4
	1.32		1.23					1.24	1.19	1.30	1.33	1.21
	14.60		14.01					14.02	14.06	14.10	14.71	14.00
	10.92		10.43					10.70	10.35	11.14	10.92	10.57
	0.13		0.23					0.15	0.17	0.17	0.16	0.23
	4.68		4.68					4.96	4.73	5.38	4.33	4.92
	8.26		8.02					7.87	8.10	8.01	8.31	8.64
	2.74		2.76					2.54	2.56	2.62	2.78	2.70
	1.39		1.37					1.42	1.40	1.46	1.43	1.59
	0.18		0.14					0.13	0.13	0.17	0.18	0.17
	0.65		1.97					2.30	1.80			1.07
	100.37		99.24					98.53	98.57	99.65	99.65	98.50
15	13	8	9	12	12	11	13			13	12	15
6	13	8	6	6	8	5	8	75	57	8	10	8
46	41	42	44	42	41	49	41	45	46	42	43	80
209	213	219	209	220	214	214	231	240	235	226	225	335
50	45	28	47	54	45	43	42	44	42	49	40	45
7	8	7	6	7	8	7	7	7.0	6.9	7	8	8
37	39	37	38	38	35	35	34	32	32	36	36	36
123	121	119	122	123	118	120	124	128	131	124	123	117

Barrmill-Hartfell

Barrmill		Andershaw				The Kame				Boghouse			Shield
BRM4	BRM6	BMN1	BMN2	BMN3	BMN4	BMN5	BMN6	BMN7	BMN8	BMN9	BMN10	BMN11	
42.79	56.48	55.88	56.34	52.61	55.11	55.48	51.63	50.26	53.19	56.06	56.25	55.26	
1.53	1.07	1.16	1.12	1.21	1.16	1.18	1.19	1.30	1.24	1.15	1.12	1.17	
15.52	13.46	14.05	13.52	13.74	13.75	14.03	13.68	14.36	14.08	13.72	13.61	13.58	
12.53	8.44	8.55	8.76	9.90	8.76	8.94	9.79	10.33	10.12	9.45	9.07	9.66	
0.17	0.15	0.13	0.14	0.16	0.14	0.14	0.17	0.15	0.18	0.15	0.16	0.16	
4.16	5.11	5.10	5.05	5.59	4.96	5.20	6.19	5.78	5.91	5.15	5.13	5.41	
12.32	7.49	7.25	8.47	10.15	8.58	8.69	9.82	10.96	9.74	8.03	8.40	9.21	
2.58	2.42	2.46	2.40	2.33	2.51	2.39	2.44	2.33	2.45	2.57	2.56	2.32	
0.38	2.04	1.94	1.92	1.13	1.68	1.68	1.10	0.82	1.16	1.91	1.65	1.43	
0.18	0.19	0.19	0.18	0.17	0.19	0.18	0.18	0.17	0.18	0.18	0.17	0.18	
6.20	1.90	2.04	1.88	1.32	2.39	1.18	1.97	2.87	1.10	1.45	1.33	1.26	
98.36	98.75	98.75	99.78	98.31	99.23	99.09	98.16	99.33	99.35	99.82	99.45	99.64	
		151	136	173	162	158	174	180	164	147	156	153	
75	57	35	37	50	45	47	49	55	46	38	41	41	
11	69	66	66	32	57	56	31	24	41	82	61	51	
313	207	256	234	237	252	237	244	244	206	188	220	212	
32	54	51	58	33	57	38	32	34	39	39	55	48	
6.0	8.8	8	8.5	7	7	7.5	7	6.5	7	8	8	7.5	
36	35	46	39	37	40	37	27	29	28	39	39	40	
104	196	171	172	134	164	152	132	121	132	161	169	156	

Dalraith

Dalsraith			Bowhills			Dalwhatswood		
A	B	C	A	C	Ea	A	C	E
57.4	53.5	55.4					57.9	
1.22	1.16	1.28					1.21	
14.28	13.01	14.08					13.97	
10.38	10.23	11.62					10.48	
0.18	0.17	0.19					0.28	
4.27	4.35	4.98					4.40	
7.37	7.24	8.35					7.25	
2.77	2.75	2.69					2.74	
1.79	1.82	1.41					1.77	
0.20	0.18	0.19					0.16	
0.96	3.77	0.84					0.98	
100.82	98.18	101.03					101.14	

Linburn

Linburn		rhc	Muirkirk JM No.2
A	B		
55.2	57.0		57.0
1.35	1.20		1.22
14.84	14.01		14.03
10.75	10.47		10.72
0.21	0.20		0.22
5.40	4.47		4.48
7.45	7.81		5.65
2.59	2.78		2.75
1.44	1.76		3.58
0.19	0.19		0.18
	1.01		
99.42	100.90		99.83

11	10	9	9	10	9	9	12	14	12	9	9	10
8	10	9	3	8	8	6	9	16	10	10	10	8
54	56	41	50	51	39	47	51	41	41	51	54	78
224	213	223	196	198	204	205	193	218	211	208	204	232
50	49	38	41	58	35	39	48	27	45	46	52	55
8	8	7	6	8	7	9	8	7	8	9	9	9
38	38	33	37	37	36	40	41	38	35	38	40	37
151	147	117	156	159	125	155	160	136	123	143	148	145

Eskdalemuir

ESK-1	ESK-4	ESK-3	ESK-2	ESK-5	ESK-6	ESK-7	Brown Dod	Hawkwood	Breconside	Glengap	Kirkhill	CastleH 2E
49.50	52.00	55.46	57.83	59.14	56.83	51.25	61.60		61.4	59.6		59.30
0.94	0.95	0.89	0.85	0.83	0.90	0.97	0.86		0.82	0.91		0.92
14.78	14.63	13.95	13.48	13.44	14.18	14.70	13.46		13.64	14.07		13.97
9.92	9.06	8.44	8.00	7.50	7.92	9.54	7.60		7.61	8.14		8.33
0.15	0.16	0.15	0.13	0.13	0.13	0.16	0.18		0.16			0.20
7.25	6.29	5.09	4.55	4.02	4.59	6.49	4.40		4.74	4.86		4.71
10.18	9.63	8.79	6.95	7.05	7.44	10.17	6.40		5.95	6.18		7.87
2.62	2.09	2.11	2.39	2.21	2.12	2.11	2.33		2.07	2.11		2.36
0.81	1.13	1.69	2.51	2.23	2.01	1.01	2.61		2.76	2.91		1.40
0.10	0.12	0.14	0.15	0.13	0.15	0.12	0.18		0.16	0.14		0.18
2.3	2.5	2.0	2.0	2.2	2.5	2.1				1.13		1.23
98.55	98.56	98.71	98.84	98.88	98.77	98.62	99.62		99.31	100.05		100.47
301	239	205	171	157	178	239	155	159	166	157	139	150
55	43	38	27		34	46	30	31	23	28	25	32
34	47	63	112	81	77	41	81	88	84	95	93	77
192	188	172	194	167	175	180	133	131	136	140	134	152
28.5	38.5	48.2	56.1	59.9	57	34.7	66	61	64	56	68	70
5.3	7.0	8.5	9.9	9.9	9.5	6.0	11	11	10	9	12	10
30	34	35	37	34	38	32	44	45	42	39	44	40
104	133	164	192	207	196	120	192	195	184	156	192	167

Stevenson-Coylton

Toothope	Bankh'd A	Bankh'd D	Bankh'd F	Bankh'd G	Bankh'd H	Burnfoot 1	Castle Hill	Drumm 1A	Drumm 1B	Irvine 1	Irvine 2	Irvine 3
60.80	51.8	53.1	60.4	60.4		60.5	52.0	59.0	60.3			
0.85	0.98	0.99	0.9	0.86		0.89	1.00	0.86	0.83			
13.74	14.91	14.61	14.03	13.66		13.68	14.81	15.10	15.67			
7.77	10.09	10.12	7.89	7.85		7.89	9.90	7.80	7.14			
0.20	0.19	0.23	0.15	0.20		0.16	0.20	0.16	0.14			
4.36	7.45	6.54	4.54	3.98		4.41	7.41	4.65	4.16			
6.83	11.07	11.14	7.72	7.34		7.50	11.21	7.97	7.09			
2.06	1.62	1.17	2.11	2.29		2.43	1.75	2.44	2.62			
2.47	0.89	0.84	1.33	1.53		1.79	0.87	1.85	1.72			
0.17	0.14	0.11	0.15	0.15		0.18	0.14	0.19	0.16			
0.97	0.86	1.64	0.44	1.33		2.21	0.88	1.01	1.02			
100.22	100.00	100.49	99.66	99.59		101.64	100.17	101.03	100.85			
168	257	210	159	161	172	161	229	149	115	240	196	176
31	38	42	29	30	32	28	48	22	19	22	19	15
76	29	26	85	86	61	77	29	52	83	58	64	58
148	146	149	150	142	185	143	157	213	235	288	244	226
60	28	44	59	67	57	59	36	58	63	57	42	52
9	5	6	10	12	10	10	6	9	11	9	9	8
43	33	32	40	41	38	41	31	33	36	36	30	28
182	77	84	172	185	164	181	78	163	184	135	161	146

												Cleveland (fresh sam		
Irvine 4	Stinking5A	Stinking5B	BAR1	BAR2	BAR3	R.Ayr 6	Old Polqu.	Dalgig 32	Lagrae 33	Vennel34B	Petteril M.	Eden 10D		
	57.3	60.8	56.22	59.60	59.73	60.1		57.6		57.3			58.8	58.7
	0.80	0.83	0.82	0.80	0.78	0.84		0.80		0.77			1.20	1.20
	16.33	15.03	14.73	14.19	14.19	15.64		15.25		16.16			13.83	13.82
	7.76	7.24	8.10	7.07	6.89	7.31		7.43		7.09			9.97	9.80
	0.23	0.14	0.18	0.11	0.11	0.12		0.13		0.15			0.20	0.16
	5.23	3.92	5.38	4.05	4.05	4.03		3.88		4.08			3.81	3.92
	8.31	6.67	7.23	6.12	6.06	6.74		8.07		8.35			6.17	6.74
	2.52	2.64	2.54	2.66	2.64	2.62		2.66		2.62			2.31	2.36
	1.62	2.4	1.82	2.54	2.48	2.69		2.10		1.88			2.54	2.11
	0.16	0.16	0.14	0.17	0.16	0.17		0.14		0.13			0.23	0.22
	1.35	0.99	1.6	1.6	1.8	1.54		1.92		1.96			0.99	1.52
	101.61	100.82	98.76	98.91	98.89	101.80		99.98		100.49			100.05	100.55
222	204	149				172	154	154	175	148			37	45
21	24	23	32	34	33	20	13	12	9	13			12	21
63	51	73	57	78	77	74	40	59	53	53			70	58
278	203	180	199	178	177	205	213	195	190	191			205	225
62	48	60	50	64	63	66	60	49	57	60			42	58
8	8	11	8.2	9.9	9.9	10	9	9	11	9			10	10
37	31	38	28	32	31	39	28	29	28	29			41	42
131	132	192	168	222	215	180	147	161	145	153			172	180

amples)
 Eden 10E Whin11C Whin11D Whin11E Loo Gill Ethers15C Ethers15D Woolly18A Woolly18B Hagg19B Bolam top Bolam 2m Legs Cr. Cliff R.24D

58.5	58.7			58.5	57.3		58.7		58.5	59.7	58.6	59.3
1.20	1.24			1.15	1.16		1.17		1.20	1.19	1.16	1.18
13.96	13.94			13.69	13.83		13.99		13.88	14.00	13.76	13.75
9.57	9.50			9.29	9.41		9.57		9.84	9.56	9.46	9.60
0.14	0.13			0.18	0.23		0.23		0.22	0.17	0.16	0.20
4.05	4.50			3.93	3.85		4.25		3.97	4.34	4.06	4.33
6.71	6.96			6.93	7.17		6.50		6.57	6.24	6.24	6.35
2.88	2.33			2.08	1.91		1.93		2.16	1.95	2.03	2.18
2.07	1.82			2.08	2.33		2.50		2.74	2.23	2.40	2.11
0.22	0.20			0.2	0.19		0.23		0.21	0.22	0.20	0.22
1.37				1.66	1.85					1.41	2.22	1.77
100.67	99.32			99.69	99.23		99.07		99.29	101.01	100.29	100.99

55	42	40	44	40	44	41	44	40	40	40	46	31	43
22	19	20	15	22	19	19	23	21	20	19	21	17	27
61	45	54	61	140	63	65	82	86	86	62	66	59	57
167	246	220	233	223	233	235	217	232	200	196	200	215	220
60	59	56	67	56	60	50	57	57	55	59	52	64	59
9	10	11	11	10	11	9	11	11	10	11	10	10	10
42	41	41	41	42	43	44	45	46	44	45	42	46	46
186	198	181	183	179	180	182	183	186	179	183	183	189	188

				Cleveland (altered chill samples)			
Cliff R.24F	Cliff R.24G	Egton F	Bleahill	Whinfell A	Hagger A	CliffRid. R1	Pickering
59.4		58.9	58.9		58.6		68.3
1.20		1.21	1.20		1.21		1.57
14.23		14.15	13.84		13.94		17.62
9.45		10.75	9.84		10.05		4.49
0.17		0.17	0.15		0.16		0.02
3.73		3.81	3.69		4.16		0.6
6.82		5.94	7.74		7.05		0.37
2.08		2.11	2.20		2.25		1.42
2.03		1.63	1.85		1.63		0.03
0.22		0.21	0.23		0.22		0.26
1.12		1.99	0.93		1.89		5.17
100.45		100.87	100.57		101.16		99.85
45	36	38	42	61	60	77	76
24	30	38	21	19	36	57	27
57	53	48	48	136	79	30	3
212	197	212	244	61	242	185	18
60	54	56	57	79	70	127	101
11	9	9	10	15	12	13	12
45	45	45	41	68	42	72	50
188	175	168	173	267	224	251	241

