APPENDIX

Results of incremental crush analysis of vein samples from localities within the Moine, Dalradian and Old Red Sandstone*.

	Number of crushes	Gas / gas ratio	Average mol% or ratio	Min mol % or ratio	Max mol % or ratio
MOINE LOCH EIL GROUP					
Strathglass	10	H_2O	92.42	86.09	96.42
		CO_2	7.441	3.483	13.73
		CH_4	0.0323	0.0145	0.0462
		N_2	0.0675	0	0.1455
		Ar	0.0008	0.0005	0.0013
		CO_2/CH_4	235.2	125.8	407.5
		N_2/Ar	97.04	0	304.3
Loch Ness	8	H_2O	91.84	86.66	95.54
		CO_2	7.210	3.888	12.80
		CH_4	0.0263	0.0053	0.1615
		N_2	0.8514	0.4763	2.601
		Ar	0.0014	0.0007	0.0032
		CO_2/CH_4	976.4	38.1	1998
		N_2/Ar	610.0	380.8	901.1
MOINE GLENFINNAN GROUP					
River Callop	6	H_2O	98.95	98.66	99.18
		CO_2	0.7433	0.5999	1.0260
		CH_4	0.1540	0.0906	0.2079
		N_2	0.1218	0.0701	0.1642
		Ar	0.0016	0.0014	0.0019
		CO_2/CH_4	5.1160	3.4930	6.7740
		N_2/Ar	79.14	37.23	105.2
Struy	6	H_2O	94.65	92.61	95.70
		CO_2	3.491	2.376	4.905
		CH_4	0.1214	0.0922	0.1457
		N_2	1.692	1.219	2.277
		Ar	0.0016	0.0013	0.0019
		CO_2/CH_4	29.35	18.20	38.10
		N_2/Ar	1077.5	794.7	1602
Pollcherian Bridge	6	H_2O	93.39	91.94	94.09
		CO_2	4.516	3.481	5.267
		CH_4	0.0921	0.0616	0.1517
		N_2	1.979	1.271	2.713
		Ar	0.0024	0.0021	0.0030
		CO_2/CH_4	54.95	27.20	76.00
		N_2/Ar	837.1	589.7	1048
GSF quartz-graphite vein	7	H_2O	91.97	88.69	96.57
		CO_2	4.784	2.017	6.528
		CH_4	0.1364	0.0673	0.2556
		N_2	3.054	1.336	5.655
		Ar	0.0045	0.0019	0.0074
		CO_2/CH_4	37.57	21.00	49.70

		N_2/Ar	693.0	531.6	872.4
	Number of crushes	**Gas / gas ratio**	**Average mol% or ratio**	**Min mol % or ratio**	**Max mol % or ratio**
MOINE MORAR GROUP					
Kinlochewe (1)	7	H_2O	99.14	98.80	99.50
		CO_2	0.8064	0.4493	1.140
		CH_4	0.0043	0.0026	0.0058
		N_2	0.0371	0.0211	0.0516
		Ar	0.0008	0.0004	0.0011
		CO_2/CH_4	188.9	143.0	222.9
		N_2/Ar	52.17	18.90	83.00
Kinlochewe (2)	8	H_2O	99.39	99.20	99.60
		CO_2	0.3186	0.1796	0.5458
		CH_4	0.0277	0.0125	0.0418
		N_2	0.2306	0.1723	0.3055
		Ar	0.0013	0.0002	0.0025
		CO_2/CH_4	15.04	5.400	38.10
		N_2/Ar	310.9	120.1	875.8
Basal pelite	8	H_2O	97.86	96.91	98.66
		CO_2	1.212	0.4653	1.812
		CH_4	0.7152	0.5767	0.9001
		N_2	0.1802	0.0668	0.3461
		Ar	0.0018	0.0013	0.0022
		CO_2/CH_4	1.707	0.7933	2.800
		N_2/Ar	100.4	47.49	158.0
DALRADIAN					
Portsoy - vein in graphitic schist	6	H_2O	89.71	86.70	93.31
		CO_2	5.238	1.284	8.493
		CH_4	0.751	0.582	1.132
		N_2	4.167	3.452	5.282
		Ar	0.0018	0.0014	0.0025
		CO_2/CH_4	7.741	1.134	12.66
		N_2/Ar	2384	2037	3147
Portsoy - vein in staurolite schist	8	H_2O	93.74	92.78	94.55
		CO_2	3.537	2.993	4.227
		CH_4	1.160	0.9972	1.525
		N_2	1.528	1.157	2.353
		Ar	0.0017	0.0013	0.0025
		CO_2/CH_4	3.099	2.168	3.746
		N_2/Ar	880.101	698.587	1058
Sandend	8	H_2O	84.28	79.98	91.69
		CO_2	8.050	4.416	11.26
		CH_4	0.9989	0.7145	1.448
		N_2	6.593	3.125	9.846
		Ar	0.0065	0.0030	0.0091
		CO_2/CH_4	8.487	4.022	15.76
		N_2/Ar	1021	846.8	1321

	Number of crushes	Gas / gas ratio	Average mol% or ratio	Min mol % or ratio	Max mol % or ratio
Cullen quartzite (1)	11	H_2O	79.22	70.44	87.71
		CO_2	15.83	7.817	23.88
		CH_4	0.0998	0.0468	0.2154
		N_2	4.618	1.721	6.229
		Ar	0.0190	0.0031	0.0280
		CO_2/CH_4	187.9	36.29	363.4
		N_2/Ar	345.1	105.3	1205
Cullen quartzite (2)	10	H_2O	77.32	71.27	84.67
		CO_2	21.76	14.55	27.78
		CH_4	0.0264	0.0172	0.0450
		N_2	0.8044	0.3793	1.262
		Ar	0.0016	0.0013	0.0021
		CO_2/CH_4	869.7	463.6	1319
		N_2/Ar	490.0	267.1	719.3
OLD RED SANDSTONE					
Spittal (1)	7	H_2O	99.57	99.46	99.66
		CO_2	0.3133	0.2442	0.3853
		CH_4	0.0089	0.0051	0.0150
		N_2	0.0755	0.0606	0.0898
		Ar	0.0022	0.0014	0.0027
		CO_2/CH_4	39.44	19.66	47.75
		N_2/Ar	35.79	28.55	42.71
Spittal (2)	6	H_2O	99.78	99.62	99.96
		CO_2	0.1052	0.0132	0.1940
		CH_4	0.0142	0.0078	0.0196
		N_2	0.0665	0.0118	0.1283
		Ar	0.0017	0.0002	0.0031
		CO_2/CH_4	7.347	1.690	15.10
		N_2/Ar	44.87	21.54	64.65
Wick South Head	8	H_2O	81.18	76.03	84.60
		CO_2	2.034	1.319	2.712
		CH_4	15.67	12.94	19.87
		N_2	0.8721	0.6517	1.108
		Ar	0.0037	0.0025	0.00
		CO_2/CH_4	0.1305	0.1019	0.1848
		N_2/Ar	241.9	191.1	369.0
Castletown Harbour	7	H_2O	99.50	99.28	99.72
		CO_2	0.3621	0.2261	0.5049
		CH_4	0.0101	0.0089	0.0123
		N_2	0.1014	0.0165	0.1873
		Ar	0.0027	0.0018	0.0047
		CO_2/CH_4	35.86	22.27	53.37
		N_2/Ar	34.66	9.051	57.93

* Selected gas data only. Full results showing analysis of H_2, He, H_2S, SO_2, C_2H_4, C_2H_6, C_3H_6, C_3H_8, C_4H_8, C_4H_{10} and benzene are available on request.