

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

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CHEMICAL ANALYSES OF IGNEOUS ROCKS
FROM J. SEIGAL AND HEDLEYS CREEK 1:100 000 SHEET AREAS,
NORTHERN TERRITORY AND QUEENSLAND

compiled by

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ABSTRACT

Tables of chemical analyses are presented for the Cliffdale Volcanics (36 samples), dyke rocks (10, of which most cut the Cliffdale Volcanics), xenoliths in the Nicholson Granite Complex (4), the Nicholson Granite Complex (25), and the Peters Creek Volcanics (14).

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INTRODUCTION

The tables in this Report present all the chemical analyses carried out on igneous rocks from the Seigal and Hedleys Creek 1:100 000 Sheet areas as a result of detailed studies by BMR and the Geological Survey of Queensland (GSQ) in 1972-74. In all, 89 analyses are presented - 36 of the Cliffdale Volcanics, 25 of the Nicholson Granite Complex, four of xenoliths, 10 of dyke rocks, and 14 of the Peters Creek Volcanics. These units are described by Sweet, Mock, & Mitchell (1981), and the geochemistry of the Nicholson Granite Complex is discussed by Gardner (1978). All the analyses were carried out by The Australian Mineral Development Laboratories.

REFERENCES

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- SWEET, I.P., MOCK, C.M., & MITCHELL, J.E., 1981 - Seigal, Northern Territory, and Hedleys Creek, Queensland - 1:100 000 Geological Map Commentary. Bureau of Mineral Resources, Australia.

TABLE 1. MAJOR AND TRACE-ELEMENT ANALYSES,
AND CIFW NORMS - CLIFFDALE VOLCANICS

Rock unit	Ecc ₁	Ecc ₁	Ecc ₂	Ecc ₂	Ecc ₃	Ecc ₃
Registered no.	74760038	74760039	74760040	74760041	74760042	74760043
SiO ₂	69.00	66.35	78.66	73.44	67.50	71.09
TiO ₂	0.49	0.45	0.07	0.10	0.41	0.22
Al ₂ O ₃	14.11	15.09	11.94	13.56	15.67	14.49
Fe ₂ O ₃	1.66	1.17	1.38	1.46	1.20	0.83
FeO	2.15	2.55	0.15	0.30	2.35	1.45
MnO	0.12	0.06	0.01	0.02	0.05	0.03
MgO	0.46	1.23	0.46	0.67	0.95	0.67
CaO	1.77	2.57	0.03	0.69	2.84	1.87
Na ₂ O	2.50	2.58	0.18	2.30	2.88	2.35
K ₂ O	6.01	4.62	5.50	5.37	4.47	5.11
P ₂ O ₅	0.11	0.12	n.d.	n.d.	0.11	n.d.
H ₂ O ⁺	0.89	1.92	1.40	1.11	1.11	1.20
H ₂ O ⁻	0.01	0.04	0.02	0.01	0.01	0.02
Total	99.28	98.74	99.80	99.03	99.55	99.33
Quartz	26.84	26.11	56.74	37.84	25.62	32.73
Corundum	0.55	1.51	5.73	2.77	1.22	1.73
Orthoclase	36.09	28.20	33.03	32.40	26.83	30.77
Albite	21.49	22.54	1.55	19.87	24.75	20.26
Anorthite	8.19	12.36	0.15	3.50	13.58	9.45
Diopside	-	-	-	-	-	-
Hypersthene	3.19	6.35	1.16	1.70	5.19	3.40
Magnetite	2.45	1.75	0.32	0.76	1.77	1.23
Hematite	-	-	1.18	0.97	-	-
Ilmenite	0.95	0.88	0.14	0.19	0.79	0.43
Apatite	0.27	0.29	-	-	0.26	-
Ba	1150	1300	420	1100	1150	1150
Ce	140	130	70	110	130	140
Mo	n.d.	n.d.	n.d.	4	n.d.	n.d.
Nb	10	10	20	10	10	10
Pb	38	32	24	20	34	26
Rb	240	195	350	210	175	200
Sn	6	6	24	n.d.	n.d.	n.d.
Sr	110	270	34	115	300	210
Th	24	20	28	16	18	20
U	8	4	8	n.d.	6	4
W	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Y	45	25	40	25	20	25
Zr	330	270	115	125	230	220
Bi	n.d.	n.d.	n.d.	n.d.	n.d.	4
Co	n.d.	8	n.d.	n.d.	10	5
Cu	12	10	5	2	5	2
Li	27	33	28	20	33	20
Ni	n.d.	5	n.d.	5	5	5
Zn	95	55	15	15	50	40

TABLE 1 (continued)

Rock unit	Ecc ₄	Ecc ₄	Ecc ₄	Ecc ₄	Ecc _{4a}	Ecc _{4a}	Ecc _{4a}	Ecc _{4b}
Registered no.	73760913	73761208	73761209	72762037	73761236	73761252	73760826	74760037
SiO ₂	74.61	56.16	66.11	76.08	74.57	69.71	69.13	69.21
TiO ₂	0.14	0.85	0.43	0.18	0.09	0.26	0.25	0.45
Al ₂ O ₃	12.33	15.47	15.16	12.10	13.13	15.32	15.46	13.72
Fe ₂ O ₃	1.13	3.89	1.07	1.21	0.41	1.46	2.15	1.67
FeO	0.89	2.95	2.88	0.25	0.75	1.10	0.76	2.55
MnO	0.04	0.12	0.06	0.01	0.02	0.03	0.04	0.06
MgO	0.32	4.87	1.81	0.39	0.20	0.71	0.36	0.39
CaO	0.65	5.10	1.68	0.05	1.17	0.59	1.40	1.84
Na ₂ O	2.62	2.41	2.80	0.28	4.68	3.47	3.24	3.50
K ₂ O	5.55	3.47	5.05	8.03	3.11	5.31	6.07	4.67
P ₂ O ₅	n.d.	0.20	0.10	n.d.	n.d.	0.06	0.05	0.09
H ₂ O ⁺	0.74	2.70	1.84	1.20	0.46	0.99	0.66	1.06
H ₂ O ⁻	0.06	0.12	0.08	0.10	0.05	0.15	0.06	0.10
Total	99.10	98.29	98.99	99.88	98.65	99.17	99.62	99.31
Quartz		11.95	23.52	43.66	32.89	27.41		26.12
Corundum		-	2.34	2.90	-	3.00		-
Orthoclase		21.47	30.74	48.13	18.72	21.01		28.11
Albite		21.35	24.40	2.40	40.34	29.94		30.16
Anorthite		22.15	7.91	0.25	5.75	2.59		8.09
Diopside		2.34	-	-	0.14	-		0.52
Hypersthene		12.67	8.41	0.98	1.38	2.25		3.44
Magnetite		5.91	1.60	0.32	0.61	2.16		2.47
Hematite		-	-	1.01	-	-		-
Ilmenite		1.69	0.84	0.35	0.17	0.50		0.87
Apatite		0.50	0.24	-	-	0.15		0.22
Ba	170						1050	1400
Ce	100						70	140
Mo	10						10	6
Nb	25						10	10
Pb	14						30	22
Rb	310						230	210
Sn	4						4	6
Sr	50						270	220
Th	44						22	20
U	44						4	6
W	10						10	n.d.
Y	65						25	30
Zr	170						290	320
Bi	8						8	n.d.
Co	5						5	n.d.
Cu	3						3	8
Li	3						7	33
Ni	n.d.						n.d.	n.d.
Zn	n.d.						n.d.	65

TABLE 1 (continued)

Rock unit	Ecc _{4d}	Ecc _{4d}	Ecc _{4d}	Ecc _{4d}	Ecc _{4d}	Ecc _{4d}	Ecc _{4d}	Ecc _{4d}	Ecc _{4d}
Registered no.	74760802	74760817	74760915	73761218	73761224	73761225	73761246	73761248	73762017
SiO ₂	59.59	64.94	63.58	58.06	61.26	66.02	69.01	72.31	66.17
TiO ₂	0.58	0.51	0.79	0.85	0.64	0.43	0.28	0.16	0.31
Al ₂ O ₃	13.00	16.54	15.62	15.89	16.63	15.24	15.89	14.86	17.01
Fe ₂ O ₃	1.35	1.92	2.54	4.07	1.75	1.73	2.63	0.86	0.83
FeO	4.26	2.45	2.97	3.85	3.35	2.25	0.20	0.90	2.15
MnO	0.08	0.06	0.08	0.09	0.08	0.06	0.02	0.02	0.06
MgO	5.60	1.18	1.69	3.10	2.03	1.29	0.34	0.49	0.76
CaO	5.06	2.97	2.81	5.25	4.16	3.58	2.41	1.04	3.02
Na ₂ O	2.06	3.10	3.30	2.83	3.60	3.20	3.78	3.83	3.97
K ₂ O	4.52	4.74	3.83	3.52	3.58	3.93	4.63	4.39	3.91
P ₂ O ₅	0.32	0.12	0.22	0.21	0.15	0.14	n.d.	n.d.	0.07
H ₂ O ⁺	2.44	0.79	1.61	1.74	1.45	0.96	0.48	0.76	1.42
H ₂ O ⁻	0.18	0.05	0.05	0.14	0.07	0.06	0.04	0.06	0.02
Total	99.05	99.37	99.10	99.60	98.75	98.89	99.70	99.68	99.71
Quartz	11.52	19.99	20.80	12.99	14.00	22.98	23.85	30.31	19.77
Corundum	-	1.20	1.46	-	-	-	0.28	1.94	0.94
Orthoclase	26.72	28.02	22.64	21.28	21.75	23.72	27.58	26.24	23.51
Albite	17.43	26.23	27.92	24.49	31.31	27.65	32.23	21.77	34.17
Anorthite	12.88	13.95	12.50	20.74	19.18	15.96	12.05	5.22	14.78
Diopside	8.17	-	-	3.61	0.85	1.02	-	-	-
Hypersthene	15.91	5.12	6.41	8.70	8.69	4.93	0.85	1.96	4.84
Magnetite	1.96	2.78	3.68	6.04	2.61	2.56	-	1.26	1.22
Hematite	-	-	-	-	-	-	2.65	-	-
Ilmenite	1.10	0.97	1.50	1.65	1.25	0.83	0.47	0.31	0.60
Apatite	0.75	0.28	0.52	0.51	0.37	0.34	-	-	0.17
Ba	1400	1150	1350						
Ce	100	100	130						
Mo	10	10	10						
Nb	15	10	15						
Pb	28	28	22						
Rb	220	185	130						
Sn	4	4	4						
Sr	340	340	260						
Th	24	12	14						
U	8	4	14						
W	10	10	10						
Y	20	25	35						
Zr	220	380	300						
Bi	8	8	10						
Co	28	14	16						
Cu	41	14	13						
Li	21	15	14						
Ni	120	n.d.	n.d.						
Zn	n.a.	n.a.	n.a.						

TABLE 1 (continued)

Rock unit	Pcc _{4d}	Pcc ₅	Pcc ₅	Pcc ₅	Pcc ₅	Pcc ₅	Pcc ₅
Registered no.	74760828	73761214	72762028	72762029	74760836	74760845	74760869
SiO ₂	65.53	73.12	78.09	74.39	74.66	73.67	73.35
TiO ₂	0.61	0.13	0.13	0.20	0.18	0.14	0.13
Al ₂ O ₃	15.85	12.45	10.67	13.10	12.73	13.31	13.41
Fe ₂ O ₃	2.34	1.80	0.35	1.75	1.62	0.79	1.29
FeO	2.52	0.80	0.20	0.45	0.52	1.48	1.07
MnO	0.07	0.06	0.06	0.02	0.02	0.06	0.04
MgO	1.18	0.33	0.24	0.18	0.37	0.26	0.18
CaO	2.95	0.07	0.21	0.74	0.19	0.58	0.73
Na ₂ O	3.19	0.24	0.75	2.81	1.32	3.00	3.44
K ₂ O	4.39	9.63	7.50	5.73	6.75	6.09	5.89
P ₂ O ₅	0.15	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
H ₂ O ⁺	0.93	0.55	0.77	0.51	1.11	0.43	0.43
H ₂ O ⁻	0.05	0.11	0.13	0.01	0.15	0.03	0.03
Total	99.76	99.28	99.11	99.88	99.66	100.05	100.02
Quartz	21.69	34.72	45.04	34.50	40.27	30.48	28.70
Corundum	0.85	1.53	0.96	0.94	2.98	0.80	0.12
Orthoclase	25.95	57.69	45.12	34.07	39.90	35.99	34.81
Albite	26.99	2.06	6.46	23.92	11.17	25.38	29.11
Anorthite	13.66	0.35	1.06	3.69	0.75	2.68	3.43
Diopside	-	-	-	-	-	-	-
Hypersthene	4.76	0.83	0.61	0.45	0.92	2.59	1.21
Magnetite	3.39	2.43	0.47	0.94	1.22	1.15	1.87
Hematite	-	0.15	0.03	1.11	-	-	-
Ilmenite	1.16	0.25	0.25	0.38	0.34	0.27	0.25
Apatite	0.35	-	-	-	0.07	0.07	0.07

Ba	1750
Ce	130
Mo	10
Nb	10
Pb	28
Rb	170
Sn	4
Sr	340
Th	22
U	6
W	10
Y	30
Zr	290
Bi	8
Co	12
Cu	20
Li	10
Ni	n.d.
Zn	n.d.

TABLE 1 (continued)

Rock unit	Pcc ₅	Pcc _r	Pcc _g	Pcc _g	Pcc _a	Pcc _a
Registered no.	74760893	73760845	73761276	73761278	74760018	74760019
SiO ₂	79.05	73.67	69.99	73.17	60.85	55.48
TiO ₂	0.16	0.14	0.35	0.22	0.78	0.83
Al ₂ O ₃	10.28	13.31	13.87	13.47	15.68	15.85
Fe ₂ O ₃	1.16	0.79	2.15	1.54	1.74	1.77
FeO	1.01	1.48	1.80	1.00	4.65	5.45
MnO	0.04	0.06	0.02	0.02	0.10	0.12
MgO	0.42	0.26	0.46	0.18	2.05	6.07
CaO	0.25	0.58	0.69	0.33	5.09	5.05
Na ₂ O	1.30	3.00	2.25	2.15	2.62	2.46
K ₂ O	4.21	6.09	6.98	7.33	3.51	3.53
P ₂ O ₅	n.d.	0.03	n.d.	n.d.	0.20	0.14
H ₂ O ⁺	1.36	0.59	0.74	0.40	1.74	2.77
H ₂ O ⁻	0.10	0.05	0.10	0.08	0.22	0.17
Total	99.35	100.05	99.40	99.89	99.23	99.68
Quartz	53.95		28.00	31.73	17.25	5.23
Corundum	3.18		1.38	1.41	-	-
Orthoclase	24.88		41.84	43.56	21.32	21.56
Albite	11.00		19.31	18.29	22.78	21.50
Anorthite	1.11		3.47	1.65	21.24	22.52
Diopside	-		-	-	2.80	1.96
Hypersthene	1.75		2.16	0.69	10.02	22.31
Magnetite	1.68		3.16	2.25	2.59	2.65
Hematite	-		-	-	-	-
Ilmenite	0.30		0.67	0.42	1.52	1.63
Apatite	0.05		-	-	0.49	0.34
Ba		820			1050	1200
Ce		120			110	80
Mo		n.d.			n.d.	n.d.
Nb		20			10	n.d.
Pb					22	20
Rb		310			130	120
Sn		6			n.d.	n.d.
Sr		110			310	370
Th		34			12	10
U		14			4	4
W		n.d.			n.d.	n.d.
Y		30			30	15
Zr		230			200	180
Bi		n.d.			n.d.	n.d.
Co		3			20	25
Cu		3			20	32
Li		5			32	52
Ni		n.d.			5	50
Zn		-			65	55

n.d. = not detected; n.a. = not analysed

TABLE 2. CHEMICAL ANALYSES AND CIPW NORMS - DYKE ROCKS

Registered no.	72762042	73761238	73761243	74760815	74760820	73761204	74760032
SiO ₂	73.82	73.21	73.52	63.63	63.35	52.52	51.30
TiO ₂	0.18	0.22	0.17	0.62	0.52	1.78	1.46
Al ₂ O ₃	12.76	13.33	13.57	14.38	14.66	13.82	14.74
Fe ₂ O ₃	0.25	0.74	0.55	0.82	0.97	2.64	4.22
FeO	1.40	1.15	1.40	3.90	3.92	9.55	8.45
MnO	0.03	0.02	0.03	0.06	0.07	0.22	0.17
MgO	0.47	0.38	0.34	2.75	3.42	3.71	3.55
CaO	0.60	0.77	0.30	3.85	5.91	6.90	6.83
Na ₂ O	2.31	3.05	2.45	2.38	2.68	2.16	2.22
K ₂ O	6.17	5.93	6.06	4.80	4.91	2.97	3.07
P ₂ O ₅	n.d.	n.d.	n.d.	0.24	0.24	0.24	0.45
H ₂ O ⁺	0.88	0.68	0.89	1.59	1.30	2.42	2.43
H ₂ O ⁻	0.02	0.06	0.09	0.07	0.01	0.12	0.17
Total	98.89	99.53	99.68	99.09	100.05	99.03	99.06
Quartz	34.53	30.41	33.37	17.88	14.53	6.25	5.79
Corundum	1.22	0.50	2.14	-	-	-	-
Orthoclase	37.20	35.46	38.07	28.37	29.02	18.18	18.80
Albite	19.94	26.11	21.00	20.14	22.68	18.93	19.47
Anorthite	3.04	3.87	1.51	14.38	13.47	19.94	21.97
Diopside	-	-	-	2.59	3.56	11.63	8.39
Hypersthene	3.36	2.15	2.77	11.15	12.45	17.03	15.29
Magnetite	0.37	1.09	0.81	1.19	1.41	3.97	6.34
Hematite	-	-	-	-	-	-	-
Ilmenite	0.35	0.42	0.33	1.18	0.99	3.50	2.87
Apatite	-	-	-	0.57	0.57	0.57	1.11
Ba							1200
Ce							140
Mo							4
Nb							10
Pb							20
Rb							110
Sn							n.d.
Sr							380
Th							12
U							4
W							280
Y							20
Zr							150
Bi							n.d.
Co							40
Cu							35
Li							56
Ni							5
Zn							110

TABLE 2 (continued)

Registered no.	72762032	72762034	72762040
SiO ₂	76.63	75.88	74.30
TiO ₂	0.08	0.03	0.16
Al ₂ O ₃	12.40	12.85	12.01
Fe ₂ O ₃	0.36	0.38	0.47
FeO	0.75	0.20	1.10
MnO	0.04	0.01	0.03
MgO	0.30	0.20	0.46
CaO	0.28	0.46	0.52
Na ₂ O	2.30	2.79	1.14
K ₂ O	5.78	5.32	7.59
P ₂ O ₅	n.d.	n.d.	n.d.
H ₂ O ⁺	1.03	0.90	0.95
H ₂ O ⁻	0.03	0.08	0.03
Total	99.98	99.10	98.76
Quartz	40.07	38.74	37.01
Corundum	1.87	1.70	1.00
Orthoclase	34.52	32.03	45.86
Albite	19.66	24.05	9.86
Anorthite	1.40	2.33	2.64
Diopside	-	-	-
Hypersthene	1.79	0.53	2.63
Magnetite	0.53	0.56	0.70
Hematite	0.15	0.06	0.31
Apatite	-	-	-

n.d. - not detected

TABLE 3. MAJOR AND TRACE-ELEMENT ANALYSES, AND CIPW NORMS -
XENOLITHS IN THE NICHOLSON GRANITE COMPLEX

Registered no.	74760035	74760036	73761270	73761271
SiO ₂	71.90	72.28	66.91	67.13
TiO ₂	0.25	0.24	0.45	0.43
Al ₂ O ₃	14.80	14.88	15.69	15.46
Fe ₂ O ₃	0.31	0.44	1.96	0.51
FeO	1.65	1.55	1.75	3.20
MnO	0.04	0.05	0.06	0.05
MgO	0.48	0.57	0.74	0.99
CaO	1.71	1.15	4.67	3.55
Na ₂ O	3.57	2.43	3.02	2.69
K ₂ O	4.12	5.07	2.87	4.20
P ₂ O ₅	n.d.	n.d.	0.12	0.11
H ₂ O ⁺	0.75	0.84	0.79	1.24
H ₂ O ⁻	0.09	0.12	0.11	0.06
Total	99.66	99.63	99.13	99.64
Quartz	30.25	34.92	28.01	24.87
Corundum	1.38	3.35	-	0.31
Orthoclase	24.63	30.36	17.26	25.24
Albite	30.55	20.83	26.00	23.14
Anorthite	8.58	5.78	21.16	17.18
Wollastonite	-	-	-	-
Diopside	-	-	1.32	-
Hypersthene	3.67	3.65	2.22	7.43
Magnetite	0.45	0.65	2.89	0.75
Hematite	-	-	-	-
Ilmenite	0.48	0.46	0.87	0.83
Apatite	-	-	0.29	0.27
Ba	1600	1550		
Ce	160	140		
Mo	10	6		
Nb	15	10		
Pb	40	32		
Rb	330	330		
Sn	6	n.d.		
Sr	220	190		
Th	18	20		
U	6	6		
W	180	10		
Y	35	20		
Zr	200	220		
Bi	4	n.d.		
Co	n.d.	n.d.		
Cu	n.d.	n.d.		
Li	70	75		
Ni	n.d.	n.d.		
Zn	25	20		

n.d. = not detected

TABLE 4. MAJOR AND TRACE-ELEMENT ANALYSES - NICHOLSON GRANITE COMPLEX

Rock unit	Egn ₁	Egn ₁	Egn ₂	Egn ₂	Egn ₂	Egn ₂	Egn ₂	Egn ₂	Egn ₂	Egn ₂
Registered no.	73760889	73760924	73760859A	73760875	73760882	73760923A	73760925	73760927	73760923B	73760923C
SiO ₂	70.24	67.03	69.01	72.47	74.78	70.42	66.78	73.18	62.25	68.85
TiO ₂	0.32	0.45	0.58	0.28	0.15	0.41	0.56	0.20	0.65	0.35
Al ₂ O ₃	14.36	14.35	13.34	12.89	12.27	13.54	14.47	13.38	15.16	13.85
Fe ₂ O ₃	0.99	1.13	1.02	1.09	0.61	0.69	1.09	0.67	0.47	0.85
FeO	2.04	2.63	4.08	1.56	1.26	3.15	3.60	1.56	5.55	2.85
MnO	0.06	0.06	0.07	0.06	0.05	0.05	0.06	0.05	0.08	0.05
MgO	1.06	1.56	0.89	0.35	0.17	0.73	0.83	0.46	1.92	0.85
CaO	2.13	2.70	1.29	1.20	0.84	2.24	2.29	0.92	2.21	1.85
Na ₂ O	3.28	2.70	2.10	2.84	2.96	2.76	2.70	3.18	2.82	2.85
K ₂ O	4.55	5.09	5.91	5.33	5.28	4.63	5.38	4.89	6.01	5.85
P ₂ O ₅	0.01	0.16	0.21	0.09	0.03	0.09	0.18	0.08	0.14	0.05
H ₂ O ⁺	0.92	1.13	1.14	0.77	0.76	1.33	1.31	0.71	1.53	1.15
H ₂ O ⁻	0.06	0.03	0.04	0.03	0.04	0.01	0.03	0.05	0.05	0.05
Total	100.02	99.03	99.68	98.95	99.20	100.05	99.29	99.34	98.85	100.05
Pb	22	24	34	40	50	30	32	34	32	32
U	10	10	8	14	22	8	8	6	6	6
Th	32	28	24	40	50	22	24	26	20	20
W	<10	<10	10	<10	<10	<10	<10	<10	<10	<10
Sn	<4	<4	4	12	14	6	4	4	<4	<4
Mo	<10	<10	12	10	<10	<10	<10	<10	<10	<10
Zr	170	190	340	150	140	230	320	170	220	220
Sr	380	500	130	100	44	120	240	160	150	150
Ba	480	980	1350	480	240	650	1400	600	920	920
Nb	15	10	20	15	35	10	20	15	10	10
Rb	170	180	250	310	500	210	190	190	300	300
Ce	90	100	140	100	100	90	160	80	100	100
Y	25	20	45	35	80	45	45	25	50	50
Bi	<8	10	<8	<8	<8	<8	<8	<8	<8	<8
Co	11	10	13	6	4	9	10	5	14	14
Cu	3	3	15	3	2	37	18	3	220	220
Li	16	19	24	26	39	26	27	18	32	32
Ni	8	12	4	<2	<2	6	4	2	18	18
Pb	25	32	38	51	54	30	40	57	47	47
Rb/Sr	0.45	0.36	1.92	3.10	11.36	1.75	0.79	2.50	2.00	2.00
K/Rb	222	235	196	143	88	183	235	214	166	166
Ba/Sr	1.26	1.96	10.38	4.80	5.45	5.42	5.83	3.75	6.13	6.13
Ba/Rb	2.80	5.44	5.40	1.55	0.48	3.10	7.63	1.50	3.07	3.07
K/Ba	79	43	36	92	183	59	32	68	54	54
Th/U	3.20	2.80	3	2.86	2.27	2.75	3	4.33	3.33	3.33

TABLE 4 (continued)

Rock unit	Egn ₄	Egn ₄	Egn ₄	Egn ₄	Egn ₄	Egn ₅	Egn ₅	Egn ₅	Egn ₇	Egn ₇	Egn ₈	Egn ₈	Egn ₈	Egn ₈
Registered no.	73760860	73760862A	73760862B	73760827	73760850	73760812	73760885	73760888	73760824	73760855C	73760858	73760864A	73760868	73760926
SiO ₂	63.58	63.59	56.82	58.80	61.37	73.64	70.86	75.16	74.76	74.35	75.58	72.51	76.27	74.37
TiO ₂	0.63	0.65	0.76	0.62	0.71	0.22	0.36	0.18	0.15	0.10	0.07	0.46	0.07	0.11
Al ₂ O ₃	14.57	14.52	13.82	13.87	16.05	12.92	13.77	12.23	12.58	13.75	13.18	13.27	12.29	13.68
Fe ₂ O ₃	1.09	0.84	0.93	1.76	1.36	0.62	1.03	0.66	1.19	0.67	0.82	1.29	0.67	0.80
FeO	3.97	4.33	6.41	5.00	4.85	1.34	1.78	1.07	0.77	0.67	0.30	0.67	0.41	0.89
MnO	0.06	0.07	0.12	0.09	0.09	0.04	0.05	0.03	0.03	0.04	0.03	0.04	0.03	0.05
MgO	3.71	3.65	6.27	6.70	2.52	0.38	0.54	0.18	0.33	0.35	0.18	0.43	0.07	0.29
CaO	3.09	3.33	5.03	4.21	3.99	0.70	1.63	0.78	0.65	0.53	0.29	0.21	0.25	0.39
Na ₂ O	2.12	2.22	1.84	2.08	2.72	2.24	2.26	2.46	2.84	2.70	2.14	0.02	2.86	2.80
K ₂ O	5.46	5.07	5.59	3.93	4.72	6.57	6.14	5.84	5.57	6.24	6.59	8.78	6.09	5.67
P ₂ O ₅	0.22	0.23	0.27	0.16	0.22	0.04	0.08	0.03	0.03	0.07	0.05	0.14	0.02	0.12
H ₂ O ⁺	1.34	1.33	1.38	1.88	1.02	0.72	1.03	0.54	0.41	0.64	0.77	1.13	0.40	0.86
H ₂ O ⁻	0.04	0.03	0.04	0.06	0.04	0.12	0.05	0.04	0.17	0.04	0.09	0.15	0.04	0.06
Total	99.87	99.86	99.28	99.16	99.67	99.55	99.57	99.20	99.48	100.15	100.09	99.10	99.46	100.10
Pb	30	22	34	18	32	28	30	42	26	36	34	20	28	36
U	6	6	<4	<4	6	4	6	6	14	6	8	4	18	1.2
Th	24	22	16	10	20	24	24	30	42	12	4	24	14	12
W	40	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Sn	6	<4	18	<4	<4	8	<4	<4	4	<4	<4	12	<4	10
Mo	<10	<10	<10	10	<10	<10	<10	10	<10	<10	<10	<10	<10	<10
Zr	260	270	230	160	270	190	210	160	150	60	45	310	60	60
Sr	500	500	410	330	390	125	230	85	70	140	60	65	55	65
Ba	1300	1150	1300	1050	1850	1000	1050	300	230	720	300	1500	170	400
Nb	15	15	15	5	15	10	10	10	15	5	5	20	15	5
Rb	210	190	240	160	165	280	200	270	370	200	350	290	270	280
Ce	110	130	130	70	130	110	110	150	60	30	20	140	30	30
Y	30	25	35	20	25	30	30	50	50	15	25	45	15	30
Bi	<8	8	10	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	8
Co	23	18	30	36	23	4	8	4	2	6	5	5	3	2
Cu	16	10	134	48	16	6	7	1	42	<1	21	79	115	5
Li	19	21	20	18	25	6	12	10	3	8	4	9	1	14
Ni	46	44	81	83	12	<2	2	<2	<2	<2	4	<2	<2	<2
Pb	29	27	44	24	38	43	66	48	31	43	42	28	30	35
Rb/Sr	0.42	0.38	0.59	0.48	0.42	2.24	0.87	3.18	5.29	1.43	5.83	4.46	4.91	4.31
K/Rb	215	222	193	204	237	195	255	180	125	259	156	251	187	168
Ba/Sr	2.60	2.30	3.17	3.18	4.74	8	4.57	3.53	3.29	5.14	5	20	3.09	6.15
Ba/Rb	6.14	6.05	5.37	6.58	11.29	3.55	5.25	1.11	0.62	3.60	0.86	4.48	0.63	1.43
K/Ba	35	37	36	31	21	55	49	162	201	72	182	56	297	118
Th/U	4	3.67	>4	>2.5	3.33	6	4	5	3	2	0.5	6	0.78	1

TABLE 5. MAJOR-ELEMENT ANALYSES - PETERS CREEK VOLCANICS

Rock unit	Etp ₁	Etp ₁	Etp ₁	Etp ₁	Etp ₂	Etp ₂	Etp ₂	Etp ₅	Etp ₅	Etp ₆	Etp ₆	Etp _d	Etp _d	Etp _d
Registered no.	74760009	74760011	74760013	74760055	74760044	74760046	74760047	74760064	74760065	74760063	74760070	72762058	72762059	72762065
SiO ₂	47.86	56.34	54.70	52.94	77.48	73.26	76.17	72.29	68.43	56.45	52.16	75.43	80.46	79.17
TiO ₂	1.05	1.84	1.39	1.37	0.28	0.39	0.39	0.56	0.65	2.57	2.25	0.32	0.26	0.25
Al ₂ O ₃	15.17	11.56	13.32	13.01	11.48	11.78	12.34	10.51	11.88	13.31	13.41	11.82	9.61	9.61
Fe ₂ O ₃	1.92	18.21	2.31	3.76	0.17	3.69	0.84	5.79	7.30	11.64	17.52	2.01	0.18	1.70
FeO	8.25	0.25	6.15	6.25	0.20	0.20	0.15	0.25	0.50	0.50	0.50	0.15	0.20	0.30
MnO	0.18	0.19	0.12	0.22	0.01	0.01	0.01	0.01	0.03	0.02	0.02	0.01	0.01	0.01
MgO	7.63	0.81	9.72	6.43	0.07	0.10	0.02	0.40	0.48	0.83	0.51	0.08	0.01	0.14
CaO	8.56	0.16	0.31	4.09	0.04	0.06	0.03	0.19	0.18	0.92	0.08	0.03	0.02	0.03
Na ₂ O	1.32	0.04	0.06	2.83	0.16	0.28	0.23	0.09	0.14	0.09	0.03	0.12	0.11	0.10
K ₂ O	3.37	8.50	5.26	2.99	9.45	9.22	8.91	7.95	9.12	9.59	10.46	9.15	8.04	7.43
P ₂ O ₅	0.19	0.11	0.15	0.15	0.02	0.07	0.01	0.16	0.15	0.79	0.17	0.01	0.03	0.02
H ₂ O ⁺	3.15	1.33	5.47	3.47	0.41	0.62	0.84	1.21	0.97	1.82	1.40	0.82	0.28	0.92
H ₂ O ⁻	0.27	0.25	0.43	0.07	0.07	0.12	0.04	0.15	0.07	0.30	0.18	0.06	0.04	0.06
TOTAL	98.92	99.59	99.39	97.57	99.82	99.80	99.97	99.57	99.91	98.82	99.13	99.98	99.21	99.72

TABLE 6. LOCALITIES AND DESCRIPTIONS OF CHEMICALLY ANALYSED ROCKS

Rock unit	Registered no.	Rock type	Grid reference
Ecc ₁	74760038	Red ignimbrite	HC 976446
Ecc ₁	74760039	Porphyritic purple lava	HC 904435
Ecc ₂	74760040	Porphyritic pink ignimbrite	HC 965438
Ecc ₂	74760041	Pumice-rich pink ignimbrite	HC 935413
Ecc ₃	74760042	Blue-black ignimbrite	HC 885440
Ecc ₃	74760043	Red-brown ignimbrite	HC 925444
Ecc _{4a}	73761236	Red-brown ignimbrite	HC 824422
Ecc _{4a}	73761252	Red-brown ignimbrite	S 143403
Ecc _{4a}	73760826	Red-brown ignimbrite	S 043383
Ecc ₄	73760913	Red-brown ignimbrite	HC 923523
Ecc _{4b}	74760037	Red rhyolite	HC 831557
Ecc _{4d}	73761218	Blue-black ignimbrite	S 070442
Ecc _{4d}	73761224	Blue-black ignimbrite, augite-bearing	S 073427
Ecc _{4d}	73761225	Blue-black ignimbrite, augite-bearing	S 073427
Ecc _{4d}	73761246	Blue-black ignimbrite	S 158424
Ecc _{4d}	73761248	Blue-black ignimbrite	HC 824422
Ecc _{4d}	72762017	Blue-black ignimbrite	HC 030518
Ecc ₄	73761208	Blue-black ignimbrite, augite-bearing	HC 857465 (from type section)
Ecc ₄	73761209	Red-brown ignimbrite	HC 857465 (from type section)
Ecc _{4d}	74760802	Blue-black ignimbrite	S 147340
Ecc _{4d}	74760817	Blue-black ignimbrite	S 990383
Ecc _{4d}	74760828	Blue-black ignimbrite	S 038416
Ecc _{4d}	74760915	Blue-black ignimbrite	S 034418
Ecc ₄	72762037	Red rhyolite	HC 861455
Ecc ₅	73751214	Red rhyolite	HC 830474
Ecc ₅	72762028	Red rhyolite	HC 852504
Ecc ₅	72762029	Red rhyolite	HC 927535
Ecc ₅	74760836	Red rhyolite	HC 818428
Ecc ₅	74760845	Red rhyolite	S 919243
Ecc ₅	74760869	Red rhyolite	S 904245
Ecc ₅	74760893	Red rhyolite	HC 867555
Ecc _g	73761276	Pink granofels	S 100322
Ecc _g	73761278	Pink granofels	S 080275
Ecc _a	74760018	Fine-grained andesite	S 146551
Ecc _a	74760019	Medium-grained andesite	S 153556
Dyke	72762032	Quartz-feldspar porphyry	HC 912387
Dyke	72762034	Quartz-feldspar porphyry	HC 364437
Dyke	72762040	Quartz-feldspar porphyry	HC 877366
Dyke	72762042	Quartz-feldspar porphyry	HC 841412
Dyke	73761238	Quartz-feldspar porphyry	S 145434
Dyke	73761243	Quartz-feldspar porphyry	S 154432
Dyke	74760815	Feldspar porphyry	S 023422
Dyke	74760820	Feldspar porphyry	S 981350
Dyke	73761204	Dolerite	HC 864557
Dyke	74760032	Dolerite	S 153367
Xenolith	74760035	(in granite, Pgn ₅) - Pcc 1?	HC 890417
Xenolith	74760036	(in granite, Pgn ₅) - Pcc 1?	HC 890417
Xenolith	73761270	(in granite, Pgn ₅) Blue-black ignimbrite,	S 150348
Xenolith	73761271	Pcc _{4d} (in granite, Pgn ₅) Blue-black ignimbrite,	S 152357
		Pcc _{4d}	

TABLE 6 (continued)

Rock unit	Registered no.	Rock type	Grid reference
Egn ₁	73760889	Coarse porphyritic red-feldspar biotite-hornblende granite	S 032343
Egn ₁	73760924	Coarse porphyritic red-feldspar biotite-hornblende granite with basic xenoliths	S 155292
Egn ₂	73760859A	Coarse porphyritic red-feldspar muscovite granite	S 803220
Egn ₂	73760875	Medium porphyritic white-feldspar biotite granite	S 957336
Egn ₂	73760882	Medium porphyritic white-feldspar biotite granite	S 991339
Egn ₂	73760923A	Medium porphyritic white-feldspar biotite-hornblende granite with basic xenoliths	S 153291
Egn ₂	73760925	Medium porphyritic white-feldspar biotite granite	S 803253
Egn ₂	73760927	Medium porphyritic white-feldspar biotite granite	S 814219
Egn ₂	73760923B	Basic xenolith from 0923A	S 153292
Egn ₃	73760805	Greisen	S 015378
Egn ₃	73760809*	Greisen dyke	S 998380
Egn ₄	73760860	Medium porphyritic red-feldspar hornblende-biotite granodiorite	S 905242
Egn ₄	73760862A	Medium red-feldspar hornblende-biotite granodiorite with basic xenoliths	S 904241
Egn ₄	73760862B	Hornblende-biotite xenolith from 0862A	S 904241
Egn ₄	73760827	Medium-fine dark green hornblende granodiorite with plagioclase phenocrysts	S 030400
Egn ₄	73760850**	Fine black hornblende-biotite microgranodiorite	S 850238
Egn ₅	73760812	Fine even-grained red-feldspar microgranite	S 988379
Egn ₅	73760885	Medium even-grained red-feldspar biotite granite	S 052375
Egn ₅	73760888	Medium even-grained red-feldspar biotite granite	S 031369
Egn ₇	73760824**	Fine even-grained red microgranite	S 073427
Egn ₇	73760855C	Fine even white-feldspar muscovite granite	S 862205
Egn ₈	73760858	Fine even white-feldspar muscovite granite	S 893224
Egn ₈	73760864A	Medium even white-feldspar muscovite granite	S 845207
Egn ₈	73760868	Medium even white-feldspar muscovite granite	S 875278
Egn ₈	73760926	Medium even white-feldspar muscovite-biotite granite	S 863213
Etp ₁	74760009	Medium-grained slightly porphyritic basalt	HC 103441
Etp ₁	74760011	Vesicular basalt	HC 070432
Etp ₁	74760013	Altered amygdaloidal basalt	HC 934366
Etp ₁	74760055		HC 968411
Etp ₂	74760044	Quartz-feldspar porphyry	HC 313391
Etp ₂	74760046	Rhyolite	HC 957367
Etp ₂	74760047	Rhyolite	S 927200
Etp ₅	74760064	?Rhyodacite	HC 159377
Etp ₅	74760065	?Rhyodacite	HC 208380
Etp ₆	74760063	Intermediate volcanic	HC 202378
Etp ₆	74760070		HC 172350
Etp _d	72762058	Porphyritic rhyolite	HC 196361
Etp _d	72762059	Rhyolite	HC 196361
Etp _d	72762065	Rhyolite	HC 190359

* Sample is from dyke shown as quartz (should be greisen, though) on 1:100 000 map.

** Sample is from dyke too small to be shown on 1:100 000 map.