DEPARTMENT OF THE INTERIOR

U. S. GEOLOGICAL SURVEY

Chemical Analyses of Rocks and Glass Separates from Crater Lake National Park and Vicinity, Oregon

by

Peggy E. Bruggman[1]
Charles R. Bacon[1]
Philip J. Aruscavage[2]
Richard W. Lerner[1]
Louis J. Schwarz[2]
Kathleen C. Stewart[3]

Open-file Report 87-57

[1]Menlo Park, California [2]Reston, Virginia [3]Lakewood, Colorado

Introduction

This report contains chemical analyses of rocks and glass separates from lava flows, domes, and pyroclastic deposits from Crater Lake National Park and vicinity, Oregon. Included are all analyzed samples collected by C. R. Bacon and assistants (W. A. Bartling [1979, 1980], S. W. Novak [1981], M. H. Moench [1982], C. A. Michelsen [1983], and M. M. Hirshmann [1984, 1985]) that are either (1) from units believed to be related to the climactic magma chamber that was responsible for the caldera-forming eruption about 6850 B.P. or (2) from monogenetic vents and small basaltic to andesitic shield volcanoes in the vicinity of Mount Mazama, regardless of age. This report is intended to accompany papers in preparation by C. R. Bacon and T. H. Druitt.

Analytical Methods

Approximately 350 samples (Table 1) have been analyzed for major elements in this study, and the majority also for trace elements. Most samples were ground in an alumina shatterbox. Some glass separates were ground in an agate mortar. A few samples were ground in tungsten carbide; Co and Ta are not reported for these rocks because of contamination during grinding. All chemical analyses were made in USGS laboratories.

Major elements in whole-rock and some glass samples were determined by x-ray fluorescence (XRF) in Lakewood, Colorado, by K. Stewart, J. Baker, A. Bartel, J. Taggart, J. S. Wahlberg. Major element analyses of glass in dense rock samples and partially-melted granitoids were made by C. R. Bacon with an ARL SEMQ microprobe in Menlo Park, California, using 9 wavelength-dispersive spectrometers. Na_2O and K_2O were measured by flame photometry on approximately half of the whole-rock samples, and F, Cl, $H_2O\pm$, and FeO on a smaller number (H_2O and FeO are not reported here), by P. R. Klock, L. F. Espos, S. T. Neil, and D. V. Vivit in Menlo Park. Rb, Sr, Y, Zr, and Ba were determined by energy-dispersive x-ray fluorescence by P. E. Bruggman in Menlo Park. Nb analyses were made by spectrophotometry in Reston, Virginia, by P. Aruscavage and E. Campbell. Emission spectrographic values for Be, Cu, Ga, Ni, and V were obtained by T. L. Fries and R. W. Lerner (Menlo Park), and instrumental neutron activation analyses (INAA) for Co, Cr, Cs, Hf, Sb, Ta, Th, U, Zn, Sc, La, Ce, Nd, Sm, Eu, Gd, Tb, Tm, Yb, and Lu were made by L. J. Schwarz, G. A. Wandless, J. S. Mee, and J. N. Grossman (Reston).

Precision and Accuracy

Precision was measured by repeated analysis of internal standards. Means and standard deviations for repeated determinations of concentrations of each element in representative silicic and mafic rock standards are given in Table 2. For INAA and emission spectrographic analyses we report data for USGS standards RGM and DNC; XRF data are for rhyodacite pumice 322 and andesite scoria 336; microprobe analyses are for microlite-free obsidian RLS132 obtained from R. L. Smith. Precision of wet chemical determinations was not monitored by this method; the data are reported to a number of significant figures justified by experience with the particular technique employed and concentration range encountered. Results for Gd and Tm are significantly less precise than for other REE.

Accuracy is difficult to assess. Trace element concentrations for USGS standards generally agree with accepted values to within limits of measured precision. Comparison of XRF major-element whole-rock analyses with other laboratories' analyses of the same powders or of rocks collected from the same

localities shows that the XRF values are probably accurate to within the measured precision, with the exception of Na_2O. Flame photometric (FP) Na_2O values are consistently 5% (relative) higher than XRF. To correct for this bias (presumably due to calibration of the XRF facility) we have used FP values for Na_2O and K_2O where available, and have multiplied all remaining (XRF) Na_2O concentrations by 1.05. Many data for samples analyzed by flame photometry can be recognized by K_2O reported to 3 decimal places; however, not all flame photometric values are so reported. Microprobe analyses of the obsidian agree well with wet chemical analysis. However, we are not convinced that the microprobe and XRF major element data are exactly comparable.

KEY TO SYMBOLS

Materials

AGL	Agglutinate from cinder cone
BMB	Bomb from cinder cone
CDB	Diabasic xenolith, climactic deposits (mostly veneer)
CFP	Pumice, climactic pumice fall
CFS	Scoria, climactic pumice fall
CGR	Granitoid block, climactic deposits (mostly in veneer, but also in pumice fall and ignimbrite)
CIP	Pumice, ring-vent phase ignimbrite (valley fill)
CIS	Scoria, ring-vent phase ignimbrite (valley fill)
CLP	Pumice, lag breccia (proximal ring-vent phase ignimbrite)
CVO	Obsidian, veneer (proximal ring-vent phase ignimbrite above CLP)
CVS	Scoria, veneer (proximal ring-vent phase ignimbrite above CLP)
CWP	Pumice, Wineglass Welded Tuff
CWV	Vitrophyre, Wineglass Welded Tuff
INC	Inclusion in lava flow
INT	Dike or volcanic neck
LAV	Lava from lava flow
PCB	Postcaldera lava block (dredge samples)
PCL	Postcaldera lava
PDO	Preclimactic dike, obsidian selvage
PHF	Preclimactic Holocene felsite
PHG	Preclimactic Holocene hydrated vitrophyre
PHI	Inclusion in preclimactic Holocene rhyodacite
PHO	Preclimactic Holocene obsidian
PHP	Preclimactic Holocene pumice
PLP	Preclimactic Holocene pumice, lower pumice fall (Llao source)
PPG	Preclimactic Pleistocene hydrated vitrophyre
PPI	Inclusion in preclimactic Pleistocene rhyodacite
PPO	Preclimactic Pleistocene obsidian
PPP	Preclimactic Pleistocene pumice

Lower case suffixes indicate the folowing units:

b	Rhyodacite of Steel Bay (hill 7352')
c	Cleetwood flow and pumice
g	Grouse Hill flow and dome
l	Llao Rock flow and pumice
r	Redcloud Cliff flow and pumice
s	Sharp Peak domes

[1]Microprobe analysis
[2]Microscopically heterogeneous (mixed) sample

Localities

AC	Annie Creek, west fork
AF	Annie Falls
AG	Applegate Peak
AP	Arant Point
AS	Anderson Springs
BB	Buckeye Butte
BC	Bald Crater
BY	Boundary Butte
CC	Crater Creek
CD	Cascade Creek
CL	Castle Creek near Little Castle Creek
CP	Castle Point
CR	Crater Peak
CS	Cascade Spring
CT	Castle Creek near Trapper Creek
CV	Cavern Creek
CW	Cleetwood Cove (and lava flow)
DB	Dry Butte
DC	Desert Cone
DR	Dutton Ridge
GH	Grouse Hill
GP	Garfield Peak
HP	Hillman Peak
LB	Lookout Butte
LC	Little Castle Creek
LR	Llao Rock
MC	Merriam Cone
MP	Merriam Point
MR	Maklaks Crater
MS	Munson Springs
OB	Oasis Butte
PN	The Pinnacles
PP	Pumice Point
RB	Rogue River bridge, highway 230
RC	Red Cone
RD	Redcloud Cliff
RV	Rim Village
SB	Steel Bay
SH	Skell Head
SM	Sun Mountain
SP	Sharp Peak
SR	Sand Ridge
TC	Timber Crater
TY	Tiny Creek
UC	Union Creek (settlement)
WB	Whitehorse Bluff
WC	Williams Crater (aka Forgotten Crater)
WD	Submerged dome east of WI
WG	Wineglass
WI	Wizard Island
WP	Submerged platform east of WI

Numbers following locality symbols refer to height in meters above base of unit or base of exposed section.

TABLE 1

Chemical Analyses

Sample#	79C-002	79C-007	79C-012	79C-017	79C-019	79C-025	79C-026	79C-027	79C-027G	79C-031	79C-069	79C-070
Material	CLP	CWV	CFP	CFP	CFP	CFP	PHPc	PHPc	PHPc[1]	PLP1	CFS[2]	CFS
Location	WG	WG	WG5.5	WG7.8	WG6.1	WG0.1	WG5.7	WG5.7	WG5.7	WG0.1	SH20	SH43
Latitude	42° 57.72'	42° 57.73'	42° 57.73'	42 °57.72'	42° 57.73'	42° 57.73'	42° 57.73'	42° 57.72'	42° 57.72'	42° 57.72'	42° 56.78'	42° 56.79'
Longitude	122° 3.05'	122° 3.05'	122° 3.07'	122° 3.07'	122° .07'	122° 3.07'	122° 3.07'	122° 3.07'	122° 3.07'	122° 3.08'	122° 3.02'	122° 3.02'
Major Elements												
pct												
SiO2	66.8	69.6	68.4	69.5	67.9	66.8	67.9	68.8	72.1	68.6	59.2	58.0
Al2O3	15.0	15.0	15.1	15.3	14.8	14.7	14.9	15.1	14.0	15.0	17.6	17.9
FeTO3	3.08	2.83	2.85	2.81	2.76	2.74	2.75	2.83	2.02	2.64	5.03	5.64
MgO	0.84	0.79	0.84	0.79	0.75	0.74	0.76	0.76	0.37	0.64	2.97	3.50
CaO	2.24	2.28	2.39	2.10	2.22	2.23	2.28	2.34	1.49	2.07	6.17	6.79
Na2O	4.59	5.22	5.18	5.07	5.04	5.03	5.13	5.18	5.29	5.14	4.34	4.41
K2O	2.472	2.576	2.517	2.536	2.48	2.464	2.489	2.499	2.88	2.542	1.20	1.20
TiO2	0.48	0.47	0.47	0.48	0.46	0.46	0.45	0.48	0.41	0.45	0.65	0.81
P2O5	0.11	0.10	0.11	0.11	0.10	0.10	0.11	0.10	-	0.09	0.18	0.18
MnO	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.07
Cl	0.11	0.13	0.12	0.031	-	0.13	0.11	0.11	-	0.11	-	-
F	0.04	0.04	0.03	0.03	-	0.04	0.04	0.04	-	0.04	-	-
LOI	4.57	0.50	1.82	2.76	2.55	3.68	2.85	2.38	-	2.71	1.76	1.18
Less O	0.04	0.04	0.03	0.03	-	0.04	0.04	0.04	-	0.04	-	-
Total	100.36	99.55	99.85	101.54	99.11	99.13	99.78	100.63	98.61	100.05	99.17	99.68
Trace Elements												
ppm												
Ba	728	751	745	739	745	747	745	722	-	779	411	385
Be	1.5	1.9	1.8	1.5	1.8	1.7	1.6	1.7	-	1.8	-	-
Co	-	-	-	-	-	-	-	-	-	-	-	19.2
Cr	2.9	1.9	2.6	2.9	1.6	1.4	1.1	1.9	-	1.0	44.4	45.7
Cs	2.7	2.9	2.8	2.8	2.9	2.7	2.9	2.9	-	3.1	1.0	1.0
Cu	23	22	20	15	10	21	14	17	-	14	21	68
Ga	14	17	17	14	16	14	14	15	-	17	19	22
Hf	5.5	5.7	5.4	5.5	5.5	5.6	5.6	5.6	-	5.7	2.6	2.7
Nb	6.5	7.2	7.2	7.2	7.1	6.8	6.8	7.9	-	8.0	3.8	-
Ni	9	6	6	5	6	5	5	6	-	6	35	41
Rb	52	51	53	54	57	49	50	51	-	55	28	29
Sb	0.6	0.7	0.8	0.9	3.8	0.9	1.9	0.9	-	1.0	0.8	0.4
Sc	6.98	6.59	6.61	6.30	6.43	6.21	6.33	6.56	-	6.67	11.5	14.8
Sr	380	381	396	370	379	375	380	385	-	316	1060	1050
Ta	-	-	-	-	-	-	-	-	-	-	-	0.22
Th	4.9	5.0	4.8	4.8	5.1	4.7	4.9	4.8	-	5.1	2.4	2.5
U	1.9	1.8	1.9	2.1	1.9	2.0	2.1	2.2	-	1.9	0.8	0.8
V	38	36	36	28	33	31	29	34	-	26	110	130
Y	23	27	24	24	24	23	24	24	-	26	17	17
Zn	44	45	43	36	41	42	44	45	-	45	57	57
Zr	229	236	226	230	224	224	223	228	-	233	138	145
La	21	22	21	21	21	20	21	21	-	21	15	15
Ce	46	42	42	40	41	42	42	41	-	41	27	30
Nd	21	19	23	21	23	22	20	20	-	23	16	18
Sm	4.6	4.7	4.7	4.6	4.8	4.4	4.7	4.4	-	4.5	3.0	3.5
Eu	0.88	0.95	0.92	0.90	0.94	0.84	0.90	0.89	-	0.89	0.89	1.04
Gd	4.0	4.1	4.0	4.2	4.4	3.9	4.3	3.2	-	4.1	2.7	3.1
Tb	0.62	0.60	0.59	0.60	0.60	0.53	0.62	0.59	-	0.64	0.35	0.34
Tm	0.39	0.34	0.35	0.31	0.34	0.30	0.33	0.23	-	0.29	-	0.11
Yb	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.1	-	2.3	1.0	1.1
Lu	0.33	0.32	0.34	0.33	0.33	0.30	0.33	0.33	-	0.34	0.15	0.16

Sample#	79C-070G	79C-073	79C-087	79C-088	79C-089	79C-104	79C-105	79C-106	79C-106G	79C-108	79C-109	79C-113
Material	CFS	CLP	PHOc	PLPc	PHPc	CFS[2]	CGR	CFS	CFS	CFP[2]	CFP	CGR
Location	SH43	SH14	CW	CW0.1	CW13	PP3	PP3	PP3	PP3	PP3	PP2	SH
Latitude	42° 56.79'	42° 56.77'	42° 58.62'	42 °58.62'	42° 58.62'	42° 58.52'	42° 58.52'	42° 58.52'	42° 58.52'	42° 58.52'	42° 58.52'	42° 57.53'
Longitude	122° 3.02'	122° 2.55'	122° 4.33'	122° 4.37'	122° 4.33'	122° 6.12'	122° 6.12'	122° 6.12'	122° 6.12'	122° 6.12'	122° 6.12'	122° 8.82'
Major Elements												
pct												
SiO2	67.6	68.8	70.0	66.2	68.8	60.5	65.6	58.3	66.8	66.1	68.8	67.1
Al2O3	15.4	15.1	15.2	15.0	15.5	17.4	15.6	18.2	16.3	15.2	15.0	15.6
FeTO3	2.69	2.93	2.78	2.70	[illegible]83	4.97	4.44	5.46	3.52	3.17	2.73	3.62
MgO	0.9	0.89	0.78	0.74	0.88	2.87	1.86	3.63	1.13	1.29	0.74	1.39
CaO	2.91	2.31	2.29	2.13	2.34	5.75	4.02	7.08	3.66	2.94	2.20	3.32
Na2O	5.46	4.07	5.29	4.70	5.04	4.58	4.27	4.61	5.11	4.79	5.04	4.88
K2O	2.020	2.69	2.492	2.454	2.425	1.49	2.36	1.155	1.81	2.29	2.51	2.307
TiO2	0.46	0.48	0.46	0.46	0.48	0.68	0.71	0.79	0.52	0.51	0.46	0.54
P2O5	0.22	0.12	0.11	0.11	0.11	0.20	0.16	0.16	0.25	0.13	0.11	0.12
MnO	0.05	0.05	0.05	0.05	0.05	0.07	0.07	0.07	0.06	0.06	0.05	0.06
Cl	-	-	0.11	0.12	0.13	-	-	0.094	-	-	-	0.041
F	-	-	0.04	0.04	0.04	-	-	0.05	-	-	-	0.04
LOI	2.05	3.61	0.39	5.35	3.10	1.98	0.54	0.90	0.85	3.10	3.34	0.90
Less O	-	-	0.04	0.04	0.04	-	-	0.04	-	-	-	0.03
Total	99.76	101.05	99.90	100.02	101.69	100.49	99.63	100.45	100.01	99.58	100.98	99.88
Trace Elements												
ppm												
Ba	623	760	735	716	721	464	661	356	563	681	767	660
Be	-	1.7	1.9	1.7	1.9	1.0	1.5	-	-	1.6	1.6	1.2
Co	5.6	-	-	-	-	-	-	-	7.0	-	-	-
Cr	-	2.3	0.7	2.6	2.6	34.5	19.9	49.1	-	10.3	1.5	12.9
Cs	1.7	3.0	3.2	4.2	3.1	1.4	2.4	1.1	1.6	2.8	3.0	2.8
Cu	-	12	13	19	20	33	13	70	-	21	12	13
Ga	-	14	18	14	16	20	18	20	-	16	14	14
Hf	4.1	5.5	5.8	5.8	5.7	3.2	5.6	2.8	3.8	5.4	5.5	5.1
Nb	-	6.5	7.6	7.4	7.0	4.8	9.2	4.3	-	6.7	7.2	7.2
Ni	-	7	6	6	7	32	18	48	-	16	6	13
Rb	40	53	52	52	51	36	45	27	38	46	55	46
Sb	0.3	1.3	1.1	1.7	1.5	0.8	1.7	1.9	0.3	1.0	1.3	1.9
Sc	3.90	6.68	6.76	6.72	6.61	12.1	11.6	15.6	4.60	7.98	6.25	9.24
Sr	716	391	384	359	408	990	414	1130	833	491	372	380
Ta	0.31	-	-	-	-	-	-	-	0.31	-	-	-
Th	4.1	4.7	5.1	5.3	4.8	2.8	5.2	2.4	3.9	4.6	4.9	4.6
U	1.4	2.1	2.5	2.6	2.1	1.0	1.8	1.0	1.5	2.1	2.3	2.3
V	-	37	37	31	37	110	97	140	-	50	30	60
Y	19	25	24	25	27	19	25	18	17	25	24	24
Zn	51	44	45	45	46	57	40	58	60	48	43	44
Zr	193	228	229	237	229	149	208	139	183	215	231	196
La	20	21	22	23	22	16	21	15	20	21	21	19
Ce	42	40	43	47	44	32	42	29	44	41	41	37
Nd	20	20	26	23	24	21	23	17	21	21	22	23
Sm	3.6	4.7	5.2	5.4	4.8	3.7	5.5	3.9	3.9	4.7	4.7	4.7
Eu	0.95	0.95	0.97	0.96	0.87	1.01	1.03	1.03	1.05	0.92	0.83	0.89
Gd	2.6	3.8	4.7	4.7	4.[illegible]	2.9	4.9	2.2	3.6	3.8	3.8	4.3
Tb	0.39	0.58	0.65	0.67	0.64	0.39	0.73	0.41	0.43	0.52	0.55	0.64
Tm	-	0.33	0.44	0.36	0.33	0.22	0.41	0.33	-	0.34	0.31	0.36
Yb	1.1	2.2	2.5	2.5	2.3	1.2	2.4	1.1	1.0	2.2	2.3	1.9
Lu	0.17	0.34	0.34	0.36	0.33	0.19	0.39	0.23	0.19	0.31	0.34	0.34

Sample#	79C-119	79C-120	79C-125	79C-132	79C-133	79C-153	79C-153G	79C-154	79C-154G	79C-155	79C-158	79C-158G
Material	LAV	INC	BMB	BMB	BMB	PHO1	PHO1[1]	CFP	CFP[1]	PLP1	PLP1	PLP1
Location	WC	WC	WC	WC	WC	LR	LR	LR2	LR2	LR36	LR0.4	LR0.4
Latitude	42° 57.22'	42° 57.22'	42° 57.60'	42 °57.27'	42° 57.27'	42° 58.32'	42° 58.32'	42° 58.67'	42° 58.67'	42° 58.65'	42° 58.63'	42° 58.63'
Longitude	122°11.00'	122°11.00'	122°10.62'	122°10.62'	122°10.62'	122° 8.73'	122° 8.73'	122° 7.57'	122° 7.57'	122° 7.57'	122° 7.43'	122° 7.43'
Major Elements												
pct												
SiO2	60.3	52.7	58.1	61.1	48.8	70.4	73.3	68.5	72.6	69.1	69.7	-
Al2O3	15.9	16.2	16.1	16.8	16.3	15.1	14.4	15.0	13.4	15.2	14.3	-
FeTO3	5.71	7.91	6.28	5.61	8.37	2.70	1.88	2.74	2.11	2.75	2.30	-
MgO	4.34	7.73	5.13	3.27	7.99	0.70	0.27	0.77	0.45	0.74	0.56	-
CaO	6.14	9.25	6.97	5.68	9.53	2.16	1.28	2.24	1.47	2.20	1.68	-
Na2O	4.22	3.78	4.05	4.68	3.38	5.39	5.19	5.13	5.05	5.28	5.16	-
K2O	1.675	1.078	1.556	1.374	0. o0	2.594	2.88	2.484	2.69	2.517	2.747	-
TiO2	0.82	1.09	0.89	0.65	1.10	0.45	0.35	0.46	0.40	0.46	0.39	-
P2O5	0.25	0.36	0.28	0.16	0.39	0.11	-	0.11	-	0.11	0.08	-
MnO	0.09	0.12	0.10	0.11	0.13	0.05	0.06	0.05	0.06	0.05	0.05	-
Cl	0.049	0.032	0.039	0.043	0.021	0.11	-	0.11	-	0.11	0.13	-
F	0.04	0.04	0.05	0.03	0.04	0.04	-	0.04	-	0.04	0.04	-
LOI	0.74	0.25	0.68	0.61	0.86	0.38	-	2.40	-	1.34	2.76	-
Less O	0.04	0.03	0.04	0.03	0.03	0.04	-	0.04	-	0.04	0.04	-
Total	100.24	100.51	100.18	100.09	97.71	100.15	99.61	100.00	98.23	99.86	99.86	-
Trace Elements												
ppm												
Ba	538	388	496	512	376	778	817	745	816	794	783	811
Be	1.4	-	1.2	1.4	-	1.9	-	1.7	-	1.8	1.9	-
Co	-	-	-	-	-	-	2.0	-	2.7	1.7	-	-
Cr	126	272	163	77.2	262	0.7	-	1.6	-	1.2	0.5	-
Cs	1.9	0.8	1.8	1.5	0.5	3.1	3.4	3.2	3.2	3.3	3.6	3.4
Cu	42	63	60	25	77	53	-	15	-	14	10	-
Ga	19	20	20	20	20	16	-	15	-	16	15	-
Hf	4.2	3.4	4.1	3.1	3.3	5.8	6.1	5.7	6.0	6.0	6.3	6.1
Nb	7.6	10.0	9.7	5.0	11.0	7.0	-	6.9	-	6.7	7.1	-
Ni	60	100	62	62	100	5	-	4	-	4	4	-
Rb	36	23	38	29	21	54	52	52	51	54	58	58
Sb	2.0	1.3	1.6	1.1	1.4	1.2	0.5	1.4	0.6	1.3	1.9	0.6
Sc	17.2	25.3	19.3	15.0	27.2	6.36	5.73	6.55	5.66	6.58	6.20	4.74
Sr	645	942	741	949	1005	318	250	374	298	344	262	199
Ta	-	-	-	-	-	-	0.49	-	0.50	-	-	0.49
Th	3.8	2.8	3.6	2.8	2.7	4.9	5.2	5.2	5.2	5.2	5.5	5.3
U	1.7	1.1	1.7	1.3	1.0	2.5	2.3	2.3	2.3	2.5	2.7	2.4
V	140	160	130	140	170	23	-	25	-	24	15	-
Y	22	20	21	23	23	25	25	26	24	26	27	25
Zn	66	81	70	68	88	43	41	47	48	44	43	46
Zr	178	168	182	130	173	236	246	232	249	234	243	262
La	20	21	20	15	23	21	21	22	21	21	22	20
Ce	39	42	40	30	43	43	41	43	43	42	43	40
Nd	21	24	21	19	24	21	21	26	21	23	23	20
Sm	4.6	4.6	4.7	4.2	4.7	4.9	4.7	5.0	4.7	5.0	5.0	4.5
Eu	1.06	1.23	1.10	1.11	1.28	0.96	0.87	0.92	0.83	0.94	0.87	0.78
Gd	3.9	3.7	3.6	3.7	3.8	4.3	-	3.9	-	4.3	4.3	-
Tb	0.59	0.56	0.59	0.52	0.52	0.57	0.65	0.53	0.64	0.53	0.55	0.62
Tm	0.28	0.30	0.33	0.28	0.30	0.41	-	0.35	-	0.38	0.35	-
Yb	2.0	1.8	1.9	2.0	1.8	2.4	2.2	2.4	2.2	2.4	2.5	2.2
Lu	0.28	0.30	0.29	0.30	0.34	0.36	0.36	0.34	0.36	0.36	0.39	0.36

Sample#	79C-160	79C-160G	79C-161	79C-161G	79C-165	79C-165G	79C-195	79C-195G	79C-206	79C-206G	79C-208	79C-209
Material	PHOc	PHOc[1]	PPOr	PPOr[1]	PLPl	PLPl[1]	CGR	CGR[1]	PPOr	PPOr[1]	CGR	PHIl
Location	CW	CW	RD	RD	LR1	LR1	RD	RD	RD	RD	RD	LR
Latitude	42° 58.85'	42° 58.85'	42° 56.17'	42° 56.17'	42° 58.50'	42° 58.50'	42° 55.76'	42° 55.76'	42° 56.03'	42° 56.03'	42° 56.07'	42° 58.70'
Longitude	122° 4.45'	122° 4.45'	122° 2.57'	122° 2.57'	122° 7.87'	122° 5.37'	122° 3.09'	122° 3.09'	122° 2.95'	122° 2.95'	122° 2.90'	122° 7.70'
Major Elements												
pct												
SiO2	69.9	73.5	70.4	75.0	69.0	71.3	67.7	75.0	69.9	73.7	67.5	58.4
Al2O3	15.2	14.2	15.0	14.0	14.8	13.6	15.6	11.9	15.1	14.0	15.4	17.3
FeTO3	2.79	1.84	2.73	1.44	2.55	1.94	3.62	2.22	2.90	1.87	3.76	6.09
MgO	0.82	0.34	0.76	0.17	0.65	0.31	1.41	0.20	0.81	0.26	1.53	3.58
CaO	2.30	1.41	2.32	1.07	1.98	1.22	3.29	0.52	2.44	1.32	3.46	6.07
Na2O	5.38	5.25	4.87	4.92	5.18	5.11	4.89	3.53	5.02	4.98	4.71	4.77
K2O	2.549	2.81	2.734	3.24	2.611	2.87	2.310	5.06	2.730	3.25	2.229	1.415
TiO2	0.46	0.40	0.44	0.26	0.43	0.47	0.54	0.35	0.48	0.31	0.57	0.86
P2O5	0.12	-	0.10	-	0.09	-	0.13	-	0.12	-	0.12	0.36
MnO	0.05	0.06	0.04	0.04	0.05	0.06	0.06	0.04	0.05	0.04	0.05	0.08
Cl	0.010	-	0.010	-	0.13	-	0.066	-	0.088	-	0.035	0.11
F	0.04	-	0.05	-	0.04	-	0.05	-	0.06	-	0.03	0.08
LOI	0.35	-	0.35	-	2.57	-	0.90	-	0.31	-	0.31	1.08
Less O	0.03	-	0.04	-	0.04	-	0.04	-	0.05	-	0.03	0.07
Total	99.94	99.81	99.76	100.14	100.04	96.88	100.52	98.82	99.95	99.73	99.68	100.12
Trace Elements												
ppm												
Ba	753	798	797	863	771	-	691	-	786	-	725	617
Be	2.1	-	2.0	-	1.8	-	-	-	2.0	-	1.5	1.3
Co	-	2.6	-	2.1	-	-	8.1	-	-	-	-	-
Cr	1.6	-	1.8	-	1.0	-	12.1	-	-	-	20.5	39.3
Cs	3.1	3.6	4.1	4.6	4.1	-	2.7	-	-	-	2.8	1.2
Cu	12	-	15	-	18	-	-	-	14	-	19	11
Ga	18	-	18	-	15	-	-	-	18	-	17	21
Hf	5.7	6.7	6.4	6.6	5.7	-	5.3	-	-	-	5.5	3.2
Nb	7.8	-	7.5	-	6.8	-	6.2	-	-	-	7.0	8.1
Ni	6	-	7	-	4	-	-	-	7	-	22	54
Rb	53	53	64	67	52	-	50	-	63	-	48	41
Sb	1.6	0.5	2.0	0.9	1.0	-	-	-	-	-	2.6	0.6
Sc	6.67	6.19	7.32	5.77	6.36	-	9.10	-	-	-	9.40	10.6
Sr	387	297	287	172	285	-	375	-	304	-	369	1480
Ta	-	0.53	-	0.58	-	-	0.38	-	-	-	-	-
Th	5.2	5.8	6.3	6.9	5.0	-	4.8	-	-	-	5.0	3.8
U	2.5	2.5	3.0	3.1	2.6	-	1.9	-	-	-	2.7	1.2
V	33	-	34	-	20	-	-	-	40	-	78	140
Y	24	25	26	26	25	-	24	-	27	-	24	19
Zn	45	46	42	36	44	-	54	-	-	-	38	70
Zr	231	253	243	242	233	-	184	-	240	-	228	182
La	22	23	22	23	21	-	19	-	-	-	18	27
Ce	43	47	45	47	41	-	38	-	-	-	36	51
Nd	23	23	24	24	20	-	17	-	-	-	21	30
Sm	5.2	5.2	5.8	5.5	5.0	-	4.3	-	-	-	4.8	5.3
Eu	0.95	0.97	0.96	0.86	0.91	-	0.90	-	-	-	0.85	1.29
Gd	4.3	-	4.7	-	4.2	-	4.0	-	-	-	4.3	3.3
Tb	0.54	0.66	0.72	0.77	0.59	-	0.57	-	-	-	0.64	0.34
Tm	0.35	-	0.42	-	0.39	-	0.31	-	-	-	0.30	0.20
Yb	2.4	2.4	2.6	2.7	2.4	-	2.2	-	-	-	2.3	1.2
Lu	0.36	0.39	0.37	0.40	0.37	-	0.32	-	-	-	0.36	0.22

Sample#	79C-209G	79C-216	79C-217	80C-222	80C-224	80C-226	80C-227	80C-227G	80C-313	80C-313G	80C-320	80C-322
Material	PHI1[1]	CWP	CLB	PPGg	PPIg	PPIg	PPOg	PPOg[1]	CGR	CGR[1]	CIP	CIP
Location	LR	MP	MP	GH	GH	GH	GH	GH	DR	DR	AC3	AC11
Latitude	42° 58.70'	42° 57.97'	42° 57.97'	42° 59.59'	42° 59.59'	42° 59.47'	42° 59.68'	42° 59.68'	42° 53.67'	42° 53.67'	42° 51.59'	42° 51.59'
Longitude	122° 7.70'	122° 8.89'	122° 8.89'	122° 7.19'	122° 7.19'	122° 7.43'	122° 7.86'	122° 7.86'	122° 4.42'	122° 4.42'	122° 9.00'	122° 9.00'
Major Elements												
pct												
SiO2	73.1	67.9	68.2	68.6	59.9	58.2	70.0	74.3	67.9	75.4	68.2	68.0
Al2O3	14.2	14.8	14.7	14.9	17.0	17.3	14.6	14.3	15.5	12.0	14.9	15.1
FeTO3	2.03	2.72	2.78	2.89	6.41	7.25	2.65	1.77	3.62	1.86	2.40	2.75
MgO	0.34	0.077	0.77	0.76	2.21	2.60	0.68	0.24	1.36	0.19	0.79	0.82
CaO	1.39	2.23	2.27	2.38	5.19	6.17	2.15	1.18	3.23	0.52	2.25	2.35
Na2O	5.11	5.02	5.05	4.83	4.80	4.45	4.89	4.76	4.61	3.57	4.99	5.05
K2O	2.87	2.47	2.52	2.64	1.49	1.23	2.80	3.21	2.04	5.04	2.62	2.53
TiO2	0.35	0.49	0.48	0.46	1.22	1.12	0.44	0.25	0.58	0.45	0.46	0.47
P2O5	-	0.11	0.11	0.11	0.27	0.17	0.10	-	0.12	-	0.08	0.11
MnO	0.06	0.05	0.05	0.05	0.10	0.10	0.04	0.05	0.06	0.03	0.05	0.05
Cl	-	-	-	0.067	0.072	0.056	0.11	-	-	-	0.12	0.11
F	-	-	-	0.05	0.04	0.03	0.05	-	-	-	0.01	-
LOI	-	3.27	2.84	1.43	0.85	0.70	0.45	-	0.64	-	2.75	2.50
Less O	-	-	-	0.04	0.04	0.03	0.05	-	-	-	0.01	-
Total	99.45	99.14	99.77	99.12	99.52	99.35	98.91	100.06	99.66	99.06	99.61	99.84
Trace Elements												
ppm												
Ba	-	761	754	784	529	439	807	875	689	-	726	748
Be	-	1.4	1.5	1.7	1.2	1.2	1.8	-	1.3	-	1.6	1.6
Co	-	3.7	-	4.3	11.0	18.6	3.9	1.6	7.8	-	3.0	3.8
Cr	-	1.2	-	1.7	1.4	6.5	2.7	-	11.9	-	1.5	1.9
Cs	-	2.8	-	3.6	1.8	1.7	3.7	4.4	2.4	-	2.9	2.9
Cu	-	14	14	13	20	32	17	-	28	-	5	5
Ga	-	18	20	19	22	23	17	-	20	-	16	16
Hf	-	5.4	-	6.1	3.6	3.2	5.7	6.1	5.3	-	5.6	5.7
Nb	-	-	-	6.4	6.1	5.2	6.7	-	-	-	6.6	6.6
Ni	-	5	5	7	6	13	7	-	15	-	5	5
Rb	-	53	54	63	36	30	67	70	49	-	51	53
Sb	-	1.3	-	0.7	0.3	0.3	0.6	0.7	1.3	-	0.5	0.5
Sc	-	5.96	-	7.48	18.1	19.8	6.70	4.72	8.84	-	5.95	6.41
Sr	-	380	380	300	573	581	267	178	382	-	383	379
Ta	-	0.46	-	0.60	0.46	0.38	0.54	0.60	0.41	-	0.46	0.47
Th	-	4.6	-	6.1	2.9	2.6	5.9	6.6	4.6	-	4.7	4.6
U	-	1.9	-	2.6	1.0	1.0	2.2	3.1	1.7	-	2.0	1.9
V	-	31	31	28	93	190	21	-	66	-	21	27
Y	-	26	24	26	24	18	27	28	23	-	24	25
Zn	-	47	-	51	89	84	48	44	47	-	45	47
Zr	-	227	230	219	153	134	233	234	185	-	231	229
La	-	20	-	21	14	13	19	23	18	-	19	20
Ce	-	39	-	44	30	26	41	46	35	-	39	40
Nd	-	20	-	25	21	17	23	23	16	-	21	16
Sm	-	4.5	-	4.6	3.8	3.2	4.0	5.2	3.9	-	3.7	3.7
Eu	-	0.88	-	1.00	1.23	1.05	0.91	0.82	0.91	-	0.86	0.92
Gd	-	4.3	-	5.5	4.5	3.7	4.8	5.0	4.1	-	3.9	4.1
Tb	-	0.42	-	0.73	0.60	0.52	0.66	0.68	0.60	-	0.55	0.62
Tm	-	0.28	-	0.39	0.35	0.27	0.34	-	0.27	-	0.32	0.33
Yb	-	2.0	-	2.5	2.1	1.7	2.4	2.6	2.1	-	2.2	2.2
Lu	-	0.30	-	0.36	0.28	0.25	0.35	0.36	0.32	-	0.30	0.33

Sample#	80C-324	80C-325	80C-329	80C-330	80C-331	80C-332	80C-336	80C-337	80C-337G	80C-338	80C-340	80C-342
Material	CIP	CIP	CIP	CIP	CIS[2]	CIS	CIS[2]	CGR	CGR[1]	CIS[2]	CIS	CIS
Location	AC23	AC30	AC45	AC48	AC49	AC51	AC66	AC66	AC66	AC67	AC84	AC92
Latitude	42° 51.58'	42° 51.58'	42° 51.58'	42° 51.58'	42° 51.58'	42° 51.57'	42° 51.57'	42° 51.57'	42° 51.57'	42° 51.57'	42° 51.57'	42° 51.57'
Longitude	122° 9.00'	122° 9.00'	122° 9.00'	122° 9.00'	122° 9.00'	122° 9.00'	122° 8.98'	122° 8.98'	122° 8.98'	122° 8.97'	122° 8.96'	122° 8.95'
Major Elements												
pct												
SiO2	68.8	68.3	68.1	68.0	57.7	59.4	53.5	66.8	74.8	54.1	53.3	57.1
Al2O3	15.0	14.8	14.9	14.9	17.9	17.5	18.9	15.3	11.5	18.7	19.2	18.5
FeTO3	2.54	2.74	2.78	2.83	6.66	5.78	6.66	3.74	1.64	6.26	6.18	6.86
MgO	0.78	0.78	0.79	0.88	3.23	2.64	5.00	1.46	0.22	5.41	5.44	3.26
CaO	2.27	2.21	2.30	2.34	6.90	5.96	9.06	3.32	0.74	9.12	9.52	6.87
Na2O	5.03	5.03	5.04	5.07	4.47	4.58	3.90	4.62	3.95	3.55	3.58	4.52
K2O	2.66	2.57	2.56	2.57	1.19	1.40	0.93	2.22	3.79	0.84	0.77	1.01
TiO2	0.48	0.47	0.48	0.48	0.95	0.95	1.17	0.56	0.38	1.01	1.10	0.98
P2O5	0.09	0.09	0.09	0.10	0.33	0.30	0.25	0.12	-	0.18	0.17	0.29
MnO	0.05	0.05	0.05	0.05	0.08	0.08	0.07	0.06	0.03	0.08	0.07	0.10
Cl	0.089	0.089	0.046	0.048	0.077	0.066	0.067	0.018	-	0.094	0.066	0.036
F	0.01	0.01	0.01	0.01	0.04	0.04	0.07	0.01	-	0.04	0.05	0.02
LOI	2.65	2.43	2.57	2.45	0.62	1.27	0.40	1.39	-	0.25	0.58	0.76
Less O	0.01	0.01	0.01	0.01	0.04	0.04	0.06	0.01	-	0.04	0.04	0.02
Total	100.44	99.56	99.71	99.72	100.11	99.93	99.92	99.61	97.05	99.60	99.98	100.29
Trace Elements												
ppm												
Ba	729	729	716	745	402	427	390	665	-	281	265	386
Be	1.4	1.3	1.3	1.5	1.1	1.0	-	1.4	-	-	-	-
Co	3.8	3.2	3.3	3.1	18.9	13.8	26.0	7.2	-	26.2	26.5	18.2
Cr	1.8	1.7	2.4	1.9	9.4	1.9	27.6	12.4	-	88.7	69.9	24.1
Cs	2.8	2.9	2.8	2.9	1.0	1.0	0.9	3.2	-	0.6	0.6	1.2
Cu	5	5	5	8	55	25	56	7	-	40	33	14
Ga	18	17	18	18	28	24	25	16	-	24	25	21
Hf	5.2	5.7	5.4	5.5	3.2	3.5	2.5	5.0	-	2.6	2.6	2.3
Nb	6.6	6.8	7.9	6.4	4.1	5.2	4.9	5.8	-	4.1	4.3	5.4
Ni	5	5	5	5	22	10	46	11	-	73	64	16
Rb	52	50	52	50	36	39	28	50	-	30	32	27
Sb	0.4	0.5	0.5	0.5	0.3	0.3	-	0.3	-	-	-	0.3
Sc	5.86	6.06	6.15	6.13	12.1	9.77	23.1	8.76	-	22.0	23.7	14.9
Sr	390	383	403	390	1460	1440	1370	374	-	1530	1520	737
Ta	0.44	0.48	0.46	0.46	0.26	0.28	0.35	0.41	-	0.24	0.20	0.28
Th	4.5	4.8	4.5	4.7	2.5	2.9	1.8	4.1	-	1.8	1.8	1.8
U	1.9	1.8	1.9	1.8	0.8	0.8	0.5	1.8	-	0.6	0.5	0.7
V	22	19	22	25	150	120	150	47	-	130	150	120
Y	22	25	24	24	19	20	20	23	-	16	19	19
Zn	44	47	44	44	74	66	69	47	-	65	61	75
Zr	226	231	225	222	158	179	125	195	-	137	126	110
La	19	20	19	19	19	22	15	16	-	16	14	11
Ce	38	40	40	39	42	47	31	32	-	34	31	24
Nd	20	20	21	23	24	23	20	19	-	21	21	14
Sm	3.7	3.6	3.6	3.7	3.7	3.7	4.0	3.4	-	3.3	3.5	2.8
Eu	0.86	0.89	0.91	0.90	1.28	1.25	1.37	0.88	-	1.21	1.27	1.07
Gd	3.8	4.1	3.9	3.6	3.4	3.4	3.9	3.8	-	3.5	3.9	3.2
Tb	0.59	0.62	0.58	0.61	0.50	0.42	0.51	0.59	-	0.41	0.44	0.45
Tm	0.32	0.31	0.32	0.33	0.17	0.18	0.21	0.26	-	0.23	0.14	0.20
Yb	2.1	2.2	2.1	2.2	1.3	1.1	1.3	2.0	-	1.0	1.0	1.5
Lu	0.29	0.32	0.30	0.30	0.19	0.17	0.20	0.29	-	0.16	0.16	0.22

Sample#	80C-344	80C-345	80C-345G	80C-347	80C-349	80C-354	80C-355	80C-432	80C-438	80C-439	80C-441	80C-442
Material	CIS	CIS	CIS	CIS[2]	PHP	BMB	LAV	CGR	CVS[2]	CVS	CVS	CVS
Location	AC94	AC97	AC97	AC97	MS	RC	RC	HP	HP	HP	HP	HP
Latitude	42° 51.57'	42° 51.57'	42° 51.57'	42° 51.57'	42° 54.17'	42° 59.89'	42° 59.70'	42° 57.02'	42° 57.27'	42° 57.27'	42° 57.27'	42° 57.27'
Longitude	122° 8.95'	122° 8.95'	122° 8.95'	122° 8.95'	122° 7.98'	122° 9.76'	122°10.15'	122°10.07'	122° 9.90'	122° 9.90'	122° 9.90'	122° 9.90'
Major Elements												
pct												
SiO2	53.6	58.2	67.1	53.2	62.8	53.0	53.6	72.6	55.5	54.5	53.1	53.0
Al2O3	19.5	18.7	15.4	18.5	16.4	16.7	16.3	13.5	19.2	19.2	19.1	20.6
FeTO3	7.47	6.16	3.02	6.25	3.42	7.66	7.76	2.35	7.38	8.12	8.54	6.14
MgO	4.32	2.82	0.84	6.22	0.97	7.21	8.10	0.65	2.99	4.02	5.29	6.00
CaO	8.93	6.39	2.72	9.49	2.58	8.52	7.96	1.84	7.16	8.17	8.69	9.65
Na2O	3.71	4.76	5.34	3.36	4.64	3.70	3.66	3.90	4.68	4.01	3.50	3.14
K2O	0.83	1.01	2.14	0.79	2.15	1.22	1.14	3.72	0.817	0.714	0.558	0.598
TiO2	0.98	0.88	0.59	0.89	0.50	1.03	0.94	0.41	1.23	0.99	0.86	0.72
P2O5	0.26	0.25	0.20	0.15	0.17	0.42	0.31	0.06	0.39	0.19	0.12	0.10
MnO	0.09	0.10	0.06	0.08	0.06	0.11	0.11	0.03	0.10	0.10	0.13	0.09
Cl	0.054	0.033	-	0.026	-	0.040	0.010	-	-	-	-	-
F	0.03	0.01	-	0.03	-	0.05	0.04	-	-	-	-	-
LOI	0.32	0.79	2.32	0.79	5.86	0.33	-	0.47	0.60	0.31	0.36	0.55
Less O	0.03	0.01	-	0.03	-	0.04	0.03	-	-	-	-	-
Total	100.07	100.09	99.73	99.75	99.61	99.95	99.90	99.53	100.05	100.32	100.25	100.59
Trace Elements												
ppm												
Ba	329	400	720	298	691	548	449	847	323	275	226	214
Be	-	-	-	-	1.7	-	-	1.6	-	-	-	-
Co	25.4	13.8	3.2	30.5	5.8	31.0	35.7	5.9	-	25.1	-	30.0
Cr	32.2	16.5	-	140	3.4	268	383	4.6	-	29.8	-	57.2
Cs	0.7	1.3	2.8	0.6	2.6	0.4	0.2	3.1	-	0.8	-	0.7
Cu	48	11	-	30	26	73	50	22	-	-	-	-
Ga	22	23	-	22	21	23	22	19	-	-	-	-
Hf	2.2	2.3	4.6	2.3	5.8	3.1	2.8	7.4	-	1.6	-	1.5
Nb	4.4	5.0	-	3.7	-	7.4	6.4	-	-	2.3	-	2.1
Ni	33	14	-	95	7	170	220	10	-	-	-	-
Rb	33	29	42	26	48	27	25	93	20	14	13	18
Sb	-	0.2	0.5	-	1.9	-	0.0	1.3	-	-	-	-
Sc	18.1	11.7	7.59	21.6	8.35	19.9	20.7	5.33	-	18.0	-	19.8
Sr	1500	712	346	1370	505	1300	945	222	802	761	760	748
Ta	0.20	0.25	0.45	0.21	0.47	0.42	0.34	0.57	-	0.14	-	0.12
Th	1.7	1.8	3.6	1.6	5.5	2.7	2.4	9.9	-	1.1	-	0.9
U	0.7	0.8	1.8	0.5	1.9	0.8	0.7	3.9	-	0.5	-	0.4
V	160	120	-	120	46	160	160	52	-	-	-	-
Y	16	15	26	17	26	18	19	24	17	14	13	15
Zn	71	65	52	58	52	82	82	20	-	69	-	60
Zr	120	107	197	127	240	157	141	257	96	86	72	75
La	14	11	18	13	23	26	19	22	-	8	-	6
Ce	29	22	36	28	48	50	39	44	-	15	-	13
Nd	15	13	22	15	27	27	20	23	-	11	-	9
Sm	3.1	2.5	4.6	3.0	5.8	4.1	3.4	4.8	-	2.6	-	2.4
Eu	1.10	1.03	1.07	1.05	1.07	1.35	1.11	0.73	-	0.86	-	0.79
Gd	3.1	2.6	5.3	2.8	5.8	4.1	3.6	4.9	-	2.1	-	2.3
Tb	0.39	0.37	0.55	0.35	0.66	0.42	0.39	0.64	-	0.35	-	0.32
Tm	0.21	0.16	-	0.15	0.34	0.32	0.25	0.36	-	0.20	-	0.18
Yb	1.2	1.3	2.1	1.0	2.3	1.5	1.5	2.3	-	1.1	-	1.1
Lu	0.17	0.19	0.30	0.15	0.37	0.20	0.20	0.36	-	0.17	-	0.16

Sample#	80C-442G	80C-443	80C-444	80C-444G	80C-445	80C-446G	80C-452	80C-453	80C-456G	80C-459	80C-463	80C-466
Material	CVS	CVS[2]	CVS	CVS	CVS	CGR[1]	CGR	CGR	CGR[1]	CGR	CGR	CGR
Location	HP	HP	HP	HP	HP	HP	HP	HP	HP	HP	HP	HP
Latitude	42° 57.27'	42° 57.27'	42° 57.27'	42° 57.27'	42° 57.27'	42° 57.27'	42° 57.28'	42° 57.28'	42° 57.28'	42° 57.28'	42° 57.28'	42° 57.28'
Longitude	122° 9.90'	122° 9.90'	122° 9.90'	122° 9.90'	122° 9.90'	122° 9.90'	122° 9.91'	122° 9.91'	122° 9.91'	122° 9.91'	122° 9.91'	122° 9.91'
Major Elements												
pct												
SiO2	62.7	53.9	51.1	62.3	52.[illegible]	74.5	63.1	65.4	75.1	72.6	67.5	65.4
Al2O3	18.7	19.4	10.6	18.0	19.5	11.9	16.6	16.6	12.1	13.3	15.7	15.9
FeTO3	3.93	8.37	9.04	4.12	8.79	1.72	5.08	3.86	2.03	2.36	3.69	4.44
MgO	1.19	3.55	16.7	1.91	4.43	0.17	2.57	1.02	0.19	0.59	1.40	1.91
CaO	5.43	8.11	9.21	4.55	8.75	0.57	5.17	3.30	0.55	1.69	3.25	3.99
Na2O	4.92	4.44	2.21	5.48	3.81	3.22	4.48	5.74	3.54	3.99	4.87	4.58
K2O	1.55	0.548	0.612	1.72	0.627	5.78	1.67	1.60	5.29	4.37	2.28	2.97
TiO2	0.70	1.15	0.37	0.56	1.09	0.38	0.62	0.66	0.41	0.35	0.57	0.64
P2O5	0.23	0.46	0.16	0.40	0.17	-	0.13	0.25	-	0.06	0.13	0.15
MnO	0.06	0.11	0.13	0.05	0.10	0.02	0.09	0.05	0.03	-	0.05	0.07
Cl	-	-	-	-	-	-	0.046	0.037	-	0.088	0.034	0.058
F	-	-	-	-	-	-	0.04	0.02	-	0.05	0.04	0.03
LOI	0.62	0.19	0.05	0.84	0.38	-	0.61	0.83	-	0.34	0.64	0.35
Less O	-	-	-	-	-	-	0.03	0.02	-	0.04	0.03	0.03
Total	100.03	100.23	100.18	99.93	100.25	98.26	100.17	99.35	99.24	99.74	100.12	100.46
Trace Elements												
ppm												
Ba	555	241	210	619	249	-	543	703	-	768	684	624
Be	-	-	-	-	-	-	-	-	-	-	-	-
Co	9.2	-	76.2	9.9	-	-	15.2	2.6	-	3.4	7.1	11.9
Cr	5.0	-	579	25.3	-	-	30.1	2.2	-	3.7	14	20.1
Cs	1.9	-	0.7	2.1	-	-	2.7	1.4	-	3.2	3.3	3.5
Cu	-	-	-	-	-	-	-	-	-	-	-	-
Ga	-	-	-	-	-	-	-	-	-	-	-	-
Hf	3.2	-	1.5	3.6	-	-	4.2	4.5	-	7.0	5.4	5.0
Nb	-	-	1.4	-	-	-	4.7	8.1	-	6.8	6.4	6.8
Ni	-	-	-	-	-	-	-	-	-	-	-	-
Rb	33	14	12	40	16	-	48	35	-	93	42	50
Sb	0.4	-	-	-	-	-	0.3	-	-	-	0.0	0.3
Sc	7.90	-	28.2	7.62	-	-	12.6	6.97	-	5.11	9.18	10.7
Sr	558	821	588	834	805	-	533	539	-	216	386	436
Ta	0.33	-	0.11	0.33	-	-	0.32	0.48	-	0.62	0.50	0.44
Th	2.6	-	1.2	3.3	-	-	3.6	4.8	-	10.6	4.9	4.7
U	1.3	-	0.5	1.5	-	-	1.6	1.7	-	3.8	1.9	2.1
V	-	-	-	-	-	-	-	-	-	-	-	-
Y	21	15	10	19	16	-	17	23	-	24	19	21
Zn	51	-	78	54	-	-	62	35	-	21	41	52
Zr	148	72	79	172	80	-	164	175	-	250	191	187
La	14	-	7	19	-	-	14	20	-	25	19	16
Ce	29	-	16	37	-	-	26	42	-	49	37	33
Nd	16	-	10	20	-	-	13	23	-	24	20	18
Sm	3.7	-	2.5	4.0	-	-	3.4	5.1	-	4.6	4.2	4.0
Eu	1.06	-	0.61	1.04	-	-	0.85	1.40	-	0.62	0.94	0.85
Gd	3.2	-	2.2	-	-	-	3.4	4.2	-	5.7	4.2	4.7
Tb	0.48	-	0.28	0.47	-	-	0.51	0.72	-	0.59	0.59	0.64
Tm	-	-	0.16	-	-	-	0.24	0.33	-	0.32	0.33	0.32
Yb	1.7	-	0.8	1.4	-	-	1.7	2.3	-	2.1	2.1	2.0
Lu	0.24	-	0.13	0.18	-	-	0.26	0.33	-	0.33	0.32	0.30

Sample#	80C-471	80C-498	80C-498G	80C-503	80C-503G	80C-512	80C-513	80C-515	80C-516	80C-517	80C-518	80C-518G
Material	CGR	PDO1	PDO1[1]	PDO1	PDO1[1]	PCL	PCL	PCL	INC	PCL	PPPr	PPPr
Location	HP	LR	LR	LR	LR	WI	WI	WI	WI	WI	RD	RD
Latitude	42° 57.28'	42° 58.18'	42° 58.18'	42° 58.12'	42° 58.12'	42° 56.34'	42° 56.34'	42° 56.34'	42° 56.36'	42° 56.06'	42° 56.16'	42° 56.16'
Longitude	122° 9.91'	122° 7.93'	122° 7.93'	122° 8.08'	122° 8.08'	122° 9.04'	122° 8.69'	122° 9.12'	122° 9.07'	122° 8.83'	122° 2.55'	122° 2.55'
Major Elements												
pct												
SiO2	67.3	71.0	73.9	72.3	73.7	58.5	58.0	59.7	50.3	58.7	68.6	70.1
Al2O3	15.8	14.6	14.0	14.8	14.1	18.2	18.4	17.9	20.3	18.2	14.6	14.1
FeTO3	3.56	2.43	1.73	2.36	1.74	6.49	6.55	6.05	10.10	6.40	2.58	1.83
MgO	1.38	0.62	0.27	0.54	0.28	3.68	3.73	3.13	5.31	3.54	0.68	0.39
CaO	3.33	1.81	1.15	1.69	1.18	6.89	6.97	6.16	8.5	6.65	2.21	1.69
Na2O	4.94	5.39	5.29	5.36	5.28	4.33	4.24	4.69	3.97	4.44	4.69	4.75
K2O	2.31	2.71	3.03	2.75	2.950	1.01	0.98	1.21	0.21	1.07	2.78	3.03
TiO2	0.53	0.41	0.26	0.40	0.28	0.75	0.75	0.72	1.15	0.74	0.41	0.29
P2O5	0.13	0.07	-	0.07	0.03	0.20	0.20	0.21	0.51	0.20	0.09	0.08
MnO	0.05	0.05	0.04	0.05	0.05	0.10	0.10	0.09	0.10	0.10	0.04	0.03
Cl	0.030	0.14	-	0.15	-	0.055	0.035	0.062	0.079	0.047	-	-
F	0.01	0.04	-	0.05	-	0.02	0.01	0.03	0.02	0.02	-	-
LOI	0.67	0.77	-	1.12	-	0.10	0.34	0.27	-	0.19	2.94	3.32
Less O	0.01	0.04	-	0.05	-	0.02	0.01	0.03	0.02	0.02	-	-
Total	100.03	100.00	99.67	101.59	99.59	100.31	100.30	100.19	100.53	100.28	99.62	99.61
Trace Elements												
ppm												
Ba	676	810	-	817	831	384	389	432	238	406	762	831
Be	-	2.2	-	2.1	-	-	-	-	1.3	-	1.6	1.8
Co	7.8	3.0	-	2.4	1.8	20.3	19.8	17.8	28.2	19.6	3.6	2.1
Cr	12.5	2.9	-	0.7	-	48.2	46.2	36.3	68.8	45.8	2.4	1.2
Cs	3.1	3.2	-	3.4	3.8	1.0	1.0	1.3	-	1.1	3.9	4.4
Cu	-	13	-	12	-	51	55	49	65	48	12	71
Ga	-	20	-	21	-	19	21	21	24	19	19	19
Hf	5.0	6.0	-	6.1	6.7	2.8	2.6	3.0	3.7	2.8	6.1	6.2
Nb	8.0	7.1	-	6.5	-	5.1	4.8	4.8	9.5	5.0	-	-
Ni	-	7	-	7	-	39	44	36	59	38	6	6
Rb	53	58	-	54	54	23	16	23	4	22	61	71
Sb	-	0.5	-	0.5	0.6	0.1	-	0.2	0.5	-	1.1	1.2
Sc	8.82	6.29	-	5.98	5.55	15.5	15.0	13.5	16.1	14.5	6.47	5.11
Sr	399	255	-	250	195	683	693	674	826	693	271	240
Ta	0.46	0.49	-	0.51	0.56	0.29	0.29	0.27	0.57	0.33	0.52	0.53
Th	4.5	5.1	-	5.3	5.9	1.7	1.7	2.1	1.5	1.9	5.7	6.5
U	1.8	2.2	-	2.2	2.6	0.6	0.7	0.8	0.5	0.8	2.5	2.5
V	-	25	-	30	-	130	150	190	130	130	32	27
Y	24	29	-	25	26	17	18	20	22	19	27	27
Zn	42	45	-	49	45	73	73	66	56	72	40	38
Zr	192	242	-	248	257	122	120	140	172	125	231	217
La	18	20	-	20	23	13	12	13	31	13	21	22
Ce	36	42	-	41	45	25	24	26	57	-	40	44
Nd	18	21	-	22	23	13	16	16	34	15	22	24
Sm	4.1	3.8	-	3.8	5.1	2.7	2.5	2.7	5.6	2.7	4.8	5.0
Eu	0.92	0.86	-	0.85	0.85	0.98	0.96	0.97	1.46	1.25	0.80	0.78
Gd	4.9	3.7	-	4.2	-	3.1	-	3.0	2.4	5.4	5.0	5.3
Tb	0.59	0.54	-	0.54	0.69	0.38	0.36	0.43	0.74	0.36	0.70	0.78
Tm	0.32	0.26	-	0.36	-	0.22	-	0.20	0.22	0.31	0.36	0.33
Yb	2.1	2.4	-	2.4	2.5	1.5	1.3	1.5	2.1	1.5	2.3	2.7
Lu	0.30	0.35	-	0.35	0.41	0.22	0.20	0.22	0.32	0.22	0.36	0.37

Sample#	81C-533	81C-535	81C-536	81C-538	81C-539	81C-543	81C-555	81C-556	81C-556G	81C-557	81C-558	81C-559
Material	BMB	PHOc	INC	LAV	LAV	LAV	CIP	CIP	CIP	CIP	CIP	CIP
Location	CR	CW	WC	WC	WC	WC	PN1	PN7	PN7	PN7	PN12	PN17
Latitude	42° 51.02'	42° 59.34'	42° 57.42'	42° 57.33'	42° 57.33'	42° 57.43'	42° 51.05'	42° 51.05'	42° 51.05'	42° 51.05'	42° 51.05'	42° 51.05'
Longitude	122° 5.98'	122° 3.97'	122°11.52'	122°11.19'	122°11.19'	122°11.76'	122° 0.05'	122° 0.05'	122° 0.05'	122° 0.05'	122° 0.05'	122° 0.05'
Major Elements												
pct												
SiO2	56.5	70.0	51.3	66.8	59.9	51.2	68.6	68.0	70.2	67.7	68.0	68.1
Al2O3	17.4	15.3	16.5	15.6	15.9	16.6	15.1	14.8	14.2	15.1	14.8	14.8
FeTO3	6.80	2.79	8.48	3.95	5.85	8.38	2.71	2.41	1.58	2.49	2.49	2.52
MgO	4.77	0.77	8.06	1.85	4.44	7.58	0.88	0.78	0.56	0.86	0.79	0.78
CaO	7.39	2.38	9.92	3.71	6.20	9.82	2.40	2.19	1.62	2.34	2.21	2.16
Na2O	4.24	5.36	3.83	4.77	4.24	3.68	4.99	4.99	5.05	4.96	5.00	5.01
K2O	1.36	2.48	0.84	2.27	1.67	0.89	2.55	2.59	2.84	2.63	2.48	2.54
TiO2	0.93	0.51	1.26	0.62	0.86	1.24	0.47	0.46	0.42	0.46	0.45	0.45
P2O5	0.31	0.11	0.41	0.14	0.26	0.42	0.11	0.11	0.09	0.12	0.10	0.10
MnO	0.10	0.05	0.13	0.06	0.09	0.13	0.05	0.05	0.04	0.05	0.05	0.05
Cl	-	-	-	-	-	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-	-	-	-	-	-
LOI	0.31	0.29	0.01	0.52	0.64	0.01	3.17	3.25	3.30	2.88	2.95	3.09
Less O	-	-	-	-	-	-	-	-	-	-	-	-
Total	100.11	100.14	100.74	100.29	100.05	99.95	101.03	99.63	99.90	99.59	99.32	99.60
Trace Elements												
ppm												
Ba	539	764	385	652	525	353	726	755	787	755	-	-
Be	1.1	1.7	-	1.3	1.1	1.5	1.5	1.4	1.7	1.4	1.6	1.6
Co	24.6	3.7	36.2	9.2	21.1	34.1	-	2.6	1.2	-	-	-
Cr	90.8	-	265	28.1	134	243	-	1.5	0.9	-	-	-
Cs	0.9	3.0	-	2.8	1.9	0.2	-	2.9	3.3	-	-	-
Cu	55	14	69	22	31	88	20	7	22	10	7	5
Ga	21	21	23	22	22	25	18	21	19	20	19	17
Hf	3.5	5.7	3.3	4.7	4.3	3.4	-	5.5	6.2	-	-	-
Nb	-	-	-	-	-	-	-	7.0	7.4	-	-	-
Ni	64	6	100	21	52	91	10	6	6	6	10	6
Rb	28	48	18	52	38	21	46	48	58	48	-	-
Sb	0.6	1.5	0.9	1.5	1.5	0.7	-	1.1	0.8	-	-	-
Sc	17.5	6.19	26.8	9.64	17.2	27.0	-	6.21	5.82	-	-	-
Sr	1020	396	1010	447	676	1020	404	384	292	403	-	-
Ta	0.33	0.50	0.53	0.43	0.50	0.52	-	0.44	0.50	-	-	-
Th	3.1	5.0	2.7	4.7	4.1	2.7	-	4.6	5.2	-	-	-
U	0.8	1.9	0.5	1.8	1.5	0.7	-	2.0	2.3	-	-	-
V	140	38	190	71	110	190	31	30	25	35	37	28
Y	20	23	22	24	22	20	24	21	27	24	-	-
Zn	76	48	87	50	68	86	-	39	37	-	-	-
Zr	159	229	170	191	178	168	219	221	247	224	-	-
La	21	21	23	18	20	24	-	20	21	-	-	-
Ce	44	41	46	36	42	48	-	39	44	-	-	-
Nd	25	23	25	19	21	23	-	19	22	-	-	-
Sm	4.5	4.6	4.6	3.9	4.2	4.6	-	4.2	4.7	-	-	-
Eu	1.24	0.95	1.36	0.98	1.15	1.43	-	0.88	0.88	-	-	-
Gd	3.7	4.4	4.3	3.9	5.0	4.9	-	4.8	3.0	-	-	-
Tb	0.46	0.57	0.50	0.51	0.50	0.55	-	0.66	0.57	-	-	-
Tm	0.21	0.28	0.21	0.29	0.27	0.33	-	0.33	0.40	-	-	-
Yb	1.8	2.1	1.7	1.7	2.0	1.6	-	2.0	2.4	-	-	-
Lu	0.24	0.34	0.27	0.28	0.29	0.26	-	0.31	0.33	-	-	-

Sample#	81C-560	81C-561	81C-563	81C-563G	81C-566	81C-566G	81C-567	81C-568	81C-569	81C-570	81C-571	81C-572
Material	CIS[2]	CIS	CIP	CIP	CIP	CIP	CIP	CIP	CIS[2]	CIS[2]	CIP	CIS[2]
Location	PN17	PN19	PN20	PN20	PN24	PN24	PN24	PN30	PN30	PN30	PN35	PN36
Latitude	42° 51.05'	42° 51.05'	42° 51.05'	42° 51.05'	42° 51.04'	42° 51.04'	42° 51.04'	42° 51.04'	42° 51.04'	42° 51.04'	42° 51.04'	42° 51.04'
Longitude	122° 0.05'	122° 0.05'	122° 0.05'	122° 0.05'	122° 0.05'	122° 0.05'	122° 0.05'	122° 0.05'	122° 0.05'	122° 0.05'	122° 0.05'	122° 0.05'
Major Elements												
pct												
SiO2	60.1	55.1	68.1	69.8	68.7	69.8	68.0	67.8	60.3	54.0	67.7	60.4
Al2O3	17.5	19.0	14.8	14.2	15.0	14.2	14.9	14.8	17.2	19.6	15.0	17.2
FeTO3	5.29	5.66	2.61	1.77	2.50	1.64	2.61	2.69	5.23	6.45	2.67	5.17
MgO	2.21	5.20	0.79	0.54	0.82	0.55	0.82	0.77	2.27	4.27	0.89	2.52
Cao	5.18	8.66	2.20	1.66	2.25	1.63	2.25	2.28	5.30	9.02	2.38	5.27
Na2O	4.92	3.61	4.98	5.06	4.96	4.94	5.00	5.04	4.77	3.76	5.00	4.75
K2O	1.60	0.87	2.53	2.76	2.63	2.89	2.53	2.51	1.56	0.91	2.44	1.61
TiO2	0.80	0.84	0.46	0.41	0.40	0.42	0.47	0.47	0.80	1.07	0.48	0.80
P2O5	0.26	0.15	0.10	0.09	0.10	0.09	0.10	0.13	0.30	0.22	0.08	0.14
MnO	0.08	0.07	0.05	0.04	0.05	0.04	0.05	0.05	0.08	0.07	0.05	0.07
Cl	-	-	-	-	-	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-	-	-	-	-	-
LOI	1.75	0.89	3.02	3.28	2.89	3.23	3.00	3.08	2.04	0.39	3.04	1.87
Less 0	-	-	-	-	-	-	-	-	-	-	-	-
Total	99.69	100.05	99.64	99.91	100.37	99.43	38.53	99.62	99.85	99.76	99.73	99.80
Trace Elements												
ppm												
Ba	550	293	764	808	752	765	-	-	522	315	-	-
Be	1.0	-	1.3	1.6	1.6	1.5	1.8	1.5	-	-	1.7	1.2
Co	-	-	2.9	1.5	3.0	1.4	-	-	-	-	-	-
Cr	-	-	1.2	-	2.1	6.7	-	-	-	-	-	-
Cs	-	-	2.9	3.4	3.1	3.2	-	-	-	-	-	-
Cu	15	29	8	15	7	16	8	14	52	52	7	10
Ga	21	23	20	19	18	19	20	20	22	27	20	21
Hf	-	-	5.5	6.4	5.9	6.1	-	-	-	-	-	-
Nb	-	-	6.6	7.1	7.0	6.4	-	-	-	-	-	-
Ni	9	77	6	7	7	7	7	8	10	35	7	18
Rb	34	25	50	52	52	60	-	0	34	28	-	-
Sb	-	-	0.7	0.8	-	1.4	-	-	-	-	-	-
Sc	-	-	6.29	6.14	6.63	5.61	-	-	-	-	-	-
Sr	1010	1270	391	299	398	303	-	390	1040	1560	-	-
Ta	-	-	0.44	0.52	0.48	0.49	-	-	-	-	-	-
Th	-	-	4.6	5.3	4.8	5.2	-	-	-	-	-	-
U	-	-	1.8	2.2	1.9	2.1	-	-	-	-	-	-
V	97	130	35	26	35	31	38	48	98	160	38	110
Y	19	14	25	25	23	27	-	21	19	16	-	-
Zn	-	0	41	45	45	45	-	-	-	-	-	-
Zr	159	117	224	251	229	249	-	0	160	130	-	-
La	-	-	19	21	19	21	-	-	-	-	-	-
Ce	-	-	39	42	40	42	-	-	-	-	-	-
Nd	-	-	20	21	22	21	-	-	-	-	-	-
Sm	-	-	4.1	4.6	4.3	4.6	-	-	-	-	-	-
Eu	-	-	0.91	0.91	0.87	0.87	-	-	-	-	-	-
Gd	-	-	4.3	4.5	3.8	-	-	-	-	-	-	-
Tb	-	-	0.56	0.71	0.58	0.56	-	-	-	-	-	-
Tm	-	-	0.32	0.32	0.27	-	-	-	-	-	-	-
Yb	-	-	2.0	2.2	2.0	2.3	-	-	-	-	-	-
Lu	-	-	0.32	0.33	0.30	0.33	-	-	-	-	-	-

Sample#	81C-572G	81C-573	81C-573G	81C-574	81C-575	81C-576	81C-577	81C-578	81C-578G	81C-579	81C-582	81C-582G
Material	CIS	CIP	CIP	CIS[2]	CIS[2]	CIS	CIS[2]	CIS[2]	CIS	CIS	CIS	CIS
Location	PN36	PN38	PN38	PN41	PN41	PN41	PN41	PN47	PN47	PN49	PN57	PN57
Latitude	42° 51.04'	42° 51.04'	42° 51.04'	42° 51.03'	42° 51.03'	42° 51.03'	42° 51.03'	42° 51.03'	42° 51.03'	42° 51.03'	42° 51.03'	42° 51.03'
Longitude	122° 0.05'	122° 0.05'	122° 0.05'	122° 0.05'	122° 0.05'	122° 0.05'	122° 0.05'	122° 0.05'	122° 0.05'	122° 0.05'	122° 0.05'	122° 0.05'
Major Elements												
pct												
SiO2	68.1	66.8	69.7	59.8	53.7	52.3	56.2	55.7	66.4	54.0	55.8	66.9
Al2O3	15.2	15.1	14.9	17.5	19.6	19.6	18.6	18.5	15.6	19.0	18.9	15.8
FeTO3	1.71	3.01	1.74	5.58	7.19	6.52	6.65	6.74	3.36	7.35	7.58	3.14
MgO	0.74	1.02	0.64	2.55	4.84	5.24	2.96	3.88	1.06	3.72	3.21	0.86
CaO	2.42	2.58	1.99	5.71	9.20	9.76	7.15	7.62	2.93	8.60	7.13	2.78
Na2O	5.03	5.01	5.11	4.68	3.54	3.66	4.59	4.15	5.40	3.85	4.37	5.22
K2O	2.45	2.37	2.62	1.54	0.72	0.90	1.19	1.05	2.18	1.17	0.78	1.96
TiO2	0.44	0.49	0.42	0.82	0.93	1.19	1.03	1.01	0.60	1.12	1.09	0.55
P2O5	0.15	0.08	0.08	0.28	0.21	0.19	0.43	0.26	0.24	0.53	0.35	0.25
MnO	0.05	0.05	0.05	0.08	0.09	0.07	0.07	0.08	0.07	0.07	0.12	0.08
Cl	-	-	-	-	-	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-	-	-	-	-	-
LOI	3.03	2.80	2.97	1.70	0.31	0.42	0.94	0.78	1.75	0.52	1.00	2.44
Less O	-	-	-	-	-	-	-	-	-	-	-	-
Total	99.32	99.31	100.22	100.24	100.33	99.85	99.81	99.77	99.59	99.93	100.33	99.98
Trace Elements												
ppm												
Ba	714	700	766	534	-	408	-	388	701	405	334	643
Be	1.9	1.6	2.0	1.4	-	-	1.2	1.1	2.1	1.2	-	2.0
Co	1.9	4.3	1.8	-	-	-	-	21.5	5.6	-	17.2	3.1
Cr	1.9	4.1	-	-	-	-	-	30.2	1.7	-	20.3	-
Cs	2.6	2.7	3.1	-	-	-	-	1.1	2.3	-	1.0	2.5
Cu	16	8	8	21	32	47	31	52	45	110	41	48
Ga	20	19	16	20	20	21	21	21	19	22	21	19
Hf	5.2	5.3	5.7	-	-	-	-	2.7	4.7	-	1.7	4.1
Nb	-	6.2	6.0	-	-	-	-	4.2	5.4	-	3.8	-
Ni	6	7	6	17	55	66	16	36	8	28	17	7
Rb	48	48	49	37	-	25	-	30	41	34	23	37
Sb	0.4	1.1	1.3	-	-	-	-	0.7	0.7	-	1.1	1.2
Sc	3.66	6.58	5.63	-	-	-	-	19.0	5.62	-	12.6	4.15
Sr	581	448	369	1040	-	1490	-	1100	580	1580	787	377
Ta	0.43	0.43	0.46	-	-	-	-	0.24	0.40	-	0.21	0.38
Th	5.2	4.4	5.0	-	-	-	-	2.0	4.2	-	1.2	3.3
U	1.9	1.8	2.1	-	-	-	-	0.7	1.6	-	0.7	1.5
V	29	38	30	120	140	160	160	150	52	180	140	41
Y	19	24	22	21	-	17	-	17	19	20	15	17
Zn	33	40	34	-	-	-	-	75	55	-	70	36
Zr	221	221	232	162	-	116	-	127	191	149	92	164
La	24	19	21	-	-	-	-	14	23	-	10	17
Ce	49	39	41	-	-	-	-	30	47	-	20	32
Nd	21	19	-	-	-	-	-	19	24	-	10	18
Sm	4.0	4.1	4.6	-	-	-	-	3.9	4.4	-	2.9	3.4
Eu	0.91	0.93	0.90	-	-	-	-	1.28	1.13	-	1.02	0.90
Gd	-	3.6	6.3	-	-	-	-	4.0	3.6	-	3.3	3.0
Tb	0.43	0.61	0.66	-	-	-	-	0.42	-	-	0.40	0.46
Tm	-	0.30	0.38	-	-	-	-	-	-	-	-	-
Yb	1.5	1.9	2.1	-	-	-	-	1.6	1.7	-	1.2	1.5
Lu	0.23	0.29	0.32	-	-	-	-	0.22	0.25	-	0.17	0.23

Sample#	81C-583	81C-584	81C-585	81C-586	81C-586G	81C-587	81C-589	81C-589G	81C-591	81C-591G	81C-592	81C-592G
Material	CIS[2]	CIS[2]	CIS	CIS[2]	CIS	CIS	CIS[2]	CIS	CIS[2]	CIS	CIP	CIP
Location	PN57	PN60	PN62	PN62	PN62	PN63	CT9	CT9	CT9	CT9	CT9	CT9
Latitude	42° 51.03'	42° 51.03'	42° 51.02'	42° 51.02'	42° 51.02'	42° 51.02'	42° 53.53'	42° 53.53'	42° 53.53'	42° 53.53'	42° 53.53'	42° 53.53'
Longitude	122° 0.05'	122° 0.05'	122° 0.05'	122° 0.05'	122° 0.05'	122° 0.05'	122°11.82'	122°11.82'	122°11.82'	122°11.82'	122°11.82'	122°11.82'
Major Elements												
pct												
SiO2	52.1	53.1	52.6	54.8	-	54.1	52.7	-	56.5	67.2	67.8	70.3
Al2O3	19.5	21.6	18.8	20.1	-	18.8	18.7	-	17.7	15.1	14.8	14.1
FeTO3	6.52	5.10	9.74	6.03	-	6.08	7.60	-	6.93	2.50	2.83	2.08
MgO	5.82	4.39	4.54	5.06	-	5.32	5.3	-	3.17	0.82	0.81	0.50
CaO	10.3	10.5	8.82	9.29	-	9.13	9.00	-	6.67	2.39	2.22	1.57
Na2O	3.38	3.37	3.80	3.42	-	3.63	3.94	-	4.44	5.08	4.76	4.77
K2O	0.83	0.75	0.65	0.66	-	0.91	0.96	-	1.40	2.59	2.59	2.85
TiO2	1.11	0.83	1.17	0.63	-	1.15	1.30	-	1.04	0.50	0.47	0.40
P2O5	0.20	0.17	0.13	0.15	-	0.16	0.20	-	0.34	0.21	0.09	0.09
MnO	0.07	0.06	0.10	0.10	-	0.07	0.08	-	0.08	0.06	0.05	0.05
Cl	-	-	-	-	-	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-	-	-	-	-	-
LOI	0.40	0.33	0.09	0.21	-	0.53	0.59	-	1.44	2.88	2.94	3.33
Less O	-	-	-	-	-	-	-	-	-	-	-	-
Total	100.23	100.20	100.44	100.45	-	99.88	100.37	-	99.71	99.33	99.36	100.04
Trace Elements												
ppm												
Ba	-	-	268	278	538	331	455	813	548	897	756	804
Be	-	-	-	-	1.3	-	-	1.9	1.2	1.8	1.8	1.7
Co	-	-	-	-	9.2	-	27.3	8.7	19.1	4.4	3.5	1.5
Cr	-	-	-	-	4	-	16.4	2.4	3.4	-	1.8	-
Cs	-	-	-	-	1.6	-	0.9	1.9	1.3	2.4	3.2	3.2
Cu	39	33	120	56	120	45	42	190	22	120	10	27
Ga	22	22	21	19	21	21	23	22	24	19	17	17
Hf	-	-	-	-	3.1	-	2.3	3.9	3.2	5.3	6.0	6.0
Nb	-	-	-	-	5.4	-	6.9	7.8	5.8	7.8	7.0	7.4
Ni	100	63	38	37	11	70	57	12	22	6	22	7
Rb	-	-	14	16	27	28	30	45	37	49	52	56
Sb	-	-	-	-	0.3	-	0.3	0.4	0.7	0.5	0.5	0.6
Sc	-	-	-	-	8.45	-	25.5	4.89	15.9	3.35	6.73	5.55
Sr	-	-	725	857	795	1430	1450	943	1210	611	380	277
Ta	-	-	-	-	0.32	-	0.29	0.42	-	0.50	0.50	0.45
Th	-	-	-	-	2.5	-	2.0	4.4	2.9	5.9	5.2	5.2
U	-	-	-	-	1.2	-	0.7	1.4	0.7	2.1	2.3	2.2
V	160	110	230	95	70	150	190	60	170	37	30	18
Y	-	-	14	13	18	16	18	18	19	19	23	25
Zn	-	-	-	-	61	-	75	69	77	49	43	36
Zr	-	-	79	94	142	131	130	173	149	225	228	247
La	-	-	-	-	16	-	17	28	19	30	21	21
Ce	-	-	-	-	33	-	36	53	41	56	42	41
Nd	-	-	-	-	17	-	23	27	23	24	20	22
Sm	-	-	-	-	3.9	-	4.9	4.6	5.1	4.3	4.9	4.5
Eu	-	-	-	-	1.17	-	1.42	1.21	1.41	1.02	0.95	0.83
Gd	-	-	-	-	4.6	-	4.4	3.8	4.8	3.7	4.4	4.3
Tb	-	-	-	-	0.47	-	0.50	0.40	0.56	0.49	0.57	0.56
Tm	-	-	-	-	0.23	-	0.17	0.22	0.26	0.23	0.33	0.30
Yb	-	-	-	-	1.6	-	1.3	1.3	1.5	1.5	2.2	2.3
Lu	-	-	-	-	0.23	-	0.17	0.20	0.23	0.23	0.34	0.34

Sample#	81C-594	81C-595	81C-595G	81C-596	81C-597	81C-601	81C-601G	81C-603	81C-603G	81C-605	81C-606	81C-606G
Material	CIP	CIS	CIS	CIP	CIP	CIP	CIP	CIS[2]	CIS	CIP	CIS	CIS
Location	CT25	CT25	CT25	CT30	CT37	CT48	CT48	CT56	CT56	CT61	CT62	CT62
Latitude	42° 53.53'	42° 53.50'	42° 53.50'	42° 53.50'	42° 53.50'	42° 53.50'	42° 53.50'	42° 53.50'	42° 53.50'	42° 53.50'	42° 53.50'	42° 53.50'
Longitude	122°11.82'	122°11.82'	122°11.82'	122°11.82'	122°11.82'	122°11.82'	122°11.82'	122°11.82'	122°11.82'	122°11.82'	122°11.82'	122°11.82'
Major Elements												
pct												
SiO2	68.3	55.5	65.7	68.1	68.7	67.6	69.2	51.8	-	67.5	52.8	60.5
Al2O3	14.8	18.8	16.5	14.7	15.2	15.0	14.2	19.9	-	14.9	22.1	18.2
FeTO3	2.76	7.37	3.39	2.95	3.08	2.70	1.78	6.15	-	2.91	4.92	4.76
MgO	0.78	3.31	0.98	0.80	0.82	0.84	0.56	5.65	-	0.84	3.72	2.00
CaO	2.18	7.19	3.54	2.21	2.25	2.33	1.74	10.5	-	2.30	10.4	5.76
Na2O	4.86	4.29	5.23	4.99	4.87	5.01	4.88	3.22	-	4.89	3.46	4.85
K2O	2.60	1.00	2.09	2.46	2.68	2.47	2.83	0.64	-	2.45	0.86	1.64
TiO2	0.47	1.13	0.57	0.46	0.46	0.48	0.41	1.12	-	0.46	0.81	0.67
P2O5	0.09	0.32	0.29	0.10	0.10	0.10	0.10	0.16	-	0.10	0.19	0.35
MnO	0.05	0.09	0.06	0.05	0.06	0.05	0.04	0.07	-	0.05	0.05	0.07
Cl	-	-	-	-	-	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-	-	-	-	-	-
LOI	3.07	0.60	1.28	2.74	2.85	2.73	3.17	0.30	-	3.00	0.30	0.67
Less O	-	-	-	-	-	-	-	-	-	-	-	-
Total	99.96	99.60	99.63	99.56	101.07	99.31	98.91	99.51	-	99.40	99.61	99.47
Trace Elements												
ppm												
Ba	-	354	665	-	-	705	803	235	410	-	340	626
Be	1.6	-	1.8	1.7	1.5	1.8	1.9	-	1.4	1.7	-	1.5
Co	-	18.3	4.8	-	-	3.3	1.4	26.8	13.3	-	18.2	11.3
Cr	-	13.6	-	-	-	1.6	-	83.6	5.7	-	42.8	5.7
Cs	-	1.1	2.5	-	-	2.9	3.2	0.6	1.0	-	0.7	1.3
Cu	7	24	55	5	9	6	34	40	230	8	34	64
Ga	17	24	20	15	17	18	17	23	21	16	25	22
Hf	-	2.4	4.5	-	-	5.4	6.2	2.3	3.8	-	2.0	3.5
Nb	-	5.9	5.8	-	-	8.2	6.8	4.2	6.0	-	4.0	5.8
Ni	6	19	6	5	5	6	5	81	19	6	46	12
Rb	-	21	43	-	-	54	54	21	21	-	31	37
Sb	-	0.5	0.8	-	-	0.3	0.6	0.6	-	-	0.5	0.2
Sc	-	18.9	6.83	-	-	6.47	5.66	24.9	10.1	-	18.8	7.71
Sr	-	725	421	-	-	405	307	1750	1600	-	1760	1320
Ta	-	0.24	0.39	-	-	0.43	0.48	0.24	0.30	-	0.18	0.29
Th	-	1.8	3.8	-	-	4.7	5.3	1.4	2.8	-	1.7	3.5
U	-	0.6	1.5	-	-	1.9	2.2	-	1.0	-	0.6	1.1
V	30	160	42	28	31	36	25	150	140	40	140	110
Y	-	19	24	-	-	26	24	17	18	-	16	19
Zn	-	75	51	-	-	43	37	81	71	-	50	69
Zr	-	109	181	-	-	222	244	132	180	-	129	177
La	-	11	18	-	-	20	21	15	25	-	15	25
Ce	-	24	37	-	-	39	41	36	54	-	32	51
Nd	-	16	20	-	-	18	21	21	31	-	16	27
Sm	-	3.9	4.6	-	-	4.2	4.7	4.3	5.0	-	3.4	4.6
Eu	-	1.25	1.09	-	-	0.94	0.86	1.28	1.40	-	1.08	1.24
Gd	-	-	4.8	-	-	4.1	4.1	-	3.4	-	2.2	3.9
Tb	-	0.60	0.62	-	-	0.56	0.60	0.41	0.40	-	0.33	0.39
Tm	-	0.23	0.32	-	-	0.35	0.33	0.18	-	-	-	0.18
Yb	-	1.7	2.1	-	-	2.1	2.3	1.0	1.1	-	0.9	1.2
Lu	-	0.26	0.31	-	-	0.32	0.33	0.15	0.18	-	0.13	0.18

Sample#	81C-608	81C-608G	81C-609	81C-609G	81C-611	81C-613	81C-613G	81C-614	81C-614G	81C-616	81C-616G	81C-620
Material	CIS[2]	CIS	CIS[2]	CIS	CIP	CIS[2]	CIS	CIP	CIP	CIS[2]	CIS	CIS[2]
Location	CT81	CT81	CT101	CT101	CL7	CL17	CL17	CL19	CL19	CL37	CL37	CL57
Latitude	42° 53.50'	42° 53.50'	42° 53.50'	42° 53.50'	42° 53.64'	42° 53.64'	42° 53.64'	42° 53.64'	42° 53.64'	42° 53.64'	42° 53.64'	42° 53.64'
Longitude	122°11.82'	122°11.82'	122°11.82'	122°11.82'	122°14.82'	122°14.82'	122°14.82'	122°14.82'	122°14.82'	122°14.82'	122°14.82'	122°14.82'
Major Elements												
pct												
SiO2	54.9	-	55.3	-	68.1	55.7	64.5	68.1	69.2	58.4	64.7	55.8
Al2O3	18.9	-	19.0	-	15.0	18.1	16.4	15.0	14.5	17.5	16.5	18.5
FeTO3	6.76	-	7.09	-	3.22	6.39	3.81	2.78	2.12	5.65	2.94	7.24
MgO	4.72	-	3.70	-	0.89	4.67	1.43	0.78	0.57	3.10	1.18	3.17
CaO	8.78	-	7.84	-	2.24	8.06	4.03	2.24	1.82	6.18	3.86	7.09
Na2O	3.71	-	4.36	-	5.02	3.87	4.97	4.85	4.88	4.49	4.90	4.29
K2O	0.91	-	0.90	-	2.46	1.00	2.05	2.56	2.74	1.56	2.23	1.17
TiO2	1.00	-	1.06	-	0.40	0.94	0.62	0.47	0.41	0.88	0.47	1.02
P2O5	0.21	-	0.28	-	0.11	0.22	0.29	0.11	0.11	0.30	0.41	0.36
MnO	0.09	-	0.09	-	0.06	0.08	0.06	0.05	0.04	0.08	0.06	0.09
Cl	-	-	-	-	-	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-	-	-	-	-	-
LOI	0.40	-	0.26	-	2.71	0.63	1.23	2.89	3.24	1.50	2.39	1.24
Less O	-	-	-	-	-	-	-	-	-	-	-	-
Total	100.38	-	99.88	-	100.28	99.66	99.39	99.83	99.63	99.64	99.64	99.97
Trace Elements												
ppm												
Ba	334	577	380	730	-	345	609	750	797	574	760	461
Be	-	1.4	1.0	1.9	1.7	-	1.6	1.6	2.0	1.3	1.5	1.2
Co	24.0	10.1	21.2	7.6	-	23.7	8.5	3.0	1.7	15.8	5.5	15.6
Cr	71	11.4	16.7	-	-	74	10.2	-	2.6	8.8	3.1	7.8
Cs	0.8	2.1	1.0	2.0	-	1.0	1.5	2.7	3.1	1.4	2.1	1.2
Cu	39	130	62	110	12	48	54	13	50	26	59	28
Ga	22	20	23	22	18	26	23	15	17	22	18	21
Hf	2.5	4.1	2.1	4.0	-	2.8	4.0	5.5	6.0	3.5	4.5	2.8
Nb	4.8	6.0	5.4	7.0	-	5.5	7.0	7.4	7.9	5.7	6.4	5.2
Ni	68	16	33	12	6	75	12	5	6	29	10	16
Rb	25	43	27	39	-	31	41	47	52	38	50	34
Sb	-	0.5	0.5	0.4	-	0.3	0.3	0.6	0.6	0.4	0.5	0.8
Sc	20.0	8.22	18.5	6.10	-	19.0	6.17	6.27	5.72	12.6	4.62	14.6
Sr	1310	1050	1070	812	-	1380	1000	387	320	1330	996	1140
Ta	0.17	0.32	0.21	0.37	-	0.22	0.31	0.45	0.49	0.32	0.41	0.29
Th	1.7	3.7	1.6	4.0	-	2.2	3.8	4.7	5.1	3.2	4.7	2.4
U	0.7	1.4	0.7	1.4	-	0.9	1.1	1.9	2.1	1.2	1.7	0.9
V	160	85	180	62	38	160	66	29	20	120	40	150
Y	16	21	19	18	-	17	19	25	26	18	19	17
Zn	70	64	73	61	-	68	58	29	63	56	30	65
Zr	127	184	112	175	-	140	200	234	243	178	212	136
La	14	25	13	24	-	17	24	19	21	22	29	18
Ce	31	55	27	48	-	36	50	40	42	46	57	36
Nd	19	27	-	26	-	20	25	24	21	27	28	24
Sm	3.9	4.8	3.9	4.7	-	4.2	4.2	4.5	4.8	4.9	4.6	4.5
Eu	1.19	1.36	1.25	1.21	-	1.24	1.15	0.91	0.90	1.33	1.11	1.33
Gd	2.6	4.7	4.2	3.5	-	3.5	-	4.3	4.6	4.2	3.5	4.2
Tb	0.40	0.49	0.47	0.46	-	0.39	0.38	0.49	0.59	0.45	0.46	0.48
Tm	0.20	-	0.24	0.22	-	-	-	0.34	0.36	0.21	0.23	0.21
Yb	1.2	1.7	1.2	1.6	-	1.1	1.1	2.1	2.2	1.4	1.3	1.4
Lu	0.18	0.25	0.19	0.24	-	0.19	0.18	0.32	0.33	0.21	0.21	0.21

Sample#	81C-620G	81C-621	81C-625	81C-627	81C-631	81C-631G	81C-632	81C-635	81C-637	81C-637G	81C-639	81C-639G
Material	CIS	LAV	CIP	CIP	CIP	CIP	CIP	CIP	CIS	CIS	CIS[2]	CIS
Location	CL57	CL	RB1	RB9	RB33	RB33	RB38	RB56	CT78	CT78	CT89	CT89
Latitude	42° 53.64'	42° 53.64'	42° 58.78'	42° 58.78'	42° 58.80'	42° 58.80'	42° 58.80'	42° 58.80'	42° 53.47'	42° 53.47'	42° 53.47'	42° 53.47'
Longitude	122°14.82'	122°14.82'	122°23.95'	122°23.95'	122°23.90'	122°23.90'	122°23.85'	122°23.85'	122°11.83'	122°11.83'	122°11.83'	122°11.83'
Major Elements												
pct												
SiO2	-	47.5	68.0	68.3	67.8	69.9	67.8	67.8	58.8	69.0	54.5	-
Al2O3	-	17.4	15.0	14.8	14.8	14.3	14.9	15.0	17.6	14.4	19.6	-
FeTO3	-	10.80	2.73	2.61	2.81	1.68	2.60	2.82	6.68	1.90	5.99	-
MgO	-	9.74	0.83	0.75	0.79	0.52	0.79	0.83	2.68	0.57	4.05	-
CaO	-	11.1	2.36	2.20	2.27	1.73	2.23	2.35	5.94	2.03	8.82	-
Na2O	-	2.59	5.01	5.03	4.83	4.89	4.86	4.98	4.50	4.91	3.94	-
K2O	-	0.07	2.47	2.54	2.55	2.82	2.56	2.43	1.28	2.70	0.90	-
TiO2	-	1.08	0.46	0.46	0.46	0.41	0.45	0.47	1.04	0.45	1.06	-
P2O5	-	0.11	0.11	0.01	0.11	0.09	0.11	0.11	0.27	0.14	0.22	-
MnO	-	0.19	0.05	0.05	.05	0.03	0.05	0.05	0.10	0.03	0.07	-
Cl	-	-	-	-	-	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-	-	-	-	-	-
LOI	-	0.49	2.60	2.61	2.72	3.11	2.90	2.70	1.26	3.14	0.39	-
Less O	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	100.07	99.62	99.36	99.19	99.48	99.25	99.54	100.15	99.27	99.54	-
Trace Elements												
ppm												
Ba	798	80	-	-	749	771	-	-	461	779	347	598
Be	1.8	-	1.7	1.6	1.5	1.6	1.8	1.4	1.0	1.6	-	1.5
Co	2.9	49.0	-	-	3.8	2.0	-	-	13.3	1.5	21.7	10.4
Cr	2.3	305	-	-	1.9	1.9	-	-	13.3	3.1	56.5	10.5
Cs	2.3	-	-	-	3.2	3.3	-	-	1.5	3.3	1.0	2.0
Cu	59	100	11	17	13	57	15	10	9	53	57	85
Ga	20	18	16	17	18	17	17	20	20	17	23	23
Hf	4.7	1.7	-	-	5.7	6.0	-	-	3.0	5.7	2.3	3.5
Nb	7.4	2.4	-	-	7.6	7.7	-	-	7.2	7.4	5.0	6.5
Ni	7	210	5	4	7	4	5	7	13	7	58	24
Rb	45	4	-	-	48	54	-	-	29	58	26	30
Sb	1.2	0.4	-	-	0.6	0.8	-	-	0.4	0.5	0.5	0.5
Sc	4.56	35.4	-	-	6.43	5.61	-	-	14.4	6.94	21.2	10.6
Sr	770	315	380	370	389	305	390	370	618	259	1260	1300
Ta	0.42	-	-	-	0.53	0.52	-	-	0.33	0.46	0.23	0.30
Th	4.7	-	-	-	4.8	5.0	-	-	2.6	5.3	1.3	2.5
U	1.8	-	-	-	1.9	2.0	-	-	1.1	2.3	0.6	1.2
V	49	210	22	19	31	14	25	24	130	29	160	94
Y	19	24	20	19	25	25	21	19	19	24	18	21
Zn	37	86	-	-	40	37	-	-	65	33	68	57
Zr	190	80	-	-	225	240	-	-	133	231	116	120
La	27	3.0	-	-	19	21	-	-	13	18	12	17
Ce	54	9.0	-	-	41	42	-	-	26	37	27	36
Nd	26	-	-	-	24	20	-	-	16	19	16	21
Sm	5.0	2.9	-	-	4.1	4.3	-	-	3.5	4.3	4.3	4.3
Eu	1.15	1.06	-	-	0.91	0.86	-	-	1.04	0.85	1.33	1.31
Gd	4.2	3.2	-	-	3.5	4.3	-	-	3.5	4.9	4.2	4.2
Tb	0.53	0.68	-	-	0.79	0.77	-	-	0.52	0.71	0.54	0.58
Tm	0.26	-	-	-	-	-	-	-	-	-	-	-
Yb	1.6	2.6	-	-	2.1	2.2	-	-	1.5	2.2	1.4	1.7
Lu	0.25	0.38	-	-	0.31	0.33	-	-	0.23	0.33	0.22	0.26

Sample#	81C-666	81C-667	81C-669	81C-673	82C-674	82C-698	82C-703	82C-714	82C-715	82C-716	82C-718	82C-719
Material	BMB	BMB	PCL	PCB	LAV	CVO	LAV	PPGs	PPGs	PPGs	PPGs	PPGs
Location	WC	WC	WI	WD	SM	CS	LB	SP	SP	SP	SP	SP
Latitude	42° 57.30'	42° 57.30'	42° 56.74'	42° 56.57'	42° 46.93'	42° 57.38'	42° 58.34'	42° 59.86'	43° 00.01'	42° 59.82'	42° 59.71'	42° 59.61'
Longitude	122°10.67'	122°10.67'	122° 8.91'	122° 7.10'	121°59.06'	122° 0.42'	121°55.17'	122° 0.52'	122° 0.44'	122° 0.65'	122° 0.75'	122° 0.83'
Major Elements												
pct												
SiO2	50.9	54.1	58.1	70.6	51.2	68.7	58.2	68.7	69.3	68.3	68.8	68.7
Al2O3	16.4	16.2	18.2	14.5	16.9	15.0	16.6	14.8	14.9	14.8	14.8	14.7
FeTO3	8.32	7.46	6.73	2.58	8.69	2.76	6.18	2.76	2.73	2.73	2.76	2.74
MgO	8.03	6.78	3.71	0.82	7.30	0.84	4.62	0.76	0.74	0.76	0.77	0.76
CaO	9.69	8.47	6.88	2.24	8.13	2.33	7.21	2.30	2.26	2.29	2.28	2.30
Na2O	3.46	3.65	4.24	4.18	3.32	5.41	3.86	4.97	5.21	4.92	5.19	4.94
K2O	0.87	1.17	1.01	3.19	0.97	2.490	1.353	2.50	2.503	2.53	2.501	2.51
TiO2	1.17	1.06	0.76	0.37	1.15	0.47	0.78	0.47	0.47	0.48	0.48	0.48
P2O5	0.41	0.36	0.21	0.09	0.36	0.12	0.18	0.12	0.11	0.12	0.12	0.12
MnO	0.13	0.11	0.10	0.04	0.13	0.05	0.09	0.05	0.05	0.05	0.05	0.05
Cl	-	-	-	-	-	0.094	-	-	-	-	-	-
F	-	-	-	-	-	0.03	-	-	-	-	-	-
LOI	0.34	0.29	0.10	0.83	1.16	0.75	0.64	0.91	1.59	1.72	1.20	1.21
Less O	-	-	-	-	-	0.03	-	-	-	-	-	-
Total	99.72	99.65	100.04	99.44	99.31	99.02	99.71	98.34	99.86	98.70	98.95	98.51
Trace Elements												
ppm												
Ba	354	432	388	865	508	746	389	-	748	-	756	-
Be	-	1.5	-	1.5	1.1	1.7	-	-	1.6	-	1.8	-
Co	36.6	31.0	20.3	4.3	36.3	4.1	23.2	-	3.9	-	3.8	-
Cr	284	220	48.4	5.7	247	2.4	102	-	-	-	2.2	-
Cs	0.4	1.0	0.9	4.6	-	2.9	1.2	-	3.0	-	3.0	-
Cu	78	71	47	15	74	14	52	-	15	-	20	-
Ga	21	22	20	16	20	17	18	-	15	-	16	-
Hf	3.3	3.9	2.6	5.2	3.0	5.7	2.9	-	5.8	-	5.6	-
Nb	8.9	9.5	4.9	7.1	8.3	5.6	3.9	-	6.2	-	6.0	-
Ni	120	100	48	8	130	6	54	-	5	-	5	-
Rb	21	28	19	81	15	50	26	-	48	-	48	-
Sb	-	0.2	0.4	1.2	-	0.4	0.4	-	0.4	-	0.4	-
Sc	27.5	24.3	15.7	5.12	23.6	6.53	17.8	-	6.37	-	6.29	-
Sr	964	882	693	292	888	396	742	-	396	-	390	-
Ta	0.42	0.50	0.23	0.65	0.50	0.46	0.30	-	0.51	-	0.49	-
Th	2.4	3.3	1.7	8.6	2.2	4.9	2.6	-	4.9	-	4.9	-
U	0.8	1.1	0.8	3.2	0.6	2.2	1.1	-	2.0	-	2.0	-
V	170	180	140	38	170	36	130	-	23	-	27	-
Y	20	21	16	21	21	24	17	-	24	-	25	-
Zn	98	87	72	41	102	29	63	-	47	-	49	-
Zr	168	178	120	202	147	235	134	-	233	-	235	-
La	22	23	12	23	21	21	13	-	20	-	21	-
Ce	43	45	25	42	42	43	27	-	42	-	41	-
Nd	25	26	15	17	23	24	14	-	22	-	21	-
Sm	4.6	4.8	3.2	3.9	4.9	4.9	3.2	-	4.6	-	4.5	-
Eu	1.32	1.31	1.04	0.75	1.42	0.95	0.97	-	0.94	-	0.94	-
Gd	3.5	5.1	2.7	3.9	3.9	4.4	3.5	-	4.5	-	4.1	-
Tb	0.59	0.70	0.44	0.54	0.57	0.64	0.47	-	0.63	-	0.51	-
Tm	-	-	-	0.30	0.20	0.37	0.26	-	0.34	-	0.31	-
Yb	1.6	2.1	1.5	1.9	1.8	2.2	1.5	-	2.2	-	2.1	-
Lu	0.26	0.31	0.21	0.29	0.29	0.34	0.21	-	0.33	-	0.33	-

Sample#	82C-722	82C-723	82C-724	82C-728	82C-728G	82C-729	82C-730	82C-753	82C-754	82C-761	82C-770	82C-771
Material	PPGs	PPGs	PPGs	PPGs	PPGs	PPGs	LAV	AGL	AGL	AGL	PHOc	PHOc
Location	SP	SP	SP	SP	SP	SP	LB	BB	TY	CV	CW	CW
Latitude	42° 59.50'	42° 59.39'	42° 59.39'	43° 00.40'	43° 00.40'	43° 00.58'	42° 59.59'	43° 05.38'	43° 05.43'	42° 53.70'	42° 59.24'	42° 59.89'
Longitude	122° 0.93'	122° 1.02'	122° 1.02'	122° 0.20'	122° 0.20'	122° 0.04'	121°56.66'	121°51.03'	121°58.42'	121°59.92'	122° 3.41'	122° 2.76'

Major Elements

pct												
SiO2	68.8	68.4	68.5	68.4	71.1	68.0	52.6	52.3	52.8	60.8	69.8	69.3
Al2O3	14.8	14.9	14.7	14.7	14.0	15.0	17.4	17.7	17.6	16.6	14.9	14.9
FeTO3	2.75	2.80	2.74	2.75	2.08	2.74	8.94	7.90	8.31	5.38	2.73	2.83
MgO	0.75	0.76	0.76	0.75	0.49	0.74	6.23	4.14	5.38	3.15	0.74	0.78
CaO	2.28	2.30	2.26	2.22	1.67	2.29	8.51	7.28	8.56	5.61	2.28	2.34
Na2O	4.86	5.01	5.09	5.20	5.46	4.80	3.69	3.69	3.69	4.19	5.31	5.30
K2O	2.55	2.459	2.511	2.529	2.84	2.61	0.681	2.046	1.106	1.592	2.511	2.468
TiO2	0.47	0.48	0.47	0.47	0.41	0.47	1.07	1.25	1.21	0.71	0.46	0.48
P2O5	0.12	0.12	0.12	0.12	0.09	0.12	0.25	0.62	0.36	0.16	0.12	0.12
MnO	0.05	0.05	0.05	0.05	0.04	0.05	0.14	0.11	0.12	0.08	0.05	0.05
Cl	-	-	-	-	-	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-	-	-	-	-	-
LOI	1.35	1.85	1.83	1.51	2.10	1.75	-	2.24	0.78	0.59	0.49	0.44
Less O	-	-	-	-	-	-	-	-	-	-	-	-
Total	98.78	99.13	99.03	98.70	100.28	98.57	99.51	99.28	99.92	98.86	99.39	99.01

Trace Elements

ppm												
Ba	-	785	774	747	806	768	316	1006	462	468	763	756
Be	-	2.1	1.9	1.9	-	-	-	1.9	1.1	1.1	1.7	1.4
Co	-	3.6	4.0	3.8	2.39	-	32.7	25.3	28.1	17.1	3.9	4.0
Cr	-	-	-	-		-	204	44.6	93.5	50.5	-	-
Cs	-	2.8	2.9	2.9	3.5	-	0.4	0.3	-	1.2	3.0	3.1
Cu	-	13	15	12	-	-	58	78	36	28	16	12
Ga	-	16	16	16	-	-	20	22	21	20	21	23
Hf	-	5.8	5.8	5.6	6.2	-	2.4	4.5	3.1	3.6	5.9	6.0
Nb	-	5.6	5.6	6.2	-	-	4.3	10.0	8.4	4.2	5.6	5.8
Ni	-	5	5	5	-	-	93	39	63	44	7	8
Rb	-	46	51	50	53	48	9	43	8	35	50	50
Sb	-	0.5	0.5	0.4	0.5	-	-	-	-	0.3	0.5	0.5
Sc	-	6.28	6.28	6.13	5.69	-	23.9	19.0	21.7	13.2	6.45	6.69
Sr	-	390	381	373	274	384	502	1750	547	577	386	380
Ta	-	0.47	0.47	0.47	0.52	-	0.25	0.37	0.40	0.34	0.47	0.49
Th	-	4.9	5.0	4.7	5.5	-	1.0	4.0	2.4	3.1	5.1	5.0
U	-	2.1	2.0	2.1	2.4	-	-	-	-	1.3	2.0	2.1
V	-	30	31	26	-	-	160	110	190	120	63	69
Y	-	24	22	24	24	25	23	24	21	18	25	26
Zn	-	48	48	49	43	-	81	96	83	65	49	51
Zr	-	228	229	229	245	233	102	216	118	153	230	234
La	-	20	20	20	22	-	12	37	22	14	21	20
Ce	-	42	42	41	44	-	23	75	43	26	42	43
Nd	-	21	22	22	23	-	16	41	28	18	22	23
Sm	-	4.4	4.6	4.4	5.0	-	3.8	7.2	4.6	304.0	4.7	4.6
Eu	-	0.95	0.95	0.92	0.92	-	1.23	1.94	1.35	0.87	0.95	0.98
Gd	-	3.9	4.0	4.1	-	-	3.5	3.7	-	3.1	4.1	4.6
Tb	-	0.52	0.52	0.52	0.63	-	0.62	0.62	0.48	0.43	0.53	0.57
Tm	-	0.36	0.34	0.30	-	-	0.32	0.25	0.27	0.25	0.31	0.36
Yb	-	2.0	2.1	2.1	2.3	-	2.2	1.6	1.9	1.6	2.3	2.2
Lu	-	0.33	0.32	0.33	0.36	-	0.33	0.24	0.28	0.24	0.34	0.34

Sample#	82C-775	82C-776	82C-777	82C-778	82C-779	82C-785	82C-795	82C-796	82C-797	82C-798	82C-799	82C-799G
Material	PHIc	CDB	CDB	CDB	PHO	CGR	PPOr	CVO	CGR	CGR	CGR	CGR[1]
Location	CW	CW	CW	CW	CW	WG	RC	WG	CW	CW	CW	CW
Latitude	42° 59.89'	42° 58.35'	42° 58.35'	42° 58.35'	43° 00.07'	42° 57.98'	42° 56.88'	42° 57.23'	43° 00.73'	43° 01.25'	42° 59.41'	42° 59.41'
Longitude	122° 2.76'	122° 3.71'	122° 3.71'	122° 3.71'	122° 3.45'	122° 2.44'	122° 2.42'	122° 2.54'	122° 4.08'	122° 3.60'	122° 5.18'	122° 5.18'
Major Elements												
pct												
SiO2	59.4	51.6	49.5	48.7	69.7	65.8	69.3	69.3	66.1	65.7	65.9	74.8
Al2O3	17.6	18.4	18.7	18.8	14.8	15.8	14.8	15.0	15.9	15.7	15.9	12.1
FeTO3	5.24	8.15	10.30	9.35	2.75	3.61	2.76	2.78	3.28	3.63	3.53	2.36
MgO	2.82	6.10	5.30	5.78	0.75	1.41	0.76	0.78	1.35	1.39	1.39	0.23
CaO	5.17	8.98	7.99	10.3	2.23	3.37	2.40	2.31	3.26	3.3	3.44	0.66
Na2O	4.49	3.85	4.43	3.36	5.34	4.97	4.98	5.33	4.99	4.77	5.04	3.88
K2O	1.386	0.368	0.398	0.235	2.526	2.174	2.726	2.493	2.265	2.220	2.213	4.61
TiO2	0.68	0.93	1.43	1.08	0.47	0.54	0.45	0.47	0.52	0.54	0.52	0.58
P2O5	0.35	0.33	0.51	0.30	0.11	0.15	0.11	0.12	0.18	0.17	0.13	-
MnO	0.09	0.14	0.16	0.14	0.05	0.07	0.04	0.05	0.06	0.06	0.06	0.03
Cl	-	-	-	-	-	0.006	-	-	0.042	0.069	0.079	-
F	-	-	-	-	-	0.01	-	-	0.03	0.02	0.03	-
LOI	2.02	0.30	0.33	0.28	0.30	0.59	0.63	0.28	0.68	1.00	0.90	-
Less O	-	-	-	-	-	0.01	-	-	0.03	0.02	0.03	-
Total	99.25	99.15	99.05	98.33	99.03	98.49	98.96	98.91	98.63	98.55	99.10	99.25
Trace Elements												
ppm												
Ba	458	306	342	145	747	678	771	755	672	697	660	542
Be	1.1	-	1.1	-	1.8	1.6	1.3	1.7	1.9	1.8	1.7	-
Co	15.4	30.9	32.4	33.7	3.5	7.9	4.0	4.0	7.2	7.9	7.6	4.1
Cr	34.4	194	85.1	99.0	2.2	12.3	2.6	-	10.6	12.7	12.4	-
Cs	1.3	0.2	0.3	0.2	2.9	3.1	3.7	3.1	2.7	2.6	3.0	7.8
Cu	21	28	40	8	15	18	16	18	15	13	20	-
Ga	21	25	25	22	21	17	23	24	20	18	19	-
Hf	2.9	1.0	3.0	1.0	5.9	4.8	6.4	5.9	5.2	4.9	4.9	10.5
Nb	3.6	2.3	5.8	2.3	6.4	5.1	6.6	6.2	5.0	-	5,1	-
Ni	30	95	56	65	6	12	9	8	11	12	13	-
Rb	34	16	18	8	54	48	64	54	48	45	46	112
Sb	0.3	-	0.3	-	0.4	-	0.6	0.5	-	0.2	-	-
Sc	11.4	20.3	21.4	24.2	6.40	8.93	7.17	6.54	8.71	9.21	8.76	8.95
Sr	983	1380	1500	837	387	385	286	391	368	374	371	52
Ta	0.23	0.11	0.32	0.16	0.44	0.39	0.53	0.47	0.44	0.43	0.45	0.94
Th	2.8	0.5	1.1	-	5.0	4.4	5.9	4.9	5.1	4.5	4.6	11.2
U	1.0	-	0.5	-	2.1	2.0	2.5	2.1	2.3	2.0	2.2	5.0
V	110	190	190	180	50	54	64	62	56	59	63	-
Y	15	15	26	15	23	22	27	24	21	20	24	38
Zn	78	91	105	91	50	41	44	55	47	41	56	50
Zr	141	81	154	58	239	183	241	234	188	193	193	364
La	16	11	19	6	20	18	21	21	17	19	19	28
Ce	32	23	40	15	43	35	43	41	34	38	37	62
Nd	18	20	29	18	22	20	23	22	18	21	22	29
Sm	3.6	3.1	5.5	3.2	4.6	4.6	5.2	4.7	4.0	4.7	4.8	7.3
Eu	1.04	1.08	1.57	1.05	0.97	0.91	0.95	0.95	0.89	0.92	0.90	0.49
Gd	3.2	2.1	4.9	1.7	4.5	4.4	4.6	4.7	3.4	3.4	4.3	-
Tb	0.34	0.34	0.67	0.44	0.55	0.63	0.67	0.58	0.54	0.62	0.62	1.02
Tm	0.17	0.14	0.30	0.16	0.38	0.26	0.41	0.33	0.16	0.35	0.34	-
Yb	1.0	0.9	2.2	1.4	2.3	2.0	2.5	2.1	1.8	2.0	2.1	4.1
Lu	0.15	0.14	0.33	0.20	0.33	0.30	0.36	0.34	0.29	0.30	0.31	0.60

Sample #	82C-800	82C-800G	82C-803	82C-803G	82C-811	82C-814	82C-816	82C-845	82C-846	82C-847	82C-848	82C-849
Material	CGR	CGR[1]	PPOb	PPOb	PPIb	BMB	BMB	BMB	PLP1	PLP1	PLP1	PLP1
Location	CW	CW	SB	SB	SB	LC	LC	SB	LR3	LR8	LR25	LR30
Latitude	42° 59.41'	42° 59.41'	42° 58.70'	42° 58.70'	42° 58.87'	42° 53.88'	42° 54.40'	42° 58.58'	42° 58.62'	42° 58.63'	42° 58.63'	42° 58.64'
Longitude	122° 5.18'	122° 5.18'	122° 7.18'	122° 7.18'	122° 7.35'	122°14.40'	122°13.96'	122° 7.47'	122° 7.51'	122° 7.51'	122° 7.50'	122° 7.50'
Major Elements												
pct												
SiO2	59.5	74.9	70.2	73.0	59.8	51.9	58.2	52.1	68.8	68.5	67.9	69.0
Al2O3	16.8	12.0	14.4	13.3	16.6	16.8	17.2	17.4	14.0	14.5	14.8	14.4
FeTO3	5.71	2.42	2.49	1.76	6.58	8.00	6.72	8.19	2.22	2.44	2.57	2.35
MgO	2.95	0.26	0.62	0.34	2.28	6.86	4.05	6.34	0.51	0.62	0.67	0.57
CaO	4.98	0.73	2.11	1.27	5.19	9.58	6.94	9.47	1.61	1.88	2.03	1.78
Na2O	5.11	3.79	4.94	4.92	4.96	3.57	4.09	3.45	5.22	5.25	5.21	5.24
K2O	1.593	4.50	2.909	3.31	1.369	1.002	1.216	0.746	2.694	2.575	2.498	2.632
TiO2	0.71	0.63	0.40	0.25	1.27	1.11	0.84	1.08	0.38	0.42	0.44	0.41
P2O5	0.18	-	0.10	0.05	0.25	0.37	0.22	0.24	0.08	0.09	0.10	0.09
MnO	0.13	0.06	0.04	0.03	0.10	0.12	0.11	0.13	0.04	0.05	0.05	0.05
Cl	0.076	-	-	-	-	-	-	-	0.13	-	-	-
F	0.02	-	-	-	-	-	-	-	0.04	-	-	-
LOI	0.94	-	0.26	2.04	0.35	0.31	-	0.59	3.01	2.78	2.83	2.46
Less O	0.02	-	-	-	-	-	-	-	0.04	-	-	-
Total	98.68	99.29	98.47	100.27	98.75	99.62	99.59	99.74	98.70	99.11	99.10	98.98
Trace Elements												
ppm												
Ba	527	-	817	867	506	443	472	248	766	771	781	788
Be	1.4	-	1.6	-	1.2	1.0	-	-	1.9	2.1	1.9	2.2
Co	14.2	-	3.7	4.1	12.4	32.7	22.0	31.0	2.4	2.8	3.0	2.6
Cr	44.6	-	2.7	-	2.2	206	81.8	186	-	-	1.6	-
Cs	2.6	-	4.0	4.8	1.3	0.5	0.6	0.4	3.4	3.2	3.1	3.3
Cu	13	-	16	-	31	100	51	52	12	12	12	10
Ga	18	-	20	-	22	20	20	19	16	17	16	17
Hf	3.6	-	6.1	6.3	3.3	3.2	3.2	2.5	6.3	6.0	5.9	6.0
Nb	4.1	-	6.8	-	5.1	7.4	5.6	4.5	5.9	5.8	5.9	6.1
Ni	25	-	8	-	6	79	49	67	5	5	5	4
Rb	32	-	68	72	31	21	17	11	53	52	48	55
Sb	-	-	0.6	0.8	-	-	-	-	0.5	0.5	0.4	0.5
Sc	14.4	-	6.63	4.82	18.9	26.6	17.3	25.6	6.13	6.20	6.34	6.15
Sr	473	-	280	164	567	986	601	581	235	261	294	255
Ta	0.29	-	0.54	0.63	0.39	0.34	0.36	0.27	0.50	0.48	0.45	0.47
Th	2.5	-	6.1	7.3	2.7	2.8	2.1	1.1	5.3	5.0	5.1	5.1
U	1.4	-	2.5	3.2	1.0	0.8	0.3	-	2.5	2.3	2.4	2.4
V	83	-	59	-	95	180	130	200	20	31	16	18
Y	20	-	27	26	21	22	19	21	25	24	25	24
Zn	83	-	42	34	90	85	72	81	46	49	45	44
Zr	140	-	227	227	140	158	156	122	246	231	232	243
La	15	-	20	24	15	22	17	11	21	20	19	21
Ce	32	-	44	47	29	44	31	23	42	39	42	41
Nd	18	-	24	24	19	26	18	15	23	22	24	23
Sm	4.8	-	5.1	5.5	4.4	4.7	3.8	3.5	5.2	4.9	5.2	5.1
Eu	1.17	-	0.92	0.81	1.20	1.34	1.08	1.09	0.90	0.88	0.94	0.89
Gd	3.8	-	5.0	-	4.6	3.2	-	-	4.7	4.4	4.9	4.2
Tb	0.55	-	0.62	0.73	0.55	0.54	0.48	0.59	0.69	0.64	0.63	0.71
Tm	0.33	-	0.37	-	0.26	0.32	0.28	0.32	0.38	0.30	0.38	0.29
Yb	2.1	-	2.4	2.5	1.8	1.8	1.7	1.8	2.3	2.1	2.3	2.4
Lu	0.30	-	0.36	0.40	0.28	0.27	0.26	0.30	0.36	0.35	0.36	0.36

Sample#	82C-850	82C-852	82C-853	82C-854	82C-860	82C-860G	82C-861	82C-861G	82C-862	82C-862G	82C-866	82C-866G
Material	PLP1	LAV	LAV	LAV	CVS	CVS	CVS	CVS	CVS	CVS	CVS	CVS
Location	LR32	TC	TC	DC	LR	LR	LR	LR	LR	LR	LR	LR
Latitude	42° 58.65'	43° 02.64'	43° 02.50'	43° 01.68'	42° 58.37'	42° 58.37'	42° 58.37'	42° 58.37'	42° 58.37'	42° 58.37'	42° 58.37'	42° 58.37'
Longitude	122° 7.50'	122° 5.04'	122° 4.20'	122° 9.65'	122° 8.99'	122° 8.99'	122° 8.99'	122° 8.99'	122° 8.99'	122° 8.99'	122° 8.99'	122° 8.99'
Major Elements												
pct												
SiO2	68.1	58.2	57.8	53.4	54.4	-	53.7	65.0	55.2	65.4	52.4	62.4
Al2O3	15.0	17.2	17.1	17.5	18.7	-	19.8	16.7	18.9	16.8	9.7	17.4
FeTO3	2.67	6.59	6.67	8.73	8.38	-	8.06	4.26	7.93	3.86	10.60	4.92
MgO	0.68	4.07	4.08	5.99	4.48	-	3.4	1.22	3.92	1.09	15.2	2.09
CaO	2.14	6.94	6.91	7.96	8.08	-	7.94	3.74	7.57	3.75	8.56	4.60
Na2O	5.32	4.01	3.91	3.94	3.90	-	4.30	5.42	4.27	5.51	2.24	5.30
K2O	2.499	1.206	1.298	0.774	0.627	-	0.694	1.64	0.768	1.76	0.552	1.51
TiO2	0.46	0.85	0.85	1.10	0.81	-	1.11	0.70	1.02	0.70	0.63	0.72
P2O5	0.11	0.30	0.30	0.25	0.30	-	0.46	0.41	0.31	0.33	0.11	0.28
MnO	0.05	0.10	0.11	0.14	0.13	-	0.09	0.08	0.12	0.07	0.16	0.07
Cl	0.110	-	-	-	-	-	-	-	-	-	-	-
F	0.03	-	-	-	-	-	-	-	-	-	-	-
LOI	2.00	0.06	0.60	0.05	0.49	-	0.54	0.91	0.15	0.55	0.30	0.71
Less O	0.03	-	-	-	-	-	-	-	-	-	-	-
Total	99.14	99.53	99.63	99.83	100.30	-	100.09	100.08	100.16	99.82	100.44	100.00
Trace Elements												
ppm												
Ba	781	511	526	294	273	-	303	548	291	609	172	496
Be	2.0	1.1	1.4	-	-	-	-	-	-	-	-	-
Co	3.2	22.2	22.7	33.0	25.4	6.1	23.7	7.9	24.0	6.7	73.4	14.2
Cr	-	99	102	197	40.3	-	11.6	-	23.1	-	555	25.9
Cs	3.0	0.5	0.8	0.4	0.8	2.7	0.8	2.1	0.9	2.2	0.6	1.9
Cu	12	39	60	35	-	-	-	-	-	-	-	-
Ga	18	20	21	21	-	-	-	-	-	-	-	-
Hf	5.8	3.6	3.7	2.8	1.5	4.2	1.7	3.7	1.7	4.0	1.5	3.6
Nb	5.5	7.5	1.3	3.4	2.0	-	2.4	-	2.7	-	2.0	-
Ni	4	54	54	98	-	-	-	-	-	-	-	-
Rb	52	18	22	7	21	-	16	31	18	35	9	32
Sb	0.5	-	-	-	-	-	0.2	0.3	0.2	0.4	-	0.3
Sc	6.43	16.6	16.8	22.9	16.6	7.6	20.0	8.50	17.3	8.61	32.5	10.5
Sr	315	757	750	546	787	-	788	433	748	456	376	556
Ta	0.47	0.48	0.51	0.20	0.12	0.40	0.15	0.35	0.16	0.37	0.11	0.37
Th	4.9	2.1	2.1	1.1	1.3	3.4	1.1	2.8	1.2	2.8	0.9	2.6
U	2.2	0.7	0.9	-	0.5	1.5	0.5	1.4	0.6	1.5	0.4	1.2
V	24	130	130	170	-	-	-	-	-	-	-	-
Y	24	19	23	21	14	-	18	22	18	23	13	20
Zn	48	78	79	85	84	59	76	59	81	61	93	60
Zr	230	170	177	118	85	-	88	155	91	165	65	150
La	21	21	20	11	9	17	10	17	10	17	6	14
Ce	41	39	42	25	17	33	20	34	19	37	14	27
Nd	23	20	23	18	12	20	15	19	14	21	11	16
Sm	5.1	4.5	4.6	4.1	2.7	4.2	3.9	4.5	3.3	4.7	2.9	3.8
Eu	0.95	1.25	1.27	1.27	0.87	1.09	1.21	1.22	1.08	1.23	0.69	1.04
Gd	4.2	3.7	5.3	-	1.2	4.2	4.0	5.6	2.8	-	-	4.9
Tb	0.66	0.57	0.54	0.67	0.34	0.56	0.52	0.60	0.43	0.64	0.37	0.56
Tm	0.35	0.32	0.29	0.34	0.14	-	0.23	-	0.23	-	0.20	-
Yb	2.3	2.0	1.9	2.3	1.1	2.0	1.4	1.8	1.3	1.7	1.1	1.7
Lu	0.35	0.29	0.30	0.34	0.16	0.28	0.21	0.28	0.19	0.31	0.17	0.25

Sample#	82C-867	82C-870	82C-870G	82C-871	82C-871G	82C-874	82C-874G	82C-876	82C-876G	82C-878	82C-878G	82C-879
Material	CVS	CVS	CVS	CVS	CVS	CVS	CVS	CVS	CVS	CVS	CVS	CVS
Location	LR	CW	CW	CW	CW	CW	CW	SH	SH	SH	SH	SH
Latitude	42° 58.37'	42° 58.51'	42° 58.51'	42° 58.51'	42° 58.51'	42° 58.51'	42° 58.51'	42° 57.10'	42° 57.10'	42° 57.10'	42° 57.10'	42° 57.10'
Longitude	122° 8.99'	122° 4.09'	122° 4.09'	122° 4.09'	122° 4.09'	122° 4.09'	122° 4.09'	122° 2.49'	122° 2.49'	122° 2.49'	122° 2.49'	122° 2.49'
Major Elements												
pct												
SiO2	54.5	53.1	64.2	55.9	67.2	54.7	66.8	56.0	66.8	55.9	66.0	55.6
Al2O3	19.2	13.7	17.3	19.3	16.6	19.0	16.0	18.9	15.7	18.9	16.5	18.9
FeTO3	7.95	8.81	3.96	7.36	3.18	8.07	3.65	7.46	2.64	7.64	3.86	7.65
MgO	4.08	11.0	1.43	3.96	0.87	4.02	0.91	3.65	0.69	3.60	1.04	3.59
CaO	8.05	8.32	4.29	7.90	3.39	7.89	3.48	7.40	2.99	7.54	3.61	7.39
Na2O	4.15	2.96	5.36	3.90	5.28	3.99	5.27	4.05	4.88	4.20	5.61	4.32
K2O	0.614	0.615	1.69	0.816	2.08	0.664	2.00	0.909	2.47	0.755	1.72	0.784
TiO2	0.90	0.79	0.68	0.84	0.50	1.01	0.64	0.89	0.47	1.04	0.69	1.08
P2O5	0.34	0.18	0.29	0.14	0.16	0.28	0.26	0.30	0.31	0.31	0.28	0.33
MnO	0.12	0.14	0.06	0.11	0.06	0.12	0.07	0.11	0.04	0.11	0.07	0.11
Cl	-	-	-	-	-	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-	-	-	-	-	-
LOI	0.26	0.46	0.75	-	0.80	0.65	1.37	0.62	2.77	0.29	0.68	0.29
Less O	-	-	-	-	-	-	-	-	-	-	-	-
Total	100.16	100.08	100.01	100.23	100.16	100.39	100.45	100.29	99.76	100.29	100.06	100.04
Trace Elements												
ppm												
Ba	260	242	584	309	663	297	667	333	736	323	646	318
Be	-	-	-	-	-	-	-	-	-	-	-	-
Co	24.2	53.9	10.2	24.0	5.6	24.9	6.5	-	5.0	21.0	6.4	22.3
Cr	34.6	349	15.8	28.2	-	27.4	-	-	-	22.3	-	21.5
Cs	0.7	0.7	2.1	0.9	2.5	1.1	3.3	-	2.9	0.9	2.2	0.9
Cu	-	-	-	-	-	-	-	-	-	-	-	-
Ga	-	-	-	-	-	-	-	-	-	-	-	-
Hf	1.4	1.7	4.1	1.9	4.5	1.7	4.8	-	6.0	1.9	4.1	1.9
Nb	2.3	2.3	-	2.0	-	2.6	-	-	-	2.6	-	2.8
Ni	-	-	-	-	-	-	-	-	-	-	-	-
Rb	19	16	32	17	43	21	43	19	51	18	32	18
Sb	-	0.9	-	0.3	0.3	0.2	0.6	-	0.4	0.3	0.4	0.2
Sc	15.9	25.6	9.30	16.5	5.10	16.0	7.60	-	6.07	14.6	7.47	17.3
Sr	821	575	526	727	408	785	419	711	355	752	442	736
Ta	0.12	0.12	0.39	0.16	0.43	0.16	0.44	-	0.44	0.17	0.36	0.18
Th	1.0	1.0	3.4	1.3	3.6	1.4	3.6	-	5.0	1.4	3.0	1.4
U	0.5	0.5	1.6	0.6	1.8	0.6	1.8	-	2.1	0.7	1.6	0.6
V	-	-	-	-	-	-	-	-	-	-	-	-
Y	13	16	22	16	18	16	24	18	28	16	22	16
Zn	80	84	66	74	54	82	61	-	48	74	63	80
Zr	80	81	165	94	192	90	192	107	243	93	172	96
La	9	8	18	9	17	9	17	-	18	10	17	10
Ce	18	16	35	17	35	18	37	-	41	19	34	20
Nd	12	12	-	11	18	12	19	-	23	13	19	13
Sm	2.9	3.0	4.7	2.5	3.7	2.9	4.5	-	5.1	3.0	4.2	3.4
Eu	1.01	0.84	1.18	0.82	0.93	0.90	1.00	-	0.99	0.98	1.13	1.05
Gd	3.2	2.0	5.3	2.1	3.8	2.4	5.4	-	5.5	2.5	4.3	2.8
Tb	0.38	0.37	0.57	0.32	0.51	0.37	0.62	-	0.69	0.37	0.57	0.45
Tm	0.17	0.17	-	0.15	-	0.23	-	-	-	0.17	-	0.20
Yb	1.1	1.1	1.9	1.2	2.0	1.1	2.0	-	2.3	1.3	2.0	1.4
Lu	0.17	0.17	0.29	0.18	0.26	0.17	0.30	-	0.37	0.18	0.28	0.20

Sample#	82C-879G	82C-880	82C-881	82C-882	82C-885	82C-885G	82C-888	82C-888G	82C-889	82C-893	82C-894	82C-896
Material	CVS	CVS	CVS	CVS[2]	CVS	CVS	CVS	CVS	CVS[2]	LAV	LAV	PPGg
Location	SH	SH	SH	SH	SH	SH	SH	SH	SH	UC	UC	GH
Latitude	42° 57.10'	42° 57.10'	42° 57.10'	42° 57.10'	42° 57.10'	42° 57.10'	42° 57.10'	42° 57.10'	42° 57.10'	42° 54.70'	42° 56.04'	42° 59.65'
Longitude	122° 2.49'	122° 2.49'	122° 2.49'	122° 2.49'	122° 2.49'	122° 2.49'	122° 2.49'	122° 2.49'	122° 2.49'	122°26.34'	122°25.27'	122° 6.58'
Major Elements												
pct												
SiO2	66.5	55.7	55.2	54.5	51.3	64.5	54.8	64.9	53.8	47.7	47.4	67.4
Al2O3	16.2	19.1	19.1	19.4	18.7	17.1	17.9	17.0	17.0	17.6	17.3	14.7
FeTO3	3.82	7.54	6.71	7.27	10.50	4.41	7.63	3.59	7.84	10.10	10.10	2.51
MgO	1.07	3.69	5.32	4.55	4.68	1.31	5.39	1.18	7.33	9.38	9.51	0.66
CaO	3.30	7.51	8.07	8.45	8.50	3.84	7.79	4.05	8.44	11.3	11.3	2.01
Na2O	5.54	4.16	3.74	3.81	3.98	5.59	3.89	5.19	3.52	2.85	2.82	4.62
K2O	1.73	0.752	0.660	0.672	0.709	1.62	0.856	1.88	0.717	0.103	0.098	2.768
TiO2	0.69	0.97	0.73	0.81	1.86	0.70	0.91	0.62	0.86	1.09	1.04	0.40
P2O5	0.28	0.29	0.17	0.16	0.13	0.28	0.24	0.28	0.24	0.11	0.10	0.10
MnO	0.08	0.11	0.12	0.10	0.10	0.08	0.11	0.07	0.12	0.16	0.16	0.04
Cl	-	-	-	-	-	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-	-	-	-	-	-
LOI	0.90	0.36	0.36	0.22	0.34	0.51	0.56	0.83	0.44	-	-	4.09
Less O	-	-	-	-	-	-	-	-	-	-	-	-
Total	100.11	100.08	100.18	99.94	100.89	99.94	100.08	99.59	100.31	100.39	99.83	99.30
Trace Elements												
ppm												
Ba	643	322	258	-	276	589	316	633	-	54	61	829
Be	-	-	-	-	-	-	-	-	-	-	-	1.6
Co	6.6	-	26.4	-	32.7	8.6	29.6	8.0	-	45.7	47.6	3.4
Cr	-	-	74	-	-	-	92	6.4	-	250	253	1.5
Cs	2.2	-	0.8	-	0.8	2.2	1.0	2.2	-	-	-	3.7
Cu	-	-	-	-	-	-	-	-	-	83	91	16
Ga	-	-	-	-	-	-	-	-	-	21	19	17
Hf	4.1	-	1.6	-	2.0	4.2	2.2	4.3	-	1.6	1.6	5.9
Nb	-	-	1.9	-	4.5	-	3.6	-	-	1.3	2.0	6.5
Ni	-	-	-	-	-	-	-	-	-	160	170	7
Rb	35	16	18	-	12	32	19	38	-	3	3	59
Sb	0.4	-	-	-	-	-	0.3	0.4	-	-	-	0.7
Sc	8.08	-	17.6	-	40.9	10.1	17.9	7.86	-	34.1	35.2	6.50
Sr	408	743	725	-	646	461	803	561	-	294	297	255
Ta	0.41	-	0.14	-	0.17	0.36	0.18	0.36	-	-	-	0.55
Th	3.1	-	1.1	-	1.3	3.2	1.4	3.4	-	-	-	6.2
U	1.7	-	0.5	-	0.5	1.5	0.7	1.7	-	-	-	2.8
V	-	-	-	-	-	-	-	-	-	240	240	38
Y	23	14	14	-	19	25	14	22	-	22	25	24
Zn	60	-	70	-	83	68	75	56	-	69	76	42
Zr	171	90	83	-	89	171	103	184	-	78	73	229
La	17	-	8	-	8	16	9	17	-	3	3	21
Ce	36	-	15	-	17	34	21	37	-	8	9	43
Nd	21	-	11	-	12	22	12	21	-	5	7	24
Sm	4.7	-	2.6	-	3.8	5.0	3.1	4.7	-	2.6	2.5	5.4
Eu	1.21	-	0.88	-	1.11	1.22	0.99	1.10	-	0.95	1.00	0.89
Gd	5.1	-	-	-	4.1	4.3	4.2	4.0	-	3.5	3.6	4.7
Tb	0.62	-	0.37	-	0.53	0.63	0.48	0.58	-	0.58	0.61	0.74
Tm	-	-	0.12	-	-	-	-	-	-	0.36	0.39	0.39
Yb	2.0	-	1.2	-	1.5	2.2	-	1.8	-	2.6	2.6	2.4
Lu	0.31	-	0.17	-	-	0.33	0.21	0.26	-	0.39	0.36	0.37

Sample#	82C-930	82C-938	83C-939	83C-940G	83C-946	83C-947	83C-948	83C-957	83C-980	83C-981	83C-982	83C-983
Material	LAV	PHI1	PCB	PCB	LAV	LAV	LAV	LAV	LAV	INT	INT	INT
Location	SM	LR	MC	WD	CL	CL	CL	AP	WB	WB	WB	WB
Latitude	42° 44.03'	42° 58.16'	42° 57.42'	42° 56.57'	42° 54.37'	42° 54.44'	42° 54.21'	42° 52.18'	42° 52.81'	42°'53.14'	42° 53.14'	42° 53.16'
Longitude	121°58.47'	122° 8.92'	122° 5.64'	122° 7.10'	122°15.72'	122°15.66'	122°15.15'	122°10.22'	122°11.15'	122°12.05'	122°12.05'	122°12.05'
Major Elements												
pct												
SiO2	51.7	52.7	60.3	77.7	53.5	54.1	55.4	55.8	55.9	54.2	53.5	54.2
Al2O3	17.3	15.3	17.7	12.4	18.1	18.9	18.6	17.8	17.6	17.7	18.2	17.9
FeTO3	8.79	7.64	6.00	0.92	8.77	7.44	7.63	7.37	7.68	8.52	8.53	8.61
MgO	7.00	9.30	3.05	0.12	4.51	4.38	4.11	4.00	4.32	5.00	5.26	4.77
CaO	8.94	7.63	5.97	0.68	8.02	8.12	7.89	7.21	7.22	8.15	8.40	8.16
Na2O	3.60	3.53	4.57	3.63	4.05	4.25	4.06	4.37	4.19	3.99	3.86	3.90
K2O	0.856	1.084	1.357	4.24	1.32	1.210	0.92	1.590	1.324	0.862	0.839	0.944
TiO2	1.16	0.95	0.74	0.18	1.11	1.02	1.01	1.11	1.02	1.17	1.13	1.24
P2O5	0.34	0.25	0.22	-	0.52	0.37	0.27	0.50	0.44	0.29	0.29	0.35
MnO	0.13	0.10	0.09	0.04	0.14	0.11	0.11	0.11	0.13	0.14	0.13	0.13
Cl	-	-	0.050	-	-	-	-	-	-	-	-	-
F	-	-	0.02	-	-	-	-	-	-	-	-	-
LOI	-	0.60	0.30	-	-	0.20	0.13	0.22	0.13	-	0.18	0.15
Less O	-	-	0.02	-	-	-	-	-	-	-	-	-
Total	99.82	99.08	100.35	99.91	100.04	100.10	100.13	100.08	99.95	100.02	100.32	100.35
Trace Elements												
ppm												
Ba	420	442	471	-	581	494	350	683	636	392	324	391
Be	-	1.0	-	-	-	-	-	-	-	-	-	-
Co	34.6	45.6	18.6	-	-	24.0	-	22.0	23.1	26.2	28.7	28.3
Cr	192	322	33	-	-	29.7	-	68.5	86.7	70.5	87.2	75
Cs	-	0.7	1.5	-	-	0.3	-	0.5	0.3	0.2	0.4	0.2
Cu	60	16	-	-	-	-	-	-	-	-	-	-
Ga	23	24	-	-	-	-	-	-	-	-	-	-
Hf	2.8	2.5	3.5	-	-	3.0	-	4.0	4.0	2.0	2.9	3.2
Nb	7.1	3.9	4.5	-	-	-	-	-	9.2	-	-	6.4
Ni	130	260	-	-	-	-	-	-	-	-	-	-
Rb	11	22	28	-	19	30	12	29	19	13	10	12
Sb	-	-	0.3	-	-	0.2	-	0.2	-	-	-	-
Sc	23.8	21.4	14.1	-	-	16.7	-	15.5	16.9	21.0	22.3	23.4
Sr	810	1330	-	-	868	1350	823	1370	917	688	701	676
Ta	0.42	0.23	0.33	-	-	0.31	-	0.57	0.53	0.26	0.34	0.41
Th	1.6	2.5	2.6	-	-	3.1	-	3.2	2.4	1.2	1.6	1.8
U	0.4	0.8	1.1	-	-	0.7	-	0.9	0.7	0.4	0.5	0.5
V	230	170	-	-	-	-	-	-	-	-	-	-
Y	20	12	18	-	26	22	19	22	22	21	19	20
Zn	90	84	69	-	-	81	-	85	93	81	93	95
Zr	135	131	145	-	160	153	132	203	193	105	128	144
La	17	20	15	-	-	22	-	30	27	13	14	16
Ce	35	42	28	-	-	43	-	60	52	25	30	34
Nd	21	24	17	-	-	25	-	32	30	16	19	23
Sm	4.5	4.3	3.6	-	-	4.5	-	5.8	5.8	3.8	4.3	4.9
Eu	1.34	1.20	1.00	-	-	1.28	-	1.55	1.47	1.31	1.26	1.35
Gd	3.3	3.6	-	-	-	4.0	-	4.5	4.8	2.9	4.1	4.3
Tb	0.54	0.29	0.49	-	-	0.48	-	0.53	0.60	0.55	0.57	0.67
Tm	0.28	0.12	0.20	-	-	0.19	-	0.31	0.18	0.22	0.18	0.31
Yb	1.7	0.6	1.6	-	-	1.3	-	1.8	2.1	1.9	1.9	2.2
Lu	0.27	0.15	0.29	-	-	0.24	-	0.30	0.33	0.32	0.33	0.37

Sample#	83C-984	83C-985	83C-987	83C-995	83C-1006	83C-1007	83C-1008	83C-1009	83C-1010	83C-1012	83C-1013	83C-1013G	83C-1016
Material	INT	INT	LAV	CGR	INT	INT	INT	INT	INT	CWP	CWP	CWP	CBD
Location	WB	WB	CP	CL	AP	AP	AP	AP	AP	CW	CW	CW	GP
Latitude	42° 53.19'	42° 53.17'	42° 53.04'	42° 54.69'	42° 51.17'	42° 51.11'	42° 51.11'	42° 51.18'	42° 51.41'	42° 58.73'	42° 58.73'	42° 58.73'	42° 53.99'
Longitude	122°12.06'	122°12.03'	122°14.84'	122°11.70'	122° 9.84'	122° 9.78'	122° 9.78'	122° 9.80'	122°10.01'	122° 5.19'	122° 5.19'	122° 5.19'	122° 7.31'
Major Elements													
pct													
SiO2	53.5	53.2	53.3	63.8	56.6	57.5	57.0	57.1	57.1	68.1	68.0	70.6	51.2
Al2O3	18.2	18.0	18.2	16.1	18.8	18.7	18.7	18.7	18.7	14.7	14.8	14.2	21.9
FeTO3	7.65	8.38	8.59	5.02	6.73	6.53	6.76	6.70	6.70	2.71	2.66	1.62	9.28
MgO	5.31	5.01	4.13	2.26	4.20	4.16	4.17	4.44	4.04	0.77	0.72	0.50	4.29
CaO	8.54	8.33	7.86	4.56	7.17	7.14	7.04	7.31	7.10	2.26	2.28	1.72	8.71
Na2O	3.94	3.87	4.14	4.40	4.11	4.22	4.12	4.18	4.21	4.79	4.68	4.67	3.96
K2O	0.87	0.887	1.315	2.10	0.754	0.761	0.77	0.766	0.787	2.630	2.504	2.71	0.11
TiO2	0.95	1.14	1.09	0.75	0.70	0.67	0.72	0.71	0.69	0.47	0.47	0.42	1.16
P2O5	0.28	0.39	0.53	0.17	0.18	0.18	0.19	0.18	0.19	0.11	0.11	0.09	0.23
MnO	0.12	0.13	0.15	0.08	0.11	0.10	0.11	0.11	0.11	0.05	0.05	0.04	0.11
Cl	-	-	-	-	-	-	-	-	-	0.084	0.14	-	0.089
F	-	-	-	-	-	-	-	-	-	0.01	0.01	-	0.01
LOI	0.18	0.42	0.33	0.69	0.58	0.17	0.64	0.04	0.46	3.48	3.77	4.15	-
Less O	-	-	-	-	-	-	-	-	-	0.01	0.01	-	0.01
Total	99.54	99.76	99.64	99.93	99.93	100.13	100.22	100.24	100.09	100.15	100.18	100.72	101.04
Trace Elements													
ppm													
Ba	356	339	577	-	263	292	285	286	271	749	756	-	157
Be	-	-	-	-	-	-	-	-	-	-	-	-	-
Co	-	27.3	25.8	-	23.2	22.4	-	23.7	22.7	3.7	3.7	-	28.7
Cr	-	80.7	40.1	-	53.8	49.4	-	63.2	44.1	1.6	-	-	29.7
Cs	-	0.5	0.3	-	0.2	0.4	-	0.2	0.5	3.0	3.0	-	-
Cu	-	-	-	-	-	-	-	-	-	-	-	-	-
Ga	-	-	-	-	-	-	-	-	-	-	-	-	-
Hf	-	2.8	3.4	-	2.0	1.9	-	2.0	2.1	5.9	5.9	-	2.5
Nb	-	6.0	-	-	2.1	1.9	-	2.3	2.0	5.1	5.2	-	4.1
Ni	-	-	-	-	-	-	-	-	-	-	-	-	-
Rb	16	15	21	-	19	13	16	20	16	50	48	-	7
Sb	-	-	-	-	0.2	-	-	-	0.2	0.5	0.5	-	-
Sc	-	22.2	21.4	-	15.8	15.1	-	15.9	15.1	6.39	6.52	-	25.8
Sr	879	700	811	-	807	777	776	784	790	386	385	-	951
Ta	-	0.39	0.46	-	0.15	0.12	-	0.19	0.16	0.49	0.46	-	0.17
Th	-	1.6	1.9	-	1.1	1.1	-	1.1	1.0	4.8	4.9	-	1.1
U	-	0.5	0.4	-	0.4	-	-	0.4	0.3	2.0	1.8	-	0.4
V	-	-	-	-	-	-	-	-	-	-	-	-	-
Y	19	20	24	-	19	16	17	18	16	24	25	-	15
Zn	-	86	97	-	78	68	-	77	74	37	33	-	66
Zr	122	131	164	-	99	98	103	107	103	228	231	-	113
La	-	14	23	-	9	9	-	10	9	20	20	-	11
Ce	-	30	47	-	18	18	-	18	19	40	41	-	22
Nd	-	19	27	-	12	12	-	11	11	20	22	-	16
Sm	-	4.2	5.8	-	2.8	2.7	-	2.8	2.9	4.3	4.3	-	3.2
Eu	-	1.22	1.57	-	0.94	0.93	-	0.94	0.96	0.93	0.97	-	1.11
Gd	-	3.6	4.7	-	2.6	2.6	-	2.8	2.9	4.1	3.8	-	2.5
Tb	-	0.59	0.68	-	0.38	0.36	-	0.41	0.40	0.63	0.56	-	0.42
Tm	-	0.25	0.26	-	0.19	0.17	-	0.16	0.18	0.31	0.30	-	0.14
Yb	-	2.1	2.1	-	1.2	1.2	-	1.3	1.3	2.1	2.2	-	1.3
Lu	-	0.35	0.35	-	0.23	0.23	-	0.22	0.23	0.34	0.34	-	0.24

Sample#	83C-1023	83C-1023G	83C-1029	83C-1037	83C-1037G	83C-1038	83C-1038G	83C-1054	83C-1059	83C-1074	83C-1087	83C-1089
Material	CGR	CGR[1]	LAV	CGR	CGR[1]	CGR	CGR[1]	INT	AGL	INT	AGL	AGL
Location	GP	GP	CR	CT	CT	CT	CT	DB	BY	AG	SR	BY
Latitude	42° 53.56'	42° 53.56'	42° 51.15'	42° 53.27'	42° 53.27'	42° 53.42'	42° 53.42'	42° 50.64'	42° 48.47'	42° 53.82'	42° 47.93'	42° 48.04'
Longitude	122° 6.77'	122° 6.77'	122° 5.22'	122°10.46'	122°10.46'	122°10.03'	122°10.03'	121°56.30'	121°55.15'	122° 6.07'	121°59.38'	121°56.37'
Major Elements												
pct												
SiO2	67.4	75.2	57.2	68.6	75.9	67.5	75.6	56.7	52.5	56.4	53.7	51.4
Al2O3	15.8	11.8	17.1	15.4	11.9	15.7	11.8	18.1	17.6	17.4	18.2	18.3
FeTO3	3.63	2.23	6.64	3.57	1.73	3.68	2.13	7.74	8.09	6.76	8.17	9.41
MgO	1.51	0.24	4.62	1.33	0.16	1.47	0.21	3.72	6.43	4.03	6.01	6.23
CaO	3.40	0.65	7.11	3.86	0.48	3.44	0.54	6.76	9.03	7.64	8.28	8.36
Na2O	5.11	4.00	4.28	5.00	3.82	5.18	3.93	4.36	3.70	3.71	3.75	3.66
K2O	2.204	4.64	1.431	1.45	4.74	2.01	4.67	1.050	1.040	1.435	0.650	0.563
TiO2	0.57	0.49	0.89	0.54	0.40	0.57	0.47	0.99	1.08	0.96	0.95	1.23
P2O5	0.13	0.03	0.31	0.12	-	0.14	-	0.24	0.40	0.29	0.17	0.24
MnO	0.05	0.02	0.10	0.07	0.03	0.06	0.04	0.12	0.12	0.10	0.13	0.14
Cl	0.140	-	-	0.027	-	0.075	-	-	-	-	-	-
F	0.04	-	-	0.02	-	0.04	-	-	-	-	-	-
LOI	0.65	-	0.04	0.39	-	0.57	-	0.16	0.40	1.47	0.17	0.79
Less O	0.04	-	-	0.02	-	0.04	-	-	-	-	-	-
Total	100.60	99.30	99.72	100.36	99.18	100.40	99.39	99.94	100.39	100.20	100.18	100.32
Trace Elements												
ppm												
Ba	668	562	541	550	-	666	423	476	643	559	293	274
Be	-	-	-	-	-	-	-	-	-	-	-	-
Co	7.8	4.2	23.3	7.7	-	14.0	4.1	24.2	31.4	21.4	31.4	36.0
Cr	12.8	1.8	86.8	13.6	-	13.3	-	29.1	173	34.4	176	147
Cs	2.5	7.6	0.8	1.7	-	2.4	9.7	0.4	0.4	1.2	0.6	-
Cu	-	-	-	-	-	-	-	-	-	-	-	-
Ga	-	-	-	-	-	-	-	-	-	-	-	-
Hf	5.1	5.8	3.6	4.8	-	5.1	11.1	2.7	3.0	3.8	2.0	2.6
Nb	5.0	-	6.0	6.5	-	6.3	-	3.6	6.2	4.6	2.3	3.5
Ni	-	-	-	-	-	-	-	-	-	-	-	-
Rb	41	116	30	25	-	37	150	22	24	28	10	3
Sb	-	0.2	-	-	-	-	0.3	0.3	-	-	-	-
Sc	9.28	7.42	17.2	8.55	-	8.94	8.40	16.8	22.7	19.6	21.3	23.4
Sr	388	54	980	445	-	387	52	610	1045	870	553	495
Ta	0.43	0.69	0.36	0.43	-	0.39	1.11	0.25	0.36	0.32	0.18	0.24
Th	4.4	8.1	3.0	4.5	-	4.4	15.5	1.3	3.1	3.1	0.8	0.8
U	1.8	3.5	0.7	1.7	-	1.7	6.6	0.6	0.3	1.0	-	0.4
V	-	-	-	-	-	-	-	-	-	-	-	-
Y	25	30	22	19	-	21	43	21	21	17	19	22
Zn	38	40	80	47	-	36	36	82	96	77	77	85
Zr	194	200	164	177	-	189	372	119	150	164	97	119
La	17	22	21	17	-	18	33	12	29	19	8	10
Ce	35	46	40	34	-	35	71	25	56	39	17	20
Nd	19	22	23	19	-	18	34	16	21	25	12	17
Sm	4.2	5.6	4.5	4.0	-	4.2	8.1	3.6	4.6	4.7	3.2	4.1
Eu	0.90	0.50	1.16	0.90	-	0.91	0.44	1.15	1.60	1.25	0.93	1.18
Gd	4.1	-	3.6	4.9	-	4.4	-	2.8	4.9	3.6	3.6	1.4
Tb	0.51	0.82	0.48	0.57	-	0.58	1.16	0.51	0.53	0.52	0.46	0.66
Tm	0.34	-	0.23	0.32	-	0.28	-	0.24	0.22	0.22	0.13	0.07
Yb	2.0	3.1	1.6	1.9	-	2.0	4.6	1.7	1.4	1.6	1.9	2.4
Lu	0.33	0.45	0.30	0.32	-	0.31	0.69	0.30	0.29	0.28	0.29	0.40

Sample#	83C-1092	84C-1107	84C-1123	84C-1141	84C-1142	84C-1143	84C-1164	84C-1165	84C-1166	84C-1169	84C-1171	84C-1172
Material	CGR	LAV	PLPl	BMB	LAV	LAV	CVO	CVO	CVO	CVO	PCB	PCB
Location	GP	WC	RV	BC	BC	BC	AS	AS	AS	AS	WP	MC
Latitude	42° 54.36'	42° 57.37'	42° 55.07'	43° 02.52'	43° 02.33'	43° 02.75'	42° 54.78'	42° 54.78'	42° 54.78'	42° 54.78'	42° 56.83'	42° 57.50'
Longitude	122° 7.41'	122°12.95'	122° 9.82'	122°13.67'	122°13.38'	122°12.32'	122° 2.98'	122° 2.98'	122° 2.98'	122° 2.98'	122° 7.00'	122° 5.50'
Major Elements												
pct												
SiO2	59.8	51.2	69.9	53.2	53.8	48.7	71.0	67.0	70.1	71.0	60.0	59.8
Al2O3	16.9	16.3	14.3	16.8	17.0	17.0	14.5	15.9	15.0	14.7	17.4	17.6
FeTO3	5.75	8.61	2.19	7.71	8.28	10.20	2.43	3.64	2.78	2.50	6.40	6.19
MgO	3.20	8.40	0.47	6.88	6.96	9.18	0.64	1.32	0.72	0.67	2.99	3.15
CaO	5.63	9.96	1.53	8.57	8.47	11.1	1.90	3.62	2.20	2.06	6.05	6.10
Na2O	4.14	3.36	4.95	3.70	3.80	2.95	5.33	4.75	5.31	5.33	4.46	4.45
K2O	1.629	0.84	2.71	0.94	0.74	0.25	2.68	2.51	2.58	2.67	1.31	1.27
TiO2	0.78	1.19	0.36	1.02	0.99	1.17	0.43	0.60	0.47	0.43	0.92	0.75
P2O5	0.18	0.42	0.07	0.31	0.25	0.17	0.09	0.13	0.11	0.09	0.25	0.22
MnO	0.09	0.13	0.05	0.12	0.13	0.17	0.05	0.05	0.05	0.05	0.10	0.10
Cl	0.007	-	-	-	-	-	-	-	-	-	-	-
F	0.03	-	-	-	-	-	-	-	-	-	-	-
LOI	1.50	0.13	3.33	0.91	-	-	0.48	0.51	0.55	0.27	0.35	0.10
Less O	0.03	-	-	-	-	-	-	-	-	-	-	-
Total	99.61	100.54	99.86	100.16	100.42	100.89	99.53	100.03	99.87	99.77	100.23	99.73
Trace Elements												
ppm												
Ba	513	371	787	395	305	102	817	707	768	767	471	458
Be	-	-	-	-	-	-	-	-	-	-	-	-
Co	18.4	37.3	2.2	32.5	34.1	46.9	3.1	7.5	3.7	3.3	17.2	17.9
Cr	45.2	278	-	251	276	326	2.1	10.8	-	-	30.4	34.4
Cs	0.5	0.3	3.4	0.3	-	-	3.3	3.4	3.2	3.2	1.6	1.5
Cu	-	-	-	-	-	-	-	-	-	-	-	-
Ga	-	-	-	-	-	-	-	-	-	-	-	-
Hf	3.6	3.4	6.6	2.7	2.7	2.2	6.4	6.0	6.0	6.1	3.4	3.1
Nb	4.3	8.3	6.5	4.0	3.4	2.7	6.1	6.4	5.4	5.7	4.4	3.3
Ni	-	-	-	-	-	-	-	-	-	-	-	-
Rb	31	16	53	14	11	-	48	52	48	50	30	27
Sb	0.6	-	0.5	-	-	-	0.4	0.5	0.4	0.5	0.3	0.3
Sc	14.2	27.8	5.98	20.7	22.7	38.9	6.11	8.69	6.71	6.14	14.9	14.0
Sr	534	996	229	1127	717	366	324	404	317	356	662	670
Ta	0.34	0.50	0.54	0.24	0.23	0.19	0.51	0.52	0.50	0.49	0.36	0.31
Th	3.2	2.8	5.6	1.7	1.5	0.7	5.4	5.5	5.2	5.2	2.6	2.4
U	1.3	0.8	2.5	0.4	-	0.3	2.3	2.3	2.2	2.2	1.0	0.9
V	-	-	-	-	-	-	-	-	-	-	-	-
Y	17	19	26	16	19	24	26	24	23	23	20	18
Zn	68	86	44	80	71	79	44	54	51	44	66	66
Zr	144	158	251	134	115	94	245	232	228	240	140	141
La	15	22	21	16	12	6	22	20	21	22	15	14
Ce	28	46	43	35	27	16	44	41	43	43	29	28
Nd	16	22	21	18	13	9	21	21	21	20	15	17
Sm	3.6	4.8	4.9	4.0	3.8	3.5	4.7	5.0	4.8	4.7	4.0	3.7
Eu	0.96	1.42	0.89	1.28	1.21	1.21	0.95	1.04	1.02	0.93	1.11	1.10
Gd	-	-	-	-	-	-	-	-	-	-	-	-
Tb	0.50	0.58	0.70	0.50	0.55	0.70	0.60	0.67	0.64	0.63	0.51	0.50
Tm	0.25	-	0.41	-	0.27	-	0.34	0.34	-	-	-	-
Yb	1.8	1.6	2.5	1.7	1.8	2.9	2.3	2.4	2.3	2.4	1.8	1.7
Lu	0.35	0.26	0.38	0.23	0.28	0.45	0.35	0.36	0.36	0.34	0.28	0.25

Sample#	85C-1178	85C-1181	85C-1185	85C-1186	85C-1187	85C-1193	85C-1198	85C-1210	85C-1211	85C-1216	85C-1217	85C-1222
Material	CGR	INT	LAV	LAV	LAV	LAV	LAV	LAV	LAV	BMB	LAV	AGL
Location	CC	OB	OB	OB	OB	CC	OB	AF	AF	CR	CR	MR
Latitude	42° 59.90'	43° 01.25'	43° 00.93'	43° 01.06'	43° 00.85'	42° 58.36'	43° 01.07'	42° 49.14'	42° 49.55'	42° 50.27'	42° 50.29'	42° 49.97'
Longitude	122°15.19'	122°14.47'	122°14.65'	122°14.58'	122°14.42'	122°13.43'	122°12.66'	122° 6.00'	122° 6.43'	122° 5.82'	122° 5.38'	122° 0.94'
Major Elements												
pct												
SiO2	64.7	52.9	53.1	53.5	53.8	52.4	53.9	52.4	57.1	53.3	56.9	53.6
Al2O3	16.2	17.1	17.2	16.9	17.4	16.9	16.3	18.0	18.1	17.4	17.3	17.9
FeTO3	4.40	8.20	8.17	8.17	7.95	8.23	7.89	8.95	7.09	7.97	6.75	8.61
MgO	1.63	6.43	6.52	7.20	6.24	6.83	7.80	6.85	3.93	6.35	4.62	6.28
CaO	4.25	9.66	9.62	8.85	9.50	9.47	8.45	8.58	7.31	8.28	7.19	8.61
Na2O	4.59	3.53	3.42	3.55	3.31	3.67	3.69	3.90	4.13	3.84	4.05	3.67
K2O	1.766	1.011	0.904	1.040	0.926	0.968	1.107	0.564	1.068	1.258	1.552	0.663
TiO2	0.68	1.12	1.09	1.03	1.07	1.18	1.00	1.07	0.89	1.03	0.90	0.98
P2O5	0.34	0.24	0.24	0.24	0.22	0.32	0.33	0.20	0.22	0.35	0.28	0.15
MnO	0.07	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.11	0.12	0.10	0.13
Cl	-	-	-	-	-	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-	-	-	-	-	-
LOI	1.53	0.34	0.5	0.16	0.1	0.35	0.05	-	0.54	0.55	0.98	0.75
Less O	-	-	-	-	-	-	-	-	-	-	-	-
Total	100.16	100.65	100.88	100.76	100.84	100.44	100.64	100.64	100.49	100.45	100.62	101.34
Trace Elements												
ppm												
Ba	585	350	368	397	336	396	429	196	454	548	549	270
Be	1.5	-	-	-	-	1.3	-	-	-	1.5	-	-
Co	10.1	29.7	-	-	29.5	32.2	-	35.4	-	30.9	-	33.4
Cr	-	153	-	-	152	198	-	145	-	134	-	174
Cs	0.8	-	-	-	-	-	-	0.3	-	0.6	-	0.6
Cu	16	49	-	-	42	65	-	57	-	57	-	69
Ga	21	20	-	-	21	23	-	21	-	23	-	21
Hf	4.7	2.8	-	-	2.6	3.1	-	2.2	-	3.1	-	1.9
Nb	5.5	3.4	-	-	3.4	5.0	-	2.4	-	4.6	-	1.9
Ni	4	67	-	-	70	85	-	150	-	120	-	120
Rb	30	13	12	15	14	20	17	7	16	22	24	11
Sb	0.1	-	-	-	-	-	-	-	-	-	-	-
Sc	5.40	25.2	-	-	24.8	25.6	-	22.1	-	19.3	-	22.6
Sr	1240	888	896	809	857	887	959	650	678	1150	982	539
Ta	0.43	0.22	-	-	0.19	0.28	-	0.17	-	0.31	-	0.15
Th	4.4	1.4	-	-	1.5	2.2	-	0.8	-	2.4	-	0.8
U	1.3	0.5	-	-	0.5	0.6	-	-	-	0.7	-	0.4
V	77	210	-	-	210	190	-	200	-	170	-	180
Y	15	20	17	20	18	24	19	18	17	19	18	19
Zn	45	76	-	-	71	87	-	72	-	86	-	89
Zr	193	136	135	134	129	158	141	102	132	157	169	94
La	29	14	-	-	13	17	-	8.3	-	21	-	7.5
Ce	63	31	-	-	27	37	-	18	-	40	-	17
Nd	26	18	-	-	16	19	-	12	-	22	-	11
Sm	4.4	4.0	-	-	3.8	4.5	-	3.3	-	4.6	-	3.0
Eu	1.23	1.24	-	-	1.13	1.34	-	1.07	-	1.24	-	1.01
Gd	3.4	-	-	-	3.6	-	-	-	-	3.6	-	-
Tb	0.52	0.54	-	-	0.52	0.57	-	0.55	-	0.57	-	0.51
Tm	-	-	-	-	-	-	-	-	-	-	-	-
Yb	1.1	1.7	-	-	1.9	1.7	-	2.0	-	1.6	-	1.8
Lu	0.19	0.26	-	-	0.2	0.28	-	0.26	-	0.25	-	0.26

Sample#	85C-1229	85C-1230	85C-1231	85C-1234	85C-1236	85C-1239	85C-1241	85C-1267
Material	LAV	LAV	LAV	AGL	BMB	CGR	LAV	BMB
Location	SR	SR	SR	SR	SR	LR	CC	BY
Latitude	42° 49.79'	43° 49.79'	42° 48.87'	42° 48.66'	42° 47.70'	42° 58.44'	42° 58.08'	42° 51.15'
Longitude	121°56.99'	121°56.99'	121°57.83'	122° 0.14'	121°58.70'	122° 8.34'	122°11.26'	121°53.83'
Major Elements								
pct								
SiO2	58.5	62.2	60.7	51.9	53.9	78.7	52.7	55.4
Al2O3	17.8	16.5	16.6	17.5	17.5	11.4	17.1	18.6
FeTO3	7.15	6.57	7.01	9.05	8.59	0.81	8.43	7.67
MgO	2.55	1.91	1.95	6.46	6.61	-	6.82	4.26
CaO	6.70	4.80	4.97	9.11	8.92	0.31	9.49	8.05
Na2O	4.66	5.11	5.07	3.64	3.47	3.96	3.69	3.63
K2O	1.179	1.490	1.411	0.841	0.688	4.410	0.967	0.844
TiO2	1.06	1.03	1.24	1.23	0.84	0.12	1.21	0.93
P2O5	0.20	0.22	0.37	0.33	0.17	-	0.32	0.18
MnO	0.11	0.11	0.13	0.14	0.14	-	0.13	0.11
Cl	-	-	-	-	-	-	-	-
F	-	-	-	-	-	-	-	-
LOI	0.1	0.64	0.86	0.7	-	0.78	0.31	0.4
Less O	-	-	-	-	-	-	-	-
Total	100.01	100.58	100.31	100.90	100.83	100.49	101.17	100.07
Trace Elements								
ppm								
Ba	446	535	558	381	254	867	380	338
Be	-	-	-	1.1	-	1.5	1.3	-
Co	15.8	-	-	33.3	32.6	0.38	32.6	25.4
Cr	11.6	-	-	161	210	-	192	66
Cs	0.6	-	-	-	0.6	3.3	0.6	0.5
Cu	43	-	-	67	30	3	69	44
Ga	21	-	-	23	19	11	22	22
Hf	2.8	-	-	3.0	2.0	5.4	3.5	2.3
Nb	3.8	-	-	6.3	-	4.2	4.5	2.8
Ni	7	-	-	130	99	-	85	63
Rb	24	30	27	16	16	67	13	19
Sb	0.2	-	-	-	-	0.3	-	-
Sc	19.1	-	-	24.0	24.9	2.23	26.1	20.2
Sr	609	520	535	636	537	26	871	679
Ta	0.28	-	-	0.43	0.16	0.51	0.29	0.24
Th	1.9	-	-	1.4	0.8	6.2	2.3	1.2
U	0.8	-	-	-	-	2.4	0.8	0.5
V	190	-	-	170	190	-	200	170
Y	20	24	34	23	18	21	21	19
Zn	69	-	-	85	83	15	93	75
Zr	125	147	140	148	101	178	156	111
La	12	-	-	16	7.9	17	17	10
Ce	25	-	-	32	17	35	37	21
Nd	15	-	-	18	10	13	21	12
Sm	3.8	-	-	4.5	2.9	3.3	4.6	3.2
Eu	1.17	-	-	1.34	0.96	0.38	1.33	1.03
Gd	3.8	-	-	4.4	-	3.5	4.6	-
Tb	0.55	-	-	0.67	0.47	0.61	0.61	0.47
Tm	-	-	-	-	-	-	-	-
Yb	1.8	-	-	2.2	1.9	2.0	1.9	1.5
Lu	0.29	-	-	0.33	0.27	0.32	0.26	0.23

TABLE 2

Control Standards

Standard	Number	Mean	Absolute Std. Deviation	Percent Std. Deviation	Number	Mean	Absolute Std. Deviation	Percent Std. Deviation	Number	Mean	Absolute Std. Deviation	Percent Std. Deviation
			322				336				RLS132	
SiO_2	6	68.2	0.3	0.4	8	53.4	0.3	0.6	22	75.4	0.3	0.4
Al_2O_3	6	14.8	0.1	0.7	8	18.8	0.2	1.1	22	11.3	0.1	1.3
$FeTO_3$	6	2.6	0.02	0.8	8	6.59	0.06	0.9	22	2.12	0.03	1.4
MgO	6	0.76	0.02	2.6	8	4.94	0.07	1.4	22	0.06	0.01	14
CaO	6	2.21	0.01	0.5	8	9.00	0.07	0.8	22	0.11	0.01	6
Na_2O	6	4.77	0.10	2.1	8	3.68	0.07	1.9	22	5.16	0.05	1.0
K_2O	6	2.58	0.01	0.4	8	0.94	0.01	1.1	22	4.44	0.04	0.9
TiO_2	6	0.46	0.01	2.2	8	1.17	0.02	1.7	22	0.19	0.02	9
P_2O_5	6	0.11	0.01	9.1	8	0.25	0.01	4.0	13	0.01	0.01	100
MnO	6	0.05	-	-	8	0.07	-	-	9	0.16	0.01	6
LOI	6	2.68	0.07	2.6	8	0.45	0.06	13.3	-	-	-	-
Standard			DNC-1				RGM-1					
Co	15	57.0	1.7	3.0	32	2.0	0.1	5.0				
Cr	15	297	8	2.7	32	2.9	0.7	24				
Cs	5	0.4	0.1	25	32	9.6	0.3	3.1				
Hf	15	0.9	0.1	11.1	32	5.7	0.1	1.8				
Sb	15	1.0	0.1	10	28	1.5	0.3	20				
Ta	6	0.14	0.05	36	32	1.05	0.04	3.8				
Th	7	0.3	0.1	33	32	14.6	0.4	2.7				
U	1	0.8	0.0	0.0	31	5.2	0.5	9.6				
Zn	15	70	6	8.6	32	33	2	6.1				
Sc	15	31.0	1.1	3.6	32	4.42	0.10	2.3				
La	15	3.9	0.2	5.1	31	24	1	4.2				
Ce	15	8.4	0.5	6.0	32	45	2	4.4				
Nd	8	6	2	33	32	20	1	5.0				
Sm	15	1.47	0.08	5.4	31	4.0	0.3	7.5				
Eu	15	0.55	0.02	3.6	32	0.59	0.05	8.5				
Gd	7	2.1	0.4	19	31	4.3	0.7	16				
Tb	15	0.37	0.04	11	32	0.59	0.03	5.1				
Tm	12	0.25	0.07	28	30	0.35	0.07	20				
Yb	15	2.0	0.1	5.0	32	2.4	0.2	8.3				
Lu	15	0.32	0.02	6.3	32	0.36	0.01	2.8				
Standard			322				336					
Ba	15	744	11	1.5	15	375	8	2.1				
Rb	17	51	2	3.9	16	28	3	10.7				
Sr	17	375	4	1.1	16	1385	10	0.7				
Y	17	24	1	4.2	16	19	1	5.3				
Zr	17	228	3	1.3	16	129	4	3.1				
Standard			DNC-1				RGM-1					
Be	-	-	-	-	16	2.8	0.3	10				
Cu	15	102	6	5.7	16	12	1	8.0				
Ga	15	16	2	12	16	17	2	11				
Ni	15	250	15	6.1	16	5	1	15				
V	15	140	10	6.9	15	17	5	27				