

G-probe 14 Summary Report
 July 2015
 Stephen Wilson

A total of fifteen labs submitted final results during this stage of the G-probe 14 study. Technique breakdown was, eleven labs used LA-ICP-MS, two used SEM, four used EPMA and one lab used Micro-XRF. Three labs reported results from two techniques. The material (BBRZ-1G) used in this study was a glass version of BRP-1 which is a basalt material collected from southern Brazil and developed into a geologic reference material at the University of Campanias under the direction of Dr. Jacinta Enzweiler. Conversion of BBRZ-1G to a glass was accomplished at the USGS by melting 200 g of BRP-1 in a one liter platinum bowl at 1325° C over a period of six hours. At the end of the melting period the molten material was poured into a platinum boat and rapidly lowered into a water bath for quenching. Twenty grams of random fragments were selected, ground and then split into representative aliquots. Samples were analyzed for their total element content using techniques at the USGS and SGS minerals, Canada. If you have any questions or comments about this study please forward them to me at your earliest convenience.

Below you will find summary results for each element studied in this test. In the element diagrams you will find information for each technique providing a value. Also included is the target value (◆) and calculated precision ($X \pm Ha$) (♦) based on the Horowitz equation. A figure is also presented representing the data compilation for the entire study when more than one technique reported values. The study average is represented by ■, the standard deviation of the average by ■ and the maximum and minimum values by □. This study average is calculated primarily for the analysis of the major elements where multiple techniques provided data. For each technique an average value is presented (ex. LA-ICP-MS, ▲) as well as \pm one standard deviation (ex. LA-ICP-MS, ▲), and the maximum and minimum values reported (ex. LA-ICP-MS, Δ).

Table 1. Symbols used on figures 1 through 52

<u>Symbol type</u>		<u>Represents</u>
Large solid symbol,	●	Study or method average
Small solid symbol,	●	Study or method one standard deviation
Large open symbol,	○	Study or method Maximum or Minimum

Table 2. Summary results for GP-14, BBRZ-1G (BRP-1G)

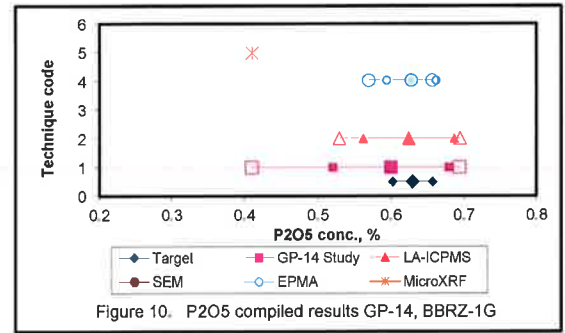
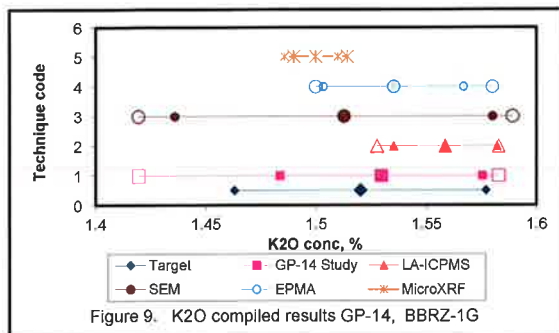
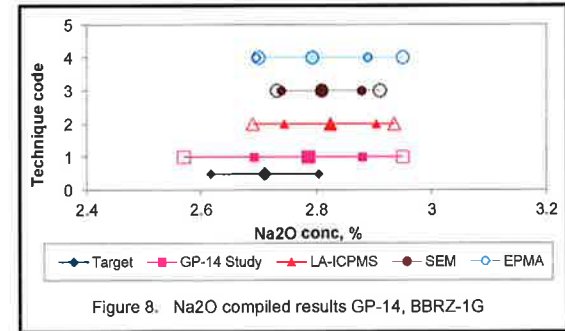
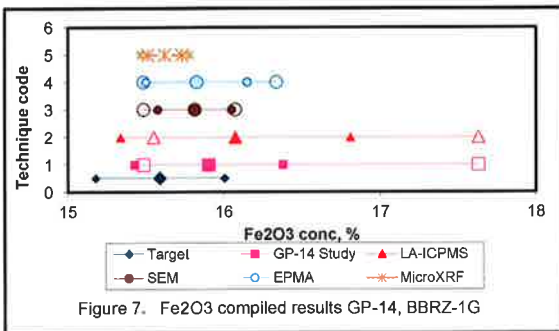
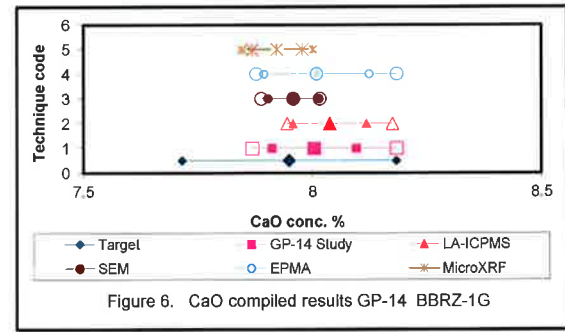
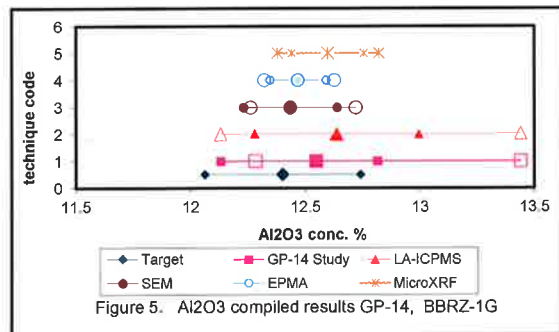
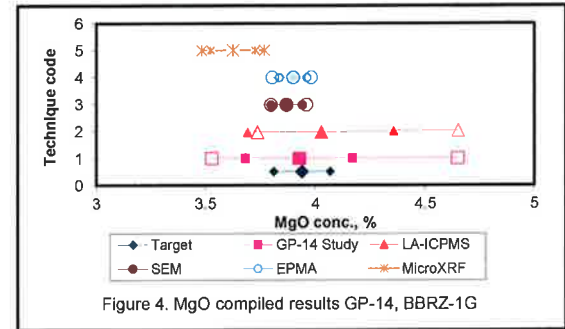
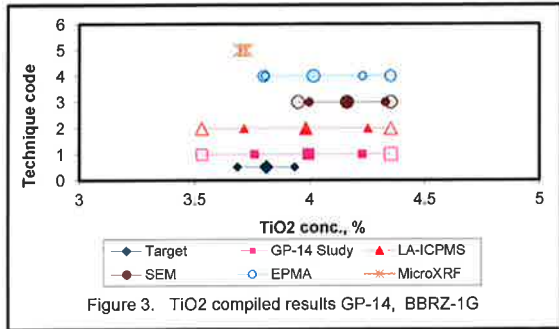
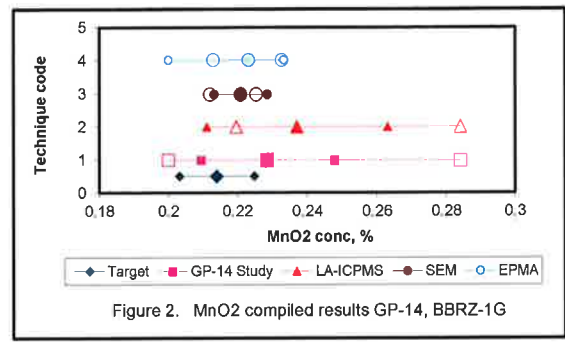
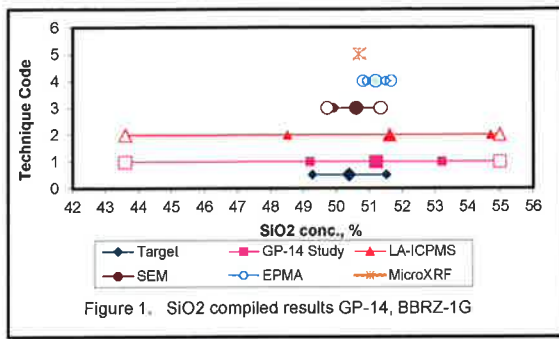
Oxide	Xa % m/m	Ha % m/m	s.d.m. % m/m	GP-14 AVG. % m/m	Max % m/m	Min % m/m
SiO2	50.39	1.120	2.000	51.20	54.98	43.59
TiO2	3.81	0.125	0.230	3.99	4.35	3.53
Al2O3	12.40	0.340	0.260	12.54	13.44	12.13
Fe2O3T	15.59	0.412	0.470	15.90	17.63	15.48
Fe(II)OT	14.03	0.377	0.430	14.31	15.86	13.93
MnO	0.21	0.011	0.020	0.23	0.28	0.20
MgO	3.94	0.128	0.240	3.92	4.65	3.53
CaO	7.95	0.233	0.091	8.00	8.18	7.87
Na2O	2.71	0.093	0.093	2.79	2.95	2.57
K2O	1.52	0.057	0.046	1.53	1.58	1.42
P2O5	0.63	0.027	0.080	0.60	0.69	0.41

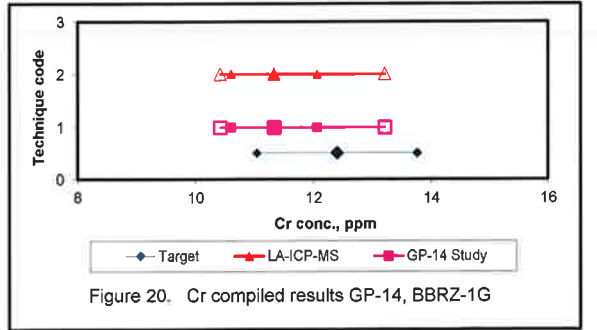
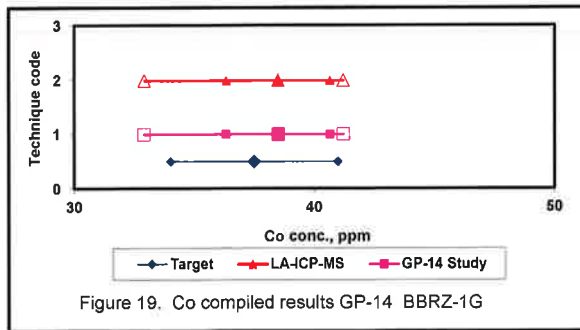
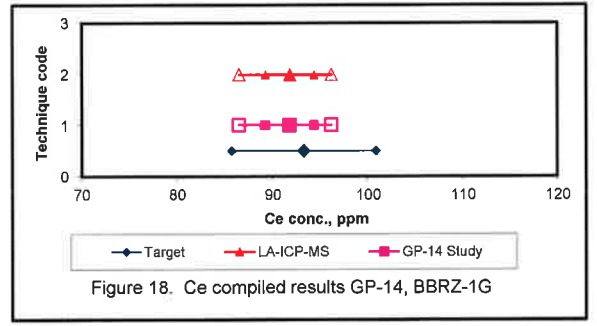
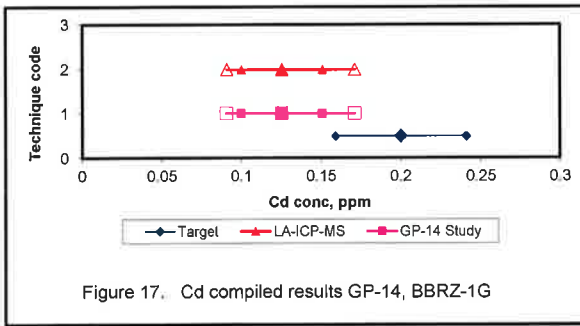
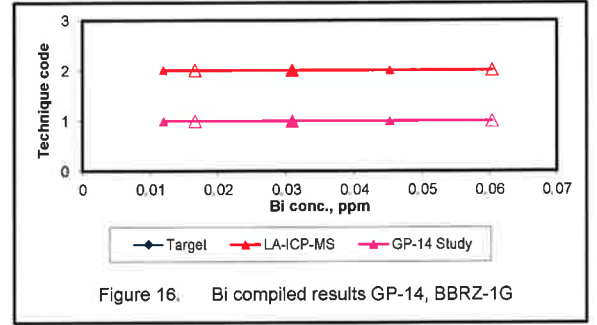
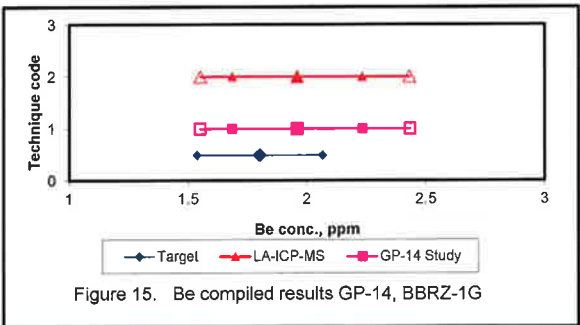
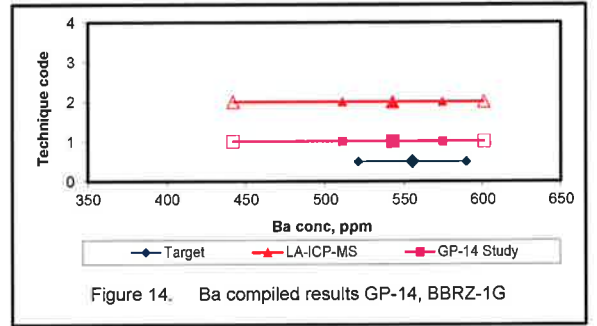
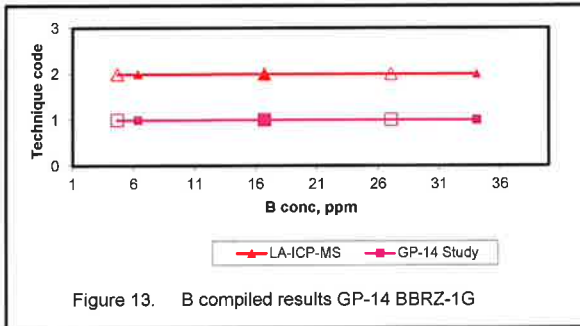
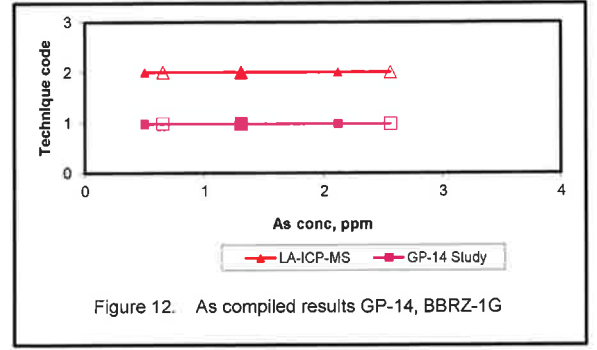
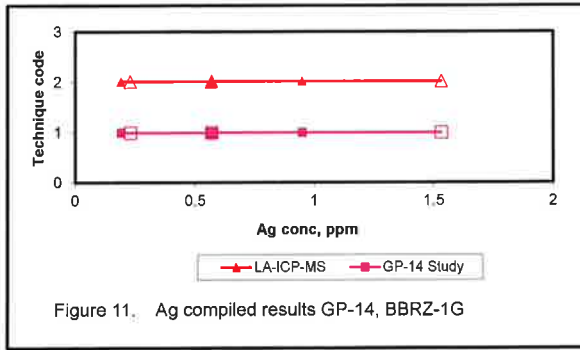
Element	Xa mg/kg	Ha mg/kg	s.d.m. mg/kg	GP-14 AVG. mg/kg	Max mg/kg	Min mg/kg
Ag	-	-	0.38	0.57	1.53	0.23
As	-	-	0.81	1.30	2.55	0.65
Au	-	-	0.24	1.05	1.22	0.69
B	-	-	10.40	16.70	34.00	4.60
Ba	555	34.30	31.90	543.0	600.0	442.0
Be	1.8	0.26	2.38	2.54	11.40	1.55
Bi	-	-	5.43	1.84	16.30	0.01
Cd	0.2	0.04	0.03	0.12	0.17	0.09
Ce	93.3	7.54	2.55	91.80	96.20	86.50
Co	37.5	3.48	2.16	38.5	41.2	32.9
Cr	12.4	1.36	0.72	11	13	10
Cs	0.37	0.05	0.06	0.38	0.61	0.30
Cu	160	11.90	12.40	150.0	170.0	123.0
Dy	8.5	0.99	0.88	8.56	10.90	7.58
Er	4.2	0.54	0.52	4.18	5.27	3.12
Eu	3.42	0.45	0.17	3.44	3.94	3.23
Ga	24.9	2.45	11.40	30.8	59.9	21.1
Gd	10.4	1.17	1.08	10.40	13.30	9.06
Ge	1.7	0.25	1.03	2.91	4.57	1.74

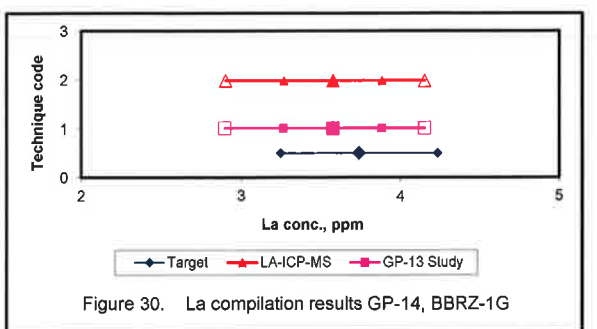
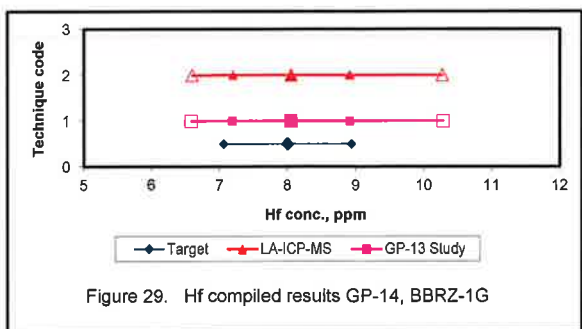
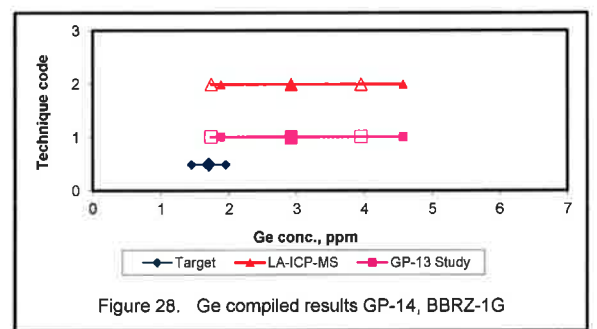
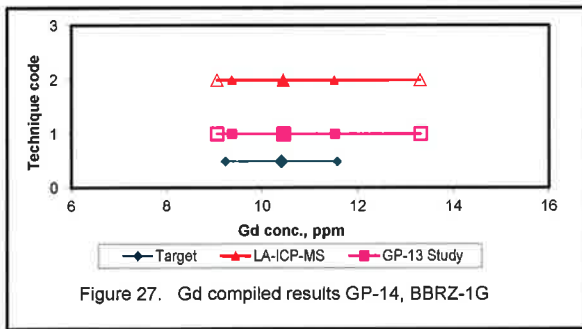
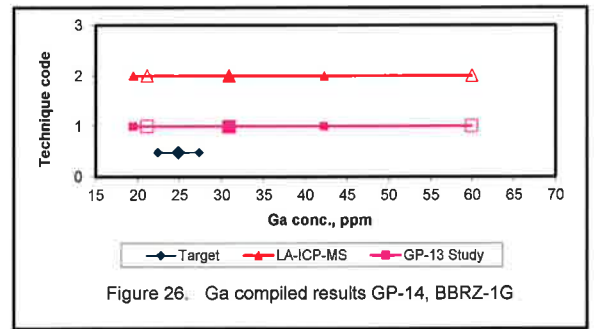
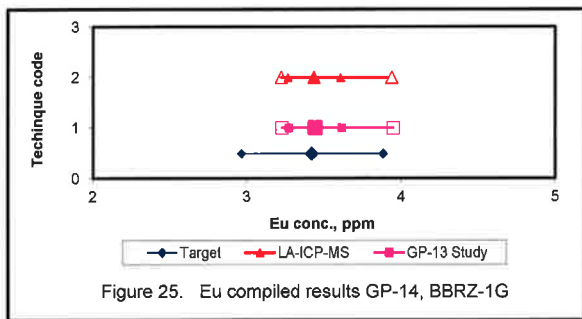
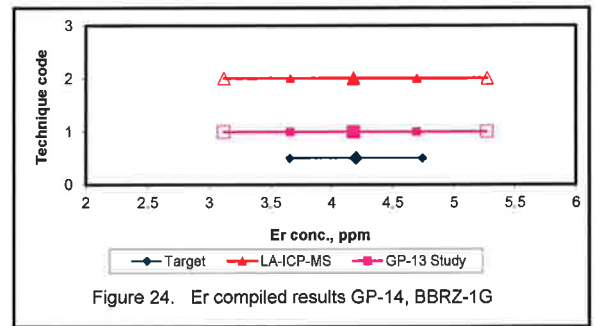
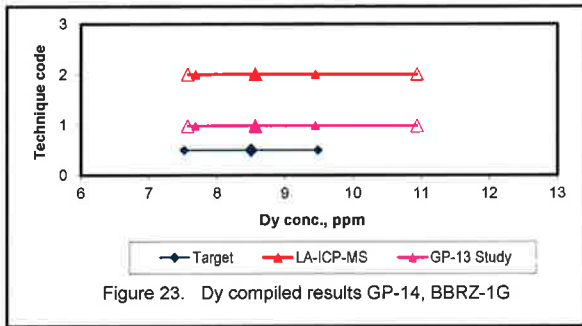
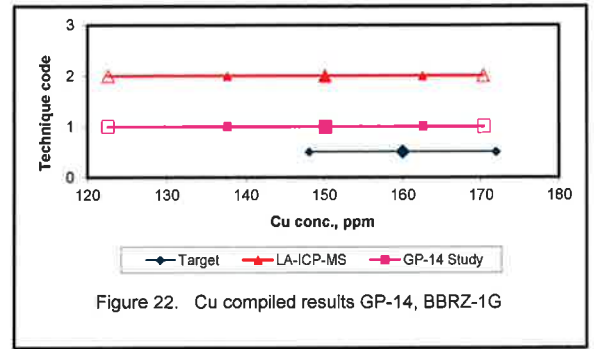
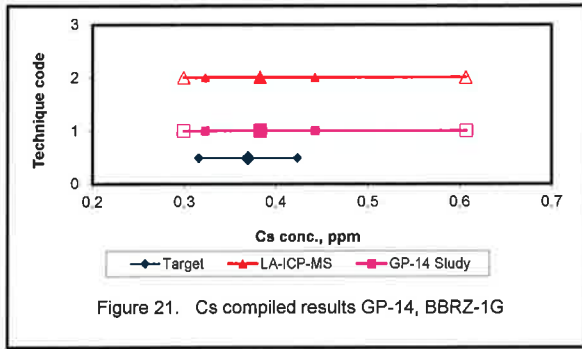
Element	Xa mg/kg	Ha mg/kg	s.d.m. mg/kg	GP-14 AVG. mg/kg	Max mg/kg	Min mg/kg
Hf	8	0.9*4	0.86	8.05	10.30	6.59
Ho	1.62	0.24	0.19	1.60	2.18	1.38
In	0.13	0.03	1.05	1.09	2.08	0.17
La	42.6	3.87	3.18	42.8	53.9	40.4
Li	7.1	0.85	1.15	6.39	8.05	3.26
Lu	0.5	0.09	0.05	0.50	0.65	0.44
Mn	1657	86.9	58.0	1723	1805	1630
Mo	1.5	0.23	0.18	1.52	1.92	1.22
Nb	29.1	2.80	2.73	30.4	35.7	25.0
Nd	51.9	4.58	3.43	52.5	21.8	48.1
Ni	23.4	2.3	1.99	23.3	27.4	18.9
Pb	5.5	0.68	0.76	5.62	6.21	3.22
Pr	12.30	1.35	0.57	11.8	13.2	10.8
Pt	-	-	-	0.78	1.02	0.47
Rb	35.4	3.31	2.74	35.2	40.9	29.3
Sb	0.06	0.01	0.03	0.10	0.15	0.06
Sc	28.5	2.75	1.73	30.1	33.4	27.6
Se	<1	-	0.16	0.83	0.94	0.72
Sm	11.2	1.25	0.65	11.3	12.5	10.4
Sn	2.5	0.35	0.99	2.93	5.35	1.90
Sr	492.0	30.9	12.2	500.3	522.2	480.0
Ta	1.96	0.28	0.17	1.82	2.09	1.51
Tb	1.52	0.23	0.27	1.51	2.33	1.28
Th	3.97	0.52	0.18	3.89	4.23	3.61
Tl	0.13	0.03	0.03	0.16	0.19	0.12
Tm	0.57	0.10	0.04	0.54	0.61	0.49
U	0.82	0.14	0.05	0.81	0.98	0.69
V	391.0	25.5	25.9	407.9	452.3	336.3
W	-	-	0.01	0.49	0.52	0.47
Y	42	3.83	4.86	41.8	55.9	36.2
Yb	3.48	0.46	0.60	3.55	4.13	3.16
Zn	142	10.80	20.30	159.2	192.0	119.2
Zr	310.0	20.90	36.10	319.0	421.0	272.5

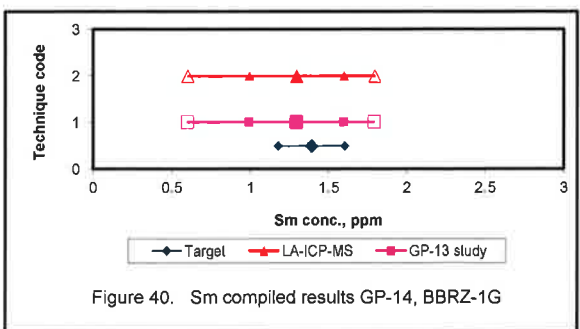
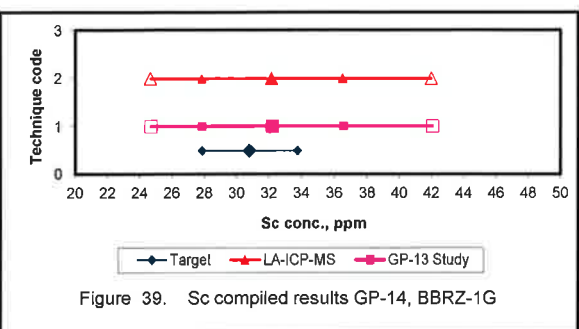
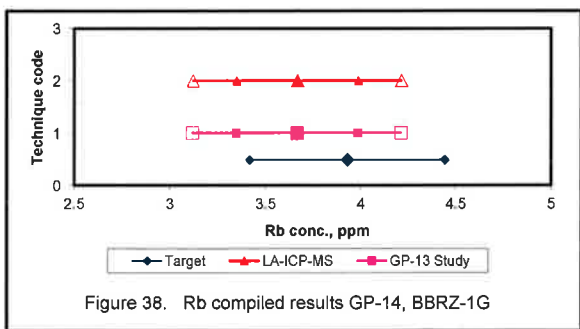
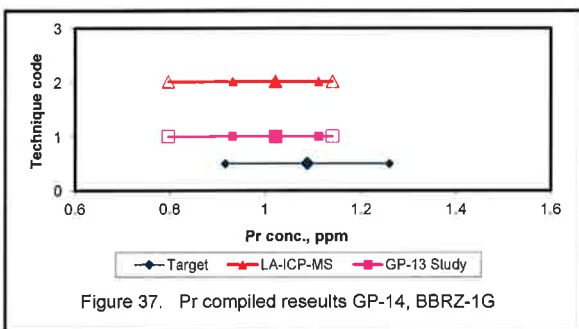
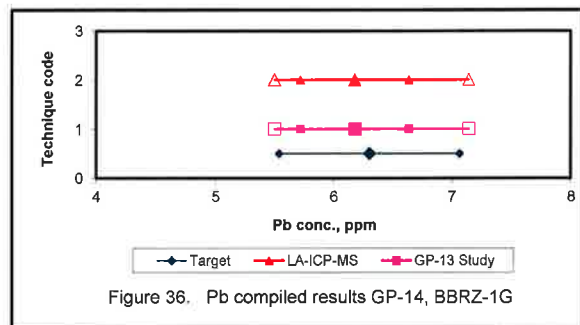
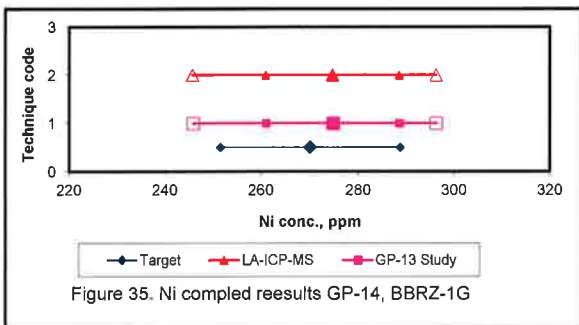
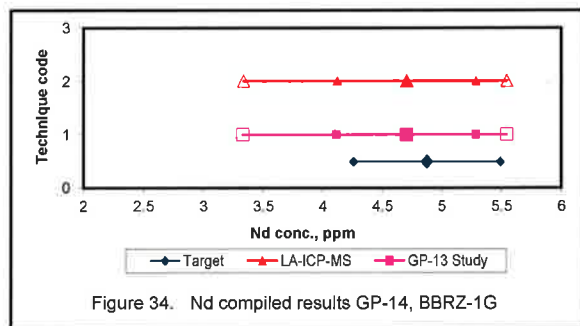
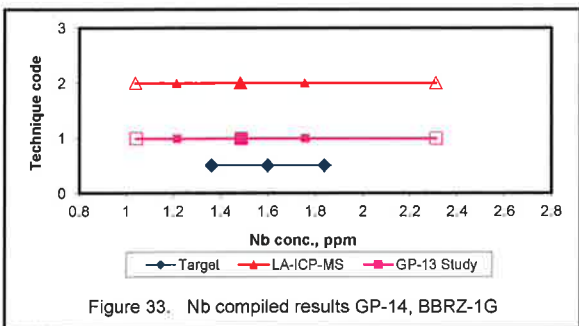
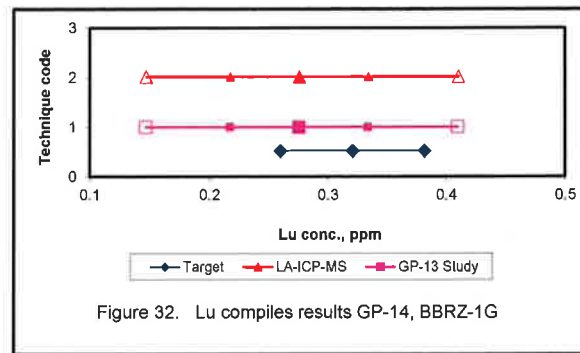
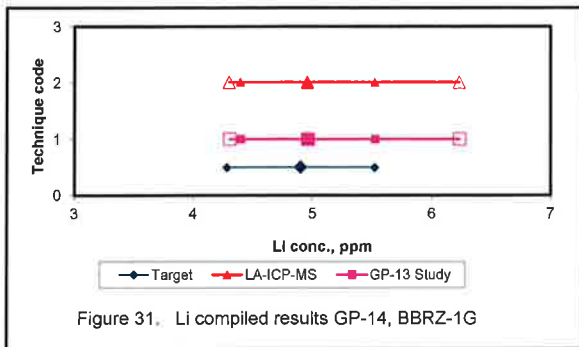
Xa = Target value - USGS bulk analysis of glass fragments and W-2 certificate values

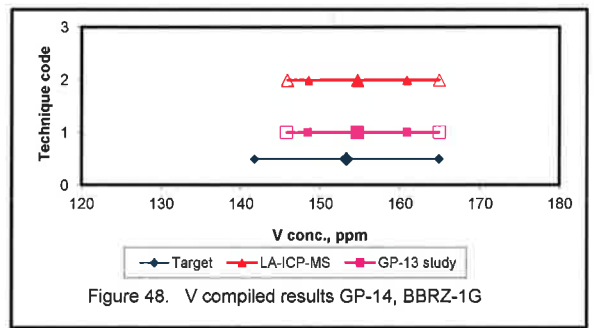
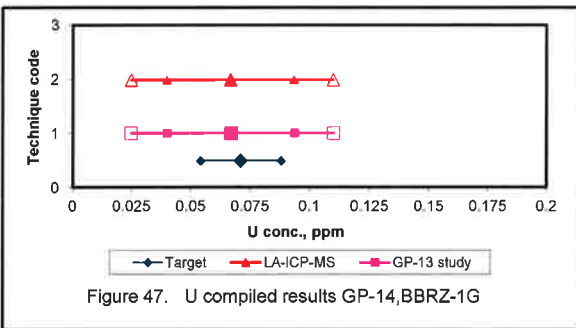
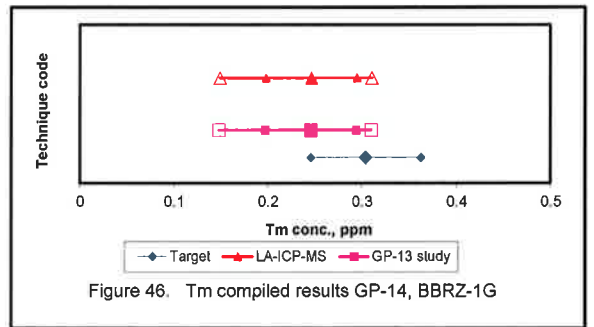
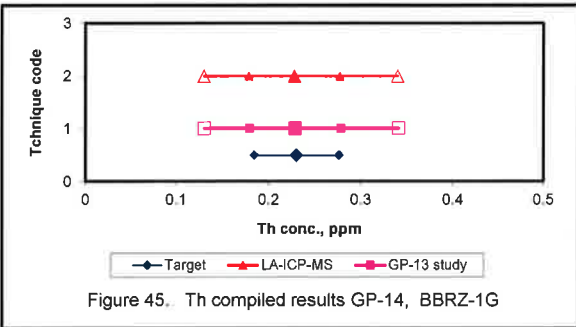
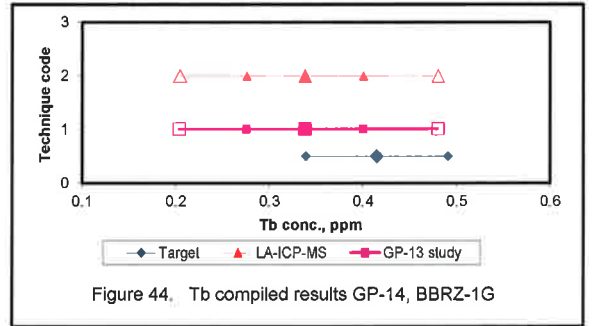
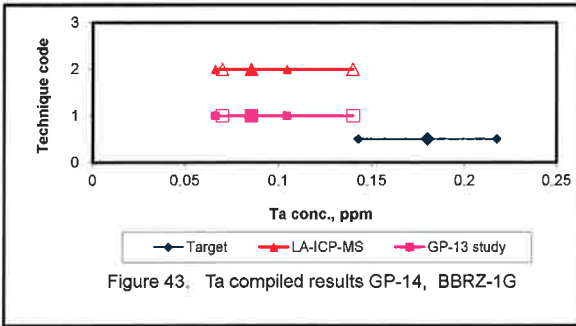
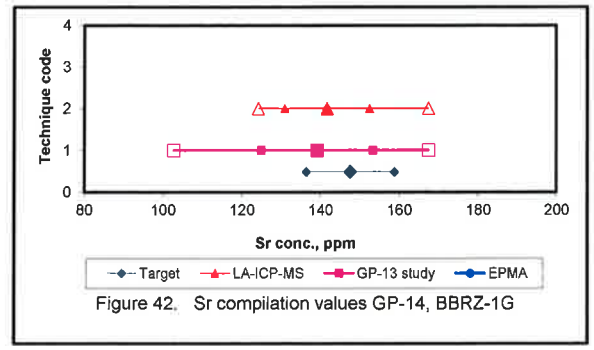
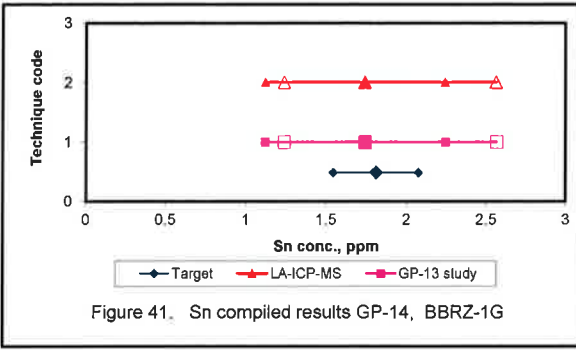
Ha = Target precision calculated using modified version of Horowitz equation for data quality 2 (Ha = 0.01Xa^{0.8495})











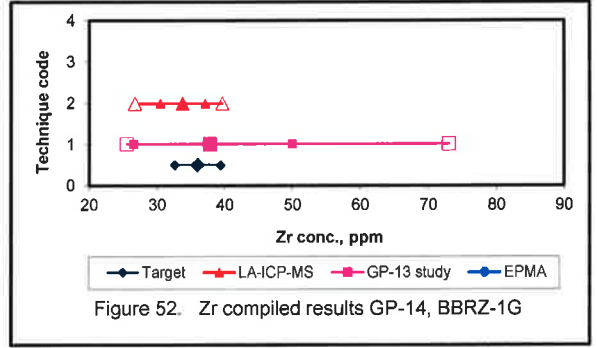
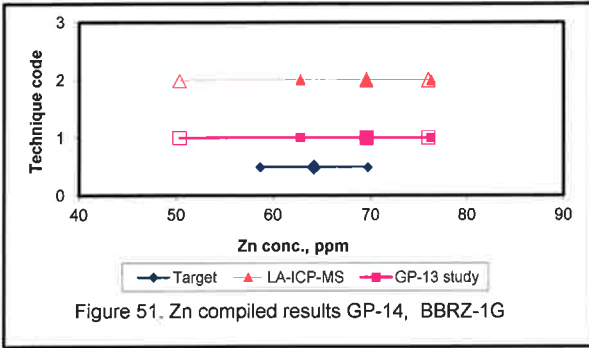
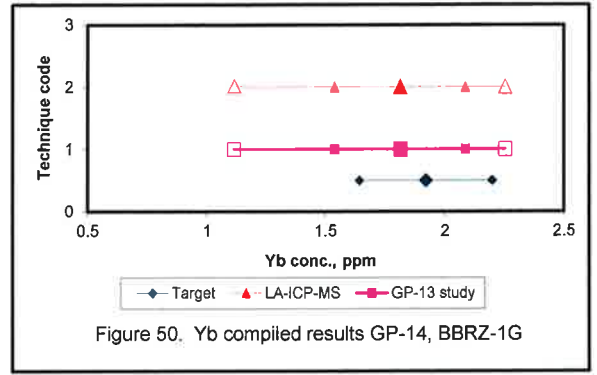
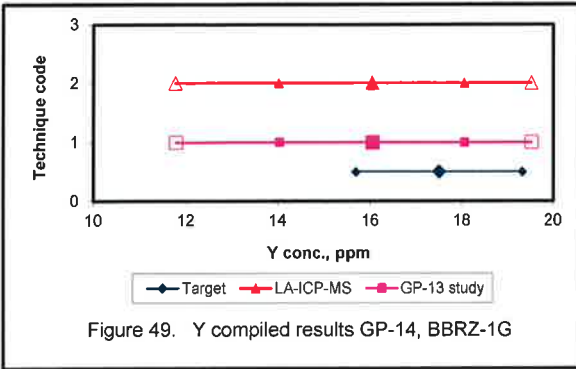


Table 3 cont.

Lab identifier Data Quality Elem/Cmpnd	units	BBZ-10A	BBZ-10B	BBZ-15A	BBZ-15B	BBZ-8A	BBZ-8B	BBZ-9A	BBZ-9B	BBZ-10A	BBZ-10B
		2	2	2	2	2	2	2	2	2	2
		EPMA	EPMA	Micro-XRF	Micro-XRF	LAICPMS	LAICPMS	LAICPMS	LAICPMS	LAICPMS	LAICPMS
SiO2	% m/m	51.00	51.13	50.67	1.05						
TiO2	% m/m	4.35	4.35	3.70	0.08						
Al2O3	% m/m	12.32	12.39	12.75	0.58						
Fe2O3T	% m/m	15.48	15.57	15.51	0.29						
Fe(II)O	% m/m										
MnO	% m/m	0.23	0.23								
MgO	% m/m	3.81	3.83	3.73	0.33						
CaO	% m/m	7.91	7.88	7.87	0.21						
Na2O	% m/m	2.91	2.95								
K2O	% m/m	1.58	1.58	1.49	0.03						
P2O5	% m/m	0.57	0.58	0.41	0.02						
Ag	mg/kg							0.55	0.55		
As	mg/kg							<DL	<DL		
Au	mg/kg							1.22	1.18		
B	mg/kg										
Ba	mg/kg					587.18	600.78	543.91	540.03	549.45	543.85
Be	mg/kg									1.92	1.83
Bi	mg/kg							0.03	0.03		
Br	mg/kg										
Cd	mg/kg							0.15	0.17		
Ce	mg/kg					94.97	94.67	91.87	90.55	90.39	90.90
Cl	mg/kg										
Co	mg/kg							39.03	37.93	37.79	38.32
Cr	mg/kg							10.44	11.48	11.92	11.71
Cs	mg/kg							0.43	0.39	0.39	0.37
Cu	mg/kg							154.28	153.20	136.62	148.28
Dy	mg/kg					10.80	10.93	8.48	8.11	7.77	7.69
Er	mg/kg					5.13	5.27	4.25	4.49	3.24	3.12
Eu	mg/kg					3.94	3.70	3.41	3.42	3.28	3.23
F	mg/kg										
Ga	mg/kg					25.43	25.13	23.94	23.40	41.53	42.98
Gd	mg/kg					13.02	13.30	10.38	10.15	9.53	9.44
Ge	mg/kg					1.89	1.74	1.91	1.76	4.35	4.57
Hf	mg/kg					10.18	10.27	7.91	7.29	7.33	7.31
Hg	mg/kg										
Ho	mg/kg					2.18	2.11	1.56	1.60	1.38	1.38
I	mg/kg										
In	mg/kg					0.20	0.17				
Ir	mg/kg							0.04	0.03		
La	mg/kg					49.81	53.94	41.88	41.09	40.53	40.39
Li	mg/kg							<DL	<DL	5.99	6.13
Lu	mg/kg					0.65	0.51	0.49	0.46	0.45	0.44
Mn	mg/kg							1722	1706	1789	1806
Mo	mg/kg					1.25	1.22	1.46	1.34	1.56	1.55
Nb	mg/kg					35.33	35.67	29.44	28.44	32.14	31.64
Nd	mg/kg					61.12	61.78	51.52	52.11	50.22	49.56
Ni	mg/kg							23.71	24.12	25.89	27.36
Os	mg/kg										
Pb	mg/kg							5.37	5.20	5.77	5.63
Pd	mg/kg										
Pr	mg/kg					12.39	12.61	11.55	11.39	11.50	11.38
Pt	mg/kg							1.02	1.02		
Rb	mg/kg							34.88	33.19	36.32	35.89
Re	mg/kg										
Rh	mg/kg										
Ru	mg/kg										
S	mg/kg										
Sb	mg/kg							0.10	0.10		
Sc	mg/kg							30.50	29.81	30.09	30.26
Se	mg/kg							<DL	<DL		
Sm	mg/kg					12.39	12.53	11.25	11.00	10.69	10.46
Sn	mg/kg										
Sr	mg/kg							509.36	499.30	499.26	494.52
Ta	mg/kg							1.69	1.65	1.77	1.78
Tb	mg/kg					2.33	2.29	1.40	1.41	1.30	1.28
Te	mg/kg										
Th	mg/kg							4.04	3.92	3.67	3.61
Tl	mg/kg							0.19	0.17		
Tm	mg/kg					0.61	0.61	0.57	0.51	0.50	0.49
U	mg/kg							0.82	0.82	0.76	0.74
V	mg/kg							420.9	412.4	450.1	452.3
W	mg/kg							0.48	0.52		
Y	mg/kg					54.97	55.93	40.94	40.56	39.94	39.82
Yb	mg/kg					4.12	4.13	3.48	3.30	3.24	3.22
Zn	mg/kg							154.73	150.61	180.38	180.14
Zr	mg/kg					413.1	421.6	315.4	305.8	315.0	313.5

Table 3 cont.

Lab identifier Data Quality Elem/Cmpnd	units	BBZ-11A	BBZ-11B	BBZ-12A	BBZ-12B	BBZ-13A	BBZ-13B	BBZ-14A	BBZ-14B	BBZ-15A	BBZ-15B
		2 LAICPMS	2 LAICPMS	2 LAICPMS	2 LAICPMS	2 LAICPMS	2 LAICPMS	2 LAICPMS	2 LAICPMS	2 LAICPMS	2 LAICPMS
SiO2	% m/m	53.85	53.12	51.38	51.54			54.98	53.31		
TiO2	% m/m	3.53	3.56	4.04	4.05			4.33	4.35		
Al2O3	% m/m	12.43	12.45	12.47	12.50			13.44	12.94		
Fe2O3T	% m/m							17.63	16.11		
Fe(II)O	% m/m			14.04	14.01			15.87	14.49		
MnO	% m/m	0.281	0.284	0.22	0.22			0.23	0.23	0.223	0.003
MgO	% m/m			3.91	3.91	3.81	3.78	4.63	4.65		
CaO	% m/m			7.95	7.95			8.03	8.04		
Na2O	% m/m			2.87	2.86			2.84	2.69	2.57	0.04
K2O	% m/m			1.58	1.58						
P2O5	% m/m			0.69	0.69			0.56	0.53		
Ag	mg/kg			0.58	0.51					0.23	0.43
As	mg/kg							0.65	0.69	2.55	2.38
Au	mg/kg			1.09	0.69						
B	mg/kg			4.89	4.60			34.04	31.64	18	17
Ba	mg/kg	518.20	521.11	562.01	562.90	537	534	546.60	547.59	557.5	548
Be	mg/kg			1.96	1.98	1.6	1.99	1.60	1.62	2.43	2.16
Bi	mg/kg									0.028	0.04
Br	mg/kg										
Cd	mg/kg									0.11	0.12
Ce	mg/kg	87.69	87.75	92.77	92.75	93.9	93.1	90.75	91.79	94.73	92.93
Cl	mg/kg							211.31	208.18		
Co	mg/kg			39.56	39.61	41.1	41.2	39.39	39.23	38.72	38.97
Cr	mg/kg	10.67	10.63	10.57	10.53	11.4	11.1	11.09	11.17	12.4	13.2
Cs	mg/kg	0.36	0.37	0.39	0.39	0.4	0.4	0.37	0.36	0.37	0.35
Cu	mg/kg	147.20	138.77	167.32	161.80	166	170	151.08	142.92	146.1	147.8
Dy	mg/kg	7.58	7.65	8.68	8.70	7.9	7.77	8.63	7.92	8.98	8.77
Er	mg/kg	3.65	3.65	4.35	4.36	3.73	3.74	4.32	4.01	4.34	4.45
Eu	mg/kg	3.25	3.29	3.41	3.42	3.5	3.41	3.38	3.38	3.45	3.44
F	mg/kg										
Ga	mg/kg	24.59	24.77	26.28	26.50			36.84	34.23	59.93	57.7
Gd	mg/kg	9.33	9.31	10.42	10.42	9.26	9.06	10.40	9.79	10.85	11.05
Ge	mg/kg									3.44	3.47
Hf	mg/kg	7.46	7.54	8.16	8.14	7.47	7.4	8.10	8.07	8.29	8.3
Hg	mg/kg										
Ho	mg/kg	1.46	1.46	1.59	1.58	1.54	1.52	1.67	1.53	1.64	1.63
I	mg/kg										
In	mg/kg									1.91	2.08
Ir	mg/kg										
La	mg/kg	40.46	40.60	41.50	41.53	43.3	43.1	41.31	41.38	42.98	42.23
Li	mg/kg			6.80	6.82	7.89	8.05	6.56	6.36	4.9	3.26
Lu	mg/kg	0.45	0.45	0.51	0.51	0.47	0.47	0.49	0.50	0.5	0.51
Mn	mg/kg					1671	1678	1759.43	1748.34		
Mo	mg/kg			1.57	1.55			1.51	1.55	1.92	1.79
Nb	mg/kg	24.98	25.10	31.68	31.72	27.5	27.7	29.73	29.28	29.83	29.43
Nd	mg/kg	48.13	48.45	52.14	52.13	50.5	50.1	50.53	50.24	53	52.57
Ni	mg/kg	22.34	22.04	24.02	24.01	24.1	24.3	22.51	22.64	25.4	24.47
Os	mg/kg										
Pb	mg/kg	5.99	5.94	6.06	6.08	5.89	5.79	6.05	5.78		
Pd	mg/kg									5.38	5.37
Pr	mg/kg	10.86	10.82	11.83	11.84	11.5	11.5	11.81	11.83	12.09	11.83
Pt	mg/kg			0.60	0.47						
Rb	mg/kg	36.51	36.95	36.21	36.40	40.3	40.9	36.14	34.09	33.33	32.27
Re	mg/kg										
Rh	mg/kg										
Ru	mg/kg										
S	mg/kg										
Sb	mg/kg									0.13	0.15
Sc	mg/kg	27.63	27.85	29.47	29.56	28.3	28.1			33.43	33.21
Se	mg/kg									0.94	0.72
Sm	mg/kg	10.35	10.43	11.24	11.27	10.8	10.7	11.13	11.17	11.72	11.27
Sn	mg/kg	2.51	2.38	2.20	2.16	2.7	2.7				
Sr	mg/kg	481.57	483.34	503.43	503.67	480	483	522.24	515.85	516.25	504.4
Ta	mg/kg			1.99	1.98	1.52	1.51	1.74	1.79	1.73	1.72
Tb	mg/kg	1.36	1.37	1.49	1.50	1.42	1.41	1.51	1.39	1.47	1.48
Te	mg/kg										
Th	mg/kg	3.62	3.61	3.99	3.99	3.79	3.75	3.83	3.95	4.1	3.94
Tl	mg/kg									0.13	0.19
Tm	mg/kg	0.49	0.49	0.56	0.56	0.51	0.5	0.56	0.53	0.56	0.54
U	mg/kg	0.81	0.81	0.81	0.82	0.86	0.86	0.79	0.81	0.85	0.81
V	mg/kg	400.7	401.3	406.6	406.3	422	423	416.34	422.01	398	391
W	mg/kg			0.49	0.49			0.48	0.48	0.47	0.5
Y	mg/kg	36.22	36.36	42.81	42.74	37.9	37.7	40.87	38.55	41.75	41.58
Yb	mg/kg	3.17	3.16	3.56	3.58	3.39	3.4	3.58	3.56	3.67	3.58
Zn	mg/kg	192.04	192.15	169.48	170.20	175	174	148.04	128.79	146.95	150.13
Zr	mg/kg	280.3	283.4	315.3	315.7	295	294	303.88	303.69	331.5	326.93

Table 3 cont.

Lab identifier Data Quality Elem/Cmpnd	units	BBZ-16A	BBZ-16B	BBZ-16C	BBZ-17A	BBZ-18A	BBZ-18B	BBZ-19A	BBZ-19B
		2 LAICPMS	2 LAICPMS	2 LAICPMS	2 LAICPMS	2 LAICPMS	2 LAICPMS	2 ED-SEM	2 ED-SEM
SiO2	% m/m	51.66	51.14	51.46	43.59			51.35	50.63
TiO2	% m/m	4.00	4.04	3.96	3.97			3.79	3.76
Al2O3	% m/m	12.54	12.65	12.80	12.13			12.47	12.3
Fe2O3T	% m/m	15.69	16.24	15.68					
Fe(II)O	% m/m							13.78	13.78
MnO	% m/m	0.22	0.22	0.22				0.21	0.22
MgO	% m/m	3.93	3.97	3.94	3.74			3.94	3.9
CaO	% m/m	8.05	8.09	8.17	int std			8.12	8.04
Na2O	% m/m	2.93	2.79	2.78				2.57	2.61
K2O	% m/m	1.55	1.53	1.55				1.54	1.56
P2O5	% m/m	0.64	0.62	0.64				0.62	0.59
Ag	mg/kg	1.53	0.44	0.30					
As	mg/kg	0.97	0.84	1.07					
Au	mg/kg								
B	mg/kg	16.10	12.60	11.19					
Ba	mg/kg	565.60	555.95	551.94	530	491.9	441.94		
Be	mg/kg	2.18	2.11	2.12		2.31	1.55		
Bi	mg/kg	0.06	0.02	0.03	0.012				
Br	mg/kg								
Cd	mg/kg	0.12	0.12	0.11	0.091				
Ce	mg/kg	92.55	92.22	92.85	88.2	86.51	96.17		
Cl	mg/kg								
Co	mg/kg	38.96	39.42	39.45	37.9	32.92	33.36		
Cr	mg/kg	11.23	12.01	11.51	11.0				
Cs	mg/kg	0.39	0.37	0.36	0.607	0.3	0.31		
Cu	mg/kg	170.37	150.04	145.61	148	122.6	134.31		
Dy	mg/kg	8.60	9.01	8.96	8.73	8.16	8.69		
Er	mg/kg	4.37	4.47	4.49	4.25	4.2	4.04		
Eu	mg/kg	3.66	3.72	3.41	3.36	3.34	3.32		
F	mg/kg								
Ga	mg/kg	25.30	25.01	25.24	24.9	21.09	21.84		
Gd	mg/kg	10.74	10.88	10.46	10.4	10.59	11.08		
Ge	mg/kg	2.54	2.54	2.71	4.06				
Hf	mg/kg	8.22	8.38	8.54	8.51	6.59	7.65		
Hg	mg/kg								
Ho	mg/kg	1.55	1.58	1.61	1.60	1.59	1.5		
I	mg/kg								
In	mg/kg				BDL				
Ir	mg/kg								
La	mg/kg	41.18	41.47	42.29	42.8	44.15	43.18		
Li	mg/kg	7.13	6.68	6.52		6.78	6.04		
Lu	mg/kg	0.47	0.48	0.54	0.49	0.52	0.55		
Mn	mg/kg				1630				
Mo	mg/kg	1.64	1.56	1.50	1.35				
Nb	mg/kg	32.64	32.43	32.15	30.8	31.58	29.15		
Nd	mg/kg	52.65	52.57	55.43	51.3	54.43	54.1		
Ni	mg/kg	22.00	22.57	21.72	BDL	18.92	19.92		
Os	mg/kg								
Pb	mg/kg	6.21	6.09	6.00	3.22	4.15	5.94		
Pd	mg/kg								
Pr	mg/kg	11.97	11.97	12.56	11.6	12.52	13.21		
Pt	mg/kg								
Rb	mg/kg	35.91	34.86	36.06	33.1	31.17	29.29		
Re	mg/kg								
Rh	mg/kg								
Ru	mg/kg								
S	mg/kg								
Sb	mg/kg	0.07	0.07	0.06	BDL				
Sc	mg/kg	31.18	31.09	31.51	29.4				
Se	mg/kg								
Sm	mg/kg	11.46	11.51	12.46	11.1	12.29	11.13		
Sn	mg/kg	3.95	3.56	3.43	5.35	1.9	2.3		
Sr	mg/kg	507.42	510.56	509.68	492	494.18	496.32		
Ta	mg/kg	1.97	1.96	1.97	1.93	2.09	1.96		
Tb	mg/kg	1.48	1.49	1.57	1.42	1.38	1.55		
Te	mg/kg								
Th	mg/kg	3.77	3.82	4.10	4.10	4.04	4.23		
Tl	mg/kg				0.12				
Tm	mg/kg	0.54	0.54	0.59	0.49	0.53	0.54		
U	mg/kg	0.87	0.85	0.82	0.731	0.69	0.81		
V	mg/kg	416.31	413.97	410.87	397	336.3	360.5		
W	mg/kg	0.51	0.51	0.48	0.490				
Y	mg/kg	40.89	42.16	42.82	43.4	40.1	41.25		
Yb	mg/kg	3.65	3.71	3.77	3.60	3.53	3.68		
Zn	mg/kg	160.38	159.36	159.36	132	119.2	140.27		
Zr	mg/kg	316.40	321.15	344.04	326	272.5	304.21		