

G-probe 17 Summary Report  
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Stephen Wilson

A total of twenty six labs submitted final results during this stage of the G-probe 17 study. Technique breakdown was, nineteen labs used LA-ICP-MS, five used SEM, six used EPMA and one provided information using miro-XRF. Five labs reported results using multiple techniques. Starting material used in glass preparation was donated by the Geological Survey of Japan. The starting powdered material is identified at JGB-1 and the glass version as JGb-1G.

Conversion of JGB-1 to a glass was accomplished at the USGS by melting 300 g of JGB-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 for bulk analysis testing. Samples were analyzed for their total element content using techniques at the USGS and Agat Laboratories, 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 that 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, △).

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

**Organizations interested in providing suitable starting materials for future G-probe studies are encouraged to contact Stephen Wilson at the U.S. Geological Survey ([swilson@usgs.gov](mailto:swilson@usgs.gov)). Contributors of suitable starting materials will receive a complimentary portion of the produced glasses.**

Table 2. Summary results for GP-17, JGB-1G

Oxide	Xa %/m/m	Ha %/m/m	s.d.m. %/m/m	GP-17 AVG. %/m/m	MAX %/m/m	Min %/m/m
SiO2	44.03	0.996	1.14	44.05	47.01	39.83
TiO2	1.61	0.060	0.05	1.61	1.75	1.51
Al2O3	17.62	0.458	0.50	17.66	18.82	16.68
Fe2O3	15.28	0.405	1.71	14.79	16.61	8.79
FeO	13.75	0.371	1.74	12.99	14.09	7.91
MnO	0.20	0.010	0.02	0.19	0.23	0.14
MgO	7.86	0.231	0.41	7.95	8.76	7.01
CaO	11.97	0.330	0.24	11.81	12.21	11.03
Na2O	1.23	0.048	0.09	1.27	1.47	1.04
K2O	0.23	0.011	0.04	0.22	0.28	0.03
P2O5	0.07	0.004	0.03	0.07	0.13	0.04

Element	Xa mg/kg	Ha mg/kg	s.d.m. mg/kg	GP-17 AVG. mg/kg	MAX mg/kg	Min mg/kg
Ag	0.65	0.11	0.13	0.69	0.99	0.50
As	0.99	0.16	0.43	1.00	1.91	0.21
Au	1.21	0.19	0.37	1.27	2.23	0.85
B	7.73	0.91	4.00	8.79	20.76	6.34
Ba	66.33	5.64	3.65	63.04	71.00	55.27
Be	0.33	0.06	0.03	0.34	0.42	0.30
Bi	0.03	0.01	0.02	0.04	0.10	0.02
Br	-	-	-	-	-	-
Cd	0.14	0.03	0.10	0.14	0.48	0.03
Ce	8.35	0.97	0.43	8.36	9.10	7.22
Cl	-	-	-	-	0.00	0.00
Co	61.46	5.29	4.04	62.71	72.10	52.90
Cr	66.66	5.67	3.52	59.05	67.48	52.30
Cs	0.33	0.05	0.03	0.25	0.34	0.21
Cu	86.66	7.08	6.96	83.79	99.76	75.98
Dy	1.56	0.23	0.11	1.68	1.92	1.46
Er	0.98	0.16	0.05	0.97	1.10	0.85
Eu	0.59	0.10	0.03	0.62	0.67	0.55
F	-	-	-	-	-	-
Ga	17.66	1.83	2.02	19.59	23.60	15.15
Gd	1.56	0.23	0.11	1.61	1.81	1.32
Ge	1.00	0.16	1.29	1.88	5.40	0.61
Hf	0.76	0.13	0.08	0.77	0.89	0.38
Hg	-	-	-	-	-	-
Ho	0.35	0.07	0.03	0.34	0.39	0.26
I	-	-	-	-	-	-

Element	Xa mg/kg	Ha mg/kg	s.d.m. mg/kg	GP-17 AVG. mg/kg	MAX mg/kg	Min mg/kg
In	0.05	0.01	0.01	0.05	0.07	0.04
Ir	0.09	0.02	0.02	0.10	0.15	0.09
La	3.23	0.43	0.18	3.47	3.75	3.02
Li	4.54	0.58	0.37	4.70	6.10	4.24
Lu	0.13	0.03	0.01	0.13	0.15	0.11
Mn	1437	77	88	1479	1588	1289
Mo	0.32	0.06	0.06	0.34	0.52	0.19
Nb	2.00	0.29	0.15	2.25	2.52	1.99
Nd	4.93	0.62	0.29	5.24	5.70	4.49
Ni	32.00	3.04	2.04	26.29	30.70	21.51
Os	-	-	-	-	-	-
Pb	1.81	0.27	0.16	1.86	2.27	1.57
Pd	0.14	0.03	0.02	0.14	0.15	0.12
Pr	1.08	0.17	0.08	1.11	1.27	0.88
Pt	3.72	0.49	0.67	3.70	5.04	2.81
Rb	5.43	0.67	0.49	6.06	7.13	5.21
Re	-	-	-	-	-	-
Rh	-	-	-	-	-	-
Ru	-	-	-	-	-	-
S	-	-	-	-	-	-
Sb	0.08	0.02	0.09	0.11	0.39	0.04
Sc	34.67	3.25	1.72	34.46	38.40	30.76
Se	-	-	-	-	-	-
Sm	1.33	0.20	0.09	1.43	1.62	1.15
Sn	1.67	0.25	0.35	1.07	1.87	0.54
Sr	332.00	22.17	21.06	327.34	359.94	228.00
Ta	0.13	0.03	0.01	0.13	0.16	0.12
Tb	0.24	0.05	0.02	0.26	0.30	0.20
Te	-	-	-	-	-	-
Th	0.47	0.08	0.03	0.44	0.50	0.40
Tl	0.11	0.10	0.02	0.11	0.18	0.08
Tm	0.13	0.03	0.01	0.14	0.16	0.11
U	0.11	0.02	0.01	0.12	0.13	0.10
V	681.00	40.81	36.27	681.69	746.40	576.00
W	3.67	0.48	0.29	3.45	4.00	2.91
Y	9.17	1.05	0.71	8.94	10.52	7.32
Yb	0.97	0.16	0.06	0.91	1.04	0.80
Zn	114.00	8.94	14.24	122.27	144.00	89.60
Zr	31.93	3.03	1.56	26.73	30.70	23.20

Xa = Target value - USGS bulk analysis of glass fragments  
 Ha = Target precision calculated using modified version of Horowitz equation  
 for data quality 2 (Ha = 0.01Xa<sup>0.8495</sup>)  
 s.d.m. = Standard deviation of population mean  
 mean = Mean element concentration for all techniques reporting  
 Max. = Maximum element/oxide concentration reported  
 Min. = Minimum element/oxide concentration reported





Table 3 cont.

Lab Identifier		11A	11B		12A	12B	5A	5A	2A	2B	14A	14B
Data Quality		2	2		2	2	2	2	2	2	2	2
Elem/Cmpnd	units	EPMA	EPMA	units	EPMA	EPMA	LAICPMS	LAICPMS	LAICPMS	LAICPMS	LAICPMS	LAICPMS
SiO2	% m/m	44.22	44.15	% m/m	43.21	43.75					44.1	44.0
TiO2	% m/m			% m/m	1.56	1.65					1.64	1.75
Al2O3	% m/m	17.5	17.43	% m/m	18.34	18.48					18.8	18.8
Fe2O3T	% m/m	14.68	14.88	% m/m	14.14	14.36					9.7	8.8
Fe(II)O	% m/m			% m/m							8.7	7.9
MnO	% m/m			% m/m							0.19	0.20
MgO	% m/m	7.76	7.8	% m/m	7.92	7.87					8.6	8.7
CaO	% m/m	11.79	11.8	% m/m	11.78	12.07					11.9	11.9
Na2O	% m/m			% m/m							1.23	1.23
K2O	% m/m			% m/m	0.2	0.28					0.22	0.23
P2O5	% m/m	0.065	0.063	% m/m							0.04	0.04
Ag	mg/kg			mg/kg					0.77	0.84	0.60	0.62
As	mg/kg			mg/kg					0.93	0.93		
Au	mg/kg			mg/kg					1.48	0.95		
B	mg/kg			mg/kg					6.38	6.50		
Ba	mg/kg			mg/kg			64.400	66.700	62.61	63.00	62.1	62.2
Be	mg/kg			mg/kg					0.35	0.35		
Bi	mg/kg			mg/kg					0.03	0.03	0.03	0.03
Br	mg/kg			mg/kg								
Cd	mg/kg			mg/kg			0.133	0.115	0.07	0.06	0.11	0.10
Ce	mg/kg			mg/kg			8.140	8.410	8.66	8.72	8.3	8.2
Cl	mg/kg			mg/kg								
Co	mg/kg			mg/kg			55.100	59.600	66.77	66.43	61.7	61.9
Cr	mg/kg			mg/kg					59.71	58.64	56	56
Cs	mg/kg			mg/kg			0.234	0.242	0.24	0.24	0.22	0.22
Cu	mg/kg			mg/kg			80.600	88.300	85.98	81.32	77.2	77.2
Dy	mg/kg			mg/kg			1.750	1.760	1.62	1.64	1.8	1.8
Er	mg/kg			mg/kg			1.040	1.090	0.94	0.98	1.0	1.0
Eu	mg/kg			mg/kg			0.616	0.609	0.61	0.62	0.62	0.62
F	mg/kg			mg/kg								
Ga	mg/kg			mg/kg					19.60	19.62	19.6	19.5
Gd	mg/kg			mg/kg			1.590	1.640	1.59	1.63	1.7	1.6
Ge	mg/kg			mg/kg					3.50	3.56	2.0	2.1
Hf	mg/kg			mg/kg			0.800	0.810	0.74	0.75	0.8	0.8
Hg	mg/kg			mg/kg								
Ho	mg/kg			mg/kg			0.386	0.371	0.33	0.34	0.36	0.36
I	mg/kg			mg/kg								
In	mg/kg			mg/kg							0.06	0.06
Ir	mg/kg			mg/kg					0.09	0.09		
La	mg/kg			mg/kg			3.570	3.640	3.48	3.51	3.5	3.5
Li	mg/kg			mg/kg					4.72	4.76	4.53	4.51
Lu	mg/kg			mg/kg			0.148	0.146	0.13	0.13	0.14	0.14
Mn	mg/kg			mg/kg							1502	1526
Mo	mg/kg			mg/kg			0.257	0.239	0.37	0.36	0.3	0.3
Nb	mg/kg			mg/kg			2.120	2.180	2.17	2.21	2.2	2.2
Nd	mg/kg			mg/kg			5.510	5.540	5.23	5.22	5.2	5.3
Ni	mg/kg			mg/kg			23.700	25.900	27.47	27.57	25	26
Os	mg/kg			mg/kg								
Pb	mg/kg			mg/kg			1.660	1.581	1.78	1.82	1.79	1.79
Pd	mg/kg			mg/kg								
Pr	mg/kg			mg/kg			1.202	1.249	1.11	1.12	1.1	1.1
Pt	mg/kg			mg/kg					3.95	3.87	2.81	2.85
Rb	mg/kg			mg/kg			5.590	5.670	6.06	6.13	5.8	5.8
Re	mg/kg			mg/kg								
Rh	mg/kg			mg/kg								
Ru	mg/kg			mg/kg								
S	mg/kg			mg/kg								
Sb	mg/kg			mg/kg			0.080	0.075	0.08	0.08		
Sc	mg/kg			mg/kg					34.56	34.84	35	36
Se	mg/kg			mg/kg								
Sm	mg/kg			mg/kg			1.506	1.540	1.43	1.43	1.4	1.5
Sn	mg/kg			mg/kg			1.210	1.140	1.26	1.52	1.07	0.97
Sr	mg/kg			mg/kg			316.000	327.000	330.97	337.49	329	330
Ta	mg/kg			mg/kg			0.164	0.160	0.12	0.13	0.13	0.13
Tb	mg/kg			mg/kg			0.292	0.275	0.24	0.25	0.27	0.27
Te	mg/kg			mg/kg								
Th	mg/kg			mg/kg			0.470	0.451	0.42	0.43	0.46	0.45
Tl	mg/kg			mg/kg					0.11	0.11		
Tm	mg/kg			mg/kg			0.153	0.157	0.13	0.13		
U	mg/kg			mg/kg			0.114	0.110	0.12	0.12	0.11	0.11
V	mg/kg			mg/kg					728.78	718.83	680	692
W	mg/kg			mg/kg					3.70	3.66	3.39	3.38
Y	mg/kg			mg/kg			10.520	9.980	8.61	8.82	9	9
Yb	mg/kg			mg/kg			0.980	0.967	0.88	0.91	1.0	1.0
Zn	mg/kg			mg/kg					124.37	124.83	139	130
Zr	mg/kg			mg/kg			27.600	27.400	25.66	26.31	27	27

Table 3 cont.

Lab Identifier Data Quality Elem/Cmpnd	units	15A	15B	16A	16B	17A	17B	18A	18B	19A	19B	20A	20B
		2 LAICPMS	2 LAICPMS	2 LAICPMS	2 LAICPMS	2 LAICPMS	2 LAICPMS	2 LAICPMS	2 LAICPMS	2 LAICPMS	2 LAICPMS	2 LAICPMS	2 LAICPMS
SiO2	% m/m	45.1	46.1	45.74	45.64			43.8	43.6			44.5	44.7
TiO2	% m/m	1.51	1.53	1.56	1.55	1.61	1.62	1.58	1.60			1.63	1.62
Al2O3	% m/m	17.2	17.4	17.21	17.20			17.7	17.9			18.0	17.9
Fe2O3T	% m/m	15.05	15.10					16.42	16.61			15.3	15.3
Fe(II)O	% m/m			13.99	14.09								
MnO	% m/m	0.199	0.200	0.232	0.232			0.200	0.205			0.19	0.19
MgO	% m/m	8.04	8.10	7.90	7.92	8.75	8.76	7.2	7.0			8.06	8.02
CaO	% m/m			11.79	11.80			11.58	11.55			11.9	11.8
Na2O	% m/m	1.33	1.37	1.32	1.32	1.35	1.34	1.08	1.04			1.28	1.28
K2O	% m/m	0.25	0.25	0.2436	0.2426	0.247	0.246	0.240	0.246			0.24	0.24
P2O5	% m/m			0.0573	0.0574			0.051	0.049			0.11	0.11
Ag	mg/kg			0.61	0.65			0.654	0.577	0.99	0.50	0.69	0.69
As	mg/kg			1.154	1.192			0.997	0.980	1.75	1.91	1.07	0.94
Au	mg/kg			1.365	1.100			0.853	1.420	2.23	1.25		
B	mg/kg			6.5	6.3					17.90	20.78	7.6	7.8
Ba	mg/kg	61.1	62.8	60.6	60.8	65.1	65.3	64.9	70.9	58.20	58.90	62	63
Be	mg/kg			0.331	0.332					BDL	BDL	0.34	0.33
Bi	mg/kg							0.027	0.028	0.10	0.09	0.03	0.03
Br	mg/kg												
Cd	mg/kg							0.11	0.10	0.48	0.29	0.19	0.20
Ce	mg/kg	8.3	8.5	8.14	8.15	8.8	8.8	7.9	8.5	7.46	7.65	8.2	8.4
Cl	mg/kg												
Co	mg/kg	64.5	65.9	63.9	64.2	61.0	60.4	63.4	61.4	58.60	60.09	61.1	60.2
Cr	mg/kg	59	59	54.1	54.8	66	65	59.3	57.8	52.30	53.30	60	59
Cs	mg/kg	0.242	0.250	0.234	0.233	0.24	0.24	0.34	0.32	0.33	0.31	0.23	0.22
Cu	mg/kg	78.9	83.1	88.2	87.6	79	79	76.2	78.7	79.60	77.11	76.0	77.0
Dy	mg/kg	1.59	1.65	1.69	1.69	1.67	1.68	1.46	1.62	1.66	1.74	1.78	1.82
Er	mg/kg	0.95	0.96	1.02	1.01	0.94	0.97	0.85	0.95	0.95	1.01	1.04	1.04
Eu	mg/kg	0.61	0.63	0.60	0.61	0.62	0.62	0.58	0.64	0.58	0.60	0.61	0.61
F	mg/kg												
Ga	mg/kg	20.6	21.2	20.40	20.33	16.7	16.6	19.8	20.1	21.22	21.60	19.2	19.3
Gd	mg/kg	1.57	1.61	1.65	1.65	1.69	1.64	1.44	1.58	1.41	1.61	1.71	1.65
Ge	mg/kg			1.185	1.188			1.26	1.26	4.66	5.40	1.41	1.37
Hf	mg/kg	0.71	0.73	0.76	0.76	0.74	0.77	0.69	0.77	0.75	0.83	0.82	0.83
Hg	mg/kg												
Ho	mg/kg	0.33	0.33	0.34	0.34	0.34	0.34	0.296	0.329	0.34	0.34	0.36	0.36
I	mg/kg												
In	mg/kg							0.043	0.049	0.06	0.07		
Ir	mg/kg												
La	mg/kg	3.44	3.52	3.44	3.46	3.48	3.51	3.02	3.25	3.20	3.29	3.56	3.52
Li	mg/kg			4.55	4.54	4.77	4.91			BDL	BDL	4.24	4.33
Lu	mg/kg	0.129	0.131	0.131	0.134	0.13	0.13	0.120	0.132	0.13	0.14	0.14	0.14
Mn	mg/kg	1540.0	1551.6	1584.3	1587.8	1548	1540			1371.0	1391.0		
Mo	mg/kg			0.323	0.326	0.5	0.5	0.32	0.31	0.42	0.38	0.38	0.38
Nb	mg/kg	2.15	2.15	2.15	2.15	2.29	2.30	2.26	2.41	2.08	2.00	2.30	2.34
Nd	mg/kg	5.3	5.3	5.22	5.21	5.1	5.2	4.7	5.2	4.70	4.68	5.3	5.5
Ni	mg/kg	27	28	26.9	27.1	25	25	25.4	25.4	24.72	25.90	25	25
Os	mg/kg												
Pb	mg/kg	2.11	2.12	1.86	1.85	1.87	1.83	1.78	1.87	1.89	1.91	1.91	1.94
Pd	mg/kg									0.12	0.15		
Pr	mg/kg	1.10	1.13	1.10	1.10	1.10	1.10	1.01	1.10	1.01	1.03	1.13	1.14
Pt	mg/kg			3.239	2.842					4.29	3.57		
Rb	mg/kg	6.23	6.43	6.14	6.10	6.04	6.00	5.83	6.09	5.88	5.89	5.90	5.95
Re	mg/kg									BDL	BDL		
Rh	mg/kg									BDL	BDL		
Ru	mg/kg												
S	mg/kg									BDL	BDL		
Sb	mg/kg							0.040	0.057	0.36	0.39	0.08	0.06
Sc	mg/kg	33.8	33.5	34.61	34.60	37.9	38.4	30.8	31.3	32.10	32.80	36.4	36.2
Se	mg/kg									BDL	BDL		
Sm	mg/kg	1.35	1.44	1.43	1.40	1.39	1.42	1.28	1.41	1.38	1.34	1.51	1.48
Sn	mg/kg			0.59	0.63	0.96	0.93	1.157	0.675	1.46	1.47	1.80	1.87
Sr	mg/kg	322	329	324.5	324.7	323	325	328.1	340.5	305.00	311.50	332	332
Ta	mg/kg	0.122	0.121	0.130	0.127	0.13	0.14	0.116	0.130	0.12	0.13	0.15	0.14
Tb	mg/kg	0.247	0.248	0.258	0.255	0.25	0.26	0.220	0.246	0.25	0.24	0.27	0.28
Te	mg/kg												
Th	mg/kg	0.442	0.447	0.433	0.436	0.44	0.44	0.415	0.477	0.42	0.44	0.46	0.46
Tl	mg/kg			0.114	0.092			0.098	0.107	0.18	0.14		
Tm	mg/kg	0.129	0.128	0.136	0.137	0.13	0.13	0.118	0.133	0.14	0.14	0.15	0.15
U	mg/kg	0.116	0.114	0.106	0.101	0.12	0.11	0.115	0.121	0.12	0.13	0.11	0.11
V	mg/kg	681	686	677.7	678.9	720	723	680.7	693.2	635.00	639.00	648	651
W	mg/kg	3.516	3.54	3.288	3.280	3.74	3.73	3.190	3.420	3.17	3.22	3.18	3.21
Y	mg/kg	8.5	8.6	9.18	9.15	8.6	8.7	7.3	7.9	8.28	8.54	9.6	9.4
Yb	mg/kg	0.87	0.91	0.92	0.91	0.89	0.88	0.80	0.89	0.94	0.93	0.99	0.99
Zn	mg/kg	131.5	140.3	103.12	103.38	120.0	117.0	120.4	118.1	140.60	142.90	130	127
Zr	mg/kg	25	26	26.7	26.7	25	26	24.1	25.1	25.20	25.89	29	28

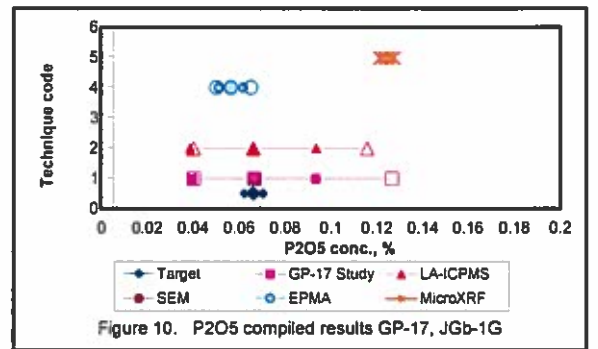
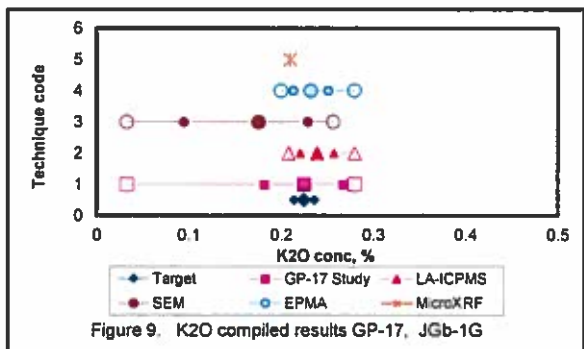
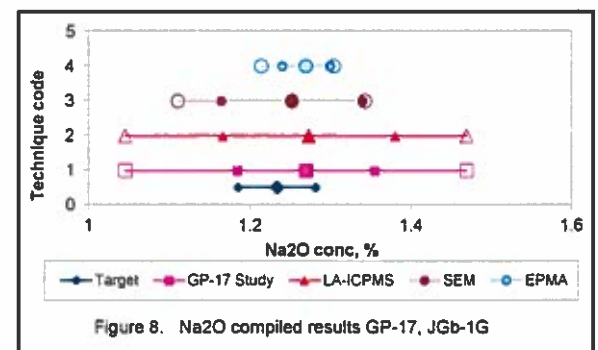
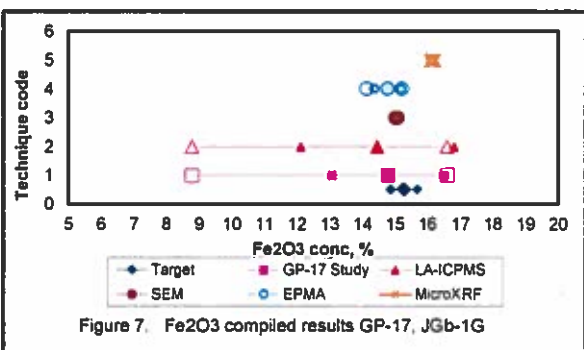
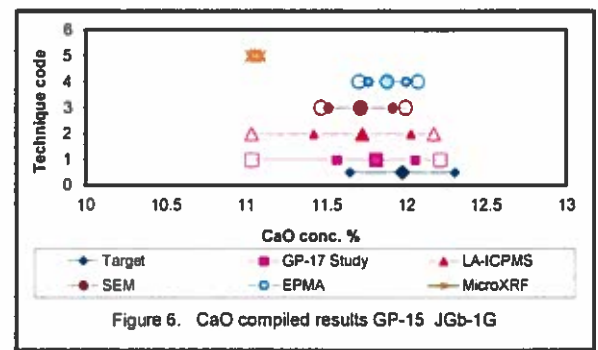
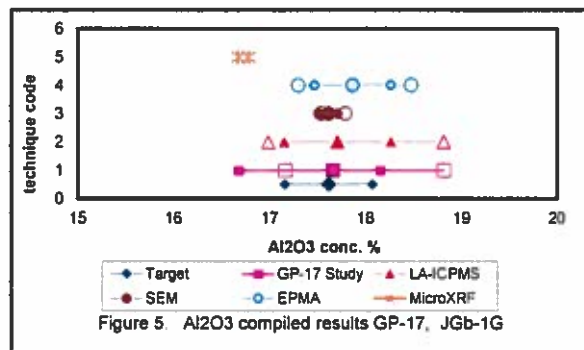
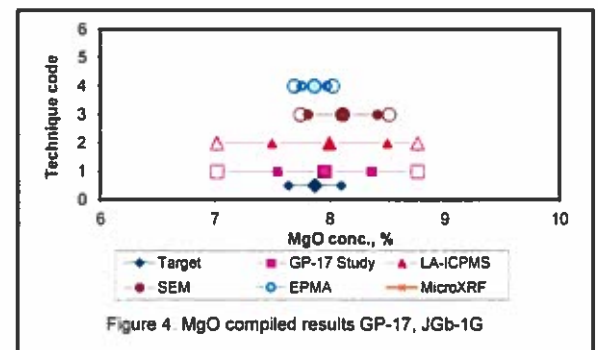
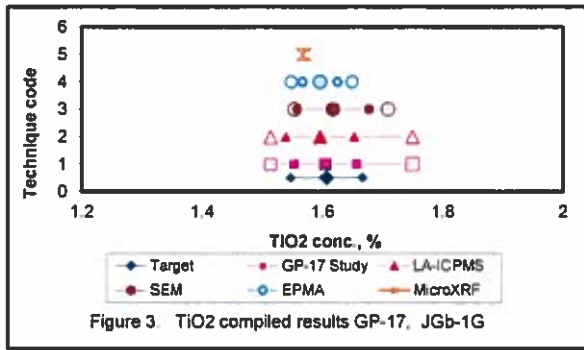
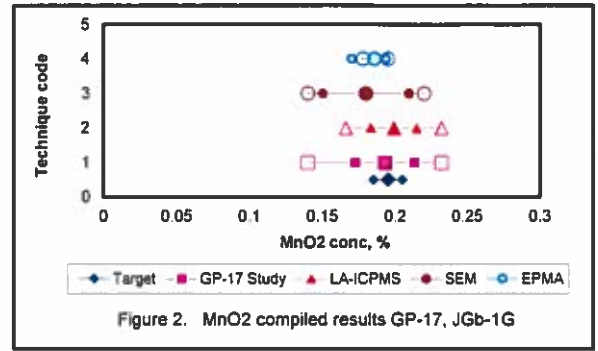
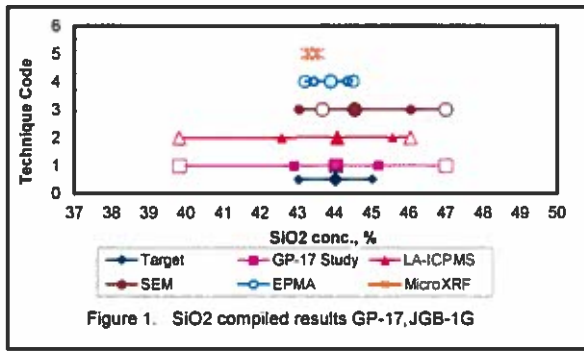
Table 3 cont.

Lab Identifier Data Quality Elem/Cmpnd	units	20A	20B	23A	23B	24A	24B	25A	25B	26A	26B	27A	27B
		2 LAICPMS	2 LAICPMS	23A LAICPMS	23B LAICPMS	2 LA-ICP-MS	2 LA-ICP-MS	2 LA-ICP-MS	2 LA-ICP-MS	2 LA-ICP-MS	2 LA-ICP-MS	2 LA-ICP-MS	2 LA-ICP-MS
SiO2	% m/m	44.017	44.412					43.90	43.90	42.03	39.83		
TiO2	% m/m	1.667	1.654					1.53	1.54	1.59	1.55		
Al2O3	% m/m	18.009	18.049					16.99	17.04	17.61	17.61		
Fe2O3T	% m/m	15.566	15.284					15.75	15.86	14.21	13.55		
Fe(II)O	% m/m												
MnO	% m/m	0.195	0.193					0.19	0.19	0.177	0.166		
MgO	% m/m	8.073	8.080					7.84	7.71	7.87	7.38		
CaO	% m/m	12.170	12.010					11.75	11.73	11.78	11.64		
Na2O	% m/m	1.281	1.281					1.23	1.22	1.22	1.13		
K2O	% m/m	0.229	0.228					0.23	0.23	0.215	0.208		
P2O5	% m/m	0.116	0.107					0.05	0.05	0.0505	0.0487		
Ag	mg/kg	0.534	0.700										
As	mg/kg	0.235	0.208										
Au	mg/kg												
B	mg/kg	7.499	7.476					8.168	8.70				
Ba	mg/kg	63.131	62.327	55.27	54.40	62.56	62.16	58.887	59.92	63.8	62.5	68.00	71.00
Be	mg/kg	0.338	0.381			0.38	0.32			0.32	0.37		
Bi	mg/kg	0.025	0.029										
Br	mg/kg												
Cd	mg/kg	0.195	0.242							0.11	0.11		
Ce	mg/kg	8.448	8.279	7.37	7.22	8.18	8.20	8.171	8.13	8.56	8.27	8.89	9.10
Cl	mg/kg												
Co	mg/kg	60.437	60.207			58.89	62.66	62.659	62.71	56.5	52.0	66.42	68.53
Cr	mg/kg	59.068	59.178			57.91	58.35	56.030	55.99	58	55.5	63.42	62.44
Cs	mg/kg	0.230	0.232			0.23	0.22			0.28	0.3	0.27	0.28
Cu	mg/kg	76.584	76.811			92.89	90.65	79.899	80.18	84.4	80.8	94.17	96.47
Dy	mg/kg	1.738	1.658	1.47	1.49	1.65	1.70	1.671	1.71	1.91	1.92	1.72	1.76
Er	mg/kg	1.007	1.011	0.87	0.89	0.95	0.96	1.004	0.97	1.1	1.1	0.96	1.01
Eu	mg/kg	0.621	0.597	0.55	0.55	0.62	0.61	0.619	0.61	0.68	0.67	0.66	0.67
F	mg/kg												
Ga	mg/kg	19.332	19.369	16.09	15.15	18.40	18.75	18.843	18.67	18.4	17.5	22.25	23.35
Gd	mg/kg	1.628	1.553	1.32	1.33	1.65	1.81	1.674	1.65	1.81	1.8	1.62	1.71
Ge	mg/kg	1.439	1.384	0.74	0.61			1.353	1.40	1.1	0.89		
Hf	mg/kg	0.782	0.763	0.69	0.73	0.85	0.84			0.89	0.88	0.81	0.83
Hg	mg/kg												
Ho	mg/kg	0.344	0.353	0.26	0.37	0.38	0.38	0.352	0.35	0.38	0.38	0.35	0.37
I	mg/kg												
In	mg/kg												
Ir	mg/kg												
La	mg/kg	3.505	3.463	3.05	3.12	3.42	3.63	3.418	3.44	3.73	3.74	3.64	3.75
Li	mg/kg	4.325	4.399			4.61	4.50	4.489	4.49	4.3	6.1	4.87	4.89
Lu	mg/kg	0.142	0.137			0.13	0.13	0.137	0.14	0.15	0.15	0.14	0.14
Mn	mg/kg							1493.436	1502.77	1372	1289		
Mo	mg/kg	0.194	0.276					0.324	0.32	0.33	0.33	0.32	0.35
Nb	mg/kg	2.341	2.289	2.05	1.99	2.52	2.46	2.119	2.20	2.5	2.41	2.43	2.52
Nd	mg/kg	5.370	5.333	4.49	4.62	5.29	5.14	5.226	5.21	5.67	5.61	5.34	5.70
Ni	mg/kg	21.511	24.258			29.12	29.80	28.054	27.43	24.5	22.6	27.50	28.23
Os	mg/kg												
Pb	mg/kg	1.733	1.683			1.88	1.73	1.903	1.80	1.97	1.77	2.04	2.27
Pd	mg/kg												
Pr	mg/kg	1.128	1.149	0.89	0.88	1.10	1.09	1.059	1.09	1.19	1.17	1.20	1.27
Pt	mg/kg												
Rb	mg/kg	5.567	5.688			6.53	6.42	5.730	5.72	5.88	5.55	5.97	7.13
Re	mg/kg												
Rh	mg/kg												
Ru	mg/kg												
S	mg/kg												
Sb	mg/kg	0.047	0.098					0.174	0.20			0.08	0.08
Sc	mg/kg	35.939	35.278					34.888	34.98	34.7	35.1	35.00	34.39
Se	mg/kg												
Sm	mg/kg	1.407	1.418	1.15	1.18	1.48	1.54	1.424	1.45	1.56	1.55	1.48	1.62
Sn	mg/kg	1.322	1.210					0.762	0.69	0.92	1.04	0.93	0.91
Sr	mg/kg	332.371	331.367			334.48	358.49	320.250	320.84	333	338	346.91	359.94
Ta	mg/kg	0.146	0.142			0.14	0.13	0.136	0.12	0.15	0.15	0.15	0.15
Tb	mg/kg	0.260	0.269	0.20	0.20	0.29	0.29	0.249	0.25	0.3	0.28	0.27	0.28
Te	mg/kg												
Th	mg/kg	0.433	0.454			0.47	0.46	0.413	0.42	0.47	0.46	0.46	0.48
Tl	mg/kg									0.14	0.11		
Tm	mg/kg	0.137	0.133	0.13	0.11	0.13	0.15	0.135	0.14	0.15	0.15	0.14	0.15
U	mg/kg	0.106	0.117			0.12	0.10	0.115	0.11	0.11	0.11	0.13	0.13
V	mg/kg	654.997	657.525			746.40	706.68	684.562	685.56	615	576	689.30	678.39
W	mg/kg	2.908	2.938					3.401	3.35			3.74	4.00
Y	mg/kg	9.483	9.339	8.44	8.58	9.30	8.65	8.916	9.03	10.3	10.5	9.42	9.34
Yb	mg/kg	0.936	0.936	0.90	0.81	0.92	0.91	0.941	0.93	1.04	1	0.88	0.95
Zn	mg/kg	138.052	118.401			104.81	101.05	120.993	120.87	95	89.6	123.16	132.62
Zr	mg/kg	27.756	27.897	27.13	27.16	26.88	30.69	26.797	26.65	29.4	29.2	27.25	27.08

Table 3 cont.

Lab identifier Data Quality Elem/Cmpnd	units	6A	6B	11A	11B	29A	29B	12A	12B	13A	13B
		2 LA-ICP-MS	2 LA-ICP-MS	2 LAICPMS	2 LAICPMS	2 LAICPMS	2 LAICPMS	2 LAICPMS	2 LAICPMS	2 uXRF	2 uXRF
SiO2	% m/m									43.53	43.29
TiO2	% m/m			1.61	1.58					1.57	1.57
Al2O3	% m/m									16.78	16.68
Fe2O3T	% m/m									16.22	16.10
Fe(II)O	% m/m										
MnO	% m/m			0.21	0.210					0.20	0.20
MgO	% m/m									7.98	7.94
CaO	% m/m					11.08	11.03			11.08	11.03
Na2O	% m/m			1.47	1.45					1.19	1.19
K2O	% m/m			0.28	0.28					0.21	0.21
P2O5	% m/m			0.065	0.063					0.12	0.13
Ag	mg/kg									0.58	0.57
As	mg/kg									0.79	1.11
Au	mg/kg									1.17	1.03
B	mg/kg			8.99	10					7.95	6.60
Ba	mg/kg	60.71	61.83	67.33	64.63			67		59.70	59.90
Be	mg/kg	0.3216	0.339	0.303	0.332					0.42	0.32
Bi	mg/kg									0.02	0.02
Br	mg/kg										
Cd	mg/kg									0.03	0.07
Ce	mg/kg	8.027	8.12	8.74	8.31			9		8.55	8.50
Cl	mg/kg										
Co	mg/kg	59.48	59.82	72.1	69.79					62.69	62.70
Cr	mg/kg	56.53	57.11	67.5	64.6					60.35	59.95
Cs	mg/kg	0.2136	0.2105	0.27	0.247					0.21	0.22
Cu	mg/kg	78.73	81.27	97.93	99.76					82.45	82.30
Dy	mg/kg	1.642	1.533	1.56	1.48			1.8		1.78	1.88
Er	mg/kg	0.968	0.9182	0.886	0.845			1.02		0.95	0.91
Eu	mg/kg	0.598	0.5945	0.59	0.574			0.7		0.61	0.60
F	mg/kg										
Ga	mg/kg	18.63	18.83	23.6	22.6					17.59	16.88
Gd	mg/kg	1.584	1.478	1.48	1.44			1.8		1.54	1.73
Ge	mg/kg	1.142	1.149							0.95	0.91
Hf	mg/kg	0.7732	0.7316	0.716	0.383			0.8		0.70	0.65
Hg	mg/kg										
Ho	mg/kg	0.3229	0.3118	0.307	0.295			0.36		0.32	0.32
I	mg/kg										
In	mg/kg									0.05	0.04
Ir	mg/kg									0.09	0.15
La	mg/kg	3.421	3.339	3.34	3.24			4		3.53	3.52
Li	mg/kg	4.285	4.509	5.2	5.22					4.92	4.84
Lu	mg/kg	0.1247	0.1176	0.11	0.11			0.134		0.13	0.13
Mn	mg/kg	1419	1446								
Mo	mg/kg									0.35	0.35
Nb	mg/kg	2.187	2.205	2.35	2.25			2.3		2.02	2.14
Nd	mg/kg	5.037	5.02	5.11	4.91			6		5.59	5.47
Ni	mg/kg	26.58	26.51	30.7	29.7					21.95	25.90
Os	mg/kg										
Pb	mg/kg	1.796	1.855	2.08	2.03			2		1.66	1.57
Pd	mg/kg										
Pr	mg/kg	1.067	1.061	1.11	1.08			1.2		1.09	1.16
Pt	mg/kg									4.15	5.04
Rb	mg/kg	5.576	5.653	7.02	6.62					5.21	5.26
Re	mg/kg										
Rh	mg/kg										
Ru	mg/kg										
S	mg/kg										
Sb	mg/kg									0.10	0.11
Sc	mg/kg	34.82	33.56	31.4	31.00					34.96	33.94
Se	mg/kg										
Sm	mg/kg	1.423	1.399	1.43	1.38			1.5		1.29	1.44
Sn	mg/kg									0.54	0.54
Sr	mg/kg	326.9	228	332	320.0					306.75	306.35
Ta	mg/kg	0.1194	0.1223	0.147	0.135			0.14		0.12	0.12
Tb	mg/kg	0.2493	0.244	0.238	0.23			0.28		0.26	0.26
Te	mg/kg										
Th	mg/kg	0.4123	0.3954	0.419	0.395			0		0.40	0.42
Tl	mg/kg									0.09	0.08
Tm	mg/kg	0.1296	0.1245	0.125	0.119			0.141		0.12	0.12
U	mg/kg	0.1016	0.1046	0.128	0.124			0.1		0.12	0.12
V	mg/kg	639.7	665.4	742	718					670.35	663.85
W	mg/kg									3.19	3.23
Y	mg/kg	8.829	8.412	7.81	7.45			9.7		8.43	8.59
Yb	mg/kg	0.842	0.808	0.856	0.826			0.95		0.87	0.85
Zn	mg/kg	124.8	124.3	144	142					102.65	102.40
Zr	mg/kg	26.7	25.56	24.4	23.2			31		25.91	25.85





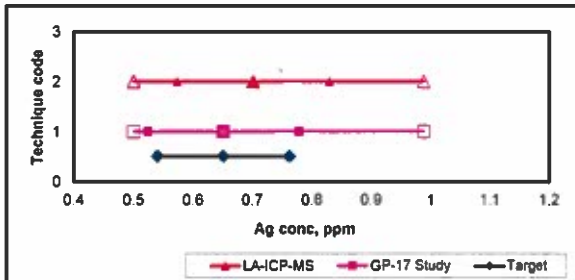


Figure 11. Ag compiled results GP-17, JGb-1G

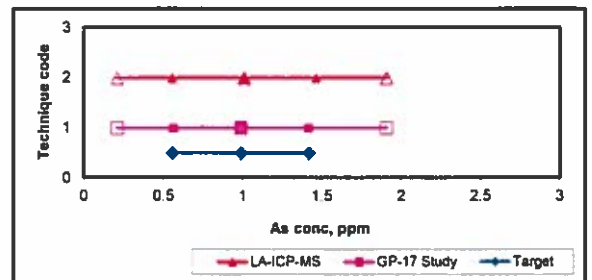


Figure 12. As compiled results GP-17, JGb-1G

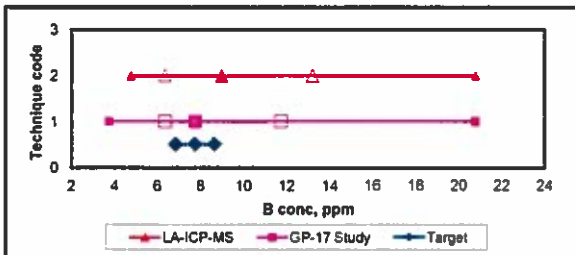


Figure 13. B compiled results GP-17 JGb-1G

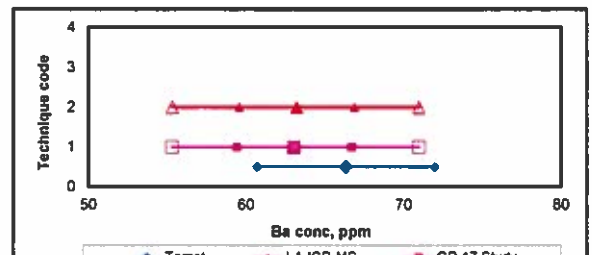


Figure 14. Ba compiled results GP-17, JGb-1G

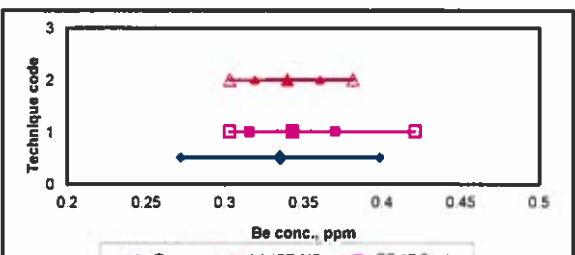


Figure 15. Be compiled results GP-17, JGb-1G

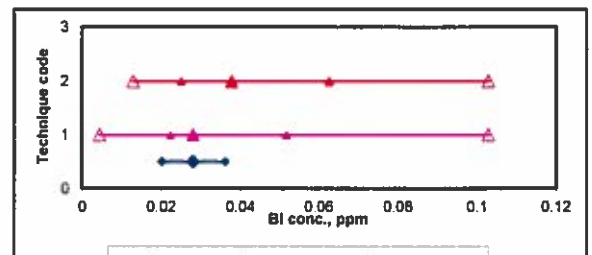


Figure 16. Bi compiled results GP-17, JGb-1G

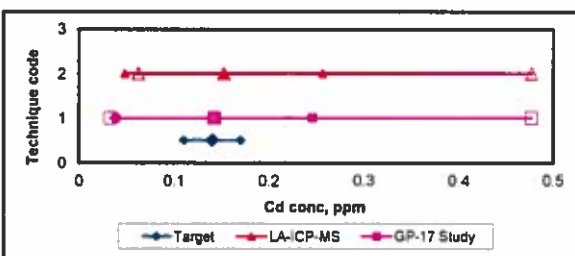


Figure 17. Cd compiled results GP-17, JGb-1G

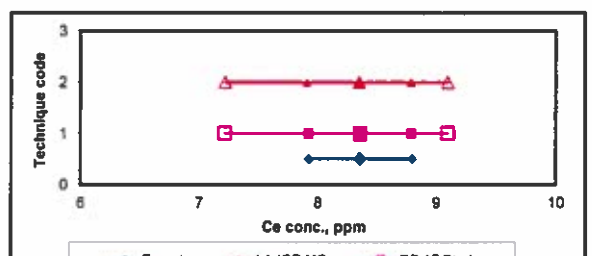


Figure 18. Ce compiled results GP-17, JGb-1G

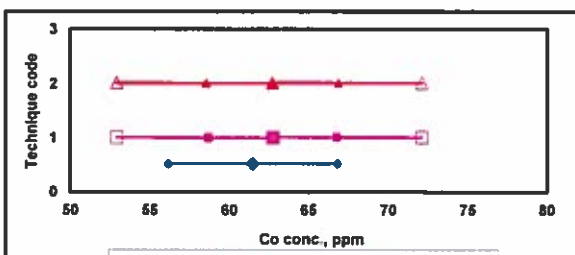


Figure 19. Co compiled results GP-17 JGb-1G

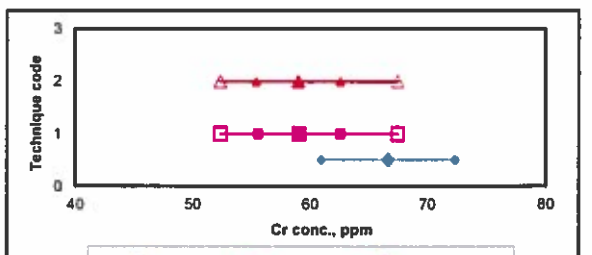


Figure 20. Cr compiled results GP-17, JGb-1G

