G-probe 6 summary
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A total of fourteen labs submitted final results during this stage of the G-probe 6 study. Technique breakdown was six labs used LA-ICP-MS, four used SEM four used EPMA and one lab used Micro-XRF. This alignment of techniques makes this the most balance G-probe study to date. At the time of data analysis up to three labs had yet to submit their final results. When results from these labs are provided their scores will be calculated but the summary results will not be modified. The material used in this study was a glass material made from NIST SRM 688 (Basalt). The glass was prepared at the USGS and at this time, it is uncertain if NIST will make this a certified SRM.   In the event that NIST does decide to certify this material the GP-6 results will be an important first step in that certification process. 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. The range of elements does not cover all those reported by participants but is limited to those elements with certified or recommended values from NIST or the IAG's GEOPT 16 study. In element diagrams you will find information for each technique providing a value. Also included is the target value (♦)   and calculated precision (X ± 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 ± 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 48

Symbol type		Represents
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. G-probe 6 (BNV-1G basalt glass)   Assigned values and statistical analysis of contributed results

Oxide	X_a % m/m	H_a % m/m	s.d.m. % m/m	mean % m/m	Max % m/m	Min % m/m		Element	X_a mg/kg	H_a mg/kg	s.d.m. mg/kg	mean mg/kg	Max mg/kg	Min mg/kg
SiO2	47.98	0.536	2.015	47.793	50.900	42.520		Ge	1.26	0.10	0.41	1.53	1.89	1.10
TiO2	1.17	0.02	0.22	1.08	1.20	0.38		Hf	1.52	0.11	0.15	1.38	1.56	1.14
Al2O3	17.41	0.23	2.35	17.61	25.91	15.78		Ho	0.72	0.06	0.09	0.68	0.84	0.56
Fe2O3T	10.33	0.145	1.903	9.358	10.786	3.396		La	5.20	0.32	0.56	5.05	6.07	4.23
Fe(II)OT	9.30	0.11	1.71	8.42	9.71	3.06		Li	6.00	0.37	1.39	6.43	9.09	4.90
MnO	0.162	0.0043	0.012	0.159	0.180	0.138		Lu	0.32	0.03	0.04	0.29	0.36	0.24
MgO	8.51	0.12	1.15	8.10	8.90	4.36		Nb	4.16	0.27	0.41	3.94	4.57	3.08
CaO	12.15	0.17	0.65	12.15	14.30	10.90		Nd	8.40	0.49	0.98	8.23	10.18	6.98
Na2O	2.09	0.04	0.18	2.13	2.67	1.80		Ni	145.7	5.5	18.9	151.3	175.1	123.9
K2O	0.19	0.00	0.02	0.18	0.23	0.10		Pb	3.28	0.22	0.78	3.84	5.20	2.20
P2O5	0.14	0.00	0.03	0.16	0.21	0.10		Pr	1.69	0.13	0.12	1.66	1.88	1.48

Element	X_a mg/kg	H_a mg/kg	s.d.m. mg/kg	mean mg/kg	Max mg/kg	Min mg/kg		Element	X_a mg/kg	H_a mg/kg	s.d.m. mg/kg	mean mg/kg	Max mg/kg	Min mg/kg
								Sb	0.13	0.01	0.01	0.12	0.13	0.11
Ba	173.00	6.40	25.62	156.90	174.74	99.88		Sc	36.75	1.71	2.59	34.42	36.96	29.95
Be	0.40	0.04	0.14	0.46	0.68	0.28		Sm	2.36	0.17	0.31	2.34	2.89	1.96
Ce	12.00	0.70	0.61	11.60	12.73	10.86		Sn	1.33	0.10	0.71	1.54	2.85	0.94
Co	46.90	2.10	3.51	47.18	53.15	41.28		Sr	166.6	6.2	26.1	159.0	186.4	107.1
Cr	300.2	10.2	21.5	317.9	357.6	288.0		Ta	0.28	0.03	0.03	0.26	0.32	0.21
Cs	0.04	0.01	0.01	0.04	0.05	0.03		Tb	0.51	0.05	0.06	0.47	0.57	0.40
Cu	89.50	3.60	20.31	76.47	98.27	50.88		Th	0.33	0.03	0.04	0.31	0.37	0.27
Dy	3.30	0.22	0.46	3.08	3.88	2.54		Tm	0.31	0.03	0.05	0.29	0.38	0.24
Er	2.10	0.15	0.34	1.99	2.56	1.54		U	0.29	0.03	0.06	0.34	0.49	0.29
Eu	0.98	0.08	0.13	0.98	1.22	0.79		V	238.0	8.4	27.1	263.1	315.0	243.6
Ga	16.02	0.84	2.00	16.38	18.56	13.40		Y	19.33	0.99	1.78	16.96	19.06	14.71
Gd	2.87	0.20	0.46	2.74	3.60	2.16		Yb	2.06	0.15	0.33	2.01	2.65	1.66
								Zn	70.80	3.00	16.60	67.97	84.18	39.58
								Zr	55.10	2.40	5.07	48.34	54.21	39.69

Xa   = Target value obtained from USGS bulk analysis, NIST certificate or GEOPT 16 results
Ha   = Target precision calculated using modified version of Horowitz equation
        for data quality 1 ($Ha = 0.01Xa^{0.8495}$)
s.d.m. = Standard deviation of population mean
mean   = Mean element concentration for all techniques reporting
Max.   = Maximum element/oxide concentration reported
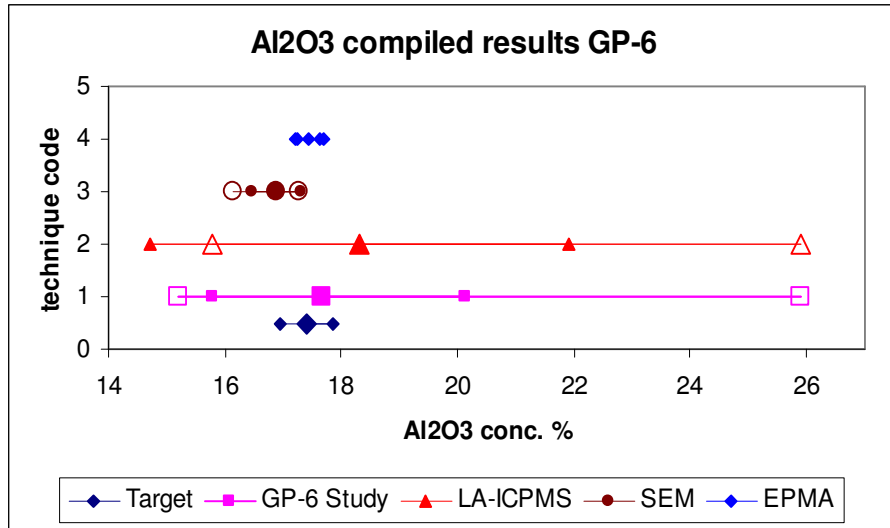Min.   =   Minimum element/oxide concentration reported

Figure 1. Al₂O₃ results for G-probe 6 study
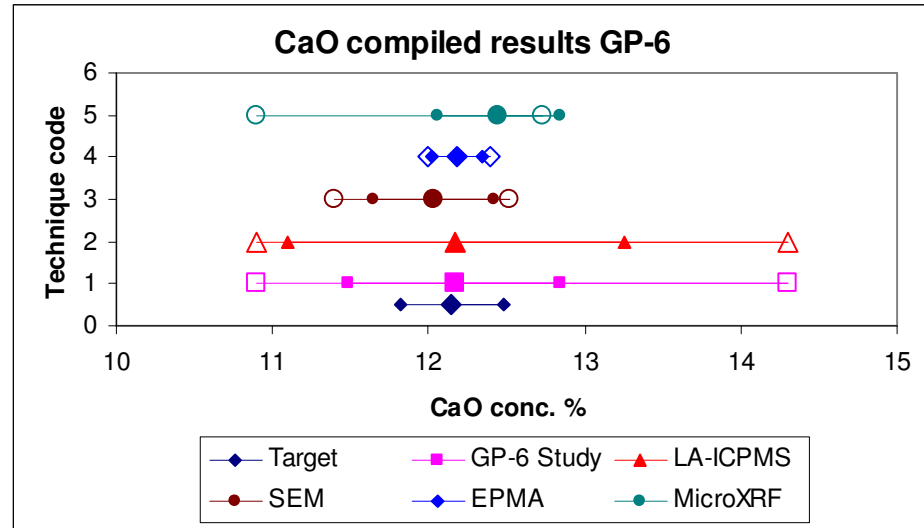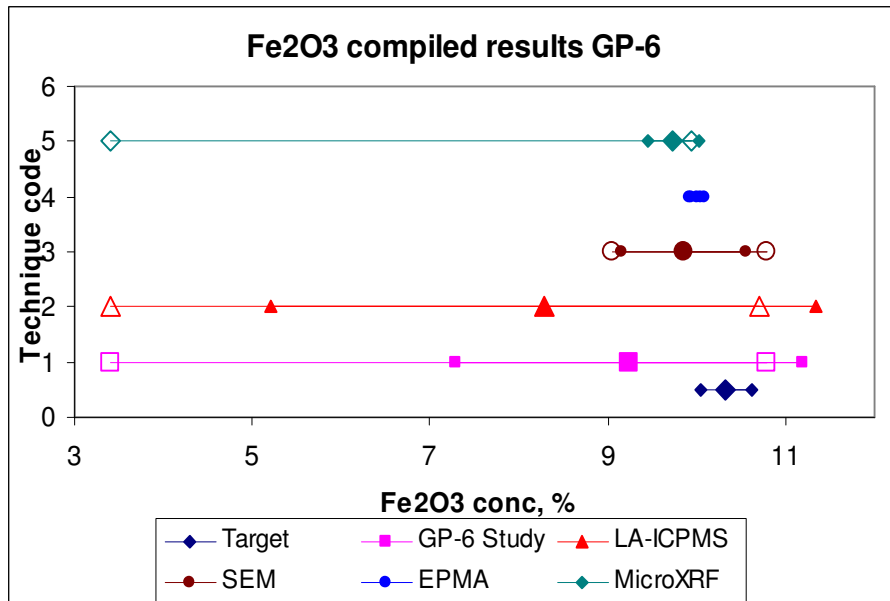

Figure 2. CaO results for G-probe 6 study

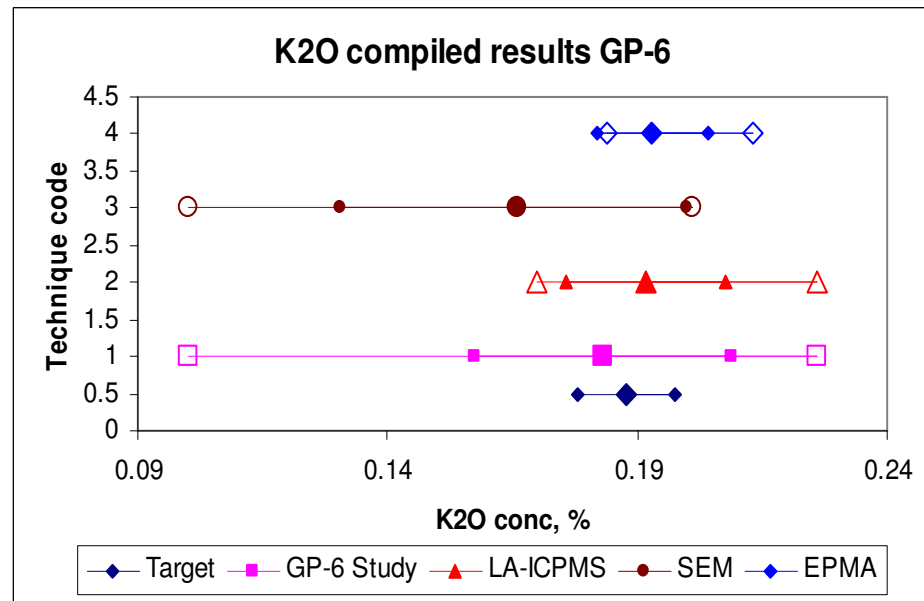Figure 3. Fe₂O₃ results for G-probe 6 study

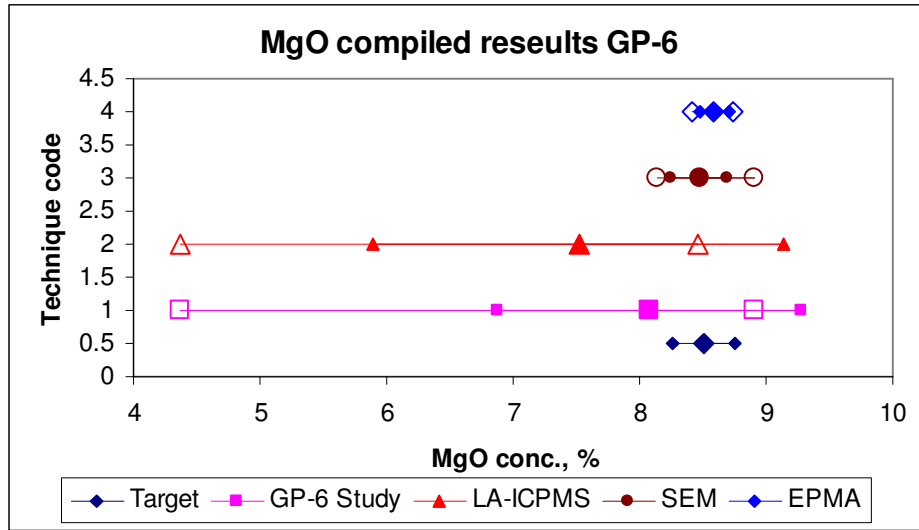Figure 4. K₂O results for G-Probe 6 study

Figure 5. MgO results for G-probe 6 study

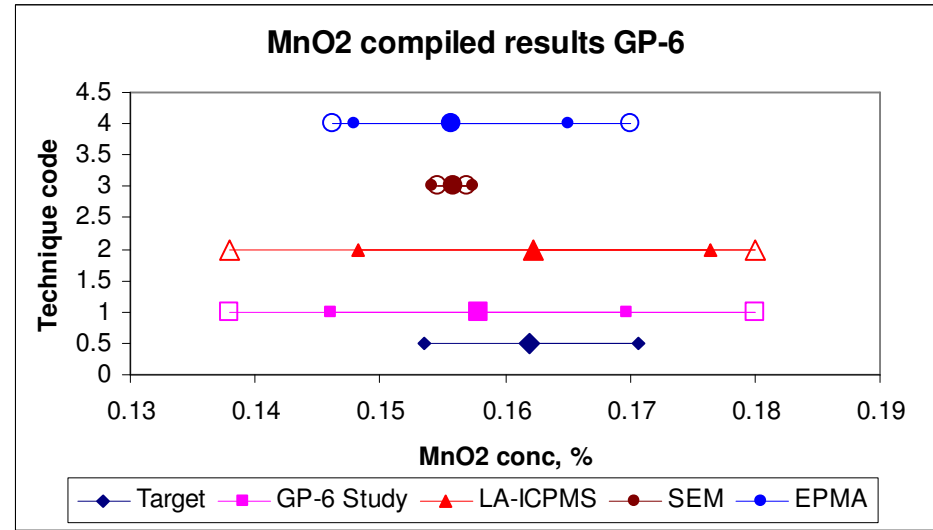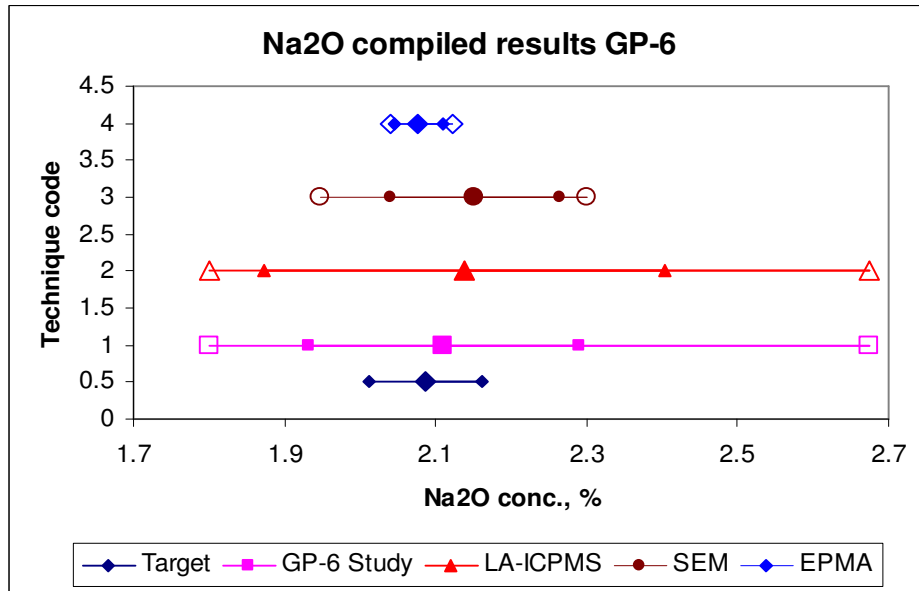Figure 6. MnO$_2$ results for G-probe 6 study

Figure 7 Na$_2$O results for G-probe 6 study

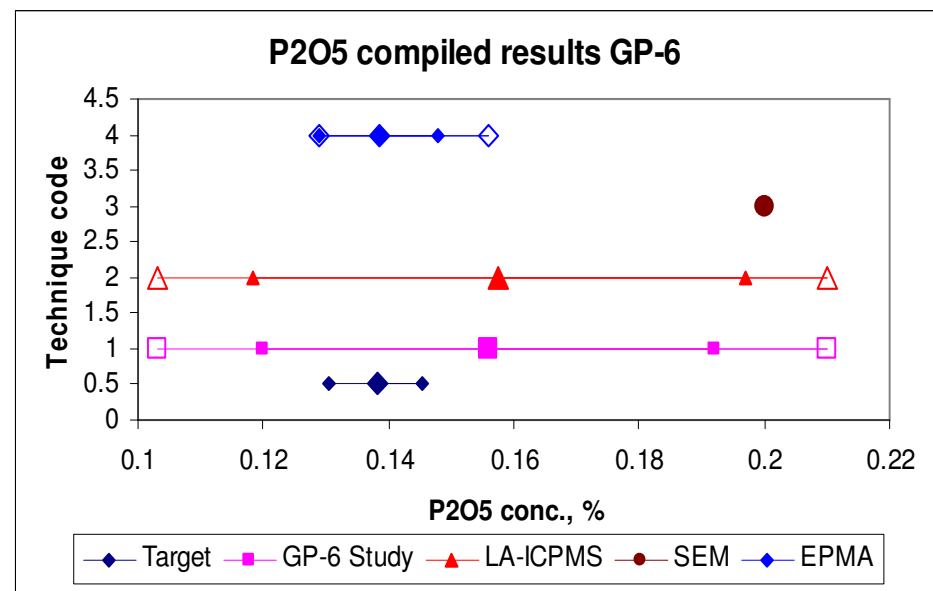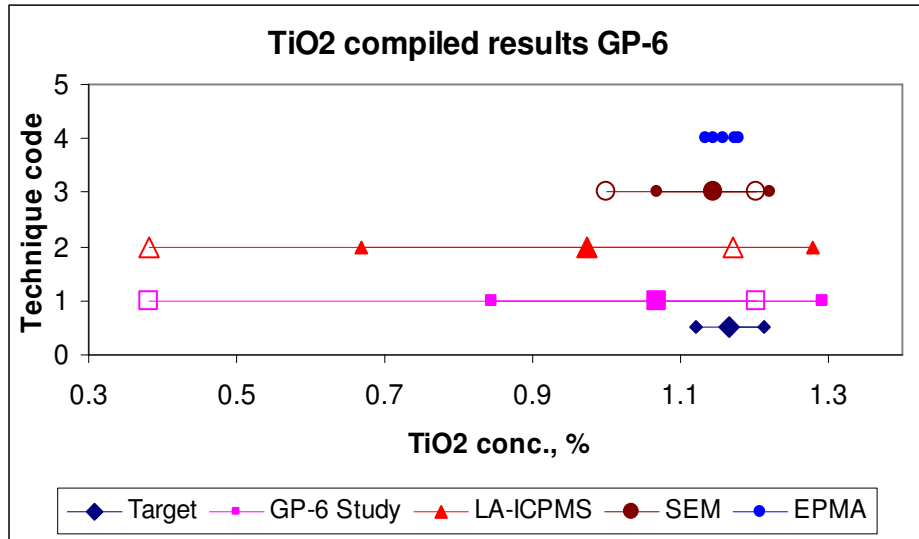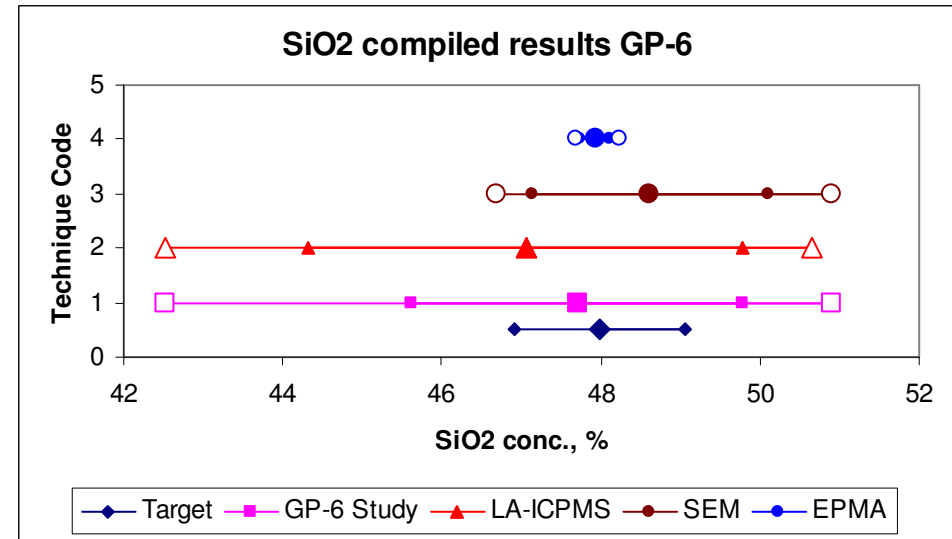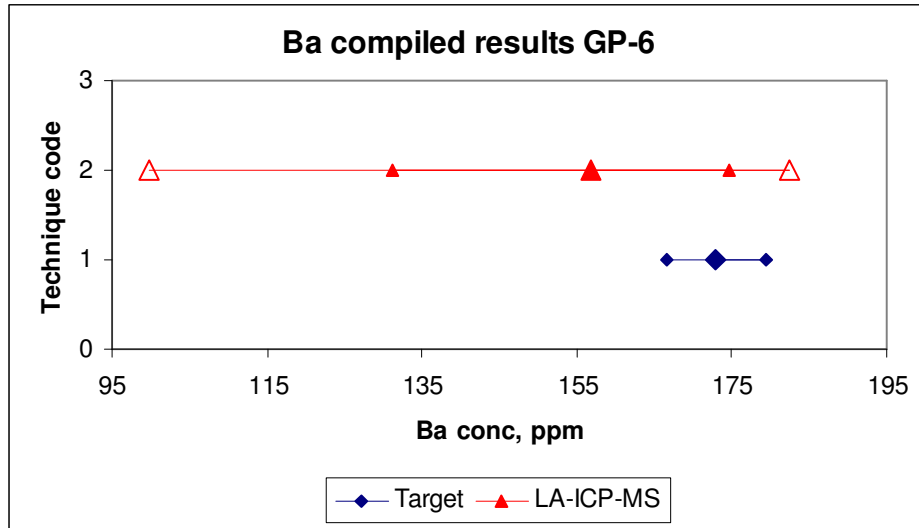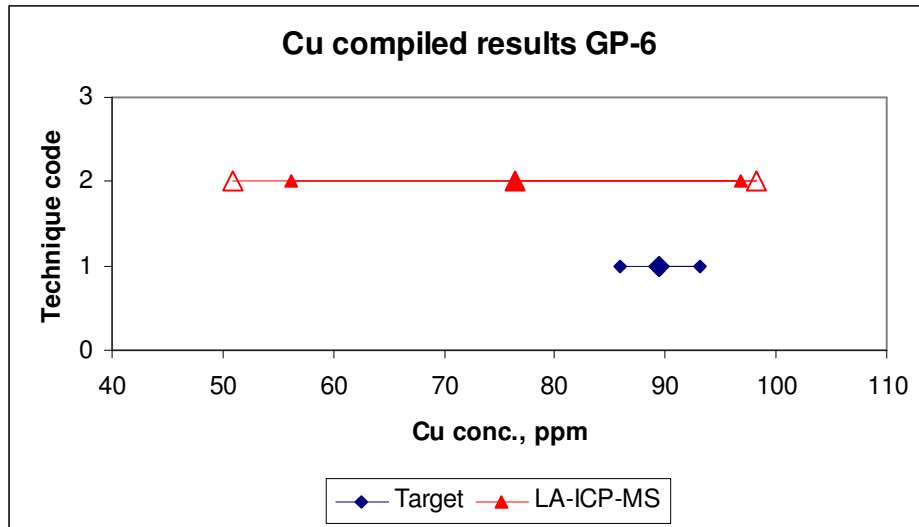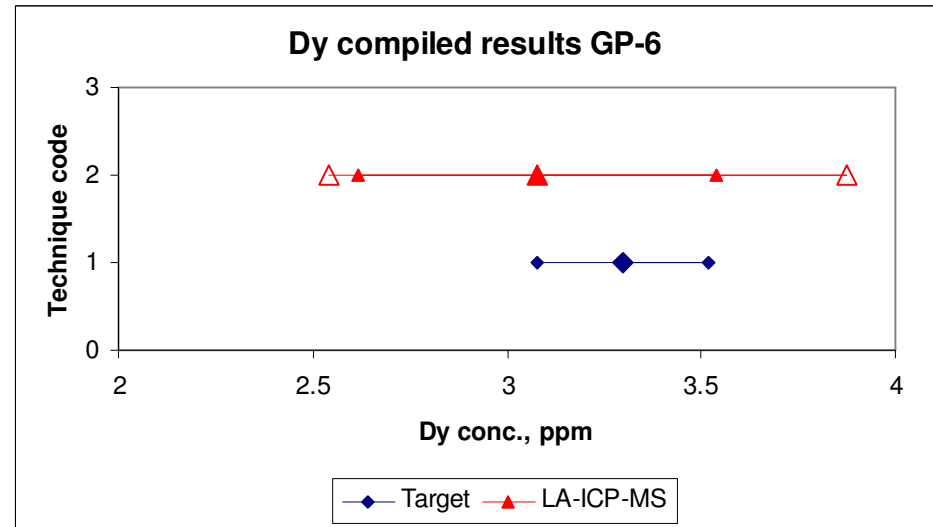Figure 8. P$_2$O$_5$ results for G-probe 6 study

Figure 9. TiO$_2$ results for G-probe 6 study

Figure 10. SiO$_2$ results for G-probe 6 study

Figure 11. Ba results for G-probe 6 study
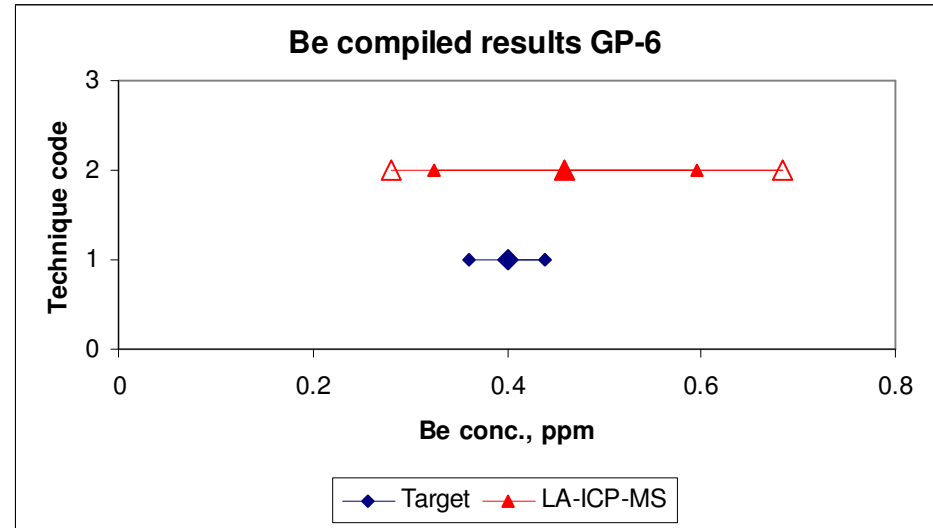
Figure 12. Be results for G-probe 6
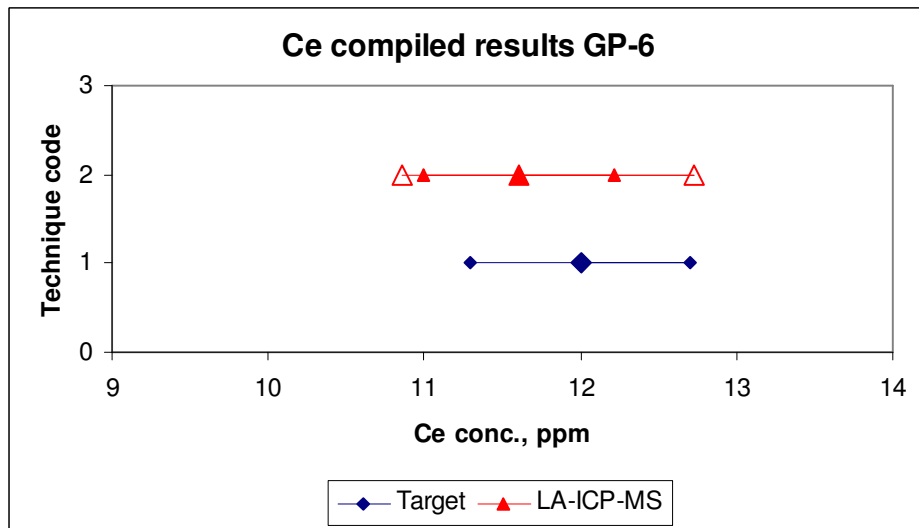
Figure 13. Ce results for G-probe 6
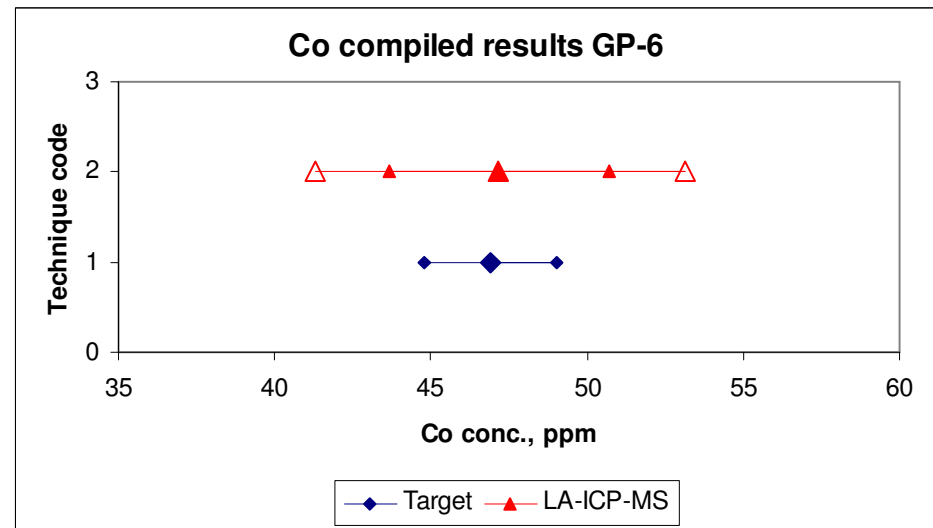
Figure 14. Co results G-probe 6 study
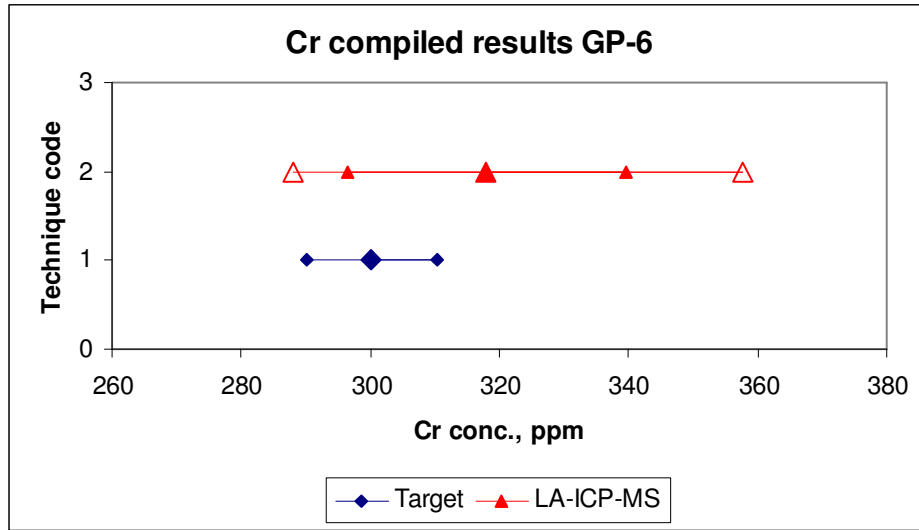
Figure 15. Cr results G-probe 6 study
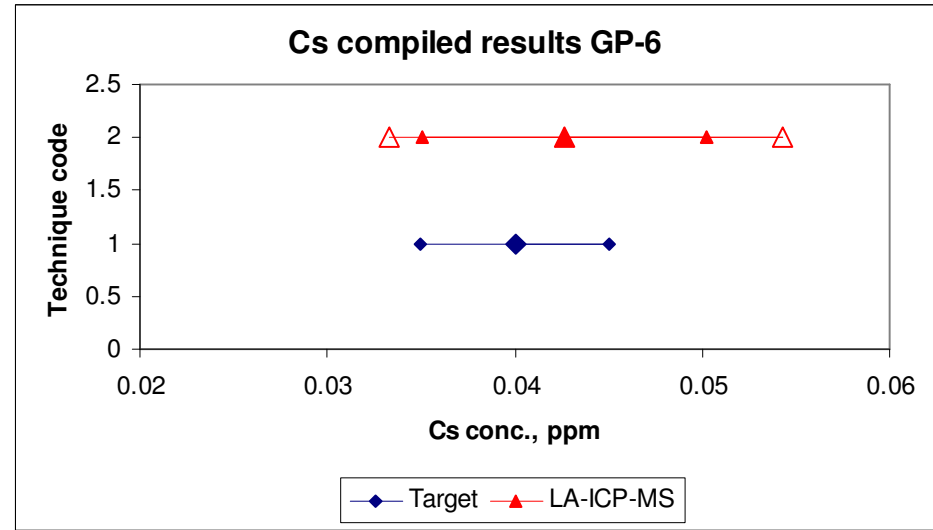
Figure 16. Cs results G-probe 6 study

Figure 17. Cu results G-probe 6 study

Figure 18.   Dy results for G-probe 6 study
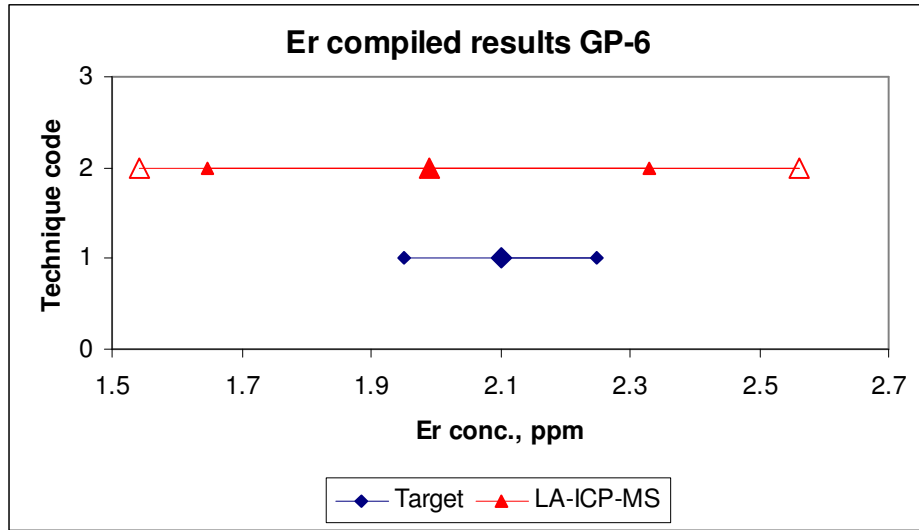
Figure 19.   Er results for G-probe 6 study
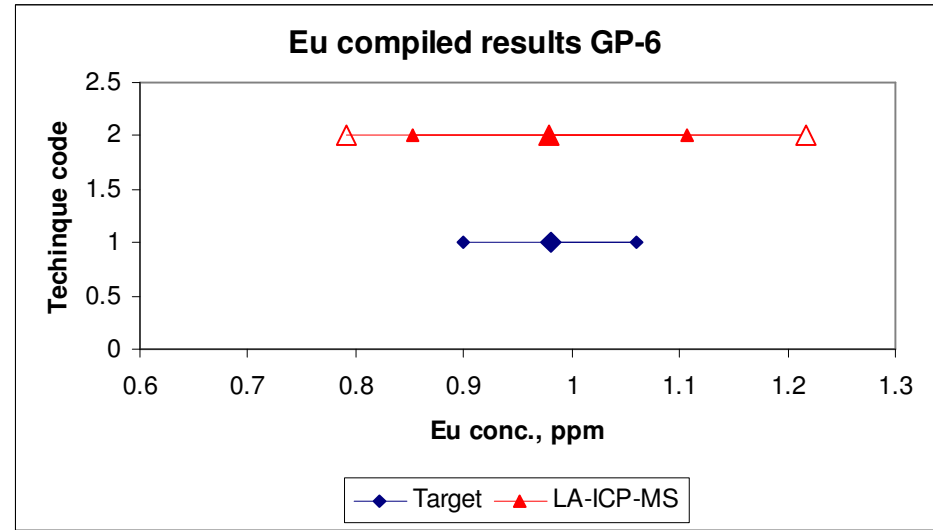
Figure 20.   Eu results G-probe 6 study
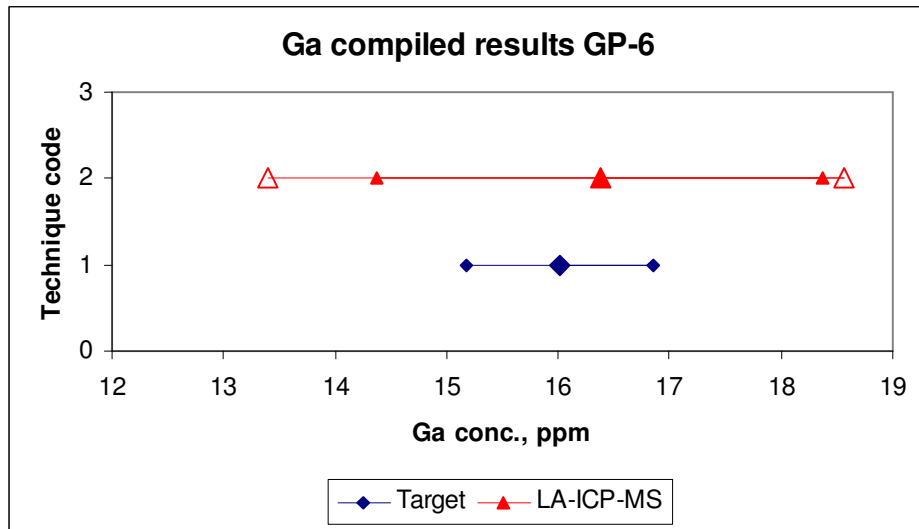
Figure 21.   Ga results G-probe 6 study
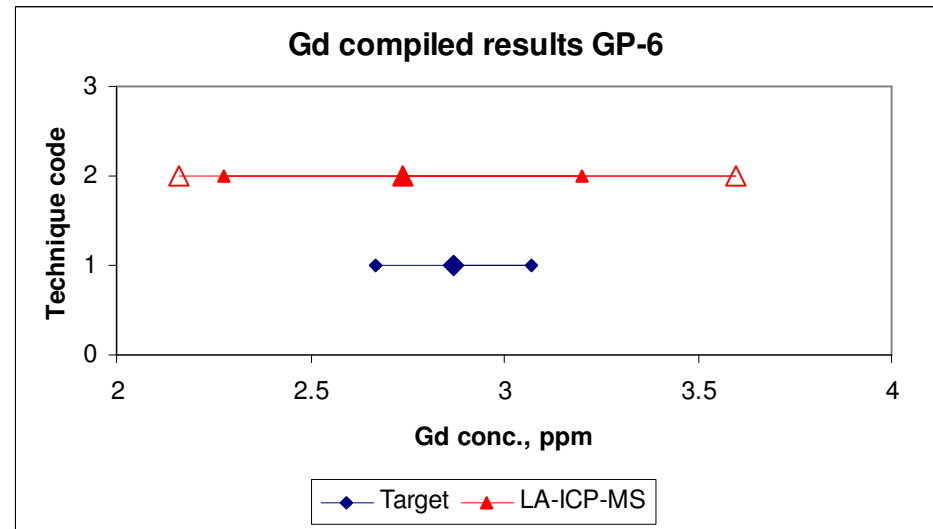
Figure 22.   Gd results G-probe 6 study
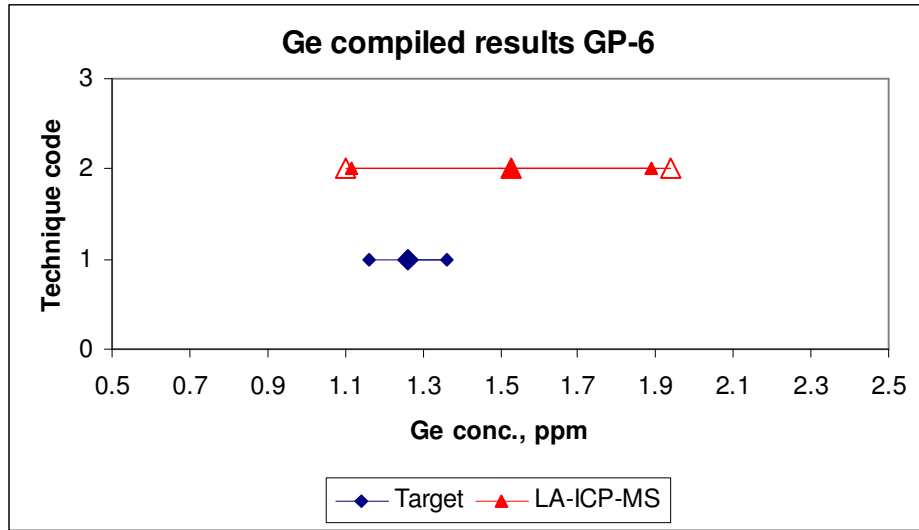
Figure 23.   Ge results G-probe 6 study
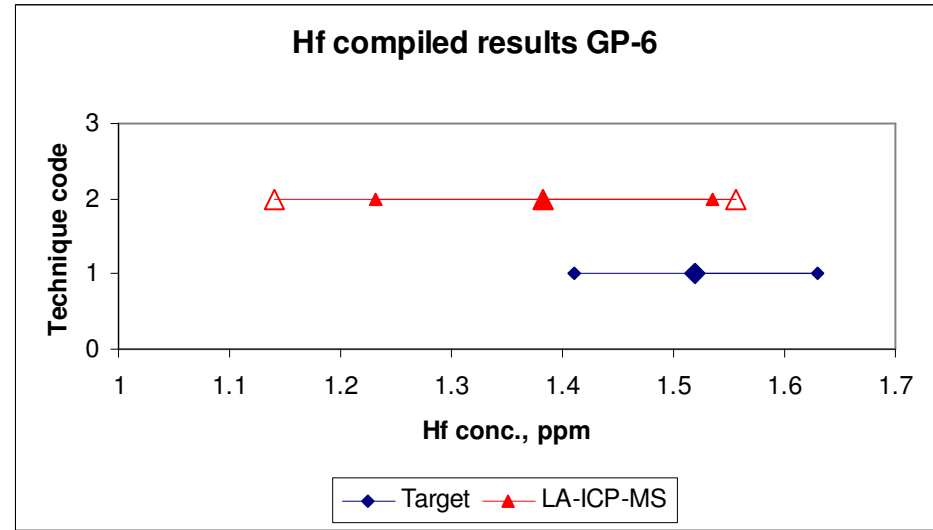
Figure 24.   Hf results G-probe 6 study
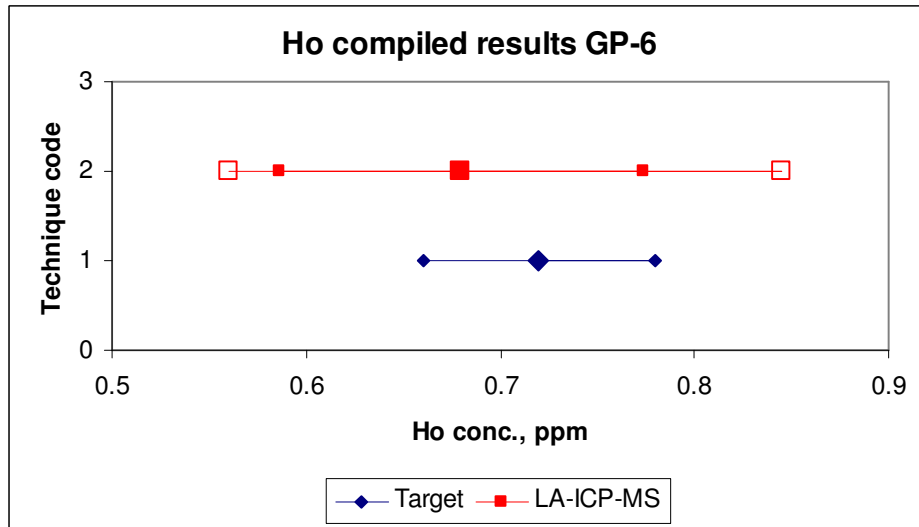
Figure 25.   Ho results G-probe 6 study
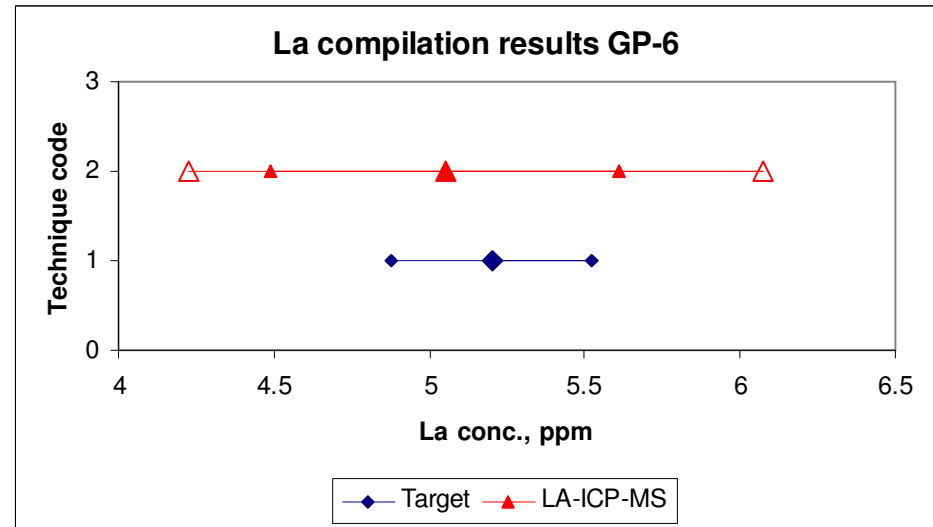
Figure 26.   La results G-probe 6 study
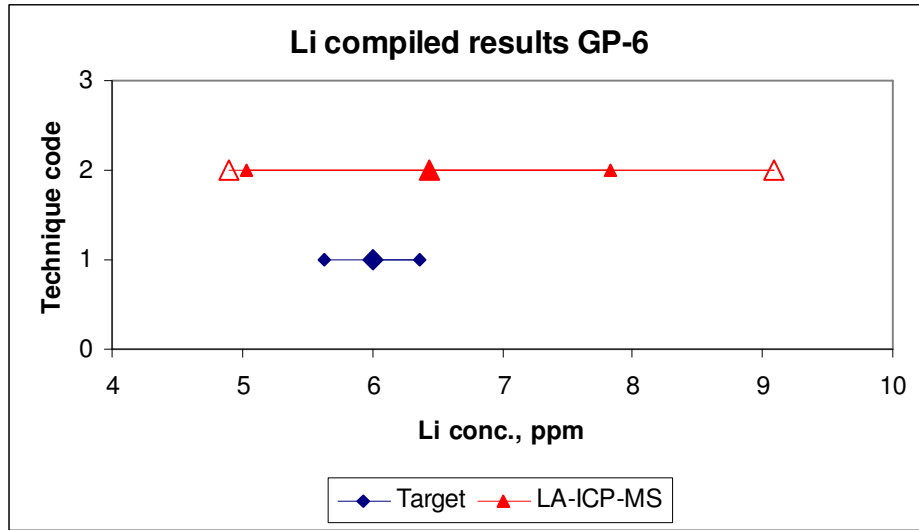
Figure 27. Li results G-probe 6 study
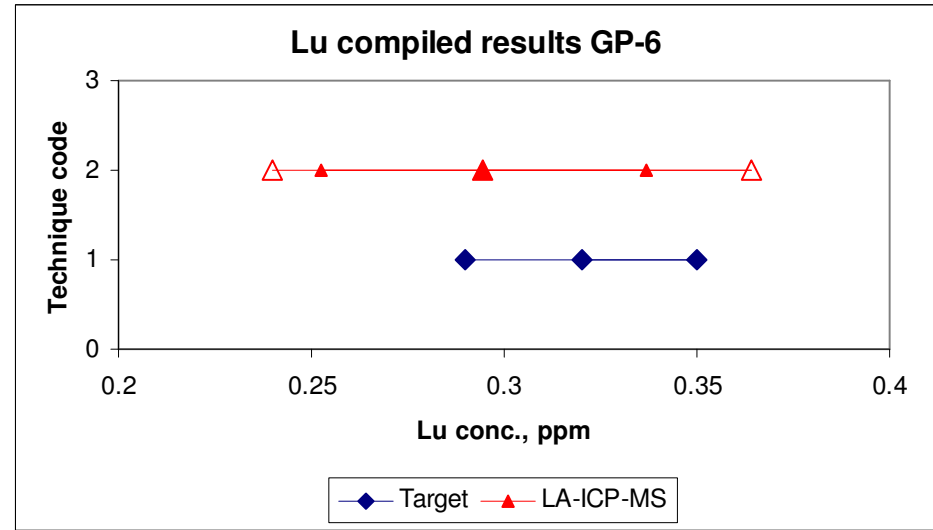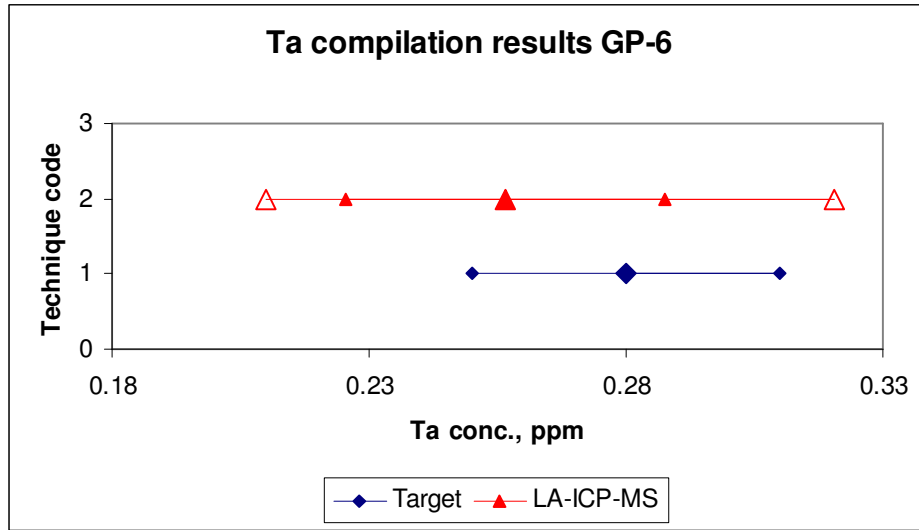

Figure 28. Lu results G-probe 6 study
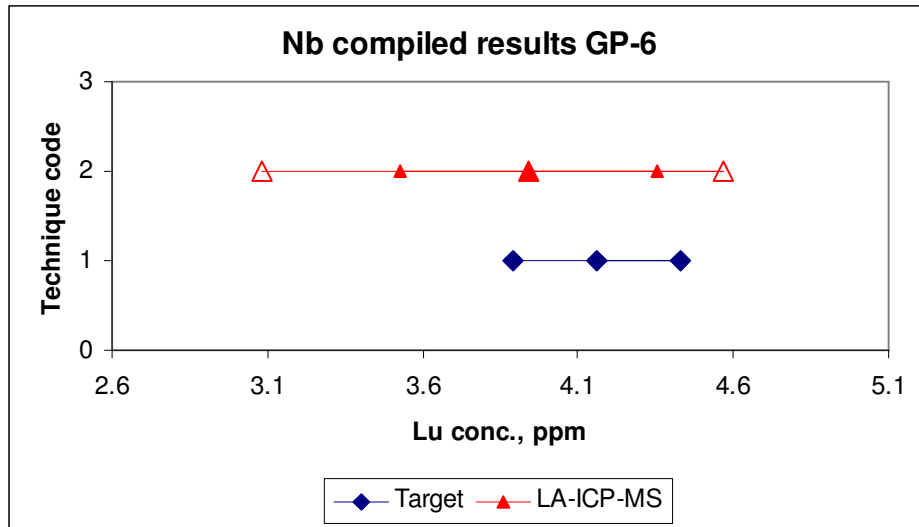
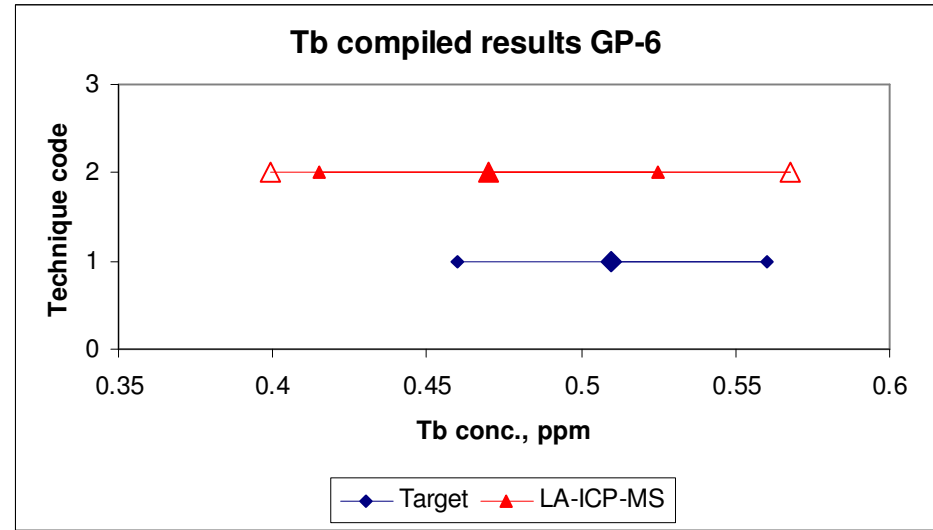Figure 29.   Nb results G-probe 6
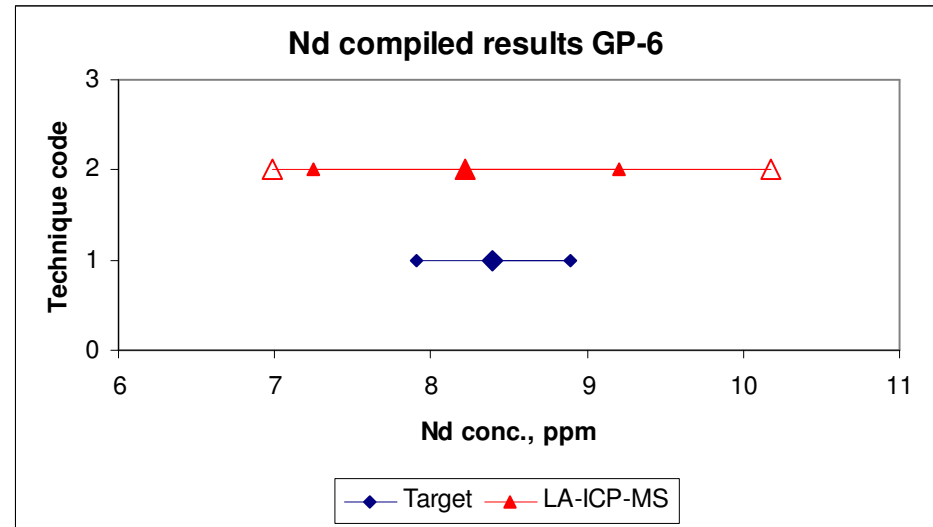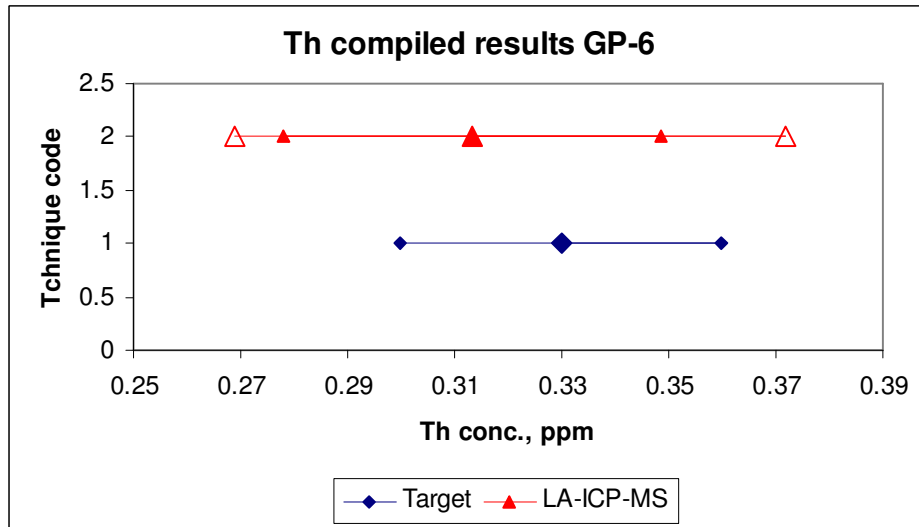

Figure 30. Nd results G-probe 6
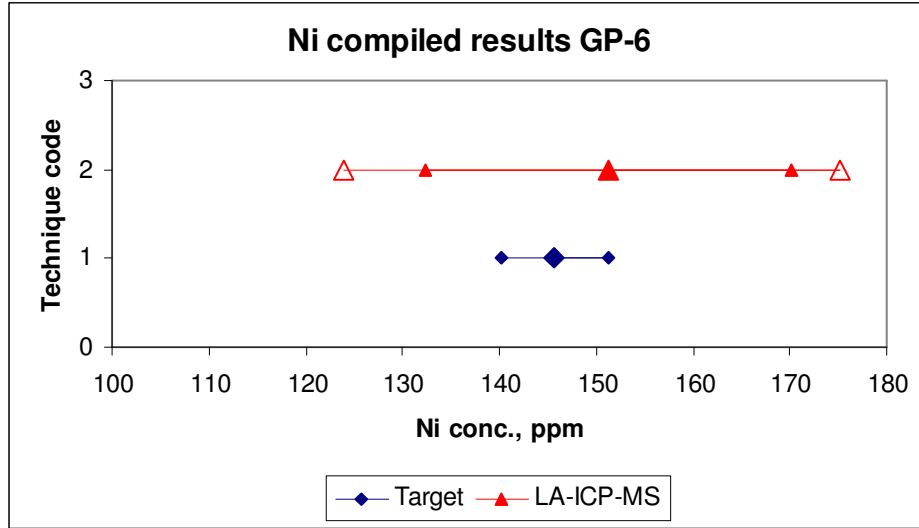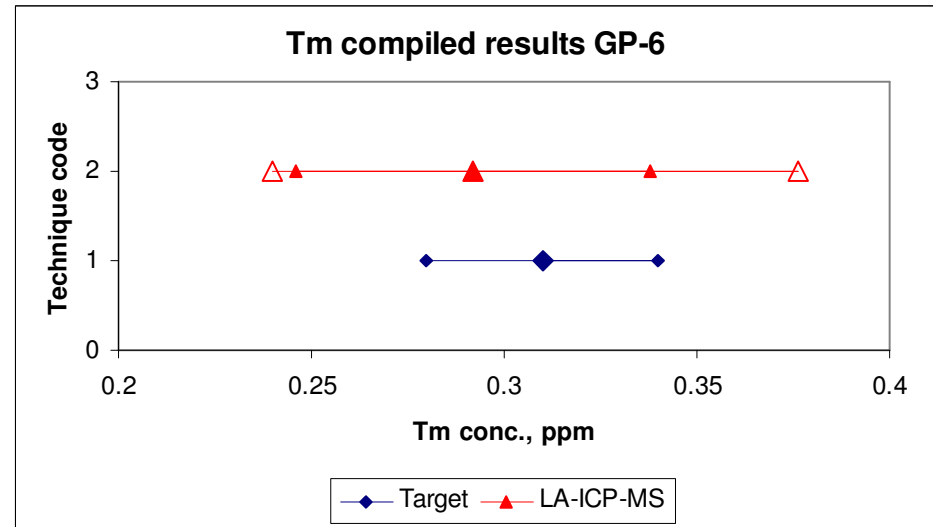
Figure 31. Ni results G-probe 6
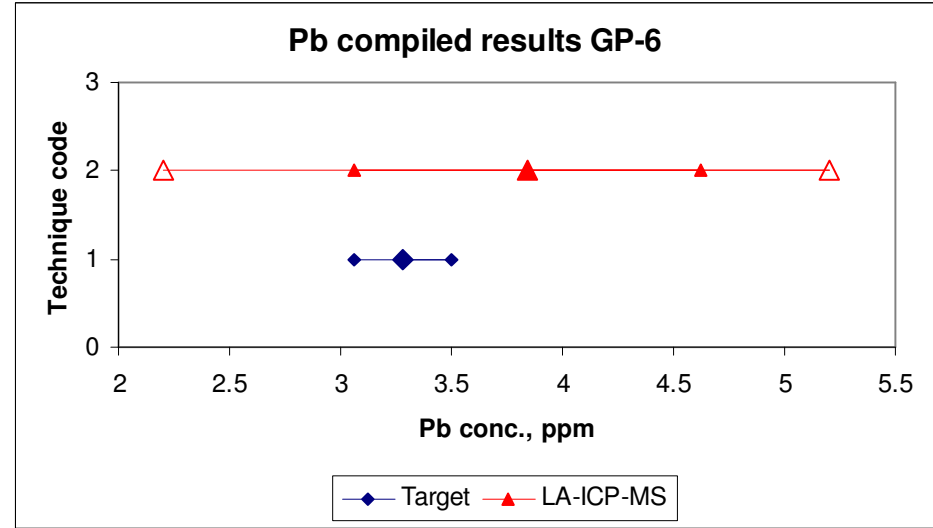
Figure 32. Pb results G-probe 6
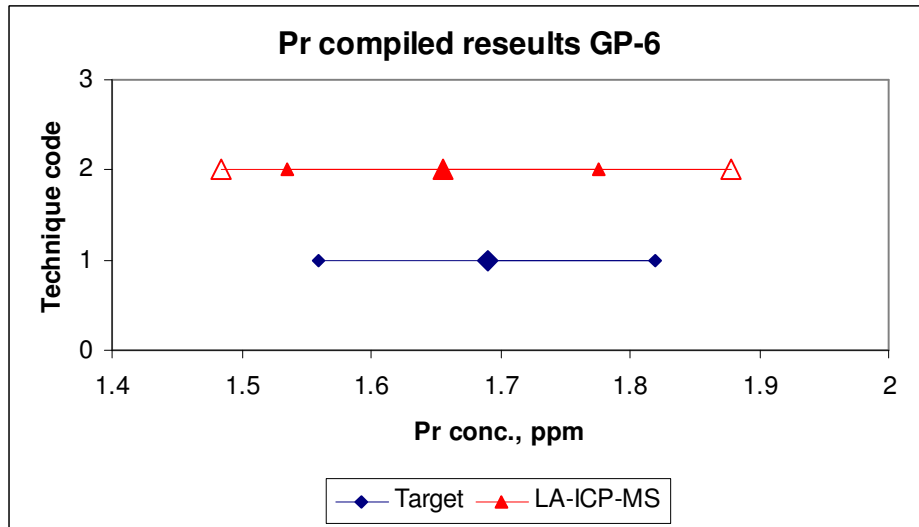
Figure 33. Pr results G-probe 6
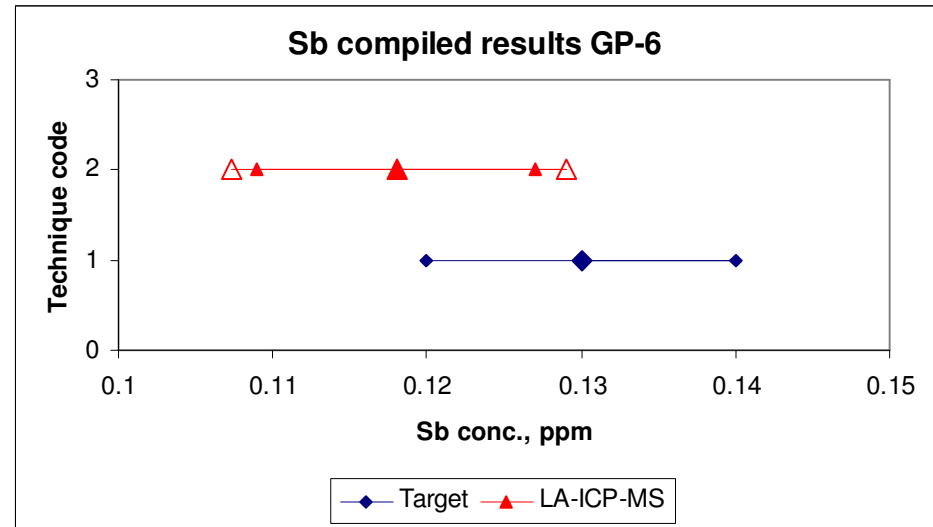
Figure 34. Sb results G-probe 6
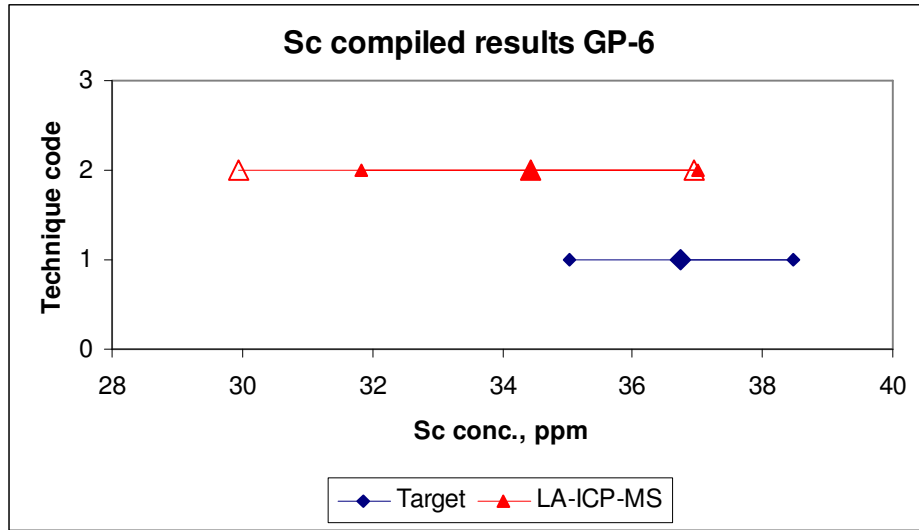
Figure 35.   Sc results G-probe 6
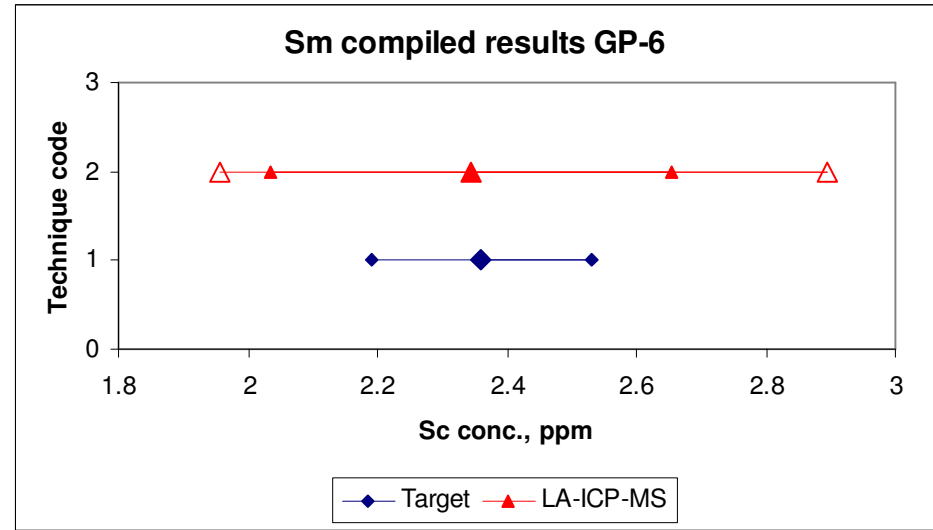
Figure 36.   Sm results G-probe 6
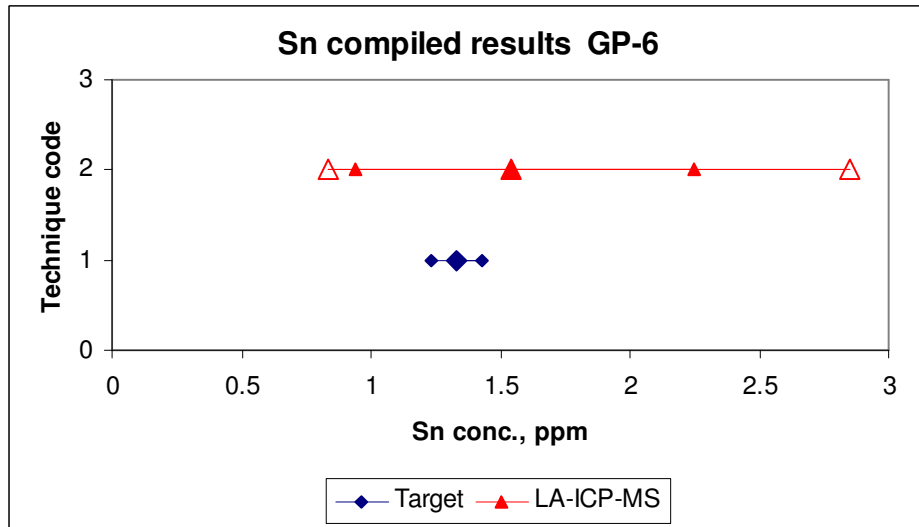
Figure 37.   Sn results G-probe 6
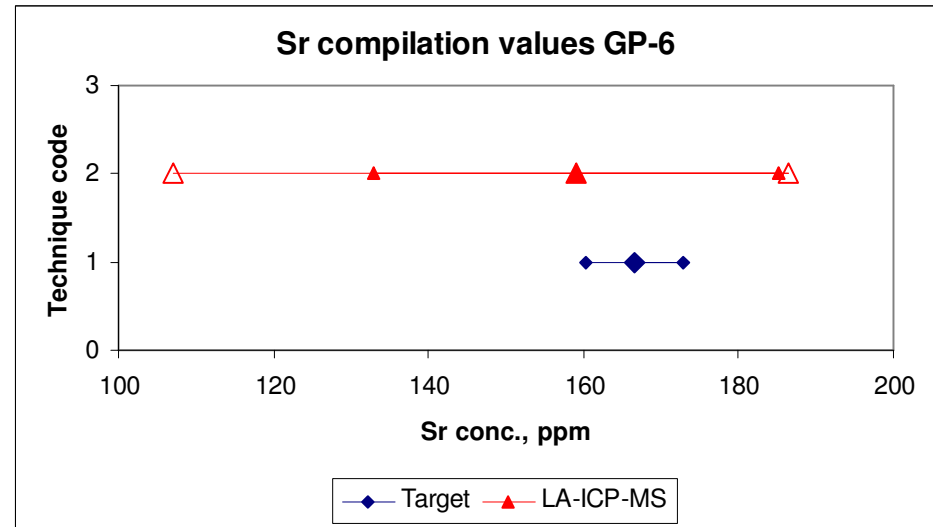
Figure 38.   Sr results G-probe 6

Figure 39.   Ta results G-probe 6

Figure 40.   Tb results G-probe 6

Figure 41.   Th results G-probe 6

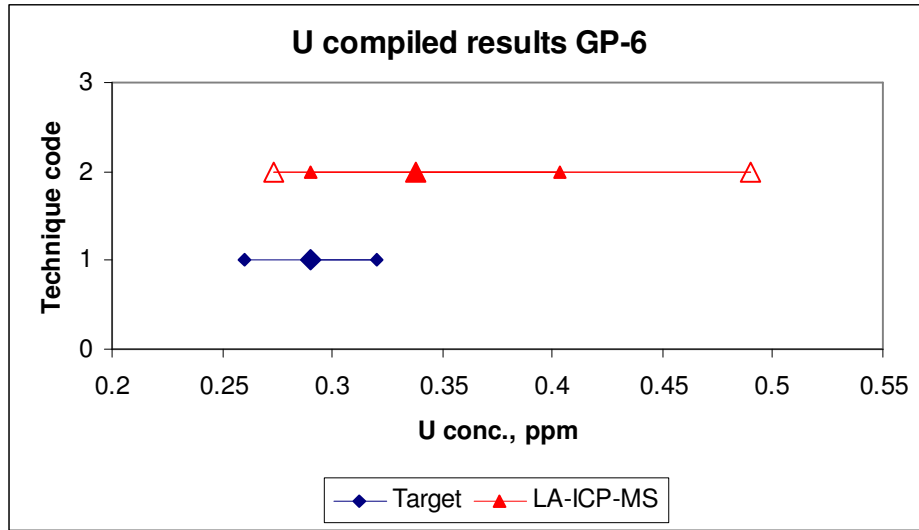Figure 42.   Tm results G-probe 6

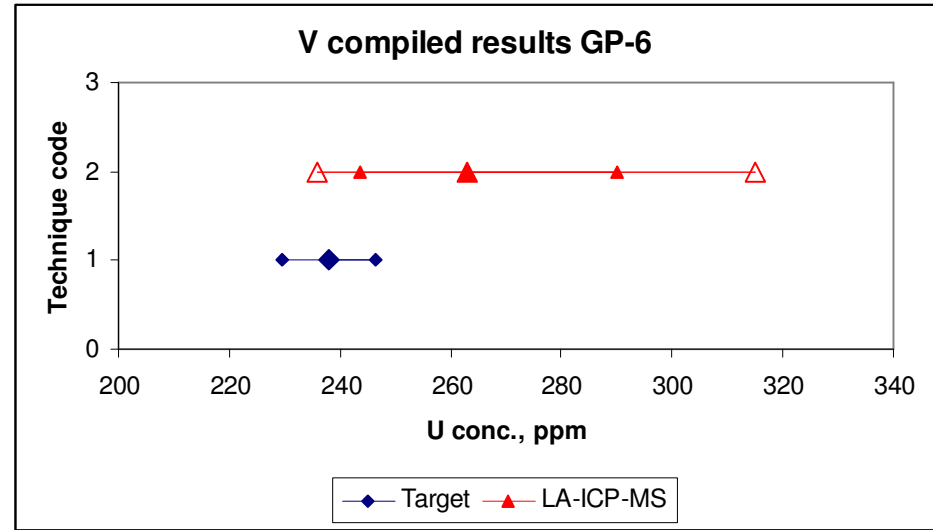Figure 43.   U results G-probe 6

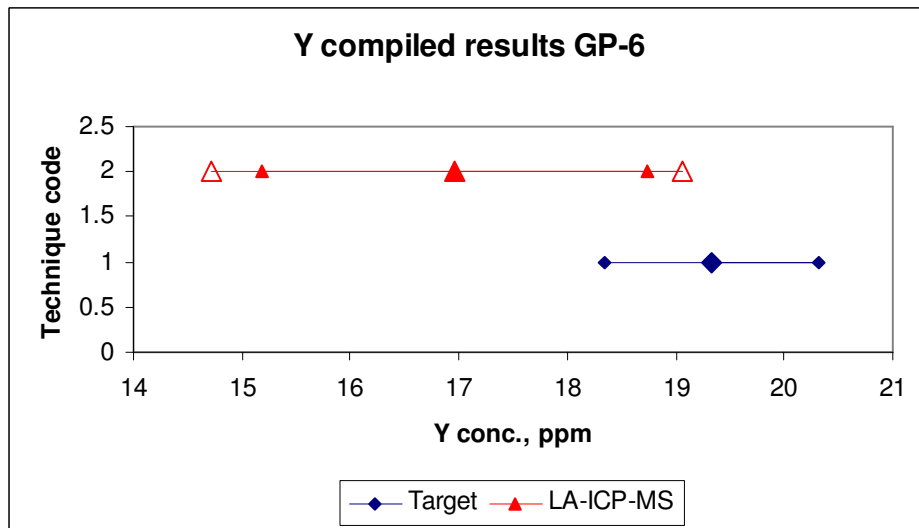Figure 44.   V results G-probe 6

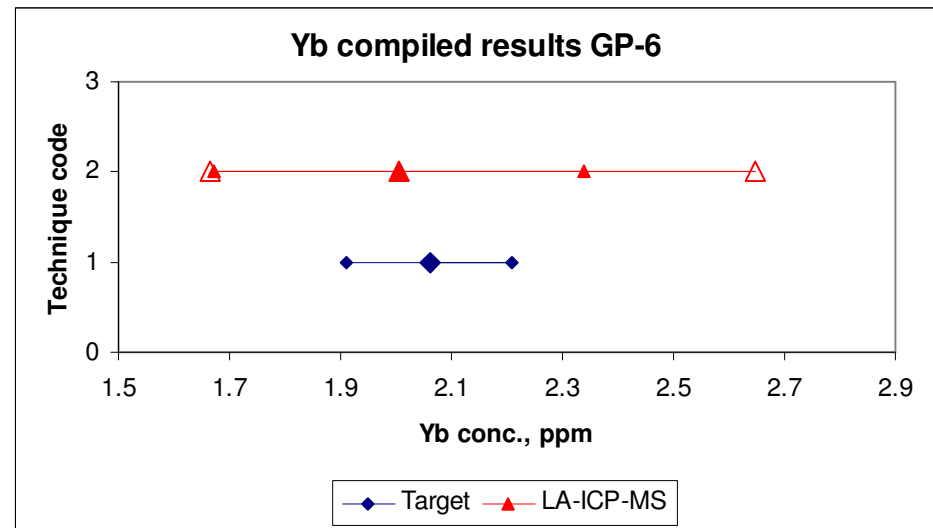Figure 45.   Y results G-probe 6

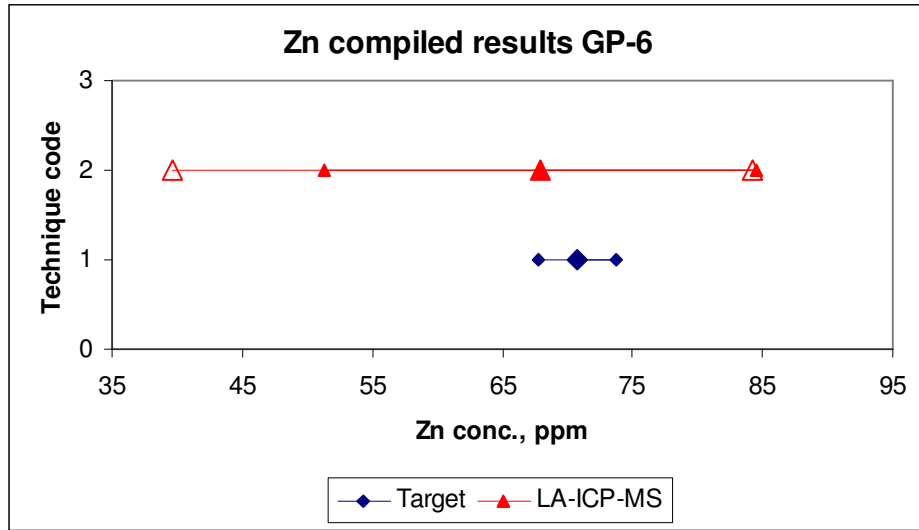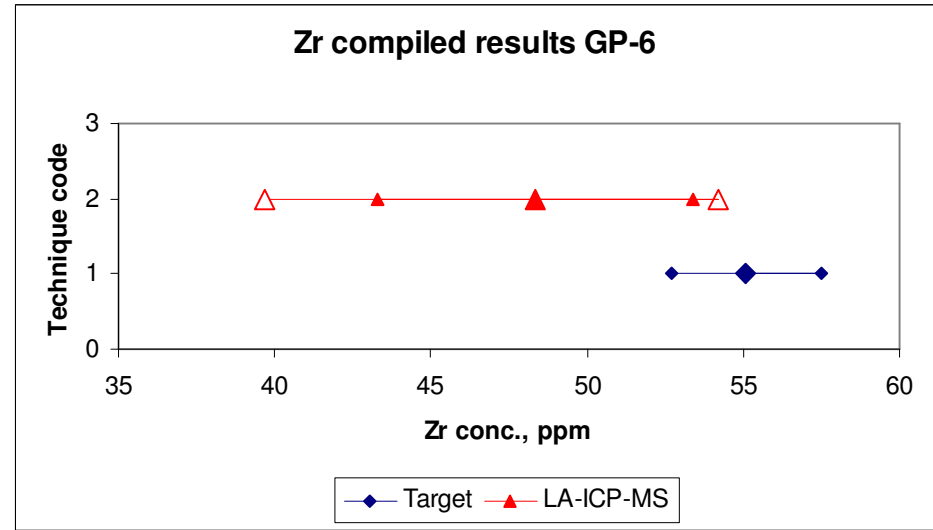Figure 46.   Yb results G-probe 6

Figure 47.   Zn results G-probe 6

Figure 48.   Zr results G-probe 6