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Sludge Batch 7b Glass Variability Study

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EXECUTIVE SUMMARY

The Defense Waste Processing Facility (DWPF) is preparing to initiate processing Sludge Batch 7b (SB7b). In support of the upcoming processing, the Savannah River National Laboratory (SRNL) provided a recommendation to utilize Frits 418 with a 6% Na_2O addition (26 wt% Na_2O in sludge) and 702 with a 4% Na_2O addition (24 wt% Na_2O in sludge) to process SB7b. This recommendation was based on assessments of the compositional projections for SB7b available at the time from the Savannah River Remediation (SRR). To support qualification of SB7b, SRNL executed a variability study to assess the applicability of the current durability models for SB7b. The durability models were assessed over the expected composition range of SB7b, including potential caustic additions, combined with Frits 702 and 418 over a 32-40% waste loading (WL) range.

Thirty four glasses were selected based on Frits 418 and 702 coupled with the sludge projections with an additional 4-6% Na_2O to reflect the potential caustic addition. Six of these glasses, based on average nominal sludge compositions including the appropriate caustic addition, were developed for both Frit 418 and Frit 702 at 32, 36 and 40% WL to provide coverage in the center of the anticipated SB7b glass region. All glasses were fabricated and characterized using chemical composition analysis, X-ray diffraction (XRD) and the Product Consistency Test (PCT).

To comply with the DWPF Glass Product Control Program, a total of thirty four glasses were fabricated to assess the applicability of the current DWPF PCCS durability models. Based on the measured PCT response, all of the glasses were acceptable with respect to the Environmental Assessment (EA) benchmark glass regardless of thermal history. The NL[B] values of the SB7b variability study glasses were less than 1.99 g/L as compared to 16.695 g/L for EA. A small number of the D-optimally selected “outer layer” extreme vertices (EV) glasses were not predictable using the current Product Composition Control System (PCCS) models for durability, but were acceptable compared to the EA glass when tested. These glasses fell outside of the lower 95% confidence band, which demonstrates conservatism in the model. A few of the glasses fell outside of the upper 95% confidence band; however, these particular glasses have normalized release values that were much lower than the values of EA and should be of no practical concern.

Per the requirements of the DWPF Glass Product Control Program, the PCCS durability models have been shown to be applicable to the SB7b sludge system with a range of Na_2O concentrations blended with Frits 418 or 702. PCT results from the glasses fabricated as part of the variability study were shown to be predictable by the current DWPF PCCS models and/or acceptable with respect to the EA benchmark glass regardless of thermal history or compositional view.

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LIST OF ABBREVIATIONS

AD	Analytical Development
ANOVA	Analysis of Variance
AR	Aqua Regia
ARM	Approved Reference Material
ARP	Actinide Removal Process
CCC	Centerline Canister Cooling
DWPF	Defense Waste Processing Facility
EA	Environmental Assessment
EV	Extreme Vertices
ICP-AES	Inductively Coupled Plasma-Atomic Emission Spectroscopy
MAR	Measurement Acceptability Region
NL	Normalized Leachate
PCCS	Product Composition Control System
PCT	Product Consistency Test
PF	Peroxide Fusion
SB	Sludge Batch
$SB7_{ref}$	SB7 Reference
SRNL	Savannah River National Laboratory
SRR	Savannah River Remediation
TL	Liquidus Temperature
TTQAP	Task Technical And Quality Assurance Plan
TTR	Technical Task Request
U_{std}	Uranium Standard
WL	Waste Loading
XRD	X-ray Diffraction

1.0 Introduction

The Defense Waste Processing Facility (DWPF) is preparing to initiate processing Sludge Batch 7b (SB7b). In support of the upcoming processing, the Savannah River National Laboratory (SRNL) provided a recommendation[a] to utilize Frits 418 with a 6% Na_2O addition (26 wt% Na_2O in sludge), 702 with a 4% Na_2O addition (24 wt% Na_2O in sludge) and 425 with a 2% Na_2O addition (22 wt% Na_2O in sludge) to process SB7b. This recommendation was based on assessments of the compositional projections[b] for SB7b available at the time from the Savannah River Remediation (SRR) The Na_2O concentration in the sludge projection was low, so in order to improve sulfur retention in the glass, all frits were evaluated with a caustic addition. These particular caustic additions were shown to yield the best operating windows in terms of waste loading. Based on the balance of sulfur solubility and caustic addition, the selection of frits was narrowed down to Frits 418 and 702.[c]

To support qualification of SB7b, SRNL executed a variability study to assess the applicability of the current durability models for SB7b. The durability models were assessed over the expected composition range of SB7b, including potential caustic additions, combined with Frits 702 and 418 over a 32-40% waste loading (WL) range. The experimental portion of the variability study was initiated by a DWPF Technical Task Request[1] (TTR) and was performed under a SRNL Task Technical and Quality Assurance Plan[2] (TT&QAP).

1.1 Glass Selection Strategy

For a complete discussion of the sludge projections and assessments leading up to the frit selection see SRNL-L3100-2011-00160.[3] Only a brief summary will be provided in this section.

In order to develop glasses for the variability study, one sludge region was created from the combination of the 4 and 6% Na_2O addition sludges.[d,e] Extreme vertices (EVs) for this single sludge region were generated and bounds were created using 32 and 40% WL. Both Frits 418 and 702 were combined with the minimum concentrations of sludge components at 32% WL and the maximum concentration of sludge components at 40% WL to create one glass region. The bounds of each component for the glass region are shown in Table 2-1. EVs were then generated based on the bounds of this glass region and an initial set of 14 "outer layer" EV glasses were D-optimally selected using the Custom Design feature of the Design of Experiments in JMP™.[4] An additional set of 14 EV glasses were D-optimally selected to provide "inner layer" coverage. Using average nominal sludge compositions shown in Table 2-2[f], a third set of 6 glasses was developed for both Frit 418 and Frit 702 at 32, 36 and 40% WL to provide coverage in the center of the anticipated SB7b region.

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[a] D.K. Peeler and T.B. Edwards, "MAR Assessments on SB7b Projections: 5/25/2011," Savannah River National Laboratory, Oral Presentation at the SRR-SRNL Plan of the Month Meeting, May 26, 2011.

[b] SB7b projections received from H.B. Shah on May 25, 2011 via email. See SRNL-NB-2010-00108, page 134 for more details.

[c] Using the 5/25/2011 SB7b projections, Frit 418 with a 6% Na_2O addition yielded an operating window of 25-39% in the variation stage of the Measurement Acceptability Region (MAR) assessments, whereas Frit 702 with a 4% Na_2O addition yielded an operating window of 25-37%. Frit 418 offered a slightly bigger operating window, but Frit 702 was shown to have better sulfur retention.

[d] Extreme vertices (EVs) and subsequently centroids for both the 4% Na_2O and 6% Na_2O sludges were previously defined by Peeler and Edwards for the frit recommendation and take into account with/without Actinide Removal Process (ARP) stream and two Tank 40 blending scenarios.

[e] Nominal coupled operations projections are based on introduction of the ARP stream from S.G. Subosits, "Actinide Removal Process Material Balance Calculation with Low Curie Salt Feed," X-CLC-S-00113 Rev. 0, Appendix J, September 24, 2004.

[f] The average nominal sludge compositions (with 4% and 6% Na_2O additions) took into account with/without ARP and two blending scenarios.

Thirty four glasses were fabricated and characterized using chemical composition analysis, X-ray diffraction (XRD) and the Product Consistency Test (PCT).

2.0 Experimental Procedure

2.1 Target Glass Compositions

Target glass compositions of the variability study glasses are shown in Table 2-3. Glasses SB7b-01 through -14 were based on the "outer layer" EVs, SB7b-15 through -28 were based on the "inner layer" EVs and SB7b-29 through -34 were based on the nominal sludge compositions.

2.2 Glass Fabrication

Each variability study glass was prepared from the proper proportions of reagent-grade metal oxides, carbonates, H_3BO_3, and salts in 150 g batches. The raw materials were thoroughly mixed and placed into a platinum alloy, 250 ml crucible. Batched materials were placed into a high-temperature furnace at the target melt temperature of 1150°C. The crucible was removed from the furnace after an isothermal hold at 1150°C for 1 hour. The molten glass was quenched by pouring the liquid onto a clean, stainless steel plate. The glass pour patty was used as a sampling stock for the various property measurements (i.e., chemical composition, durability testing and XRD).

Approximately 25 g of each glass was heat-treated to simulate cooling along the centerline of a DWPF-type canister to gauge the effects of thermal history on the product performance.[5] This cooling schedule is referred to as the centerline canister cooling (ccc) curve.

2.3 Compositional Analysis

A representative sample from each glass was submitted to Analytical Development (AD) and analyzed under the auspices of an analytical plan.[6] Two dissolution methods were utilized to allow measurement of the compositions: aqua regia (AR) and sodium peroxide fusion (PF). For each study glass, measurements were obtained from samples prepared in duplicate by each of these dissolution methods. All of the prepared samples were analyzed (twice for each element of interest) by Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES). Between the duplicate analyses, the instrument was recalibrated. The analytical plan was developed in such a way as to provide the opportunity to evaluate potential sources of bias and error. Glass standards were also intermittently measured to assess the performance of the ICP-AES instrument over the course of these analyses.

2.4 XRD

Select pairs of quenched and ccc glasses were submitted to AD for XRD analysis based on PCT response.[g] Samples were analyzed under conditions providing a detection limit of approximately 0.5 vol%, i.e. no crystals can be detected if the amount in the sample is less than ~0.5 vol%.

2.5 Density

The density of representative samples of each of the as-fabricated glasses was measured in duplicate via the Archimedes method.[7] A NIST standard glass was measured intermittently throughout the samples as an internal check of the measured density value.

[g] Both the quenched and ccc version of a glass were submitted if the difference between the normalized PCT response was greater than 0.2 g/L.

Table 2-1. Bounds of SB7b Projected Glass Region

Component	Minimum (wt%)	Maximum (wt%)
Al_2O_3	6.353	9.900
B_2O_3	4.800	5.440
BaO	0.014	0.066
CaO	0.204	0.674
Ce_2O_3	0.027	0.132
Cr_2O_3	0.018	0.087
CuO	0.008	0.037
Fe_2O_3	7.474	11.600
K_2O	0.018	0.089
La_2O_3	0.004	0.021
Li_2O	4.800	6.800
MgO	0.018	0.440
MnO	1.503	2.365
Na_2O	11.067	16.036
NiO	1.178	2.023
PbO	0.004	0.021
SO_4	0.518	0.784
SiO_2	46.460	52.751
ThO_2	0.327	0.862
TiO_2	0.000	0.723
U_3O_8	2.141	3.329
ZnO	0.003	0.016
ZrO_2	0.020	0.097

Table 2-2. Nominal Sludge Compositions

Component	Nominal Sludge Compostions (wt%)	
	+ 4% Na_2O	+ 6% Na_2O
Al_2O_3	22.502	21.917
BaO	0.106	0.103
CaO	1.179	1.149
Ce_2O_3	0.210	0.205
Cr_2O_3	0.138	0.135
CuO	0.059	0.058
Fe_2O_3	26.540	25.853
K_2O	0.142	0.139
La_2O_3	0.034	0.033
MgO	0.579	0.564
MnO	5.367	5.229
Na_2O	24.022	25.973
NiO	4.439	4.324
PbO	0.033	0.032
SO_4	1.821	1.775
SiO_2	2.773	2.701
ThO_2	1.598	1.556
TiO_2	0.666	0.666
U_3O_8	7.611	7.414
ZnO	0.025	0.024
ZrO_2	0.155	0.151

Table 2-3. Target Glass Compositions (wt%)

Glass ID	Sludge Information	Al_2O_3	B_2O_3	BaO	CaO	Ce_2O_3	Cr_2O_3	CuO	Fe_2O_3	K_2O	La_2O_3	Li_2O	MgO	MnO	Na_2O	NiO	PbO	SO_4	SiO_2	ThO_2	TiO_2	U_3O_8	ZnO	ZrO_2
SB7b-01	Outer Layer EVs	6.353	5.440	0.009	0.204	0.019	0.012	0.005	11.600	0.013	0.003	4.800	0.053	1.503	16.036	2.023	0.003	0.784	48.121	0.862	0.000	2.141	0.002	0.014
SB7b-02		6.353	5.440	0.070	0.204	0.140	0.092	0.039	11.600	0.095	0.023	4.800	0.404	2.365	15.162	1.178	0.022	0.518	46.460	0.862	0.723	3.329	0.017	0.103
SB7b-03		8.841	4.800	0.070	0.674	0.140	0.092	0.039	7.474	0.095	0.023	6.800	0.404	2.365	16.036	2.023	0.022	0.518	46.460	0.862	0.000	2.141	0.017	0.103
SB7b-04		9.900	4.800	0.009	0.204	0.019	0.012	0.005	7.474	0.013	0.003	4.800	0.053	2.365	11.420	1.178	0.003	0.784	52.751	0.862	0.000	3.329	0.002	0.014
SB7b-05		6.353	5.440	0.070	0.674	0.140	0.092	0.039	7.474	0.095	0.023	4.800	0.404	1.503	15.204	1.178	0.022	0.518	52.194	0.327	0.000	3.329	0.017	0.103
SB7b-06		9.900	5.440	0.070	0.204	0.140	0.092	0.039	11.600	0.095	0.023	6.800	0.404	2.365	11.067	1.906	0.022	0.784	46.460	0.327	0.000	2.141	0.017	0.103
SB7b-07		9.900	4.800	0.009	0.204	0.019	0.012	0.005	7.474	0.013	0.003	6.800	0.053	1.503	16.036	1.178	0.003	0.518	48.263	0.327	0.723	2.141	0.002	0.014
SB7b-08		6.353	4.800	0.009	0.674	0.019	0.012	0.005	11.474	0.013	0.003	6.800	0.053	2.365	15.323	1.178	0.003	0.784	46.460	0.327	0.000	3.329	0.002	0.014
SB7b-09		9.900	5.440	0.009	0.674	0.019	0.012	0.005	11.291	0.013	0.003	6.800	0.053	1.503	11.067	2.023	0.003	0.518	46.460	0.862	0.000	3.329	0.002	0.014
SB7b-10		9.900	5.440	0.009	0.674	0.019	0.012	0.005	7.474	0.013	0.003	4.800	0.053	2.365	15.568	2.023	0.003	0.784	46.460	0.327	0.723	3.329	0.002	0.014
SB7b-11		9.900	4.800	0.070	0.674	0.140	0.092	0.039	11.600	0.095	0.023	4.800	0.404	1.503	13.569	1.178	0.022	0.784	46.460	0.862	0.723	2.141	0.017	0.103
SB7b-12		6.353	4.800	0.009	0.674	0.019	0.012	0.005	11.600	0.013	0.003	4.800	0.053	2.365	11.067	2.023	0.003	0.518	52.476	0.327	0.723	2.141	0.002	0.014
SB7b-13		6.353	4.800	0.070	0.204	0.140	0.092	0.039	8.114	0.095	0.023	6.800	0.404	1.503	11.067	2.023	0.022	0.784	52.432	0.862	0.723	3.329	0.017	0.103
SB7b-14		6.353	5.440	0.009	0.674	0.019	0.012	0.005	7.474	0.013	0.003	6.800	0.053	2.365	12.322	1.178	0.003	0.784	52.751	0.862	0.723	2.141	0.002	0.014
SB7b-15	Inner Layer EVs	7.240	4.960	0.025	0.557	0.049	0.032	0.014	8.506	0.033	0.008	5.300	0.141	1.719	14.794	1.389	0.008	0.718	50.431	0.461	0.542	3.032	0.006	0.036
SB7b-16		9.013	4.960	0.055	0.322	0.110	0.072	0.031	10.414	0.075	0.018	6.300	0.316	1.719	12.309	1.389	0.017	0.718	48.033	0.461	0.542	3.032	0.013	0.081
SB7b-17		7.240	5.280	0.055	0.322	0.110	0.072	0.031	8.506	0.075	0.018	6.300	0.316	1.719	12.829	1.812	0.017	0.585	51.178	0.461	0.542	2.438	0.013	0.081
SB7b-18		7.240	4.960	0.055	0.557	0.110	0.072	0.031	10.569	0.075	0.018	5.300	0.316	2.150	14.165	1.812	0.017	0.718	48.033	0.728	0.542	2.438	0.013	0.081
SB7b-19		9.013	4.960	0.055	0.322	0.110	0.072	0.031	8.506	0.075	0.018	5.300	0.316	1.719	14.794	1.389	0.017	0.585	49.277	0.728	0.181	2.438	0.013	0.081
SB7b-20		9.013	4.960	0.025	0.322	0.049	0.032	0.014	8.807	0.033	0.008	5.300	0.141	2.150	12.309	1.812	0.008	0.718	51.178	0.461	0.181	2.438	0.006	0.036
SB7b-21		7.240	5.280	0.055	0.557	0.110	0.072	0.031	8.506	0.075	0.018	6.300	0.316	2.150	12.309	1.389	0.017	0.718	50.822	0.728	0.181	3.032	0.013	0.081
SB7b-22		7.240	4.960	0.025	0.557	0.049	0.032	0.014	10.569	0.033	0.008	6.300	0.141	1.719	12.309	1.389	0.008	0.585	50.941	0.461	0.181	2.438	0.006	0.036
SB7b-23		9.013	4.960	0.025	0.557	0.049	0.032	0.014	8.506	0.033	0.008	6.300	0.141	1.719	12.309	1.812	0.008	0.585	49.586	0.728	0.542	3.032	0.006	0.036
SB7b-24		9.013	5.280	0.025	0.557	0.049	0.032	0.014	8.506	0.033	0.008	6.300	0.141	2.150	14.395	1.389	0.008	0.585	48.033	0.461	0.542	2.438	0.006	0.036
SB7b-25		7.240	4.960	0.055	0.322	0.110	0.072	0.031	9.342	0.075	0.018	6.300	0.316	2.150	14.794	1.812	0.017	0.585	48.033	0.461	0.181	3.032	0.013	0.081
SB7b-26		9.013	5.280	0.055	0.557	0.110	0.072	0.031	10.569	0.075	0.018	5.300	0.316	1.719	12.309	1.812	0.017	0.585	48.394	0.461	0.181	3.032	0.013	0.081
SB7b-27		7.240	5.280	0.025	0.322	0.049	0.032	0.014	10.569	0.033	0.008	6.300	0.141	1.719	14.309	1.812	0.008	0.718	48.033	0.728	0.181	2.438	0.006	0.036
SB7b-28		7.240	5.280	0.025	0.322	0.049	0.032	0.014	10.569	0.033	0.008	5.300	0.141	2.150	12.309	1.389	0.008	0.585	50.203	0.728	0.542	3.032	0.006	0.036
SB7b-29	Nominal (+6% Na_2O)-Frit 418 at 32% WL	7.013	5.440	0.033	0.368	0.066	0.043	0.018	8.273	0.044	0.011	5.440	0.180	1.673	13.751	1.384	0.010	0.568	52.544	0.498	0.213	2.372	0.008	0.048
SB7b-30	Nominal (+6% Na2O)-Frit 418 at 36% WL	7.890	5.120	0.037	0.413	0.074	0.048	0.021	9.307	0.050	0.012	5.120	0.203	1.882	14.470	1.557	0.012	0.639	49.612	0.560	0.240	2.669	0.009	0.054
SB7b-31	Nominal (+6% Na2O)-Frit 418 at 40% WL	8.767	4.800	0.041	0.459	0.082	0.054	0.023	10.341	0.056	0.013	4.800	0.226	2.092	15.189	1.730	0.013	0.710	46.680	0.622	0.266	2.965	0.010	0.061
SB7b-32	Nominal (+4% Na2O)-Frit 702 at 32% WL	7.201	5.440	0.034	0.377	0.067	0.044	0.019	8.493	0.046	0.011	6.800	0.185	1.717	11.767	1.421	0.011	0.583	52.567	0.511	0.213	2.435	0.008	0.050
SB7b-33	Nominal (+4% Na2O)-Frit 702 at 36% WL	8.101	5.120	0.038	0.424	0.076	0.050	0.021	9.554	0.051	0.012	6.400	0.208	1.932	12.488	1.598	0.012	0.655	49.638	0.575	0.240	2.740	0.009	0.056
SB7b-34	Nominal (+4% Na2O)-Frit 702 at 40% WL	9.001	4.800	0.042	0.471	0.084	0.055	0.024	10.616	0.057	0.014	6.000	0.232	2.147	13.209	1.776	0.013	0.728	46.709	0.639	0.267	3.044	0.010	0.062

2.6 PCT

The PCT was performed in triplicate on each quenched and ccc glass to assess chemical durability using Method A of the procedure.[8] Also included in the experimental test matrix was the Environmental Assessment (EA) glass, the Approved Reference Material (ARM) glass, and blanks from the sample cleaning batch. Samples were ground, washed, and prepared according to the standard procedure. The resulting solutions were sampled (filtered and acidified) and analyzed by AD under the auspices of an analytical plan.[9] Samples of a multi-element, standard solution were also included in the analytical plan (as a check on the accuracy of the ICP-AES instrument). Normalized release rates were calculated based on target and measured compositional views using the average of the leachate concentrations.

3.0 Results and Discussion

3.1 Chemical Composition Measurements

Tables A-1 and A-2 in Appendix A provide the elemental concentration measurements from the glasses that were prepared using AR, while the measurements using PF are shown in Table A-3 and Table A-4. Measurements for the Batch 1, uranium standard (U_{std}) glass and SB7 reference glass ($SB7_{ref}$)[8] are also provided in the tables of Appendix A.

Elemental concentrations were converted to oxide concentrations by multiplying the values for each element by the gravimetric factor for the corresponding oxide. During this process, an elemental concentration that was determined to be below the detection limit of the analytical procedures used was reduced to half of that detection limit as the oxide concentration was determined.[10]

3.1.1 *Measurements in Analytical Sequence*

Exhibit A-1 in Appendix A provides plots in analytical sequence of the sample measurements generated for each oxide by preparation method (i.e., AQ and PF) for analytical block 1, 2 and 3. Exhibit A-2 in Appendix A provides the same plots for analytical blocks 4 and 5. These plots include all of the measurement data, and in addition to analytical sequence of the measurements, the laboratory identifiers of each sample are shown. These plots provide the reader with an opportunity to perform a high-level review of the data; however, the data reported in these exhibits are presented in analytical sequence and it may be difficult to ascertain specific issues with the measured data for an individual glass. In the next section, the measured data are compiled and presented to provide assessments of reproducibility and comparisons between target and measured compositions. Specific and/or general issues with the compositional measurements are discussed.

3.1.2 *Composition Measurements by Glass Identifier*

Exhibit A-3 in Appendix A provides plots of the oxide concentration measurements by Glass ID/Lab ID (including Batch 1,U_{std} and $SB7_{ref}$). These plots demonstrate the individual measurements across the duplicates of each preparation method and the two ICP-AES calibrations for each glass.

In general, there appears to be good repeatability amongst the measurements for each of the major oxides except for SiO_2. Some scatter is also observed in the minor components, including Ce_2O_3,

[8] The $SB7_{ref}$ glass was developed as a non-radioactive internal standard representing Frit 418 coupled with the Tank 40 60" heel nominal projection (after removing U_3O_8 and ThO_2 and renormalizing) at 36% WL. This glass was not only submitted to AD but to the Process Science Analytical Laboratory (PSAL) for compositional analysis. For more information on the $SB7_{ref}$ glass see SRNL-NB-2010-00162 pages 31 – 32.

Cr_2O_3, CuO, La_2O_3, PbO, ZnO and ZrO_2. While the reference value for Cr_2O_3 is 0 wt% in the U_{std} glass, the measured values are on the order of 0.25 wt%. These measured values are consistent with previous measurements and indicate that the U_{std} glass does contain a small fraction of Cr_2O_3, which was not report in the reference composition.

Exhibit A-4 in Appendix A provides a comparison of the oxide concentration measurements for AR and PF. Based on a review of these plots, a decision was made by the authors to use the AR rather than the PF measurements for PbO and SO_4. There appears to be a detection limit issue with the PF measurements for these oxides. For the remainder of the oxides, an average of the AR and PF values (when applicable) was taken in order to determine an average measured composition.[9]

3.1.3 *Statistical Evaluations of the Standard Glasses*

Exhibit A-5 in Appendix A provides statistical analyses of the $SB7_{ref}$ and U_{std} results by calibration block for each oxide of interest for both the AR and PF preparation methods. The results include analysis of variance (ANOVA) investigations, which determine statistically significant differences among the means of these groups for each of the oxides for each of the standards. The following components indicate a significant ICP-AES calibration effect on the block averages at the 5% significance level:

- $SB7_{ref}$: Al_2O_3 (PF), B_2O_3 (PF), BaO (AR,PF), CaO (PF), Ce_2O_3 (AR,PF), Cr_2O_3 (AR,PF), CuO (AR,PF), Fe_2O_3 (AR,PF), K_2O (AR,PF), La_2O_3 (AR,PF), Li_2O (PF), MgO (AR,PF), MnO (AR,PF), NiO (AR,PF), PbO (AR,PF), SiO_2 (PF), SO_4 (AR), TiO_2 (AR,PF), ZnO (AR) and ZrO_2 (AR)
- U_{std}: Al_2O_3 (AR,PF), B_2O_3 (AR), CaO (AR), Fe_2O_3 (AR), Li_2O (AR), MgO (AR), MnO (AR), Na_2O (AR), NiO (AR), SiO_2 (PF), TiO_2 (AR,PF) and U_3O_8 (PF)

Reference values for the oxide concentrations of the standards are given in the header for each set of measurements in Exhibit A-5. While there is a calibration effect, these results do not impact the outcome of this study.

3.1.4 *Measured and Target Compositions*

Table A-5 in Appendix A provides a summary of the average measured and target compositions, as well as some associated and relative differences. Exhibit A-6 in Appendix A provides plots showing a comparison of the target and average measured compositions of each oxide for all of the glasses.

In general, the average measured values were consistent with the target values for each oxide of interest. Of the major oxides, there is some variability in the average measured SiO_2; however, these differences do not impact the conclusions drawn from this study. Again, some variation is observed in the minor components, including Ce_2O_3, Cr_2O_3, CuO, La_2O_3, PbO, ZnO and ZrO_2. The measured sums of oxides for all of the glass fall within the interval of 95 to 105 wt%.

3.2 MAR Assessments

Results from the PCCS assessment at the Measurement Acceptability Region (MAR) based on target and measured compositions are shown in Table 3-1 and Table 3-2. The columns in the table list the glass identifier with Al_2O_3 content, TiO_2 content, sum of alkali (R_2O), nepheline discriminator value (Neph. Discr.), the overall PCCS assessment at the MAR and the predicted values for: ΔG_p value for boron (B Del G_p value), normalized release for boron in grams/liter (NL

[9] AR was the only digestion used for Ca, Na and Zr. PF was the only digestion used for Si.

[B (g/L)]), liquidus temperature in degrees Celsius (T_L Pred. (ºC)) and viscosity in Poise (Visc Pred (P)). Glasses SB7b-03 and -08 were intentionally chosen to fail the PCCS constraint for ΔG_p at the MAR, which is shown in both compositional views. Slight differences in predicted property values are observed for glasses based on target and measured composition as compared to its measured composition.

3.3 XRD

Table 3-3 summarizes the results of the XRD analysis of the quenched and heat treated (ccc) glasses.[10] No crystals were detected in any of the analyzed quenched glasses. Some of the "outer" layer EV ccc glasses exhibited a small degree of crystallization. Trevorite (a spinel – $NiFe_2O_4$) was detected in SB7b-03ccc, -06ccc and -09ccc, which is a typical crystal found in slowly cooled, higher WL DWPF-like glasses. Hematite (Fe_2O_3) was also observed in some of the glasses as well as lithium iron oxide ($LiFeO_2$); however, neither of these crystal types is known to have a significant impact on durability.

3.4 Density

Average densities[11] of the variability study glasses are shown in Table 3-4. Values were in the range of 2.65 – 2.75 g/cc.

3.5 PCT

Table B-1 in Appendix B provides the elemental leachate concentration measurements for the solution samples generated by the PCTs. Any measurement below the detection limit of the analytical procedure (indicated by a "<") was replaced by ½ of the detection limit in subsequent analyses.[10] In addition to adjustments for detection limits, the values were adjusted for the dilution factors: study glasses, blanks and the ARM glass were multiplied by 1.6667 to determine the values in parts per million (ppm) and the values for EA were multiplied by 16.6667. Over the course of the 7-day test, there were no water loss issues.

3.5.1 *Measurements in Analytical Sequence*

Exhibits B-1 through B-4 in Appendix B provides plots of the common logarithms of the leachate (ppm) concentrations in analytical sequence. No issues were observed in these plots.

3.5.2 *Results of the Multi-Element Solution Standard*

Exhibit B-5 in Appendix B provides analyses of measurements of the multi-element solution standard by analytical set/ICP-AES calibration block, and ANOVA investigations for each element of interest. A statistically significant difference (at a 5% level) among the averages of these measurements was indicated for B, Na and Si in Set 1 and Li in Set 2.

Table 3-5 summarizes the average measurements and the reference values for the 4 elements of interest for both sets of PCTs. The results indicate consistent and accurate measurements throughout the measurement process and none of the differences are greater than 5%. Averaging the ppm values for each set of triplicates helps to minimize the impact of any potential instrumentation effects.

[10] XRD patterns are shown in SRNL-NB-2010-00162, pages 115-119 and pages 144-145.
[11] All density values are shown in SRNL-NB-2010-00162, pages 124-125.

Table 3-1. Results of the PCCS Assessment at the MAR (Target Compositions)

Glass ID	B Del Gp	NL [B (g/L)]	T_L Pred (°C)	Visc Pred (P)	Al_2O_3 (wt%)	TiO_2 (wt%)	R_2O (wt%)	Neph Discr.	MAR Status
SB7b-01	-12.34	2.16	916	24	6.353	0.000	20.849	0.68	low viscosity
SB7b-02	-12.03	1.89	910	23	6.353	0.723	20.057	0.68	low viscosity
SB7b-03	-13.97	4.26	878	18	8.841	0.000	22.931	0.65	DGp low viscosity
SB7b-04	-7.38	0.27	897	122	9.900	0.000	16.233	0.71	high viscosity
SB7b-05	-12.06	1.92	818	48	6.353	0.000	20.099	0.71	acceptable
SB7b-06	-8.97	0.53	1048	32	9.900	0.000	17.962	0.69	TL
SB7b-07	-12.81	2.62	809	24	9.900	0.723	22.849	0.65	low viscosity
SB7b-08	-13.86	4.07	831	12	6.353	0.000	22.136	0.68	DGp low viscosity
SB7b-09	-8.67	0.47	1015	33	9.900	0.000	17.880	0.69	TL
SB7b-10	-11.45	1.49	905	40	9.900	0.723	20.381	0.65	acceptable
SB7b-11	-9.04	0.55	982	44	9.900	0.723	18.464	0.66	acceptable
SB7b-12	-8.00	0.35	1012	73	6.353	0.723	15.880	0.75	acceptable
SB7b-13	-9.65	0.70	947	49	6.353	0.723	17.962	0.75	acceptable
SB7b-14	-11.10	1.29	798	42	6.353	0.723	19.135	0.74	acceptable
SB7b-15	-11.55	1.55	849	40	7.240	0.542	20.127	0.70	acceptable
SB7b-16	-9.57	0.68	957	37	9.013	0.542	18.684	0.69	acceptable
SB7b-17	-10.66	1.07	916	41	7.240	0.542	19.204	0.72	acceptable
SB7b-18	-11.16	1.32	950	32	7.240	0.542	19.540	0.69	acceptable
SB7b-19	-11.02	1.24	891	43	9.013	0.181	20.169	0.67	acceptable
SB7b-20	-8.83	0.50	952	71	9.013	0.181	17.642	0.71	acceptable
SB7b-21	-10.51	1.01	889	43	7.240	0.181	18.684	0.72	acceptable
SB7b-22	-10.06	0.83	912	39	7.240	0.181	18.642	0.72	acceptable
SB7b-23	-9.60	0.69	934	47	9.013	0.542	18.642	0.70	acceptable
SB7b-24	-11.70	1.65	868	29	9.013	0.542	20.728	0.67	acceptable
SB7b-25	-12.67	2.48	896	22	7.240	0.181	21.169	0.69	low viscosity
SB7b-26	-8.90	0.51	1007	51	9.013	0.181	17.684	0.69	acceptable
SB7b-27	-11.94	1.83	911	22	7.240	0.181	20.642	0.69	low viscosity
SB7b-28	-9.37	0.62	933	50	7.240	0.542	17.642	0.72	acceptable
SB7b-29	-10.81	1.14	855	51	7.013	0.213	19.236	0.72	acceptable
SB7b-30	-10.99	1.23	901	42	7.890	0.240	19.640	0.69	acceptable
SB7b-31	-11.17	1.33	943	34	8.767	0.266	20.045	0.66	acceptable
SB7b-32	-10.13	0.86	877	45	7.201	0.213	18.613	0.73	acceptable
SB7b-33	-10.24	0.90	926	38	8.101	0.240	18.939	0.71	acceptable
SB7b-34	-10.35	0.94	970	31	9.001	0.267	19.266	0.68	acceptable

Table 3-2. Results of the PCCS Assessment at the MAR (Measured Compositions)

Glass ID	B Del Gp	NL [B (g/L)]	T_L Pred (°C)	Visc Pred (P)	Al_2O_3 (wt%)	TiO_2 (wt%)	R_2O (wt%)	Neph Discr.	MAR Status
SB7b-01	-12.28	2.10	915	26	6.443	0.010	20.9124	0.68	acceptable
SB7b-02	-11.84	1.75	908	23	6.382	0.690	19.8259	0.68	acceptable
SB7b-03	-13.79	3.96	895	17	8.867	0.009	22.6788	0.65	DGp low viscosity
SB7b-04	-7.42	0.28	892	131	10.147	0.012	16.4141	0.71	high viscosity
SB7b-05	-11.95	1.84	817	49	6.481	0.009	20.0551	0.71	acceptable
SB7b-06	-8.89	0.51	1036	33	10.038	0.008	17.8762	0.69	TL
SB7b-07	-12.44	2.26	812	27	9.913	0.684	22.4911	0.65	acceptable
SB7b-08	-13.69	3.80	835	13	6.436	0.011	22.057	0.68	DGp low viscosity
SB7b-09	-8.74	0.48	1002	36	10.026	0.011	18.0949	0.69	acceptable
SB7b-10	-11.42	1.47	898	44	9.946	0.691	20.4461	0.65	acceptable
SB7b-11	-8.81	0.50	977	48	9.993	0.683	18.2424	0.67	acceptable
SB7b-12	-7.96	0.35	1009	77	6.533	0.668	15.9094	0.75	acceptable
SB7b-13	-9.41	0.64	947	49	6.462	0.680	17.6233	0.75	acceptable
SB7b-14	-11.11	1.29	801	43	6.507	0.676	19.2258	0.74	acceptable
SB7b-15	-11.68	1.64	853	35	7.303	0.510	20.2122	0.69	acceptable
SB7b-16	-9.38	0.63	956	39	9.041	0.520	18.4957	0.69	acceptable
SB7b-17	-10.40	0.96	918	46	7.315	0.510	19.0121	0.72	acceptable
SB7b-18	-11.18	1.33	952	32	7.383	0.520	19.6463	0.69	acceptable
SB7b-19	-11.37	1.44	883	39	9.150	0.184	20.5862	0.67	acceptable
SB7b-20	-8.51	0.44	945	81	9.070	0.174	17.3447	0.71	acceptable
SB7b-21	-10.77	1.12	886	35	7.376	0.181	18.8744	0.71	acceptable
SB7b-22	-10.34	0.94	896	37	7.398	0.182	18.8992	0.72	acceptable
SB7b-23	-9.45	0.65	926	51	9.164	0.530	18.5687	0.70	acceptable
SB7b-24	-11.69	1.65	863	28	8.987	0.509	20.6465	0.67	acceptable
SB7b-25	-12.72	2.53	889	22	7.450	0.180	21.3621	0.68	low viscosity
SB7b-26	-8.85	0.50	990	52	9.115	0.174	17.6005	0.69	acceptable
SB7b-27	-11.92	1.81	918	20	7.362	0.176	20.6172	0.68	low viscosity
SB7b-28	-9.17	0.58	935	52	7.272	0.515	17.4306	0.72	acceptable
SB7b-29	-10.97	1.22	856	47	7.090	0.199	19.3881	0.71	acceptable
SB7b-30	-10.83	1.15	901	47	8.033	0.227	19.6336	0.69	acceptable
SB7b-31	-9.05	0.55	985	53	7.686	0.213	17.4244	0.71	acceptable
SB7b-32	-11.91	1.81	844	33	8.330	0.252	20.9378	0.69	acceptable
SB7b-33	-10.38	0.95	924	34	8.238	0.233	19.0711	0.70	acceptable
SB7b-34	-10.30	0.92	964	33	9.056	0.258	19.2668	0.68	acceptable

Table 3-3. XRD Results

Glass ID	Sludge Description	Quenched	ccc
SB7b-03ccc	Outer layer EV	amorphous	trevorite ($NiFe_2O_4$), hematite (Fe_2O_3)
SB7b-06ccc		amorphous	trevorite ($NiFe_2O_4$)
SB7b-07ccc		amorphous	hematite (Fe_2O_3)
SB7b-08ccc		amorphous	hematite (Fe_2O_3)
SB7b-09ccc		amorphous	lithium iron oxide ($LiFeO_2$), trevorite ($NiFe_2O4$)
SB7b-13ccc		amorphous	amorphous
SB7b-14ccc		amorphous	amorphous
SB7b-24ccc	Inner layer EV	amorphous	amorphous
SB7b-25ccc		amorphous	amorphous
SB7b-27ccc		amorphous	possibly hematite (Fe_2O_3)
SB7b-32ccc	Nominal (+4% Na2O)-Frit 702 at 32% WL	amorphous	amorphous
SB7b-33ccc	Nominal (+4% Na2O)-Frit 702 at 36% WL	amorphous	amorphous
SB7b-34ccc	Nominal (+4% Na2O)-Frit 702 at 40% WL	amorphous	amorphous

Table 3-4. Densities

Glass ID	Density (g/cc)
SB7b-01	2.72
SB7b-02	2.75
SB7b-03	2.69
SB7b-04	2.65
SB7b-05	2.67
SB7b-06	2.70
SB7b-07	2.65
SB7b-08	2.73
SB7b-09	2.72
SB7b-10	2.70
SB7b-11	2.71
SB7b-12	2.70
SB7b-13	2.69
SB7b-14	2.66
SB7b-15	2.69
SB7b-16	2.75
SB7b-17	2.68

Glass ID	Density (g/cc)
SB7b-18	2.72
SB7b-19	2.67
SB7b-20	2.66
SB7b-21	2.69
SB7b-22	2.67
SB7b-23	2.68
SB7b-24	2.68
SB7b-25	2.71
SB7b-26	2.70
SB7b-27	2.71
SB7b-28	2.71
SB7b-29	2.66
SB7b-30	2.69
SB7b-31	2.71
SB7b-32	2.67
SB7b-33	2.69
SB7b-34	2.72

Table 3-5. Results from Samples of the Multi-Element Solution Standard (ppm)

Analytical Set/Block	Average B	Average Li	Average Na	Average Si
1/1	19.8	9.9	82.6	52.5
1/2	19.8	9.9	83.3	52.2
1/3	19.8	9.9	83.6	52.2
1/4	19.6	10.0	82.6	51.3
1/5	19.7	9.8	83.1	52.3
1/6	19.7	9.8	82.9	52.1
2/1	19.8	10.1	83.3	52.3
2/2	20.1	10.1	84.1	52.8
2/3	19.9	10.1	83.2	52.3
2/4	19.7	10.0	83.8	52.2
2/5	19.7	9.9	83.0	52.0
2/6	19.8	9.9	83.0	52.2
Average	19.8	9.9	83.2	52.2
Reference Value	20	10	81	50
% Difference	-1.0	-0.6	2.7	4.4

3.5.3 *Measurements by Glass Identifier*

Exhibit B-6 in Appendix B provides plots of the leachate concentrations for both the quenched and ccc versions of each glass, as well as the standards (EA, ARM[12], multi-element solution standard and blanks).[11] Two units of measure are used in these plots: ppm and the common logarithms of the ppm values. The common logarithm plots allow for the assessment of the repeatability of the measurements and any differences between the quenched and ccc version of a given glass. In general, the most noticeable differences are seen in the glasses with identified crystallization (SB7b-03ccc, -06ccc, -07ccc, -08ccc, -09ccc, -13ccc and -27ccc), especially in Li.

3.5.4 *Normalized PCT Release Values*

PCT leachate concentrations were normalized using the target and measured cation compositions (wt%) in the glass to obtain a grams-per-liter (g/L) leachate concentration.

Exhibit B-7 in Appendix B provides scatter plots that contain normalized released rates for both the quenched and ccc versions of the glasses based on the target and measured compositions. These plots offer an opportunity to investigate the consistency in the leaching across the elements for the glasses of this study. Consistency in the leaching across the elements is typically demonstrated by a high degree of linear correlation among the values for pairs of these elements. The smallest correlation in this plot is for Na and Li, with a value of ~86.2%, which demonstrates the consistency of the results among the 4 analytes.

Table 4-1 summarizes the normalized PCTs for all of the glasses of this study, which are listed by heat treatment and compositional view for each glass. A review of the data shows that all of the glasses were acceptable relative to the EA glass regardless of thermal history (quenched or CCC) or compositional view (target or measured). It is noted that the NL [B] release for the EA glass from this study was relatively low (i.e., 13.8 g/L in set 1 and 9.3 g/L in set 2) as compared to the

[12] The concentrations of each element of interest for ARM are within the controls limits in THERMO™.

reported values of 16.695 g/L. Variations in the EA glass response have been observed in previous studies, which is why ARM is used as the PCT standard and EA is used as a benchmark.[12,13] All of the SB7b variability study glasses were acceptable relative to the EA glass regardless of the historical release value (16.695 g/L) or the values observed in this study.

3.5.5 *Effects of Heat Treatment*

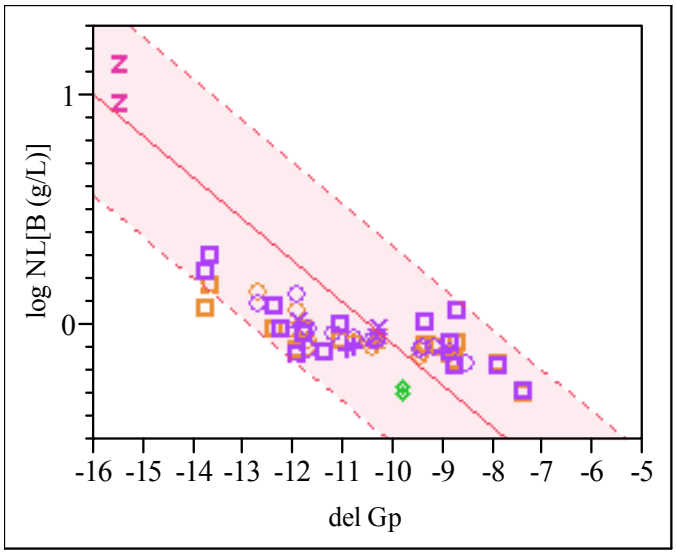
Exhibit B-8 in Appendix B provides plots of the normalized PCT responses both the quenched and CCC glasses. These plots provide a basis for judging the practical impact of differences in the PCT response due to the heat treatment of the glass. In general, the ccc versions were relatively consistent with the quenched versions (within experimental error). As stated in Section 3.5.3, the most noticeable differences are seen in the glasses with identified crystallization (SB7b-03ccc, -06ccc, -07ccc, -08ccc, -09ccc, -13ccc and -27ccc), especially in Li. In these particular glasses, the PCT releases of the ccc version of the glasses was slightly elevated as compared to the quenched version of the glass; however, the releases of each compositional view were well below EA and were acceptable. One of the glasses (SB7b-25) has lower PCT releases in the ccc version of the glass rather than the quenched version of the glass.

3.5.6 *Predicted and Measured PCT Values*

Exhibits B-9 and B-10 in Appendix B provide plots of the DWPF models for B, Li, Na, and Si that relate the logarithm of the normalized PCT (for each element of interest) to a linear function of a free energy of hydration term (ΔG_p, kcal/100g glass) derived for the target and measured compositional views, respectively. The results for both heat treatments are shown on each plot. Prediction limits at a 95% confidence level for an individual PCT result are also plotted along with the linear fit. The EA and ARM results are also indicated on these plots. Figure 3-1 provides a closer look at the boron PCT responses.

All of the glasses, both quenched and ccc, were acceptable relative to the EA glass. Each of the nominal glasses, as well as the "inner layer" EV glasses, were predictable with respect to the PCCS durability models for durability. In Figure 3-1, as well as the plots in Exhibit B-9, there were a small number of the "outer layer" EV quenched glasses that were unpredictable and fall outside of the lower 95% confidence band. Of these glasses, two glasses (SB7b-03 and -08) failed the PCCS MAR constraint for ΔG_p; however, the normalized boron releases values were only in the range of 1.12-1.99 g/L regardless of heat treatment and/or compositional view. Glasses outside of the lower 95% confidence band at more negative values of ΔG_p demonstrate the conservatism of the model as the measured normalized boron release values were lower than the predicted values.

In Exhibits B-9 and B-10, a few of the "outer layer" ccc glasses also fall above the upper 95% confidence band. These points have more positive ΔG_p and were of little practical concern. The normalized PCT values were acceptable when compared to EA and this type of behavior for ΔG_p-model predictions has been observed in previous variability studies supporting DWPF.[14-16] Of these glasses, SB7b-06ccc and -09ccc contained lithium iron oxide and/or trevorite. The current models for durability are only valid for homogeneous glasses and would not be expected to predict the PCT response of glasses containing crystals.



Legend

◇	ARM	---	□	D-Opt EV Outer Layer	quenched
Z	EA	---	+	Nominal-Frit 418	ccc
○	D-Opt EV Inner Layer	ccc	+	Nominal-Frit 418	quenched
○	D-Opt EV Inner Layer	quenched	×	Nominal-Frit 702	ccc
□	D-Opt EV Outer Layer	ccc	×	Nominal-Frit 702	quenched

Figure 3-1. Del G_p versus log NL [B] values based on measured compositions.

4.0 Conclusions

To comply with the DWPF Glass Product Control Program, a total of thirty four glasses were fabricated to assess the applicability of the current DWPF PCCS durability models for the SB7b sludge system (plus caustic addition) blended with Frits 418 or 702. Based on the measured PCT response, all of the glasses were acceptable with respect to the Environmental Assessment (EA) benchmark glass regardless of thermal history. The NL[B] values of the SB7b variability study glasses were less than 1.99 g/L. A small number of the D-optimally selected "outer layer" EV glasses were not predictable using the current PCCS models for durability, but were acceptable compared to the EA glass when tested. These glasses fell outside of the lower 95% confidence band, which demonstrates conservatism in the model. A few of the glasses fell outside of the upper 95% confidence band; however, these particular glasses have normalized release values that were much lower than the values of EA and should be of no practical concern.

Per the requirements of the DWPF Glass Product Control Program, the PCCS durability models have been shown to be applicable to the SB7b sludge system with a range of Na_2O concentrations blended with Frits 418 or 702. PCT results from the glasses fabricated as part of the variability study were shown to be predictable by the current DWPF PCCS models and/or acceptable with respect to the EA benchmark glass regardless of thermal history or compositional view.

Table 4-1. Normalized PCT Results

Glass ID	Heat Treatment	Comp View	log NL [B (g/L)]	log NL [Li (g/L)]	log NL [Na (g/L)]	log NL [Si (g/L)]	NL B (g/L)	NL Li (g/L)	NL Na (g/L)	NL Si (g/L)
ARM	reference	set 1	-0.30	-0.22	-0.28	-0.53	0.50	0.60	0.52	0.30
		set 2	-0.27	-0.20	-0.25	-0.51	0.53	0.64	0.56	0.31
EA	reference	set 1	1.14	0.90	1.05	0.56	13.82	7.97	11.20	3.63
		set 2	0.97	0.77	0.89	0.45	9.27	5.95	7.78	2.80
SB7b-01	quenched	target	-0.03	-0.04	0.10	-0.16	0.92	0.91	1.25	0.70
		measured	-0.02	-0.04	0.10	-0.16	0.96	0.92	1.25	0.69
	ccc	target	-0.04	-0.01	0.07	-0.15	0.92	0.98	1.18	0.70
		measured	-0.02	0.00	0.07	-0.16	0.96	0.99	1.18	0.69
SB7b-02	quenched	target	-0.03	-0.02	0.07	-0.19	0.93	0.94	1.16	0.65
		measured	-0.02	-0.02	0.07	-0.18	0.96	0.95	1.19	0.66
	ccc	target	-0.05	-0.03	0.02	-0.20	0.89	0.94	1.05	0.63
		measured	-0.04	-0.02	0.03	-0.20	0.91	0.94	1.07	0.63
SB7b-03	quenched	target	0.05	0.11	0.24	-0.09	1.12	1.29	1.73	0.81
		measured	0.07	0.12	0.24	-0.08	1.19	1.31	1.75	0.83
	ccc	target	0.21	0.39	0.26	0.07	1.62	2.43	1.80	1.17
		measured	0.23	0.39	0.26	0.08	1.72	2.47	1.82	1.20
SB7b-04	quenched	target	-0.31	-0.16	-0.30	-0.34	0.49	0.69	0.50	0.46
		measured	-0.30	-0.16	-0.31	-0.35	0.51	0.69	0.50	0.45
	ccc	target	-0.31	-0.17	-0.30	-0.34	0.49	0.67	0.51	0.46
		measured	-0.29	-0.17	-0.30	-0.35	0.51	0.68	0.50	0.45
SB7b-05	quenched	target	-0.14	-0.07	0.02	-0.24	0.73	0.84	1.05	0.58
		measured	-0.11	-0.07	0.02	-0.23	0.77	0.86	1.05	0.58
	ccc	target	-0.15	-0.08	-0.03	-0.26	0.70	0.83	0.94	0.55
		measured	-0.13	-0.07	-0.02	-0.26	0.74	0.85	0.95	0.56
SB7b-06	quenched	target	-0.09	-0.06	-0.08	-0.22	0.81	0.88	0.83	0.60
		measured	-0.08	-0.05	-0.08	-0.22	0.84	0.88	0.84	0.61
	ccc	target	-0.09	0.08	-0.04	-0.13	0.81	1.20	0.90	0.74
		measured	-0.08	0.08	-0.04	-0.13	0.84	1.21	0.91	0.74

Table 3-5 cont. Normalized PCT Results

Glass ID	Heat Treatment	Comp View	log NL [B (g/L)]	log NL [Li (g/L)]	log NL [Na (g/L)]	log NL [Si (g/L)]	NL B (g/L)	NL Li (g/L)	NL Na (g/L)	NL Si (g/L)
SB7b-07	quenched	target	-0.04	0.03	0.17	-0.10	0.90	1.08	1.49	0.79
		measured	-0.02	0.04	0.18	-0.11	0.95	1.10	1.53	0.78
	ccc	target	0.06	0.33	0.19	0.08	1.15	2.12	1.53	1.19
		measured	0.08	0.33	0.19	0.07	1.21	2.15	1.56	1.18
SB7b-08	quenched	target	0.15	0.16	0.25	-0.02	1.42	1.46	1.80	0.96
		measured	0.17	0.17	0.26	-0.02	1.50	1.48	1.81	0.95
	ccc	target	0.28	0.44	0.31	0.17	1.89	2.73	2.04	1.47
		measured	0.30	0.44	0.31	0.17	1.99	2.76	2.06	1.47
SB7b-09	quenched	target	-0.10	-0.05	-0.09	-0.23	0.80	0.89	0.82	0.59
		measured	-0.08	-0.05	-0.09	-0.24	0.83	0.89	0.81	0.58
	ccc	target	0.04	0.28	0.06	0.02	1.09	1.92	1.16	1.04
		measured	0.06	0.28	0.06	0.01	1.14	1.91	1.14	1.02
SB7b-10	quenched	target	-0.15	-0.12	0.01	-0.24	0.72	0.76	1.02	0.57
		measured	-0.12	-0.11	0.01	-0.25	0.76	0.77	1.02	0.56
	ccc	target	-0.14	-0.08	-0.01	-0.24	0.72	0.82	0.97	0.57
		measured	-0.12	-0.08	-0.02	-0.25	0.76	0.83	0.97	0.56
SB7b-11	quenched	target	-0.18	-0.13	-0.10	-0.30	0.67	0.75	0.79	0.50
		measured	-0.16	-0.12	-0.10	-0.30	0.70	0.76	0.80	0.50
	ccc	target	-0.20	-0.15	-0.14	-0.31	0.63	0.71	0.73	0.48
		measured	-0.18	-0.14	-0.13	-0.31	0.66	0.73	0.74	0.49
SB7b-12	quenched	target	-0.19	-0.11	-0.18	-0.30	0.64	0.77	0.66	0.50
		measured	-0.17	-0.11	-0.18	-0.30	0.67	0.78	0.66	0.50
	ccc	target	-0.20	-0.12	-0.19	-0.30	0.64	0.76	0.65	0.50
		measured	-0.18	-0.11	-0.18	-0.30	0.67	0.77	0.65	0.50
SB7b-13	quenched	target	-0.11	-0.04	-0.07	-0.22	0.77	0.92	0.85	0.60
		measured	-0.09	-0.02	-0.06	-0.21	0.82	0.94	0.86	0.62
	ccc	target	-0.02	0.16	0.00	-0.10	0.96	1.44	1.00	0.80
		measured	0.01	0.17	0.01	-0.08	1.01	1.47	1.02	0.82

Table 3-5 cont. Normalized PCT Results

Glass ID	Heat Treatment	Comp View	log NL [B (g/L)]	log NL [Li (g/L)]	log NL [Na (g/L)]	log NL [Si (g/L)]	NL B (g/L)	NL Li (g/L)	NL Na (g/L)	NL Si (g/L)
SB7b-14	quenched	target	-0.09	-0.01	0.00	-0.20	0.81	0.99	0.99	0.63
		measured	-0.07	0.00	-0.01	-0.20	0.85	1.00	0.99	0.63
	ccc	target	-0.03	0.20	0.04	-0.04	0.94	1.59	1.08	0.90
		measured	0.00	0.21	0.03	-0.04	0.99	1.61	1.08	0.90
SB7b-15	quenched	target	-0.12	-0.05	0.03	-0.20	0.76	0.90	1.08	0.63
		measured	-0.10	-0.04	0.03	-0.19	0.79	0.91	1.08	0.65
	ccc	target	-0.13	-0.04	-0.01	-0.19	0.75	0.91	0.99	0.64
		measured	-0.11	-0.04	-0.01	-0.18	0.78	0.92	0.98	0.67
SB7b-16	quenched	target	-0.15	-0.10	-0.09	-0.24	0.72	0.80	0.82	0.58
		measured	-0.12	-0.09	-0.08	-0.24	0.75	0.82	0.83	0.58
	ccc	target	-0.12	-0.04	-0.08	-0.22	0.75	0.92	0.83	0.61
		measured	-0.10	-0.03	-0.07	-0.22	0.79	0.93	0.84	0.61
SB7b-17	quenched	target	-0.13	-0.06	-0.03	-0.22	0.75	0.86	0.93	0.60
		measured	-0.10	-0.06	-0.02	-0.22	0.79	0.87	0.94	0.60
	ccc	target	-0.09	0.02	-0.03	-0.18	0.81	1.05	0.93	0.66
		measured	-0.07	0.03	-0.03	-0.19	0.85	1.06	0.94	0.65
SB7b-18	quenched	target	-0.05	-0.03	0.05	-0.20	0.88	0.94	1.12	0.62
		measured	-0.04	-0.03	0.05	-0.20	0.92	0.94	1.11	0.63
	ccc	target	-0.05	-0.02	0.02	-0.20	0.88	0.96	1.06	0.63
		measured	-0.04	-0.01	0.02	-0.20	0.92	0.97	1.05	0.63
SB7b-19	quenched	target	-0.13	-0.06	0.03	-0.22	0.74	0.86	1.08	0.60
		measured	-0.12	-0.06	0.02	-0.21	0.77	0.86	1.05	0.61
	ccc	target	-0.14	-0.05	-0.01	-0.22	0.73	0.88	0.98	0.61
		measured	-0.12	-0.06	-0.02	-0.21	0.75	0.88	0.96	0.62
SB7b-20	quenched	target	-0.20	-0.09	-0.12	-0.27	0.64	0.82	0.76	0.54
		measured	-0.17	-0.08	-0.11	-0.27	0.67	0.84	0.77	0.54
	ccc	target	-0.20	-0.08	-0.14	-0.26	0.63	0.83	0.73	0.55
		measured	-0.17	-0.07	-0.13	-0.27	0.67	0.85	0.75	0.54

Table 3-5 cont. Normalized PCT Results

Glass ID	Heat Treatment	Comp View	log NL [B (g/L)]	log NL [Li (g/L)]	log NL [Na (g/L)]	log NL [Si (g/L)]	NL B (g/L)	NL Li (g/L)	NL Na (g/L)	NL Si (g/L)
SB7b-21	quenched	target	-0.10	-0.02	-0.02	-0.22	0.80	0.95	0.96	0.60
		measured	-0.08	-0.02	-0.02	-0.20	0.83	0.95	0.95	0.63
	ccc	target	-0.08	0.04	-0.03	-0.19	0.83	1.10	0.94	0.65
		measured	-0.06	0.04	-0.03	-0.16	0.86	1.10	0.93	0.69
SB7b-22	quenched	target	-0.09	0.00	0.00	-0.19	0.81	1.00	0.99	0.65
		measured	-0.08	0.00	-0.01	-0.18	0.83	1.00	0.98	0.67
	ccc	target	-0.08	0.06	-0.02	-0.17	0.82	1.14	0.95	0.68
		measured	-0.07	0.05	-0.03	-0.16	0.85	1.13	0.94	0.69
SB7b-23	quenched	target	-0.16	-0.07	-0.07	-0.25	0.70	0.84	0.84	0.57
		measured	-0.14	-0.07	-0.07	-0.25	0.73	0.85	0.85	0.56
	ccc	target	-0.13	0.01	-0.07	-0.19	0.75	1.02	0.86	0.64
		measured	-0.11	0.01	-0.06	-0.19	0.78	1.02	0.87	0.64
SB7b-24	quenched	target	-0.09	-0.03	0.05	-0.19	0.80	0.93	1.12	0.65
		measured	-0.07	-0.02	0.05	-0.18	0.86	0.96	1.13	0.67
	ccc	target	-0.04	0.12	0.06	-0.11	0.90	1.33	1.14	0.77
		measured	-0.02	0.13	0.06	-0.10	0.96	1.36	1.15	0.79
SB7b-25	quenched	target	0.06	0.36	0.20	0.04	1.16	2.31	1.58	1.09
		measured	0.14	0.37	0.19	0.05	1.37	2.32	1.57	1.12
	ccc	target	0.01	0.12	0.20	-0.07	1.03	1.31	1.60	0.85
		measured	0.09	0.12	0.20	-0.06	1.22	1.32	1.58	0.87
SB7b-26	quenched	target	-0.15	-0.10	-0.10	-0.28	0.71	0.80	0.79	0.53
		measured	-0.13	-0.09	-0.10	-0.27	0.75	0.81	0.80	0.54
	ccc	target	-0.14	-0.07	-0.10	-0.26	0.73	0.86	0.79	0.55
		measured	-0.12	-0.06	-0.10	-0.25	0.76	0.88	0.79	0.56
SB7b-27	quenched	target	0.04	0.07	0.16	-0.11	1.10	1.18	1.44	0.78
		measured	0.06	0.08	0.16	-0.09	1.15	1.19	1.44	0.81
	ccc	target	0.11	0.33	0.18	0.03	1.29	2.15	1.53	1.07
		measured	0.13	0.34	0.18	0.04	1.35	2.19	1.53	1.10

Table 3-5 cont. Normalized PCT Results

Glass ID	Heat Treatment	Comp View	log NL [B (g/L)]	log NL [Li (g/L)]	log NL [Na (g/L)]	log NL [Si (g/L)]	NL B (g/L)	NL Li (g/L)	NL Na (g/L)	NL Si (g/L)
SB7b-28	quenched	target	-0.11	-0.06	-0.07	-0.25	0.77	0.87	0.85	0.57
		measured	-0.09	-0.06	-0.06	-0.25	0.81	0.88	0.87	0.57
	ccc	target	-0.12	-0.03	-0.09	-0.23	0.75	0.94	0.82	0.58
		measured	-0.10	-0.02	-0.08	-0.23	0.79	0.95	0.84	0.59
SB7b-29	quenched	target	-0.14	-0.05	0.00	-0.22	0.73	0.90	1.00	0.60
		measured	-0.11	-0.04	0.00	-0.21	0.77	0.91	0.99	0.62
	ccc	target	-0.14	-0.03	-0.03	-0.21	0.73	0.94	0.94	0.61
		measured	-0.11	-0.02	-0.03	-0.20	0.77	0.95	0.93	0.63
SB7b-30	quenched	target	-0.11	-0.04	0.03	-0.20	0.78	0.90	1.07	0.63
		measured	-0.09	-0.04	0.03	-0.21	0.82	0.91	1.07	0.61
	ccc	target	-0.12	-0.04	-0.02	-0.23	0.76	0.90	0.96	0.59
		measured	-0.10	-0.04	-0.02	-0.24	0.79	0.91	0.96	0.58
SB7b-31	quenched	target	-0.07	-0.06	-0.19	-0.25	0.85	0.86	0.64	0.56
		measured	-0.13	-0.08	-0.10	-0.28	0.75	0.83	0.79	0.52
	ccc	target	-0.07	-0.06	-0.21	-0.25	0.85	0.88	0.62	0.56
		measured	-0.13	-0.07	-0.12	-0.28	0.75	0.84	0.77	0.53
SB7b-32	quenched	target	-0.12	0.03	0.21	-0.16	0.76	1.08	1.64	0.70
		measured	-0.02	0.06	0.13	-0.13	0.95	1.15	1.34	0.74
	ccc	target	-0.08	0.07	0.02	-0.17	0.84	1.16	1.05	0.67
		measured	0.02	0.09	-0.07	-0.15	1.04	1.24	0.86	0.72
SB7b-33	quenched	target	-0.09	-0.01	0.00	-0.21	0.81	0.97	1.00	0.62
		measured	-0.07	-0.01	-0.01	-0.19	0.85	0.98	0.98	0.64
	ccc	target	-0.07	0.08	0.08	-0.16	0.84	1.21	1.21	0.70
		measured	-0.05	0.09	0.08	-0.14	0.88	1.22	1.20	0.72
SB7b-34	quenched	target	-0.07	-0.02	0.00	-0.20	0.85	0.96	0.99	0.63
		measured	-0.05	-0.01	0.00	-0.20	0.89	0.97	0.99	0.63
	ccc	target	-0.03	0.23	0.12	-0.06	0.94	1.70	1.31	0.87
		measured	-0.01	0.24	0.12	-0.06	0.99	1.72	1.31	0.87

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Appendix A. Tables and Exhibits Supporting the Analysis of the Chemical Composition Measurements

RTable A-1. Measured Elemental Concentrations (ug/g) for the Study Glasses Prepared Using Aqua Regia (part 1)

Glass ID	Lab ID - ck	Block	Sub-Blk	Sequence	Lab ID	Al	B	Ba	Ca	Ce	Cr	Cu	Fe	K	La	Li	Mg
SB7Ref	SB7Ref	1	1	1	SB7REFAR11	47500	15900	168	3470	184	829	383	61500	2380	113	24100	1640
Ustd	Ustd	1	1	2	USTDAR11	20000	26900	13.9	8880	71.1	1570	47.7	91700	23300	13.8	13700	6930
SB7b-19	A27	1	1	3	A27AR2	49400	15500	521	2490	902	351	300	61100	627	171	25300	2020
SB7b-33	A10	1	1	4	A10AR1	44300	15900	347	3090	610	300	197	68500	447	111	30100	1330
SB7b-14	A09	1	1	5	A09AR2	34700	16700	103	4900	142	81.7	487	53700	< 203	56.6	31900	372
SB7b-26	A05	1	1	6	A05AR2	47200	15700	498	3860	834	288	240	70000	636	155	24000	1910
SB7b-25	A18	1	1	7	A18AR1	39000	13200	497	2320	883	379	282	65200	601	139	29200	1950
SB7b-26	A05	1	1	8	A05AR1	48000	15900	501	3900	849	288	249	71000	626	155	24200	1920
SB7b-13	A07	1	1	9	A07AR1	34600	14600	634	1490	1120	520	1080	57300	823	190	31400	2480
SB7Ref	SB7Ref	1	1	10	SB7REFAR12	47000	15900	168	3470	181	828	381	61500	2320	114	23900	1640
Ustd	Ustd	1	1	11	USTDAR12	20100	26800	13.9	8970	74.2	1570	48.1	92100	23100	14.8	13700	6920
SB7b-13	A07	1	1	12	A07AR2	32300	13800	589	1410	1060	484	1010	53600	746	178	29300	2330
SB7b-29	A21	1	1	13	A21AR2	37100	16400	301	2650	512	264	183	57600	413	99	25000	1150
SB7b-19	A27	1	1	14	A27AR1	47700	15000	505	2360	869	338	282	59600	607	165	24500	1960
SB7b-25	A18	1	1	15	A18AR2	38700	13200	491	2300	868	374	280	65200	620	136	28900	1950
SB7b-29	A21	1	1	16	A21AR1	37700	16500	304	2670	512	267	187	58400	385	100	25400	1160
SB7b-14	A09	1	1	17	A09AR1	33500	16200	99.7	4780	148	78.5	503	52000	< 200	55.1	31100	364
SB7b-33	A10	1	1	18	A10AR2	42500	15200	332	2940	580	286	188	65700	453	106	29100	1280
blank	blank	1	1	19	BLANKAR1	< 266	< 162	< 0.48	43.5	< 67.9	< 8.16	< 5.04	83.2	< 205	< 4.32	< 117	4.4
SB7Ref	SB7Ref	1	1	20	SB7REFAR13	47100	15900	167	3450	180	822	382	61100	2340	112	24200	1630
Ustd	Ustd	1	1	21	USTDAR13	19200	25700	13.4	8570	< 67.1	1520	47.5	88100	22700	13.6	13300	6720
SB7Ref	SB7Ref	1	2	1	SB7REFAR11	48300	16100	177	3460	198	845	389	61600	2400	119	24100	1630
Ustd	Ustd	1	2	2	USTDAR11	20400	27200	15.5	8910	67.9	1600	47.2	92600	24000	16	13800	6900
SB7b-25	A18	1	2	3	A18AR2	39600	13300	521	2320	923	387	282	65600	666	143	29100	1940
SB7b-14	A09	1	2	4	A09AR2	35500	16800	109	4940	162	85	491	53900	< 203	62.2	31900	372
SB7b-33	A10	1	2	5	A10AR2	43600	15300	352	2950	619	295	191	66400	515	111	29200	1270
SB7b-14	A09	1	2	6	A09AR1	34400	16300	106	4790	155	82.2	512	52300	207	59.7	31100	364
SB7b-33	A10	1	2	7	A10AR1	45200	15900	368	3110	642	307	201	68600	506	117	30200	1320
SB7b-29	A21	1	2	8	A21AR2	37900	16400	319	2660	548	272	185	57700	395	104	25100	1140
SB7b-26	A05	1	2	9	A05AR1	48900	16000	528	3910	896	293	250	71300	670	163	24200	1920
SB7Ref	SB7Ref	1	2	10	SB7REFAR12	48200	16000	178	3490	198	849	394	61700	2420	119	24100	1640
Ustd	Ustd	1	2	11	USTDAR12	20500	27000	15.7	8940	74.6	1600	49.5	92200	23200	17.4	13800	6890
SB7b-13	A07	1	2	12	A07AR1	35300	14700	667	1490	1190	528	1100	57400	862	198	31700	2470
SB7b-19	A27	1	2	13	A27AR2	50400	15500	551	2520	941	361	307	61500	628	178	25400	2030
SB7b-19	A27	1	2	14	A27AR1	48900	15100	532	2460	913	347	299	59800	658	172	24700	1960
SB7b-29	A21	1	2	15	A21AR1	38700	16700	323	2680	538	274	192	58700	436	105	25600	1150
SB7b-26	A05	1	2	16	A05AR2	49000	16000	524	3880	881	296	244	71300	713	160	24300	1910
SB7b-13	A07	1	2	17	A07AR2	33100	13800	622	1460	1100	493	1030	53900	761	187	29600	2320
SB7b-25	A18	1	2	18	A18AR1	39900	13300	526	2330	926	388	285	65700	632	144	29200	1950
blank	blank	1	2	19	BLANKAR1	< 266	< 162	< 0.48	44	< 67.9	< 8.16	< 5.04	84.8	< 205	< 4.32	< 117	5.48
SB7Ref	SB7Ref	1	2	20	SB7REFAR13	48700	16000	177	3470	203	844	387	62100	2390	120	24400	1630
Ustd	Ustd	1	2	21	USTDAR13	19900	26100	15	8670	68.6	1550	47.4	89700	23000	16.2	13500	6680
SB7Ref	SB7Ref	2	1	1	SB7REFAR21	48000	16000	169	3490	189	833	373	61700	2330	117	24300	1640
Ustd	Ustd	2	1	2	USTDAR21	20900	27800	14.3	9260	72.9	1640	63.6	95000	24200	18.4	14300	7190
SB7b-05	A11	2	1	3	A11AR1	34700	16500	643	4790	1120	546	347	52800	785	188	22300	2460
SB7b-30	A13	2	1	4	A13AR2	41900	15300	340	2910	592	282	168	64600	442	121	23400	1270
SB7b-03	A17	2	1	5	A17AR1	46700	14300	639	4780	1090	1000	283	51900	741	186	31100	2460
SB7b-31	A02	2	1	6	A02AR1	40700	17200	333	2840	578	298	174	75600	414	123	23200	1200

RTable A-1. Measured Elemental Concentrations (ug/g) for the Study Glasses Prepared Using Aqua Regia (part 1)

Glass ID	Lab ID - ck	Block	Sub-Blk	Sequence	Lab ID	Al	B	Ba	Ca	Ce	Cr	Cu	Fe	K	La	Li	Mg
SB7b-20	A03	2	1	7	A03AR1	47900	14800	238	2300	391	123	165	60200	271	93.9	24200	876
SB7b-31	A02	2	1	8	A02AR2	40400	17200	329	2850	571	292	172	75700	370	122	23300	1190
SB7b-06	A19	2	1	9	A19AR2	52700	16600	617	1490	1130	455	331	78300	724	195	31600	2490
SB7Ref	SB7Ref	2	1	10	SB7REFAR22	48300	16200	171	3540	193	842	370	62600	2380	118	24600	1660
Ustd	Ustd	2	1	11	USTDAR22	20600	27600	14.1	9170	81.3	1630	62.9	94900	23500	17.3	14200	7130
SB7b-20	A03	2	1	12	A03AR2	47500	14700	237	2280	396	122	158	59900	275	93	23900	868
SB7b-17	A25	2	1	13	A25AR2	38300	15700	509	2320	882	444	363	59700	599	156	28700	1930
SB7b-30	A13	2	1	14	A13AR1	42300	15500	345	2980	595	287	171	65800	390	121	23800	1280
SB7b-05	A11	2	1	15	A11AR2	34000	16300	651	4820	1120	553	353	52600	783	190	22200	2490
SB7b-06	A19	2	1	16	A19AR1	52200	16400	631	1470	1130	449	332	78100	720	193	31200	2450
SB7b-03	A17	2	1	17	A17AR2	46500	14300	648	4770	1130	1010	291	52200	759	187	31200	2470
SB7b-17	A25	2	1	18	A25AR1	38000	15600	513	2310	876	443	371	59400	598	154	28700	1930
blank	blank	2	1	19	BLANKAR2	< 266	< 162	< 0.48	34.8	< 67.9	< 8.16	< 5.04	< 76.8	< 205	< 4.32	< 117	6.76
SB7Ref	SB7Ref	2	1	20	SB7REFAR23	47800	16000	175	3540	181	849	378	62200	2350	119	24500	1670
Ustd	Ustd	2	1	21	USTDAR23	20200	27100	14.1	9140	70.9	1620	63.1	93500	23300	18	13900	7100
SB7Ref	SB7Ref	2	2	1	SB7REFAR21	47800	16000	168	3470	194	828	375	61400	2370	115	24100	1630
Ustd	Ustd	2	2	2	USTDAR21	20500	27600	14.1	9270	80.3	1640	64.4	93700	24400	17.6	14000	7180
SB7b-30	A13	2	2	3	A13AR1	42500	15600	342	2950	594	286	171	65300	461	121	23600	1280
SB7b-17	A25	2	2	4	A25AR1	38400	15800	508	2320	879	443	370	59400	639	156	28600	1940
SB7b-06	A19	2	2	5	A19AR2	53300	16700	614	1490	1140	455	328	78800	793	195	31500	2490
SB7b-05	A11	2	2	6	A11AR2	34200	16400	645	4820	1120	550	354	52300	814	189	22000	2470
SB7b-05	A11	2	2	7	A11AR1	33900	16300	639	4770	1110	545	348	51900	815	188	21900	2460
SB7b-31	A02	2	2	8	A02AR2	40300	17200	328	2830	563	291	174	75400	450	122	23000	1180
SB7b-03	A17	2	2	9	A17AR2	46600	14400	638	4760	1110	999	290	52000	796	186	31000	2460
SB7Ref	SB7Ref	2	2	10	SB7REFAR22	48100	16300	171	3550	198	844	379	62300	2350	117	24500	1660
Ustd	Ustd	2	2	11	USTDAR22	20700	27700	14.1	9190	74.7	1620	64.5	94500	24000	17.6	14100	7120
SB7b-06	A19	2	2	12	A19AR1	52200	16400	626	1470	1120	446	331	77500	831	192	31100	2450
SB7b-20	A03	2	2	13	A03AR1	47600	14800	238	2310	402	126	167	59800	349	93.4	23900	880
SB7b-17	A25	2	2	14	A25AR2	38200	15800	506	2320	878	437	362	59400	668	155	28700	1930
SB7b-20	A03	2	2	15	A03AR2	47200	14800	236	2280	398	123	160	59500	371	92.2	23800	864
SB7b-31	A02	2	2	16	A02AR1	40400	17200	333	2890	576	298	179	75700	433	122	23200	1200
SB7b-30	A13	2	2	17	A13AR2	41300	15300	340	2910	593	283	170	64100	478	120	23100	1260
SB7b-03	A17	2	2	18	A17AR1	45900	14200	640	4770	1110	991	294	51400	788	186	30600	2450
blank	blank	2	2	19	BLANKAR2	< 266	< 162	< 0.48	36.1	< 67.9	< 8.16	< 5.04	< 76.8	< 205	< 4.32	< 117	6.72
SB7Ref	SB7Ref	2	2	20	SB7REFAR23	47800	16100	172	3540	190	842	377	61900	2390	118	24200	1670
Ustd	Ustd	2	2	21	USTDAR23	20200	27200	13.9	9100	77.1	1600	64.6	93100	23300	16.6	13800	7060
SB7Ref	SB7Ref	3	1	1	SB7REFAR31	49900	16800	178	3670	190	876	400	64700	2530	122	25100	1720
Ustd	Ustd	3	1	2	USTDAR31	20900	27900	14.2	9290	71.1	1640	48.5	95600	23900	19.7	14300	7180
SB7b-04	A32	3	1	3	A32AR1	53900	14800	99.5	1510	238	74.7	243	50800	< 199	80.9	22200	361
SB7b-15	A16	3	1	4	A16AR2	39000	15100	230	3990	364	209	367	60900	364	82.5	24400	894
SB7b-22	A14	3	1	5	A14AR2	39500	15300	238	4080	406	99.1	189	70700	327	88.2	29300	913
SB7b-27	A34	3	1	6	A34AR2	39000	16100	229	2390	378	225	181	76200	402	149	29000	900
SB7b-16	A15	3	1	7	A15AR1	48400	15200	511	2350	897	385	338	74300	707	170	29100	1950
SB7b-22	A14	3	1	8	A14AR1	39800	15500	241	4090	409	96.6	189	71500	409	88.6	29700	917
SB7b-04	A32	3	1	9	A32AR2	53800	14800	99.2	1510	242	76.1	252	51100	230	80.5	22100	361
SB7Ref	SB7Ref	3	1	10	SB7REFAR32	49500	16700	177	3650	185	870	403	65000	2560	120	25000	1710
Ustd	Ustd	3	1	11	USTDAR32	20700	27900	14	9260	83.2	1640	45.9	95800	24300	19.6	14200	7170
SB7b-32	A29	3	1	12	A29AR2	44500	14000	373	3180	621	280	193	57300	505	133	29700	1340

RTable A-1. Measured Elemental Concentrations (ug/g) for the Study Glasses Prepared Using Aqua Regia (part 1)

Glass ID	Lab ID - ck	Block	Sub-Blk	Sequence	Lab ID	Al	B	Ba	Ca	Ce	Cr	Cu	Fe	K	La	Li	Mg
SB7b-16	A15	3	1	13	A15AR2	47000	14700	492	2290	877	370	348	72000	663	166	28300	1900
SB7b-27	A34	3	1	14	A34AR1	38700	15900	226	2390	376	244	186	75400	346	146	28800	893
SB7b-10	A06	3	1	15	A06AR1	52500	16200	99.3	4800	239	87.6	142	52100	< 204	75.2	21900	362
SB7b-10	A06	3	1	16	A06AR2	53800	16500	102	4880	244	89.9	123	53000	< 201	73.8	22400	364
SB7b-15	A16	3	1	17	A16AR1	39000	15100	230	4000	368	208	385	61100	381	83.4	24600	896
SB7b-32	A29	3	1	18	A29AR1	44300	13800	370	3150	615	277	196	56900	524	130	29700	1330
blank	blank	3	1	19	BLANKAR3	< 266	< 162	< 0.48	27.6	< 67.9	< 8.16	< 5.04	< 76.8	< 205	< 4.32	< 117	3.36
SB7Ref	SB7Ref	3	1	20	SB7REFAR33	48100	16300	173	3560	174	855	393	63000	2460	119	24500	1680
Ustd	Ustd	3	1	21	USTDAR33	20300	27300	13.8	9160	66.1	1620	48.3	93800	24200	20.7	13900	7080
SB7Ref	SB7Ref	3	2	1	SB7REFAR31	49400	16700	176	3640	189	868	407	64200	2490	119	25100	1720
Ustd	Ustd	3	2	2	USTDAR31	20700	27900	14.1	9260	80.9	1630	48.1	95600	24100	16.2	14300	7200
SB7b-10	A06	3	2	3	A06AR1	52700	16300	98.5	4800	233	85.6	143	52100	< 204	70.2	21900	363
SB7b-15	A16	3	2	4	A16AR1	38900	15200	229	4020	359	208	387	61100	277	79.2	24400	900
SB7b-27	A34	3	2	5	A34AR2	39200	16100	228	2380	370	222	180	76300	331	143	28900	904
SB7b-22	A14	3	2	6	A14AR1	39700	15500	239	4120	403	95.2	189	71400	290	86	29600	924
SB7b-04	A32	3	2	7	A32AR2	53700	14900	99.4	1510	255	74.1	251	51000	< 200	75.5	22100	365
SB7b-27	A34	3	2	8	A34AR1	38400	15900	225	2410	373	241	186	75300	269	142	28600	894
SB7b-16	A15	3	2	9	A15AR2	46900	14700	490	2290	858	366	348	71800	575	162	28200	1920
SB7Ref	SB7Ref	3	2	10	SB7REFAR32	48900	16700	176	3630	185	861	408	64400	2390	118	25000	1720
Ustd	Ustd	3	2	11	USTDAR32	20600	27800	14	9290	73.4	1630	47.8	95300	24000	17.6	14100	7200
SB7b-04	A32	3	2	12	A32AR1	53100	14700	98.5	1500	239	73.6	247	50500	< 199	76	22100	362
SB7b-32	A29	3	2	13	A29AR2	44100	14000	370	3190	617	277	197	56900	440	128	29900	1350
SB7b-10	A06	3	2	14	A06AR2	53100	16400	101	4890	253	88.7	122	52800	< 201	70.7	22200	367
SB7b-32	A29	3	2	15	A29AR1	44100	13900	367	3150	600	275	194	56800	503	127	29700	1340
SB7b-15	A16	3	2	16	A16AR2	38700	15100	228	3980	355	204	371	60900	319	79.3	24400	896
SB7b-22	A14	3	2	17	A14AR2	39100	15200	238	4070	391	98.2	190	70200	302	84.6	29200	918
SB7b-16	A15	3	2	18	A15AR1	48000	15100	506	2340	889	375	333	74100	612	168	29100	1960
blank	blank	3	2	19	BLANKAR3	< 266	< 162	< 0.48	25.8	< 67.9	< 8.16	< 5.04	< 76.8	< 205	< 4.32	< 117	3.28
SB7Ref	SB7Ref	3	2	20	SB7REFAR33	47600	16200	174	3570	185	845	399	63000	2400	117	24400	1690
Ustd	Ustd	3	2	21	USTDAR33	20100	27100	14	9130	76.9	1610	49.5	93500	23000	17	13800	7100
SB7Ref	SB7Ref	4	1	1	SB7REFAR41	48300	16300	163	3480	192	830	387	62700	2410	112	24700	1650
Ustd	Ustd	4	1	2	USTDAR41	20400	27300	12.4	8930	< 67.1	1560	45	93200	23700	23.3	14000	6980
SB7b-18	A24	4	1	3	A24AR1	38700	15100	482	4010	870	456	284	74800	662	165	24600	1950
SB7b-21	A08	4	1	4	A08AR1	38900	16000	487	3990	860	340	289	59600	682	163	29500	1960
SB7b-12	A23	4	1	5	A23AR2	34200	14500	97.7	4800	150	84.8	251	79900	< 203	50.5	22300	362
SB7b-34	A30	4	1	6	A30AR1	47700	14500	397	3380	650	337	201	74000	507	148	27800	1450
SB7b-12	A23	4	1	7	A23AR1	34200	14500	97.7	4830	157	103	238	80400	< 202	49.8	22400	362
SB7b-01	A04	4	1	8	A04AR2	32900	16100	89.3	1480	137	86.1	54.9	80600	< 198	55	21800	391
SB7b-21	A08	4	1	9	A08AR2	39200	16100	495	4030	865	345	303	60400	689	166	29700	1980
SB7Ref	SB7Ref	4	1	10	SB7REFAR42	47000	16100	163	3500	181	833	384	61900	2430	112	24500	1650
Ustd	Ustd	4	1	11	USTDAR42	19700	26600	12.2	8900	75.5	1550	44.1	91000	23300	22.3	13700	6930
SB7b-09	A33	4	1	12	A33AR2	52500	16600	76.7	4860	236	86.9	182	78000	< 197	76.8	32000	324
SB7b-18	A24	4	1	13	A24AR2	38700	15200	487	4040	874	462	270	75400	657	166	25000	1980
SB7b-09	A33	4	1	14	A33AR1	52400	16600	76.1	4820	236	90.5	170	78000	< 196	76.6	32000	324
SB7b-01	A04	4	1	15	A04AR1	33800	16600	91.6	1520	138	86.7	54.7	82600	< 204	57.5	22500	401
SB7b-08	A22	4	1	16	A22AR1	33400	14400	87.6	4780	182	89.5	63.7	80600	< 196	68.1	31700	369
SB7b-34	A30	4	1	17	A30AR2	46900	14500	398	3400	650	319	203	73500	547	149	27800	1440
SB7b-08	A22	4	1	18	A22AR2	32800	14300	86.6	4730	177	91.1	63.4	79700	< 199	66.5	31400	366

RTable A-1. Measured Elemental Concentrations (ug/g) for the Study Glasses Prepared Using Aqua Regia (part 1)

Glass ID	Lab ID - ck	Block	Sub-Blk	Sequence	Lab ID	Al	B	Ba	Ca	Ce	Cr	Cu	Fe	K	La	Li	Mg
blank	blank	4	1	19	BLANKAR4	< 266	< 162	< 0.48	35.6	< 67.9	< 8.16	< 5.04	< 76.8	< 205	< 4.32	< 117	4.44
SB7Ref	SB7Ref	4	1	20	SB7REFAR43	44600	15200	156	3360	172	802	372	59200	2350	110	23500	1600
Ustd	Ustd	4	1	21	USTDAR43	19800	27000	12.3	8980	80.4	1570	45.6	92300	24100	23.7	14000	7010
SB7Ref	SB7Ref	4	2	1	SB7REFAR41	48400	16400	173	3530	184	855	391	62600	2440	119	24600	1660
Ustd	Ustd	4	2	2	USTDAR41	20400	27400	13.7	9040	83.1	1600	47.8	93300	23600	22	13800	7000
SB7b-01	A04	4	2	3	A04AR2	33800	16300	95.1	1490	201	88.9	56	81500	< 198	56.7	21600	395
SB7b-21	A08	4	2	4	A08AR2	39900	16400	523	4060	898	354	307	61000	653	169	29600	2000
SB7b-09	A33	4	2	5	A33AR2	53700	16700	81.4	4890	244	90.6	185	78800	< 197	77.9	31700	327
SB7b-18	A24	4	2	6	A24AR1	39300	15200	509	4030	883	467	284	75700	615	170	24600	1960
SB7b-01	A04	4	2	7	A04AR1	34700	16800	98.4	1530	211	90.2	57.3	83700	< 204	58.4	22400	404
SB7b-09	A33	4	2	8	A33AR1	53800	16800	81.6	4860	239	92.9	176	79200	< 196	77.4	31800	325
SB7b-34	A30	4	2	9	A30AR1	48200	14600	419	3390	666	345	207	74500	487	150	27700	1450
SB7Ref	SB7Ref	4	2	10	SB7REFAR42	48200	16200	172	3530	183	854	390	62600	2410	119	24500	1670
Ustd	Ustd	4	2	11	USTDAR42	20100	26900	13.5	8960	82.1	1600	47.3	91900	23200	22.6	13700	6950
SB7b-12	A23	4	2	12	A23AR1	34800	14700	105	4870	148	105	247	81100	< 202	51.1	22300	364
SB7b-12	A23	4	2	13	A23AR2	34500	14500	105	4880	153	85.7	262	80200	< 203	51.2	22200	366
SB7b-34	A30	4	2	14	A30AR2	48200	14700	425	3410	667	328	207	74600	524	151	28000	1450
SB7b-21	A08	4	2	15	A08AR1	39100	16000	520	4060	889	350	301	59900	648	166	29100	1970
SB7b-08	A22	4	2	16	A22AR1	34300	14600	94.2	4840	187	92.3	68.7	81500	< 196	67.5	31400	375
SB7b-18	A24	4	2	17	A24AR2	39500	15300	513	4080	889	474	276	76200	670	169	24800	1980
SB7b-08	A22	4	2	18	A22AR2	33900	14400	92.3	4800	178	93.7	66.4	80700	< 199	67.9	31100	371
blank	blank	4	2	19	BLANKAR4	< 266	< 162	< 0.48	35.5	< 67.9	< 8.16	< 5.04	< 76.8	< 205	< 4.32	< 117	4.88
SB7Ref	SB7Ref	4	2	20	SB7REFAR43	46100	15400	165	3400	186	819	376	60000	2360	113	23400	1600
Ustd	Ustd	4	2	21	USTDAR43	20200	27100	13.5	9100	81	1610	46.6	93200	23500	22.5	13900	7030
SB7Ref	SB7Ref	5	1	1	SB7REFAR51	47800	16100	168	3460	179	836	381	61900	2410	115	24300	1640
Ustd	Ustd	5	1	2	USTDSR51	20500	27400	13.5	9050	73.4	1600	46.6	93800	23600	20.3	13900	7040
SB7b-23	A31	5	1	3	A31AR2	48700	15100	225	4050	392	156	220	58700	314	89.2	29300	907
SB7b-23	A31	5	1	4	A31AR1	47800	14800	220	3920	377	149	218	57700	277	87.3	28800	882
SB7b-11	A20	5	1	5	A20AR1	53500	14700	629	4850	1090	551	306	81100	767	190	22300	2470
SB7b-02	A01	5	1	6	A01AR2	33200	16400	587	1460	1080	511	217	79000	818	180	21700	2400
SB7b-28	A28	5	1	7	A28AR2	37700	15500	217	2290	377	197	185	71900	318	89.1	23800	864
SB7b-07	A12	5	1	8	A12AR1	52700	14500	82.1	1510	213	100	62.5	53100	< 200	54.2	31600	367
SB7b-11	A20	5	1	9	A20AR2	51400	14100	600	4660	1040	526	292	77900	730	182	21500	2380
SB7Ref	SB7Ref	5	1	10	SB7REFAR52	47800	16100	167	3490	186	838	382	62000	2360	114	24500	1650
Ustd	Ustd	5	1	11	USTDSR52	20800	27800	13.5	9250	75.4	1630	47	95400	23700	20.3	14200	7170
SB7b-24	A26	5	1	12	A26AR2	48100	16000	243	4050	389	205	180	59400	305	78.9	29200	902
SB7b-07	A12	5	1	13	A12AR2	51000	14100	79.8	1490	194	97.5	59.6	51600	< 202	53.1	30600	360
SB7b-24	A26	5	1	14	A26AR1	47700	15900	239	4000	388	204	178	58900	280	77.3	29200	891
SB7b-28	A28	5	1	15	A28AR1	39000	16100	224	2420	384	204	176	74300	296	92.2	24700	902
SB7b-02	A01	5	1	16	A01AR1	33900	16700	598	1490	1110	538	233	81300	849	184	22300	2480
blank	blank	5	1	17	BLANKAR5	< 266	< 162	< 0.48	30.9	< 67.9	< 8.16	< 5.04	117	< 205	< 4.32	< 117	4.32
SB7Ref	SB7Ref	5	1	18	SB7REFAR53	46900	15700	164	3450	175	829	376	61100	2350	113	24200	1620
Ustd	Ustd	5	1	19	USTDAR53	20500	27500	13.5	9260	75.4	1620	47.1	94700	24000	20.6	14100	7170
SB7Ref	SB7Ref	5	2	1	SB7REFAR51	48200	16200	168	3500	192	834	379	62000	2370	115	24400	1640
Ustd	Ustd	5	2	2	USTDSR51	20700	27600	13.1	9030	87.6	1590	46	93900	23400	21.2	14000	7000
SB7b-02	A01	5	2	3	A01AR1	34600	17100	609	1490	1150	538	233	82000	861	187	22400	2470
SB7b-07	A12	5	2	4	A12AR1	53400	14700	82.9	1520	210	99	61.4	53300	< 200	55	31600	369
SB7b-23	A31	5	2	5	A31AR2	49300	15200	227	4050	391	155	219	58900	330	93.4	29400	910

RTable A-1. Measured Elemental Concentrations (ug/g) for the Study Glasses Prepared Using Aqua Regia (part 1)

Glass ID	Lab ID - ck	Block	Sub-Blk	Sequence	Lab ID	Al	B	Ba	Ca	Ce	Cr	Cu	Fe	K	La	Li	Mg
SB7b-24	A26	5	2	6	A26AR2	48900	16100	246	4040	400	203	179	59600	303	80.5	29300	900
SB7b-24	A26	5	2	7	A26AR1	48300	16000	244	4000	394	202	179	59300	290	78.1	29100	888
SB7b-23	A31	5	2	8	A31AR1	47900	14900	222	3950	383	149	220	57900	328	89.8	29000	884
SB7b-28	A28	5	2	9	A28AR1	39300	16200	227	2380	397	203	176	74500	308	93.5	24600	898
SB7Ref	SB7Ref	5	2	10	SB7REFAR52	48000	16200	169	3500	192	839	383	62200	2420	116	24400	1650
Ustd	Ustd	5	2	11	USTDSR52	20800	28000	13.4	9230	77.2	1630	46.2	95600	23900	20.4	14200	7140
SB7b-11	A20	5	2	12	A20AR2	51800	14300	612	4680	1060	529	299	78400	805	184	21600	2380
SB7b-28	A28	5	2	13	A28AR2	38000	15700	220	2290	393	196	186	71600	290	89.3	23900	869
SB7b-11	A20	5	2	14	A20AR1	53600	14900	635	4850	1110	548	303	81200	821	191	22400	2460
SB7b-07	A12	5	2	15	A12AR2	51400	14200	81.1	1490	212	96.4	61.2	51600	< 202	53.3	30700	359
SB7b-02	A01	5	2	16	A01AR2	33200	16500	595	1460	1100	511	218	79200	871	180	21800	2410
blank	blank	5	2	17	BLANKAR5	< 266	< 162	< 0.48	32.2	< 67.9	< 8.16	< 5.04	131	< 205	< 4.32	< 117	4.24
SB7Ref	SB7Ref	5	2	18	SB7REFAR53	47000	15800	168	3460	183	834	383	61100	2330	115	24000	1630
Ustd	Ustd	5	2	19	USTDAR53	20600	27800	13.5	9270	78.2	1640	45.9	95100	23700	21.9	14300	7180

Table A-2. Measured Elemental Concentrations (ug/g) for the Study Glasses Prepared Using Aqua Regia (part 2)

Glass ID	Block	Sub-Blk	Sequence	Lab ID	Mn	Na	Ni	Pb	S	Th	Ti	U	Zn	Zr
SB7Ref	1	1	1	SB7REFAR11	16300	109000	9610	< 55.6	2020	69.8	2630	< 2530	178	626
Ustd	1	1	2	USTDAR11	21000	84700	8380	< 56.6	< 593	395	5070	18200	81.1	11.6
SB7b-19	1	1	3	A27AR2	14000	114000	11100	152	1990	6900	1090	20600	193	387
SB7b-33	1	1	4	A10AR1	15400	95100	12700	84.1	2210	5380	1350	22600	169	413
SB7b-14	1	1	5	A09AR2	18800	92900	9510	< 56.5	2290	7330	3590	18200	171	241
SB7b-26	1	1	6	A05AR2	13100	89900	13500	169	1760	4280	992	23900	193	545
SB7b-25	1	1	7	A18AR1	16900	111000	13900	152	2270	4460	1040	25200	213	519
SB7b-26	1	1	8	A05AR1	13200	90500	13700	169	1390	4300	990	24300	194	454
SB7b-13	1	1	9	A07AR1	11800	82900	15900	152	2220	7850	3860	27300	388	687
SB7Ref	1	1	10	SB7REFAR12	16200	109000	9610	< 55.6	2000	72.7	2640	< 2530	178	604
Ustd	1	1	11	USTDAR12	21100	84900	8450	< 56.6	< 593	394	5000	18400	81	12.5
SB7b-13	1	1	12	A07AR2	11100	77500	14900	150	1710	7320	3630	25500	361	650
SB7b-29	1	1	13	A21AR2	13000	101000	11000	86.5	1890	4440	1120	19200	147	314
SB7b-19	1	1	14	A27AR1	13500	111000	10800	135	2110	6670	1050	20100	185	616
SB7b-25	1	1	15	A18AR2	16800	110000	13900	148	1990	4430	1040	24800	209	515
SB7b-29	1	1	16	A21AR1	13200	104000	11100	86.2	1960	4500	1140	19600	149	309
SB7b-14	1	1	17	A09AR1	18200	90500	9090	< 55.9	2110	7400	3790	17400	172	293
SB7b-33	1	1	18	A10AR2	14800	91500	12200	77.3	2000	5140	1310	22100	162	437
blank	1	1	19	BLANKAR1	< 42.4	< 5900	< 364	< 57.3	< 600	< 32.3	< 3.6	< 2610	< 5.28	< 4.4
SB7Ref	1	1	20	SB7REFAR13	16100	109000	9620	< 55.6	1740	64.7	2610	< 2530	176	619
Ustd	1	1	21	USTDAR13	20200	81700	8050	< 56.6	< 593	380	4850	17900	79.2	11.8
SB7Ref	1	2	1	SB7REFAR11	16400	111000	9620	< 55.6	1610	66.3	2690	< 2530	180	628
Ustd	1	2	2	USTDAR11	21300	85600	8400	< 56.6	< 593	399	5210	18400	82.1	12.7
SB7b-25	1	2	3	A18AR2	17000	111000	14000	167	1710	4470	1080	24900	214	529
SB7b-14	1	2	4	A09AR2	19100	93600	9490	< 56.5	1890	7370	3690	18100	173	246
SB7b-33	1	2	5	A10AR2	15100	92700	12200	85.5	1670	5200	1350	22200	165	451
SB7b-14	1	2	6	A09AR1	18500	91400	9200	< 55.9	1560	7460	3910	17300	176	299
SB7b-33	1	2	7	A10AR1	15600	95600	12700	101	1630	5410	1400	22700	171	424
SB7b-29	1	2	8	A21AR2	13200	103000	10900	83.7	1560	4470	1170	19300	151	321
SB7b-26	1	2	9	A05AR1	13400	91300	13600	183	1550	4340	1020	24200	198	460
SB7Ref	1	2	10	SB7REFAR12	16300	110000	9520	< 55.6	1660	67	2720	< 2530	181	611
Ustd	1	2	11	USTDAR12	21300	85200	8420	< 56.6	< 593	395	5170	18400	83.1	13.7
SB7b-13	1	2	12	A07AR1	11900	83600	15900	173	1520	7880	3980	28000	395	702
SB7b-19	1	2	13	A27AR2	14100	114000	11200	137	1830	6950	1130	20700	195	397
SB7b-19	1	2	14	A27AR1	13700	111000	10800	125	1650	6730	1100	20100	190	633
SB7b-29	1	2	15	A21AR1	13400	104000	11100	72.8	1870	4530	1180	19900	152	316
SB7b-26	1	2	16	A05AR2	13400	91300	13600	184	1420	4320	1030	24200	196	560
SB7b-13	1	2	17	A07AR2	11200	77900	14800	166	1250	7400	3760	26100	369	665
SB7b-25	1	2	18	A18AR1	17000	112000	14000	145	2020	4510	1080	25100	216	534
blank	1	2	19	BLANKAR1	< 42.4	< 5900	< 364	< 57.3	< 600	< 32.3	4.88	< 2610	< 5.28	< 4.4
SB7Ref	1	2	20	SB7REFAR13	16500	111000	9660	< 55.6	1650	67	2710	< 2530	179	627
Ustd	1	2	21	USTDAR13	20700	83000	8200	< 56.6	< 593	384	5000	17500	81	12.3
SB7Ref	2	1	1	SB7REFAR21	16300	110000	9700	< 56.2	1680	63.3	2540	< 2560	176	229
Ustd	2	1	2	USTDAR21	21900	87600	8710	< 55.6	< 583	404	5260	19000	84.4	9.62
SB7b-05	2	1	3	A11AR1	11700	113000	9300	225	2220	3290	40.7	27400	197	584
SB7b-30	2	1	4	A13AR2	14600	107000	12100	103	2050	5140	1320	22200	151	420
SB7b-03	2	1	5	A17AR1	18200	118000	15100	131	2170	7800	45.4	17800	320	401

Table A-2. Measured Elemental Concentrations (ug/g) for the Study Glasses Prepared Using Aqua Regia (part 2)

Glass ID	Block	Sub-Blk	Sequence	Lab ID	Mn	Na	Ni	Pb	S	Th	Ti	U	Zn	Zr
SB7b-31	2	1	6	A02AR1	14100	91500	14100	83.9	1830	6000	1230	26000	187	384
SB7b-20	2	1	7	A03AR1	16500	89700	13600	< 56.1	2100	4230	1000	19700	163	279
SB7b-31	2	1	8	A02AR2	14000	91500	14000	91.9	1700	5900	1200	25500	185	407
SB7b-06	2	1	9	A19AR2	18400	81900	14400	179	2380	3280	38.5	17300	246	449
SB7Ref	2	1	10	SB7REFAR22	16600	111000	9880	< 56.2	2010	65.4	2570	< 2560	179	242
Ustd	2	1	11	USTDAR22	21700	86300	8600	< 55.6	< 583	399	5150	19000	84.6	10.6
SB7b-20	2	1	12	A03AR2	16500	88500	13500	< 55.5	1940	4210	996	19500	165	303
SB7b-17	2	1	13	A25AR2	13400	93500	14100	94.7	1700	4150	2830	19500	227	241
SB7b-30	2	1	14	A13AR1	14800	108000	12200	90.4	2150	5120	1280	22300	152	265
SB7b-05	2	1	15	A11AR2	11700	112000	9350	230	1770	3300	40.8	27000	192	494
SB7b-06	2	1	16	A19AR1	18300	80300	14400	174	2550	3230	38.6	17200	243	483
SB7b-03	2	1	17	A17AR2	18300	118000	15100	142	1720	7860	48.3	17700	318	538
SB7b-17	2	1	18	A25AR1	13200	93600	14000	118	1610	4120	2830	19300	227	460
blank	2	1	19	BLANKAR2	< 42.4	< 5900	< 364	< 57.3	< 600	< 32.3	< 3.6	< 2610	< 5.28	< 4.4
SB7Ref	2	1	20	SB7REFAR23	16400	110000	9680	< 56.2	1710	66.1	2630	< 2560	179	217
Ustd	2	1	21	USTDAR23	21400	85200	8630	< 55.6	< 583	406	5210	18500	83.8	10.2
SB7Ref	2	2	1	SB7REFAR21	16200	109000	9610	< 56.2	1810	66.1	2530	< 2560	175	226
Ustd	2	2	2	USTDAR21	21500	86400	8530	< 55.6	< 583	407	5250	18000	85.2	8.75
SB7b-30	2	2	3	A13AR1	14700	108000	12100	107	2360	5090	1280	21300	151	266
SB7b-17	2	2	4	A25AR1	13300	94200	13900	120	1800	4110	2820	19700	228	455
SB7b-06	2	2	5	A19AR2	18400	82100	14300	187	2730	3260	40.1	17400	246	452
SB7b-05	2	2	6	A11AR2	11700	113000	9200	209	2120	3290	41.9	26500	193	497
SB7b-05	2	2	7	A11AR1	11600	112000	9190	220	2230	3270	41.5	26100	197	585
SB7b-31	2	2	8	A02AR2	14000	91100	14000	96.4	1970	5850	1200	25000	184	409
SB7b-03	2	2	9	A17AR2	18200	118000	15000	140	2010	7800	48.6	17600	317	524
SB7Ref	2	2	10	SB7REFAR22	16400	110000	9750	74.8	2170	67.2	2580	< 2560	180	240
Ustd	2	2	11	USTDAR22	21700	87100	8590	< 55.6	< 583	402	5190	18700	84.4	9.93
SB7b-06	2	2	12	A19AR1	18100	80600	14200	183	2700	3210	40.5	16700	239	481
SB7b-20	2	2	13	A03AR1	16400	90200	13500	65.4	1990	4230	1010	19300	162	280
SB7b-17	2	2	14	A25AR2	13200	94000	13900	125	1990	4110	2830	19200	225	242
SB7b-20	2	2	15	A03AR2	16400	89400	13400	< 55.5	2290	4180	1000	19500	163	306
SB7b-31	2	2	16	A02AR1	14000	91600	14000	97.6	1910	5990	1230	24800	186	384
SB7b-30	2	2	17	A13AR2	14400	105000	11900	97.7	2360	5140	1330	21000	150	422
SB7b-03	2	2	18	A17AR1	18000	116000	15000	154	1990	7790	48.1	16600	319	403
blank	2	2	19	BLANKAR2	< 42.4	< 5900	< 364	< 57.3	< 600	< 32.3	< 3.6	< 2610	< 5.28	< 4.4
SB7Ref	2	2	20	SB7REFAR23	16300	110000	9670	< 56.2	2170	67.3	2610	< 2560	180	210
Ustd	2	2	21	USTDAR23	21300	85200	8490	< 55.6	< 583	399	5180	18300	84.1	9.72
SB7Ref	3	1	1	SB7REFAR31	17000	114000	10100	< 54.9	2770	71.9	2660	< 2500	189	684
Ustd	3	1	2	USTDAR31	21900	87200	8650	< 54.9	1210	400	5200	18800	80.9	11.1
SB7b-04	3	1	3	A32AR1	18800	86000	9210	116	3990	7860	47.4	28100	131	290
SB7b-15	3	1	4	A16AR2	13500	110000	11000	< 54.6	3060	4270	2850	24800	154	285
SB7b-22	3	1	5	A14AR2	13700	91600	10900	< 56.8	3210	4230	1020	20100	135	182
SB7b-27	3	1	6	A34AR2	13600	107000	14300	< 57.2	3410	6710	1060	19700	166	338
SB7b-16	3	1	7	A15AR1	13600	92000	11000	112	2710	4460	3070	25000	212	556
SB7b-22	3	1	8	A14AR1	13800	93400	11100	< 56.6	3420	4280	1050	20400	136	288
SB7b-04	3	1	9	A32AR2	18800	85600	9330	90.8	4210	7890	47.2	28100	124	295
SB7Ref	3	1	10	SB7REFAR32	17100	114000	10100	< 54.9	3210	69.1	2660	< 2500	185	660

Table A-2. Measured Elemental Concentrations (ug/g) for the Study Glasses Prepared Using Aqua Regia (part 2)

Glass ID	Block	Sub-Blk	Sequence	Lab ID	Mn	Na	Ni	Pb	S	Th	Ti	U	Zn	Zr
Ustd	3	1	11	USTDAR32	21900	87300	8650	< 54.9	987	398	5230	18500	80.5	10.3
SB7b-32	3	1	12	A29AR2	15700	107000	10600	86.4	3570	4570	1460	19000	157	394
SB7b-16	3	1	13	A15AR2	13200	88900	10800	117	3470	4320	2970	24000	212	369
SB7b-27	3	1	14	A34AR1	13400	106000	14100	< 55.5	3750	6650	1050	19600	168	364
SB7b-10	3	1	15	A06AR1	18500	115000	15200	< 56.9	3440	3280	3990	27400	145	140
SB7b-10	3	1	16	A06AR2	18800	117000	15600	< 56	3060	3330	4090	28100	140	156
SB7b-15	3	1	17	A16AR1	13500	110000	11000	< 54.8	3220	4300	2910	24900	159	256
SB7b-32	3	1	18	A29AR1	15700	107000	10600	83.8	3620	4530	1470	19100	154	455
blank	3	1	19	BLANKAR3	< 42.4	< 5900	< 364	< 57.3	1370	< 32.3	< 3.6	< 2610	< 5.28	< 4.4
SB7Ref	3	1	20	SB7REFAR33	16600	112000	9710	< 54.9	3170	69.1	2610	< 2500	183	645
Ustd	3	1	21	USTDAR33	21400	86000	8480	< 54.9	1310	395	5150	18500	80.9	7.8
SB7Ref	3	2	1	SB7REFAR31	16900	114000	9960	65.3	1850	68.1	2640	< 2500	188	638
Ustd	3	2	2	USTDAR31	21900	87400	8740	< 54.9	< 575	403	5170	18800	83.5	10.7
SB7b-10	3	2	3	A06AR1	18500	115000	15300	< 56.9	1490	3270	3960	27600	146	137
SB7b-15	3	2	4	A16AR1	13600	110000	11100	< 54.8	1730	4310	2890	24400	158	255
SB7b-27	3	2	5	A34AR2	13600	107000	14400	< 57.2	2140	6730	1060	20000	162	333
SB7b-22	3	2	6	A14AR1	13800	92600	11200	< 56.6	1570	4310	1040	20200	139	287
SB7b-04	3	2	7	A32AR2	18800	85900	9280	109	2640	7940	48.3	27800	126	292
SB7b-27	3	2	8	A34AR1	13400	105000	14100	< 55.5	2080	6650	1040	19600	167	358
SB7b-16	3	2	9	A15AR2	13200	89100	10700	118	1730	4330	2970	23700	211	364
SB7Ref	3	2	10	SB7REFAR32	16900	113000	10000	< 54.9	2030	69.1	2640	< 2500	185	619
Ustd	3	2	11	USTDAR32	21800	87000	8730	< 54.9	< 575	408	5190	18600	83	10.6
SB7b-04	3	2	12	A32AR1	18600	85400	9250	116	2400	7860	46.6	27800	130	285
SB7b-32	3	2	13	A29AR2	15600	107000	10600	88	2420	4590	1460	18500	156	388
SB7b-10	3	2	14	A06AR2	18700	116000	15500	< 56	2100	3330	4070	27700	141	153
SB7b-32	3	2	15	A29AR1	15600	106000	10600	74.7	2190	4540	1460	18600	155	453
SB7b-15	3	2	16	A16AR2	13500	110000	11000	< 54.6	1930	4270	2840	24800	156	284
SB7b-22	3	2	17	A14AR2	13600	91500	11000	58.1	1810	4270	1020	19700	138	179
SB7b-16	3	2	18	A15AR1	13500	91600	11000	106	1680	4470	3050	24800	212	550
blank	3	2	19	BLANKAR3	< 42.4	< 5900	< 364	< 57.3	< 600	< 32.3	< 3.6	< 2610	< 5.28	< 4.4
SB7Ref	3	2	20	SB7REFAR33	16600	110000	9830	< 54.9	2090	72.1	2600	< 2500	183	588
Ustd	3	2	21	USTDAR33	21300	84700	8630	< 54.9	< 575	406	5150	18300	81.4	10.3
SB7Ref	4	1	1	SB7REFAR41	16600	112000	9700	59.4	1530	64.9	2660	< 2510	179	717
Ustd	4	1	2	USTDAR41	21400	85800	8560	< 56.6	< 593	371	5000	18700	82.7	13
SB7b-18	4	1	3	A24AR1	16800	105000	14300	138	1330	6650	2970	19800	195	479
SB7b-21	4	1	4	A08AR1	16800	92100	10800	127	1680	6690	1020	24800	179	559
SB7b-12	4	1	5	A23AR2	18300	81500	15400	< 56.6	< 593	3070	3610	17500	156	141
SB7b-34	4	1	6	A30AR1	16700	98300	13700	86	2260	5970	1470	24700	183	349
SB7b-12	4	1	7	A23AR1	18400	82100	15500	< 56.4	1030	3080	3650	17200	156	122
SB7b-01	4	1	8	A04AR2	11400	117000	15300	72.5	2170	7620	43.3	17800	127	307
SB7b-21	4	1	9	A08AR2	17000	92900	10900	144	1800	6780	1040	25000	187	631
SB7Ref	4	1	10	SB7REFAR42	16300	110000	9570	< 55.1	1560	64.5	2640	< 2510	179	747
Ustd	4	1	11	USTDAR42	20900	83500	8240	< 56.6	< 593	369	4980	17700	80.8	12.8
SB7b-09	4	1	12	A33AR2	11800	83500	15100	< 54.9	1690	8000	46.6	27900	146	303
SB7b-18	4	1	13	A24AR2	16900	106000	14300	132	1040	6740	3020	20000	194	546
SB7b-09	4	1	14	A33AR1	11800	83000	15200	61.5	1720	7950	46.1	28200	143	327
SB7b-01	4	1	15	A04AR1	11700	121000	15600	73.6	2490	7840	43.9	18100	131	276

Table A-2. Measured Elemental Concentrations (ug/g) for the Study Glasses Prepared Using Aqua Regia (part 2)

Glass ID	Block	Sub-Blk	Sequence	Lab ID	Mn	Na	Ni	Pb	S	Th	Ti	U	Zn	Zr
SB7b-08	4	1	16	A22AR1	18300	113000	9050	< 54.7	2510	3320	48.1	27400	96.4	172
SB7b-34	4	1	17	A30AR2	16600	97400	13600	83.1	2110	5990	1480	24600	182	518
SB7b-08	4	1	18	A22AR2	18100	112000	9000	< 55.6	2310	3280	48	26500	95	180
blank	4	1	19	BLANKAR4	< 42.4	< 5900	< 364	< 57.3	< 600	< 32.3	< 3.6	< 2610	< 5.28	< 4.4
SB7Ref	4	1	20	SB7REFAR43	15500	105000	9110	55.4	1820	61.5	2530	< 2510	171	719
Ustd	4	1	21	USTDAR43	21100	84800	8340	< 56.6	< 593	372	5040	18700	81.7	11
SB7Ref	4	2	1	SB7REFAR41	16600	113000	9740	80.9	1300	60.1	2750	< 2510	183	722
Ustd	4	2	2	USTDAR41	21500	86600	8500	< 56.6	< 593	378	5160	19100	83.9	13.1
SB7b-01	4	2	3	A04AR2	11600	118000	15500	89.4	2550	7680	48.1	18000	131	310
SB7b-21	4	2	4	A08AR2	17200	93700	11100	152	2640	6820	1070	25300	192	641
SB7b-09	4	2	5	A33AR2	12000	83000	15400	70.1	1510	8020	50	28100	149	306
SB7b-18	4	2	6	A24AR1	17000	105000	14400	150	1260	6710	3080	20200	201	486
SB7b-01	4	2	7	A04AR1	11900	121000	15800	92.6	2730	7910	49.3	18400	136	281
SB7b-09	4	2	8	A33AR1	12100	82900	15400	66.3	1660	8010	51.8	28500	147	331
SB7b-34	4	2	9	A30AR1	16900	97700	13700	113	2430	6020	1520	25400	188	355
SB7Ref	4	2	10	SB7REFAR42	16600	110000	9820	83	1710	65.3	2730	< 2510	184	751
Ustd	4	2	11	USTDAR42	21100	83700	8380	< 56.6	< 593	374	5140	18600	83.4	13.6
SB7b-12	4	2	12	A23AR1	18600	81700	15800	< 56.4	925	3100	3780	17600	161	124
SB7b-12	4	2	13	A23AR2	18400	81400	15700	< 56.6	968	3110	3770	17800	161	144
SB7b-34	4	2	14	A30AR2	16900	98100	13800	97.7	2050	6050	1540	25200	187	530
SB7b-21	4	2	15	A08AR1	16900	91100	10900	152	2260	6770	1070	25300	185	571
SB7b-08	4	2	16	A22AR1	18600	114000	9200	< 54.7	2740	3360	54.3	27900	101	177
SB7b-18	4	2	17	A24AR2	17100	106000	14400	139	1480	6770	3120	20700	200	554
SB7b-08	4	2	18	A22AR2	18400	112000	9170	< 55.6	2950	3300	52.8	27600	99.1	184
blank	4	2	19	BLANKAR4	< 42.4	< 5900	< 364	< 57.3	< 600	< 32.3	< 3.6	< 2610	< 5.28	< 4.4
SB7Ref	4	2	20	SB7REFAR43	15800	106000	9390	56	1790	64.2	2610	< 2510	176	728
Ustd	4	2	21	USTDAR43	21400	83900	8530	< 56.6	< 593	381	5200	18800	83.5	11.3
SB7Ref	5	1	1	SB7REFAR51	16300	109000	9620	66.9	1900	68	2670	< 2520	287	684
Ustd	5	1	2	USTDSR51	21400	85400	8450	< 56.3	< 590	387	5140	18400	85.9	13.1
SB7b-23	5	1	3	A31AR2	13500	90500	13900	< 55.9	1600	6760	3100	25000	178	375
SB7b-23	5	1	4	A31AR1	13300	89100	13700	58	1490	6580	3030	25000	175	380
SB7b-11	5	1	5	A20AR1	11700	99900	8930	188	1820	7820	4000	17400	180	803
SB7b-02	5	1	6	A01AR2	17800	108000	8850	153	1150	7750	3890	26900	182	782
SB7b-28	5	1	7	A28AR2	16300	87400	10600	< 56.6	1460	6430	2860	23800	147	358
SB7b-07	5	1	8	A12AR1	11700	117000	9070	< 55.7	994	3130	3890	17400	88.6	162
SB7b-11	5	1	9	A20AR2	11300	96700	8570	178	1550	7500	3840	17000	176	737
SB7Ref	5	1	10	SB7REFAR52	16400	108000	9550	57.8	1670	65.4	2660	< 2520	288	700
Ustd	5	1	11	USTDSR52	21800	86300	8630	< 56.3	< 590	391	5230	18900	87	14.1
SB7b-24	5	1	12	A26AR2	16900	106000	10700	< 55.5	1570	4330	3020	19900	144	336
SB7b-07	5	1	13	A12AR2	11300	114000	8770	< 56.5	1090	3060	3830	16900	86.9	179
SB7b-24	5	1	14	A26AR1	16800	105000	10600	< 57.8	1620	4270	2970	19600	147	315
SB7b-28	5	1	15	A28AR1	16800	90200	10800	< 56.9	1520	6690	2950	24900	148	343
SB7b-02	5	1	16	A01AR1	18200	110000	9090	149	1320	7930	3980	27700	190	679
blank	5	1	17	BLANKAR5	< 42.4	< 5900	< 364	< 57.3	< 600	< 32.3	< 3.6	< 2610	6.96	< 4.4
SB7Ref	5	1	18	SB7REFAR53	16100	108000	9450	< 55.3	1730	65	2610	< 2520	285	661
Ustd	5	1	19	USTDAR53	21600	85800	8520	< 56.3	< 590	391	5190	18500	85.3	12.5
SB7Ref	5	2	1	SB7REFAR51	16400	113000	9680	59.9	1940	66.3	2680	< 2520	290	669

Table A-2. Measured Elemental Concentrations (ug/g) for the Study Glasses Prepared Using Aqua Regia (part 2)

Glass ID	Block	Sub-Blk	Sequence	Lab ID	Mn	Na	Ni	Pb	S	Th	Ti	U	Zn	Zr
Ustd	5	2	2	USTDSR51	21600	87600	8510	< 56.3	< 590	383	5130	19000	87.3	12.9
SB7b-02	5	2	3	A01AR1	18400	114000	9220	147	1140	7950	4010	27700	194	685
SB7b-07	5	2	4	A12AR1	11800	120000	9090	< 55.7	962	3150	3930	17500	90	165
SB7b-23	5	2	5	A31AR2	13600	92500	14000	< 55.9	1240	6770	3130	25500	182	379
SB7b-24	5	2	6	A26AR2	17000	108000	10800	< 55.5	1370	4330	3060	19600	147	340
SB7b-24	5	2	7	A26AR1	17000	107000	10800	< 57.8	1460	4280	3010	19700	149	319
SB7b-23	5	2	8	A31AR1	13300	90100	13600	< 55.9	1230	6600	3050	24500	179	383
SB7b-28	5	2	9	A28AR1	17000	91300	10900	< 56.9	1190	6670	2990	24900	150	348
SB7Ref	5	2	10	SB7REFAR52	16400	110000	9650	58.9	1590	68	2690	< 2520	292	684
Ustd	5	2	11	USTDSR52	21800	87600	8680	< 56.3	< 590	384	5260	18600	87.8	14.1
SB7b-11	5	2	12	A20AR2	11400	98000	8610	161	1230	7550	3900	16900	179	745
SB7b-28	5	2	13	A28AR2	16200	88700	10500	< 56.6	1090	6440	2880	24100	148	360
SB7b-11	5	2	14	A20AR1	11800	102000	8950	172	1470	7820	4050	17800	181	809
SB7b-07	5	2	15	A12AR2	11400	115000	8840	< 56.5	1020	3070	3890	17100	86.9	184
SB7b-02	5	2	16	A01AR2	17900	110000	8900	156	1270	7740	3940	26700	183	787
blank	5	2	17	BLANKAR5	< 42.4	< 5900	< 364	< 57.3	< 600	< 32.3	< 3.6	< 2610	7.04	4.64
SB7Ref	5	2	18	SB7REFAR53	16100	108000	9470	< 55.3	1570	65.1	2670	< 2520	290	635
Ustd	5	2	19	USTDAR53	21700	86500	8590	< 56.3	< 590	394	5310	18700	88	13.3

Table A-3. Measured Elemental Concentrations (ug/g) for the Study Glasses Prepared Using Peroxide Fusion (part 1)

Glass ID	Block	Sub-Blk	Sequence	Lab ID	Al	B	Ba	Ce	Cr	Cu	Fe	K	La	Li
SB7Ref	1	1	1	SB7REFPF11	47900	15100	186	< 478	854	388	60800	2810	127	23800
Ustd	1	1	2	USTDPF11	21000	26200	< 40.9	< 475	1670	< 49.6	92300	25400	< 42.5	13900
SB7b-05	1	1	3	A11PF1	34700	15500	650	961	562	344	51600	< 2340	187	22000
SB7b-18	1	1	4	A24PF1	39400	14300	518	631	479	282	74000	< 2340	160	24300
SB7b-29	1	1	5	A21PF2	37100	15300	321	< 470	420	201	56700	< 2350	108	24400
SB7b-12	1	1	6	A23PF1	34600	13800	111	< 478	96.1	253	79500	< 2380	54.6	22000
SB7b-08	1	1	7	A22PF2	34800	13800	120	< 475	98.4	72.4	80200	< 2370	63	31300
SB7b-12	1	1	8	A23PF2	35200	13800	120	< 460	115	242	79900	< 2300	58.8	22100
SB7b-08	1	1	9	A22PF1	34200	13800	103	< 462	103	58.2	80200	< 2300	75.9	31000
SB7Ref	1	1	10	SB7REFPF12	47900	15100	183	< 478	845	384	60800	3610	108	23700
Ustd	1	1	11	USTDPF12	20800	26100	< 40.9	< 475	1650	< 49.6	92100	25000	< 42.5	13700
SB7b-11	1	1	12	A20PF1	53200	13800	639	1070	609	311	79200	< 2380	193	21800
SB7b-24	1	1	13	A26PF2	45700	14300	245	< 474	190	160	55400	< 2360	67.6	27200
SB7b-11	1	1	14	A20PF2	53100	13900	643	1010	595	314	79300	< 2350	183	21900
SB7b-05	1	1	15	A11PF2	34400	15400	640	1220	554	349	51400	< 2340	194	21800
SB7b-29	1	1	16	A21PF1	37400	15500	315	< 479	271	184	56700	< 2390	110	24900
SB7b-18	1	1	17	A24PF2	38900	14200	508	795	478	265	73000	< 2330	181	24300
SB7b-24	1	1	18	A26PF1	47900	15000	257	< 479	202	168	57500	< 2390	75.4	28600
blank	1	1	19	BLANKPF1	782	< 162	46.4	< 482	< 81.6	< 50.4	91.2	< 2410	< 43.2	< 117
SB7Ref	1	1	20	SB7REFPF13	48000	15100	181	< 478	852	384	61800	3460	110	23700
Ustd	1	1	21	USTDPF13	20900	26300	< 40.9	< 475	1690	< 49.6	94300	24800	< 42.5	13600
SB7Ref	1	2	1	SB7REFPF11	47800	15200	184	< 478	876	422	60200	4050	108	23700
Ustd	1	2	2	USTDPF11	21000	26400	< 40.9	< 475	1690	70.9	91600	25600	< 42.5	13700
SB7b-05	1	2	3	A11PF2	34200	15700	646	1090	577	369	50800	2580	194	21500
SB7b-08	1	2	4	A22PF2	34800	14000	118	< 475	135	89	79800	2940	44.1	31200
SB7b-18	1	2	5	A24PF2	39000	14400	520	775	502	305	73500	2350	148	24100
SB7b-11	1	2	6	A20PF2	53200	14100	647	929	616	336	78900	2630	171	21700
SB7b-24	1	2	7	A26PF1	47900	15100	254	< 479	208	195	57200	2750	63.5	28400
SB7b-29	1	2	8	A21PF2	36900	15300	317	< 470	434	198	55400	2460	95.2	24200
SB7b-08	1	2	9	A22PF1	34300	13900	104	< 462	100	74.3	79200	2640	62.1	31100
SB7Ref	1	2	10	SB7REFPF12	47700	15300	180	< 478	883	403	60100	3950	105	23900
Ustd	1	2	11	USTDPF12	20800	26300	< 40.9	< 475	1700	61.4	91000	25500	< 42.5	13800
SB7b-12	1	2	12	A23PF1	34300	13800	109	< 478	90.7	265	77800	3060	59.4	22000
SB7b-18	1	2	13	A24PF1	39100	14400	519	670	503	302	73200	2870	163	24200
SB7b-24	1	2	14	A26PF2	46000	14500	251	< 474	216	193	55000	3070	69.2	27500
SB7b-29	1	2	15	A21PF1	37400	15700	316	< 479	297	209	56300	2680	98.5	24800
SB7b-12	1	2	16	A23PF2	34800	14000	118	< 460	111	252	78800	2530	< 41.2	22100
SB7b-11	1	2	17	A20PF1	53300	14000	645	1010	635	327	78700	2830	208	21900
SB7b-05	1	2	18	A11PF1	34300	15600	646	951	582	359	50800	2990	168	21800
blank	1	2	19	BLANKPF1	912	< 162	46.4	< 482	< 81.6	< 50.4	118	2840	< 43.2	< 117
SB7Ref	1	2	20	SB7REFPF13	47500	15200	183	< 478	872	409	59700	4470	117	24000
Ustd	1	2	21	USTDPF13	20700	26200	< 40.9	< 475	1670	< 49.6	90700	26100	< 42.5	13800
SB7Ref	2	1	1	SB7REFPF21	48100	15500	198	< 473	889	402	61100	2820	98.2	23800
Ustd	2	1	2	USTDPF21	21200	26600	56.3	< 465	1710	70.2	92100	24500	< 41.6	13900
SB7b-20	2	1	3	A03PF1	47700	14200	262	524	201	182	58800	< 2290	99.6	23500
SB7b-30	2	1	4	A13PF2	42900	15000	379	567	315	186	64900	< 2360	114	23500
SB7b-01	2	1	5	A04PF1	34200	15800	120	< 465	105	67.8	80600	< 2320	54	21900

Table A-3. Measured Elemental Concentrations (ug/g) for the Study Glasses Prepared Using Peroxide Fusion (part 1)

Glass ID	Block	Sub-Blk	Sequence	Lab ID	Al	B	Ba	Ce	Cr	Cu	Fe	K	La	Li
SB7b-30	2	1	6	A13PF1	42800	15000	371	640	314	182	65100	< 2340	122	23600
SB7b-17	2	1	7	A25PF2	39100	15300	538	765	481	394	59300	< 2350	143	28900
SB7b-14	2	1	8	A09PF1	34200	15700	118	< 462	100	530	51500	< 2300	71.3	30900
SB7b-04	2	1	9	A32PF1	53400	13900	116	< 470	123	253	49000	< 2340	74.8	21800
SB7Ref	2	1	10	SB7REFPF22	48600	15500	196	< 473	875	414	61400	3030	88.7	24200
Ustd	2	1	11	USTDPF22	21500	26800	56.3	< 465	1710	67.1	92400	25700	< 41.6	14200
SB7b-01	2	1	12	A04PF2	34600	15900	115	< 482	99.1	65.5	80900	< 2400	64.7	22100
SB7b-14	2	1	13	A09PF2	34500	15700	123	< 469	107	519	51400	< 2340	63.1	31300
SB7b-20	2	1	14	A03PF2	48900	14500	259	< 475	195	178	60300	< 2370	93.8	24400
SB7b-34	2	1	15	A30PF1	48200	14000	441	688	358	221	72300	< 2340	155	27800
SB7b-34	2	1	16	A30PF2	47900	13900	441	599	348	234	71200	< 2290	143	27100
SB7b-04	2	1	17	A32PF2	54200	14000	127	< 483	118	243	48800	< 2410	78.5	22100
SB7b-17	2	1	18	A25PF1	39500	15400	542	900	488	384	59700	< 2380	155	29400
blank	2	1	19	BLANKPF2	1230	< 162	62.4	< 482	< 81.6	< 50.4	150	< 2410	< 43.2	< 117
SB7Ref	2	1	20	SB7REFPF23	48200	15300	198	< 473	882	408	60500	3110	103	24000
Ustd	2	1	21	USTDPF23	21600	26700	55.5	< 465	1720	60.1	92000	24900	< 41.6	14100
SB7Ref	2	2	1	SB7REFPF21	48200	15500	198	< 473	879	415	61400	3650	91.1	23900
Ustd	2	2	2	USTDPF21	21300	26600	57.1	< 465	1700	69.4	93000	25400	< 41.6	13900
SB7b-20	2	2	3	A03PF1	48100	14200	264	< 458	181	174	59300	2520	77.5	23700
SB7b-14	2	2	4	A09PF2	34400	15700	124	< 469	89.2	526	51700	< 2340	< 42	30900
SB7b-01	2	2	5	A04PF2	34400	15900	113	< 482	85.5	63.9	81500	< 2400	46.3	21900
SB7b-14	2	2	6	A09PF1	34300	15800	116	< 462	90.4	514	52000	< 2300	58.2	31100
SB7b-04	2	2	7	A32PF2	53900	14000	125	< 483	96.3	254	49400	2530	51.2	21800
SB7b-34	2	2	8	A30PF1	48200	14000	437	670	372	222	72900	2640	135	27300
SB7b-30	2	2	9	A13PF1	43100	15100	377	637	310	171	65300	2970	101	23600
SB7Ref	2	2	10	SB7REFPF22	48400	15500	196	< 473	874	413	61900	3570	90.3	24000
Ustd	2	2	11	USTDPF22	21400	26800	57.1	< 465	1720	50.1	93900	25800	< 41.6	14000
SB7b-34	2	2	12	A30PF2	48100	13900	441	574	357	221	71600	2410	119	26900
SB7b-01	2	2	13	A04PF1	34400	15900	117	< 465	80.2	60.1	81100	2570	< 41.6	21900
SB7b-04	2	2	14	A32PF1	53600	14100	116	< 470	118	244	49300	2490	62.3	21900
SB7b-30	2	2	15	A13PF2	43300	15200	384	610	315	182	65600	2380	90.1	23700
SB7b-17	2	2	16	A25PF2	38800	15300	540	794	482	395	59300	2450	141	28800
SB7b-20	2	2	17	A03PF2	49100	14600	262	< 475	193	176	60900	2380	63.9	24300
SB7b-17	2	2	18	A25PF1	39400	15500	546	997	486	384	60400	2690	150	29100
blank	2	2	19	BLANKPF2	1110	< 162	64	< 482	< 81.6	< 50.4	168	< 2410	< 43.2	< 117
SB7Ref	2	2	20	SB7REFPF23	48500	15500	198	< 473	869	404	61100	3680	84	23900
Ustd	2	2	21	USTDPF23	21600	26800	57.8	< 465	1730	51.7	93200	25900	< 41.6	14100
SB7Ref	3	1	1	SB7REFPF31	47800	15400	191	< 472	883	410	61200	3860	72	24100
Ustd	3	1	2	USTDPF31	20900	26800	< 41	< 476	1710	52.1	93500	25200	< 42.6	14000
SB7b-27	3	1	3	A34PF2	39200	15300	261	< 473	256	200	74300	< 2360	108	28900
SB7b-09	3	1	4	A33PF2	52800	15900	93.3	< 477	96.2	190	76500	< 2380	59.4	31200
SB7b-19	3	1	5	A27PF1	47800	14300	518	894	504	321	58800	< 2370	159	24500
SB7b-16	3	1	6	A15PF1	48000	14400	512	842	429	364	72400	< 2350	150	28700
SB7b-27	3	1	7	A34PF1	38900	15100	238	< 478	236	192	73400	< 2380	122	28500
SB7b-21	3	1	8	A08PF1	38800	15400	518	975	429	321	59100	< 2310	147	29000
SB7b-19	3	1	9	A27PF2	47500	14200	522	860	501	286	58500	< 2340	139	24000
SB7Ref	3	1	10	SB7REFPF32	47800	15300	194	< 472	882	376	61400	3820	83.7	24000

Table A-3. Measured Elemental Concentrations (ug/g) for the Study Glasses Prepared Using Peroxide Fusion (part 1)

Glass ID	Block	Sub-Blk	Sequence	Lab ID	Al	B	Ba	Ce	Cr	Cu	Fe	K	La	Li
Ustd	3	1	11	USTDPF32	20800	26600	< 41	< 476	1690	< 49.7	93500	25800	< 42.6	13900
SB7b-21	3	1	12	A08PF2	38600	15200	511	824	444	301	58700	< 2290	135	28700
SB7b-31	3	1	13	A02PF1	40800	16500	340	630	356	183	75300	< 2300	113	23200
SB7b-16	3	1	14	A15PF2	48000	14400	514	755	425	367	72000	< 2360	142	28900
SB7b-31	3	1	15	A02PF2	40700	16600	345	612	340	183	75300	< 2330	85.9	23200
SB7b-23	3	1	16	A31PF1	48500	14300	240	578	197	225	58100	< 2360	79.3	28800
SB7b-23	3	1	17	A31PF2	47900	14200	234	588	189	225	57600	< 2340	83.4	28900
SB7b-09	3	1	18	A33PF1	52700	15800	93.4	< 460	90.9	195	76700	< 2300	73.3	31300
blank	3	1	19	BLANKPF3	1160	< 162	59.2	< 482	< 81.6	< 50.4	118	< 2410	< 43.2	< 117
SB7Ref	3	1	20	SB7REFPF33	47300	15200	187	< 472	869	386	61100	3460	73.5	24000
Ustd	3	1	21	USTDPF33	20700	26500	< 41	< 476	1680	< 49.7	93100	25700	< 42.6	14000
SB7Ref	3	2	1	SB7REFPF31	47900	15400	192	< 472	885	403	60700	3150	65.7	24200
Ustd	3	2	2	USTDPF31	21000	26800	42.6	< 476	1700	< 49.7	92400	24900	< 42.6	14000
SB7b-27	3	2	3	A34PF2	39300	15400	259	< 473	261	175	73600	< 2360	122	28900
SB7b-31	3	2	4	A02PF2	41100	16700	359	< 467	362	194	74600	< 2330	113	23400
SB7b-19	3	2	5	A27PF2	48100	14400	539	802	492	307	58100	< 2340	157	24400
SB7b-27	3	2	6	A34PF1	39000	15300	243	< 478	235	172	72900	< 2380	124	28900
SB7b-16	3	2	7	A15PF2	48400	14500	533	644	426	369	71800	< 2360	172	29000
SB7b-16	3	2	8	A15PF1	48100	14500	530	875	430	371	72000	< 2350	162	29100
SB7b-19	3	2	9	A27PF1	47600	14500	535	895	493	313	58200	< 2370	152	24600
SB7Ref	3	2	10	SB7REFPF32	48500	15500	200	< 472	881	397	60900	3120	85.3	24400
Ustd	3	2	11	USTDPF32	21000	26900	41.8	< 476	1700	< 49.7	92200	25100	< 42.6	14200
SB7b-31	3	2	12	A02PF1	41000	16700	353	555	349	172	74300	< 2300	108	23500
SB7b-09	3	2	13	A33PF2	53000	15900	91	< 477	93	161	75600	< 2380	65.7	31700
SB7b-23	3	2	14	A31PF2	48700	14400	244	< 470	182	219	56900	< 2340	101	29300
SB7b-21	3	2	15	A08PF2	38800	15400	532	754	439	295	57900	< 2290	151	29200
SB7b-09	3	2	16	A33PF1	53600	16000	99.9	< 460	88.2	177	75800	< 2300	61.8	31600
SB7b-21	3	2	17	A08PF1	39000	15500	538	942	439	307	58300	< 2310	160	29400
SB7b-23	3	2	18	A31PF1	49200	14500	248	< 473	202	229	57400	< 2360	82.5	29600
blank	3	2	19	BLANKPF3	1040	< 162	63.2	< 482	< 81.6	< 50.4	102	< 2410	< 43.2	< 117
SB7Ref	3	2	20	SB7REFPF33	48800	15400	195	< 472	888	401	60500	2980	78.2	24500
Ustd	3	2	21	USTDPF33	21300	26800	42.6	< 476	1710	< 49.7	92000	24700	< 42.6	14100
SB7Ref	4	1	1	SB7REFPF41	47900	15400	182	< 478	857	403	60500	3290	103	23800
Ustd	4	1	2	USTDPF41	21100	26900	< 40.5	< 469	1700	69.3	93600	25700	< 42	14000
SB7b-25	4	1	3	A18PF1	39900	12800	517	773	413	327	64900	< 2350	122	28800
SB7b-13	4	1	4	A07PF1	34900	14000	650	1200	602	1090	56300	< 2400	180	31100
SB7b-07	4	1	5	A12PF2	52800	13800	94.3	< 481	98	63.8	52000	< 2400	< 43	31000
SB7b-03	4	1	6	A17PF1	47700	14000	668	1040	1150	312	51800	< 2340	163	31000
SB7b-25	4	1	7	A18PF2	39400	12700	506	706	417	308	64700	< 2370	150	29200
SB7b-13	4	1	8	A07PF2	34500	13800	639	1300	602	1070	55400	< 2320	191	30800
SB7b-33	4	1	9	A10PF1	43300	14800	350	508	312	196	65800	< 2370	103	29000
SB7Ref	4	1	10	SB7REFPF42	47600	15300	175	< 478	870	384	60200	3120	97.5	23900
Ustd	4	1	11	USTDPF42	21100	26900	< 40.5	< 469	1690	53.7	93700	25300	< 42	14200
SB7b-06	4	1	12	A19PF1	53700	16200	639	1040	570	350	78400	< 2370	172	31400
SB7b-06	4	1	13	A19PF2	53400	16200	632	970	574	361	78100	< 2370	183	31500
SB7b-03	4	1	14	A17PF2	47100	13800	659	1080	1130	328	51000	< 2320	183	30900
SB7b-07	4	1	15	A12PF1	52700	13900	93.6	< 475	112	70.1	52000	< 2370	47.3	31100

Table A-3. Measured Elemental Concentrations (ug/g) for the Study Glasses Prepared Using Peroxide Fusion (part 1)

Glass ID	Block	Sub-Blk	Sequence	Lab ID	Al	B	Ba	Ce	Cr	Cu	Fe	K	La	Li
SB7b-33	4	1	16	A10PF2	43500	14900	354	482	320	201	65800	< 2310	97.4	29200
SB7b-26	4	1	17	A05PF1	48300	15300	517	662	391	262	70200	< 2360	127	24000
SB7b-26	4	1	18	A05PF2	47900	15300	513	681	380	268	69800	2690	149	24000
blank	4	1	19	BLANKPF4	691	< 162	43.2	< 482	< 81.6	< 50.4	< 76.8	< 2410	< 43.2	< 117
SB7Ref	4	1	20	SB7REFPF43	47300	15200	180	< 478	858	391	60000	3480	88	24000
Ustd	4	1	21	USTDPF43	20400	26000	< 40.5	< 469	1640	53.7	90300	25200	< 42	13700
SB7Ref	4	2	1	SB7REFPF41	47500	15300	185	< 478	878	418	60400	3400	106	23900
Ustd	4	2	2	USTDPF41	21200	26700	< 40.5	< 469	1710	73.2	93600	25200	< 42	14100
SB7b-33	4	2	3	A10PF2	43300	14900	362	499	315	222	65900	< 2310	95.1	29500
SB7b-06	4	2	4	A19PF1	53700	16000	652	1000	581	363	78000	2290	168	31400
SB7b-25	4	2	5	A18PF1	39600	12600	524	797	428	316	64500	< 2350	129	29100
SB7b-26	4	2	6	A05PF2	48100	15300	530	604	395	274	70100	2370	148	24000
SB7b-33	4	2	7	A10PF1	43100	14700	360	532	321	211	65700	< 2370	118	29200
SB7b-13	4	2	8	A07PF1	34600	14000	665	961	611	1090	55900	2700	203	31500
SB7b-07	4	2	9	A12PF1	52900	13900	93	< 475	108	67	52000	< 2370	< 42.6	31400
SB7Ref	4	2	10	SB7REFPF42	48100	15300	184	< 478	884	391	60100	3700	91.9	24300
Ustd	4	2	11	USTDPF42	21100	26800	< 40.5	< 469	1730	64.6	93400	25900	< 42	14200
SB7b-03	4	2	12	A17PF2	47300	13900	675	1210	1150	335	51000	2360	180	31300
SB7b-13	4	2	13	A07PF2	34300	13800	655	1140	619	1080	55300	< 2320	201	31100
SB7b-26	4	2	14	A05PF1	48500	15400	535	726	397	274	70500	2460	142	24400
SB7b-03	4	2	15	A17PF1	47600	13900	681	1140	1150	325	51400	2350	179	31400
SB7b-25	4	2	16	A18PF2	39300	12700	523	819	430	305	64300	2510	147	29500
SB7b-07	4	2	17	A12PF2	52800	13700	92.2	< 481	116	71.7	51500	< 2400	53.4	31300
SB7b-06	4	2	18	A19PF2	53800	16200	648	917	578	361	78400	2290	194	32100
blank	4	2	19	BLANKPF4	554	< 162	44.8	< 482	< 81.6	< 50.4	< 76.8	< 2410	< 43.2	< 117
SB7Ref	4	2	20	SB7REFPF43	47600	15200	185	< 478	880	398	59900	3510	102	24000
Ustd	4	2	21	USTDPF43	20500	25900	< 40.5	< 469	1660	< 49	90100	25500	< 42	13800
SB7Ref	5	1	1	SB7REFPF51	47000	15200	182	< 478	851	410	60300	3440	92	24100
Ustd	5	1	2	USTDPF51	20800	26600	< 40.6	< 471	1700	56.2	93000	25300	< 42.2	14100
SB7b-15	5	1	3	A16PF1	38200	14400	238	< 471	221	382	59500	2420	80.5	24500
SB7b-10	5	1	4	A06PF1	51900	15600	114	< 470	97.9	139	50900	2450	75.7	22100
SB7b-10	5	1	5	A06PF2	51800	15600	109	< 468	87.3	118	50900	< 2340	66.8	22000
SB7b-32	5	1	6	A29PF2	43200	13100	377	485	279	195	55000	2830	111	29600
SB7b-02	5	1	7	A01PF2	33500	16200	622	668	559	245	79800	2610	157	22300
SB7b-02	5	1	8	A01PF1	33600	16200	632	1100	562	266	80100	2380	185	22400
SB7b-22	5	1	9	A14PF2	38600	14400	248	< 480	92	213	68300	2970	73.2	29400
SB7Ref	5	1	10	SB7REFPF52	47000	15200	187	< 478	850	390	60500	3820	87.3	24300
Ustd	5	1	11	USTDPF52	20500	26100	< 40.6	< 471	1640	< 49.2	91600	25200	< 42.2	13900
SB7b-28	5	1	12	A28PF1	37900	15300	233	< 463	213	176	72400	2770	74.4	24500
SB7b-22	5	1	13	A14PF1	38300	14400	246	< 470	106	190	68500	2560	88.1	29400
SB7b-28	5	1	14	A28PF2	38300	15300	235	< 468	207	182	73200	2630	75.3	24700
SB7b-32	5	1	15	A29PF1	43800	13200	381	< 466	283	191	55200	2380	114	30100
SB7b-15	5	1	16	A16PF2	38100	14200	238	< 481	198	371	58600	2570	61.5	24400
blank	5	1	17	BLANKPF5	754	< 162	52.8	< 482	< 81.6	< 50.4	< 76.8	< 2410	< 43.2	< 117
SB7Ref	5	1	18	SB7REFPF53	47100	15000	181	< 478	828	373	59800	3790	92.8	24300
Ustd	5	1	19	USTDPF53	20700	26600	< 40.6	< 471	1680	< 49.2	92600	25700	< 42.2	14400
SB7Ref	5	2	1	SB7REFPF51	47800	15300	184	< 478	851	414	60300	3400	94.4	23900

Table A-3. Measured Elemental Concentrations (ug/g) for the Study Glasses Prepared Using Peroxide Fusion (part 1)

Glass ID	Block	Sub-Blk	Sequence	Lab ID	Al	B	Ba	Ce	Cr	Cu	Fe	K	La	Li
Ustd	5	2	2	USTDPF51	21100	26900	< 40.6	< 471	1710	65.6	93300	25500	< 42.2	14000
SB7b-15	5	2	3	A16PF2	38500	14500	244	< 481	210	398	58700	< 2400	75.8	24200
SB7b-22	5	2	4	A14PF2	39200	14500	254	< 480	104	214	68400	< 2390	70.9	29200
SB7b-10	5	2	5	A06PF1	52500	15700	112	< 470	101	148	50800	< 2350	79.6	22000
SB7b-28	5	2	6	A28PF2	39000	15500	239	< 468	235	206	72800	< 2330	81.5	24500
SB7b-02	5	2	7	A01PF2	34100	16300	634	812	555	260	80100	< 2350	178	22100
SB7b-32	5	2	8	A29PF1	44800	13400	389	497	283	207	56400	< 2320	112	29800
SB7b-15	5	2	9	A16PF1	38800	14500	244	< 471	215	392	59700	< 2350	85.9	24300
SB7Ref	5	2	10	SB7REFPF52	47600	15300	184	< 478	862	409	60200	3360	93.6	23900
Ustd	5	2	11	USTDPF52	20600	26500	< 40.6	< 471	1680	53.9	92500	25200	< 42.2	13800
SB7b-28	5	2	12	A28PF1	38700	15500	237	< 463	208	193	72900	< 2310	79.8	24200
SB7b-02	5	2	13	A01PF1	34100	16500	643	1030	554	271	80400	< 2360	169	22200
SB7b-22	5	2	14	A14PF1	39000	14600	245	< 470	97.3	182	68900	< 2350	84.2	29100
SB7b-32	5	2	15	A29PF2	43900	13200	379	< 462	286	192	55300	< 2310	112	29500
SB7b-10	5	2	16	A06PF2	52800	15700	106	< 468	91.6	110	50900	< 2340	75.3	21900
blank	5	2	17	BLANKPF5	958	< 162	52.8	< 482	< 81.6	< 50.4	< 76.8	< 2410	< 43.2	< 117
SB7Ref	5	2	18	SB7REFPF53	47700	15200	183	< 478	853	405	60200	3520	102	24000
Ustd	5	2	19	USTDPF53	21000	26800	< 40.6	< 471	1690	< 49.2	93100	25000	< 42.2	14200

Table A-4. Measured Elemental Concentrations (ug/g) for the Study Glasses Prepared Using Peroxide Fusion (part 2)

Glass ID	Block	Sub-Blk	Sequence	Lab ID	Mg	Mn	Ni	Pb	S	Si	Th	Ti	U	Zn
SB7Ref	1	1	1	SB7REFPF11	1580	16000	9540	< 568	< 5950	216000	< 434	2820	< 2590	197
Ustd	1	1	2	USTDPF11	7190	21200	8550	< 564	< 5910	208000	< 431	5610	19000	110
SB7b-05	1	1	3	A11PF1	2390	11500	9210	< 557	< 5830	245000	2770	80.8	26300	206
SB7b-18	1	1	4	A24PF1	1900	16600	14100	< 557	< 5840	226000	5880	3190	19700	215
SB7b-29	1	1	5	A21PF2	1140	12700	10800	< 558	< 5850	238000	4260	1200	19600	154
SB7b-12	1	1	6	A23PF1	366	18200	15400	< 567	< 5940	248000	2800	4310	17200	170
SB7b-08	1	1	7	A22PF2	383	18200	9180	< 564	< 5900	219000	2880	83.9	27300	117
SB7b-12	1	1	8	A23PF2	371	18300	15600	< 547	< 5730	246000	2880	4310	17900	183
SB7b-08	1	1	9	A22PF1	355	18100	9130	< 549	< 5750	220000	2520	93.9	26200	123
SB7Ref	1	1	10	SB7REFPF12	1580	16000	9550	< 568	< 5950	239000	< 434	2790	< 2590	188
Ustd	1	1	11	USTDPF12	7160	21000	8490	< 564	< 5910	211000	< 431	5550	18800	89
SB7b-11	1	1	12	A20PF1	2460	11500	8850	< 567	< 5940	217000	7260	4230	17300	198
SB7b-24	1	1	13	A26PF2	844	15800	10100	< 563	< 5900	215000	3520	2980	19000	145
SB7b-11	1	1	14	A20PF2	2390	11400	8870	< 559	< 5850	215000	6710	4200	17100	204
SB7b-05	1	1	15	A11PF2	2450	11400	9170	< 556	< 5830	243000	2940	70.7	27200	203
SB7b-29	1	1	16	A21PF1	1120	12900	10800	< 569	< 5960	243000	4170	1270	19200	167
SB7b-18	1	1	17	A24PF2	1910	16400	14000	< 554	< 5800	222000	6050	3180	19700	213
SB7b-24	1	1	18	A26PF1	835	16400	10500	< 569	< 5960	222000	3550	3160	19100	154
blank	1	1	19	BLANKPF1	63.2	< 42.4	< 364	< 573	< 6000	904	< 438	80	< 2610	< 52.8
SB7Ref	1	1	20	SB7REFPF13	1590	16200	9730	< 568	< 5950	238000	< 434	2820	< 2590	205
Ustd	1	1	21	USTDPF13	7310	21600	8670	< 564	< 5910	215000	< 431	5660	18100	104
SB7Ref	1	2	1	SB7REFPF11	1580	16000	9570	< 568	< 5950	227000	< 434	2830	< 2590	201
Ustd	1	2	2	USTDPF11	7210	21200	8610	< 564	< 5910	204000	< 431	5680	18200	101
SB7b-05	1	2	3	A11PF2	2450	11500	9240	< 556	< 5830	239000	2920	61	26300	200
SB7b-08	1	2	4	A22PF2	390	18300	9230	< 564	< 5900	217000	2760	66.1	26700	116
SB7b-18	1	2	5	A24PF2	1920	16600	14200	< 554	< 5800	222000	5930	3220	19200	211
SB7b-11	1	2	6	A20PF2	2410	11500	8950	< 559	< 5850	217000	6690	4280	16500	194
SB7b-24	1	2	7	A26PF1	843	16500	10600	< 569	< 5960	222000	3530	3170	18400	151
SB7b-29	1	2	8	A21PF2	1130	12600	10700	< 558	< 5850	234000	4120	1210	18900	155
SB7b-08	1	2	9	A22PF1	358	18100	9200	< 549	< 5750	217000	2480	61.7	25700	115
SB7Ref	1	2	10	SB7REFPF12	1570	16000	9610	< 568	< 5950	235000	< 434	2820	< 2590	194
Ustd	1	2	11	USTDPF12	7190	21100	8540	< 564	< 5910	211000	< 431	5660	18500	103
SB7b-12	1	2	12	A23PF1	369	18100	15500	< 567	< 5940	244000	2820	4310	16900	166
SB7b-18	1	2	13	A24PF1	1900	16500	14100	< 557	< 5840	224000	5790	3180	19300	214
SB7b-24	1	2	14	A26PF2	858	15800	10200	< 563	< 5900	216000	3480	3050	17700	158
SB7b-29	1	2	15	A21PF1	1140	12800	10900	< 569	< 5960	241000	4200	1270	19300	164
SB7b-12	1	2	16	A23PF2	373	18200	15600	< 547	< 5730	242000	2820	4320	17700	171
SB7b-11	1	2	17	A20PF1	2470	11500	9020	< 567	< 5940	218000	7300	4290	17200	190
SB7b-05	1	2	18	A11PF1	2390	11400	9170	< 557	< 5830	241000	2660	47.8	25600	207
blank	1	2	19	BLANKPF1	76.8	< 42.4	< 364	< 573	< 6000	999	< 438	< 36	< 2610	< 52.8
SB7Ref	1	2	20	SB7REFPF13	1570	15900	9630	< 568	< 5950	233000	< 434	2820	< 2590	187
Ustd	1	2	21	USTDPF13	7150	21000	8420	< 564	< 5910	209000	< 431	5610	18300	93.7
SB7Ref	2	1	1	SB7REFPF21	1560	16300	9650	< 562	< 5890	223000	< 430	2840	< 2560	196
Ustd	2	1	2	USTDPF21	7170	21500	8580	< 552	< 5780	212000	< 423	5760	17700	94.8
SB7b-20	2	1	3	A03PF1	845	16300	13400	< 544	< 5700	235000	3830	1030	18800	173
SB7b-30	2	1	4	A13PF2	1230	14700	12200	< 561	< 5880	235000	4050	1400	19700	164
SB7b-01	2	1	5	A04PF1	382	11600	15500	< 552	< 5780	226000	6840	71.7	17000	143

Table A-4. Measured Elemental Concentrations (ug/g) for the Study Glasses Prepared Using Peroxide Fusion (part 2)

Glass ID	Block	Sub-Blk	Sequence	Lab ID	Mg	Mn	Ni	Pb	S	Si	Th	Ti	U	Zn
SB7b-30	2	1	6	A13PF1	1250	14700	12200	< 558	< 5840	237000	4700	1410	21400	166
SB7b-17	2	1	7	A25PF2	1900	13300	14100	< 559	< 5850	244000	3570	3260	18600	252
SB7b-14	2	1	8	A09PF1	353	18400	9260	< 549	< 5750	246000	6960	4380	17100	195
SB7b-04	2	1	9	A32PF1	346	18400	9140	< 558	< 5840	246000	6890	88.6	25900	139
SB7Ref	2	1	10	SB7REFPF22	1550	16200	9700	< 562	< 5890	244000	< 430	2850	< 2560	194
Ustd	2	1	11	USTDPF22	7180	21500	8600	< 552	< 5780	217000	< 423	5830	17700	103
SB7b-01	2	1	12	A04PF2	384	11700	15600	< 572	< 5990	230000	6670	76.3	16600	141
SB7b-14	2	1	13	A09PF2	375	18300	9240	< 557	< 5840	248000	6240	4370	16400	189
SB7b-20	2	1	14	A03PF2	868	16700	13700	< 564	< 5910	246000	3550	1120	18400	176
SB7b-34	2	1	15	A30PF1	1380	16600	13600	< 557	< 5830	221000	5220	1620	23800	194
SB7b-34	2	1	16	A30PF2	1400	16300	13400	< 544	< 5700	217000	4600	1550	22400	204
SB7b-04	2	1	17	A32PF2	416	18400	9100	< 573	< 6000	251000	6640	97.2	25800	138
SB7b-17	2	1	18	A25PF1	1910	13400	14200	< 567	< 5940	241000	3820	3290	19500	252
blank	2	1	19	BLANKPF2	68.8	< 42.4	< 364	< 573	< 6000	966	< 438	50.4	< 2610	< 52.8
SB7Ref	2	1	20	SB7REFPF23	1540	16100	9570	< 562	< 5890	241000	< 430	2870	< 2560	191
Ustd	2	1	21	USTDPF23	7170	21500	8570	< 552	< 5780	216000	< 423	5820	17700	94.8
SB7Ref	2	2	1	SB7REFPF21	1560	16300	9680	< 562	< 5890	227000	< 430	2820	< 2560	192
Ustd	2	2	2	USTDPF21	7170	21600	8690	< 552	< 5780	213000	< 423	5750	17800	103
SB7b-20	2	2	3	A03PF1	848	16400	13500	< 544	7440	235000	3780	1060	19600	170
SB7b-14	2	2	4	A09PF2	375	18400	9320	< 557	< 5840	246000	6290	4330	16500	186
SB7b-01	2	2	5	A04PF2	385	11800	15700	< 572	< 5990	229000	6540	80.6	16300	151
SB7b-14	2	2	6	A09PF1	355	18600	9350	< 549	< 5750	246000	6840	4380	17300	197
SB7b-04	2	2	7	A32PF2	420	18600	9320	< 573	< 6000	253000	6590	95.1	25500	143
SB7b-34	2	2	8	A30PF1	1390	16800	13800	< 557	< 5830	221000	5200	1630	24300	208
SB7b-30	2	2	9	A13PF1	1250	14800	12300	< 558	< 5840	237000	4590	1430	21700	175
SB7Ref	2	2	10	SB7REFPF22	1560	16400	9760	< 562	< 5890	243000	< 430	2860	< 2560	194
Ustd	2	2	11	USTDPF22	7190	21700	8700	< 552	< 5780	215000	< 423	5830	18300	102
SB7b-34	2	2	12	A30PF2	1420	16500	13500	< 544	< 5700	216000	4520	1560	22600	211
SB7b-01	2	2	13	A04PF1	384	11700	15600	< 552	6360	227000	6670	85.1	17000	147
SB7b-04	2	2	14	A32PF1	350	18600	9240	< 558	< 5840	247000	6780	101	26800	146
SB7b-30	2	2	15	A13PF2	1230	14900	12400	< 561	< 5880	237000	4030	1430	19900	176
SB7b-17	2	2	16	A25PF2	1900	13400	14200	< 559	< 5850	242000	3500	3280	18700	249
SB7b-20	2	2	17	A03PF2	873	16900	13900	< 564	< 5910	248000	3450	1130	18500	180
SB7b-17	2	2	18	A25PF1	1920	13600	14300	< 567	< 5940	241000	3750	3310	19100	264
blank	2	2	19	BLANKPF2	69.6	< 42.4	< 364	< 573	< 6000	1090	< 438	101	< 2610	< 52.8
SB7Ref	2	2	20	SB7REFPF23	1550	16300	9730	< 562	7140	239000	< 430	2870	< 2560	199
Ustd	2	2	21	USTDPF23	7190	21700	8710	< 552	< 5780	215000	< 423	5840	17700	96.4
SB7Ref	3	1	1	SB7REFPF31	1510	16100	9610	< 560	< 5870	231000	< 429	2810	< 2550	196
Ustd	3	1	2	USTDPF31	7290	21500	8570	< 565	< 5920	213000	< 433	5670	18000	87.6
SB7b-27	3	1	3	A34PF2	890	13300	14100	< 562	< 5890	216000	5880	1020	19100	192
SB7b-09	3	1	4	A33PF2	346	11600	15100	< 567	< 5940	223000	7120	78.8	26500	155
SB7b-19	3	1	5	A27PF1	1940	13400	10800	< 565	< 5920	226000	5980	1120	19200	193
SB7b-16	3	1	6	A15PF1	1910	13200	10900	< 559	< 5850	224000	3760	3180	23700	235
SB7b-27	3	1	7	A34PF1	817	13100	14000	< 567	< 5940	221000	4980	1060	17700	181
SB7b-21	3	1	8	A08PF1	1920	16600	10800	< 549	< 5750	230000	5980	1110	24100	191
SB7b-19	3	1	9	A27PF2	1880	13300	10700	< 557	< 5840	228000	5200	1070	18500	198
SB7Ref	3	1	10	SB7REFPF32	1520	16100	9600	< 560	< 5870	242000	< 429	2780	< 2550	195

Table A-4. Measured Elemental Concentrations (ug/g) for the Study Glasses Prepared Using Peroxide Fusion (part 2)

Glass ID	Block	Sub-Blk	Sequence	Lab ID	Mg	Mn	Ni	Pb	S	Si	Th	Ti	U	Zn
Ustd	3	1	11	USTDPF32	7270	21400	8580	< 565	< 5920	213000	< 433	5650	17600	88.4
SB7b-21	3	1	12	A08PF2	1890	16400	10700	< 546	< 5720	223000	5440	1090	22600	210
SB7b-31	3	1	13	A02PF1	1210	13900	14100	< 546	< 5720	230000	4940	1340	24800	193
SB7b-16	3	1	14	A15PF2	1880	13100	10900	< 562	< 5890	223000	3470	3170	22300	239
SB7b-31	3	1	15	A02PF2	1150	13900	14000	< 554	< 5810	234000	4980	1300	24100	213
SB7b-23	3	1	16	A31PF1	899	13300	13800	< 562	< 5890	230000	6050	3220	24200	183
SB7b-23	3	1	17	A31PF2	865	13200	13700	< 558	< 5850	235000	5420	3210	22900	181
SB7b-09	3	1	18	A33PF1	325	11600	15100	< 547	< 5730	219000	6970	71	26600	144
blank	3	1	19	BLANKPF3	14.4	< 42.4	< 364	< 573	< 6000	< 782	< 438	60	< 2610	< 52.8
SB7Ref	3	1	20	SB7REFPF33	1510	16000	9560	< 560	< 5870	239000	< 429	2770	< 2550	176
Ustd	3	1	21	USTDPF33	7300	21300	8560	< 565	< 5920	211000	< 433	5620	17700	88.4
SB7Ref	3	2	1	SB7REFPF31	1480	16200	9550	< 560	< 5870	231000	< 429	2840	< 2550	189
Ustd	3	2	2	USTDPF31	7230	21600	8520	< 565	< 5920	210000	< 433	5780	18300	93.9
SB7b-27	3	2	3	A34PF2	879	13400	14100	< 562	< 5890	215000	5920	1040	20100	192
SB7b-31	3	2	4	A02PF2	1130	14100	14100	< 554	< 5810	236000	5000	1340	24700	217
SB7b-19	3	2	5	A27PF2	1860	13500	10700	< 557	< 5840	229000	5210	1110	18500	195
SB7b-27	3	2	6	A34PF1	813	13300	14000	< 567	< 5940	222000	5020	1110	18300	189
SB7b-16	3	2	7	A15PF2	1860	13400	10800	< 562	< 5890	222000	3480	3270	22900	239
SB7b-16	3	2	8	A15PF1	1890	13400	10800	< 559	< 5850	227000	3790	3280	24400	230
SB7b-19	3	2	9	A27PF1	1920	13500	10700	< 565	< 5920	224000	5990	1140	19700	200
SB7Ref	3	2	10	SB7REFPF32	1500	16300	9660	< 560	< 5870	242000	< 429	2890	< 2550	210
Ustd	3	2	11	USTDPF32	7210	21600	8580	< 565	< 5920	213000	< 433	5830	18600	82.9
SB7b-31	3	2	12	A02PF1	1190	14100	14100	< 546	< 5720	230000	5010	1380	26000	198
SB7b-09	3	2	13	A33PF2	342	11700	15100	< 567	< 5940	224000	7180	90.5	27700	155
SB7b-23	3	2	14	A31PF2	851	13400	13700	< 558	< 5850	237000	5490	3350	23500	192
SB7b-21	3	2	15	A08PF2	1860	16600	10700	< 546	< 5720	223000	5570	1150	23700	201
SB7b-09	3	2	16	A33PF1	323	11700	15100	< 547	< 5730	219000	6940	90.1	27200	149
SB7b-21	3	2	17	A08PF1	1890	16700	10800	< 549	< 5750	227000	5990	1150	24500	188
SB7b-23	3	2	18	A31PF1	891	13400	13800	< 562	< 5890	231000	6200	3360	25100	184
blank	3	2	19	BLANKPF3	15.2	< 42.4	< 364	< 573	< 6000	< 782	< 438	92.8	< 2610	< 52.8
SB7Ref	3	2	20	SB7REFPF33	1480	16300	9590	< 560	< 5870	241000	< 429	2910	< 2550	181
Ustd	3	2	21	USTDPF33	7160	21600	8520	< 565	< 5920	212000	< 433	5870	18900	90
SB7Ref	4	1	1	SB7REFPF41	1500	16100	9520	< 567	< 5940	190000	< 434	2850	< 2590	191
Ustd	4	1	2	USTDPF41	7230	21500	8610	< 557	< 5840	198000	< 426	5800	17800	91.1
SB7b-25	4	1	3	A18PF1	1890	16800	13900	< 560	< 5870	220000	3680	1080	23200	237
SB7b-13	4	1	4	A07PF1	2470	11700	15700	< 571	< 5980	249000	7320	4340	26900	414
SB7b-07	4	1	5	A12PF2	360	11600	9160	< 571	< 5980	226000	2630	4300	16800	100
SB7b-03	4	1	6	A17PF1	2430	18300	15200	< 556	< 5820	218000	6820	47	16900	339
SB7b-25	4	1	7	A18PF2	1940	16800	13900	< 564	< 5900	220000	3970	1090	24400	231
SB7b-13	4	1	8	A07PF2	2420	11500	15500	< 552	< 5780	228000	7260	4290	26600	403
SB7b-33	4	1	9	A10PF1	1230	14900	12200	< 565	< 5920	230000	4440	1420	20700	174
SB7Ref	4	1	10	SB7REFPF42	1510	16000	9500	< 567	< 5940	210000	< 434	2820	< 2590	187
Ustd	4	1	11	USTDPF42	7270	21500	8640	< 557	< 5840	199000	< 426	5770	18200	93.4
SB7b-06	4	1	12	A19PF1	2460	18400	14700	< 563	< 5900	221000	2730	48.8	17100	263
SB7b-06	4	1	13	A19PF2	2430	18400	14700	< 564	< 5910	210000	2650	48.8	16500	258
SB7b-03	4	1	14	A17PF2	2420	18100	15100	< 552	< 5780	205000	7040	52.4	16800	329
SB7b-07	4	1	15	A12PF1	352	11500	9110	< 564	< 5910	228000	2710	4270	16700	89.8

Table A-4. Measured Elemental Concentrations (ug/g) for the Study Glasses Prepared Using Peroxide Fusion (part 2)

Glass ID	Block	Sub-Blk	Sequence	Lab ID	Mg	Mn	Ni	Pb	S	Si	Th	Ti	U	Zn
SB7b-33	4	1	16	A10PF2	1240	14900	12300	< 549	< 5750	220000	4170	1420	20600	173
SB7b-26	4	1	17	A05PF1	1840	13100	13700	< 561	< 5880	225000	3380	1060	22700	205
SB7b-26	4	1	18	A05PF2	1850	13000	13600	< 555	< 5810	218000	3410	1060	22200	206
blank	4	1	19	BLANKPF4	< 12	< 42.4	< 364	< 573	< 6000	< 782	< 438	< 36	< 2610	< 52.8
SB7Ref	4	1	20	SB7REFPF43	1500	15900	9470	< 567	< 5940	204000	< 434	2810	< 2590	185
Ustd	4	1	21	USTDPF43	7020	20800	8370	< 557	< 5840	193000	< 426	5580	17600	87.9
SB7Ref	4	2	1	SB7REFPF41	1510	16200	9620	< 567	< 5940	198000	< 434	2890	< 2590	192
Ustd	4	2	2	USTDPF41	7190	21800	8610	< 557	< 5840	198000	< 426	5860	17600	97.3
SB7b-33	4	2	3	A10PF2	1240	15100	12300	< 549	< 5750	219000	4300	1470	20300	180
SB7b-06	4	2	4	A19PF1	2420	18500	14700	< 563	< 5900	219000	2740	56.3	17000	270
SB7b-25	4	2	5	A18PF1	1880	16900	13900	< 560	< 5870	220000	3750	1080	23400	248
SB7b-26	4	2	6	A05PF2	1850	13300	13600	< 555	< 5810	219000	3440	1090	22800	208
SB7b-33	4	2	7	A10PF1	1230	15000	12400	< 565	< 5920	229000	4500	1450	21000	183
SB7b-13	4	2	8	A07PF1	2460	11700	15600	< 571	< 5980	248000	7440	4390	26900	413
SB7b-07	4	2	9	A12PF1	351	11700	9130	< 564	< 5910	228000	2740	4360	16100	95.4
SB7Ref	4	2	10	SB7REFPF42	1510	16200	9550	< 567	< 5940	209000	< 434	2890	< 2590	197
Ustd	4	2	11	USTDPF42	7210	21800	8630	< 557	< 5840	199000	< 426	5880	18000	92.6
SB7b-03	4	2	12	A17PF2	2410	18300	15100	< 552	< 5780	204000	7150	58.2	17400	345
SB7b-13	4	2	13	A07PF2	2400	11600	15500	< 552	< 5780	227000	7280	4360	26500	413
SB7b-26	4	2	14	A05PF1	1830	13400	13600	< 561	< 5880	226000	3480	1110	22600	216
SB7b-03	4	2	15	A17PF1	2400	18400	15200	< 556	< 5820	219000	6970	73	17100	345
SB7b-25	4	2	16	A18PF2	1920	17000	13900	< 564	< 5900	220000	3990	1130	24400	227
SB7b-07	4	2	17	A12PF2	356	11600	9020	< 571	< 5980	226000	2600	4350	16700	95.7
SB7b-06	4	2	18	A19PF2	2410	18700	14700	< 564	< 5910	210000	2720	59.5	16200	273
blank	4	2	19	BLANKPF4	< 12	< 42.4	< 364	< 573	< 6000	< 782	< 438	54.4	< 2610	< 52.8
SB7Ref	4	2	20	SB7REFPF43	1500	16100	9500	< 567	< 5940	207000	< 434	2880	< 2590	195
Ustd	4	2	21	USTDPF43	6950	21100	8290	< 557	< 5840	193000	< 426	5710	17500	94.9
SB7Ref	5	1	1	SB7REFPF51	1470	16000	9470	< 568	< 5950	206000	< 435	2830	< 2590	215
Ustd	5	1	2	USTDPF51	7250	21500	8650	< 559	< 5850	205000	< 428	5770	17200	82.7
SB7b-15	5	1	3	A16PF1	878	13300	10900	< 559	< 5860	227000	3800	3230	24200	171
SB7b-10	5	1	4	A06PF1	350	18300	15200	< 559	< 5850	219000	2620	4200	25700	154
SB7b-10	5	1	5	A06PF2	342	18300	15300	< 556	< 5820	221000	2560	4230	25100	140
SB7b-32	5	1	6	A29PF2	1250	15300	10300	< 549	< 5750	233000	3500	1530	17100	166
SB7b-02	5	1	7	A01PF2	2400	18100	9180	< 559	< 5850	211000	6260	4280	24900	222
SB7b-02	5	1	8	A01PF1	2420	18200	9210	< 563	< 5890	217000	6930	4260	26500	206
SB7b-22	5	1	9	A14PF2	851	13200	10800	< 570	< 5970	231000	3300	1130	17900	143
SB7Ref	5	1	10	SB7REFPF52	1480	16000	9580	< 568	< 5950	219000	< 435	2830	< 2590	186
Ustd	5	1	11	USTDPF52	7110	21100	8480	< 559	< 5850	204000	< 428	5650	17200	89
SB7b-28	5	1	12	A28PF1	806	16500	10800	< 549	< 5750	226000	4640	3210	21600	150
SB7b-22	5	1	13	A14PF1	880	13300	10800	< 558	< 5850	233000	3880	1130	19400	140
SB7b-28	5	1	14	A28PF2	845	16700	11000	< 556	< 5820	240000	5260	3230	22800	140
SB7b-32	5	1	15	A29PF1	1230	15400	10500	< 553	< 5800	227000	3230	1530	16800	158
SB7b-15	5	1	16	A16PF2	834	13100	10700	< 572	< 5990	227000	3270	3190	22500	166
blank	5	1	17	BLANKPF5	< 12	< 42.4	< 364	< 573	< 6000	< 782	< 438	< 36	< 2610	< 52.8
SB7Ref	5	1	18	SB7REFPF53	1470	15900	9380	< 568	< 5950	215000	< 435	2820	< 2590	291
Ustd	5	1	19	USTDPF53	7220	21400	8540	< 559	< 5850	208000	< 428	5770	17700	82
SB7Ref	5	2	1	SB7REFPF51	1470	16100	9430	< 568	< 5950	206000	< 435	2890	< 2590	225

Table A-4. Measured Elemental Concentrations (ug/g) for the Study Glasses Prepared Using Peroxide Fusion (part 2)

Glass ID	Block	Sub-Blk	Sequence	Lab ID	Mg	Mn	Ni	Pb	S	Si	Th	Ti	U	Zn
Ustd	5	2	2	USTDPF51	7190	21700	8550	< 559	< 5850	206000	< 428	5870	17500	95.2
SB7b-15	5	2	3	A16PF2	832	13300	10800	< 572	< 5990	228000	3370	3260	22200	177
SB7b-22	5	2	4	A14PF2	846	13400	10600	< 570	< 5970	233000	3350	1170	18600	148
SB7b-10	5	2	5	A06PF1	346	18400	15100	< 559	< 5850	220000	2720	4280	26000	155
SB7b-28	5	2	6	A28PF2	834	16800	10900	< 556	< 5820	239000	5310	3310	22700	154
SB7b-02	5	2	7	A01PF2	2410	18300	9120	< 559	< 5850	211000	6310	4360	24900	239
SB7b-32	5	2	8	A29PF1	1240	15700	10500	< 553	< 5800	230000	3320	1600	16700	177
SB7b-15	5	2	9	A16PF1	873	13500	10900	< 559	< 5860	228000	3810	3310	24200	172
SB7Ref	5	2	10	SB7REFPF52	1470	16200	9460	< 568	< 5950	219000	< 435	2880	< 2590	194
Ustd	5	2	11	USTDPF52	7110	21400	8510	< 559	< 5850	207000	< 428	5800	17300	92.9
SB7b-28	5	2	12	A28PF1	807	16700	10800	< 549	< 5750	228000	4700	3290	22100	154
SB7b-02	5	2	13	A01PF1	2410	18400	9180	< 563	< 5890	220000	7000	4370	26300	210
SB7b-22	5	2	14	A14PF1	884	13500	10800	< 558	< 5850	234000	3850	1170	19600	151
SB7b-32	5	2	15	A29PF2	1240	15400	10400	< 549	< 5750	235000	3590	1560	17400	166
SB7b-10	5	2	16	A06PF2	341	18500	15300	< 556	< 5820	223000	2580	4310	25900	158
blank	5	2	17	BLANKPF5	< 12	< 42.4	< 364	< 573	< 6000	< 782	< 438	44	< 2610	< 52.8
SB7Ref	5	2	18	SB7REFPF53	1460	16100	9390	< 568	< 5950	216000	< 435	2870	< 2590	293
Ustd	5	2	19	USTDPF53	7200	21700	8510	< 559	< 5850	208000	< 428	5870	18100	94.5

Table A-5. Average Measured Versus Target Compositions by Oxide by Glass ID

		Measured	Target	Difference of	% Difference of
				Measuserd versus	Measuserd versus
Glass ID	Oxide	(wt%)	(wt%)	Target	Target
SB7b-01	Al_2O_3	6.4432	6.3530	0.0902	1.4%
SB7b-01	B_2O_3	5.2042	5.4400	-0.2358	-4.3%
SB7b-01	BaO	0.0117	0.0090	0.0027	30.2%
SB7b-01	CaO	0.2106	0.2040	0.0066	3.2%
SB7b-01	Ce_2O_3	0.0239	0.0190	0.0049	25.9%
SB7b-01	Cr_2O_3	0.0132	0.0120	0.0012	9.9%
SB7b-01	CuO	0.0075	0.0050	0.0025	50.3%
SB7b-01	Fe_2O_3	11.6610	11.6000	0.0610	0.5%
SB7b-01	K_2O	0.0984	0.0130	0.0854	656.6%
SB7b-01	La_2O_3	0.0061	0.0030	0.0031	102.0%
SB7b-01	Li_2O	4.7391	4.8000	-0.0609	-1.3%
SB7b-01	MgO	0.0648	0.0530	0.0118	22.3%
SB7b-01	MnO	1.5075	1.5030	0.0045	0.3%
SB7b-01	Na_2O	16.0749	16.0360	0.0389	0.2%
SB7b-01	NiO	1.9819	2.0230	-0.0411	-2.0%
SB7b-01	PbO	0.0088	0.0030	0.0058	194.5%
SB7b-01	SiO_2	48.7760	48.1210	0.6550	1.4%
SB7b-01	SO_4	0.7445	0.7840	-0.0395	-5.0%
SB7b-01	ThO_2	0.8217	0.8620	-0.0403	-4.7%
SB7b-01	TiO_2	0.0104	0.0000	0.0104	
SB7b-01	U_3O_8	2.0518	2.1410	-0.0892	-4.2%
SB7b-01	ZnO	0.0172	0.0020	0.0152	761.2%
SB7b-01	ZrO_2	0.0396	0.0140	0.0256	183.2%
SB7b-01	Sum	100.5180	100.0000	0.5180	0.5%
SB7b-02	Al_2O_3	6.3818	6.3530	0.0288	0.5%
SB7b-02	B_2O_3	5.3088	5.4400	-0.1312	-2.4%
SB7b-02	BaO	0.0687	0.0700	-0.0013	-1.9%
SB7b-02	CaO	0.2064	0.2040	0.0024	1.2%
SB7b-02	Ce_2O_3	0.1179	0.1400	-0.0221	-15.8%
SB7b-02	Cr_2O_3	0.0791	0.0920	-0.0129	-14.1%
SB7b-02	CuO	0.0304	0.0390	-0.0086	-22.0%
SB7b-02	Fe_2O_3	11.4716	11.6000	-0.1284	-1.1%
SB7b-02	K_2O	0.1618	0.0950	0.0668	70.3%
SB7b-02	La_2O_3	0.0208	0.0230	-0.0022	-9.5%
SB7b-02	Li_2O	4.7687	4.8000	-0.0313	-0.7%
SB7b-02	MgO	0.4021	0.4040	-0.0019	-0.5%
SB7b-02	MnO	2.3451	2.3650	-0.0199	-0.8%
SB7b-02	Na_2O	14.8954	15.1620	-0.2666	-1.8%
SB7b-02	NiO	1.1572	1.1780	-0.0208	-1.8%
SB7b-02	PbO	0.0163	0.0220	-0.0057	-25.9%
SB7b-02	SiO_2	45.9415	46.4600	-0.5185	-1.1%
SB7b-02	SO_4	0.3655	0.5180	-0.1525	-29.4%
SB7b-02	ThO_2	0.8231	0.8620	-0.0389	-4.5%
SB7b-02	TiO_2	0.6899	0.7230	-0.0331	-4.6%
SB7b-02	U_3O_8	3.1190	3.3290	-0.2100	-6.3%
SB7b-02	ZnO	0.0253	0.0170	0.0083	48.8%
SB7b-02	ZrO_2	0.0990	0.1030	-0.0040	-3.8%
SB7b-02	Sum	98.4953	99.9990	-1.5037	-1.5%
SB7b-03	Al_2O_3	8.8665	8.8410	0.0255	0.3%
SB7b-03	B_2O_3	4.5401	4.8000	-0.2599	-5.4%
SB7b-03	BaO	0.0732	0.0700	0.0032	4.6%
SB7b-03	CaO	0.6674	0.6740	-0.0066	-1.0%
SB7b-03	Ce_2O_3	0.1305	0.1400	-0.0095	-6.8%
SB7b-03	Cr_2O_3	0.1568	0.0920	0.0648	70.4%
SB7b-03	CuO	0.0385	0.0390	-0.0005	-1.4%
SB7b-03	Fe_2O_3	7.3755	7.4740	-0.0985	-1.3%
SB7b-03	K_2O	0.1524	0.0950	0.0574	60.5%
SB7b-03	La_2O_3	0.0213	0.0230	-0.0017	-7.6%
SB7b-03	Li_2O	6.6874	6.8000	-0.1126	-1.7%
SB7b-03	MgO	0.4042	0.4040	0.0002	0.1%
SB7b-03	MnO	2.3532	2.3650	-0.0118	-0.5%

Table A-5. Average Measured Versus Target Compositions by Oxide by Glass ID

		Measured	Target	Difference of	% Difference of
				Measuserd versus	Measuserd versus
Glass ID	Oxide	(wt%)	(wt%)	Target	Target
SB7b-03	Na_2O	15.8390	16.0360	-0.1970	-1.2%
SB7b-03	NiO	1.9215	2.0230	-0.1015	-5.0%
SB7b-03	PbO	0.0153	0.0220	-0.0067	-30.6%
SB7b-03	SiO_2	45.2462	46.4600	-1.2138	-2.6%
SB7b-03	SO_4	0.5909	0.5180	0.0729	14.1%
SB7b-03	ThO_2	0.8425	0.8620	-0.0195	-2.3%
SB7b-03	TiO_2	0.0088	0.0000	0.0088	
SB7b-03	U_3O_8	2.0326	2.1410	-0.1084	-5.1%
SB7b-03	ZnO	0.0410	0.0170	0.0240	140.9%
SB7b-03	ZrO_2	0.0630	0.1030	-0.0400	-38.8%
SB7b-03	Sum	98.0676	99.9990	-1.9314	-1.9%
SB7b-04	Al_2O_3	10.1466	9.9000	0.2466	2.5%
SB7b-04	B_2O_3	4.6367	4.8000	-0.1633	-3.4%
SB7b-04	BaO	0.0123	0.0090	0.0033	36.6%
SB7b-04	CaO	0.2109	0.2040	0.0069	3.4%
SB7b-04	Ce_2O_3	0.0282	0.0190	0.0092	48.5%
SB7b-04	Cr_2O_3	0.0138	0.0120	0.0018	14.8%
SB7b-04	CuO	0.0311	0.0050	0.0261	521.8%
SB7b-04	Fe_2O_3	7.1467	7.4740	-0.3273	-4.4%
SB7b-04	K_2O	0.1193	0.0130	0.1063	817.8%
SB7b-04	La_2O_3	0.0085	0.0030	0.0055	183.3%
SB7b-04	Li_2O	4.7391	4.8000	-0.0609	-1.3%
SB7b-04	MgO	0.0618	0.0530	0.0088	16.6%
SB7b-04	MnO	2.4049	2.3650	0.0399	1.7%
SB7b-04	Na_2O	11.5557	11.4200	0.1357	1.2%
SB7b-04	NiO	1.1750	1.1780	-0.0030	-0.3%
SB7b-04	PbO	0.0116	0.0030	0.0086	287.6%
SB7b-04	SiO_2	53.3221	52.7510	0.5711	1.1%
SB7b-04	SO_4	0.9916	0.7840	0.2076	26.5%
SB7b-04	ThO_2	0.8314	0.8620	-0.0306	-3.6%
SB7b-04	TiO_2	0.0119	0.0000	0.0119	
SB7b-04	U_3O_8	3.1809	3.3290	-0.1481	-4.4%
SB7b-04	ZnO	0.0168	0.0020	0.0148	737.9%
SB7b-04	ZrO_2	0.0392	0.0140	0.0252	180.3%
SB7b-04	Sum	100.6960	100.0000	0.6960	0.7%
SB7b-05	Al_2O_3	6.4810	6.3530	0.1280	2.0%
SB7b-05	B_2O_3	5.1398	5.4400	-0.3002	-5.5%
SB7b-05	BaO	0.0720	0.0700	0.0020	2.9%
SB7b-05	CaO	0.6716	0.6740	-0.0024	-0.4%
SB7b-05	Ce_2O_3	0.1273	0.1400	-0.0127	-9.1%
SB7b-05	Cr_2O_3	0.0816	0.0920	-0.0104	-11.3%
SB7b-05	CuO	0.0442	0.0390	0.0052	13.3%
SB7b-05	Fe_2O_3	7.4023	7.4740	-0.0717	-1.0%
SB7b-05	K_2O	0.1672	0.0950	0.0722	76.0%
SB7b-05	La_2O_3	0.0220	0.0230	-0.0010	-4.5%
SB7b-05	Li_2O	4.7229	4.8000	-0.0771	-1.6%
SB7b-05	MgO	0.4055	0.4040	0.0015	0.4%
SB7b-05	MnO	1.4930	1.5030	-0.0100	-0.7%
SB7b-05	Na_2O	15.1650	15.2040	-0.0390	-0.3%
SB7b-05	NiO	1.1744	1.1780	-0.0036	-0.3%
SB7b-05	PbO	0.0238	0.0220	0.0018	8.2%
SB7b-05	SiO_2	51.7711	52.1940	-0.4229	-0.8%
SB7b-05	SO_4	0.6246	0.5180	0.1066	20.6%
SB7b-05	ThO_2	0.3476	0.3270	0.0206	6.3%
SB7b-05	TiO_2	0.0089	0.0000	0.0089	
SB7b-05	U_3O_8	3.1308	3.3290	-0.1982	-6.0%
SB7b-05	ZnO	0.0248	0.0170	0.0078	46.0%
SB7b-05	ZrO_2	0.0729	0.1030	-0.0301	-29.2%
SB7b-05	Sum	99.1742	99.9990	-0.8248	-0.8%
SB7b-06	Al_2O_3	10.0380	9.9000	0.1380	1.4%
SB7b-06	B_2O_3	5.2605	5.4400	-0.1795	-3.3%

Table A-5. Average Measured Versus Target Compositions by Oxide by Glass ID

		Measured	Target	Difference of	% Difference of
				Measuserd versus	Measuserd versus
Glass ID	Oxide	(wt%)	(wt%)	Target	Target
SB7b-06	BaO	0.0706	0.0700	0.0006	0.9%
SB7b-06	CaO	0.2071	0.2040	0.0031	1.5%
SB7b-06	Ce_2O_3	0.1237	0.1400	-0.0163	-11.7%
SB7b-06	Cr_2O_3	0.0751	0.0920	-0.0169	-18.4%
SB7b-06	CuO	0.0431	0.0390	0.0041	10.6%
SB7b-06	Fe_2O_3	11.1803	11.6000	-0.4197	-3.6%
SB7b-06	K_2O	0.1508	0.0950	0.0558	58.8%
SB7b-06	La_2O_3	0.0219	0.0230	-0.0011	-4.9%
SB7b-06	Li_2O	6.7763	6.8000	-0.0237	-0.3%
SB7b-06	MgO	0.4063	0.4040	0.0023	0.6%
SB7b-06	MnO	2.3758	2.3650	0.0108	0.5%
SB7b-06	Na_2O	10.9491	11.0670	-0.1179	-1.1%
SB7b-06	NiO	1.8467	1.9060	-0.0593	-3.1%
SB7b-06	PbO	0.0195	0.0220	-0.0025	-11.5%
SB7b-06	SiO_2	45.9950	46.4600	-0.4650	-1.0%
SB7b-06	SO_4	0.7759	0.7840	-0.0081	-1.0%
SB7b-06	ThO_2	0.3388	0.3270	0.0118	3.6%
SB7b-06	TiO_2	0.0077	0.0000	0.0077	
SB7b-06	U_3O_8	1.9958	2.1410	-0.1452	-6.8%
SB7b-06	ZnO	0.0317	0.0170	0.0147	86.5%
SB7b-06	ZrO_2	0.0630	0.1030	-0.0400	-38.9%
SB7b-06	Sum	98.7526	99.9990	-1.2464	-1.2%
SB7b-07	Al_2O_3	9.9128	9.9000	0.0128	0.1%
SB7b-07	B_2O_3	4.5401	4.8000	-0.2599	-5.4%
SB7b-07	BaO	0.0098	0.0090	0.0008	8.4%
SB7b-07	CaO	0.2102	0.2040	0.0062	3.1%
SB7b-07	Ce_2O_3	0.0261	0.0190	0.0071	37.6%
SB7b-07	Cr_2O_3	0.0151	0.0120	0.0031	25.9%
SB7b-07	CuO	0.0081	0.0050	0.0031	61.9%
SB7b-07	Fe_2O_3	7.4541	7.4740	-0.0199	-0.3%
SB7b-07	K_2O	0.0779	0.0130	0.0649	499.1%
SB7b-07	La_2O_3	0.0053	0.0030	0.0023	75.5%
SB7b-07	Li_2O	6.7090	6.8000	-0.0910	-1.3%
SB7b-07	MgO	0.0596	0.0530	0.0066	12.4%
SB7b-07	MnO	1.4946	1.5030	-0.0084	-0.6%
SB7b-07	Na_2O	15.7042	16.0360	-0.3318	-2.1%
SB7b-07	NiO	1.1483	1.1780	-0.0297	-2.5%
SB7b-07	PbO	0.0030	0.0030	0.0000	0.7%
SB7b-07	SiO_2	48.5621	48.2630	0.2991	0.6%
SB7b-07	SO_4	0.3045	0.5180	-0.2135	-41.2%
SB7b-07	ThO_2	0.3284	0.3270	0.0014	0.4%
SB7b-07	TiO_2	0.6843	0.7230	-0.0387	-5.4%
SB7b-07	U_3O_8	1.9928	2.1410	-0.1482	-6.9%
SB7b-07	ZnO	0.0114	0.0020	0.0094	470.5%
SB7b-07	ZrO_2	0.0233	0.0140	0.0093	66.4%
SB7b-07	Sum	99.2849	100.0000	-0.7151	-0.7%
SB7b-08	Al_2O_3	6.4361	6.3530	0.0831	1.3%
SB7b-08	B_2O_3	4.5562	4.8000	-0.2438	-5.1%
SB7b-08	BaO	0.0112	0.0090	0.0022	24.9%
SB7b-08	CaO	0.6699	0.6740	-0.0041	-0.6%
SB7b-08	Ce_2O_3	0.0243	0.0190	0.0053	28.0%
SB7b-08	Cr_2O_3	0.0147	0.0120	0.0027	22.3%
SB7b-08	CuO	0.0087	0.0050	0.0037	74.0%
SB7b-08	Fe_2O_3	11.4716	11.4740	-0.0024	0.0%
SB7b-08	K_2O	0.1251	0.0130	0.1121	862.5%
SB7b-08	La_2O_3	0.0076	0.0030	0.0046	151.7%
SB7b-08	Li_2O	6.7332	6.8000	-0.0668	-1.0%
SB7b-08	MgO	0.0615	0.0530	0.0085	16.0%
SB7b-08	MnO	2.3581	2.3650	-0.0069	-0.3%
SB7b-08	Na_2O	15.1987	15.3230	-0.1243	-0.8%
SB7b-08	NiO	1.1637	1.1780	-0.0143	-1.2%

Table A-5. Average Measured Versus Target Compositions by Oxide by Glass ID

		Measured	Target	Difference of	% Difference of
				Measuserd versus	Measuserd versus
Glass ID	Oxide	(wt%)	(wt%)	Target	Target
SB7b-08	PbO	0.0030	0.0030	0.0000	-1.0%
SB7b-08	SiO_2	46.6902	46.4600	0.2302	0.5%
SB7b-08	SO_4	0.7872	0.7840	0.0032	0.4%
SB7b-08	ThO_2	0.3399	0.3270	0.0129	4.0%
SB7b-08	TiO_2	0.0106	0.0000	0.0106	
SB7b-08	U_3O_8	3.1735	3.3290	-0.1555	-4.7%
SB7b-08	ZnO	0.0134	0.0020	0.0114	571.0%
SB7b-08	ZrO_2	0.0241	0.0140	0.0101	72.0%
SB7b-08	Sum	99.8824	100.0000	-0.1176	-0.1%
SB7b-09	Al_2O_3	10.0262	9.9000	0.1262	1.3%
SB7b-09	B_2O_3	5.2444	5.4400	-0.1956	-3.6%
SB7b-09	BaO	0.0097	0.0090	0.0007	7.5%
SB7b-09	CaO	0.6797	0.6740	0.0057	0.8%
SB7b-09	Ce_2O_3	0.0277	0.0190	0.0087	45.8%
SB7b-09	Cr_2O_3	0.0133	0.0120	0.0013	11.0%
SB7b-09	CuO	0.0225	0.0050	0.0175	349.4%
SB7b-09	Fe_2O_3	11.0552	11.2910	-0.2358	-2.1%
SB7b-09	K_2O	0.0764	0.0130	0.0634	487.6%
SB7b-09	La_2O_3	0.0083	0.0030	0.0053	178.0%
SB7b-09	Li_2O	6.8166	6.8000	0.0166	0.2%
SB7b-09	MgO	0.0546	0.0530	0.0016	3.1%
SB7b-09	MnO	1.5220	1.5030	0.0190	1.3%
SB7b-09	Na_2O	11.2019	11.0670	0.1349	1.2%
SB7b-09	NiO	1.9326	2.0230	-0.0904	-4.5%
SB7b-09	PbO	0.0061	0.0030	0.0031	102.3%
SB7b-09	SiO_2	47.3320	46.4600	0.8720	1.9%
SB7b-09	SO_4	0.4928	0.5180	-0.0252	-4.9%
SB7b-09	ThO_2	0.8561	0.8620	-0.0059	-0.7%
SB7b-09	TiO_2	0.0109	0.0000	0.0109	
SB7b-09	U_3O_8	3.2531	3.3290	-0.0759	-2.3%
SB7b-09	ZnO	0.0185	0.0020	0.0165	824.3%
SB7b-09	ZrO_2	0.0428	0.0140	0.0288	205.6%
SB7b-09	Sum	100.7034	100.0000	0.7034	0.7%
SB7b-10	Al_2O_3	9.9459	9.9000	0.0459	0.5%
SB7b-10	B_2O_3	5.1518	5.4400	-0.2882	-5.3%
SB7b-10	BaO	0.0117	0.0090	0.0027	30.5%
SB7b-10	CaO	0.6776	0.6740	0.0036	0.5%
SB7b-10	Ce_2O_3	0.0279	0.0190	0.0089	47.0%
SB7b-10	Cr_2O_3	0.0133	0.0120	0.0013	11.1%
SB7b-10	CuO	0.0164	0.0050	0.0114	227.0%
SB7b-10	Fe_2O_3	7.3898	7.4740	-0.0842	-1.1%
SB7b-10	K_2O	0.0959	0.0130	0.0829	637.8%
SB7b-10	La_2O_3	0.0086	0.0030	0.0056	187.0%
SB7b-10	Li_2O	4.7471	4.8000	-0.0529	-1.1%
SB7b-10	MgO	0.0588	0.0530	0.0058	10.9%
SB7b-10	MnO	2.3887	2.3650	0.0237	1.0%
SB7b-10	Na_2O	15.6031	15.5680	0.0351	0.2%
SB7b-10	NiO	1.9485	2.0230	-0.0745	-3.7%
SB7b-10	PbO	0.0030	0.0030	0.0000	1.3%
SB7b-10	SiO_2	47.2250	46.4600	0.7650	1.6%
SB7b-10	SO_4	0.7557	0.7840	-0.0283	-3.6%
SB7b-10	ThO_2	0.3370	0.3270	0.0100	3.0%
SB7b-10	TiO_2	0.6908	0.7230	-0.0322	-4.5%
SB7b-10	U_3O_8	3.1470	3.3290	-0.1820	-5.5%
SB7b-10	ZnO	0.0183	0.0020	0.0163	817.3%
SB7b-10	ZrO_2	0.0198	0.0140	0.0058	41.4%
SB7b-10	Sum	100.2818	100.0000	0.2818	0.3%
SB7b-11	Al_2O_3	9.9931	9.9000	0.0931	0.9%
SB7b-11	B_2O_3	4.5803	4.8000	-0.2197	-4.6%
SB7b-11	BaO	0.0705	0.0700	0.0005	0.7%
SB7b-11	CaO	0.6660	0.6740	-0.0080	-1.2%

Table A-5. Average Measured Versus Target Compositions by Oxide by Glass ID

		Measured	Target	Difference of	% Difference of
				Measuserd versus	Measuserd versus
Glass ID	Oxide	(wt%)	(wt%)	Target	Target
SB7b-11	Ce_2O_3	0.1218	0.1400	-0.0182	-13.0%
SB7b-11	Cr_2O_3	0.0842	0.0920	-0.0078	-8.5%
SB7b-11	CuO	0.0389	0.0390	-0.0001	-0.2%
SB7b-11	Fe_2O_3	11.3429	11.6000	-0.2571	-2.2%
SB7b-11	K_2O	0.1648	0.0950	0.0698	73.5%
SB7b-11	La_2O_3	0.0220	0.0230	-0.0010	-4.3%
SB7b-11	Li_2O	4.7122	4.8000	-0.0878	-1.8%
SB7b-11	MgO	0.4026	0.4040	-0.0014	-0.4%
SB7b-11	MnO	1.4865	1.5030	-0.0165	-1.1%
SB7b-11	Na_2O	13.3654	13.5690	-0.2036	-1.5%
SB7b-11	NiO	1.1254	1.1780	-0.0526	-4.5%
SB7b-11	PbO	0.0188	0.0220	-0.0032	-14.4%
SB7b-11	SiO_2	46.3693	46.4600	-0.0907	-0.2%
SB7b-11	SO_4	0.4546	0.7840	-0.3294	-42.0%
SB7b-11	ThO_2	0.8342	0.8620	-0.0278	-3.2%
SB7b-11	TiO_2	0.6837	0.7230	-0.0393	-5.4%
SB7b-11	U_3O_8	2.0223	2.1410	-0.1187	-5.5%
SB7b-11	ZnO	0.0234	0.0170	0.0064	37.5%
SB7b-11	ZrO_2	0.1045	0.1030	0.0015	1.4%
SB7b-11	Sum	98.6874	99.9990	-1.3116	-1.3%
SB7b-12	Al_2O_3	6.5329	6.3530	0.1799	2.8%
SB7b-12	B_2O_3	4.5723	4.8000	-0.2277	-4.7%
SB7b-12	BaO	0.0120	0.0090	0.0030	33.9%
SB7b-12	CaO	0.6779	0.6740	0.0039	0.6%
SB7b-12	Ce_2O_3	0.0226	0.0190	0.0036	19.1%
SB7b-12	Cr_2O_3	0.0145	0.0120	0.0025	20.5%
SB7b-12	CuO	0.0315	0.0050	0.0265	529.0%
SB7b-12	Fe_2O_3	11.3947	11.6000	-0.2053	-1.8%
SB7b-12	K_2O	0.1255	0.0130	0.1125	865.4%
SB7b-12	La_2O_3	0.0058	0.0030	0.0028	93.5%
SB7b-12	Li_2O	4.7741	4.8000	-0.0259	-0.5%
SB7b-12	MgO	0.0608	0.0530	0.0078	14.7%
SB7b-12	MnO	2.3645	2.3650	-0.0005	0.0%
SB7b-12	Na_2O	11.0098	11.0670	-0.0572	-0.5%
SB7b-12	NiO	1.9803	2.0230	-0.0427	-2.1%
SB7b-12	PbO	0.0030	0.0030	0.0000	1.4%
SB7b-12	SiO_2	52.4129	52.4760	-0.0632	-0.1%
SB7b-12	SO_4	0.2411	0.5180	-0.2769	-53.4%
SB7b-12	ThO_2	0.3368	0.3270	0.0098	3.0%
SB7b-12	TiO_2	0.6685	0.7230	-0.0545	-7.5%
SB7b-12	U_3O_8	2.0607	2.1410	-0.0803	-3.8%
SB7b-12	ZnO	0.0206	0.0020	0.0186	930.1%
SB7b-12	ZrO_2	0.0179	0.0140	0.0039	28.1%
SB7b-12	Sum	99.3407	100.0000	-0.6593	-0.7%
SB7b-13	Al_2O_3	6.4621	6.3530	0.1091	1.7%
SB7b-13	B_2O_3	4.5280	4.8000	-0.2720	-5.7%
SB7b-13	BaO	0.0715	0.0700	0.0015	2.1%
SB7b-13	CaO	0.2046	0.2040	0.0006	0.3%
SB7b-13	Ce_2O_3	0.1328	0.1400	-0.0072	-5.1%
SB7b-13	Cr_2O_3	0.0815	0.0920	-0.0105	-11.5%
SB7b-13	CuO	0.1338	0.0390	0.0948	243.0%
SB7b-13	Fe_2O_3	7.9545	8.1140	-0.1595	-2.0%
SB7b-13	K_2O	0.1417	0.0950	0.0467	49.2%
SB7b-13	La_2O_3	0.0224	0.0230	-0.0006	-2.6%
SB7b-13	Li_2O	6.6336	6.8000	-0.1664	-2.4%
SB7b-13	MgO	0.4011	0.4040	-0.0029	-0.7%
SB7b-13	MnO	1.4930	1.5030	-0.0100	-0.7%
SB7b-13	Na_2O	10.8480	11.0670	-0.2190	-2.0%
SB7b-13	NiO	1.9692	2.0230	-0.0538	-2.7%
SB7b-13	PbO	0.0173	0.0220	-0.0047	-21.5%
SB7b-13	SiO_2	50.9153	52.4320	-1.5167	-2.9%

Table A-5. Average Measured Versus Target Compositions by Oxide by Glass ID

		Measured	Target	Difference of	% Difference of
				Measuserd versus	Measuserd versus
Glass ID	Oxide	(wt%)	(wt%)	Target	Target
SB7b-13	SO_4	0.5018	0.7840	-0.2822	-36.0%
SB7b-13	ThO_2	0.8499	0.8620	-0.0121	-1.4%
SB7b-13	TiO_2	0.6799	0.7230	-0.0431	-6.0%
SB7b-13	U_3O_8	3.1514	3.3290	-0.1776	-5.3%
SB7b-13	ZnO	0.0491	0.0170	0.0321	188.9%
SB7b-13	ZrO_2	0.0913	0.1030	-0.0117	-11.3%
SB7b-13	Sum	97.3338	99.9990	-2.6652	-2.7%
SB7b-14	Al_2O_3	6.5070	6.3530	0.1540	2.4%
SB7b-14	B_2O_3	5.1881	5.4400	-0.2519	-4.6%
SB7b-14	BaO	0.0125	0.0090	0.0035	39.4%
SB7b-14	CaO	0.6790	0.6740	0.0050	0.7%
SB7b-14	Ce_2O_3	0.0225	0.0190	0.0035	18.5%
SB7b-14	Cr_2O_3	0.0130	0.0120	0.0010	8.7%
SB7b-14	CuO	0.0639	0.0050	0.0589	1177.5%
SB7b-14	Fe_2O_3	7.4791	7.4740	0.0051	0.1%
SB7b-14	K_2O	0.0775	0.0130	0.0645	496.5%
SB7b-14	La_2O_3	0.0066	0.0030	0.0036	118.5%
SB7b-14	Li_2O	6.7332	6.8000	-0.0668	-1.0%
SB7b-14	MgO	0.0607	0.0530	0.0077	14.6%
SB7b-14	MnO	2.3936	2.3650	0.0286	1.2%
SB7b-14	Na_2O	12.4151	12.3220	0.0931	0.8%
SB7b-14	NiO	1.1844	1.1780	0.0064	0.5%
SB7b-14	PbO	0.0030	0.0030	0.0000	0.9%
SB7b-14	SiO_2	52.7337	52.7510	-0.0173	0.0%
SB7b-14	SO_4	0.5879	0.7840	-0.1961	-25.0%
SB7b-14	ThO_2	0.7950	0.8620	-0.0670	-7.8%
SB7b-14	TiO_2	0.6764	0.7230	-0.0466	-6.4%
SB7b-14	U_3O_8	2.0385	2.1410	-0.1025	-4.8%
SB7b-14	ZnO	0.0227	0.0020	0.0207	1035.1%
SB7b-14	ZrO_2	0.0364	0.0140	0.0224	160.3%
SB7b-14	Sum	99.7299	100.0000	-0.2701	-0.3%
SB7b-15	Al_2O_3	7.3029	7.2400	0.0629	0.9%
SB7b-15	B_2O_3	4.7534	4.9600	-0.2066	-4.2%
SB7b-15	BaO	0.0263	0.0250	0.0013	5.0%
SB7b-15	CaO	0.5593	0.5570	0.0023	0.4%
SB7b-15	Ce_2O_3	0.0351	0.0490	-0.0139	-28.3%
SB7b-15	Cr_2O_3	0.0306	0.0320	-0.0014	-4.5%
SB7b-15	CuO	0.0478	0.0140	0.0338	241.2%
SB7b-15	Fe_2O_3	8.5871	8.5060	0.0811	1.0%
SB7b-15	K_2O	0.1311	0.0330	0.0981	297.2%
SB7b-15	La_2O_3	0.0092	0.0080	0.0012	15.1%
SB7b-15	Li_2O	5.2531	5.3000	-0.0469	-0.9%
SB7b-15	MgO	0.1452	0.1410	0.0042	3.0%
SB7b-15	MnO	1.7318	1.7190	0.0128	0.7%
SB7b-15	Na_2O	14.8280	14.7940	0.0340	0.2%
SB7b-15	NiO	1.3902	1.3890	0.0012	0.1%
SB7b-15	PbO	0.0029	0.0080	-0.0051	-63.2%
SB7b-15	SiO_2	48.6691	50.4310	-1.7619	-3.5%
SB7b-15	SO_4	0.7445	0.7180	0.0265	3.7%
SB7b-15	ThO_2	0.4466	0.4610	-0.0144	-3.1%
SB7b-15	TiO_2	0.5104	0.5420	-0.0316	-5.8%
SB7b-15	U_3O_8	2.8301	3.0320	-0.2019	-6.7%
SB7b-15	ZnO	0.0204	0.0060	0.0144	240.5%
SB7b-15	ZrO_2	0.0365	0.0360	0.0005	1.3%
SB7b-15	Sum	98.0915	100.0010	-1.9095	-1.9%
SB7b-16	Al_2O_3	9.0413	9.0130	0.0283	0.3%
SB7b-16	B_2O_3	4.7292	4.9600	-0.2308	-4.7%
SB7b-16	BaO	0.0571	0.0550	0.0021	3.7%
SB7b-16	CaO	0.3243	0.3220	0.0023	0.7%
SB7b-16	Ce_2O_3	0.0972	0.1100	-0.0128	-11.7%
SB7b-16	Cr_2O_3	0.0586	0.0720	-0.0134	-18.6%

Table A-5. Average Measured Versus Target Compositions by Oxide by Glass ID

		Measured	Target	Difference of	% Difference of
				Measuserd versus	Measuserd versus
Glass ID	Oxide	(wt%)	(wt%)	Target	Target
SB7b-16	CuO	0.0444	0.0310	0.0134	43.3%
SB7b-16	Fe_2O_3	10.3725	10.4140	-0.0415	-0.4%
SB7b-16	K_2O	0.1094	0.0750	0.0344	45.9%
SB7b-16	La_2O_3	0.0189	0.0180	0.0009	5.2%
SB7b-16	Li_2O	6.2004	6.3000	-0.0996	-1.6%
SB7b-16	MgO	0.3165	0.3160	0.0005	0.2%
SB7b-16	MnO	1.7205	1.7190	0.0015	0.1%
SB7b-16	Na_2O	12.1859	12.3090	-0.1231	-1.0%
SB7b-16	NiO	1.3823	1.3890	-0.0067	-0.5%
SB7b-16	PbO	0.0122	0.0170	-0.0048	-28.2%
SB7b-16	SiO_2	47.9203	48.0330	-0.1127	-0.2%
SB7b-16	SO_4	0.7183	0.7180	0.0003	0.0%
SB7b-16	ThO_2	0.4563	0.4610	-0.0047	-1.0%
SB7b-16	TiO_2	0.5204	0.5420	-0.0216	-4.0%
SB7b-16	U_3O_8	2.8124	3.0320	-0.2196	-7.2%
SB7b-16	ZnO	0.0279	0.0130	0.0149	114.2%
SB7b-16	ZrO_2	0.0621	0.0810	-0.0189	-23.3%
SB7b-16	Sum	99.1882	100.0000	-0.8118	-0.8%
SB7b-17	Al_2O_3	7.3147	7.2400	0.0747	1.0%
SB7b-17	B_2O_3	5.0069	5.2800	-0.2731	-5.2%
SB7b-17	BaO	0.0586	0.0550	0.0036	6.6%
SB7b-17	CaO	0.3243	0.3220	0.0023	0.7%
SB7b-17	Ce_2O_3	0.1021	0.1100	-0.0079	-7.2%
SB7b-17	Cr_2O_3	0.0677	0.0720	-0.0043	-6.0%
SB7b-17	CuO	0.0473	0.0310	0.0163	52.6%
SB7b-17	Fe_2O_3	8.5174	8.5060	0.0114	0.1%
SB7b-17	K_2O	0.1507	0.0750	0.0757	100.9%
SB7b-17	La_2O_3	0.0177	0.0180	-0.0003	-1.5%
SB7b-17	Li_2O	6.2138	6.3000	-0.0862	-1.4%
SB7b-17	MgO	0.3184	0.3160	0.0024	0.8%
SB7b-17	MnO	1.7238	1.7190	0.0048	0.3%
SB7b-17	Na_2O	12.6476	12.8290	-0.1814	-1.4%
SB7b-17	NiO	1.7926	1.8120	-0.0194	-1.1%
SB7b-17	PbO	0.0123	0.0170	-0.0047	-27.5%
SB7b-17	SiO_2	51.7711	51.1780	0.5931	1.2%
SB7b-17	SO_4	0.5318	0.5850	-0.0532	-9.1%
SB7b-17	ThO_2	0.4428	0.4610	-0.0182	-4.0%
SB7b-17	TiO_2	0.5098	0.5420	-0.0322	-5.9%
SB7b-17	U_3O_8	2.2641	2.4380	-0.1739	-7.1%
SB7b-17	ZnO	0.0299	0.0130	0.0169	130.3%
SB7b-17	ZrO_2	0.0472	0.0810	-0.0338	-41.7%
SB7b-17	Sum	99.9126	100.0000	-0.0874	-0.1%
SB7b-18	Al_2O_3	7.3832	7.2400	0.1432	2.0%
SB7b-18	B_2O_3	4.7534	4.9600	-0.2066	-4.2%
SB7b-18	BaO	0.0566	0.0550	0.0016	2.9%
SB7b-18	CaO	0.5653	0.5570	0.0083	1.5%
SB7b-18	Ce_2O_3	0.0935	0.1100	-0.0165	-15.0%
SB7b-18	Cr_2O_3	0.0698	0.0720	-0.0022	-3.0%
SB7b-18	CuO	0.0355	0.0310	0.0045	14.5%
SB7b-18	Fe_2O_3	10.6477	10.5690	0.0787	0.7%
SB7b-18	K_2O	0.1530	0.0750	0.0780	104.0%
SB7b-18	La_2O_3	0.0194	0.0180	0.0014	7.7%
SB7b-18	Li_2O	5.2719	5.3000	-0.0281	-0.5%
SB7b-18	MgO	0.3213	0.3160	0.0053	1.7%
SB7b-18	MnO	2.1611	2.1500	0.0111	0.5%
SB7b-18	Na_2O	14.2214	14.1650	0.0564	0.4%
SB7b-18	NiO	1.8101	1.8120	-0.0019	-0.1%
SB7b-18	PbO	0.0151	0.0170	-0.0019	-11.4%
SB7b-18	SiO_2	47.8134	48.0330	-0.2196	-0.5%
SB7b-18	SO_4	0.3827	0.7180	-0.3353	-46.7%
SB7b-18	ThO_2	0.7186	0.7280	-0.0094	-1.3%

Table A-5. Average Measured Versus Target Compositions by Oxide by Glass ID

		Measured	Target	Difference of	% Difference of
				Measuserd versus	Measuserd versus
Glass ID	Oxide	(wt%)	(wt%)	Target	Target
SB7b-18	TiO_2	0.5204	0.5420	-0.0216	-4.0%
SB7b-18	U_3O_8	2.3378	2.4380	-0.1002	-4.1%
SB7b-18	ZnO	0.0256	0.0130	0.0126	96.7%
SB7b-18	ZrO_2	0.0697	0.0810	-0.0113	-13.9%
SB7b-18	Sum	99.4464	100.0000	-0.5536	-0.6%
SB7b-19	Al_2O_3	9.1499	9.0130	0.1369	1.5%
SB7b-19	B_2O_3	4.7695	4.9600	-0.1905	-3.8%
SB7b-19	BaO	0.0589	0.0550	0.0039	7.2%
SB7b-19	CaO	0.3439	0.3220	0.0219	6.8%
SB7b-19	Ce_2O_3	0.1036	0.1100	-0.0064	-5.8%
SB7b-19	Cr_2O_3	0.0619	0.0720	-0.0101	-14.1%
SB7b-19	CuO	0.0378	0.0310	0.0068	21.9%
SB7b-19	Fe_2O_3	8.4996	8.5060	-0.0064	-0.1%
SB7b-19	K_2O	0.1089	0.0750	0.0339	45.2%
SB7b-19	La_2O_3	0.0190	0.0180	0.0010	5.3%
SB7b-19	Li_2O	5.3123	5.3000	0.0123	0.2%
SB7b-19	MgO	0.3227	0.3160	0.0067	2.1%
SB7b-19	MnO	1.7593	1.7190	0.0403	2.3%
SB7b-19	Na_2O	15.1650	14.7940	0.3710	2.5%
SB7b-19	NiO	1.3807	1.3890	-0.0083	-0.6%
SB7b-19	PbO	0.0148	0.0170	-0.0022	-13.0%
SB7b-19	SiO_2	48.5086	49.2770	-0.7684	-1.6%
SB7b-19	SO_4	0.5677	0.5850	-0.0173	-3.0%
SB7b-19	ThO_2	0.7059	0.7280	-0.0221	-3.0%
SB7b-19	TiO_2	0.1837	0.1810	0.0027	1.5%
SB7b-19	U_3O_8	2.3201	2.4380	-0.1179	-4.8%
SB7b-19	ZnO	0.0241	0.0130	0.0111	85.4%
SB7b-19	ZrO_2	0.0687	0.0810	-0.0123	-15.2%
SB7b-19	Sum	99.4864	100.0000	-0.5136	-0.5%
SB7b-20	Al_2O_3	9.0696	9.0130	0.0566	0.6%
SB7b-20	B_2O_3	4.6930	4.9600	-0.2670	-5.4%
SB7b-20	BaO	0.0279	0.0250	0.0029	11.4%
SB7b-20	CaO	0.3208	0.3220	-0.0012	-0.4%
SB7b-20	Ce_2O_3	0.0412	0.0490	-0.0078	-15.9%
SB7b-20	Cr_2O_3	0.0231	0.0320	-0.0089	-27.8%
SB7b-20	CuO	0.0213	0.0140	0.0073	52.0%
SB7b-20	Fe_2O_3	8.5550	8.8070	-0.2520	-2.9%
SB7b-20	K_2O	0.1279	0.0330	0.0949	287.7%
SB7b-20	La_2O_3	0.0104	0.0080	0.0024	29.6%
SB7b-20	Li_2O	5.1589	5.3000	-0.1411	-2.7%
SB7b-20	MgO	0.1435	0.1410	0.0025	1.8%
SB7b-20	MnO	2.1321	2.1500	-0.0179	-0.8%
SB7b-20	Na_2O	12.0579	12.3090	-0.2511	-2.0%
SB7b-20	NiO	1.7258	1.8120	-0.0862	-4.8%
SB7b-20	PbO	0.0040	0.0080	-0.0040	-49.9%
SB7b-20	SiO_2	51.5571	51.1780	0.3791	0.7%
SB7b-20	SO_4	0.6231	0.7180	-0.0949	-13.2%
SB7b-20	ThO_2	0.4475	0.4610	-0.0135	-2.9%
SB7b-20	TiO_2	0.1740	0.1810	-0.0070	-3.9%
SB7b-20	U_3O_8	2.2596	2.4380	-0.1784	-7.3%
SB7b-20	ZnO	0.0210	0.0060	0.0150	250.6%
SB7b-20	ZrO_2	0.0394	0.0360	0.0034	9.6%
SB7b-20	Sum	99.2341	100.0010	-0.7669	-0.8%
SB7b-21	Al_2O_3	7.3761	7.2400	0.1361	1.9%
SB7b-21	B_2O_3	5.0713	5.2800	-0.2087	-4.0%
SB7b-21	BaO	0.0576	0.0550	0.0026	4.6%
SB7b-21	CaO	0.5646	0.5570	0.0076	1.4%
SB7b-21	Ce_2O_3	0.1026	0.1100	-0.0074	-6.7%
SB7b-21	Cr_2O_3	0.0574	0.0720	-0.0146	-20.3%
SB7b-21	CuO	0.0379	0.0310	0.0069	22.4%
SB7b-21	Fe_2O_3	8.4871	8.5060	-0.0189	-0.2%

Table A-5. Average Measured Versus Target Compositions by Oxide by Glass ID

		Measured	Target	Difference of	% Difference of
				Measuserd versus	Measuserd versus
Glass ID	Oxide	(wt%)	(wt%)	Target	Target
SB7b-21	K_2O	0.1095	0.0750	0.0345	46.0%
SB7b-21	La_2O_3	0.0184	0.0180	0.0004	2.4%
SB7b-21	Li_2O	6.3026	6.3000	0.0026	0.0%
SB7b-21	MgO	0.3207	0.3160	0.0047	1.5%
SB7b-21	MnO	2.1660	2.1500	0.0160	0.7%
SB7b-21	Na_2O	12.4623	12.3090	0.1533	1.2%
SB7b-21	NiO	1.3791	1.3890	-0.0099	-0.7%
SB7b-21	PbO	0.0155	0.0170	-0.0015	-8.9%
SB7b-21	SiO_2	48.2947	50.8220	-2.5273	-5.0%
SB7b-21	SO_4	0.6276	0.7180	-0.0904	-12.6%
SB7b-21	ThO_2	0.7118	0.7280	-0.0162	-2.2%
SB7b-21	TiO_2	0.1814	0.1810	0.0004	0.2%
SB7b-21	U_3O_8	2.8787	3.0320	-0.1533	-5.1%
SB7b-21	ZnO	0.0239	0.0130	0.0109	83.5%
SB7b-21	ZrO_2	0.0811	0.0810	0.0001	0.1%
SB7b-21	Sum	97.3278	100.0000	-2.6722	-2.7%
SB7b-22	Al_2O_3	7.3974	7.2400	0.1574	2.2%
SB7b-22	B_2O_3	4.8057	4.9600	-0.1543	-3.1%
SB7b-22	BaO	0.0272	0.0250	0.0022	8.8%
SB7b-22	CaO	0.5723	0.5570	0.0153	2.7%
SB7b-22	Ce_2O_3	0.0375	0.0490	-0.0115	-23.5%
SB7b-22	Cr_2O_3	0.0144	0.0320	-0.0176	-55.0%
SB7b-22	CuO	0.0243	0.0140	0.0103	73.9%
SB7b-22	Fe_2O_3	9.9704	10.5690	-0.5986	-5.7%
SB7b-22	K_2O	0.1390	0.0330	0.1060	321.1%
SB7b-22	La_2O_3	0.0097	0.0080	0.0017	21.6%
SB7b-22	Li_2O	6.3215	6.3000	0.0215	0.3%
SB7b-22	MgO	0.1479	0.1410	0.0069	4.9%
SB7b-22	MnO	1.7480	1.7190	0.0290	1.7%
SB7b-22	Na_2O	12.4387	12.3090	0.1297	1.1%
SB7b-22	NiO	1.3870	1.3890	-0.0020	-0.1%
SB7b-22	PbO	0.0039	0.0080	-0.0041	-51.8%
SB7b-22	SiO_2	49.7922	50.9410	-1.1488	-2.3%
SB7b-22	SO_4	0.7497	0.5850	0.1647	28.2%
SB7b-22	ThO_2	0.4476	0.4610	-0.0134	-2.9%
SB7b-22	TiO_2	0.1820	0.1810	0.0010	0.6%
SB7b-22	U_3O_8	2.2980	2.4380	-0.1400	-5.7%
SB7b-22	ZnO	0.0176	0.0060	0.0116	193.0%
SB7b-22	ZrO_2	0.0316	0.0360	-0.0044	-12.2%
SB7b-22	Sum	98.5634	100.0010	-1.4376	-1.4%
SB7b-23	Al_2O_3	9.1641	9.0130	0.1511	1.7%
SB7b-23	B_2O_3	4.7252	4.9600	-0.2348	-4.7%
SB7b-23	BaO	0.0260	0.0250	0.0010	3.8%
SB7b-23	CaO	0.5586	0.5570	0.0016	0.3%
SB7b-23	Ce_2O_3	0.0466	0.0490	-0.0024	-5.0%
SB7b-23	Cr_2O_3	0.0252	0.0320	-0.0068	-21.3%
SB7b-23	CuO	0.0278	0.0140	0.0138	98.4%
SB7b-23	Fe_2O_3	8.2780	8.5060	-0.2280	-2.7%
SB7b-23	K_2O	0.0896	0.0330	0.0566	171.4%
SB7b-23	La_2O_3	0.0103	0.0080	0.0023	29.4%
SB7b-23	Li_2O	6.2730	6.3000	-0.0270	-0.4%
SB7b-23	MgO	0.1469	0.1410	0.0059	4.2%
SB7b-23	MnO	1.7270	1.7190	0.0080	0.5%
SB7b-23	Na_2O	12.2061	12.3090	-0.1029	-0.8%
SB7b-23	NiO	1.7529	1.8120	-0.0591	-3.3%
SB7b-23	PbO	0.0038	0.0080	-0.0042	-52.2%
SB7b-23	SiO_2	49.8992	49.5860	0.3132	0.6%
SB7b-23	SO_4	0.4164	0.5850	-0.1686	-28.8%
SB7b-23	ThO_2	0.7093	0.7280	-0.0187	-2.6%
SB7b-23	TiO_2	0.5306	0.5420	-0.0114	-2.1%
SB7b-23	U_3O_8	2.8846	3.0320	-0.1474	-4.9%

Table A-5. Average Measured Versus Target Compositions by Oxide by Glass ID

		Measured	Target	Difference of	% Difference of
				Measuserd versus	Measuserd versus
Glass ID	Oxide	(wt%)	(wt%)	Target	Target
SB7b-23	ZnO	0.0226	0.0060	0.0166	277.1%
SB7b-23	ZrO_2	0.0512	0.0360	0.0152	42.3%
SB7b-23	Sum	99.5751	100.0010	-0.4259	-0.4%
SB7b-24	Al_2O_3	8.9869	9.0130	-0.0261	-0.3%
SB7b-24	B_2O_3	4.9466	5.2800	-0.3334	-6.3%
SB7b-24	BaO	0.0276	0.0250	0.0026	10.5%
SB7b-24	CaO	0.5628	0.5570	0.0058	1.0%
SB7b-24	Ce_2O_3	0.0370	0.0490	-0.0120	-24.6%
SB7b-24	Cr_2O_3	0.0298	0.0320	-0.0022	-6.9%
SB7b-24	CuO	0.0224	0.0140	0.0084	60.1%
SB7b-24	Fe_2O_3	8.2619	8.5060	-0.2441	-2.9%
SB7b-24	K_2O	0.1411	0.0330	0.1081	327.7%
SB7b-24	La_2O_3	0.0087	0.0080	0.0007	8.2%
SB7b-24	Li_2O	6.1492	6.3000	-0.1508	-2.4%
SB7b-24	MgO	0.1443	0.1410	0.0033	2.3%
SB7b-24	MnO	2.1337	2.1500	-0.0163	-0.8%
SB7b-24	Na_2O	14.3562	14.3950	-0.0388	-0.3%
SB7b-24	NiO	1.3409	1.3890	-0.0481	-3.5%
SB7b-24	PbO	0.0031	0.0080	-0.0049	-61.9%
SB7b-24	SiO_2	46.7972	48.0330	-1.2358	-2.6%
SB7b-24	SO_4	0.4509	0.5850	-0.1341	-22.9%
SB7b-24	ThO_2	0.4451	0.4610	-0.0159	-3.5%
SB7b-24	TiO_2	0.5092	0.5420	-0.0328	-6.1%
SB7b-24	U_3O_8	2.2552	2.4380	-0.1828	-7.5%
SB7b-24	ZnO	0.0186	0.0060	0.0126	209.9%
SB7b-24	ZrO_2	0.0442	0.0360	0.0082	22.9%
SB7b-24	Sum	97.6725	100.0010	-2.3285	-2.3%
SB7b-25	Al_2O_3	7.4494	7.2400	0.2094	2.9%
SB7b-25	B_2O_3	4.1778	4.9600	-0.7822	-15.8%
SB7b-25	BaO	0.0573	0.0550	0.0023	4.2%
SB7b-25	CaO	0.3243	0.3220	0.0023	0.7%
SB7b-25	Ce_2O_3	0.0980	0.1100	-0.0120	-10.9%
SB7b-25	Cr_2O_3	0.0588	0.0720	-0.0132	-18.4%
SB7b-25	CuO	0.0373	0.0310	0.0063	20.4%
SB7b-25	Fe_2O_3	9.2948	9.3420	-0.0472	-0.5%
SB7b-25	K_2O	0.1290	0.0750	0.0540	71.9%
SB7b-25	La_2O_3	0.0163	0.0180	-0.0017	-9.6%
SB7b-25	Li_2O	6.2703	6.3000	-0.0297	-0.5%
SB7b-25	MgO	0.3196	0.3160	0.0036	1.2%
SB7b-25	MnO	2.1821	2.1500	0.0321	1.5%
SB7b-25	Na_2O	14.9628	14.7940	0.1688	1.1%
SB7b-25	NiO	1.7720	1.8120	-0.0400	-2.2%
SB7b-25	PbO	0.0165	0.0170	-0.0005	-3.1%
SB7b-25	SiO_2	47.0646	48.0330	-0.9684	-2.0%
SB7b-25	SO_4	0.5984	0.5850	0.0134	2.3%
SB7b-25	ThO_2	0.4731	0.4610	0.0121	2.6%
SB7b-25	TiO_2	0.1797	0.1810	-0.0013	-0.7%
SB7b-25	U_3O_8	2.8802	3.0320	-0.1518	-5.0%
SB7b-25	ZnO	0.0279	0.0130	0.0149	114.8%
SB7b-25	ZrO_2	0.0708	0.0810	-0.0102	-12.6%
SB7b-25	Sum	98.4610	100.0000	-1.5390	-1.5%
SB7b-26	Al_2O_3	9.1145	9.0130	0.1015	1.1%
SB7b-26	B_2O_3	5.0271	5.2800	-0.2529	-4.8%
SB7b-26	BaO	0.0579	0.0550	0.0029	5.2%
SB7b-26	CaO	0.5439	0.5570	-0.0131	-2.3%
SB7b-26	Ce_2O_3	0.0898	0.1100	-0.0202	-18.4%
SB7b-26	Cr_2O_3	0.0498	0.0720	-0.0222	-30.8%
SB7b-26	CuO	0.0322	0.0310	0.0012	4.0%
SB7b-26	Fe_2O_3	10.0830	10.5690	-0.4860	-4.6%
SB7b-26	K_2O	0.1708	0.0750	0.0958	127.8%
SB7b-26	La_2O_3	0.0176	0.0180	-0.0004	-2.3%

Table A-5. Average Measured Versus Target Compositions by Oxide by Glass ID

		Measured	Target	Difference of	% Difference of
				Measuserd versus	Measuserd versus
Glass ID	Oxide	(wt%)	(wt%)	Target	Target
SB7b-26	Li_2O	5.1966	5.3000	-0.1034	-2.0%
SB7b-26	MgO	0.3116	0.3160	-0.0044	-1.4%
SB7b-26	MnO	1.7092	1.7190	-0.0098	-0.6%
SB7b-26	Na_2O	12.2331	12.3090	-0.0759	-0.6%
SB7b-26	NiO	1.7322	1.8120	-0.0798	-4.4%
SB7b-26	PbO	0.0190	0.0170	0.0020	11.7%
SB7b-26	SiO_2	47.4925	48.3940	-0.9015	-1.9%
SB7b-26	SO_4	0.4584	0.5850	-0.1266	-21.6%
SB7b-26	ThO_2	0.4402	0.4610	-0.0208	-4.5%
SB7b-26	TiO_2	0.1741	0.1810	-0.0069	-3.8%
SB7b-26	U_3O_8	2.7549	3.0320	-0.2771	-9.1%
SB7b-26	ZnO	0.0251	0.0130	0.0121	93.4%
SB7b-26	ZrO_2	0.0682	0.0810	-0.0128	-15.8%
SB7b-26	Sum	97.8016	100.0000	-2.1984	-2.2%
SB7b-27	Al_2O_3	7.3620	7.2400	0.1220	1.7%
SB7b-27	B_2O_3	5.0351	5.2800	-0.2449	-4.6%
SB7b-27	BaO	0.0266	0.0250	0.0016	6.6%
SB7b-27	CaO	0.3348	0.3220	0.0128	4.0%
SB7b-27	Ce_2O_3	0.0358	0.0490	-0.0132	-26.9%
SB7b-27	Cr_2O_3	0.0351	0.0320	0.0031	9.6%
SB7b-27	CuO	0.0230	0.0140	0.0090	64.5%
SB7b-27	Fe_2O_3	10.6763	10.5690	0.1073	1.0%
SB7b-27	K_2O	0.0917	0.0330	0.0587	177.8%
SB7b-27	La_2O_3	0.0155	0.0080	0.0075	93.5%
SB7b-27	Li_2O	6.2030	6.3000	-0.0970	-1.5%
SB7b-27	MgO	0.1449	0.1410	0.0039	2.8%
SB7b-27	MnO	1.7286	1.7190	0.0096	0.6%
SB7b-27	Na_2O	14.3225	14.3090	0.0135	0.1%
SB7b-27	NiO	1.7990	1.8120	-0.0130	-0.7%
SB7b-27	PbO	0.0030	0.0080	-0.0050	-62.1%
SB7b-27	SiO_2	46.7437	48.0330	-1.2893	-2.7%
SB7b-27	SO_4	0.8523	0.7180	0.1343	18.7%
SB7b-27	ThO_2	0.6904	0.7280	-0.0376	-5.2%
SB7b-27	TiO_2	0.1760	0.1810	-0.0050	-2.8%
SB7b-27	U_3O_8	2.2714	2.4380	-0.1666	-6.8%
SB7b-27	ZnO	0.0220	0.0060	0.0160	267.5%
SB7b-27	ZrO_2	0.0470	0.0360	0.0110	30.7%
SB7b-27	Sum	98.6399	100.0010	-1.3611	-1.4%
SB7b-28	Al_2O_3	7.2722	7.2400	0.0322	0.4%
SB7b-28	B_2O_3	5.0351	5.2800	-0.2449	-4.6%
SB7b-28	BaO	0.0256	0.0250	0.0006	2.3%
SB7b-28	CaO	0.3281	0.3220	0.0061	1.9%
SB7b-28	Ce_2O_3	0.0363	0.0490	-0.0127	-25.8%
SB7b-28	Cr_2O_3	0.0304	0.0320	-0.0016	-5.1%
SB7b-28	CuO	0.0232	0.0140	0.0092	65.4%
SB7b-28	Fe_2O_3	10.4297	10.5690	-0.1393	-1.3%
SB7b-28	K_2O	0.1345	0.0330	0.1015	307.6%
SB7b-28	La_2O_3	0.0099	0.0080	0.0019	23.7%
SB7b-28	Li_2O	5.2450	5.3000	-0.0550	-1.0%
SB7b-28	MgO	0.1415	0.1410	0.0005	0.3%
SB7b-28	MnO	2.1466	2.1500	-0.0034	-0.2%
SB7b-28	Na_2O	12.0511	12.3090	-0.2579	-2.1%
SB7b-28	NiO	1.3727	1.3890	-0.0163	-1.2%
SB7b-28	PbO	0.0031	0.0080	-0.0049	-61.8%
SB7b-28	SiO_2	49.8992	50.2030	-0.3038	-0.6%
SB7b-28	SO_4	0.3940	0.5850	-0.1910	-32.7%
SB7b-28	ThO_2	0.6563	0.7280	-0.0717	-9.9%
SB7b-28	TiO_2	0.5154	0.5420	-0.0266	-4.9%
SB7b-28	U_3O_8	2.7549	3.0320	-0.2771	-9.1%
SB7b-28	ZnO	0.0185	0.0060	0.0125	208.9%
SB7b-28	ZrO_2	0.0476	0.0360	0.0116	32.2%

Table A-5. Average Measured Versus Target Compositions by Oxide by Glass ID

		Measured	Target	Difference of	% Difference of
				Measuserd versus	Measuserd versus
Glass ID	Oxide	(wt%)	(wt%)	Target	Target
SB7b-28	Sum	98.5708	100.0010	-1.4302	-1.4%
SB7b-29	Al_2O_3	7.0903	7.0130	0.0773	1.1%
SB7b-29	B_2O_3	5.1438	5.4400	-0.2962	-5.4%
SB7b-29	BaO	0.0351	0.0330	0.0021	6.4%
SB7b-29	CaO	0.3729	0.3680	0.0049	1.3%
SB7b-29	Ce_2O_3	0.0448	0.0660	-0.0212	-32.1%
SB7b-29	Cr_2O_3	0.0457	0.0430	0.0027	6.2%
SB7b-29	CuO	0.0241	0.0180	0.0061	33.8%
SB7b-29	Fe_2O_3	8.1761	8.2730	-0.0969	-1.2%
SB7b-29	K_2O	0.1376	0.0440	0.0936	212.8%
SB7b-29	La_2O_3	0.0120	0.0110	0.0010	9.2%
SB7b-29	Li_2O	5.3661	5.4400	-0.0739	-1.4%
SB7b-29	MgO	0.1893	0.1800	0.0093	5.1%
SB7b-29	MnO	1.6753	1.6730	0.0023	0.1%
SB7b-29	Na_2O	13.8844	13.7510	0.1334	1.0%
SB7b-29	NiO	1.3886	1.3840	0.0046	0.3%
SB7b-29	PbO	0.0089	0.0100	-0.0011	-11.3%
SB7b-29	SiO_2	51.1293	52.5440	-1.4147	-2.7%
SB7b-29	SO_4	0.5453	0.5680	-0.0227	-4.0%
SB7b-29	ThO_2	0.4934	0.4980	-0.0046	-0.9%
SB7b-29	TiO_2	0.1993	0.2130	-0.0137	-6.4%
SB7b-29	U_3O_8	2.2847	2.3720	-0.0873	-3.7%
SB7b-29	ZnO	0.0193	0.0080	0.0113	141.0%
SB7b-29	ZrO_2	0.0426	0.0480	-0.0054	-11.4%
SB7b-29	Sum	98.3088	99.9980	-1.6892	-1.7%
SB7b-30	Al_2O_3	8.0327	7.8900	0.1427	1.8%
SB7b-30	B_2O_3	4.9103	5.1200	-0.2097	-4.1%
SB7b-30	BaO	0.0402	0.0370	0.0032	8.6%
SB7b-30	CaO	0.4110	0.4130	-0.0020	-0.5%
SB7b-30	Ce_2O_3	0.0707	0.0740	-0.0033	-4.5%
SB7b-30	Cr_2O_3	0.0437	0.0480	-0.0043	-9.0%
SB7b-30	CuO	0.0219	0.0210	0.0009	4.4%
SB7b-30	Fe_2O_3	9.3056	9.3070	-0.0014	0.0%
SB7b-30	K_2O	0.1426	0.0500	0.0926	185.2%
SB7b-30	La_2O_3	0.0133	0.0120	0.0013	11.2%
SB7b-30	Li_2O	5.0674	5.1200	-0.0526	-1.0%
SB7b-30	MgO	0.2083	0.2030	0.0053	2.6%
SB7b-30	MnO	1.8981	1.8820	0.0161	0.9%
SB7b-30	Na_2O	14.4236	14.4700	-0.0464	-0.3%
SB7b-30	NiO	1.5493	1.5570	-0.0077	-0.5%
SB7b-30	PbO	0.0107	0.0120	-0.0013	-10.7%
SB7b-30	SiO_2	50.5944	49.6120	0.9824	2.0%
SB7b-30	SO_4	0.6681	0.6390	0.0291	4.6%
SB7b-30	ThO_2	0.5385	0.5600	-0.0215	-3.8%
SB7b-30	TiO_2	0.2268	0.2400	-0.0132	-5.5%
SB7b-30	U_3O_8	2.4984	2.6690	-0.1706	-6.4%
SB7b-30	ZnO	0.0200	0.0090	0.0110	122.2%
SB7b-30	ZrO_2	0.0464	0.0540	-0.0076	-14.1%
SB7b-30	Sum	100.7421	99.9990	0.7431	0.7%
SB7b-31	Al_2O_3	7.6855	8.7670	-1.0815	-12.3%
SB7b-31	B_2O_3	5.4457	4.8000	0.6457	13.5%
SB7b-31	BaO	0.0380	0.0410	-0.0030	-7.4%
SB7b-31	CaO	0.3991	0.4590	-0.0599	-13.0%
SB7b-31	Ce_2O_3	0.0632	0.0820	-0.0188	-22.9%
SB7b-31	Cr_2O_3	0.0472	0.0540	-0.0068	-12.5%
SB7b-31	CuO	0.0224	0.0230	-0.0006	-2.6%
SB7b-31	Fe_2O_3	10.7567	10.3410	0.4157	4.0%
SB7b-31	K_2O	0.0948	0.0560	0.0388	69.3%
SB7b-31	La_2O_3	0.0133	0.0130	0.0003	2.5%
SB7b-31	Li_2O	5.0055	4.8000	0.2055	4.3%
SB7b-31	MgO	0.1959	0.2260	-0.0301	-13.3%

Table A-5. Average Measured Versus Target Compositions by Oxide by Glass ID

		Measured	Target	Difference of	% Difference of
				Measuserd versus	Measuserd versus
Glass ID	Oxide	(wt%)	(wt%)	Target	Target
SB7b-31	MnO	1.8093	2.0920	-0.2827	-13.5%
SB7b-31	Na_2O	12.3241	15.1890	-2.8649	-18.9%
SB7b-31	NiO	1.7879	1.7300	0.0579	3.3%
SB7b-31	PbO	0.0100	0.0130	-0.0030	-23.4%
SB7b-31	SiO_2	49.7387	46.6800	3.0587	6.6%
SB7b-31	SO_4	0.5550	0.7100	-0.1550	-21.8%
SB7b-31	ThO_2	0.6212	0.6220	-0.0008	-0.1%
SB7b-31	TiO_2	0.2131	0.2660	-0.0529	-19.9%
SB7b-31	U_3O_8	2.9613	2.9650	-0.0037	-0.1%
SB7b-31	ZnO	0.0243	0.0100	0.0143	143.2%
SB7b-31	ZrO_2	0.0535	0.0610	-0.0075	-12.3%
SB7b-31	Sum	99.8656	100.0000	-0.1344	-0.1%
SB7b-32	Al_2O_3	8.3303	7.2010	1.1293	15.7%
SB7b-32	B_2O_3	4.3710	5.4400	-1.0690	-19.7%
SB7b-32	BaO	0.0420	0.0340	0.0080	23.4%
SB7b-32	CaO	0.4432	0.3770	0.0662	17.6%
SB7b-32	Ce_2O_3	0.0571	0.0670	-0.0099	-14.8%
SB7b-32	Cr_2O_3	0.0409	0.0440	-0.0031	-7.0%
SB7b-32	CuO	0.0245	0.0190	0.0055	28.9%
SB7b-32	Fe_2O_3	8.0385	8.4930	-0.4545	-5.4%
SB7b-32	K_2O	0.1430	0.0460	0.0970	210.9%
SB7b-32	La_2O_3	0.0142	0.0110	0.0032	28.9%
SB7b-32	Li_2O	6.4049	6.8000	-0.3951	-5.8%
SB7b-32	MgO	0.2139	0.1850	0.0289	15.6%
SB7b-32	MnO	2.0078	1.7170	0.2908	16.9%
SB7b-32	Na_2O	14.3899	11.7670	2.6229	22.3%
SB7b-32	NiO	1.3377	1.4210	-0.0833	-5.9%
SB7b-32	PbO	0.0090	0.0110	-0.0020	-18.5%
SB7b-32	SiO_2	49.4713	52.5670	-3.0957	-5.9%
SB7b-32	SO_4	0.8838	0.5830	0.3008	51.6%
SB7b-32	ThO_2	0.4533	0.5110	-0.0577	-11.3%
SB7b-32	TiO_2	0.2517	0.2130	0.0387	18.2%
SB7b-32	U_3O_8	2.1108	2.4350	-0.3242	-13.3%
SB7b-32	ZnO	0.0201	0.0080	0.0121	150.7%
SB7b-32	ZrO_2	0.0571	0.0500	0.0071	14.1%
SB7b-32	Sum	99.1158	100.0000	-0.8842	-0.9%
SB7b-33	Al_2O_3	8.2382	8.1010	0.1372	1.7%
SB7b-33	B_2O_3	4.8942	5.1200	-0.2258	-4.4%
SB7b-33	BaO	0.0394	0.0380	0.0014	3.8%
SB7b-33	CaO	0.4229	0.4240	-0.0011	-0.3%
SB7b-33	Ce_2O_3	0.0655	0.0760	-0.0105	-13.8%
SB7b-33	Cr_2O_3	0.0449	0.0500	-0.0051	-10.3%
SB7b-33	CuO	0.0251	0.0210	0.0041	19.7%
SB7b-33	Fe_2O_3	9.5147	9.5540	-0.0393	-0.4%
SB7b-33	K_2O	0.0994	0.0510	0.0484	94.9%
SB7b-33	La_2O_3	0.0126	0.0120	0.0006	4.9%
SB7b-33	Li_2O	6.3376	6.4000	-0.0624	-1.0%
SB7b-33	MgO	0.2102	0.2080	0.0022	1.1%
SB7b-33	MnO	1.9497	1.9320	0.0177	0.9%
SB7b-33	Na_2O	12.6341	12.4880	0.1461	1.2%
SB7b-33	NiO	1.5747	1.5980	-0.0233	-1.5%
SB7b-33	PbO	0.0094	0.0120	-0.0026	-21.9%
SB7b-33	SiO_2	48.0273	49.6380	-1.6107	-3.2%
SB7b-33	SO_4	0.5625	0.6550	-0.0925	-14.1%
SB7b-33	ThO_2	0.5482	0.5750	-0.0268	-4.7%
SB7b-33	TiO_2	0.2329	0.2400	-0.0071	-3.0%
SB7b-33	U_3O_8	2.5382	2.7400	-0.2018	-7.4%
SB7b-33	ZnO	0.0214	0.0090	0.0124	138.1%
SB7b-33	ZrO_2	0.0583	0.0560	0.0023	4.0%
SB7b-33	Sum	98.0614	99.9980	-1.9366	-1.9%
SB7b-34	Al_2O_3	9.0554	9.0010	0.0544	0.6%

Table A-5. Average Measured Versus Target Compositions by Oxide by Glass ID

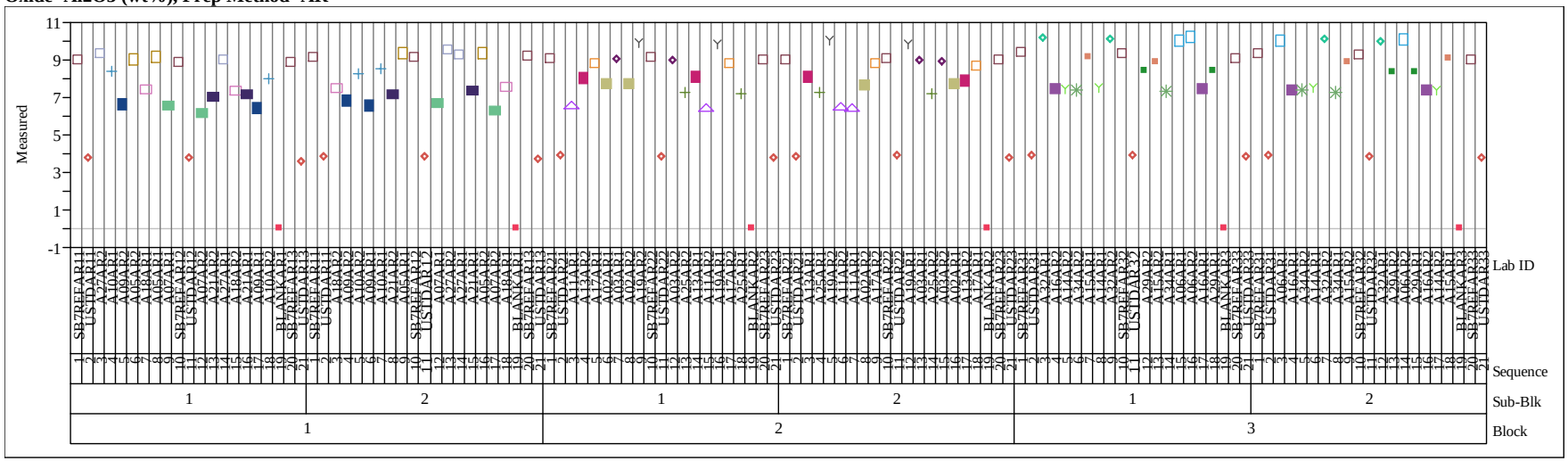
		Measured	Target	Difference of	% Difference of
				Measuserd versus	Measuserd versus
Glass ID	Oxide	(wt%)	(wt%)	Target	Target
SB7b-34	B_2O_3	4.5924	4.8000	-0.2076	-4.3%
SB7b-34	BaO	0.0474	0.0420	0.0054	12.9%
SB7b-34	CaO	0.4750	0.4710	0.0040	0.9%
SB7b-34	Ce_2O_3	0.0756	0.0840	-0.0084	-10.0%
SB7b-34	Cr_2O_3	0.0505	0.0550	-0.0045	-8.2%
SB7b-34	CuO	0.0269	0.0240	0.0029	11.9%
SB7b-34	Fe_2O_3	10.4475	10.6160	-0.1685	-1.6%
SB7b-34	K_2O	0.1420	0.0570	0.0850	149.1%
SB7b-34	La_2O_3	0.0169	0.0140	0.0029	20.4%
SB7b-34	Li_2O	5.9312	6.0000	-0.0688	-1.1%
SB7b-34	MgO	0.2359	0.2320	0.0039	1.7%
SB7b-34	MnO	2.1515	2.1470	0.0045	0.2%
SB7b-34	Na_2O	13.1936	13.2090	-0.0154	-0.1%
SB7b-34	NiO	1.7354	1.7760	-0.0406	-2.3%
SB7b-34	PbO	0.0102	0.0130	-0.0028	-21.3%
SB7b-34	SiO_2	46.7972	46.7090	0.0882	0.2%
SB7b-34	SO_4	0.6628	0.7280	-0.0652	-9.0%
SB7b-34	ThO_2	0.6197	0.6390	-0.0193	-3.0%
SB7b-34	TiO_2	0.2579	0.2670	-0.0091	-3.4%
SB7b-34	U_3O_8	2.8448	3.0440	-0.1992	-6.5%
SB7b-34	ZnO	0.0242	0.0100	0.0142	142.3%
SB7b-34	ZrO_2	0.0592	0.0620	-0.0028	-4.6%
SB7b-34	Sum	99.4532	100.0000	-0.5468	-0.5%
SB7Ref	Al_2O_3	9.0425	8.8920	0.1505	1.7%
SB7Ref	B_2O_3	5.0574	5.2610	-0.2036	-3.9%
SB7Ref	BaO	0.0200	0.0170	0.0030	17.6%
SB7Ref	CaO	0.4912	0.4760	0.0152	3.2%
SB7Ref	Ce_2O_3	0.0249	0.0240	0.0009	3.6%
SB7Ref	Cr_2O_3	0.1249	0.1240	0.0009	0.8%
SB7Ref	CuO	0.0492	0.0330	0.0162	49.0%
SB7Ref	Fe_2O_3	8.7788	8.6680	0.1108	1.3%
SB7Ref	K_2O	0.3540	0.2120	0.1420	67.0%
SB7Ref	La_2O_3	0.0124	0.0140	-0.0016	-11.6%
SB7Ref	Li_2O	5.2075	5.2610	-0.0535	-1.0%
SB7Ref	MgO	0.2633	0.0270	0.2363	875.3%
SB7Ref	MnO	2.0997	2.0740	0.0257	1.2%
SB7Ref	Na_2O	14.8639	14.6820	0.1819	1.2%
SB7Ref	NiO	1.2249	1.2230	0.0019	0.2%
SB7Ref	PbO	0.0045	0.0060	-0.0015	-25.5%
SB7Ref	SiO_2	47.9916	51.5360	-3.5444	-6.9%
SB7Ref	SO_4	0.5738	0.5860	-0.0122	-2.1%
SB7Ref	ThO_2	0.0161	0.0000	0.0161	
SB7Ref	TiO_2	0.4571	0.4860	-0.0289	-5.9%
SB7Ref	U_3O_8	0.1503	0.0000	0.1503	
SB7Ref	ZnO	0.0251	0.0100	0.0151	150.9%
SB7Ref	ZrO_2	0.0780	0.1460	-0.0680	-46.6%
SB7Ref	Sum	96.9113	99.7580	-2.8467	-2.9%
Ustd	Al_2O_3	3.9069	4.1000	-0.1931	-4.7%
Ustd	B_2O_3	8.6717	9.2090	-0.5373	-5.8%
Ustd	BaO	0.0024	0.0000	0.0024	
Ustd	CaO	1.2708	1.3010	-0.0302	-2.3%
Ustd	Ce_2O_3	0.0181	0.0000	0.0181	
Ustd	Cr_2O_3	0.2409	0.0000	0.2409	
Ustd	CuO	0.0060	0.0000	0.0060	
Ustd	Fe_2O_3	13.2967	13.1960	0.1007	0.8%
Ustd	K_2O	2.9511	2.9990	-0.0479	-1.6%
Ustd	La_2O_3	0.0023	0.0000	0.0023	
Ustd	Li_2O	3.0062	3.0570	-0.0508	-1.7%
Ustd	MgO	1.1803	1.2100	-0.0297	-2.5%
Ustd	MnO	2.7664	2.8920	-0.1256	-4.3%
Ustd	Na_2O	11.5479	11.7950	-0.2471	-2.1%

Table A-5. Average Measured Versus Target Compositions by Oxide by Glass ID

		Measured	Target	Difference of	% Difference of
				Measuserd versus	Measuserd versus
Glass ID	Oxide	(wt%)	(wt%)	Target	Target
Ustd	NiO	1.0861	1.1200	-0.0339	-3.0%
Ustd	PbO	0.0030	0.0000	0.0030	
Ustd	SiO_2	44.4689	45.3530	-0.8841	-1.9%
Ustd	SO_4	0.1143	0.0000	0.1143	
Ustd	ThO_2	0.0345	0.0000	0.0345	
Ustd	TiO_2	0.9084	1.0490	-0.1406	-13.4%
Ustd	U_3O_8	2.1503	2.4060	-0.2557	-10.6%
Ustd	ZnO	0.0110	0.0000	0.0110	
Ustd	ZrO_2	0.0016	0.0000	0.0016	
Ustd	Sum	97.6457	99.6870	-2.0413	-2.0%

Exhibit A-1. Measurements of Study Glasses by Lab ID in Analytical Sequence for Analytical Blocks 1, 2, and 3 by Oxide and Preparation Method

Oxide=Al2O3 (wt%), Prep Method=AR



Oxide=Al2O3 (wt%), Prep Method=PF

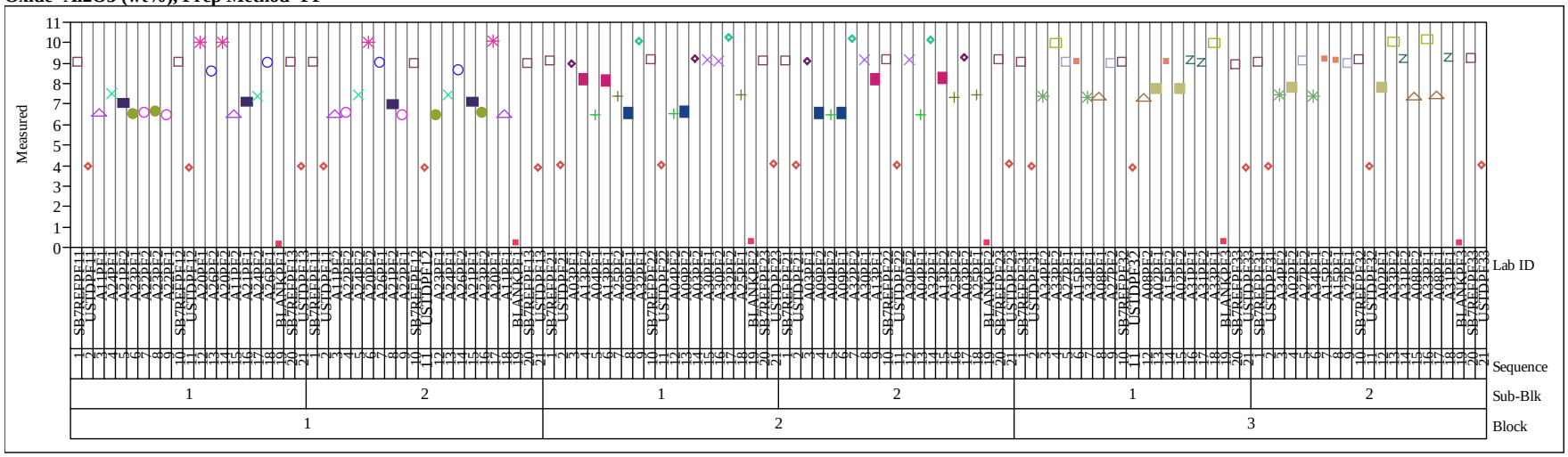
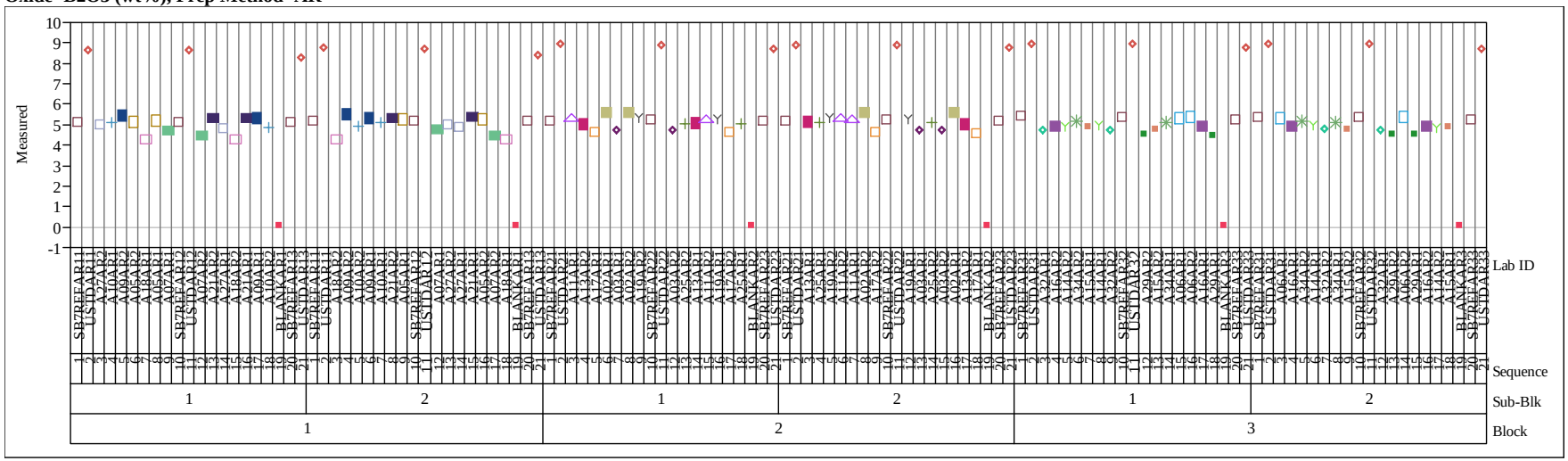


Exhibit A-1. Measurements of Study Glasses by Lab ID in Analytical Sequence for Analytical Blocks 1, 2, and 3 by Oxide and Preparation Method

Oxide=B2O3 (wt%), Prep Method=AR



Oxide=B2O3 (wt%), Prep Method=PF

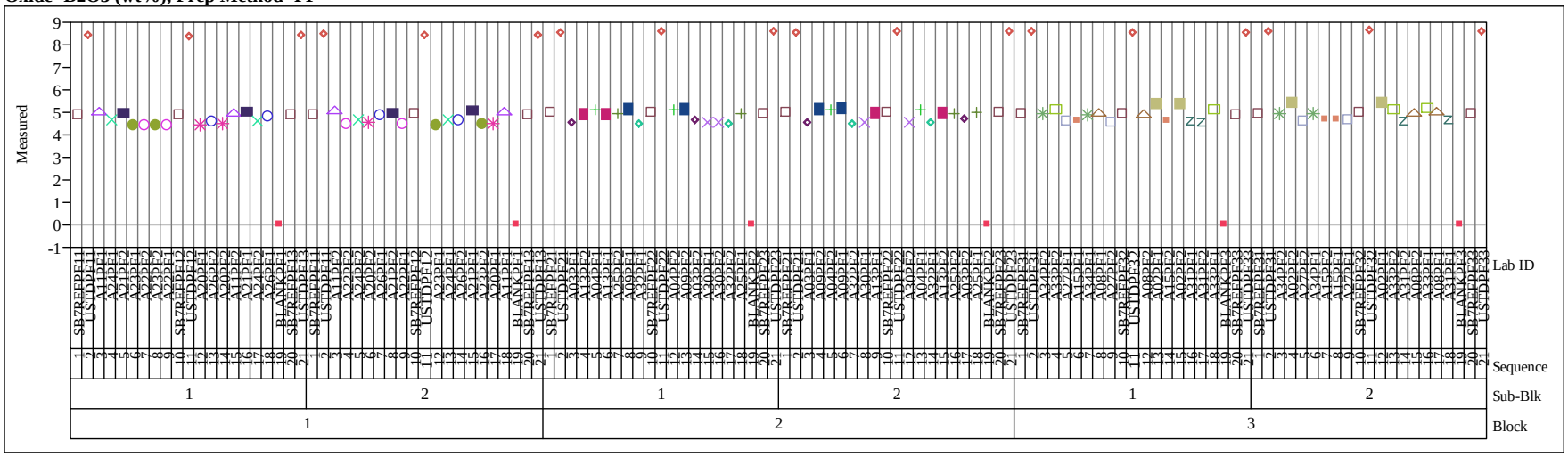
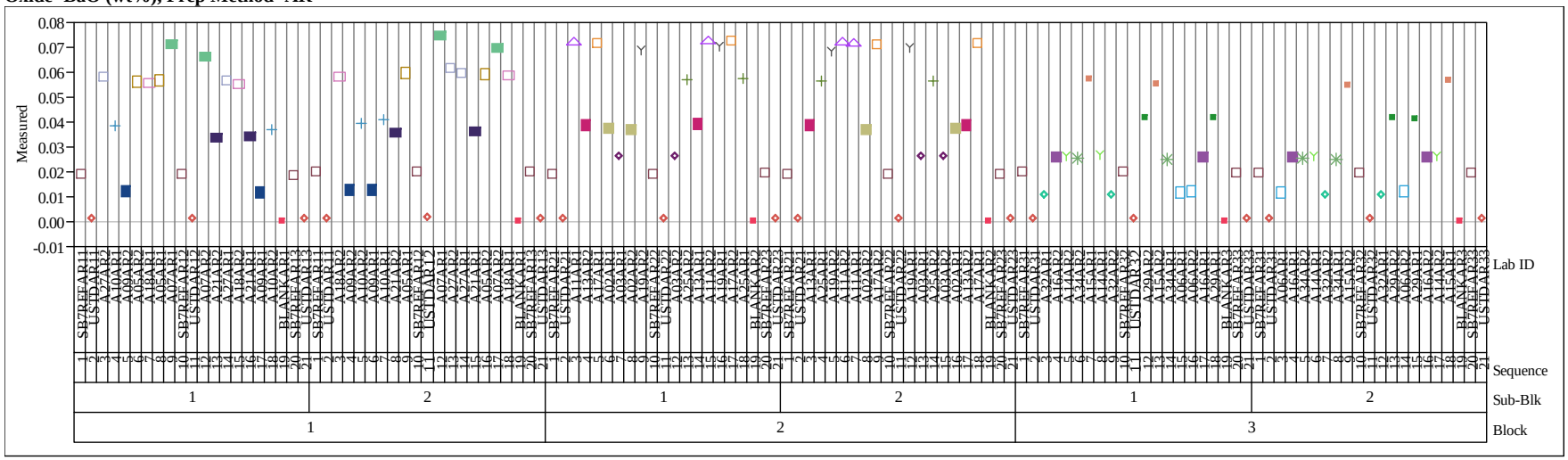


Exhibit A-1. Measurements of Study Glasses by Lab ID in Analytical Sequence for Analytical Blocks 1, 2, and 3 by Oxide and Preparation Method

Oxide=BaO (wt%), Prep Method=AR



Oxide=BaO (wt%), Prep Method=PF

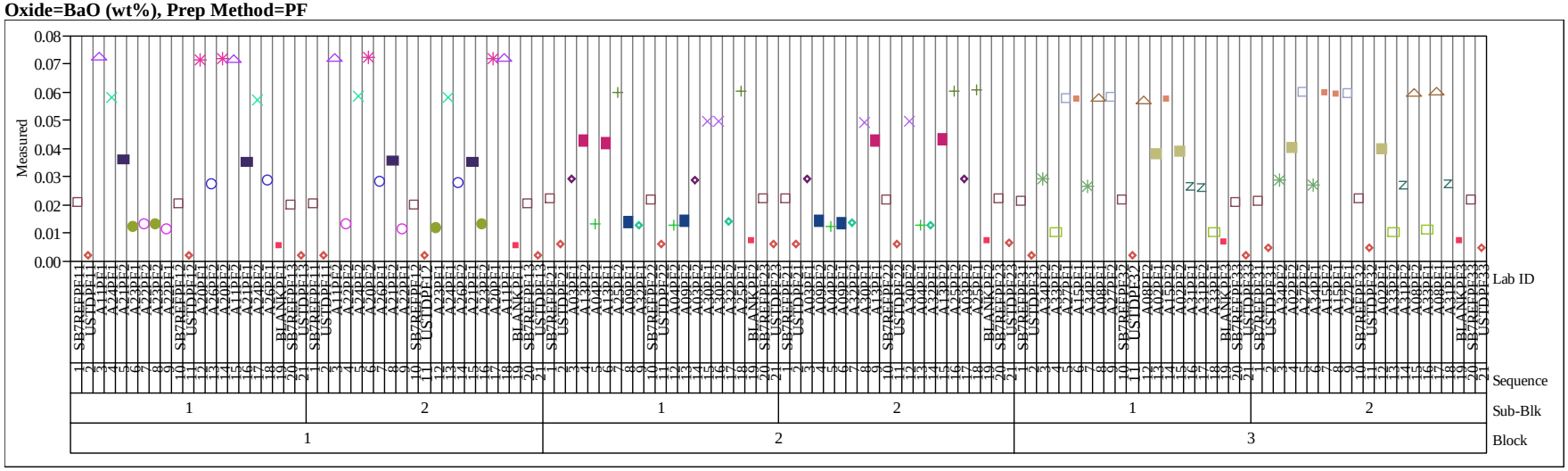
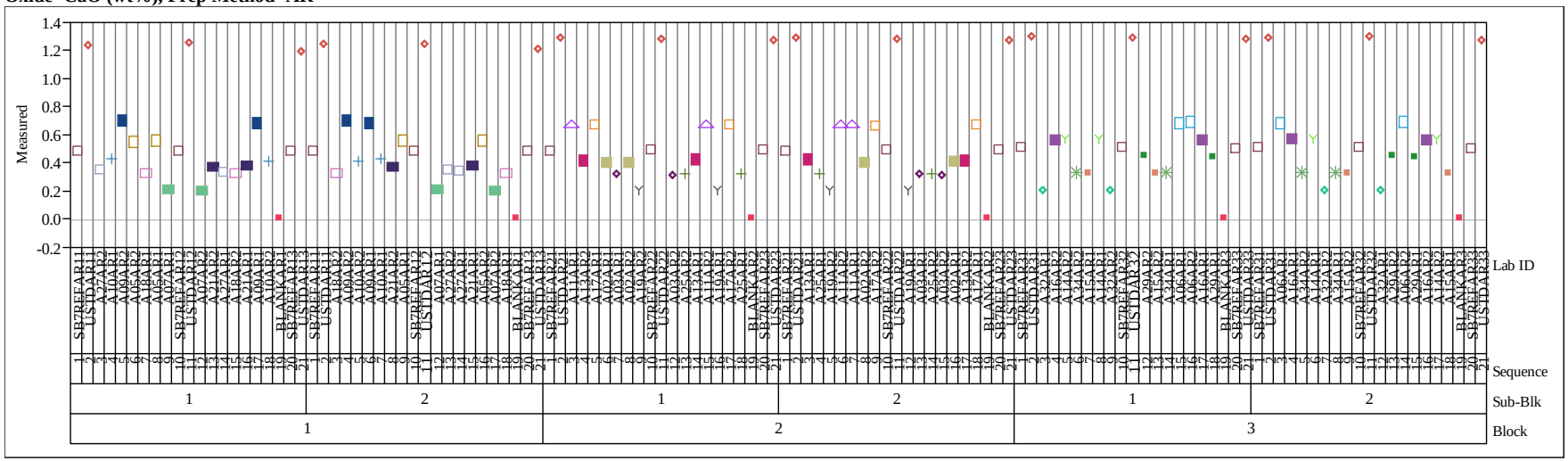


Exhibit A-1. Measurements of Study Glasses by Lab ID in Analytical Sequence for Analytical Blocks 1, 2, and 3 by Oxide and Preparation Method

Oxide=CaO (wt%), Prep Method=AR



Oxide=Ce2O3 (wt%), Prep Method=AR

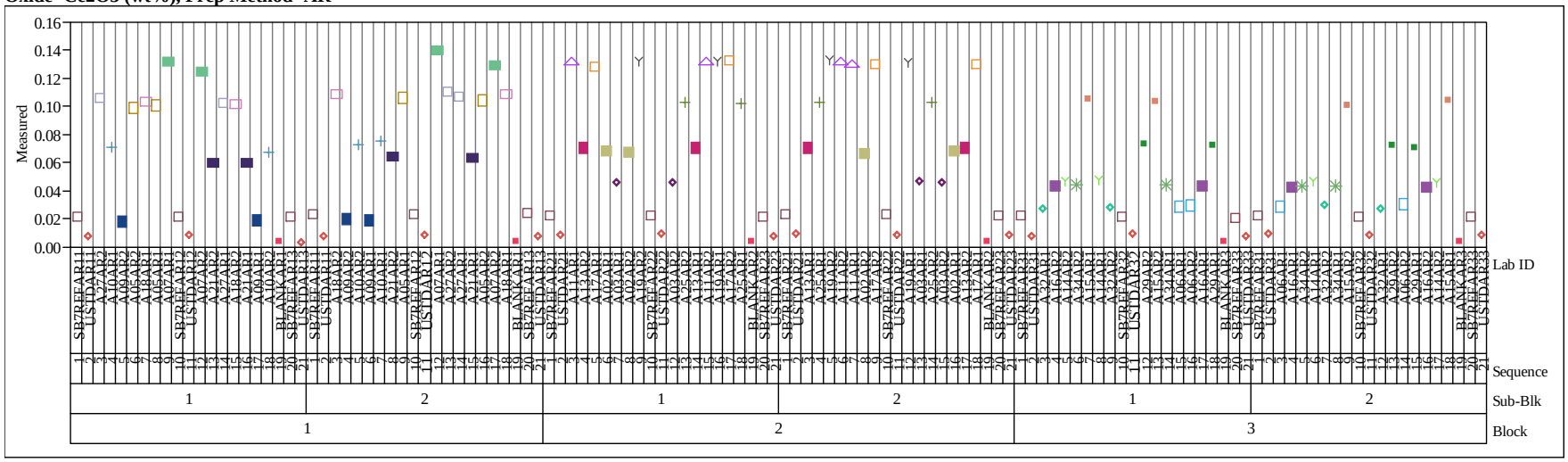
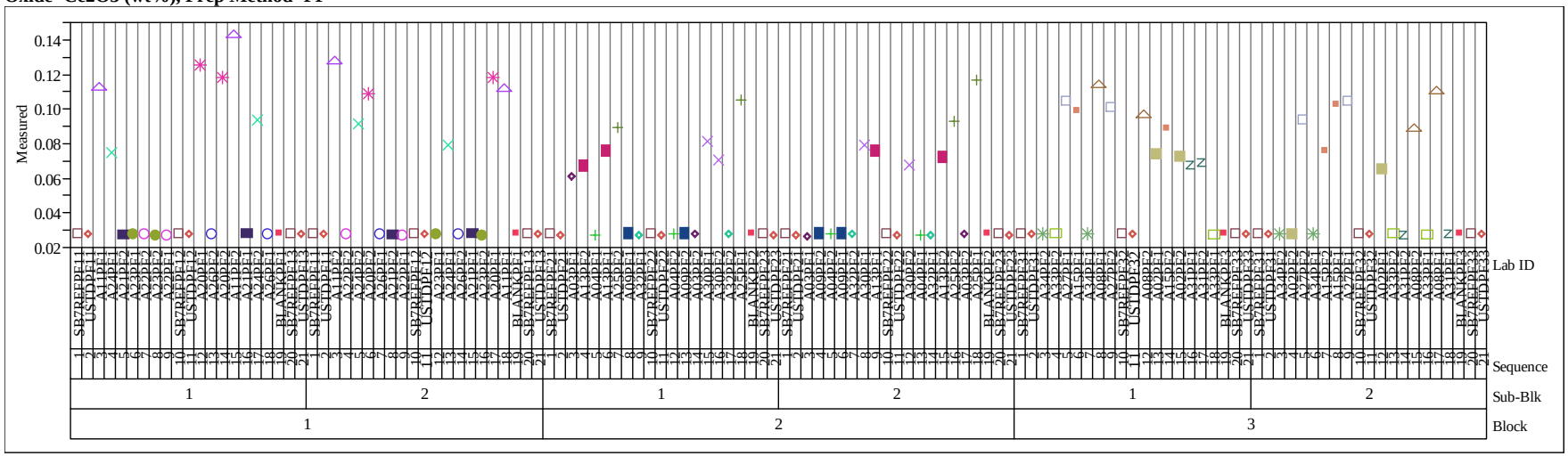


Exhibit A-1. Measurements of Study Glasses by Lab ID in Analytical Sequence for Analytical Blocks 1, 2, and 3 by Oxide and Preparation Method

Oxide=Ce2O3 (wt%), Prep Method=PF



Oxide=Cr2O3 (wt%), Prep Method=AR

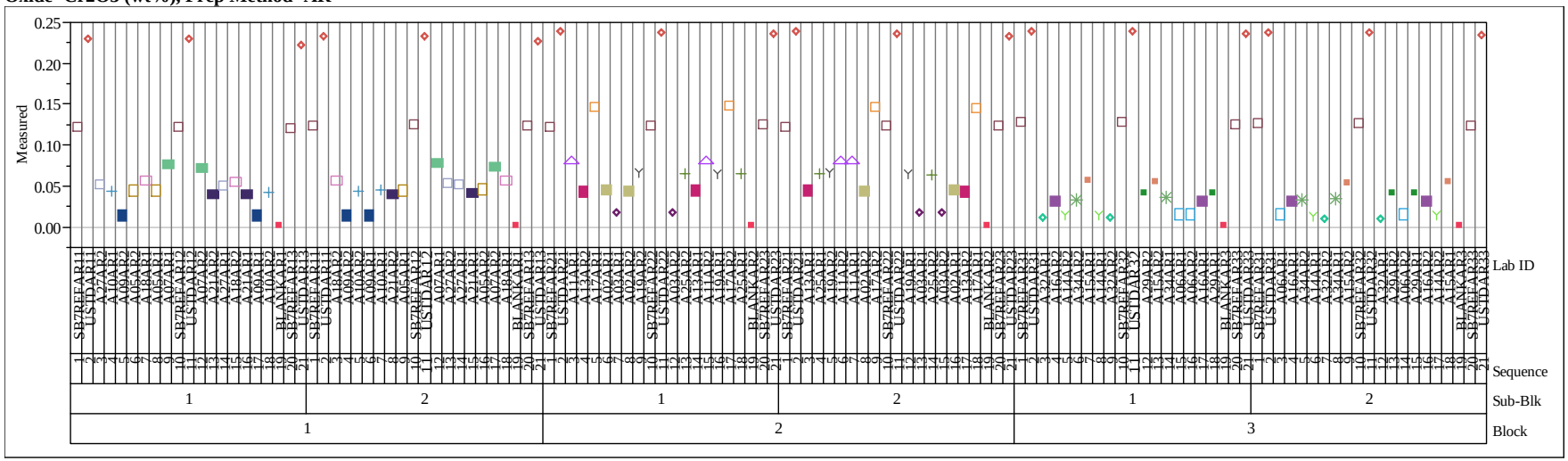
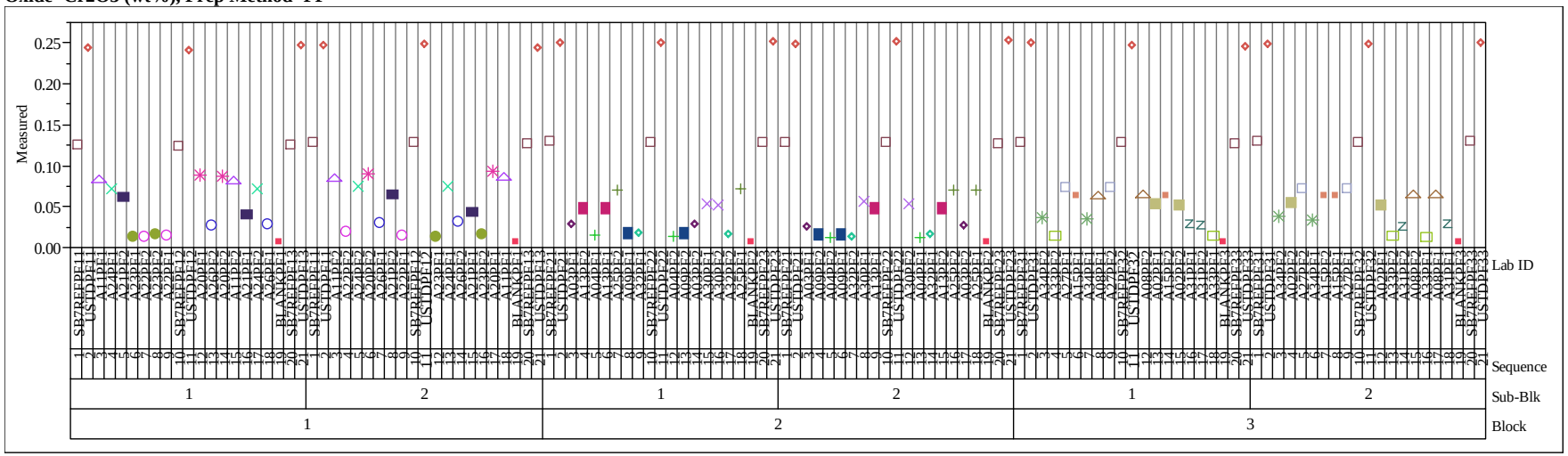


Exhibit A-1. Measurements of Study Glasses by Lab ID in Analytical Sequence for Analytical Blocks 1, 2, and 3 by Oxide and Preparation Method

Oxide=Cr2O3 (wt%), Prep Method=PF



Oxide=CuO (wt%), Prep Method=AR

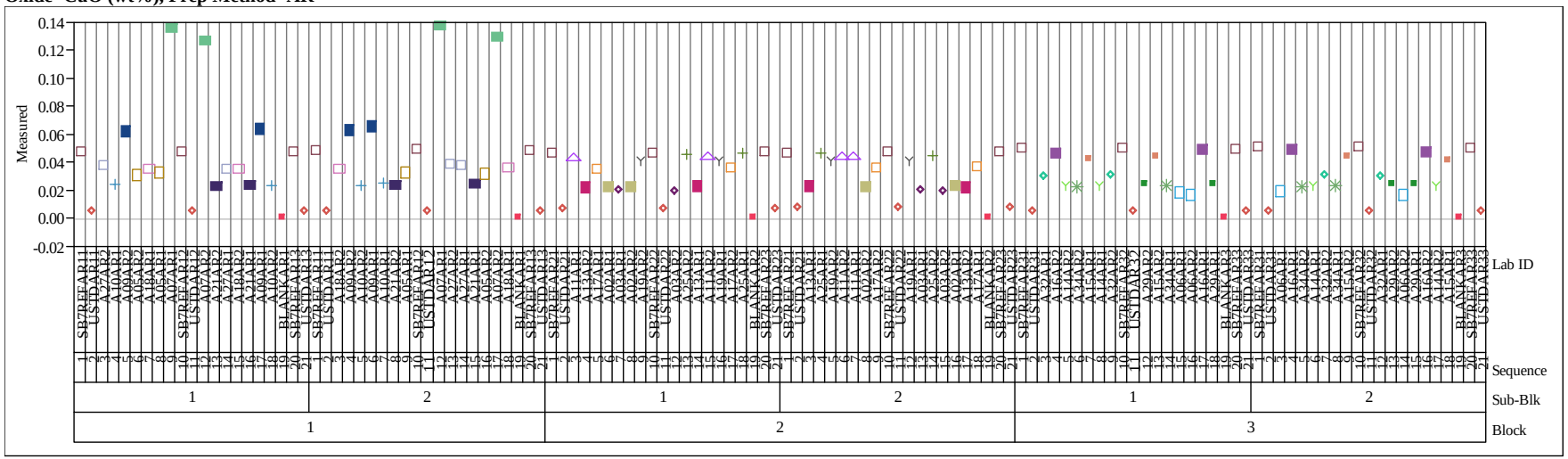
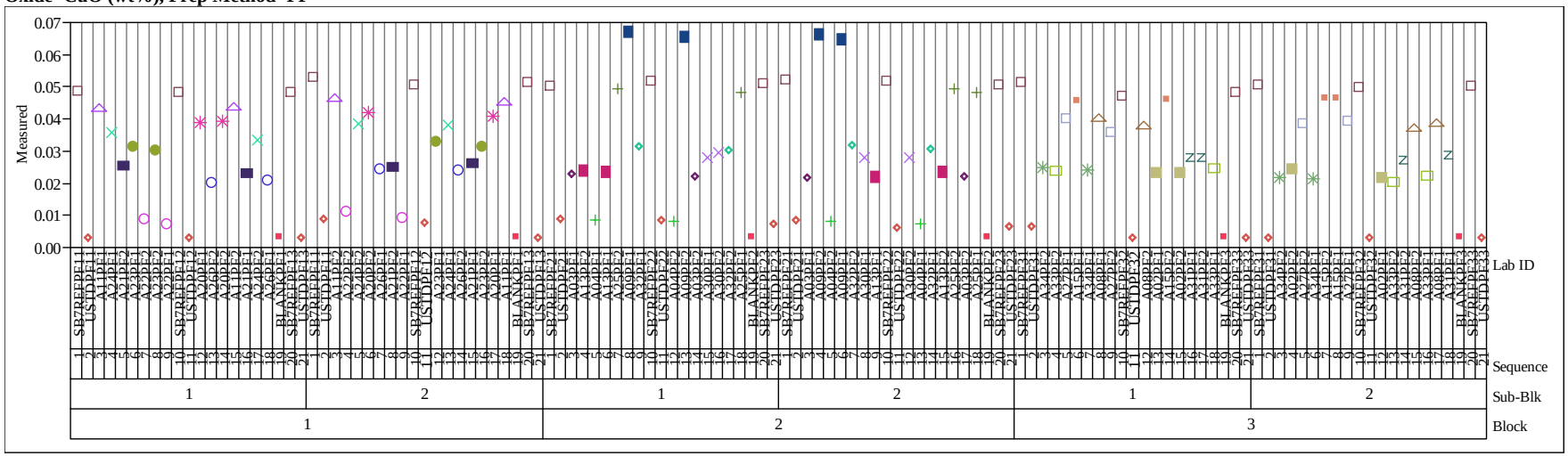


Exhibit A-1. Measurements of Study Glasses by Lab ID in Analytical Sequence for Analytical Blocks 1, 2, and 3 by Oxide and Preparation Method

Oxide=CuO (wt%), Prep Method=PF



Oxide=Fe2O3 (wt%), Prep Method=AR

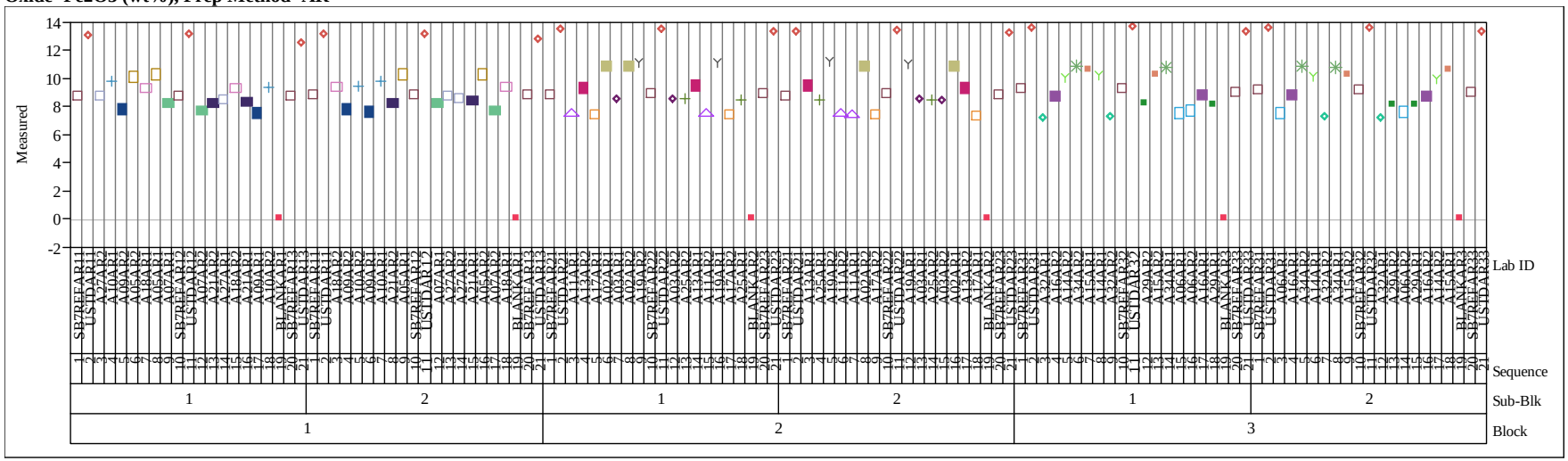
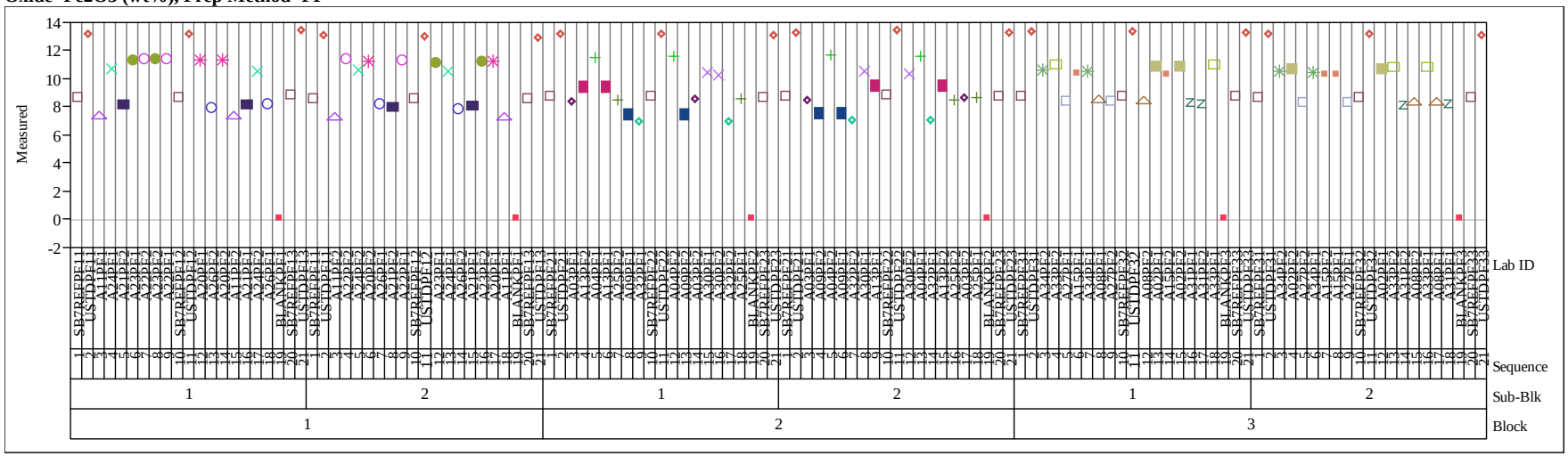


Exhibit A-1. Measurements of Study Glasses by Lab ID in Analytical Sequence for Analytical Blocks 1, 2, and 3 by Oxide and Preparation Method

Oxide=Fe2O3 (wt%), Prep Method=PF



Oxide=K2O (wt%), Prep Method=AR

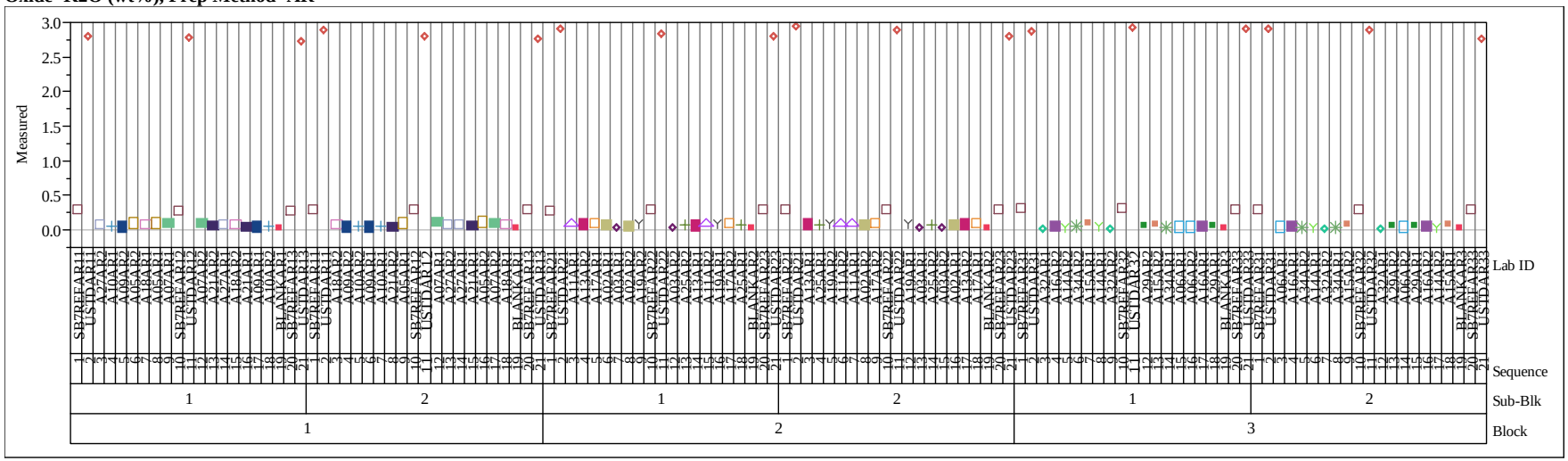
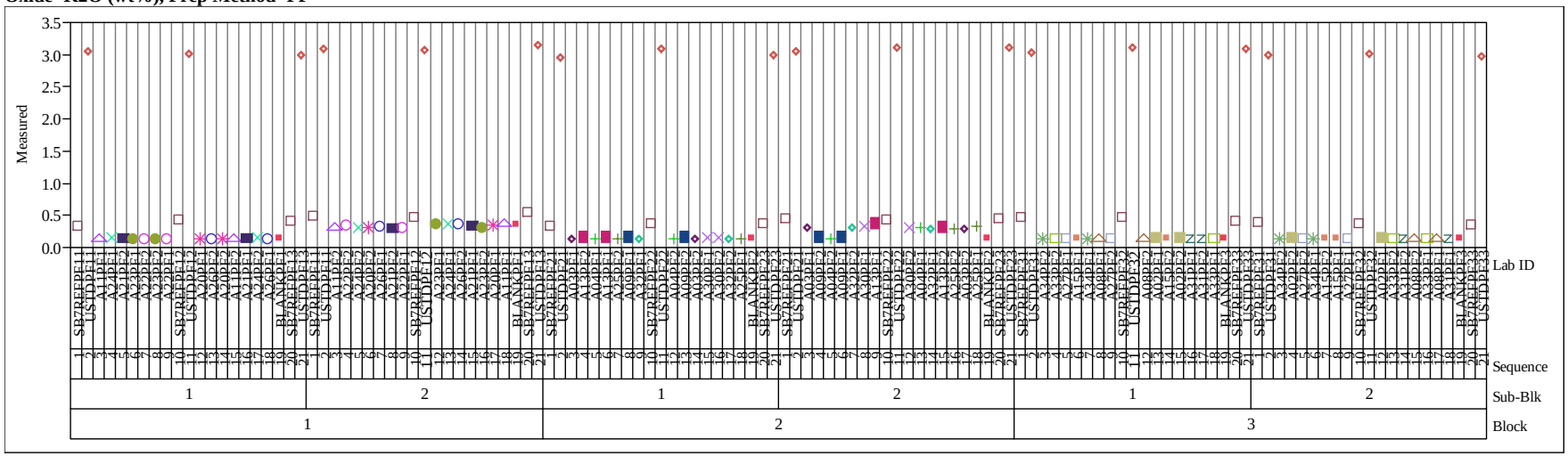


Exhibit A-1. Measurements of Study Glasses by Lab ID in Analytical Sequence for Analytical Blocks 1, 2, and 3 by Oxide and Preparation Method

Oxide=K2O (wt%), Prep Method=PF



Oxide=La2O3 (wt%), Prep Method=AR

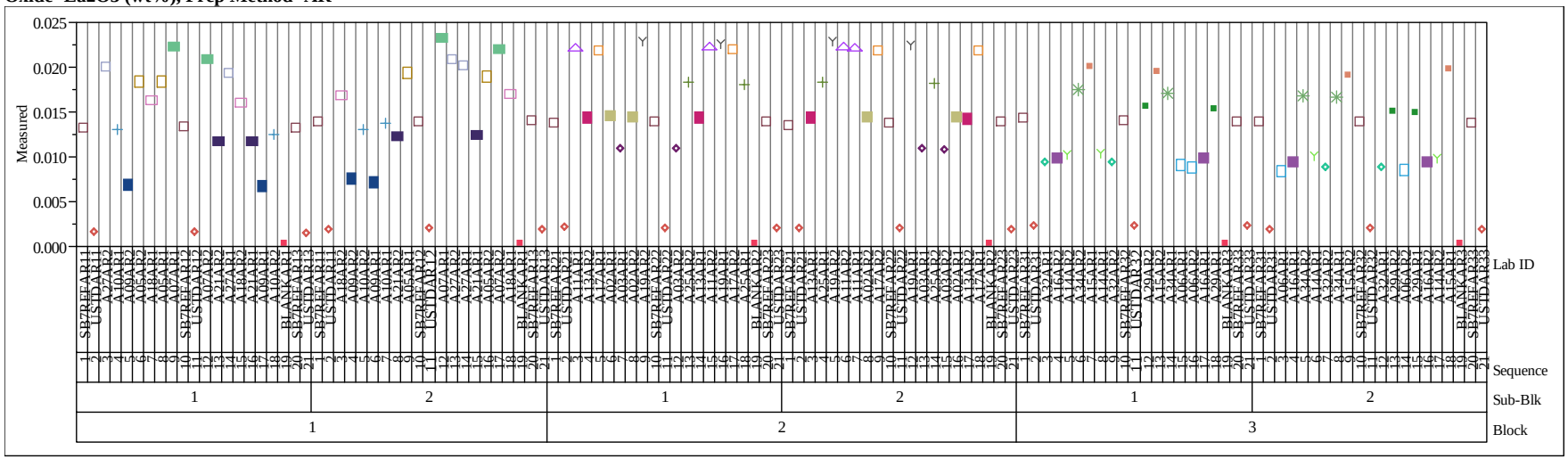
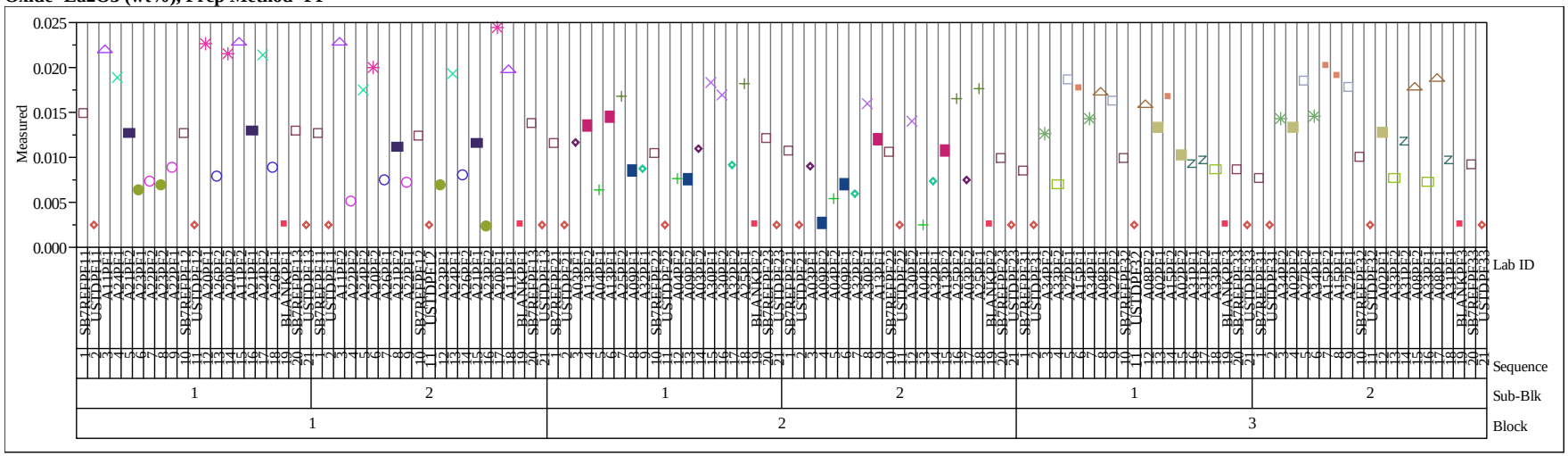


Exhibit A-1. Measurements of Study Glasses by Lab ID in Analytical Sequence for Analytical Blocks 1, 2, and 3 by Oxide and Preparation Method

Oxide=La2O3 (wt%), Prep Method=PF



Oxide=Li2O (wt%), Prep Method=AR

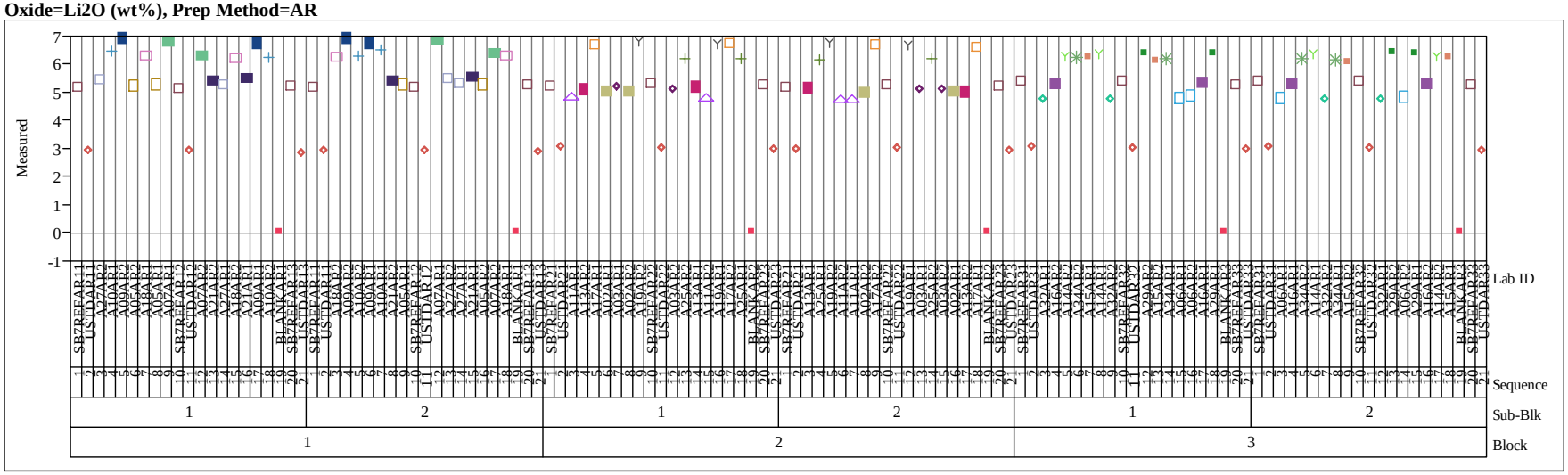
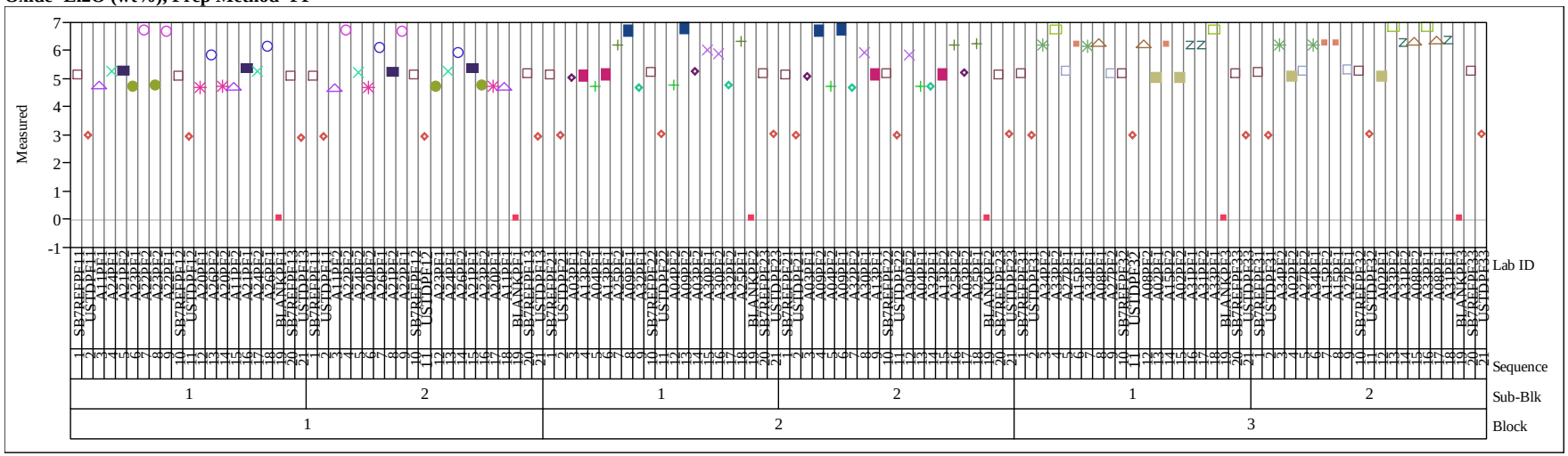


Exhibit A-1. Measurements of Study Glasses by Lab ID in Analytical Sequence for Analytical Blocks 1, 2, and 3 by Oxide and Preparation Method

Oxide=Li2O (wt%), Prep Method=PF



Oxide=MgO (wt%), Prep Method=AR

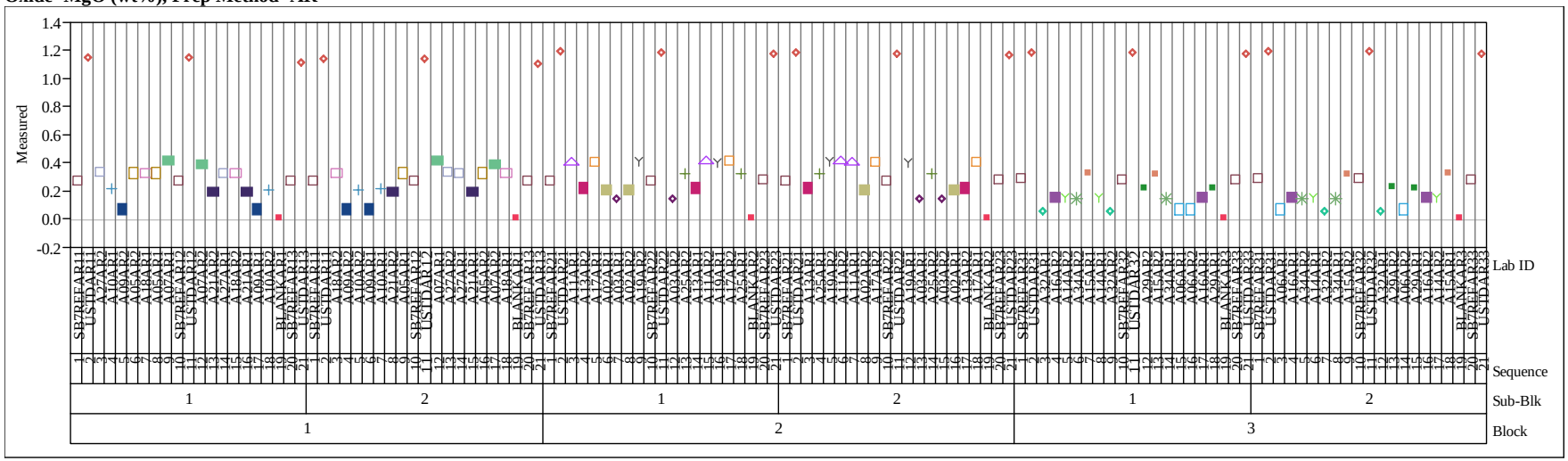
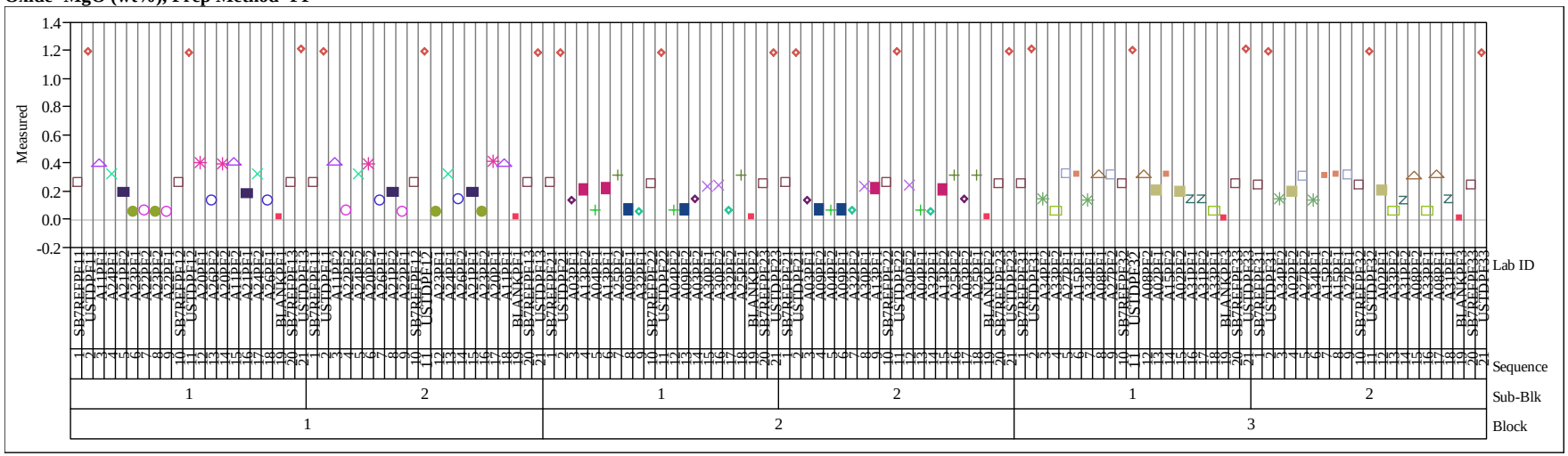


Exhibit A-1. Measurements of Study Glasses by Lab ID in Analytical Sequence for Analytical Blocks 1, 2, and 3 by Oxide and Preparation Method

Oxide=MgO (wt%), Prep Method=PF



Oxide=MnO (wt%), Prep Method=AR

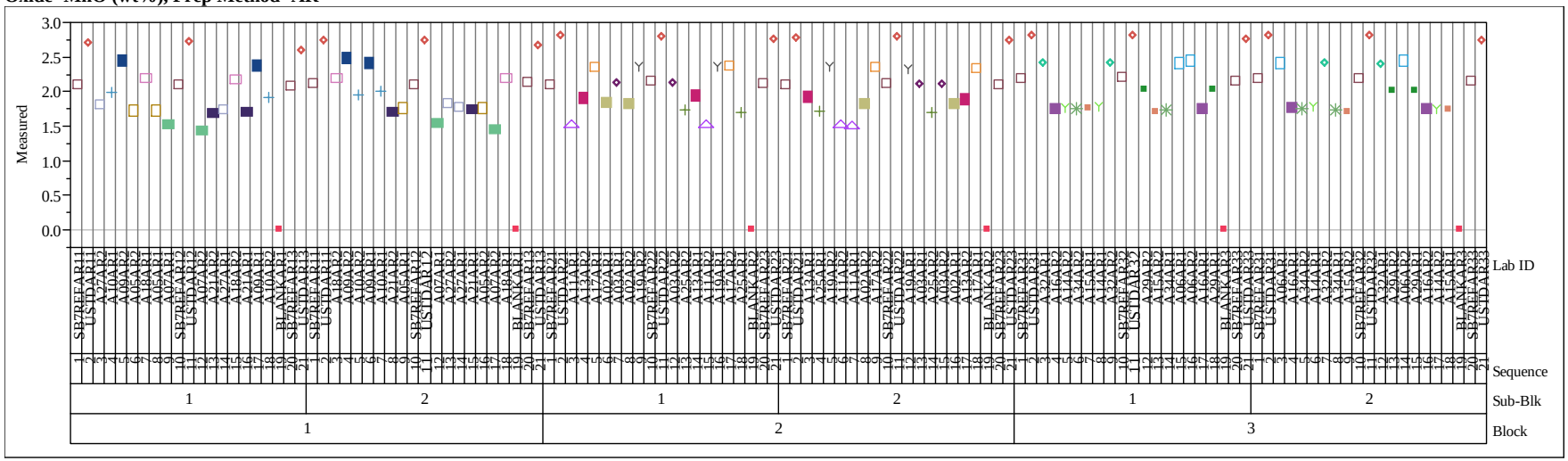
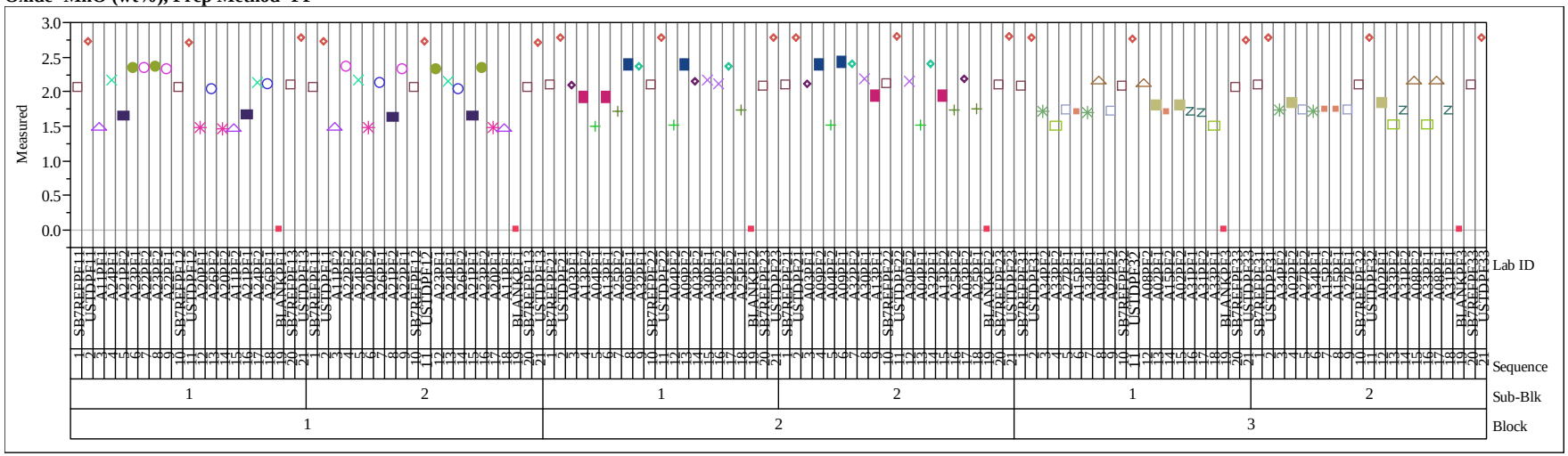


Exhibit A-1. Measurements of Study Glasses by Lab ID in Analytical Sequence for Analytical Blocks 1, 2, and 3 by Oxide and Preparation Method

Oxide=MnO (wt%), Prep Method=PF



Oxide=Na2O (wt%), Prep Method=AR

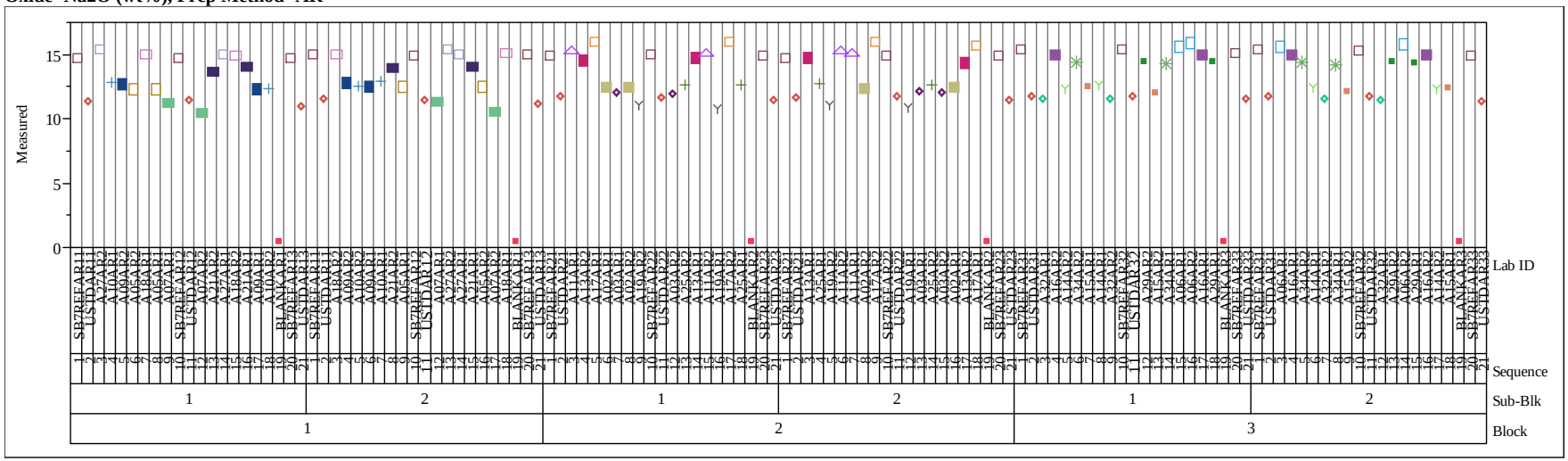
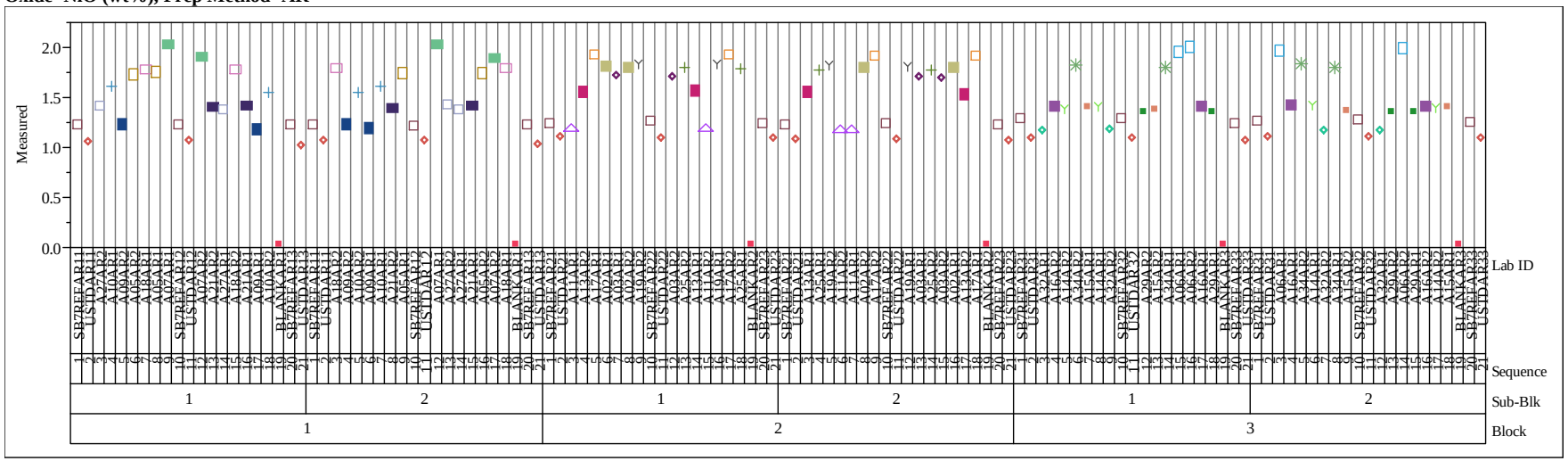


Exhibit A-1. Measurements of Study Glasses by Lab ID in Analytical Sequence for Analytical Blocks 1, 2, and 3 by Oxide and Preparation Method

Oxide=NiO (wt%), Prep Method=AR



Oxide=NiO (wt%), Prep Method=PF

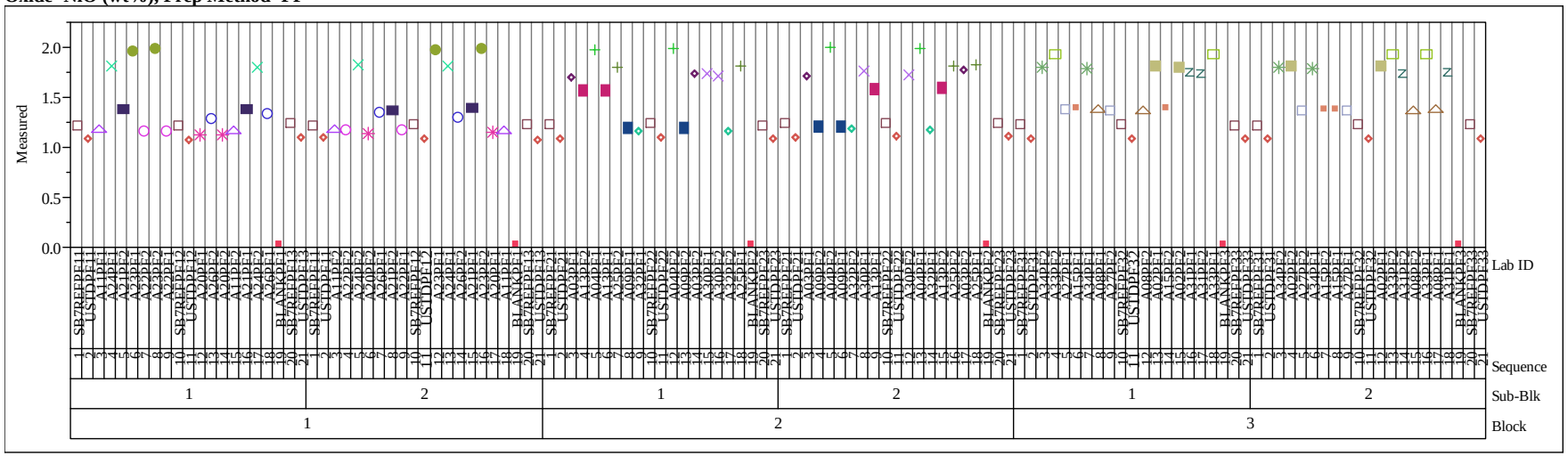
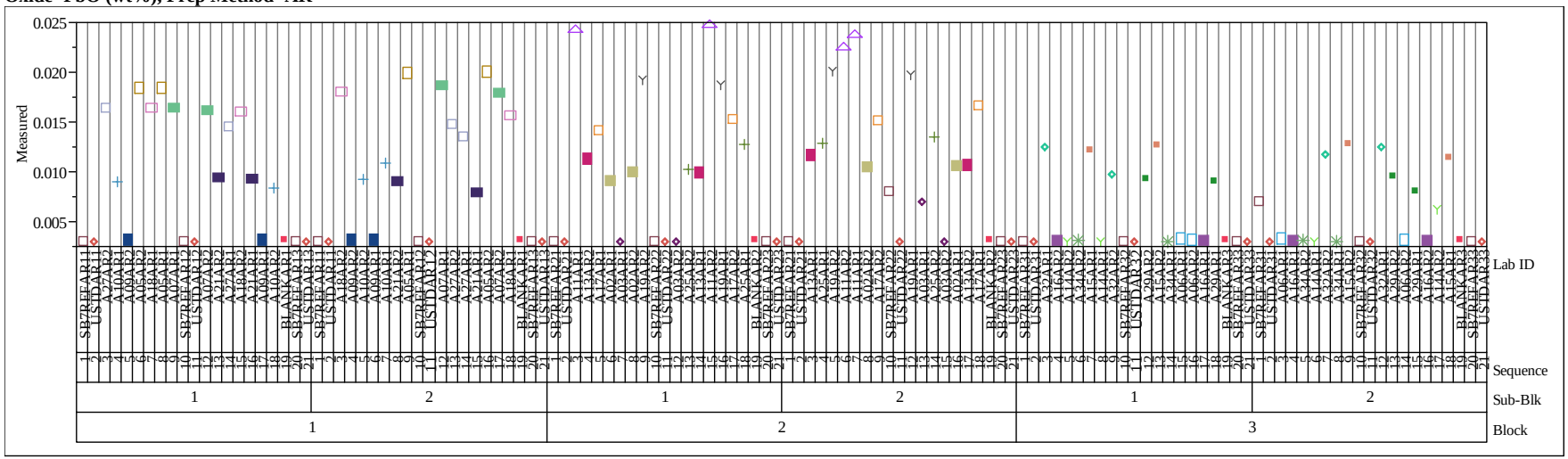


Exhibit A-1. Measurements of Study Glasses by Lab ID in Analytical Sequence for Analytical Blocks 1, 2, and 3 by Oxide and Preparation Method

Oxide=PbO (wt%), Prep Method=AR



Oxide=PbO (wt%), Prep Method=PF

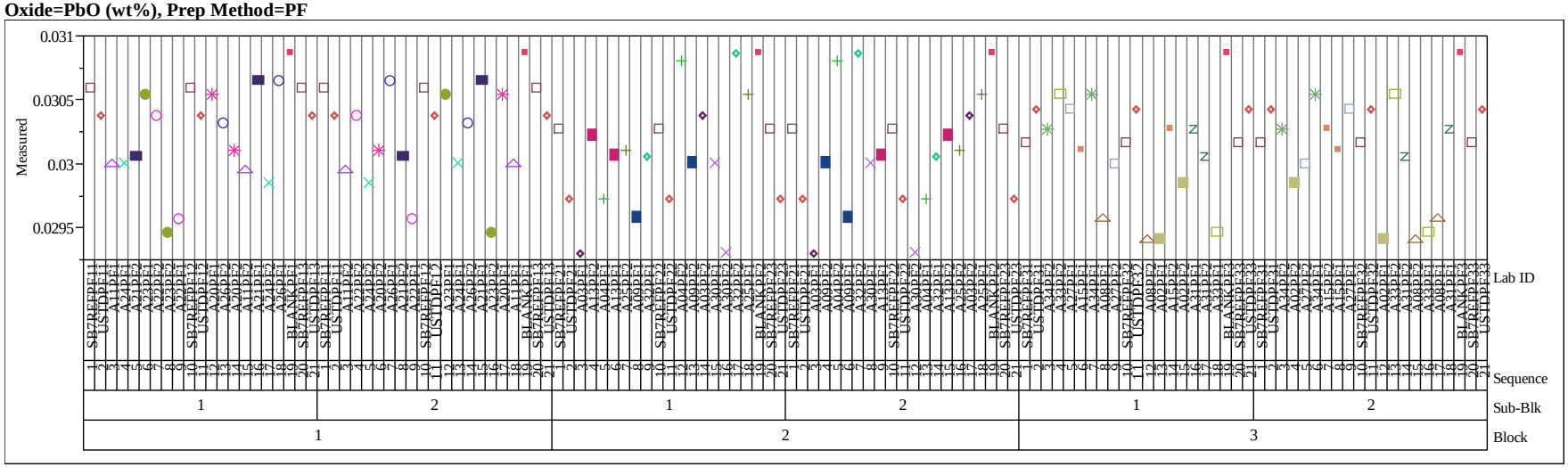
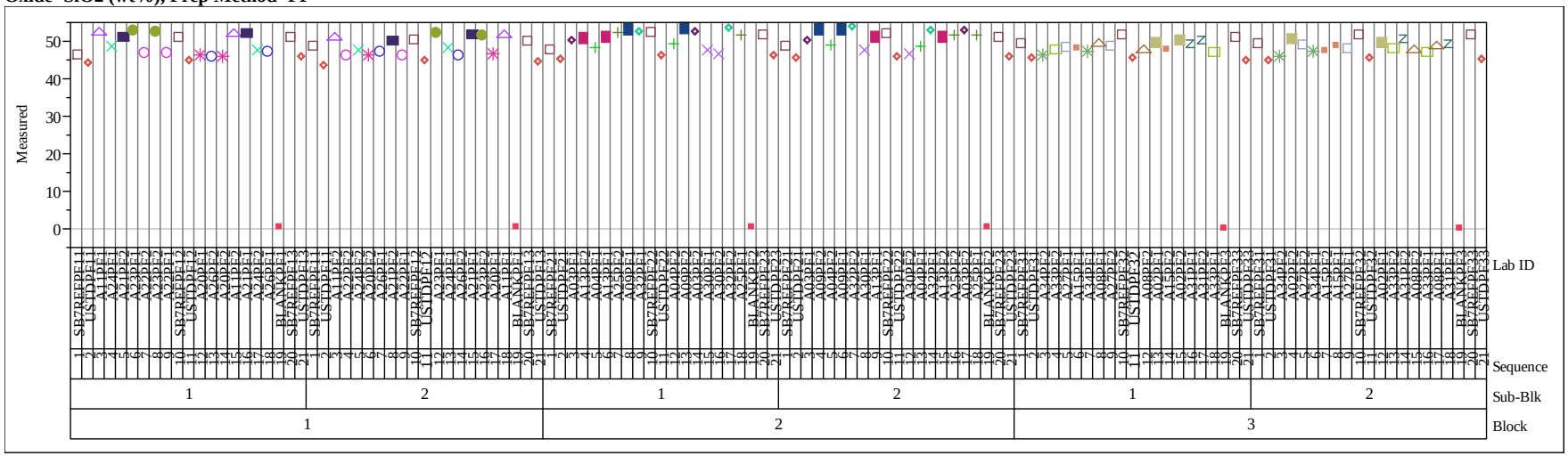


Exhibit A-1. Measurements of Study Glasses by Lab ID in Analytical Sequence for Analytical Blocks 1, 2, and 3 by Oxide and Preparation Method

Oxide=SiO2 (wt%), Prep Method=PF



Oxide=SO4 (wt%), Prep Method=AR

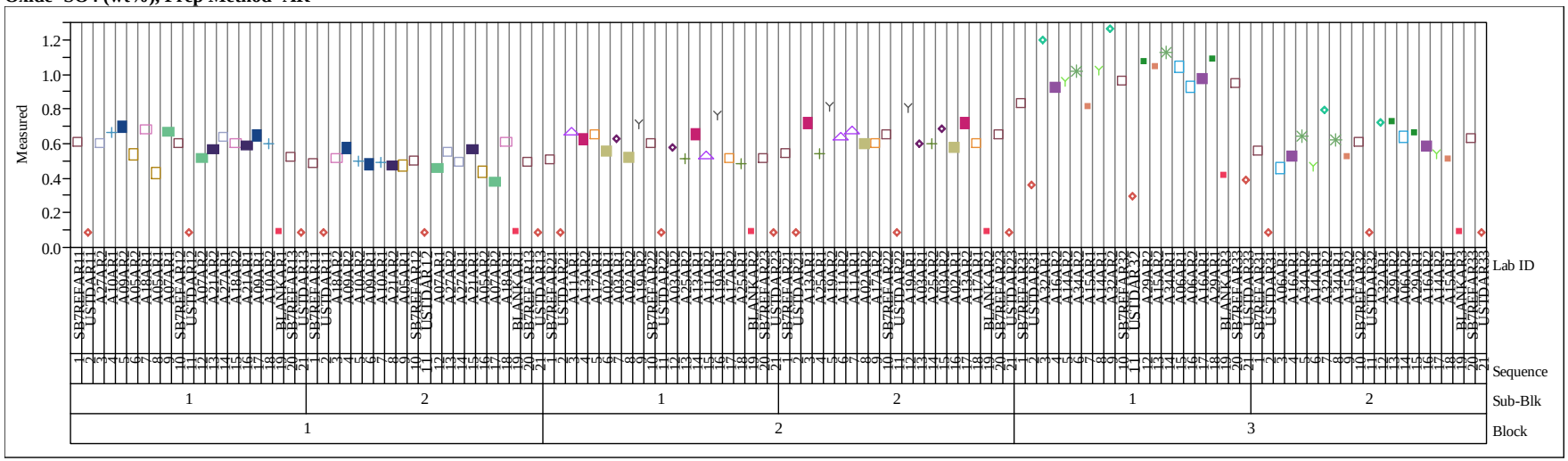
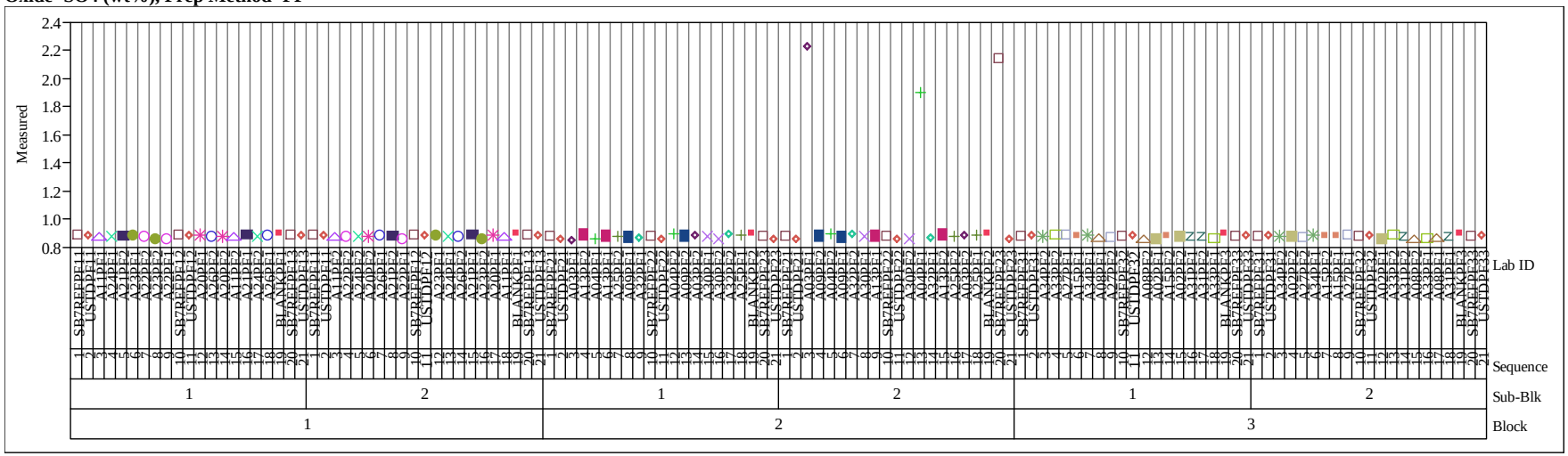


Exhibit A-1. Measurements of Study Glasses by Lab ID in Analytical Sequence for Analytical Blocks 1, 2, and 3 by Oxide and Preparation Method

Oxide=SO4 (wt%), Prep Method=PF



Oxide=ThO2 (wt%), Prep Method=AR

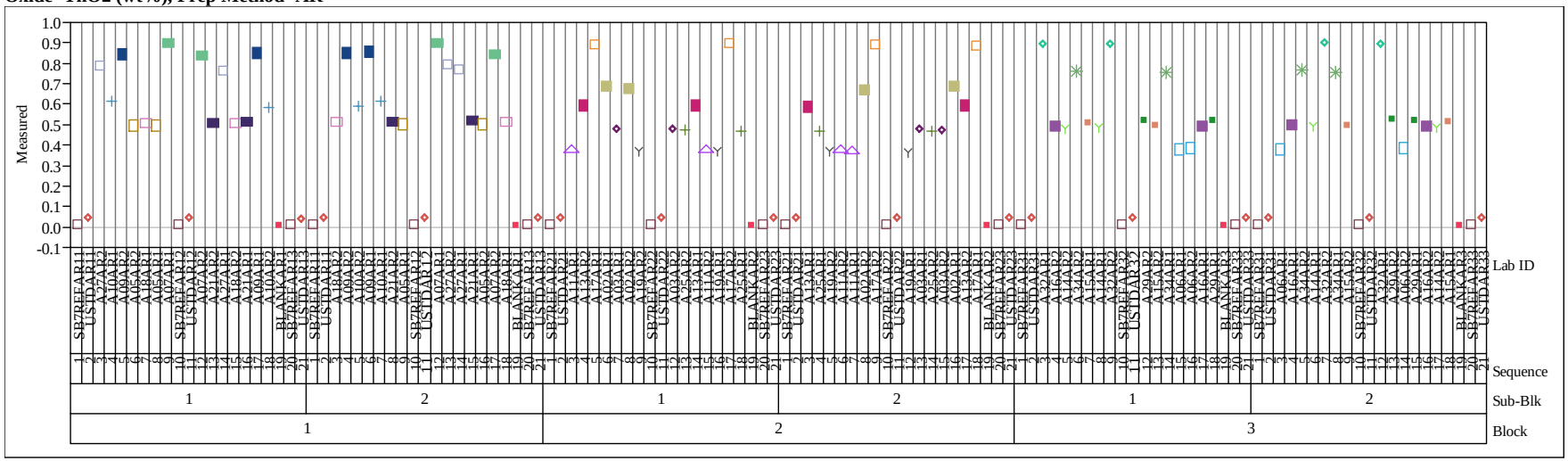
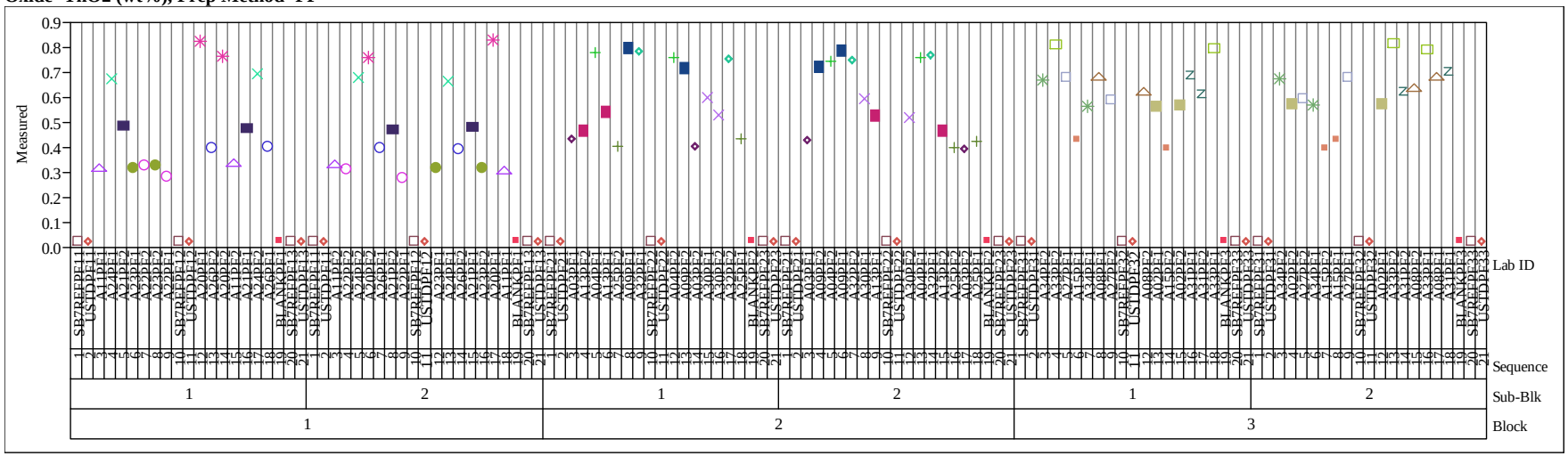


Exhibit A-1. Measurements of Study Glasses by Lab ID in Analytical Sequence for Analytical Blocks 1, 2, and 3 by Oxide and Preparation Method

Oxide=ThO2 (wt%), Prep Method=PF



Oxide=TiO2 (wt%), Prep Method=AR

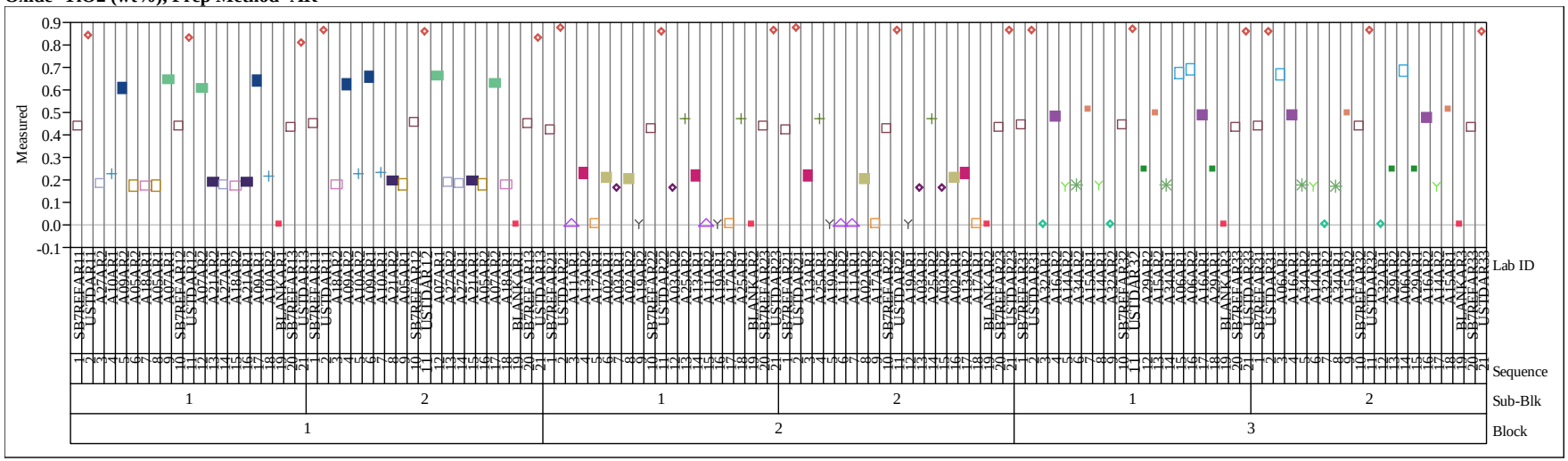
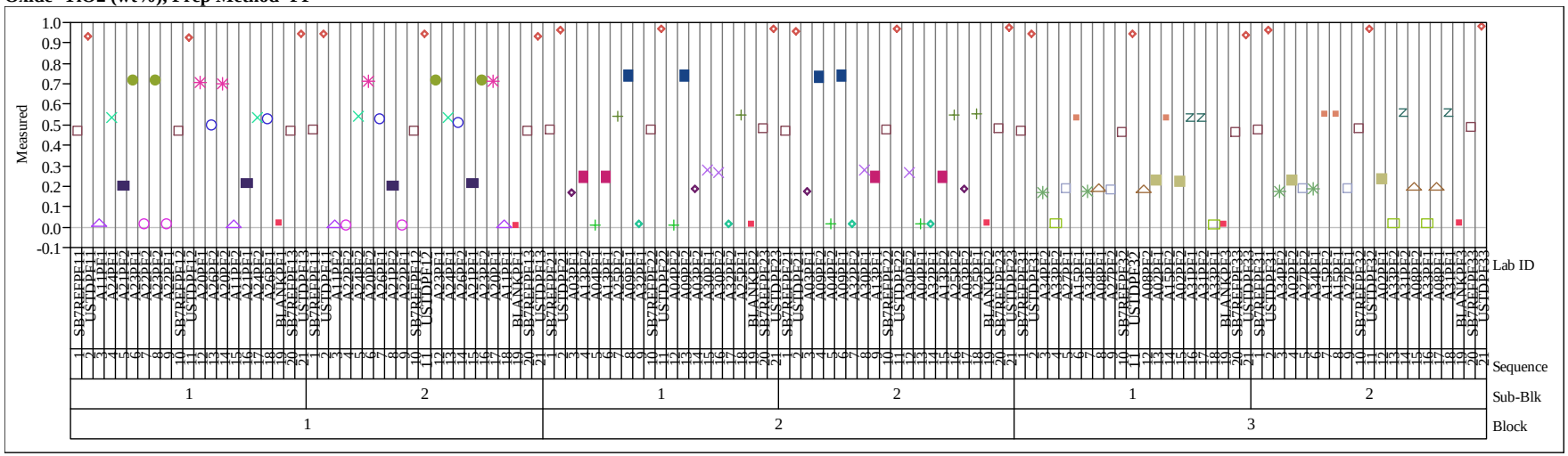


Exhibit A-1. Measurements of Study Glasses by Lab ID in Analytical Sequence for Analytical Blocks 1, 2, and 3 by Oxide and Preparation Method

Oxide=TiO2 (wt%), Prep Method=PF



Oxide=U3O8 (wt%), Prep Method=AR

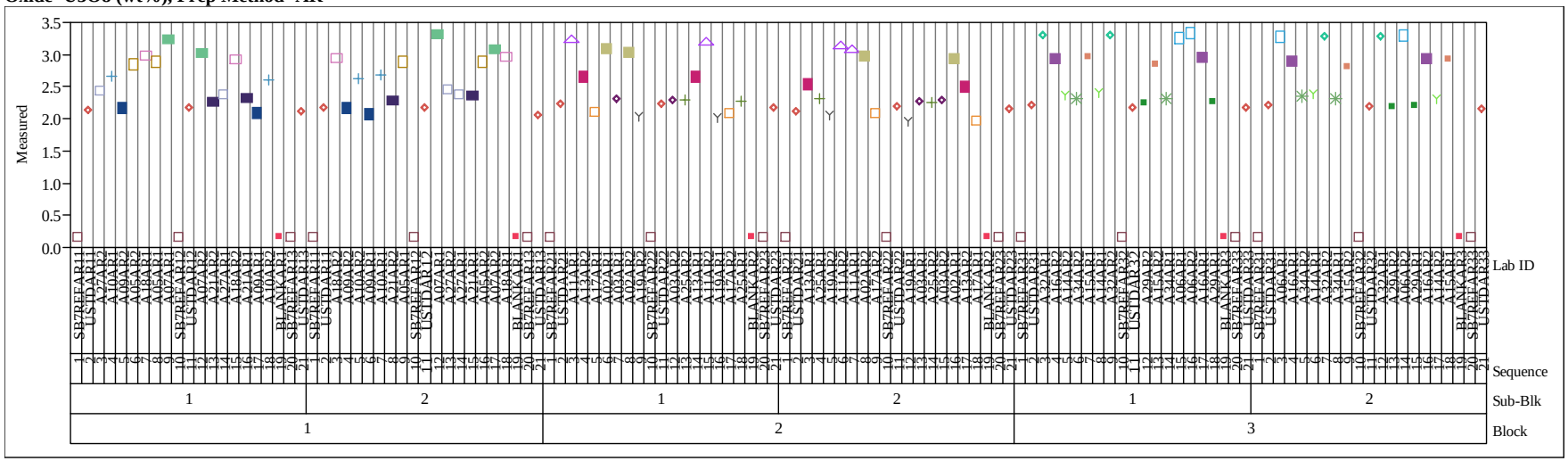
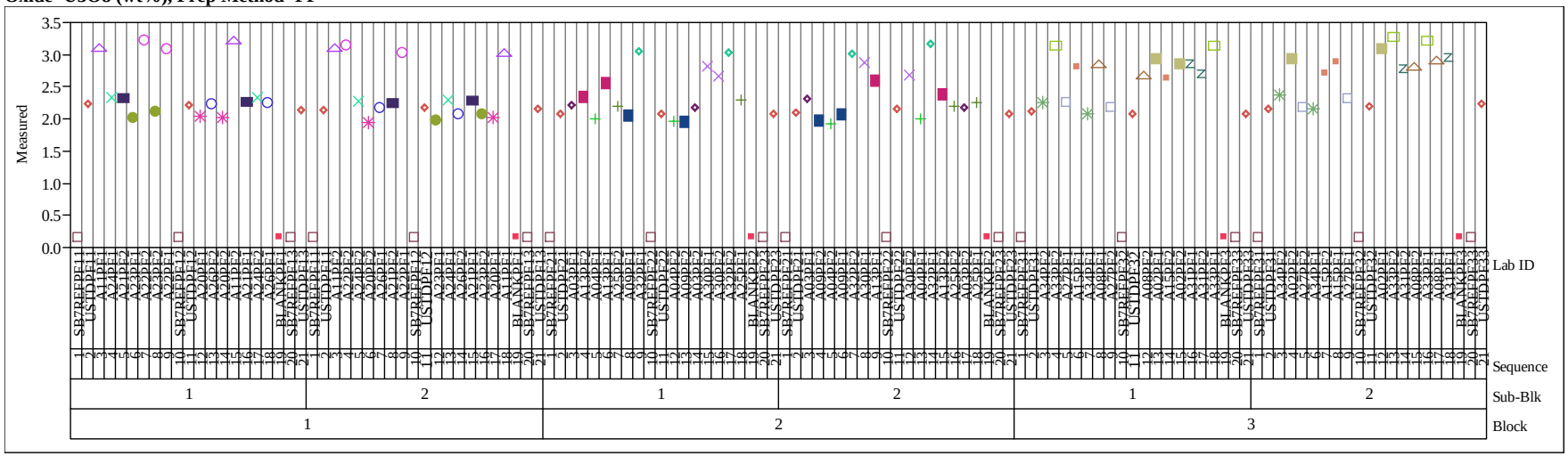


Exhibit A-1. Measurements of Study Glasses by Lab ID in Analytical Sequence for Analytical Blocks 1, 2, and 3 by Oxide and Preparation Method

Oxide=U3O8 (wt%), Prep Method=PF



Oxide=ZnO (wt%), Prep Method=AR

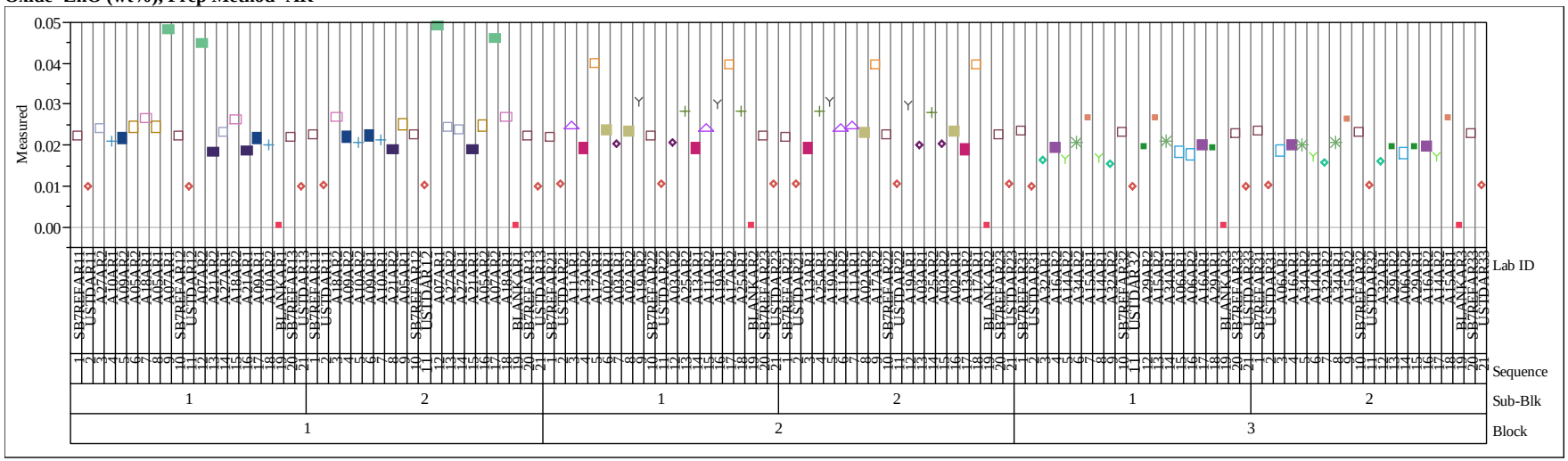
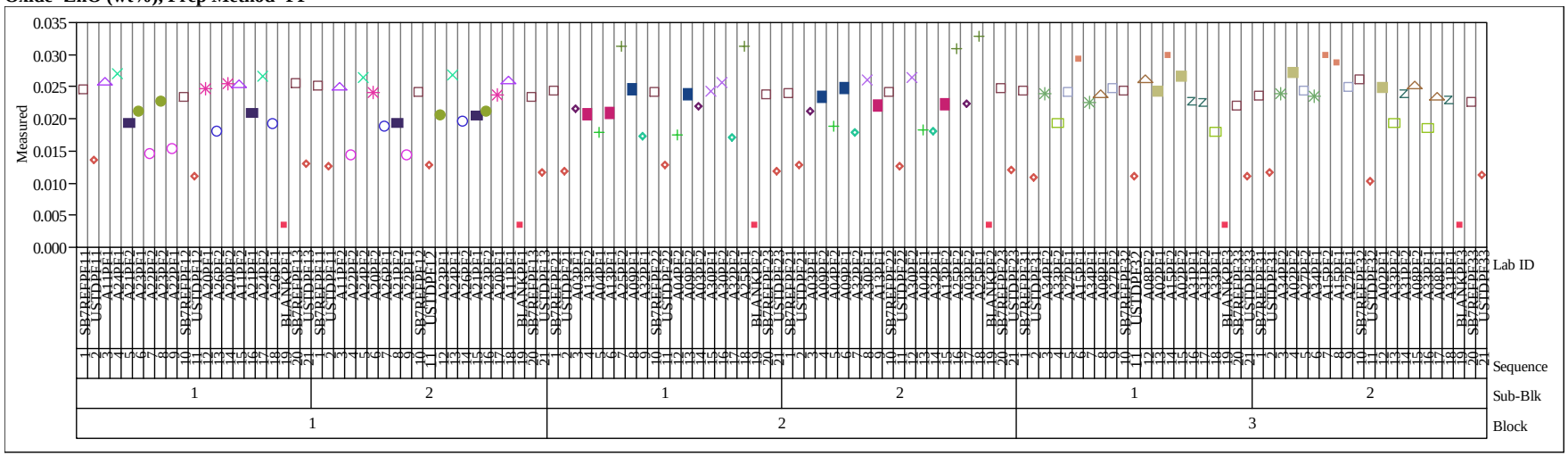


Exhibit A-1. Measurements of Study Glasses by Lab ID in Analytical Sequence for Analytical Blocks 1, 2, and 3 by Oxide and Preparation Method

Oxide=ZnO (wt%), Prep Method=PF



Oxide=ZrO2 (wt%), Prep Method=AR

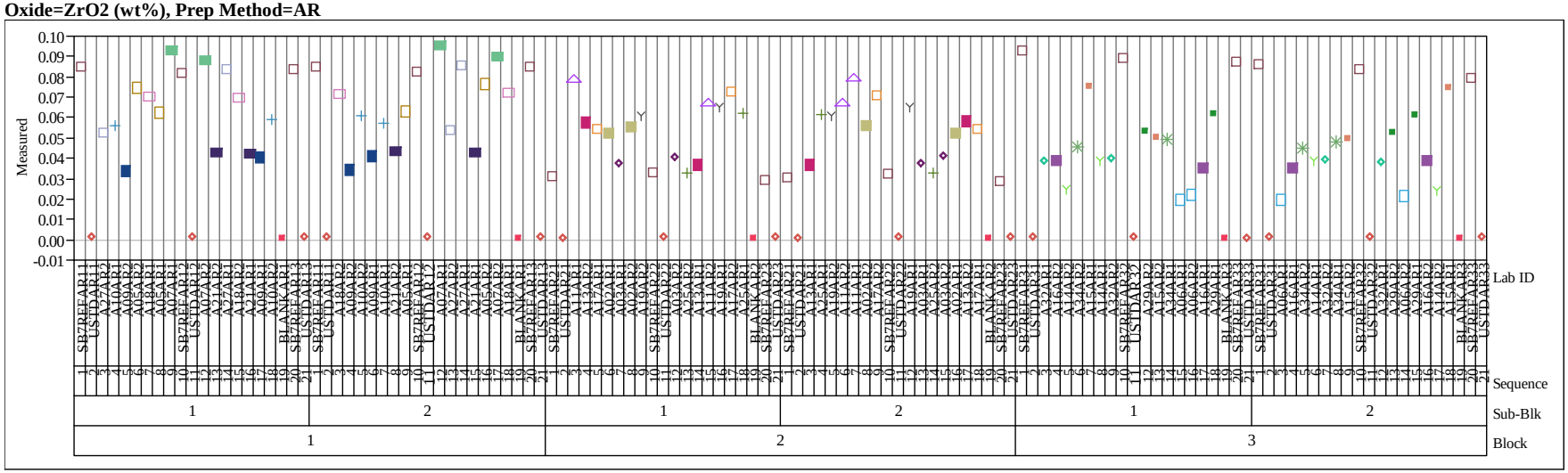
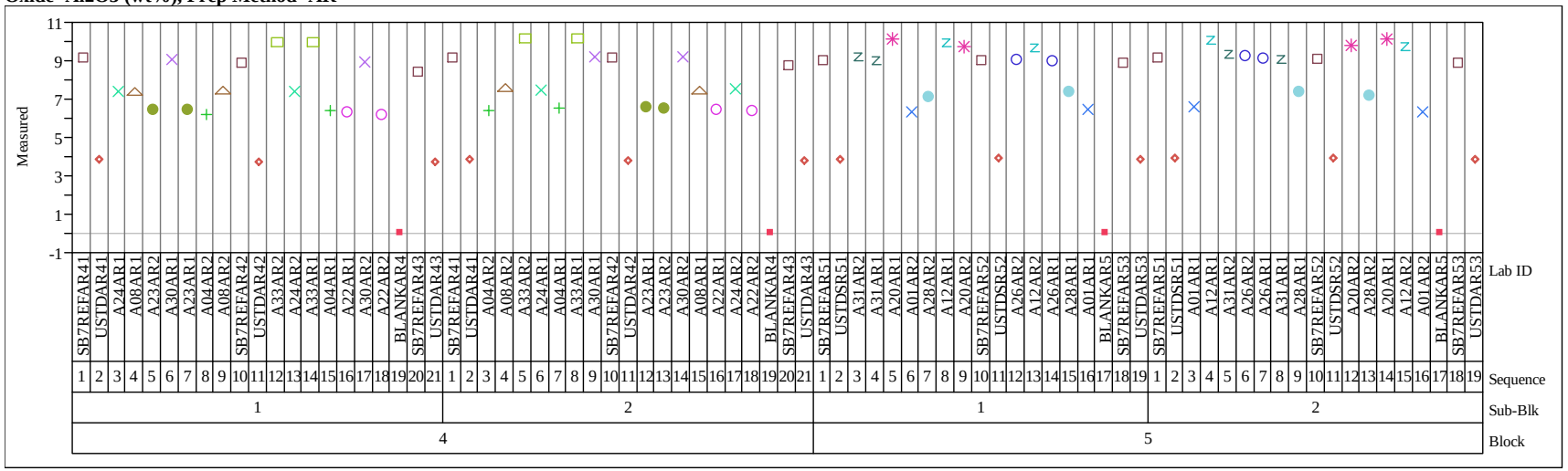


Exhibit A-2. Measurements of Initial Glasses in Analytical Sequence for Samples by Oxide and Preparation Method for Analytical Blocks 4 and 5

Oxide=Al2O3 (wt%), Prep Method=AR



Oxide=Al2O3 (wt%), Prep Method=PF

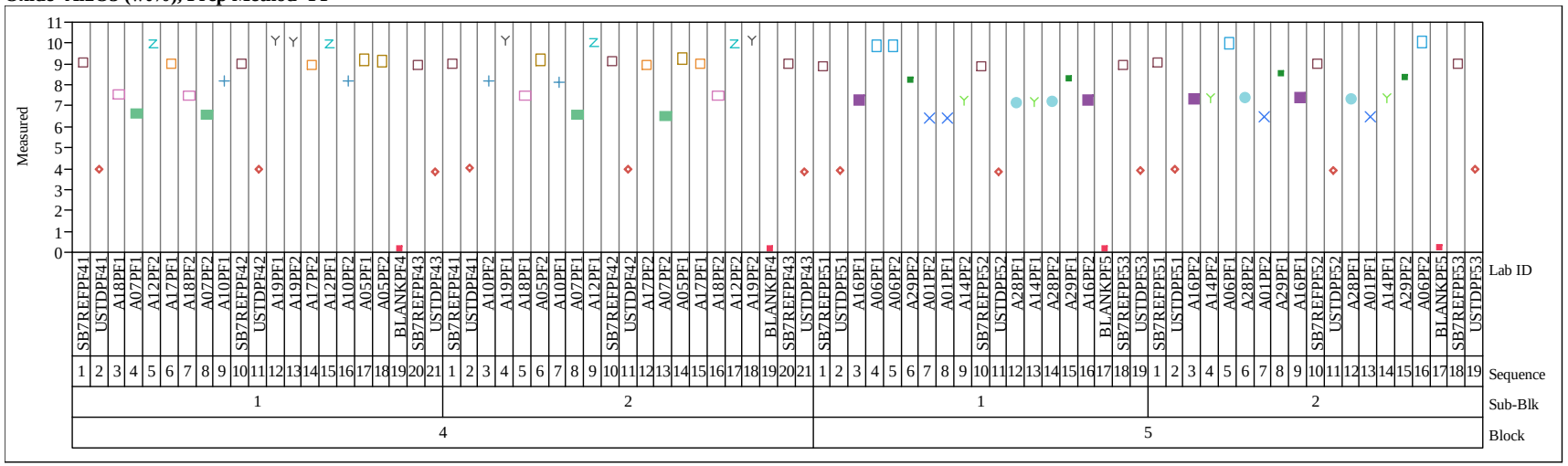
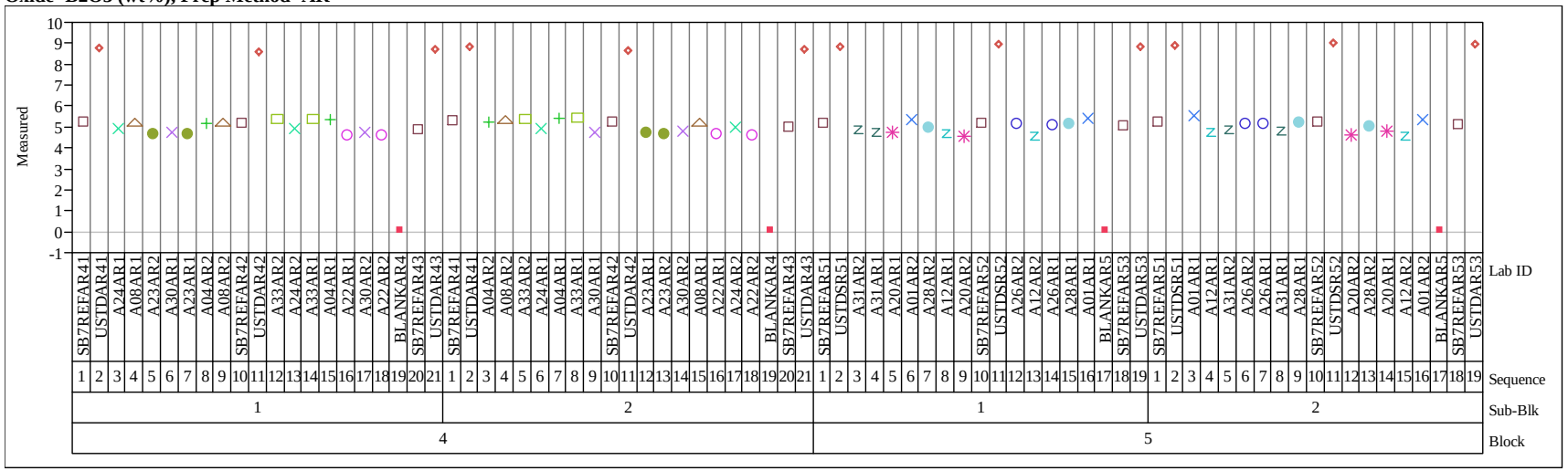


Exhibit A-2. Measurements of Initial Glasses in Analytical Sequence for Samples by Oxide and Preparation Method for Analytical Blocks 4 and 5

Oxide=B2O3 (wt%), Prep Method=AR



Oxide=B2O3 (wt%), Prep Method=PF

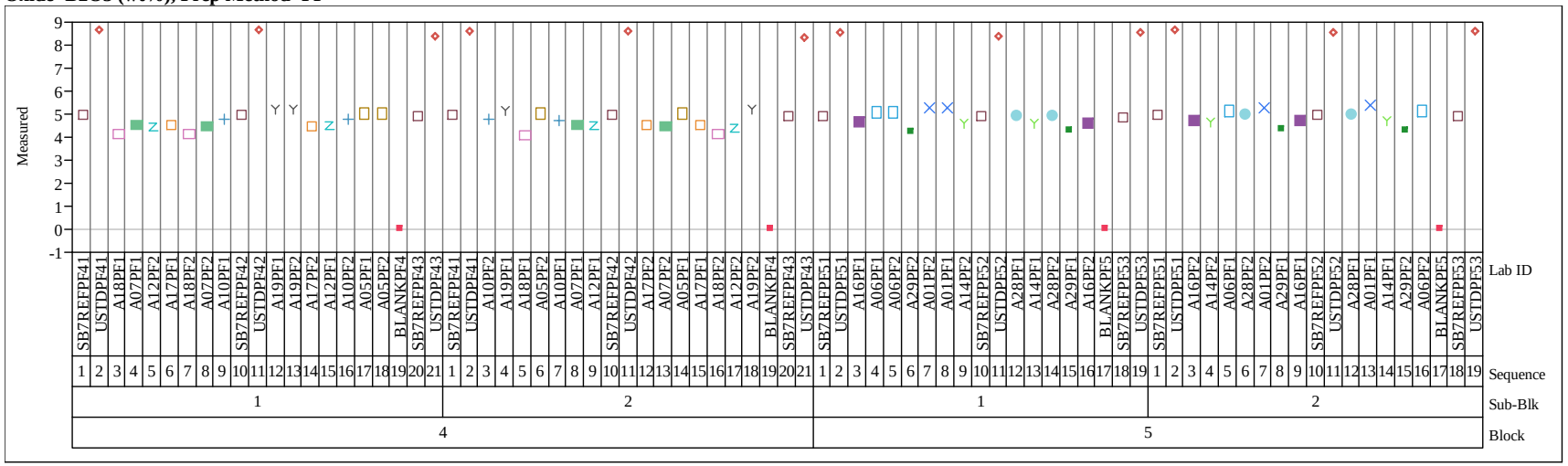
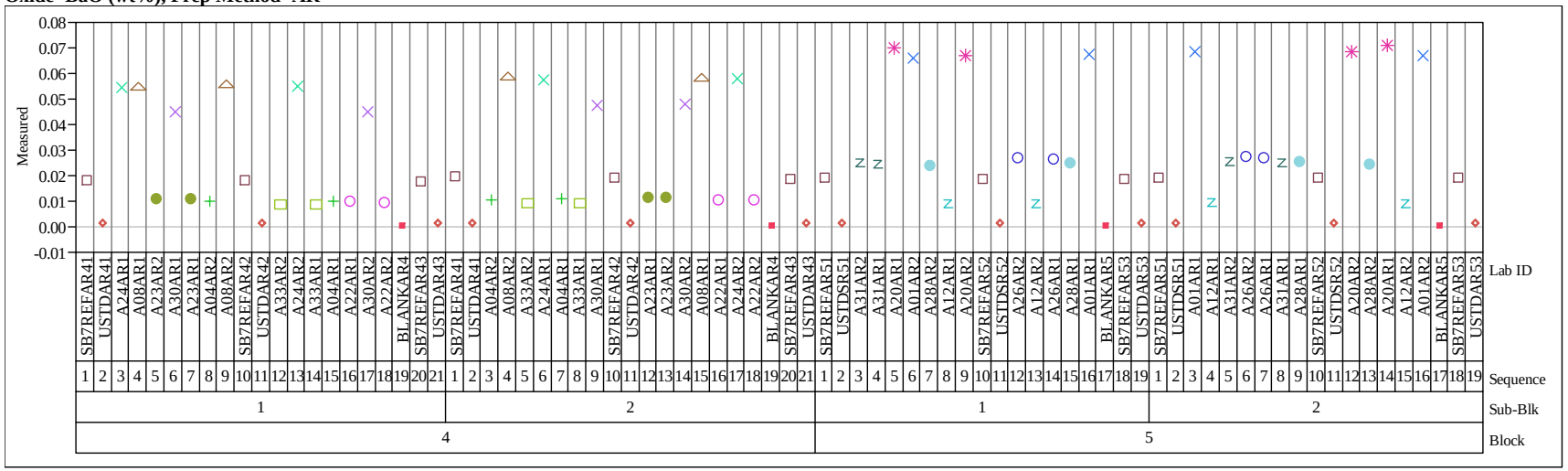


Exhibit A-2. Measurements of Initial Glasses in Analytical Sequence for Samples by Oxide and Preparation Method for Analytical Blocks 4 and 5

Oxide=BaO (wt%), Prep Method=AR



Oxide=BaO (wt%), Prep Method=PF

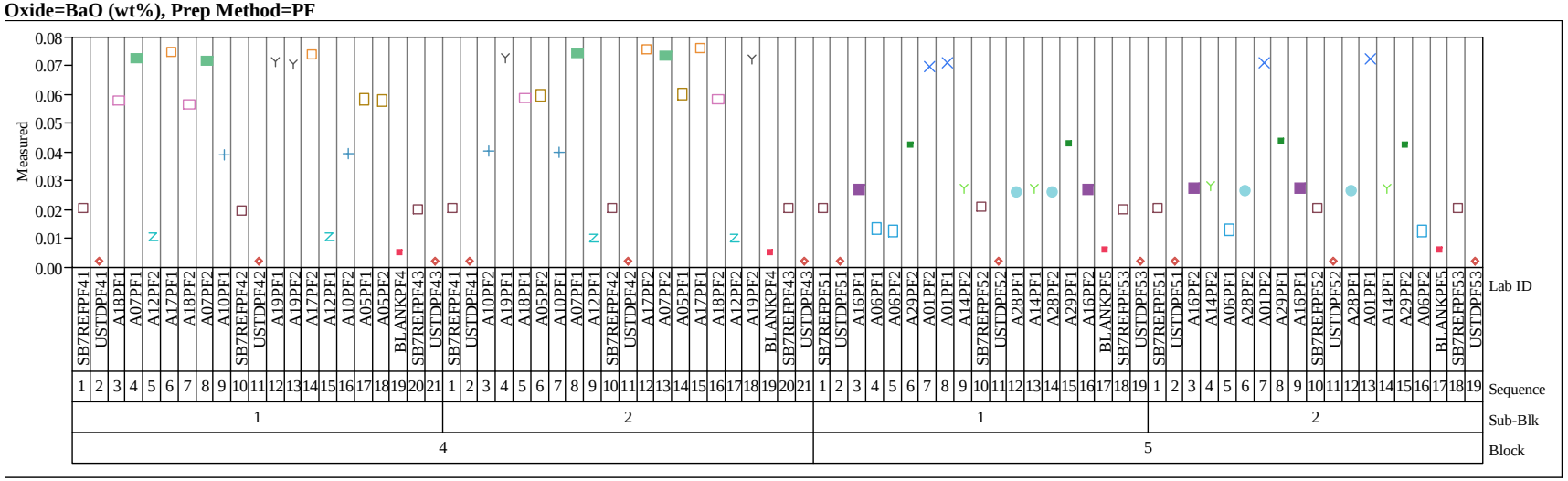
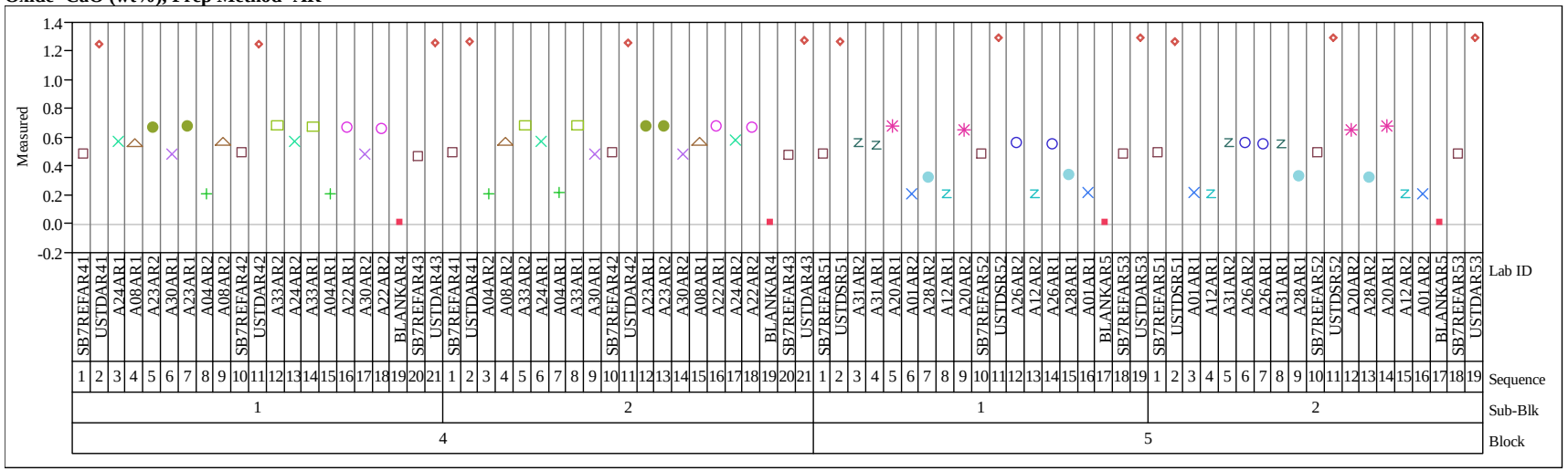


Exhibit A-2. Measurements of Initial Glasses in Analytical Sequence for Samples by Oxide and Preparation Method for Analytical Blocks 4 and 5

Oxide=CaO (wt%), Prep Method=AR



Oxide=Ce2O3 (wt%), Prep Method=AR

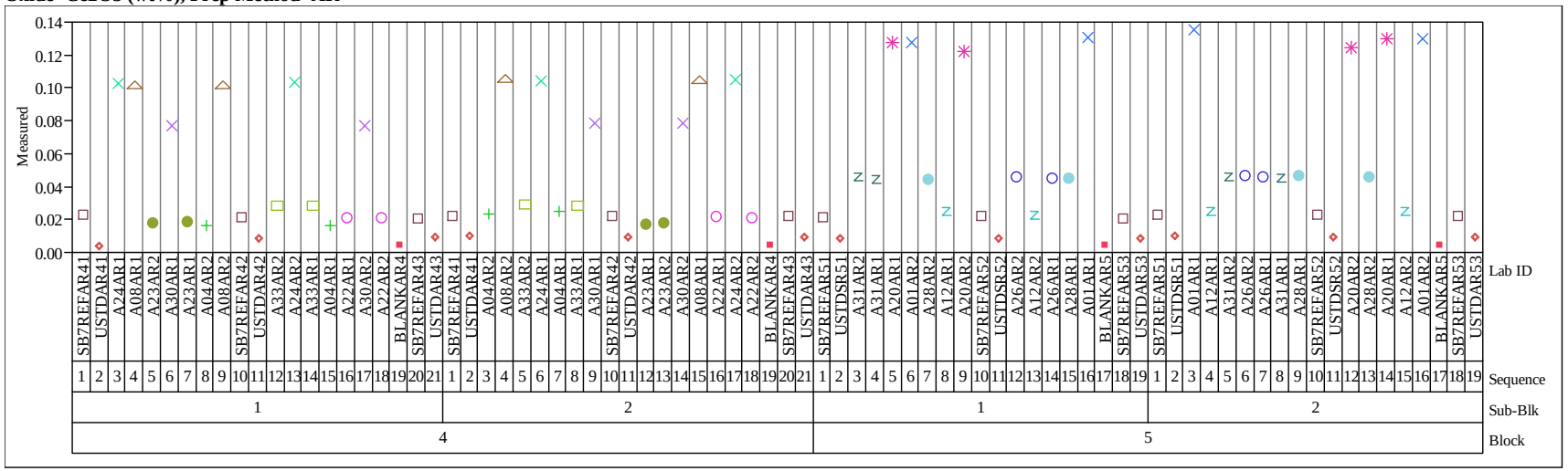
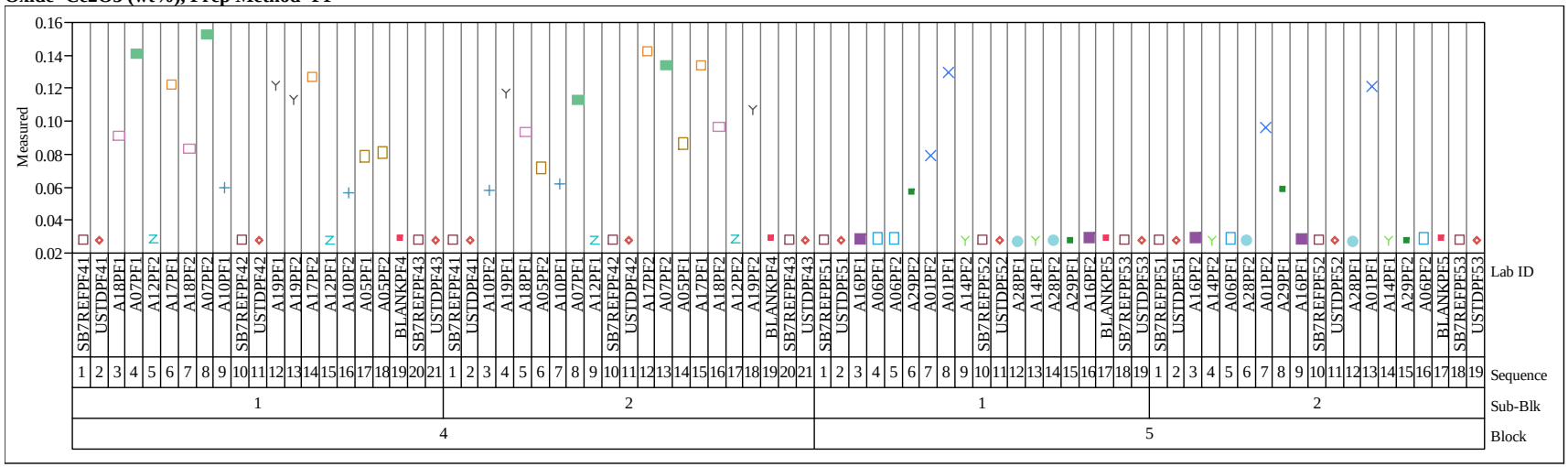


Exhibit A-2. Measurements of Initial Glasses in Analytical Sequence for Samples by Oxide and Preparation Method for Analytical Blocks 4 and 5

Oxide=Ce2O3 (wt%), Prep Method=PF



Oxide=Cr2O3 (wt%), Prep Method=AR

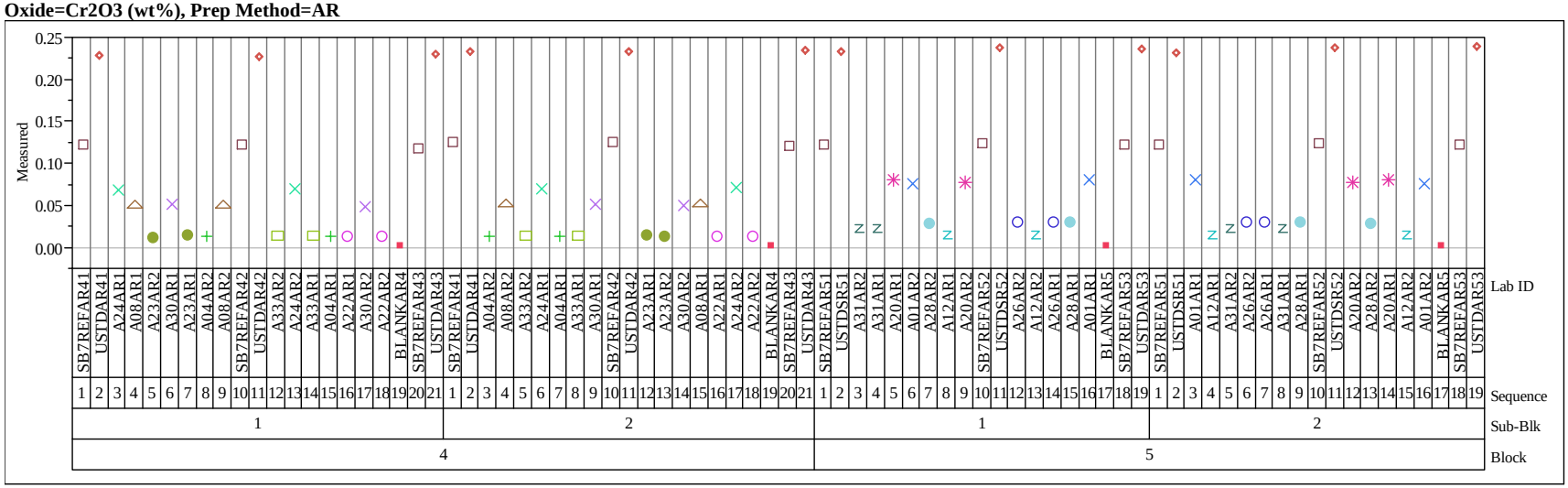
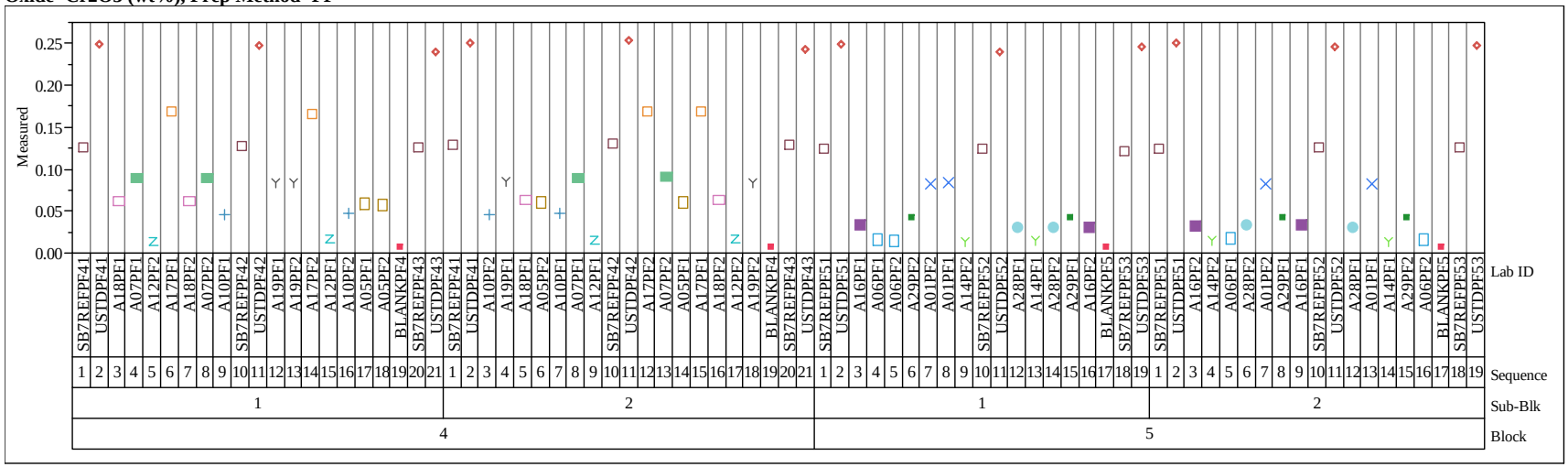


Exhibit A-2. Measurements of Initial Glasses in Analytical Sequence for Samples by Oxide and Preparation Method for Analytical Blocks 4 and 5

Oxide=Cr2O3 (wt%), Prep Method=PF



Oxide=CuO (wt%), Prep Method=AR

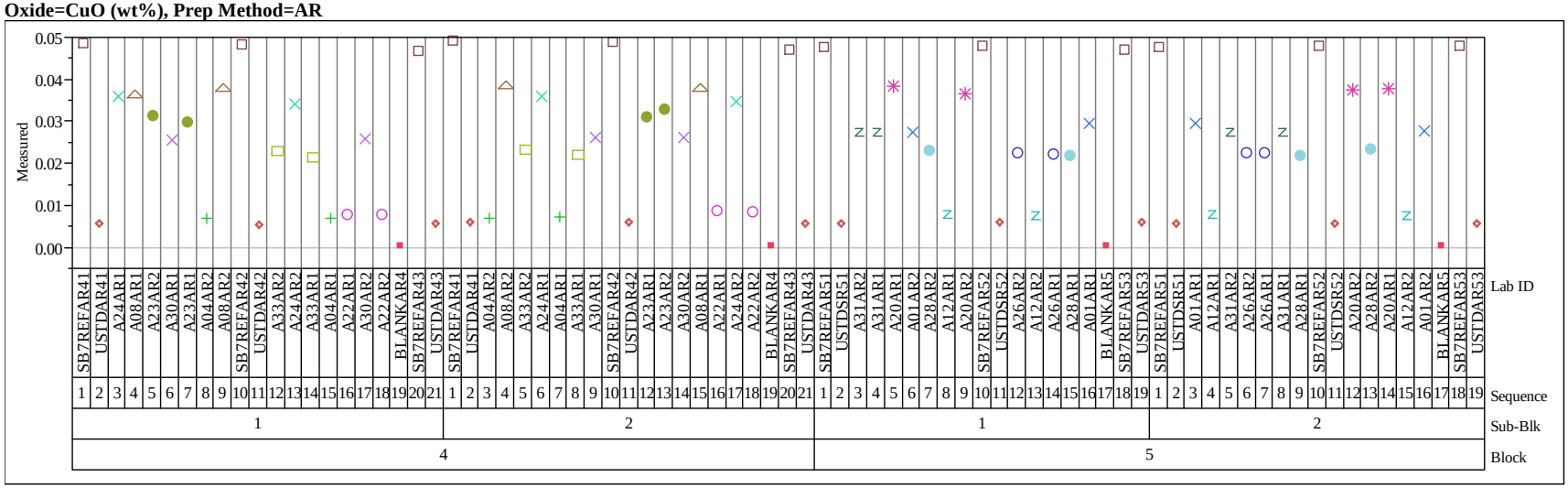
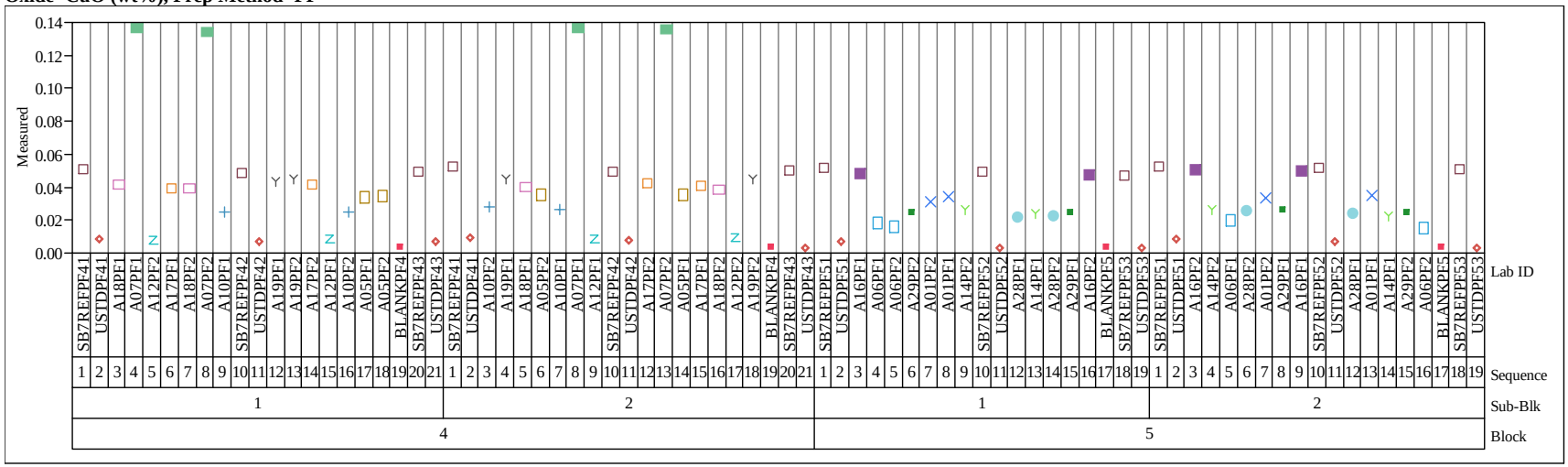


Exhibit A-2. Measurements of Initial Glasses in Analytical Sequence for Samples by Oxide and Preparation Method for Analytical Blocks 4 and 5

Oxide=CuO (wt%), Prep Method=PF



Oxide=Fe2O3 (wt%), Prep Method=AR

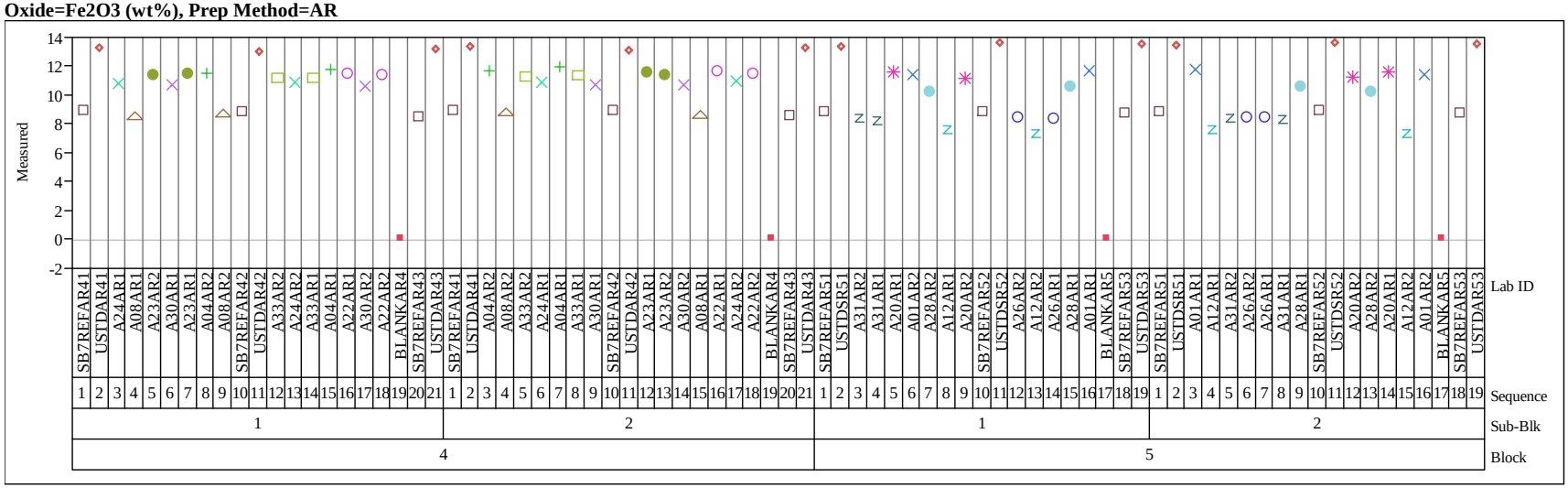
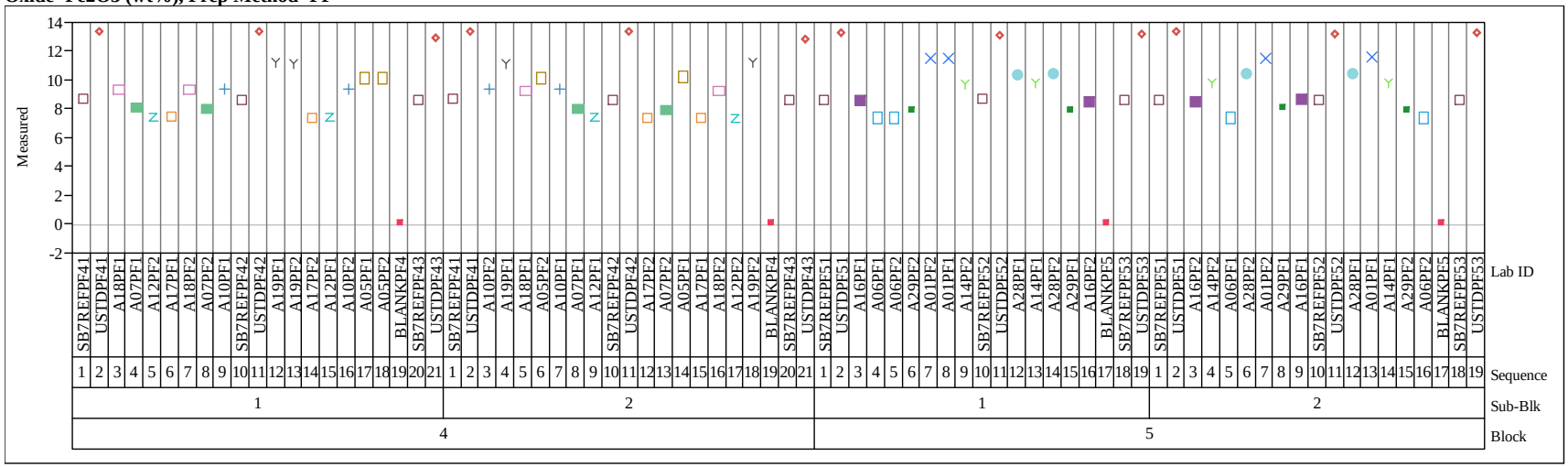


Exhibit A-2. Measurements of Initial Glasses in Analytical Sequence for Samples by Oxide and Preparation Method for Analytical Blocks 4 and 5

Oxide=Fe2O3 (wt%), Prep Method=PF



Oxide=K2O (wt%), Prep Method=AR

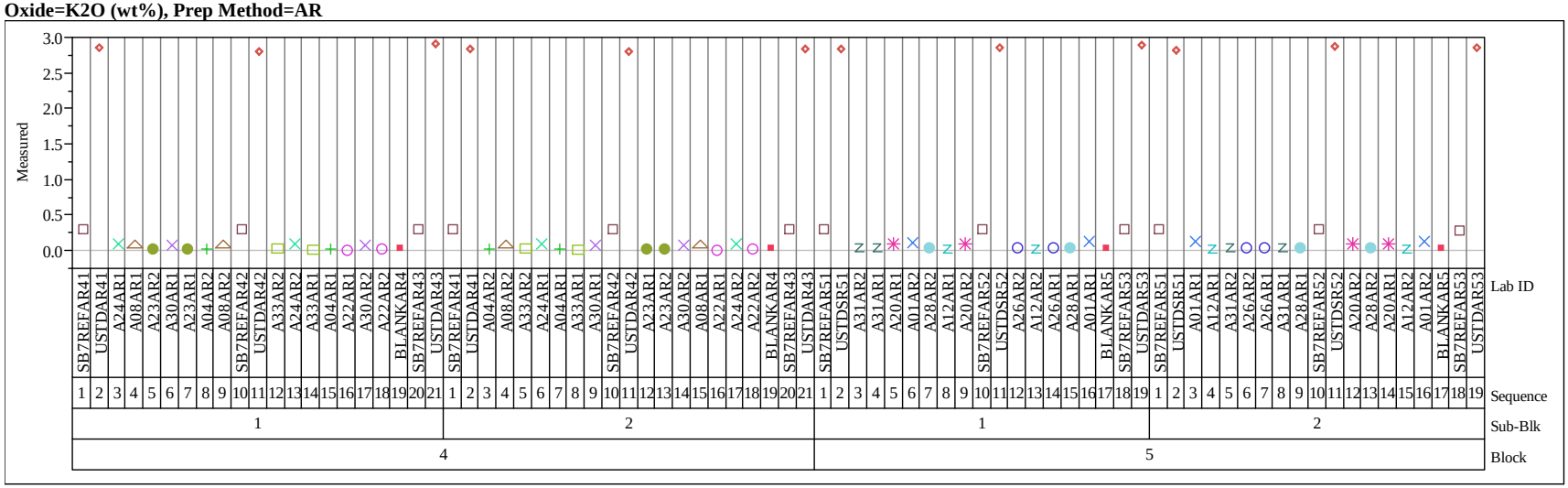
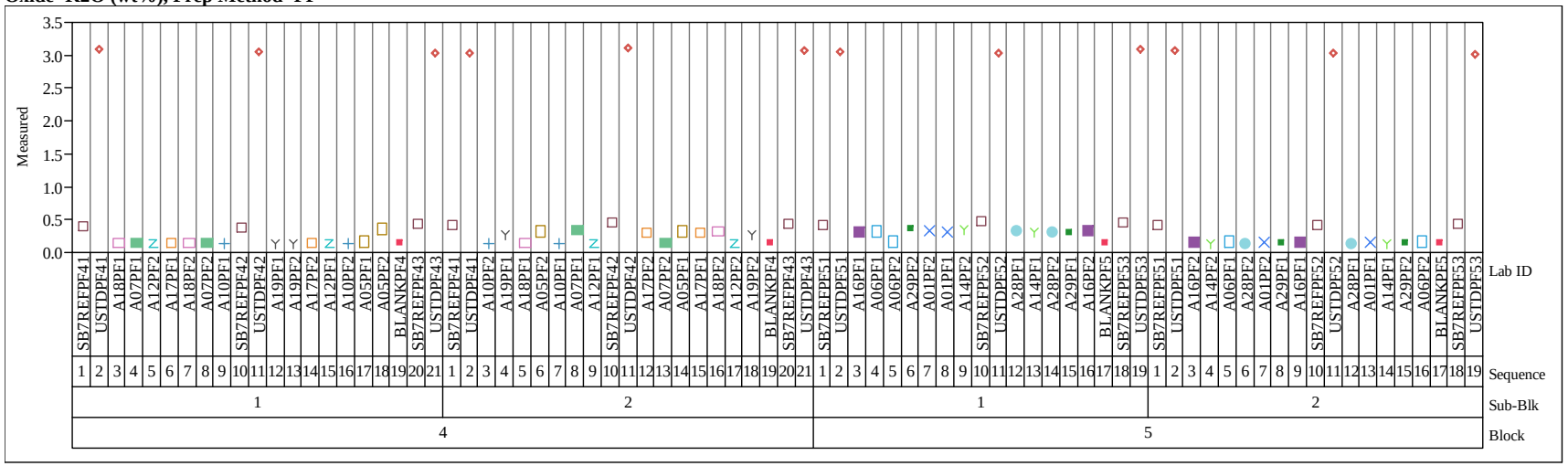


Exhibit A-2. Measurements of Initial Glasses in Analytical Sequence for Samples by Oxide and Preparation Method for Analytical Blocks 4 and 5

Oxide=K2O (wt%), Prep Method=PF



Oxide=La2O3 (wt%), Prep Method=AR

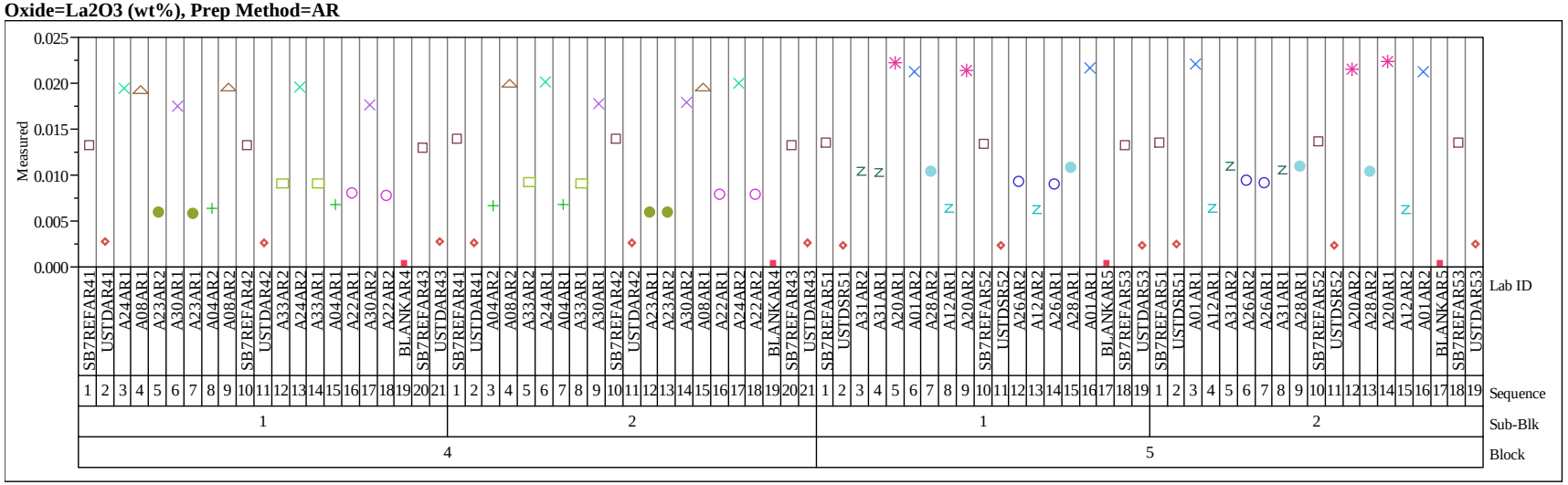
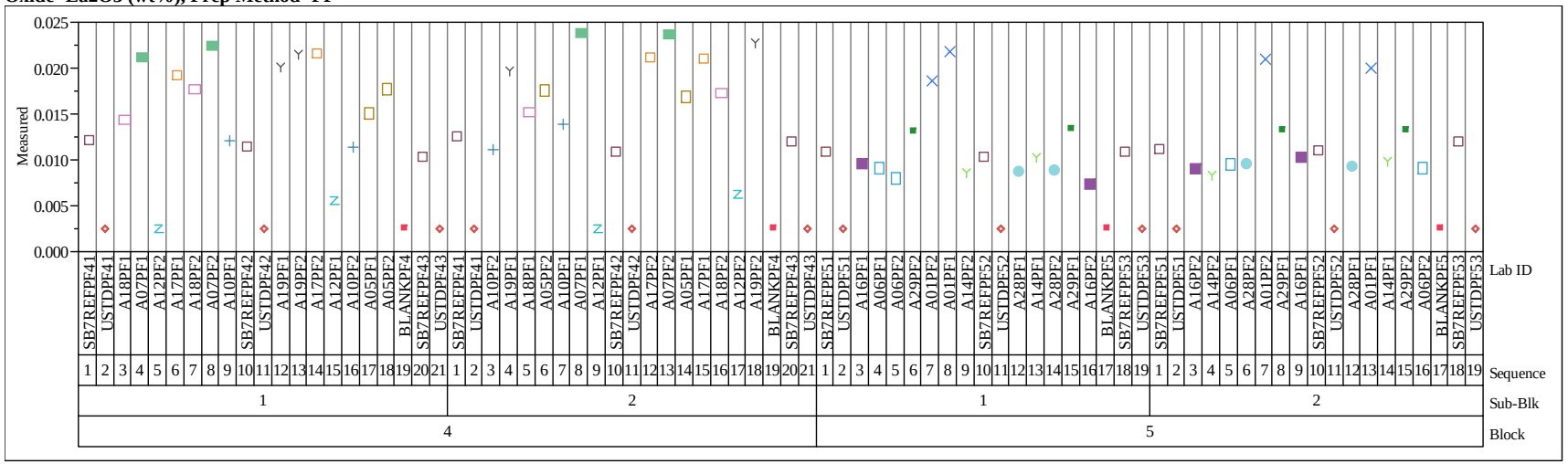


Exhibit A-2. Measurements of Initial Glasses in Analytical Sequence for Samples by Oxide and Preparation Method for Analytical Blocks 4 and 5

Oxide=La2O3 (wt%), Prep Method=PF



Oxide=Li2O (wt%), Prep Method=AR

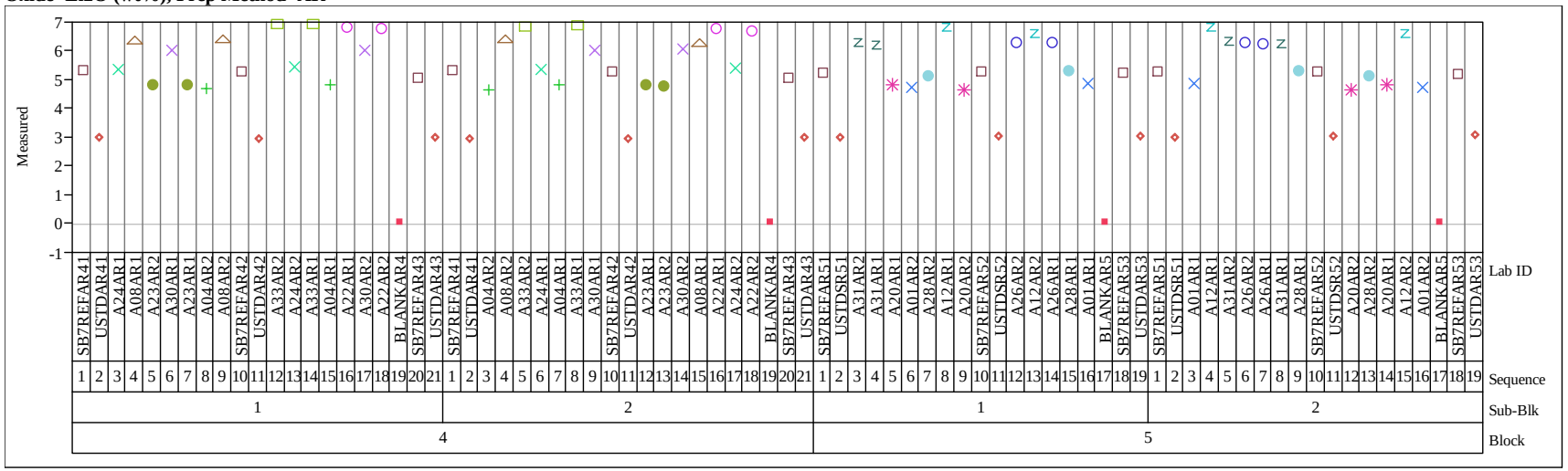
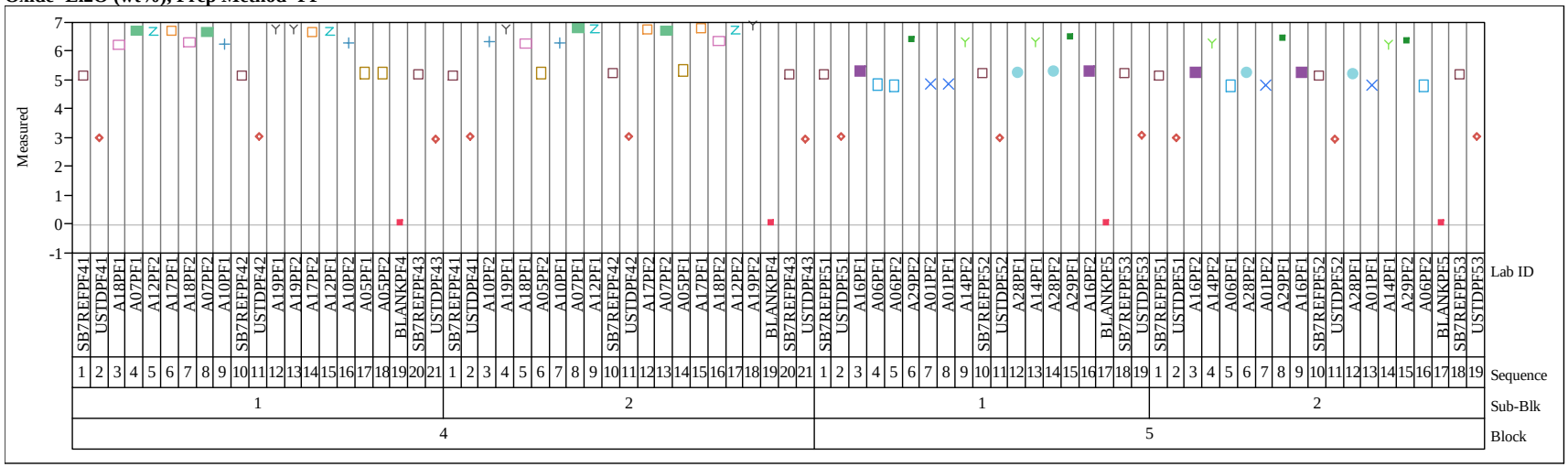


Exhibit A-2. Measurements of Initial Glasses in Analytical Sequence for Samples by Oxide and Preparation Method for Analytical Blocks 4 and 5

Oxide=Li2O (wt%), Prep Method=PF



Oxide=MgO (wt%), Prep Method=AR

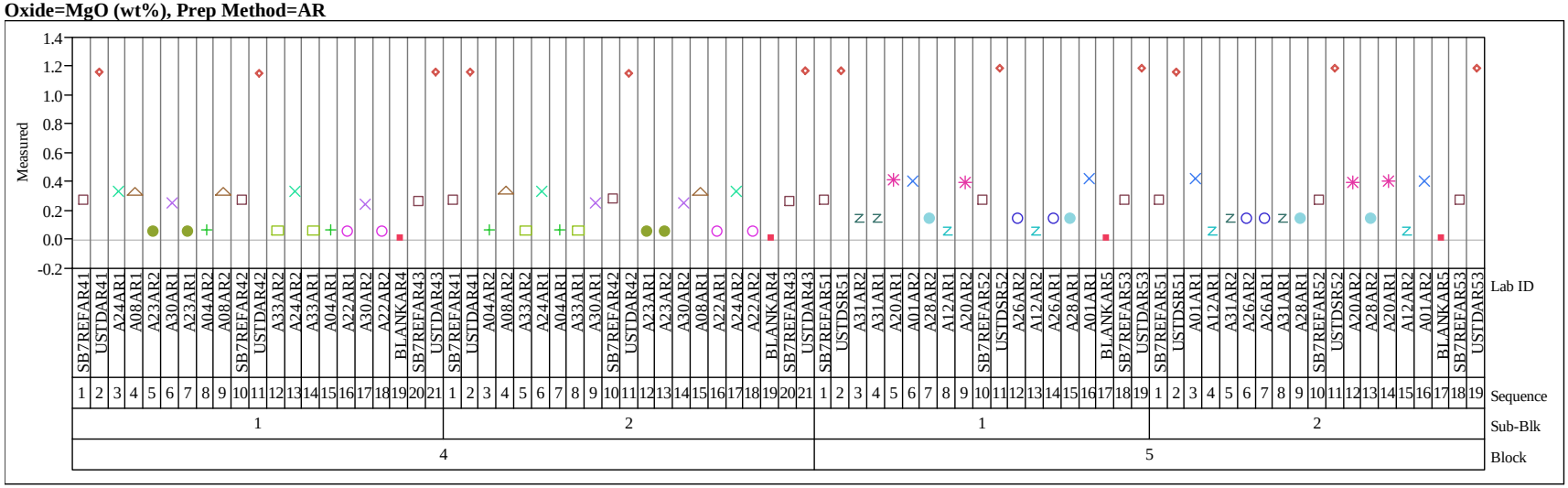
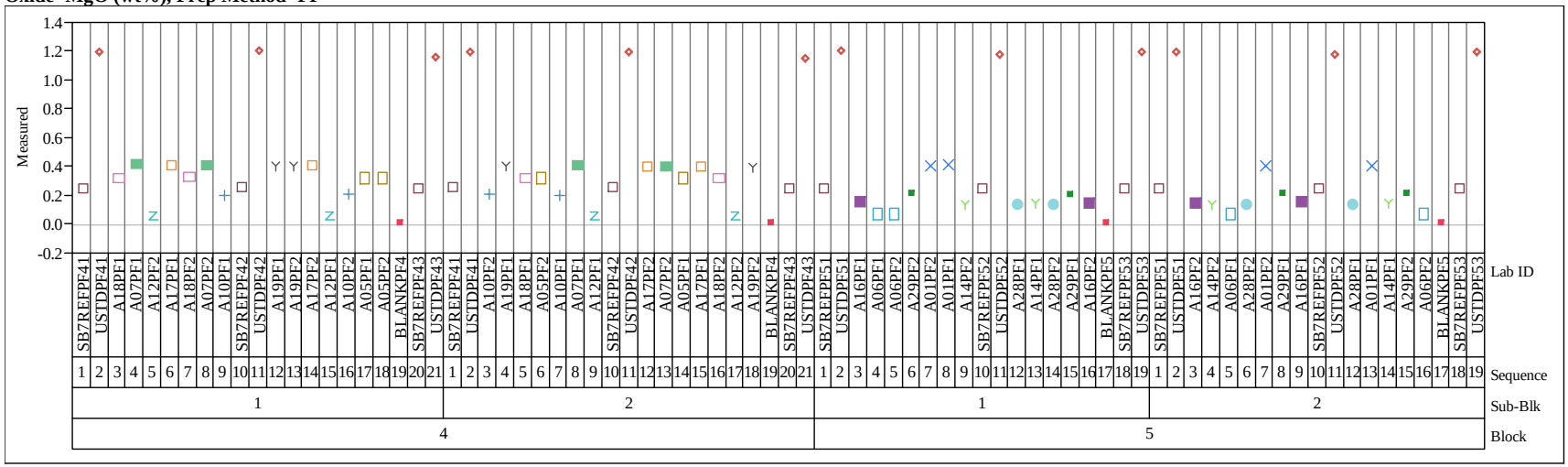


Exhibit A-2. Measurements of Initial Glasses in Analytical Sequence for Samples by Oxide and Preparation Method for Analytical Blocks 4 and 5

Oxide=MgO (wt%), Prep Method=PF



Oxide=MnO (wt%), Prep Method=AR

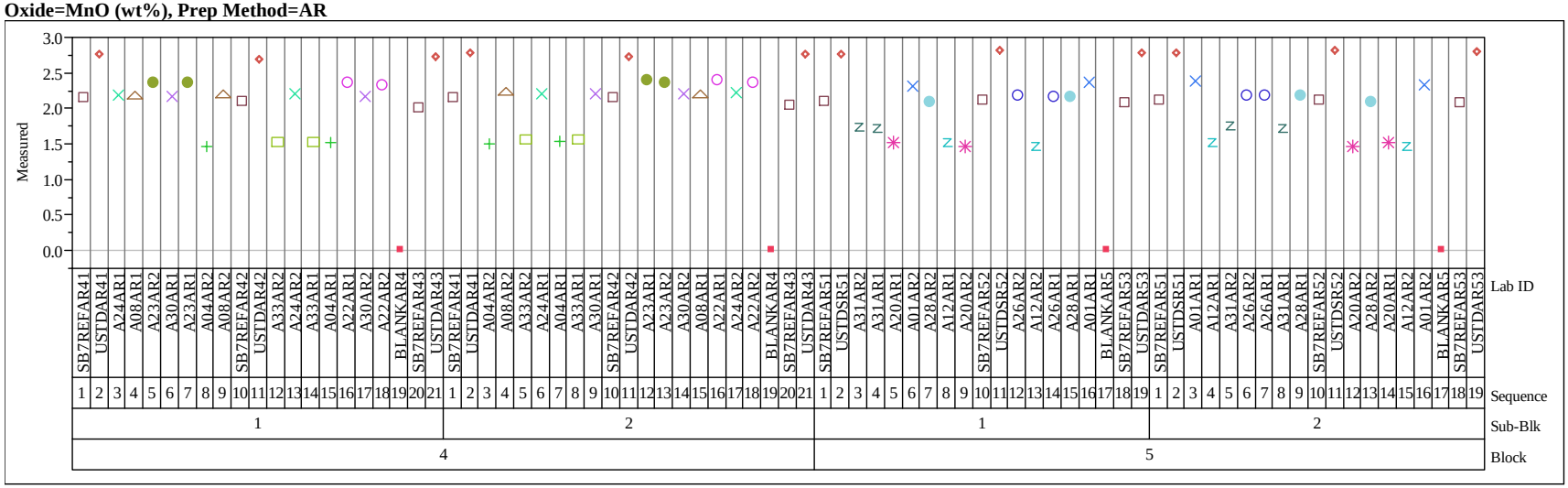
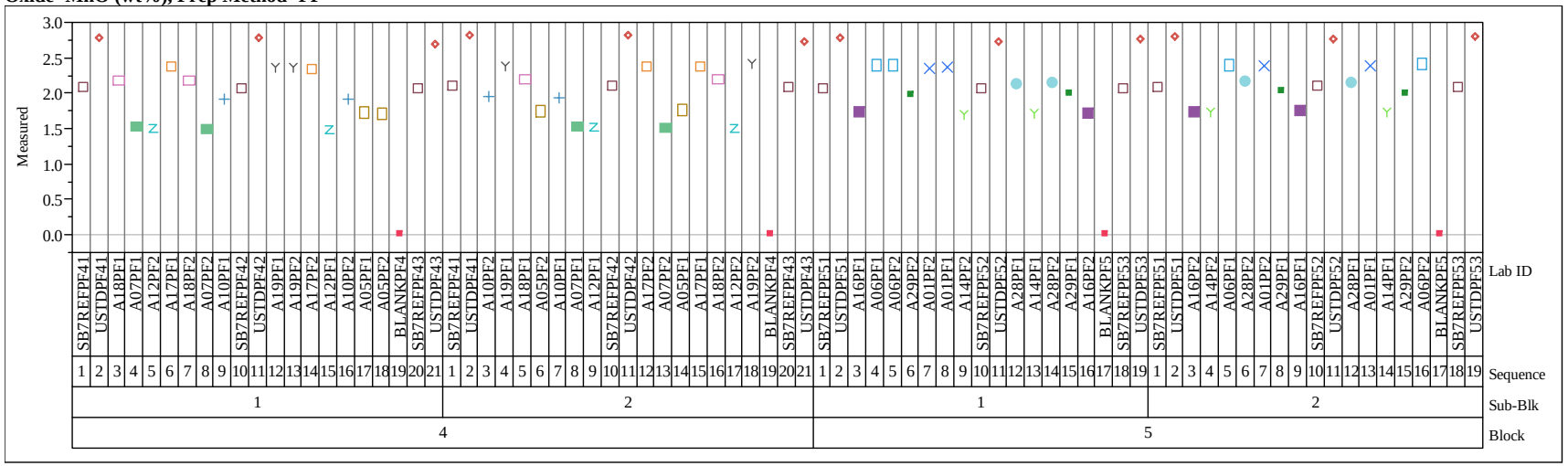


Exhibit A-2. Measurements of Initial Glasses in Analytical Sequence for Samples by Oxide and Preparation Method for Analytical Blocks 4 and 5

Oxide=MnO (wt%), Prep Method=PF



Oxide=Na2O (wt%), Prep Method=AR

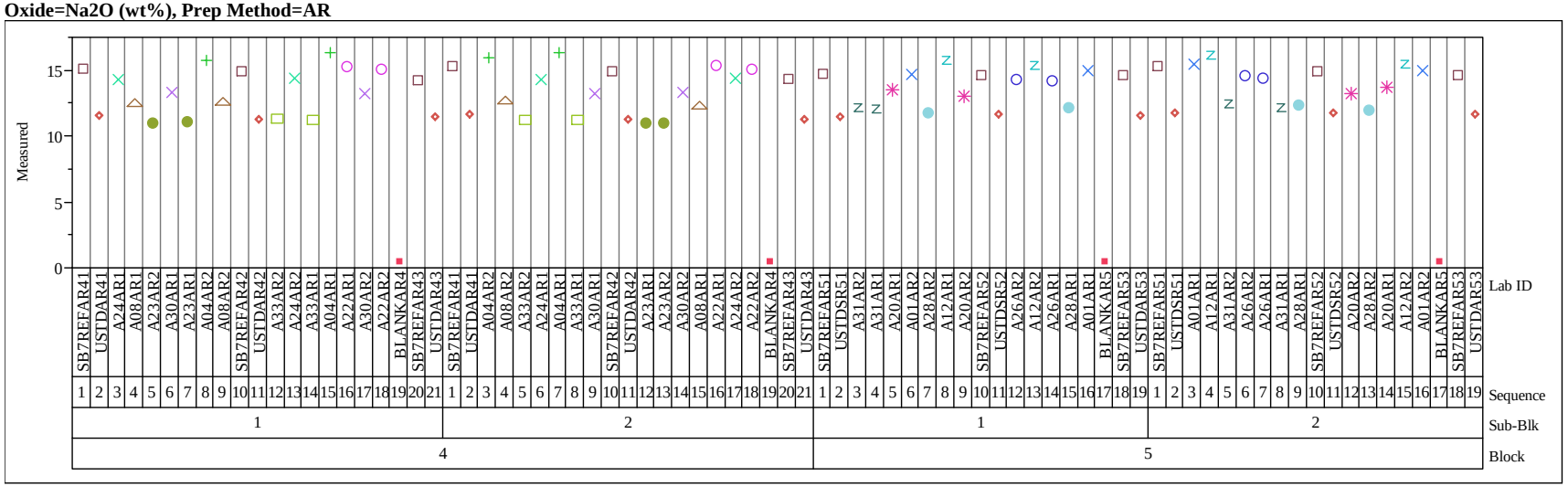
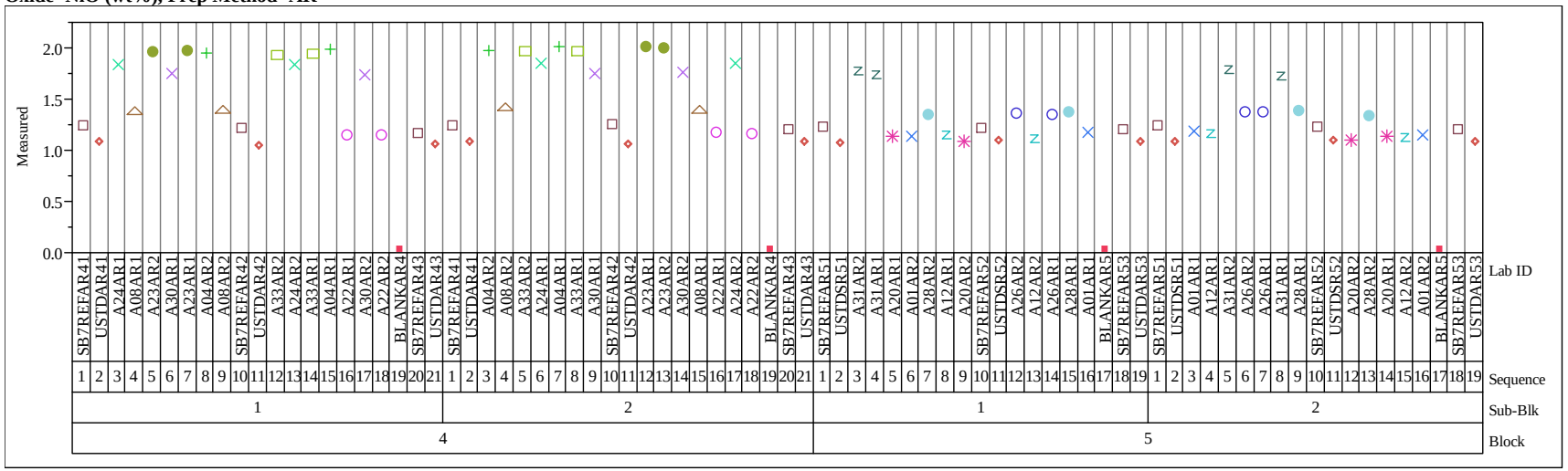


Exhibit A-2. Measurements of Initial Glasses in Analytical Sequence for Samples by Oxide and Preparation Method for Analytical Blocks 4 and 5

Oxide=NiO (wt%), Prep Method=AR



Oxide=NiO (wt%), Prep Method=PF

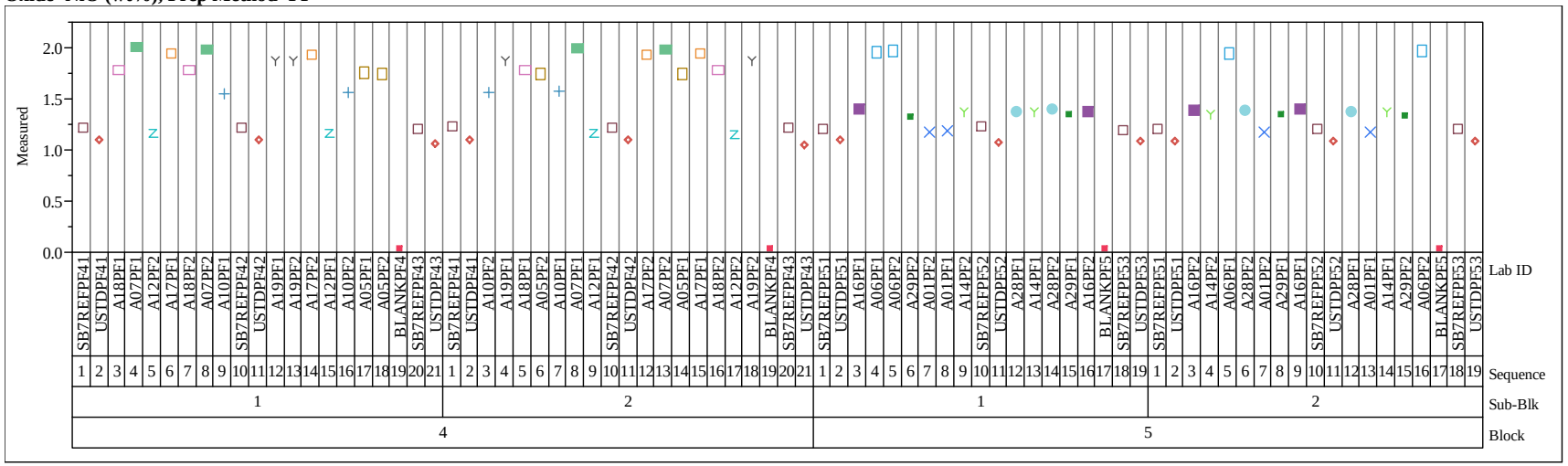
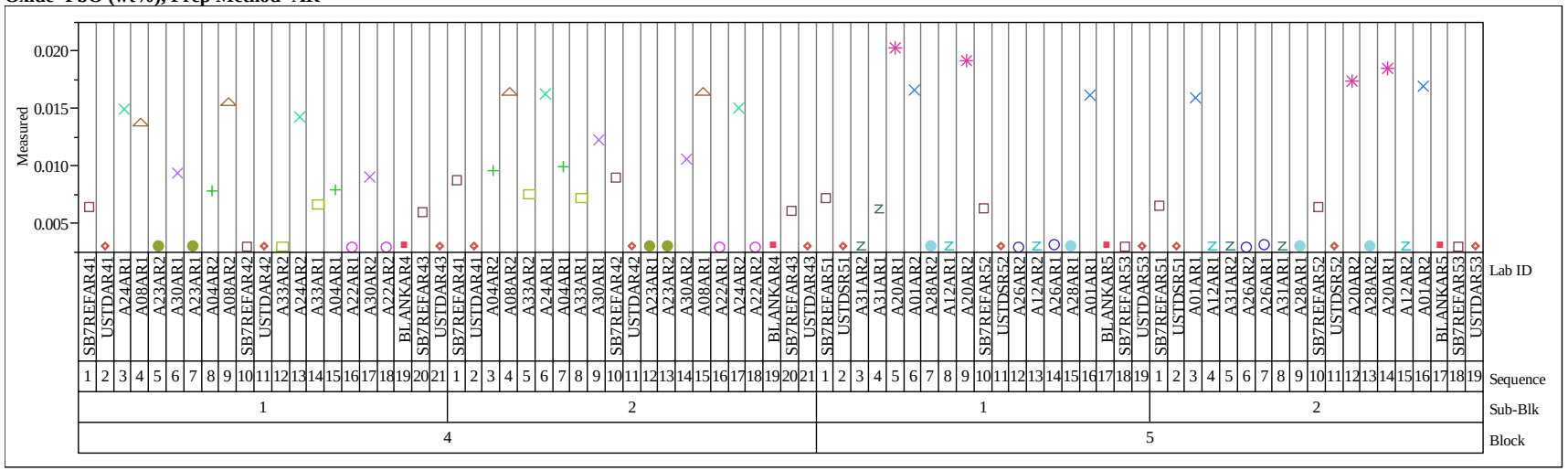


Exhibit A-2. Measurements of Initial Glasses in Analytical Sequence for Samples by Oxide and Preparation Method for Analytical Blocks 4 and 5

Oxide=PbO (wt%), Prep Method=AR



Oxide=PbO (wt%), Prep Method=PF

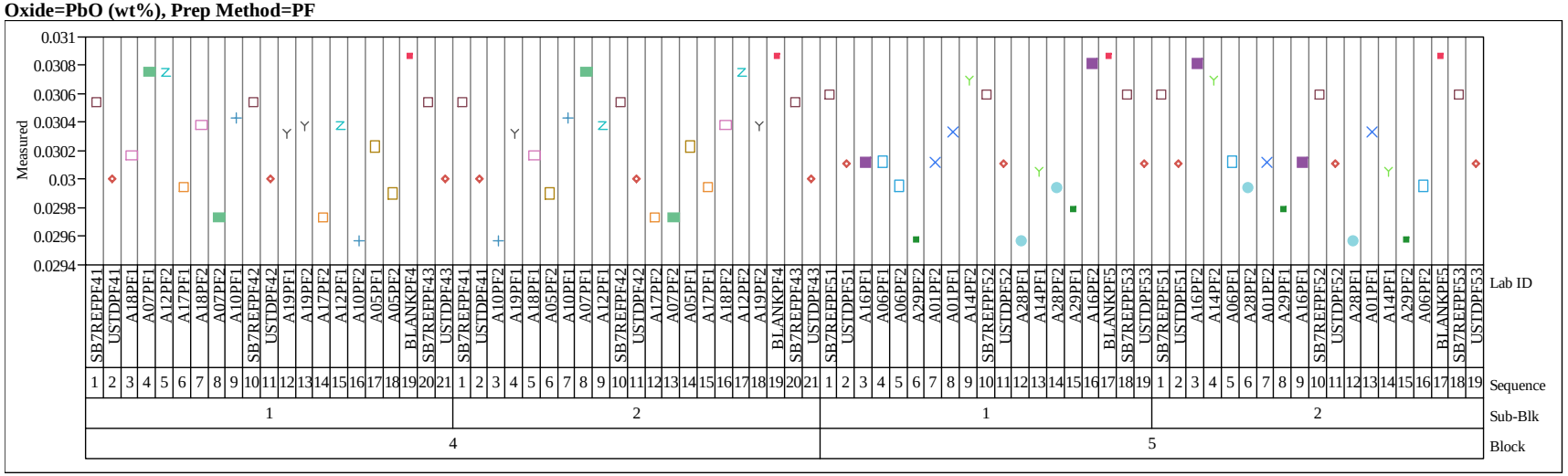
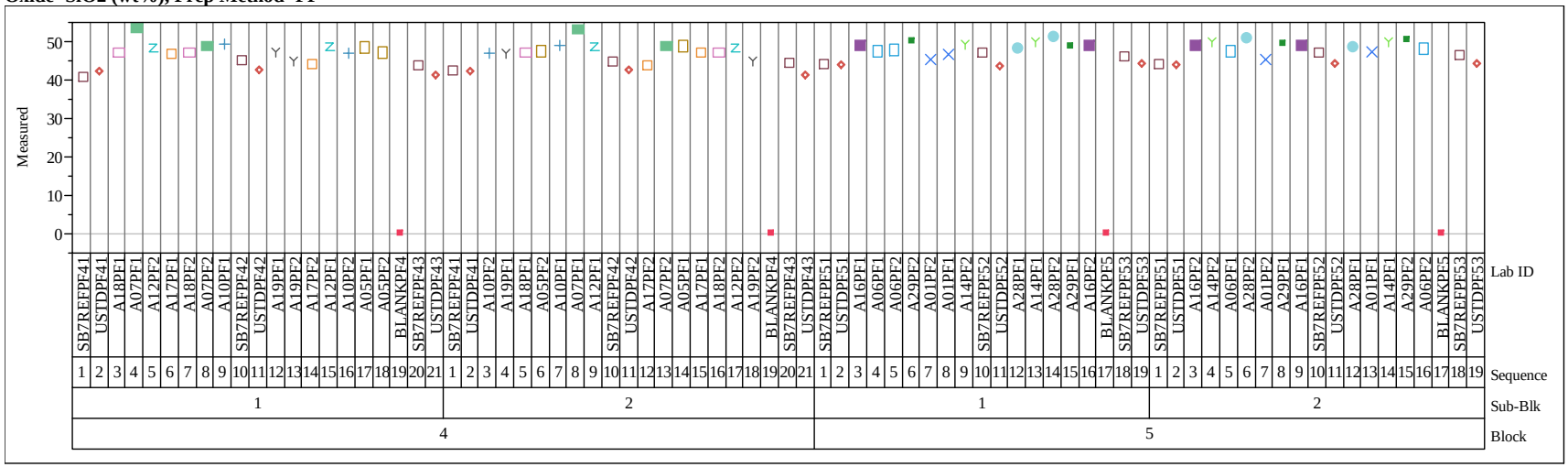


Exhibit A-2. Measurements of Initial Glasses in Analytical Sequence for Samples by Oxide and Preparation Method for Analytical Blocks 4 and 5

Oxide=SiO2 (wt%), Prep Method=PF



Oxide=SO4 (wt%), Prep Method=AR

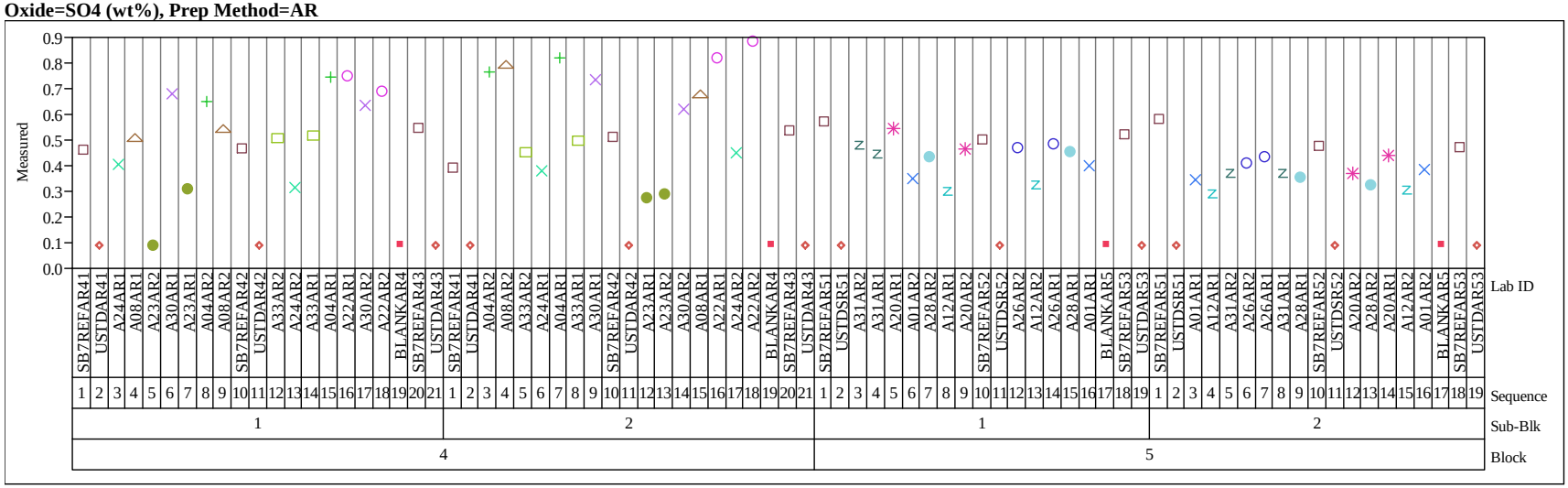
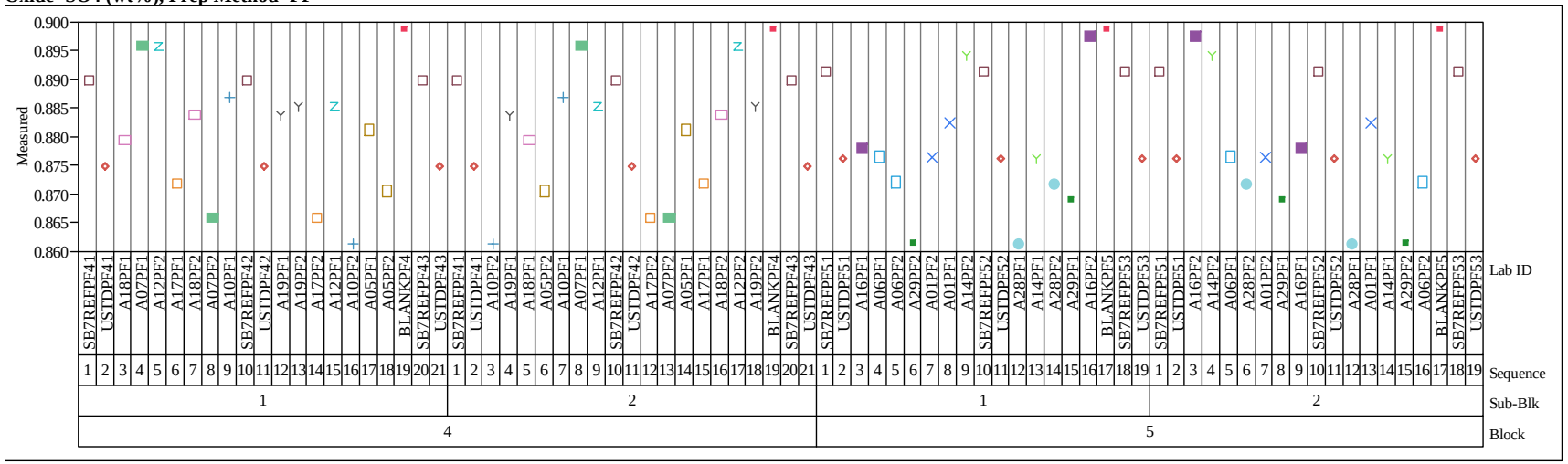


Exhibit A-2. Measurements of Initial Glasses in Analytical Sequence for Samples by Oxide and Preparation Method for Analytical Blocks 4 and 5

Oxide=SO4 (wt%), Prep Method=PF



Oxide=ThO2 (wt%), Prep Method=AR

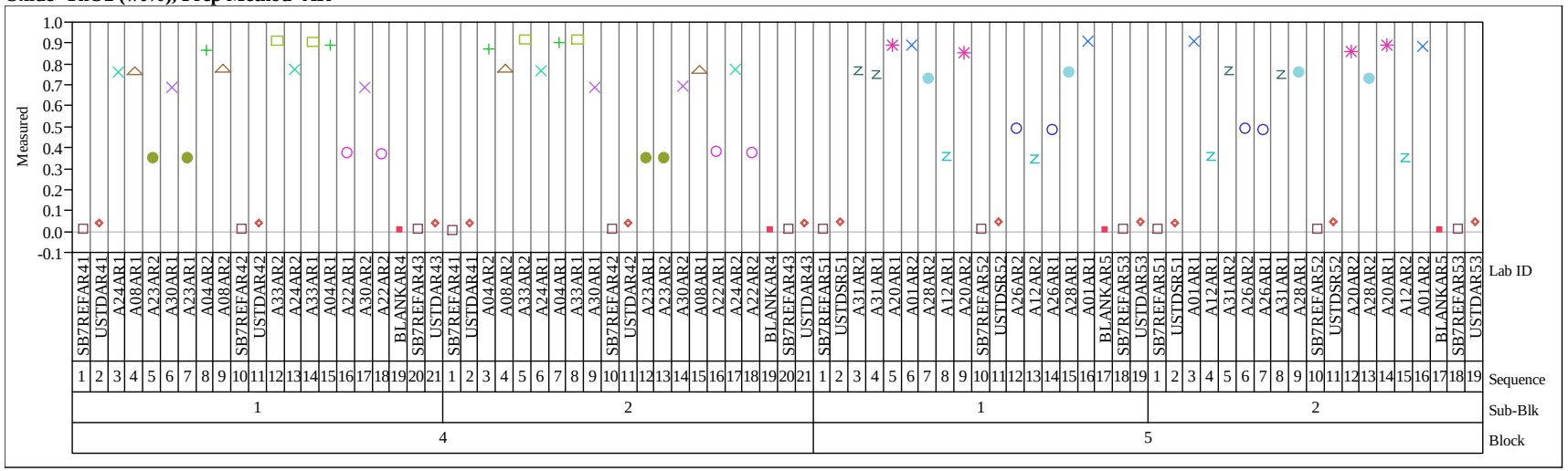
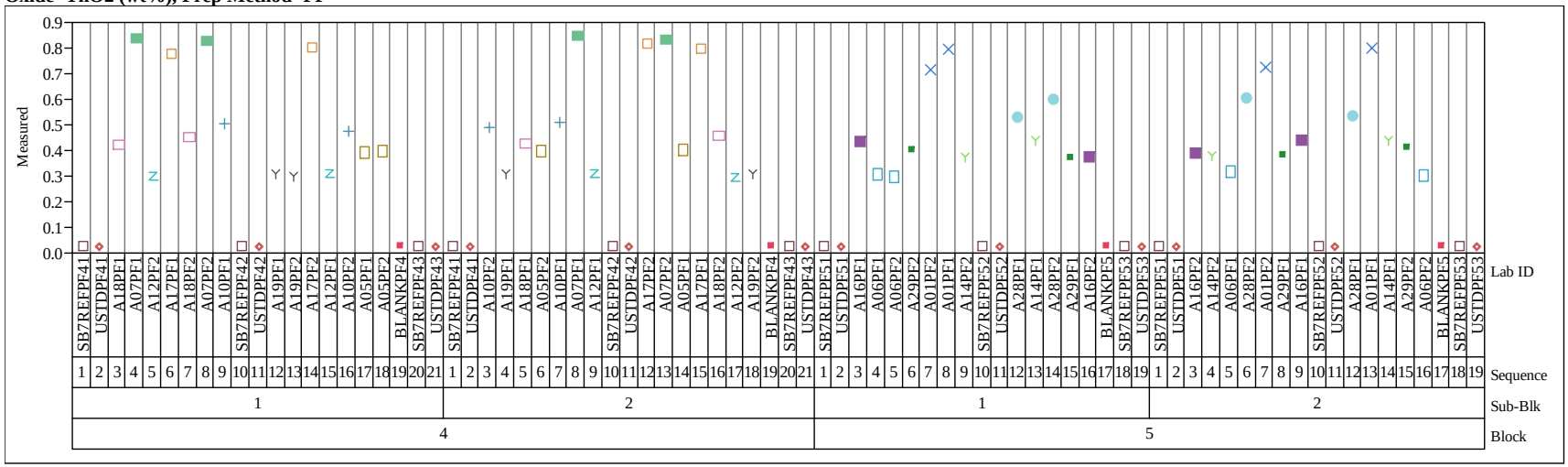


Exhibit A-2. Measurements of Initial Glasses in Analytical Sequence for Samples by Oxide and Preparation Method for Analytical Blocks 4 and 5

Oxide=ThO2 (wt%), Prep Method=PF



Oxide=TiO2 (wt%), Prep Method=AR

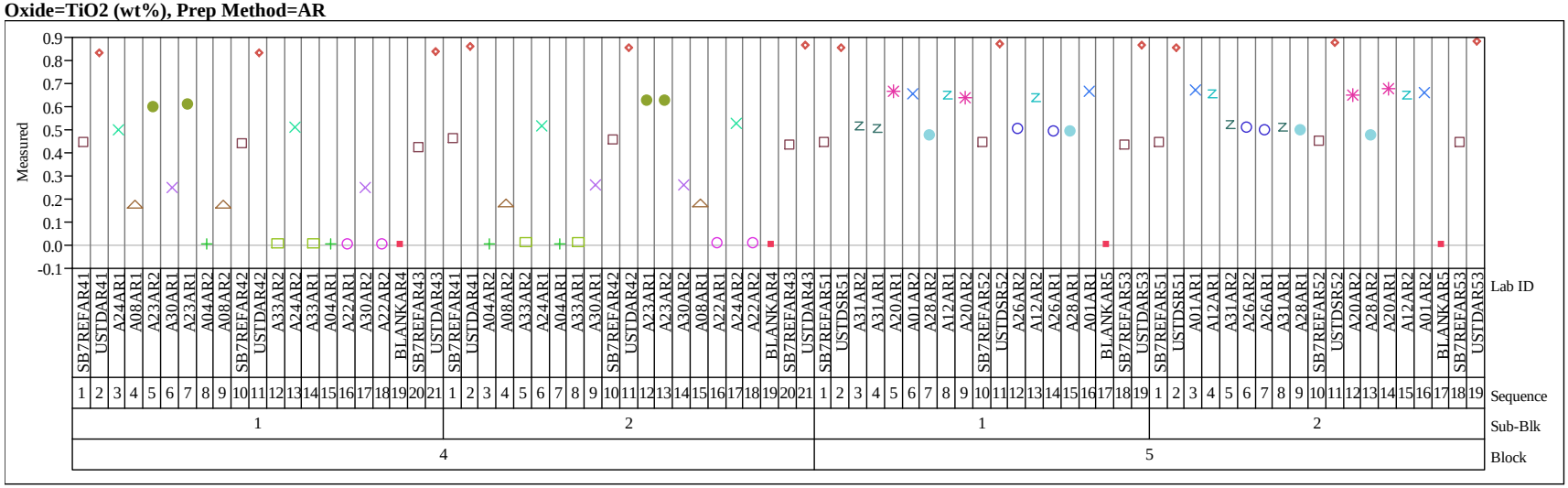
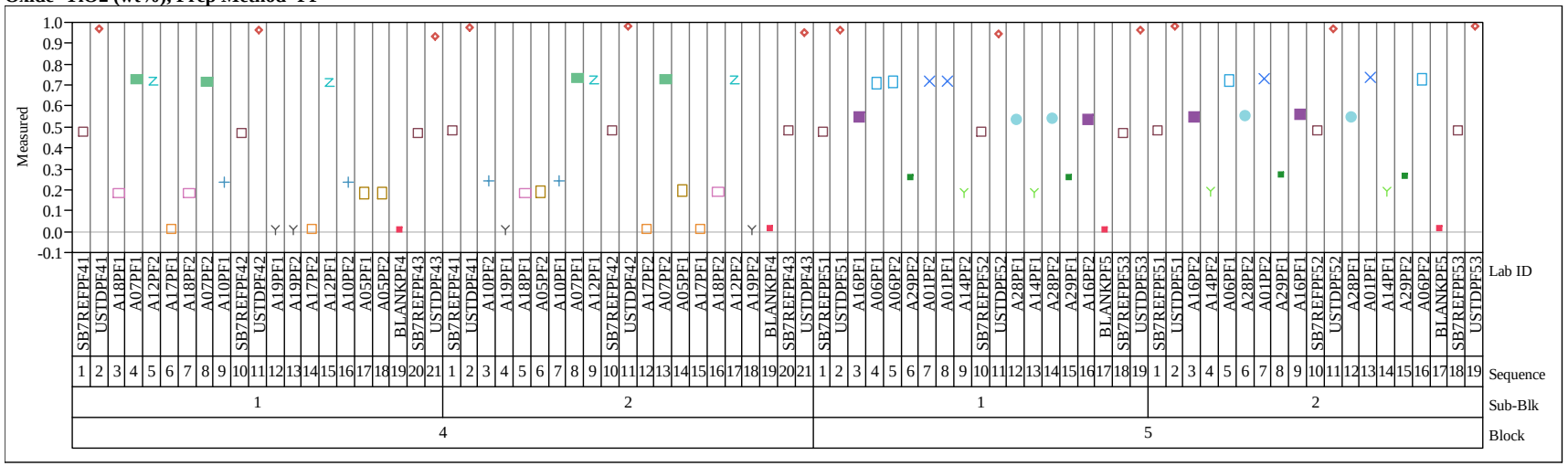


Exhibit A-2. Measurements of Initial Glasses in Analytical Sequence for Samples by Oxide and Preparation Method for Analytical Blocks 4 and 5

Oxide=TiO2 (wt%), Prep Method=PF



Oxide=U3O8 (wt%), Prep Method=AR

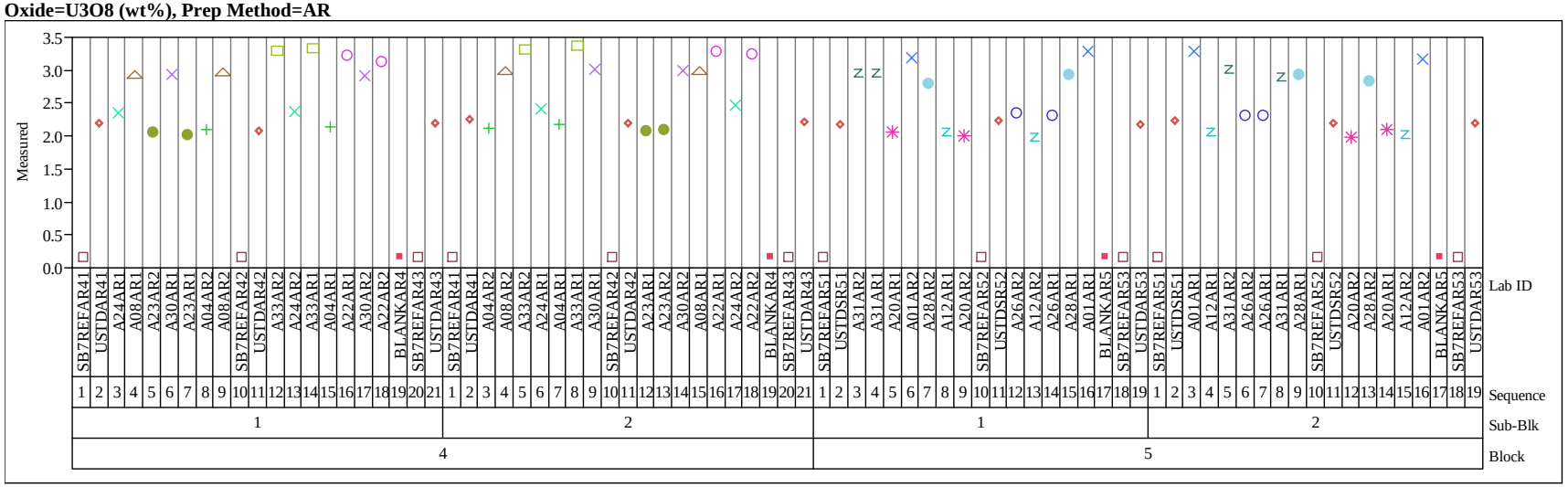
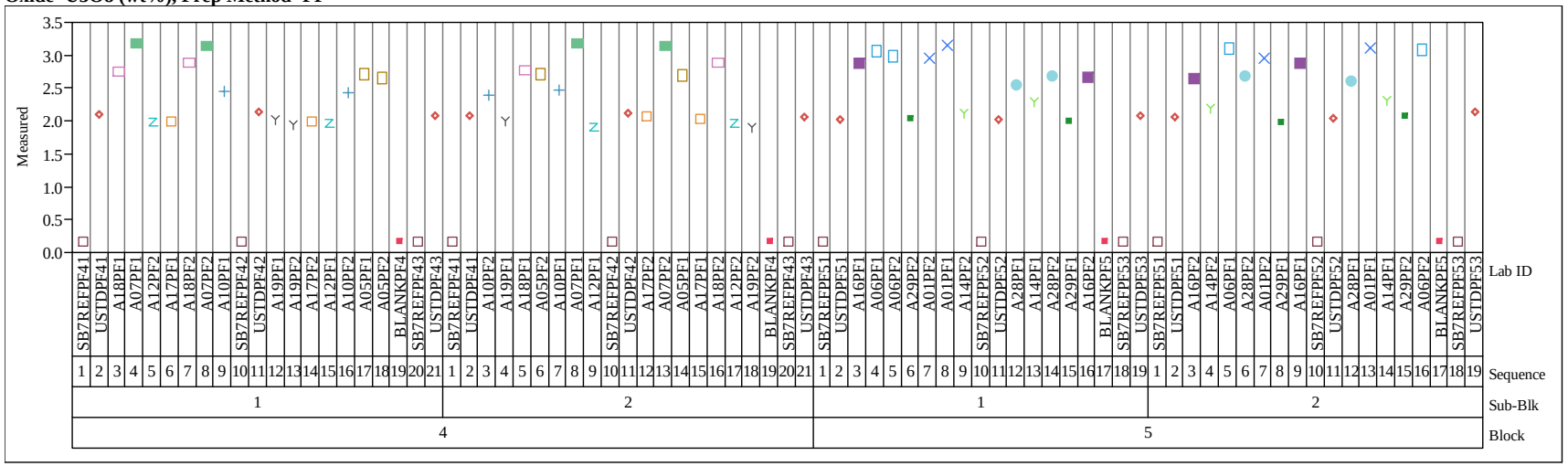


Exhibit A-2. Measurements of Initial Glasses in Analytical Sequence for Samples by Oxide and Preparation Method for Analytical Blocks 4 and 5

Oxide=U3O8 (wt%), Prep Method=PF



Oxide=ZnO (wt%), Prep Method=AR

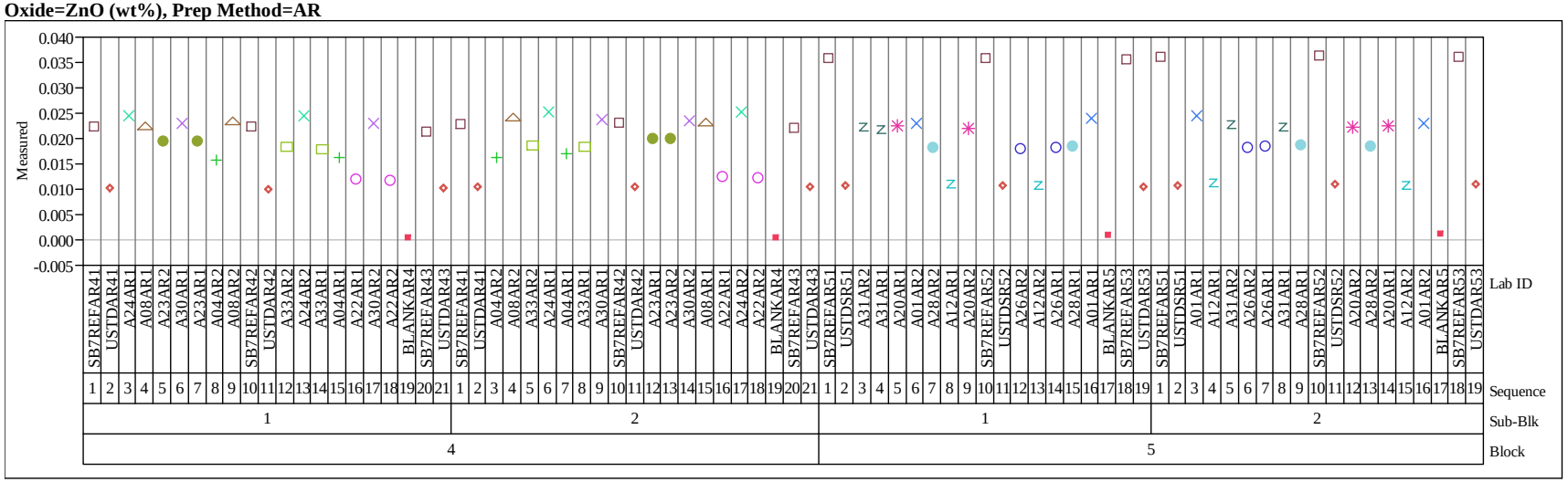
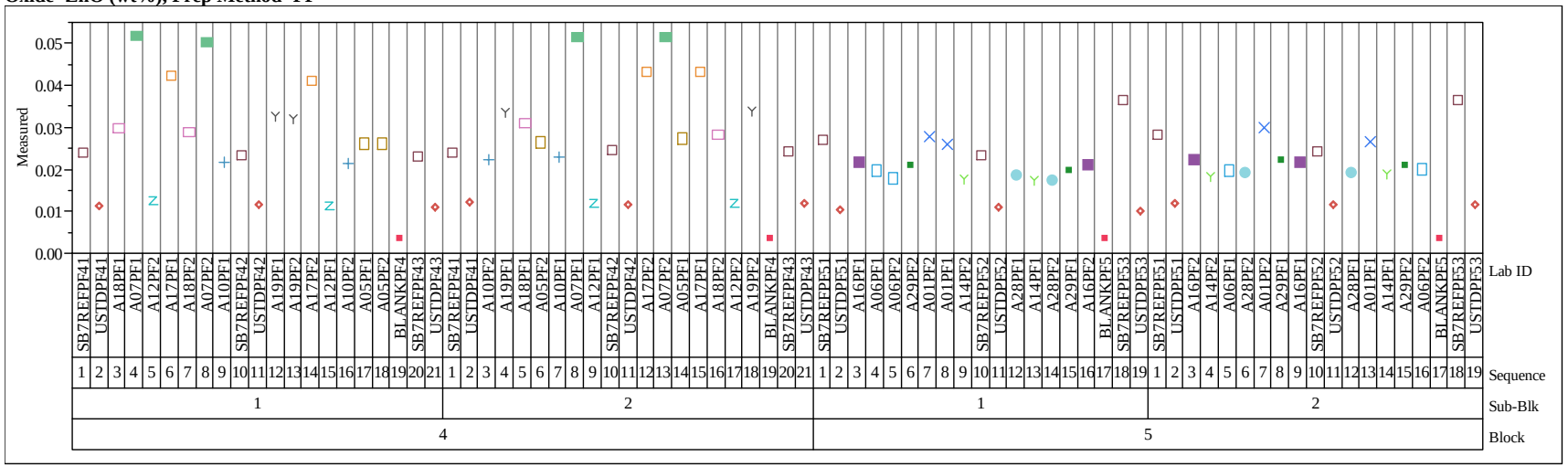


Exhibit A-2. Measurements of Initial Glasses in Analytical Sequence for Samples by Oxide and Preparation Method for Analytical Blocks 4 and 5

Oxide=ZnO (wt%), Prep Method=PF



Oxide=ZrO2 (wt%), Prep Method=AR

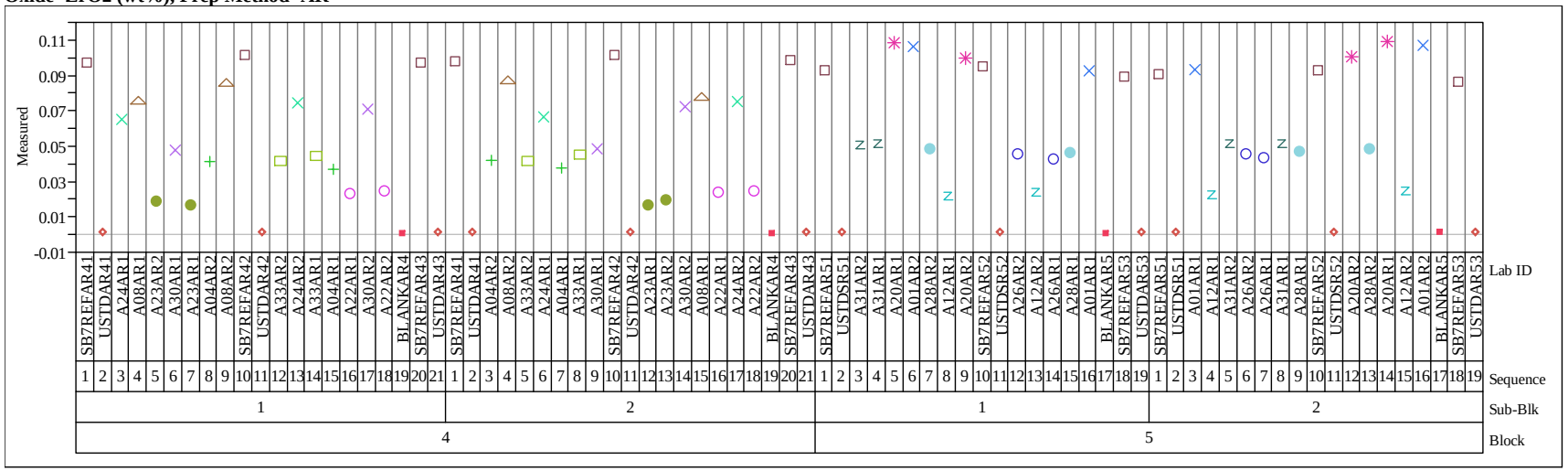
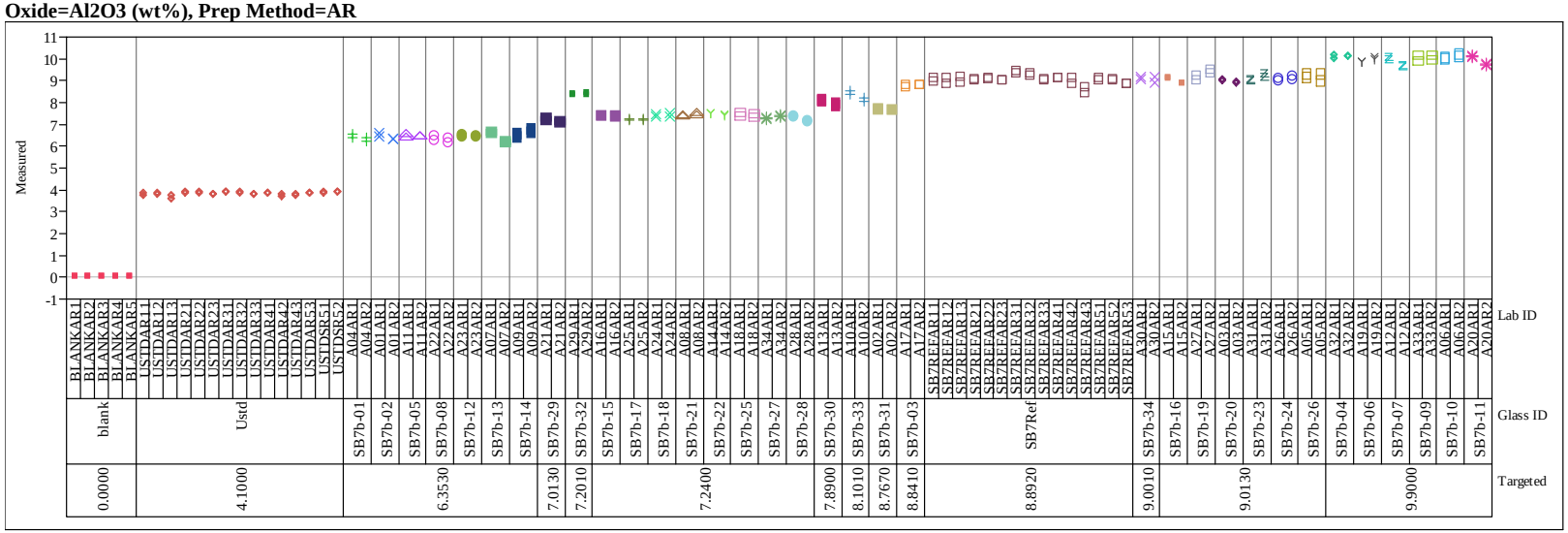


Exhibit A-3. Measurements from by Lab ID within Glass ID by Target Concentration for Each Oxide for Each Prep

Oxide=Al2O3 (wt%), Prep Method=AR



Oxide=Al2O3 (wt%), Prep Method=PF

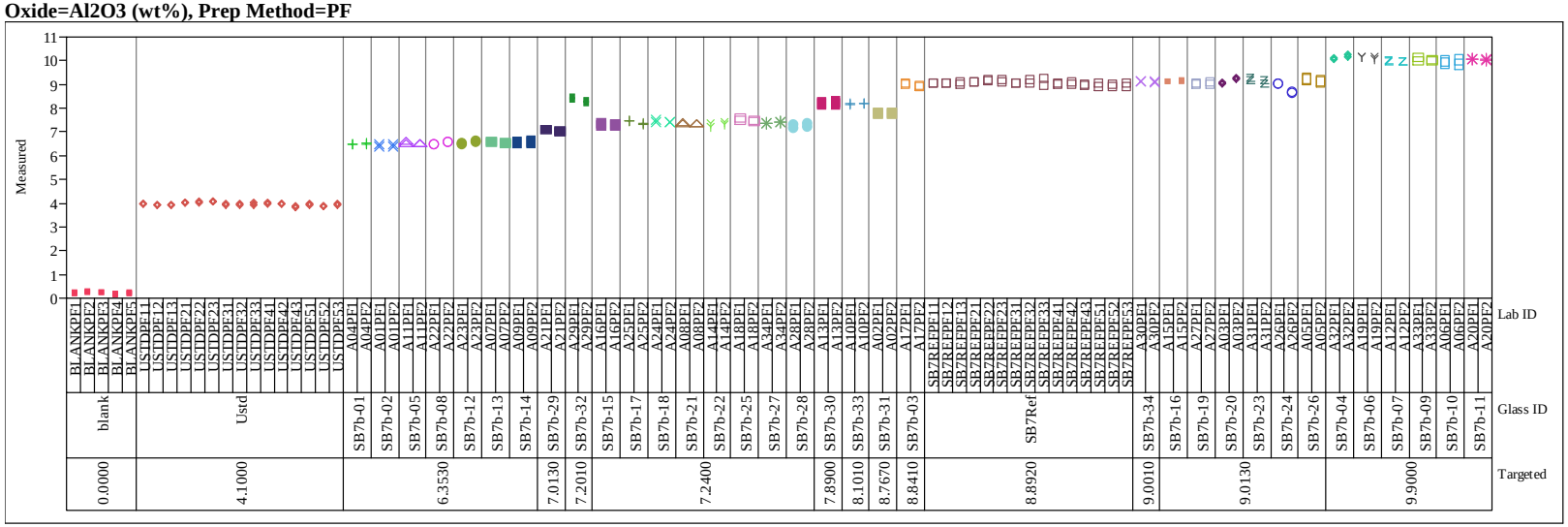
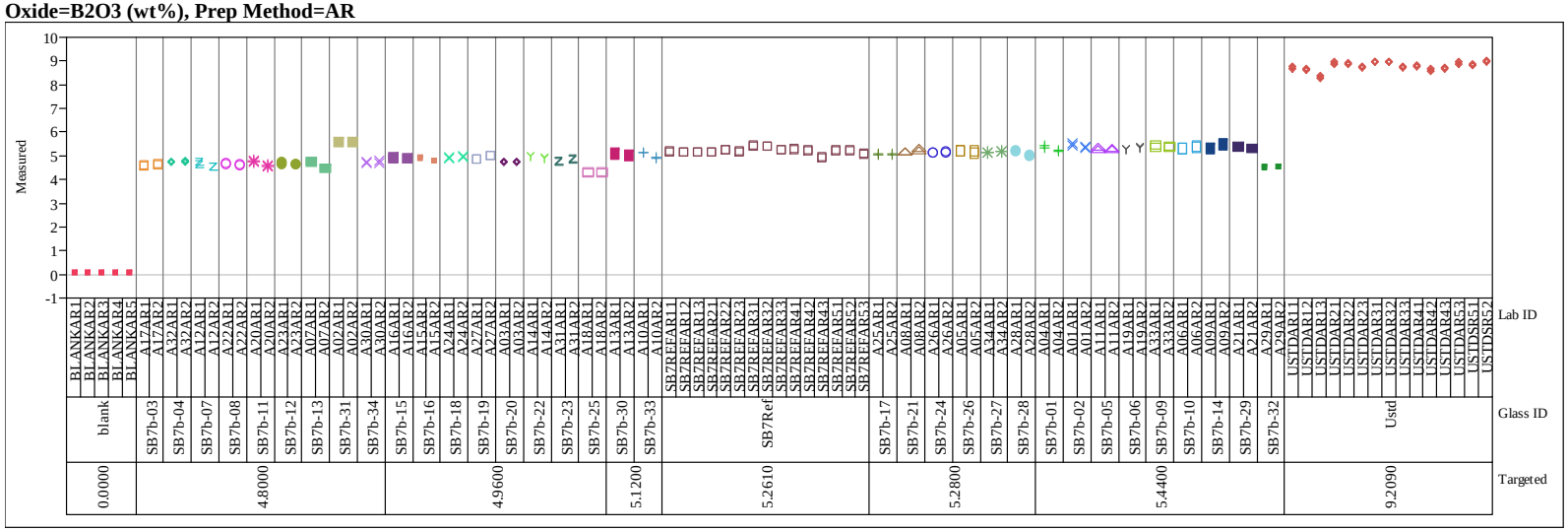


Exhibit A-3. Measurements from by Lab ID within Glass ID by Target Concentration for Each Oxide for Each Prep

Oxide=B2O3 (wt%), Prep Method=AR



Oxide=B2O3 (wt%), Prep Method=PF

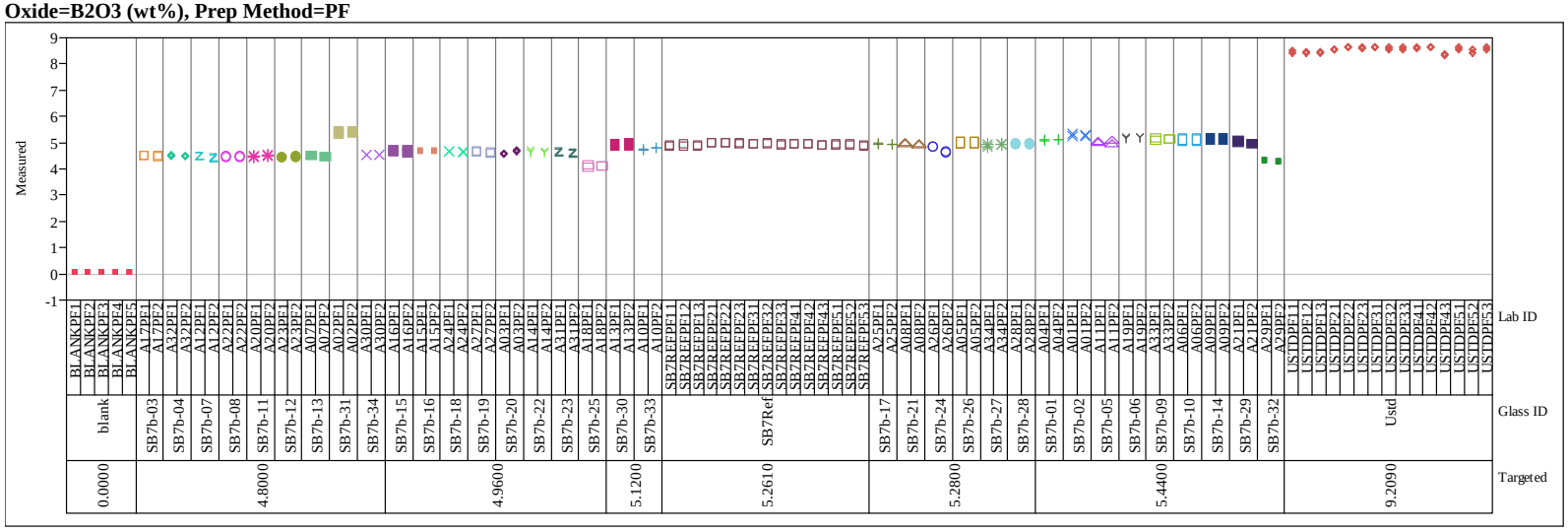
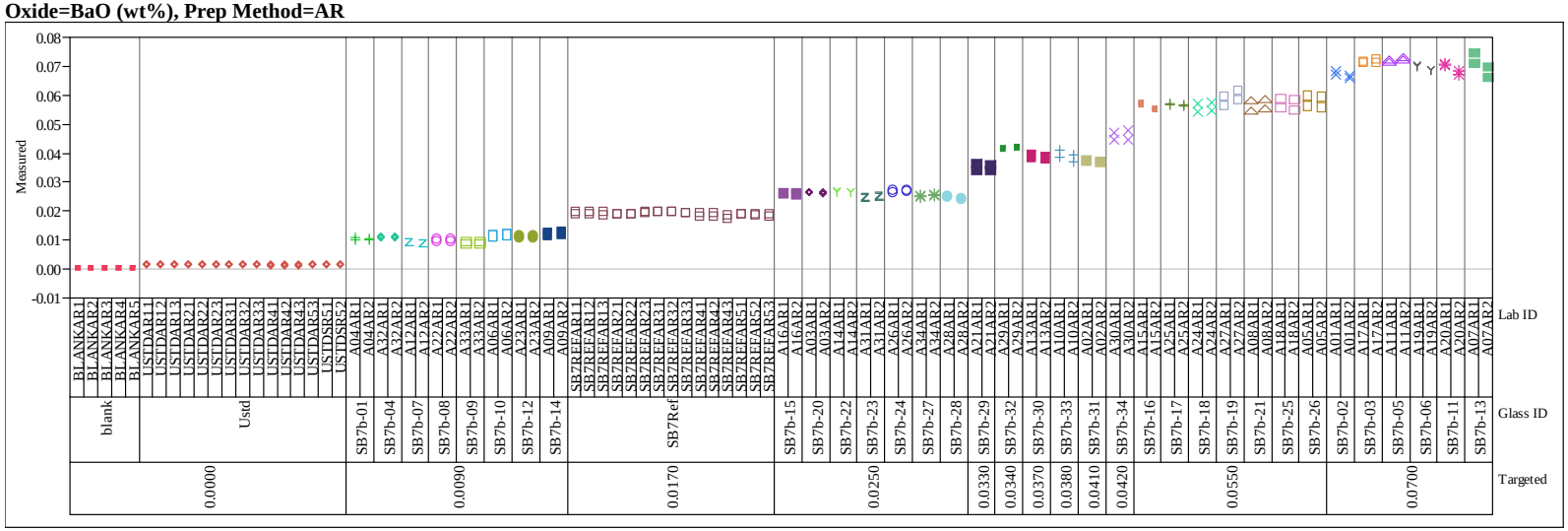


Exhibit A-3. Measurements from by Lab ID within Glass ID by Target Concentration for Each Oxide for Each Prep

Oxide=BaO (wt%), Prep Method=AR



Oxide=BaO (wt%), Prep Method=PF

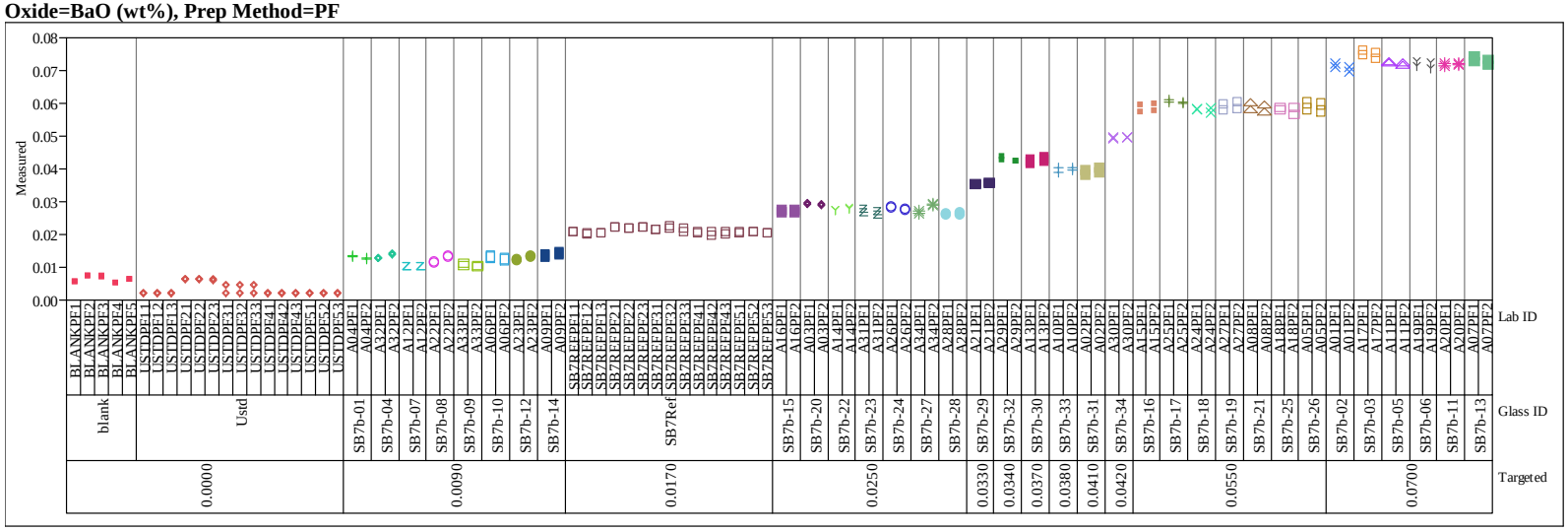
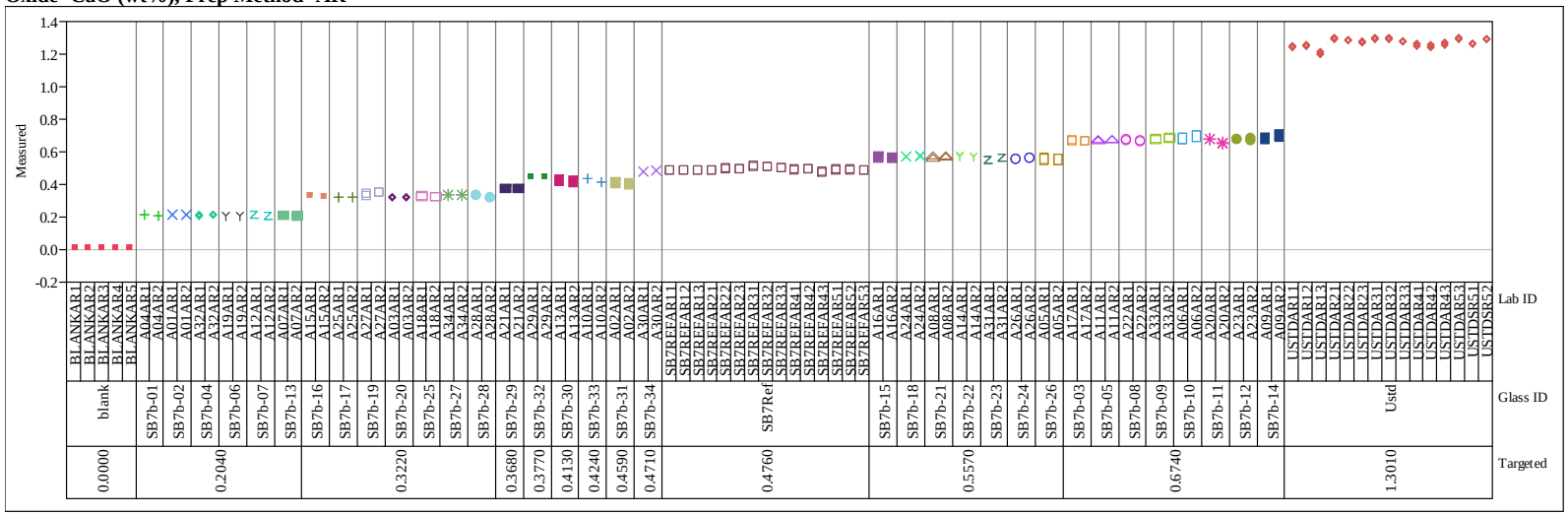


Exhibit A-3. Measurements from by Lab ID within Glass ID by Target Concentration for Each Oxide for Each Prep

Oxide=CaO (wt%), Prep Method=AR



Oxide=Ce2O3 (wt%), Prep Method=AR

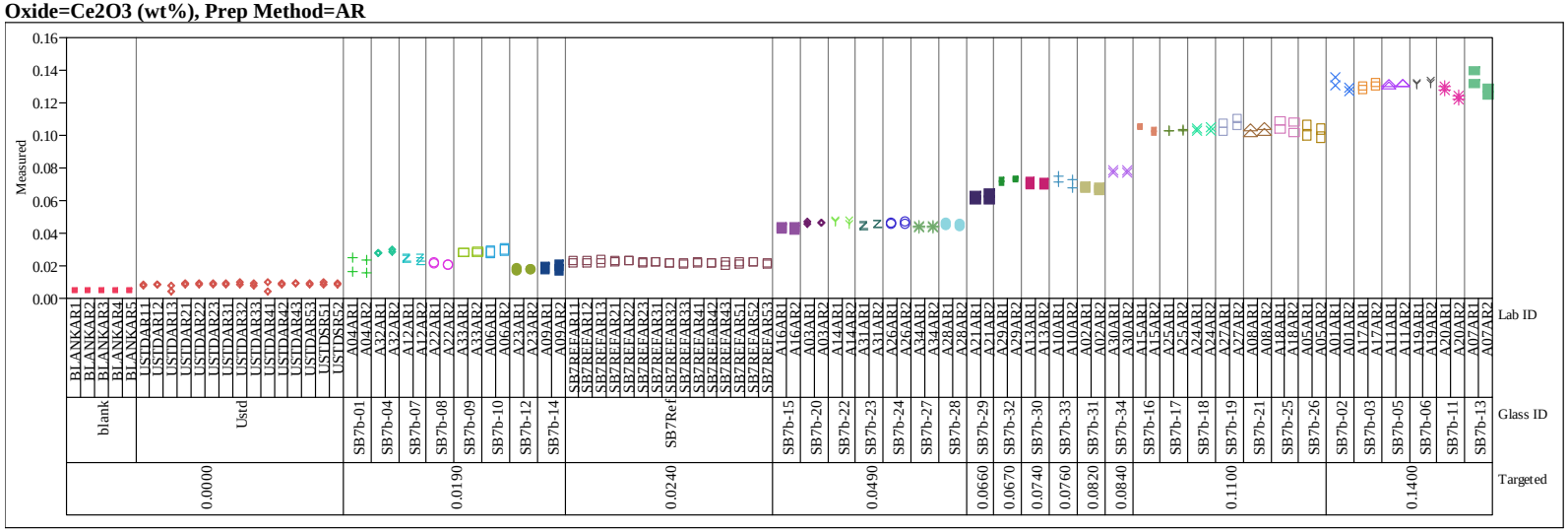
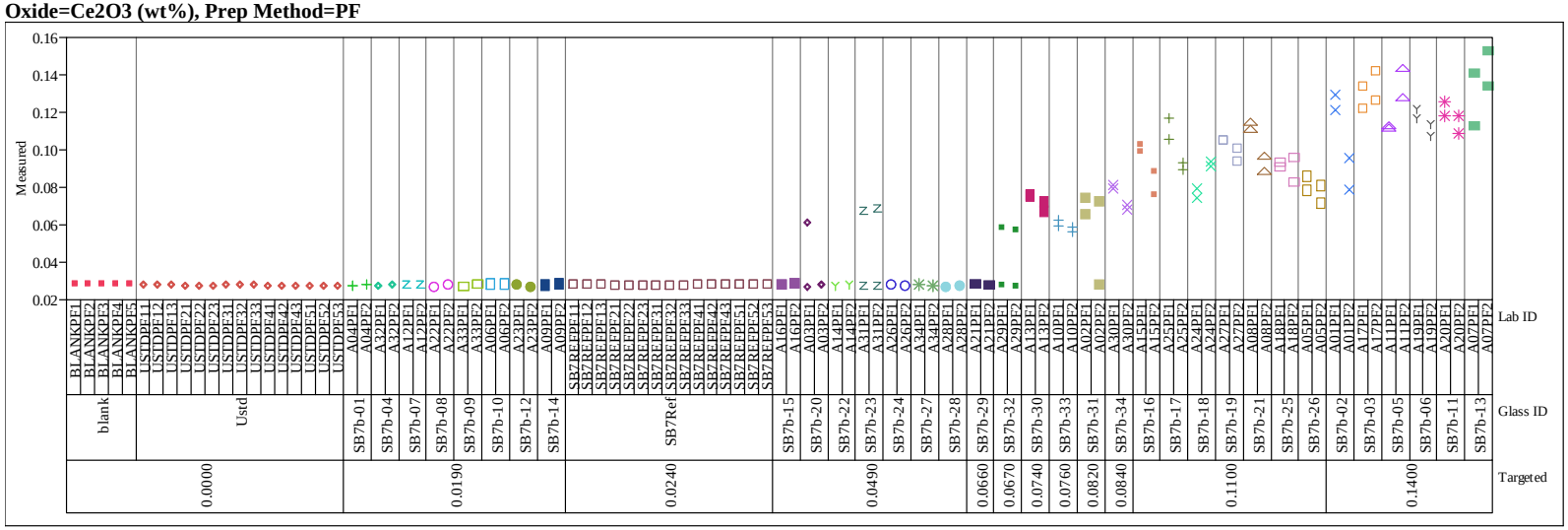


Exhibit A-3. Measurements from by Lab ID within Glass ID by Target Concentration for Each Oxide for Each Prep

Oxide=Ce2O3 (wt%), Prep Method=PF



Oxide=Cr2O3 (wt%), Prep Method=AR

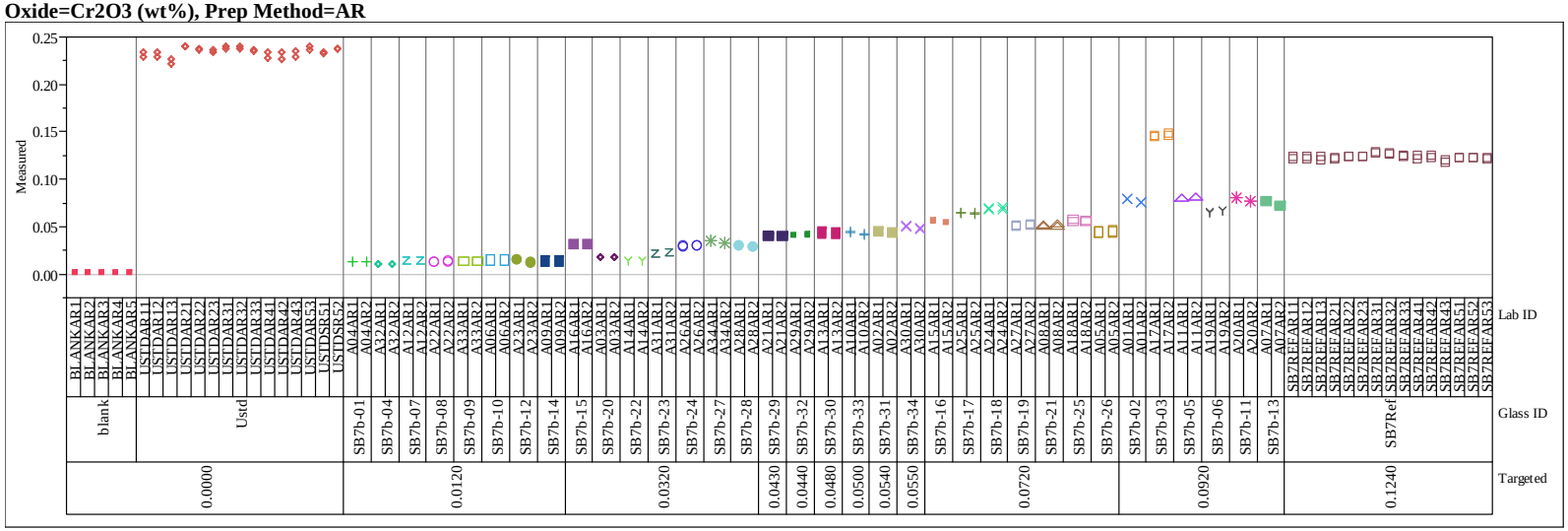
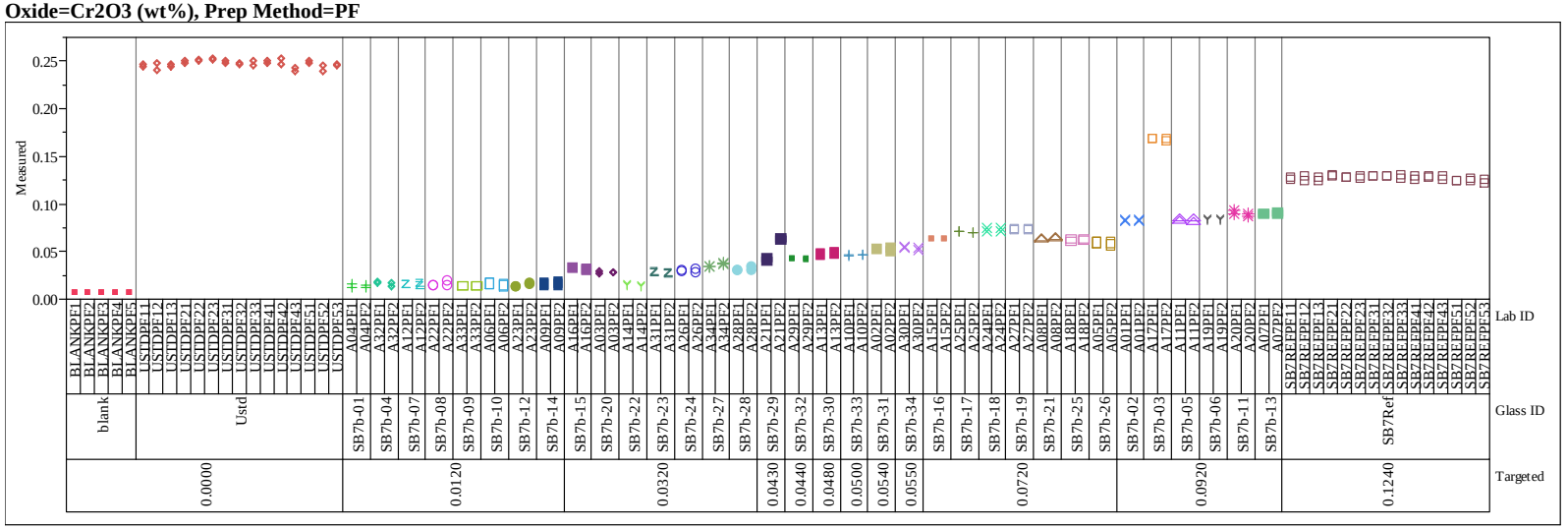


Exhibit A-3. Measurements from by Lab ID within Glass ID by Target Concentration for Each Oxide for Each Prep

Oxide=Cr2O3 (wt%), Prep Method=PF



Oxide=CuO (wt%), Prep Method=AR

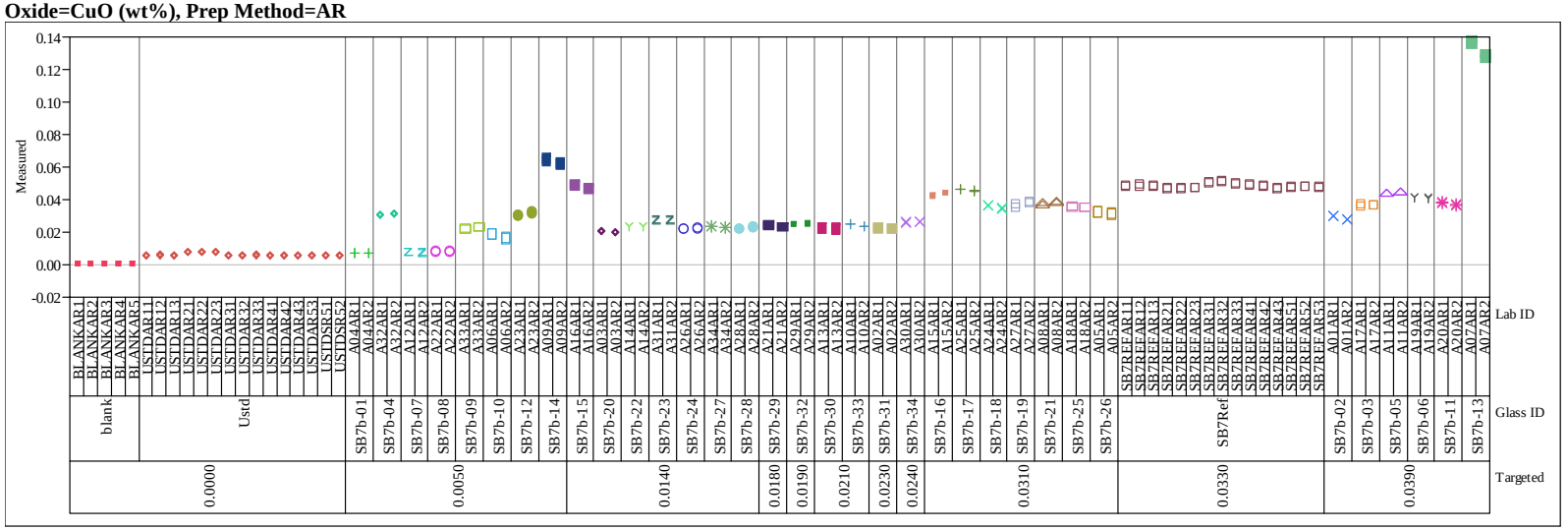
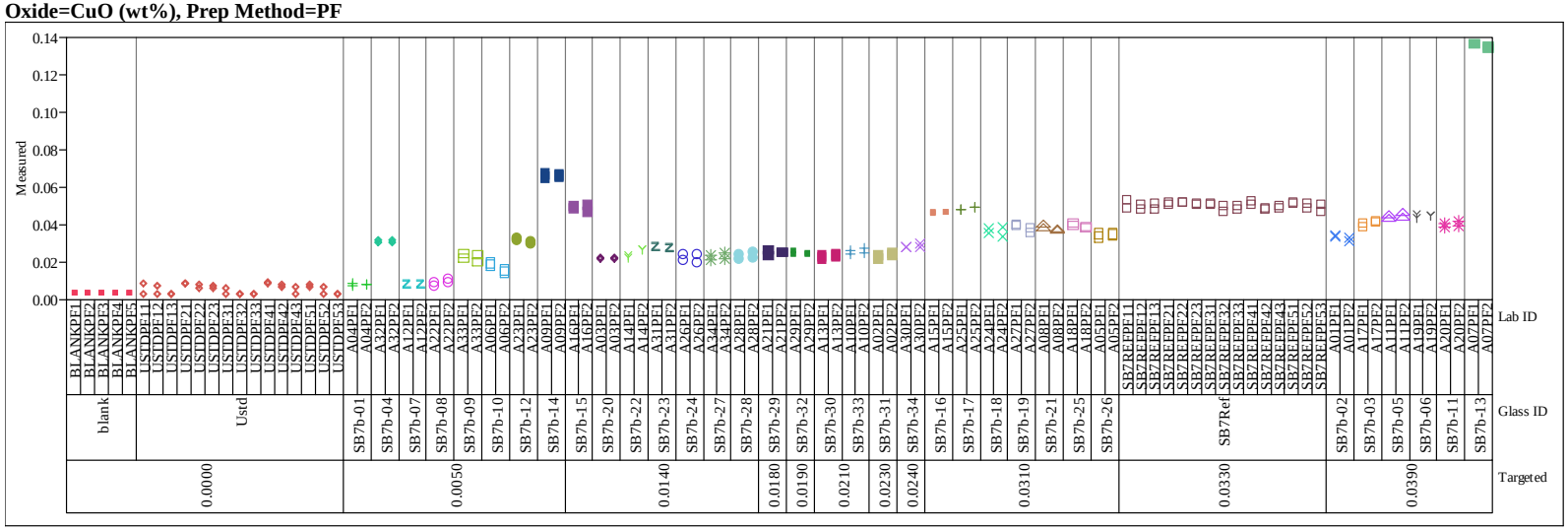


Exhibit A-3. Measurements from by Lab ID within Glass ID by Target Concentration for Each Oxide for Each Prep

Oxide=CuO (wt%), Prep Method=PF



Oxide=Fe2O3 (wt%), Prep Method=AR

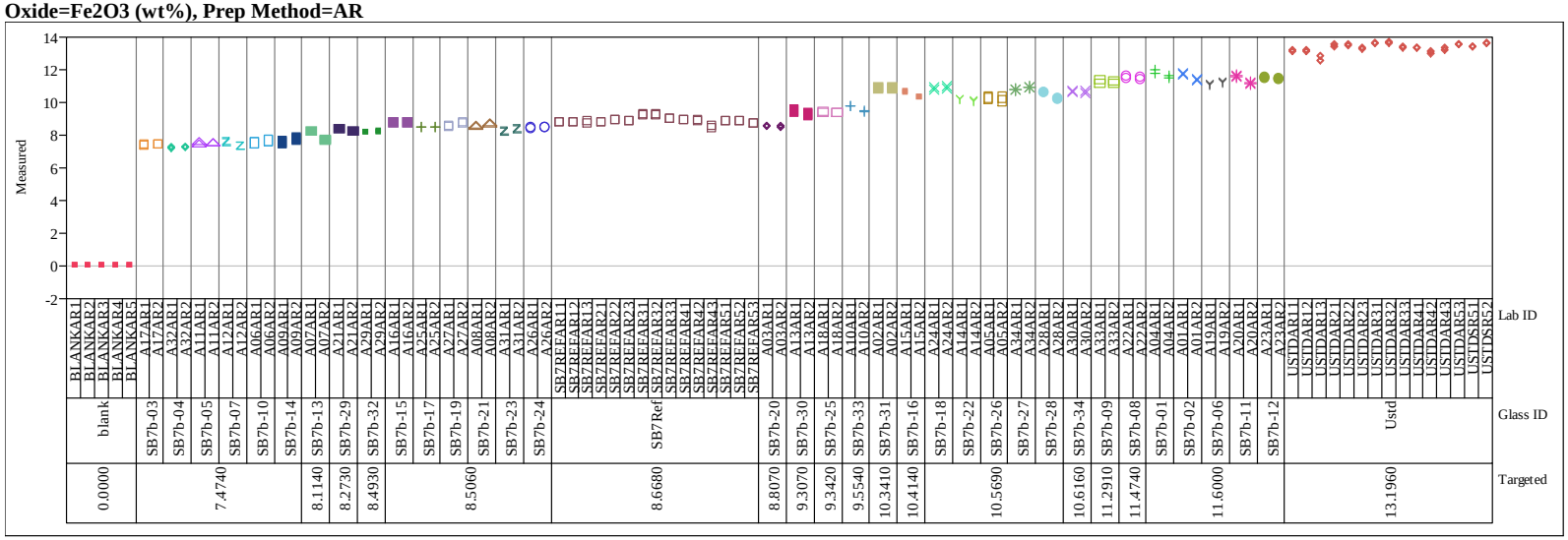
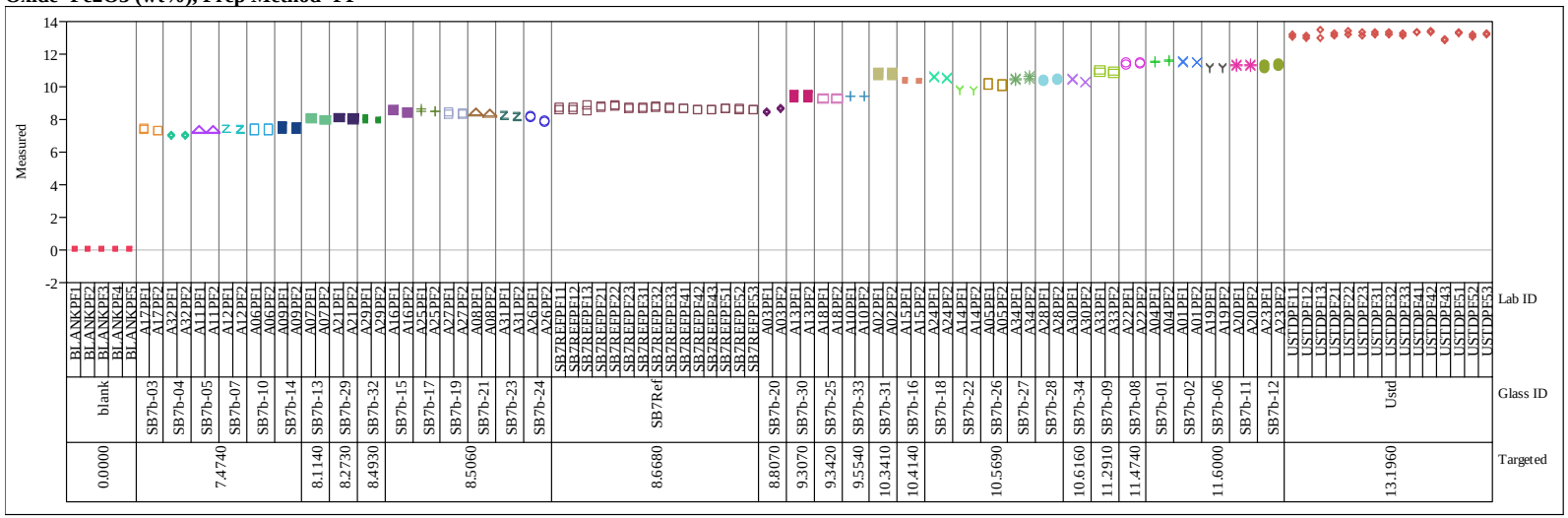


Exhibit A-3. Measurements from by Lab ID within Glass ID by Target Concentration for Each Oxide for Each Prep

Oxide=Fe2O3 (wt%), Prep Method=PF



Oxide=K2O (wt%), Prep Method=AR

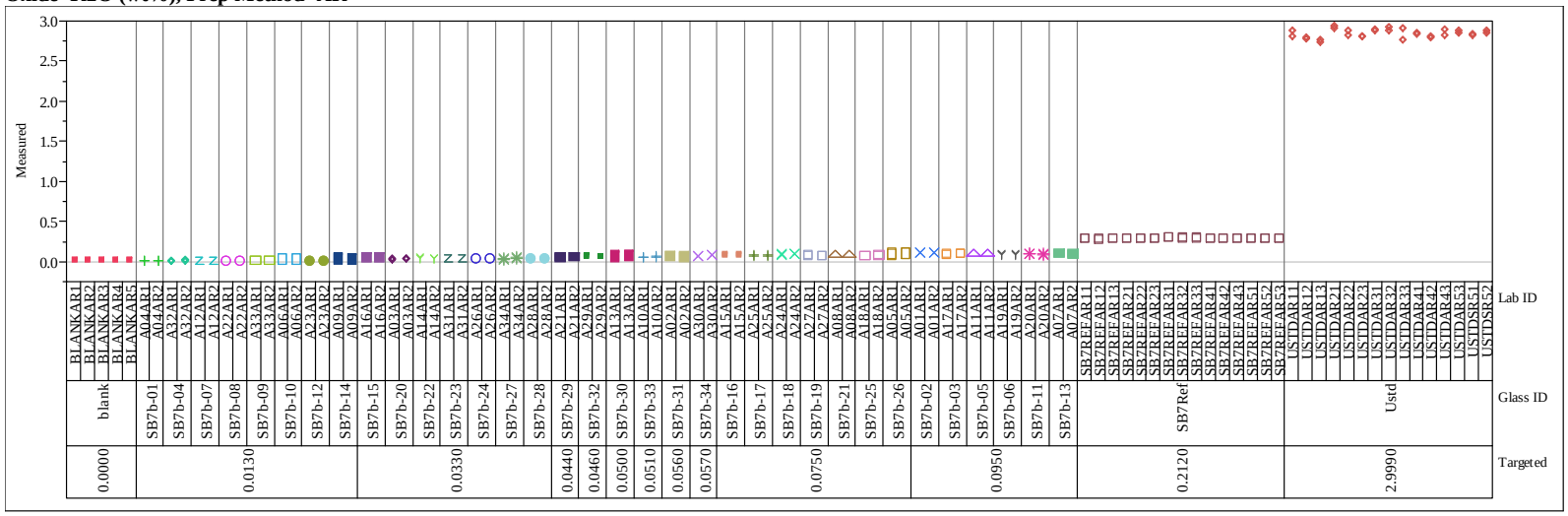
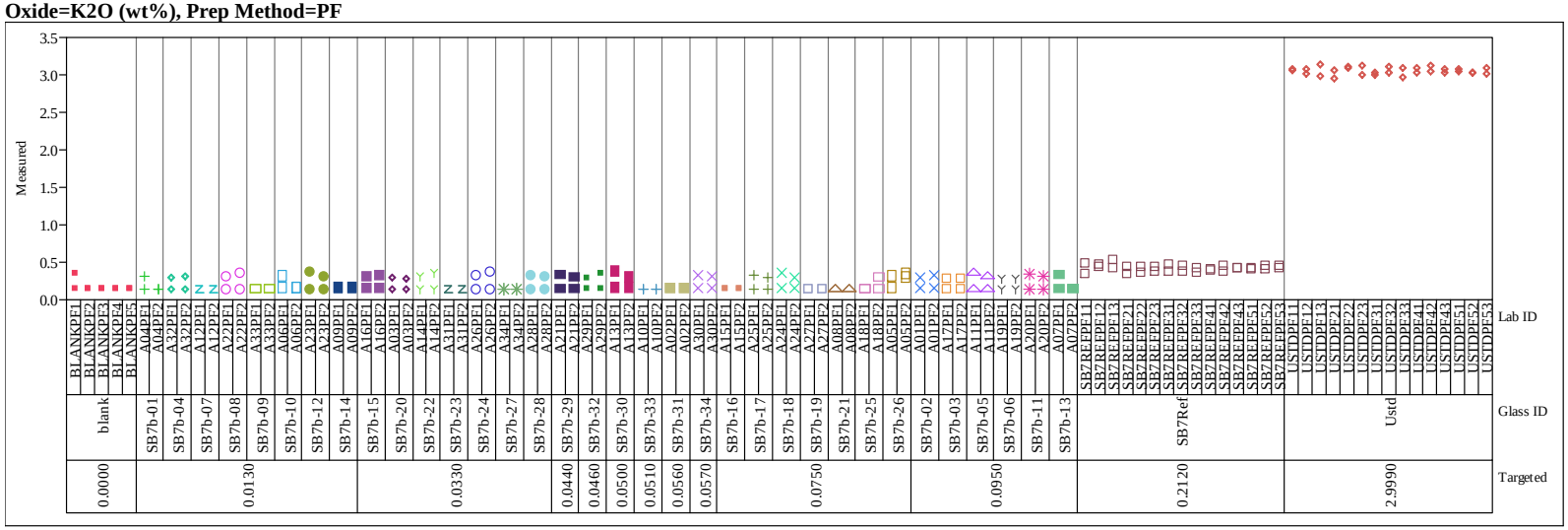


Exhibit A-3. Measurements from by Lab ID within Glass ID by Target Concentration for Each Oxide for Each Prep

Oxide=K2O (wt%), Prep Method=PF



Oxide=La2O3 (wt%), Prep Method=AR

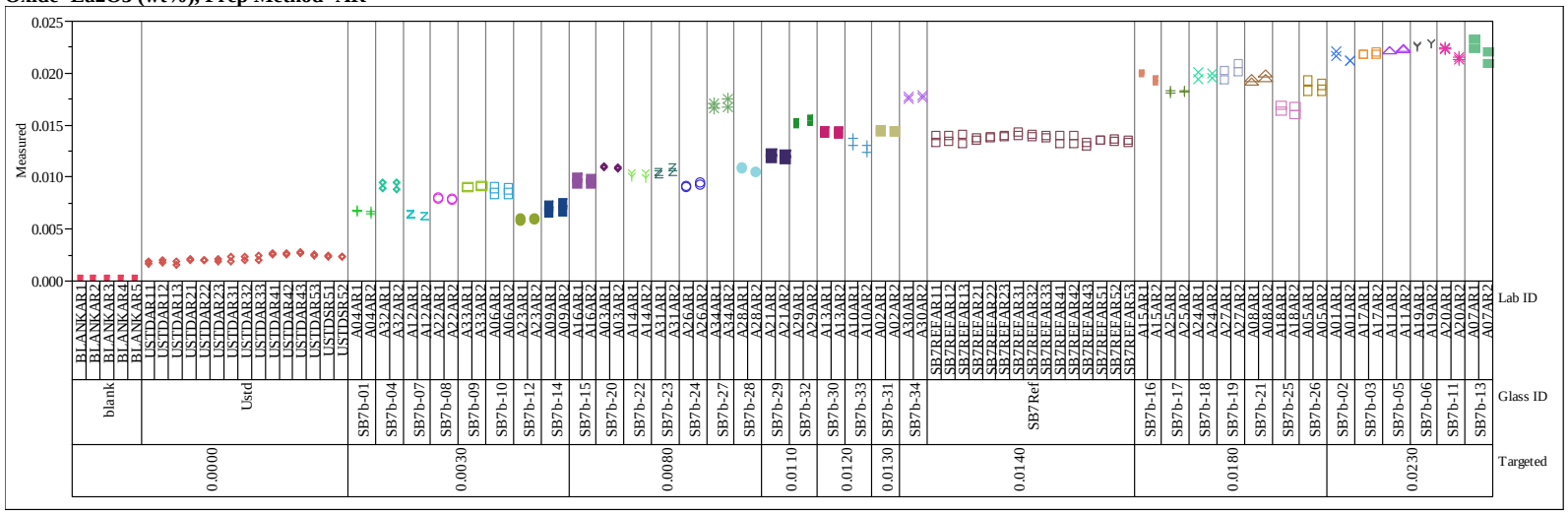
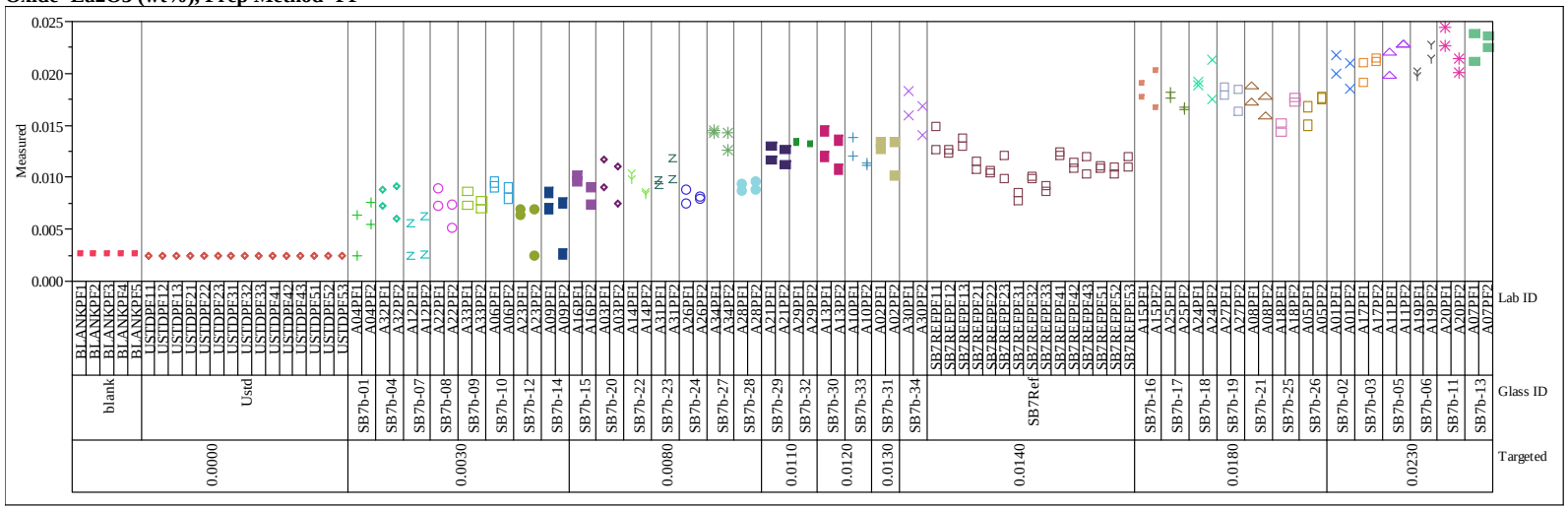


Exhibit A-3. Measurements from by Lab ID within Glass ID by Target Concentration for Each Oxide for Each Prep

Oxide=La2O3 (wt%), Prep Method=PF



Oxide=Li2O (wt%), Prep Method=AR

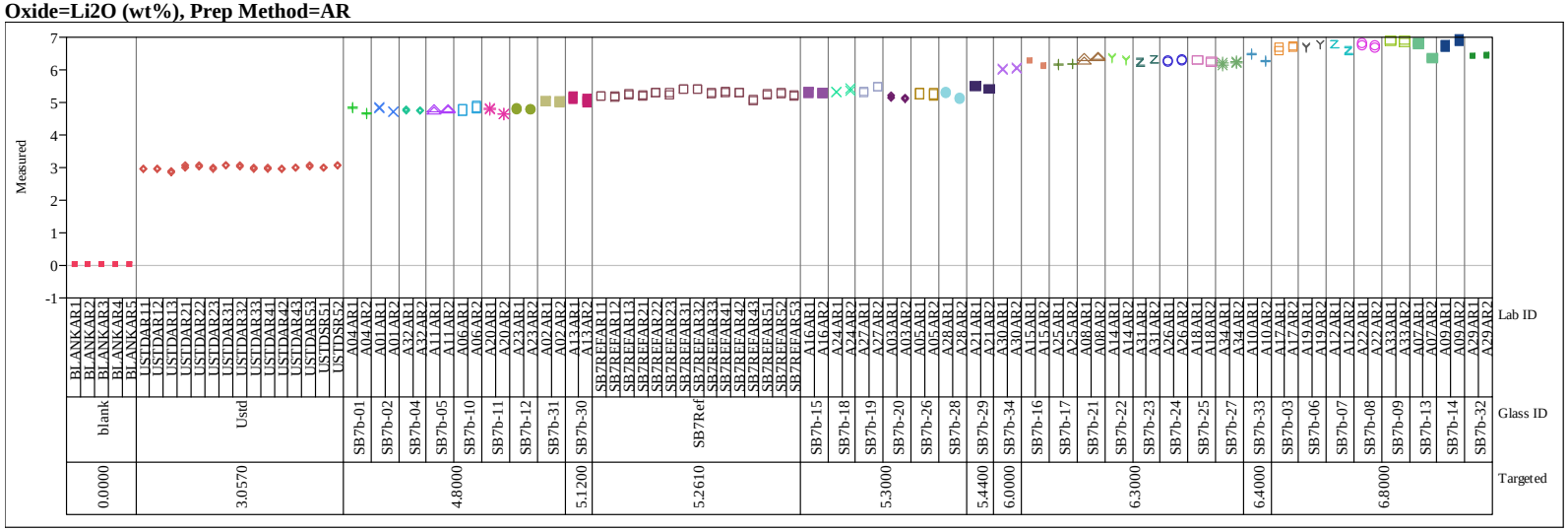
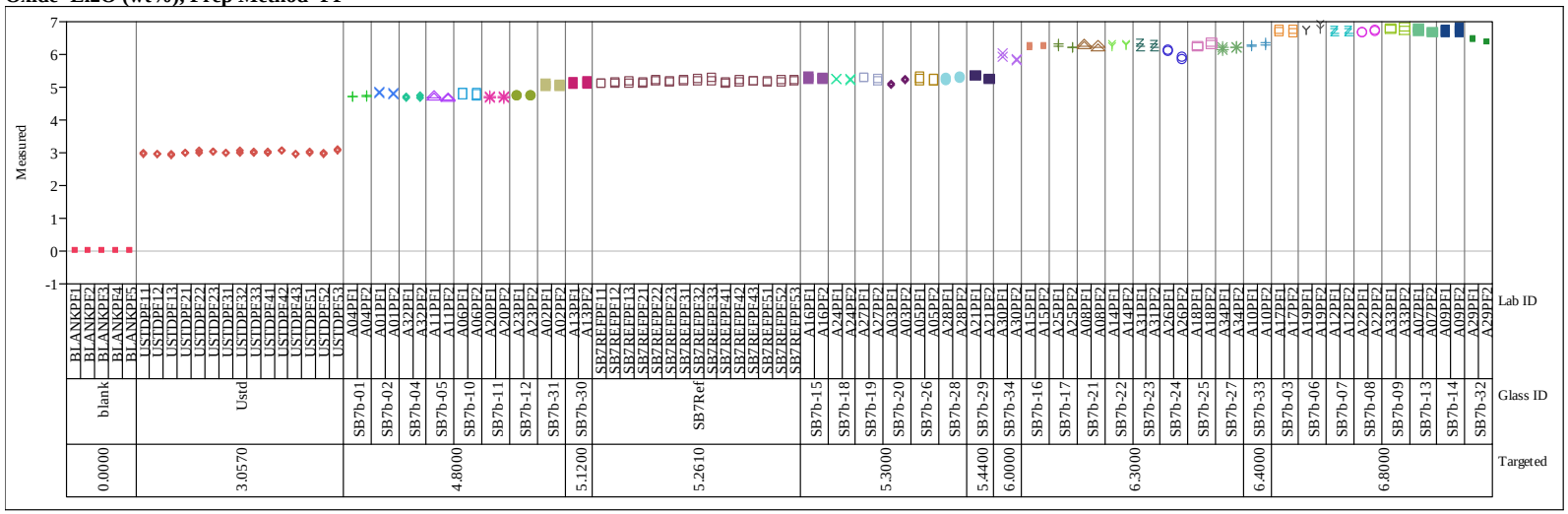


Exhibit A-3. Measurements from by Lab ID within Glass ID by Target Concentration for Each Oxide for Each Prep

Oxide=Li2O (wt%), Prep Method=PF



Oxide=MgO (wt%), Prep Method=AR

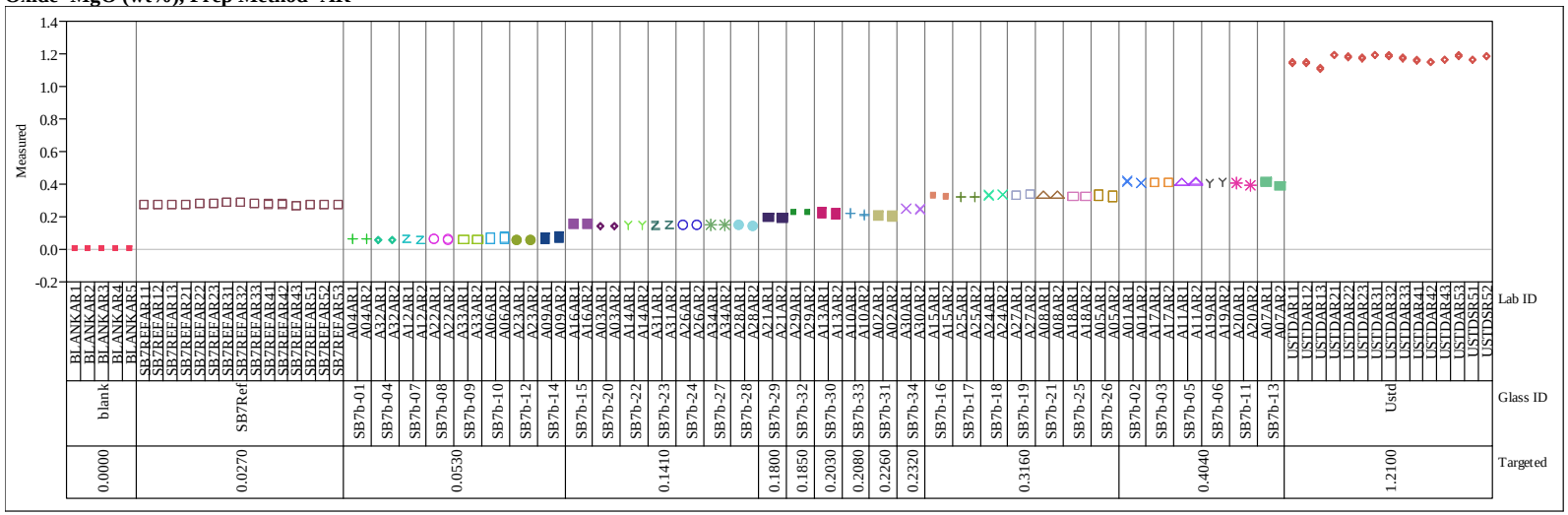
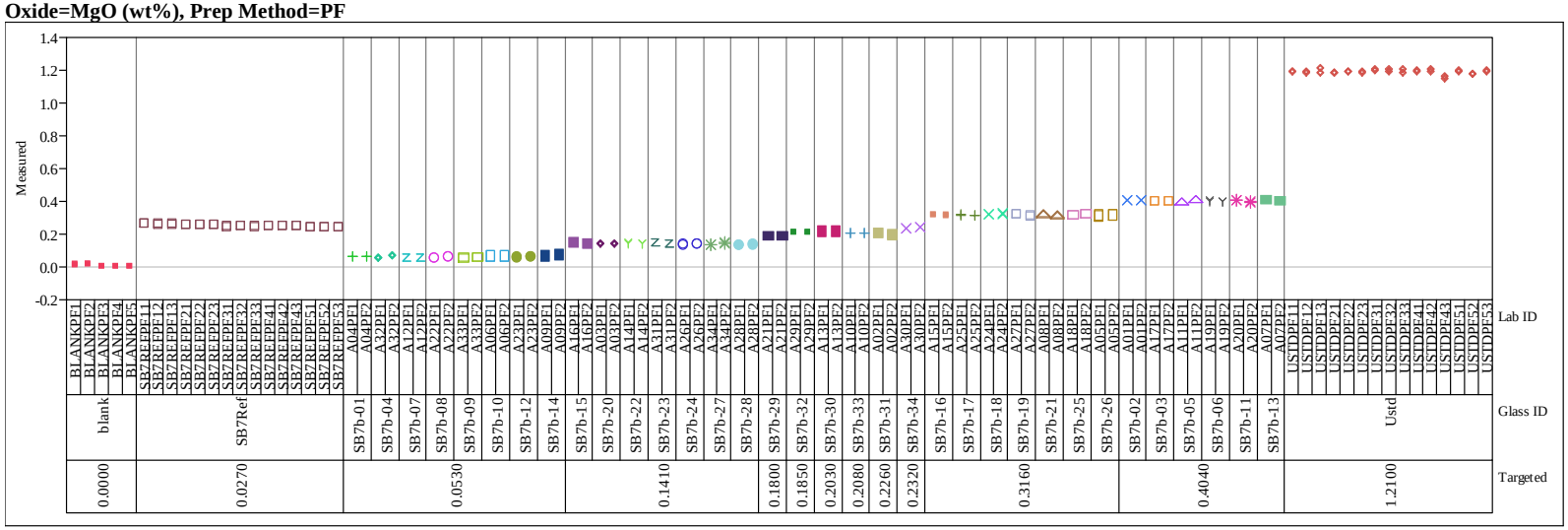


Exhibit A-3. Measurements from by Lab ID within Glass ID by Target Concentration for Each Oxide for Each Prep

Oxide=MgO (wt%), Prep Method=PF



Oxide=MnO (wt%), Prep Method=AR

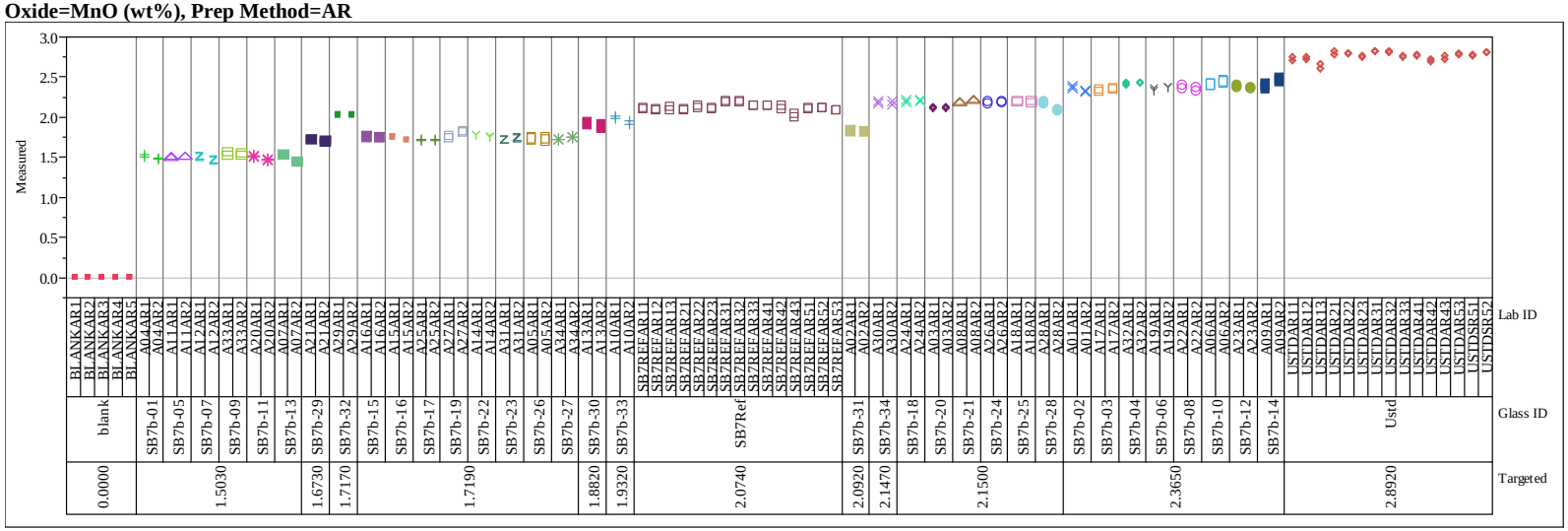
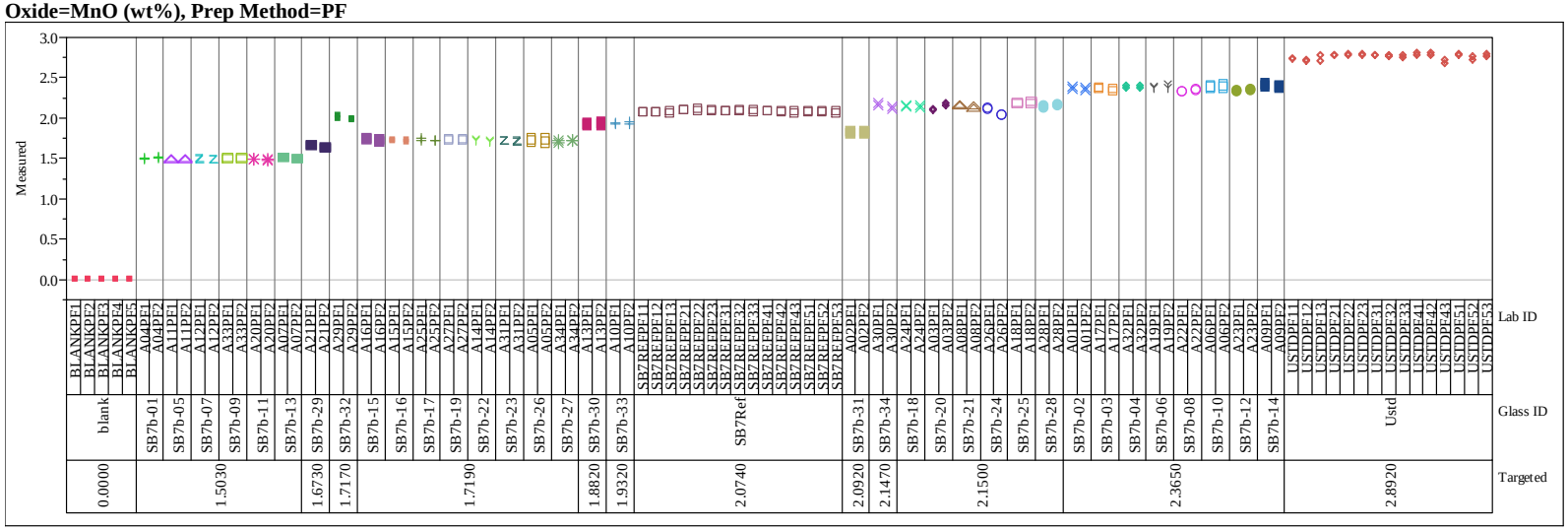


Exhibit A-3. Measurements from by Lab ID within Glass ID by Target Concentration for Each Oxide for Each Prep

Oxide=MnO (wt%), Prep Method=PF



Oxide=Na2O (wt%), Prep Method=AR

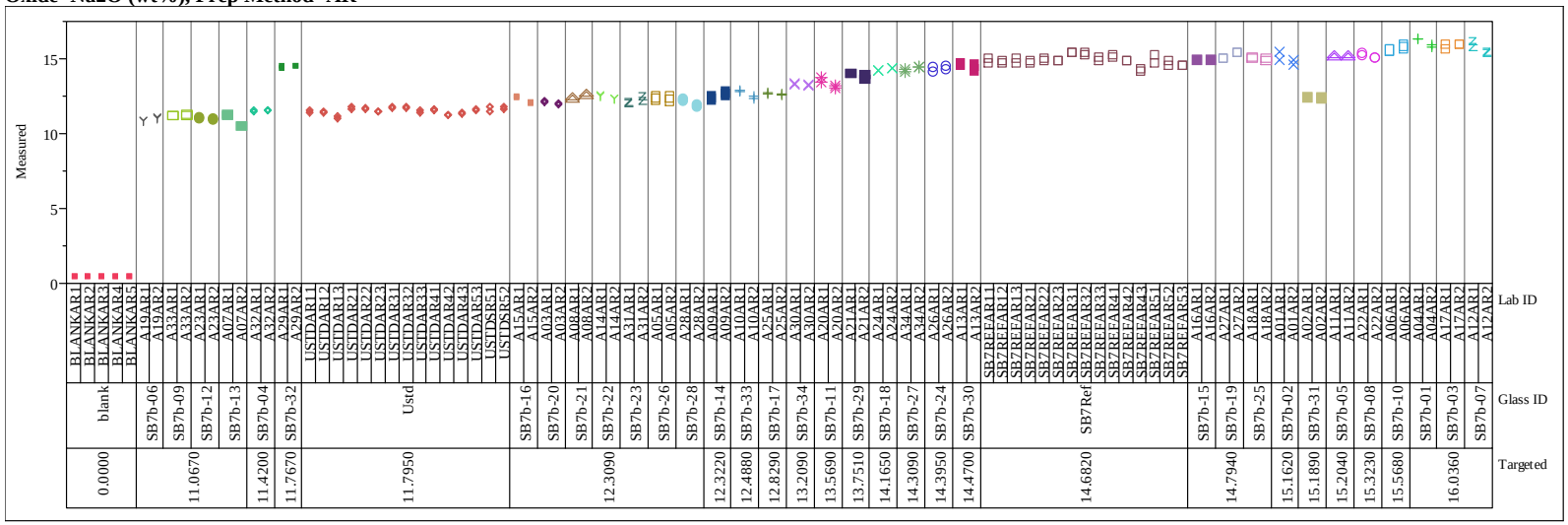
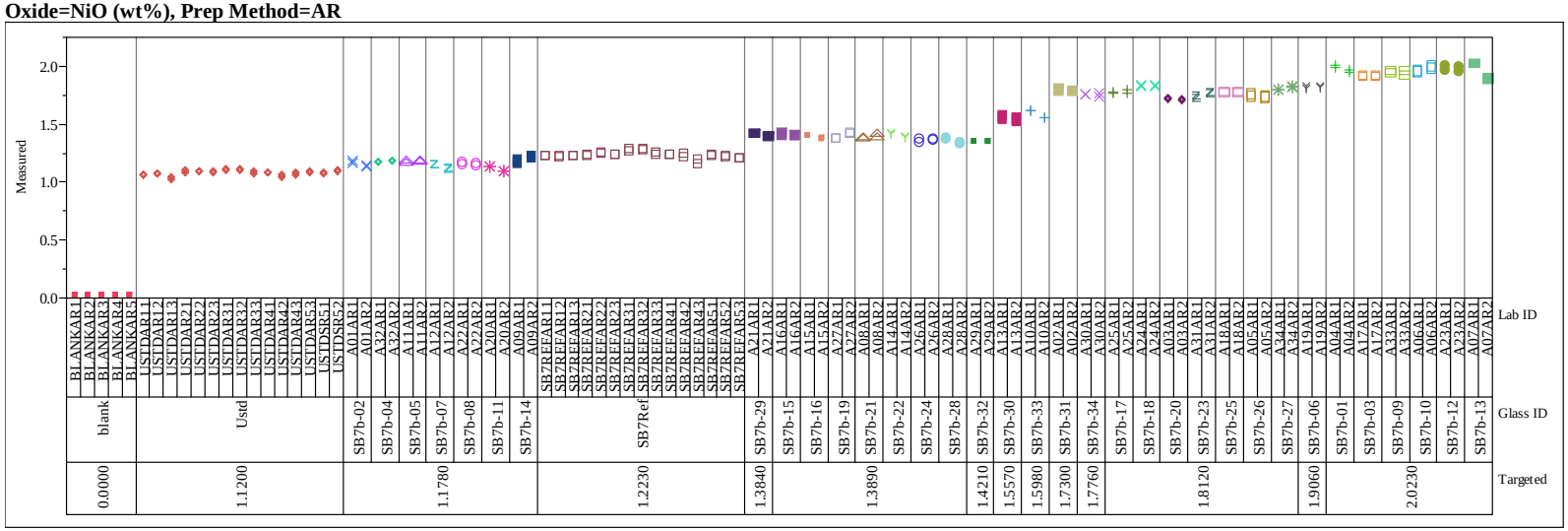


Exhibit A-3. Measurements from by Lab ID within Glass ID by Target Concentration for Each Oxide for Each Prep

Oxide=NiO (wt%), Prep Method=AR



Oxide=NiO (wt%), Prep Method=PF

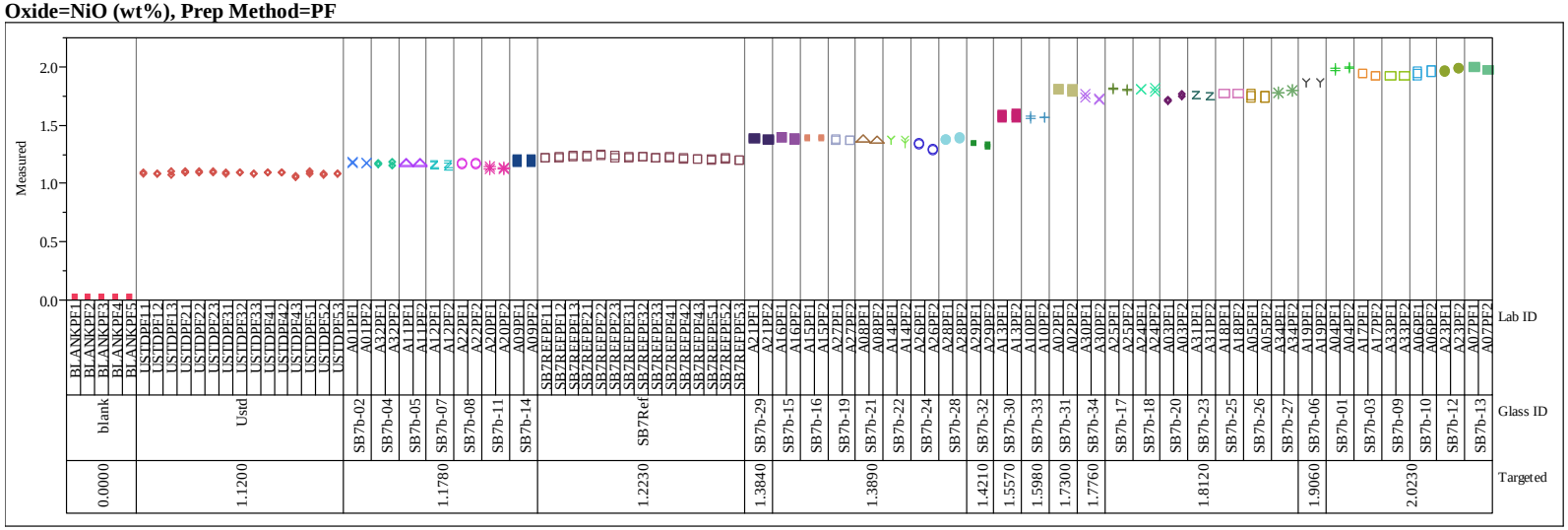
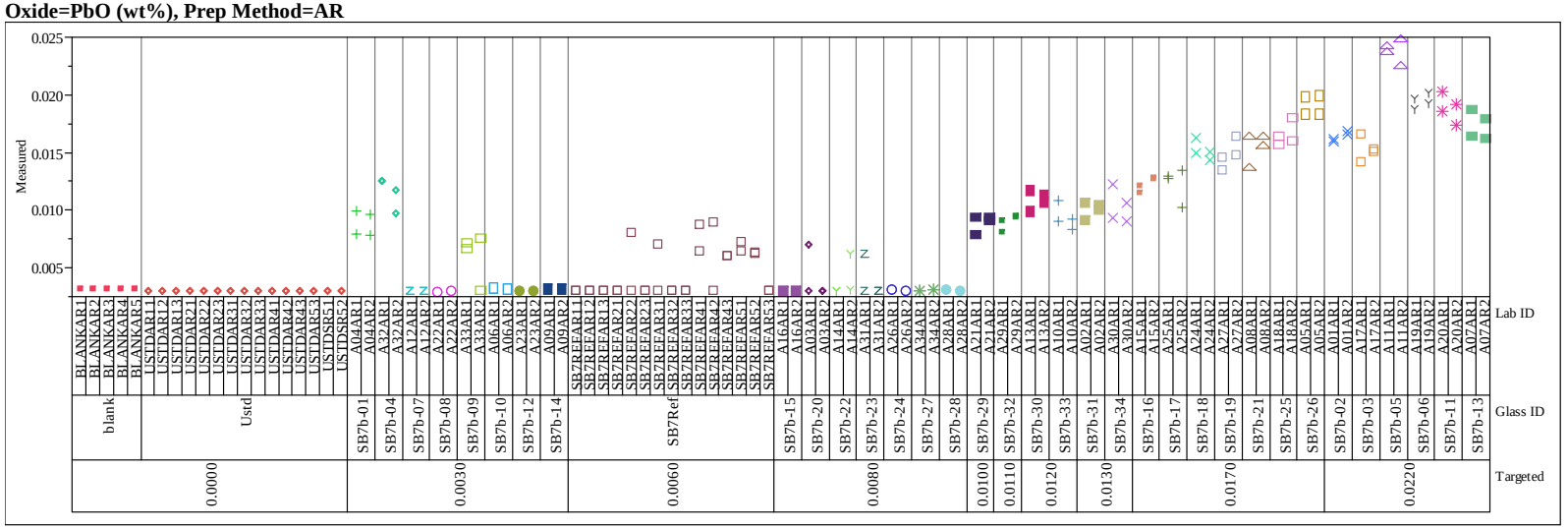


Exhibit A-3. Measurements from by Lab ID within Glass ID by Target Concentration for Each Oxide for Each Prep

Oxide=PbO (wt%), Prep Method=AR



Oxide=PbO (wt%), Prep Method=PF

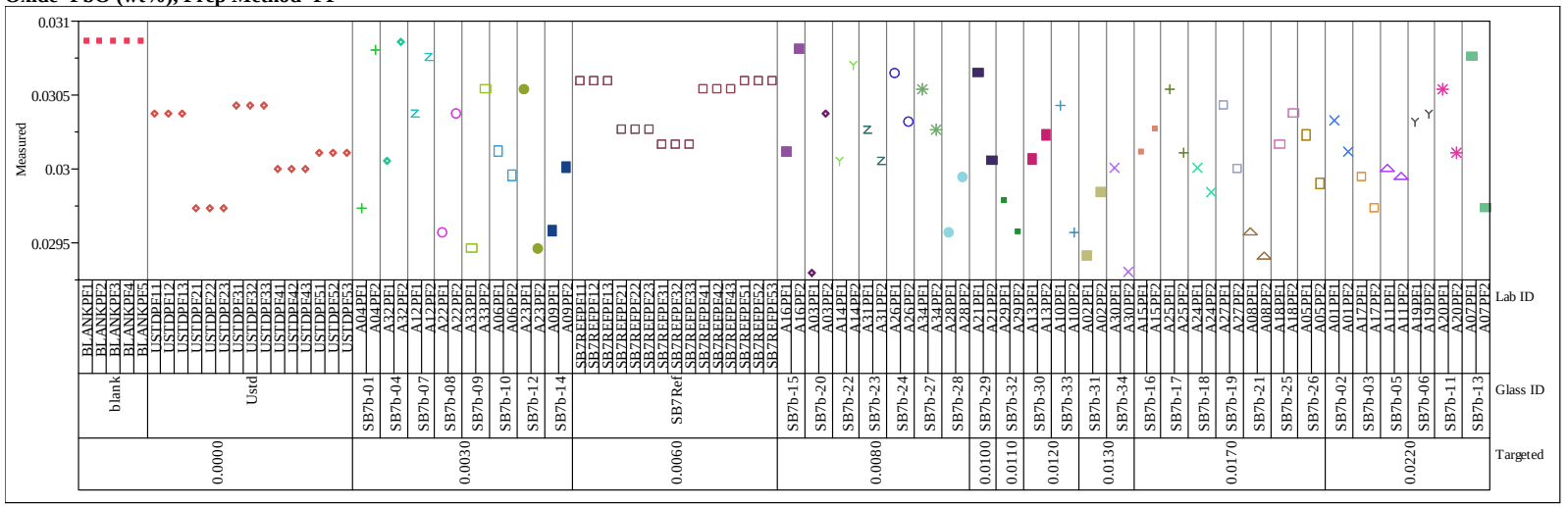
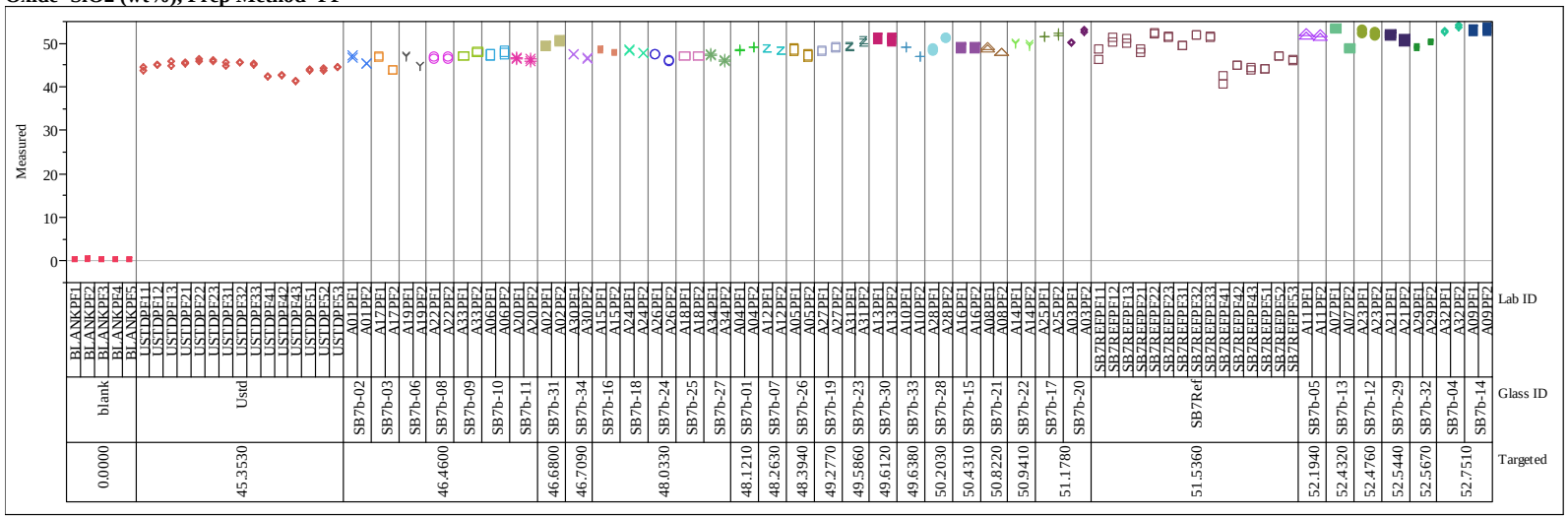


Exhibit A-3. Measurements from by Lab ID within Glass ID by Target Concentration for Each Oxide for Each Prep

Oxide=SiO2 (wt%), Prep Method=PF



Oxide=SO4 (wt%), Prep Method=AR

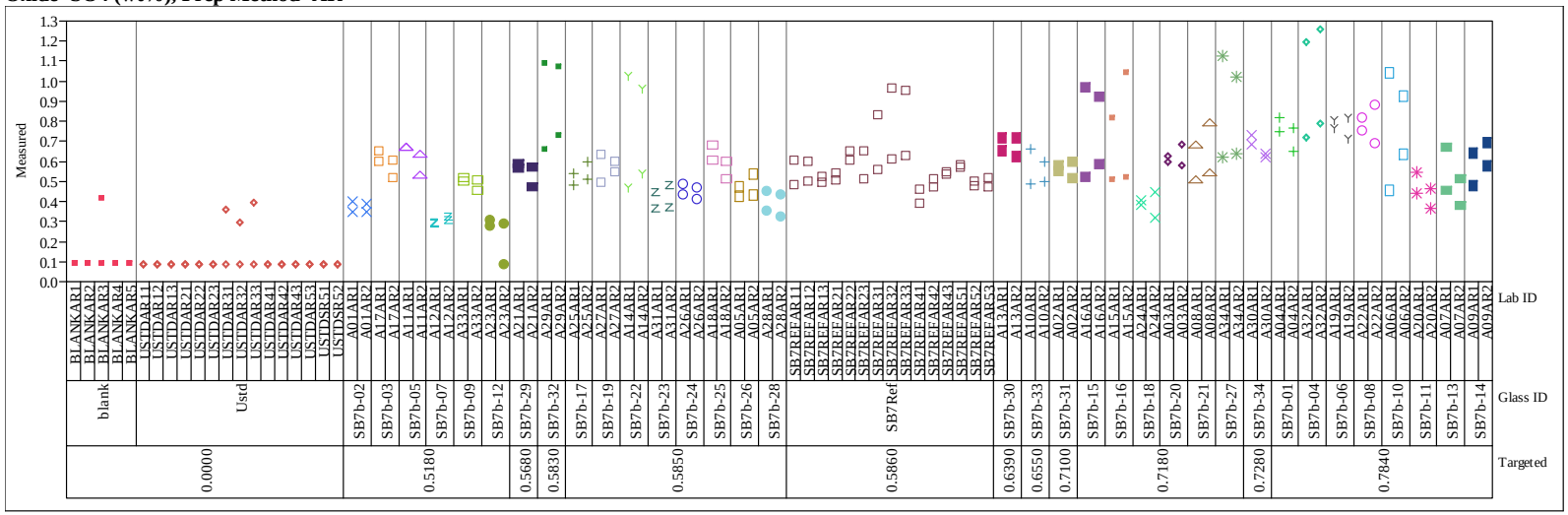
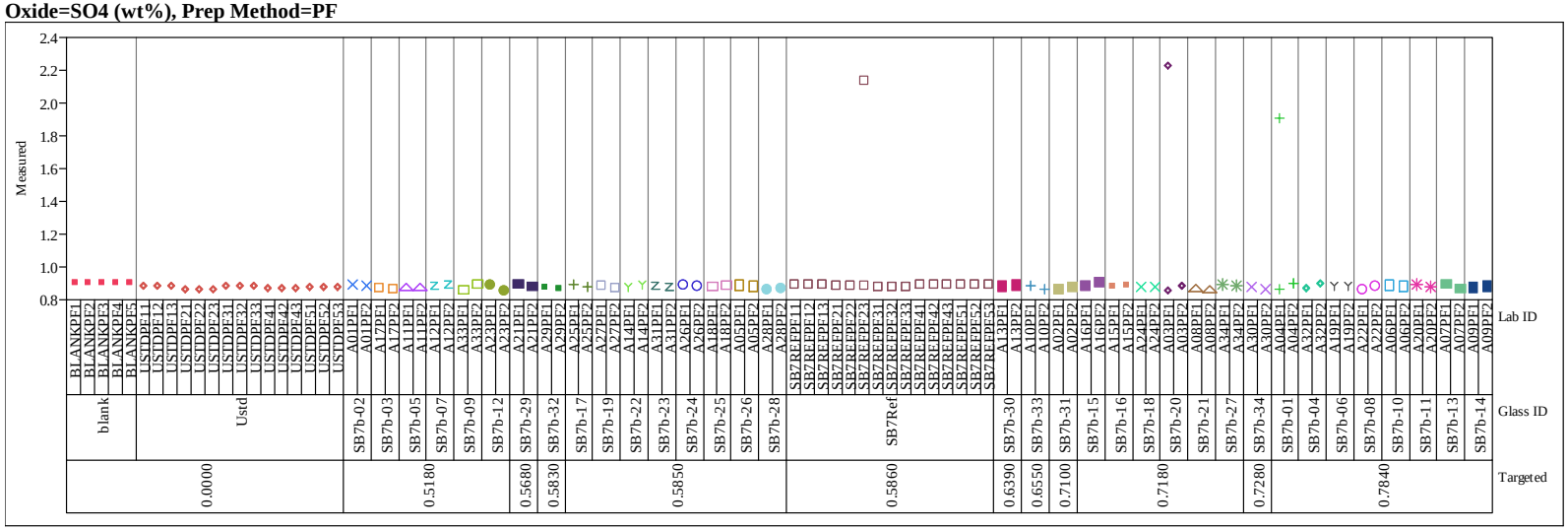


Exhibit A-3. Measurements from by Lab ID within Glass ID by Target Concentration for Each Oxide for Each Prep

Oxide=SO4 (wt%), Prep Method=PF



Oxide=ThO2 (wt%), Prep Method=AR

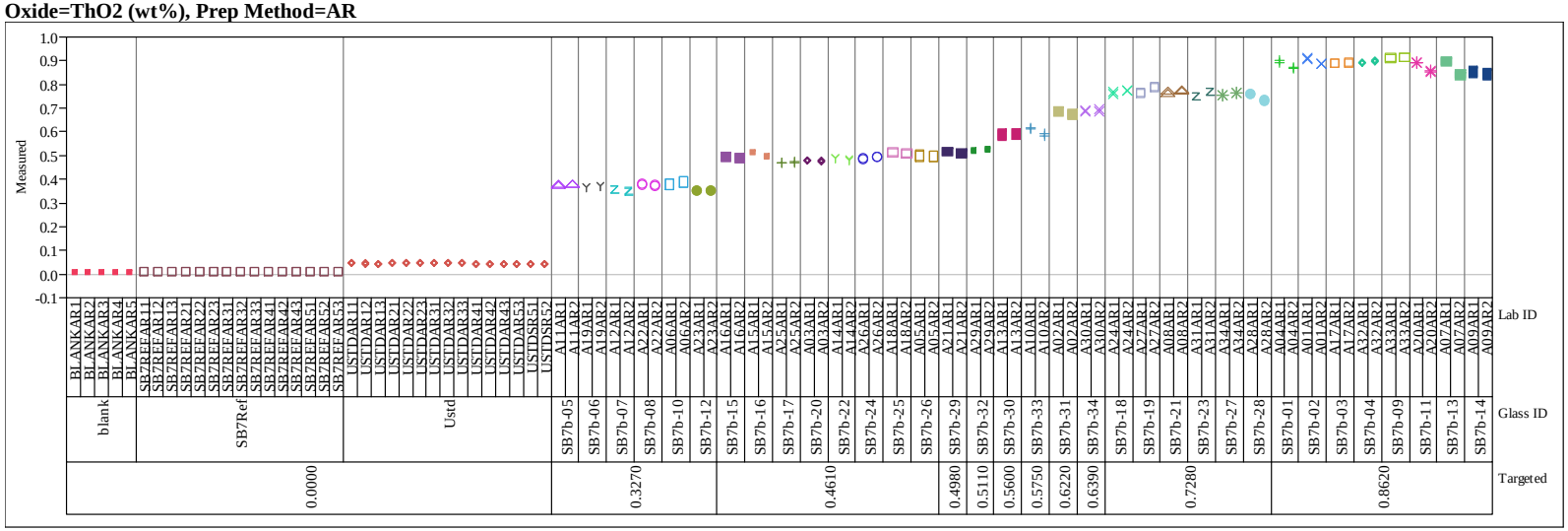
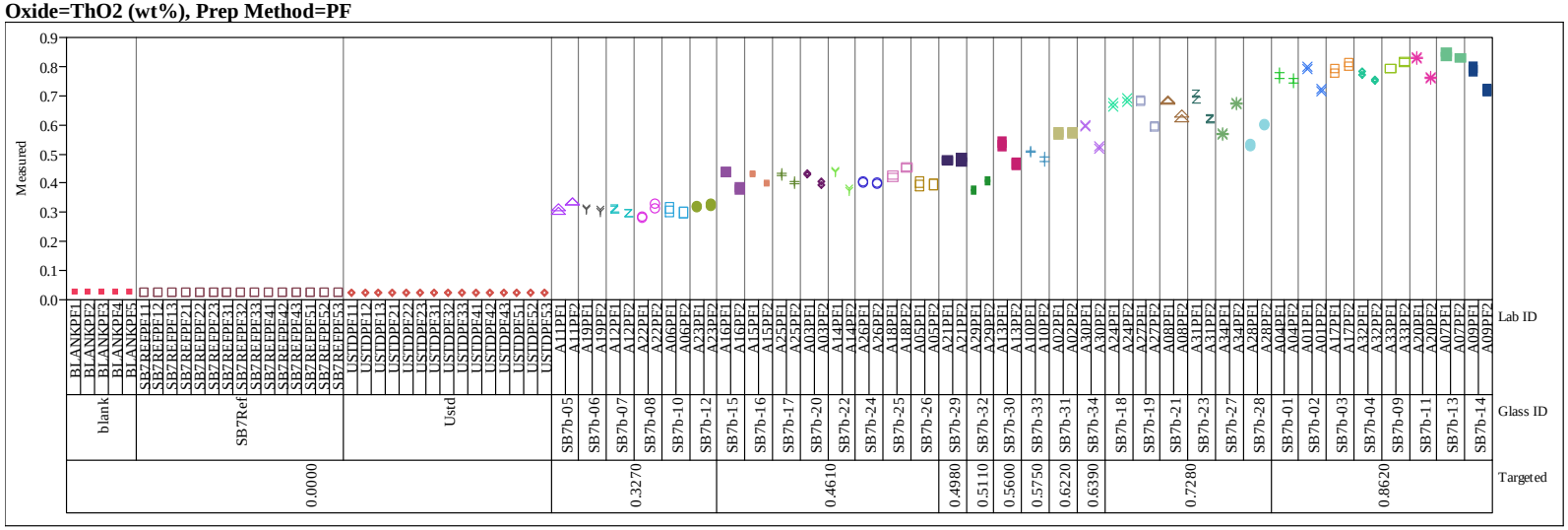


Exhibit A-3. Measurements from by Lab ID within Glass ID by Target Concentration for Each Oxide for Each Prep

Oxide=ThO2 (wt%), Prep Method=PF



Oxide=TiO2 (wt%), Prep Method=AR

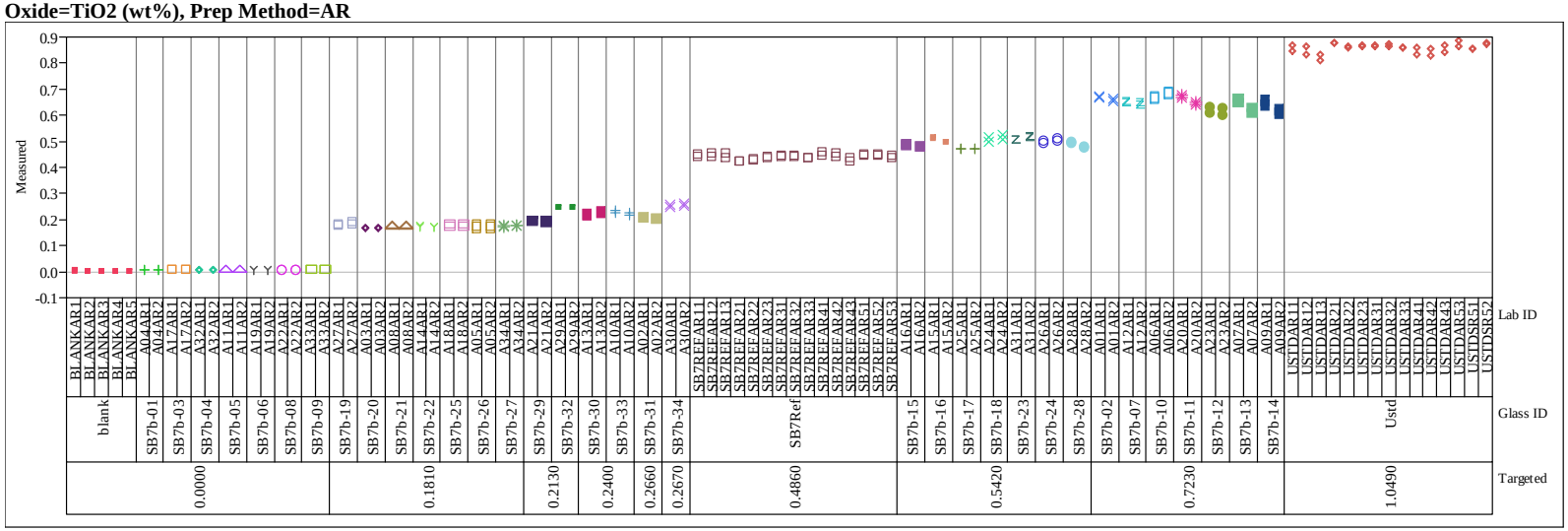
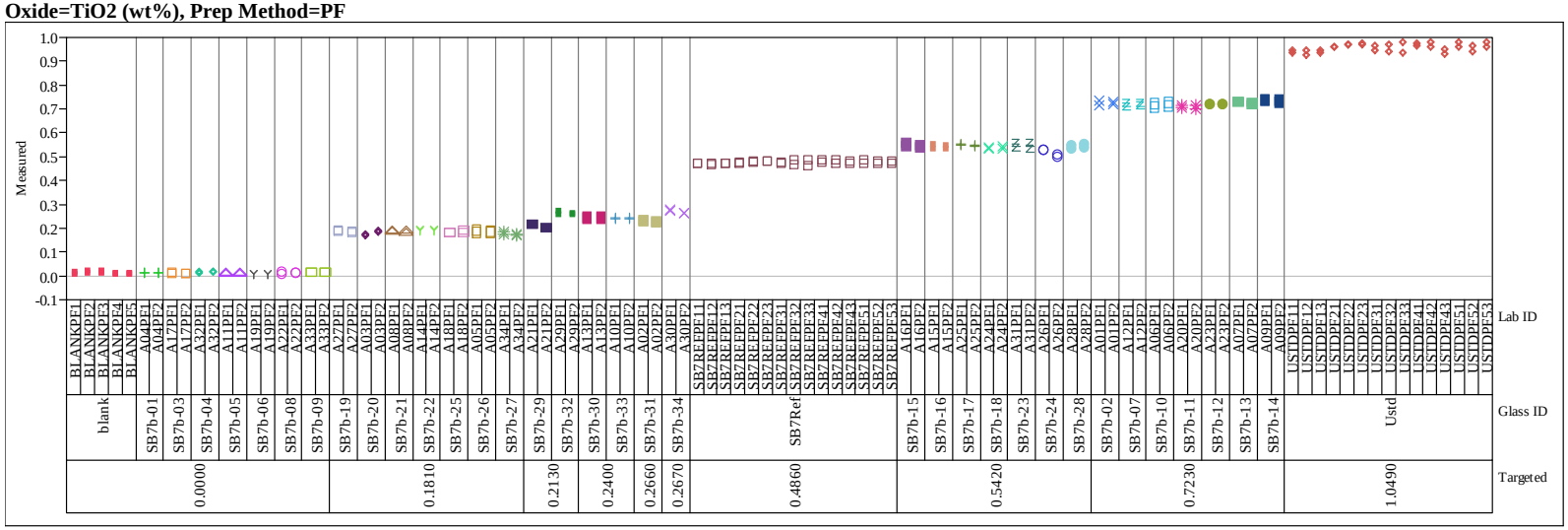


Exhibit A-3. Measurements from by Lab ID within Glass ID by Target Concentration for Each Oxide for Each Prep

Oxide=TiO2 (wt%), Prep Method=PF



Oxide=U3O8 (wt%), Prep Method=AR

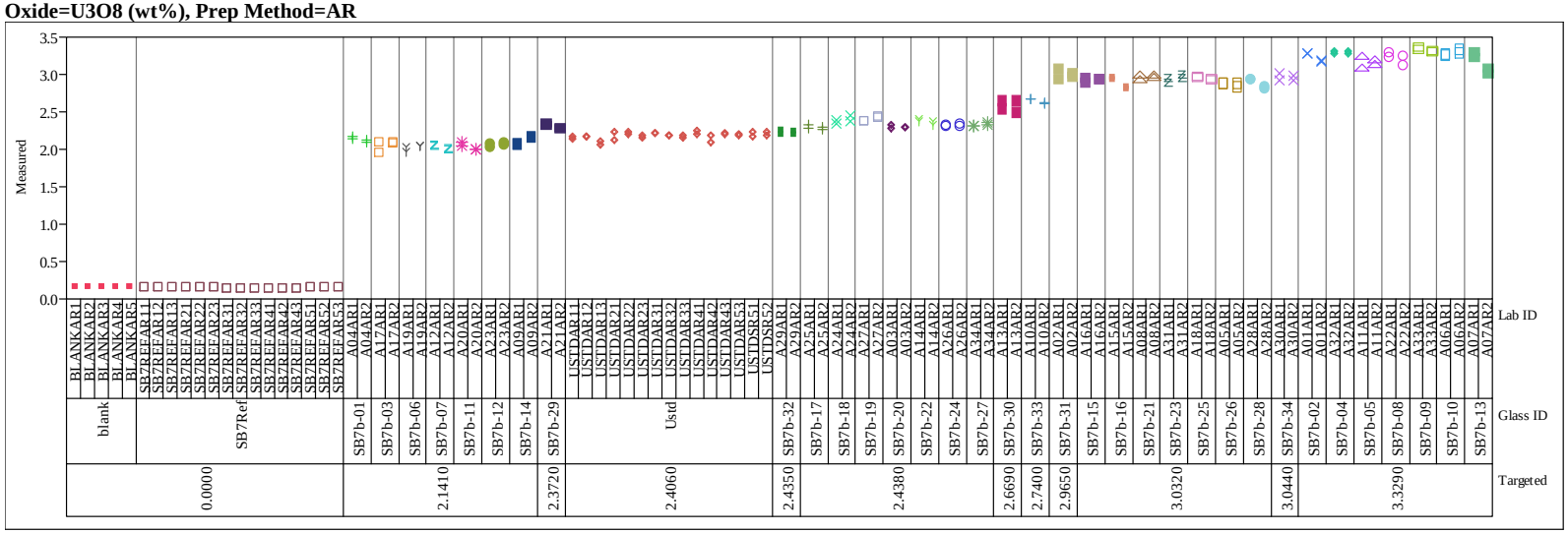
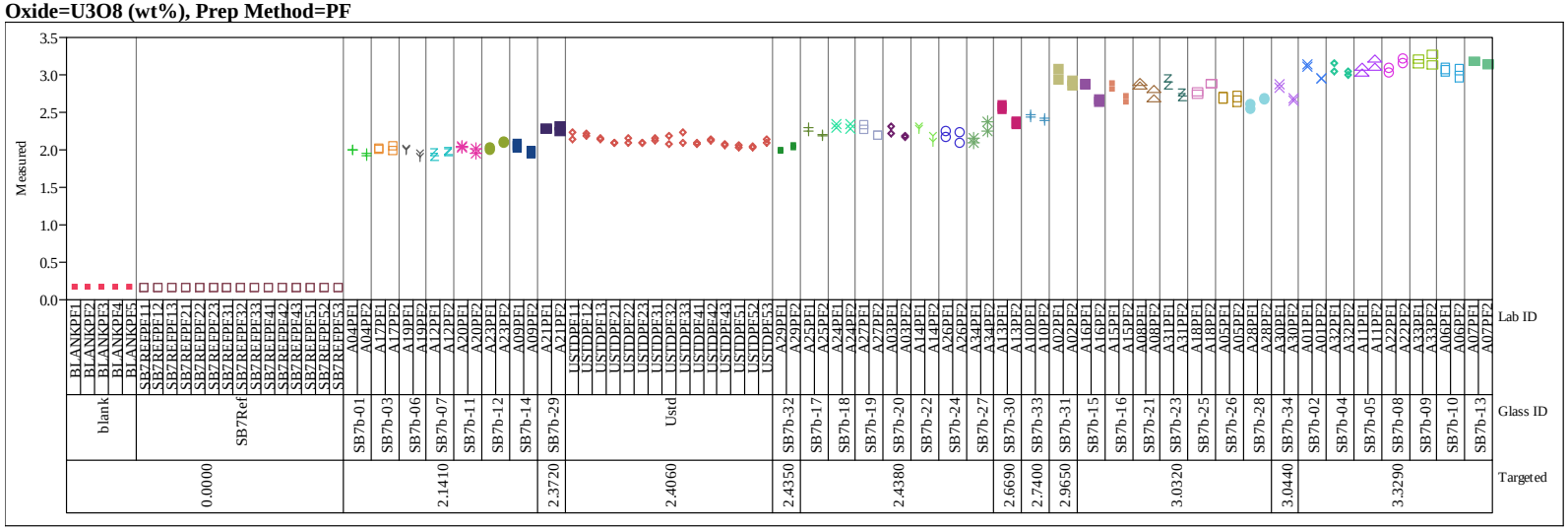


Exhibit A-3. Measurements from by Lab ID within Glass ID by Target Concentration for Each Oxide for Each Prep

Oxide=U3O8 (wt%), Prep Method=PF



Oxide=ZnO (wt%), Prep Method=AR

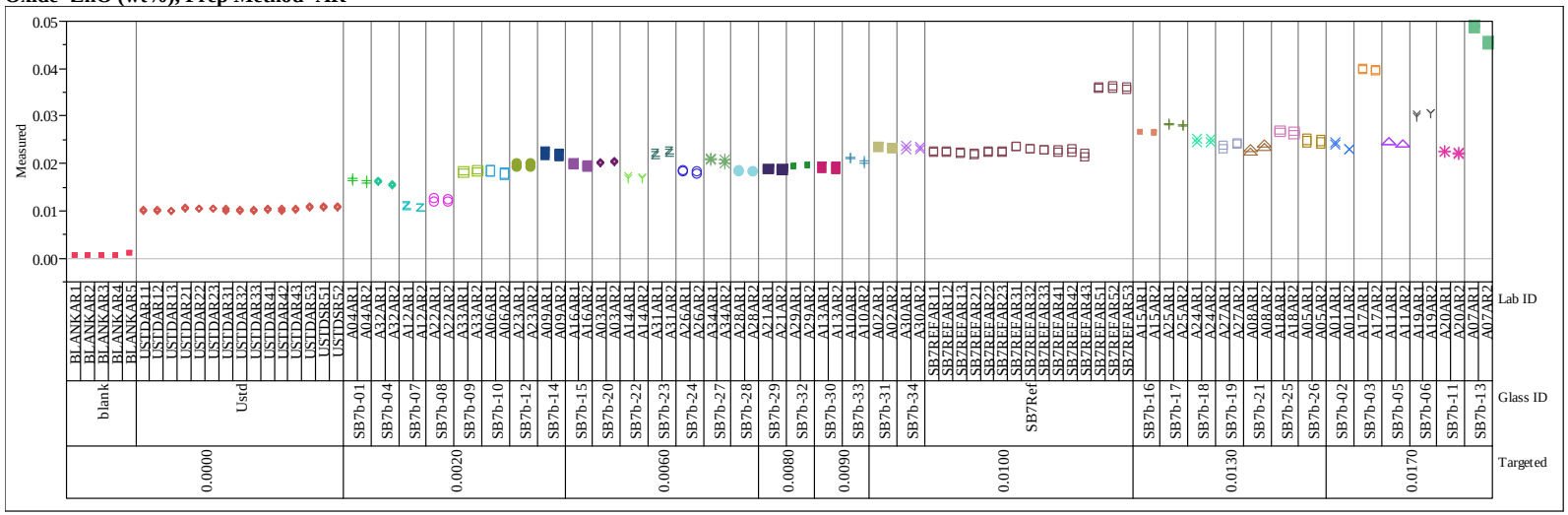
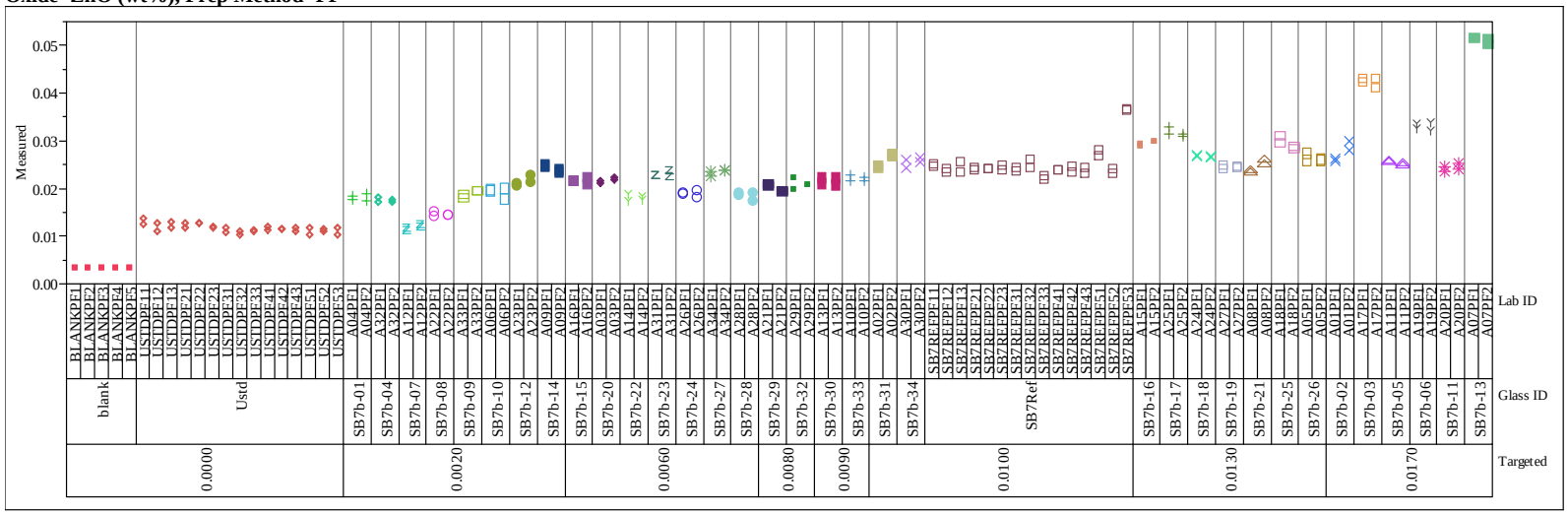


Exhibit A-3. Measurements from by Lab ID within Glass ID by Target Concentration for Each Oxide for Each Prep

Oxide=ZnO (wt%), Prep Method=PF



Oxide=ZrO2 (wt%), Prep Method=AR

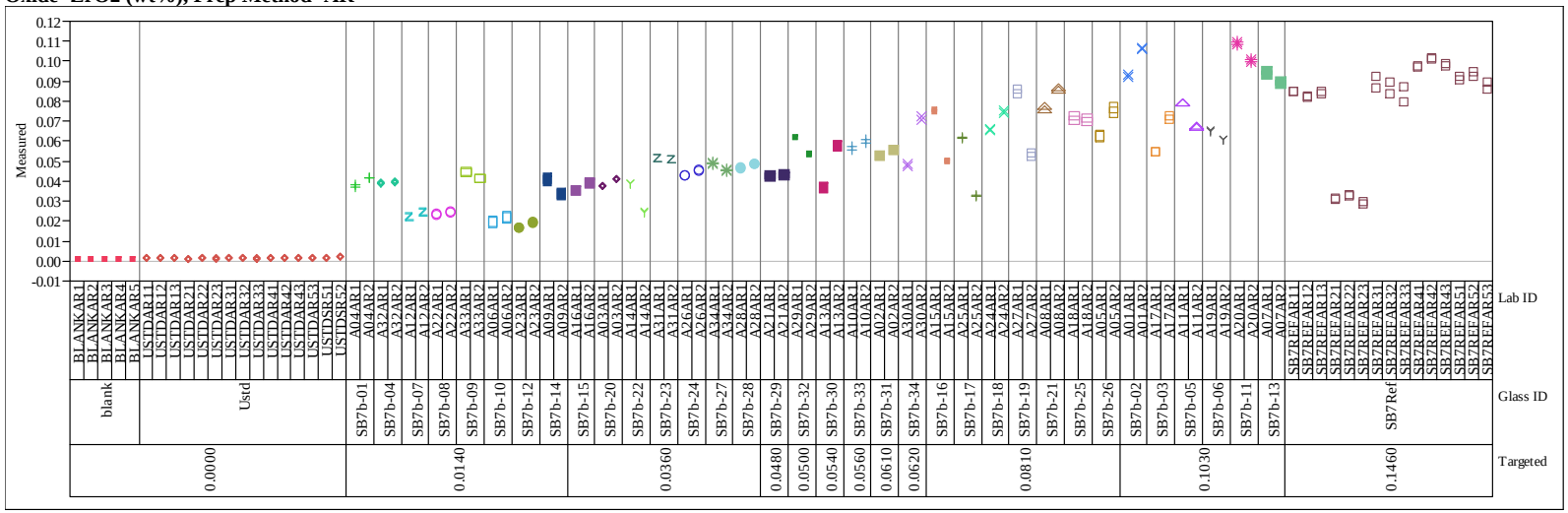


Exhibit A-4. Measurements from by Prep within Glass ID by Target Concentration for Each Oxide

Oxide=Al2O3 (wt%)

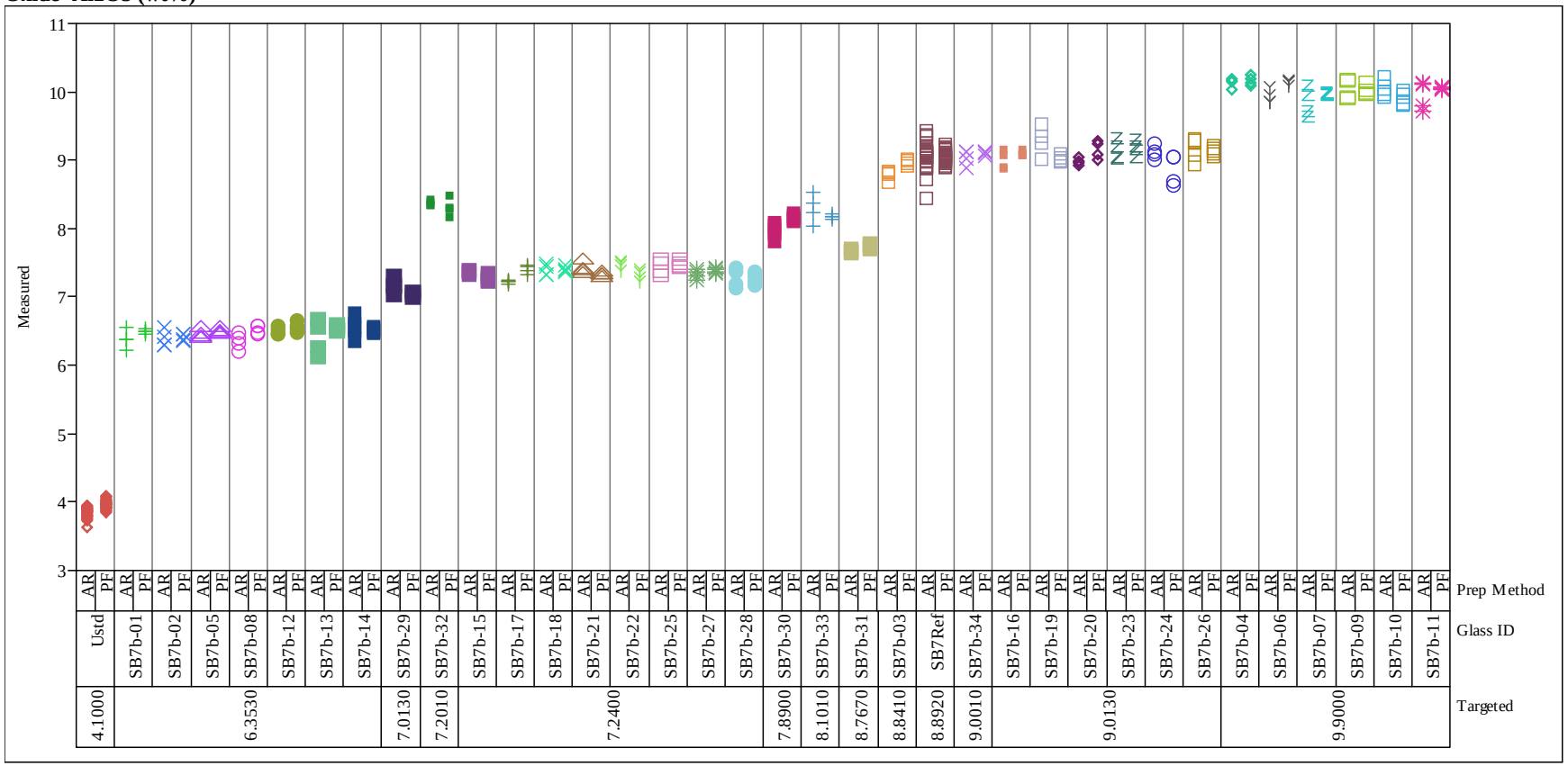


Exhibit A-4. Measurements from by Prep within Glass ID by Target Concentration for Each Oxide

Oxide=B2O3 (wt%)

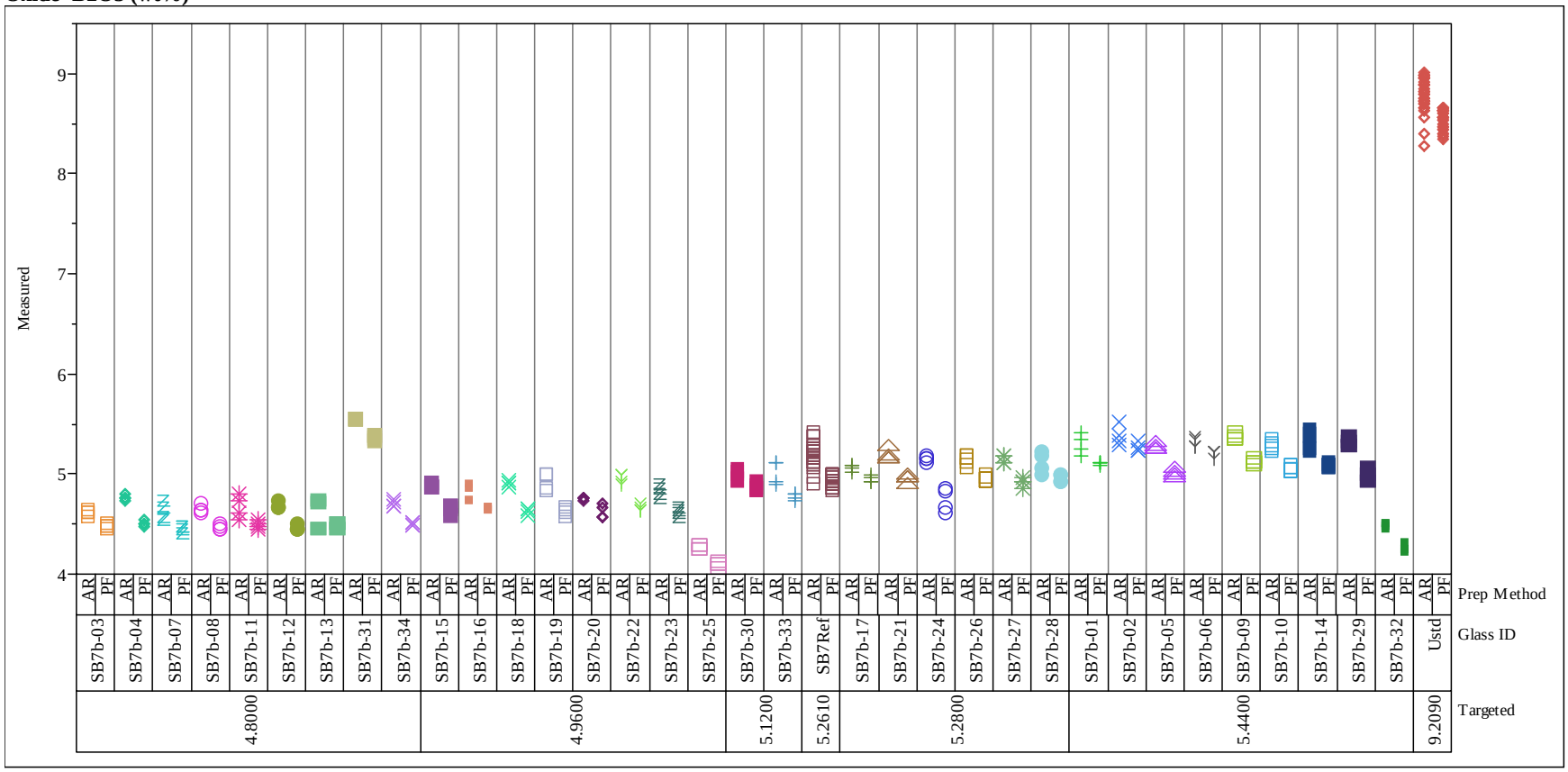


Exhibit A-4. Measurements from by Prep within Glass ID by Target Concentration for Each Oxide

Oxide=BaO (wt%)

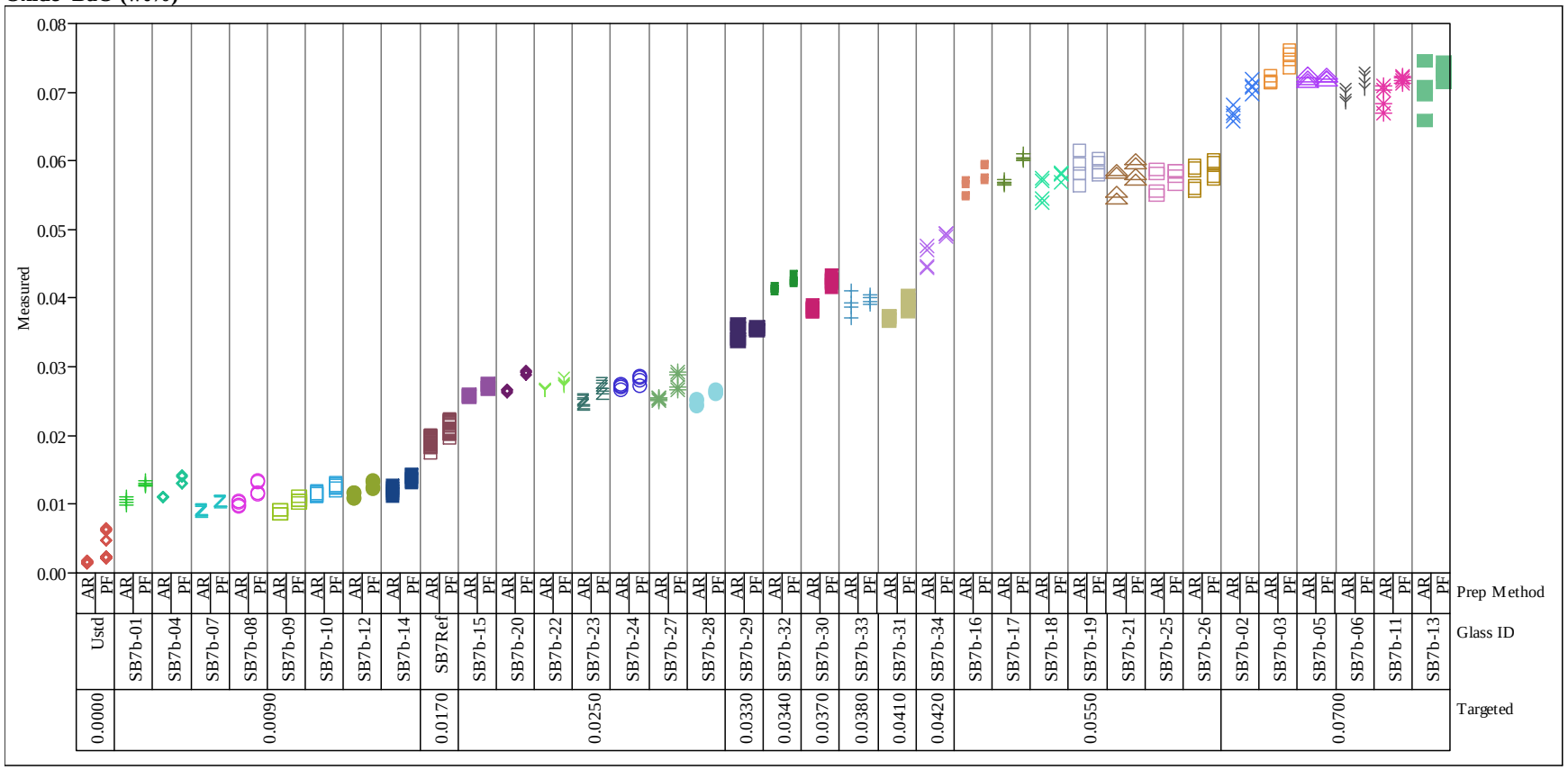


Exhibit A-4. Measurements from by Prep within Glass ID by Target Concentration for Each Oxide

Variability Gauge Oxide=CaO (wt%)

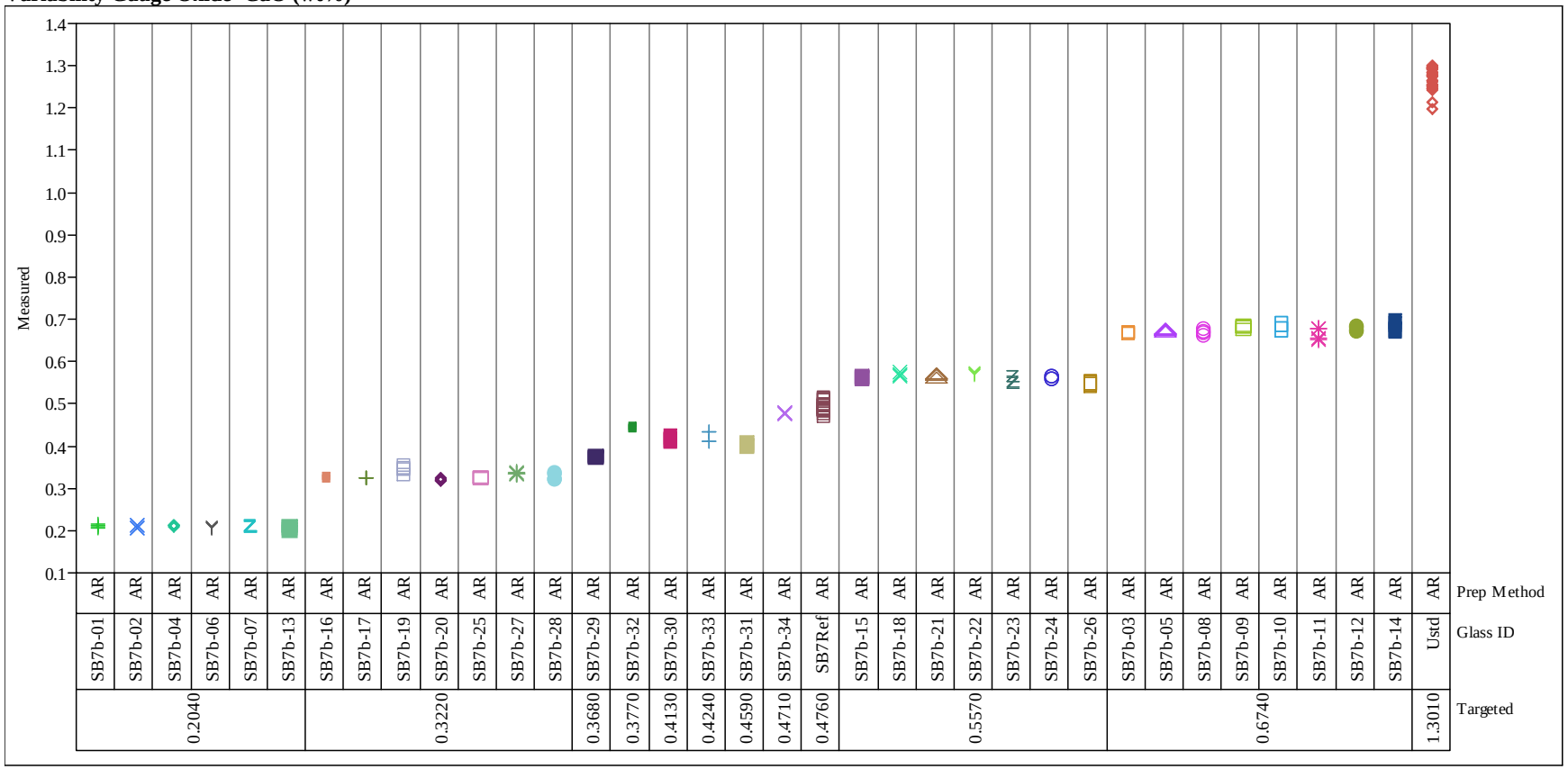


Exhibit A-4. Measurements from by Prep within Glass ID by Target Concentration for Each Oxide

Oxide=Ce2O3 (wt%)

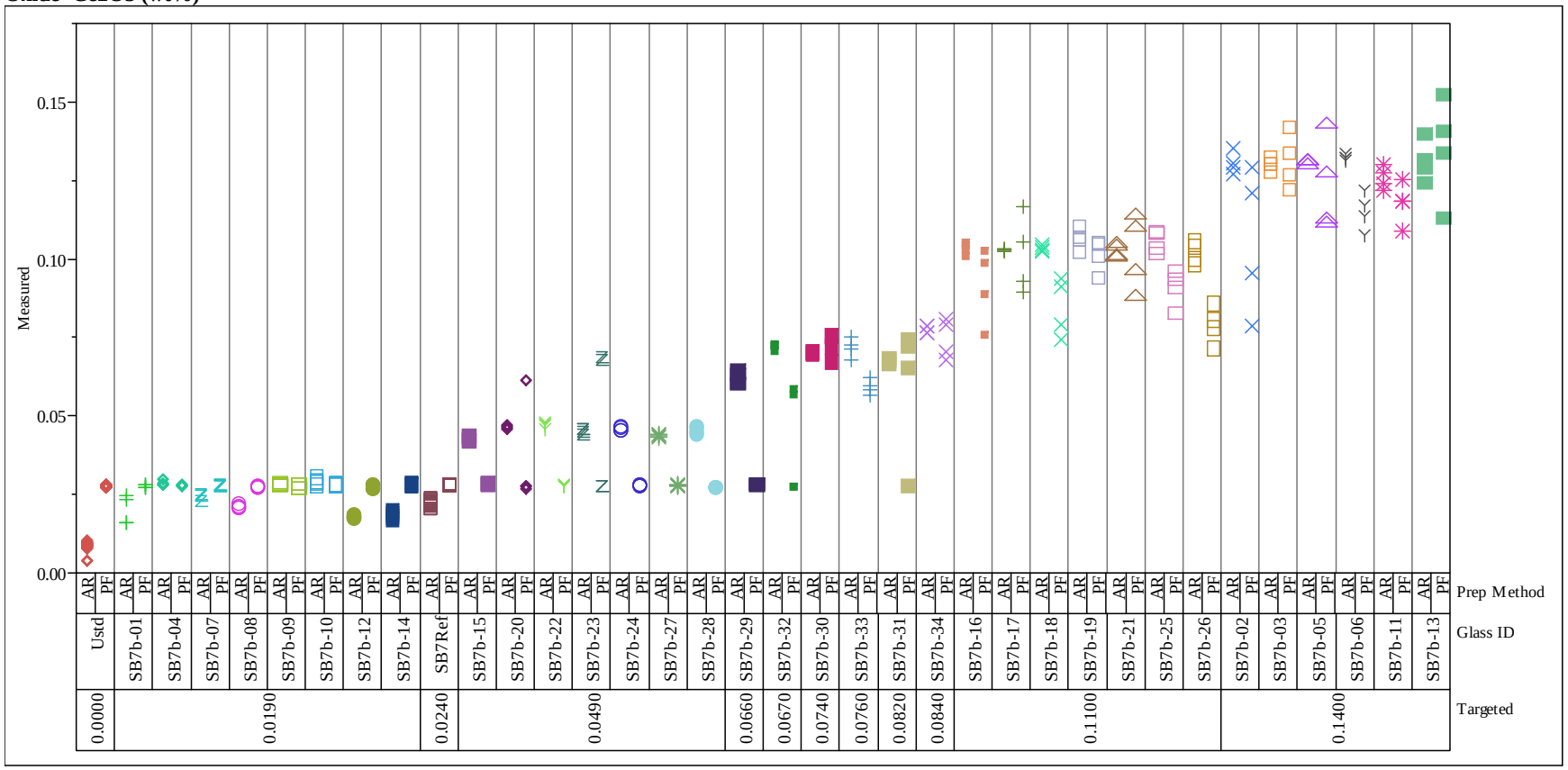


Exhibit A-4. Measurements from by Prep within Glass ID by Target Concentration for Each Oxide

Oxide=Cr2O3 (wt%)

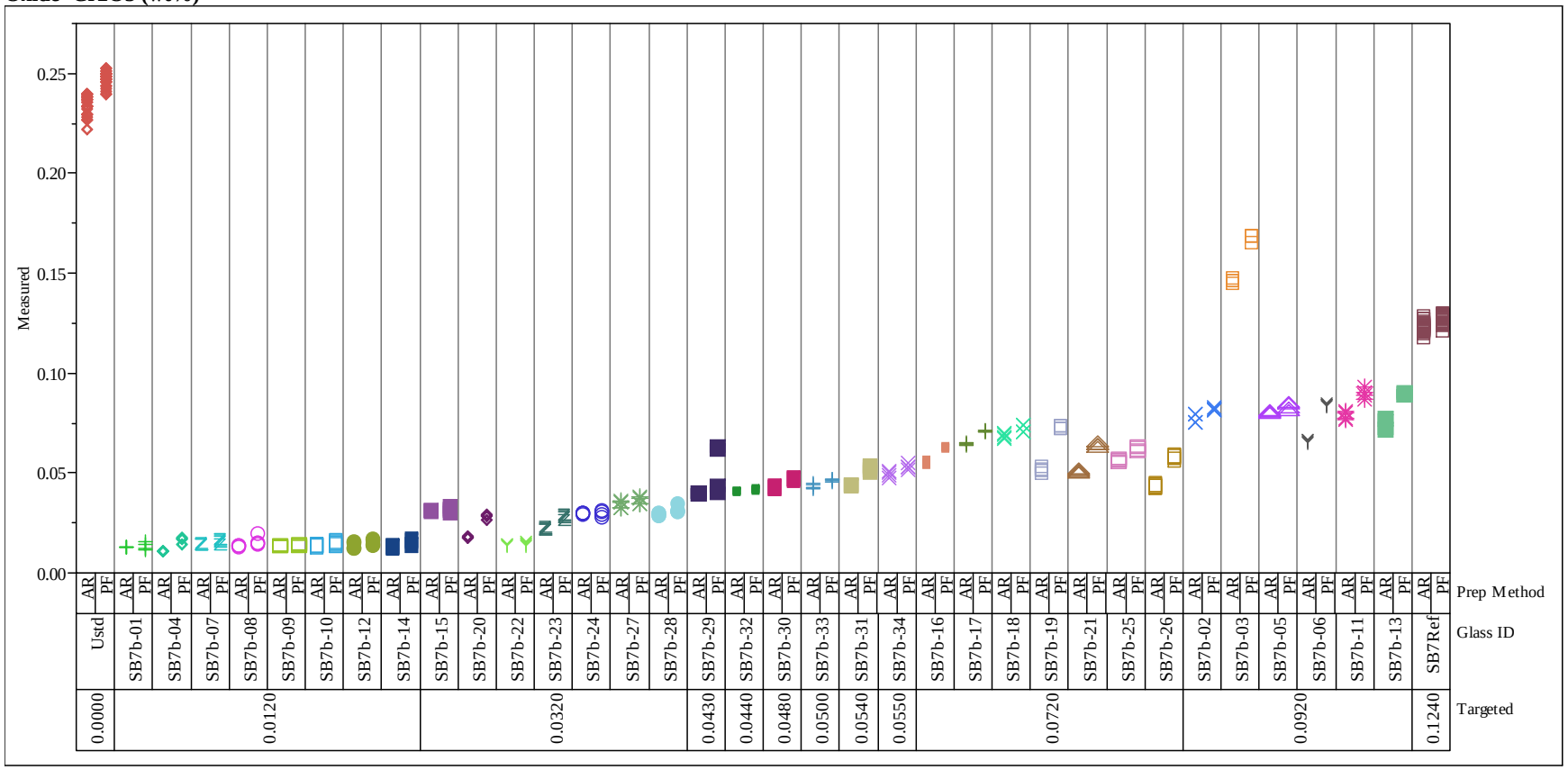


Exhibit A-4. Measurements from by Prep within Glass ID by Target Concentration for Each Oxide

Oxide=CuO (wt%)

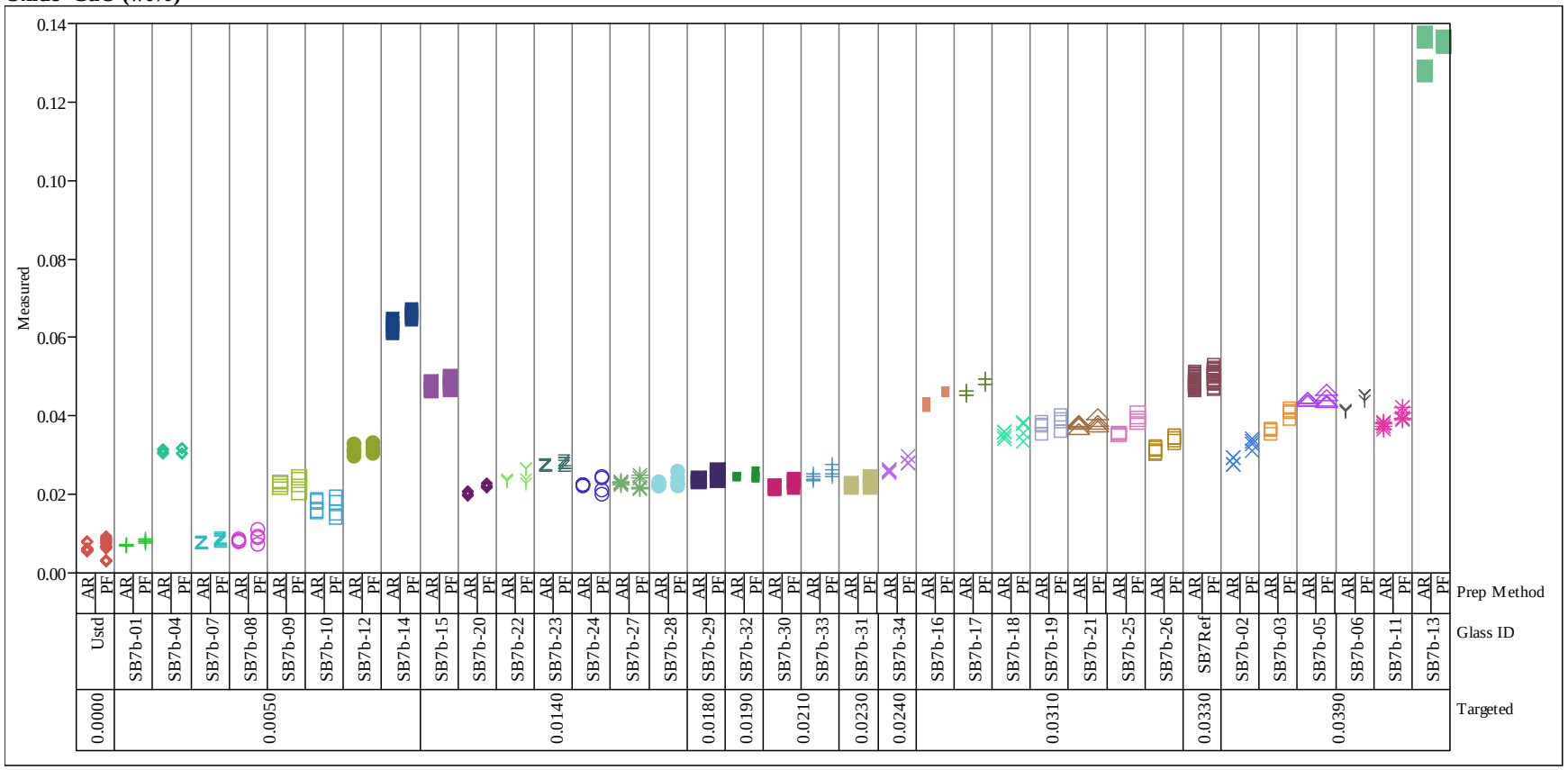


Exhibit A-4. Measurements from by Prep within Glass ID by Target Concentration for Each Oxide

Oxide=Fe2O3 (wt%)

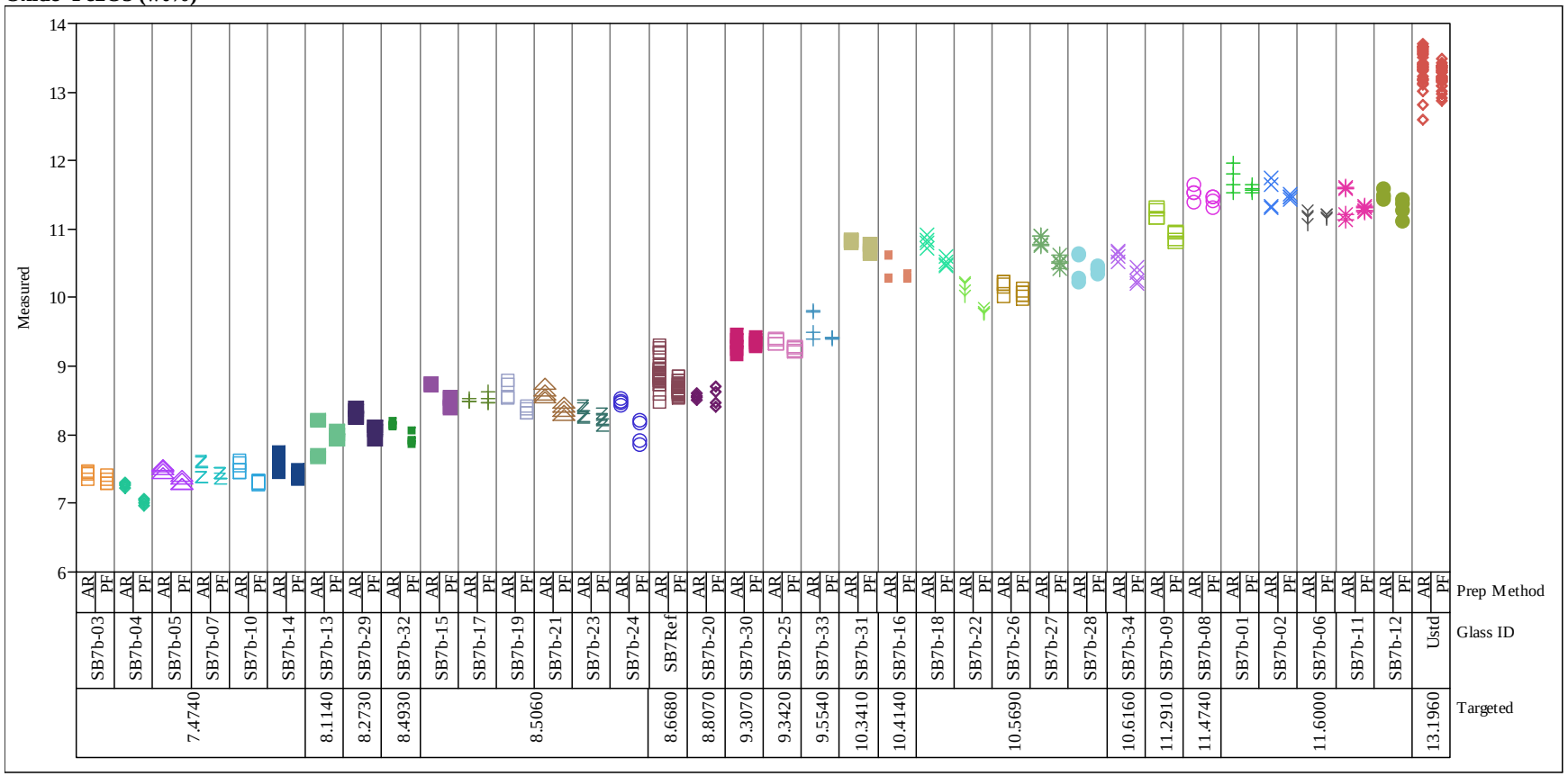


Exhibit A-4. Measurements from by Prep within Glass ID by Target Concentration for Each Oxide

Oxide=K2O (wt%)

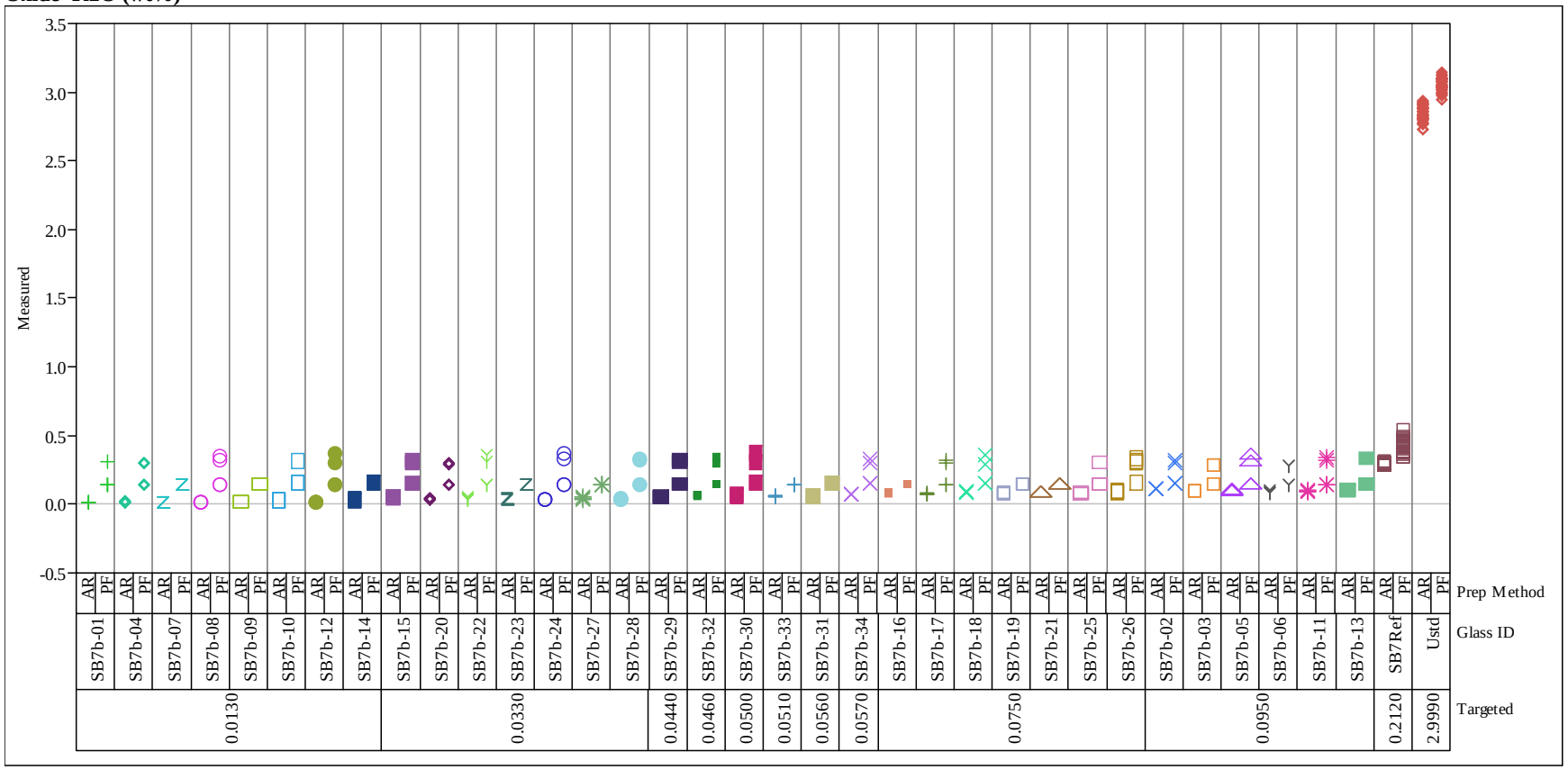


Exhibit A-4. Measurements from by Prep within Glass ID by Target Concentration for Each Oxide

Oxide=La2O3 (wt%)

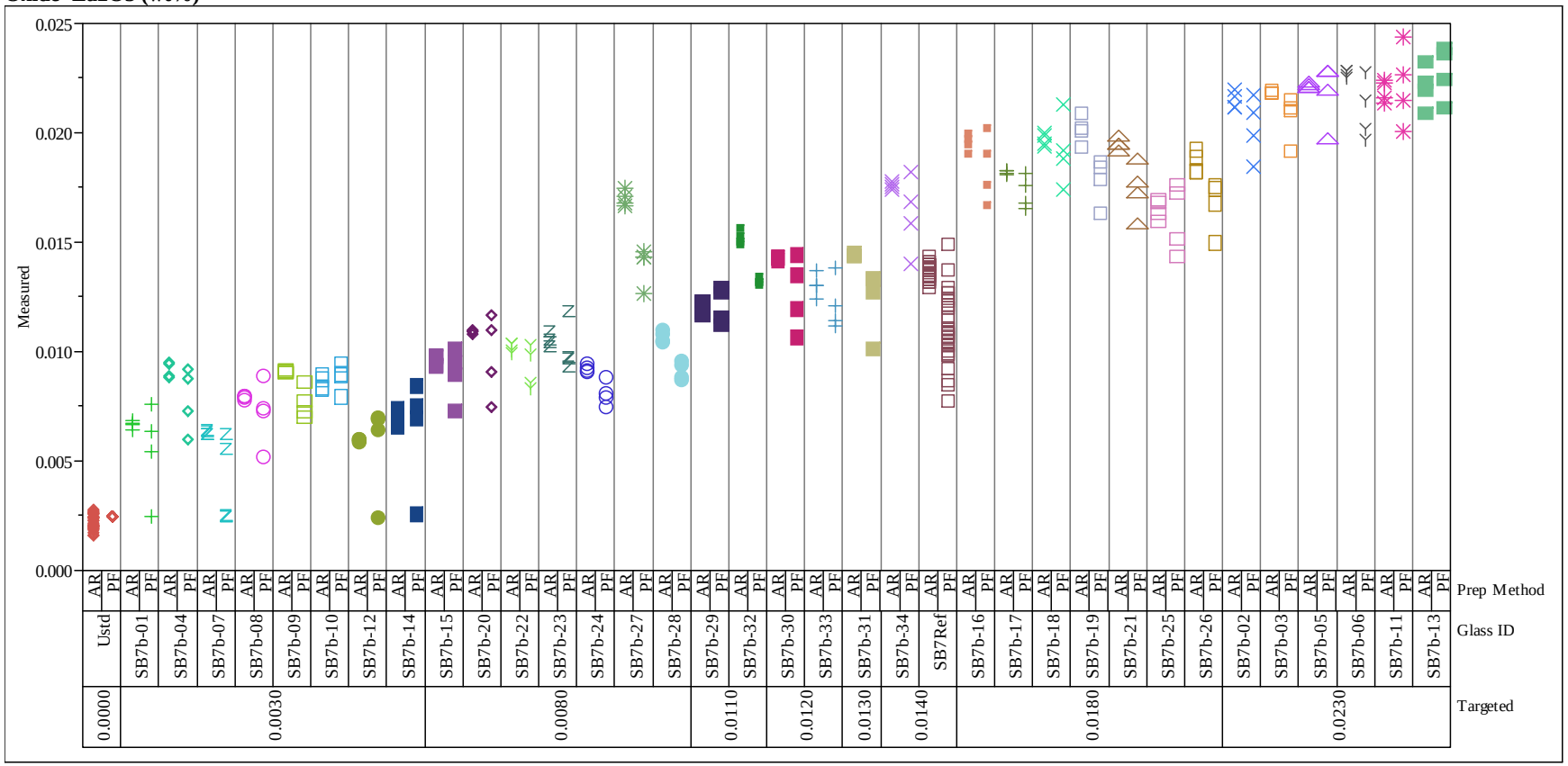


Exhibit A-4. Measurements from by Prep within Glass ID by Target Concentration for Each Oxide

Oxide=Li2O (wt%)

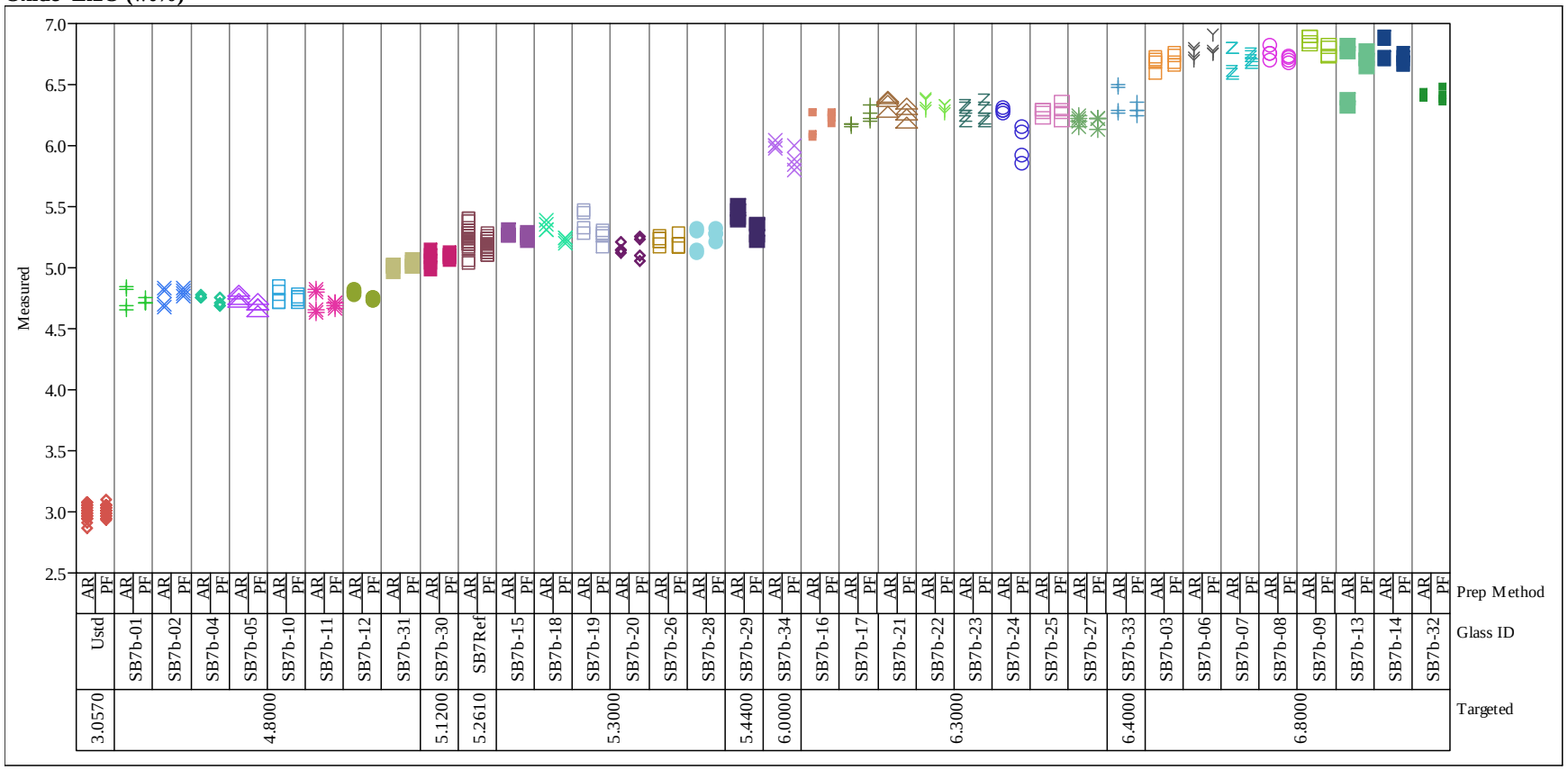


Exhibit A-4. Measurements from by Prep within Glass ID by Target Concentration for Each Oxide

Oxide=MgO (wt%)

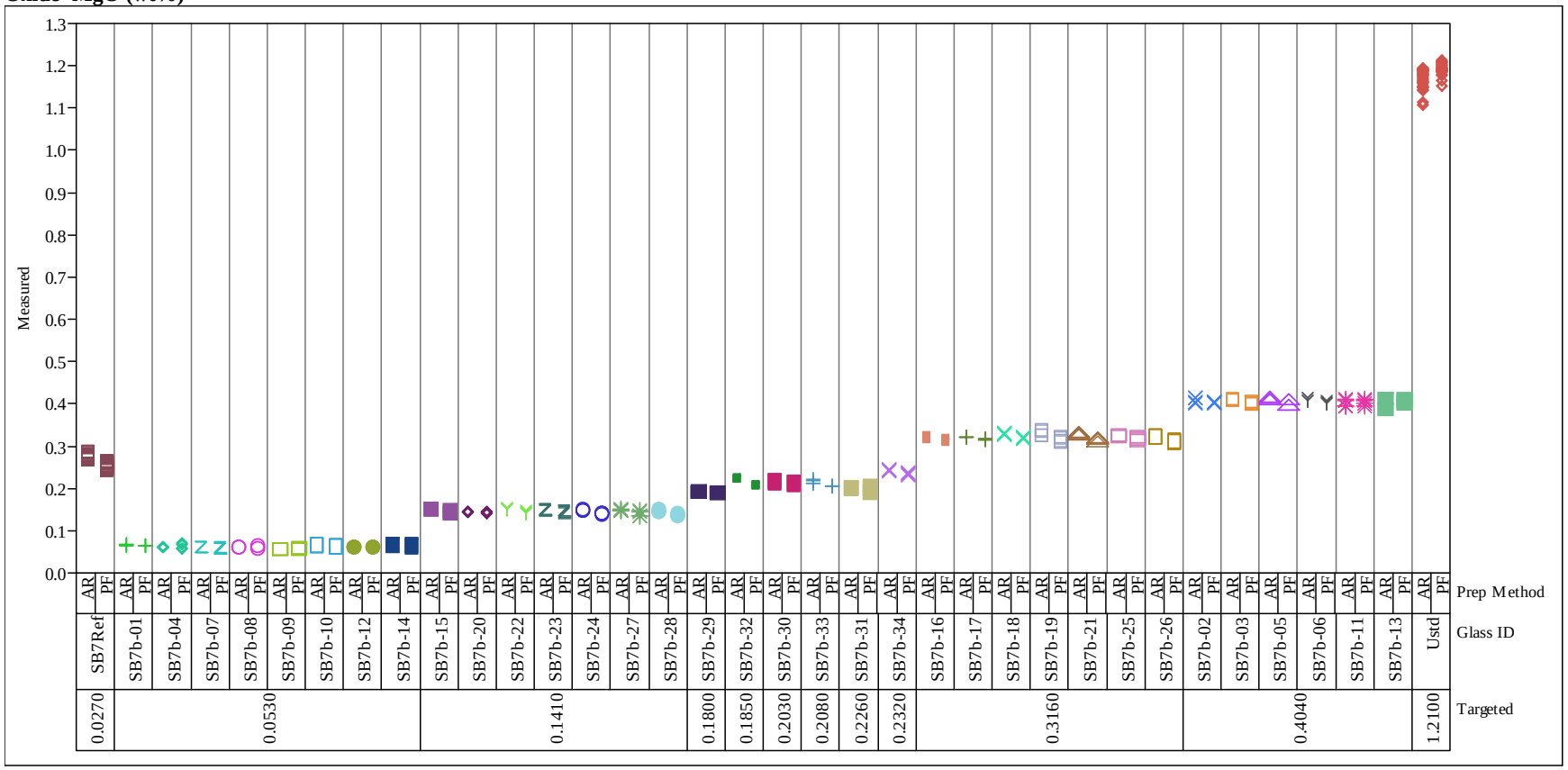


Exhibit A-4. Measurements from by Prep within Glass ID by Target Concentration for Each Oxide

Oxide=MnO (wt%)

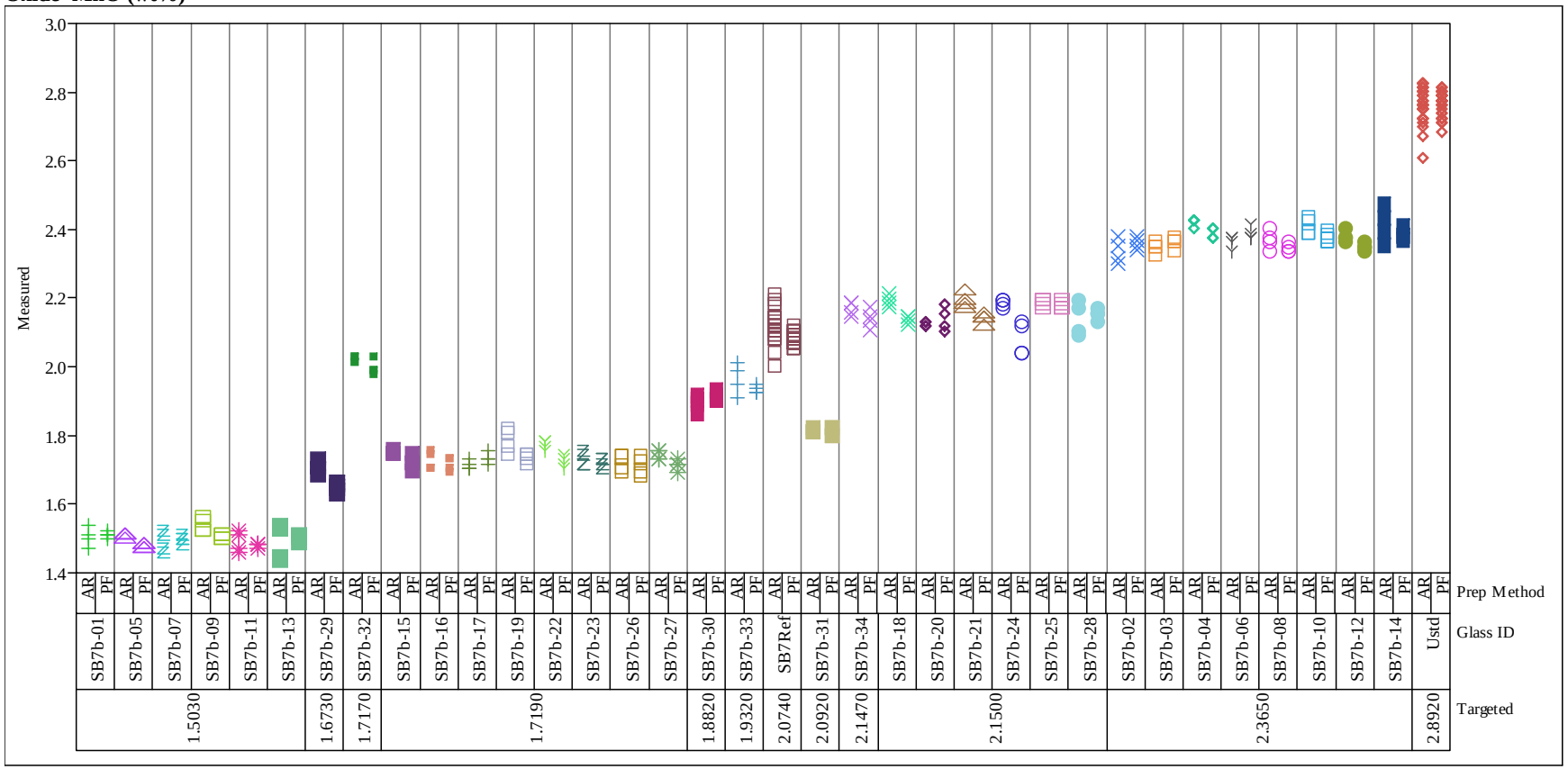


Exhibit A-4. Measurements from by Prep within Glass ID by Target Concentration for Each Oxide

Oxide=Na2O (wt%)

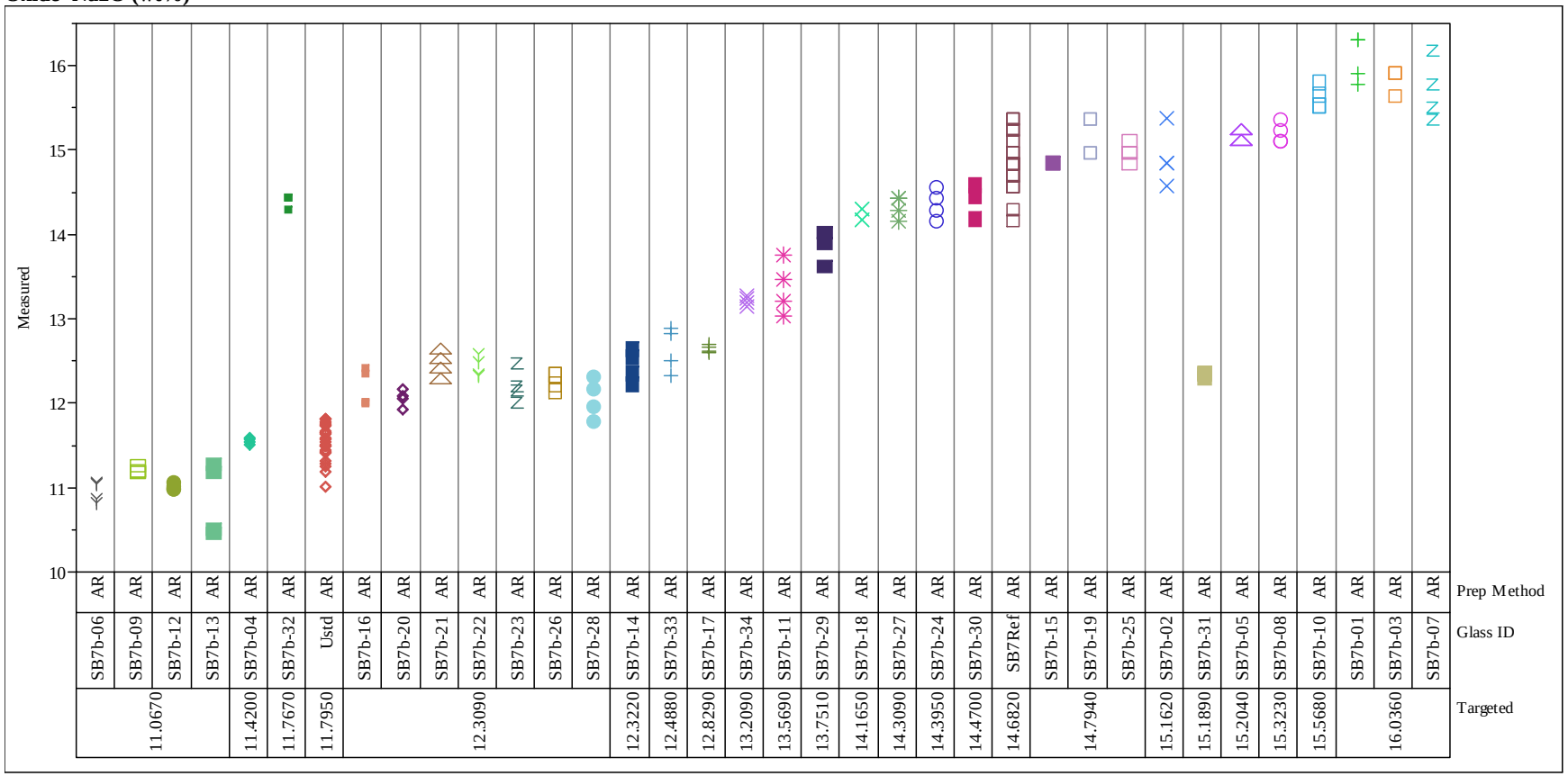


Exhibit A-4. Measurements from by Prep within Glass ID by Target Concentration for Each Oxide

Oxide=NiO (wt%)

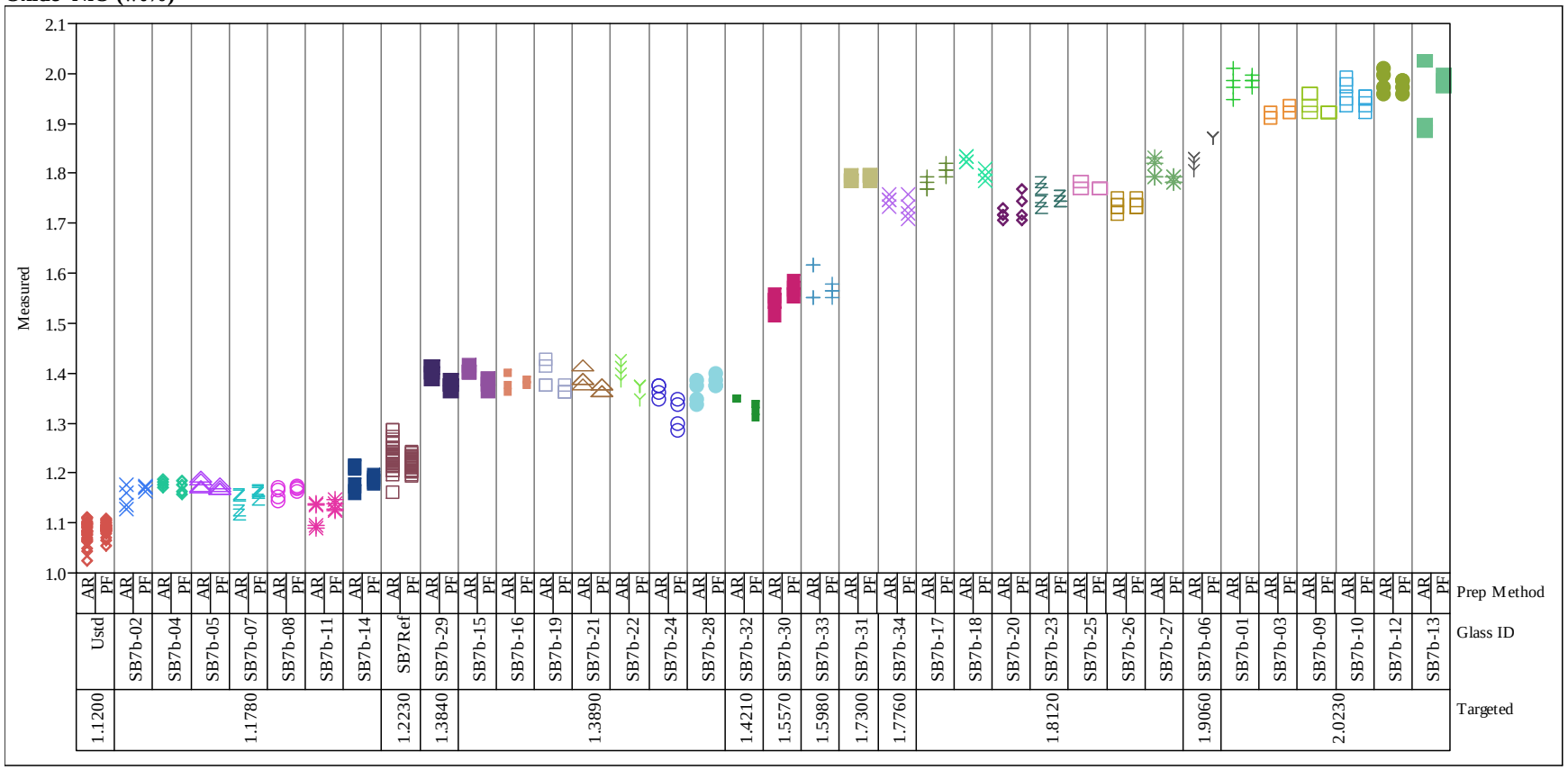


Exhibit A-4. Measurements from by Prep within Glass ID by Target Concentration for Each Oxide

Oxide=PbO (wt%)

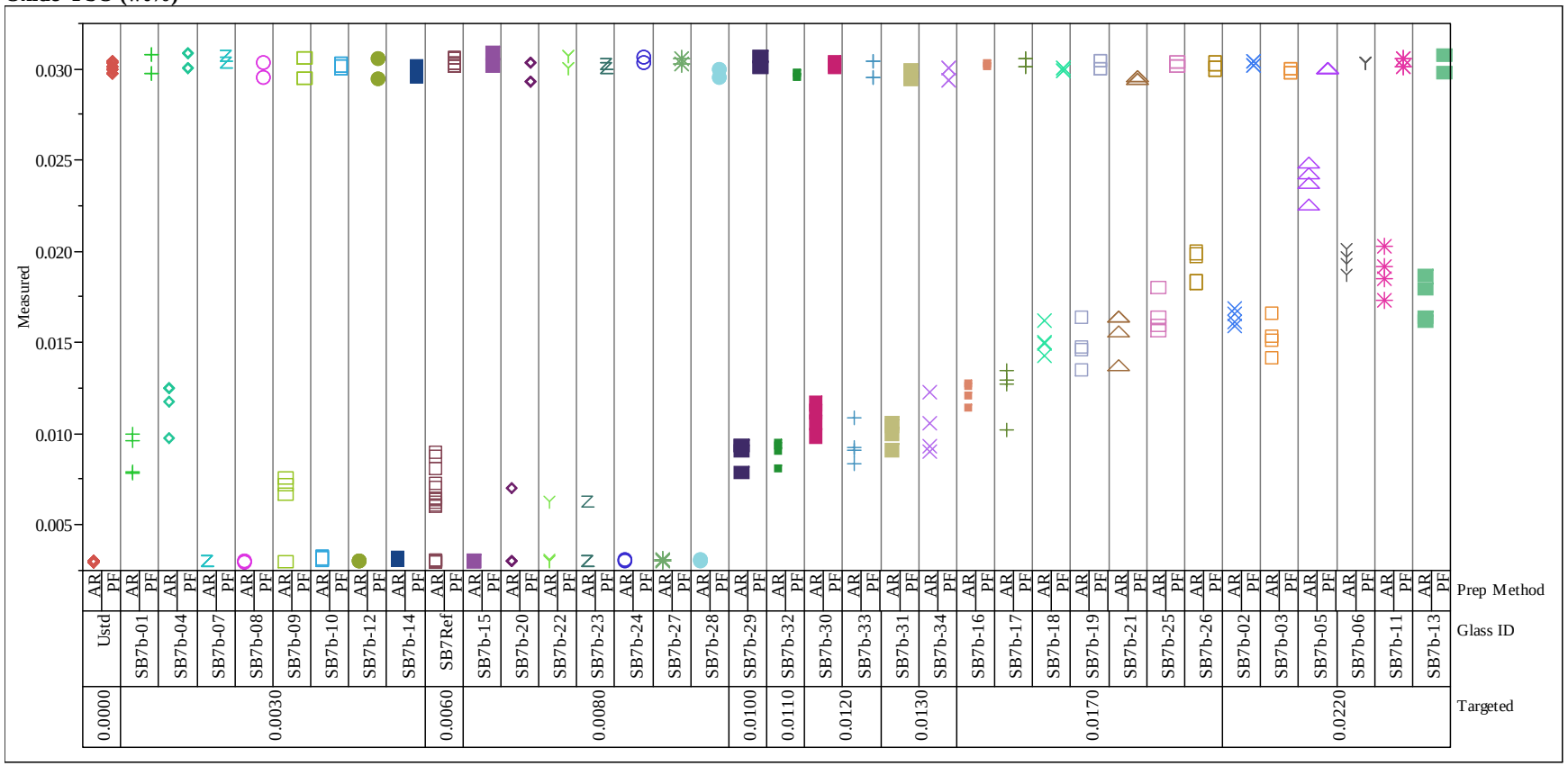


Exhibit A-4. Measurements from by Prep within Glass ID by Target Concentration for Each Oxide

Oxide=SiO2 (wt%)

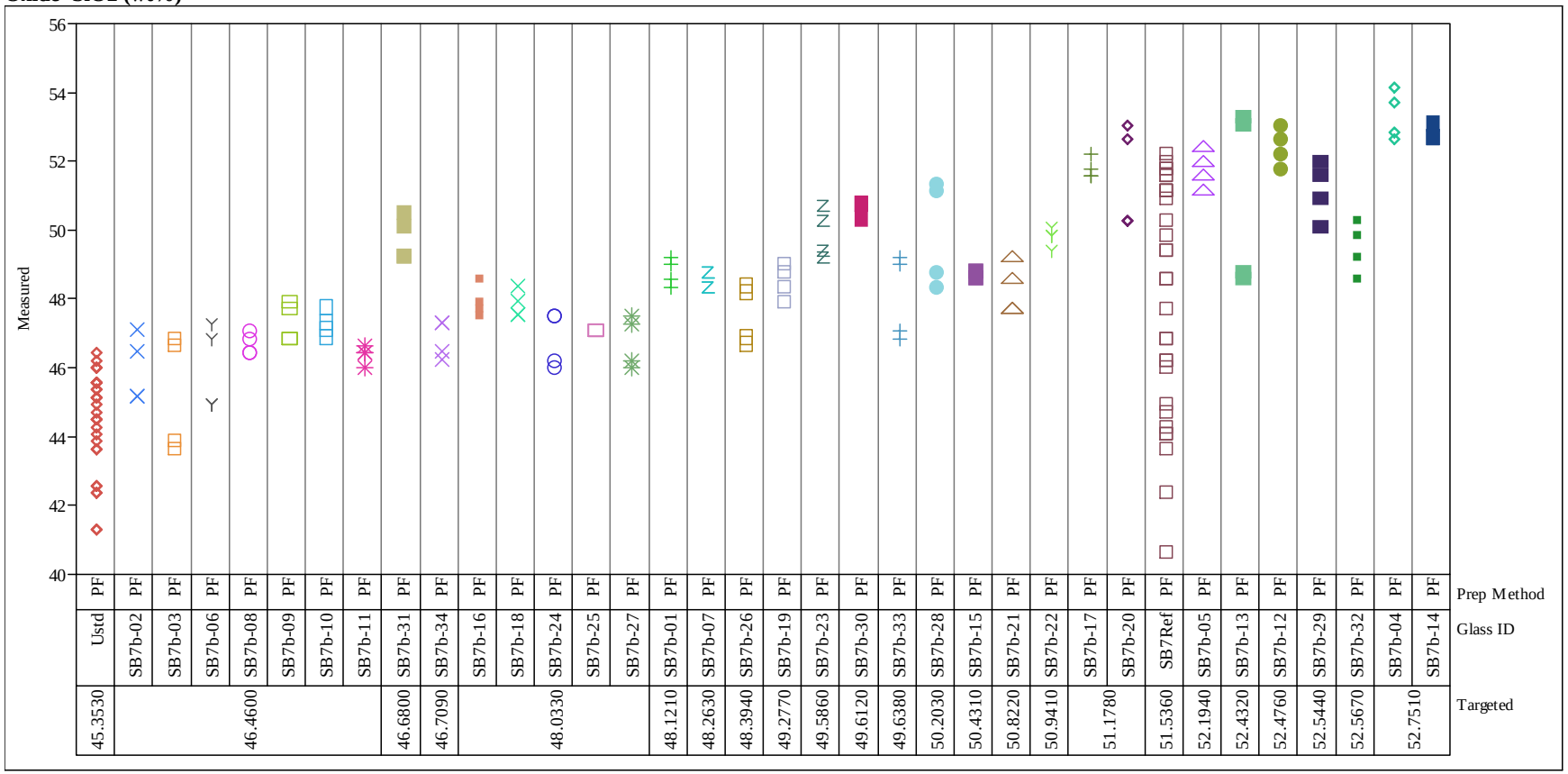


Exhibit A-4. Measurements from by Prep within Glass ID by Target Concentration for Each Oxide

Oxide=SO4 (wt%)

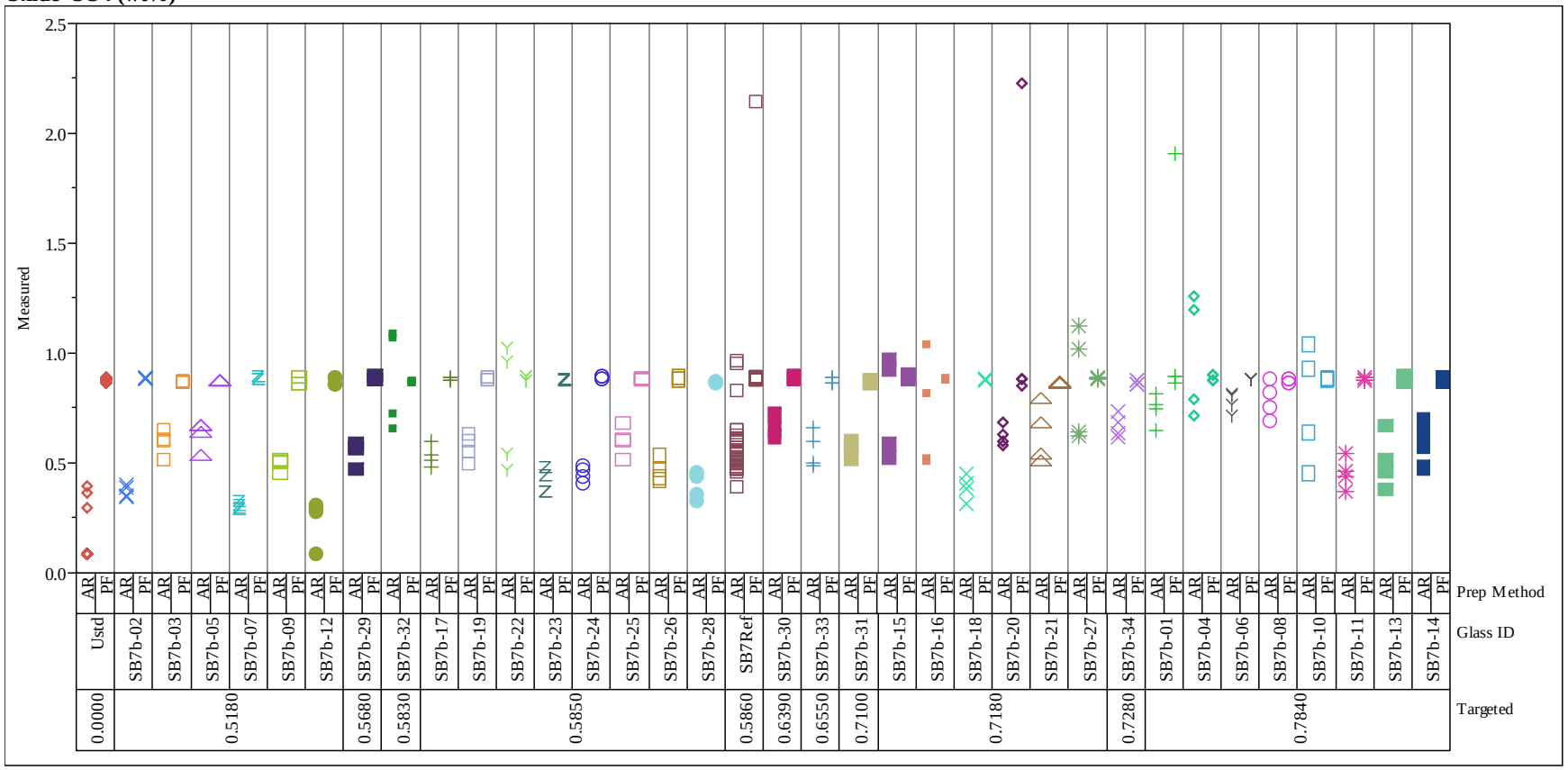


Exhibit A-4. Measurements from by Prep within Glass ID by Target Concentration for Each Oxide

Oxide=ThO2 (wt%)

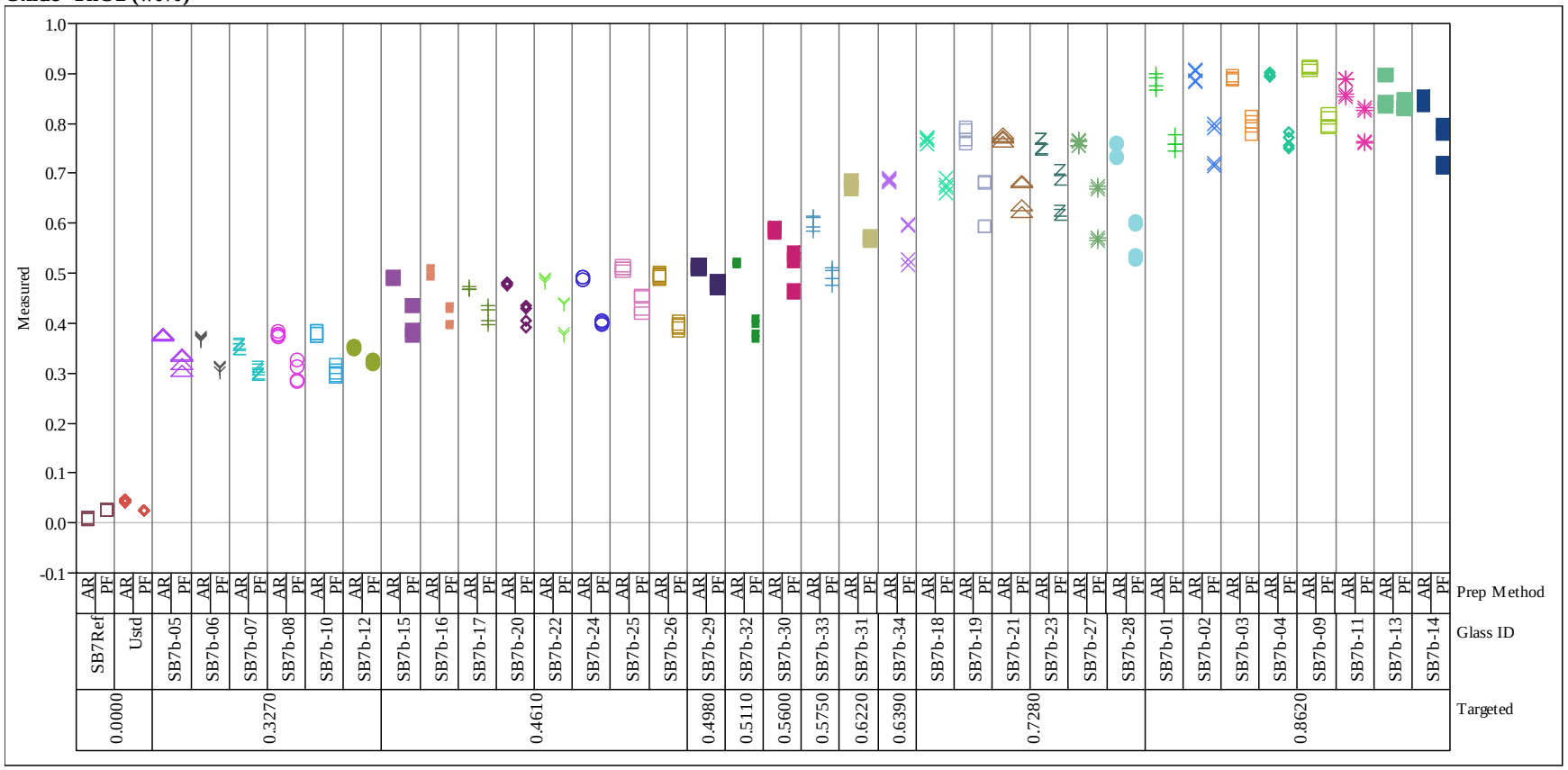


Exhibit A-4. Measurements from by Prep within Glass ID by Target Concentration for Each Oxide

Oxide=TiO2 (wt%)

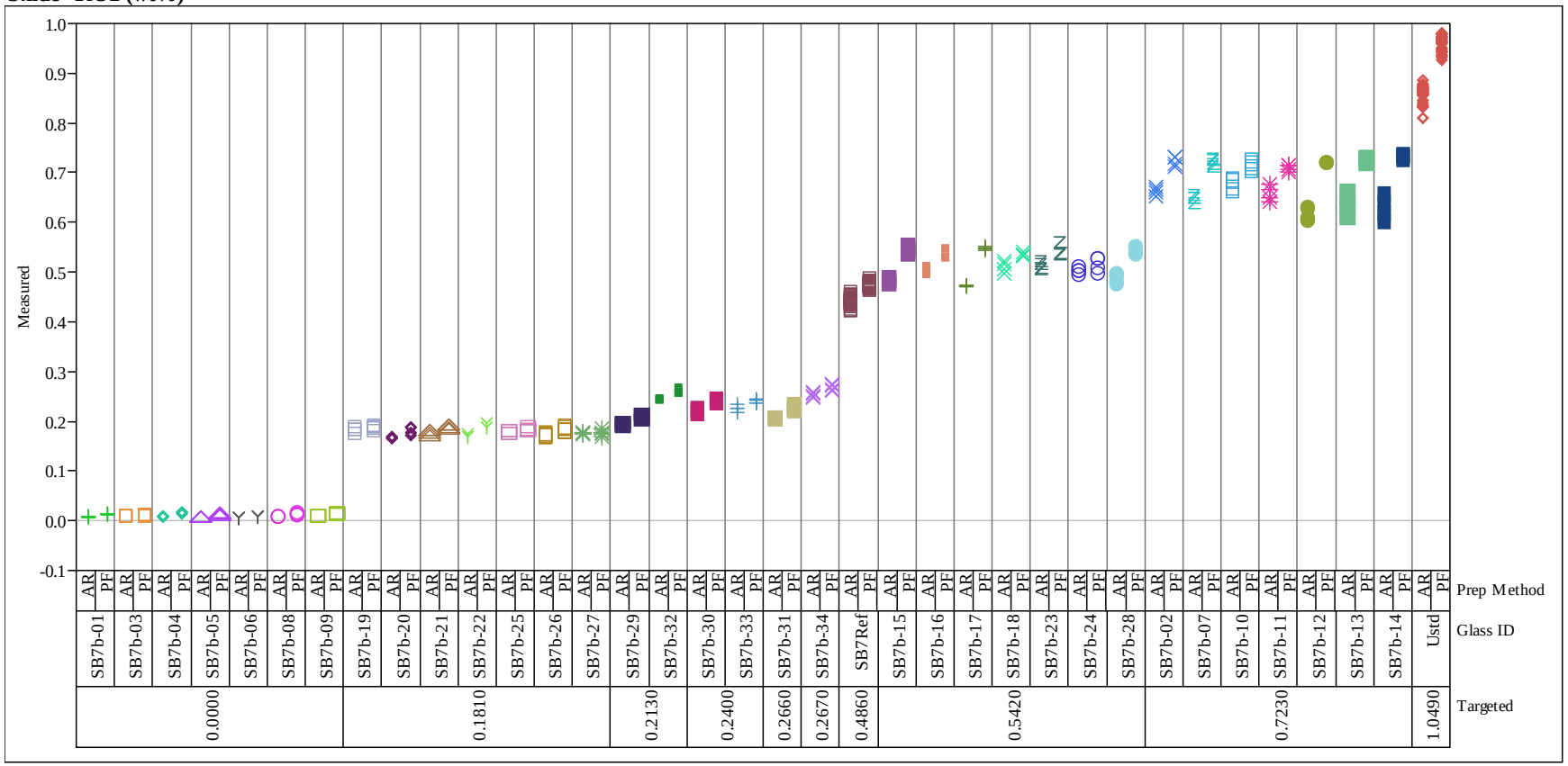


Exhibit A-4. Measurements from by Prep within Glass ID by Target Concentration for Each Oxide

Oxide=U3O8 (wt%)

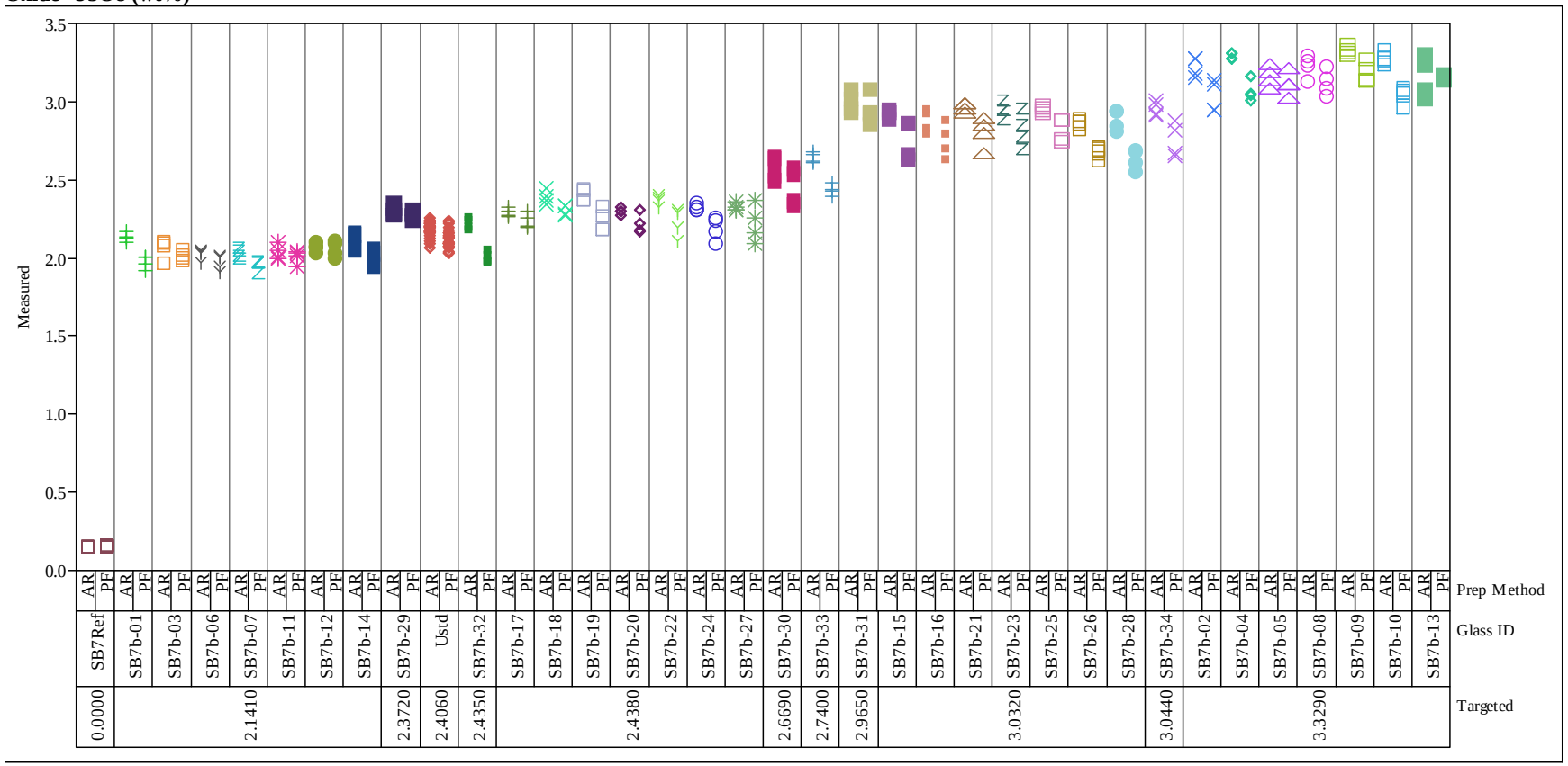


Exhibit A-4. Measurements from by Prep within Glass ID by Target Concentration for Each Oxide

Oxide=ZnO (wt%)

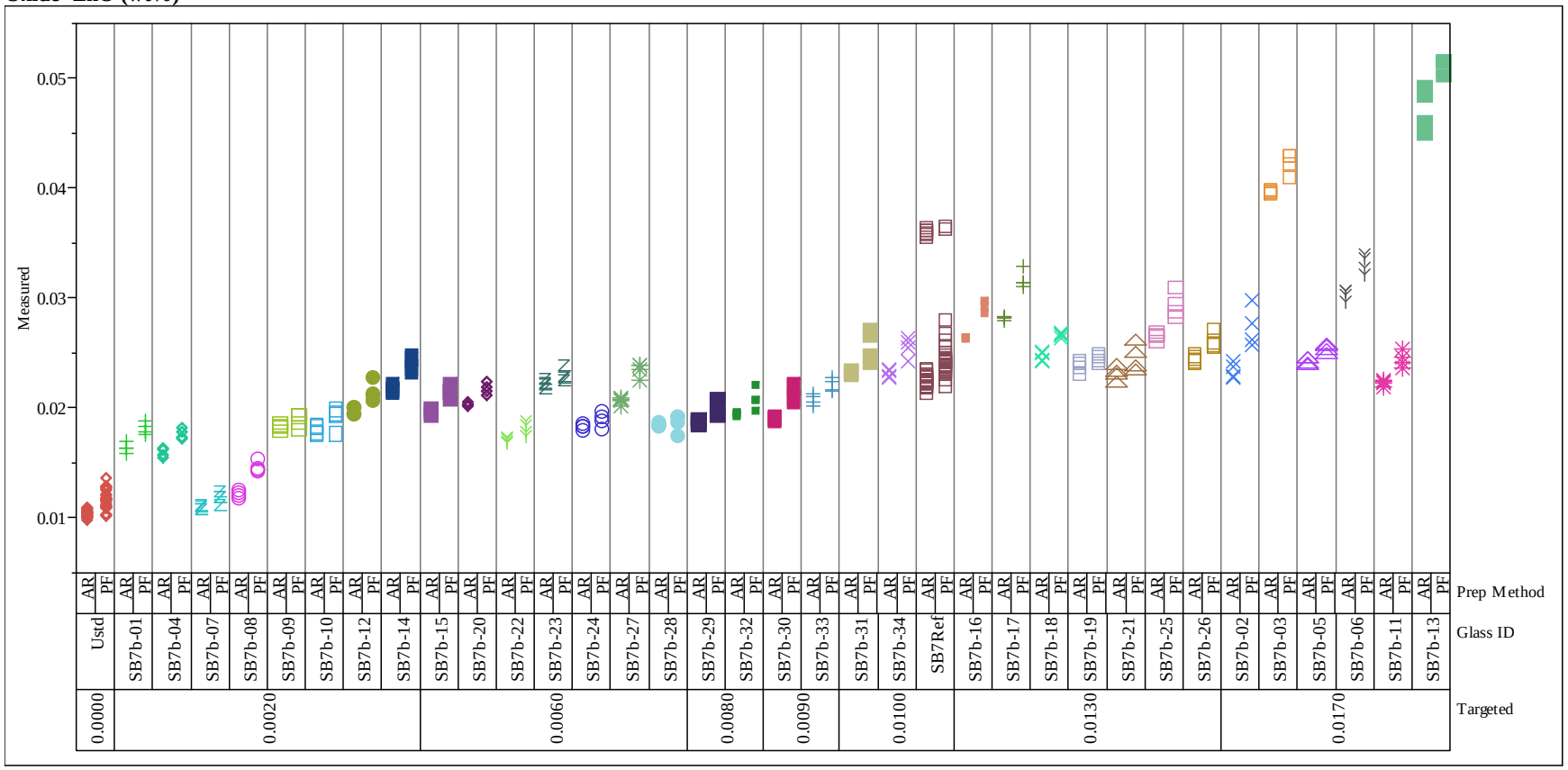


Exhibit A-4. Measurements from by Prep within Glass ID by Target Concentration for Each Oxide

Oxide=ZrO2 (wt%)

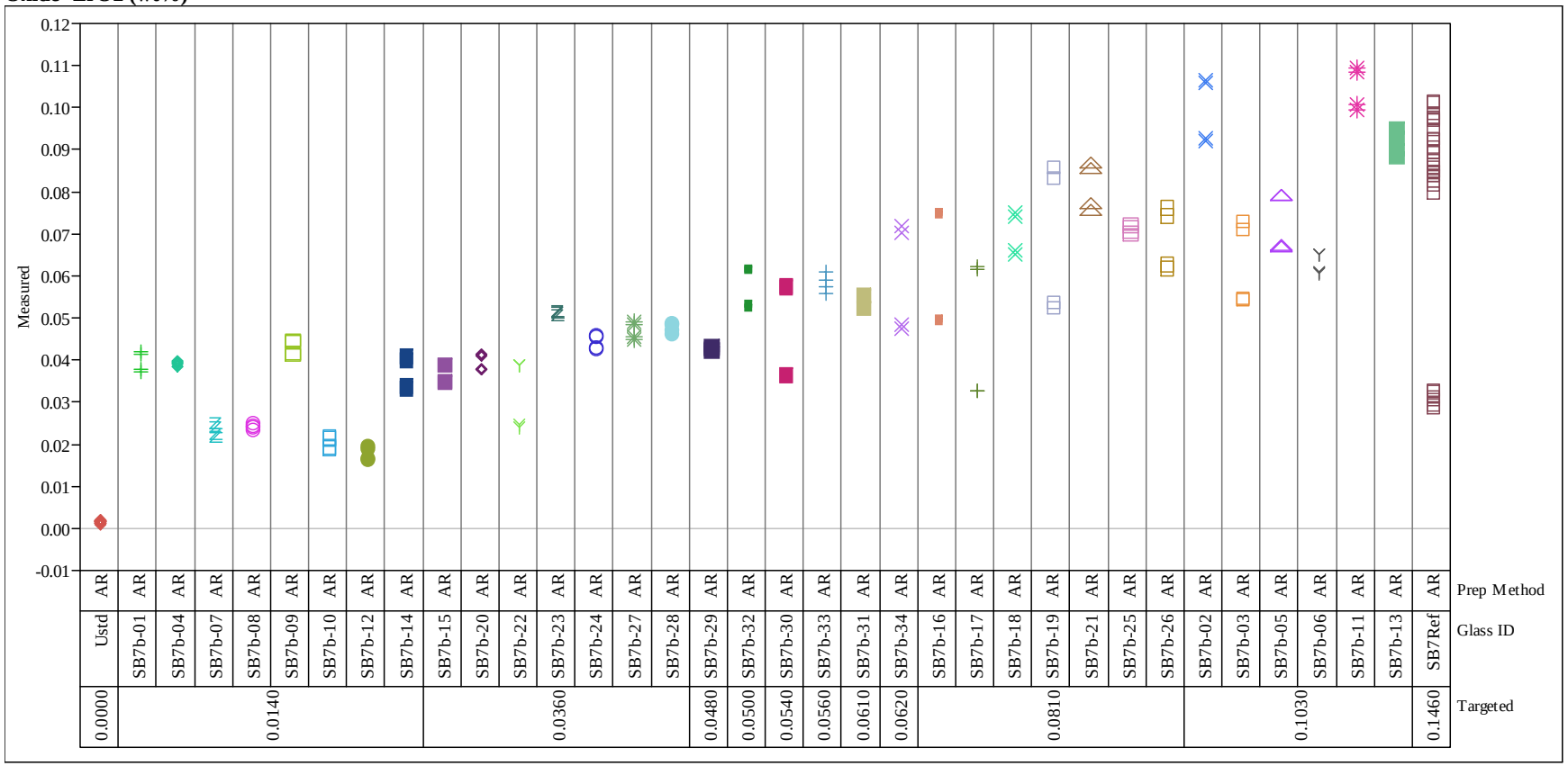
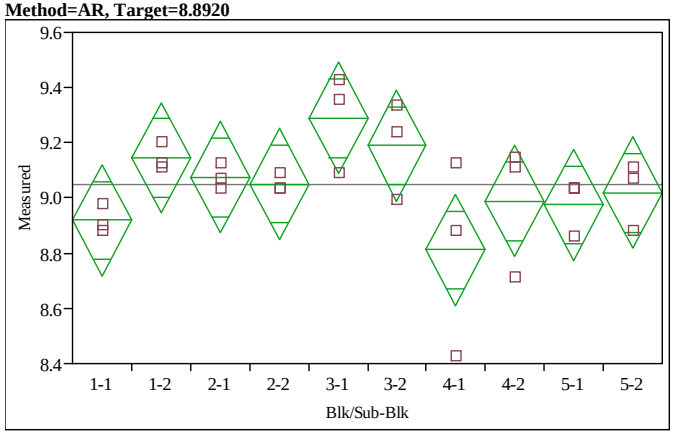


Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=Al2O3 (wt%), Prep Method=AR, Target=8.8920



Oneway Anova
Summary of Fit

Rsquare	0.479251
Adj Rsquare	0.244914
Root Mean Square Error	0.16709
Mean of Response	9.046296
Observations (or Sum Wgts)	30

Analysis of Variance

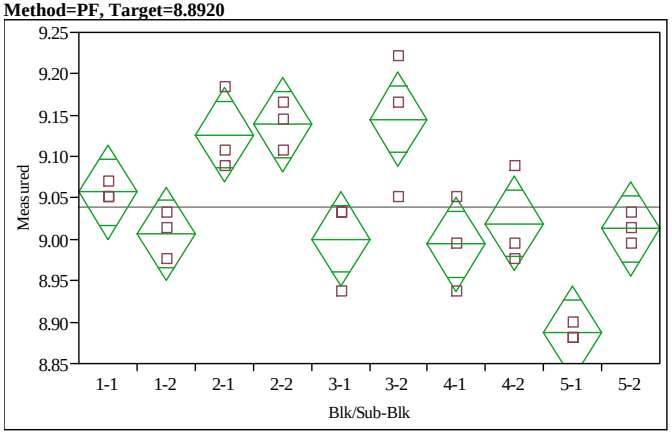
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.5138842	0.057098	2.0451	0.0877
Error	20	0.5583809	0.027919		
C. Total	29	1.0722650			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	8.91844	0.09647	8.7172	9.1197
1-2	3	9.14518	0.09647	8.9439	9.3464
2-1	3	9.07590	0.09647	8.8747	9.2771
2-2	3	9.05071	0.09647	8.8495	9.2519
3-1	3	9.29004	0.09647	9.0888	9.4913
3-2	3	9.18927	0.09647	8.9880	9.3905
4-1	3	8.81137	0.09647	8.6101	9.0126
4-2	3	8.98772	0.09647	8.7865	9.1890
5-1	3	8.97513	0.09647	8.7739	9.1764
5-2	3	9.01921	0.09647	8.8180	9.2204

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=Al2O3 (wt%), Prep Method=PF, Target=8.8920



Oneway Anova
Summary of Fit

Rsquare	0.797043
Adj Rsquare	0.705712
Root Mean Square Error	0.047048
Mean of Response	9.038738
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.17385734	0.019317	8.7270	<.0001
Error	20	0.04427061	0.002214		
C. Total	29	0.21812795			

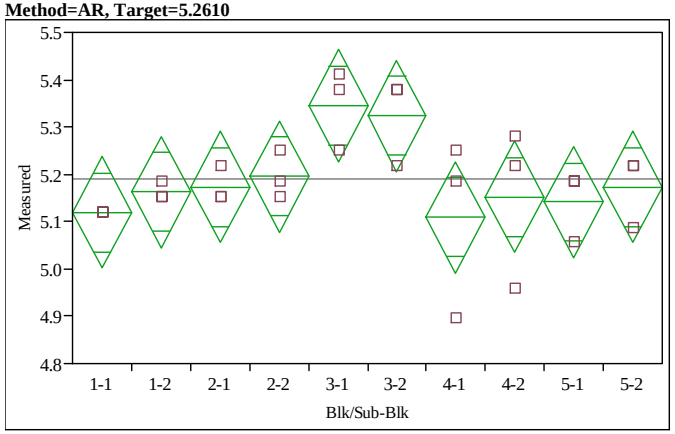
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	9.05700	0.02716	9.0003	9.1137
1-2	3	9.00662	0.02716	8.9500	9.0633
2-1	3	9.12629	0.02716	9.0696	9.1829
2-2	3	9.13888	0.02716	9.0822	9.1955
3-1	3	9.00032	0.02716	8.9437	9.0570
3-2	3	9.14518	0.02716	9.0885	9.2018
4-1	3	8.99402	0.02716	8.9374	9.0507
4-2	3	9.01921	0.02716	8.9626	9.0759
5-1	3	8.88695	0.02716	8.8303	8.9436
5-2	3	9.01292	0.02716	8.9563	9.0696

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=B2O3 (wt%), Prep Method=AR, Target=5.2610



Oneway Anova
Summary of Fit

Rsquare	0.478588
Adj Rsquare	0.243953
Root Mean Square Error	0.097841
Mean of Response	5.189405
Observations (or Sum Wgts)	30

Analysis of Variance

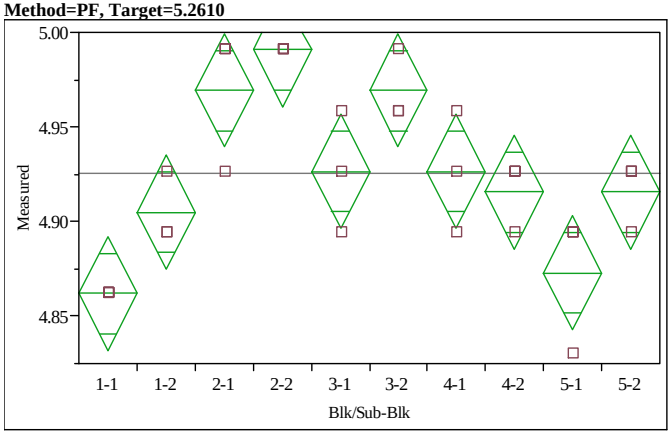
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.17573346	0.019526	2.0397	0.0885
Error	20	0.19145789	0.009573		
C. Total	29	0.36719136			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	5.11964	0.05649	5.0018	5.2375
1-2	3	5.16257	0.05649	5.0447	5.2804
2-1	3	5.17331	0.05649	5.0555	5.2911
2-2	3	5.19477	0.05649	5.0769	5.3126
3-1	3	5.34503	0.05649	5.2272	5.4629
3-2	3	5.32357	0.05649	5.2057	5.4414
4-1	3	5.10891	0.05649	4.9911	5.2267
4-2	3	5.15184	0.05649	5.0340	5.2697
5-1	3	5.14111	0.05649	5.0233	5.2589
5-2	3	5.17331	0.05649	5.0555	5.2911

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=B2O3 (wt%), Prep Method=PF, Target=5.2610



Oneway Anova
Summary of Fit

Rsquare	0.78935
Adj Rsquare	0.694558
Root Mean Square Error	0.024941
Mean of Response	4.925374
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.04662034	0.005180	8.3272	<.0001
Error	20	0.01244131	0.000622		
C. Total	29	0.05906165			

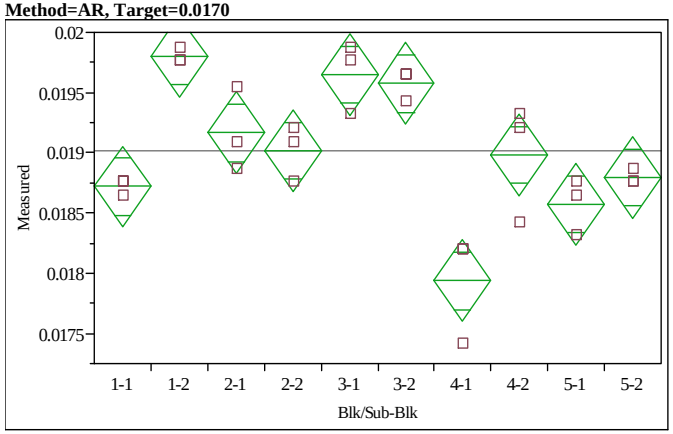
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	4.86205	0.01440	4.8320	4.8921
1-2	3	4.90498	0.01440	4.8749	4.9350
2-1	3	4.96938	0.01440	4.9393	4.9994
2-2	3	4.99085	0.01440	4.9608	5.0209
3-1	3	4.92645	0.01440	4.8964	4.9565
3-2	3	4.96938	0.01440	4.9393	4.9994
4-1	3	4.92645	0.01440	4.8964	4.9565
4-2	3	4.91571	0.01440	4.8857	4.9458
5-1	3	4.87278	0.01440	4.8427	4.9028
5-2	3	4.91571	0.01440	4.8857	4.9458

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=BaO (wt%), Prep Method=AR, Target=0.0170



Oneway Anova
Summary of Fit

Rsquare	0.845452
Adj Rsquare	0.775905
Root Mean Square Error	0.000279
Mean of Response	0.019021
Observations (or Sum Wgts)	30

Analysis of Variance

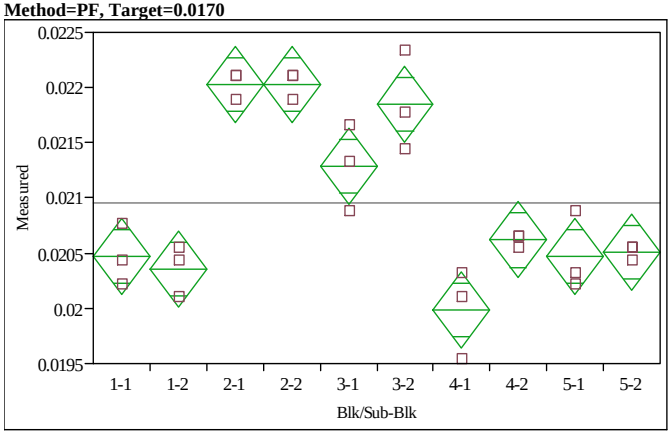
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.00000855	9.4966e-7	12.1566	<.0001
Error	20	0.00000156	7.8119e-8		
C. Total	29	0.00001011			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.018720	0.00016	0.01838	0.01906
1-2	3	0.019799	0.00016	0.01946	0.02014
2-1	3	0.019167	0.00016	0.01883	0.01950
2-2	3	0.019018	0.00016	0.01868	0.01935
3-1	3	0.019650	0.00016	0.01931	0.01999
3-2	3	0.019576	0.00016	0.01924	0.01991
4-1	3	0.017938	0.00016	0.01760	0.01828
4-2	3	0.018981	0.00016	0.01864	0.01932
5-1	3	0.018571	0.00016	0.01823	0.01891
5-2	3	0.018794	0.00016	0.01846	0.01913

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=BaO (wt%), Prep Method=PF, Target=0.0170



Oneway Anova
Summary of Fit

Rsquare	0.906374
Adj Rsquare	0.864242
Root Mean Square Error	0.000287
Mean of Response	0.02096
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.00001593	1.7699e-6	21.5129	<.0001
Error	20	0.00000165	8.2274e-8		
C. Total	29	0.00001758			

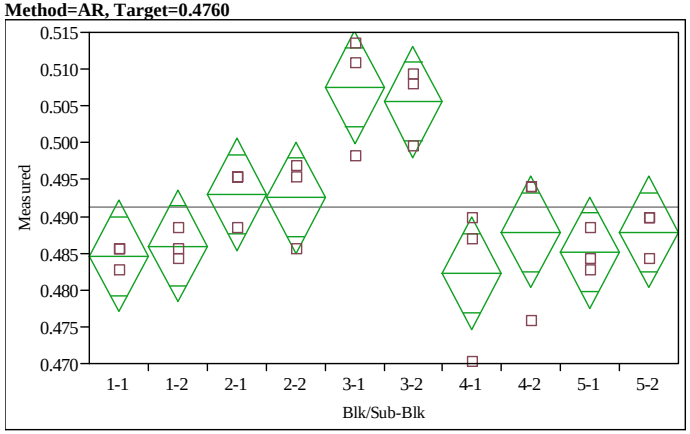
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.020469	0.00017	0.02012	0.02081
1-2	3	0.020358	0.00017	0.02001	0.02070
2-1	3	0.022032	0.00017	0.02169	0.02238
2-2	3	0.022032	0.00017	0.02169	0.02238
3-1	3	0.021288	0.00017	0.02094	0.02163
3-2	3	0.021846	0.00017	0.02150	0.02219
4-1	3	0.019985	0.00017	0.01964	0.02033
4-2	3	0.020618	0.00017	0.02027	0.02096
5-1	3	0.020469	0.00017	0.02012	0.02081
5-2	3	0.020506	0.00017	0.02016	0.02085

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=CaO (wt%), Prep Method=AR, Target=0.4760



Oneway Anova
Summary of Fit

Rsquare	0.721511
Adj Rsquare	0.596191
Root Mean Square Error	0.006304
Mean of Response	0.491212
Observations (or Sum Wgts)	30

Analysis of Variance

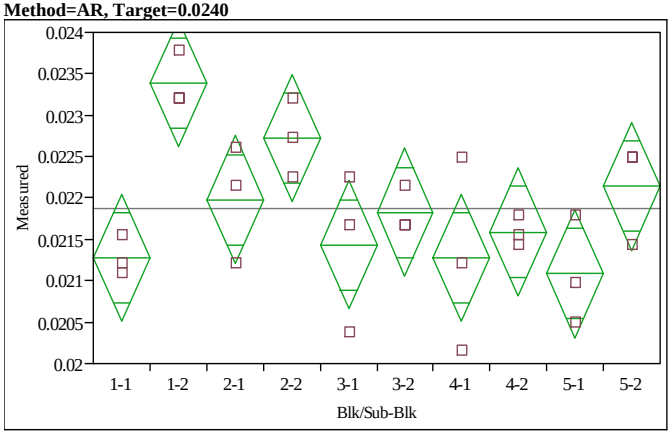
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.00205930	0.000229	5.7573	0.0006
Error	20	0.00079485	0.000040		
C. Total	29	0.00285415			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.484590	0.00364	0.47700	0.49218
1-2	3	0.485989	0.00364	0.47840	0.49358
2-1	3	0.492985	0.00364	0.48539	0.50058
2-2	3	0.492518	0.00364	0.48493	0.50011
3-1	3	0.507443	0.00364	0.49985	0.51504
3-2	3	0.505578	0.00364	0.49799	0.51317
4-1	3	0.482258	0.00364	0.47467	0.48985
4-2	3	0.487854	0.00364	0.48026	0.49545
5-1	3	0.485056	0.00364	0.47746	0.49265
5-2	3	0.487854	0.00364	0.48026	0.49545

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=Ce2O3 (wt%), Prep Method=AR, Target=0.0240



Oneway Anova
Summary of Fit

Rsquare	0.632196
Adj Rsquare	0.466684
Root Mean Square Error	0.00064
Mean of Response	0.021872
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.00001410	1.5669e-6	3.8196	0.0060
Error	20	0.00000820	4.1021e-7		
C. Total	29	0.00002231			

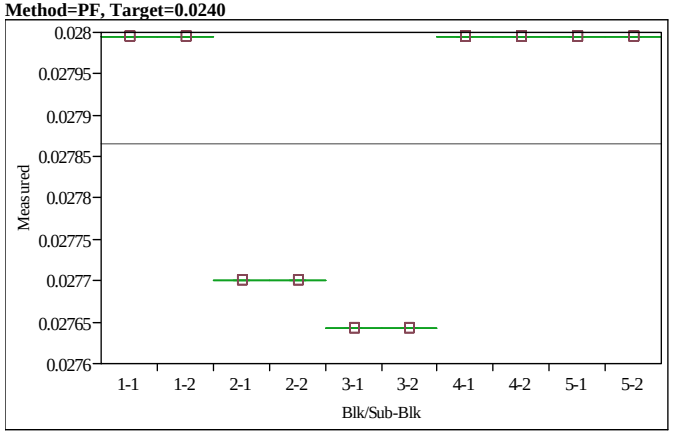
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.021279	0.00037	0.02051	0.02205
1-2	3	0.023387	0.00037	0.02262	0.02416
2-1	3	0.021981	0.00037	0.02121	0.02275
2-2	3	0.022723	0.00037	0.02195	0.02349
3-1	3	0.021435	0.00037	0.02066	0.02221
3-2	3	0.021825	0.00037	0.02105	0.02260
4-1	3	0.021279	0.00037	0.02051	0.02205
4-2	3	0.021591	0.00037	0.02082	0.02236
5-1	3	0.021083	0.00037	0.02031	0.02185
5-2	3	0.022138	0.00037	0.02137	0.02291

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=Ce2O3 (wt%), Prep Method=PF, Target=0.0240



Oneway Anova
Summary of Fit

Rsquare	1
Adj Rsquare	1
Root Mean Square Error	3.99e-12
Mean of Response	0.027865
Observations (or Sum Wgts)	30

Analysis of Variance

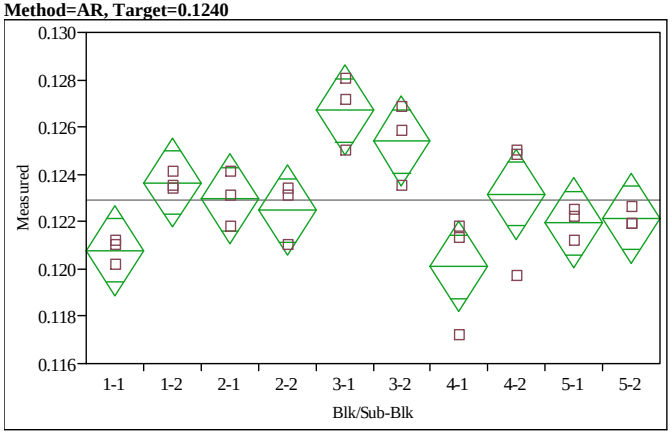
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	7.57313e-7	8.4146e-8	5.3e+15	<.0001
Error	20	3.1764e-22	1.588e-23		
C. Total	29	7.57313e-7			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.027994	2.301e-12	0.02799	0.02799
1-2	3	0.027994	2.301e-12	0.02799	0.02799
2-1	3	0.027701	2.301e-12	0.02770	0.02770
2-2	3	0.027701	2.301e-12	0.02770	0.02770
3-1	3	0.027643	2.301e-12	0.02764	0.02764
3-2	3	0.027643	2.301e-12	0.02764	0.02764
4-1	3	0.027994	2.301e-12	0.02799	0.02799
4-2	3	0.027994	2.301e-12	0.02799	0.02799
5-1	3	0.027994	2.301e-12	0.02799	0.02799
5-2	3	0.027994	2.301e-12	0.02799	0.02799

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=Cr2O3 (wt%), Prep Method=AR, Target=0.1240



Oneway Anova
Summary of Fit

Rsquare	0.68247
Adj Rsquare	0.539582
Root Mean Square Error	0.001575
Mean of Response	0.122935
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.00010662	0.000012	4.7762	0.0017
Error	20	0.00004960	2.48e-6		
C. Total	29	0.00015622			

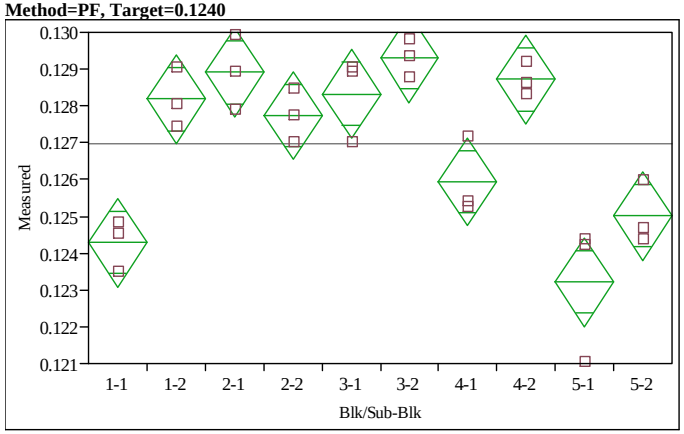
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.120777	0.00091	0.11888	0.12267
1-2	3	0.123651	0.00091	0.12175	0.12555
2-1	3	0.122969	0.00091	0.12107	0.12487
2-2	3	0.122482	0.00091	0.12059	0.12438
3-1	3	0.126721	0.00091	0.12482	0.12862
3-2	3	0.125405	0.00091	0.12351	0.12730
4-1	3	0.120095	0.00091	0.11820	0.12199
4-2	3	0.123164	0.00091	0.12127	0.12506
5-1	3	0.121946	0.00091	0.12005	0.12384
5-2	3	0.122141	0.00091	0.12024	0.12404

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=Cr2O3 (wt%), Prep Method=PF, Target=0.1240



Oneway Anova
Summary of Fit

Rsquare	0.864724
Adj Rsquare	0.803849
Root Mean Square Error	0.000997
Mean of Response	0.126964
Observations (or Sum Wgts)	30

Analysis of Variance

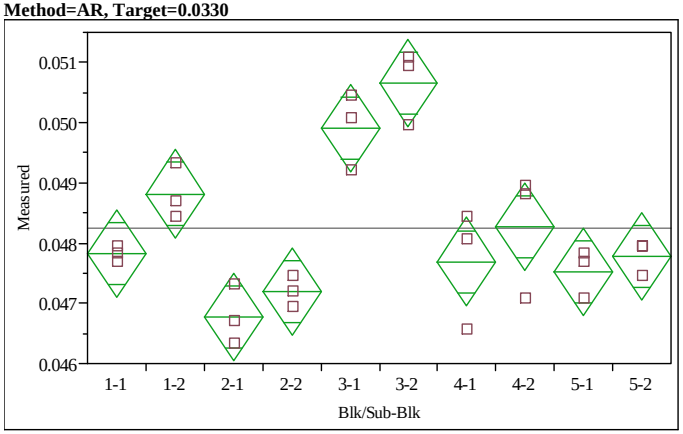
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.00012718	0.000014	14.2050	<.0001
Error	20	0.00001990	0.000001		
C. Total	29	0.00014708			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.124285	0.00058	0.12308	0.12549
1-2	3	0.128182	0.00058	0.12698	0.12938
2-1	3	0.128913	0.00058	0.12771	0.13011
2-2	3	0.127744	0.00058	0.12654	0.12895
3-1	3	0.128328	0.00058	0.12713	0.12953
3-2	3	0.129303	0.00058	0.12810	0.13050
4-1	3	0.125941	0.00058	0.12474	0.12714
4-2	3	0.128718	0.00058	0.12752	0.12992
5-1	3	0.123213	0.00058	0.12201	0.12441
5-2	3	0.125016	0.00058	0.12381	0.12622

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=CuO (wt%), Prep Method=AR, Target=0.0330



Oneway Anova
Summary of Fit

Rsquare	0.845606
Adj Rsquare	0.776128
Root Mean Square Error	0.000606
Mean of Response	0.048244
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.00004017	4.4628e-6	12.1709	<.0001
Error	20	0.00000733	3.6668e-7		
C. Total	29	0.00004750			

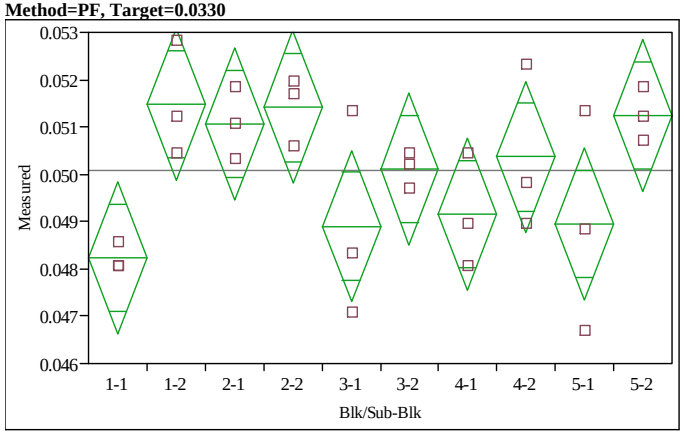
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.047819	0.00035	0.04709	0.04855
1-2	3	0.048820	0.00035	0.04809	0.04955
2-1	3	0.046776	0.00035	0.04605	0.04750
2-2	3	0.047193	0.00035	0.04646	0.04792
3-1	3	0.049905	0.00035	0.04918	0.05063
3-2	3	0.050656	0.00035	0.04993	0.05139
4-1	3	0.047694	0.00035	0.04696	0.04842
4-2	3	0.048278	0.00035	0.04755	0.04901
5-1	3	0.047527	0.00035	0.04680	0.04826
5-2	3	0.047777	0.00035	0.04705	0.04851

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=CuO (wt%), Prep Method=PF, Target=0.0330



Oneway Anova
Summary of Fit

Rsquare	0.524424
Adj Rsquare	0.310415
Root Mean Square Error	0.001335
Mean of Response	0.050093
Observations (or Sum Wgts)	30

Analysis of Variance

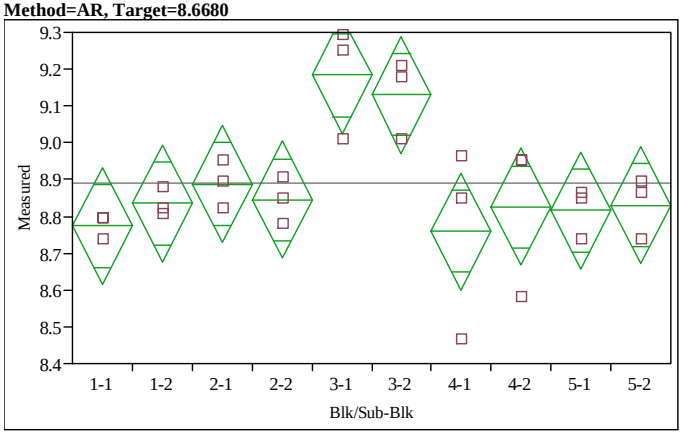
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.00003928	4.3647e-6	2.4505	0.0456
Error	20	0.00003562	1.7812e-6		
C. Total	29	0.00007491			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.048236	0.00077	0.04663	0.04984
1-2	3	0.051491	0.00077	0.04988	0.05310
2-1	3	0.051073	0.00077	0.04947	0.05268
2-2	3	0.051407	0.00077	0.04980	0.05301
3-1	3	0.048904	0.00077	0.04730	0.05051
3-2	3	0.050114	0.00077	0.04851	0.05172
4-1	3	0.049154	0.00077	0.04755	0.05076
4-2	3	0.050364	0.00077	0.04876	0.05197
5-1	3	0.048945	0.00077	0.04734	0.05055
5-2	3	0.051240	0.00077	0.04963	0.05285

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=Fe2O3 (wt%), Prep Method=AR, Target=8.6680



Oneway Anova
Summary of Fit

Rsquare	0.625542
Adj Rsquare	0.457035
Root Mean Square Error	0.131579
Mean of Response	8.888921
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.57843666	0.064271	3.7123	0.0070
Error	20	0.34626073	0.017313		
C. Total	29	0.92469739			

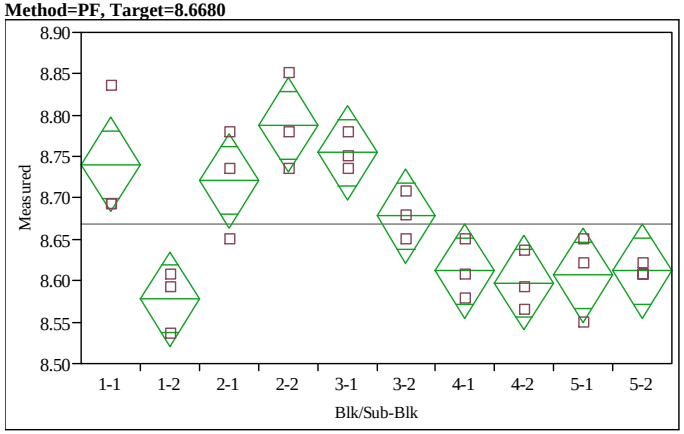
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	8.77359	0.07597	8.6151	8.9321
1-2	3	8.83555	0.07597	8.6771	8.9940
2-1	3	8.88797	0.07597	8.7295	9.0464
2-2	3	8.84508	0.07597	8.6866	9.0035
3-1	3	9.18344	0.07597	9.0250	9.3419
3-2	3	9.13102	0.07597	8.9726	9.2895
4-1	3	8.75930	0.07597	8.6008	8.9178
4-2	3	8.82601	0.07597	8.6675	8.9845
5-1	3	8.81648	0.07597	8.6580	8.9749
5-2	3	8.83078	0.07597	8.6723	8.9892

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=Fe2O3 (wt%), Prep Method=PF, Target=8.6680



Oneway Anova
Summary of Fit

Rsquare	0.780147
Adj Rsquare	0.681213
Root Mean Square Error	0.047418
Mean of Response	8.668748
Observations (or Sum Wgts)	30

Analysis of Variance

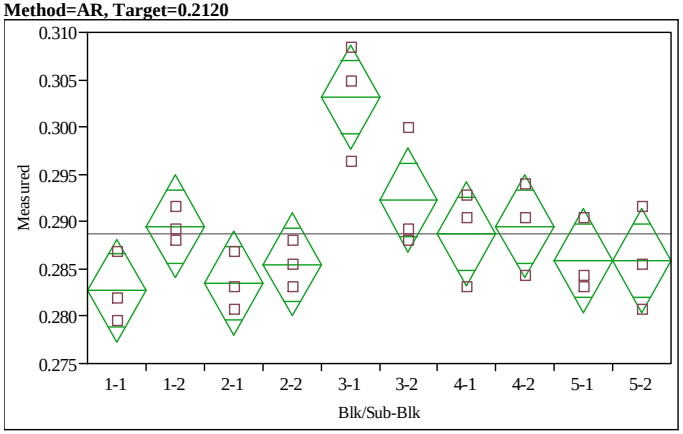
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.15957155	0.017730	7.8855	<.0001
Error	20	0.04496893	0.002248		
C. Total	29	0.20454048			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	8.74023	0.02738	8.6831	8.7973
1-2	3	8.57820	0.02738	8.5211	8.6353
2-1	3	8.72117	0.02738	8.6641	8.7783
2-2	3	8.78789	0.02738	8.7308	8.8450
3-1	3	8.75453	0.02738	8.6974	8.8116
3-2	3	8.67828	0.02738	8.6212	8.7354
4-1	3	8.61156	0.02738	8.5545	8.6687
4-2	3	8.59726	0.02738	8.5402	8.6544
5-1	3	8.60679	0.02738	8.5497	8.6639
5-2	3	8.61156	0.02738	8.5545	8.6687

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=K2O (wt%), Prep Method=AR, Target=0.2120



Oneway Anova
Summary of Fit

Rsquare	0.693451
Adj Rsquare	0.555504
Root Mean Square Error	0.004555
Mean of Response	0.288662
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.00093879	0.000104	5.0269	0.0013
Error	20	0.00041500	0.000021		
C. Total	29	0.00135379			

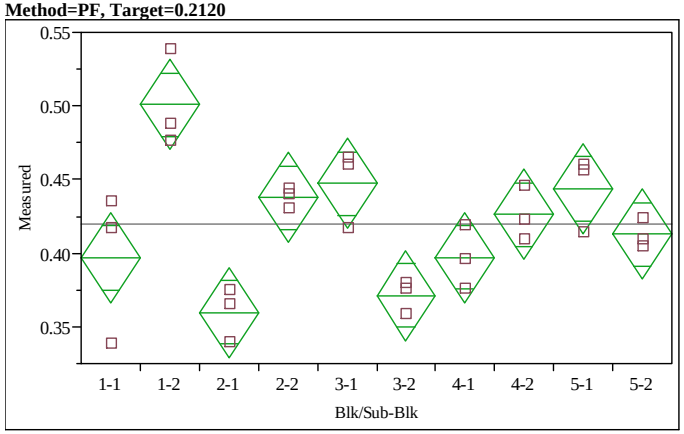
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.282679	0.00263	0.27719	0.28817
1-2	3	0.289506	0.00263	0.28402	0.29499
2-1	3	0.283483	0.00263	0.27800	0.28897
2-2	3	0.285490	0.00263	0.28000	0.29098
3-1	3	0.303158	0.00263	0.29767	0.30864
3-2	3	0.292316	0.00263	0.28683	0.29780
4-1	3	0.288702	0.00263	0.28322	0.29419
4-2	3	0.289506	0.00263	0.28402	0.29499
5-1	3	0.285892	0.00263	0.28041	0.29138
5-2	3	0.285892	0.00263	0.28041	0.29138

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=K2O (wt%), Prep Method=PF, Target=0.2120



Oneway Anova
Summary of Fit

Rsquare	0.779543
Adj Rsquare	0.680337
Root Mean Square Error	0.025452
Mean of Response	0.419321
Observations (or Sum Wgts)	30

Analysis of Variance

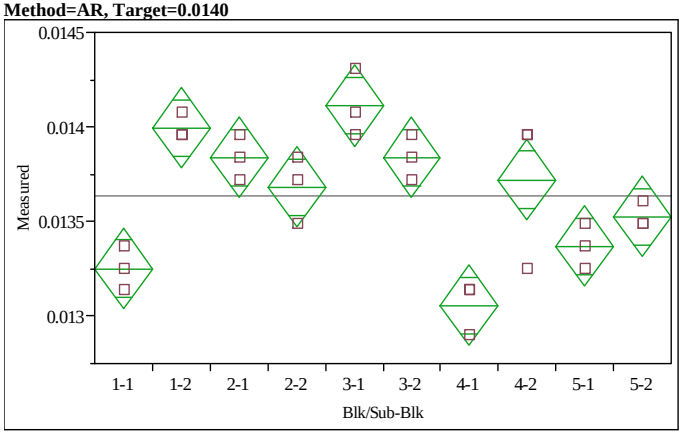
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.04581295	0.005090	7.8578	<.0001
Error	20	0.01295604	0.000648		
C. Total	29	0.05876899			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.396715	0.01469	0.36606	0.42737
1-2	3	0.500712	0.01469	0.47006	0.53136
2-1	3	0.359774	0.01469	0.32912	0.39043
2-2	3	0.437671	0.01469	0.40702	0.46832
3-1	3	0.447308	0.01469	0.41666	0.47796
3-2	3	0.371418	0.01469	0.34077	0.40207
4-1	3	0.397116	0.01469	0.36646	0.42777
4-2	3	0.426027	0.01469	0.39537	0.45668
5-1	3	0.443694	0.01469	0.41304	0.47435
5-2	3	0.412776	0.01469	0.38212	0.44343

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=La2O3 (wt%), Prep Method=AR, Target=0.0140



Oneway Anova
Summary of Fit

Rsquare	0.829766
Adj Rsquare	0.753161
Root Mean Square Error	0.000177
Mean of Response	0.01364
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	3.03931e-6	3.377e-7	10.8317	<.0001
Error	20	6.23542e-7	3.1177e-8		
C. Total	29	3.66285e-6			

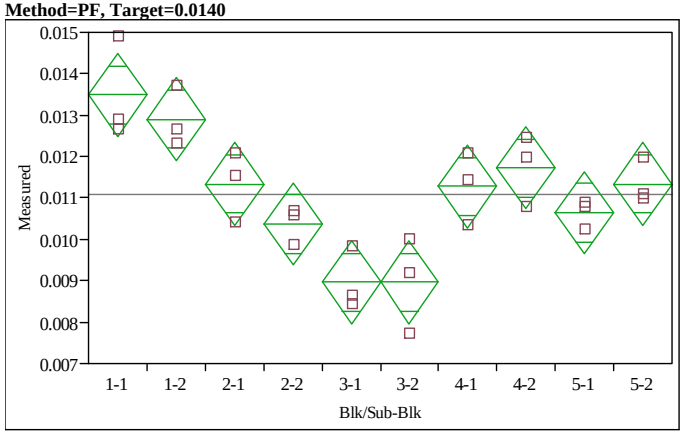
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.013253	0.00010	0.01304	0.01347
1-2	3	0.013995	0.00010	0.01378	0.01421
2-1	3	0.013839	0.00010	0.01363	0.01405
2-2	3	0.013683	0.00010	0.01347	0.01390
3-1	3	0.014113	0.00010	0.01390	0.01433
3-2	3	0.013839	0.00010	0.01363	0.01405
4-1	3	0.013057	0.00010	0.01284	0.01327
4-2	3	0.013722	0.00010	0.01351	0.01393
5-1	3	0.013370	0.00010	0.01316	0.01358
5-2	3	0.013526	0.00010	0.01331	0.01374

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=La2O3 (wt%), Prep Method=PF, Target=0.0140



Oneway Anova
Summary of Fit

Rsquare	0.809909
Adj Rsquare	0.724368
Root Mean Square Error	0.000826
Mean of Response	0.011099
Observations (or Sum Wgts)	30

Analysis of Variance

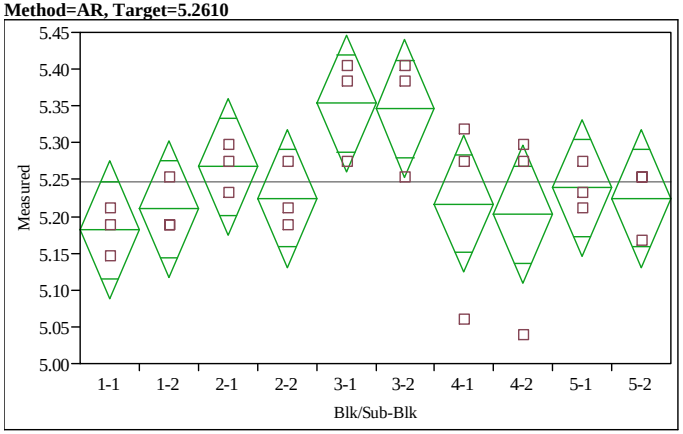
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.00005811	6.4567e-6	9.4681	<.0001
Error	20	0.00001364	6.8195e-7		
C. Total	29	0.00007175			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.013487	0.00048	0.01249	0.01448
1-2	3	0.012901	0.00048	0.01191	0.01390
2-1	3	0.011333	0.00048	0.01034	0.01233
2-2	3	0.010375	0.00048	0.00938	0.01137
3-1	3	0.008960	0.00048	0.00797	0.00995
3-2	3	0.008960	0.00048	0.00797	0.00995
4-1	3	0.011278	0.00048	0.01028	0.01227
4-2	3	0.011724	0.00048	0.01073	0.01272
5-1	3	0.010637	0.00048	0.00964	0.01163
5-2	3	0.011337	0.00048	0.01034	0.01233

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=Li2O (wt%), Prep Method=AR, Target=5.2610



Oneway Anova
Summary of Fit

Rsquare	0.437595
Adj Rsquare	0.184512
Root Mean Square Error	0.077624
Mean of Response	5.246617
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.09376561	0.010418	1.7291	0.1474
Error	20	0.12050944	0.006025		
C. Total	29	0.21427505			

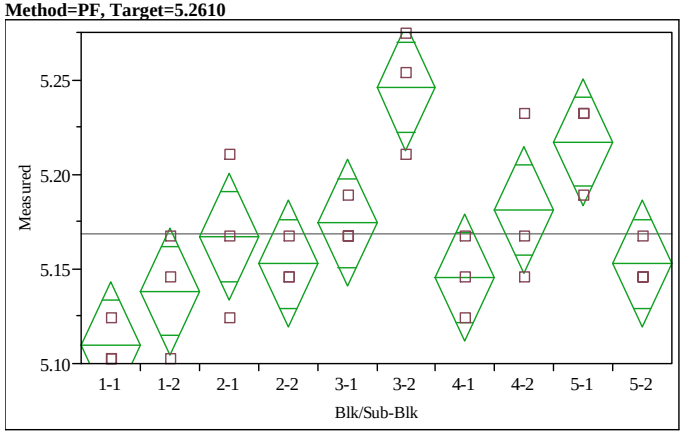
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	5.18131	0.04482	5.0878	5.2748
1-2	3	5.21002	0.04482	5.1165	5.3035
2-1	3	5.26743	0.04482	5.1739	5.3609
2-2	3	5.22437	0.04482	5.1309	5.3179
3-1	3	5.35354	0.04482	5.2601	5.4470
3-2	3	5.34637	0.04482	5.2529	5.4399
4-1	3	5.21719	0.04482	5.1237	5.3107
4-2	3	5.20284	0.04482	5.1094	5.2963
5-1	3	5.23872	0.04482	5.1452	5.3322
5-2	3	5.22437	0.04482	5.1309	5.3179

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=Li2O (wt%), Prep Method=PF, Target=5.2610



Oneway Anova
Summary of Fit

Rsquare	0.730893
Adj Rsquare	0.609795
Root Mean Square Error	0.027794
Mean of Response	5.168395
Observations (or Sum Wgts)	30

Analysis of Variance

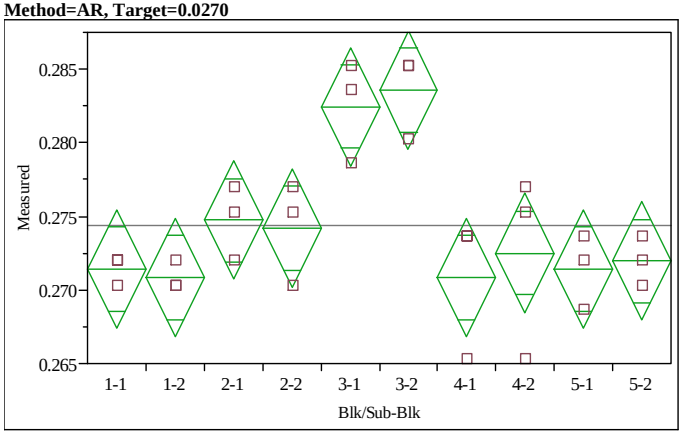
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.04196200	0.004662	6.0356	0.0004
Error	20	0.01544993	0.000772		
C. Total	29	0.05741193			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	5.10955	0.01605	5.0761	5.1430
1-2	3	5.13825	0.01605	5.1048	5.1717
2-1	3	5.16696	0.01605	5.1335	5.2004
2-2	3	5.15261	0.01605	5.1191	5.1861
3-1	3	5.17414	0.01605	5.1407	5.2076
3-2	3	5.24590	0.01605	5.2124	5.2794
4-1	3	5.14543	0.01605	5.1120	5.1789
4-2	3	5.18131	0.01605	5.1478	5.2148
5-1	3	5.21719	0.01605	5.1837	5.2507
5-2	3	5.15261	0.01605	5.1191	5.1861

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=MgO (wt%), Prep Method=AR, Target=0.0270



Oneway Anova
Summary of Fit

Rsquare	0.730208
Adj Rsquare	0.608801
Root Mean Square Error	0.003344
Mean of Response	0.274393
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.00060536	0.000067	6.0146	0.0004
Error	20	0.00022366	0.000011		
C. Total	29	0.00082902			

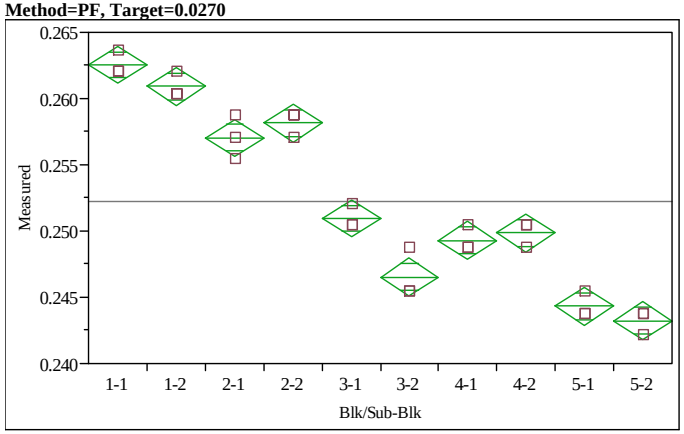
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.271408	0.00193	0.26738	0.27544
1-2	3	0.270856	0.00193	0.26683	0.27488
2-1	3	0.274725	0.00193	0.27070	0.27875
2-2	3	0.274172	0.00193	0.27014	0.27820
3-1	3	0.282464	0.00193	0.27844	0.28649
3-2	3	0.283569	0.00193	0.27954	0.28760
4-1	3	0.270856	0.00193	0.26683	0.27488
4-2	3	0.272514	0.00193	0.26849	0.27654
5-1	3	0.271408	0.00193	0.26738	0.27544
5-2	3	0.271961	0.00193	0.26793	0.27599

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=MgO (wt%), Prep Method=PF, Target=0.0270



Oneway Anova
Summary of Fit

Rsquare	0.97923
Adj Rsquare	0.969884
Root Mean Square Error	0.001173
Mean of Response	0.252283
Observations (or Sum Wgts)	30

Analysis of Variance

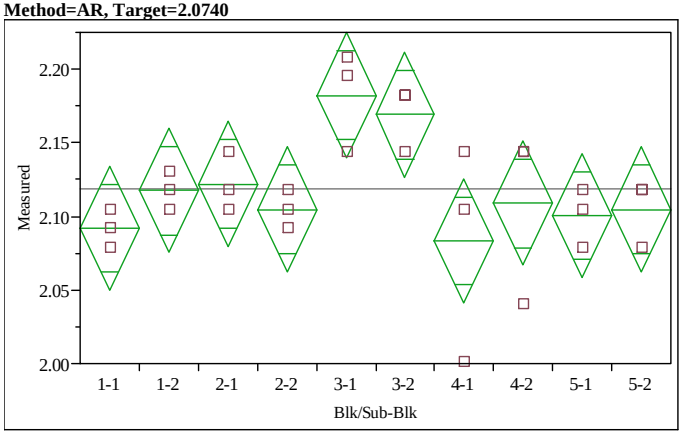
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.00129651	0.000144	104.7704	<.0001
Error	20	0.00002750	1.375e-6		
C. Total	29	0.00132401			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.262564	0.00068	0.26115	0.26398
1-2	3	0.260906	0.00068	0.25949	0.26232
2-1	3	0.257037	0.00068	0.25562	0.25845
2-2	3	0.258142	0.00068	0.25673	0.25955
3-1	3	0.250956	0.00068	0.24954	0.25237
3-2	3	0.246534	0.00068	0.24512	0.24795
4-1	3	0.249298	0.00068	0.24789	0.25071
4-2	3	0.249851	0.00068	0.24844	0.25126
5-1	3	0.244323	0.00068	0.24291	0.24574
5-2	3	0.243217	0.00068	0.24181	0.24463

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=MnO (wt%), Prep Method=AR, Target=2.0740



Oneway Anova
Summary of Fit

Rsquare	0.532299
Adj Rsquare	0.321833
Root Mean Square Error	0.035203
Mean of Response	2.118429
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.02820898	0.003134	2.5291	0.0403
Error	20	0.02478567	0.001239		
C. Total	29	0.05299465			

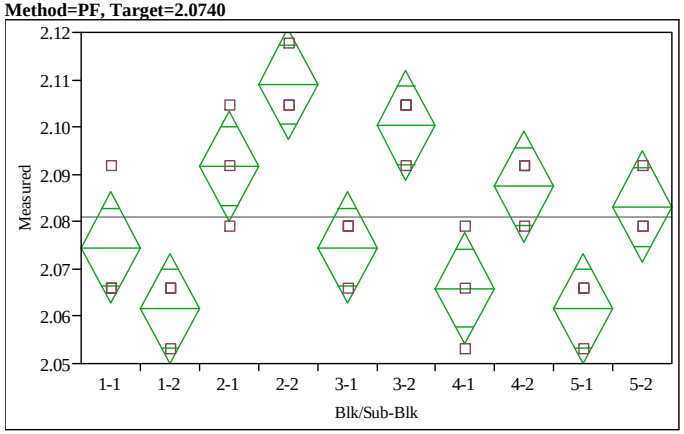
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	2.09174	0.02032	2.0493	2.1341
1-2	3	2.11757	0.02032	2.0752	2.1600
2-1	3	2.12187	0.02032	2.0795	2.1643
2-2	3	2.10466	0.02032	2.0623	2.1471
3-1	3	2.18213	0.02032	2.1397	2.2245
3-2	3	2.16922	0.02032	2.1268	2.2116
4-1	3	2.08314	0.02032	2.0407	2.1255
4-2	3	2.10896	0.02032	2.0666	2.1514
5-1	3	2.10035	0.02032	2.0580	2.1427
5-2	3	2.10466	0.02032	2.0623	2.1471

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=MnO (wt%), Prep Method=PF, Target=2.0740



Oneway Anova
Summary of Fit

Rsquare	0.790769
Adj Rsquare	0.696615
Root Mean Square Error	0.00972
Mean of Response	2.080984
Observations (or Sum Wgts)	30

Analysis of Variance

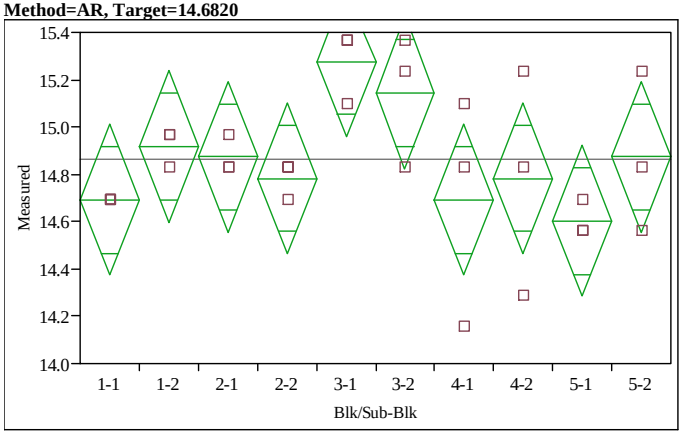
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.00714116	0.000793	8.3987	<.0001
Error	20	0.00188949	0.000094		
C. Total	29	0.00903065			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	2.07453	0.00561	2.0628	2.0862
1-2	3	2.06162	0.00561	2.0499	2.0733
2-1	3	2.09174	0.00561	2.0800	2.1034
2-2	3	2.10896	0.00561	2.0973	2.1207
3-1	3	2.07453	0.00561	2.0628	2.0862
3-2	3	2.10035	0.00561	2.0886	2.1121
4-1	3	2.06592	0.00561	2.0542	2.0776
4-2	3	2.08744	0.00561	2.0757	2.0991
5-1	3	2.06162	0.00561	2.0499	2.0733
5-2	3	2.08314	0.00561	2.0714	2.0948

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=Na2O (wt%), Prep Method=AR, Target=14.6820



Oneway Anova
Summary of Fit

Rsquare	0.454887
Adj Rsquare	0.209586
Root Mean Square Error	0.265069
Mean of Response	14.86395
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	1.1726378	0.130293	1.8544	0.1199
Error	20	1.4052271	0.070261		
C. Total	29	2.5778649			

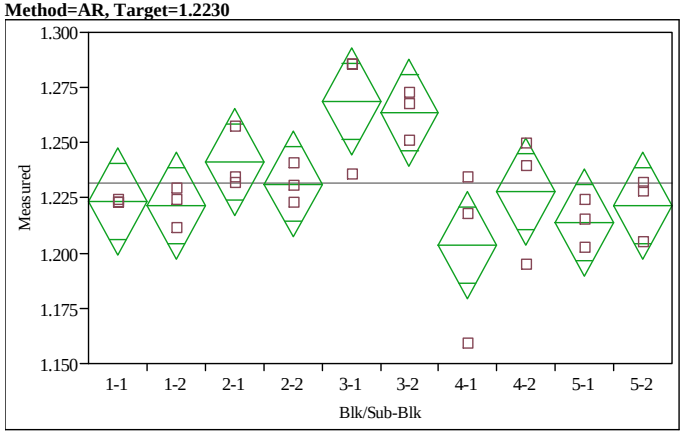
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	14.6932	0.15304	14.374	15.012
1-2	3	14.9179	0.15304	14.599	15.237
2-1	3	14.8729	0.15304	14.554	15.192
2-2	3	14.7831	0.15304	14.464	15.102
3-1	3	15.2773	0.15304	14.958	15.597
3-2	3	15.1425	0.15304	14.823	15.462
4-1	3	14.6932	0.15304	14.374	15.012
4-2	3	14.7831	0.15304	14.464	15.102
5-1	3	14.6033	0.15304	14.284	14.923
5-2	3	14.8729	0.15304	14.554	15.192

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=NiO (wt%), Prep Method=AR, Target=1.2230



Oneway Anova
Summary of Fit

Rsquare	0.588754
Adj Rsquare	0.403694
Root Mean Square Error	0.0201
Mean of Response	1.231695
Observations (or Sum Wgts)	30

Analysis of Variance

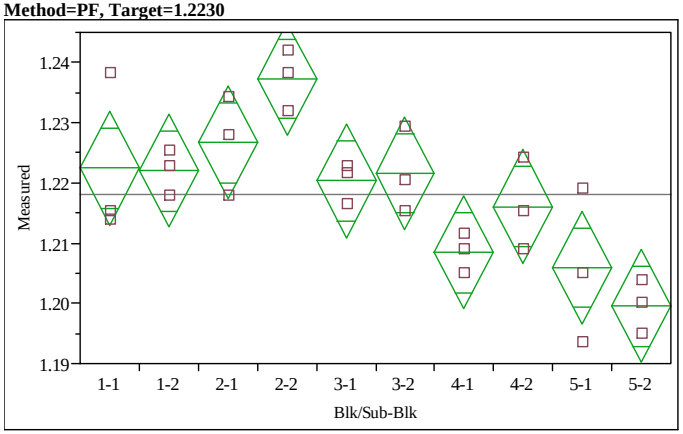
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.01156775	0.001285	3.1814	0.0149
Error	20	0.00808009	0.000404		
C. Total	29	0.01964784			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	1.22330	0.01160	1.1991	1.2475
1-2	3	1.22160	0.01160	1.1974	1.2458
2-1	3	1.24111	0.01160	1.2169	1.2653
2-2	3	1.23136	0.01160	1.2071	1.2556
3-1	3	1.26868	0.01160	1.2445	1.2929
3-2	3	1.26359	0.01160	1.2394	1.2878
4-1	3	1.20379	0.01160	1.1796	1.2280
4-2	3	1.22796	0.01160	1.2038	1.2522
5-1	3	1.21397	0.01160	1.1898	1.2382
5-2	3	1.22160	0.01160	1.1974	1.2458

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=NiO (wt%), Prep Method=PF, Target=1.2230



Oneway Anova
Summary of Fit

Rsquare	0.727374
Adj Rsquare	0.604692
Root Mean Square Error	0.007806
Mean of Response	1.218037
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.00325168	0.000361	5.9289	0.0005
Error	20	0.00121876	0.000061		
C. Total	29	0.00447044			

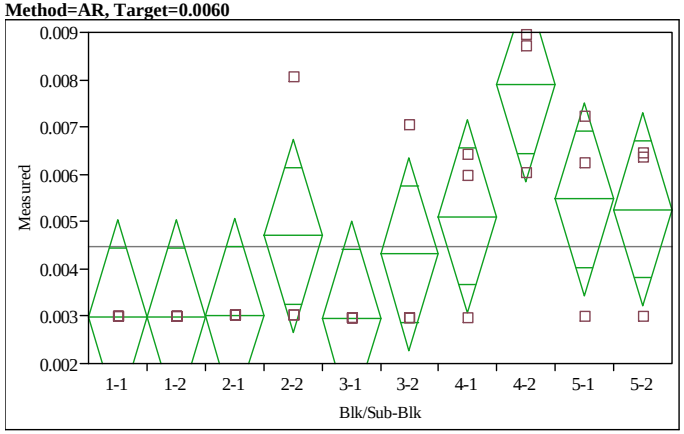
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	1.22245	0.00451	1.2130	1.2318
1-2	3	1.22202	0.00451	1.2126	1.2314
2-1	3	1.22669	0.00451	1.2173	1.2361
2-2	3	1.23729	0.00451	1.2279	1.2467
3-1	3	1.22033	0.00451	1.2109	1.2297
3-2	3	1.22160	0.00451	1.2122	1.2310
4-1	3	1.20845	0.00451	1.1990	1.2179
4-2	3	1.21609	0.00451	1.2067	1.2255
5-1	3	1.20591	0.00451	1.1965	1.2153
5-2	3	1.19954	0.00451	1.1901	1.2089

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=PbO (wt%), Prep Method=AR, Target=0.0060



Oneway Anova
Summary of Fit

Rsquare	0.539643
Adj Rsquare	0.332482
Root Mean Square Error	0.0017
Mean of Response	0.004473
Observations (or Sum Wgts)	30

Analysis of Variance

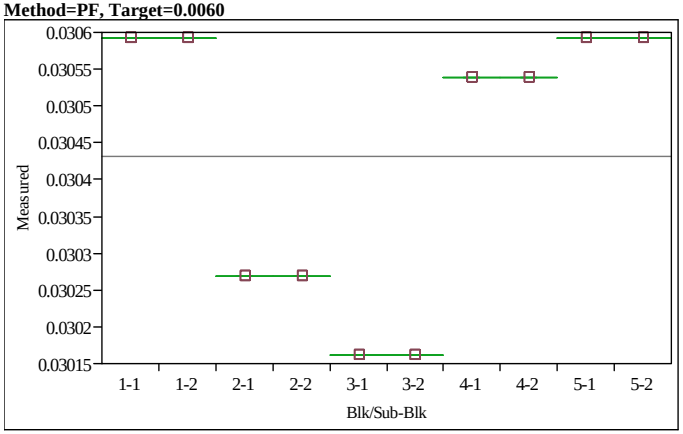
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.00006772	7.5247e-6	2.6049	0.0358
Error	20	0.00005777	2.8886e-6		
C. Total	29	0.00012549			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.002995	0.00098	0.00095	0.00504
1-2	3	0.002995	0.00098	0.00095	0.00504
2-1	3	0.003027	0.00098	0.00098	0.00507
2-2	3	0.004704	0.00098	0.00266	0.00675
3-1	3	0.002957	0.00098	0.00091	0.00500
3-2	3	0.004316	0.00098	0.00227	0.00636
4-1	3	0.005111	0.00098	0.00306	0.00716
4-2	3	0.007896	0.00098	0.00585	0.00994
5-1	3	0.005470	0.00098	0.00342	0.00752
5-2	3	0.005259	0.00098	0.00321	0.00731

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=PbO (wt%), Prep Method=PF, Target=0.0060



Oneway Anova
Summary of Fit

Rsquare	1
Adj Rsquare	1
Root Mean Square Error	2.6e-11
Mean of Response	0.030431
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	9.74702e-7	1.083e-7	1.6e+14	<.0001
Error	20	1.3553e-20	6.776e-22		
C. Total	29	9.74702e-7			

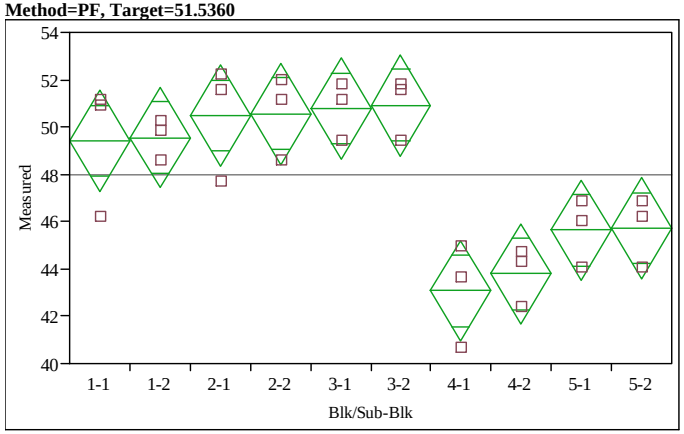
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.030592	1.503e-11	0.03059	0.03059
1-2	3	0.030592	1.503e-11	0.03059	0.03059
2-1	3	0.030269	1.503e-11	0.03027	0.03027
2-2	3	0.030269	1.503e-11	0.03027	0.03027
3-1	3	0.030162	1.503e-11	0.03016	0.03016
3-2	3	0.030162	1.503e-11	0.03016	0.03016
4-1	3	0.030539	1.503e-11	0.03054	0.03054
4-2	3	0.030539	1.503e-11	0.03054	0.03054
5-1	3	0.030592	1.503e-11	0.03059	0.03059
5-2	3	0.030592	1.503e-11	0.03059	0.03059

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=SiO2 (wt%), Prep Method=PF, Target=51.5360



Oneway Anova
Summary of Fit

Rsquare	0.805107
Adj Rsquare	0.717406
Root Mean Square Error	1.769724
Mean of Response	47.99163
Observations (or Sum Wgts)	30

Analysis of Variance

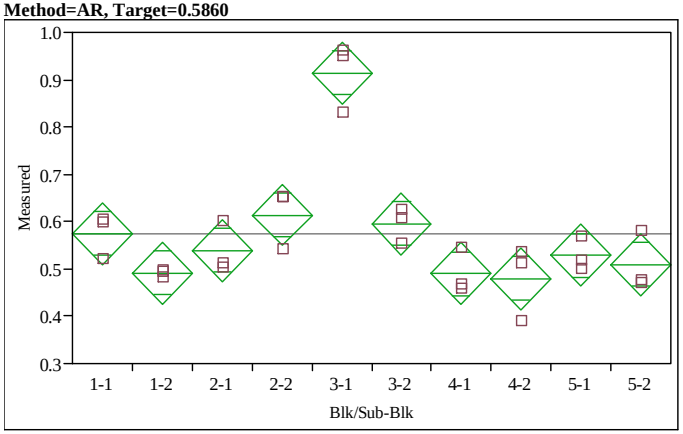
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	258.76122	28.7512	9.1801	<.0001
Error	20	62.63846	3.1319		
C. Total	29	321.39968			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	49.4178	1.0218	47.286	51.549
1-2	3	49.5605	1.0218	47.429	51.692
2-1	3	50.4875	1.0218	48.356	52.619
2-2	3	50.5588	1.0218	48.427	52.690
3-1	3	50.7727	1.0218	48.641	52.904
3-2	3	50.9153	1.0218	48.784	53.047
4-1	3	43.0712	1.0218	40.940	45.203
4-2	3	43.7843	1.0218	41.653	45.916
5-1	3	45.6384	1.0218	43.507	47.770
5-2	3	45.7097	1.0218	43.578	47.841

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=SO4 (wt%), Prep Method=AR, Target=0.5860



Oneway Anova
Summary of Fit

Rsquare	0.882576
Adj Rsquare	0.829735
Root Mean Square Error	0.054297
Mean of Response	0.573815
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.44317138	0.049241	16.7026	<.0001
Error	20	0.05896250	0.002948		
C. Total	29	0.50213388			

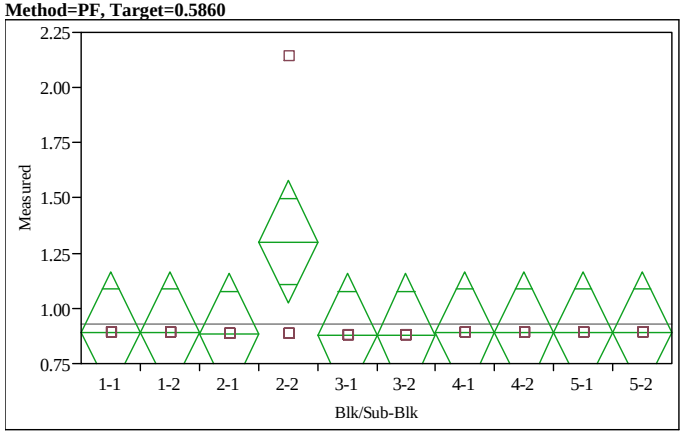
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.575213	0.03135	0.50982	0.64060
1-2	3	0.491328	0.03135	0.42594	0.55672
2-1	3	0.539262	0.03135	0.47387	0.60465
2-2	3	0.614160	0.03135	0.54877	0.67955
3-1	3	0.913750	0.03135	0.84836	0.97914
3-2	3	0.596184	0.03135	0.53079	0.66158
4-1	3	0.490329	0.03135	0.42494	0.55572
4-2	3	0.479344	0.03135	0.41395	0.54474
5-1	3	0.529276	0.03135	0.46388	0.59467
5-2	3	0.509303	0.03135	0.44391	0.57469

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=SO4 (wt%), Prep Method=PF, Target=0.5860



Oneway Anova
Summary of Fit

Rsquare	0.30555
Adj Rsquare	-0.00695
Root Mean Square Error	0.229456
Mean of Response	0.928679
Observations (or Sum Wgts)	30

Analysis of Variance

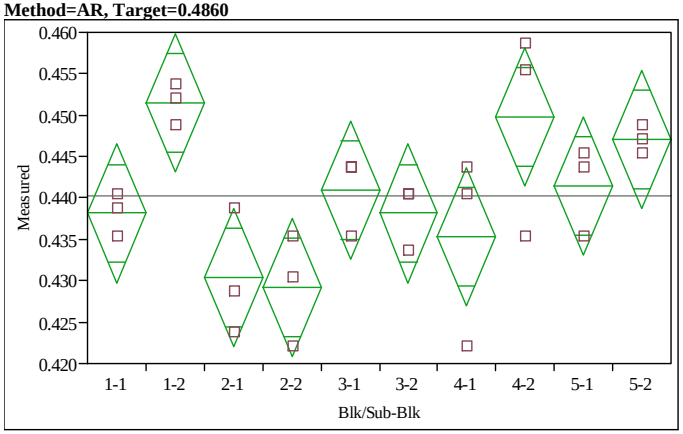
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.4633072	0.051479	0.9778	0.4866
Error	20	1.0529974	0.052650		
C. Total	29	1.5163046			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.89128	0.13248	0.6149	1.1676
1-2	3	0.89128	0.13248	0.6149	1.1676
2-1	3	0.88229	0.13248	0.6060	1.1586
2-2	3	1.30122	0.13248	1.0249	1.5776
3-1	3	0.87930	0.13248	0.6030	1.1556
3-2	3	0.87930	0.13248	0.6030	1.1556
4-1	3	0.88978	0.13248	0.6134	1.1661
4-2	3	0.88978	0.13248	0.6134	1.1661
5-1	3	0.89128	0.13248	0.6149	1.1676
5-2	3	0.89128	0.13248	0.6149	1.1676

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=TiO2 (wt%), Prep Method=AR, Target=0.4860



Oneway Anova
Summary of Fit

Rsquare	0.616816
Adj Rsquare	0.444383
Root Mean Square Error	0.006944
Mean of Response	0.440185
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.00155257	0.000173	3.5771	0.0084
Error	20	0.00096450	0.000048		
C. Total	29	0.00251708			

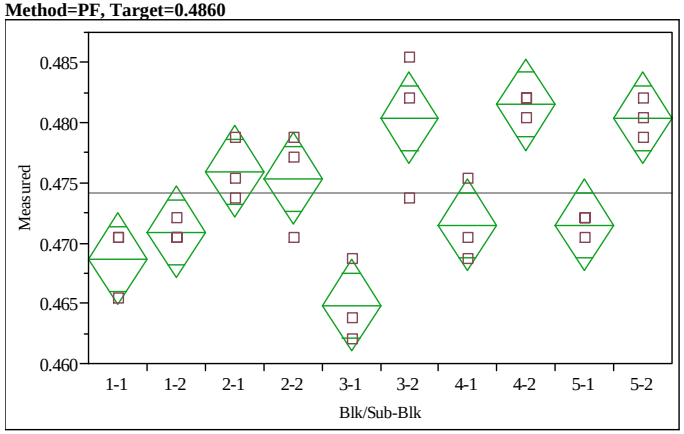
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.438128	0.00401	0.42976	0.44649
1-2	3	0.451472	0.00401	0.44311	0.45984
2-1	3	0.430344	0.00401	0.42198	0.43871
2-2	3	0.429232	0.00401	0.42087	0.43760
3-1	3	0.440908	0.00401	0.43254	0.44927
3-2	3	0.438128	0.00401	0.42976	0.44649
4-1	3	0.435348	0.00401	0.42698	0.44371
4-2	3	0.449804	0.00401	0.44144	0.45817
5-1	3	0.441464	0.00401	0.43310	0.44983
5-2	3	0.447024	0.00401	0.43866	0.45539

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=TiO2 (wt%), Prep Method=PF, Target=0.4860



Oneway Anova
Summary of Fit

Rsquare	0.806122
Adj Rsquare	0.718876
Root Mean Square Error	0.003165
Mean of Response	0.474101
Observations (or Sum Wgts)	30

Analysis of Variance

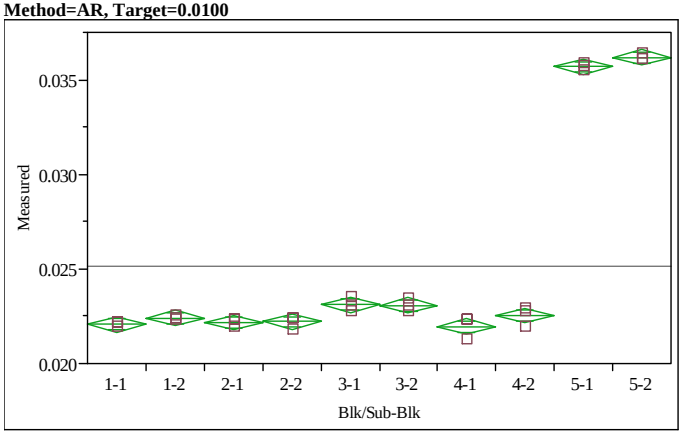
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.00083291	0.000093	9.2397	<.0001
Error	20	0.00020032	0.000010		
C. Total	29	0.00103323			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.468708	0.00183	0.46490	0.47252
1-2	3	0.470932	0.00183	0.46712	0.47474
2-1	3	0.475936	0.00183	0.47212	0.47975
2-2	3	0.475380	0.00183	0.47157	0.47919
3-1	3	0.464816	0.00183	0.46100	0.46863
3-2	3	0.480384	0.00183	0.47657	0.48420
4-1	3	0.471488	0.00183	0.46768	0.47530
4-2	3	0.481496	0.00183	0.47768	0.48531
5-1	3	0.471488	0.00183	0.46768	0.47530
5-2	3	0.480384	0.00183	0.47657	0.48420

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=ZnO (wt%), Prep Method=AR, Target=0.0100



Oneway Anova
Summary of Fit

Rsquare	0.99742
Adj Rsquare	0.99626
Root Mean Square Error	0.000337
Mean of Response	0.025137
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.00087872	0.000098	859.2303	<.0001
Error	20	0.00000227	1.136e-7		
C. Total	29	0.00088100			

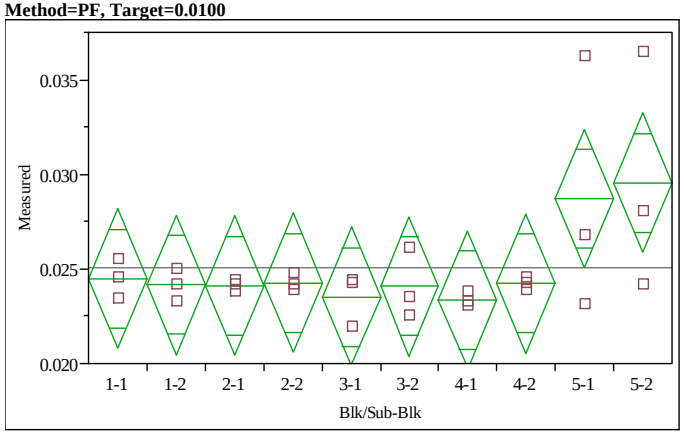
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.022074	0.00019	0.02167	0.02248
1-2	3	0.022406	0.00019	0.02200	0.02281
2-1	3	0.022157	0.00019	0.02175	0.02256
2-2	3	0.022199	0.00019	0.02179	0.02260
3-1	3	0.023112	0.00019	0.02271	0.02352
3-2	3	0.023070	0.00019	0.02266	0.02348
4-1	3	0.021950	0.00019	0.02154	0.02236
4-2	3	0.022531	0.00019	0.02212	0.02294
5-1	3	0.035684	0.00019	0.03528	0.03609
5-2	3	0.036182	0.00019	0.03578	0.03659

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=ZnO (wt%), Prep Method=PF, Target=0.0100



Oneway Anova
Summary of Fit

Rsquare	0.409363
Adj Rsquare	0.143576
Root Mean Square Error	0.003052
Mean of Response	0.025045
Observations (or Sum Wgts)	30

Analysis of Variance

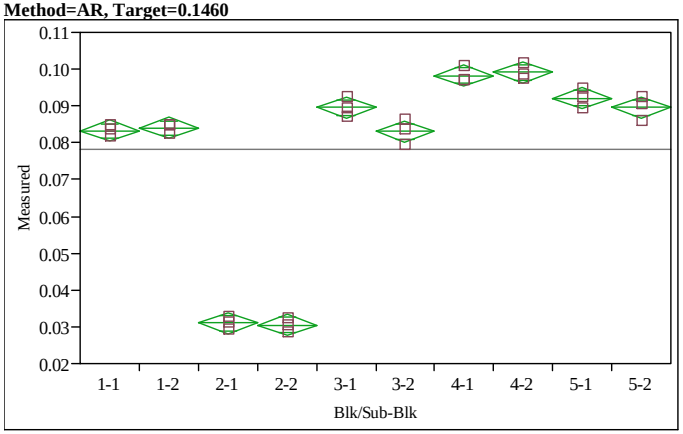
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.00012914	0.000014	1.5402	0.2011
Error	20	0.00018633	9.316e-6		
C. Total	29	0.00031547			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.024481	0.00176	0.02081	0.02816
1-2	3	0.024149	0.00176	0.02047	0.02783
2-1	3	0.024108	0.00176	0.02043	0.02778
2-2	3	0.024274	0.00176	0.02060	0.02795
3-1	3	0.023527	0.00176	0.01985	0.02720
3-2	3	0.024066	0.00176	0.02039	0.02774
4-1	3	0.023361	0.00176	0.01968	0.02704
4-2	3	0.024232	0.00176	0.02056	0.02791
5-1	3	0.028713	0.00176	0.02504	0.03239
5-2	3	0.029543	0.00176	0.02587	0.03322

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=SB7Ref, Oxide=ZrO2 (wt%), Prep Method=AR, Target=0.1460



Oneway Anova
Summary of Fit

Rsquare	0.993523
Adj Rsquare	0.990609
Root Mean Square Error	0.002399
Mean of Response	0.078031
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.01765293	0.001961	340.8964	<.0001
Error	20	0.00011508	5.754e-6		
C. Total	29	0.01776801			

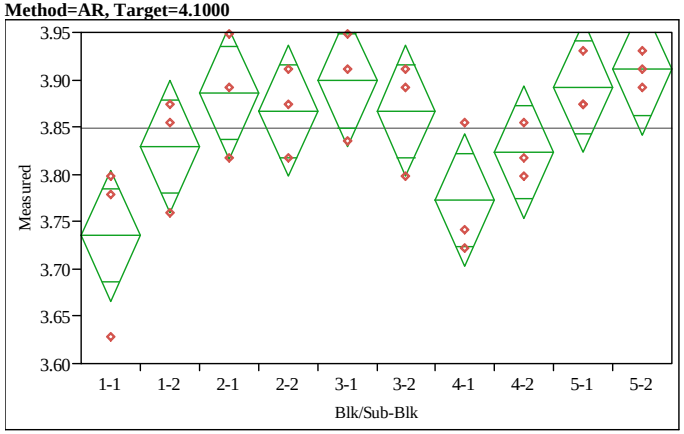
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.083254	0.00138	0.08037	0.08614
1-2	3	0.084020	0.00138	0.08113	0.08691
2-1	3	0.030978	0.00138	0.02809	0.03387
2-2	3	0.030438	0.00138	0.02755	0.03333
3-1	3	0.089558	0.00138	0.08667	0.09245
3-2	3	0.083074	0.00138	0.08019	0.08596
4-1	3	0.098293	0.00138	0.09540	0.10118
4-2	3	0.099104	0.00138	0.09621	0.10199
5-1	3	0.092080	0.00138	0.08919	0.09497
5-2	3	0.089513	0.00138	0.08662	0.09240

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=Ustd, Oxide=Al2O3 (wt%), Prep Method=AR, Target=4.1000



Oneway Anova
Summary of Fit

Rsquare	0.574887
Adj Rsquare	0.383585
Root Mean Square Error	0.057828
Mean of Response	3.848282
Observations (or Sum Wgts)	30

Analysis of Variance

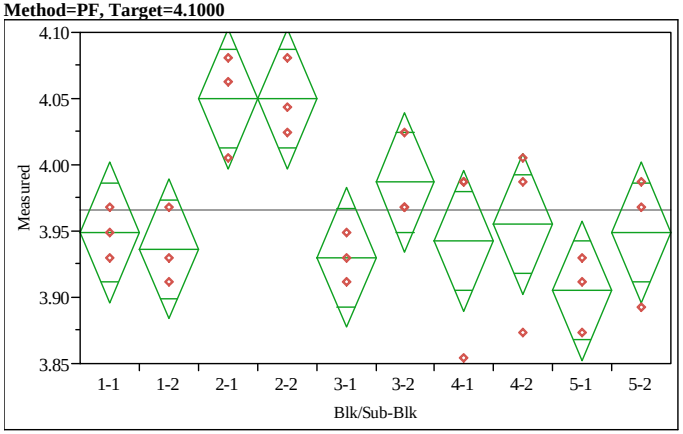
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.09044533	0.010049	3.0051	0.0194
Error	20	0.06688194	0.003344		
C. Total	29	0.15732727			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	3.73491	0.03339	3.6653	3.8046
1-2	3	3.82939	0.03339	3.7597	3.8990
2-1	3	3.88607	0.03339	3.8164	3.9557
2-2	3	3.86718	0.03339	3.7975	3.9368
3-1	3	3.89867	0.03339	3.8290	3.9683
3-2	3	3.86718	0.03339	3.7975	3.9368
4-1	3	3.77270	0.03339	3.7031	3.8423
4-2	3	3.82309	0.03339	3.7534	3.8927
5-1	3	3.89237	0.03339	3.8227	3.9620
5-2	3	3.91127	0.03339	3.8416	3.9809

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=Ustd, Oxide=Al2O3 (wt%), Prep Method=PF, Target=4.1000



Oneway Anova
Summary of Fit

Rsquare	0.6269
Adj Rsquare	0.459005
Root Mean Square Error	0.043908
Mean of Response	3.965431
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.06478742	0.007199	3.7339	0.0068
Error	20	0.03855827	0.001928		
C. Total	29	0.10334569			

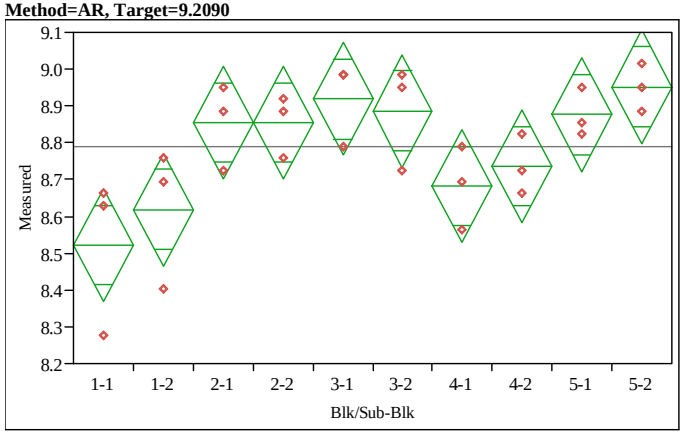
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	3.94906	0.02535	3.8962	4.0019
1-2	3	3.93646	0.02535	3.8836	3.9893
2-1	3	4.04983	0.02535	3.9969	4.1027
2-2	3	4.04983	0.02535	3.9969	4.1027
3-1	3	3.93016	0.02535	3.8773	3.9830
3-2	3	3.98685	0.02535	3.9340	4.0397
4-1	3	3.94276	0.02535	3.8899	3.9956
4-2	3	3.95535	0.02535	3.9025	4.0082
5-1	3	3.90497	0.02535	3.8521	3.9578
5-2	3	3.94906	0.02535	3.8962	4.0019

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=Ustd, Oxide=B2O3 (wt%), Prep Method=AR, Target=9.2090



Oneway Anova
Summary of Fit

Rsquare	0.628752
Adj Rsquare	0.46169
Root Mean Square Error	0.127447
Mean of Response	8.790327
Observations (or Sum Wgts)	30

Analysis of Variance

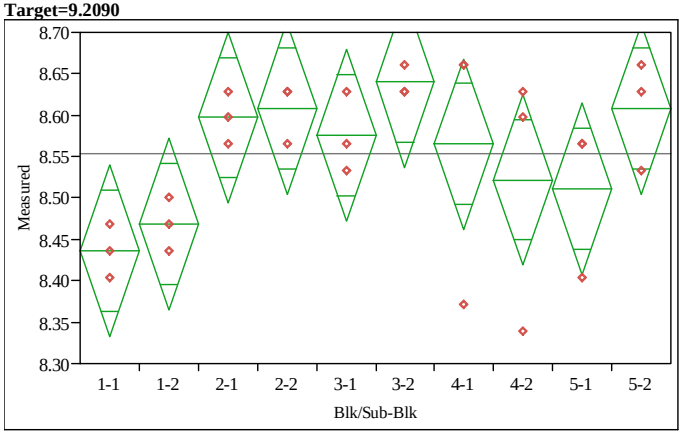
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.55018225	0.061131	3.7636	0.0065
Error	20	0.32485635	0.016243		
C. Total	29	0.87503861			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	8.52200	0.07358	8.3685	8.6755
1-2	3	8.61860	0.07358	8.4651	8.7721
2-1	3	8.85473	0.07358	8.7012	9.0082
2-2	3	8.85473	0.07358	8.7012	9.0082
3-1	3	8.91912	0.07358	8.7656	9.0726
3-2	3	8.88692	0.07358	8.7334	9.0404
4-1	3	8.68300	0.07358	8.5295	8.8365
4-2	3	8.73666	0.07358	8.5832	8.8902
5-1	3	8.87619	0.07358	8.7227	9.0297
5-2	3	8.95132	0.07358	8.7978	9.1048

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=Ustd, Oxide=B2O3 (wt%), Prep Method=PF, Target=9.2090



Oneway Anova
Summary of Fit

Rsquare	0.447399
Adj Rsquare	0.198729
Root Mean Square Error	0.085797
Mean of Response	8.553128
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.11919463	0.013244	1.7992	0.1313
Error	20	0.14722214	0.007361		
C. Total	29	0.26641677			

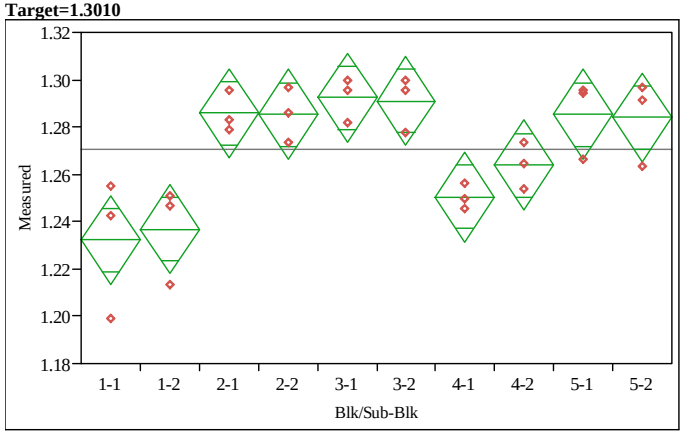
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	8.43614	0.04953	8.3328	8.5395
1-2	3	8.46834	0.04953	8.3650	8.5717
2-1	3	8.59713	0.04953	8.4938	8.7005
2-2	3	8.60787	0.04953	8.5045	8.7112
3-1	3	8.57567	0.04953	8.4723	8.6790
3-2	3	8.64007	0.04953	8.5367	8.7434
4-1	3	8.56493	0.04953	8.4616	8.6683
4-2	3	8.52200	0.04953	8.4187	8.6253
5-1	3	8.51127	0.04953	8.4079	8.6146
5-2	3	8.60787	0.04953	8.5045	8.7112

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=Ustd, Oxide=CaO (wt%), Prep Method=AR, Target=1.3010



Oneway Anova
Summary of Fit

Rsquare	0.744773
Adj Rsquare	0.629921
Root Mean Square Error	0.01571
Mean of Response	1.270753
Observations (or Sum Wgts)	30

Analysis of Variance

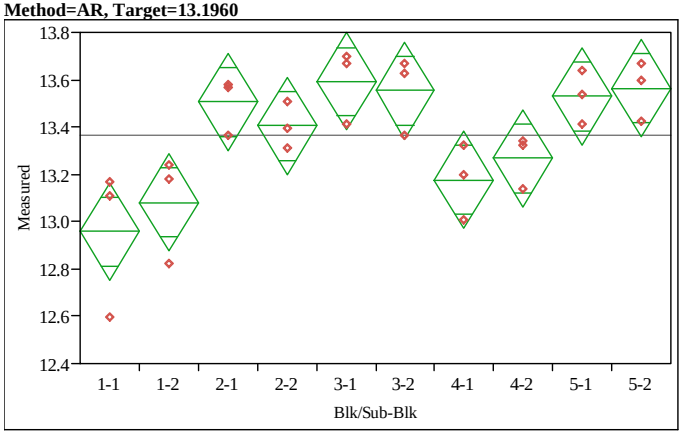
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.01440416	0.001600	6.4846	0.0003
Error	20	0.00493617	0.000247		
C. Total	29	0.01934033			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	1.23223	0.00907	1.2133	1.2511
1-2	3	1.23689	0.00907	1.2180	1.2558
2-1	3	1.28586	0.00907	1.2669	1.3048
2-2	3	1.28540	0.00907	1.2665	1.3043
3-1	3	1.29239	0.00907	1.2735	1.3113
3-2	3	1.29100	0.00907	1.2721	1.3099
4-1	3	1.25042	0.00907	1.2315	1.2693
4-2	3	1.26394	0.00907	1.2450	1.2829
5-1	3	1.28540	0.00907	1.2665	1.3043
5-2	3	1.28400	0.00907	1.2651	1.3029

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=Ustd, Oxide=Fe2O3 (wt%), Prep Method=AR, Target=13.1960



Oneway Anova
Summary of Fit

Rsquare	0.705495
Adj Rsquare	0.572967
Root Mean Square Error	0.170748
Mean of Response	13.36341
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	1.3968234	0.155203	5.3234	0.0009
Error	20	0.5830971	0.029155		
C. Total	29	1.9799205			

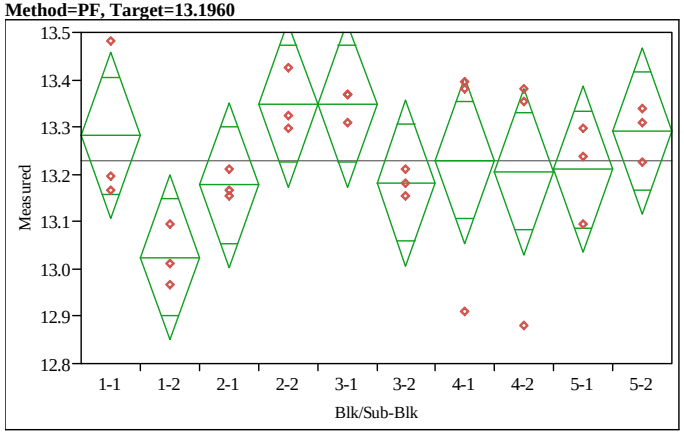
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	12.9578	0.09858	12.752	13.163
1-2	3	13.0818	0.09858	12.876	13.287
2-1	3	13.5059	0.09858	13.300	13.712
2-2	3	13.4058	0.09858	13.200	13.611
3-1	3	13.5917	0.09858	13.386	13.797
3-2	3	13.5536	0.09858	13.348	13.759
4-1	3	13.1771	0.09858	12.971	13.383
4-2	3	13.2676	0.09858	13.062	13.473
5-1	3	13.5297	0.09858	13.324	13.735
5-2	3	13.5631	0.09858	13.357	13.769

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=Ustd, Oxide=Fe2O3 (wt%), Prep Method=PF, Target=13.1960



Oneway Anova
Summary of Fit

Rsquare	0.37024
Adj Rsquare	0.086848
Root Mean Square Error	0.14545
Mean of Response	13.22997
Observations (or Sum Wgts)	30

Analysis of Variance

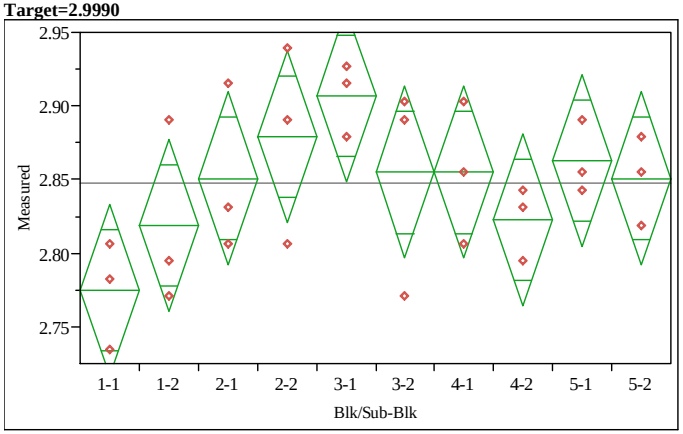
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.24875311	0.027639	1.3065	0.2939
Error	20	0.42311671	0.021156		
C. Total	29	0.67186982			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	13.2819	0.08398	13.107	13.457
1-2	3	13.0246	0.08398	12.849	13.200
2-1	3	13.1771	0.08398	13.002	13.352
2-2	3	13.3486	0.08398	13.173	13.524
3-1	3	13.3486	0.08398	13.173	13.524
3-2	3	13.1818	0.08398	13.007	13.357
4-1	3	13.2295	0.08398	13.054	13.405
4-2	3	13.2057	0.08398	13.030	13.381
5-1	3	13.2104	0.08398	13.035	13.386
5-2	3	13.2914	0.08398	13.116	13.467

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=Ustd, Oxide=K2O (wt%), Prep Method=AR, Target=2.9990



Oneway Anova
Summary of Fit

Rsquare	0.425247
Adj Rsquare	0.166608
Root Mean Square Error	0.048634
Mean of Response	2.847674
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.03499960	0.003889	1.6442	0.1695
Error	20	0.04730459	0.002365		
C. Total	29	0.08230419			

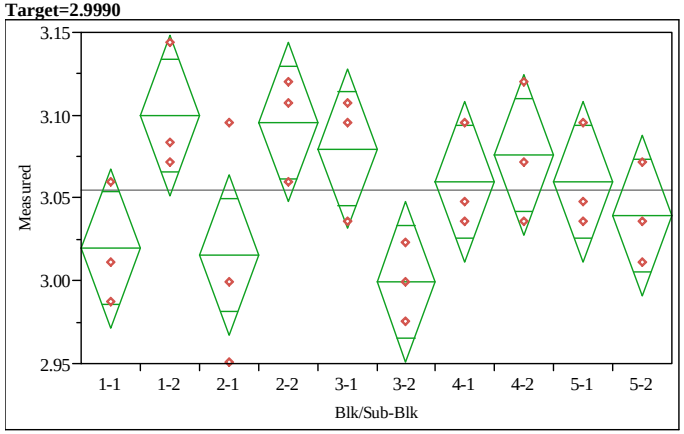
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	2.77460	0.02808	2.7160	2.8332
1-2	3	2.81876	0.02808	2.7602	2.8773
2-1	3	2.85089	0.02808	2.7923	2.9095
2-2	3	2.87899	0.02808	2.8204	2.9376
3-1	3	2.90710	0.02808	2.8485	2.9657
3-2	3	2.85490	0.02808	2.7963	2.9135
4-1	3	2.85490	0.02808	2.7963	2.9135
4-2	3	2.82278	0.02808	2.7642	2.8814
5-1	3	2.86293	0.02808	2.8044	2.9215
5-2	3	2.85089	0.02808	2.7923	2.9095

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=Ustd, Oxide=K2O (wt%), Prep Method=PF, Target=2.9990



Oneway Anova
Summary of Fit

Rsquare	0.503763
Adj Rsquare	0.280456
Root Mean Square Error	0.040133
Mean of Response	3.054464
Observations (or Sum Wgts)	30

Analysis of Variance

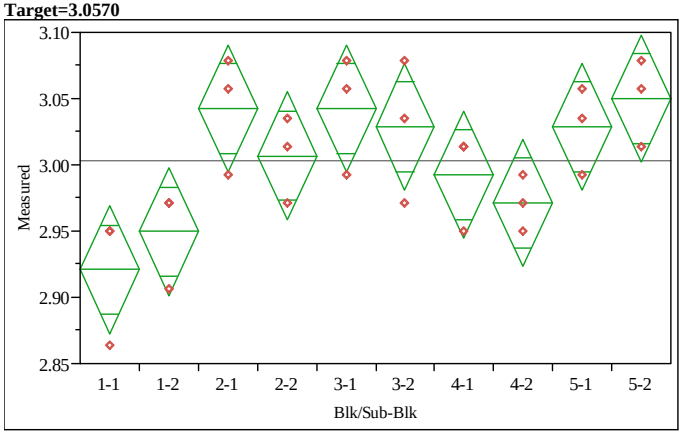
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.03270208	0.003634	2.2559	0.0623
Error	20	0.03221356	0.001611		
C. Total	29	0.06491564			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	3.01953	0.02317	2.9712	3.0679
1-2	3	3.09984	0.02317	3.0515	3.1482
2-1	3	3.01552	0.02317	2.9672	3.0638
2-2	3	3.09582	0.02317	3.0475	3.1442
3-1	3	3.07976	0.02317	3.0314	3.1281
3-2	3	2.99945	0.02317	2.9511	3.0478
4-1	3	3.05968	0.02317	3.0114	3.1080
4-2	3	3.07575	0.02317	3.0274	3.1241
5-1	3	3.05968	0.02317	3.0114	3.1080
5-2	3	3.03961	0.02317	2.9913	3.0879

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=Ustd, Oxide=Li2O (wt%), Prep Method=AR, Target=3.0570



Oneway Anova
Summary of Fit

Rsquare	0.621671
Adj Rsquare	0.451423
Root Mean Square Error	0.039892
Mean of Response	3.003296
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.05229801	0.005811	3.6516	0.0076
Error	20	0.03182685	0.001591		
C. Total	29	0.08412486			

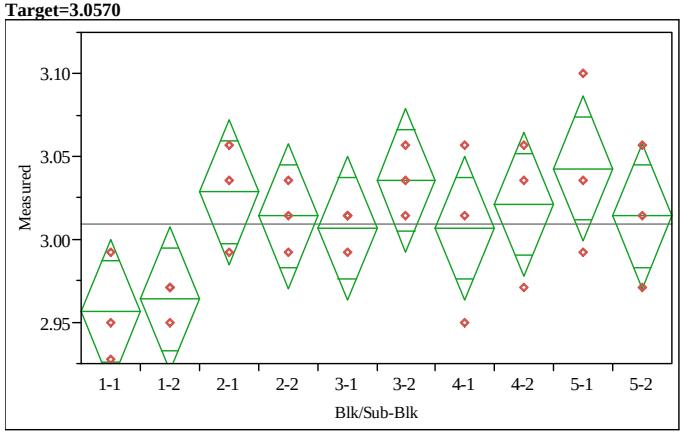
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	2.92077	0.02303	2.8727	2.9688
1-2	3	2.94947	0.02303	2.9014	2.9975
2-1	3	3.04277	0.02303	2.9947	3.0908
2-2	3	3.00688	0.02303	2.9588	3.0549
3-1	3	3.04277	0.02303	2.9947	3.0908
3-2	3	3.02841	0.02303	2.9804	3.0765
4-1	3	2.99253	0.02303	2.9445	3.0406
4-2	3	2.97100	0.02303	2.9230	3.0190
5-1	3	3.02841	0.02303	2.9804	3.0765
5-2	3	3.04994	0.02303	3.0019	3.0980

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=Ustd, Oxide=Li2O (wt%), Prep Method=PF, Target=3.0570



Oneway Anova
Summary of Fit

Rsquare	0.45179
Adj Rsquare	0.205095
Root Mean Square Error	0.036239
Mean of Response	3.009037
Observations (or Sum Wgts)	30

Analysis of Variance

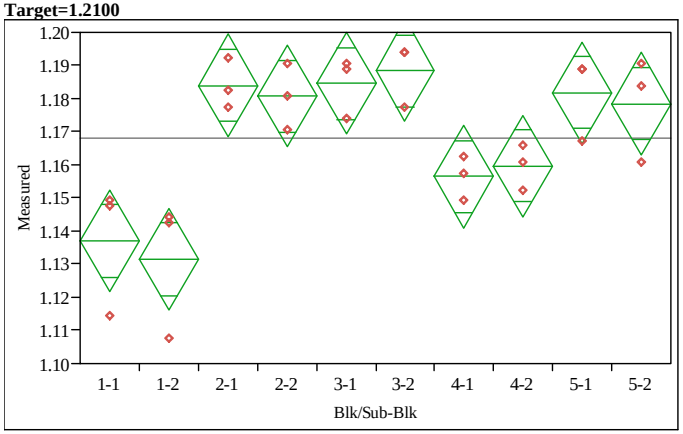
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.02164535	0.002405	1.8314	0.1245
Error	20	0.02626488	0.001313		
C. Total	29	0.04791023			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	2.95665	0.02092	2.9130	3.0003
1-2	3	2.96383	0.02092	2.9202	3.0075
2-1	3	3.02841	0.02092	2.9848	3.0721
2-2	3	3.01406	0.02092	2.9704	3.0577
3-1	3	3.00688	0.02092	2.9632	3.0505
3-2	3	3.03559	0.02092	2.9919	3.0792
4-1	3	3.00688	0.02092	2.9632	3.0505
4-2	3	3.02124	0.02092	2.9776	3.0649
5-1	3	3.04277	0.02092	2.9991	3.0864
5-2	3	3.01406	0.02092	2.9704	3.0577

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=Ustd, Oxide=MgO (wt%), Prep Method=AR, Target=1.2100



Oneway Anova
Summary of Fit

Rsquare	0.782041
Adj Rsquare	0.683959
Root Mean Square Error	0.012777
Mean of Response	1.168272
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.01171528	0.001302	7.9734	<.0001
Error	20	0.00326512	0.000163		
C. Total	29	0.01498040			

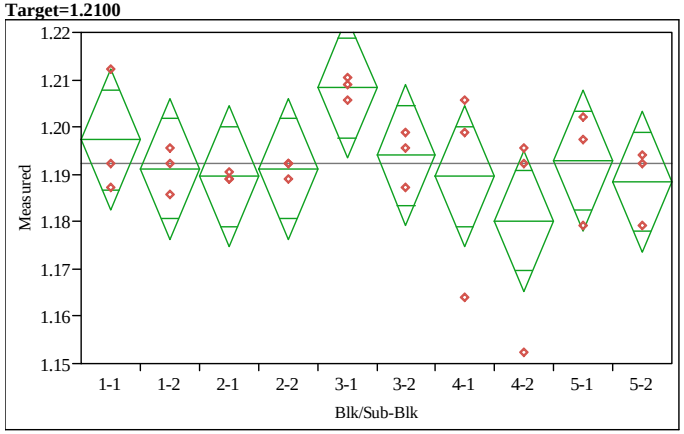
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	1.13704	0.00738	1.1217	1.1524
1-2	3	1.13151	0.00738	1.1161	1.1469
2-1	3	1.18403	0.00738	1.1686	1.1994
2-2	3	1.18071	0.00738	1.1653	1.1961
3-1	3	1.18458	0.00738	1.1692	1.2000
3-2	3	1.18845	0.00738	1.1731	1.2038
4-1	3	1.15639	0.00738	1.1410	1.1718
4-2	3	1.15970	0.00738	1.1443	1.1751
5-1	3	1.18182	0.00738	1.1664	1.1972
5-2	3	1.17850	0.00738	1.1631	1.1939

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=Ustd, Oxide=MgO (wt%), Prep Method=PF, Target=1.2100



Oneway Anova
Summary of Fit

Rsquare	0.312781
Adj Rsquare	0.003533
Root Mean Square Error	0.012384
Mean of Response	1.192262
Observations (or Sum Wgts)	30

Analysis of Variance

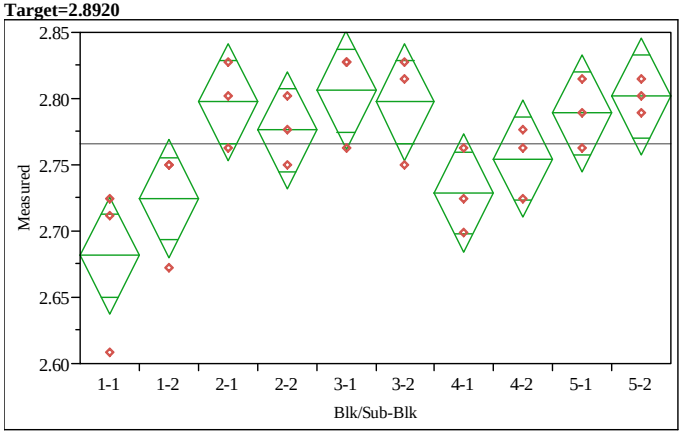
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.00139597	0.000155	1.0114	0.4633
Error	20	0.00306712	0.000153		
C. Total	29	0.00446309			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	1.19729	0.00715	1.1824	1.2122
1-2	3	1.19121	0.00715	1.1763	1.2061
2-1	3	1.18955	0.00715	1.1746	1.2045
2-2	3	1.19121	0.00715	1.1763	1.2061
3-1	3	1.20835	0.00715	1.1934	1.2233
3-2	3	1.19398	0.00715	1.1791	1.2089
4-1	3	1.18955	0.00715	1.1746	1.2045
4-2	3	1.18016	0.00715	1.1652	1.1951
5-1	3	1.19287	0.00715	1.1780	1.2078
5-2	3	1.18845	0.00715	1.1735	1.2034

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=Ustd, Oxide=MnO (wt%), Prep Method=AR, Target=2.8920



Oneway Anova
Summary of Fit

Rsquare	0.639037
Adj Rsquare	0.476604
Root Mean Square Error	0.036748
Mean of Response	2.76575
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.04781522	0.005313	3.9342	0.0052
Error	20	0.02700860	0.001350		
C. Total	29	0.07482382			

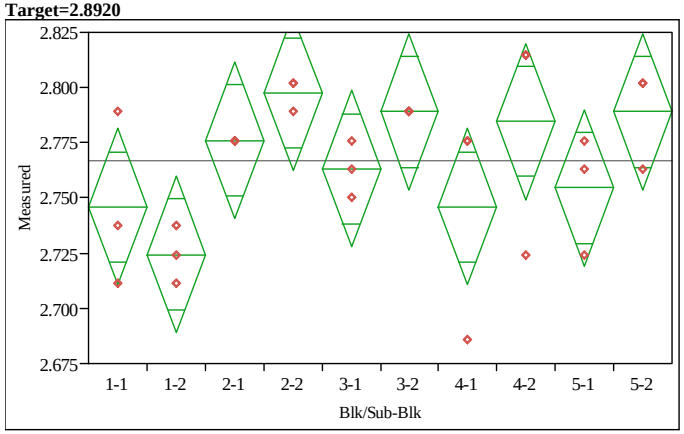
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	2.68139	0.02122	2.6371	2.7256
1-2	3	2.72443	0.02122	2.6802	2.7687
2-1	3	2.79760	0.02122	2.7533	2.8419
2-2	3	2.77608	0.02122	2.7318	2.8203
3-1	3	2.80621	0.02122	2.7620	2.8505
3-2	3	2.79760	0.02122	2.7533	2.8419
4-1	3	2.72874	0.02122	2.6845	2.7730
4-2	3	2.75456	0.02122	2.7103	2.7988
5-1	3	2.78899	0.02122	2.7447	2.8332
5-2	3	2.80190	0.02122	2.7576	2.8462

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=Ustd, Oxide=MnO (wt%), Prep Method=PF, Target=2.8920



Oneway Anova
Summary of Fit

Rsquare	0.473595
Adj Rsquare	0.236713
Root Mean Square Error	0.029349
Mean of Response	2.767042
Observations (or Sum Wgts)	30

Analysis of Variance

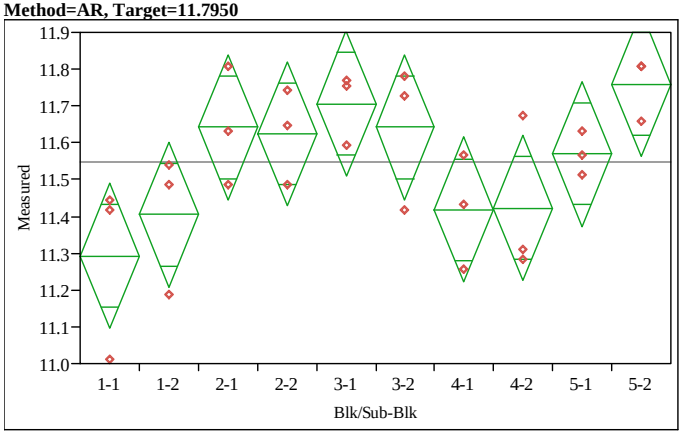
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.01549938	0.001722	1.9993	0.0945
Error	20	0.01722771	0.000861		
C. Total	29	0.03272709			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	2.74595	0.01694	2.7106	2.7813
1-2	3	2.72443	0.01694	2.6891	2.7598
2-1	3	2.77608	0.01694	2.7407	2.8114
2-2	3	2.79760	0.01694	2.7623	2.8329
3-1	3	2.76317	0.01694	2.7278	2.7985
3-2	3	2.78899	0.01694	2.7536	2.8243
4-1	3	2.74595	0.01694	2.7106	2.7813
4-2	3	2.78469	0.01694	2.7493	2.8200
5-1	3	2.75456	0.01694	2.7192	2.7899
5-2	3	2.78899	0.01694	2.7536	2.8243

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=Ustd, Oxide=Na2O (wt%), Prep Method=AR, Target=11.7950



Oneway Anova
Summary of Fit

Rsquare	0.543353
Adj Rsquare	0.337861
Root Mean Square Error	0.163696
Mean of Response	11.54787
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.6376824	0.070854	2.6442	0.0336
Error	20	0.5359245	0.026796		
C. Total	29	1.1736069			

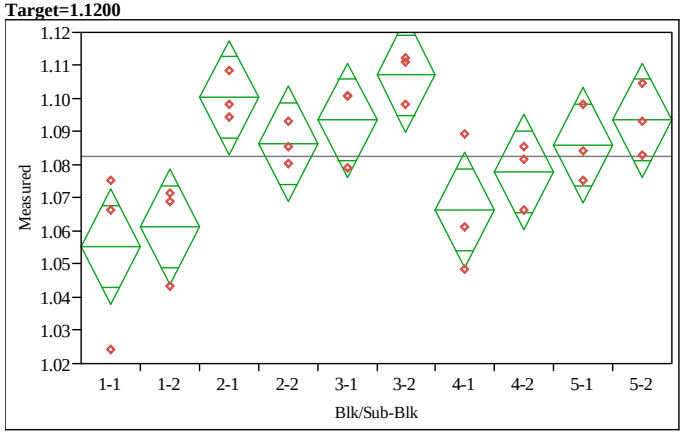
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	11.2917	0.09451	11.095	11.489
1-2	3	11.4041	0.09451	11.207	11.601
2-1	3	11.6422	0.09451	11.445	11.839
2-2	3	11.6243	0.09451	11.427	11.821
3-1	3	11.7051	0.09451	11.508	11.902
3-2	3	11.6422	0.09451	11.445	11.839
4-1	3	11.4176	0.09451	11.220	11.615
4-2	3	11.4221	0.09451	11.225	11.619
5-1	3	11.5703	0.09451	11.373	11.767
5-2	3	11.7591	0.09451	11.562	11.956

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=Ustd, Oxide=NiO (wt%), Prep Method=AR, Target=1.1200



Oneway Anova
Summary of Fit

Rsquare	0.65792
Adj Rsquare	0.503983
Root Mean Square Error	0.014402
Mean of Response	1.082728
Observations (or Sum Wgts)	30

Analysis of Variance

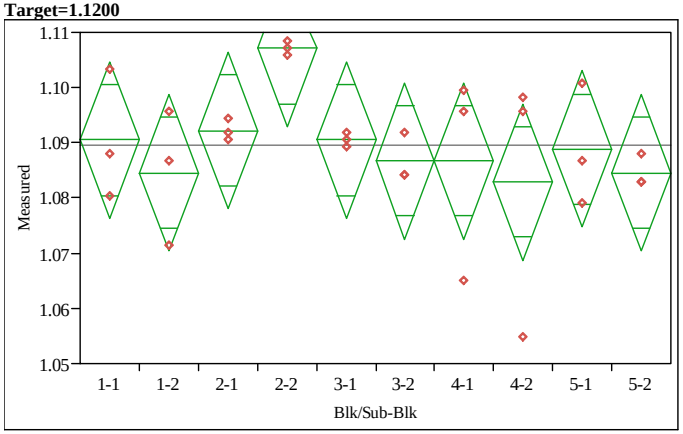
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.00797883	0.000887	4.2740	0.0033
Error	20	0.00414853	0.000207		
C. Total	29	0.01212737			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	1.05533	0.00832	1.0380	1.0727
1-2	3	1.06127	0.00832	1.0439	1.0786
2-1	3	1.10029	0.00832	1.0829	1.1176
2-2	3	1.08629	0.00832	1.0689	1.1036
3-1	3	1.09350	0.00832	1.0762	1.1108
3-2	3	1.10708	0.00832	1.0897	1.1244
4-1	3	1.06636	0.00832	1.0490	1.0837
4-2	3	1.07781	0.00832	1.0605	1.0952
5-1	3	1.08587	0.00832	1.0685	1.1032
5-2	3	1.09350	0.00832	1.0762	1.1108

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=Ustd, Oxide=NiO (wt%), Prep Method=PF, Target=1.1200



Oneway Anova
Summary of Fit

Rsquare	0.315779
Adj Rsquare	0.007879
Root Mean Square Error	0.011769
Mean of Response	1.089472
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.00127840	0.000142	1.0256	0.4537
Error	20	0.00277001	0.000139		
C. Total	29	0.00404841			

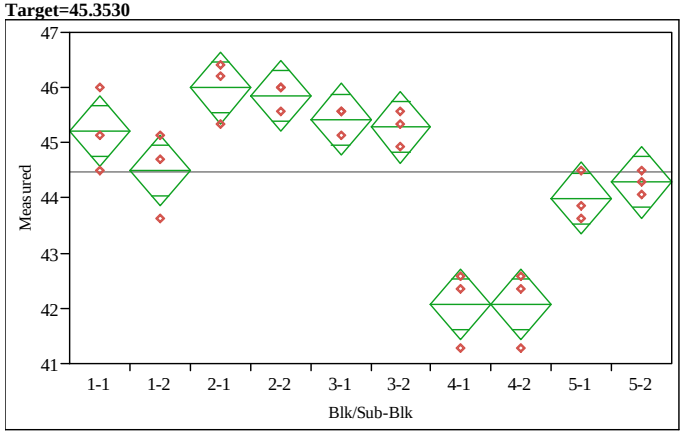
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	1.09053	0.00679	1.0764	1.1047
1-2	3	1.08459	0.00679	1.0704	1.0988
2-1	3	1.09223	0.00679	1.0781	1.1064
2-2	3	1.10708	0.00679	1.0929	1.1212
3-1	3	1.09053	0.00679	1.0764	1.1047
3-2	3	1.08672	0.00679	1.0725	1.1009
4-1	3	1.08672	0.00679	1.0725	1.1009
4-2	3	1.08290	0.00679	1.0687	1.0971
5-1	3	1.08884	0.00679	1.0747	1.1030
5-2	3	1.08459	0.00679	1.0704	1.0988

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=Ustd, Oxide=SiO2 (wt%), Prep Method=PF, Target=45.3530



Oneway Anova
Summary of Fit

Rsquare	0.903563
Adj Rsquare	0.860166
Root Mean Square Error	0.538379
Mean of Response	44.46892
Observations (or Sum Wgts)	30

Analysis of Variance

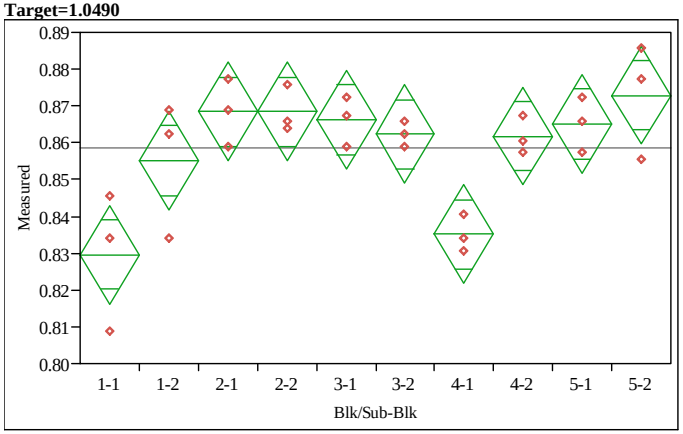
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	54.315142	6.03502	20.8211	<.0001
Error	20	5.797032	0.28985		
C. Total	29	60.112174			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	45.2105	0.31083	44.562	45.859
1-2	3	44.4974	0.31083	43.849	45.146
2-1	3	45.9950	0.31083	45.347	46.643
2-2	3	45.8523	0.31083	45.204	46.501
3-1	3	45.4245	0.31083	44.776	46.073
3-2	3	45.2819	0.31083	44.633	45.930
4-1	3	42.0729	0.31083	41.425	42.721
4-2	3	42.0729	0.31083	41.425	42.721
5-1	3	43.9983	0.31083	43.350	44.647
5-2	3	44.2835	0.31083	43.635	44.932

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=Ustd, Oxide=TiO2 (wt%), Prep Method=AR, Target=1.0490



Oneway Anova
Summary of Fit

Rsquare	0.70266
Adj Rsquare	0.568857
Root Mean Square Error	0.011077
Mean of Response	0.85852
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.00579899	0.000644	5.2514	0.0010
Error	20	0.00245392	0.000123		
C. Total	29	0.00825291			

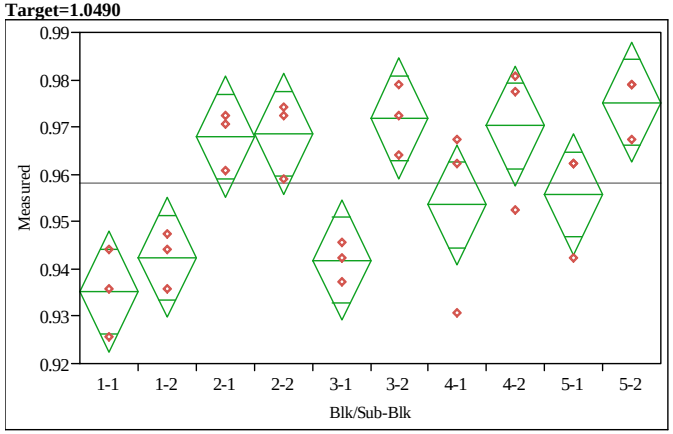
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.829552	0.00640	0.81621	0.84289
1-2	3	0.855128	0.00640	0.84179	0.86847
2-1	3	0.868472	0.00640	0.85513	0.88181
2-2	3	0.868472	0.00640	0.85513	0.88181
3-1	3	0.866248	0.00640	0.85291	0.87959
3-2	3	0.862356	0.00640	0.84902	0.87570
4-1	3	0.835112	0.00640	0.82177	0.84845
4-2	3	0.861800	0.00640	0.84846	0.87514
5-1	3	0.865136	0.00640	0.85180	0.87848
5-2	3	0.872920	0.00640	0.85958	0.88626

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=Ustd, Oxide=TiO2 (wt%), Prep Method=PF, Target=1.0490



Oneway Anova
Summary of Fit

Rsquare	0.718079
Adj Rsquare	0.591215
Root Mean Square Error	0.010571
Mean of Response	0.958266
Observations (or Sum Wgts)	30

Analysis of Variance

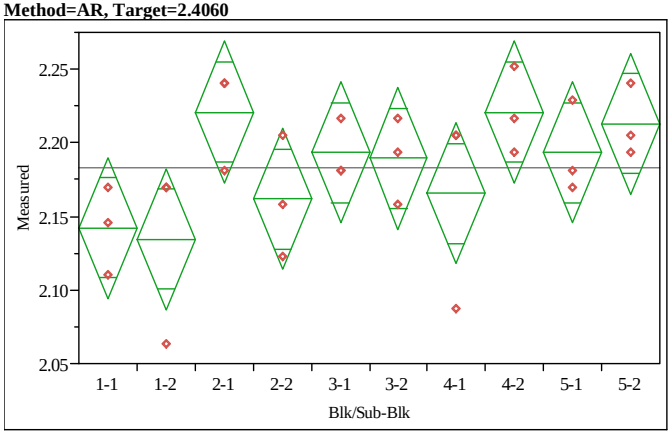
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.00569289	0.000633	5.6602	0.0006
Error	20	0.00223505	0.000112		
C. Total	29	0.00792795			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	0.935192	0.00610	0.92246	0.94792
1-2	3	0.942420	0.00610	0.92969	0.95515
2-1	3	0.967996	0.00610	0.95526	0.98073
2-2	3	0.968552	0.00610	0.95582	0.98128
3-1	3	0.941864	0.00610	0.92913	0.95460
3-2	3	0.971888	0.00610	0.95916	0.98462
4-1	3	0.953540	0.00610	0.94081	0.96627
4-2	3	0.970220	0.00610	0.95749	0.98295
5-1	3	0.955764	0.00610	0.94303	0.96850
5-2	3	0.975224	0.00610	0.96249	0.98796

Std Error uses a pooled estimate of error variance

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=Ustd, Oxide=U3O8 (wt%), Prep Method=AR, Target=2.4060



Oneway Anova
Summary of Fit

Rsquare	0.453169
Adj Rsquare	0.207094
Root Mean Square Error	0.039873
Mean of Response	2.183485
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.02635021	0.002928	1.8416	0.1225
Error	20	0.03179639	0.001590		
C. Total	29	0.05814660			

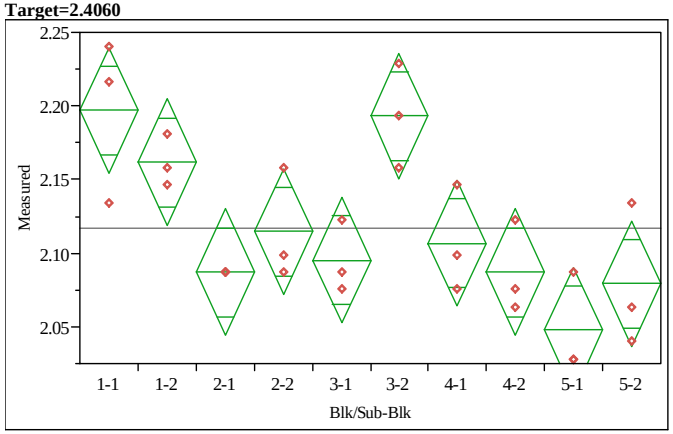
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	2.14221	0.02302	2.0942	2.1902
1-2	3	2.13435	0.02302	2.0863	2.1824
2-1	3	2.22083	0.02302	2.1728	2.2688
2-2	3	2.16187	0.02302	2.1138	2.2099
3-1	3	2.19331	0.02302	2.1453	2.2413
3-2	3	2.18938	0.02302	2.1414	2.2374
4-1	3	2.16580	0.02302	2.1178	2.2138
4-2	3	2.22083	0.02302	2.1728	2.2688
5-1	3	2.19331	0.02302	2.1453	2.2413
5-2	3	2.21297	0.02302	2.1649	2.2610

Std Error uses a pooled estimate of error variance

Exhibit A-5. Measurements by Block and Sub-Block for Samples of the Sb7ref Glass and the Ustd Standard Glass by Oxide by Prep

Oneway Analysis of Measured By Blk/Sub-Blk Glass ID=Ustd, Oxide=U3O8 (wt%), Prep Method=PF, Target=2.4060



Oneway Anova
Summary of Fit

Rsquare	0.731736
Adj Rsquare	0.611018
Root Mean Square Error	0.035441
Mean of Response	2.117057
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Blk/Sub-Blk	9	0.06852446	0.007614	6.0615	0.0004
Error	20	0.02512193	0.001256		
C. Total	29	0.09364639			

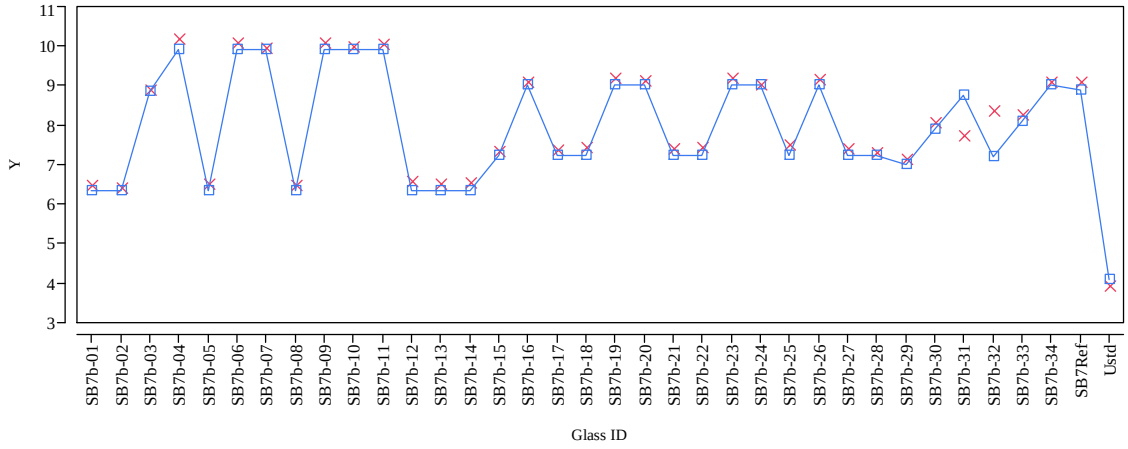
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1-1	3	2.19724	0.02046	2.1546	2.2399
1-2	3	2.16187	0.02046	2.1192	2.2045
2-1	3	2.08718	0.02046	2.0445	2.1299
2-2	3	2.11470	0.02046	2.0720	2.1574
3-1	3	2.09505	0.02046	2.0524	2.1377
3-2	3	2.19331	0.02046	2.1506	2.2360
4-1	3	2.10684	0.02046	2.0642	2.1495
4-2	3	2.08718	0.02046	2.0445	2.1299
5-1	3	2.04788	0.02046	2.0052	2.0906
5-2	3	2.07932	0.02046	2.0366	2.1220

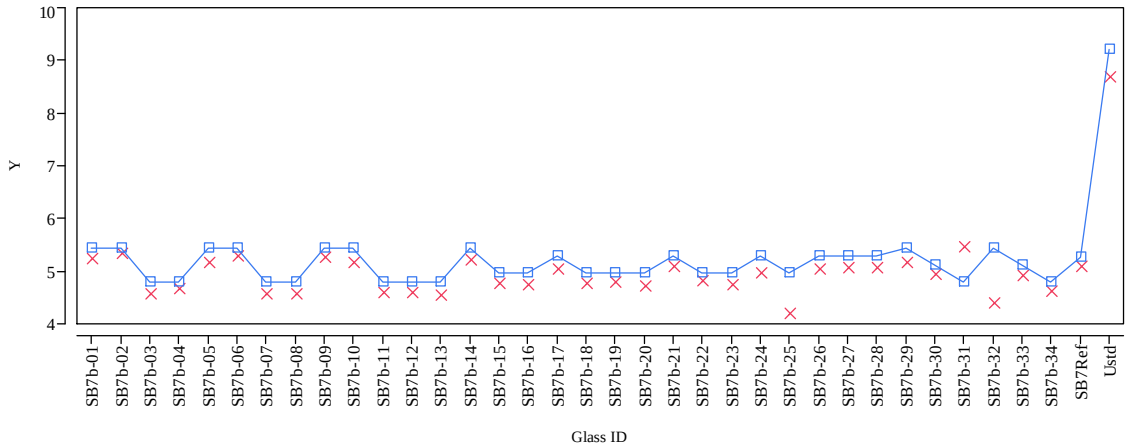
Std Error uses a pooled estimate of error variance

Exhibit A-6. Average Measured Versus Target Compositions by Glass ID by Oxide

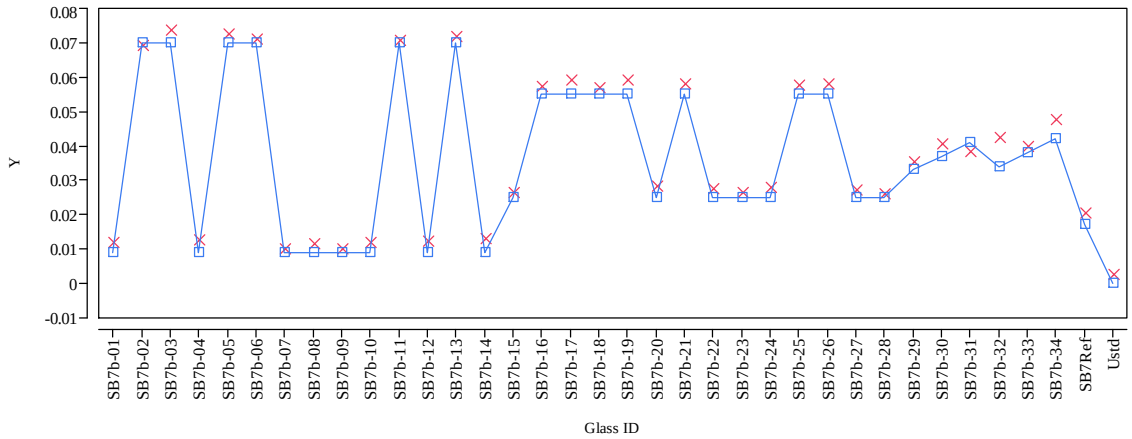
Oxide=Al2O3 (wt%)



Oxide=B2O3 (wt%)



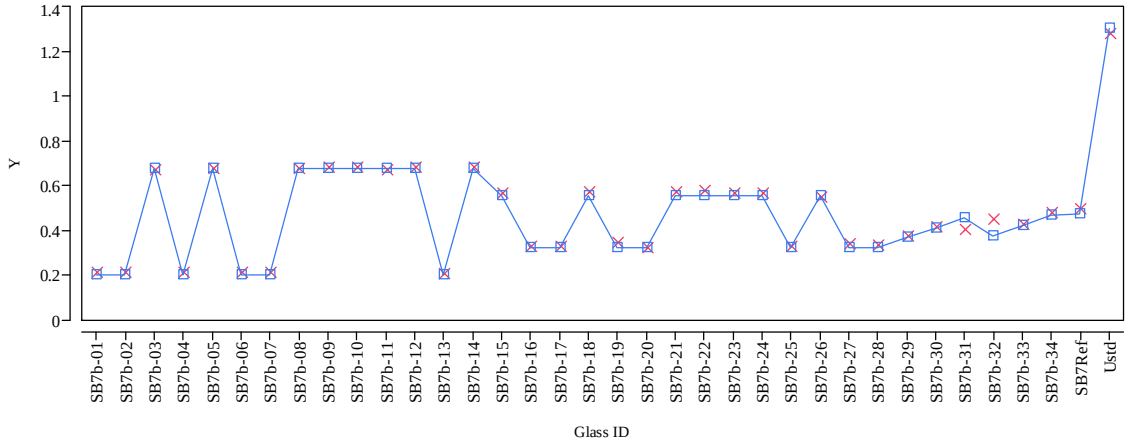
Oxide=BaO (wt%)



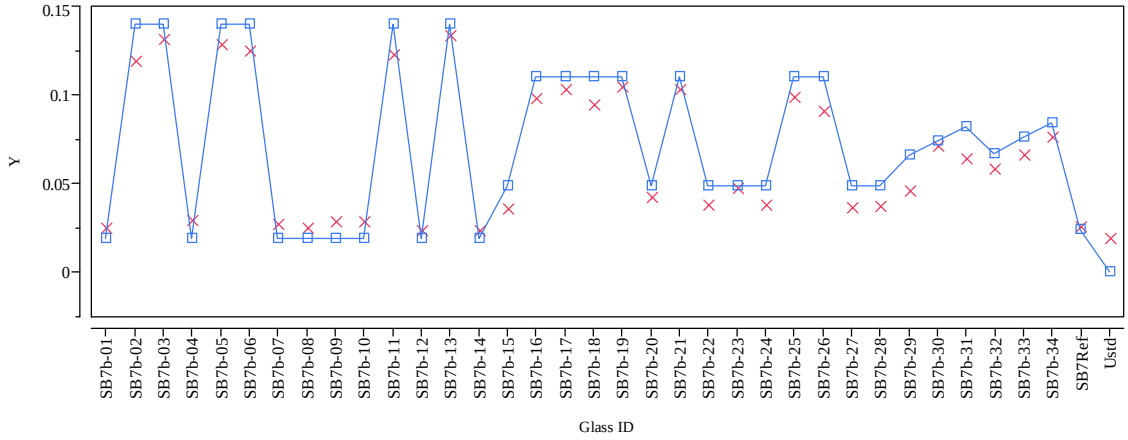
Y × Measured ▫ — Targeted

Exhibit A-6. Average Measured Versus Target Compositions by Glass ID by Oxide

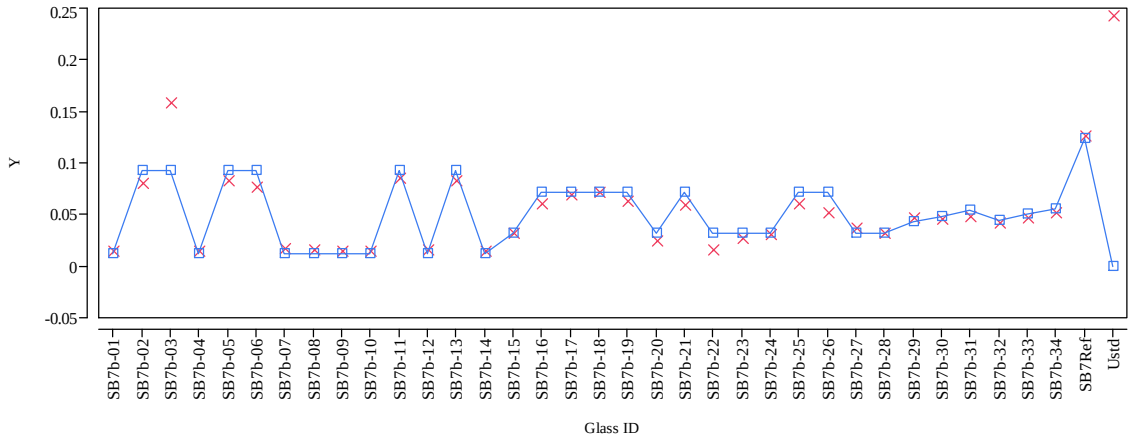
Oxide=CaO (wt%)



Oxide=Ce2O3 (wt%)



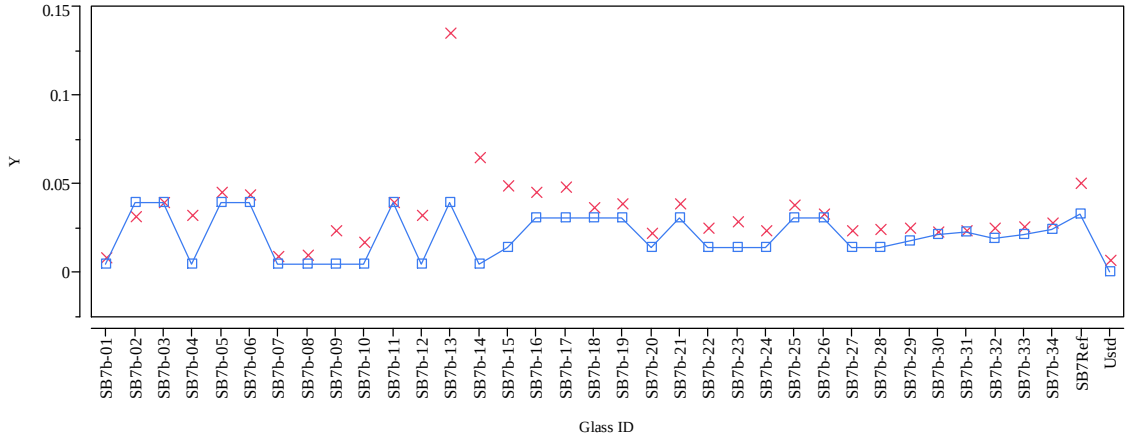
Oxide=Cr2O3 (wt%)



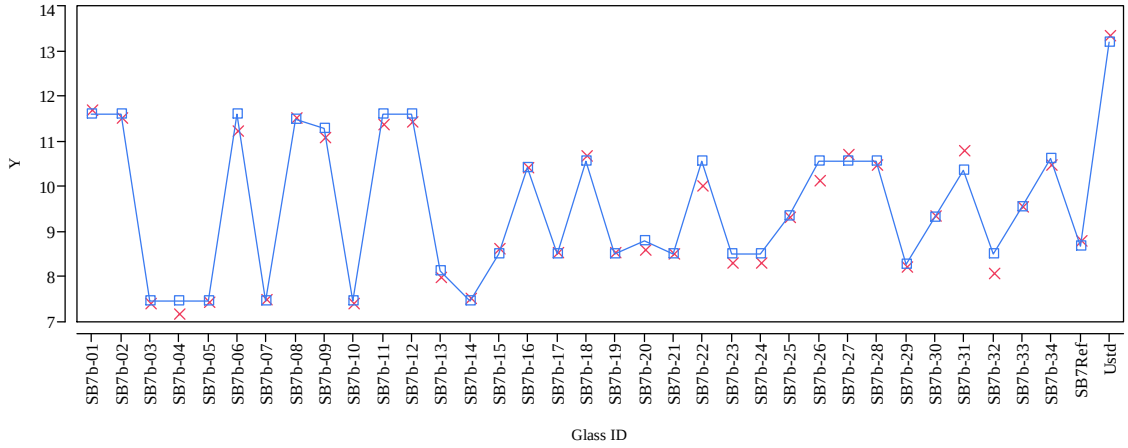
Y Measured Targeted

Exhibit A-6. Average Measured Versus Target Compositions by Glass ID by Oxide

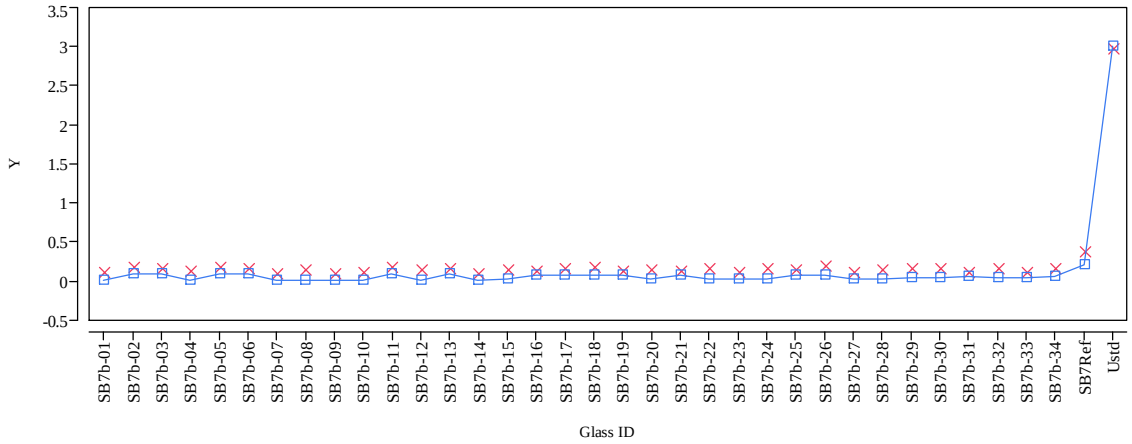
Oxide=CuO (wt%)



Oxide=Fe2O3 (wt%)



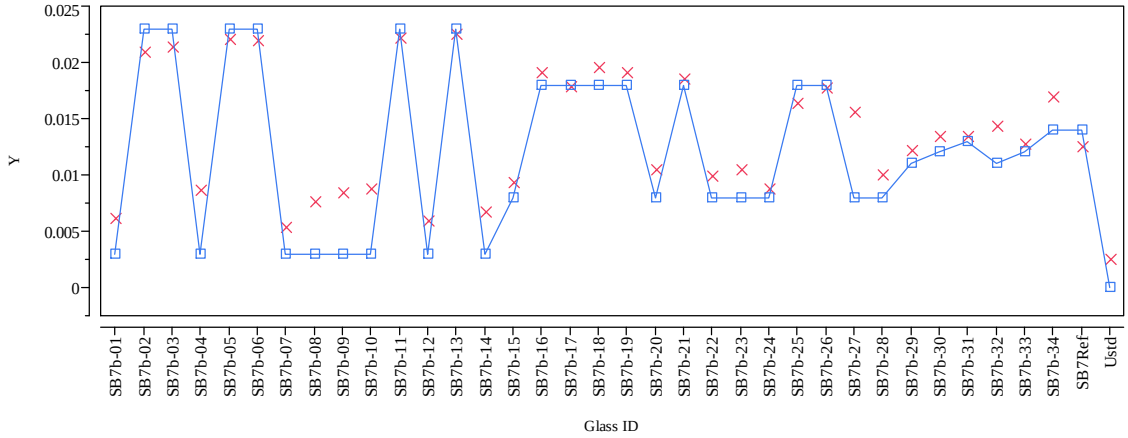
Oxide=K2O (wt%)



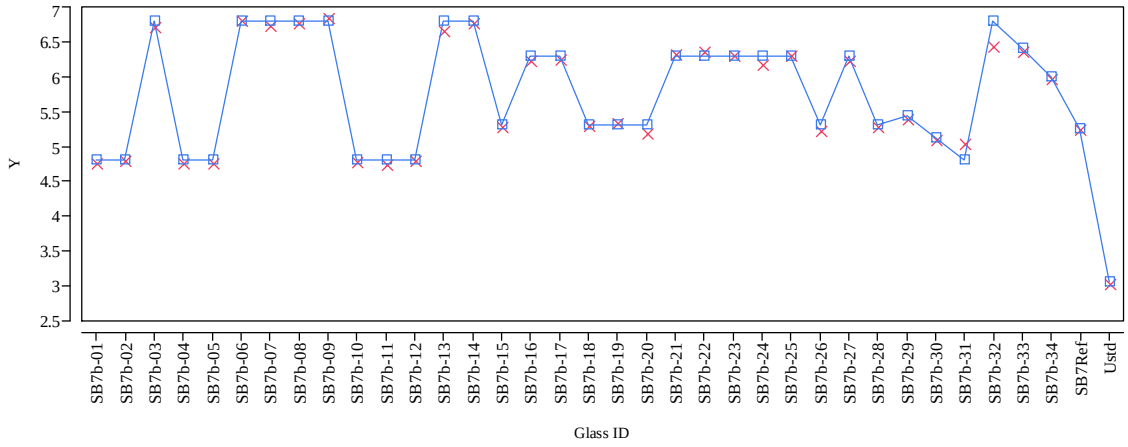
Y Measured Targeted

Exhibit A-6. Average Measured Versus Target Compositions by Glass ID by Oxide

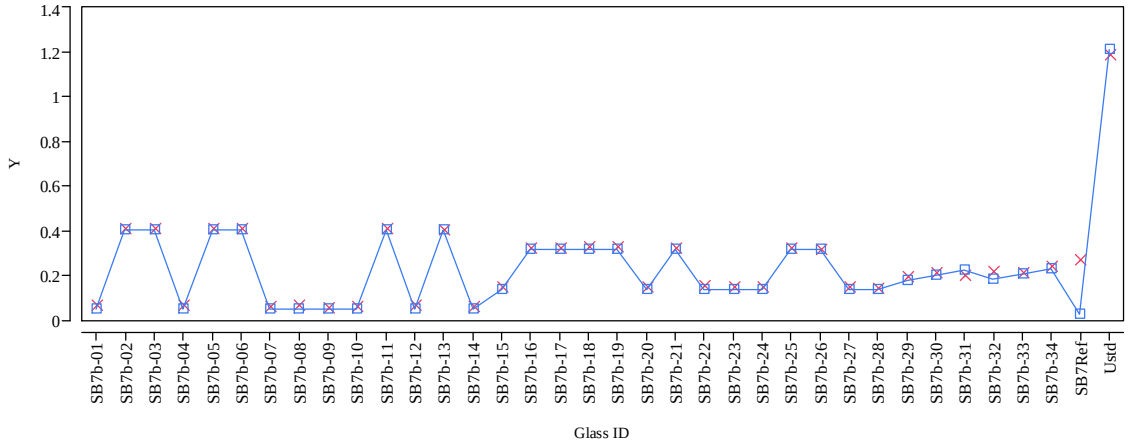
Oxide=La2O3 (wt%)



Oxide=Li2O (wt%)



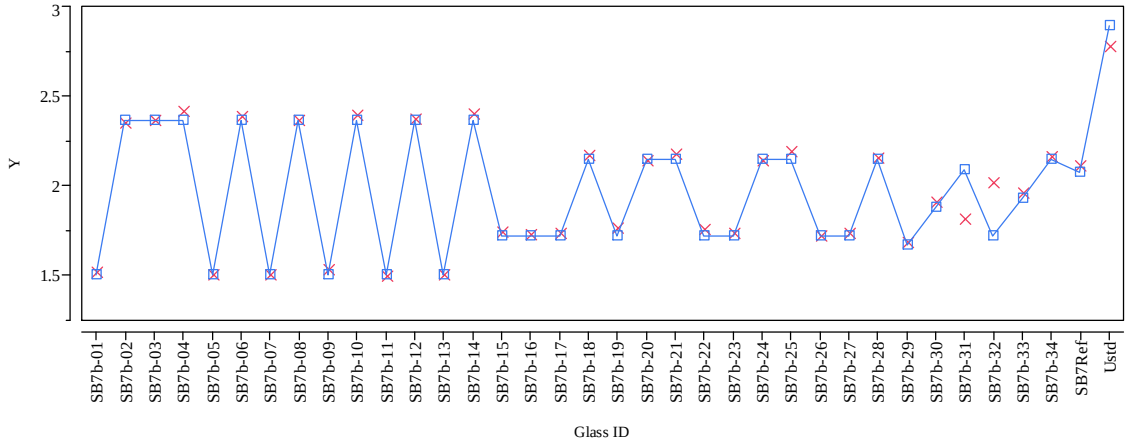
Oxide=MgO (wt%)



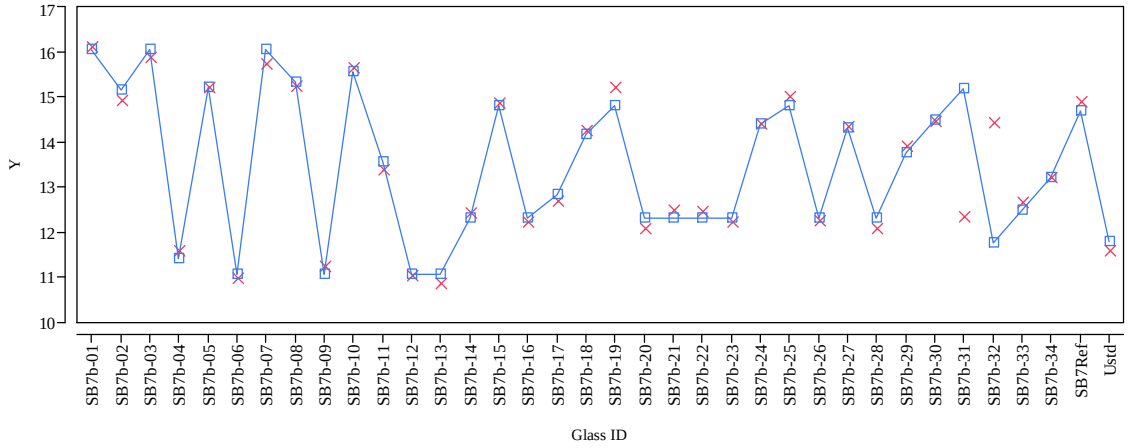
Y Measured Targeted

Exhibit A-6. Average Measured Versus Target Compositions by Glass ID by Oxide

Oxide=MnO (wt%)



Oxide=Na2O (wt%)



Oxide=NiO (wt%)

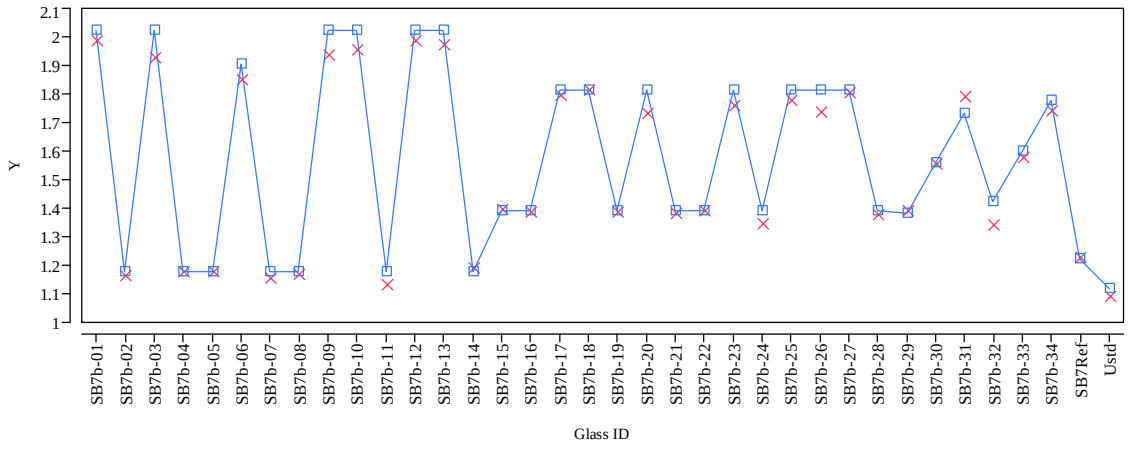
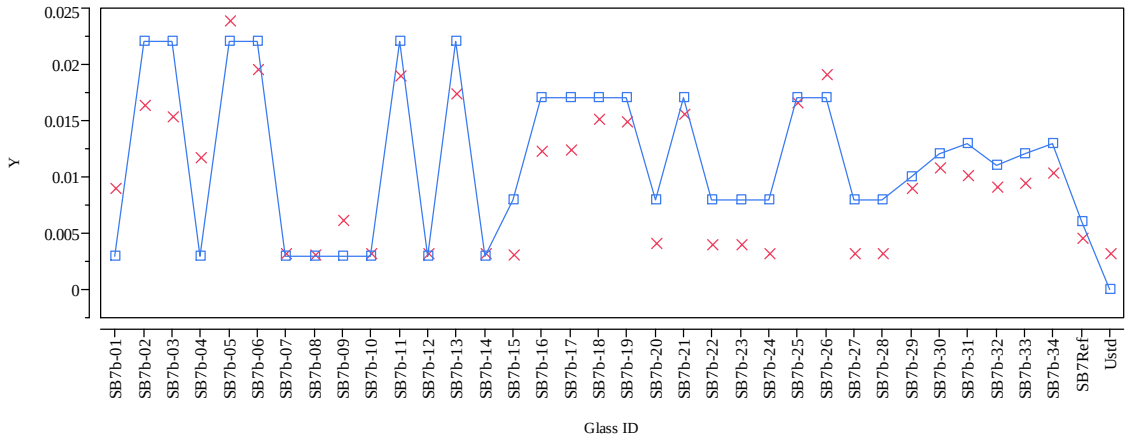
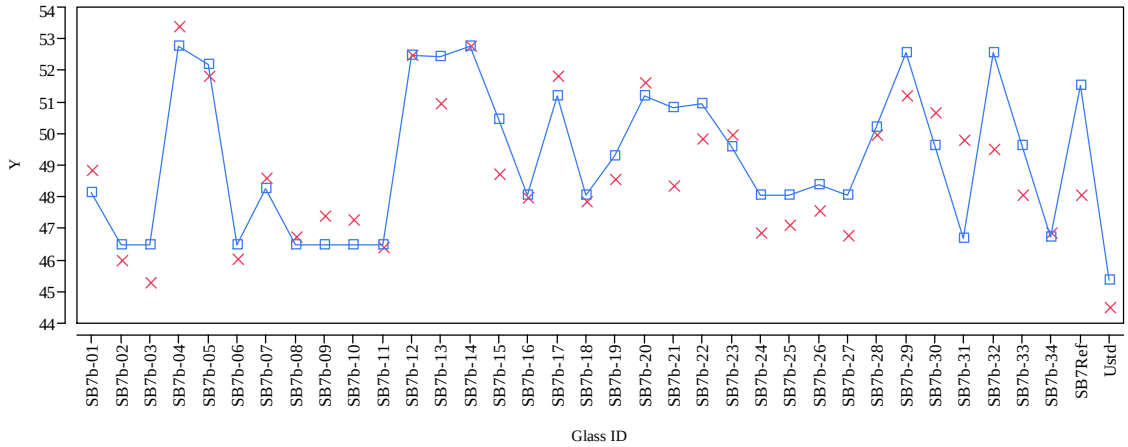


Exhibit A-6. Average Measured Versus Target Compositions by Glass ID by Oxide

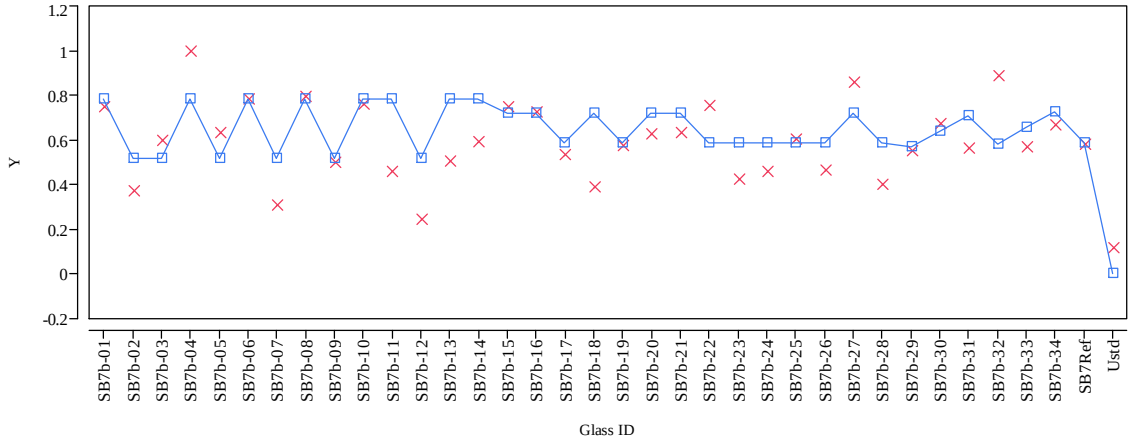
Oxide=PbO (wt%)



Oxide=SiO2 (wt%)



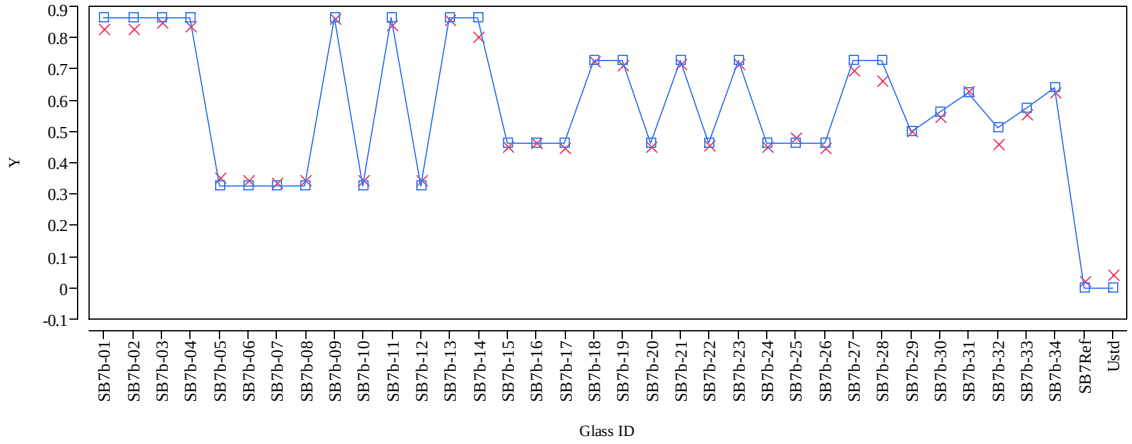
Oxide=SO4 (wt%)



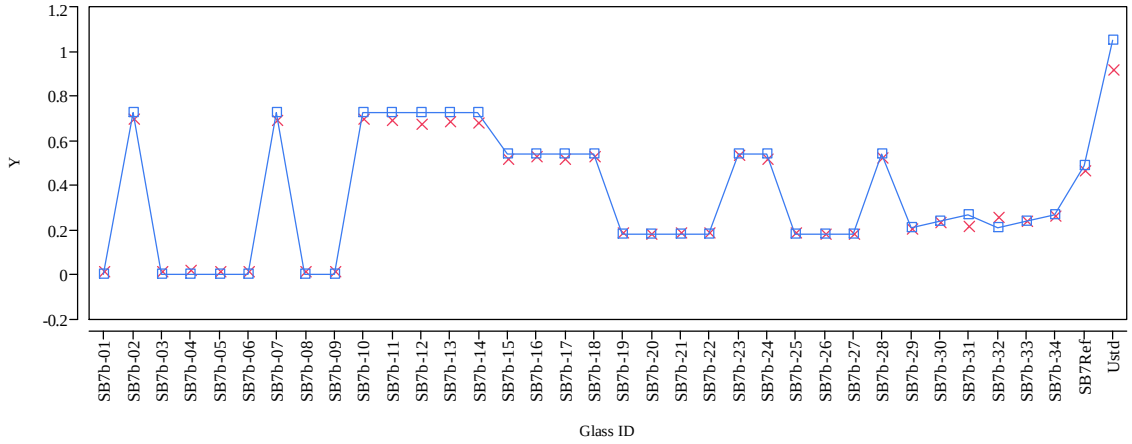
Y Measured Targeted

Exhibit A-6. Average Measured Versus Target Compositions by Glass ID by Oxide

Oxide=ThO2 (wt%)



Oxide=TiO2 (wt%)



Oxide=U3O8 (wt%)

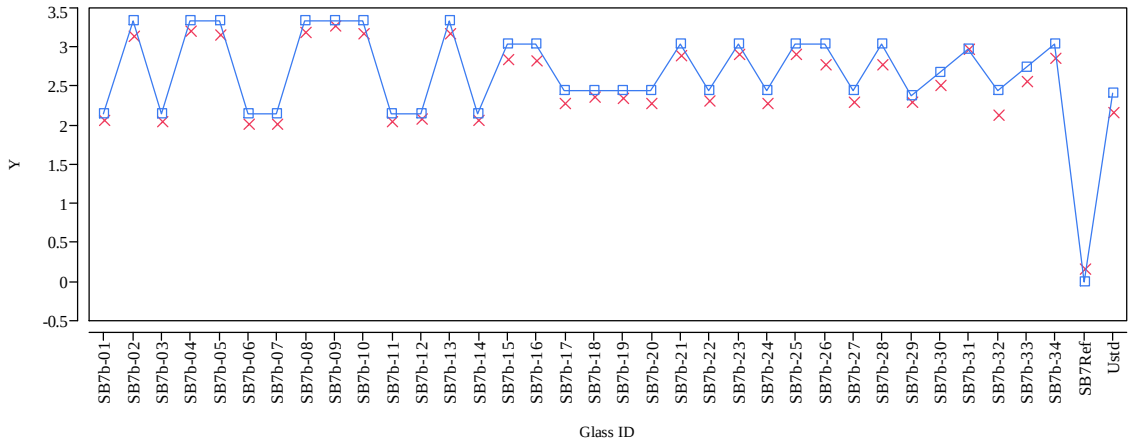
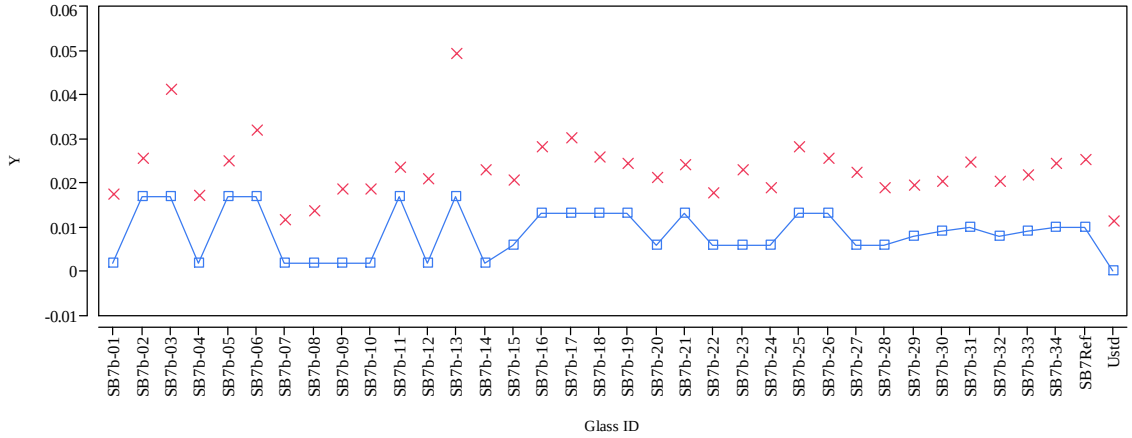
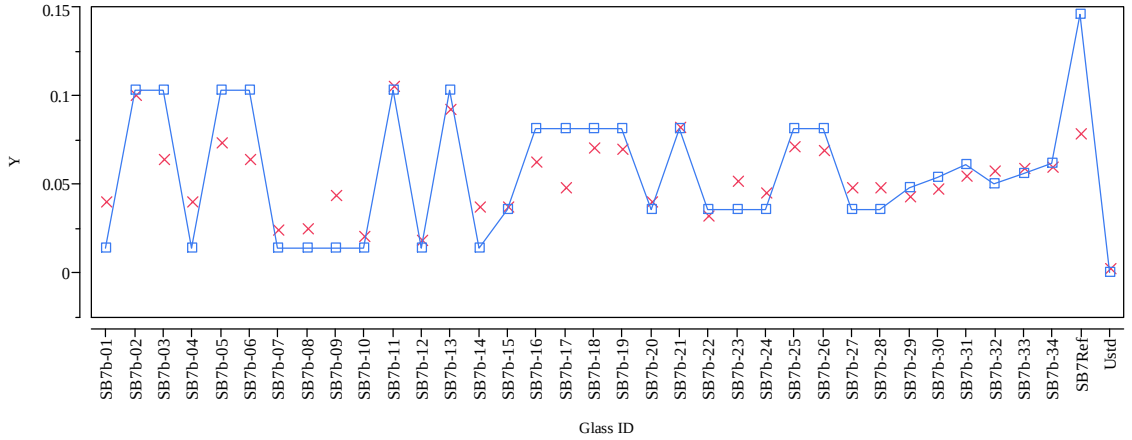


Exhibit A-6. Average Measured Versus Target Compositions by Glass ID by Oxide

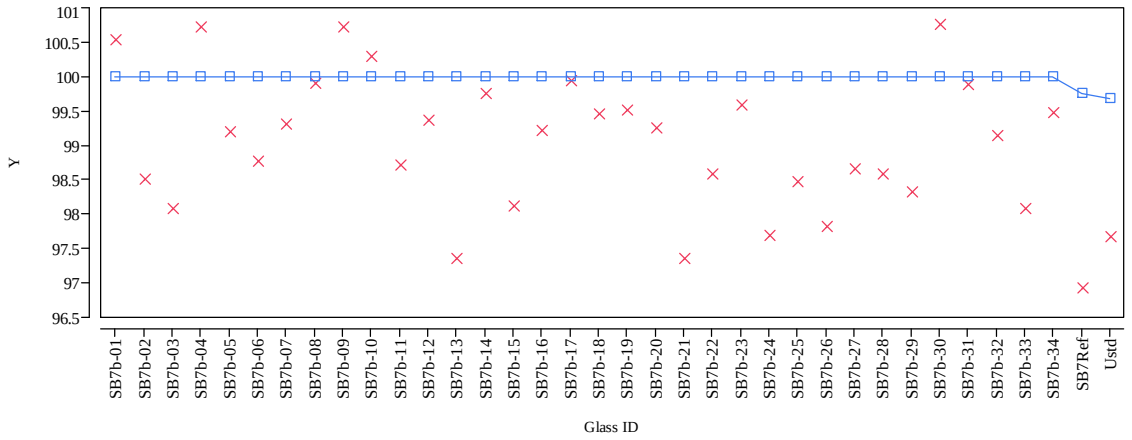
Oxide=ZnO (wt%)



Oxide=ZrO2 (wt%)



Oxide=Sum of Oxides



Y Measured Targeted

Appendix B. Tables and Exhibits Supporting the Analysis of the PCT Results

Table B-1. As-Received (ar) and Adjusted Measurements of the PCT Solutions (in ppm)

Set	Glass ID (w HT)	Block	Seq	Lab ID	B ar	Li ar	Na ar	Si ar	B (ppm)	Li (ppm)	Na (ppm)	Si (ppm)
1	Soln Std	1	1	STD_11	19.9	10	82.9	52.9	19.900	10.000	82.900	52.900
1	SB7b-01ccc	1	2	B084	9.25	13	82.4	97.6	15.417	21.667	137.336	162.670
1	SB7b-09	1	3	B071	8.14	17.1	40.4	77.5	13.567	28.501	67.335	129.169
1	SB7b-08ccc	1	4	B098	16.7	51.7	137	196	27.834	86.168	228.338	326.673
1	SB7b-07	1	5	B067	8.14	20.7	107	108	13.567	34.501	178.337	180.004
1	SB7b-14ccc	1	6	B047	9.6	30.2	59.1	144	16.000	50.334	98.502	240.005
1	blank	1	7	B072	< 0.0808	< 0.0268	< 0.212	< 0.176	0.067	0.022	0.177	0.147
1	SB7b-17ccc	1	8	B017	7.92	18.3	52.8	95.7	13.200	30.501	88.002	159.503
1	ARM-1	1	9	B079	10.4	8.32	22	38.6	17.334	13.867	36.667	64.335
1	SB7b-01	1	10	B021	9.23	11.7	86.8	97.4	15.384	19.500	144.670	162.337
1	Soln Std	1	11	STD_12	19.8	9.83	82.4	52.4	19.800	9.830	82.400	52.400
1	SB7b-09ccc	1	12	B089	9.33	30.5	47.6	111	15.550	50.834	79.335	185.004
1	SB7b-04	1	13	B038	4.39	9.08	25.3	67.8	7.317	15.134	42.168	113.002
1	SB7b-06ccc	1	14	B092	8.3	23	44.9	98	13.834	38.334	74.835	163.337
1	SB7b-14	1	15	B082	8.08	18	53	91.1	13.467	30.001	88.335	151.836
1	SB7b-06	1	16	B020	8.22	16.6	40.7	79.1	13.700	27.667	67.835	131.836
1	SB7b-07ccc	1	17	B035	10.3	40.2	109	165	17.167	67.001	181.670	275.006
1	SB7b-17	1	18	B004	7.44	15.1	53.1	90.6	12.400	25.167	88.502	151.003
1	SB7b-08	1	19	B008	12.7	27.6	122	126	21.167	46.001	203.337	210.004
1	SB7b-04ccc	1	20	B024	4.39	8.88	25.5	67.3	7.317	14.800	42.501	112.169
1	EA	1	21	B046	28.4	9.37	81	49.2	473.334	156.167	1350.003	820.002
1	Soln Std	1	22	STD_13	19.8	9.79	82.4	52.1	19.800	9.790	82.400	52.100
1	Soln Std	2	1	STD_21	19.7	9.91	83.3	52.1	19.700	9.910	83.300	52.100
1	SB7b-08ccc	2	2	B060	17	51.9	140	188	28.334	86.502	233.338	313.340
1	SB7b-01ccc	2	3	B009	9.38	13.1	84.6	94.7	15.634	21.834	141.003	157.836
1	SB7b-04	2	4	B039	4.45	9.23	25.6	68.7	7.417	15.384	42.668	114.502
1	SB7b-04ccc	2	5	B016	4.44	9.06	26	68.5	7.400	15.100	43.334	114.169
1	ARM-1	2	6	B068	10.6	8.53	22.9	38.9	17.667	14.217	38.167	64.835
1	SB7b-09ccc	2	7	B053	9.38	30.9	48.4	113	15.634	51.501	80.668	188.337
1	SB7b-06	2	8	B096	8.21	16.6	40.9	78.7	13.684	27.667	68.168	131.169
1	SB7b-14	2	9	B003	8.26	19.1	55.3	93.9	13.767	31.834	92.169	156.503
1	EA	2	10	B051	29.4	9.45	85.1	49.7	490.001	157.500	1418.336	828.335
1	Soln Std	2	11	STD_22	19.9	9.84	83.2	52.3	19.900	9.840	83.200	52.300
1	SB7b-09	2	12	B010	8.11	16.9	40.7	76.5	13.517	28.167	67.835	127.503
1	SB7b-07ccc	2	13	B011	10.3	40.4	109	176	17.167	67.335	181.670	293.339
1	SB7b-07	2	14	B018	8.13	20.6	108	108	13.550	34.334	180.004	180.004
1	SB7b-14ccc	2	15	B076	9.58	30.2	59.8	134	15.967	50.334	99.669	223.338
1	SB7b-08	2	16	B102	12.7	27.7	123	124	21.167	46.168	205.004	206.671
1	SB7b-17ccc	2	17	B081	7.89	18.4	53.1	92.5	13.150	30.667	88.502	154.170
1	SB7b-01	2	18	B056	9.39	12.3	90.2	91.7	15.650	20.500	150.336	152.836
1	SB7b-17	2	19	B026	7.35	15.2	53.2	84.7	12.250	25.334	88.668	141.169
1	SB7b-06ccc	2	20	B057	8.15	22.7	44.5	96.3	13.584	37.834	74.168	160.503
1	Soln Std	2	21	STD_23	19.8	9.87	83.5	52.3	19.800	9.870	83.500	52.300
1	Soln Std	3	1	STD_31	19.9	9.87	83.5	52.2	19.900	9.870	83.500	52.200
1	SB7b-01	3	2	B001	9.45	12.4	91.1	93.3	15.750	20.667	151.836	155.503
1	SB7b-09	3	3	B041	8	16.8	40.1	75.7	13.334	28.001	66.835	126.169
1	SB7b-09ccc	3	4	B027	15.6	51	80.6	199	26.001	85.002	134.336	331.673
1	ARM-1	3	5	B097	10.6	8.53	22.9	38.9	17.667	14.217	38.167	64.835
1	SB7b-14ccc	3	6	B058	9.53	30.1	59.5	124	15.884	50.168	99.169	206.671
1	SB7b-08ccc	3	7	B028	17	51.7	141	192	28.334	86.168	235.005	320.006
1	SB7b-14	3	8	B014	8.32	19	55.3	93.9	13.867	31.667	92.169	156.503
1	EA	3	9	B012	29.5	9.57	85.3	49.9	491.668	159.500	1421.670	831.668
1	SB7b-17ccc	3	10	B049	7.96	18.5	53.4	96	13.267	30.834	89.002	160.003
1	Soln Std	3	11	STD_32	19.9	9.97	83.7	52.4	19.900	9.970	83.700	52.400
1	SB7b-06ccc	3	12	B043	8.14	22.7	44.1	93.9	13.567	37.834	73.501	156.503
1	SB7b-06	3	13	B044	8.21	16.8	41.4	77.5	13.684	28.001	69.001	129.169
1	SB7b-07	3	14	B073	7.94	20.3	105	103	13.234	33.834	175.004	171.670
1	SB7b-08	3	15	B103	12.7	27.8	123	124	21.167	46.334	205.004	206.671
1	SB7b-01ccc	3	16	B036	9.39	13.2	85.4	91.8	15.650	22.000	142.336	153.003
1	SB7b-07ccc	3	17	B029	10.2	40.1	110	144	17.000	66.835	183.337	240.005
1	SB7b-17	3	18	B109	7.33	15.1	53.2	84.5	12.217	25.167	88.668	140.836
1	SB7b-04	3	19	B074	4.3	9.2	25.5	65.8	7.167	15.334	42.501	109.669
1	SB7b-04ccc	3	20	B104	4.36	8.97	25.8	66.7	7.267	14.950	43.001	111.169
1	Soln Std	3	21	STD_33	19.7	9.87	83.5	52.1	19.700	9.870	83.500	52.100
1	Soln Std	4	1	STD_41	19.7	10.1	82.9	51.7	19.700	10.100	82.900	51.700
1	SB7b-03	4	2	B088	9.91	24	121	103	16.517	40.001	201.671	171.670
1	SB7b-15	4	3	B013	7.04	13.6	71.4	87.6	11.734	22.667	119.002	146.003
1	SB7b-10	4	4	B075	7.1	9.91	68.6	72.7	11.834	16.517	114.336	121.169
1	SB7b-15ccc	4	5	B090	6.9	13.8	65.3	85.8	11.500	23.000	108.836	143.003
1	SB7b-13	4	6	B087	6.76	17	40.9	85.5	11.267	28.334	68.168	142.503
1	SB7b-10ccc	4	7	B007	7.25	11	66.5	72.8	12.084	18.334	110.836	121.336
1	SB7b-16ccc	4	8	B050	6.71	15.6	44.3	79.5	11.184	26.001	73.835	132.503

Table B-1. As-Received (ar) and Adjusted Measurements of the PCT Solutions (in ppm)

Set	Glass ID (w HT)	Block	Seq	Lab ID	B ar	Li ar	Na ar	Si ar	B (ppm)	Li (ppm)	Na (ppm)	Si (ppm)
1	SB7b-12	4	9	B065	5.61	10.4	31.9	72.9	9.350	17.334	53.168	121.502
1	SB7b-05	4	10	B019	7.3	11.3	69.7	81.3	12.167	18.834	116.169	135.503
1	Soln Std	4	11	STD_42	19.5	9.9	82.4	51	19.500	9.900	82.400	51.000
1	SB7b-02ccc	4	12	B062	9.24	13.1	71.9	81.4	15.400	21.834	119.836	135.669
1	SB7b-05ccc	4	13	B083	7.22	11.5	65.4	80.7	12.034	19.167	109.002	134.503
1	SB7b-12ccc	4	14	B094	5.64	10.3	31.9	72.3	9.400	17.167	53.168	120.502
1	SB7b-02	4	15	B037	9.36	12.7	78.1	82.1	15.600	21.167	130.169	136.836
1	SB7b-11ccc	4	16	B078	5.67	9.83	44.5	63.1	9.450	16.384	74.168	105.169
1	SB7b-16	4	17	B033	6.54	14.1	44.7	75.6	10.900	23.500	74.501	126.003
1	SB7b-11	4	18	B069	5.9	10.1	47.1	63.6	9.834	16.834	78.502	106.002
1	SB7b-03ccc	4	19	B059	14.4	44.8	128	146	24.000	74.668	213.338	243.338
1	SB7b-13ccc	4	20	B093	8.52	27	48.9	116	14.200	45.001	81.502	193.337
1	Soln Std	4	21	STD_43	19.5	9.95	82.5	51.2	19.500	9.950	82.500	51.200
1	Soln Std	5	1	STD_51	19.8	9.82	83	52.2	19.800	9.820	83.000	52.200
1	SB7b-03ccc	5	2	B040	14.6	46.8	128	152	24.334	78.002	213.338	253.338
1	SB7b-10ccc	5	3	B095	7.46	11.1	68	75.2	12.434	18.500	113.336	125.336
1	SB7b-15ccc	5	4	B077	6.89	13.3	64.6	86.5	11.484	22.167	107.669	144.170
1	SB7b-10	5	5	B031	7.34	10.3	71.4	73.9	12.234	17.167	119.002	123.169
1	SB7b-11	5	6	B105	5.99	10	47.9	65.9	9.984	16.667	79.835	109.836
1	SB7b-15	5	7	B064	6.95	13.2	71.2	88.6	11.584	22.000	118.669	147.670
1	SB7b-16ccc	5	8	B005	7	16.3	46	82.7	11.667	27.167	76.668	137.836
1	SB7b-05	5	9	B070	7.59	11.4	72.1	86	12.650	19.000	120.169	143.336
1	SB7b-13ccc	5	10	B055	8.65	27.6	49.6	117	14.417	46.001	82.668	195.004
1	Soln Std	5	11	STD_52	19.6	9.75	82.6	52.1	19.600	9.750	82.600	52.100
1	SB7b-02	5	12	B100	9.59	12.7	79.4	84.9	15.984	21.167	132.336	141.503
1	SB7b-11ccc	5	13	B030	5.52	9.31	43.5	62.5	9.200	15.517	72.501	104.169
1	SB7b-05ccc	5	14	B032	7.01	10.9	62.9	80.2	11.684	18.167	104.835	133.669
1	SB7b-16	5	15	B061	6.69	14.2	45.2	76.1	11.150	23.667	75.335	126.836
1	SB7b-12	5	16	B080	5.77	10.3	32.5	74.6	9.617	17.167	54.168	124.336
1	SB7b-13	5	17	B048	6.96	17.8	42.2	90.6	11.600	29.667	70.335	151.003
1	SB7b-12ccc	5	18	B042	5.64	10.2	32.1	74.8	9.400	17.000	53.501	124.669
1	SB7b-02ccc	5	19	B091	8.89	12.3	69.7	80.9	14.817	20.500	116.169	134.836
1	SB7b-03	5	20	B066	9.98	24.4	123	105	16.634	40.667	205.004	175.004
1	Soln Std	5	21	STD_53	19.8	9.94	83.6	52.6	19.800	9.940	83.600	52.600
1	Soln Std	6	1	STD_61	19.7	9.79	82.8	52	19.700	9.790	82.800	52.000
1	SB7b-15ccc	6	2	B099	6.9	13.4	64.9	102	11.500	22.334	108.169	170.003
1	SB7b-02	6	3	B106	9.42	12.5	78.3	86.6	15.700	20.834	130.503	144.336
1	SB7b-16	6	4	B107	6.62	14	44.9	82.3	11.034	23.334	74.835	137.169
1	SB7b-05	6	5	B054	7.38	11.1	70.6	87.5	12.300	18.500	117.669	145.836
1	SB7b-10	6	6	B063	7.34	10.4	71.6	76.2	12.234	17.334	119.336	127.003
1	SB7b-10ccc	6	7	B101	7.28	10.9	66.7	74.7	12.134	18.167	111.169	124.502
1	SB7b-03	6	8	B034	10.2	25	127	109	17.000	41.668	211.671	181.670
1	SB7b-16ccc	6	9	B006	7.12	16.5	46.8	82.6	11.867	27.501	78.002	137.669
1	SB7b-15	6	10	B045	6.99	13.1	71.5	90.1	11.650	21.834	119.169	150.170
1	Soln Std	6	11	STD_62	19.7	9.76	82.4	52	19.700	9.760	82.400	52.000
1	SB7b-05ccc	6	12	B108	7.1	11	63.4	81	11.834	18.334	105.669	135.003
1	SB7b-02ccc	6	13	B086	9.01	12.3	70.6	82.2	15.017	20.500	117.669	137.003
1	SB7b-11ccc	6	14	B002	5.62	9.53	44	63.7	9.367	15.884	73.335	106.169
1	SB7b-13	6	15	B052	6.92	17.6	42.1	89.4	11.534	29.334	70.168	149.003
1	SB7b-12	6	16	B015	5.81	10.3	32.7	74.6	9.684	17.167	54.501	124.336
1	SB7b-13ccc	6	17	B085	8.51	27.2	49.2	120	14.184	45.334	82.002	200.004
1	SB7b-03ccc	6	18	B110	14.6	46.4	130	159	24.334	77.335	216.671	265.005
1	SB7b-12ccc	6	19	B025	5.77	10.2	32.2	74.3	9.617	17.000	53.668	123.836
1	blank	6	20	B023	< 0.0808	< 0.0268	< 0.212	< 0.176	0.067	0.022	0.177	0.147
1	SB7b-11	6	21	B022	5.97	9.98	47.9	65.6	9.950	16.634	79.835	109.336
1	Soln Std	6	22	STD_63	19.7	9.84	83.4	52.4	19.700	9.840	83.400	52.400
2	Soln Std	1	1	STD_11	19.8	9.98	82.9	52.1	19.800	9.980	82.900	52.100
2	SB7b-28	1	2	C036	7.68	12.7	46.7	78.6	12.800	21.167	77.835	131.003
2	ARM-1	1	3	C022	11.5	9.16	24.6	40.8	19.167	15.267	41.001	68.001
2	SB7b-31	1	4	C067	7.58	11.5	43.7	72.8	12.634	19.167	72.835	121.336
2	EA	1	5	C057	19.6	7.16	58.7	38.5	326.667	119.334	978.335	641.668
2	SB7b-32	1	6	C088	7.73	20.4	86	102	12.884	34.001	143.336	170.003
2	SB7b-30	1	7	C080	7.5	12.9	69.5	87.5	12.500	21.500	115.836	145.836
2	blank	1	8	C055	< 0.0808	< 0.0268	< 0.212	< 0.176	0.067	0.022	0.177	0.147
2	SB7b-33	1	9	C056	7.69	17.1	54.1	86.9	12.817	28.501	90.168	144.836
2	SB7b-28ccc	1	10	C079	7.31	13.8	44.7	81.8	12.184	23.000	74.501	136.336
2	Soln Std	1	11	STD_12	19.7	10	82.9	52	19.700	10.000	82.900	52.000
2	SB7b-22ccc	1	12	C070	7.54	19.8	51.6	95.7	12.567	33.001	86.002	159.503
2	SB7b-22	1	13	C013	7.59	18	55.5	95	12.650	30.001	92.502	158.337
2	SB7b-25	1	14	C031	10.7	40.8	105	147	17.834	68.001	175.004	245.005
2	SB7b-25ccc	1	15	C012	10.1	24.7	113	121	16.834	41.167	188.337	201.671
2	SB7b-20ccc	1	16	C104	5.89	12.4	40.6	78.5	9.817	20.667	67.668	130.836

Table B-1. As-Received (ar) and Adjusted Measurements of the PCT Solutions (in ppm)

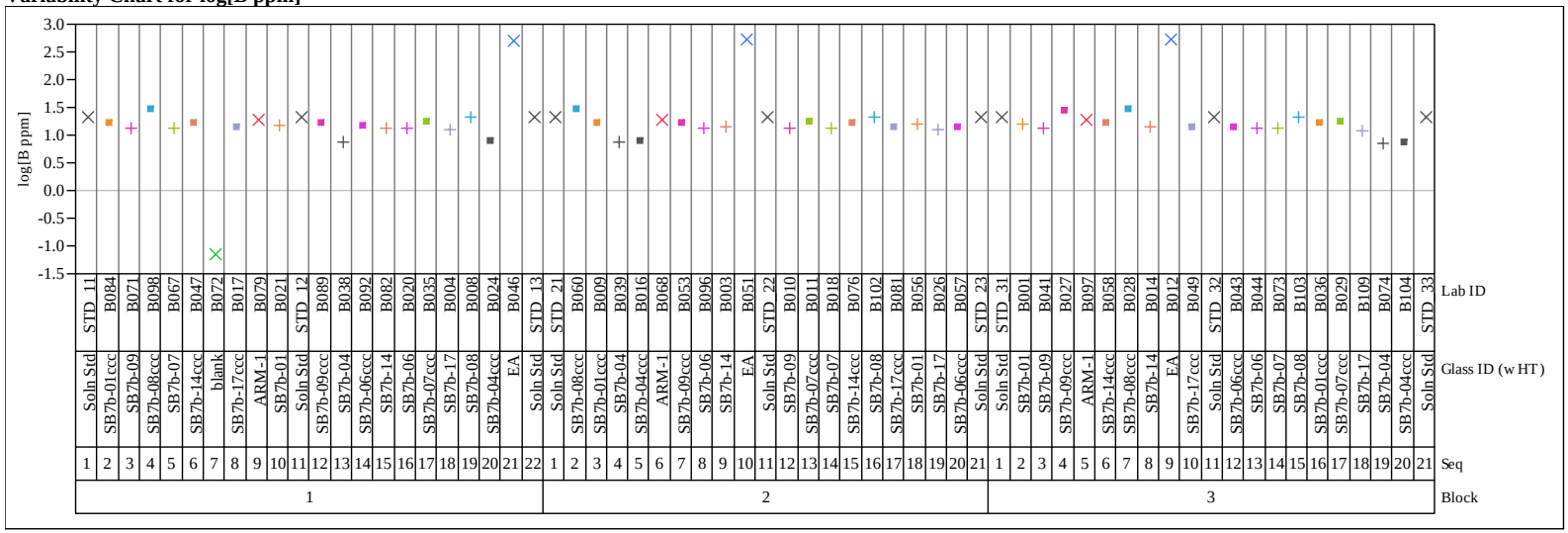
Set	Glass ID (w HT)	Block	Seq	Lab ID	B ar	Li ar	Na ar	Si ar	B (ppm)	Li (ppm)	Na (ppm)	Si (ppm)
2	SB7b-31ccc	1	17	C021	7.61	11.8	42.7	73.3	12.684	19.667	71.168	122.169
2	SB7b-33ccc	1	18	C008	8.78	36.2	87.2	133	14.634	60.335	145.336	221.671
2	SB7b-20	1	19	C101	5.88	12.1	41.7	77.7	9.800	20.167	69.501	129.503
2	SB7b-30ccc	1	20	C037	7.15	12.9	61.8	82.2	11.917	21.500	103.002	137.003
2	SB7b-32ccc	1	21	C038	8.4	22	54.6	97.7	14.000	36.667	91.002	162.837
2	Soln Std	1	22	STD_13	20	10.2	84.1	52.8	20.000	10.200	84.100	52.800
2	Soln Std	2	1	STD_21	20.2	10.1	84.7	52.8	20.200	10.100	84.700	52.800
2	SB7b-20ccc	2	2	C082	5.87	12.1	40.1	78.7	9.784	20.167	66.835	131.169
2	SB7b-32	2	3	C027	7.67	20.2	85.3	102	12.784	33.667	142.170	170.003
2	SB7b-33ccc	2	4	C092	7.66	15.7	60.4	80.7	12.767	26.167	100.669	134.503
2	EA	2	5	C020	19.9	7.12	59.3	38.8	331.667	118.667	988.335	646.668
2	SB7b-33	2	6	C028	7.88	17.8	58.8	85.9	13.134	29.667	98.002	143.170
2	SB7b-31ccc	2	7	C052	7.64	11.7	41.8	73.8	12.734	19.500	69.668	123.002
2	SB7b-25	2	8	C107	10.8	40.6	105	148	18.000	67.668	175.004	246.672
2	SB7b-31	2	9	C087	7.7	11.6	43.9	73.8	12.834	19.334	73.168	123.002
2	SB7b-30ccc	2	10	C091	7.26	12.8	61.9	82.3	12.100	21.334	103.169	137.169
2	Soln Std	2	11	STD_22	20.1	10.1	84.3	52.8	20.100	10.100	84.300	52.800
2	SB7b-22	2	12	C049	7.21	17	52.9	89.7	12.017	28.334	88.168	149.503
2	SB7b-28ccc	2	13	C018	7.4	13.8	44.8	81.4	12.334	23.000	74.668	135.669
2	SB7b-20	2	14	C034	5.95	12.2	41.8	78.6	9.917	20.334	69.668	131.003
2	SB7b-32ccc	2	15	C058	8.5	22.2	55.5	99	14.167	37.001	92.502	165.003
2	SB7b-25ccc	2	16	C060	9.88	24.2	111	119	16.467	40.334	185.004	198.337
2	SB7b-30	2	17	C062	7.45	12.9	68.8	87.1	12.417	21.500	114.669	145.170
2	SB7b-28	2	18	C105	7.63	13	46.9	80.6	12.717	21.667	78.168	134.336
2	SB7b-22ccc	2	19	C007	7.63	20.1	52.2	98.1	12.717	33.501	87.002	163.503
2	ARM-1	2	20	C094	11.1	9.07	23.9	40.3	18.500	15.117	39.834	67.168
2	Soln Std	2	21	STD_23	19.9	10.1	83.4	52.8	19.900	10.100	83.400	52.800
2	Soln Std	3	1	STD_31	20	10.1	83.7	52.7	20.000	10.100	83.700	52.700
2	SB7b-25ccc	3	2	C090	8.59	20.5	93.6	106	14.317	34.167	156.003	176.670
2	SB7b-20	3	3	C095	5.83	11.9	41.1	77.3	9.717	19.834	68.501	128.836
2	ARM-1	3	4	C086	11	8.88	23.7	40.4	18.334	14.800	39.501	67.335
2	SB7b-32ccc	3	5	C024	8.57	22	55.3	101	14.284	36.667	92.169	168.337
2	SB7b-28	3	6	C074	7.46	12.8	46	79.6	12.434	21.334	76.668	132.669
2	SB7b-28ccc	3	7	C109	7.49	13.9	44.9	83.5	12.484	23.167	74.835	139.169
2	SB7b-31ccc	3	8	C023	7.58	11.8	41.5	73.5	12.634	19.667	69.168	122.502
2	SB7b-33ccc	3	9	C064	7.74	17.8	57.7	85.4	12.900	29.667	96.169	142.336
2	SB7b-22ccc	3	10	C071	7.64	20.1	52.5	96.7	12.734	33.501	87.502	161.170
2	Soln Std	3	11	STD_32	19.7	10	82.6	51.8	19.700	10.000	82.600	51.800
2	SB7b-33	3	12	C054	7.68	17.1	53.3	86	12.800	28.501	88.835	143.336
2	SB7b-22	3	13	C006	7.53	17.9	54.8	95.1	12.550	29.834	91.335	158.503
2	SB7b-25	3	14	C081	10.6	40.5	103	147	17.667	67.501	171.670	245.005
2	SB7b-32	3	15	C001	7.81	20.8	86.4	105	13.017	34.667	144.003	175.004
2	SB7b-30ccc	3	16	C098	7.27	12.9	62.1	82.7	12.117	21.500	103.502	137.836
2	SB7b-20ccc	3	17	C041	5.83	12.1	39.7	77.7	9.717	20.167	66.168	129.503
2	EA	3	18	C072	19.1	6.93	56.6	37.5	318.334	115.500	943.335	625.001
2	SB7b-30	3	19	C096	7.49	12.9	68.6	86.8	12.484	21.500	114.336	144.670
2	SB7b-31	3	20	C029	7.52	11.5	42.7	72.5	12.534	19.167	71.168	120.836
2	Soln Std	3	21	STD_33	19.9	10.1	83.3	52.5	19.900	10.100	83.300	52.500
2	Soln Std	4	1	STD_41	20	10.1	84.5	52.7	20.000	10.100	84.500	52.700
2	SB7b-29	4	2	C099	7.69	14.3	63.2	91.7	12.817	23.834	105.335	152.836
2	SB7b-21ccc	4	3	C106	8.15	19.3	51.5	90.9	13.584	32.167	85.835	151.503
2	SB7b-23ccc	4	4	C014	7.07	18.5	48.5	88.8	11.784	30.834	80.835	148.003
2	SB7b-23	4	5	C042	6.44	15	46.2	78.1	10.734	25.001	77.002	130.169
2	SB7b-27	4	6	C089	10.7	20.7	91.4	107	17.834	34.501	152.336	178.337
2	SB7b-18ccc	4	7	C069	8.23	14.5	67.7	85.2	13.717	24.167	112.836	142.003
2	SB7b-27ccc	4	8	C065	12.9	38.8	99.1	146	21.500	64.668	165.170	243.338
2	SB7b-19ccc	4	9	C050	6.85	13.4	66.1	83.7	11.417	22.334	110.169	139.503
2	SB7b-21	4	10	C051	7.89	17	53.1	86.8	13.150	28.334	88.502	144.670
2	Soln Std	4	11	STD_42	19.6	9.98	83.2	51.9	19.600	9.980	83.200	51.900
2	SB7b-24ccc	4	12	C030	9.04	23.9	74.7	104	15.067	39.834	124.502	173.337
2	SB7b-29ccc	4	13	C102	7.57	14.8	59.3	91.9	12.617	24.667	98.835	153.170
2	SB7b-18	4	14	C032	8.06	14	70.1	83.3	13.434	23.334	116.836	138.836
2	SB7b-19	4	15	C059	6.81	12.8	71	83	11.350	21.334	118.336	138.336
2	SB7b-34	4	16	C061	7.78	17.3	55	87.7	12.967	28.834	91.669	146.170
2	SB7b-26ccc	4	17	C100	7.15	13	43.9	74.8	11.917	21.667	73.168	124.669
2	SB7b-24	4	18	C035	7.83	16.6	71.8	87.8	13.050	27.667	119.669	146.336
2	SB7b-34ccc	4	19	C044	8.84	36.3	88.5	133	14.734	60.501	147.503	221.671
2	SB7b-26	4	20	C043	6.88	11.7	42.8	70.3	11.467	19.500	71.335	117.169
2	Soln Std	4	21	STD_43	19.6	9.99	83.8	51.9	19.600	9.990	83.800	51.900
2	Soln Std	5	1	STD_51	19.7	9.79	82.5	51.7	19.700	9.790	82.500	51.700
2	SB7b-26ccc	5	2	C085	7.22	12.6	43	74.1	12.034	21.000	71.668	123.502
2	SB7b-18ccc	5	3	C033	8.28	14.2	67.2	85.4	13.800	23.667	112.002	142.336

Table B-1. As-Received (ar) and Adjusted Measurements of the PCT Solutions (in ppm)

Set	Glass ID (w HT)	Block	Seq	Lab ID	B ar	Li ar	Na ar	Si ar	B (ppm)	Li (ppm)	Na (ppm)	Si (ppm)
2	SB7b-27	5	4	C010	11.2	21.2	94.7	107	18.667	35.334	157.836	178.337
2	SB7b-18	5	5	C045	8.33	14	71.9	85.4	13.884	23.334	119.836	142.336
2	SB7b-21ccc	5	6	C068	8.16	19.1	51.4	92.4	13.600	31.834	85.668	154.003
2	SB7b-21	5	7	C103	7.76	16.5	51.8	84.9	12.934	27.501	86.335	141.503
2	SB7b-23ccc	5	8	C040	6.74	17.4	46	83.9	11.234	29.001	76.668	139.836
2	SB7b-29ccc	5	9	C053	7.44	14.2	58.1	91.7	12.400	23.667	96.835	152.836
2	SB7b-29	5	10	C016	7.28	13.2	60.3	86.9	12.134	22.000	100.502	144.836
2	Soln Std	5	11	STD_52	19.7	9.87	82.8	51.8	19.700	9.870	82.800	51.800
2	SB7b-24ccc	5	12	C108	8.92	23.2	73.5	105	14.867	38.667	122.502	175.004
2	SB7b-23	5	13	C046	6.42	14.6	46.1	78.5	10.700	24.334	76.835	130.836
2	SB7b-26	5	14	C048	7.09	11.9	43.9	72.9	11.817	19.834	73.168	121.502
2	SB7b-19ccc	5	15	C011	6.74	13.1	65.2	83.7	11.234	21.834	108.669	139.503
2	SB7b-34	5	16	C075	7.57	15.5	60.4	80.1	12.617	25.834	100.669	133.503
2	SB7b-19	5	17	C093	6.81	12.8	71.4	83.8	11.350	21.334	119.002	139.669
2	SB7b-24	5	18	C004	7.92	16.5	72.2	88	13.200	27.501	120.336	146.670
2	SB7b-27ccc	5	19	C015	12.6	37.2	96.4	145	21.000	62.001	160.670	241.672
2	SB7b-34ccc	5	20	C063	8.7	35.5	87	132	14.500	59.168	145.003	220.004
2	Soln Std	5	21	STD_53	19.8	9.93	83.7	52.4	19.800	9.930	83.700	52.400
2	Soln Std	6	1	STD_61	19.8	9.86	83	52.2	19.800	9.860	83.000	52.200
2	SB7b-26ccc	6	2	C047	7.12	12.5	42.7	74.1	11.867	20.834	71.168	123.502
2	SB7b-23ccc	6	3	C025	6.92	17.8	46.8	96.3	11.534	29.667	78.002	160.503
2	SB7b-34ccc	6	4	C083	7.83	17.8	59.1	85.6	13.050	29.667	98.502	142.670
2	SB7b-21	6	5	C019	7.88	16.7	52.6	86.3	13.134	27.834	87.668	143.836
2	SB7b-18ccc	6	6	C078	8	13.9	65.2	83.3	13.334	23.167	108.669	138.836
2	SB7b-29	6	7	C003	7.3	13.3	60.5	87.8	12.167	22.167	100.835	146.336
2	SB7b-27ccc	6	8	C002	12.6	37.5	96.8	143	21.000	62.501	161.337	238.338
2	SB7b-29ccc	6	9	C005	7.12	13.6	55.9	86.8	11.867	22.667	93.169	144.670
2	SB7b-24ccc	6	10	C039	8.67	22.8	71.9	102	14.450	38.001	119.836	170.003
2	Soln Std	6	11	STD_62	19.7	9.77	82.7	52	19.700	9.770	82.700	52.000
2	SB7b-26	6	12	C066	7.03	11.8	43.5	71.8	11.717	19.667	72.501	119.669
2	blank	6	13	C077	< 0.0808	< 0.601	< 0.212	< 0.176	0.067	0.501	0.177	0.147
2	SB7b-18	6	14	C076	8.05	13.6	69.6	83.8	13.417	22.667	116.002	139.669
2	SB7b-19ccc	6	15	C097	6.53	12.6	62.9	84.1	10.884	21.000	104.835	140.169
2	SB7b-24	6	16	C084	8	16.1	71.9	86.7	13.334	26.834	119.836	144.503
2	SB7b-19	6	17	C073	6.83	12.7	70.8	83.6	11.384	21.167	118.002	139.336
2	SB7b-23	6	18	C110	6.44	14.8	46.4	80.1	10.734	24.667	77.335	133.503
2	SB7b-21ccc	6	19	C017	8.21	19.4	52.2	95.2	13.684	32.334	87.002	158.670
2	SB7b-34	6	20	C026	7.55	15.3	60	80.7	12.584	25.501	100.002	134.503
2	SB7b-27	6	21	C009	10.6	20.1	90	103	17.667	33.501	150.003	171.670
2	Soln Std	6	22	STD_63	19.9	9.93	83.4	52.4	19.900	9.930	83.400	52.400

Exhibit B-1. PCT Measurements (as Common Logarithms) in Analytical Sequence for Blocks 1- 3 for Analytical Set 1

Set=1
Variability Chart for log[B ppm]



Set=1
Variability Chart for log[Li ppm]

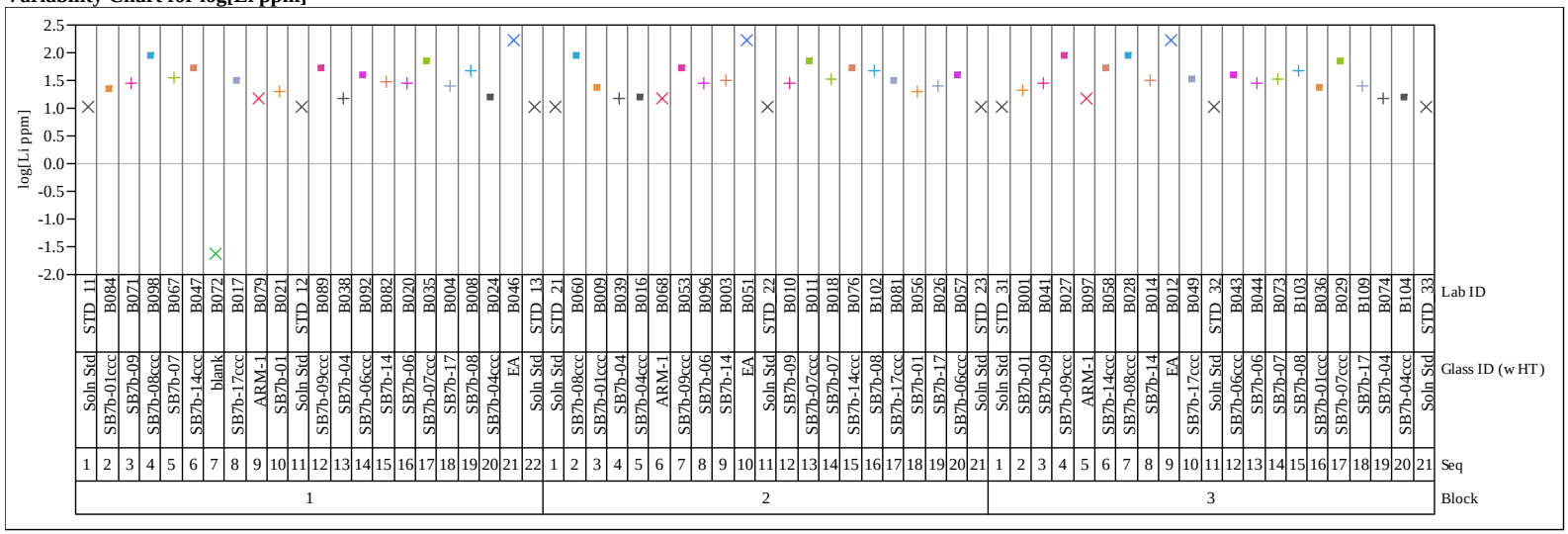
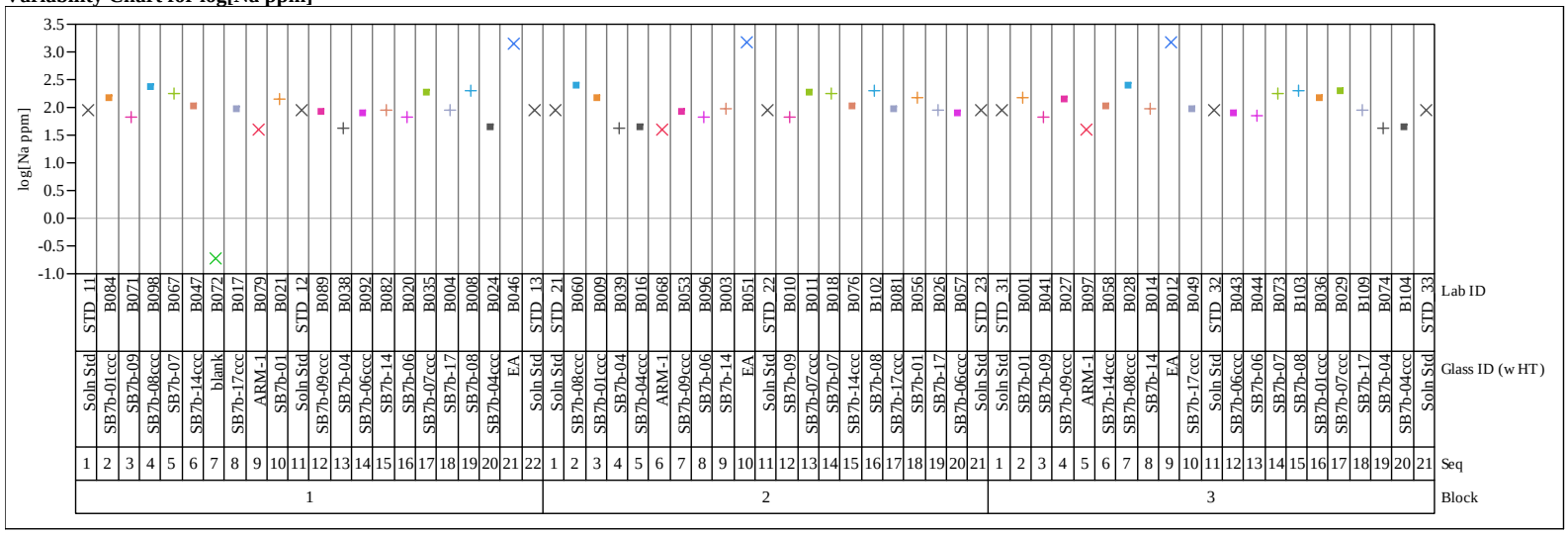


Exhibit B-1. PCT Measurements (as Common Logarithms) in Analytical Sequence for Blocks 1- 3 for Analytical Set 1

Set=1
Variability Chart for log[Na ppm]



Set=1
Variability Chart for log[Si ppm]

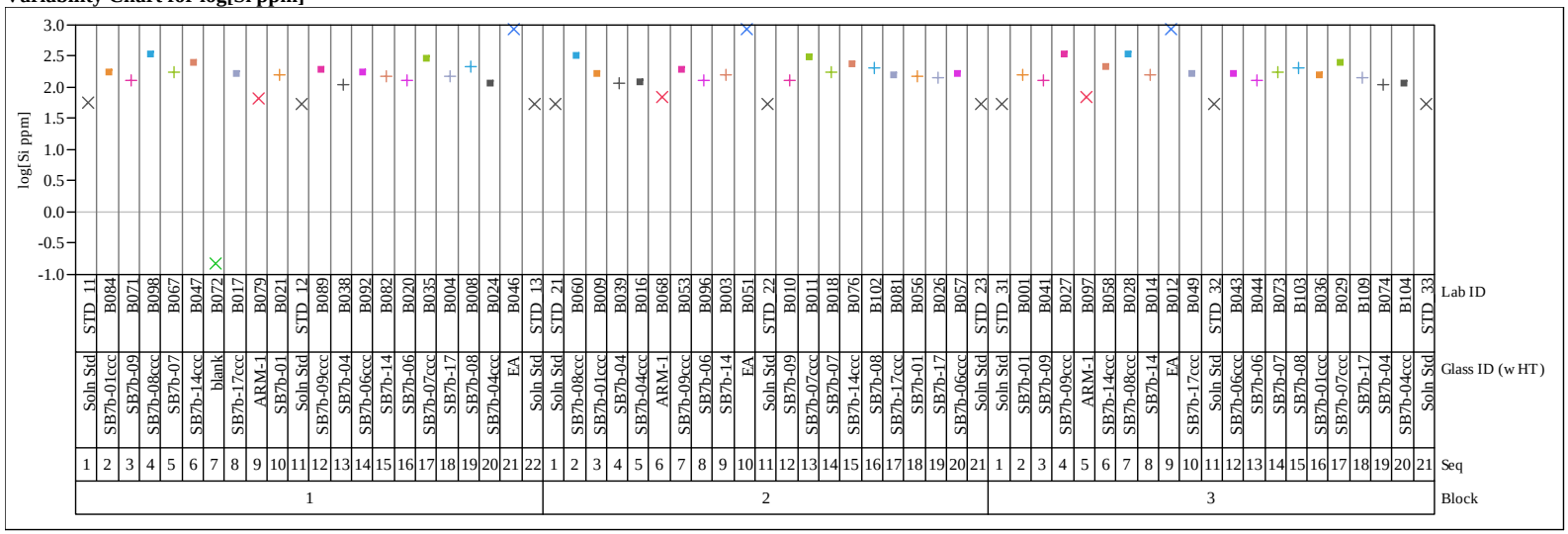
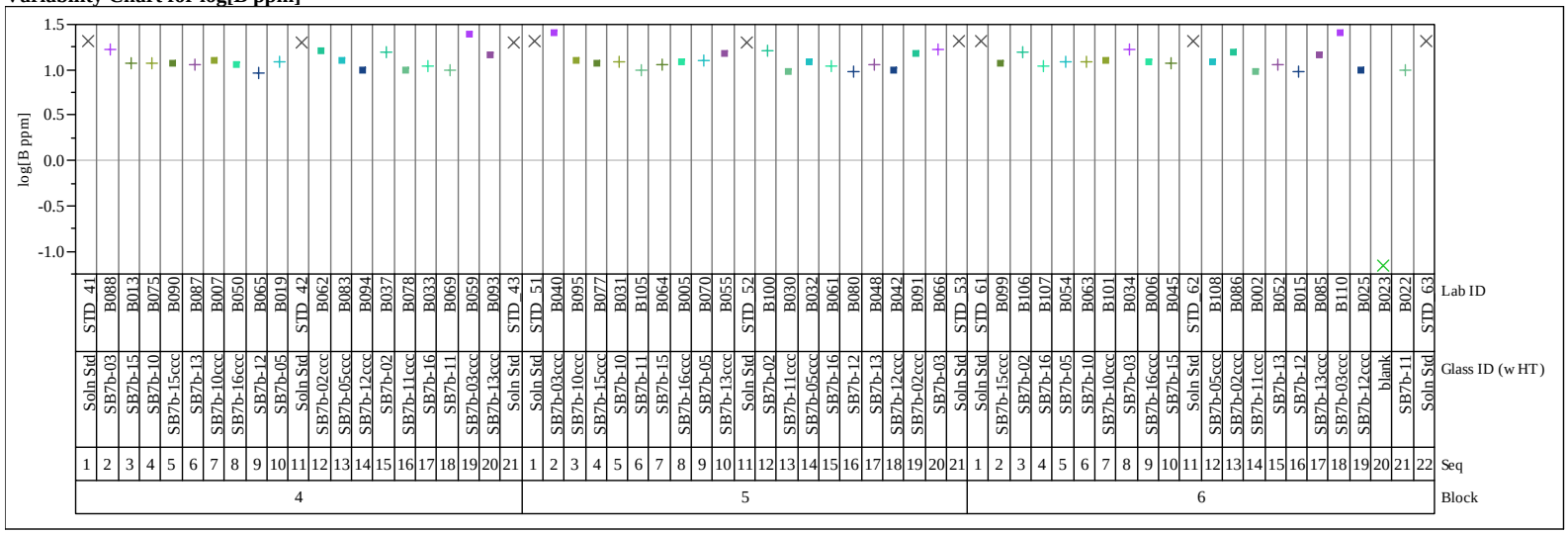


Exhibit B-2. PCT Measurements (as Common Logarithms) in Analytical Sequence for Blocks 4- 6 for Analytical Set 1

Set=1
Variability Chart for log[B ppm]



Set=1
Variability Chart for log[Li ppm]

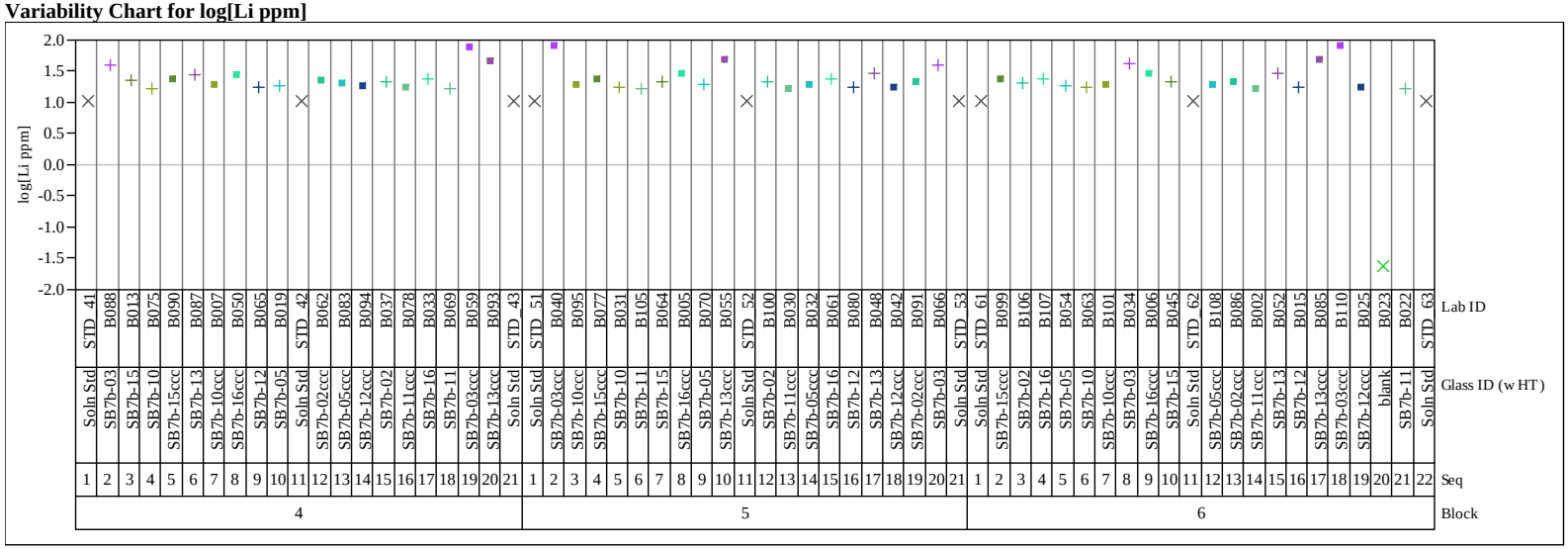
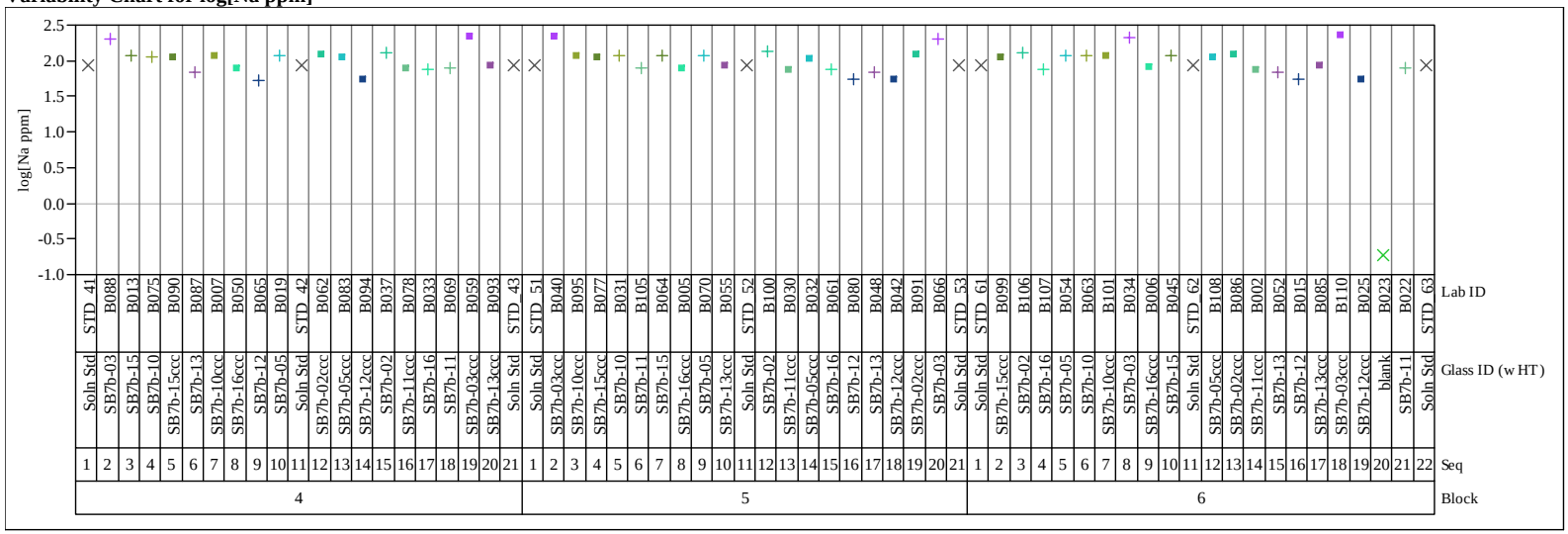


Exhibit B-2. PCT Measurements (as Common Logarithms) in Analytical Sequence for Blocks 4- 6 for Analytical Set 1

Set=1
Variability Chart for log[Na ppm]



Set=1
Variability Chart for log[Si ppm]

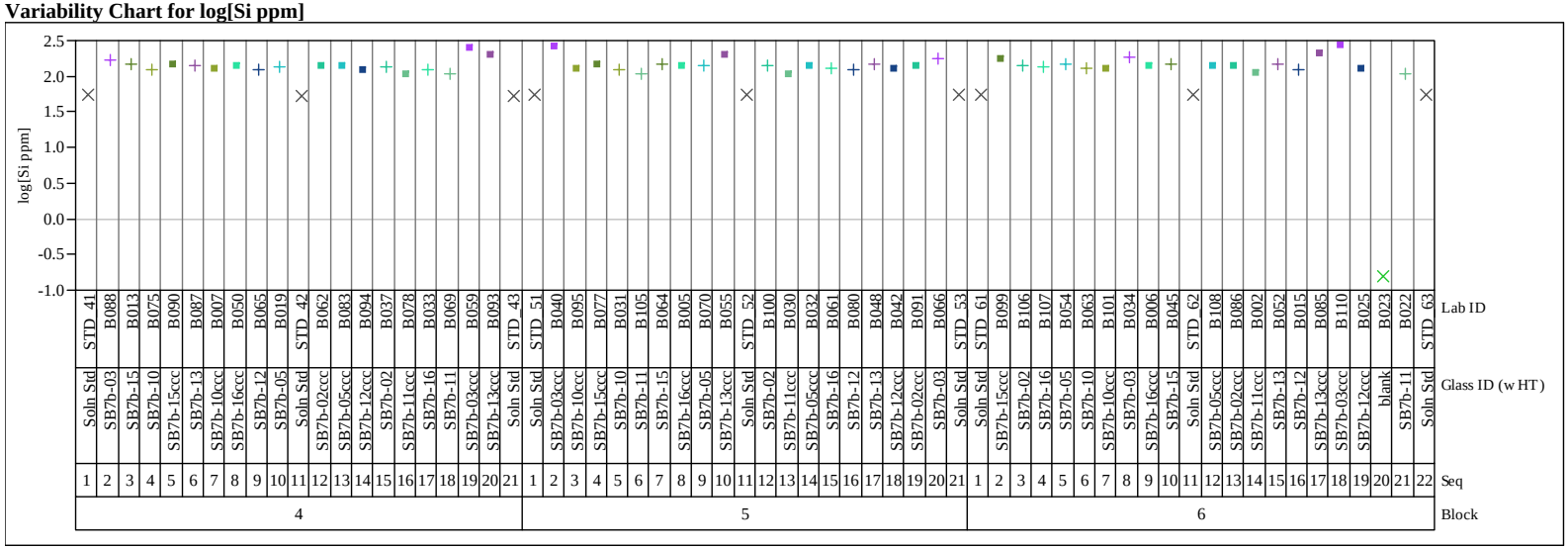
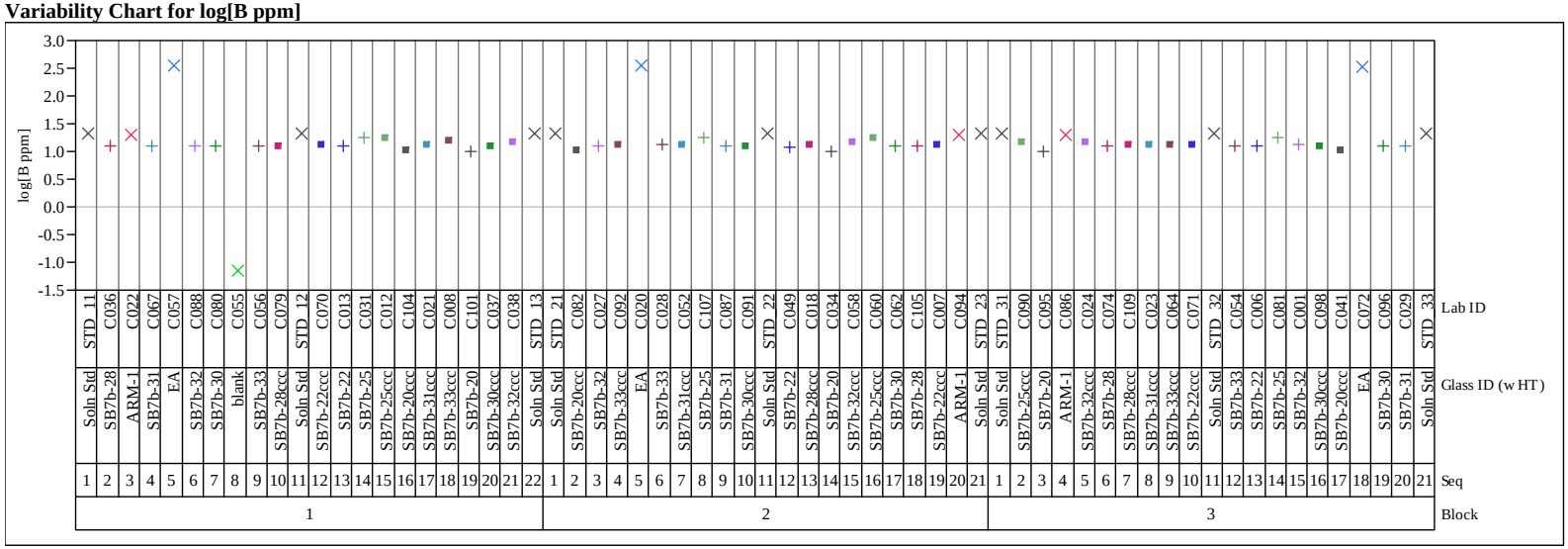


Exhibit B-3. PCT Measurements (as Common Logarithms) in Analytical Sequence for Blocks 1- 3 for Analytical Set 2

Set=2
Variability Chart for log[B ppm]



Set=2
Variability Chart for log[Li ppm]

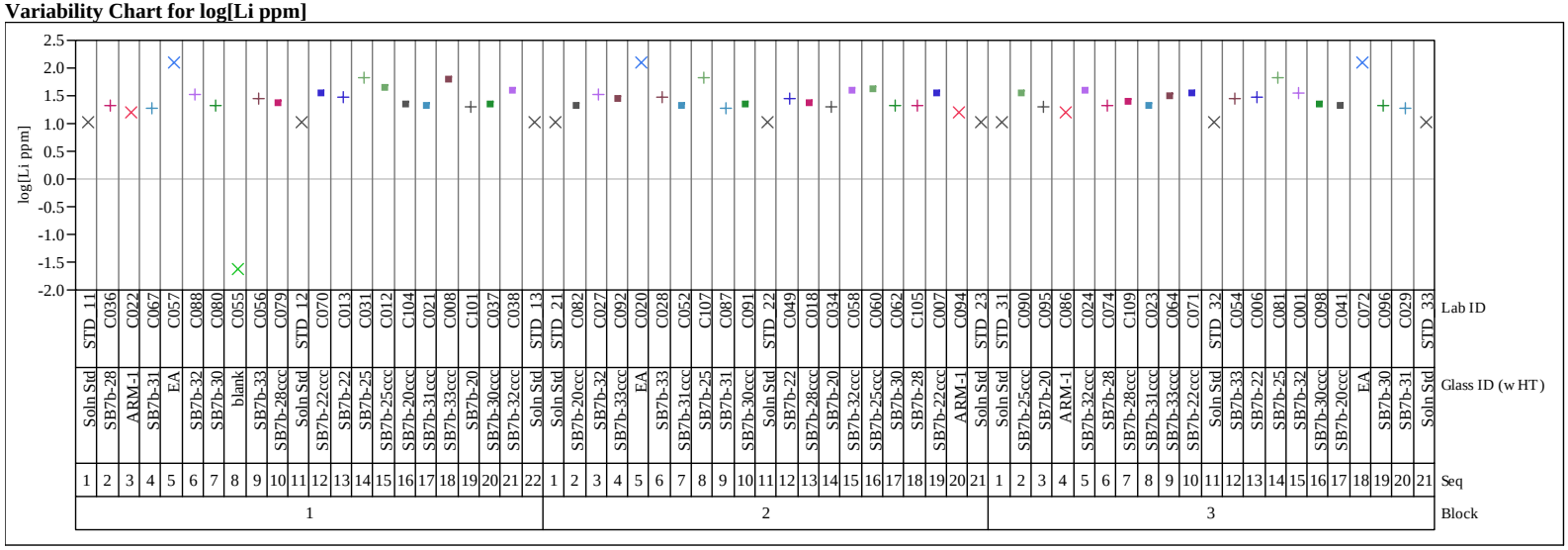
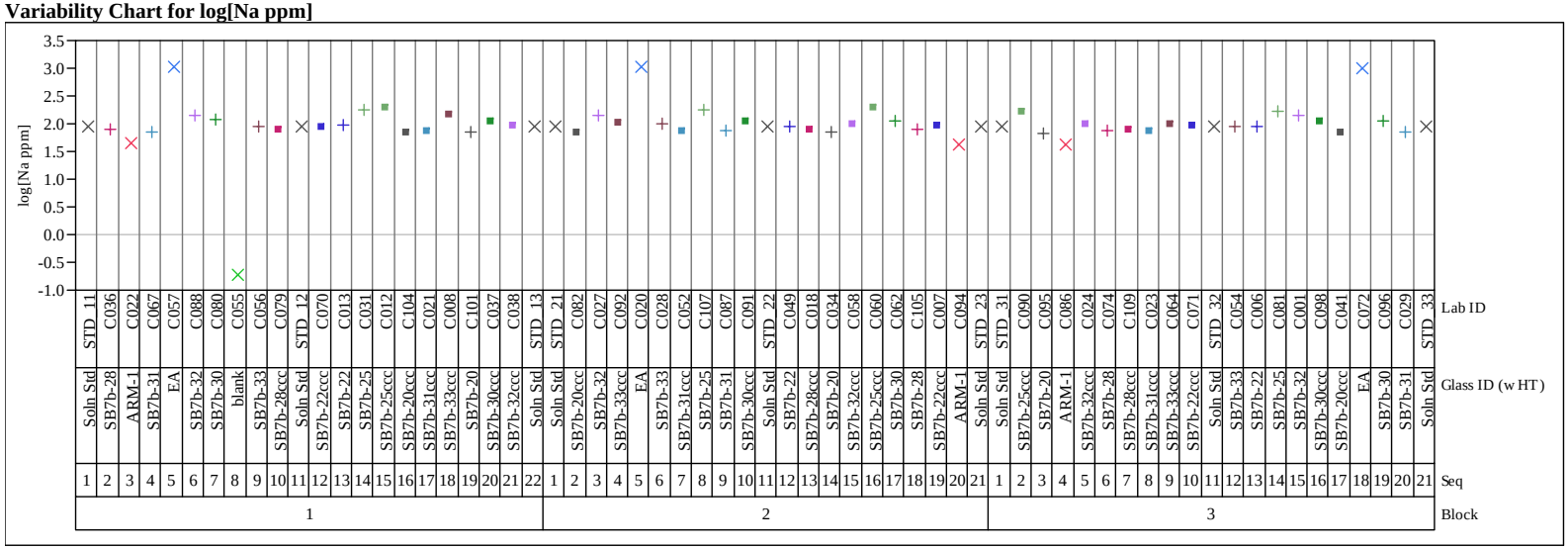


Exhibit B-3. PCT Measurements (as Common Logarithms) in Analytical Sequence for Blocks 1- 3 for Analytical Set 2

Set=2
Variability Chart for log[Na ppm]



Set=2
Variability Chart for log[Si ppm]

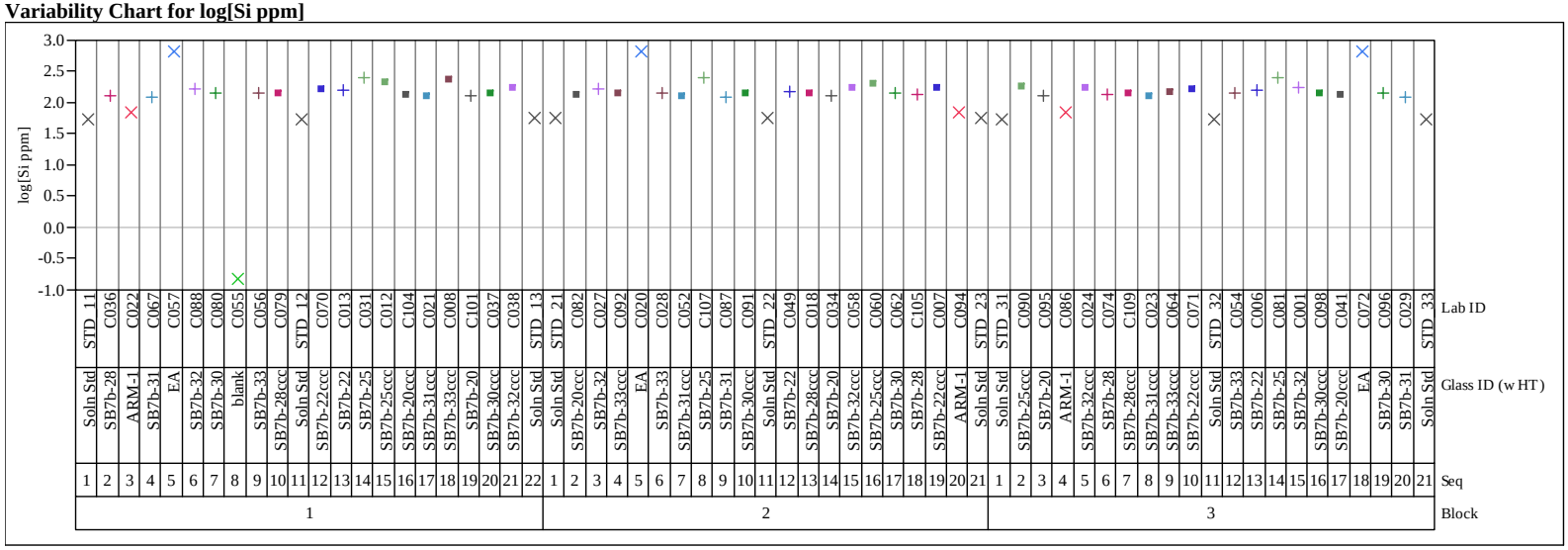
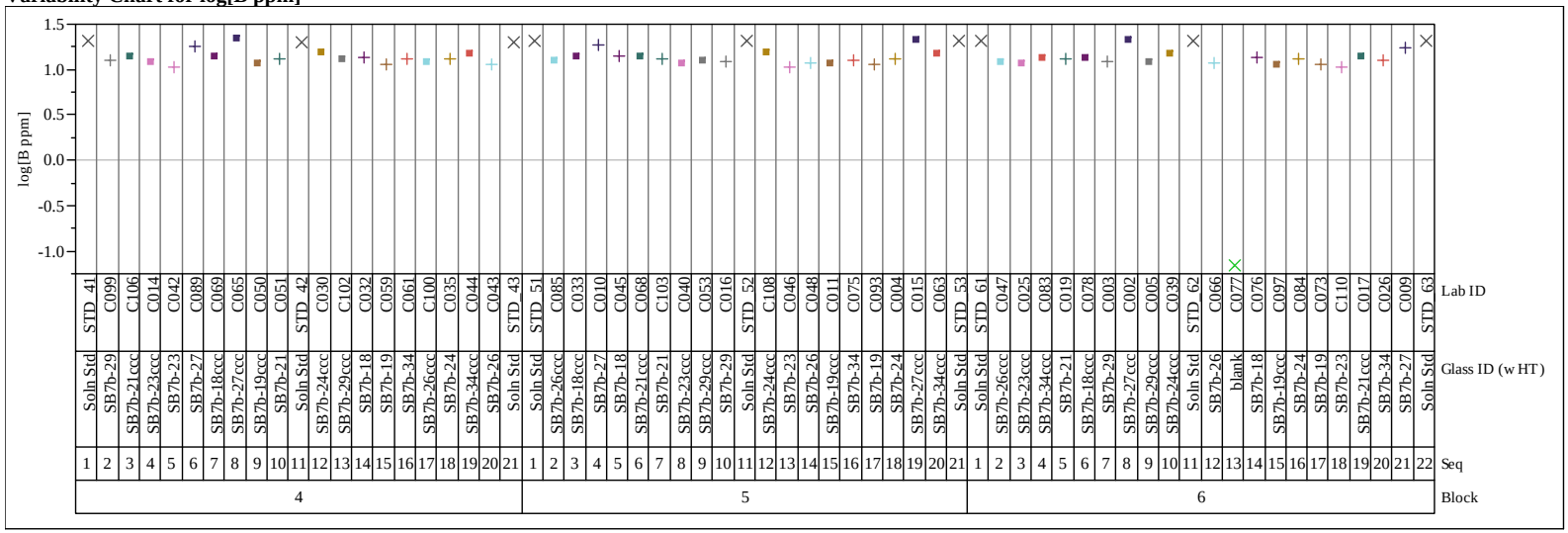


Exhibit B-4. PCT Measurements (as Common Logarithms) in Analytical Sequence for Blocks 4- 6 for Analytical Set 2

Set=2
Variability Chart for log[B ppm]



Set=2
Variability Chart for log[Li ppm]

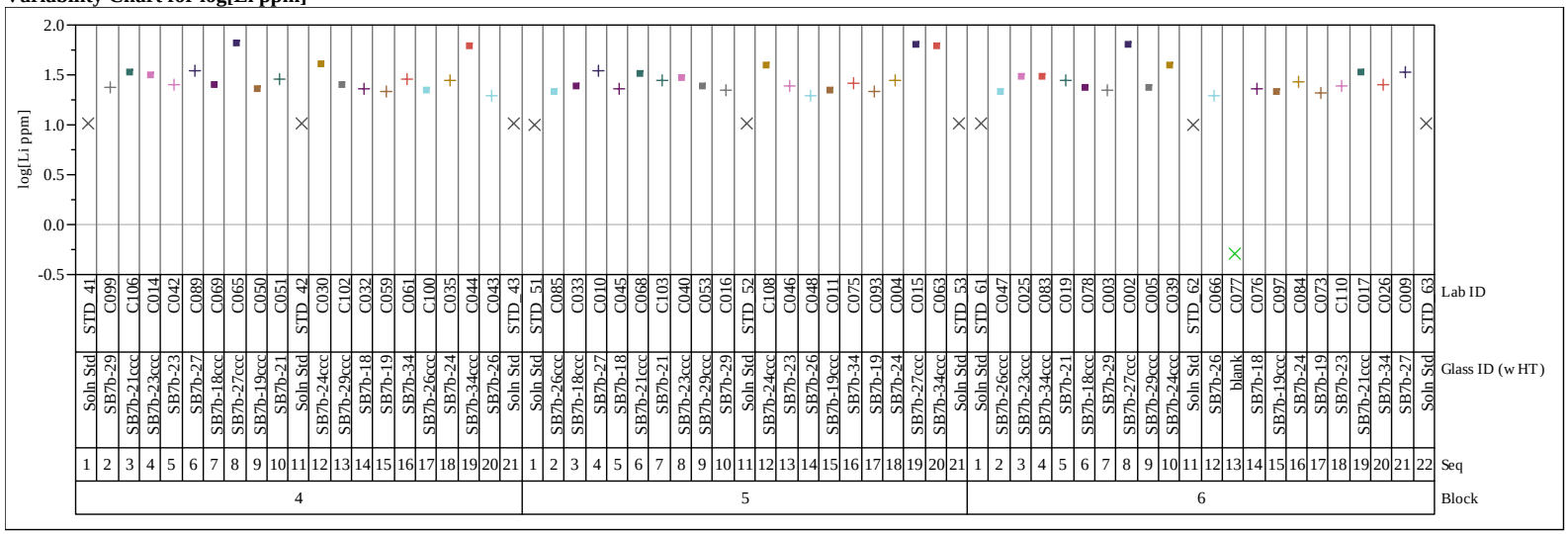
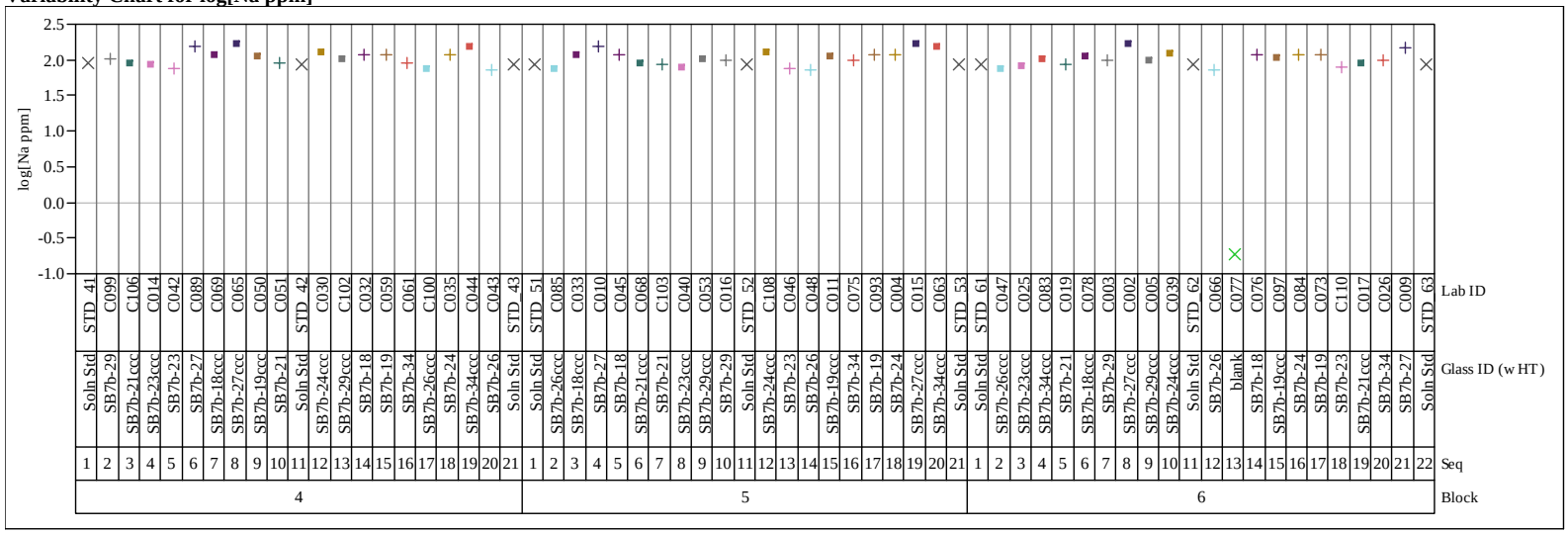


Exhibit B-4. PCT Measurements (as Common Logarithms) in Analytical Sequence for Blocks 4- 6 for Analytical Set 2

Set=2
Variability Chart for log[Na ppm]



Set=2
Variability Chart for log[Si ppm]

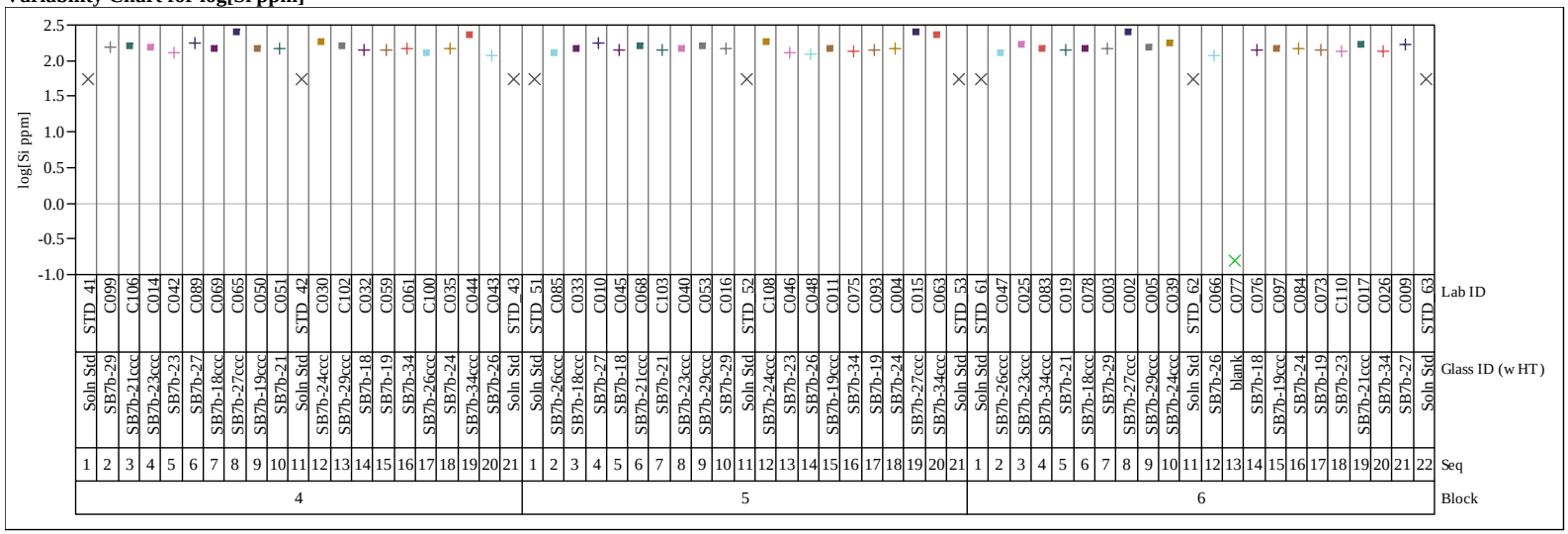
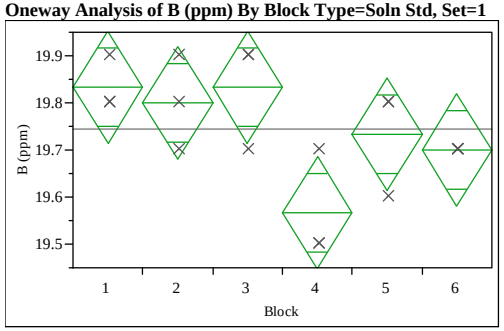


Exhibit B-5. Measurements of the Multi-Element Solution Standard by ICP Block by Analytical Set

Oneway Analysis of B (ppm) By Block Type=Soln Std, Set=1



Oneway Anova
Summary of Fit

Rsquare	0.596639
Adj Rsquare	0.428571
Root Mean Square Error	0.094281
Mean of Response	19.74444
Observations (or Sum Wgts)	18

Analysis of Variance

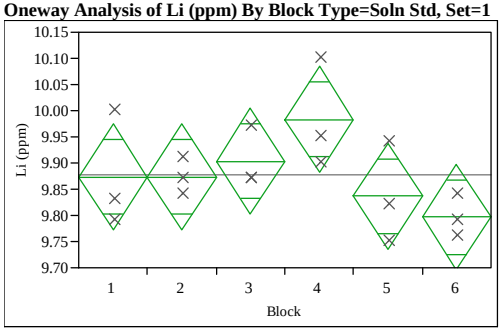
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Block	5	0.15777778	0.031556	3.5500	0.0335
Error	12	0.10666667	0.008889		
C. Total	17	0.26444444			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1	3	19.8333	0.05443	19.715	19.952
2	3	19.8000	0.05443	19.681	19.919
3	3	19.8333	0.05443	19.715	19.952
4	3	19.5667	0.05443	19.448	19.685
5	3	19.7333	0.05443	19.615	19.852
6	3	19.7000	0.05443	19.581	19.819

Std Error uses a pooled estimate of error variance

Oneway Analysis of Li (ppm) By Block Type=Soln Std, Set=1



Oneway Anova
Summary of Fit

Rsquare	0.437954
Adj Rsquare	0.203768
Root Mean Square Error	0.080312
Mean of Response	9.877778
Observations (or Sum Wgts)	18

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Block	5	0.06031111	0.012062	1.8701	0.1736
Error	12	0.07740000	0.006450		
C. Total	17	0.13771111			

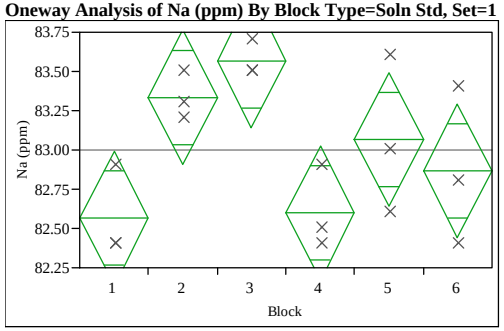
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1	3	9.87333	0.04637	9.7723	9.974
2	3	9.87333	0.04637	9.7723	9.974
3	3	9.90333	0.04637	9.8023	10.004
4	3	9.98333	0.04637	9.8823	10.084
5	3	9.83667	0.04637	9.7356	9.938
6	3	9.79667	0.04637	9.6956	9.898

Std Error uses a pooled estimate of error variance

Exhibit B-5. Measurements of the Multi-Element Solution Standard by ICP Block by Analytical Set

Oneway Analysis of Na (ppm) By Block Type=Soln Std, Set=1



Oneway Anova
Summary of Fit

Rsquare	0.633333
Adj Rsquare	0.480556
Root Mean Square Error	0.340751
Mean of Response	83
Observations (or Sum Wgts)	18

Analysis of Variance

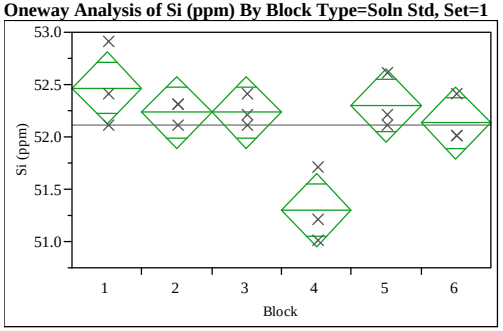
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Block	5	2.4066667	0.481333	4.1455	0.0203
Error	12	1.3933333	0.116111		
C. Total	17	3.8000000			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1	3	82.5667	0.19673	82.138	82.995
2	3	83.3333	0.19673	82.905	83.762
3	3	83.5667	0.19673	83.138	83.995
4	3	82.6000	0.19673	82.171	83.029
5	3	83.0667	0.19673	82.638	83.495
6	3	82.8667	0.19673	82.438	83.295

Std Error uses a pooled estimate of error variance

Oneway Analysis of Si (ppm) By Block Type=Soln Std, Set=1



Oneway Anova
Summary of Fit

Rsquare	0.737789
Adj Rsquare	0.628535
Root Mean Square Error	0.274874
Mean of Response	52.11111
Observations (or Sum Wgts)	18

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Block	5	2.5511111	0.510222	6.7529	0.0033
Error	12	0.9066667	0.075556		
C. Total	17	3.4577778			

Means for Oneway Anova

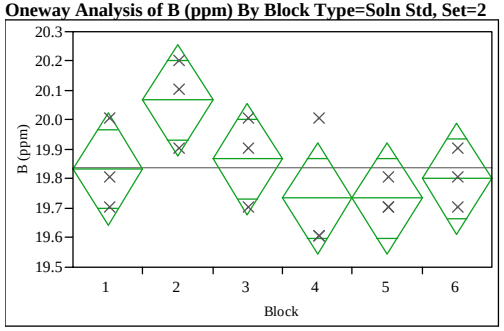
Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1	3	52.4667	0.15870	52.121	52.812
2	3	52.2333	0.15870	51.888	52.579
3	3	52.2333	0.15870	51.888	52.579
4	3	51.3000	0.15870	50.954	51.646
5	3	52.3000	0.15870	51.954	52.646
6	3	52.1333	0.15870	51.788	52.479

Std Error uses a pooled estimate of error variance

Exhibit B-5. Measurements of the Multi-Element Solution Standard by ICP Block by Analytical Set

Fit Y by X Group

Oneway Analysis of B (ppm) By Block Type=Soln Std, Set=2



Oneway Anova
Summary of Fit

Rsquare	0.456354
Adj Rsquare	0.229834
Root Mean Square Error	0.150923
Mean of Response	19.83889
Observations (or Sum Wgts)	18

Analysis of Variance

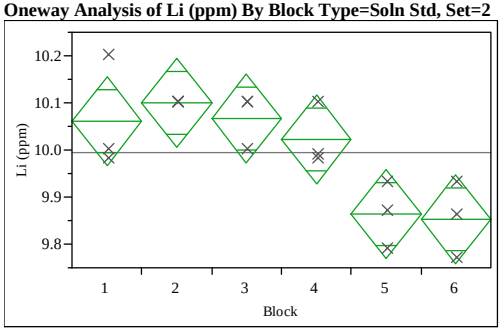
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Block	5	0.22944444	0.045889	2.0146	0.1486
Error	12	0.27333333	0.022778		
C. Total	17	0.50277778			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1	3	19.8333	0.08714	19.643	20.023
2	3	20.0667	0.08714	19.877	20.257
3	3	19.8667	0.08714	19.677	20.057
4	3	19.7333	0.08714	19.543	19.923
5	3	19.7333	0.08714	19.543	19.923
6	3	19.8000	0.08714	19.610	19.990

Std Error uses a pooled estimate of error variance

Oneway Analysis of Li (ppm) By Block Type=Soln Std, Set=2



Oneway Anova
Summary of Fit

Rsquare	0.721452
Adj Rsquare	0.60539
Root Mean Square Error	0.075203
Mean of Response	9.994444
Observations (or Sum Wgts)	18

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Block	5	0.17577778	0.035156	6.2161	0.0046
Error	12	0.06786667	0.005656		
C. Total	17	0.24364444			

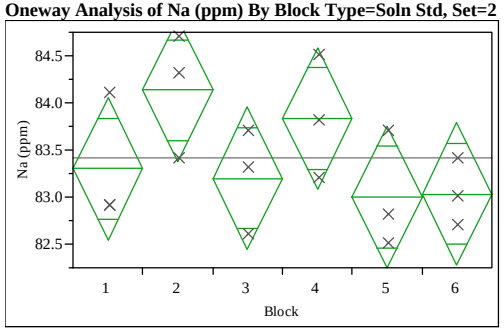
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1	3	10.0600	0.04342	9.965	10.155
2	3	10.1000	0.04342	10.005	10.195
3	3	10.0667	0.04342	9.972	10.161
4	3	10.0233	0.04342	9.929	10.118
5	3	9.8633	0.04342	9.769	9.958
6	3	9.8533	0.04342	9.759	9.948

Std Error uses a pooled estimate of error variance

Exhibit B-5. Measurements of the Multi-Element Solution Standard by ICP Block by Analytical Set

Oneway Analysis of Na (ppm) By Block Type=Soln Std, Set=2



Oneway Anova
Summary of Fit

Rsquare	0.424785
Adj Rsquare	0.185112
Root Mean Square Error	0.601387
Mean of Response	83.41667
Observations (or Sum Wgts)	18

Analysis of Variance

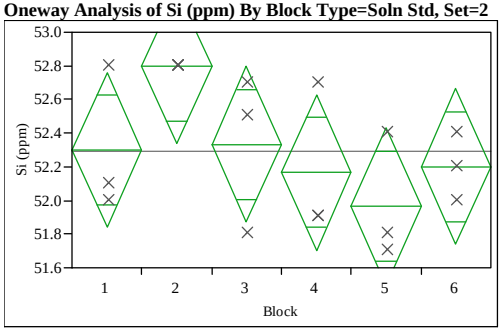
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Block	5	3.2050000	0.641000	1.7724	0.1931
Error	12	4.3400000	0.361667		
C. Total	17	7.5450000			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1	3	83.3000	0.34721	82.543	84.057
2	3	84.1333	0.34721	83.377	84.890
3	3	83.2000	0.34721	82.443	83.957
4	3	83.8333	0.34721	83.077	84.590
5	3	83.0000	0.34721	82.243	83.757
6	3	83.0333	0.34721	82.277	83.790

Std Error uses a pooled estimate of error variance

Oneway Analysis of Si (ppm) By Block Type=Soln Std, Set=2



Oneway Anova
Summary of Fit

Rsquare	0.419239
Adj Rsquare	0.177256
Root Mean Square Error	0.367423
Mean of Response	52.29444
Observations (or Sum Wgts)	18

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Block	5	1.1694444	0.233889	1.7325	0.2017
Error	12	1.6200000	0.135000		
C. Total	17	2.7894444			

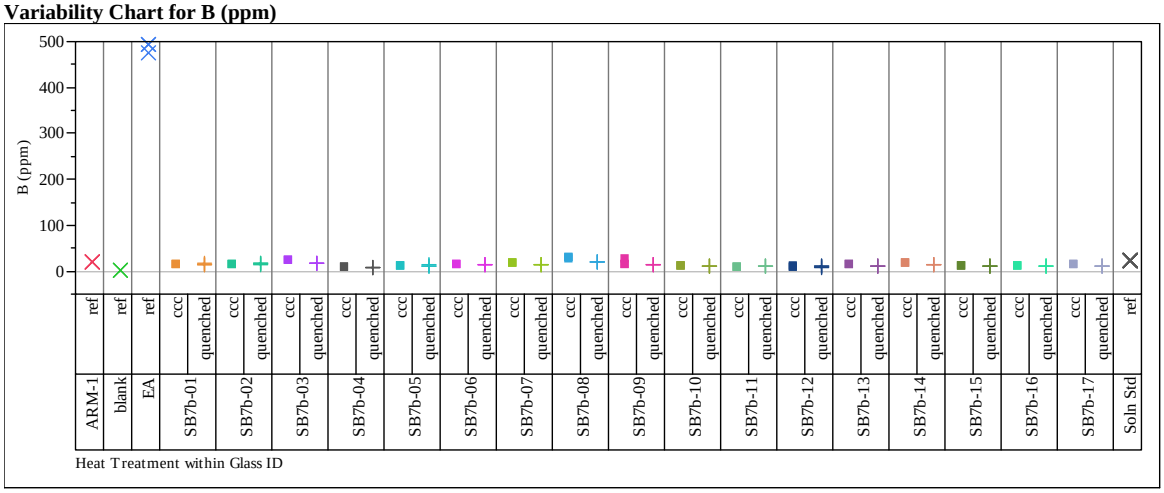
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
1	3	52.3000	0.21213	51.838	52.762
2	3	52.8000	0.21213	52.338	53.262
3	3	52.3333	0.21213	51.871	52.796
4	3	52.1667	0.21213	51.704	52.629
5	3	51.9667	0.21213	51.504	52.429
6	3	52.2000	0.21213	51.738	52.662

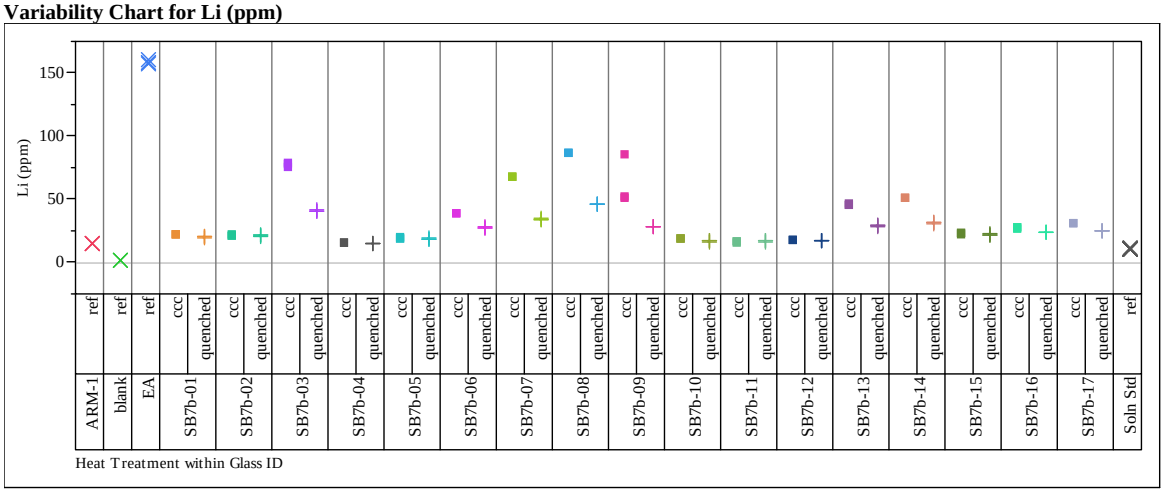
Std Error uses a pooled estimate of error variance

Exhibit B-6. PCT Measurements by Heat Treatment for Glasses and Standards by Analytical Set

Set=1
Variability Chart for B (ppm)



Set=1
Variability Chart for Li (ppm)



Set=1
Variability Chart for Na (ppm)

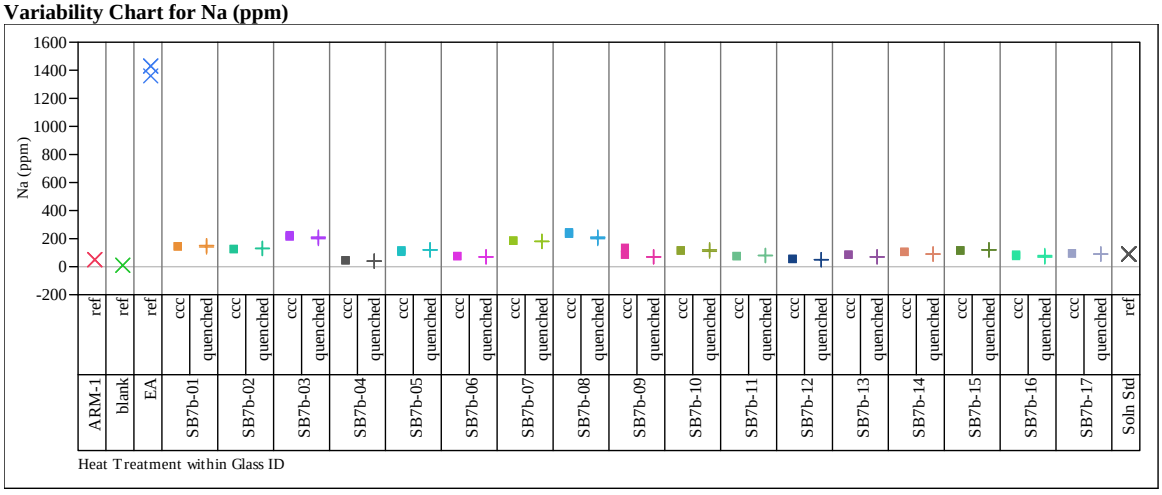
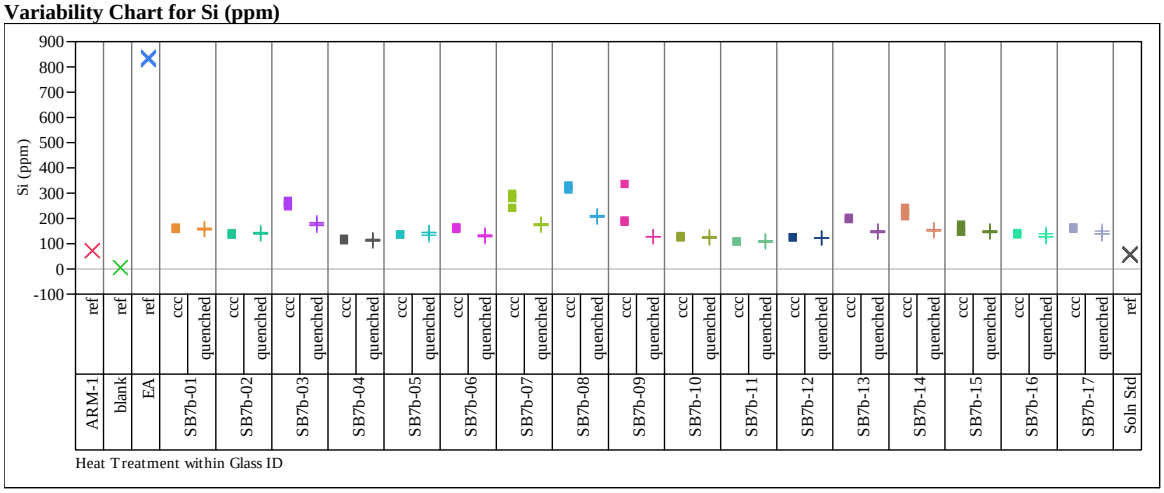
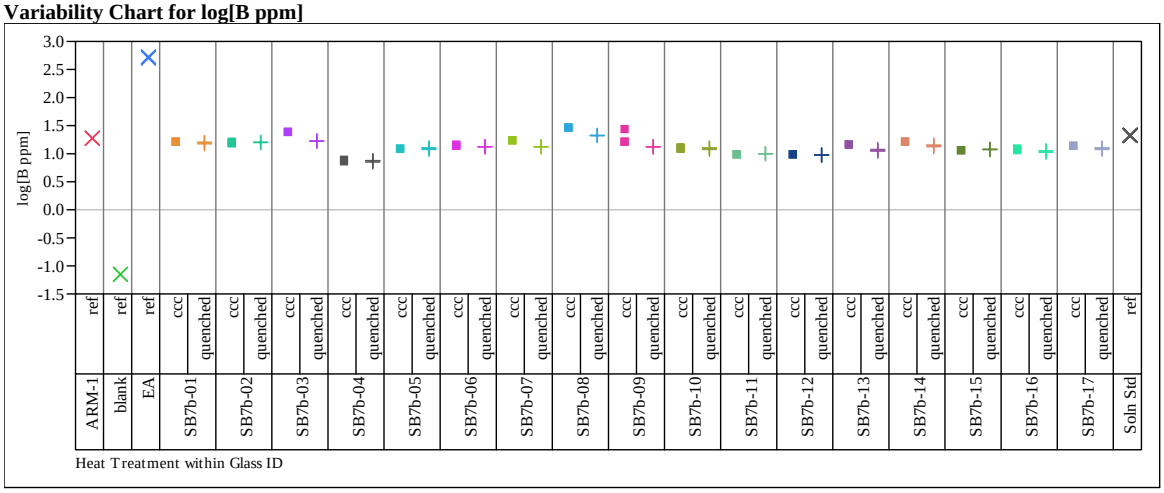


Exhibit B-6. PCT Measurements by Heat Treatment for Glasses and Standards by Analytical Set

Set=1
Variability Chart for Si (ppm)



Set=1
Variability Chart for log[B ppm]



Set=1
Variability Chart for log[Li ppm]

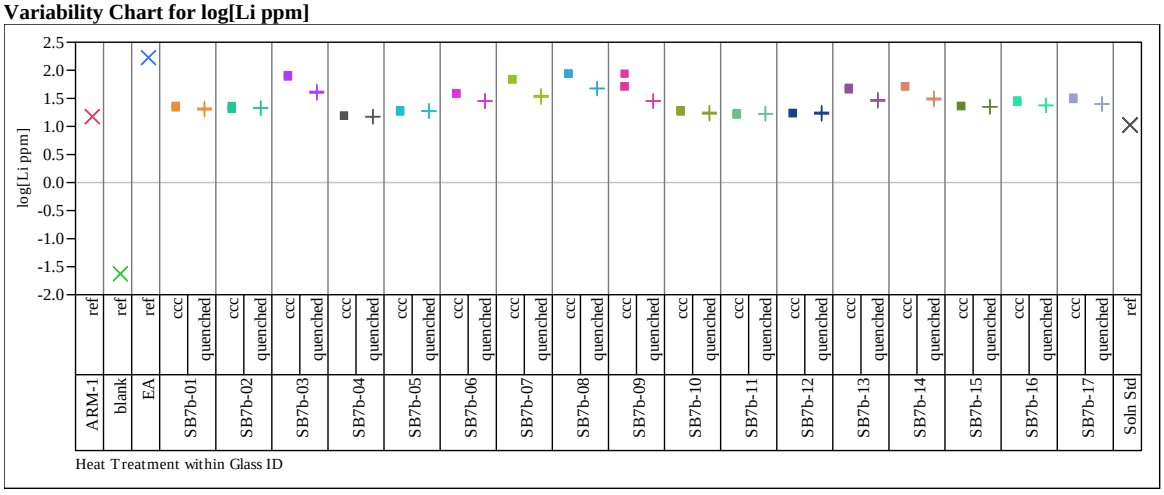
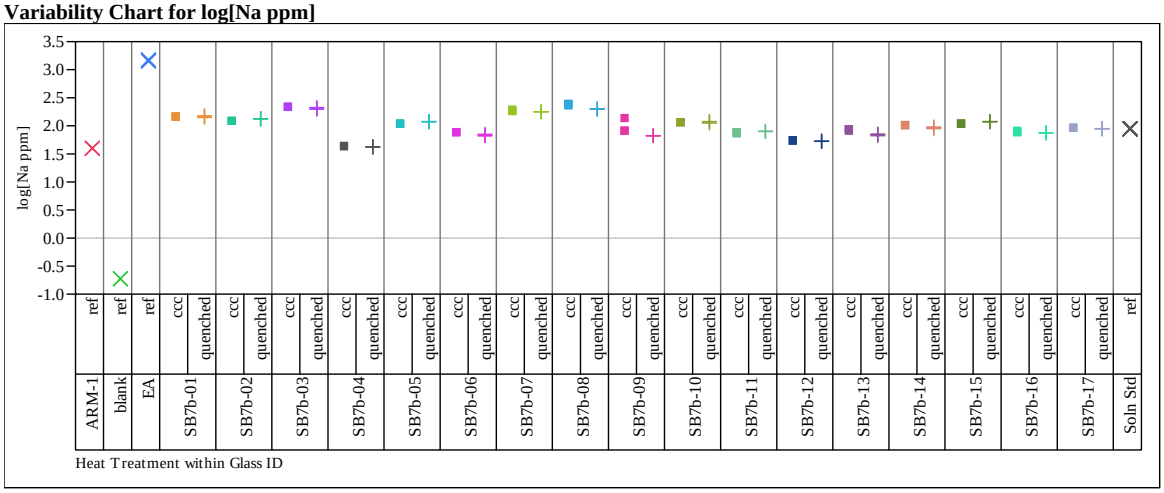
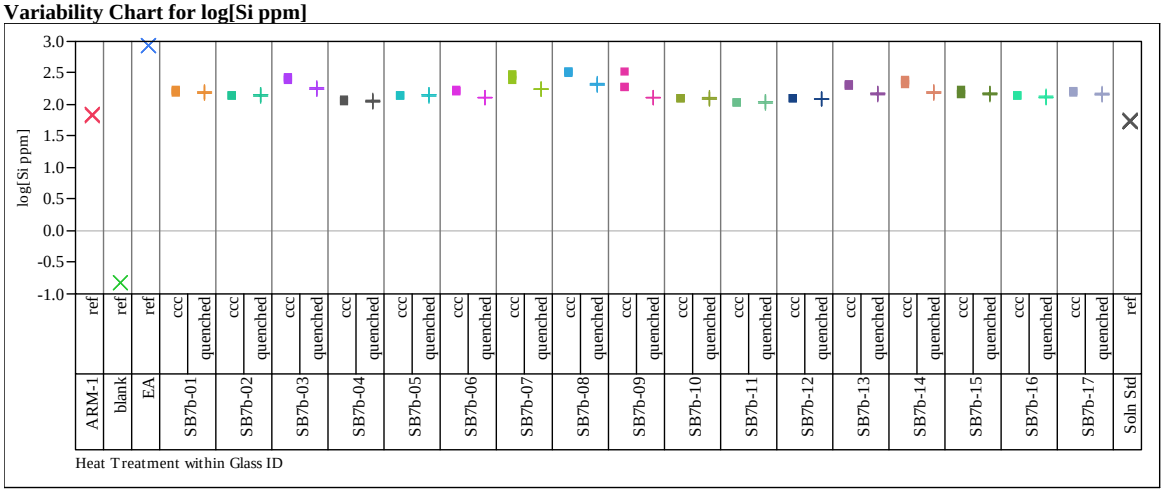


Exhibit B-6. PCT Measurements by Heat Treatment for Glasses and Standards by Analytical Set

Set=1
Variability Chart for log[Na ppm]



Set=1
Variability Chart for log[Si ppm]



Set=2
Variability Chart for B (ppm)

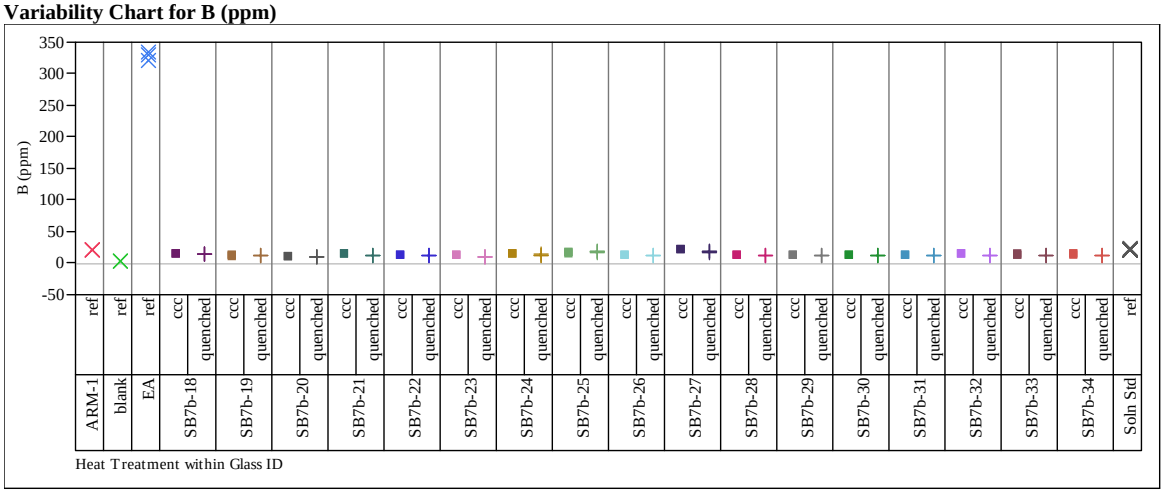
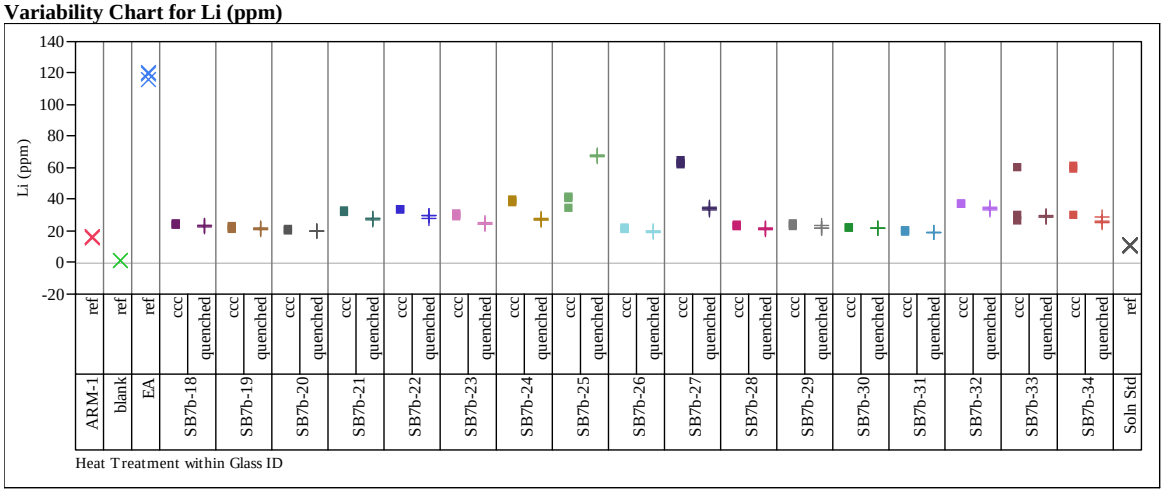
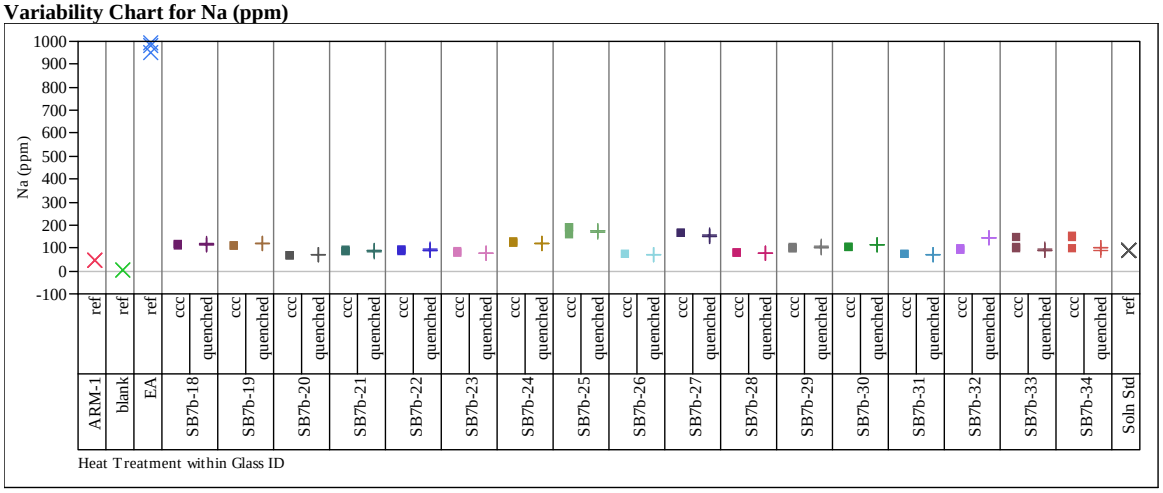


Exhibit B-6. PCT Measurements by Heat Treatment for Glasses and Standards by Analytical Set

Set=2
Variability Chart for Li (ppm)



Set=2
Variability Chart for Na (ppm)



Set=2
Variability Chart for Si (ppm)

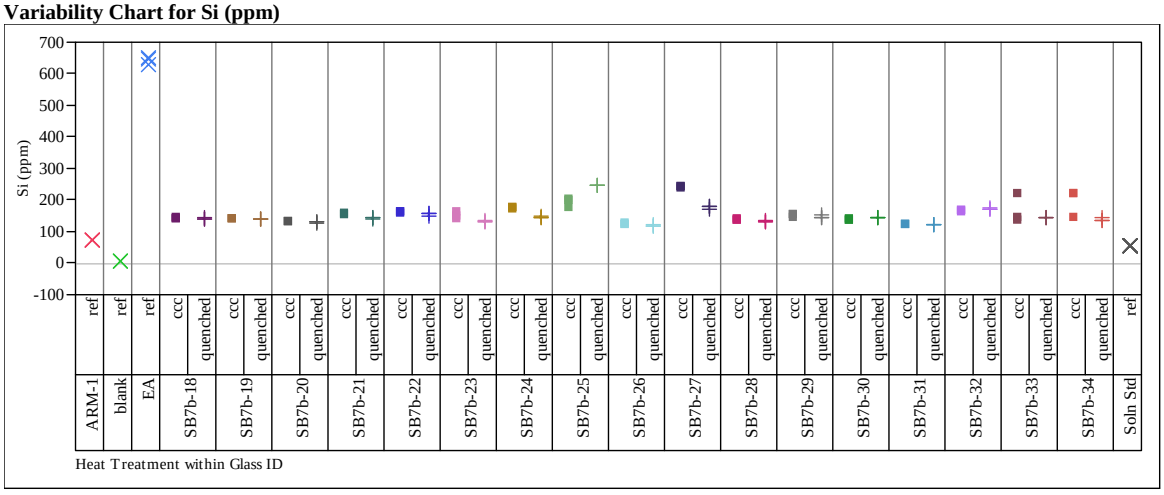
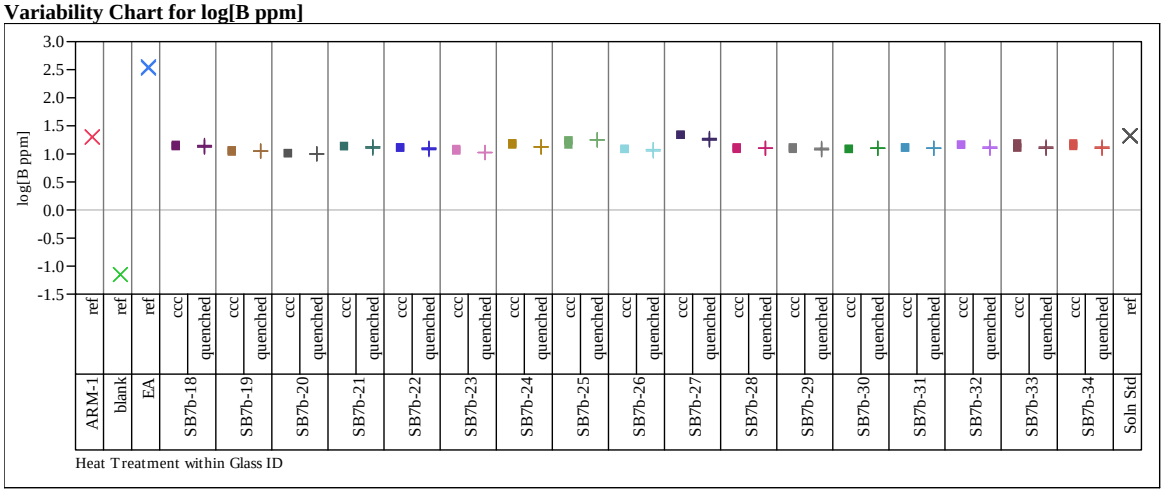
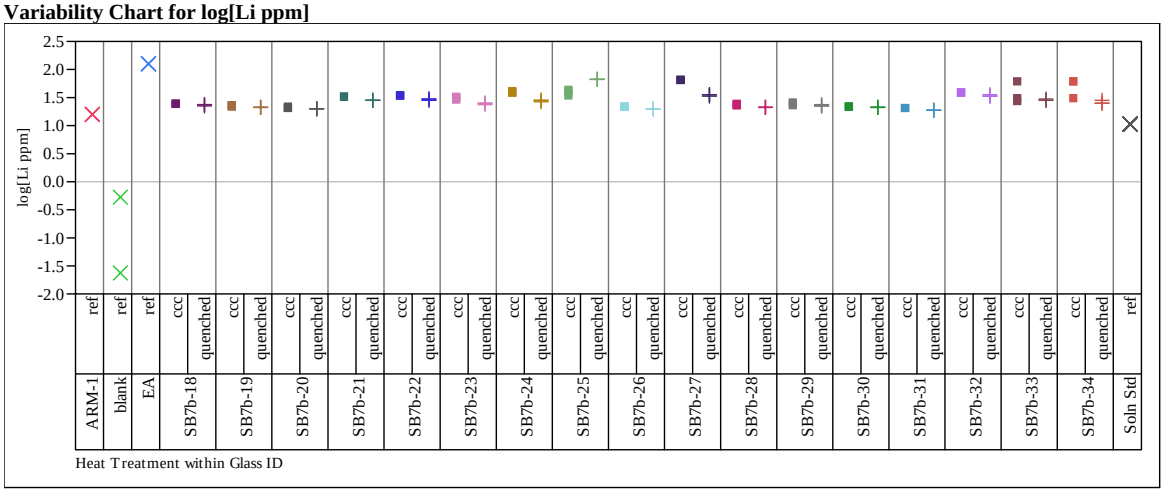


Exhibit B-6. PCT Measurements by Heat Treatment for Glasses and Standards by Analytical Set

Set=2
Variability Chart for log[B ppm]



Set=2
Variability Chart for log[Li ppm]



Set=2
Variability Chart for log[Na ppm]

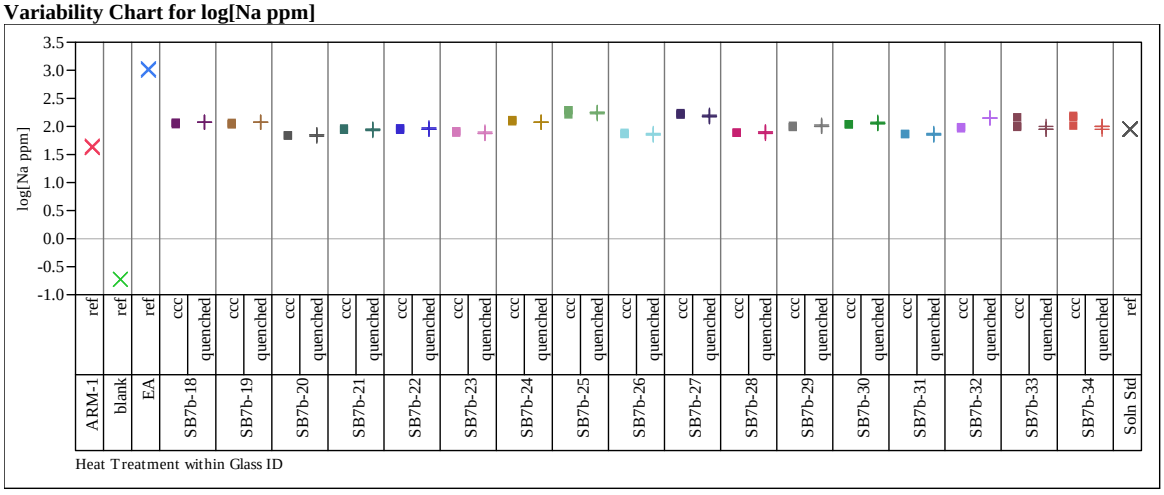


Exhibit B-6. PCT Measurements by Heat Treatment for Glasses and Standards by Analytical Set

Set=2
Variability Chart for log[Si ppm]

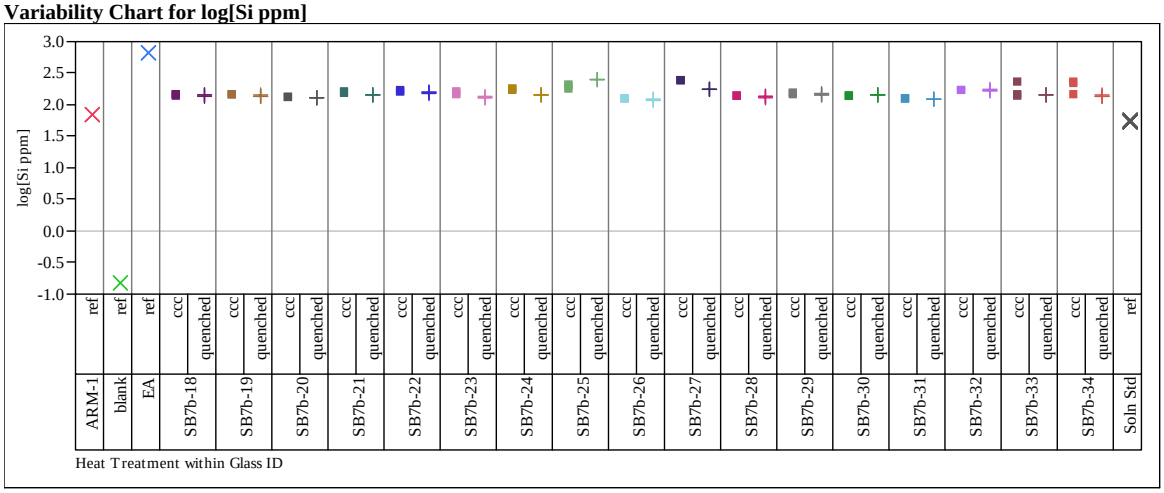


Exhibit B-7. Correlations and Scatter Plots of Normalized PCTs Over Both Compositional Views and Heat Treatments for Glasses and Standards

Correlations

	log NL[B (g/L)]	log NL[Li(g/L)]	log NL[Na (g/L)]	log NL[Si (g/L)]
log NL[B (g/L)]	1.0000	0.9058	0.9313	0.9276
log NL[Li(g/L)]	0.9058	1.0000	0.8620	0.9741
log NL[Na (g/L)]	0.9313	0.8620	1.0000	0.9152
log NL[Si (g/L)]	0.9276	0.9741	0.9152	1.0000

Scatterplot Matrix

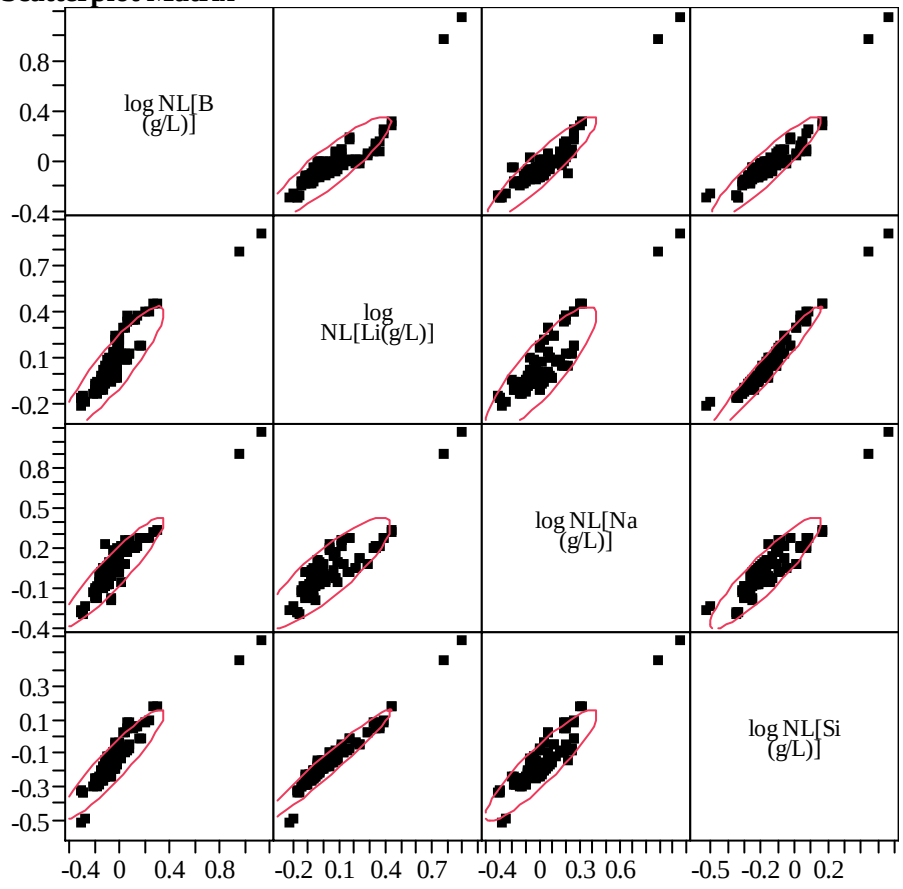
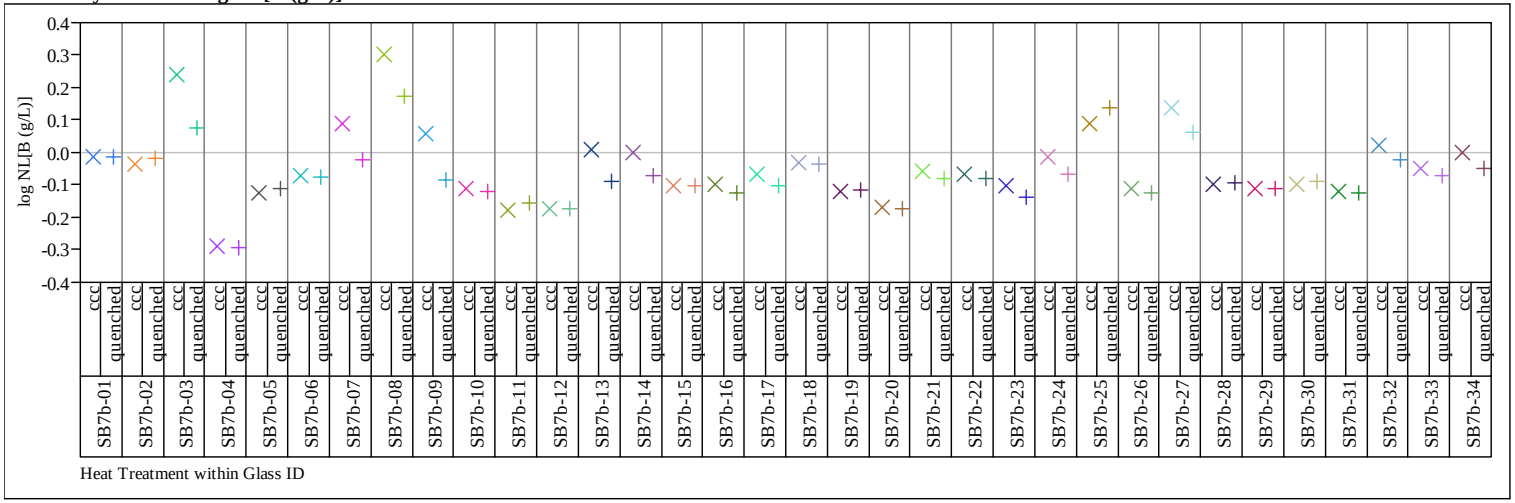


Exhibit B-8. Effects of Heat Treatment for the Glasses by Compositional View

Comp View=measured
Variability Chart for log NL[B (g/L)]



Comp View=measured
Variability Chart for log NL[Li(g/L)]

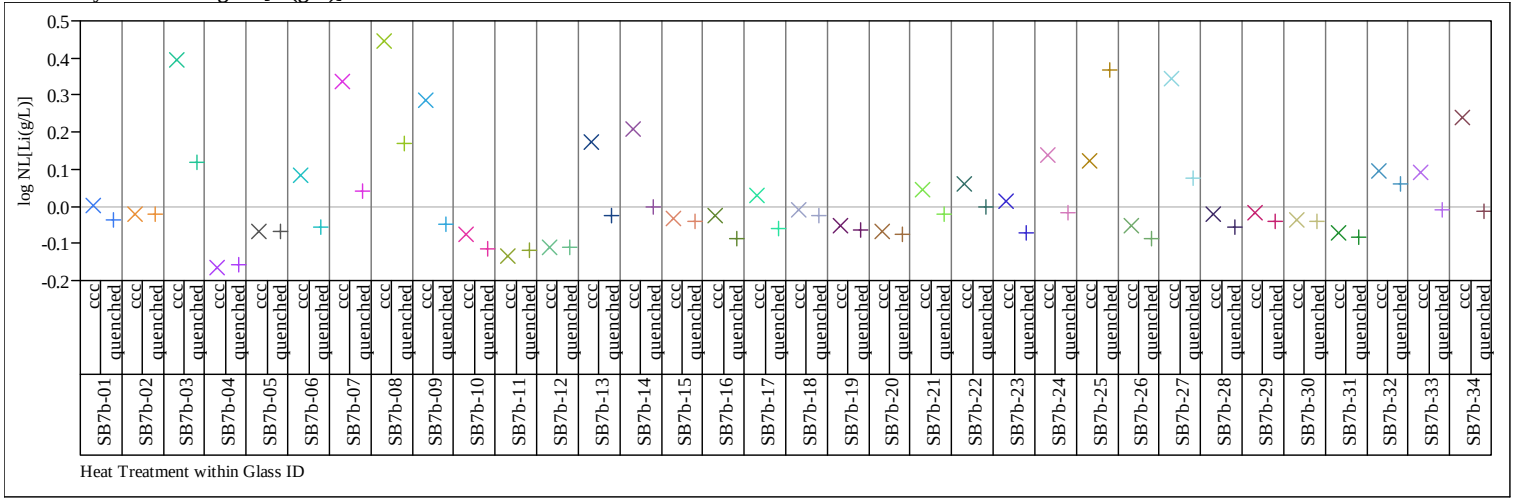
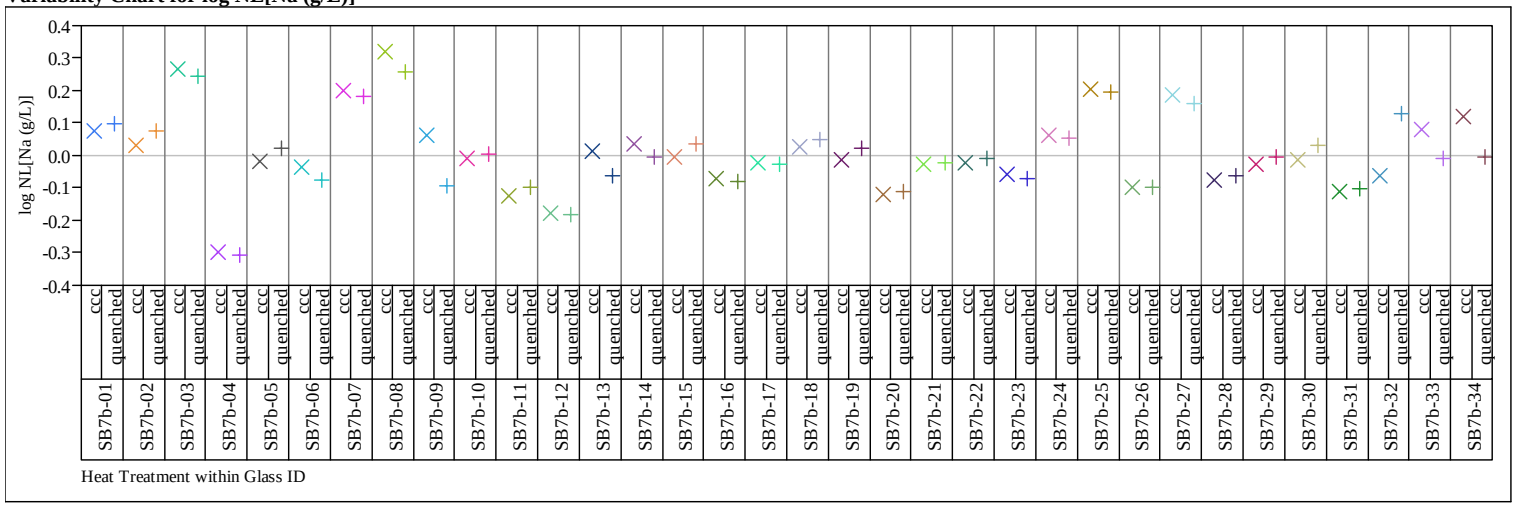


Exhibit B-8. Effects of Heat Treatment for the Glasses by Compositional View

Comp View=measured
Variability Chart for log NL[Na (g/L)]



Comp View=measured
Variability Chart for log NL[Si (g/L)]

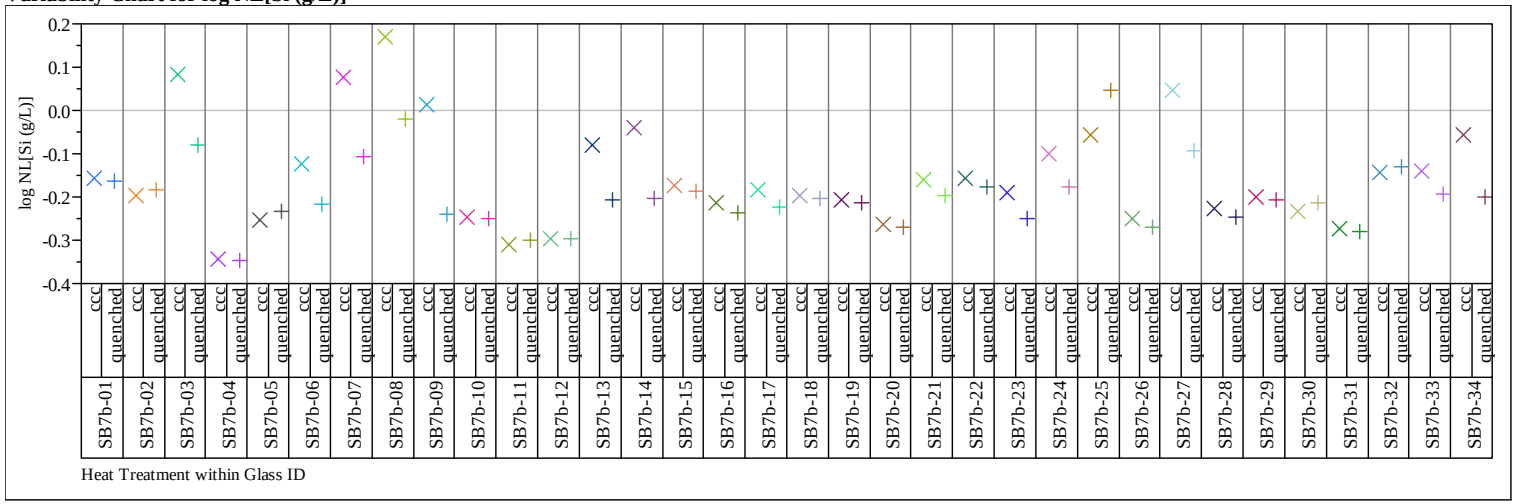
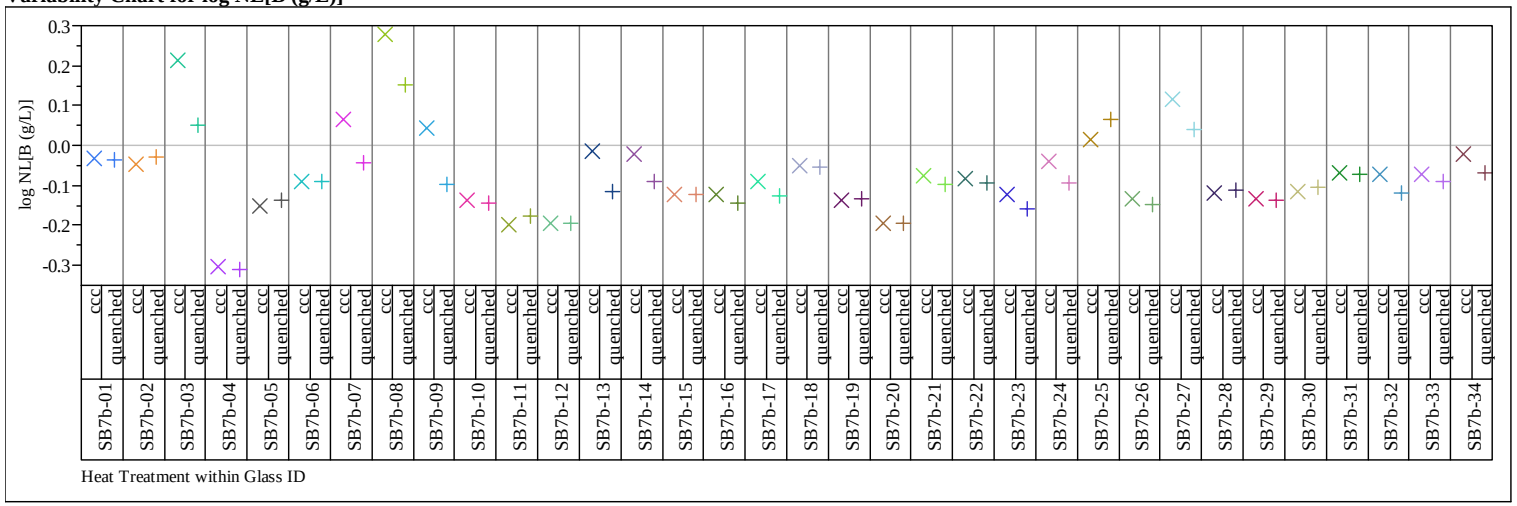


Exhibit B-8. Effects of Heat Treatment for the Glasses by Compositional View

Comp View=Target
Variability Chart for log NL[B (g/L)]



Comp View=Target
Variability Chart for log NL[Li(g/L)]

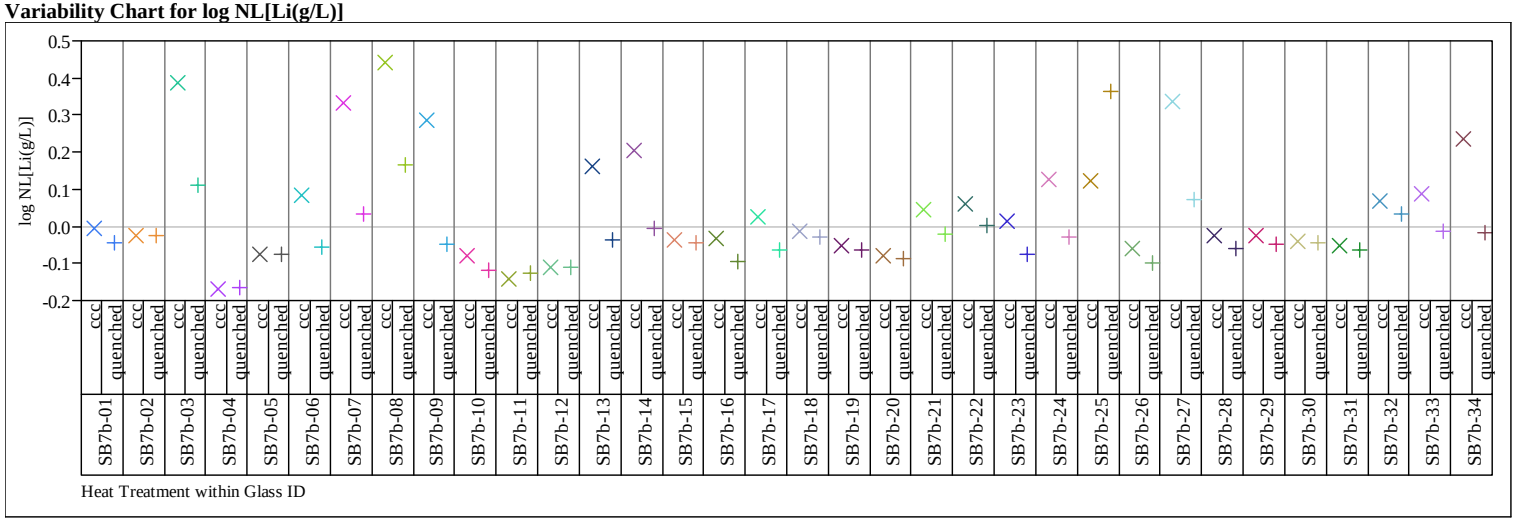
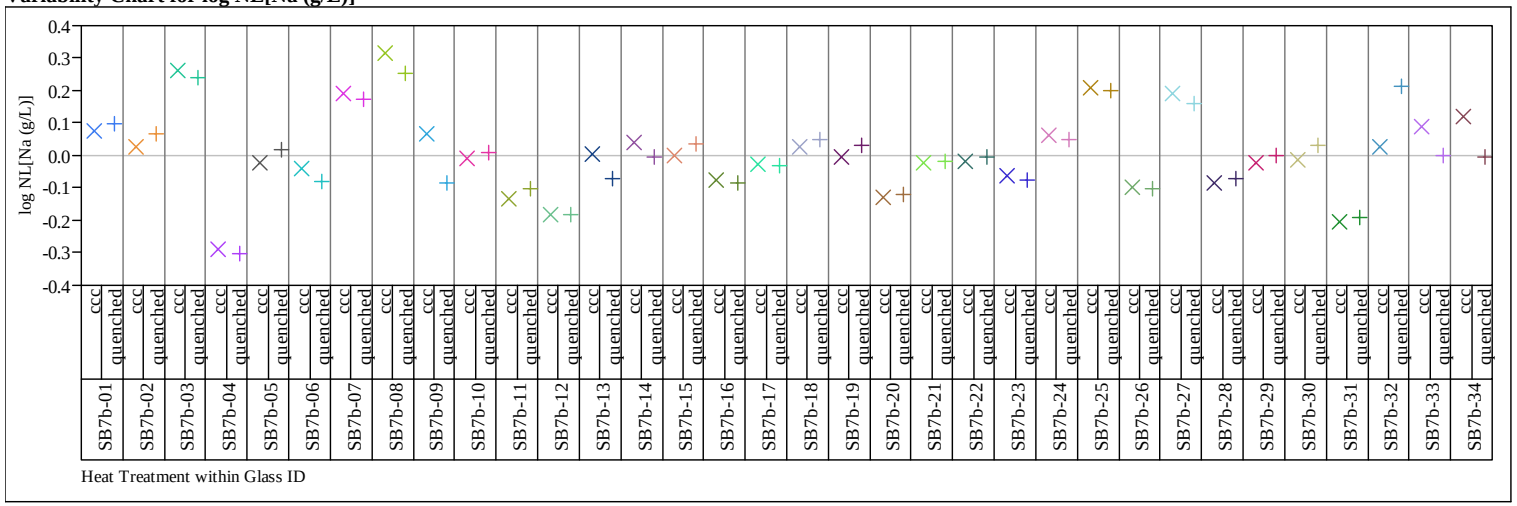


Exhibit B-8. Effects of Heat Treatment for the Glasses by Compositional View

Comp View=Target
Variability Chart for log NL[Na (g/L)]



Comp View=Target
Variability Chart for log NL[Si (g/L)]

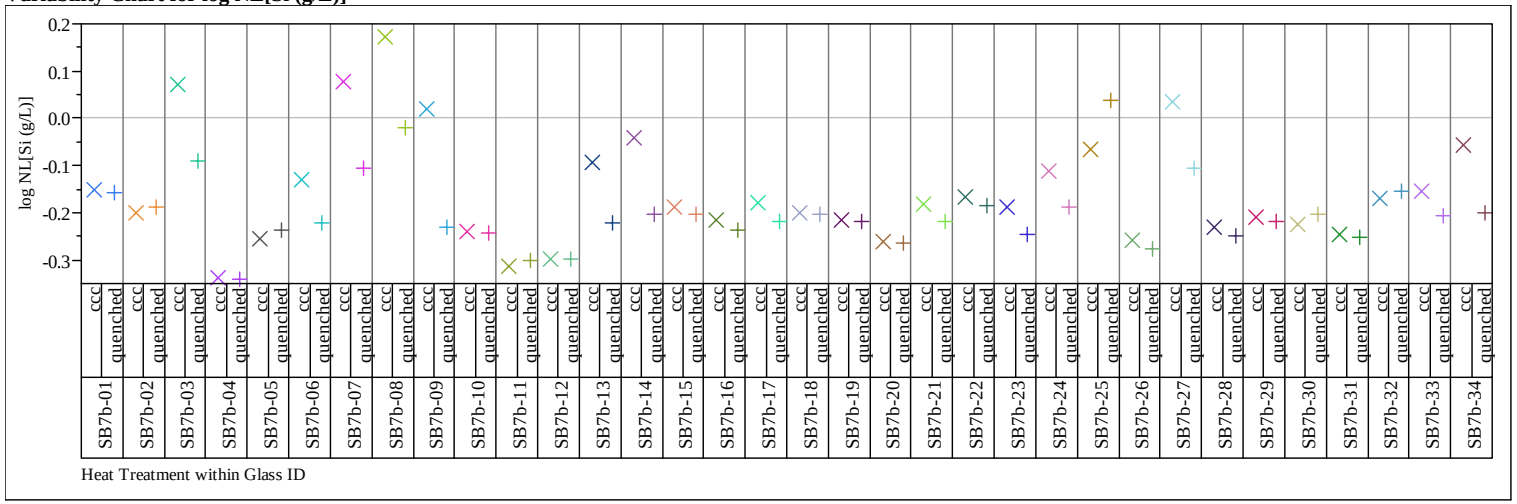
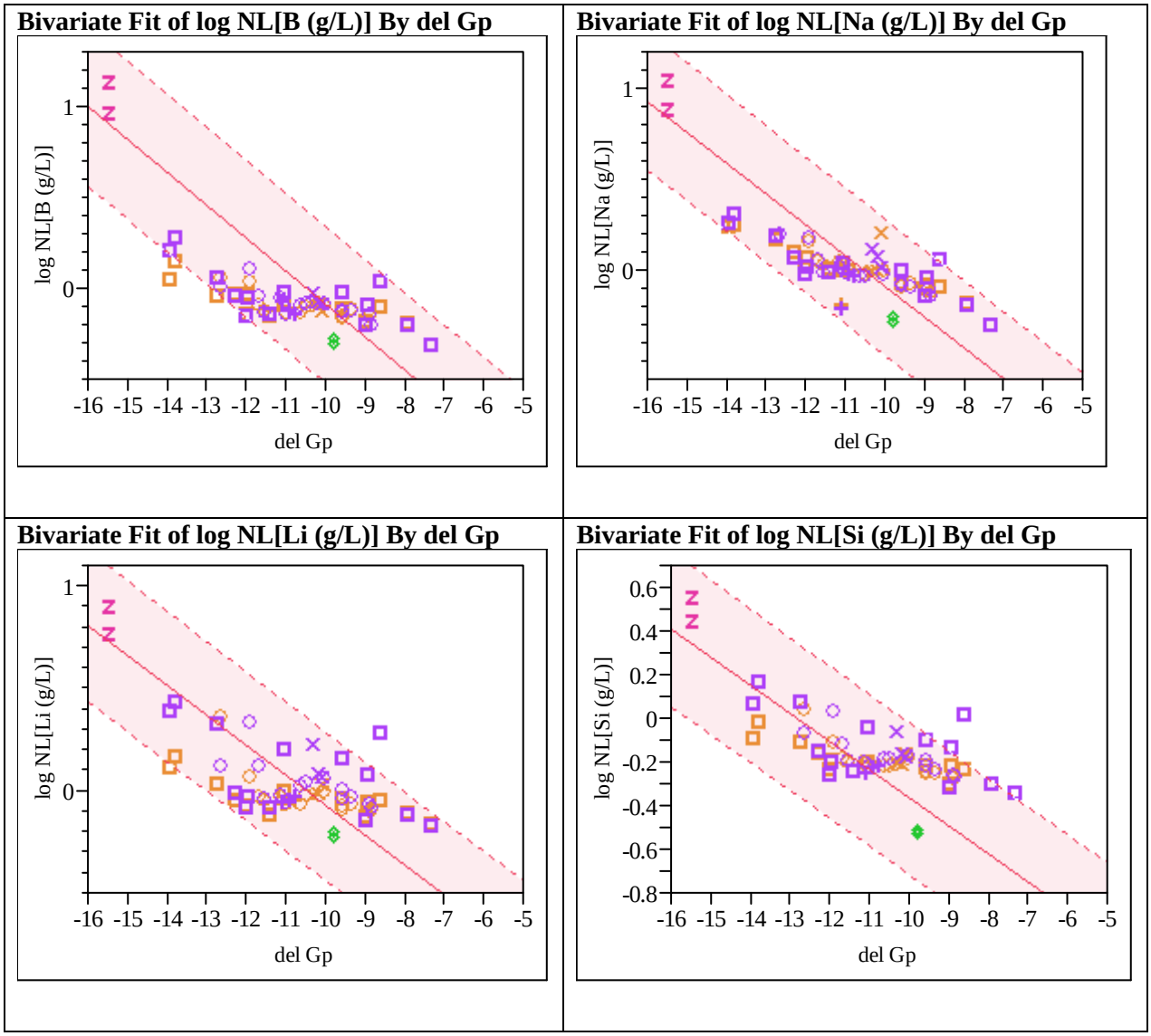
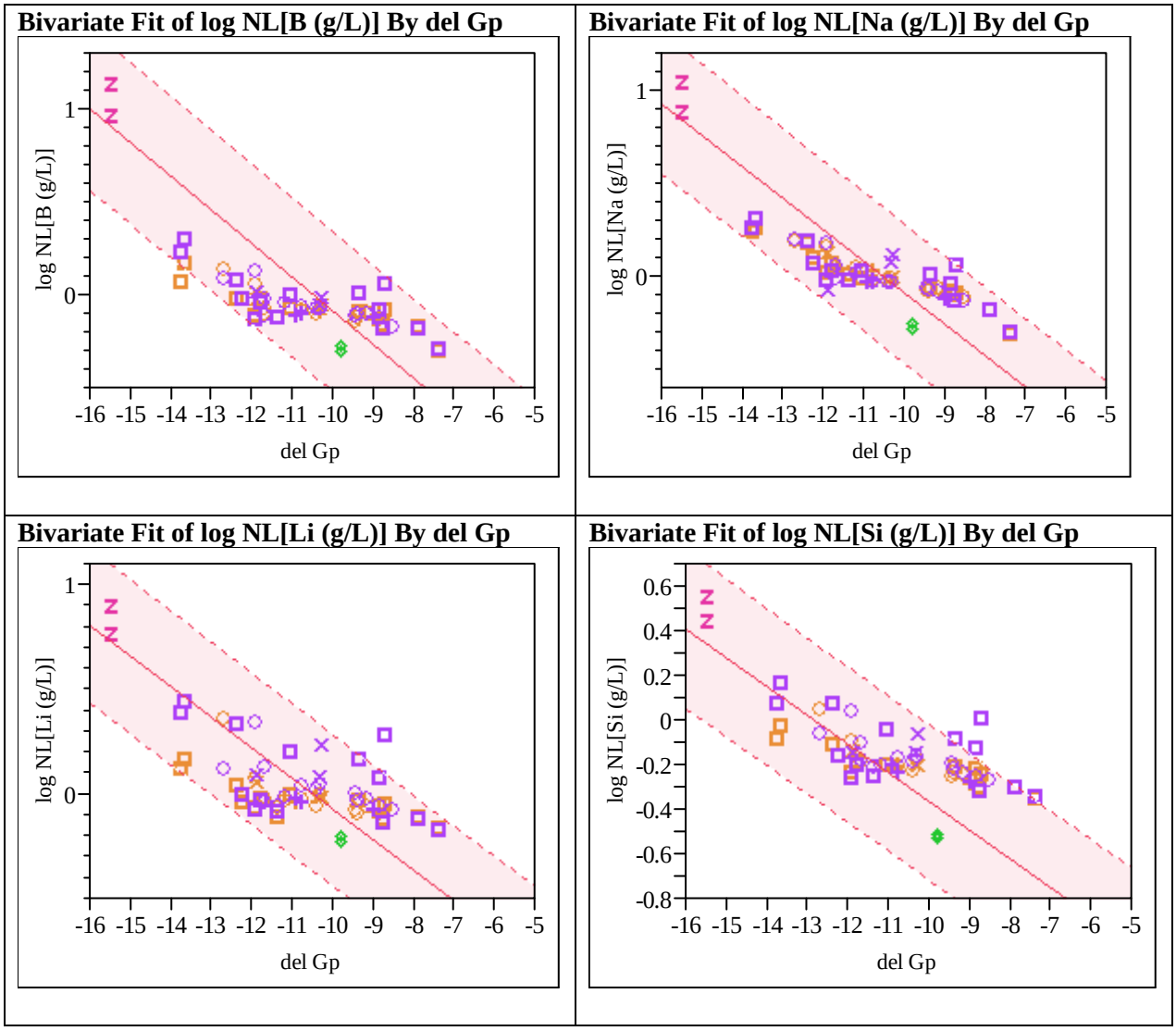


Exhibit B-9. del Gp (ΔG_p) Predictions versus the Common Logarithm of the Normalized Leachate (log NL[.]) for B, Li, Na and Si for Target Compositions for Both Heat Treatments



◇	ARM	---	□	D-Opt EV Outer Layer	quenched
Z	EA	---	+	Nominal-Frit 418	ccc
○	D-Opt EV Inner Layer	ccc	+	Nominal-Frit 418	quenched
○	D-Opt EV Inner Layer	quenched	×	Nominal-Frit 702	ccc
□	D-Opt EV Outer Layer	ccc	×	Nominal-Frit 702	quenched

Exhibit B-10. del Gp (ΔG_p) Predictions versus the Common Logarithm of the Normalized Leachate (log NL[.]) for B, Li, Na and Si for Measured Compositions for Both Heat Treatments



◇	ARM	---	□	D-Opt EV Outer Layer	quenched
Z	EA	---	+	Nominal-Frit 418	ccc
○	D-Opt EV Inner Layer	ccc	+	Nominal-Frit 418	quenched
○	D-Opt EV Inner Layer	quenched	×	Nominal-Frit 702	ccc
□	D-Opt EV Outer Layer	ccc	×	Nominal-Frit 702	quenched

Distribution:

J.W. Amoroso, 999-W
A. B. Barnes, 999-W
H.P. Boyd, 704-27S
J. M. Bricker, 704-27S
M. A. Broome, 704-29S
C.L. Crawford, 773-42A
T.B. Edwards, 999-W
T. L. Fellinger, 704-26S
S. D. Fink, 773-A
K.M. Fox, 999-W
B. J. Giddings, 786-5A
J. M. Gillam, 766-H
C. C. Herman, 999-W
R. N. Hinds, 704-S
E. W. Holtzscheiter, 704-15S
J. F. Iaukea, 704-30S
P. R. Jackson, DOE-SR, 703-46A
F.C. Johnson, 999-W
M. T. Keefer, 766-H
P.L. Lee, 703-41A
S. L. Marra, 773-A
D.W. McIlmoyle, 766-H
J. E. Occhipinti, 704-S
D.K. Peeler, 999-W
F. M. Pennebaker, 773-42A
J. W. Ray, 704-S
H. B. Shah, 766-H
D. C. Sherburne, 704-S
A. V. Staub, 704-27S
M. E. Stone, 999-W
K. H. Subramanian, 766-H
J. P. Vaughan, 773-41A