Contract No:

This document was prepared in conjunction with work accomplished under Contract No. DE-AC09-08SR22470 with the U.S. Department of Energy (DOE) Office of Environmental Management (EM).

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Sulfur Solubility Testing and Characterization of Hanford LAW Phase 2, Inner Layer Matrix Glasses

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November 2017

SRNL-STI-2017-00709, Revision 0

SRNL.DOE.GOV

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Prepared for
U.S. Department of Energy

SRNL-STI-2017-00709
Revision 0

Keywords: *Low activity waste, glass, sulfur, Hanford, WTP*

Retention: *Permanent*

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ACKNOWLEDGEMENTS

The authors thank Courtney Burckhalter, Holly Hall, Katie Hill, Meagan Kinard, Kandice Miles, and Kim Wyszynski at Savannah River National Laboratory for their skilled assistance with the laboratory analyses described in this report. The authors thank Renee Russell, Tongan Jin, and Michael Schweiger at the Pacific Northwest National Laboratory for helpful discussions and review of these data and the report. Funding from the U.S. Department of Energy Office of River Protection Waste Treatment and Immobilization Plant Project through Inter-Entity Work Order M0SRV00101 as managed by Albert A. Kruger is gratefully acknowledged.

EXECUTIVE SUMMARY

In this report, the Savannah River National Laboratory (SRNL) provides chemical analyses and Product Consistency Test (PCT) results for a series of simulated low activity waste (LAW) glass compositions. A procedure developed at the Pacific Northwest National Laboratory (PNNL) for producing sulfur saturated melts (SSMs) was carried out at both SRNL and PNNL to fabricate the glasses characterized in this report. This method includes triplicate melting steps with excess sodium sulfate, followed by grinding and washing to remove unincorporated sulfur salts. The wash solutions were also analyzed as part of this study. These data will be used in the development of improved sulfur solubility models for LAW glass.

Chemical analyses were performed on a representative sample of each of the baseline and sulfur saturated glasses to allow for comparisons with the targeted compositions. No analytical issues of conern were identified. Minor differences between the targeted and measured concentrations of some of the baseline glass components were noted, including some low values for Al_2O_3, Na_2O, and ZrO_2.

For the SSM versions of the glasses, the measured Fe_2O_3 concentration for glass LP2-IL-01SSM was unexpectedly high, while the measured Fe_2O_3 concentration in the baseline version of this glass met the targeted value. The measured SO_3 concentrations were higher than the targeted values, which is expected for the SSM versions of the study glasses. Several of the SSM glass components had measured concentrations below the targeted values, including Al_2O_3, B_2O_3, Cl, Cr_2O_3, F, K_2O, Na_2O, P_2O_5, V_2O_5, and ZrO_2. Several of these components were subsequently measured in the wash solutions generated during the preparation of the SSM versions of the glasses.

The PCT Method-A was performed using three replicate samples of each of the quenched and canister centerline cooled (CCC) versions of the baseline glasses to assess chemical durability. Normalized concentrations were calculated based on the targeted (provided by PNNL) and measured (quenched, baseline) compositions using the average of the common logarithms of the leachate concentrations. Neither compositional view (targeted or measured) nor heat treatment (quenched or CCC) had a practical impact on the PCT result for each of the study glasses. Both the quenched and CCC versions of all the study glasses had NC_B values that were lower than the Environmental Assessment (EA) benchmark NC_B value of 16.695 g/L. The quenched version of glass LP2-IL-09 had the highest NC_B value, 3.468 g/L based on normalization to the targeted composition.

Chemical analyses were also performed on a representative sample of each of the wash solutions resulting from the preparation of the SSM versions of the study glasses. The measured concentrations of B, Cr, K, and V in the wash solutions may be related to the lower measured values for these components in the SSM versions of the study glasses. The measured concentrations of Na in the wash solutions were in the range of 600-1025 mg/L. This may be attributed to both the excess sodium sulfate added as part of the SSM preparation process, as well as to the lower measured concentrations of Na_2O in some of the SSM versions of the study glasses. The concentrations of sulfur in the wash solutions were similar by the two measurement methods (SO_4^{2-} basis), and were in the range of about 1000-1800 mg/L. Further comparisons between the compositions of the glasses and the compositions of the wash solutions may be of interest, although the current sulfur saturation method used does not allow for a complete mass balance to be developed.

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LIST OF ABBREVIATIONS

ARM-1	Approved Reference Material
BDL	Below Detection Limit
CCC	Canister Centerline Cooled
DI	De-ionized
DOE	U.S. Department of Energy
EA	Environmental Assessment
IC	Ion Chromatography
ICP-AES	Inductively Coupled Plasma – Atomic Emission Spectroscopy
HLW	High Level Waste
KH	Potassium hydroxide digestion
LAW	Low Activity Waste
LM	Lithium Metaborate fusion
LRM	Low-level Reference Material
OM	Optical Microscopy
ORP	Office of River Protection
PCT	Product Consistency Test
PF	Peroxide Fusion
PNNL	Pacific Northwest National Laboratory
ppm	Parts Per Million
Q	Quenched
SRNL	Savannah River National Laboratory
SSM	Sulfur Saturated Melt
TTQAP	Task Technical and Quality Assurance Plan
wt %	Weight Percent
WTP	Hanford Tank Waste Treatment and Immobilization Plant
%RSD	Percent Relative Standard Deviation

1.0 Introduction

The U.S. Department of Energy (DOE) Office of River Protection (ORP) has requested that the Savannah River National Laboratory (SRNL) provide expert evaluation and experimental work in support of the River Protection Project vitrification technology development. DOE is building the Hanford Tank Waste Treatment and Immobilization Plant (WTP) at the Hanford Site in Washington to remediate 55 million gallons of radioactive waste that is temporarily stored in 177 underground tanks. The low-activity waste (LAW) fraction will be partitioned from the high-level waste (HLW). Both the LAW and HLW will then be vitrified into borosilicate glass using Joule-heated ceramic melters.

Efforts are being made to increase the loading of Hanford tank wastes in the glass while conforming to processing requirements and product quality regulations. DOE-ORP has requested that SRNL support the advancement of glass formulations and process control strategies in key technical areas, as defined in the Task Technical and Quality Assurance Plan (TTQAP).[1] Two of these areas are enhancing waste glass property/composition models and broadening the compositional regions over which those models are applicable.

In this report, SRNL provides chemical analysis and Product Consistency Test (PCT) results for several simulated LAW glass compositions. These glasses were selected as part of a broader study of the influence of glass composition on chemical durability, sulfur retention, and other properies.[2] The resulting data will be used in the development of improved property/composition models for LAW glass.

2.0 Experimental Procedure

2.1 Quality Assurance

Requirements for performing reviews of technical reports and the extent of review are established in Savannah River Site Manual E7, Procedure 2.60. SRNL documents the extent and type of review using the SRNL Technical Report Design Checklist contained in WSRC-IM-2002-00011, Rev. 2. Laboratory data for this study were recorded in the SRNL Electronic Laboratory Notebook system, experiment C3489-00079-15.

2.2 Glasses Selected for Study

The base glass compositions were selected and fabricated at the Pacific Northwest National Laboratory (PNNL). Identifiers for each of the glasses are listed in Table 2-1. The procedure for producing sulfur saturated melts (SSMs) of these glasses was carried out at both SRNL and PNNL, as shown in Table 2-1.

In the sections that follow, the procedure used for producing the SSMs and removing excess sulfur is briefly described, the methods used for measuring chemical compositions of the glasses are described, and reviews of the resulting data are provided. Detailed data from these analyses are included in the appendices.

Table 2-1. Identifier and Lab Responsible for Preparing Each Sulfur Saturated Melt (SSM)

Glass Identifier	SSM Preparation
LP2-IL-01Q	PNNL
LP2-IL-02Q	SRNL
LP2-IL-03Q	SRNL
LP2-IL-04Q	PNNL
LP2-IL-05Q	SRNL
LP2-IL-06-1Q	SRNL
LP2-IL-07Q	SRNL
LP2-IL-08-1Q	SRNL
LP2-IL-09Q	PNNL
LP2-IL-10Q	PNNL
LP2-IL-11Q	SRNL
LP2-IL-12Q	SRNL
LP2-IL-13Q	SRNL
LP2-IL-14Q	PNNL
LP2-IL-15Q	SRNL
LP2-IL-16Q	SRNL
LP2-IL-17Q	SRNL

2.3 Preparation of Sulfur Saturated Melts

A methodology for the preparation of the SSMs and for the removal (washing) of excess sulfur was developed at PNNL and is outlined in a test instruction.[3] Implementation of the methodology at SRNL is described in detail in a previous report on the Phase 1 glasses of this study.[4]

Briefly, the as-received, base glasses were first ground in an Angstrom, Inc. TE250 Laboratory Ring Pulverizer until all the glass powder passed through a 100 mesh sieve. Next, 100 g of ground baseline glass and 7.64 g of Na_2SO_4 were combined by blending in the ring pulverizer for about 30 seconds. The mixture was melted at 1150 °C for approximately 1 hour in a platinum/gold alloy crucible. The glass was then quenched on a steel plate. The grinding and melting process was repeated two more times to maximize sulfur incorporation in the glass, with the resulting glasses being described as sulfur saturated melts (SSMs).

The identifiers given in Table 2-1 were modified by replacing the suffix "Q" with the suffix "SSM" to indicate the sulfur saturated melts. Complete details of the grinding and melting process were recorded on log sheets for each of the study glasses. These log sheets are included as Exhibit A-1 of Appendix A. Masses recorded during the process are tabulated in Table A-1 of Appendix A.

Photographs of the SSMs taken after the third re-melting step are included as Exhibit B-1 in Appendix B. Each of the SSMs was examined using optical microscopy (OM) to identify whether the glass was homogenous and whether visible crystals were present after the third re-melting step. Optical micrographs of each of the SSMs, at two levels of magnification, are included as Exhibit B-2 in Appendix B. Fracture surfaces resulting from pouring and quenching the glasses were imaged. In general, inclusions that appear to be sulfur salts are visible in all the glasses, along with varying amounts of small bubbles.

2.4 Removal of Excess Sulfur

Each of the SSMs was ground, washed, and filtered to remove excess sulfur prior to further analysis. This methodology was developed at PNNL and is outlined in a test instruction.[3] Implementation of the methodology at SRNL is described in detail in a previous report on the Phase 1 glasses of this study.[4]

Briefly, about 4 g of each of the SSM glasses was ground in the ring pulverizer such that the resulting powder passed through a 120 mesh (125 µm) sieve. The powders were washed with about 100 mL of de-ionized (DI) water in a beaker immersed in an ultrasonic bath followed by vacuum assisted filtering with a 0.2 µm polyvinylidene difluoride membrane disc filter. The filter with glass powder was placed in a 90 °C oven overnight to dry. The dried glass powder sample was placed into a labeled vial for further analysis. The washing and filtering steps were repeated with a second ~4 g sample to obtain a sufficient mass of washed glass to support composition analyses. Samples of the wash solutions were also collected for analysis. The suffix "-W" was appended to the SSM glass identifiers to indicate the wash solutions resulting from the preparation of each glass.

Complete details of the grinding, washing, and filtering process to remove excess sulfur were recorded on log sheets for each of the study glasses. These log sheets are included as Exhibit A-2 of Appendix A. Masses recorded during the process are tabulated in Table A-2 of Appendix A.

2.5 Glass Composition Analysis

Chemical analyses were performed under the auspices of an analytical plan[5] on a representative sample of each of the glasses listed in Table 2-1 to allow for comparisons with the targeted compositions. Three dissolution techniques, sodium peroxide fusion (PF),[6] lithium metaborate fusion (LM),[7] and potassium hydroxide fusion (KH),[8] were used for preparing each of the glass samples, in duplicate, for analysis.

Each of the duplicate samples was analyzed twice for each element of interest by Inductively Coupled Plasma – Atomic Emission Spectroscopy (ICP-AES)[9] or ion chromatography (IC),[10] for a total of four measurements per element per glass. Glass standards were also intermittently measured to assess the performance of the ICP-AES and IC instruments over the course of these analyses. Specifically, several samples of the low-level reference material (LRM)[11] were included as part of the analytical plan. The LRM composition reported as the "Consensus Average" is used as the reference composition of this glass for the purposes of this study.[11] The preparation and measurement methods used for each of the reported glass components are listed in Table 2-2.

Table 2-2. Preparation and Measurement Methods Used in Reporting the Concentrations of Each of the Analytes of the Study Glasses

Analyte	Preparation Method	Measurement Method
Al	PF	ICP-AES
B	PF	ICP-AES
Ca	LM	ICP-AES
Cl	KH	IC
Cr	LM	ICP-AES
F	KH	IC
Fe	PF	ICP-AES
K	LM	ICP-AES
Li	PF	ICP-AES
Mg	LM	ICP-AES
Na	LM	ICP-AES
P	LM	ICP-AES
S	LM	ICP-AES
Si	PF	ICP-AES
Sn	PF	ICP-AES
V	LM	ICP-AES
Zn	LM	ICP-AES
Zr	LM	ICP-AES

2.6 Product Consistency Test

The PCT Method-A[12] was performed using three replicate samples of each of the quenched and WTP canister centerline cooled (CCC)[13] versions of the study glasses to assess chemical durability. Also included in the experimental test matrix was the Approved Reference Material (ARM-1) glass[14] and blanks from the vessel cleaning batch. Samples were ground, washed, and prepared according to the standard procedure.[12] Fifteen milliliters of Type-I ASTM water were added to 1.5 g of glass in stainless steel vessels. The vessels were closed, sealed, and placed in an oven at 90 ± 2 °C where the samples were maintained at temperature for 7 days (+/-2%). The vessels were then removed from the oven and cooled to ambient temperature. Once cooled, a small aliquot was drawn from each vessel and used to determine the ambient temperature pH of the leachate. The remaining solution from each vessel was sampled (filtered and acidified), then labeled and analyzed by ICP-AES under the auspices of an analytical plan.[15] Samples of a multi-element, standard solution[a] were also included in the analytical plan as a check on the accuracy of the ICP-AES instrument used for these measurements. Normalized concentrations were calculated based on the targeted (provided by PNNL) and measured (quenched) compositions using the average of the common logarithms of the leachate concentrations.

2.7 Wash Solution Analysis

Chemical analyses were performed under the auspices of an analytical plan[16] on a representative sample of each of the wash solutions from the glasses listed in Table 2-1 that resulted from the preparation steps described in Section 2.4. The samples were diluted based on the expected concentrations of the species in solution and acidified as appropriate (only when visible solids were present) in preparation for the analyses.

[a] ICP multi-element custom solution, product number SM-744-013, High Purity Standards, Charleston, SC.

Each of the samples was analyzed in triplicate for each element of interest by ICP-AES[9] and IC.[10] Solution standards and blanks were also intermittently measured to assess the performance of the ICP-AES and IC instruments over the course of these analyses.

The measurement methods used for each of the reported wash solution components are listed in Table 2-3.

Table 2-3. Measurement Methods Used in Reporting the Concentrations of Each of the Analytes of the Wash Solutions

Analyte	Measurement Method
Al	ICP-AES
B	ICP-AES
Ca	ICP-AES
Cl^-	IC
Cr	ICP-AES
F^-	IC
Fe	ICP-AES
K	ICP-AES
Li	ICP-AES
Mg	ICP-AES
Na	ICP-AES
P	ICP-AES
PO_4^-	IC
S	ICP-AES
SO_4^{2-}	IC
Si	ICP-AES
Sn	ICP-AES
V	ICP-AES
Zn	ICP-AES
Zr	ICP-AES

3.0 Results and Discussion

3.1 Review and Evaluation of the Quenched Glass Composition Measurements

Table C-1 and Table C-2 in Appendix C provide the elemental concentration measurements in wt % for the study glasses as prepared by the LM method. Table C-3 in Appendix C provides the elemental concentration measurements in wt % for the study glasses as prepared by the PF method. Table C-4 in Appendix C provides the elemental concentration measurements in wt % for the study glasses as prepared by the KH method. Elemental measurements for samples of the LRM standard glass are also included in the tables of Appendix C. These unprocessed data are provided so that the values are readily available should they be of interest for future reviews.

In the sections that follow, the analytical sequences of the measurements are explored, the measurements of the LRM standard glass are investigated, the measurements for each glass are reviewed, the average chemical composition for each glass is determined, and comparisons are made between the measurements and the targeted compositions of the glasses. JMP™ Pro Version 11.2.1 (SAS Institute, Inc.)[17] was used to support these analyses.

3.1.1 Treatment of Detection Limits

The elemental concentrations in Table C-1 through Table C-4 of Appendix C were converted to oxide concentrations by multiplying the values for each element by the gravimetric factor for the corresponding oxide. During the process of converting to oxide concentrations, an elemental concentration measurement that was reported to be below the detection limit of the analytical process used was set to the detection limit as the oxide concentration was determined for the purposes of review and calculating a sum of oxides for each glass. Those oxides with one or more concentration measurements that were below the associated detection limit (BDL) will be denoted with a less than symbol (<) as the measured compositions are reported.

3.1.2 Measurements in Analytical Sequence

Exhibit C-1 in Appendix C provides plots of the wt % measurements generated for each sample by oxide and analytical block. The plots are in analytical sequence within each calibration block with different symbols and colors being used to represent each of the study and standard glasses. These plots include all of the measurement data from Table C-1 through Table C-4 in Appendix C, with each plotted point identified by its Lab ID (from the analytical study plan). Plotting the data in this format provides an opportunity to identify gross trends in performance of the analytical instruments within and among calibration blocks. A review of these plots did not identify any gross patterns or trends in the analytical process over the course of these measurements. Only minor, block-to-block calibration shifts are seen. For example, minor calibration effects are visible between the two sub-blocks within each analytical block for the Na_2O measurements. Minor calibration effects are also visible between the two sub-blocks of Block 1 for the SnO_2 measurements. In all cases, the instrument check standards were within specification. These small calibration effects are typical of ICP-AES analyses and are negated by taking the average of the measurements for each analyte.

3.1.3 Composition Measurements by Glass Identifier

Exhibit C-2 in Appendix C provides plots of the oxide concentration measurements by the PNNL Glass ID (including the LRM reference glass) by Lab ID grouped by targeted concentration. Different symbols and colors are used to represent the different glasses. These plots show the individual measurements across the duplicates of each preparation method and the two instrument calibrations for each glass. Plotting the data in this format provides an opportunity to review the values for each individual glass as a function of the duplicate preparations and duplicate measurements. A review of the plots presented in these exhibits reveals the repeatability of the four individual values for each oxide for each glass. Some degree of scatter among the Al_2O_3, B_2O_3, Na_2O, SiO_2, SnO_2, and ZrO_2 measurements was noted for the study glasses. There were no indications of an error in preparation or measurement that had to be addressed in treatment of the data. Therefore, the entire set of measurement data was used in determining representative, measured compositions for the study glasses.

3.1.4 Results for the LRM Standard

Exhibit C-3 in Appendix C provides a comparison of the LRM results to their acceptability limits utilized by SRNL.[9] The review is in the form of plots of the measurements arranged by preparation method and element, framed by upper and lower acceptability limits for the concentration of the element in question. The results show that all the measurements for the elements present in the LRM standard glass were within the acceptability limits utilized by SRNL in conducting instrument and procedure assessments during the execution of these analyses.

3.1.5 Measured versus Targeted Compositions

From the discussion of Section 3.1.3, all of the measurements for each oxide for each glass (i.e., all of the measurements in Table C-1 through Table C-4 in Appendix C) were averaged to determine a representative chemical composition for each glass. A sum of oxides was also computed for each glass based upon the averaged, measured values. Exhibit C-4 in Appendix C provides plots showing the result for each glass for each oxide to allow PNNL to draw comparisons between the measured and targeted values. The following observations are offered from a review of these plots:

- The measured concentrations of Al_2O_3 are somewhat below the targeted values for the study glasses.
- The measured concentrations of chlorine and fluorine are low for most of the study glasses, perhaps due to volatility during melting.
- The measured Na_2O and ZrO_2 concentrations are low for several of the study glasses.
- The measured concentrations of P_2O_5 are low for those glasses that targeted higher concentrations of this component (>1 wt %).

Table C-5 in Appendix C provides a summary of the average compositions as well as the targeted compositions and some associated differences and relative differences. All the measured sums of oxides for the study glasses fall within the interval of 97.8 to 101.7 wt %, indicating excellent recovery of the glass components. Entries in Table C-5 show the relative differences between the measured values and the targeted values for the oxides with targeted values above 5 wt %. The relative differences are shaded if they are 10% or more.[a] The highlighted cells are consistent with the observation of low measured ZrO_2 concentrations for some of the study glasses as listed above.

3.2 Review and Evaluation of PCT Measurements

Table D-1 in Appendix D provides the elemental leachate concentration measurements for the solution samples generated by the PCTs for the study glasses and standards. The values for these measurements are given in the table as-received ("ar") from the laboratory analyses and after adjustments for the dilution factors. The measurements for the study glasses, blanks, and the ARM-1 glass were multiplied by 1.6667 to determine the values in mg/L.

Based on the masses of the PCT vessels before and after the 7-day procedures, there was a water-loss issue for one of the three PCT vessels for glass LP2-IL-09Q (shaded in Table D-1). The leachate from this vessel was not characterized (measured values shown as below detection limits) and was excluded from the PCT normalization calculations. The analyses of the leachates from the remaining two vessels were used to determine the normalized PCT response for this glass.

The ratio of leachant volume to the mass of ground glass was confirmed to be correct for each vessel. The measured concentrations of B, Li, Na, and Si in the leachates from the ARM-1 glasses fell within the control charts, demonstrating proper performance of the PCTs.[14] The measured, ambient temperature pH values for each of the PCT leachates are provided in Table D-2 and Table D-3 of Appendix D for reference.

In the sections that follow, the analytical sequences of the measurements are explored, the measurements for each glass are reviewed, the measurements of the multi-element solution standard are investigated, the normalized PCT results for each glass are determined, and comparisons are made between the PCT results for the two heat treatments of each glass. JMP Pro Version 11.2.1 (SAS Institute, Inc.)[17] was used to support these analyses.

[a] These criteria were selected arbitrarily for the purpose of highlighting differences from targeted concentrations that may be of practical concern.

3.2.1 Treatment of Detection Limits

Some of the “ar” measurements (Table D-1 in Appendix D) were below the analytical detection limits. These measurements (indicated by a “<” symbol in Table D-1) were replaced by their detection limits in subsequent analyses for the purposes of review and calculating normalized leachate values. Those elements with measured concentrations that were below the associated detection limit will be denoted with a less than symbol (<) as the normalized leachate values are reported.

3.2.2 Results for the Samples of the Multi-Element Solution Standard

Table 3-1 provides a review of the measurements of the solution standard samples that were included in the analytical blocks for the PCT analyses. For each analytical block, the mean, standard deviation, and percent relative standard deviation (%RSD) are determined for each element present in the standard. Following the guidance in ASTM C 1285, there were two primary evaluations conducted for these summary statistics: the mean value for each analytical block was found to be less than 10% from the reference value (i.e., a percent relative bias less than 10%) for the element in question, and the %RSD was less than 10% for the element in question. The results in Table 3-1 satisfy these criteria, and thus, the results for the standard suggest no significant issues with the analytical outcomes for the measurements of the PCT solutions.

Table 3-1. Results from Samples of the Multi-Element Solution Standard

Oven Run	**1**			**2**			**Reference values (mg/L)**
Block	**1**	**2**	**3**	**1**	**2**	**3**	
Mean(B (mg/L))	18.97	20.20	20.67	20.70	19.27	19.13	20
Mean(Li (mg/L))	9.73	10.17	10.47	10.43	10.17	9.93	10
Mean(Na (mg/L))	80.80	81.83	82.73	81.20	80.03	81.50	81
Mean(Si (mg/L))	47.33	47.80	48.17	50.67	49.00	48.27	50
% relative bias B	-5.2%	1.0%	3.3%	3.5%	-3.7%	-4.3%	<10% per ASTM C 1285
% relative bias Li	-2.7%	1.7%	4.7%	4.3%	1.7%	-0.7%	
% relative bias Na	-0.2%	1.0%	2.1%	0.2%	-1.2%	0.6%	
% relative bias Si	-5.3%	-4.4%	-3.7%	1.3%	-2.0%	-3.5%	
Std Dev (B (mg/L))	0.666	0.529	0.208	0.436	0.231	0.569	
Std Dev (Li (mg/L))	0.403	0.208	0.115	0.115	0.153	0.289	
Std Dev (Na (mg/L))	3.020	0.945	0.321	0.624	0.764	0.529	
Std Dev (Si (mg/L))	0.404	0.600	0.208	2.318	1.200	0.924	
%RSD (B (mg/L))	3.5%	2.6%	1.0%	2.1%	1.2%	3.0%	<10% per ASTM C 1285
%RSD (Li (mg/L))	4.1%	2.0%	1.1%	1.1%	1.5%	2.9%	
%RSD (Na (mg/L))	3.7%	1.2%	0.4%	0.8%	1.0%	0.6%	
%RSD (Si (mg/L))	0.9%	1.3%	0.4%	4.6%	2.4%	1.9%	

3.2.3 Measurements in Analytical Sequence

Exhibit D-1 in Appendix D provides plots of the common logarithms of the leachate concentrations (mg/L) in analytical sequence by analytical block by analytical set. Each of the analytical sets corresponds to an oven run that was used to conduct the PCT measurements needed to support the analyses of the study glasses. Plotting the data in this format provides an opportunity to identify gross trends in performance of the analytical instrument within and among calibration blocks. No issues were observed in a review of these plots.

3.2.4 Measurements by Glass Identifier

Exhibit D-2 in Appendix D provides plots of the leachate concentrations for both the quenched and CCC versions of each of the study glasses and for the standards for each analytical set. These plots are in common logarithms of the mg/L values and allow for the assessment of the repeatability of the measurements for each glass. For some of the glasses, minor scatter among the triplicate values of some analytes is observed. A closer look at the quenched and CCC outcomes is provided in the following sections.

3.2.5 Normalization of the PCT Results

The PCT leachate data were used to determine normalized concentrations for each element of interest using both the targeted and measured (quenched) compositions of the glasses following the expression given in ASTM C1285:

$$NC_i = \frac{c_i\left(sample\right)}{f_i}$$

where NC_i is the normalized concentration in units of $g_{\text{waste form}}/L_{\text{leachant}}$, c_i is the concentration of element "i" in the leachate in units of g_i/L, and f_i is the mass fraction of element "i" in the unleached glass in units of g_i/g_{glass}.[a]

An equation was developed to allow for calculation of the NC_i values using the units of measurement provided with the analytical results for this study, and to accommodate the triplicate leachate measurements for each of the study glasses. Note that the symbols in this second equation were kept consistent with those used in ASTM C1285, but the units of measurement differ. The common logarithm of the normalized concentration for each element "i" (NC_i) for each of the study glasses was determined using the equation:

$$\log_{10}\left(NC_i\right) = \overline{\log_{10} c_i} - \left[1 + \log_{10} f_i\right]$$

where NC_i remains in units of $g_{\text{waste form}}/L_{\text{leachant}}$, $\overline{\log_{10} c_i}$ is the average of the common logarithms of the measured concentrations of element "i" in the triplicate leachates in units of mg/L, and $\log_{10} f_i$ is either the common logarithm of the targeted concentration of element "i" in the glass in units of wt %, or the common logarithm of the average measured concentration of element "i" in the glass in units of wt % (from Table D-1 of Appendix D). The calculated NC_i values are discussed further in the following sections.

[a] Note that the waste forms in this study were assumed to be of similar density. The PCT-A reference volume of leachant to sample mass ratio was used, and the 100 to 200 mesh reference particle size was used. Thus, no adjustment for the density of the glasses was made in normalizing the PCT results. Data provided in the appendices of this report allow for the calculation of normalized elemental mass loss (NL_i) if glass densities are measured at a later date.

3.2.6 Effects of Heat Treatments

Exhibit D-3 in Appendix D provides plots of the normalized PCT responses for the two heat treatments for each of the study glasses as well as the responses for ARM-1. The results are grouped by compositional view. Note that an indicator is provided as part of these plots to show results involving below detection limit (BDL) values.

The plots of Exhibit D-3 provide a graphical comparison between the PCT responses for the two heat treatments of each study glass. Table 3-2 provides a listing of the normalized PCT responses in g/L.

A review of the PCT data resulted in the following observations:

- The use of either the targeted or measured compositions in calculating the normalized concentration values has little if any practical effect.
- The CCC heat treatment had little impact on the PCT results as compared to the quenched versions of the study glasses.
- Both the quenched and CCC versions of all of the study glasses have NC_B values that are lower than the EA benchmark NC_B value of 16.695 g/L.[18]
- The quenched version of glass LP2-IL-09 had the highest NC_B value, 3.468 g/L based on normalization to the targeted composition.

PNNL may wish to perform a more complete review of the influence of composition and heat treatment on the PCT responses of the glasses described in this report in order to draw further conclusions, including any potential correlations with the methods used in selecting these glass compositions for study.

Table 3-2. Normalized PCT Results

Oven Run	Glass ID	Heat Treatment	Comp. View	NC_B (g/L)	NC_{Li} (g/L)	NC_{Na} (g/L)	NC_{Si} (g/L)
1	ARM-1	ref	ref	0.437	0.526	0.454	0.248
2	ARM-1	ref	ref	0.5	0.602	0.503	0.287
2	LP2-IL-01	CCC	measured	2.191	< 0.167	2.902	0.549
2	LP2-IL-01	CCC	targeted	2.09		2.725	0.565
1	LP2-IL-01	quenched	measured	1.441	< 0.167	1.974	0.47
1	LP2-IL-01	quenched	targeted	1.375		1.854	0.483
2	LP2-IL-02	CCC	measured	1.123	< 0.167	1.443	0.408
2	LP2-IL-02	CCC	targeted	1.124		1.366	0.415
1	LP2-IL-02	quenched	measured	1.138	< 0.167	1.394	0.384
1	LP2-IL-02	quenched	targeted	1.139		1.319	0.391
2	LP2-IL-03	CCC	measured	0.762	< 0.167	1.209	0.352
2	LP2-IL-03	CCC	targeted	0.746		1.091	0.369
1	LP2-IL-03	quenched	measured	0.784	< 0.167	1.232	0.337
1	LP2-IL-03	quenched	targeted	0.768		1.111	0.353
2	LP2-IL-04	CCC	measured	1.444	< 0.167	2.255	0.574
2	LP2-IL-04	CCC	targeted	1.485		2.135	0.597
1	LP2-IL-04	quenched	measured	1.322	< 0.167	2.016	0.514
1	LP2-IL-04	quenched	targeted	1.359		1.908	0.535
2	LP2-IL-05	CCC	measured	1.224	< 0.167	1.446	0.325
2	LP2-IL-05	CCC	targeted	1.165		1.358	0.34
1	LP2-IL-05	quenched	measured	1.054	< 0.167	1.212	0.281
1	LP2-IL-05	quenched	targeted	1.003		1.138	0.294
2	LP2-IL-06	CCC	measured	2.228	< 0.167	1.708	0.258
2	LP2-IL-06	CCC	targeted	2.248		1.729	0.274
1	LP2-IL-06	quenched	measured	2.5	< 0.167	1.845	0.251
1	LP2-IL-06	quenched	targeted	2.522		1.868	0.266
2	LP2-IL-07	CCC	measured	2.653	< 0.167	2.568	0.614
2	LP2-IL-07	CCC	targeted	2.639		2.535	0.629
1	LP2-IL-07	quenched	measured	2.964	< 0.167	2.595	0.624
1	LP2-IL-07	quenched	targeted	2.948		2.561	0.639

Table 3-2. Normalized PCT Results (continued)

Oven Run	Glass ID	Heat Treatment	Comp. View	NC_B (g/L)	NC_{Li} (g/L)	NC_{Na} (g/L)	NC_{Si} (g/L)
2	LP2-IL-08	CCC	measured	1.118	< 0.167	1.549	0.409
2	LP2-IL-08	CCC	targeted	1.188		1.474	0.419
1	LP2-IL-08	quenched	measured	1.239	< 0.167	1.652	0.408
1	LP2-IL-08	quenched	targeted	1.317		1.571	0.418
2	LP2-IL-09	CCC	measured	3.249	< 0.167	2.645	0.472
2	LP2-IL-09	CCC	targeted	3.291		2.55	0.475
1	LP2-IL-09	quenched	measured	3.424	< 0.167	2.794	0.444
1	LP2-IL-09	quenched	targeted	3.468		2.693	0.447
2	LP2-IL-10	CCC	measured	0.893	< 0.167	1.263	0.36
2	LP2-IL-10	CCC	targeted	0.945		1.201	0.358
1	LP2-IL-10	quenched	measured	0.833	< 0.167	1.205	0.317
1	LP2-IL-10	quenched	targeted	0.881		1.146	0.316
2	LP2-IL-11	CCC	measured	0.583	< 0.167	0.974	0.31
2	LP2-IL-11	CCC	targeted	0.616		0.944	0.312
1	LP2-IL-11	quenched	measured	0.549	< 0.167	0.99	0.285
1	LP2-IL-11	quenched	targeted	0.581		0.96	0.286
2	LP2-IL-12	CCC	measured	1.093	< 0.167	1.437	0.426
2	LP2-IL-12	CCC	targeted	1.082		1.362	0.433
1	LP2-IL-12	quenched	measured	1.398	< 0.167	1.58	0.458
1	LP2-IL-12	quenched	targeted	1.384		1.497	0.467
2	LP2-IL-13	CCC	measured	1.553	< 0.167	1.394	0.322
2	LP2-IL-13	CCC	targeted	1.512		1.358	0.325
1	LP2-IL-13	quenched	measured	2.077	< 0.167	1.676	0.329
1	LP2-IL-13	quenched	targeted	2.022	<	1.632	0.332
2	LP2-IL-14	CCC	measured	2.88	< 0.167	2.327	0.396
2	LP2-IL-14	CCC	targeted	2.713	<	2.231	0.409
1	LP2-IL-14	quenched	measured	3.091	< 0.167	2.458	0.367
1	LP2-IL-14	quenched	targeted	2.911	<	2.356	0.379
2	LP2-IL-15	CCC	measured	0.959	< 0.167	0.938	0.315
2	LP2-IL-15	CCC	targeted	0.922	<	0.901	0.321

Table 3-2. Normalized PCT Results (continued)

Oven Run	Glass ID	Heat Treatment	Comp. View		NC_B (g/L)		NC_{Li} (g/L)		NC_{Na} (g/L)		NC_{Si} (g/L)
1	LP2-IL-15	quenched	measured		1.853	<	0.167		1.417		0.343
1	LP2-IL-15	quenched	targeted		1.78	<			1.361		0.35
2	LP2-IL-16	CCC	measured		0.942	<	0.167		1.169		0.334
2	LP2-IL-16	CCC	targeted		0.906	<			1.143		0.337
1	LP2-IL-16	quenched	measured		1.01	<	0.167		1.225		0.325
1	LP2-IL-16	quenched	targeted		0.971	<			1.197		0.328
2	LP2-IL-17	CCC	measured		1.705	<	0.167		1.356		0.335
2	LP2-IL-17	CCC	targeted		1.613	<			1.339		0.34
1	LP2-IL-17	quenched	measured		1.878	<	0.167		1.43		0.304
1	LP2-IL-17	quenched	targeted		1.777	<			1.412		0.309

3.3 Review and Evaluation of the SSM Glass Composition Measurements

Table E-1 and Table E-2 in Appendix E provide the elemental concentration measurements in wt % for the SSM versions of the study glasses as prepared by the LM method. Table E-3 in Appendix E provides the elemental concentration measurements in wt % for the SSM versions of the study glasses as prepared by the PF method. Table E-4 in Appendix C provides the elemental concentration measurements in wt % for the SSM versions of the study glasses as prepared by the KH method. Elemental measurements for samples of the LRM standard glass are also included in the tables of Appendix E. These unprocessed data are provided so that the values are readily available should they be of interest for future reviews.

In the sections that follow, the analytical sequences of the measurements are explored, the measurements of the LRM standard glass are investigated, the measurements for each glass are reviewed, the average chemical composition for the SSM version of each glass is determined, and comparisons are made between the measurements and the targeted compositions of the glasses. JMP™ Pro Version 11.2.1 (SAS Institute, Inc.)[17] was used to support these analyses.

3.3.1 Treatment of Detection Limits

The elemental concentrations in Table E-1 through Table E-4 of Appendix E were converted to oxide concentrations by multiplying the values for each element by the gravimetric factor for the corresponding oxide. During the process of converting to oxide concentrations, an elemental concentration measurement that was reported to be below the detection limit of the analytical process used was set to the detection limit as the oxide concentration was determined for the purposes of review and calculating a sum of oxides for each glass. Those oxides with one or more concentration measurements that were below the associated detection limit (BDL) will be denoted with a less than symbol (<) as the measured compositions are reported.

3.3.2 Measurements in Analytical Sequence

Exhibit E-1 in Appendix E provides plots of the wt % measurements generated for each sample by oxide and analytical block. The plots are in analytical sequence within each calibration block with different symbols and colors being used to represent each of the study and standard glasses. These plots include all of the measurement data from Table E-1 through Table E-4 in Appendix E, with each plotted point identified by its Lab ID. Plotting the data in this format provides an opportunity to identify gross trends in performance of the analytical instruments within and among calibration blocks. A review of these plots did not identify any gross patterns or trends in the analytical process over the course of these measurements. Only minor, block-to-block calibration shifts are seen. For example, see the measurements of B_2O_3 concentration in Blocks 1 and 3. In all cases, the instrument check standards were within specification. These small calibration effects are typical of ICP-AES analyses and are negated by taking the average of the measurements for each analyte.

3.3.3 Composition Measurements by Glass Identifier

Exhibit E-2 in Appendix E provides plots of the oxide concentration measurements by the PNNL Glass ID (including the LRM reference glass) by Lab ID grouped by targeted concentration. Different symbols and colors are used to represent the different glasses. These plots show the individual measurements across the duplicates of each preparation method and the two instrument calibrations for each glass. Plotting the data in this format provides an opportunity to review the values for each individual glass as a function of the duplicate preparations and duplicate measurements. A review of the plots presented in these exhibits reveals the repeatability of the four individual values for each oxide for each glass. Some degree of scatter among the Al_2O_3, B_2O_3, Fe_2O_3, Na_2O, P_2O_5, SiO_2, and ZrO_2 measurements was noted for the SSM versions of the study glasses. The measured Fe_2O_3 concentrations for glass LP2-IL-01SSM were unexpectedly high, about six times greater than the targeted value. The measured SO_3 concentrations are higher than the targeted values, which is expected for the SSM versions of the study glasses. The measured Na_2O

concentrations are generally below the targeted values. There were no indications of an error in preparation or measurement that had to be addressed in treatment of the data. Therefore, the entire set of measurement data was used in determining representative, measured compositions for the SSM versions of the study glasses.

3.3.4 Results for the LRM Standard

Exhibit E-3 in Appendix E provides a comparison of the LRM results to their acceptability limits utilized by SRNL.[9] The review is in the form of plots of the measurements arranged by preparation method and element, framed by upper and lower acceptability limits for the concentration of the element in question. The results show that all the measurements for the elements present in the LRM standard glass were within the acceptability limits utilized by SRNL in conducting instrument and procedure assessments during the execution of these analyses.

3.3.5 Measured versus Targeted Compositions

From the discussion of Section 3.3.3, all of the measurements for each oxide for each glass (i.e., all of the measurements in Table E-1 through Table E-4 in Appendix E) were averaged to determine a representative chemical composition for the SSM version of each glass. A sum of oxides was also computed for each glass based upon the averaged, measured values. Exhibit E-4 in Appendix E provides plots showing the result for each glass for each oxide to allow PNNL to draw comparisons between the measured and targeted values. The following observations are offered from a review of these plots:

- The measured Al_2O_3, B_2O_3, V_2O_5, and ZrO_2 concentrations are below the targeted values for most of the SSM glasses.
- The measured concentrations of chlorine and fluorine are low for all the SSM glasses, which is likely due to volatility over the multiple melting cycles.
- The measured concentrations of Cr_2O_3 are somewhat low for the SSM glasses except for LP2-IL-17SSM, which did not contain Cr_2O_3.
- The measured concentration of Fe_2O_3 is significantly above the targeted value for glass LP2-IL-01SSM. The measured value for the quenched version of this glass met the targeted concentrations (see Section 3.1.5).
- The measured concentrations of K_2O are low for those glasses that targeted higher concentrations (1-1.5 wt %), although no issues were noted with analyses of the LRM glass at ~1.5 wt %.
- The measured Na_2O concentrations are below the targeted values for the SSM glasses. This is unexpected given the additions of excess sodium sulfate. This result may indicate that significant sodium partitioned to the excess sulfate phase that was washed from the glasses prior to analyses.
- The measured concentrations of P_2O_5 are low for the SSM glasses.
- There are some deviations in the measured SiO_2 concentrations, both above and below the targeted values for the SSM glasses.
- As expected, the measured concentrations of SO_3 in the SSM glasses are higher than targeted due to the use of the sulfur saturation method in fabricating these glasses.

Table E-5 in Appendix E provides a summary of the average compositions as well as the targeted compositions and some associated differences and relative differences. All the measured sums of oxides for the SSM glasses fall within the interval of 95.2 to 98.9 wt %, indicating acceptable recovery of the glass components. Entries in Table E-5 show the relative differences between the measured values and the targeted values for the oxides with targeted values above 5 wt %. The relative differences are shaded if they are 10% or more.[a] The highlighted cells are consistent with the observations listed above. Note that no comparisons were made for the SO_3 values, since the use of the sulfur saturation method means that

[a] These criteria were selected arbitrarily for the purpose of highlighting differences from targeted concentrations that may be of practical concern.

there are no targeted SO_3 concentration for the SSM versions of the study glasses. Further comparison of the measured compositions of the baseline (quenched) and SSM versions of the study glasses is provided in Section 3.4. Analyses of the wash solutions, discussed in Section 3.5, may provide further insight into the measured compositions of the SSM glasses.

3.4 Comparison of Measured Compositions of Baseline and SSM Glasses

Exhibit F-1 in Appendix F provides a comparison of the measured oxide concentrations among the baseline (quenched) and SSM versions of the study glasses. A review of Exhibit F-1 led to several observations:

- The measured concentrations of B_2O_3 Cl^-, Cr_2O_3, F^-, and K_2O were lower for most of the SSM glasses as compared to the baseline glasses.
- The measured CaO concentrations were slightly lower for the SSM glasses that targeted higher values (5 wt % or more) as compared to those of the baseline glasses.
- The low measured concentration of Fe_2O_3 is again visible for glass LP2-IL-01SSM.
- The measured Na_2O and P_2O_5 concentrations were lower for some of the SSM glasses relative to the baseline, but higher for others.
- The measured SnO_2 concentrations were generally lower for the SSM versions of the study glasses when the targeted values were above 2 wt %.
- The measured SO_3 concentrations were higher for SSM versions of the study glasses, as expected.
- The measured V_2O_5 concentrations were lower for the SSM versions of the study glasses when the targeted values were 2 wt % or more.
- The measured ZrO_2 concentrations were lower for most of the SSM versions of the study glasses that targeted 5.5 wt % of this component.

The discussion of the analyses of the wash solutions, provided in the following section, may provide further insight into the measured compositions of the SSM glasses.

3.5 Review and Evaluation of Wash Solution Measurements

Table G-1 and Table G-2 in Appendix G provide the elemental concentration measurements in mg/L for the wash solutions as measured by ICP-AES. Table G-3 in Appendix G provides the anion concentration measurements in mg/L for the wash solutions as measured by IC. Elemental measurements of the blanks and standard solutions are also included in the tables of Appendix G. These unprocessed data are provided so that the values are readily available should they be of interest for future reviews.

In the sections that follow, the analytical sequences of the measurements are explored, the measurements of the standard solutions and the wash solutions are reviewed, and the average chemical composition for each wash solution is determined. JMP™ Pro Version 11.2.1 (SAS Institute, Inc.)[17] was used to support these analyses.

3.5.1 Treatment of Detection Limits

The elemental and anion concentrations in Table G-1 through Table G-3 of Appendix G include measurements that were reported to be below the detection limit of the analytical process used. These values were set to the detection limit for the purposes of review and calculating an average composition for each wash solution. Those analytes with one or more concentration measurements that were below the associated detection limit (BDL) will be denoted with a less than symbol (<) as the measured compositions are reported.

3.5.2 Measurements in Analytical Sequence

Exhibit G-1 in Appendix G provides plots of the mg/L measurements generated for each wash solution sample by element or anion and analytical block. The plots are in analytical sequence within each calibration block with different symbols and colors being used to represent each of the wash solutions and standard solutions. These plots include all of the measurement data from Table G-1 through Table G-3 in Appendix G, with each plotted point identified by its Lab ID and Solution ID. Plotting the data in this format provides an opportunity to identify gross trends in performance of the analytical instruments within and among calibration blocks. A review of these plots did not identify any gross patterns or trends in the analytical process over the course of these measurements.

3.5.3 Composition Measurements by Wash Solution Identifier

Exhibit G-2 in Appendix G provides plots of the elemental and anion concentration measurements grouped by the wash solution identifier (including the blanks and standard solutions). Different symbols and colors are used to represent the different solutions. Plotting the data in this format provides an opportunity to review the values for each individual solution as a function of the triplicate measurements. The plots in Exhibit G-2 for PO_4^{3-} and SO_4^{2-} include the measured values from both ICP-AES and IC for comparison. The measured S and P concentrations from the ICP-AES analyses were converted to PO_4^{3-} and SO_4^{2-} concentrations by multiplying by the appropriate gravimetric factors to support these comparisons. A review of the plots presented in these exhibits reveals the repeatability of the three individual values for each analyte for each solution. Minor scatter among the triplicate measurements of some of the analytes of the study glasses was noted. These observations were not considered to indicate an error in preparation or measurement that had to be addressed in treatment of the data. Therefore, the entire set of measurement data was used in determining representative, measured compositions for the wash solutions.

3.5.4 Results for the Standard Solutions

Table G-4 in Appendix G provides comparisons of the standard solution results to their reference values. Although not a detailed comparison, the results in this table indicate no issues with the performance of the analyses.

3.5.5 Measured Compositions of the Wash Solutions

From the discussion of Section 3.5.3, all of the measurements for each analyte for each wash solution (i.e., all of the measurements in Table G-1 through Table G-3 of Appendix G) were averaged to determine a representative chemical composition for each solution. Table G-5 in Appendix G provides a summary of the average measured compositions of the wash solutions. The following observations are offered from a review of Table G-5:

- The measured concentrations of Al, Ca, F, Fe, Li, Mg, PO_4^{3-} (by IC), Sn, Zn, and Zr in the wash solutions were at or below the detection limits.
- The measured concentrations of Cl ranged from below detection limits to about 30 mg/L.
- The measured concentrations of B (about 15-30 mg/L), Cr (about 2-60 mg/L), K (about 15-110 mg/L), and V (about 5-30 mg/L) in the wash solutions may be related to the lower measured values for these components noted in the SSM versions of the study glasses.
- The measured concentrations of Na in the wash solutions were in the range of 600-1025 mg/L. This may be attributed to both the excess sodium sulfate added as part of the SSM preparation process, as well as to the lower measured concentrations of Na_2O in some of the SSM versions of the study glasses.
- The concentrations of P were measurable by ICP-AES but below the detection limit of the IC method, and ranged from about 5-30 mg/L.
- The measured concentrations of S were similar by both the ICP-AES and IC methods (ICP-AES data converted to SO_4^{2-} basis for comparison), and were in the range of about 1000-1800 mg/L.

4.0 Summary

In this report, SRNL provides chemical analyses and PCT results for a series of simulated LAW glass compositions. A procedure developed at PNNL for producing sulfur saturated melts (SSMs) was carried out at both SRNL and PNNL to fabricate the glasses characterized in this report. This method includes triplicate melting steps with excess sodium sulfate, followed by grinding and washing to remove unincorporated sulfur salts. The wash solutions were also analyzed as part of this study. These data will be used in the development of improved property/composition models for LAW glass.

Chemical analyses were performed on a representative sample of each of the baseline and sulfur saturated glasses to allow for comparisons with the targeted compositions. Three dissolution techniques, sodium peroxide fusion, lithium metaborate fusion, and potassium hydroxide fusion, were used for preparing each of the glass samples, in duplicate, for analysis. Each of the duplicate samples was analyzed twice for each element of interest by ICP-AES or IC, for a total of four measurements per element per glass. Glass standards were intermittently measured to assess the performance of the analytical instruments over the course of these analyses. There were no issues with measurements of the glass standards.

For the baseline versions of the glasses, a review of the individual glass composition measurements identified no analytical issues of concern. Some degree of scatter among the Al_2O_3, B_2O_3, Na_2O, SiO_2, SnO_2, and ZrO_2 measurements was noted. There were no indications of an error in preparation or measurement that had to be addressed in treatment of the data. Minor differences between the targeted and measured concentrations of some of the baseline glass components were noted, including some low values for Al_2O_3, Na_2O, and ZrO_2.

For the SSM versions of the glasses, a review of the individual glass composition measurements identified no analytical issues of concern. Some degree of scatter among the Al_2O_3, B_2O_3, Fe_2O_3, Na_2O, P_2O_5, SiO_2, and ZrO_2 measurements was noted for the SSM versions of the study glasses. The measured Fe_2O_3 concentration for glass LP2-IL-01SSM was unexpectedly high, while the measured Fe_2O_3 concentration in the baseline version of this glass met the targeted value. The measured SO_3 concentrations were higher than the targeted values, which is expected for the SSM versions of the study glasses. Several of the SSM glass components had measured concentrations below the targeted values, including Al_2O_3, B_2O_3, Cl, Cr_2O_3, F, K_2O, Na_2O, P_2O_5, V_2O_5, and ZrO_2. Several of these components were subsequently measured in the wash solutions generated during the preparation of the SSM versions of the glasses.

The PCT Method-A was performed in triplicate on each of the quenched and CCC versions of the baseline glasses to assess chemical durability. One of the triplicate PCT vessels for the quenched version of glass LP2-IL-09 lost water and was omitted from further analysis. A review of the leachate analyses and standard solution data identified no issues with the analytical methods. Normalized concentrations were calculated based on the targeted (provided by PNNL) and measured (quenched, baseline) compositions using the average of the common logarithms of the leachate concentrations. Neither compositional view (targeted or measured) nor heat treatment (quenched or CCC) had a practical impact on the PCT result for each of the study glasses. Both the quenched and CCC versions of all the study glasses had NC_B values that were lower than the EA benchmark NC_B value of 16.695 g/L. The quenched version of glass LP2-IL-09 had the highest NC_B value, 3.468 g/L based on normalization to the targeted composition.

Chemical analyses were also performed on a representative sample of each of the wash solutions resulting from the preparation of the SSM versions of the study glasses. The samples were analyzed in triplicate for each element of interest by ICP-AES or IC. No issues were noted for the measurements of the solution standards. Minor scatter among the triplicate measurements of some of the analytes of the study glasses was noted. The measured concentrations of B, Cr, K, and V in the wash solutions may be related to the lower measured values for these components in the SSM versions of the study glasses. The measured concentrations of Na in the wash solutions were in the range of 600-1025 mg/L. This may be attributed to both the excess sodium sulfate added as part of the SSM preparation process, as well as to the lower measured concentrations of Na_2O in some of the SSM versions of the study glasses. The measured concentrations of sulfur in the wash solutions were similar by both the ICP-AES and IC methods (SO_4^{2-} basis), and were in the range of about 1000-1800 mg/L. Further comparisons between the compositions of the glasses and the compositions of the wash solutions may be of interest, although the current sulfur saturation method used does not allow for a complete mass balance to be developed.

5.0 References

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Appendix A Observations and Log Sheets for Sulfur Saturated Glass Fabrication

Exhibit A-1. Glass Melting History and Observations Log Sheets

First Re-Melt: History and Observations	
Glass ID:	LP2-IL-02Q
Person performing work:	M.Caldwell
Batch Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	4/17/17
Number of additional 30 second milling intervals used:	Ø
Sieve size:	100 mesh
Mass of ground baseline glass (Target 100 g):	100.350
Mass of Na_2SO_4 added (Target 7.64 g):	7.646
Mix in Angstrom Mill (puck only + bag) for 30 sec., record date mixed:	4/17/17
Glass Melt Details	
Crucible ID:	838-8
Mass of empty crucible (g):	175.071
Mass of crucible with glass and Na_2SO_4 (g):	~~107.467~~ MC 6/10/17 282.938
Balance ID:	AD-0043
Furnace ID:	MS8E-006-16
Temperature and date/time into the furnace:	1150°C 4/17/17 in @ 1:08 Recover @ 1:10
Temperature and date/time out of the furnace:	1150° 4/17/17 2:11
Quench Details	
Viscosity notes (describe consistency):	Sulfate poured out first. Glass was slightly thick when pouring
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is a lighter true green in color. Fairly translucent. Sulfate mostly on bottom of glass + poured out first. Some sulfate bubbles present inside of glass. Some crystallization on top of glass. Very yellow sulfate
Crucible and glass mass after cooling (g):	281.972

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

Second Re-Melt: History and Observations	
Glass ID:	LP2-IL-02Q
Person performing work:	M. Caldwell
Glass Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	4-20-2017
Number of additional 30 second milling intervals used:	1
Sieve size:	100 Mesh
Glass Melt Details	
Crucible ID:	838-8
Empty crucible mass (g):	~~175.105~~ MEC 4/20/17 175.099
Crucible with glass mass (g):	281.257
Balance ID:	AD-0043
Furnace ID:	MS&E-0016-110
Temperature and date/time into the furnace:	1150°C 4-20-17 12:12 Recover @ 12:14
Temperature and date/time out of the furnace:	1150°C 1:16 pm 4-20-17
Quench Details	
Viscosity notes (describe consistency):	Slightly thicker than first Re-melt
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Same color as the first remelt. Glass is a little more opaque. More sulfur bubbles. Same crystallization on p.p.
Crucible and glass mass after cooling (g):	280.425

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

Third Re-Melt: History and Observations	
Glass ID:	LP2-IL-02Q
Person performing work:	M.Caldwell
Glass Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	4-20-17
Number of additional 30 second milling intervals used:	2
Sieve size:	100 Mesh
Glass Melt Details	
Crucible ID:	838-8
Empty crucible mass (g):	175.089
Crucible with glass mass (g):	279.889
Balance ID:	AD-0043
Furnace ID:	MS8E-006-16
Temperature and date/time into the furnace:	1150° 4-21-17 8:12am recovered @ 8:15
Temperature and date/time out of the furnace:	1150° 4-21-17 9:15 AM
Quench Details	
Viscosity notes (describe consistency):	Same as 2nd remelt
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Same as 2nd remelt
Crucible and glass mass after cooling (g):	~~279.106~~ MLC 4/21/17 279.108

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

First Re-Melt: History and Observations	
Glass ID:	LP2-IL-03Q
Person performing work:	M. Caldwell
Batch Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	4-21-17
Number of additional 30 second milling intervals used:	Ø
Sieve size:	100 Mesh
Mass of ground baseline glass (Target 100 g):	100.101
Mass of Na_2SO_4 added (Target 7.64 g):	7.649
Mix in Angstrom Mill (puck only + bag) for 30 sec., record date mixed:	4-21-17
Glass Melt Details	
Crucible ID:	908-4
Mass of empty crucible (g):	173.996
Mass of crucible with glass and Na_2SO_4 (g):	281.481
Balance ID:	AD-0043
Furnace ID:	MS&E-006-16
Temperature and date/time into the furnace:	1150°C 4-21-17 10:21 recovered @ 10:23 Am
Temperature and date/time out of the furnace:	1150°C 4-21-17 11:24
Quench Details	
Viscosity notes (describe consistency):	Glass was of medium thickness. It seemed that less sulfate poured out.
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is a fairly transparent true green. There are some sulfate bubbles scattered within the glass. Surface has small striations/crystals. The glass seems to have less sulfate compared to -02Q. Very yellow sulfate
Crucible and glass mass after cooling (g):	280.695

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

Second Re-Melt: History and Observations	
Glass ID:	LP2-IL-03Q
Person performing work:	M.Caldwell
Glass Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	4-21-17
Number of additional 30 second milling intervals used:	2
Sieve size:	100Mesh
Glass Melt Details	
Crucible ID:	908-4
Empty crucible mass (g):	174.037
Crucible with glass mass (g):	279.671
Balance ID:	AD-0043
Furnace ID:	MSR E-006-16
Temperature and date/time into the furnace:	1150°C 4-21-17 1:08pm Recorded @ 1:10
Temperature and date/time out of the furnace:	1150°C 4-21-17 2:09
Quench Details	
Viscosity notes (describe consistency):	Glass seemed thinner and a small amount of sulfate poured
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	~~Less translucent~~ 4/21/17 MC. More sulfate bubbles. Glass is opaque
Crucible and glass mass after cooling (g):	279.000

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

Third Re-Melt: History and Observations	
Glass ID:	LP2-IL-03Q
Person performing work:	M. Caldwell
Glass Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	4-21-17
Number of additional 30 second milling intervals used:	2
Sieve size:	100 Mesh
Glass Melt Details	
Crucible ID:	908-4
Empty crucible mass (g):	174.028
Crucible with glass mass (g):	277.838
Balance ID:	AD-0043
Furnace ID:	MS&E-006-16
Temperature and date/time into the furnace:	1150° 4-24-17 8:14 AM Recovered @ 8:16 AM
Temperature and date/time out of the furnace:	1150° 4-24-17 ~~9:16~~ MC 4/24/17 9:16 AM
Quench Details	
Viscosity notes (describe consistency):	Consistency seemed thinner than the last remelt
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is completely opaque with a few sulfate bubbles. Smaller crystals/striations on the surface of the glass as well as some sulfate on top of the glass
Crucible and glass mass after cooling (g):	277.230

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

First Re-Melt: History and Observations	
Glass ID:	LP2-IL-05Q
Person performing work:	M. Caldwell
Batch Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	4-24-17
Number of additional 30 second milling intervals used:	0
Sieve size:	100 mesh
Mass of ground baseline glass (Target 100 g):	100.034
Mass of Na_2SO_4 added (Target 7.64 g):	7.640
Mix in Angstrom Mill (puck only + bag) for 30 sec., record date mixed:	4-24-17
Glass Melt Details	
Crucible ID:	909-3
Mass of empty crucible (g):	188.488
Mass of crucible with glass and Na_2SO_4 (g):	296.464
Balance ID:	AD-0043
Furnace ID:	MS&E-006-16
Temperature and date/time into the furnace:	1150°C 4-24-17 9:17 recovered @ 9:19
Temperature and date/time out of the furnace:	1150°C 4-24-17 10:21
Quench Details	
Viscosity notes (describe consistency):	Glass was fairly thin.
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is slighty darker than true green and is transparent. Surface has fairly large "striations". Glass has very few, very small sulfate bubbles. Sulfate is lighter yellow.
Crucible and glass mass after cooling (g):	296.163

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

Second Re-Melt: History and Observations	
Glass ID:	LP2-IL-05Q
Person performing work:	M.Caldwell
Glass Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	4-24-17
Number of additional 30 second milling intervals used:	1
Sieve size:	100 mesh
Glass Melt Details	
Crucible ID:	908-3
Empty crucible mass (g):	188.908
Crucible with glass mass (g):	295.310
Balance ID:	AD-0043
Furnace ID:	MS&E-006-16
Temperature and date/time into the furnace:	1150°C 4-24-17 2:09 pm recovered @ 2:13 pm
Temperature and date/time out of the furnace:	1150°C 4-24-17 3:14 pm
Quench Details	
Viscosity notes (describe consistency):	Glass still poured fairly thin.
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass seems marbled on the inside. Very few sulfate bubbles. Glass is majority opaque. Top still has striations.
Crucible and glass mass after cooling (g):	294.539

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

Third Re-Melt: History and Observations	
Glass ID:	LP2-IL-05a
Person performing work:	M. Caldwell
Glass Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	4-24-2017
Number of additional 30 second milling intervals used:	2
Sieve size:	100 mesh
Glass Melt Details	
Crucible ID:	908-3
Empty crucible mass (g):	188.906
Crucible with glass mass (g):	293.314
Balance ID:	AD-0043
Furnace ID:	MS&E-0010-110
Temperature and date/time into the furnace:	1150° 4-26-17 in 8:27 recovered @ 8:30
Temperature and date/time out of the furnace:	1150° 4-26-17 9:30
Quench Details	
Viscosity notes (describe consistency):	Slightly thicker than the last pour but still thin
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is lighter green, more green-yellow. Completely opaque. Very few sulfate bubbles. Sulfate is a little pale yellow.
Crucible and glass mass after cooling (g):	292.966

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

First Re-Melt: History and Observations	
Glass ID:	LP2-IL-06-1Q
Person performing work:	M.Caldwell
Batch Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	4-26-17
Number of additional 30 second milling intervals used:	0
Sieve size:	100 mesh
Mass of ground baseline glass (Target 100 g):	100.029
Mass of Na_2SO_4 added (Target 7.64 g):	7.640
Mix in Angstrom Mill (puck only + bag) for 30 sec., record date mixed:	4-26-17
Glass Melt Details	
Crucible ID:	908-2
Mass of empty crucible (g):	179.876
Mass of crucible with glass and Na_2SO_4 (g):	287.238
Balance ID:	AD-0043
Furnace ID:	MS&E-006-16
Temperature and date/time into the furnace:	1150°C 4-26-17 10:04 recovered @ 10:07
Temperature and date/time out of the furnace:	1150°C 4-26-17 11:07
Quench Details	
Viscosity notes (describe consistency):	Glass was of thin to medium consistency
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is a darker, transparent, true green. Some sulfate bubbles. Sulfate is bright yellow.
Crucible and glass mass after cooling (g):	286.708

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

Second Re-Melt: History and Observations	
Glass ID:	LP2-IL-06-1Q
Person performing work:	M.Caldwell
Glass Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	4-26-2017
Number of additional 30 second milling intervals used:	2
Sieve size:	100 mesh
Glass Melt Details	
Crucible ID:	908-2
Empty crucible mass (g):	179.898
Crucible with glass mass (g):	285.682
Balance ID:	AD-0043
Furnace ID:	MS&E-006-16
Temperature and date/time into the furnace:	1150 °C 4-26-17 12:19 recovered @ 12:21
Temperature and date/time out of the furnace:	1150 °C 4-26-17 1:21 pm
Quench Details	
Viscosity notes (describe consistency):	Same as first pour
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is lighter green. Glass is opaque and has several sulfate bubbles
Crucible and glass mass after cooling (g):	285.035

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

Third Re-Melt: History and Observations	
Glass ID:	LP2-IL-06-1Q
Person performing work:	M. Caldwell
Glass Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	4-26-17
Number of additional 30 second milling intervals used:	2
Sieve size:	100 mesh
Glass Melt Details	
Crucible ID:	908-2
Empty crucible mass (g):	179.920
Crucible with glass mass (g):	283.805
Balance ID:	AD-0043
Furnace ID:	MS&E-006-15
Temperature and date/time into the furnace:	1150°C ~~4-27-16~~ 4-27-17 MC 4/4/17 9:52 AM recovered @ 9:54
Temperature and date/time out of the furnace:	1150°C 4-27-17 10:56
Quench Details	
Viscosity notes (describe consistency):	Same as first & second pour
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Same as second remelt. Bright yellow sulfate
Crucible and glass mass after cooling (g):	283.038

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

First Re-Melt: History and Observations	
Glass ID:	LP2-IL-07Q
Person performing work:	M. Caldwell
Batch Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	4-26-17
Number of additional 30 second milling intervals used:	0
Sieve size:	100 mesh
Mass of ground baseline glass (Target 100 g):	100.050
Mass of Na_2SO_4 added (Target 7.64 g):	7.645
Mix in Angstrom Mill (puck only + bag) for 30 sec., record date mixed:	4-26-17
Glass Melt Details	
Crucible ID:	836-1
Mass of empty crucible (g):	176.531
Mass of crucible with glass and Na_2SO_4 (g):	283.990
Balance ID:	AD-0043
Furnace ID:	MS&E-006-15
Temperature and date/time into the furnace:	1150°C 4-27-17 9:52 recovered@9:54
Temperature and date/time out of the furnace:	1150°C 4-27-17 10:57
Quench Details	
Viscosity notes (describe consistency):	Poured w/a relatively thin consistency
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Medium true green. Translucent with very few sulfate bubbles. Sulfate is a slightly pale yellow.
Crucible and glass mass after cooling (g):	283.981

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

Second Re-Melt: History and Observations	
Glass ID:	LP2-IL-07Q
Person performing work:	M. Caldwell
Glass Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	4-27-17
Number of additional 30 second milling intervals used:	2
Sieve size:	100 mesh
Glass Melt Details	
Crucible ID:	838-1
Empty crucible mass (g):	176.556
Crucible with glass mass (g):	282.341
Balance ID:	AD-0043
Furnace ID:	MSRE-006-15
Temperature and date/time into the furnace:	1150° 4-27-17 1:22 recovered 1:23
Temperature and date/time out of the furnace:	1150° 4-27-17 2:25
Quench Details	
Viscosity notes (describe consistency):	Same as first remelt
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is a slightly lighter green. Opaque. Again, very few sulfate bubbles. Sulfate is brighter yellow.
Crucible and glass mass after cooling (g):	282.086

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

Third Re-Melt: History and Observations	
Glass ID:	LP2-IL-07Q
Person performing work:	M. Caldwell
Glass Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	4-28-17
Number of additional 30 second milling intervals used:	2
Sieve size:	100 mesh
Glass Melt Details	
Crucible ID:	838-1
Empty crucible mass (g):	176.552
Crucible with glass mass (g):	280.830
Balance ID:	AD-0043
Furnace ID:	MS&E-0016-16
Temperature and date/time into the furnace:	1150°C 4-28-17 9:21 recovered @ ~~10~~9:23
Temperature and date/time out of the furnace:	1150°C 4-28-17 10:23
Quench Details	
Viscosity notes (describe consistency):	Slightly thicker than 1st & 2nd remelts.
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Same as 2nd remelt but with only a couple sulfate bubbles
Crucible and glass mass after cooling (g):	280.172

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

First Re-Melt: History and Observations	
Glass ID:	LP2-IL-08-1Q
Person performing work:	M. Caldwell
Batch Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	4-28-17
Number of additional 30 second milling intervals used:	0
Sieve size:	100 mesh
Mass of ground baseline glass (Target 100 g):	100.070
Mass of Na_2SO_4 added (Target 7.64 g):	7.642
Mix in Angstrom Mill (puck only + bag) for 30 sec., record date mixed:	4-28-17
Glass Melt Details	
Crucible ID:	908-1
Mass of empty crucible (g):	178.246
Mass of crucible with glass and Na_2SO_4 (g):	285.740
Balance ID:	AD-0043
Furnace ID:	MS&E-006-16
Temperature and date/time into the furnace:	1150°C 4-28-17 12:16 recovered @ 12:8
Temperature and date/time out of the furnace:	1150°C
Quench Details	
Viscosity notes (describe consistency):	Medium consistency, more than
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is slightly darker than true green, the sulfate is bright yellow. Only a few sulfate bubbles present. Glass is transparent.
Crucible and glass mass after cooling (g):	285.321

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

Second Re-Melt: History and Observations	
Glass ID:	LP2-IL-08-1Q
Person performing work:	M. Caldwell
Glass Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	5-1-17
Number of additional 30 second milling intervals used:	1
Sieve size:	100 mesh
Glass Melt Details	
Crucible ID:	908-1
Empty crucible mass (g):	178.2666
Crucible with glass mass (g):	284.741
Balance ID:	AD-0043
Furnace ID:	MS&E-0016-16
Temperature and date/time into the furnace:	1150°C 5-2-17 8:29 recovered@ 8:31
Temperature and date/time out of the furnace:	1150°C 5-2-17 9:31
Quench Details	
Viscosity notes (describe consistency):	Still between medium and thin consistency
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is more of a true green. It is still mostly transparent with quite a few sulfate bubbles Sulfate is a bright yellow
Crucible and glass mass after cooling (g):	284.098

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

Third Re-Melt: History and Observations	
Glass ID:	LP2-IL-08-1Q
Person performing work:	Madison Caldwell
Glass Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	5-2-17
Number of additional 30 second milling intervals used:	2
Sieve size:	100 mesh
Glass Melt Details	
Crucible ID:	908-1
Empty crucible mass (g):	176.266
Crucible with glass mass (g):	283.450
Balance ID:	AD-0043
Furnace ID:	MS&E-006-116
Temperature and date/time into the furnace:	1150°C 5-2-17 in @ 11:04 recovered @ 11:06
Temperature and date/time out of the furnace:	1150°C 5-2-17 12:06
Quench Details	
Viscosity notes (describe consistency):	Same as first two remelts.
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass ~~is still~~ [illegible] is still slightly transparent with swirls of sulfate and sulfate bubbles. Sulfate still bright yellow.
Crucible and glass mass after cooling (g):	282.550

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

First Re-Melt: History and Observations	
Glass ID:	LP2-IL-11Q
Person performing work:	M. Caldwell
Batch Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	5-2-17
Number of additional 30 second milling intervals used:	0
Sieve size:	100 mesh
Mass of ground baseline glass (Target 100 g):	100.026
Mass of Na_2SO_4 added (Target 7.64 g):	7.640
Mix in Angstrom Mill (puck only + bag) for 30 sec., record date mixed:	5-2-17
Glass Melt Details	
Crucible ID:	908-2
Mass of empty crucible (g):	179.874
Mass of crucible with glass and Na_2SO_4 (g):	287.255
Balance ID:	AD-0043
Furnace ID:	MS&E-006-16
Temperature and date/time into the furnace:	1150° 5-2-17 2:41 recovered@ 2:43
Temperature and date/time out of the furnace:	1150°C 5-2-17 3:41
Quench Details	
Viscosity notes (describe consistency):	Poured with medium thick consistency
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is a lighter (slightly) true green. Mostly transparent with lots of smaller sulfate bubbles. Bright yellow sulfate
Crucible and glass mass after cooling (g):	~~287.129~~ MC [illegible] 287.129

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

Second Re-Melt: History and Observations	
Glass ID:	LP2-IL-11Q
Person performing work:	M.Caldwell
Glass Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	5-3-17
Number of additional 30 second milling intervals used:	1
Sieve size:	100 mesh
Glass Melt Details	
Crucible ID:	908-2
Empty crucible mass (g):	179.920
Crucible with glass mass (g):	286.386
Balance ID:	AD-0043
Furnace ID:	MS&E-0010-15
Temperature and date/time into the furnace:	1150°C 5-3-17 1:09 [illegible] 1:10
Temperature and date/time out of the furnace:	1150°C 5-3-17 2:10
Quench Details	
Viscosity notes (describe consistency):	Glass poured slightly thicker than 1st remelt.
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is a lighter green than first remelt. Glass is completly opaque. Quite a few sulfate bubbles. Sulfate is still bright yellow.
Crucible and glass mass after cooling (g):	285.621

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

Third Re-Melt: History and Observations	
Glass ID:	LP2-IL-11Q
Person performing work:	M. Caldwell
Glass Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	5-4-17
Number of additional 30 second milling intervals used:	1
Sieve size:	100 Mesh
Glass Melt Details	
Crucible ID:	908-2
Empty crucible mass (g):	179.955
Crucible with glass mass (g):	284.927
Balance ID:	AD-0043
Furnace ID:	MS&E-0016-15
Temperature and date/time into the furnace:	1150°C 5-4-17 @12:45 recovered @ 12:47
Temperature and date/time out of the furnace:	1150°C 5-4-17 1:47
Quench Details	
Viscosity notes (describe consistency):	Poured slightly thicker than the second remelt
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is more of a light jade green and still completely opaque. Not as many sulfate bubbles present. Sulfate is still bright yellow.
Crucible and glass mass after cooling (g):	283.767

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

First Re-Melt: History and Observations	
Glass ID:	LP2-IL-12Q
Person performing work:	M.Cardwell
Batch Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	5-10-17
Number of additional 30 second milling intervals used:	0
Sieve size:	100 mesh
Mass of ground baseline glass (Target 100 g):	100.092
Mass of Na_2SO_4 added (Target 7.64 g):	7.641
Mix in Angstrom Mill (puck only + bag) for 30 sec., record date mixed:	5-10.17
Glass Melt Details	
Crucible ID:	908-1
Mass of empty crucible (g):	178.244
Mass of crucible with glass and Na_2SO_4 (g):	285.813
Balance ID:	AD-0043
Furnace ID:	MS&E-006-16
Temperature and date/time into the furnace:	1150°C 5-10-17 10:45 recovered @ 10:47
Temperature and date/time out of the furnace:	1150°C 5-10-17 11:47
Quench Details	
Viscosity notes (describe consistency):	Glass poured ~~with~~ MC 6/14/17 a medium-thin consistency
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is a true green. It is transparent and has a few sulfate bubbles. The sulfate is pale yellow.
Crucible and glass mass after cooling (g):	285.327

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

Second Re-Melt: History and Observations	
Glass ID:	LP2-IL-12Q
Person performing work:	M. Caldwell
Glass Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	5-10-17
Number of additional 30 second milling intervals used:	2
Sieve size:	100 mesh
Glass Melt Details	
Crucible ID:	908-1
Empty crucible mass (g):	178.261
Crucible with glass mass (g):	284.723
Balance ID:	AD-0043
Furnace ID:	MS&E-006-~~06~~ 16 mc 5/10/17
Temperature and date/time into the furnace: *	1150°C 5-10-17 1:00 recovered @1:02 power out at 2:00 furnace dropped to 879°C 2:22 Got back up to 1150 at 2:34
Temperature and date/time out of the furnace:	1150°C 5-10-17 out at 2:45
Quench Details	
Viscosity notes (describe consistency):	Same as first remelts
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is a lighter green than the first remelt. Glass is opaque with quite a few sulfate bubbles. Sulfate is still a paler yellow.
Crucible and glass mass after cooling (g):	284.344

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

Third Re-Melt: History and Observations	
Glass ID:	LP2-IL-12Q
Person performing work:	M.Caldwell
Glass Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	5-11-17
Number of additional 30 second milling intervals used:	1
Sieve size:	100 mesh
Glass Melt Details	
Crucible ID:	908-1
Empty crucible mass (g):	178.286
Crucible with glass mass (g):	284.107
Balance ID:	M&TE AD-0043
Furnace ID:	M&TE-006-16
Temperature and date/time into the furnace:	1150°C ~~EF~~ MC 5-11-17 5-11-17 1:15 recovered @ 1:17
Temperature and date/time out of the furnace:	1150°C 5-11-17 2:17
Quench Details	
Viscosity notes (describe consistency):	Same as 1st & 2nd remelts.
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is an opaque light jade color. Very few sulfate bubbles. Sulfate is a bright yellow.
Crucible and glass mass after cooling (g):	283.433

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

First Re-Melt: History and Observations	
Glass ID:	LPZ-IL-13Q
Person performing work:	M. Caldwell
Batch Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	5-11-17
Number of additional 30 second milling intervals used:	0
Sieve size:	100 Mesh
Mass of ground baseline glass (Target 100 g):	100.096
Mass of Na_2SO_4 added (Target 7.64 g):	7.640
Mix in Angstrom Mill (puck only + bag) for 30 sec., record date mixed:	5-11-17
Glass Melt Details	
Crucible ID:	44-837
Mass of empty crucible (g):	179.~~094~~ 091 MC 5-11-17
Mass of crucible with glass and Na_2SO_4 (g):	286.235
Balance ID:	AD-0043
Furnace ID:	MSRE-006-16
Temperature and date/time into the furnace:	1150°C 5-11-17 2:18 recovered @ 2:21
Temperature and date/time out of the furnace:	1150°C 5-11-17 3:22
Quench Details	
Viscosity notes (describe consistency):	Poured with a thin consistency
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is a darker true green. There are a few sulfate bubbles scattered throughout the glass. The sulfate is a bright-slightly greenish-yellow
Crucible and glass mass after cooling (g):	286.161

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

Second Re-Melt: History and Observations	
Glass ID:	LP2-IL-13Q
Person performing work:	M. Caldwell
Glass Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	5-12-17
Number of additional 30 second milling intervals used:	1
Sieve size:	100 mesh
Glass Melt Details	
Crucible ID:	44-837
Empty crucible mass (g):	179.107
Crucible with glass mass (g):	285.736
Balance ID:	AD-0043
Furnace ID:	MS&E-006-16
Temperature and date/time into the furnace:	1150°C 5-12-17 7:57 recovered @ 7:59
Temperature and date/time out of the furnace:	1150°C 5-12-17 8:59
Quench Details	
Viscosity notes (describe consistency):	Poured same as 1st remelt
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is still a transparent ~~bright~~ medium darker green. There are still just a few sulfate bubbles. Sulfate is the same bright greenish yellow.
Crucible and glass mass after cooling (g):	285.292

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

Third Re-Melt: History and Observations	
Glass ID:	LP2-IL-13Q
Person performing work:	M. Caldwell
Glass Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	5-12-17
Number of additional 30 second milling intervals used:	2
Sieve size:	100 mesh
Glass Melt Details	
Crucible ID:	44-837
Empty crucible mass (g):	179.105
Crucible with glass mass (g):	284.859
Balance ID:	AD-0043
Furnace ID:	MS&E-0016-116
Temperature and date/time into the furnace:	1150°C 5-12-17 10:56 recovered @ 10:58
Temperature and date/time out of the furnace:	1150°C 5-12-17 12:00
Quench Details	
Viscosity notes (describe consistency):	Same as 1st & 2nd remelts
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is an opaque true green. Some sulfate bubbles. Sulfate is bright yellow.
Crucible and glass mass after cooling (g):	284.562

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

First Re-Melt: History and Observations	
Glass ID:	LP2-IL-15Q
Person performing work:	M.Caldwell
Batch Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	5-15-17
Number of additional 30 second milling intervals used:	0
Sieve size:	100 mesh
Mass of ground baseline glass (Target 100 g):	100.064
Mass of Na_2SO_4 added (Target 7.64 g):	7.641
Mix in Angstrom Mill (puck only + bag) for 30 sec., record date mixed:	5-15-17
Glass Melt Details	
Crucible ID:	908-4
Mass of empty crucible (g):	173.986
Mass of crucible with glass and Na_2SO_4 (g):	281.564
Balance ID:	AD-0043
Furnace ID:	MS&E-0010-116
Temperature and date/time into the furnace:	1150°c 5-15-17 9:25 recovered@ 9:27
Temperature and date/time out of the furnace:	1150°c 5-15-17 10:29
Quench Details	
Viscosity notes (describe consistency):	poured with medium thickness
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is darker green. There are many sulfate bubbles in the glass. Sulfate is between bright and pale yellow. Glass is translucent.
Crucible and glass mass after cooling (g):	281.015

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

Second Re-Melt: History and Observations	
Glass ID:	LP2-IL-15Q
Person performing work:	M. Caldwell
Glass Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	5-15-17
Number of additional 30 second milling intervals used:	2
Sieve size:	100 mesh
Glass Melt Details	
Crucible ID:	908-4
Empty crucible mass (g):	174.025
Crucible with glass mass (g):	280.412
Balance ID:	AD-0043
Furnace ID:	MS&E-0066-116
Temperature and date/time into the furnace:	1150°C 5-15-17 1:31 recovered @ 1:34
Temperature and date/time out of the furnace:	1150°C 5-15-17
Quench Details	
Viscosity notes (describe consistency):	Same as first remelt
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is a slightly lighter green. Glass is opaque with very few sulfate bubbles. Sulfate is bright yellow
Crucible and glass mass after cooling (g):	279.952

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

Third Re-Melt: History and Observations	
Glass ID:	~~LP2-I5~~ MC 5/16/17 LP2-IL-15Q
Person performing work:	M. Caldwell
Glass Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	5.16.17
Number of additional 30 second milling intervals used:	2
Sieve size:	100 mesh
Glass Melt Details	
Crucible ID:	908-4
Empty crucible mass (g):	174.026
Crucible with glass mass (g):	279.170
Balance ID:	AD-0043
Furnace ID:	MS&E-0006-16
Temperature and date/time into the furnace:	1150°C 5.16.17 8:24 recovered @ 8:26
Temperature and date/time out of the furnace:	1150°C 5-16-17 9:26
Quench Details	
Viscosity notes (describe consistency):	~~ST~~ MC 5/16/17 Same as 1st and 2nd remelts
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is a lighter green-yellow with a few sulfate bubbles. Glass is completely opaque. Sulfate is bright yellow
Crucible and glass mass after cooling (g):	278.560

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

First Re-Melt: History and Observations	
Glass ID:	LP2-IL-16Q
Person performing work:	M.Caldwell
Batch Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	5-15-17
Number of additional 30 second milling intervals used:	0
Sieve size:	100 mesh
Mass of ground baseline glass (Target 100 g):	100.056
Mass of Na_2SO_4 added (Target 7.64 g):	7.641
Mix in Angstrom Mill (puck only + bag) for 30 sec., record date mixed:	5-15-17
Glass Melt Details	
Crucible ID:	908-3
Mass of empty crucible (g):	188. ~~865~~ 857 mc 6/14/17
Mass of crucible with glass and Na_2SO_4 (g):	296.399
Balance ID:	AD-0043
Furnace ID:	MSRF-006-16
Temperature and date/time into the furnace:	1150°C 5-15-17 10: ~~29~~ 32 mc 6/14/17 recovered @ 10:35
Temperature and date/time out of the furnace:	1150°C 5-15-17 11:37
Quench Details	
Viscosity notes (describe consistency):	Poured with medium-thin consistency
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is a translucent true green. There are many sulfate bubbles throughout the glass. Sulfate is bright yellow.
Crucible and glass mass after cooling (g):	296.026

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

Second Re-Melt: History and Observations	
Glass ID:	LP2-IL-16Q
Person performing work:	M Caldwell
Glass Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	5-15-17
Number of additional 30 second milling intervals used:	2
Sieve size:	100 mesh
Glass Melt Details	
Crucible ID:	908-3
Empty crucible mass (g):	188.868
Crucible with glass mass (g):	205.524
Balance ID:	AD-0043
Furnace ID:	MS&E-006-16
Temperature and date/time into the furnace:	1150°C 5-15-17 2:38 recovered @ 2:41
Temperature and date/time out of the furnace:	1150°C 5-15-17 3:43
Quench Details	
Viscosity notes (describe consistency):	Glass poured with a medium consistency
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is a true green. Glass is translucent with a few sulfate bubbles throughout. Sulfate is bright yellow.
Crucible and glass mass after cooling (g):	294.265

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

Third Re-Melt: History and Observations	
Glass ID:	LP2-IL-16Q
Person performing work:	M.Caldwell
Glass Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	5-16-17
Number of additional 30 second milling intervals used:	2
Sieve size:	100 mesh
Glass Melt Details	
Crucible ID:	908-3
Empty crucible mass (g):	188.489
Crucible with glass mass (g):	293.839
Balance ID:	AD-0043
Furnace ID:	MSRE-006-16
Temperature and date/time into the furnace:	1150°C 5-16-17 9:27 recovered@ 9:30
Temperature and date/time out of the furnace:	1150°C 5-16-17 10:30
Quench Details	
Viscosity notes (describe consistency):	Same as 2nd remelt
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is a slightly lighter green than the 2nd remelt. Glass is still relatively transparent with yellow swirling. Sulfate is still bright yellow green. There are some sulfate bubbles.
Crucible and glass mass after cooling (g):	293.187

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

First Re-Melt: History and Observations	
Glass ID:	LP2-IL-17Q
Person performing work:	M.Caldwell
Batch Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	5-15-17
Number of additional 30 second milling intervals used:	0
Sieve size:	100 mesh
Mass of ground baseline glass (Target 100 g):	100.041
Mass of Na_2SO_4 added (Target 7.64 g):	7.644
Mix in Angstrom Mill (puck only + bag) for 30 sec., record date mixed:	5-15-17
Glass Melt Details	
Crucible ID:	838-8
Mass of empty crucible (g):	175.059
Mass of crucible with glass and Na_2SO_4 (g):	282.616
Balance ID:	AD-0043
Furnace ID:	MS&E-006-16
Temperature and date/time into the furnace:	1150°C 5-15-17 11:42 recovered @ 11:45
Temperature and date/time out of the furnace:	1150°C 5-15-17 12:47
Quench Details	
Viscosity notes (describe consistency):	Glass poured with slightly thin consistency.
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is a light olive green with a hint of gray. There are sulfate bubbles throughout. Sulfate is pale yellow.
Crucible and glass mass after cooling (g):	282.182

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

Second Re-Melt: History and Observations	
Glass ID:	LP2-IL-17Q
Person performing work:	M. Caldwell
Glass Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	5-15-17
Number of additional 30 second milling intervals used:	1
Sieve size:	100 mesh
Glass Melt Details	
Crucible ID:	838-8
Empty crucible mass (g):	175.092
Crucible with glass mass (g):	281.520
Balance ID:	AD-0043
Furnace ID:	MSRE-006-16
Temperature and date/time into the furnace:	1150°C 5-15-17 2:38 recovered @ 2:41
Temperature and date/time out of the furnace:	1150°C 5-15-17 3:43
Quench Details	
Viscosity notes (describe consistency):	Glass poured with a medium-thin thickness
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is a pale olive green with gray hues. There are some sulfate bubbles in the glass. Sulfate is still a very pale - almost creme - yellow.
Crucible and glass mass after cooling (g):	281.057

Exhibit A-1. Glass Melting History and Observations Log Sheets (continued)

Third Re-Melt: History and Observations	
Glass ID:	LP2-IL-17Q
Person performing work:	M. Caldwell
Glass Preparation Details	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	5-16-17
Number of additional 30 second milling intervals used:	1
Sieve size:	100 mesh
Glass Melt Details	
Crucible ID:	838-8
Empty crucible mass (g):	175.096
Crucible with glass mass (g):	280.263
Balance ID:	AD-00413
Furnace ID:	MS&E-006-16
Temperature and date/time into the furnace:	1150°C 5-16-17 10:30 recovered @ 10:32
Temperature and date/time out of the furnace:	1150°C 5-16-17 11:32
Quench Details	
Viscosity notes (describe consistency):	Slightly thicker than the 1st & 2nd results
Observations (examples below): *Undissolved particles* *Crystallization/phase separation* *Color* *Residue on the pour plate* *Bubbles* *Surface appearance*	Glass is still a pale olive green but seems to have lost its gray hue. Sulfate bubbles present. Sulfate is slightly ~~b~~ more bluish more yellow
Crucible and glass mass after cooling (g):	279.673

Exhibit A-2. Glass Grinding, Washing, and Filtering Log Sheets

Glass Grinding, Washing, and Filtering	
Glass ID:	LP2-IL-02Q SSM
First or second batch of this Glass ID (circle):	First 4 g Second 4 g
Person performing work:	M. Caldwell
Glass Grinding and Sieving	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	6-8-2017
Number of additional 30 second milling intervals used:	1
Sieve size:	120
Glass Washing and Filtering	
Date of wash and filter steps:	6-16-2017
Balance ID:	AD-0044-1 / ITS-BL001
Tare mass of new filter plus petri dish (g):	98.831
Mass of super-saturated glass (target 4 g):	4.012
Mass of DI water added to 250 mL beaker, 1st (target 50 g):	50.727
Tare mass of solution flask (g):	524.45
Mass of DI water added to 250 mL beaker, 2nd (target 50 g):	51.040
Mass of wet sample plus filter and petri dish (g):	103.222
Mass of recovered solution and flask (g):	616.02
Mass of dry sample plus filter and petri dish (g):	102.309

Exhibit A-2. Glass Grinding, Washing, and Filtering Log Sheets (continued)

Glass Grinding, Washing, and Filtering	
Glass ID:	LP2-IL-02Q SSM
First or second batch of this Glass ID (circle):	First 4 g Second 4 g
Person performing work:	M. Caldwell
Glass Grinding and Sieving	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	6-8-2017
Number of additional 30 second milling intervals used:	1
Sieve size:	120
Glass Washing and Filtering	
Date of wash and filter steps:	6-19-2017
Balance ID:	AD 0044-1 / ITS-BL001
Tare mass of new filter plus petri dish (g):	100.923
Mass of super-saturated glass (target 4 g):	4.001
Mass of DI water added to 250 mL beaker, 1st (target 50 g):	50.034
Tare mass of solution flask (g):	525.14
Mass of DI water added to 250 mL beaker, 2nd (target 50 g):	52.966
Mass of wet sample plus filter and petri dish (g):	105.257
Mass of recovered solution and flask (g):	615.98
Mass of dry sample plus filter and petri dish (g):	104.591

Exhibit A-2. Glass Grinding, Washing, and Filtering Log Sheets (continued)

Glass Grinding, Washing, and Filtering	
Glass ID:	LP2-IL-03Q SSM
First or second batch of this Glass ID (circle):	First 4 g Second 4 g
Person performing work:	M. Caldwell
Glass Grinding and Sieving	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	6-8 2017
Number of additional 30 second milling intervals used:	1
Sieve size:	120
Glass Washing and Filtering	
Date of wash and filter steps:	6-19-17
Balance ID:	AD-0044.1 / ITS-BL001
Tare mass of new filter plus petri dish (g):	99.751
Mass of super-saturated glass (target 4 g):	4.003
Mass of DI water added to 250 mL beaker, 1st (target 50 g):	50.060
Tare mass of solution flask (g):	526.35
Mass of DI water added to 250 mL beaker, 2nd (target 50 g):	50.212
Mass of wet sample plus filter and petri dish (g):	104.366
Mass of recovered solution and flask (g):	585.77
Mass of dry sample plus filter and petri dish (g):	103.475

Exhibit A-2. Glass Grinding, Washing, and Filtering Log Sheets (continued)

Glass Grinding, Washing, and Filtering	
Glass ID:	LP2-IL-03Q SSM
First or second batch of this Glass ID (circle):	First 4 g Second 4 g
Person performing work:	M.Caldwell
Glass Grinding and Sieving	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	6-8-2017
Number of additional 30 second milling intervals used:	1
Sieve size:	120
Glass Washing and Filtering	
Date of wash and filter steps:	6-20-2017
Balance ID:	AD-00441-1 / ITS-BL001
Tare mass of new filter plus petri dish (g):	99.543
Mass of super-saturated glass (target 4 g):	4.010
Mass of DI water added to 250 mL beaker, 1st (target 50 g):	50.220
Tare mass of solution flask (g):	524.40
Mass of DI water added to 250 mL beaker, 2nd (target 50 g):	50.152
Mass of wet sample plus filter and petri dish (g):	103.844
Mass of recovered solution and flask (g):	617.00
Mass of dry sample plus filter and petri dish (g):	103.267

Exhibit A-2. Glass Grinding, Washing, and Filtering Log Sheets (continued)

Glass Grinding, Washing, and Filtering	
Glass ID:	LP2-IL-05Q SSM
First or second batch of this Glass ID (circle):	First 4 g Second 4 g
Person performing work:	M.Caldwell
Glass Grinding and Sieving	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	6-8-2017
Number of additional 30 second milling intervals used:	1
Sieve size:	120
Glass Washing and Filtering	
Date of wash and filter steps:	6-20-17
Balance ID:	AD-0044-1 / ITS-BL001
Tare mass of new filter plus petri dish (g):	98.114
Mass of super-saturated glass (target 4 g):	4.012
Mass of DI water added to 250 mL beaker, 1st (target 50 g):	50.456
Tare mass of solution flask (g):	526.29
Mass of DI water added to 250 mL beaker, 2nd (target 50 g):	50.232
Mass of wet sample plus filter and petri dish (g):	102.825
Mass of recovered solution and flask (g):	624.90
Mass of dry sample plus filter and petri dish (g):	101.820

Exhibit A-2. Glass Grinding, Washing, and Filtering Log Sheets (continued)

Glass Grinding, Washing, and Filtering	
Glass ID:	LP2-IL-05Q SSM
First or second batch of this Glass ID (circle):	First 4 g Second 4 g
Person performing work:	M. Caldwell
Glass Grinding and Sieving	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	6-8-2017
Number of additional 30 second milling intervals used:	1
Sieve size:	120
Glass Washing and Filtering	
Date of wash and filter steps:	6-20-2017
Balance ID:	AD-0044-1 / ITS-BL001
Tare mass of new filter plus petri dish (g):	98.063
Mass of super-saturated glass (target 4 g):	4.001
Mass of DI water added to 250 mL beaker, 1st (target 50 g):	50.045
Tare mass of solution flask (g):	524.27
Mass of DI water added to 250 mL beaker, 2nd (target 50 g):	50.099
Mass of wet sample plus filter and petri dish (g):	102.782
Mass of recovered solution and flask (g):	622.55
Mass of dry sample plus filter and petri dish (g):	101.768

Exhibit A-2. Glass Grinding, Washing, and Filtering Log Sheets (continued)

Glass Grinding, Washing, and Filtering	
Glass ID:	LP2-IL-06-1Q SSM
First or second batch of this Glass ID (circle):	First 4 g Second 4 g
Person performing work:	M. Caldwell M. Kinard
Glass Grinding and Sieving	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	6-8-2017
Number of additional 30 second milling intervals used:	1
Sieve size:	120
Glass Washing and Filtering	
Date of wash and filter steps:	6-20-17
Balance ID:	AD-0044-1 / ITS-B1001
Tare mass of new filter plus petri dish (g):	97.557
Mass of super-saturated glass (target 4 g):	4.001
Mass of DI water added to 250 mL beaker, 1st (target 50 g):	50.244
Tare mass of solution flask (g):	526.34
Mass of DI water added to 250 mL beaker, 2nd (target 50 g):	50.710
Mass of wet sample plus filter and petri dish (g):	102.123
Mass of recovered solution and flask (g):	625.14
Mass of dry sample plus filter and petri dish (g):	101.165

Exhibit A-2. Glass Grinding, Washing, and Filtering Log Sheets (continued)

Glass Grinding, Washing, and Filtering	
Glass ID:	LP2-IL-06-1Q SSM
First or second batch of this Glass ID (circle):	First 4 g / Second 4 g
Person performing work:	M. Caldwell / M. Kinard
Glass Grinding and Sieving	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	6-8-2017
Number of additional 30 second milling intervals used:	1
Sieve size:	120
Glass Washing and Filtering	
Date of wash and filter steps:	6-20-17
Balance ID:	AD-0044-1 / ITS-BL001
Tare mass of new filter plus petri dish (g):	98.451
Mass of super-saturated glass (target 4 g):	4.039
Mass of DI water added to 250 mL beaker, 1st (target 50 g):	50.203
Tare mass of solution flask (g):	524.39
Mass of DI water added to 250 mL beaker, 2nd (target 50 g):	50.468
Mass of wet sample plus filter and petri dish (g):	103.127
Mass of recovered solution and flask (g):	623.32
Mass of dry sample plus filter and petri dish (g):	102.126

Exhibit A-2. Glass Grinding, Washing, and Filtering Log Sheets (continued)

Glass Grinding, Washing, and Filtering	
Glass ID:	LP2-IL-07Q SSM
First or second batch of this Glass ID (circle):	First 4 g Second 4 g
Person performing work:	M. Caldwell / M. Kinard
Glass Grinding and Sieving	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	6-8-2017
Number of additional 30 second milling intervals used:	1
Sieve size:	120
Glass Washing and Filtering	
Date of wash and filter steps:	6-20-17
Balance ID:	AD-0044-1 / ITS-BL001
Tare mass of new filter plus petri dish (g):	97.603
Mass of super-saturated glass (target 4 g):	4.010
Mass of DI water added to 250 mL beaker, 1st (target 50 g):	51.506
Tare mass of solution flask (g):	526.25
Mass of DI water added to 250 mL beaker, 2nd (target 50 g):	50.430
Mass of wet sample plus filter and petri dish (g):	102.376
Mass of recovered solution and flask (g):	626.42
Mass of dry sample plus filter and petri dish (g):	101.338

Exhibit A-2. Glass Grinding, Washing, and Filtering Log Sheets (continued)

Glass Grinding, Washing, and Filtering	
Glass ID:	LP2-IL-07Q SSM
First or second batch of this Glass ID (circle):	First 4 g Second 4 g
Person performing work:	M.Caldwell / M. Kinard
Glass Grinding and Sieving	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	6-8-2017
Number of additional 30 second milling intervals used:	1
Sieve size:	120
Glass Washing and Filtering	
Date of wash and filter steps:	6-20-17
Balance ID:	AD-0044-1 / ITS-BL001
Tare mass of new filter plus petri dish (g):	102.189
Mass of super-saturated glass (target 4 g):	4.003
Mass of DI water added to 250 mL beaker, 1st (target 50 g):	50.215
Tare mass of solution flask (g):	524.36
Mass of DI water added to 250 mL beaker, 2nd (target 50 g):	50.740
Mass of wet sample plus filter and petri dish (g):	106.890 ~~622.13~~ MC 6/20/17
Mass of recovered solution and flask (g):	622.13
Mass of dry sample plus filter and petri dish (g):	105.919

Exhibit A-2. Glass Grinding, Washing, and Filtering Log Sheets (continued)

Glass Grinding, Washing, and Filtering	
Glass ID:	LP2-IL-08-1Q SSM
First or second batch of this Glass ID (circle):	First 4 g Second 4 g
Person performing work:	M Caldwell / M. Kinard
Glass Grinding and Sieving	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	6-8-2017
Number of additional 30 second milling intervals used:	1
Sieve size:	120
Glass Washing and Filtering	
Date of wash and filter steps:	6-20-17
Balance ID:	AD-6044-1 / ITS-BL001
Tare mass of new filter plus petri dish (g):	98.704
Mass of super-saturated glass (target 4 g):	4.003
Mass of DI water added to 250 mL beaker, 1st (target 50 g):	50.054
Tare mass of solution flask (g):	526.25
Mass of DI water added to 250 mL beaker, 2nd (target 50 g):	51.214
Mass of wet sample plus filter and petri dish (g):	103.296
Mass of recovered solution and flask (g):	625.82
Mass of dry sample plus filter and petri dish (g):	102.405

Exhibit A-2. Glass Grinding, Washing, and Filtering Log Sheets (continued)

Glass Grinding, Washing, and Filtering	
Glass ID:	LP2-IL-08-1Q SSM
First or second batch of this Glass ID (circle):	First 4 g Second 4 g
Person performing work:	M.Caldwell / M. Kinard
Glass Grinding and Sieving	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	6-8-2017
Number of additional 30 second milling intervals used:	1
Sieve size:	120
Glass Washing and Filtering	
Date of wash and filter steps:	6-20-17
Balance ID:	AD-0044-1 / ITS-BL001
Tare mass of new filter plus petri dish (g):	98.333
Mass of super-saturated glass (target 4 g):	4.004
Mass of DI water added to 250 mL beaker, 1st (target 50 g):	51.309
Tare mass of solution flask (g):	524.44
Mass of DI water added to 250 mL beaker, 2nd (target 50 g):	50.419
Mass of wet sample plus filter and petri dish (g):	102.891
Mass of recovered solution and flask (g):	621.53
Mass of dry sample plus filter and petri dish (g):	102.023

Exhibit A-2. Glass Grinding, Washing, and Filtering Log Sheets (continued)

Glass Grinding, Washing, and Filtering	
Glass ID:	LP2-IL-11Q SSM
First or second batch of this Glass ID (circle):	First 4 g Second 4 g
Person performing work:	M. Caldwell / M. Kinard
Glass Grinding and Sieving	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	6-8-2017
Number of additional 30 second milling intervals used:	1
Sieve size:	120
Glass Washing and Filtering	
Date of wash and filter steps:	6-21-17
Balance ID:	AD-0044-1 / ITS-BL004
Tare mass of new filter plus petri dish (g):	101.636
Mass of super-saturated glass (target 4 g):	4.017
Mass of DI water added to 250 mL beaker, 1st (target 50 g):	51.323
Tare mass of solution flask (g):	526.27
Mass of DI water added to 250 mL beaker, 2nd (target 50 g):	51.323
Mass of wet sample plus filter and petri dish (g):	106.350
Mass of recovered solution and flask (g):	625.82
Mass of dry sample plus filter and petri dish (g):	105.356

Exhibit A-2. Glass Grinding, Washing, and Filtering Log Sheets (continued)

Glass Grinding, Washing, and Filtering	
Glass ID:	LP2-IL-11Q SSM
First or second batch of this Glass ID (circle):	First 4 g Second 4 g
Person performing work:	M. Caldwell M. Kinard
Glass Grinding and Sieving	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	6-8-2017
Number of additional 30 second milling intervals used:	1
Sieve size:	120
Glass Washing and Filtering	
Date of wash and filter steps:	6/21/17
Balance ID:	AD-0044-1
Tare mass of new filter plus petri dish (g):	97.981
Mass of super-saturated glass (target 4 g):	4.004
Mass of DI water added to 250 mL beaker, 1st (target 50 g):	50.117
Tare mass of solution flask (g):	524.36
Mass of DI water added to 250 mL beaker, 2nd (target 50 g):	51.991
Mass of wet sample plus filter and petri dish (g):	102.722
Mass of recovered solution and flask (g):	622.75
Mass of dry sample plus filter and petri dish (g):	101.671

Exhibit A-2. Glass Grinding, Washing, and Filtering Log Sheets (continued)

Glass Grinding, Washing, and Filtering	
Glass ID:	LP2-IL-12Q SSM
First or second batch of this Glass ID (circle):	First 4 g Second 4 g
Person performing work:	M.Caldwell M.Kinard
Glass Grinding and Sieving	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	6-12-2017
Number of additional 30 second milling intervals used:	1
Sieve size:	120
Glass Washing and Filtering	
Date of wash and filter steps:	6/26/17
Balance ID:	AD-0044-1 / ITS-B1001
Tare mass of new filter plus petri dish (g):	98.693
Mass of super-saturated glass (target 4 g):	4.004
Mass of DI water added to 250 mL beaker, 1st (target 50 g):	50.684
Tare mass of solution flask (g):	526.35
Mass of DI water added to 250 mL beaker, 2nd (target 50 g):	51.616
Mass of wet sample plus filter and petri dish (g):	103.348
Mass of recovered solution and flask (g):	609.11
Mass of dry sample plus filter and petri dish (g):	102.391

Exhibit A-2. Glass Grinding, Washing, and Filtering Log Sheets (continued)

Glass Grinding, Washing, and Filtering	
Glass ID:	LP2-IL-12Q SSM
First or second batch of this Glass ID (circle):	First 4 g Second 4 g
Person performing work:	M. Caldwell M. Kinard
Glass Grinding and Sieving	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	6-12-2017
Number of additional 30 second milling intervals used:	1
Sieve size:	120
Glass Washing and Filtering	
Date of wash and filter steps:	6/26/17
Balance ID:	AD-0044-1 / TTS-B1001
Tare mass of new filter plus petri dish (g):	99.499
Mass of super-saturated glass (target 4 g):	4.012
Mass of DI water added to 250 mL beaker, 1st (target 50 g):	52.591
Tare mass of solution flask (g):	524.29
Mass of DI water added to 250 mL beaker, 2nd (target 50 g):	50.245
Mass of wet sample plus filter and petri dish (g):	~~10~~ MC 6/26/17 104.168
Mass of recovered solution and flask (g):	625.07
Mass of dry sample plus filter and petri dish (g):	103.250

Exhibit A-2. Glass Grinding, Washing, and Filtering Log Sheets (continued)

Glass Grinding, Washing, and Filtering	
Glass ID:	LP2-IL-13Q SSM
First or second batch of this Glass ID (circle):	First 4 g Second 4 g
Person performing work:	M. Caldwell
Glass Grinding and Sieving	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	6-12-2017
Number of additional 30 second milling intervals used:	1
Sieve size:	120
Glass Washing and Filtering	
Date of wash and filter steps:	6-22-17
Balance ID:	AD-0044-1 / ITS-BL001
Tare mass of new filter plus petri dish (g):	100.528
Mass of super-saturated glass (target 4 g):	4.004
Mass of DI water added to 250 mL beaker, 1st (target 50 g):	50.504
Tare mass of solution flask (g):	526.23
Mass of DI water added to 250 mL beaker, 2nd (target 50 g):	50.002
Mass of wet sample plus filter and petri dish (g):	105.342
Mass of recovered solution and flask (g):	615.85
Mass of dry sample plus filter and petri dish (g):	104.217

Exhibit A-2. Glass Grinding, Washing, and Filtering Log Sheets (continued)

Glass Grinding, Washing, and Filtering	
Glass ID:	LP2-IL-13Q SSM
First or second batch of this Glass ID (circle):	First 4 g Second 4 g
Person performing work:	M.Caldwell M.Kinard
Glass Grinding and Sieving	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	6-12-2017
Number of additional 30 second milling intervals used:	1
Sieve size:	120
Glass Washing and Filtering	
Date of wash and filter steps:	6/26/17
Balance ID:	AD-0044-1 / ITS-B1001
Tare mass of new filter plus petri dish (g):	100.464
Mass of super-saturated glass (target 4 g):	4.000
Mass of DI water added to 250 mL beaker, 1st (target 50 g):	50.430
Tare mass of solution flask (g):	524.32
Mass of DI water added to 250 mL beaker, 2nd (target 50 g):	50.424
Mass of wet sample plus filter and petri dish (g):	104.883
Mass of recovered solution and flask (g):	615.87
Mass of dry sample plus filter and petri dish (g):	104.152

Exhibit A-2. Glass Grinding, Washing, and Filtering Log Sheets (continued)

Glass Grinding, Washing, and Filtering	
Glass ID:	LP2-IL-15Q SSM
First or second batch of this Glass ID (circle):	First 4 g Second 4 g
Person performing work:	M. Caldwell M. Kinard
Glass Grinding and Sieving	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	6-12-2017
Number of additional 30 second milling intervals used:	1
Sieve size:	120
Glass Washing and Filtering	
Date of wash and filter steps:	6/22/17
Balance ID:	AD-0044-1/ITS-BL001
Tare mass of new filter plus petri dish (g):	102.485
Mass of super-saturated glass (target 4 g):	4.006
Mass of DI water added to 250 mL beaker, 1st (target 50 g):	50.114
Tare mass of solution flask (g):	526.14
Mass of DI water added to 250 mL beaker, 2nd (target 50 g):	50.031
Mass of wet sample plus filter and petri dish (g):	106.637
Mass of recovered solution and flask (g):	622.87
Mass of dry sample plus filter and petri dish (g):	106.156

Exhibit A-2. Glass Grinding, Washing, and Filtering Log Sheets (continued)

Glass Grinding, Washing, and Filtering	
Glass ID:	LP2-IL-15Q SSM
First or second batch of this Glass ID (circle):	First 4 g Second 4 g
Person performing work:	M. Caldwell
Glass Grinding and Sieving	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	6-12-2017
Number of additional 30 second milling intervals used:	1
Sieve size:	120
Glass Washing and Filtering	
Date of wash and filter steps:	6-22-17
Balance ID:	AD-0044-1 / ITS-BL001
Tare mass of new filter plus petri dish (g):	101.636
Mass of super-saturated glass (target 4 g):	4.014
Mass of DI water added to 250 mL beaker, 1st (target 50 g):	50.209
Tare mass of solution flask (g):	524.39
Mass of DI water added to 250 mL beaker, 2nd (target 50 g):	50.363
Mass of wet sample plus filter and petri dish (g):	105.936
Mass of recovered solution and flask (g):	623.58
Mass of dry sample plus filter and petri dish (g):	105.332

Exhibit A-2. Glass Grinding, Washing, and Filtering Log Sheets (continued)

Glass Grinding, Washing, and Filtering	
Glass ID:	LP2-IL-16Q SSM
First or second batch of this Glass ID (circle):	First 4 g Second 4 g
Person performing work:	M. Caldwell
Glass Grinding and Sieving	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	6-13-2017
Number of additional 30 second milling intervals used:	1
Sieve size:	120
Glass Washing and Filtering	
Date of wash and filter steps:	6-22-17
Balance ID:	AD-0044-1 / ITS-BL001
Tare mass of new filter plus petri dish (g):	98.159
Mass of super-saturated glass (target 4 g):	4.015
Mass of DI water added to 250 mL beaker, 1st (target 50 g):	51.454
Tare mass of solution flask (g):	526.26
Mass of DI water added to 250 mL beaker, 2nd (target 50 g):	50.891
Mass of wet sample plus filter and petri dish (g):	102.608
Mass of recovered solution and flask (g):	623.44
Mass of dry sample plus filter and petri dish (g):	101.858

Exhibit A-2. Glass Grinding, Washing, and Filtering Log Sheets (continued)

Glass Grinding, Washing, and Filtering	
Glass ID:	LP2-IL-16Q SSM
First or second batch of this Glass ID (circle):	First 4 g Second 4 g
Person performing work:	M. Caldwell M. Kinard
Glass Grinding and Sieving	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	6-13-2017
Number of additional 30 second milling intervals used:	1
Sieve size:	120
Glass Washing and Filtering	
Date of wash and filter steps:	6-22-17
Balance ID:	AD-0044-1/ITS-BL001
Tare mass of new filter plus petri dish (g):	101.039
Mass of super-saturated glass (target 4 g):	4.007
Mass of DI water added to 250 mL beaker, 1st (target 50 g):	50.085
Tare mass of solution flask (g):	524.31
Mass of DI water added to 250 mL beaker, 2nd (target 50 g):	50.216
Mass of wet sample plus filter and petri dish (g):	105.186
Mass of recovered solution and flask (g):	617.76
Mass of dry sample plus filter and petri dish (g):	104.696

Exhibit A-2. Glass Grinding, Washing, and Filtering Log Sheets (continued)

Glass Grinding, Washing, and Filtering	
Glass ID:	LP2-IL-17Q SSM
First or second batch of this Glass ID (circle):	First 4 g Second 4 g
Person performing work:	M. Caldwell M. Kinard
Glass Grinding and Sieving	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	6-13-2017
Number of additional 30 second milling intervals used:	1
Sieve size:	120
Glass Washing and Filtering	
Date of wash and filter steps:	6-22-17
Balance ID:	AD-0044-1 / ITS-BL004
Tare mass of new filter plus petri dish (g):	95.815
Mass of super-saturated glass (target 4 g):	4.006
Mass of DI water added to 250 mL beaker, 1st (target 50 g):	50.991
Tare mass of solution flask (g):	526.32
Mass of DI water added to 250 mL beaker, 2nd (target 50 g):	50.084
Mass of wet sample plus filter and petri dish (g):	100.125
Mass of recovered solution and flask (g):	624.59
Mass of dry sample plus filter and petri dish (g):	99.473

Exhibit A-2. Glass Grinding, Washing, and Filtering Log Sheets (continued)

Glass Grinding, Washing, and Filtering	
Glass ID:	LP2-IL-17Q SSM
First or second batch of this Glass ID (circle):	First 4 g Second 4 g
Person performing work:	M. Caldwell M. Kinard
Glass Grinding and Sieving	
Grind glass in Angstrom Mill with ring & puck for 2 minutes, record date milled:	6-13-2017
Number of additional 30 second milling intervals used:	1
Sieve size:	120
Glass Washing and Filtering	
Date of wash and filter steps:	6-22-17
Balance ID:	AD-0044-1 / ITS-BL001
Tare mass of new filter plus petri dish (g):	100.034
Mass of super-saturated glass (target 4 g):	4.013
Mass of DI water added to 250 mL beaker, 1st (target 50 g):	52.162
Tare mass of solution flask (g):	524.33
Mass of DI water added to 250 mL beaker, 2nd (target 50 g):	50.520
Mass of wet sample plus filter and petri dish (g):	104.440
Mass of recovered solution and flask (g):	618.87
Mass of dry sample plus filter and petri dish (g):	103.714

Table A-1. Summary of Data Recorded During Re-Melting of Sulfur Saturated Glasses

Glass Identifier	First Re-Melt				Second Re-Melt				Third Re-Melt		
	Mass of Empty Crucible (g)	Mass of Crucible with Glass (g)	Mass of Crucible with Glass After Cooling (g)		Mass of Empty Crucible (g)	Mass of Crucible with Glass (g)	Mass of Crucible with Glass After Cooling (g)		Mass of Empty Crucible (g)	Mass of Crucible with Glass (g)	Mass of Crucible with Glass After Cooling (g)
LP2-IL-02	175.071	282.938	281.972		175.099	281.257	280.425		175.089	279.889	279.108
LP2-IL-03	173.996	281.481	280.695		174.037	279.671	279.000		174.028	277.838	277.230
LP2-IL-05	188.888	296.464	296.163		188.310	295.310	294.539		188.906	293.314	292.966
LP2-IL-06-1	179.876	287.238	286.708		179.898	285.682	285.035		179.920	283.805	283.038
LP2-IL-07	176.531	283.990	283.881		176.556	282.341	282.086		176.552	280.830	280.172
LP2-IL-08-1	178.246	285.740	285.321		178.266	284.741	284.098		176.266	283.450	282.550
LP2-IL-11	179.874	287.255	287.129		179.920	286.386	285.621		179.955	284.927	283.767
LP2-IL-12	178.244	285.813	285.327		178.261	284.723	284.344		178.286	284.107	283.433
LP2-IL-13	179.091	286.235	286.161		179.107	285.736	285.292		179.105	284.859	284.562
LP2-IL-15	173.986	281.564	281.015		174.025	280.412	279.952		174.026	279.170	278.560
LP2-IL-16	188.857	296.399	296.026		188.868	295.524	294.265		188.889	293.839	293.187
LP2-IL-17	175.059	282.616	282.182		175.082	281.520	281.057		175.096	280.263	279.673

nm – not measured

Table A-2. Summary of Data Recorded During Washing of Sulfur Saturated Melts

Glass Identifier	First Wash Sample								Second Wash Sample							
	Tare Mass of New Filter Plus Petri Dish (g)	Mass of Glass Sample (g)	Mass of Water Added First (g)	Mass of Water Added Second (g)	Mass of Wet Glass, Filter, and Petri Dish (g)	Mass of Dry Glass, Filter, and Petri Dish (g)	Tare Mass of Flask (g)	Mass of Recovered Solution and Flask (g)	Tare Mass of New Filter Plus Petri Dish (g)	Mass of Glass Sample (g)	Mass of Water Added First (g)	Mass of Water Added Second (g)	Mass of Wet Glass, Filter, and Petri Dish (g)	Mass of Dry Glass, Filter, and Petri Dish (g)	Tare Mass of Flask (g)	Mass of Recovered Solution and Flask (g)
LP2-IL-02	98.831	4.012	50.727	51.040	103.222	102.309	524.25	616.02	100.923	4.001	50.034	52.966	105.257	104.591	525.14	615.98
LP2-IL-03	99.751	4.003	50.060	50.212	104.366	103.475	526.35	585.77	99.543	4.010	50.220	50.152	103.844	103.267	524.40	617.00
LP2-IL-05	98.114	4.012	50.455	50.232	102.825	101.820	526.29	624.90	98.063	4.001	50.045	50.099	102.782	101.768	524.27	622.55
LP2-IL-06-1	97.557	4.001	50.244	50.710	102.123	101.165	526.34	625.14	98.451	4.039	50.203	50.468	103.127	102.126	524.39	623.32
LP2-IL-07	97.603	4.010	51.506	50.430	102.376	101.338	526.25	626.42	102.189	4.003	50.215	50.740	106.890	105.919	524.36	622.13
LP2-IL-08-1	98.704	4.003	50.054	51.214	103.286	102.405	526.25	625.82	98.333	4.004	51.309	50.419	102.891	102.023	524.44	621.53
LP2-IL-11	101.636	4.017	51.323	51.323	106.350	105.356	526.27	625.82	97.981	4.004	50.117	51.991	102.722	101.671	524.36	622.75
LP2-IL-12	98.693	4.004	50.684	51.616	103.348	102.391	526.35	609.11	99.499	4.012	52.591	50.245	104.168	103.250	524.29	625.07
LP2-IL-13	100.528	4.004	50.504	50.002	105.342	104.217	526.23	615.85	100.464	4.000	50.430	50.424	104.883	104.152	524.32	615.87
LP2-IL-15	102.485	4.006	50.114	50.031	106.637	106.156	526.14	622.87	101.636	4.014	50.209	50.363	105.936	105.322	524.39	623.58
LP2-IL-16	98.159	4.015	51.454	50.891	102.608	101.858	526.26	623.44	101.039	4.007	50.085	50.216	105.186	104.696	524.31	617.76
LP2-IL-17	95.815	4.006	50.991	50.084	100.125	99.473	526.32	624.59	100.034	4.013	52.162	50.520	104.440	103.714	524.33	618.87

nm – not measured

Appendix B Photographs and Micrographs of the LP2-IL Sulfur Saturated Melts

Exhibit B-1. Photographs of the Sulfur Saturated Melts

LP2-IL-02Q

LP2-IL-03Q

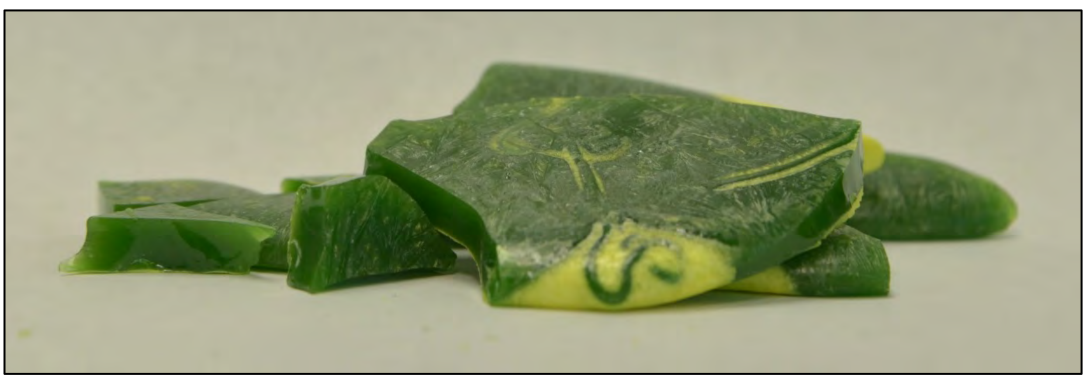
Exhibit B-1. Photographs of the Sulfur Saturated Melts (continued)

LP2-IL-05Q

LP2-IL-06-1Q

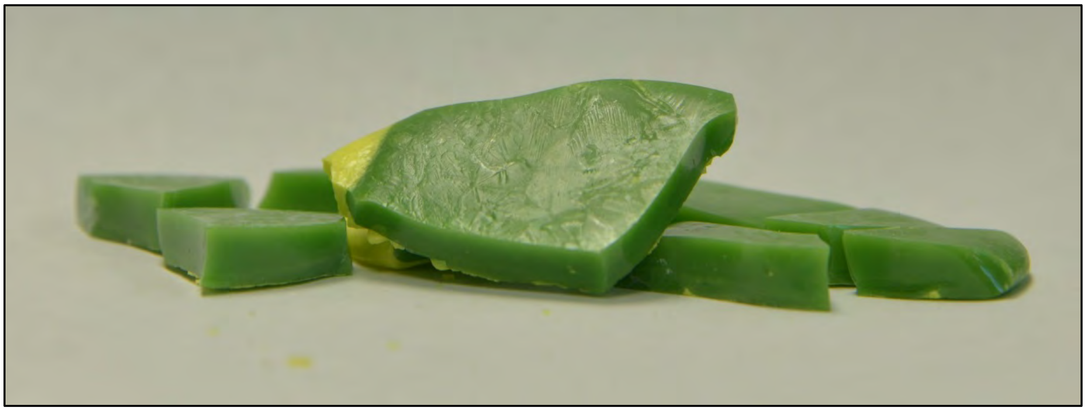
Exhibit B-1. Photographs of the Sulfur Saturated Melts (continued)

LP2-IL-07Q

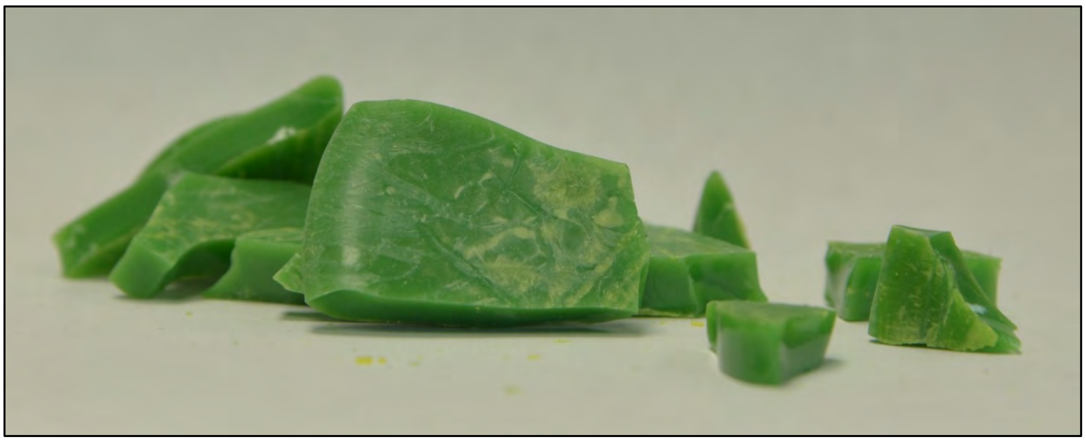


LP2-IL-08-1Q

Exhibit B-1. Photographs of the Sulfur Saturated Melts (continued)

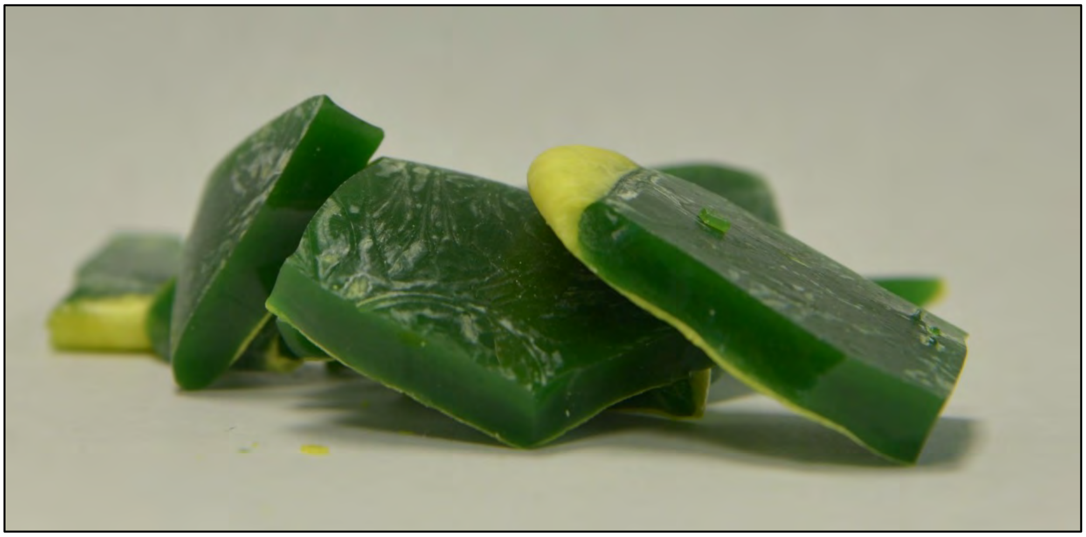


LP2-IL-11Q

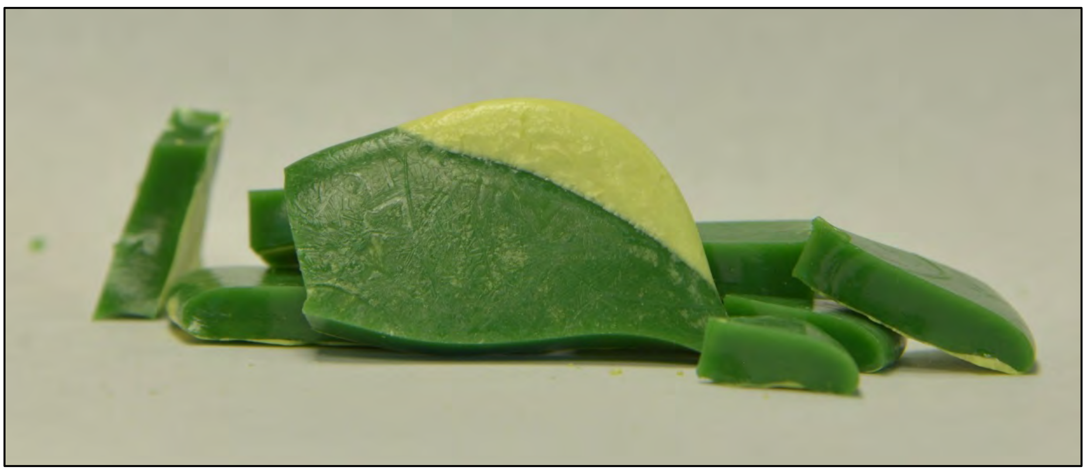


LP2-IL-12Q

Exhibit B-1. Photographs of the Sulfur Saturated Melts (continued)

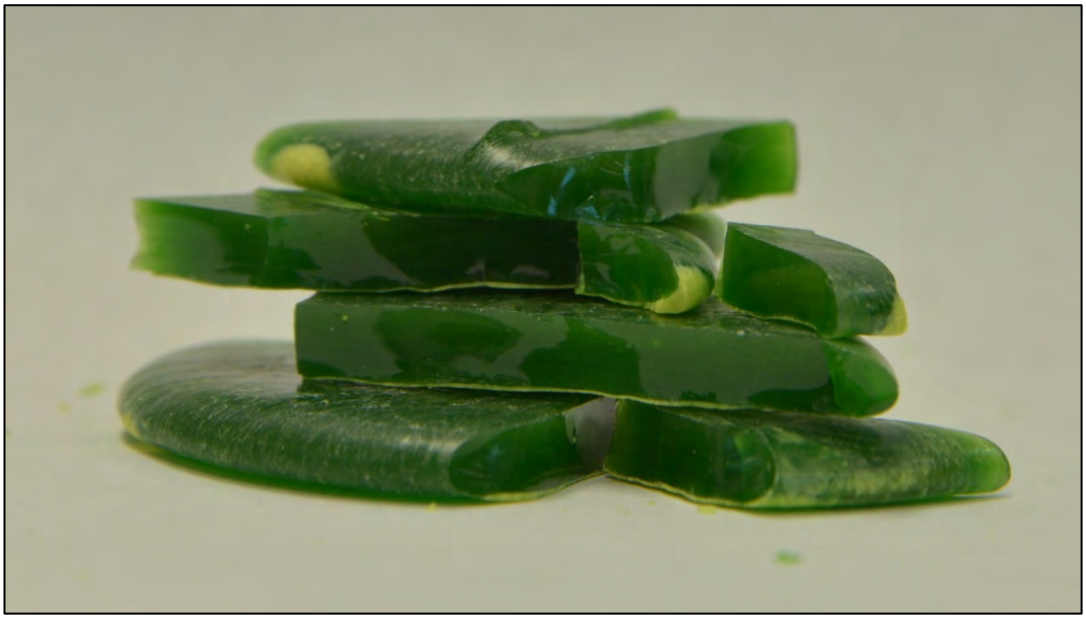


LP2-IL-13Q

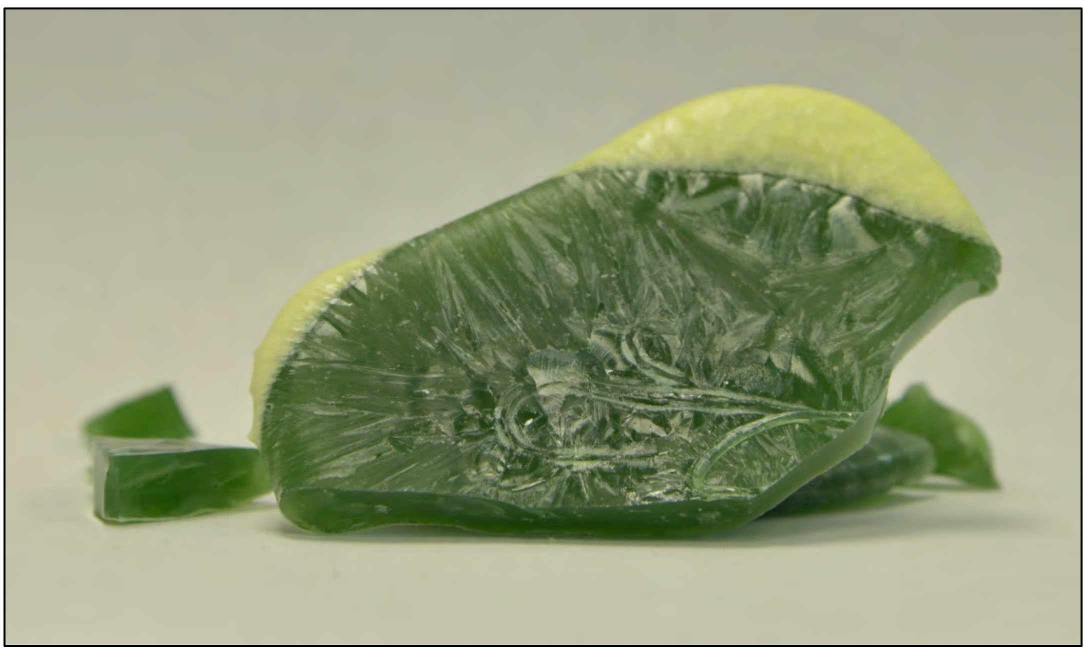


LP2-IL-15Q

Exhibit B-1. Photographs of the Sulfur Saturated Melts (continued)

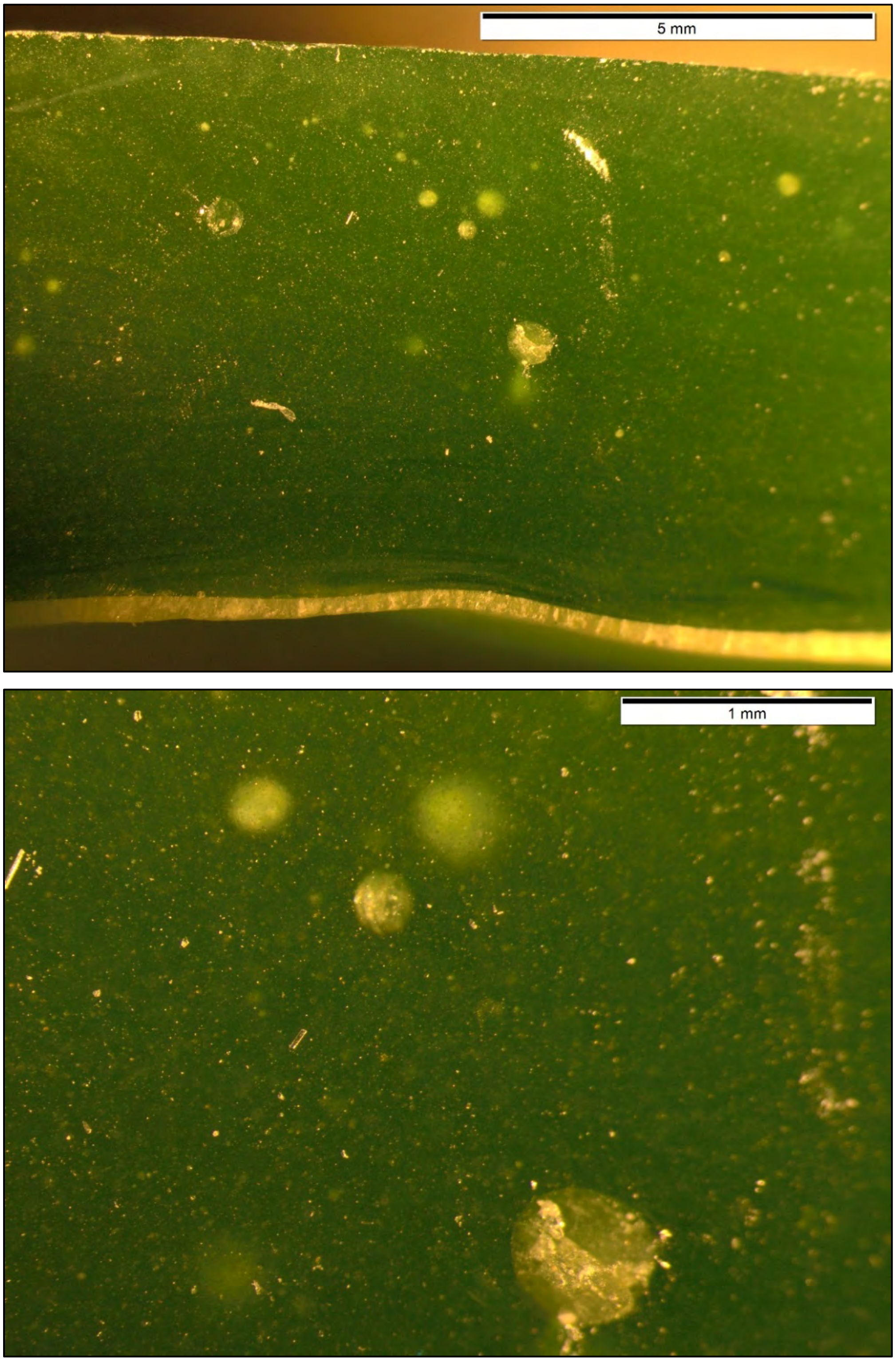


LP2-IL-16Q



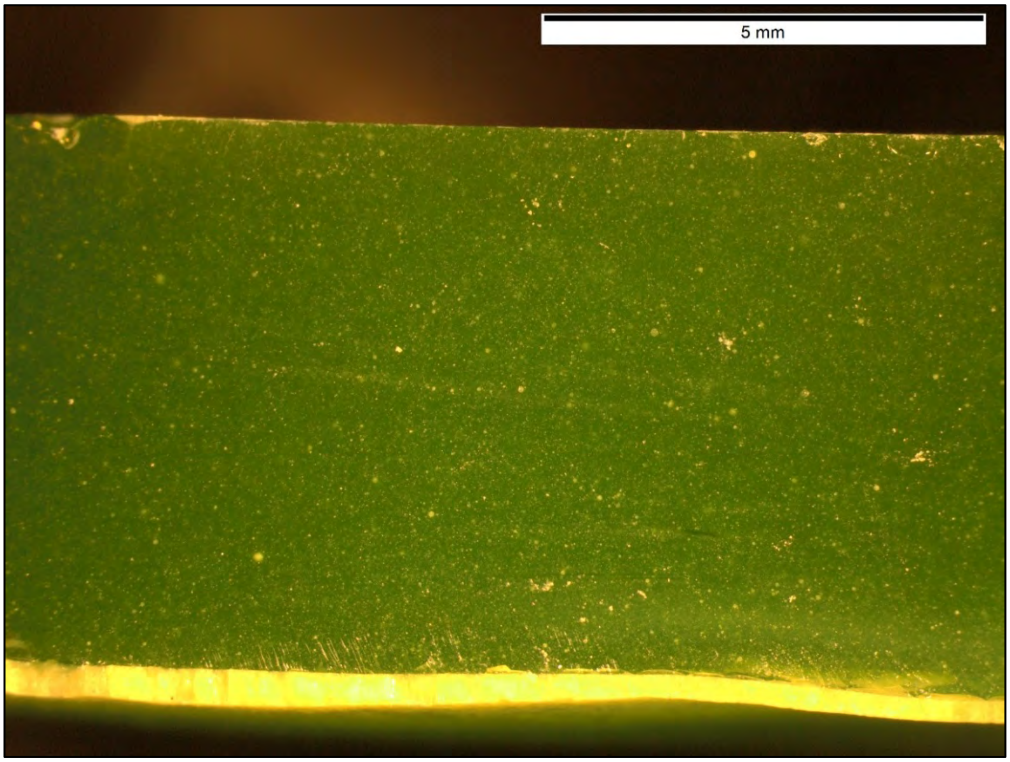
LP2-IL-17Q

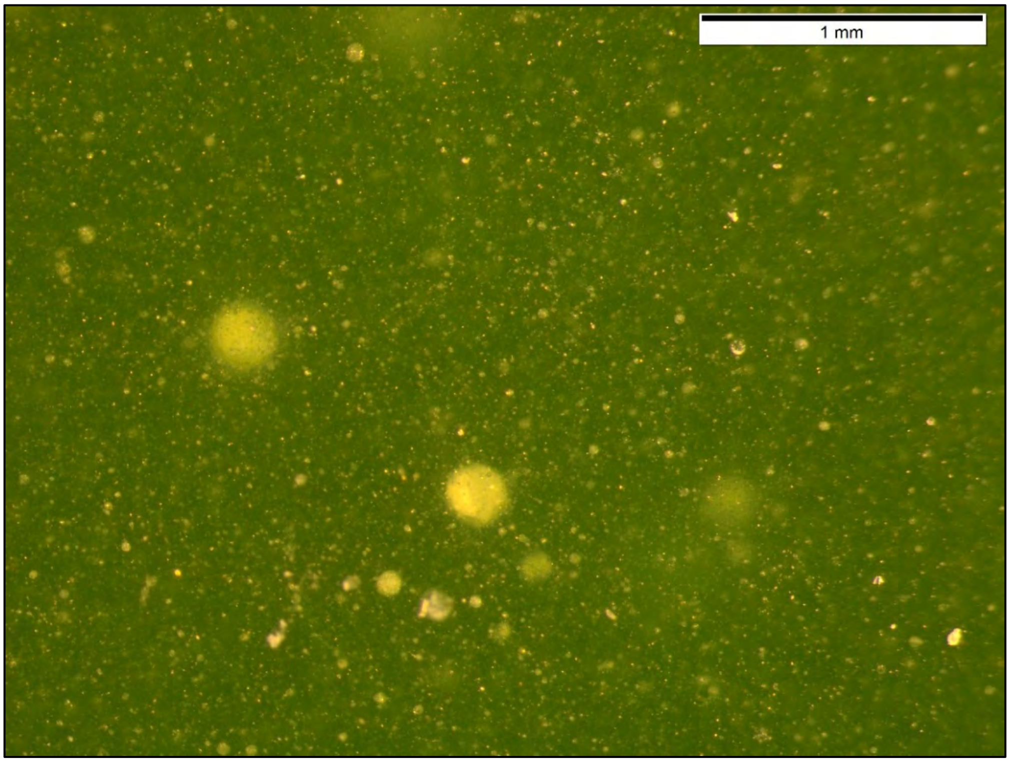
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts



LP2-IL-02 after third SSM re-melt

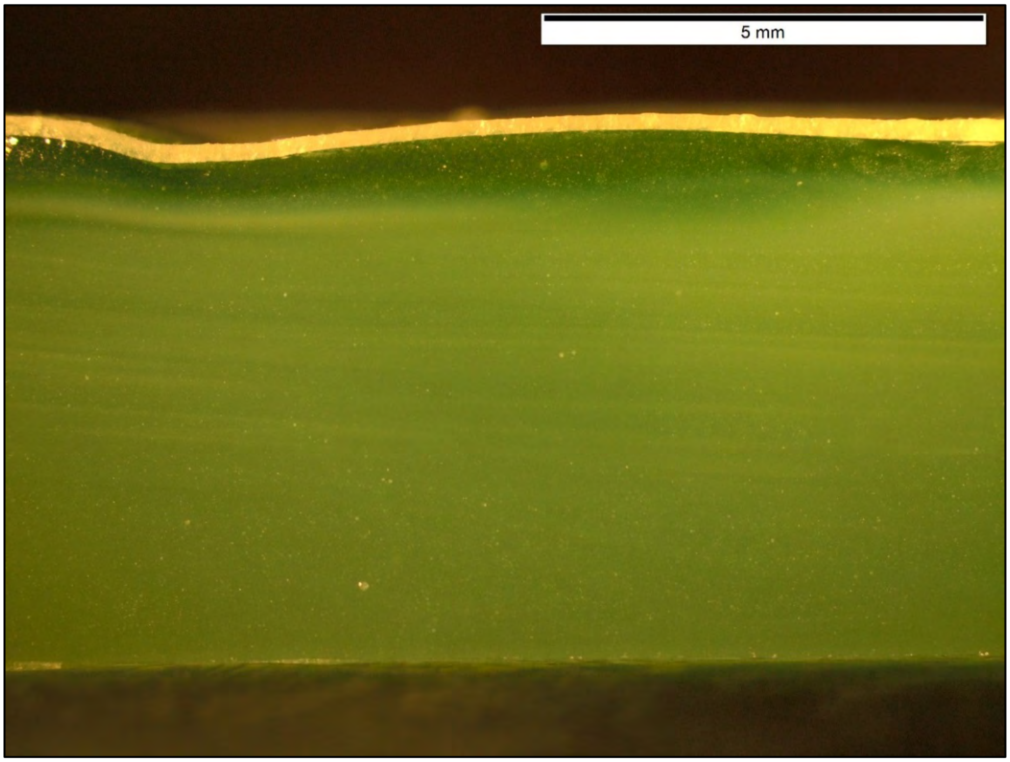
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts (continued)

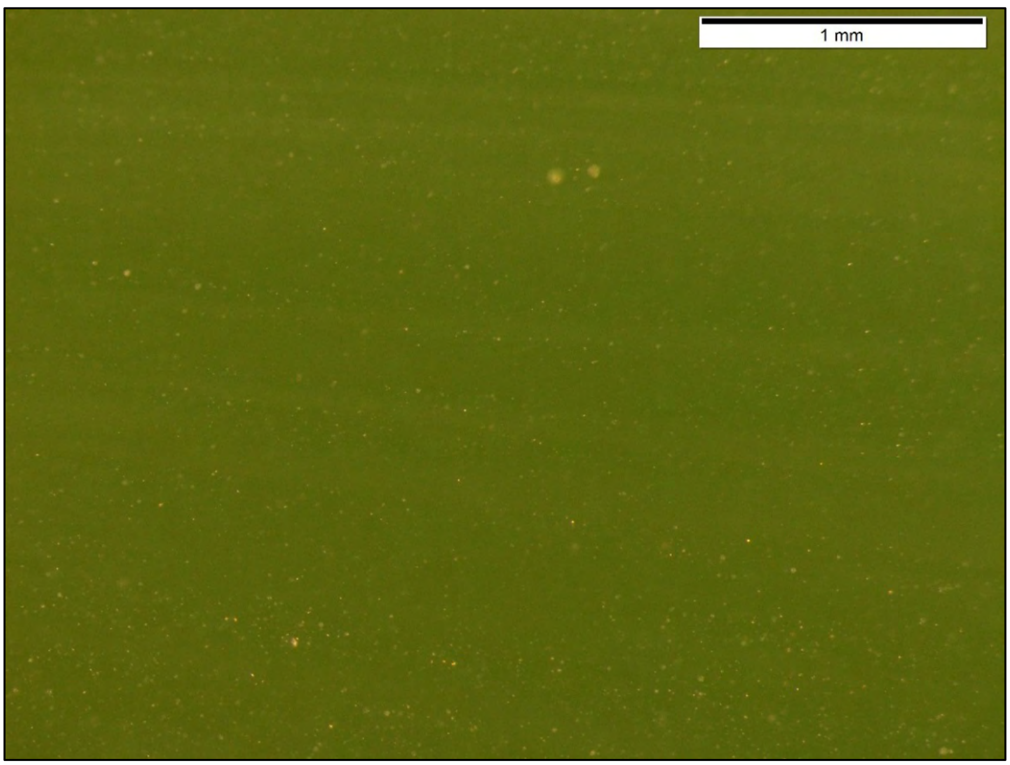




LP2-IL-03 after third SSM re-melt

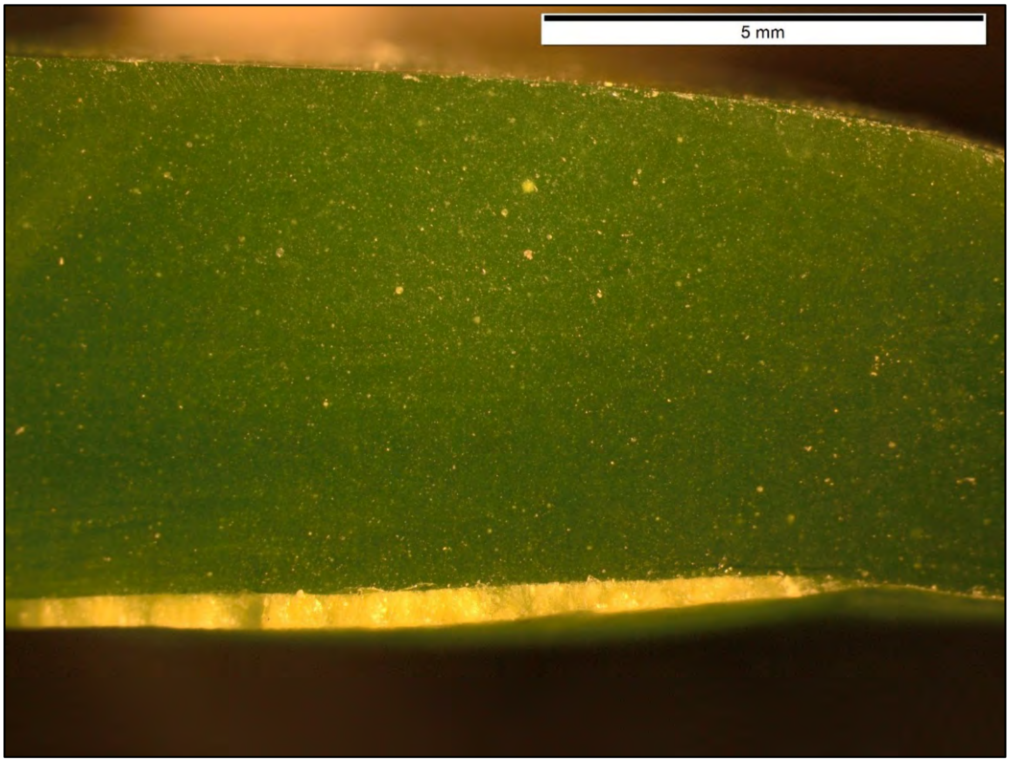
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts (continued)

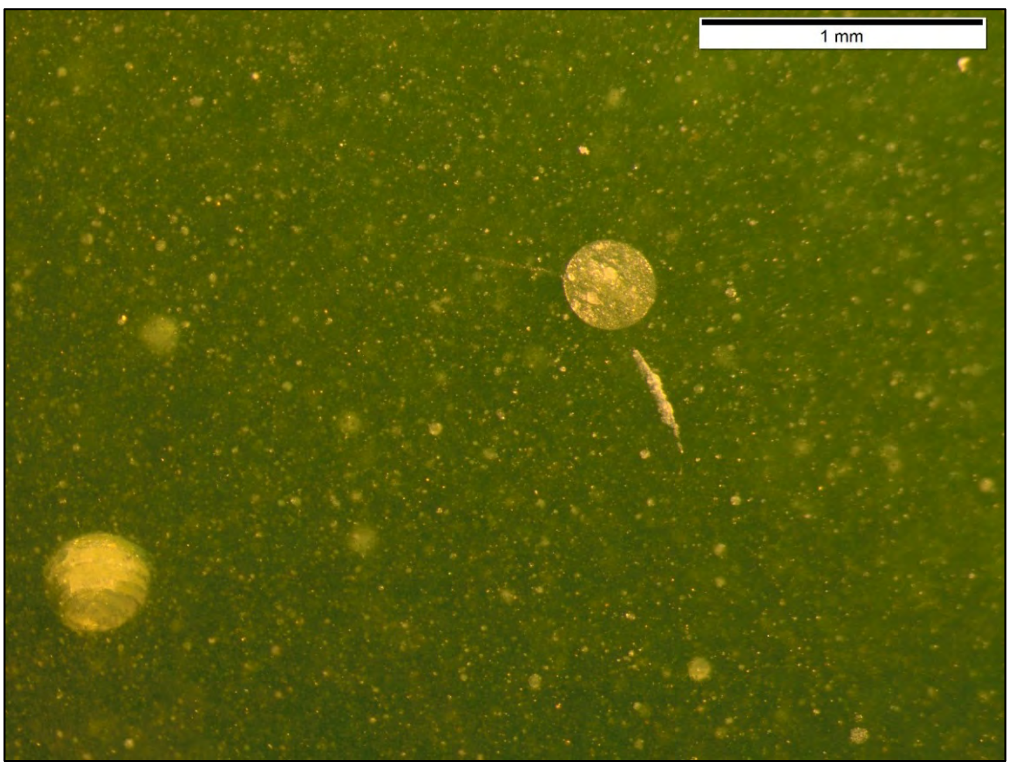




LP2-IL-05 after third SSM re-melt

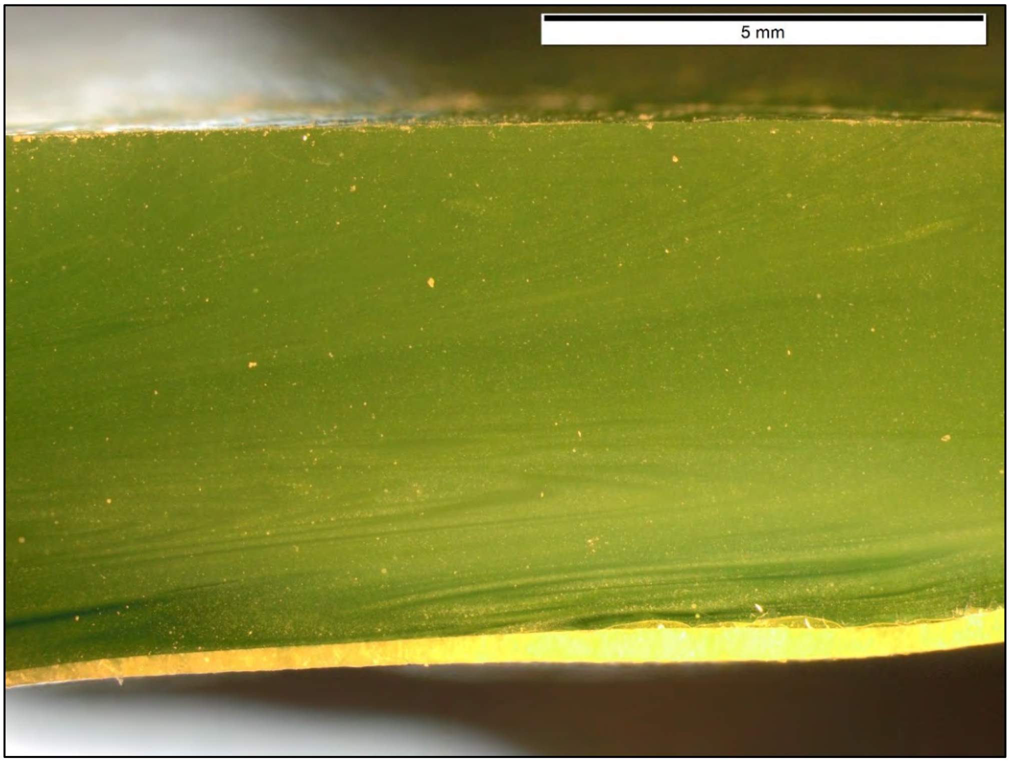
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts (continued)

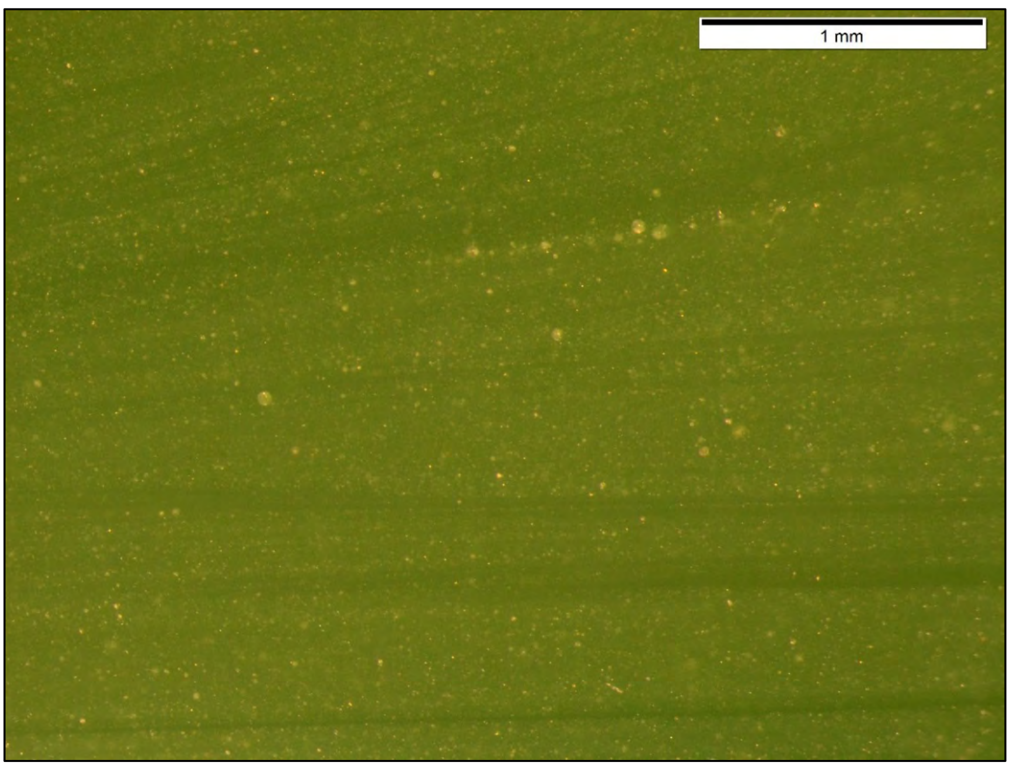




LP2-IL-06-1 after third SSM re-melt

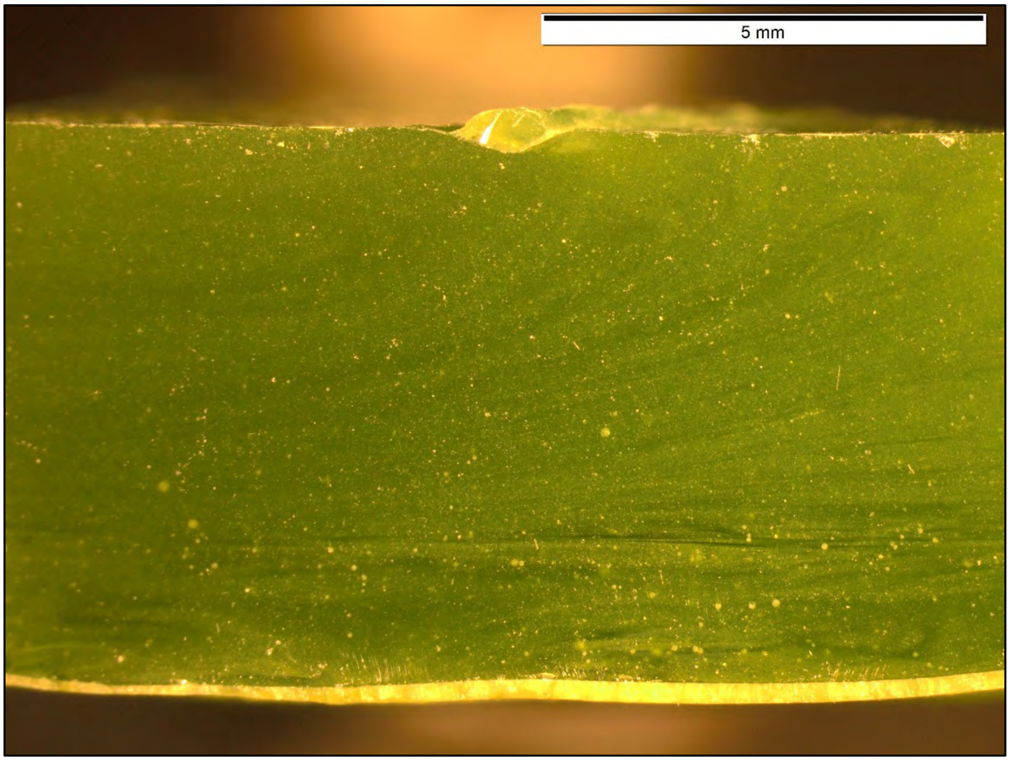
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts (continued)

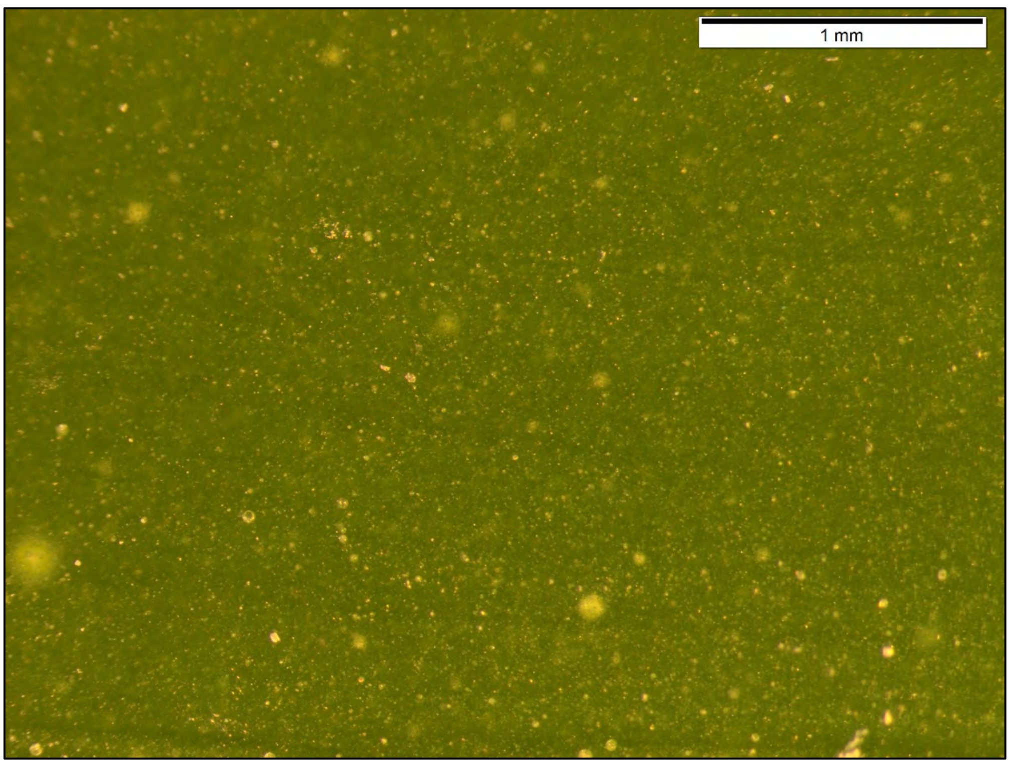




LP2-IL-07 after third SSM re-melt

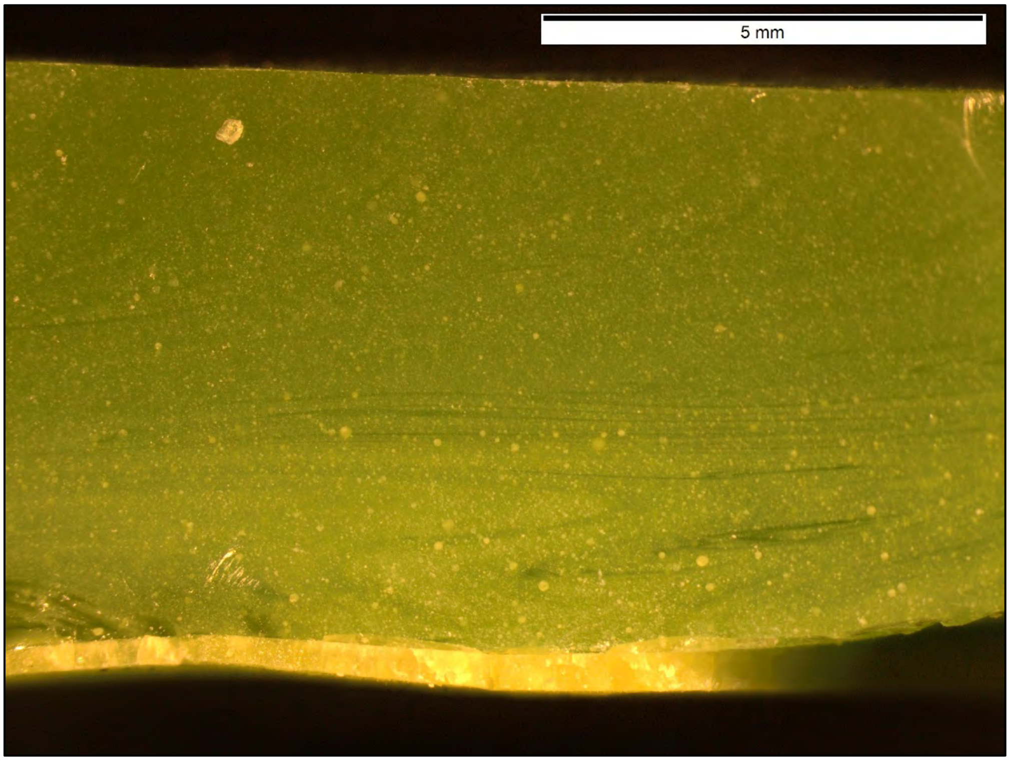
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts (continued)

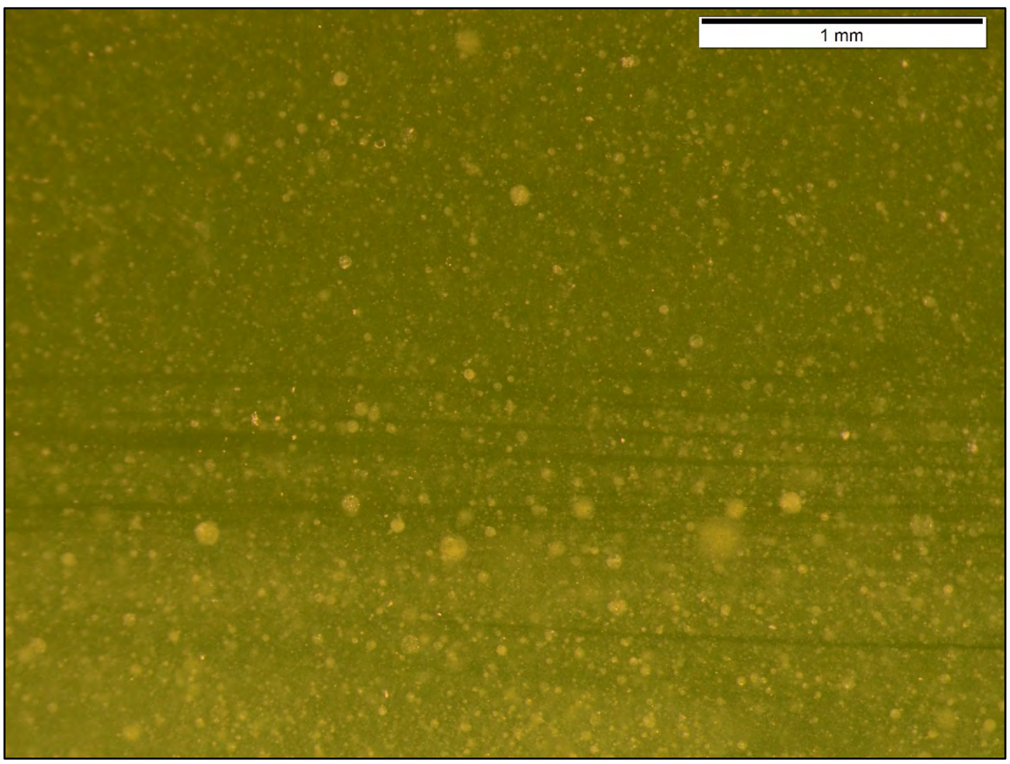




LP2-IL-08-1 after third SSM re-melt

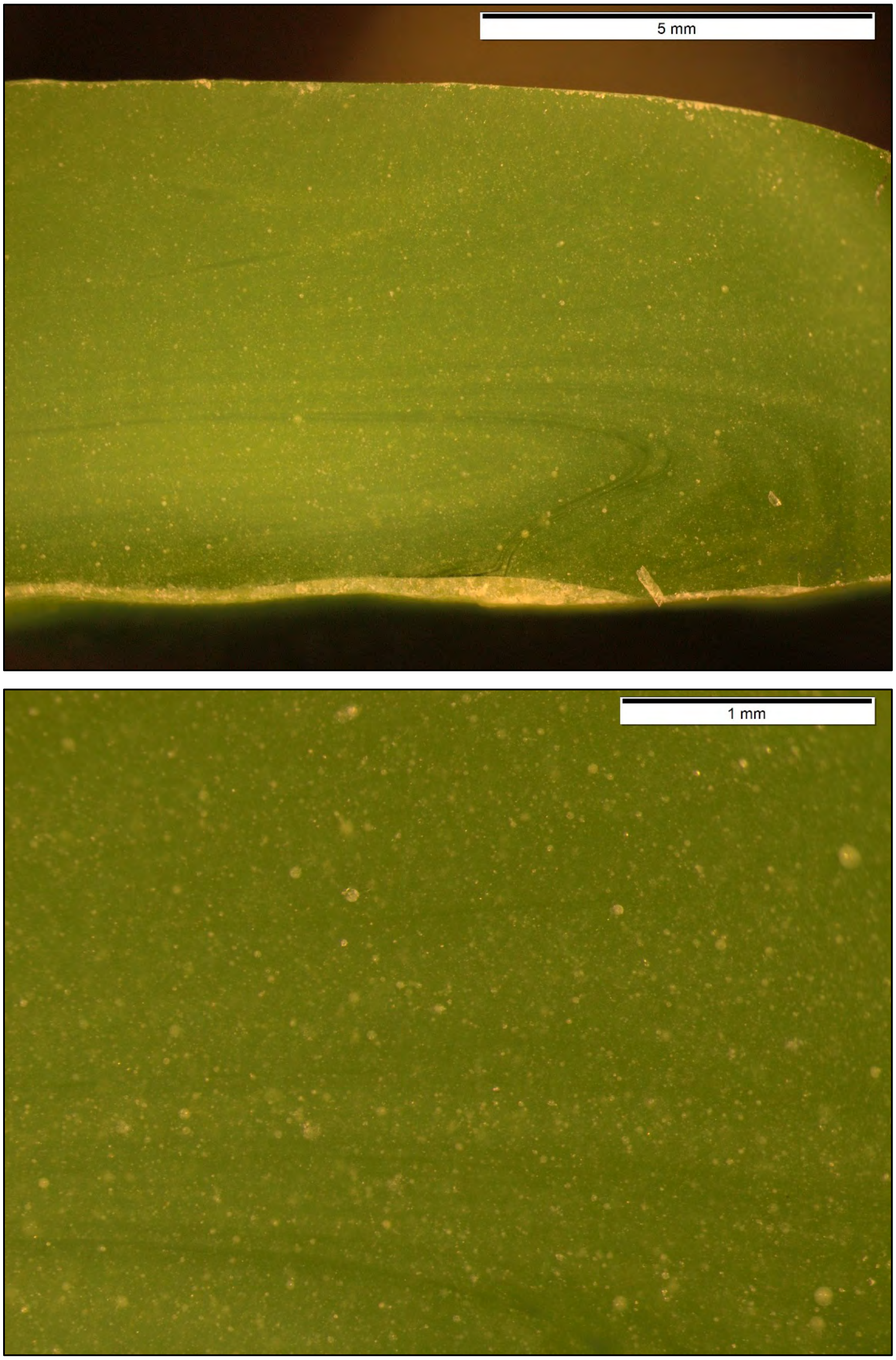
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts (continued)





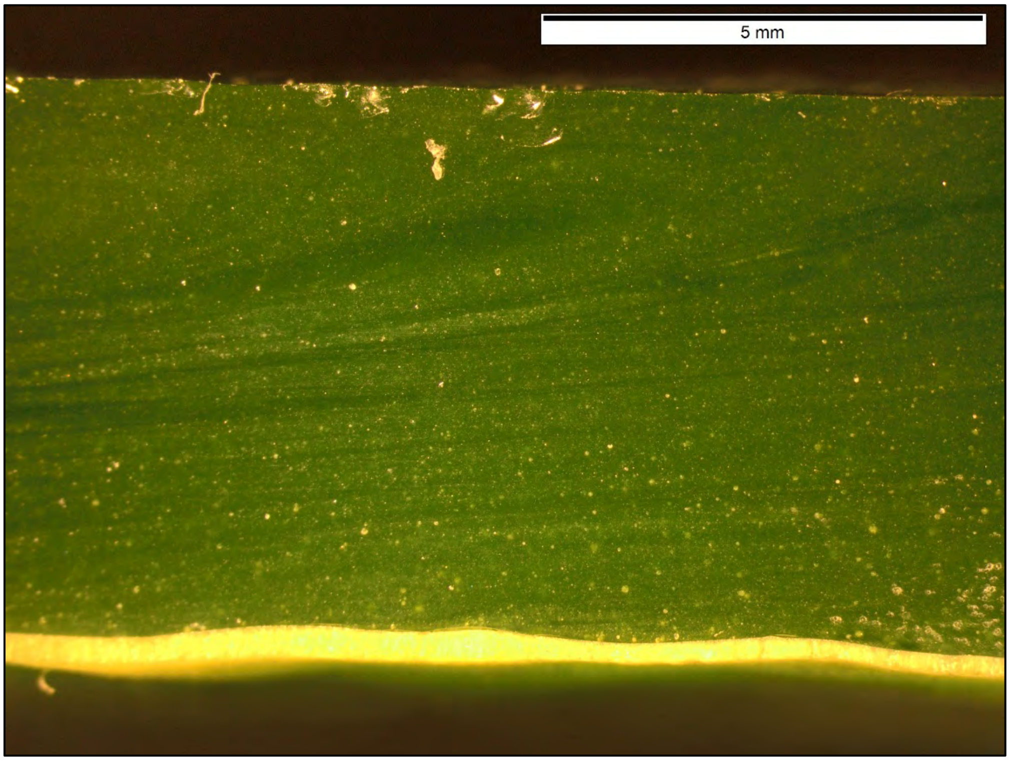
LP2-IL-11 after third SSM re-melt

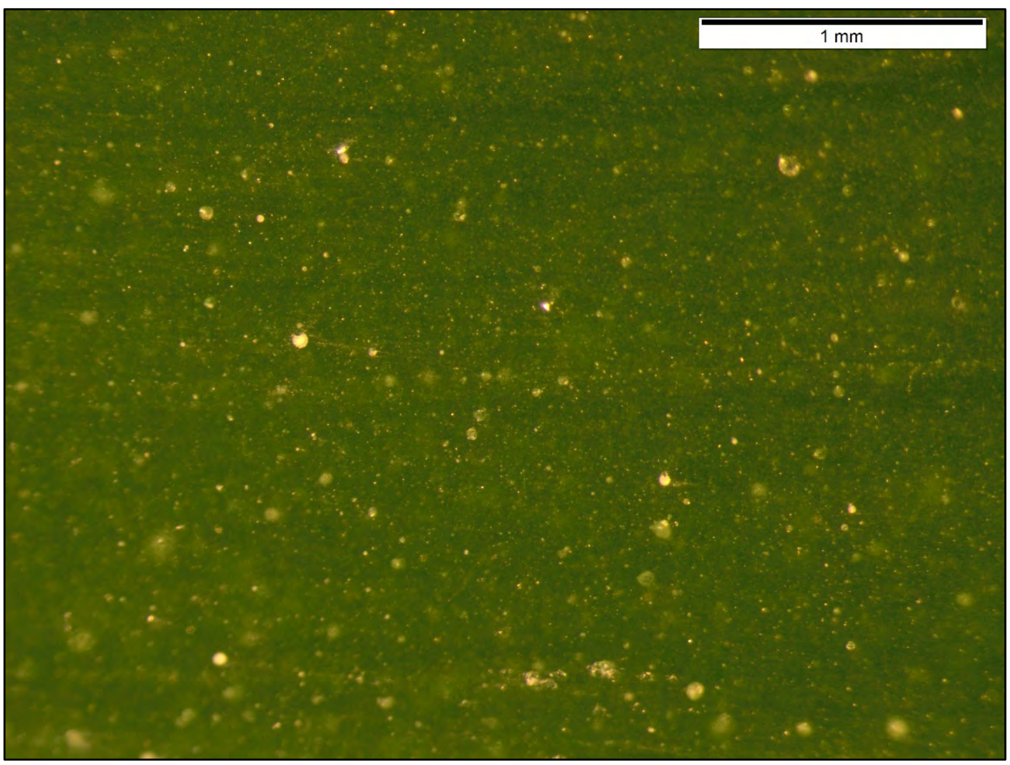
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts (continued)



LP2-IL-12 after third SSM re-melt

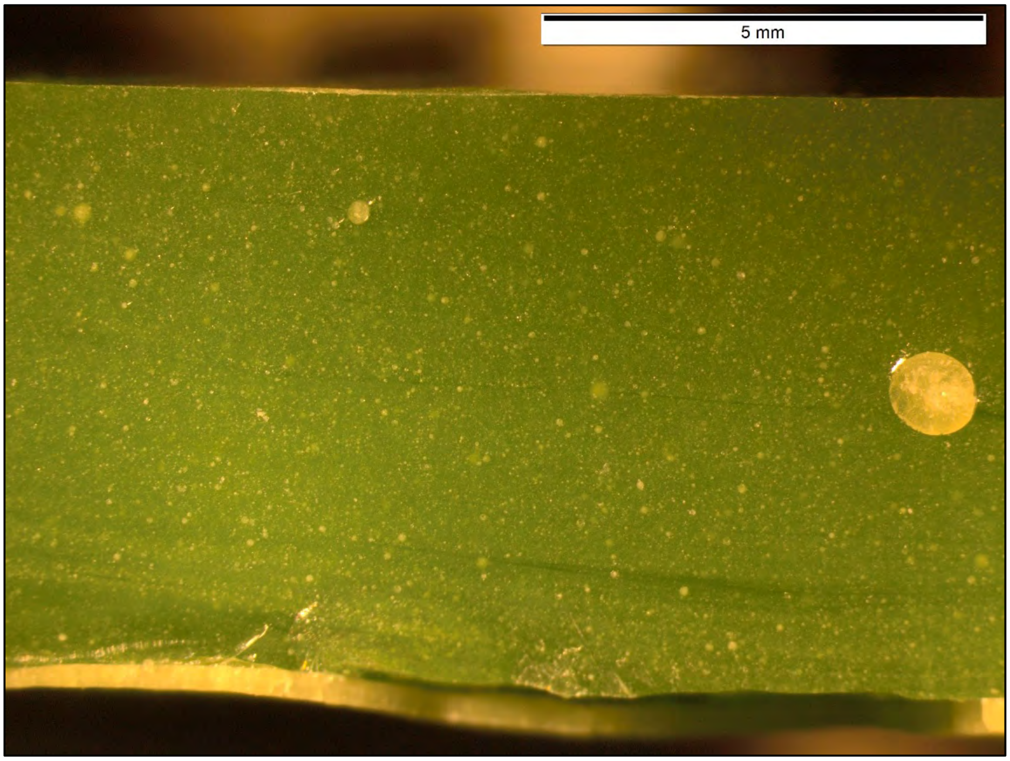
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts (continued)

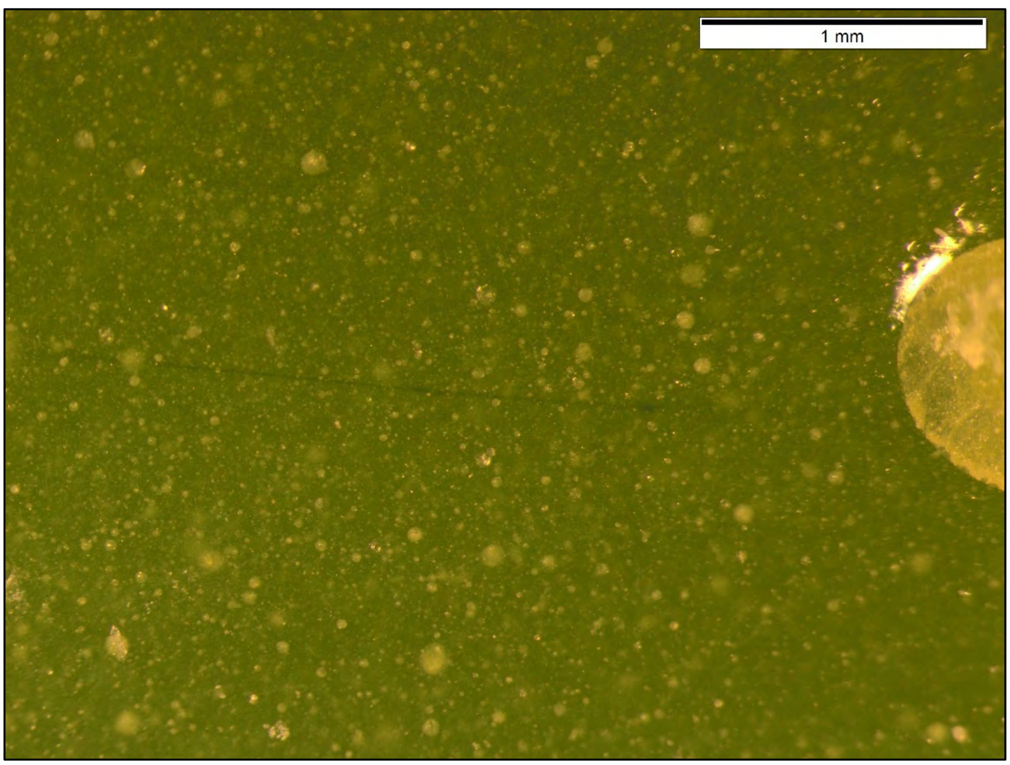




LP2-IL-13 after third SSM re-melt

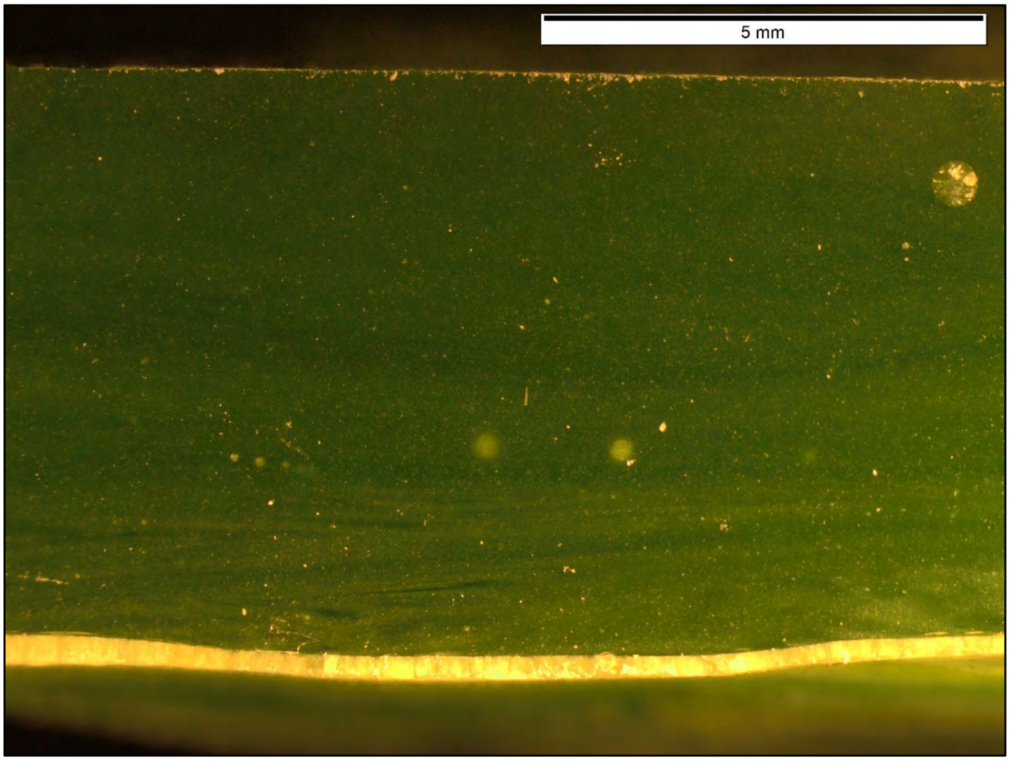
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts (continued)

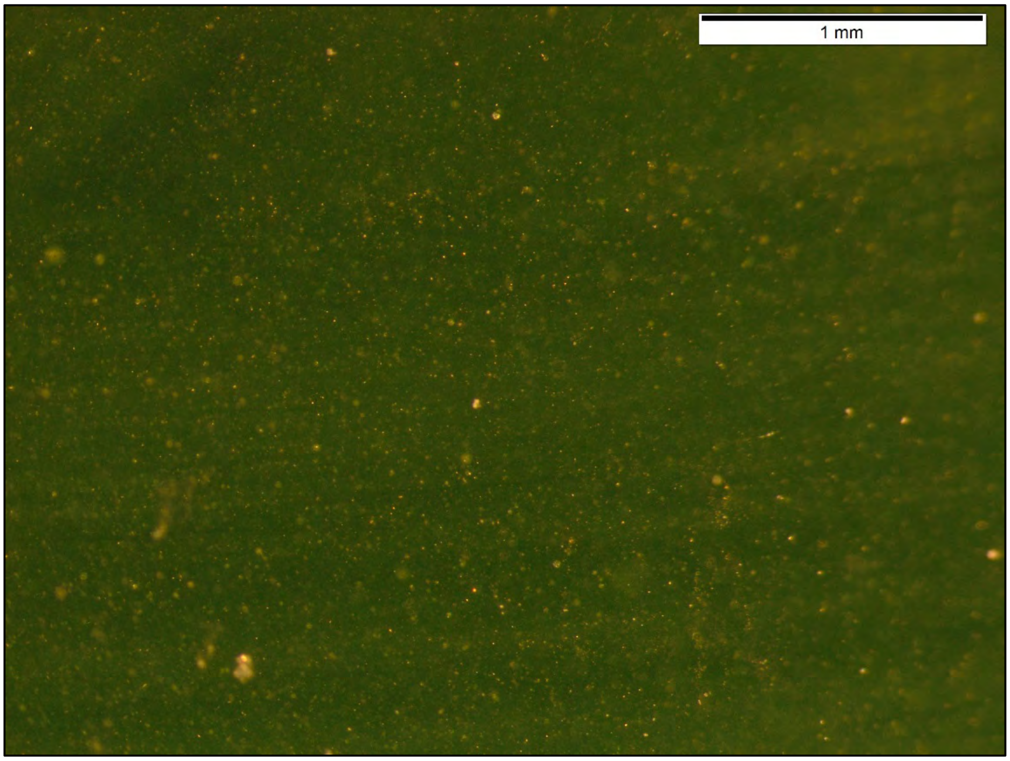




LP2-IL-15 after third SSM re-melt

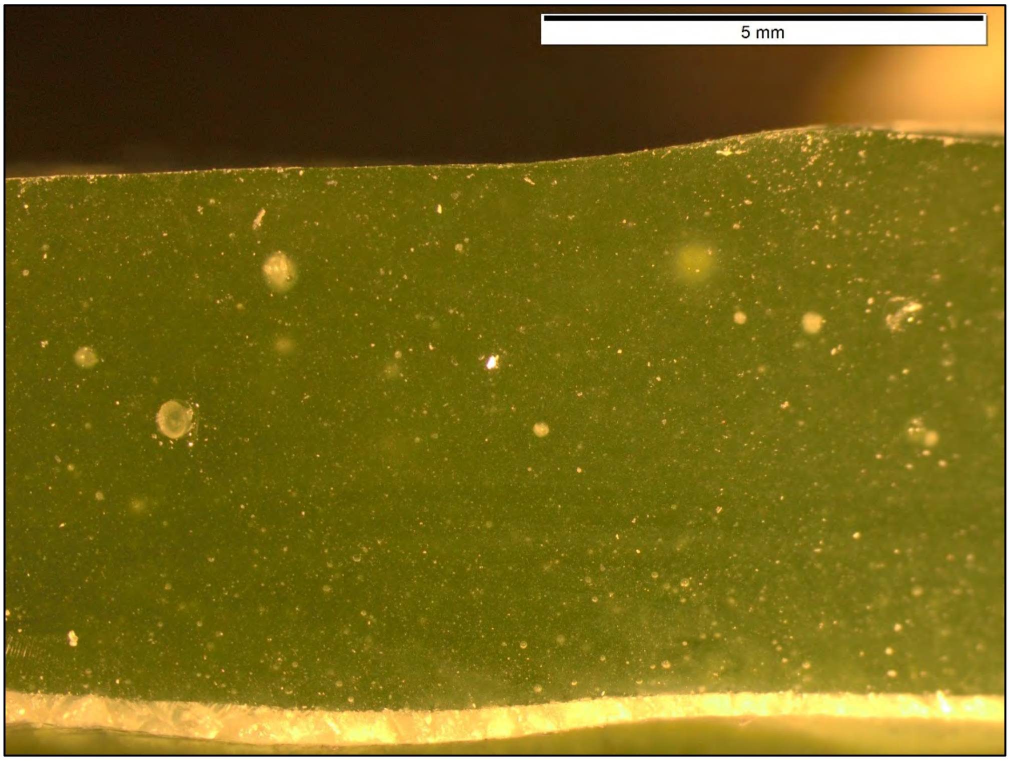
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts (continued)

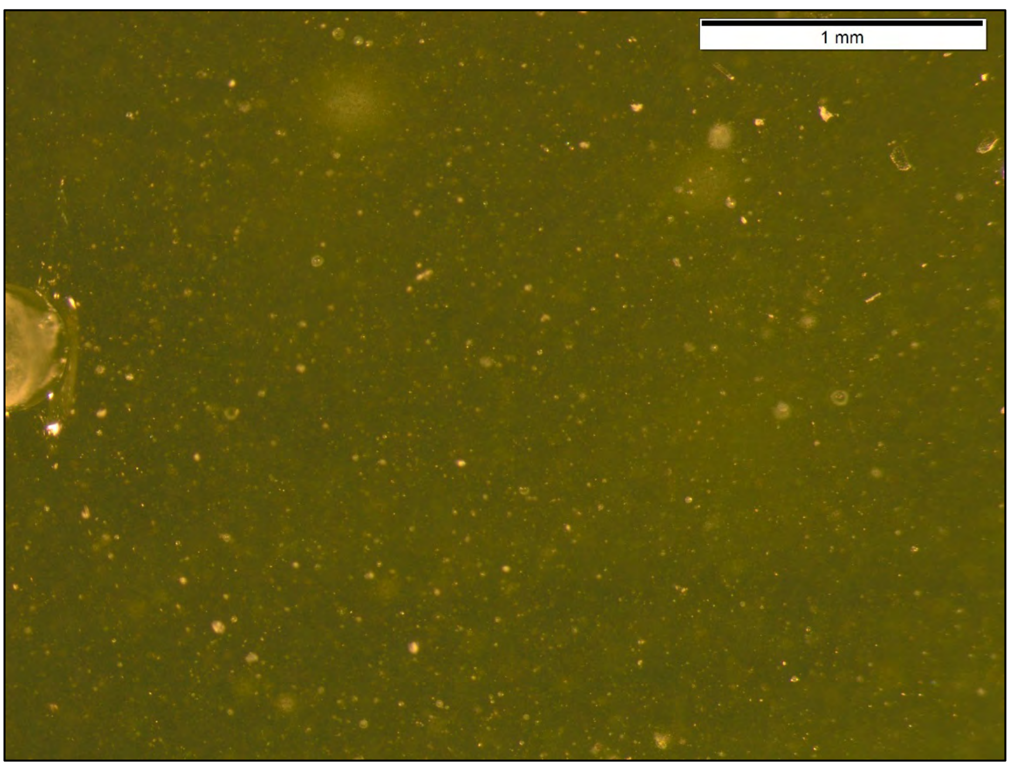




LP2-IL-16 after third SSM re-melt

Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts (continued)





LP2-IL-17 after third SSM re-melt

Appendix C Tables and Exhibits Supporting the Chemical Analysis of the Study Glasses

Table C-1. LM Elemental Measurements of the LP2-IL Series Glasses, Part 1

ID	Block	Sub-Blk	Sequence	Lab ID	Ca (wt%)	Cr (wt%)	K (wt%)	Mg (wt%)	Na (wt%)
LRM	1	1	1	LRMLM111	0.374	0.143	1.24	0.0788	15.2
LP2-IL-01Q	1	1	2	G17LM11	5.67	0.361	1.67	0.192	16.4
LP2-IL-04Q	1	1	3	G07LM11	5.51	0.354	1.65	0.599	16.4
LP2-IL-03Q	1	1	4	G01LM21	1.67	0.366	0.681	0.189	16.9
LP2-IL-02Q	1	1	5	G08LM11	1.64	0.259	1.64	0.599	16.2
LP2-IL-04Q	1	1	6	G07LM21	5.48	0.375	1.63	0.609	16.3
LP2-IL-06-1Q	1	1	7	G05LM21	1.63	0.365	1.64	0.604	15.7
LRM	1	1	8	LRMLM112	0.378	0.148	1.29	0.0800	14.4
LP2-IL-02Q	1	1	9	G08LM21	1.67	0.262	1.67	0.600	16.4
LP2-IL-05Q	1	1	10	G11LM11	5.22	0.258	0.433	0.185	15.0
LP2-IL-06-1Q	1	1	11	G05LM11	1.67	0.371	1.69	0.600	16.9
LP2-IL-03Q	1	1	12	G01LM11	1.69	0.366	0.670	0.196	15.2
LP2-IL-05Q	1	1	13	G11LM21	5.27	0.261	0.441	0.188	14.9
LP2-IL-01Q	1	1	14	G17LM21	5.65	0.363	1.64	0.191	16.1
LRM	1	1	15	LRMLM113	0.370	0.147	1.26	0.0782	14.3
LRM	1	2	1	LRMLM121	0.368	0.137	1.23	0.0749	15.3
LP2-IL-05Q	1	2	2	G11LM12	4.99	0.244	0.435	0.180	15.6
LP2-IL-01Q	1	2	3	G17LM12	5.58	0.351	1.65	0.187	16.8
LP2-IL-06-1Q	1	2	4	G05LM12	1.63	0.351	1.66	0.594	17.5
LP2-IL-03Q	1	2	5	G01LM12	1.70	0.345	0.678	0.190	15.8
LP2-IL-02Q	1	2	6	G08LM12	1.62	0.250	1.61	0.583	17.0
LP2-IL-04Q	1	2	7	G07LM12	5.37	0.342	1.57	0.580	16.9
LRM	1	2	8	LRMLM122	0.365	0.137	1.20	0.0743	14.7
LP2-IL-01Q	1	2	9	G17LM22	5.62	0.348	1.63	0.189	16.7
LP2-IL-04Q	1	2	10	G07LM22	5.41	0.351	1.61	0.589	16.9
LP2-IL-06-1Q	1	2	11	G05LM22	1.63	0.346	1.66	0.586	16.0
LP2-IL-05Q	1	2	12	G11LM22	5.18	0.247	0.441	0.182	15.8
LP2-IL-03Q	1	2	13	G01LM22	1.62	0.346	0.670	0.181	17.7
LP2-IL-02Q	1	2	14	G08LM22	1.66	0.246	1.67	0.580	16.9
LRM	1	2	15	LRMLM123	0.378	0.141	1.22	0.0759	14.8
LRM	2	1	1	LRMLM211	0.371	0.138	1.30	0.0754	15.6
LP2-IL-07Q	2	1	2	G14LM21	3.84	0.246	1.67	0.572	16.8
LP2-IL-11Q	2	1	3	G04LM11	2.41	0.251	1.64	0.177	15.9

Table C-1. LM Elemental Measurements of the LP2-IL Series Glasses, Part 1 (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	Ca (wt%)	Cr (wt%)	K (wt%)	Mg (wt%)	Na (wt%)
LP2-IL-09Q	2	1	4	G06LM21	1.66	0.348	0.451	0.589	17.2
LP2-IL-12Q	2	1	5	G12LM21	2.48	0.252	0.443	0.588	16.5
LP2-IL-08-1Q	2	1	6	G03LM11	5.75	0.345	0.435	0.582	15.0
LP2-IL-11Q	2	1	7	G04LM21	2.39	0.250	1.62	0.177	15.3
LRM	2	1	8	LRMLM212	0.365	0.139	1.27	0.0747	14.5
LP2-IL-08-1Q	2	1	9	G03LM21	5.86	0.352	0.445	0.596	15.3
LP2-IL-09Q	2	1	10	G06LM11	1.64	0.351	0.441	0.587	17.1
LP2-IL-07Q	2	1	11	G14LM11	3.83	0.252	1.67	0.579	15.4
LP2-IL-10Q	2	1	12	G13LM11	3.75	0.299	0.867	0.378	15.7
LP2-IL-10Q	2	1	13	G13LM21	3.68	0.295	0.879	0.374	15.9
LP2-IL-12Q	2	1	14	G12LM11	2.44	0.247	0.411	0.570	16.3
LRM	2	1	15	LRMLM213	0.375	0.141	1.28	0.0759	14.6
LRM	2	2	1	LRMLM221	0.367	0.137	1.22	0.0744	16.0
LP2-IL-08-1Q	2	2	2	G03LM22	5.76	0.348	0.453	0.587	16.1
LP2-IL-07Q	2	2	3	G14LM22	3.85	0.254	1.64	0.585	17.0
LP2-IL-09Q	2	2	4	G06LM22	1.62	0.349	0.459	0.585	17.6
LP2-IL-08-1Q	2	2	5	G03LM12	5.81	0.344	0.450	0.583	15.7
LP2-IL-11Q	2	2	6	G04LM22	2.39	0.252	1.59	0.178	15.8
LP2-IL-12Q	2	2	7	G12LM22	2.39	0.253	0.462	0.592	17.1
LRM	2	2	8	LRMLM222	0.372	0.139	1.23	0.0751	15.1
LP2-IL-07Q	2	2	9	G14LM12	3.83	0.254	1.61	0.587	16.2
LP2-IL-10Q	2	2	10	G13LM12	3.72	0.299	0.921	0.384	16.7
LP2-IL-09Q	2	2	11	G06LM12	1.60	0.350	0.460	0.590	17.8
LP2-IL-11Q	2	2	12	G04LM12	2.35	0.251	1.56	0.177	16.3
LP2-IL-10Q	2	2	13	G13LM22	3.76	0.294	0.919	0.376	16.6
LP2-IL-12Q	2	2	14	G12LM12	2.41	0.249	0.438	0.580	17.0
LRM	2	2	15	LRMLM223	0.373	0.139	1.22	0.0753	15.1
LRM	3	1	1	LRMLM311	0.379	0.140	1.19	0.0764	15.1
LP2-IL-16Q	3	1	2	G09LM21	3.81	0.302	0.899	0.387	16.7
LP2-IL-15Q	3	1	3	G02LM11	1.57	0.351	0.438	0.178	15.9
LP2-IL-17Q	3	1	4	G15LM11	1.96	0.0587	0.445	0.582	16.7
LP2-IL-15Q	3	1	5	G02LM21	1.55	0.357	0.455	0.180	15.9
LP2-IL-14Q	3	1	6	G16LM21	2.88	0.250	0.438	0.177	17.6
LP2-IL-13Q	3	1	7	G10LM21	1.89	0.351	1.61	0.175	15.8

Table C-1. LM Elemental Measurements of the LP2-IL Series Glasses, Part 1 (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	Ca (wt%)	Cr (wt%)	K (wt%)	Mg (wt%)	Na (wt%)
LRM	3	1	8	LRMLM312	0.378	0.140	1.23	0.0762	14.9
LP2-IL-17Q	3	1	9	G15LM21	1.96	0.0599	0.477	0.582	18.4
LP2-IL-13Q	3	1	10	G10LM11	1.78	0.347	1.51	0.175	16.8
LP2-IL-16Q	3	1	11	G09LM11	3.78	0.299	0.904	0.384	17.4
LP2-IL-14Q	3	1	12	G16LM11	2.93	0.246	0.448	0.176	17.9
LRM	3	1	13	LRMLM313	0.369	0.138	1.18	0.0751	14.4
LRM	3	2	1	LRMLM321	0.375	0.140	1.20	0.0765	14.9
LP2-IL-16Q	3	2	2	G09LM22	3.81	0.301	0.902	0.388	16.4
LP2-IL-13Q	3	2	3	G10LM12	1.83	0.348	1.65	0.176	15.5
LP2-IL-13Q	3	2	4	G10LM22	1.86	0.348	1.63	0.175	15.5
LP2-IL-16Q	3	2	5	G09LM12	3.67	0.299	0.906	0.387	16.2
LP2-IL-14Q	3	2	6	G16LM22	3.00	0.249	0.442	0.180	17.1
LP2-IL-17Q	3	2	7	G15LM12	2.00	0.0598	0.463	0.594	16.0
LRM	3	2	8	LRMLM322	0.380	0.141	1.25	0.0773	14.5
LP2-IL-15Q	3	2	9	G02LM22	1.53	0.356	0.456	0.181	15.4
LP2-IL-15Q	3	2	10	G02LM12	1.57	0.355	0.450	0.183	15.5
LP2-IL-14Q	3	2	11	G16LM12	2.96	0.254	0.469	0.183	17.1
LP2-IL-17Q	3	2	12	G15LM22	1.95	0.0602	0.468	0.581	16.3
LRM	3	2	13	LRMLM323	0.389	0.143	1.22	0.0787	14.4

Table C-2. LM Elemental Measurements of the LP2-IL Series Glasses, Part 2

ID	Block	Sub-Blk	Sequence	Lab ID	P (wt%)	S (wt%)	V (wt%)	Zn (wt%)	Zr (wt%)
LRM	1	1	1	LRMLM111	0.164	0.0944	<0.100	0.0382	0.666
LP2-IL-01Q	1	1	2	G17LM11	0.300	0.327	1.14	1.97	3.81
LP2-IL-04Q	1	1	3	G07LM11	0.391	0.0947	0.278	1.96	2.06
LP2-IL-03Q	1	1	4	G01LM21	0.388	0.0868	0.279	2.56	3.83
LP2-IL-02Q	1	1	5	G08LM11	0.233	0.325	0.278	2.11	3.84
LP2-IL-04Q	1	1	6	G07LM21	0.345	0.0981	0.277	1.97	1.41
LP2-IL-06-1Q	1	1	7	G05LM21	0.397	0.326	0.581	1.88	3.77
LRM	1	1	8	LRMLM112	0.160	0.0951	<0.100	0.0399	0.689
LP2-IL-02Q	1	1	9	G08LM21	0.238	0.330	0.280	2.15	3.86
LP2-IL-05Q	1	1	10	G11LM11	0.330	0.0857	0.273	1.96	3.85
LP2-IL-06-1Q	1	1	11	G05LM11	0.364	0.316	0.576	1.93	3.64
LP2-IL-03Q	1	1	12	G01LM11	0.339	0.0880	0.268	2.57	2.88
LP2-IL-05Q	1	1	13	G11LM21	0.325	0.0944	0.276	1.98	3.88
LP2-IL-01Q	1	1	14	G17LM21	0.277	0.336	1.12	1.95	3.79
LRM	1	1	15	LRMLM113	0.159	0.0917	<0.100	0.0397	0.679
LRM	1	2	1	LRMLM121	0.149	0.0833	<0.100	0.0346	0.657
LP2-IL-05Q	1	2	2	G11LM12	0.325	0.0772	0.265	1.85	3.67
LP2-IL-01Q	1	2	3	G17LM12	0.284	0.318	1.12	1.94	3.75
LP2-IL-06-1Q	1	2	4	G05LM12	0.373	0.303	0.569	1.88	3.57
LP2-IL-03Q	1	2	5	G01LM12	0.341	0.0828	0.261	2.55	2.88
LP2-IL-02Q	1	2	6	G08LM12	0.221	0.309	0.272	2.07	3.78
LP2-IL-04Q	1	2	7	G07LM12	0.386	0.0846	0.270	1.88	2
LRM	1	2	8	LRMLM122	0.149	0.0836	<0.100	0.0345	0.662
LP2-IL-01Q	1	2	9	G17LM22	0.293	0.311	1.12	1.94	3.74
LP2-IL-04Q	1	2	10	G07LM22	0.335	0.0896	0.268	1.93	1.38
LP2-IL-06-1Q	1	2	11	G05LM22	0.389	0.307	0.567	1.87	3.76
LP2-IL-05Q	1	2	12	G11LM22	0.328	0.0826	0.270	1.93	3.82
LP2-IL-03Q	1	2	13	G01LM22	0.377	0.0809	0.270	2.49	3.73
LP2-IL-02Q	1	2	14	G08LM22	0.210	0.305	0.270	2.11	3.84
LRM	1	2	15	LRMLM123	0.151	0.0881	<0.100	0.0354	0.68
LRM	2	1	1	LRMLM211	0.163	0.0841	<0.100	0.0362	0.657
LP2-IL-07Q	2	1	2	G14LM21	0.315	0.305	0.267	2.52	1.97
LP2-IL-11Q	2	1	3	G04LM11	0.334	0.0814	1.13	2.52	4.07

Table C-2. LM Elemental Measurements of the LP2-IL Series Glasses, Part 2 (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	P (wt%)	S (wt%)	V (wt%)	Zn (wt%)	Zr (wt%)
LP2-IL-09Q	2	1	4	G06LM21	0.281	0.0850	1.14	2.56	3.75
LP2-IL-12Q	2	1	5	G12LM21	0.320	0.0795	1.15	1.96	3.76
LP2-IL-08-1Q	2	1	6	G03LM11	0.378	0.297	0.269	2.51	3.69
LP2-IL-11Q	2	1	7	G04LM21	0.319	0.0785	1.13	2.5	4.1
LRM	2	1	8	LRMLM212	0.160	0.0833	<0.100	0.0362	0.662
LP2-IL-08-1Q	2	1	9	G03LM21	0.381	0.313	0.275	2.51	3.71
LP2-IL-09Q	2	1	10	G06LM11	0.249	0.0861	1.13	2.51	3.7
LP2-IL-07Q	2	1	11	G14LM11	0.319	0.314	0.273	2.49	2.01
LP2-IL-10Q	2	1	12	G13LM11	0.254	0.187	0.522	2.21	2.33
LP2-IL-10Q	2	1	13	G13LM21	0.280	0.187	0.528	2.22	2.66
LP2-IL-12Q	2	1	14	G12LM11	0.323	0.0823	1.13	1.91	3.7
LRM	2	1	15	LRMLM213	0.154	0.0886	<0.100	0.0369	0.679
LRM	2	2	1	LRMLM221	0.157	0.0793	<0.100	0.0342	0.64
LP2-IL-08-1Q	2	2	2	G03LM22	0.376	0.312	0.270	2.49	3.71
LP2-IL-07Q	2	2	3	G14LM22	0.330	0.316	0.274	2.53	1.99
LP2-IL-09Q	2	2	4	G06LM22	0.277	0.0831	1.11	2.52	3.76
LP2-IL-08-1Q	2	2	5	G03LM12	0.377	0.301	0.269	2.48	3.76
LP2-IL-11Q	2	2	6	G04LM22	0.345	0.0823	1.11	2.49	4.16
LP2-IL-12Q	2	2	7	G12LM22	0.344	0.0842	1.10	1.87	3.73
LRM	2	2	8	LRMLM222	0.158	0.0840	<0.100	0.0349	0.661
LP2-IL-07Q	2	2	9	G14LM12	0.337	0.318	0.275	2.5	1.96
LP2-IL-10Q	2	2	10	G13LM12	0.247	0.191	0.526	2.16	2.3
LP2-IL-09Q	2	2	11	G06LM12	0.284	0.0853	1.10	2.46	3.74
LP2-IL-11Q	2	2	12	G04LM12	0.347	0.0769	1.08	2.42	4.05
LP2-IL-10Q	2	2	13	G13LM22	0.272	0.186	0.527	2.21	2.71
LP2-IL-12Q	2	2	14	G12LM12	0.329	0.0839	1.10	1.86	3.72
LRM	2	2	15	LRMLM223	0.162	0.0835	<0.100	0.0351	0.664
LRM	3	1	1	LRMLM311	0.163	0.0882	<0.100	0.0351	0.668
LP2-IL-16Q	3	1	2	G09LM21	0.297	0.192	0.539	2.27	2.76
LP2-IL-15Q	3	1	3	G02LM11	0.401	0.294	1.16	1.96	2.07
LP2-IL-17Q	3	1	4	G15LM11	0.0764	0.377	1.19	2.4	3.42
LP2-IL-15Q	3	1	5	G02LM21	0.402	0.294	1.15	1.96	2.06
LP2-IL-14Q	3	1	6	G16LM21	0.340	0.300	0.272	1.91	3.7
LP2-IL-13Q	3	1	7	G10LM21	0.287	0.0820	0.273	1.98	3.86

Table C-2. LM Elemental Measurements of the LP2-IL Series Glasses, Part 2 (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	P (wt%)	S (wt%)	V (wt%)	Zn (wt%)	Zr (wt%)
LRM	3	1	8	LRMLM312	0.169	0.0848	<0.100	0.0352	0.682
LP2-IL-17Q	3	1	9	G15LM21	0.0866	0.383	1.19	2.39	3.41
LP2-IL-13Q	3	1	10	G10LM11	0.252	0.0771	0.265	1.87	3.18
LP2-IL-16Q	3	1	11	G09LM11	0.257	0.188	0.533	2.26	2.77
LP2-IL-14Q	3	1	12	G16LM11	0.329	0.301	0.268	1.94	3.75
LRM	3	1	13	LRMLM313	0.166	0.0859	<0.100	0.0344	0.671
LRM	3	2	1	LRMLM321	0.161	0.0896	<0.100	0.0347	0.668
LP2-IL-16Q	3	2	2	G09LM22	0.264	0.199	0.539	2.2	2.71
LP2-IL-13Q	3	2	3	G10LM12	0.230	0.0798	0.266	1.87	3.19
LP2-IL-13Q	3	2	4	G10LM22	0.279	0.0806	0.272	1.88	3.79
LP2-IL-16Q	3	2	5	G09LM12	0.259	0.199	0.538	2.14	2.66
LP2-IL-14Q	3	2	6	G16LM22	0.330	0.311	0.274	1.89	3.78
LP2-IL-17Q	3	2	7	G15LM12	0.0696	0.390	1.16	2.37	3.47
LRM	3	2	8	LRMLM322	0.168	0.0860	<0.100	0.0354	0.684
LP2-IL-15Q	3	2	9	G02LM22	0.399	0.299	1.10	1.83	1.97
LP2-IL-15Q	3	2	10	G02LM12	0.410	0.300	1.12	1.93	2.04
LP2-IL-14Q	3	2	11	G16LM12	0.357	0.316	0.277	1.86	3.71
LP2-IL-17Q	3	2	12	G15LM22	0.0751	0.379	1.14	2.31	3.38
LRM	3	2	13	LRMLM323	0.161	0.0892	<0.100	0.0361	0.698

Table C-3. PF Elemental Measurements of the LP2-IL Series Glasses

ID	Block	Sub-Blk	Sequence	Lab ID	Al (wt%)	B (wt%)	Fe (wt%)	Li (wt%)	Si (wt%)	Sn (wt%)
LRM	1	1	1	LRMPF111	5.02	2.45	1.11	<0.100	25.4	<0.100
LP2-IL-06-1Q	1	1	2	G05PF21	5.34	3.64	0.162	<0.100	18.7	0.745
LP2-IL-03Q	1	1	3	G01PF21	4.24	2.64	0.171	<0.100	20.5	2.28
LP2-IL-03Q	1	1	4	G01PF11	4.38	2.68	0.154	<0.100	19.7	2.23
LP2-IL-02Q	1	1	5	G08PF21	3.88	2.46	0.458	<0.100	20.1	2.21
LP2-IL-02Q	1	1	6	G08PF11	3.75	2.43	0.437	<0.100	20.0	2.07
LP2-IL-06-1Q	1	1	7	G05PF11	5.60	3.64	0.150	<0.100	18.1	0.712
LRM	1	1	8	LRMPF112	4.93	2.04	1.00	<0.100	27.3	<0.100
LP2-IL-05Q	1	1	9	G11PF21	3.95	3.74	0.161	<0.100	18.9	2.29
LP2-IL-04Q	1	1	10	G07PF11	3.80	2.41	0.801	<0.100	19.1	2.25
LP2-IL-04Q	1	1	11	G07PF21	3.87	2.59	0.849	<0.100	18.6	2.42
LP2-IL-05Q	1	1	12	G11PF11	3.90	3.63	0.165	<0.100	18.2	2.26
LP2-IL-01Q	1	1	13	G17PF11	3.78	2.39	0.161	<0.100	18.7	0.465
LP2-IL-01Q	1	1	14	G17PF21	3.80	2.43	0.150	<0.100	18.1	0.415
LRM	1	1	15	LRMPF113	5.12	2.29	1.04	<0.100	26.2	<0.100
LRM	1	2	1	LRMPF121	4.83	2.35	1.00	<0.100	26.5	<0.100
LP2-IL-01Q	1	2	2	G17PF12	3.41	2.20	0.153	<0.100	18.2	0.377
LP2-IL-06-1Q	1	2	3	G05PF12	5.51	3.84	0.151	<0.100	18.4	0.587
LP2-IL-06-1Q	1	2	4	G05PF22	5.56	3.92	0.147	<0.100	18.1	0.574
LP2-IL-01Q	1	2	5	G17PF22	3.63	2.46	0.144	<0.100	18.1	0.330
LP2-IL-04Q	1	2	6	G07PF22	3.79	2.56	0.691	<0.100	18.5	1.87
LP2-IL-03Q	1	2	7	G01PF22	4.44	2.83	0.150	<0.100	19.2	1.78
LRM	1	2	8	LRMPF122	4.85	2.26	0.914	<0.100	26.2	<0.100
LP2-IL-05Q	1	2	9	G11PF12	3.49	3.35	0.157	<0.100	17.4	1.84
LP2-IL-05Q	1	2	10	G11PF22	3.58	3.47	0.146	<0.100	17.9	1.82
LP2-IL-03Q	1	2	11	G01PF12	4.03	2.47	0.144	<0.100	19.7	1.81
LP2-IL-02Q	1	2	12	G08PF12	3.88	2.63	0.391	<0.100	19.6	1.84
LP2-IL-04Q	1	2	13	G07PF12	3.81	2.66	0.651	<0.100	18.1	1.76
LP2-IL-02Q	1	2	14	G08PF22	3.89	2.59	0.401	<0.100	19.9	1.81
LRM	1	2	15	LRMPF123	5.09	2.51	0.941	<0.100	26.1	<0.100
LRM	2	1	1	LRMPF211	5.20	2.35	0.931	<0.100	26.2	<0.100
LP2-IL-07Q	2	1	2	G14PF21	3.73	3.34	0.0708	<0.100	19.1	0.251
LP2-IL-09Q	2	1	3	G06PF21	3.81	3.40	0.591	<0.100	17.3	1.49

Table C-3. PF Elemental Measurements of the LP2-IL Series Glasses (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	Al (wt%)	B (wt%)	Fe (wt%)	Li (wt%)	Si (wt%)	Sn (wt%)
LP2-IL-11Q	2	1	4	G04PF21	4.78	2.53	0.659	<0.100	18.3	1.94
LP2-IL-11Q	2	1	5	G04PF11	4.81	2.54	0.665	<0.100	18.4	2.00
LP2-IL-09Q	2	1	6	G06PF11	3.97	3.95	0.689	<0.100	17.4	1.79
LP2-IL-10Q	2	1	7	G13PF11	5.12	3.00	0.374	<0.100	17.3	1.14
LRM	2	1	8	LRMPF212	5.15	2.46	0.991	<0.100	26.9	<0.100
LP2-IL-10Q	2	1	9	G13PF21	4.95	2.97	0.372	<0.100	18.6	1.16
LP2-IL-12Q	2	1	10	G12PF11	3.77	2.32	0.0704	<0.100	21.3	0.337
LP2-IL-12Q	2	1	11	G12PF21	3.65	2.29	0.0752	<0.100	20.8	0.281
LP2-IL-07Q	2	1	12	G14PF11	4.01	3.40	0.0747	<0.100	19.1	0.306
LP2-IL-08-1Q	2	1	13	G03PF11	4.05	2.64	0.696	<0.100	18.9	0.340
LP2-IL-08-1Q	2	1	14	G03PF21	3.91	2.52	0.667	<0.100	19.1	0.265
LRM	2	1	15	LRMPF213	5.17	2.39	0.982	<0.100	26.0	<0.100
LRM	2	2	1	LRMPF221	4.91	2.37	0.934	<0.100	25.4	<0.100
LP2-IL-07Q	2	2	2	G14PF12	3.62	3.99	0.100	<0.100	18.7	0.329
LP2-IL-11Q	2	2	3	G04PF22	4.44	2.67	0.681	<0.100	18.3	1.99
LP2-IL-08-1Q	2	2	4	G03PF22	3.64	2.72	0.703	<0.100	18.4	0.345
LP2-IL-07Q	2	2	5	G14PF22	3.43	4.10	0.0995	<0.100	18.7	0.308
LP2-IL-10Q	2	2	6	G13PF22	4.54	3.25	0.395	<0.100	18.2	1.16
LP2-IL-12Q	2	2	7	G12PF12	3.42	2.67	0.0965	<0.100	20.1	0.346
LRM	2	2	8	LRMPF222	4.98	2.43	0.963	<0.100	25.7	<0.100
LP2-IL-09Q	2	2	9	G06PF12	3.78	3.65	0.639	<0.100	17.0	1.63
LP2-IL-12Q	2	2	10	G12PF22	3.72	2.56	0.0917	<0.100	19.5	0.323
LP2-IL-08-1Q	2	2	11	G03PF12	3.70	2.68	0.697	<0.100	18.2	0.314
LP2-IL-11Q	2	2	12	G04PF12	4.31	2.77	0.710	<0.100	18.0	2.10
LP2-IL-10Q	2	2	13	G13PF12	4.57	3.27	0.402	<0.100	18.2	1.25
LP2-IL-09Q	2	2	14	G06PF22	3.42	4.10	0.705	<0.100	17.9	1.78
LRM	2	2	15	LRMPF223	4.64	2.65	1.03	<0.100	25.8	<0.100
LRM	3	1	1	LRMPF311	4.91	2.32	0.925	<0.100	27.5	<0.100
LP2-IL-16Q	3	1	2	G09PF21	5.04	2.80	0.400	<0.100	18.4	1.16
LP2-IL-16Q	3	1	3	G09PF11	5.07	2.86	0.393	<0.100	18.5	1.14
LP2-IL-13Q	3	1	4	G10PF11	3.82	3.40	0.665	<0.100	20.4	0.341
LP2-IL-15Q	3	1	5	G02PF11	3.73	3.16	0.650	<0.100	20.2	1.84
LP2-IL-17Q	3	1	6	G15PF21	4.47	3.15	0.113	<0.100	19.1	<0.100
LP2-IL-15Q	3	1	7	G02PF21	3.67	3.15	0.647	<0.100	20.5	1.85

Table C-3. PF Elemental Measurements of the LP2-IL Series Glasses (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	Al (wt%)	B (wt%)	Fe (wt%)	Li (wt%)	Si (wt%)	Sn (wt%)
LRM	3	1	8	LRMPF312	4.90	2.24	0.926	<0.100	25.0	<0.100
LP2-IL-14Q	3	1	9	G16PF21	4.35	3.57	0.651	<0.100	18.2	0.383
LP2-IL-14Q	3	1	10	G16PF11	4.21	3.45	0.627	<0.100	18.4	0.374
LP2-IL-17Q	3	1	11	G15PF11	4.44	3.17	0.111	<0.100	20.1	<0.100
LP2-IL-13Q	3	1	12	G10PF21	4.02	3.63	0.706	<0.100	21.2	0.361
LRM	3	1	13	LRMPF313	5.28	2.47	1.01	<0.100	27.4	<0.100
LRM	3	2	1	LRMPF321	4.98	2.38	0.958	<0.100	26.0	<0.100
LP2-IL-14Q	3	2	2	G16PF22	4.34	3.54	0.645	<0.100	17.5	0.343
LP2-IL-17Q	3	2	3	G15PF12	4.77	3.22	0.116	<0.100	19.3	<0.100
LP2-IL-15Q	3	2	4	G02PF12	3.70	3.18	0.650	<0.100	20.2	1.91
LP2-IL-17Q	3	2	5	G15PF22	4.69	3.39	0.123	<0.100	19.3	<0.100
LP2-IL-13Q	3	2	6	G10PF12	3.90	3.49	0.679	<0.100	19.7	0.350
LP2-IL-14Q	3	2	7	G16PF12	4.26	3.48	0.635	<0.100	17.4	0.384
LRM	3	2	8	LRMPF322	4.80	2.23	0.913	<0.100	25.3	<0.100
LP2-IL-16Q	3	2	9	G09PF12	4.64	2.67	0.357	<0.100	17.8	1.05
LP2-IL-13Q	3	2	10	G10PF22	3.58	3.10	0.619	<0.100	19.8	0.304
LP2-IL-15Q	3	2	11	G02PF22	3.85	3.34	0.685	<0.100	20.5	1.99
LP2-IL-16Q	3	2	12	G09PF22	5.26	3.02	0.412	<0.100	18.5	1.19
LRM	3	2	13	LRMPF323	5.27	2.45	1.00	<0.100	26.0	<0.100

Table C-4. KH Elemental Measurements of the LP2-IL Series Glasses

ID	Block	Sub-Blk	Sequence	Lab ID	Cl (wt%)	F (wt%)
LRM	1	1	1	LRMKH111	<0.050	0.850
LP2-IL-02Q	1	1	2	G08KH21	0.117	0.219
LP2-IL-06-1Q	1	1	3	G05KH11	0.219	0.419
LP2-IL-04Q	1	1	4	G07KH11	0.228	0.461
LP2-IL-01Q	1	1	5	G17KH11	0.124	0.222
LP2-IL-03Q	1	1	6	G01KH11	0.262	0.461
LP2-IL-01Q	1	1	7	G17KH21	0.126	0.225
LRM	1	1	8	LRMKH112	<0.050	0.875
LP2-IL-05Q	1	1	9	G11KH21	0.247	0.437
LP2-IL-04Q	1	1	10	G07KH21	0.226	0.453
LP2-IL-02Q	1	1	11	G08KH11	0.115	0.214
LP2-IL-05Q	1	1	12	G11KH11	0.240	0.434
LP2-IL-06-1Q	1	1	13	G05KH21	0.212	0.412
LP2-IL-03Q	1	1	14	G01KH21	0.268	0.459
LRM	1	1	15	LRMKH113	<0.050	0.884
LRM	1	2	1	LRMKH121	<0.050	0.889
LP2-IL-03Q	1	2	2	G01KH22	0.258	0.465
LP2-IL-01Q	1	2	3	G17KH12	0.123	0.223
LP2-IL-06-1Q	1	2	4	G05KH12	0.223	0.436
LP2-IL-03Q	1	2	5	G01KH12	0.258	0.462
LP2-IL-02Q	1	2	6	G08KH22	0.115	0.224
LP2-IL-04Q	1	2	7	G07KH12	0.226	0.471
LRM	1	2	8	LRMKH122	<0.050	0.891
LP2-IL-04Q	1	2	9	G07KH22	0.224	0.461
LP2-IL-01Q	1	2	10	G17KH22	0.124	0.228
LP2-IL-05Q	1	2	11	G11KH22	0.248	0.454
LP2-IL-02Q	1	2	12	G08KH12	0.113	0.218
LP2-IL-05Q	1	2	13	G11KH12	0.241	0.438
LP2-IL-06-1Q	1	2	14	G05KH22	0.218	0.428
LRM	1	2	15	LRMKH123	<0.050	0.891
LRM	2	1	1	LRMKH211	<0.050	0.881
LP2-IL-10Q	2	1	2	G13KH11	0.136	0.272
LP2-IL-07Q	2	1	3	G14KH21	0.268	0.471
LP2-IL-07Q	2	1	4	G14KH11	0.270	0.472
LP2-IL-09Q	2	1	5	G06KH11	0.116	0.224
LP2-IL-09Q	2	1	6	G06KH21	0.117	0.223
LP2-IL-08-1Q	2	1	7	G03KH11	0.203	0.441
LRM	2	1	8	LRMKH212	<0.050	0.880
LP2-IL-12Q	2	1	9	G12KH21	0.251	0.452
LP2-IL-12Q	2	1	10	G12KH11	0.250	0.450
LP2-IL-10Q	2	1	11	G13KH21	0.134	0.263
LP2-IL-08-1Q	2	1	12	G03KH21	0.205	0.443
LP2-IL-11Q	2	1	13	G04KH21	0.206	0.443
LP2-IL-11Q	2	1	14	G04KH11	0.204	0.432
LRM	2	1	15	LRMKH213	<0.050	0.886
LRM	2	2	1	LRMKH221	<0.050	0.888
LP2-IL-10Q	2	2	2	G13KH12	0.140	0.276
LP2-IL-11Q	2	2	3	G04KH22	0.207	0.438
LP2-IL-10Q	2	2	4	G13KH22	0.138	0.266
LP2-IL-12Q	2	2	5	G12KH12	0.256	0.461
LP2-IL-09Q	2	2	6	G06KH22	0.123	0.223
LP2-IL-09Q	2	2	7	G06KH12	0.122	0.223

Table C-4. KH Elemental Measurements of the LP2-IL Series Glasses (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	Cl (wt%)	F (wt%)
LRM	2	2	8	LRMKH222	<0.050	0.884
LP2-IL-08-1Q	2	2	9	G03KH12	0.208	0.445
LP2-IL-11Q	2	2	10	G04KH12	0.208	0.438
LP2-IL-12Q	2	2	11	G12KH22	0.267	0.453
LP2-IL-07Q	2	2	12	G14KH12	0.273	0.463
LP2-IL-07Q	2	2	13	G14KH22	0.270	0.459
LP2-IL-08-1Q	2	2	14	G03KH22	0.207	0.444
LRM	2	2	15	LRMKH223	<0.050	0.885
LRM	3	1	1	LRMKH311	<0.050	0.893
LP2-IL-15Q	3	1	2	G02KH11	0.260	0.431
LP2-IL-13Q	3	1	3	G10KH21	0.128	0.209
LP2-IL-17Q	3	1	4	G15KH11	0.061	0.084
LP2-IL-16Q	3	1	5	G09KH21	0.138	0.261
LP2-IL-17Q	3	1	6	G15KH21	0.062	0.089
LP2-IL-14Q	3	1	7	G16KH21	0.237	0.423
LRM	3	1	8	LRMKH312	<0.050	0.886
LP2-IL-16Q	3	1	9	G09KH11	0.143	0.273
LP2-IL-13Q	3	1	10	G10KH11	0.125	0.200
LP2-IL-14Q	3	1	11	G16KH11	0.260	0.427
LP2-IL-15Q	3	1	12	G02KH21	0.248	0.407
LRM	3	1	13	LRMKH313	<0.050	0.881
LRM	3	2	1	LRMKH321	<0.050	0.893
LP2-IL-16Q	3	2	2	G09KH22	0.137	0.261
LP2-IL-15Q	3	2	3	G02KH22	0.248	0.405
LP2-IL-14Q	3	2	4	G16KH12	0.239	0.425
LP2-IL-15Q	3	2	5	G02KH12	0.260	0.421
LP2-IL-17Q	3	2	6	G15KH12	0.061	0.085
LP2-IL-13Q	3	2	7	G10KH22	0.127	0.201
LRM	3	2	8	LRMKH322	<0.050	0.869
LP2-IL-13Q	3	2	9	G10KH12	0.127	0.199
LP2-IL-16Q	3	2	10	G09KH12	0.138	0.256
LP2-IL-17Q	3	2	11	G15KH22	0.062	0.089
LP2-IL-14Q	3	2	12	G16KH22	0.237	0.414
LRM	3	2	13	LRMKH323	<0.050	0.871

Table C-5. Comparison of Targeted and Measured Glass Compositions

Glass ID	Oxide	BDL (<)	Measured (wt %)	Targeted (wt %)	Difference of Measured versus Targeted	% Difference of Measured versus Targeted
LP2-IL-01Q	Al_2O_3		6.906	7.500	-0.594	-7.9%
LP2-IL-01Q	B_2O_3		7.631	8.000	-0.369	-4.6%
LP2-IL-01Q	CaO		7.877	7.620	0.257	3.4%
LP2-IL-01Q	Cl		0.124	0.170	-0.046	
LP2-IL-01Q	Cr_2O_3		0.520	0.530	-0.010	
LP2-IL-01Q	F		0.225	0.260	-0.035	
LP2-IL-01Q	Fe_2O_3		0.217	0.200	0.017	
LP2-IL-01Q	K_2O		1.985	2.000	-0.015	
LP2-IL-01Q	Li_2O	<	0.215	0.000	0.215	
LP2-IL-01Q	MgO		0.315	0.300	0.015	
LP2-IL-01Q	Na_2O		22.242	23.680	-1.438	-6.1%
LP2-IL-01Q	P_2O_5		0.661	0.560	0.101	
LP2-IL-01Q	SiO_2		39.096	37.980	1.116	2.9%
LP2-IL-01Q	SnO_2		0.504	0.500	0.004	
LP2-IL-01Q	SO_3		0.806	0.800	0.006	
LP2-IL-01Q	V_2O_5		2.008	2.000	0.008	
LP2-IL-01Q	ZnO		2.427	2.400	0.027	
LP2-IL-01Q	ZrO_2		5.096	5.500	-0.404	-7.3%
LP2-IL-01Q	Sum		98.856	100.000	-1.144	-1.1%
LP2-IL-02Q	Al_2O_3		7.275	7.500	-0.225	-3.0%
LP2-IL-02Q	B_2O_3		8.138	8.130	0.008	0.1%
LP2-IL-02Q	CaO		2.305	2.000	0.305	
LP2-IL-02Q	Cl		0.115	0.170	-0.055	
LP2-IL-02Q	Cr_2O_3		0.372	0.380	-0.008	
LP2-IL-02Q	F		0.219	0.260	-0.041	
LP2-IL-02Q	Fe_2O_3		0.603	0.580	0.023	
LP2-IL-02Q	K_2O		1.985	2.000	-0.015	
LP2-IL-02Q	Li_2O	<	0.215	0.000	0.215	
LP2-IL-02Q	MgO		0.979	1.000	-0.021	
LP2-IL-02Q	Na_2O		22.411	23.680	-1.269	-5.4%
LP2-IL-02Q	P_2O_5		0.517	0.560	-0.043	
LP2-IL-02Q	SiO_2		42.572	41.810	0.762	1.8%
LP2-IL-02Q	SnO_2		2.517	2.500	0.017	
LP2-IL-02Q	SO_3		0.792	0.800	-0.008	
LP2-IL-02Q	V_2O_5		0.491	0.500	-0.009	
LP2-IL-02Q	ZnO		2.627	2.630	-0.003	
LP2-IL-02Q	ZrO_2		5.174	5.500	-0.326	-5.9%
LP2-IL-02Q	Sum		99.305	100.000	-0.695	-0.7%
LP2-IL-03Q	Al_2O_3		8.073	8.730	-0.657	-7.5%
LP2-IL-03Q	B_2O_3		8.549	8.730	-0.181	-2.1%
LP2-IL-03Q	CaO		2.337	2.000	0.337	
LP2-IL-03Q	Cl		0.262	0.350	-0.088	
LP2-IL-03Q	Cr_2O_3		0.520	0.530	-0.010	
LP2-IL-03Q	F		0.462	0.530	-0.068	
LP2-IL-03Q	Fe_2O_3		0.221	0.200	0.021	
LP2-IL-03Q	K_2O		0.813	0.760	0.053	
LP2-IL-03Q	Li_2O	<	0.215	0.000	0.215	
LP2-IL-03Q	MgO		0.313	0.300	0.013	
LP2-IL-03Q	Na_2O		22.107	24.500	-2.393	-9.8%
LP2-IL-03Q	P_2O_5		0.828	1.130	-0.302	
LP2-IL-03Q	SiO_2		42.305	40.360	1.945	4.8%
LP2-IL-03Q	SnO_2		2.571	2.500	0.071	
LP2-IL-03Q	SO_3		0.211	0.200	0.011	
LP2-IL-03Q	V_2O_5		0.481	0.500	-0.019	
LP2-IL-03Q	ZnO		3.165	3.200	-0.035	
LP2-IL-03Q	ZrO_2		4.498	5.500	-1.002	-18.2%
LP2-IL-03Q	Sum		97.930	100.020	-2.090	-2.1%
LP2-IL-04Q	Al_2O_3		7.213	7.500	-0.287	-3.8%

Table C-5. Comparison of Targeted and Measured Glass Compositions (continued)

Glass ID	Oxide	BDL (<)	Measured (wt %)	Targeted (wt %)	Difference of Measured versus Targeted	% Difference of Measured versus Targeted
LP2-IL-04Q	B_2O_3		8.227	8.000	0.227	2.8%
LP2-IL-04Q	CaO		7.615	7.490	0.125	1.7%
LP2-IL-04Q	Cl		0.226	0.350	-0.124	
LP2-IL-04Q	Cr_2O_3		0.520	0.530	-0.010	
LP2-IL-04Q	F		0.462	0.530	-0.068	
LP2-IL-04Q	Fe_2O_3		1.069	1.000	0.069	
LP2-IL-04Q	K_2O		1.945	2.000	-0.055	
LP2-IL-04Q	Li_2O	<	0.215	0.000	0.215	
LP2-IL-04Q	MgO		0.985	1.000	-0.015	
LP2-IL-04Q	Na_2O		22.411	23.680	-1.269	-5.4%
LP2-IL-04Q	P_2O_5		0.835	1.130	-0.295	
LP2-IL-04Q	SiO_2		39.737	38.200	1.537	4.0%
LP2-IL-04Q	SnO_2		2.634	2.500	0.134	
LP2-IL-04Q	SO_3		0.229	0.200	0.029	
LP2-IL-04Q	V_2O_5		0.488	0.500	-0.012	
LP2-IL-04Q	ZnO		2.409	2.400	0.009	
LP2-IL-04Q	ZrO_2		2.313	3.000	-0.687	
LP2-IL-04Q	Sum		99.534	100.010	-0.476	-0.5%
LP2-IL-05Q	Al_2O_3		7.048	7.500	-0.452	-6.0%
LP2-IL-05Q	B_2O_3		11.423	12.000	-0.577	-4.8%
LP2-IL-05Q	CaO		7.227	7.030	0.197	2.8%
LP2-IL-05Q	Cl		0.244	0.350	-0.106	
LP2-IL-05Q	Cr_2O_3		0.369	0.380	-0.011	
LP2-IL-05Q	F		0.441	0.530	-0.089	
LP2-IL-05Q	Fe_2O_3		0.225	0.200	0.025	
LP2-IL-05Q	K_2O		0.527	0.500	0.027	
LP2-IL-05Q	Li_2O	<	0.215	0.000	0.215	
LP2-IL-05Q	MgO		0.305	0.300	0.005	
LP2-IL-05Q	Na_2O		20.658	22.000	-1.342	-6.1%
LP2-IL-05Q	P_2O_5		0.749	1.130	-0.381	
LP2-IL-05Q	SiO_2		38.721	37.000	1.721	4.7%
LP2-IL-05Q	SnO_2		2.606	2.500	0.106	
LP2-IL-05Q	SO_3		0.212	0.200	0.012	
LP2-IL-05Q	V_2O_5		0.484	0.500	-0.016	
LP2-IL-05Q	ZnO		2.402	2.400	0.002	
LP2-IL-05Q	ZrO_2		5.140	5.500	-0.360	-6.5%
LP2-IL-05Q	Sum		98.996	100.020	-1.024	-1.0%
LP2-IL-06-1Q	Al_2O_3		10.397	10.680	-0.283	-2.6%
LP2-IL-06-1Q	B_2O_3		12.107	12.000	0.107	0.9%
LP2-IL-06-1Q	CaO		2.295	2.000	0.295	
LP2-IL-06-1Q	Cl		0.218	0.350	-0.132	
LP2-IL-06-1Q	Cr_2O_3		0.524	0.530	-0.006	
LP2-IL-06-1Q	F		0.424	0.530	-0.106	
LP2-IL-06-1Q	Fe_2O_3		0.218	0.200	0.018	
LP2-IL-06-1Q	K_2O		2.003	2.000	0.003	
LP2-IL-06-1Q	Li_2O	<	0.215	0.000	0.215	
LP2-IL-06-1Q	MgO		0.988	1.000	-0.012	
LP2-IL-06-1Q	Na_2O		22.276	22.000	0.276	1.3%
LP2-IL-06-1Q	P_2O_5		0.872	1.130	-0.258	
LP2-IL-06-1Q	SiO_2		39.203	37.000	2.203	6.0%
LP2-IL-06-1Q	SnO_2		0.831	0.820	0.011	
LP2-IL-06-1Q	SO_3		0.782	0.800	-0.018	
LP2-IL-06-1Q	V_2O_5		1.023	1.080	-0.057	
LP2-IL-06-1Q	ZnO		2.353	2.400	-0.047	
LP2-IL-06-1Q	ZrO_2		4.978	5.500	-0.522	-9.5%
LP2-IL-06-1Q	Sum		101.705	100.020	1.685	1.7%
LP2-IL-07Q	Al_2O_3		6.986	7.500	-0.514	-6.9%
LP2-IL-07Q	B_2O_3		11.938	12.000	-0.062	-0.5%
LP2-IL-07Q	CaO		5.369	5.150	0.219	4.3%

Table C-5. Comparison of Targeted and Measured Glass Compositions (continued)

Glass ID	Oxide	BDL (<)	Measured (wt %)	Targeted (wt %)	Difference of Measured versus Targeted	% Difference of Measured versus Targeted
LP2-IL-07Q	Cl		0.270	0.350	-0.080	
LP2-IL-07Q	Cr_2O_3		0.368	0.380	-0.012	
LP2-IL-07Q	F		0.466	0.530	-0.064	
LP2-IL-07Q	Fe_2O_3		0.123	0.200	-0.077	
LP2-IL-07Q	K_2O		1.985	2.000	-0.015	
LP2-IL-07Q	Li_2O	<	0.215	0.000	0.215	
LP2-IL-07Q	MgO		0.963	1.000	-0.037	
LP2-IL-07Q	Na_2O		22.040	22.330	-0.290	-1.3%
LP2-IL-07Q	P_2O_5		0.745	1.130	-0.385	
LP2-IL-07Q	SiO_2		40.433	39.450	0.983	2.5%
LP2-IL-07Q	SnO_2		0.379	0.500	-0.121	
LP2-IL-07Q	SO_3		0.782	0.800	-0.018	
LP2-IL-07Q	V_2O_5		0.486	0.500	-0.014	
LP2-IL-07Q	ZnO		3.124	3.200	-0.076	
LP2-IL-07Q	ZrO_2		2.678	3.000	-0.322	
LP2-IL-07Q	Sum		99.351	100.020	-0.669	-0.7%
LP2-IL-08-1Q	Al_2O_3		7.227	7.500	-0.273	-3.6%
LP2-IL-08-1Q	B_2O_3		8.501	8.000	0.501	6.3%
LP2-IL-08-1Q	CaO		8.108	8.000	0.108	1.4%
LP2-IL-08-1Q	Cl		0.206	0.350	-0.144	
LP2-IL-08-1Q	Cr_2O_3		0.508	0.530	-0.022	
LP2-IL-08-1Q	F		0.443	0.530	-0.087	
LP2-IL-08-1Q	Fe_2O_3		0.988	1.000	-0.012	
LP2-IL-08-1Q	K_2O		0.537	0.500	0.037	
LP2-IL-08-1Q	Li_2O	<	0.215	0.000	0.215	
LP2-IL-08-1Q	MgO		0.973	1.000	-0.027	
LP2-IL-08-1Q	Na_2O		20.928	22.000	-1.072	-4.9%
LP2-IL-08-1Q	P_2O_5		0.866	1.130	-0.264	
LP2-IL-08-1Q	SiO_2		39.898	38.980	0.918	2.4%
LP2-IL-08-1Q	SnO_2		0.401	0.500	-0.099	
LP2-IL-08-1Q	SO_3		0.763	0.800	-0.037	
LP2-IL-08-1Q	V_2O_5		0.483	0.500	-0.017	
LP2-IL-08-1Q	ZnO		3.109	3.200	-0.091	
LP2-IL-08-1Q	ZrO_2		5.022	5.500	-0.478	-8.7%
LP2-IL-08-1Q	Sum		99.176	100.020	-0.844	-0.8%
LP2-IL-09Q	Al_2O_3		7.076	7.500	-0.424	-5.7%
LP2-IL-09Q	B_2O_3		12.155	12.000	0.155	1.3%
LP2-IL-09Q	CaO		2.281	2.000	0.281	
LP2-IL-09Q	Cl		0.120	0.170	-0.050	
LP2-IL-09Q	Cr_2O_3		0.511	0.530	-0.019	
LP2-IL-09Q	F		0.223	0.260	-0.037	
LP2-IL-09Q	Fe_2O_3		0.938	1.000	-0.062	
LP2-IL-09Q	K_2O		0.545	0.500	0.045	
LP2-IL-09Q	Li_2O	<	0.215	0.000	0.215	
LP2-IL-09Q	MgO		0.975	1.000	-0.025	
LP2-IL-09Q	Na_2O		23.489	24.370	-0.881	-3.6%
LP2-IL-09Q	P_2O_5		0.625	0.560	0.065	
LP2-IL-09Q	SiO_2		37.224	37.000	0.224	0.6%
LP2-IL-09Q	SnO_2		2.123	2.200	-0.077	
LP2-IL-09Q	SO_3		0.212	0.200	0.012	
LP2-IL-09Q	V_2O_5		1.999	2.000	-0.001	
LP2-IL-09Q	ZnO		3.128	3.200	-0.072	
LP2-IL-09Q	ZrO_2		5.049	5.500	-0.451	-8.2%
LP2-IL-09Q	Sum		98.887	99.990	-1.103	-1.1%
LP2-IL-10Q	Al_2O_3		9.060	10.000	-0.940	-9.4%
LP2-IL-10Q	B_2O_3		10.054	9.500	0.554	5.8%
LP2-IL-10Q	CaO		5.216	5.000	0.216	4.3%
LP2-IL-10Q	Cl		0.137	0.210	-0.073	
LP2-IL-10Q	Cr_2O_3		0.434	0.450	-0.016	

Table C-5. Comparison of Targeted and Measured Glass Compositions (continued)

Glass ID	Oxide	BDL (<)	Measured (wt %)	Targeted (wt %)	Difference of Measured versus Targeted	% Difference of Measured versus Targeted
LP2-IL-10Q	F		0.269	0.320	-0.051	
LP2-IL-10Q	Fe_2O_3		0.552	0.600	-0.048	
LP2-IL-10Q	K_2O		1.080	1.000	0.080	
LP2-IL-10Q	Li_2O	<	0.215	0.000	0.215	
LP2-IL-10Q	MgO		0.627	0.650	-0.023	
LP2-IL-10Q	Na_2O		21.871	23.000	-1.129	-4.9%
LP2-IL-10Q	P_2O_5		0.603	0.680	-0.077	
LP2-IL-10Q	SiO_2		38.668	38.800	-0.132	-0.3%
LP2-IL-10Q	SnO_2		1.495	1.500	-0.005	
LP2-IL-10Q	SO_3		0.469	0.500	-0.031	
LP2-IL-10Q	V_2O_5		0.939	1.000	-0.061	
LP2-IL-10Q	ZnO		2.739	2.800	-0.061	
LP2-IL-10Q	ZrO_2		3.377	4.000	-0.623	
LP2-IL-10Q	Sum		97.804	100.010	-2.206	-2.2%
LP2-IL-11Q	Al_2O_3		8.663	9.000	-0.337	-3.7%
LP2-IL-11Q	B_2O_3		8.460	8.000	0.460	5.8%
LP2-IL-11Q	CaO		3.337	3.080	0.257	
LP2-IL-11Q	Cl		0.206	0.350	-0.144	
LP2-IL-11Q	Cr_2O_3		0.367	0.380	-0.013	
LP2-IL-11Q	F		0.438	0.530	-0.092	
LP2-IL-11Q	Fe_2O_3		0.970	1.000	-0.030	
LP2-IL-11Q	K_2O		1.930	2.000	-0.070	
LP2-IL-11Q	Li_2O	<	0.215	0.000	0.215	
LP2-IL-11Q	MgO		0.294	0.300	-0.006	
LP2-IL-11Q	Na_2O		21.332	22.000	-0.668	-3.0%
LP2-IL-11Q	P_2O_5		0.770	1.130	-0.360	
LP2-IL-11Q	SiO_2		39.042	38.850	0.192	0.5%
LP2-IL-11Q	SnO_2		2.549	2.500	0.049	
LP2-IL-11Q	SO_3		0.199	0.200	-0.001	
LP2-IL-11Q	V_2O_5		1.986	2.000	-0.014	
LP2-IL-11Q	ZnO		3.090	3.200	-0.110	
LP2-IL-11Q	ZrO_2		5.532	5.500	0.032	0.6%
LP2-IL-11Q	Sum		99.382	100.020	-0.638	-0.6%
LP2-IL-12Q	Al_2O_3		6.878	7.500	-0.622	-8.3%
LP2-IL-12Q	B_2O_3		7.921	8.000	-0.079	-1.0%
LP2-IL-12Q	CaO		3.400	3.120	0.280	
LP2-IL-12Q	Cl		0.256	0.350	-0.094	
LP2-IL-12Q	Cr_2O_3		0.366	0.380	-0.014	
LP2-IL-12Q	F		0.454	0.530	-0.076	
LP2-IL-12Q	Fe_2O_3		0.119	0.200	-0.081	
LP2-IL-12Q	K_2O		0.528	0.500	0.028	
LP2-IL-12Q	Li_2O	<	0.215	0.000	0.215	
LP2-IL-12Q	MgO		0.966	1.000	-0.034	
LP2-IL-12Q	Na_2O		22.545	23.790	-1.245	-5.2%
LP2-IL-12Q	P_2O_5		0.754	1.130	-0.376	
LP2-IL-12Q	SiO_2		43.695	42.920	0.775	1.8%
LP2-IL-12Q	SnO_2		0.408	0.500	-0.092	
LP2-IL-12Q	SO_3		0.206	0.200	0.006	
LP2-IL-12Q	V_2O_5		1.999	2.000	-0.001	
LP2-IL-12Q	ZnO		2.365	2.400	-0.035	
LP2-IL-12Q	ZrO_2		5.035	5.500	-0.465	-8.5%
LP2-IL-12Q	Sum		98.112	100.020	-1.908	-1.9%
LP2-IL-13Q	Al_2O_3		7.237	7.500	-0.263	-3.5%
LP2-IL-13Q	B_2O_3		10.964	11.260	-0.296	-2.6%
LP2-IL-13Q	CaO		2.575	2.320	0.255	
LP2-IL-13Q	Cl		0.127	0.170	-0.043	
LP2-IL-13Q	Cr_2O_3		0.509	0.530	-0.021	
LP2-IL-13Q	F		0.202	0.260	-0.058	
LP2-IL-13Q	Fe_2O_3		0.954	1.000	-0.046	

Table C-5. Comparison of Targeted and Measured Glass Compositions (continued)

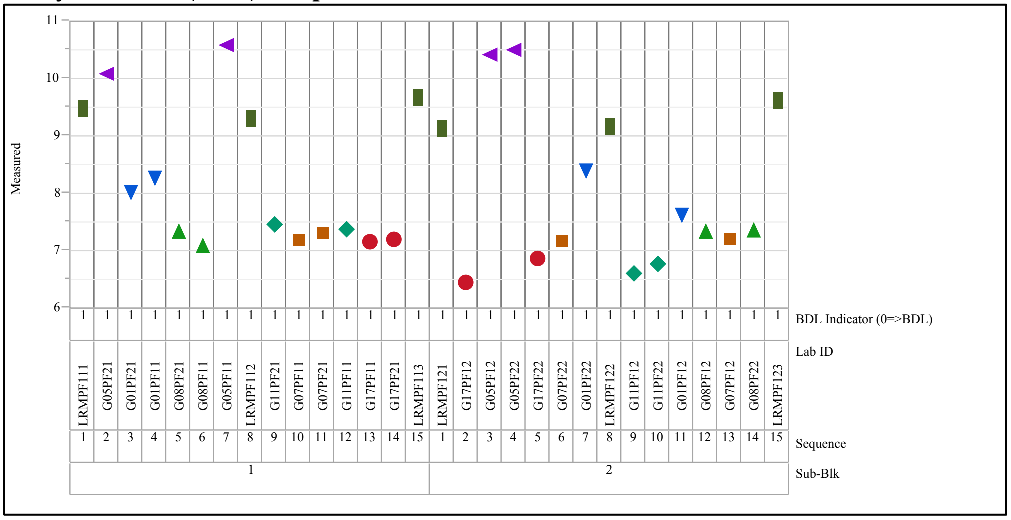
Glass ID	Oxide	BDL (<)	Measured (wt %)	Targeted (wt %)	Difference of Measured versus Targeted	% Difference of Measured versus Targeted
LP2-IL-13Q	K_2O		1.927	2.000	-0.073	
LP2-IL-13Q	Li_2O	<	0.215	0.000	0.215	
LP2-IL-13Q	MgO		0.291	0.300	-0.009	
LP2-IL-13Q	Na_2O		21.433	22.000	-0.567	-2.6%
LP2-IL-13Q	P_2O_5		0.600	0.560	0.040	
LP2-IL-13Q	SiO_2		43.374	43.000	0.374	0.9%
LP2-IL-13Q	SnO_2		0.430	0.500	-0.070	
LP2-IL-13Q	SO_3		0.199	0.200	-0.001	
LP2-IL-13Q	V_2O_5		0.480	0.500	-0.020	
LP2-IL-13Q	ZnO		2.365	2.400	-0.035	
LP2-IL-13Q	ZrO_2		4.735	5.500	-0.765	-13.9%
LP2-IL-13Q	Sum		98.618	100.000	-1.382	-1.4%
LP2-IL-14Q	Al_2O_3		8.106	8.800	-0.694	-7.9%
LP2-IL-14Q	B_2O_3		11.302	12.000	-0.698	-5.8%
LP2-IL-14Q	CaO		4.117	3.830	0.287	
LP2-IL-14Q	Cl		0.243	0.350	-0.107	
LP2-IL-14Q	Cr_2O_3		0.365	0.380	-0.015	
LP2-IL-14Q	F		0.422	0.530	-0.108	
LP2-IL-14Q	Fe_2O_3		0.914	1.000	-0.086	
LP2-IL-14Q	K_2O		0.541	0.500	0.041	
LP2-IL-14Q	Li_2O	<	0.215	0.000	0.215	
LP2-IL-14Q	MgO		0.297	0.300	-0.003	
LP2-IL-14Q	Na_2O		23.489	24.500	-1.011	-4.1%
LP2-IL-14Q	P_2O_5		0.777	1.130	-0.353	
LP2-IL-14Q	SiO_2		38.240	37.000	1.240	3.4%
LP2-IL-14Q	SnO_2		0.471	0.500	-0.029	
LP2-IL-14Q	SO_3		0.767	0.800	-0.033	
LP2-IL-14Q	V_2O_5		0.487	0.500	-0.013	
LP2-IL-14Q	ZnO		2.365	2.400	-0.035	
LP2-IL-14Q	ZrO_2		5.045	5.500	-0.455	-8.3%
LP2-IL-14Q	Sum		98.164	100.020	-1.856	-1.9%
LP2-IL-15Q	Al_2O_3		7.062	7.500	-0.438	-5.8%
LP2-IL-15Q	B_2O_3		10.328	10.750	-0.422	-3.9%
LP2-IL-15Q	CaO		2.176	2.000	0.176	
LP2-IL-15Q	Cl		0.254	0.350	-0.096	
LP2-IL-15Q	Cr_2O_3		0.519	0.530	-0.011	
LP2-IL-15Q	F		0.416	0.530	-0.114	
LP2-IL-15Q	Fe_2O_3		0.941	1.000	-0.059	
LP2-IL-15Q	K_2O		0.542	0.500	0.042	
LP2-IL-15Q	Li_2O	<	0.215	0.000	0.215	
LP2-IL-15Q	MgO		0.299	0.300	-0.001	
LP2-IL-15Q	Na_2O		21.130	22.000	-0.870	-4.0%
LP2-IL-15Q	P_2O_5		0.923	1.130	-0.207	
LP2-IL-15Q	SiO_2		43.535	42.720	0.815	1.9%
LP2-IL-15Q	SnO_2		2.409	2.500	-0.091	
LP2-IL-15Q	SO_3		0.741	0.800	-0.059	
LP2-IL-15Q	V_2O_5		2.022	2.000	0.022	
LP2-IL-15Q	ZnO		2.390	2.400	-0.010	
LP2-IL-15Q	ZrO_2		2.749	3.000	-0.251	
LP2-IL-15Q	Sum		98.650	100.010	-1.360	-1.4%
LP2-IL-16Q	Al_2O_3		9.452	10.000	-0.548	-5.5%
LP2-IL-16Q	B_2O_3		9.136	9.500	-0.364	-3.8%
LP2-IL-16Q	CaO		5.271	5.000	0.271	5.4%
LP2-IL-16Q	Cl		0.139	0.210	-0.071	
LP2-IL-16Q	Cr_2O_3		0.439	0.450	-0.011	
LP2-IL-16Q	F		0.263	0.320	-0.057	
LP2-IL-16Q	Fe_2O_3		0.558	0.600	-0.042	
LP2-IL-16Q	K_2O		1.087	1.000	0.087	
LP2-IL-16Q	Li_2O	<	0.215	0.000	0.215	

Table C-5. Comparison of Targeted and Measured Glass Compositions (continued)

Glass ID	Oxide	BDL (<)	Measured (wt %)	Targeted (wt %)	Difference of Measured versus Targeted	% Difference of Measured versus Targeted
LP2-IL-16Q	MgO		0.641	0.650	-0.009	
LP2-IL-16Q	Na_2O		22.478	23.000	-0.522	-2.3%
LP2-IL-16Q	P_2O_5		0.617	0.680	-0.063	
LP2-IL-16Q	SiO_2		39.149	38.800	0.349	0.9%
LP2-IL-16Q	SnO_2		1.441	1.500	-0.059	
LP2-IL-16Q	SO_3		0.486	0.500	-0.014	
LP2-IL-16Q	V_2O_5		0.959	1.000	-0.041	
LP2-IL-16Q	ZnO		2.760	2.800	-0.040	
LP2-IL-16Q	ZrO_2		3.681	4.000	-0.319	
LP2-IL-16Q	Sum		98.774	100.010	-1.236	-1.2%
LP2-IL-17Q	Al_2O_3		8.678	9.230	-0.552	-6.0%
LP2-IL-17Q	B_2O_3		10.408	11.000	-0.592	-5.4%
LP2-IL-17Q	CaO		2.753	2.500	0.253	
LP2-IL-17Q	Cl		0.062	0.070	-0.008	
LP2-IL-17Q	Cr_2O_3		0.087	0.080	0.007	
LP2-IL-17Q	F		0.087	0.110	-0.023	
LP2-IL-17Q	Fe_2O_3		0.165	0.200	-0.035	
LP2-IL-17Q	K_2O		0.558	0.500	0.058	
LP2-IL-17Q	Li_2O	<	0.215	0.000	0.215	
LP2-IL-17Q	MgO		0.970	1.000	-0.030	
LP2-IL-17Q	Na_2O		22.714	23.000	-0.286	-1.2%
LP2-IL-17Q	P_2O_5		0.176	0.240	-0.064	
LP2-IL-17Q	SiO_2		41.609	40.940	0.669	1.6%
LP2-IL-17Q	SnO_2	<	0.127	0.000	0.127	
LP2-IL-17Q	SO_3		0.954	1.000	-0.046	
LP2-IL-17Q	V_2O_5		2.089	2.100	-0.011	
LP2-IL-17Q	ZnO		2.947	3.000	-0.053	
LP2-IL-17Q	ZrO_2		4.620	5.030	-0.410	-8.2%
LP2-IL-17Q	Sum		99.219	100.000	-0.781	-0.8%
LRM	Al_2O_3		9.451	9.510	-0.059	-0.6%
LRM	B_2O_3		7.628	7.850	-0.222	-2.8%
LRM	CaO		0.523	0.540	-0.017	
LRM	Cl	<	0.050	0.000	0.050	
LRM	Cr_2O_3		0.205	0.190	0.015	
LRM	F		0.882	0.860	0.022	
LRM	Fe_2O_3		1.395	1.380	0.015	
LRM	K_2O		1.488	1.480	0.008	
LRM	Li_2O	<	0.215	0.110	0.105	
LRM	MgO		0.127	0.100	0.027	
LRM	Na_2O		20.055	20.030	0.025	0.1%
LRM	P_2O_5		0.366	0.540	-0.174	
LRM	SiO_2		55.966	54.200	1.766	3.3%
LRM	SnO_2	<	0.127	0.000	0.127	
LRM	SO_3		0.217	0.300	-0.083	
LRM	V_2O_5	<	0.179	0.000	0.179	
LRM	ZnO		0.045	0.000	0.045	
LRM	ZrO_2		0.906	0.930	-0.024	
LRM	Sum		99.823	98.020	1.803	1.8%

Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence

Analyte=Al2O3 (wt%), Prep Method=PF, Block=1



Analyte=Al2O3 (wt%), Prep Method=PF, Block=2

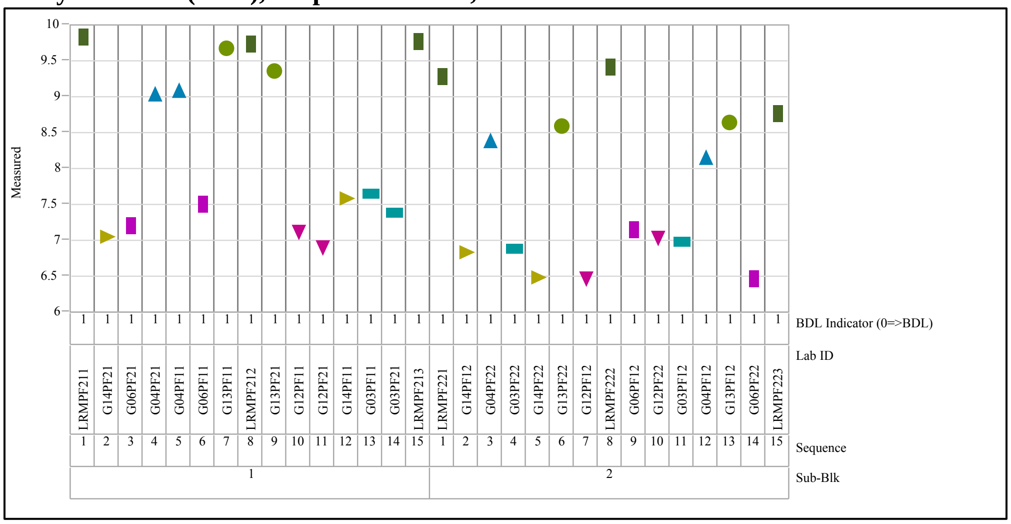
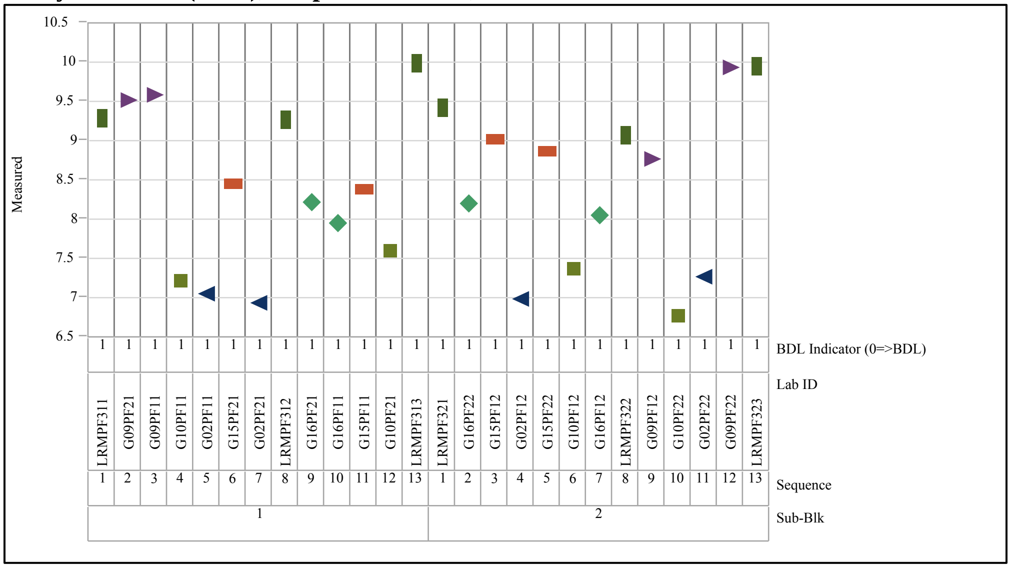


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Al2O3 (wt%), Prep Method=PF, Block=3



Analyte=B2O3 (wt%), Prep Method=PF, Block=1

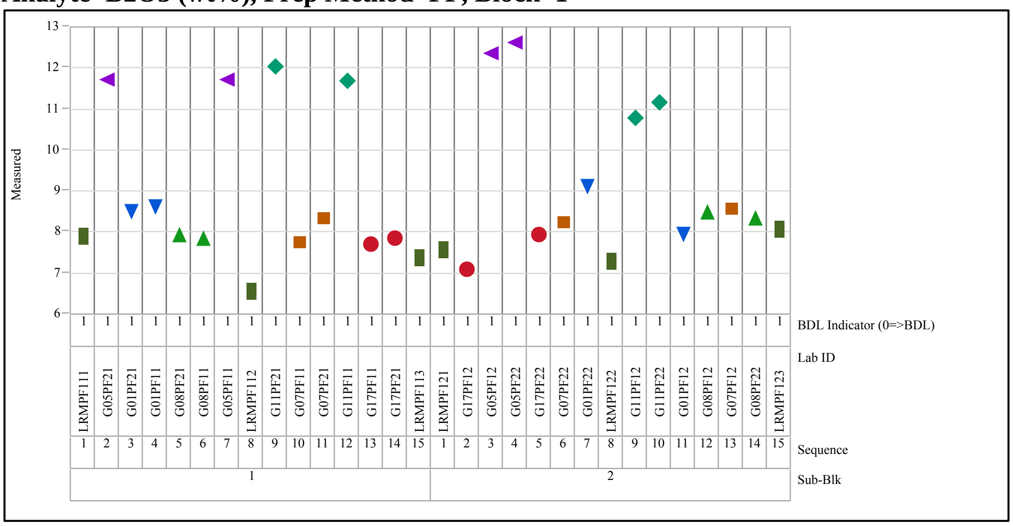
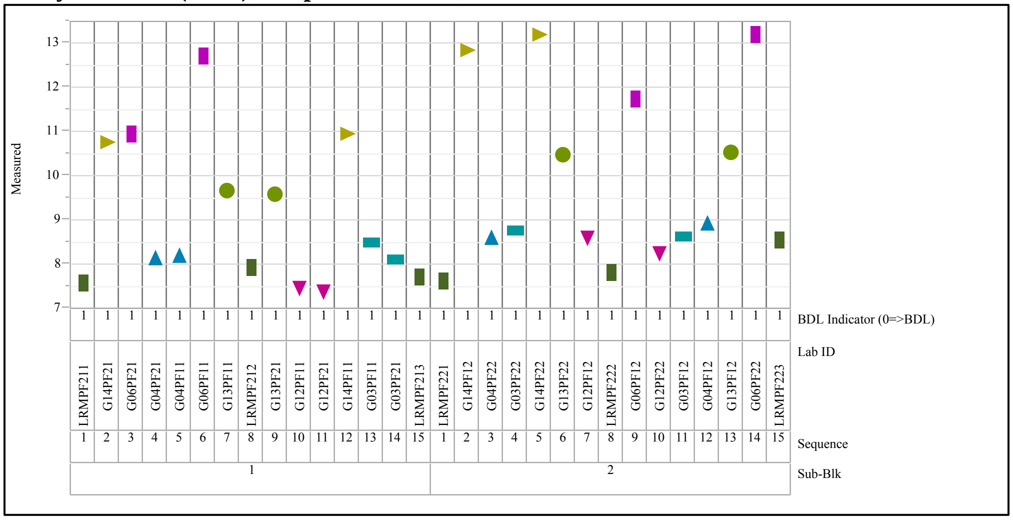


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=B2O3 (wt%), Prep Method=PF, Block=2



Analyte=B2O3 (wt%), Prep Method=PF, Block=3

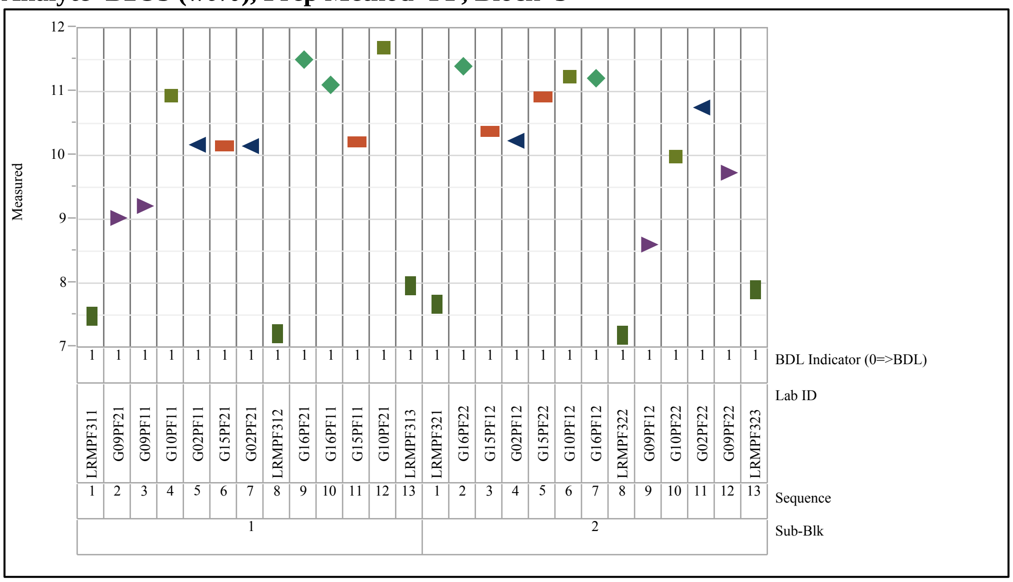
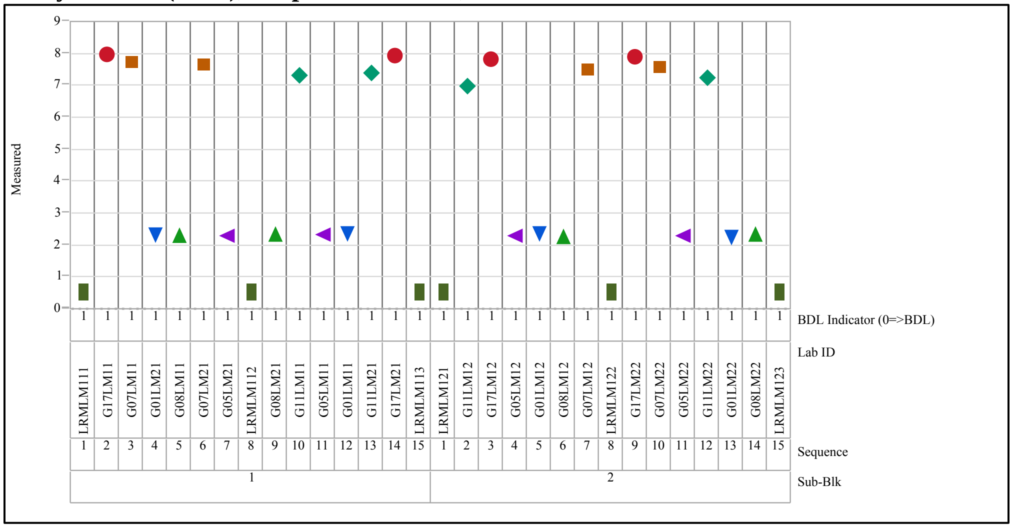


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=CaO (wt%), Prep Method=LM, Block=1



Analyte=CaO (wt%), Prep Method=LM, Block=2

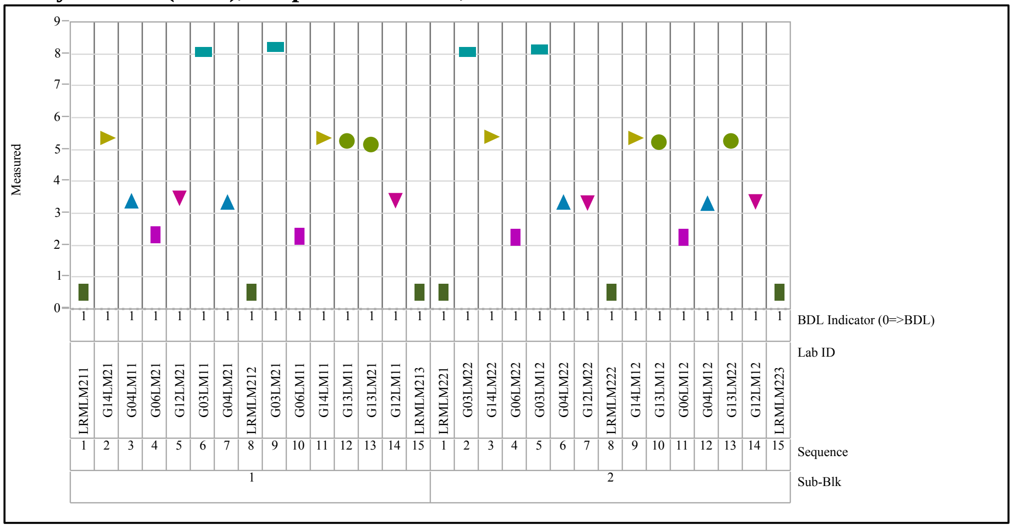
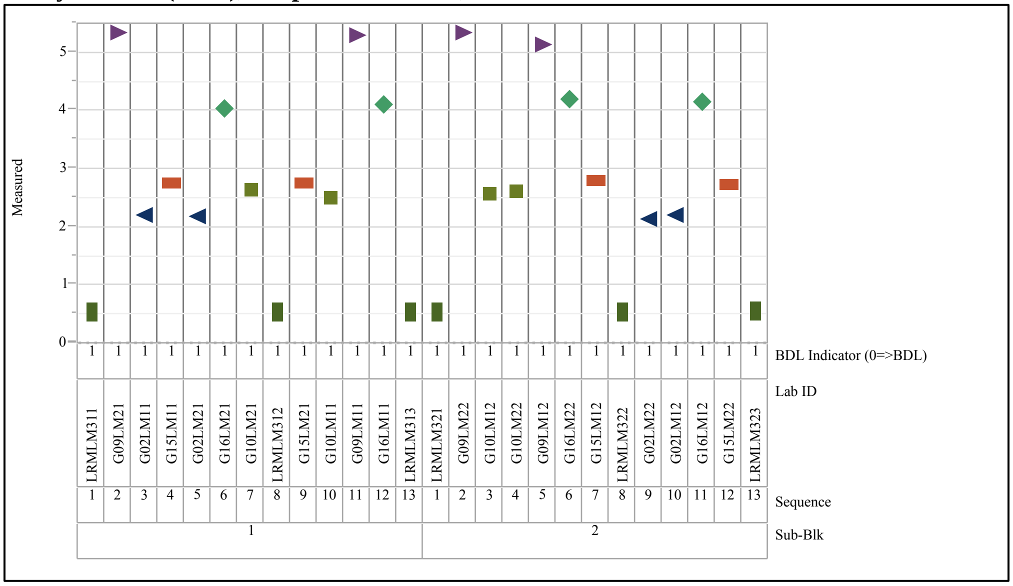


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=CaO (wt%), Prep Method=LM, Block=3



Analyte=Cl (wt%), Prep Method=KH, Block=1

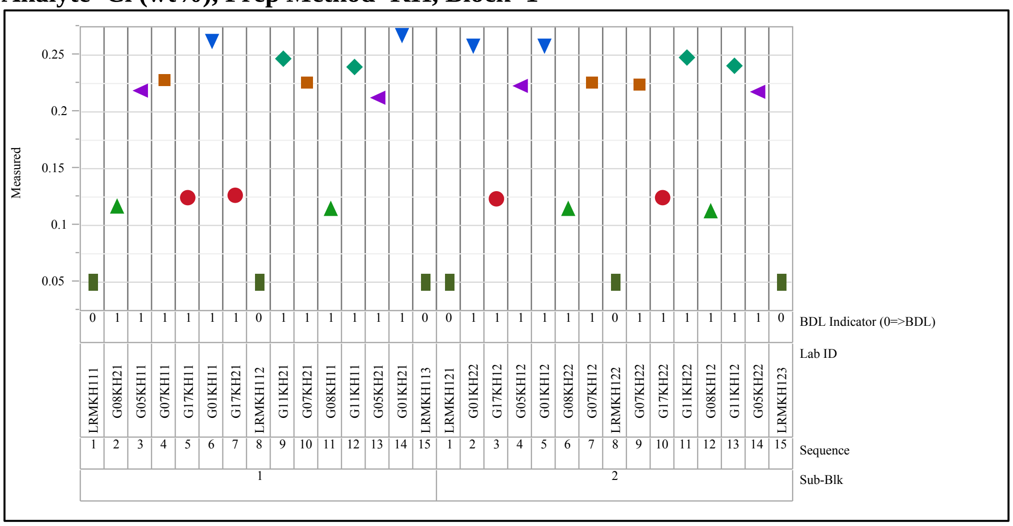
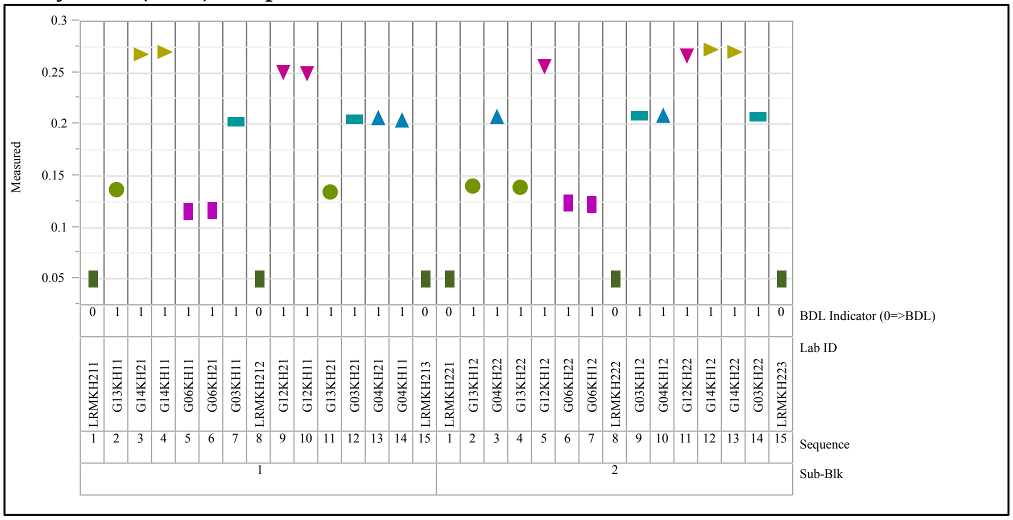


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Cl (wt%), Prep Method=KH, Block=2



Analyte=Cl (wt%), Prep Method=KH, Block=3

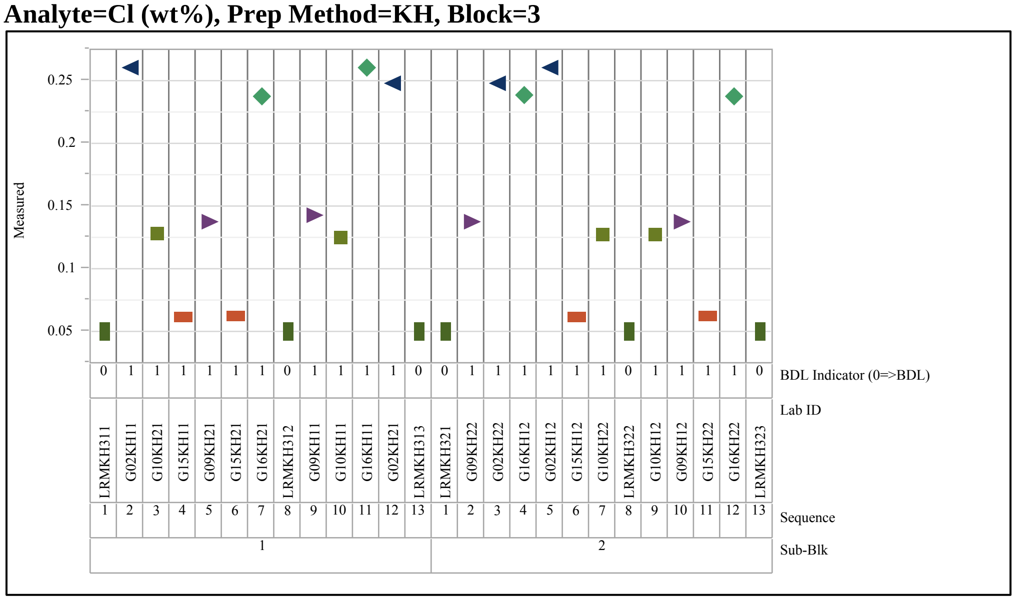
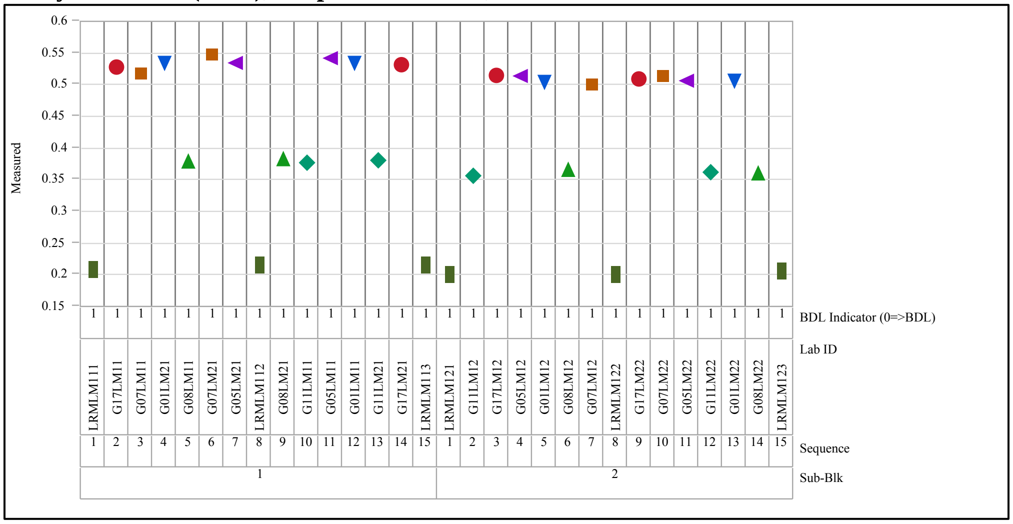


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Cr2O3 (wt%), Prep Method=LM, Block=1



Analyte=Cr2O3 (wt%), Prep Method=LM, Block=2

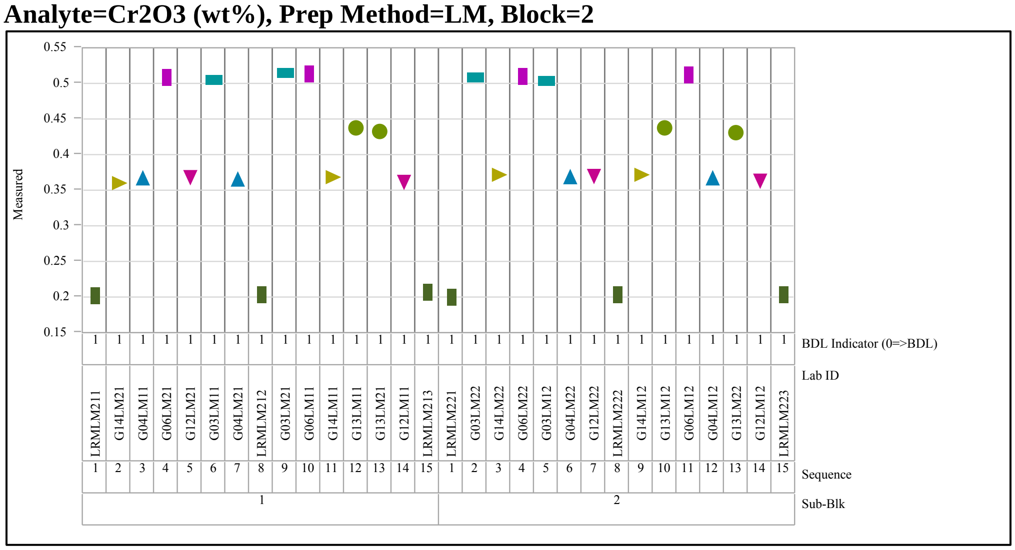
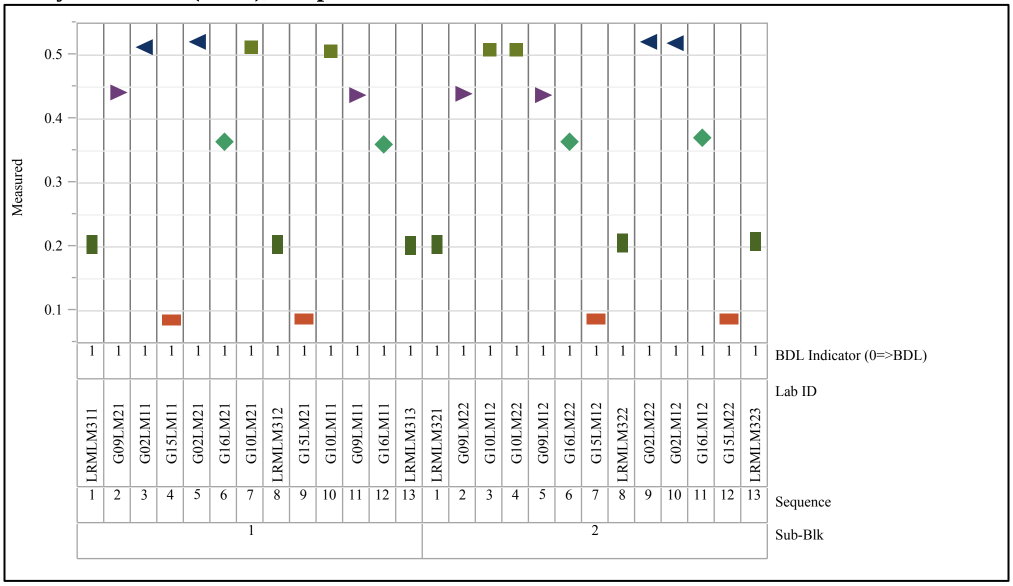


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Cr2O3 (wt%), Prep Method=LM, Block=3



Analyte=F (wt%), Prep Method=KH, Block=1

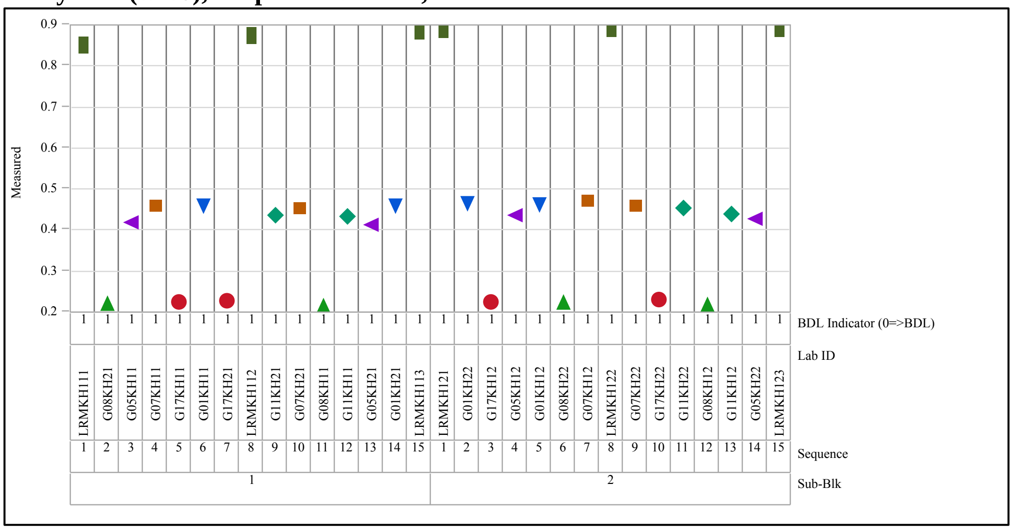
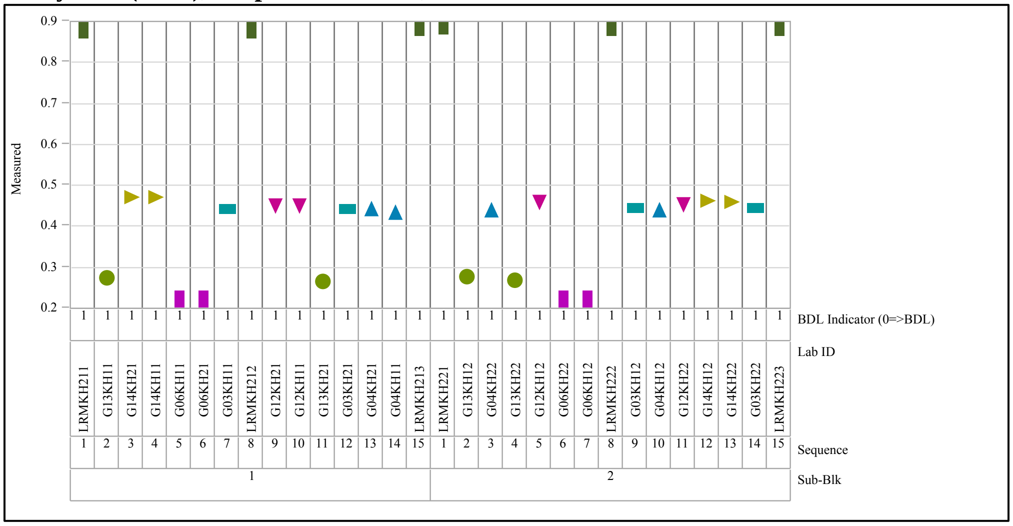


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=F (wt%), Prep Method=KH, Block=2



Analyte=F (wt%), Prep Method=KH, Block=3

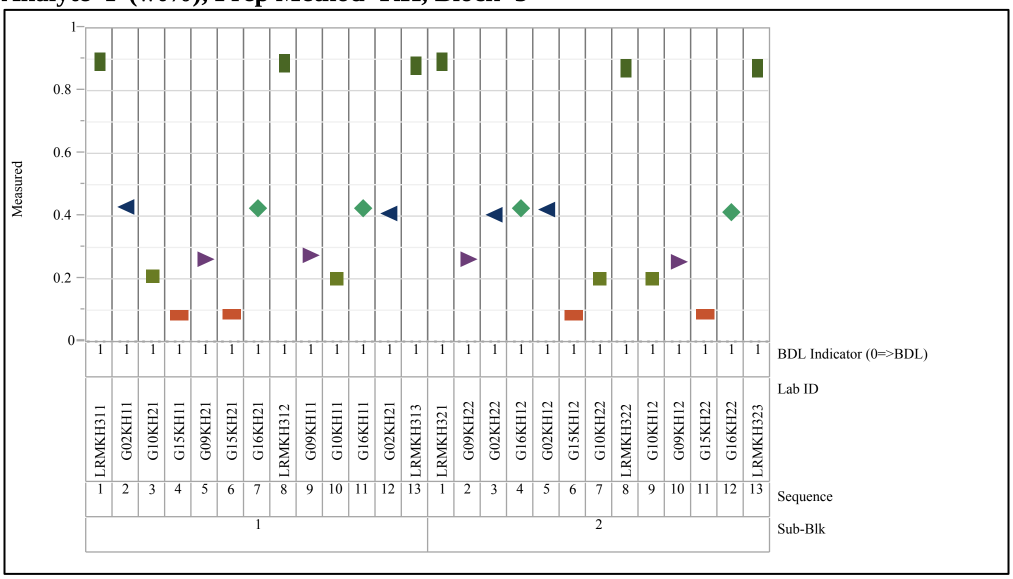
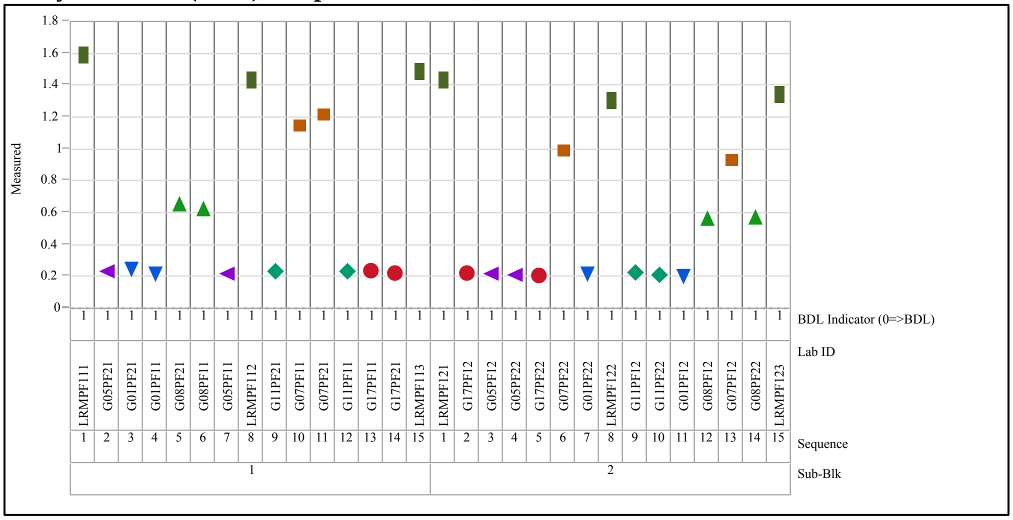


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Fe2O3 (wt%), Prep Method=PF, Block=1



Analyte=Fe2O3 (wt%), Prep Method=PF, Block=2

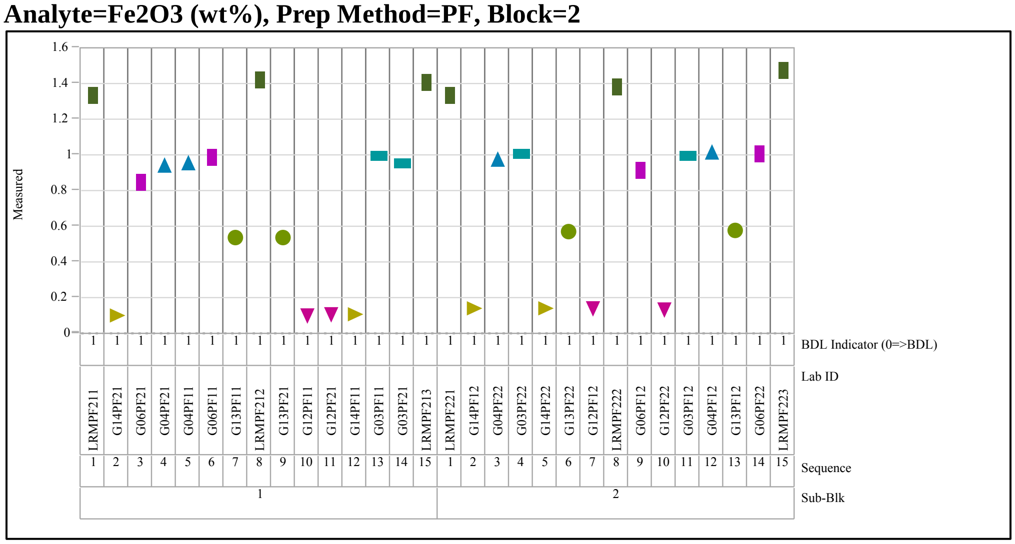
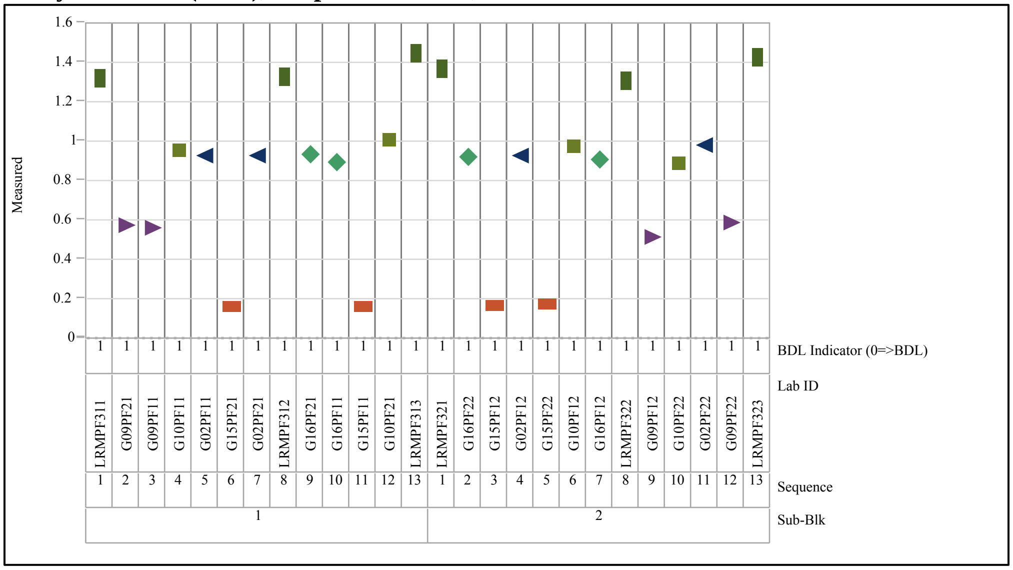


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Fe2O3 (wt%), Prep Method=PF, Block=3



Analyte=K2O (wt%), Prep Method=LM, Block=1

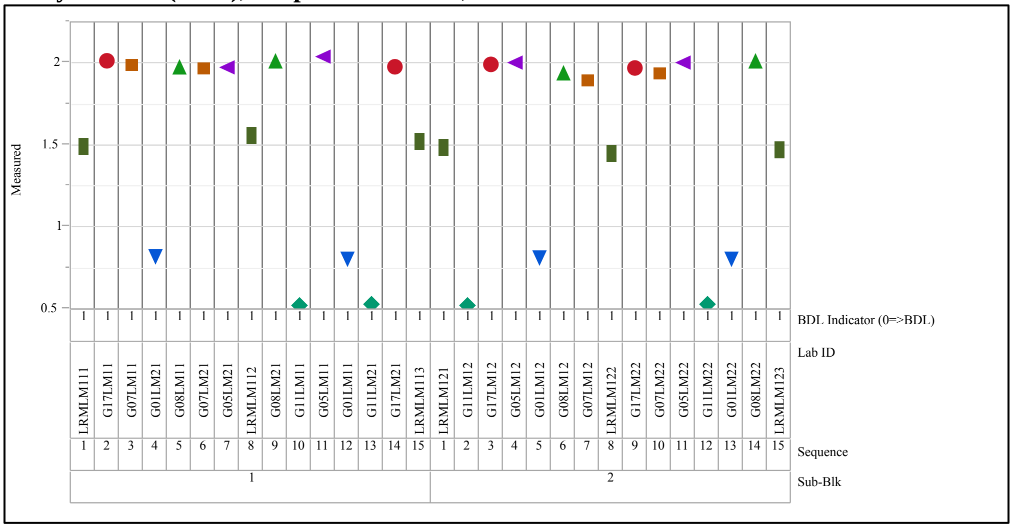
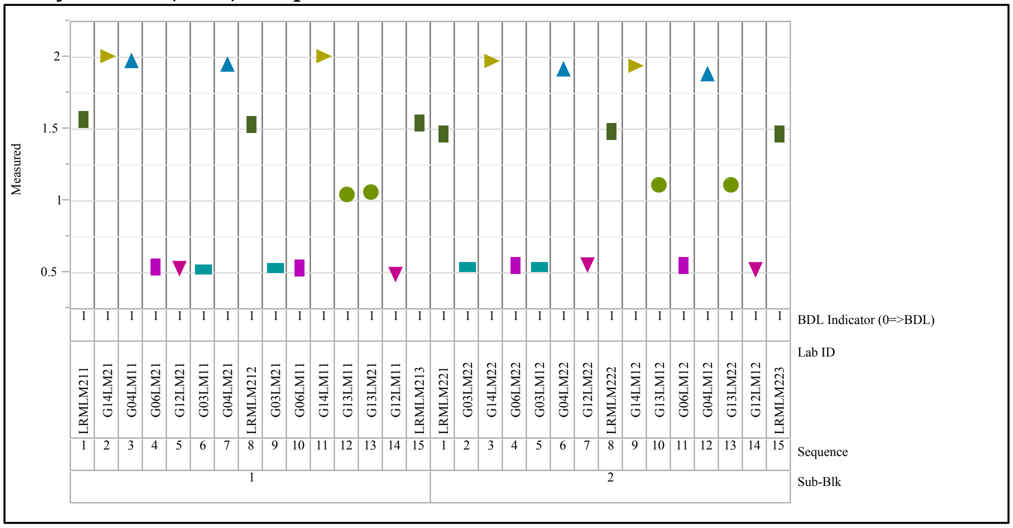


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=K2O (wt%), Prep Method=LM, Block=2



Analyte=K2O (wt%), Prep Method=LM, Block=3

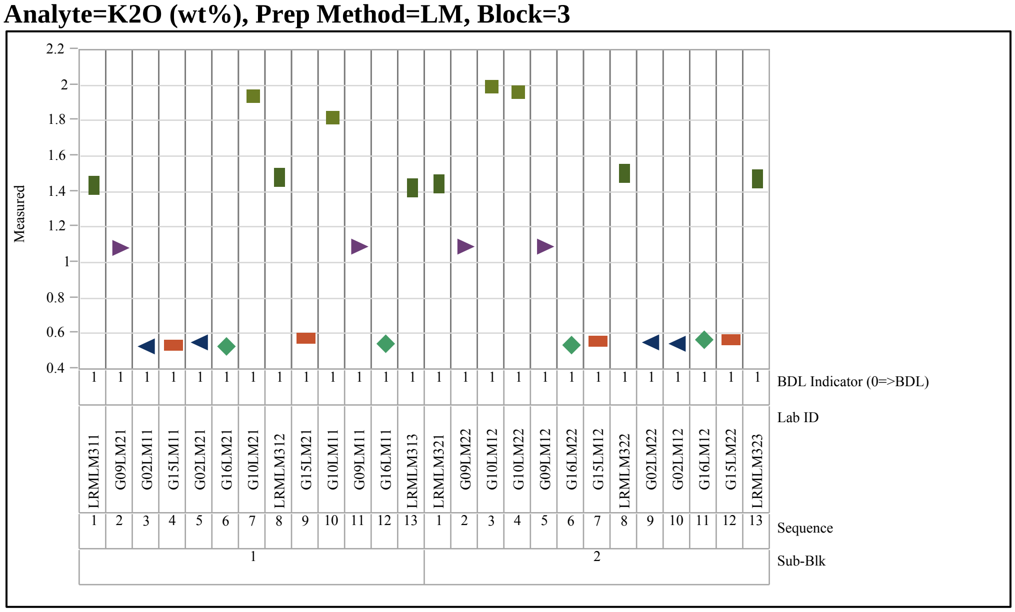
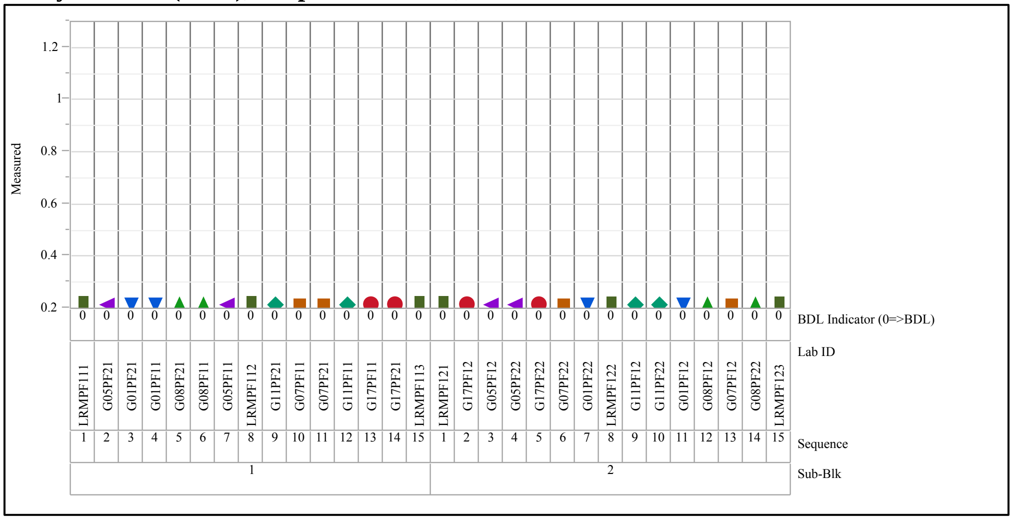


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Li2O (wt%), Prep Method=PF, Block=1



Analyte=Li2O (wt%), Prep Method=PF, Block=2

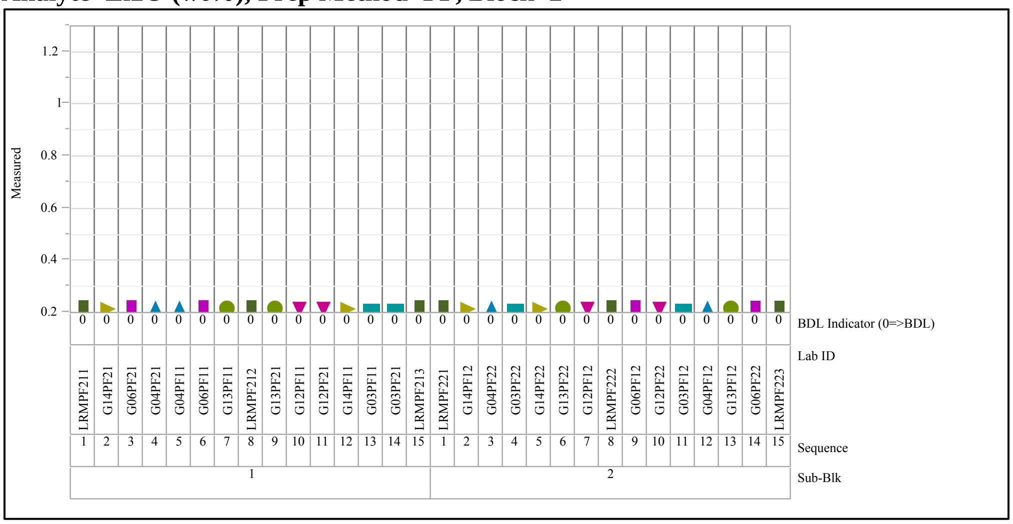
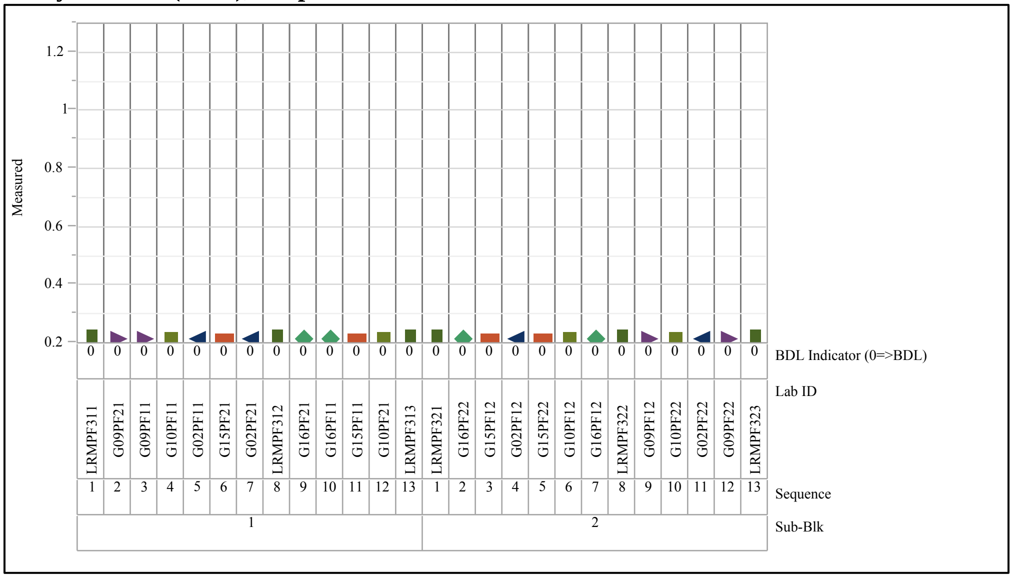


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Li2O (wt%), Prep Method=PF, Block=3



Analyte=MgO (wt%), Prep Method=LM, Block=1

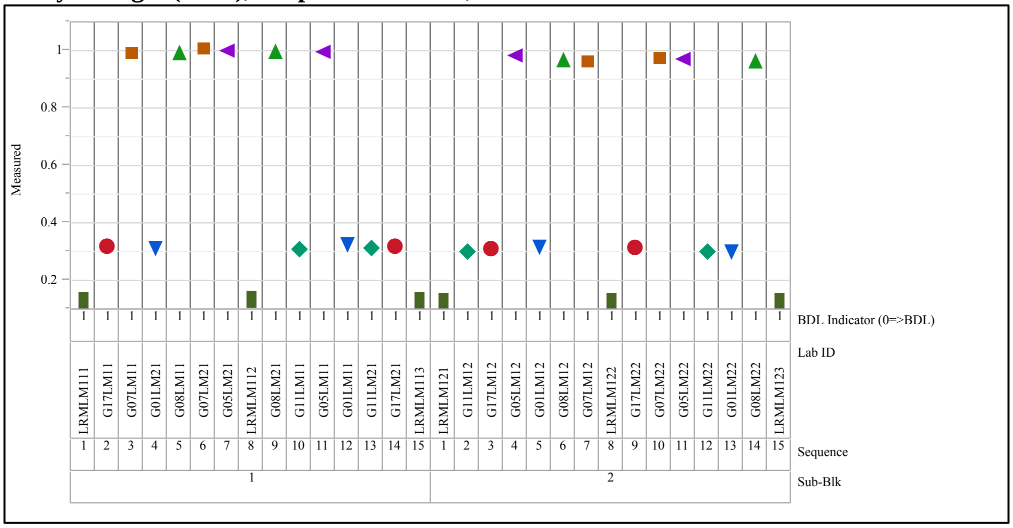
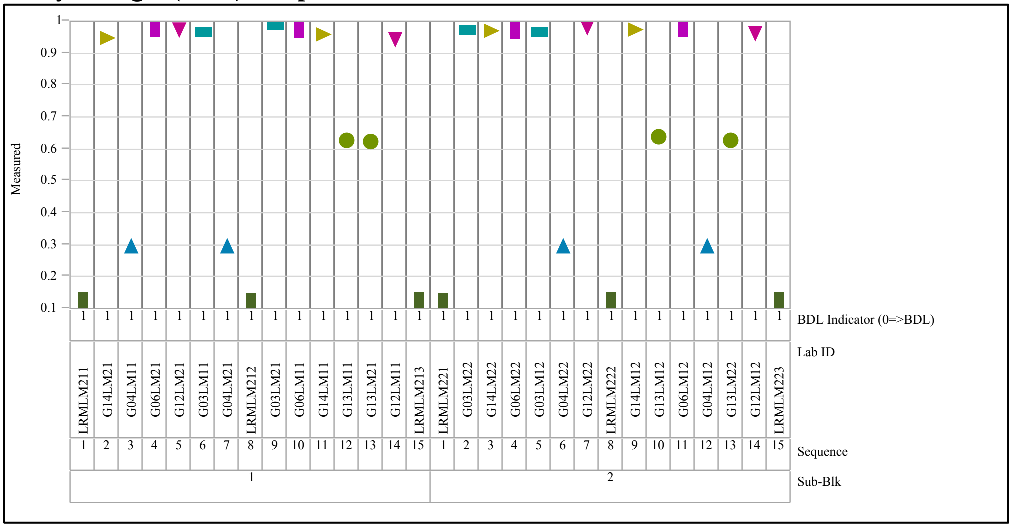


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=MgO (wt%), Prep Method=LM, Block=2



Analyte=MgO (wt%), Prep Method=LM, Block=3

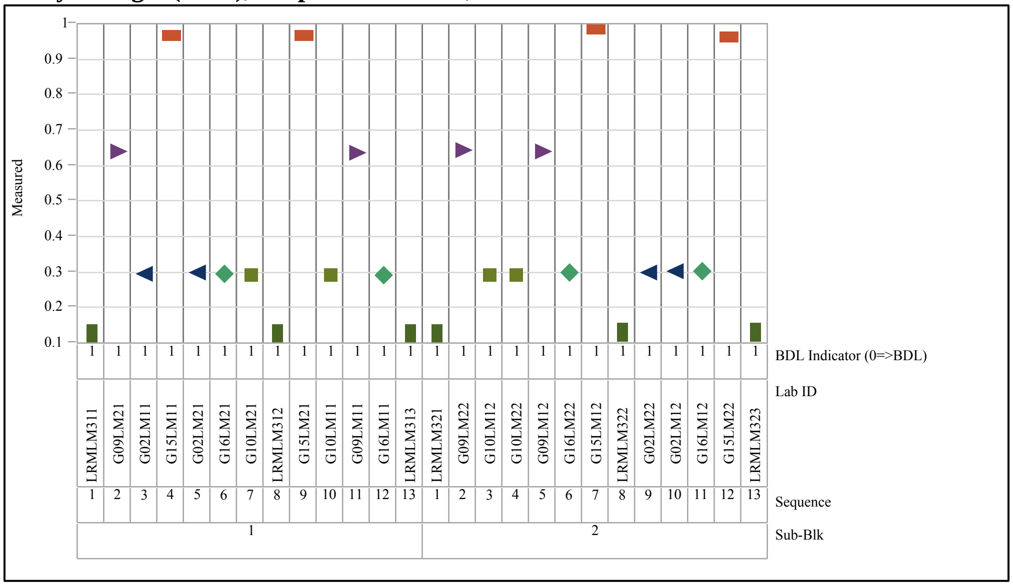
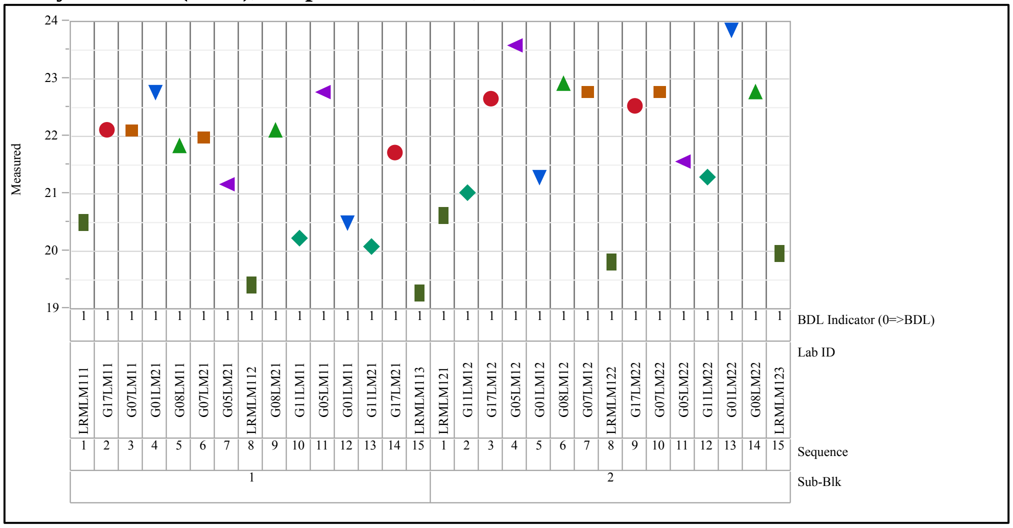


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Na2O (wt%), Prep Method=LM, Block=1



Analyte=Na2O (wt%), Prep Method=LM, Block=2

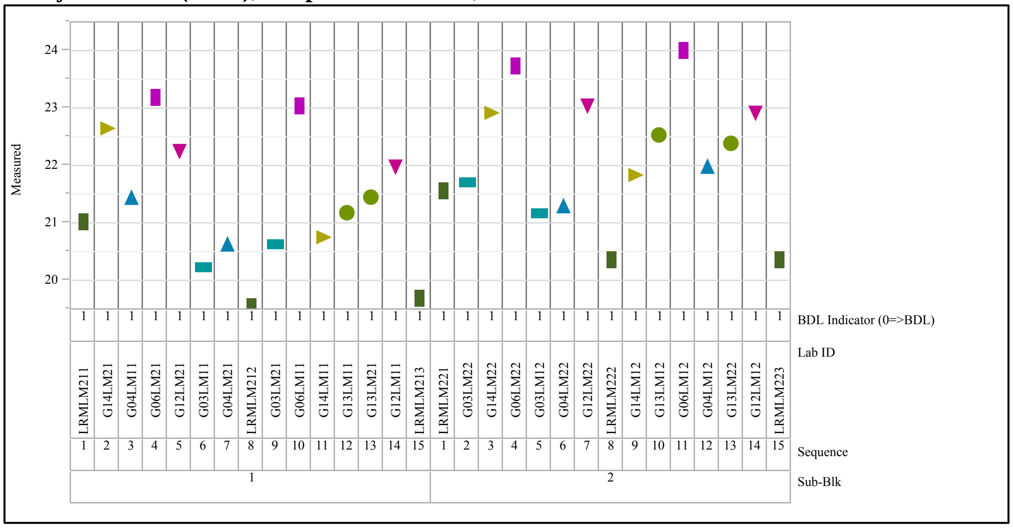
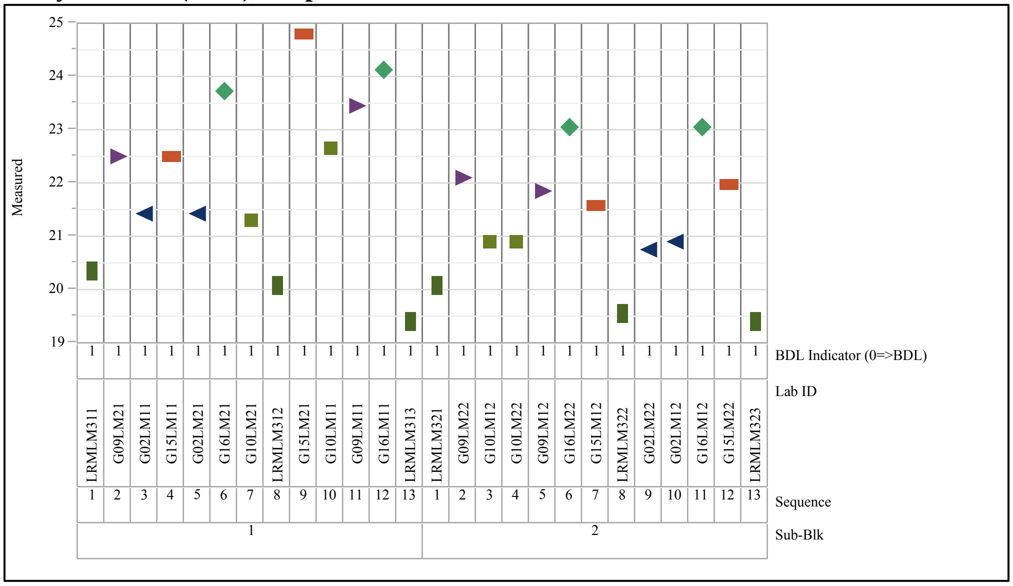


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Na2O (wt%), Prep Method=LM, Block=3



Analyte=P2O5 (wt%), Prep Method=LM, Block=1

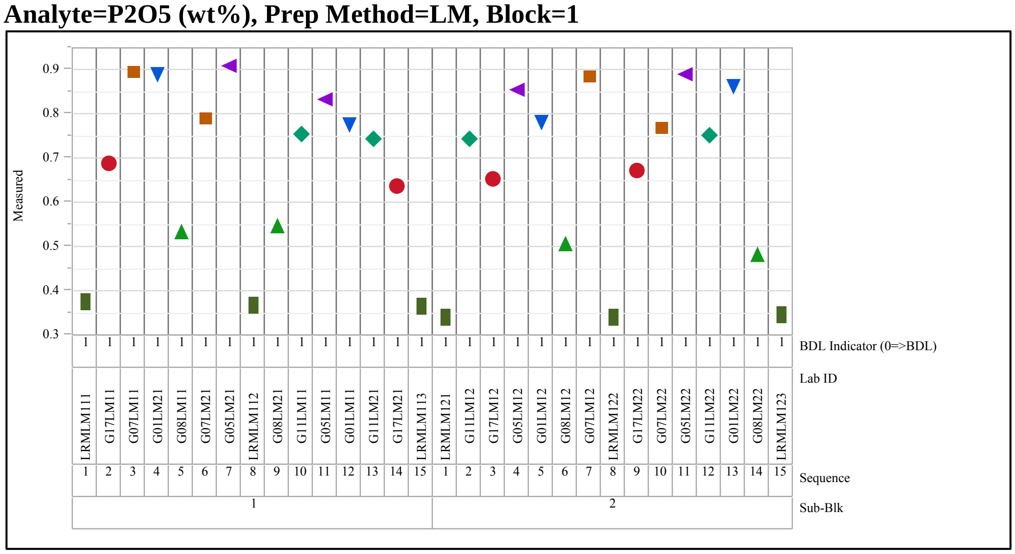
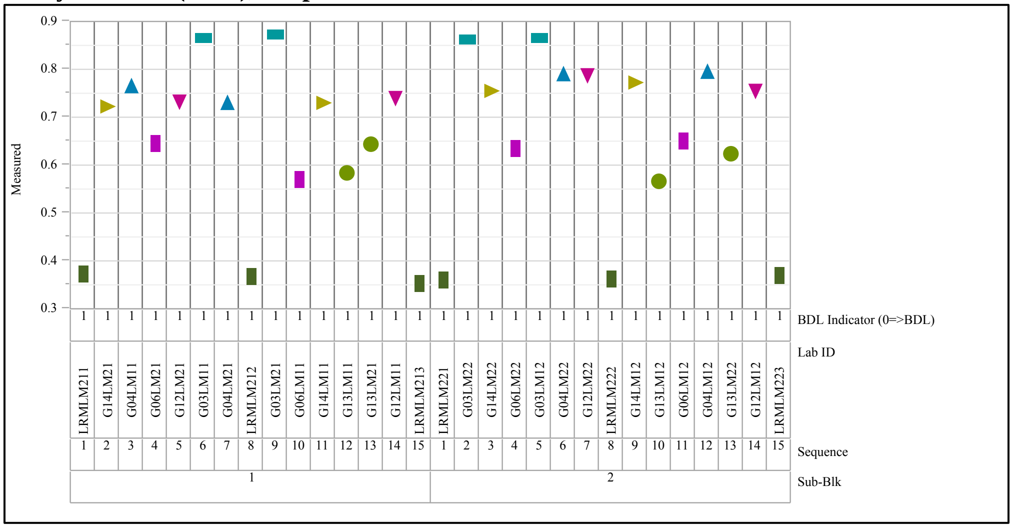


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=P2O5 (wt%), Prep Method=LM, Block=2



Analyte=P2O5 (wt%), Prep Method=LM, Block=3

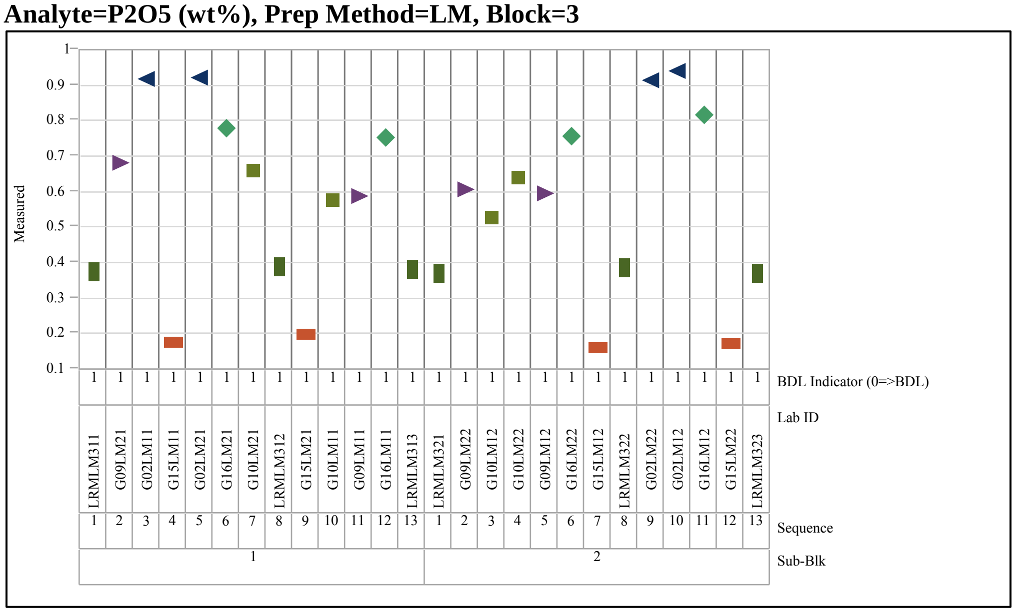
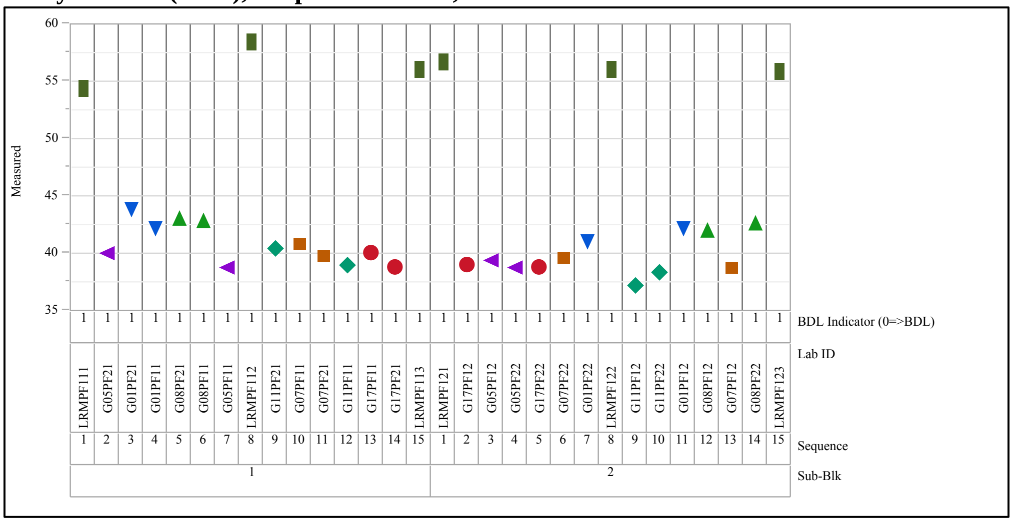


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=SiO2 (wt%), Prep Method=PF, Block=1



Analyte=SiO2 (wt%), Prep Method=PF, Block=2

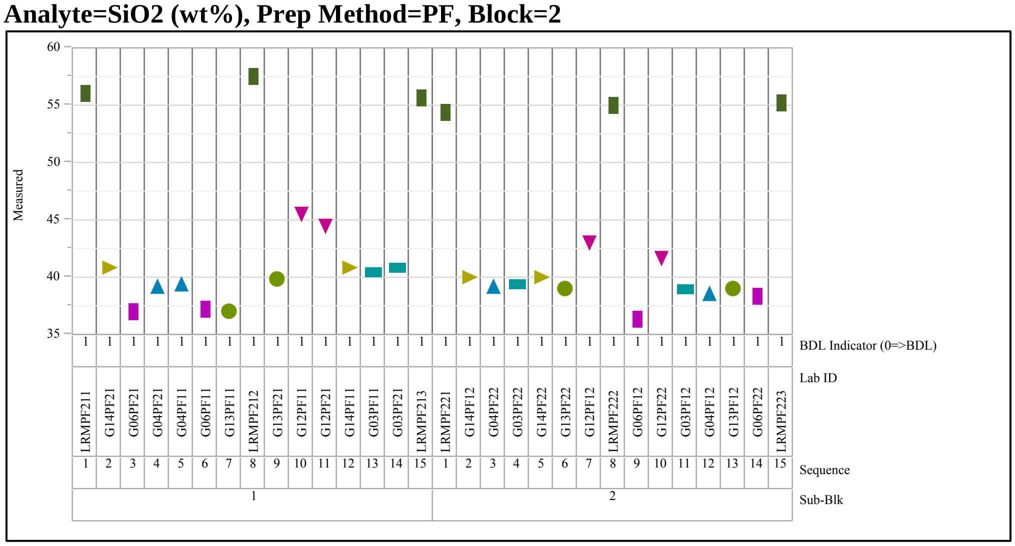
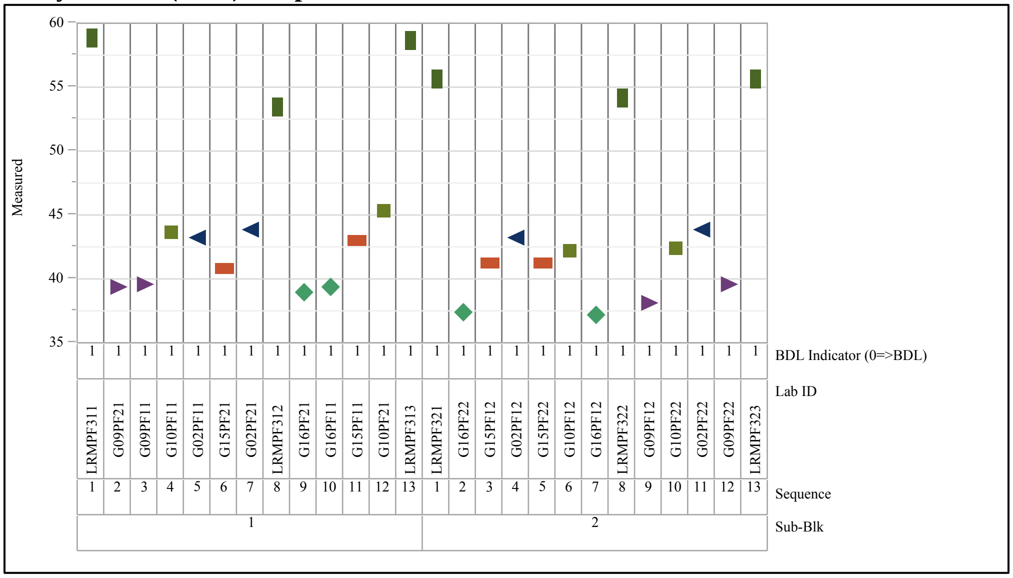


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=SiO2 (wt%), Prep Method=PF, Block=3



Analyte=SnO2 (wt%), Prep Method=PF, Block=1

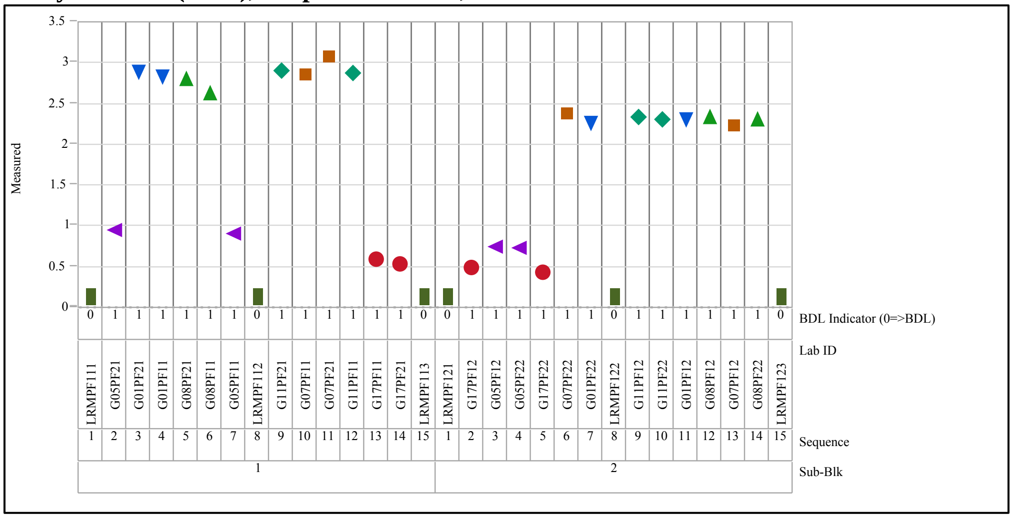
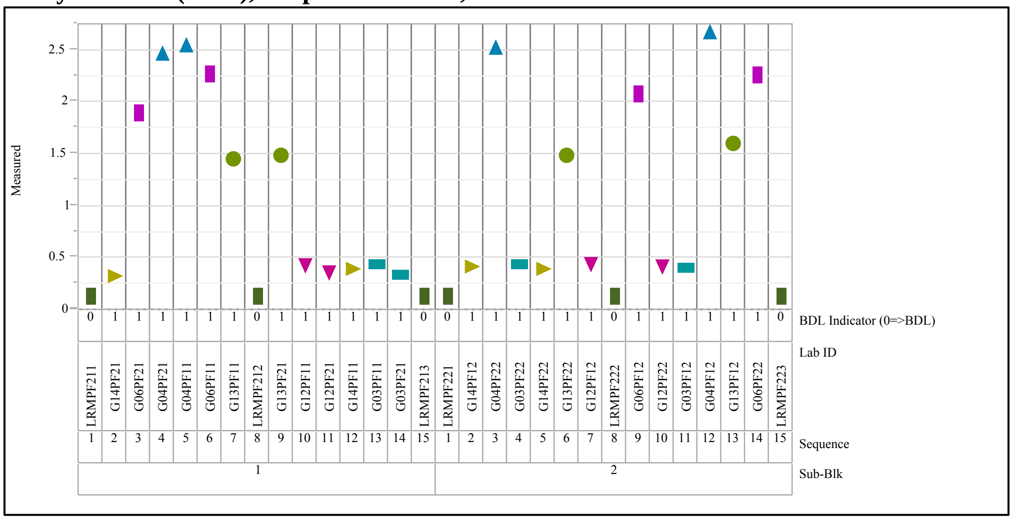


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=SnO2 (wt%), Prep Method=PF, Block=2



Analyte=SnO2 (wt%), Prep Method=PF, Block=3

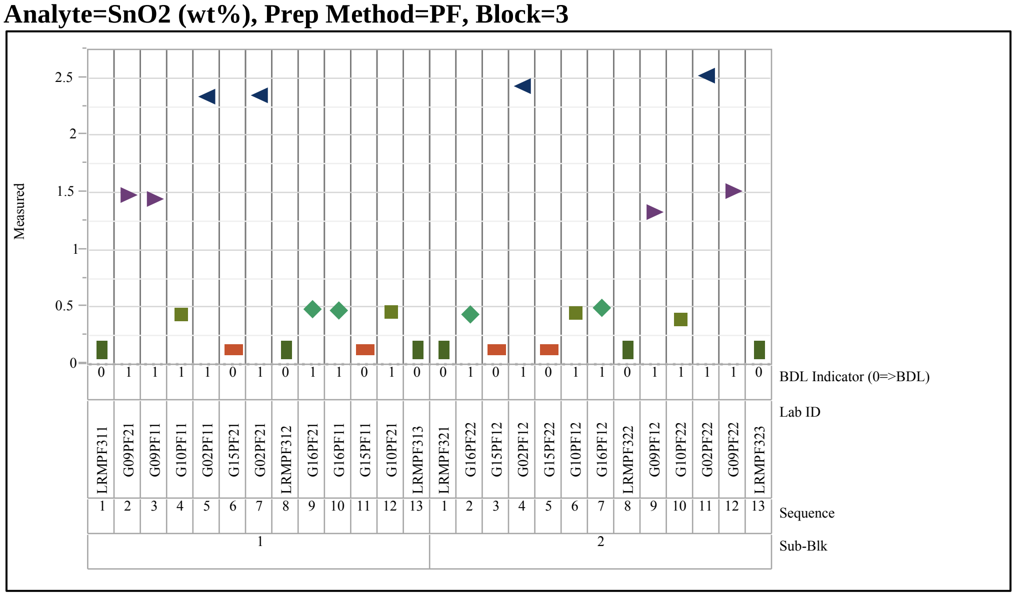
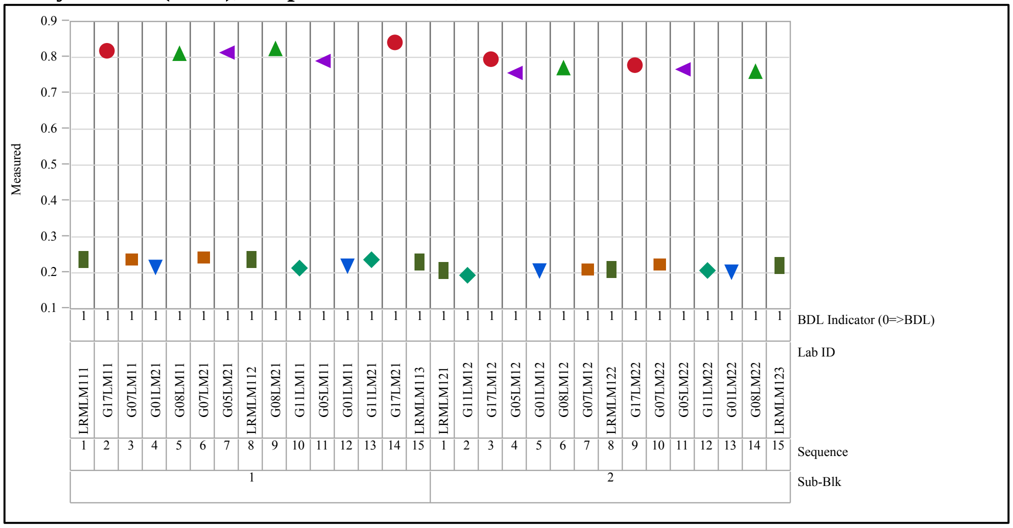


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=SO3 (wt%), Prep Method=LM, Block=1



Analyte=SO3 (wt%), Prep Method=LM, Block=2

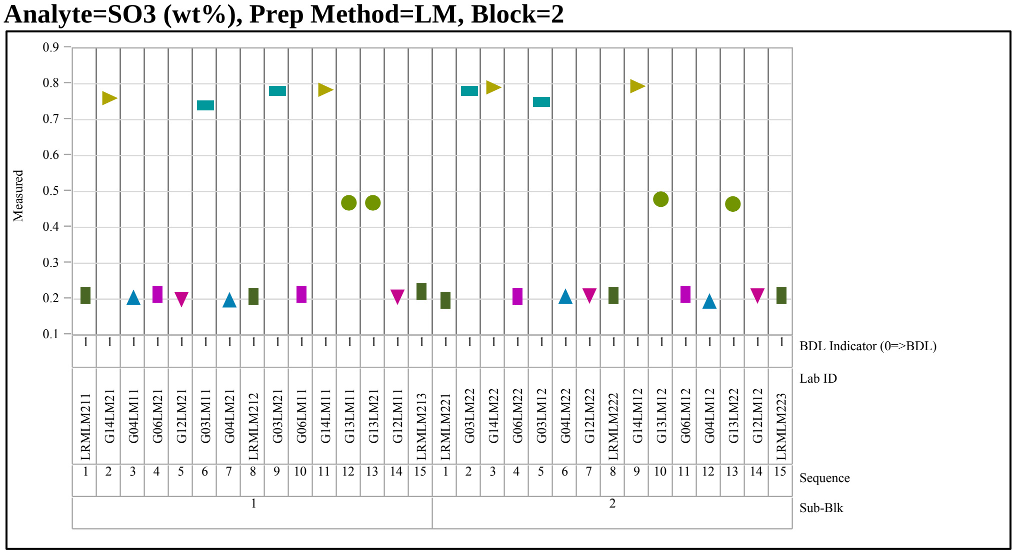
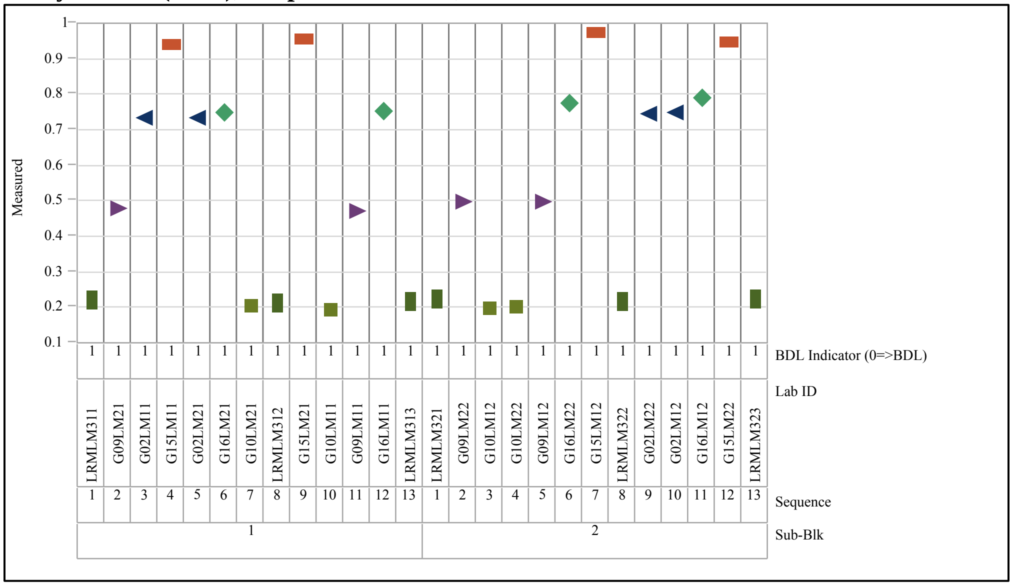


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=SO3 (wt%), Prep Method=LM, Block=3



Analyte=V2O5 (wt%), Prep Method=LM, Block=1

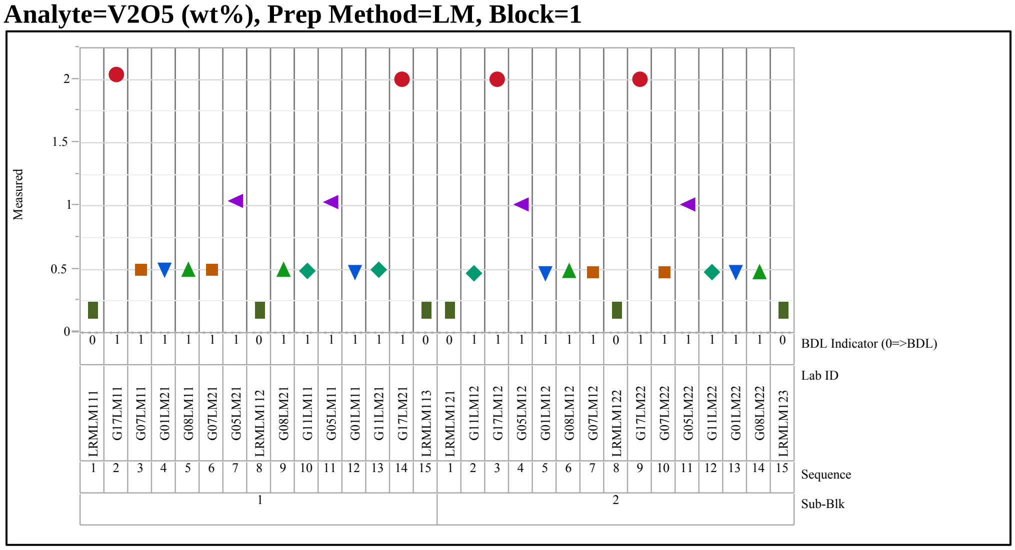
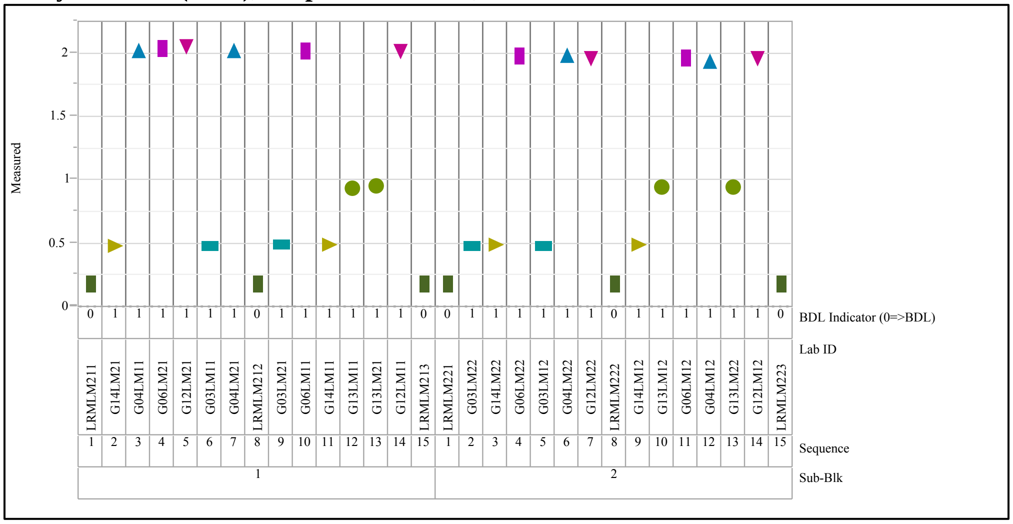


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=V2O5 (wt%), Prep Method=LM, Block=2



Analyte=V2O5 (wt%), Prep Method=LM, Block=3

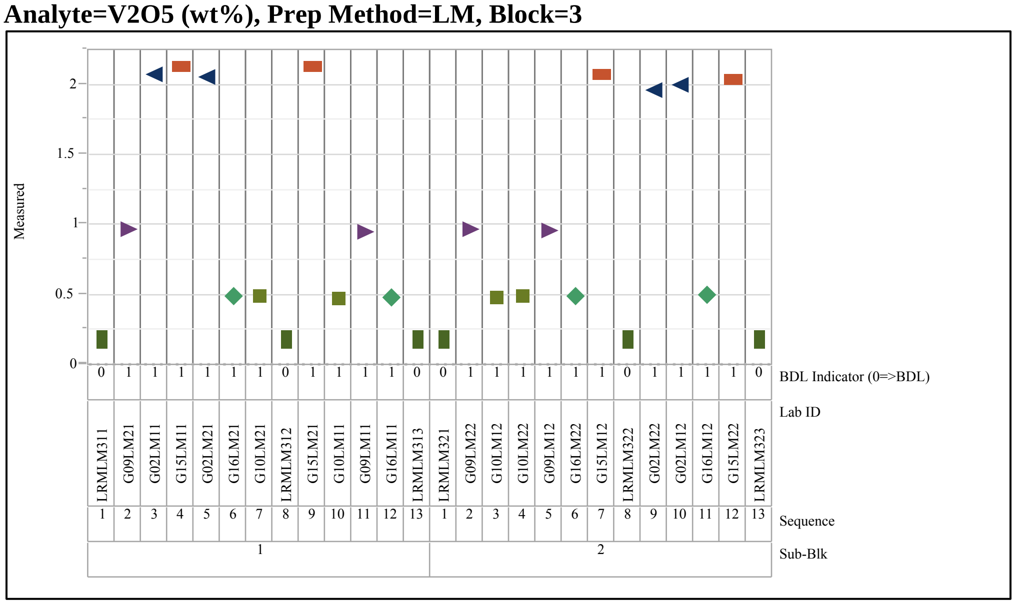
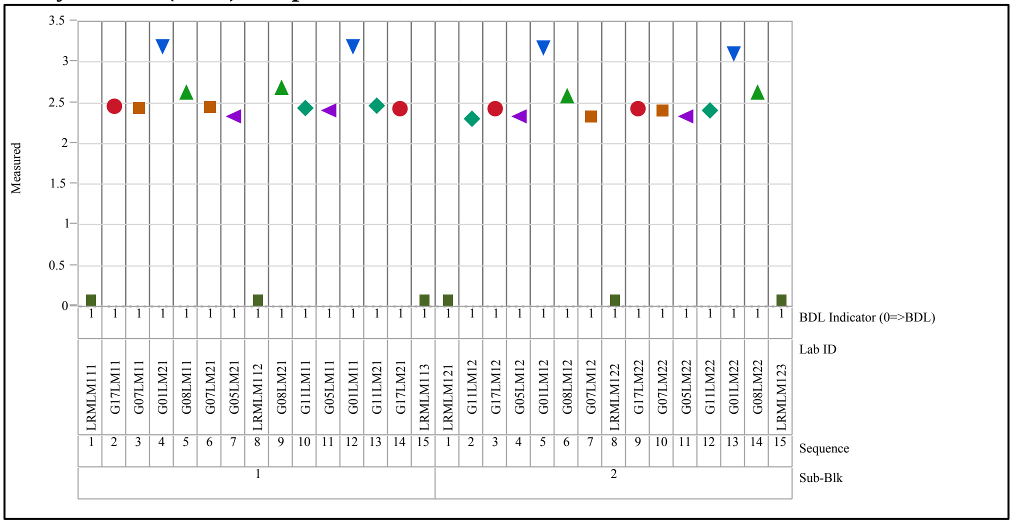


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=ZnO (wt%), Prep Method=LM, Block=1



Analyte=ZnO (wt%), Prep Method=LM, Block=2

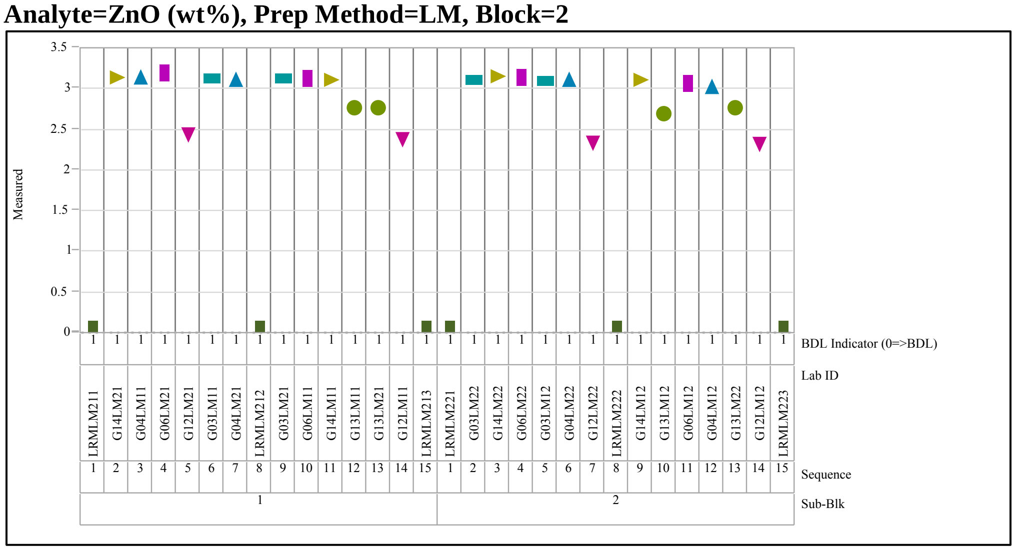
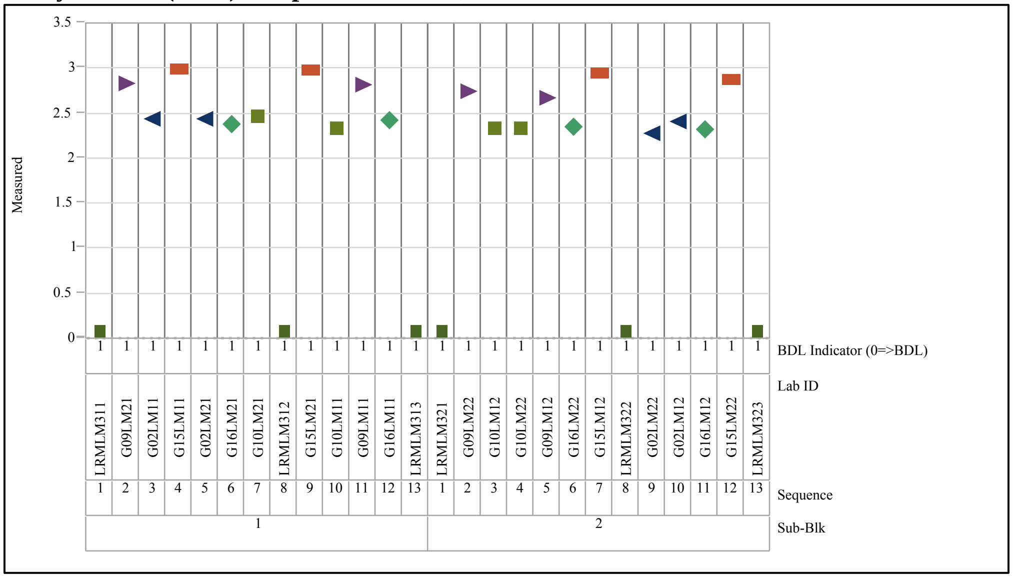


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=ZnO (wt%), Prep Method=LM, Block=3



Analyte=ZrO2 (wt%), Prep Method=LM, Block=1

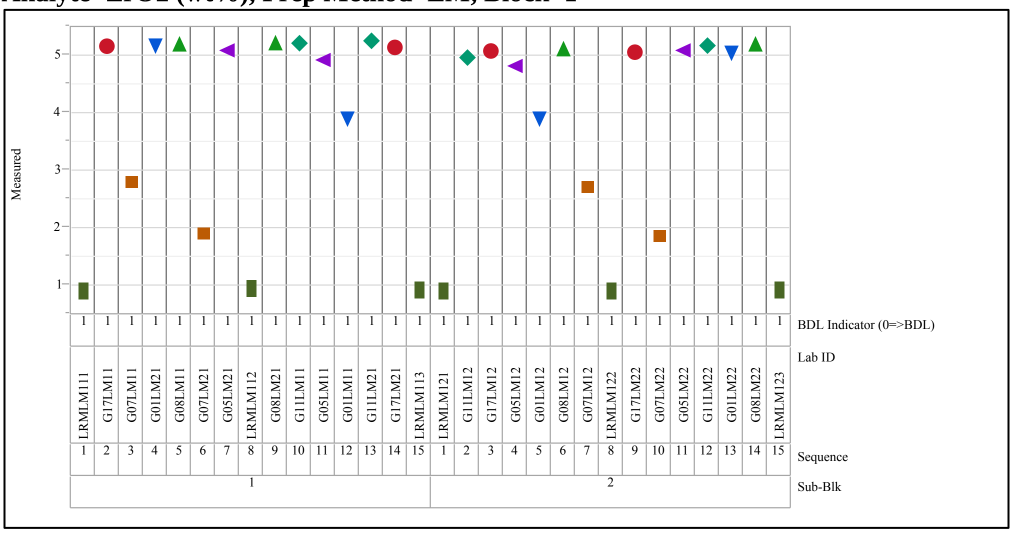
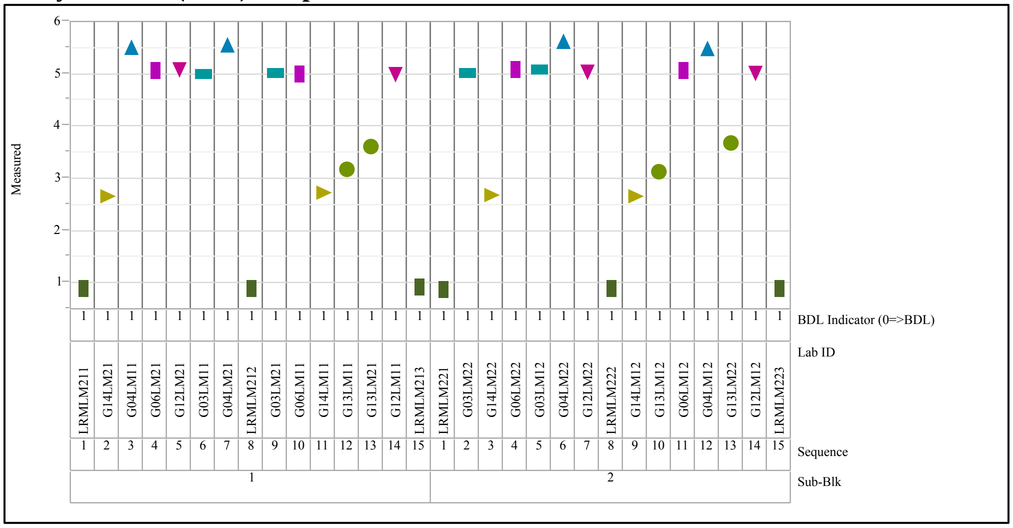


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=ZrO2 (wt%), Prep Method=LM, Block=2



Analyte=ZrO2 (wt%), Prep Method=LM, Block=3

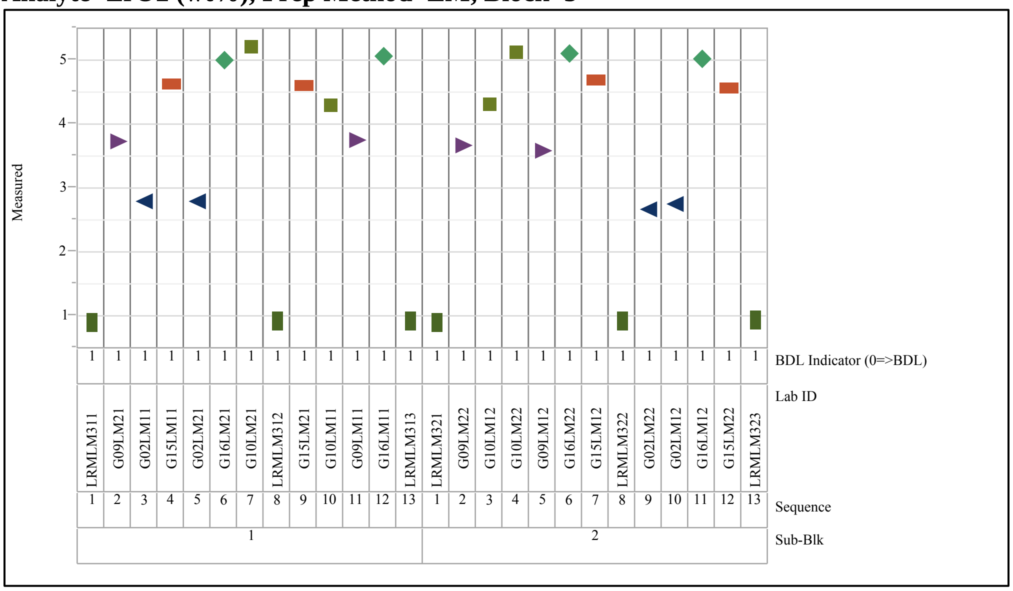


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration

Variability Gauge Analyte=Al2O3 (wt%), Prep Method=PF

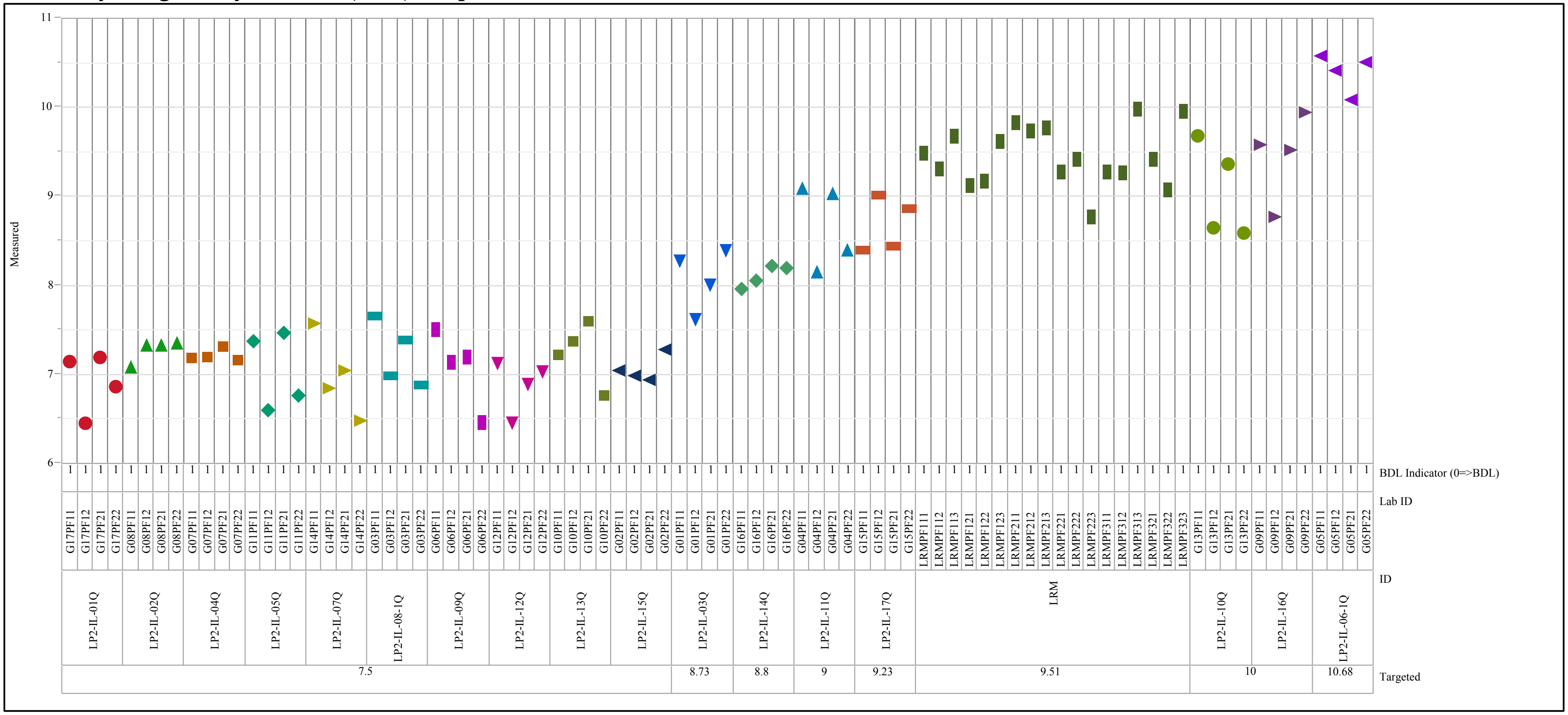


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Variability Gauge Analyte=B2O3 (wt%), Prep Method=PF

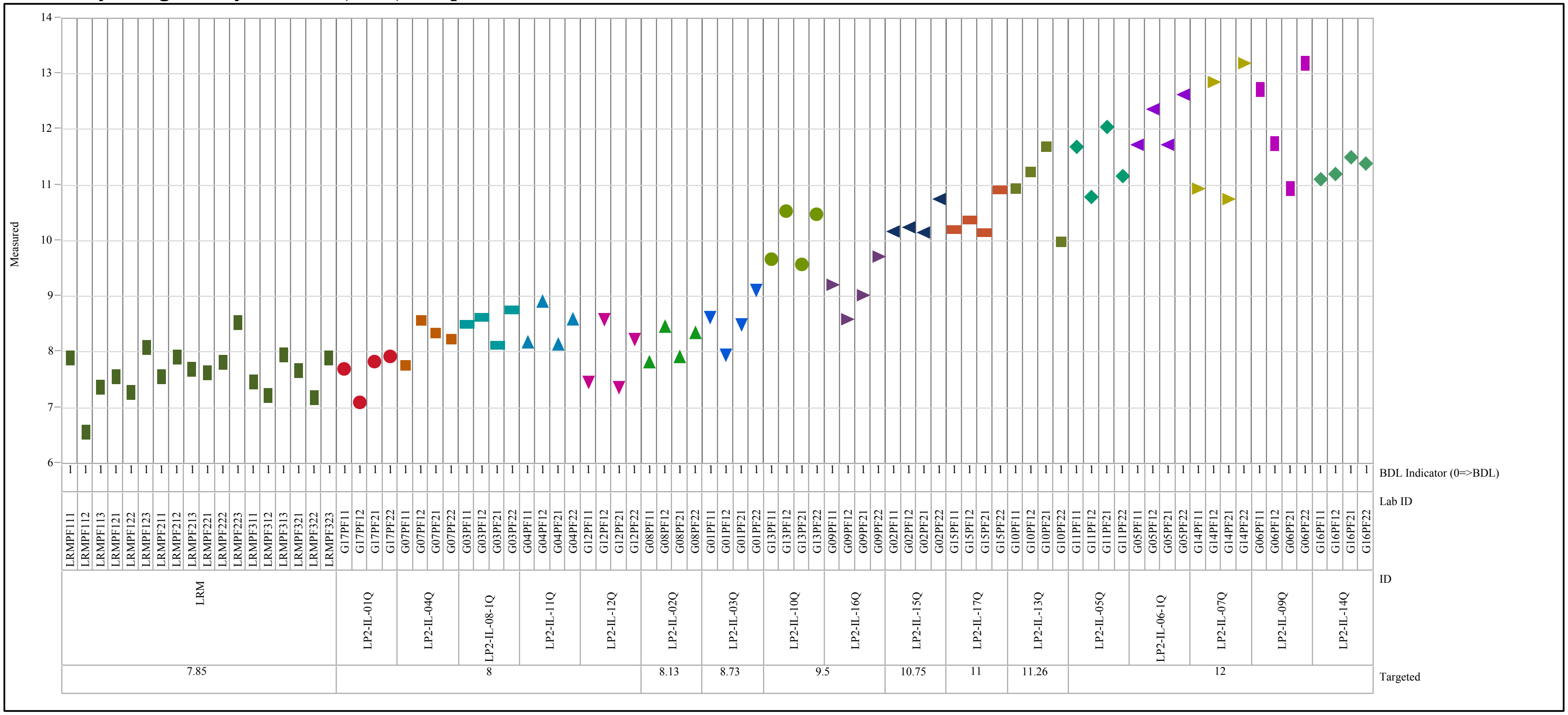


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Variability Gauge Analyte=CaO (wt%), Prep Method=LM

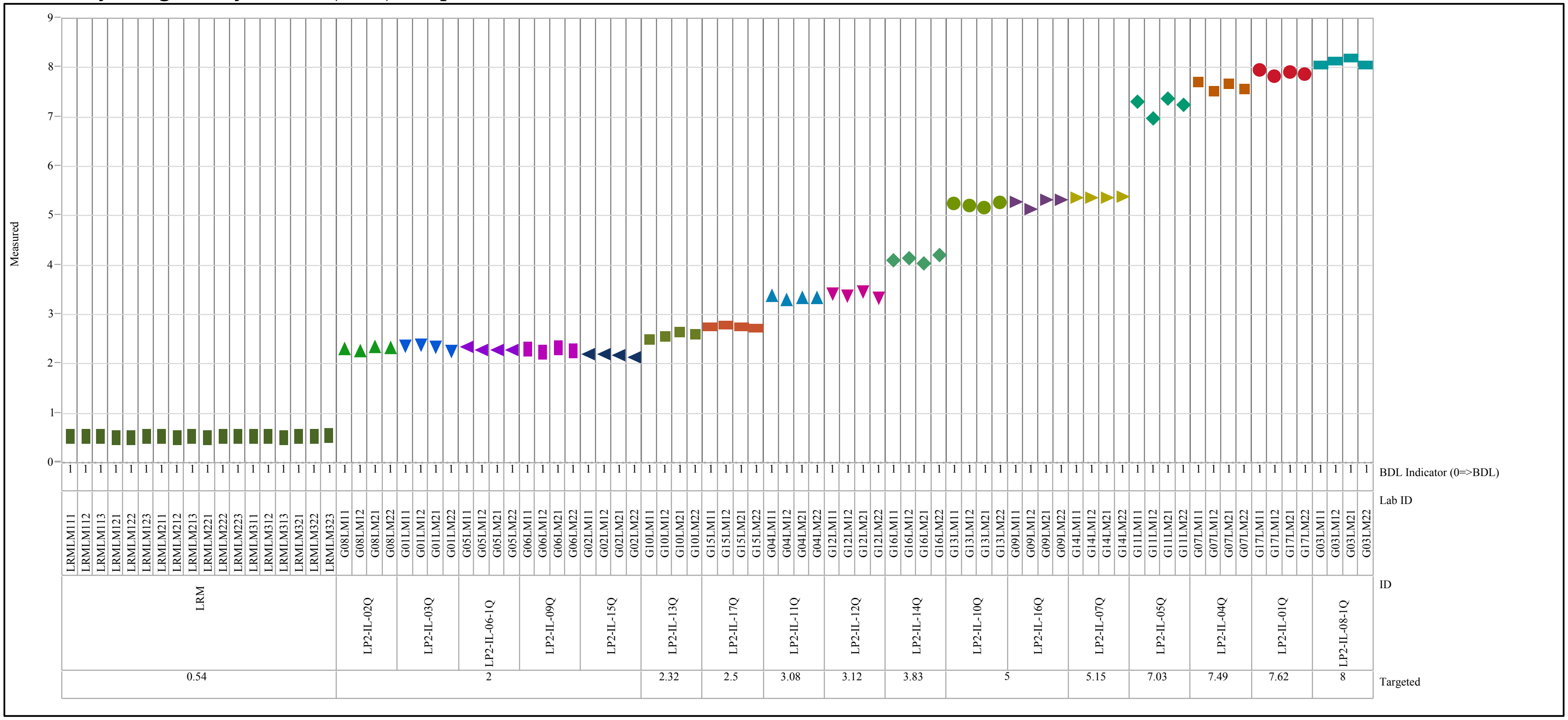


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Variability Gauge Analyte=Cl (wt%), Prep Method=KH

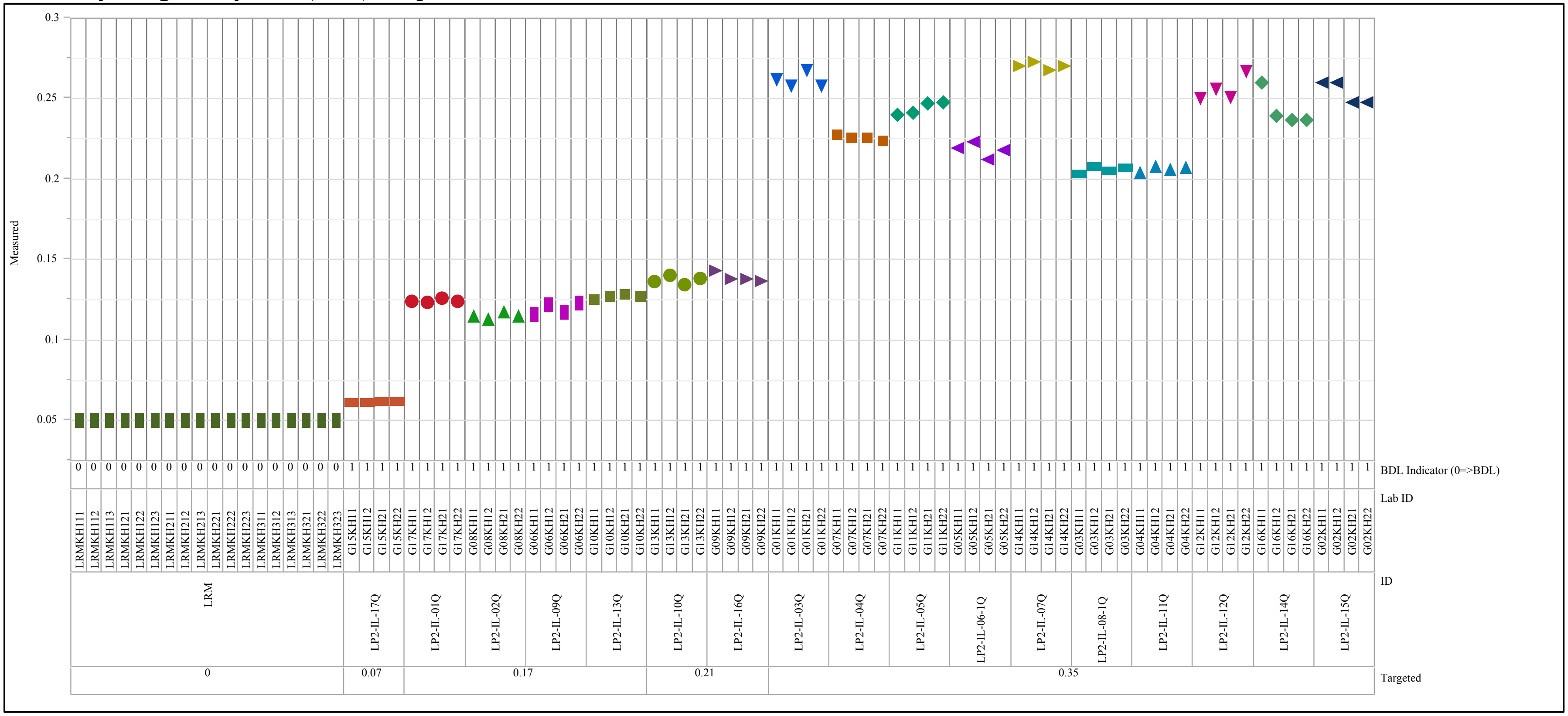


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Variability Gauge Analyte=Cr2O3 (wt%), Prep Method=LM

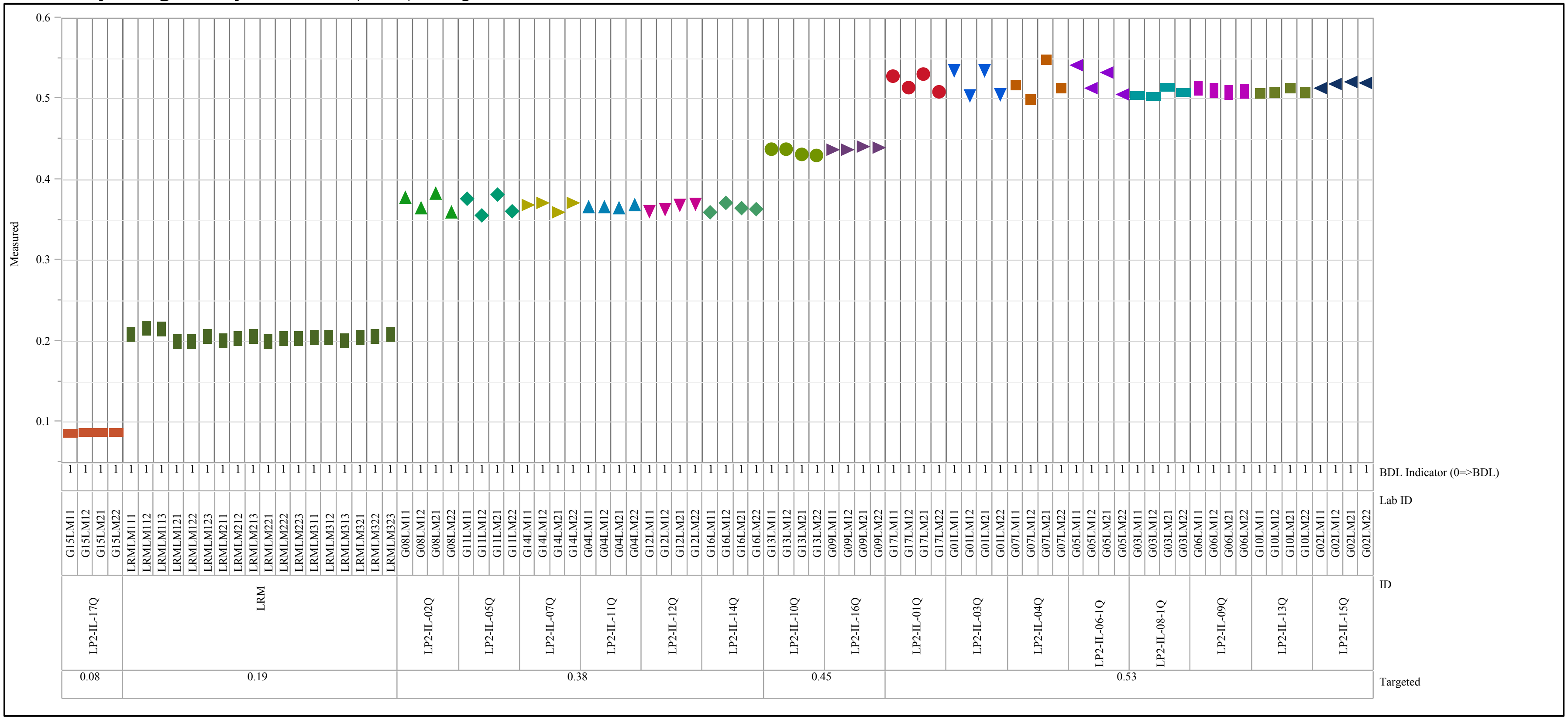


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Variability Gauge Analyte=F (wt%), Prep Method=KH

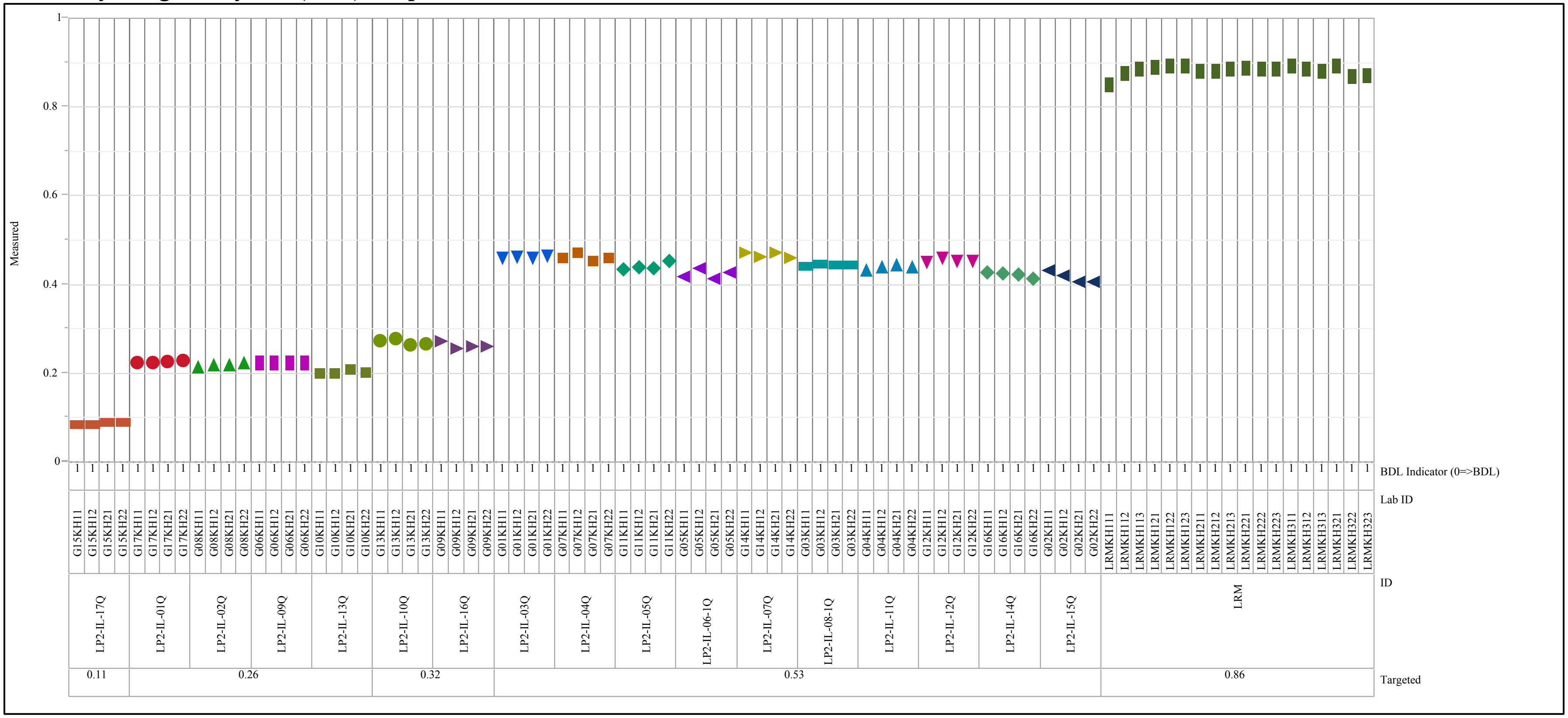


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Variability Gauge Analyte=Fe2O3 (wt%), Prep Method=PF

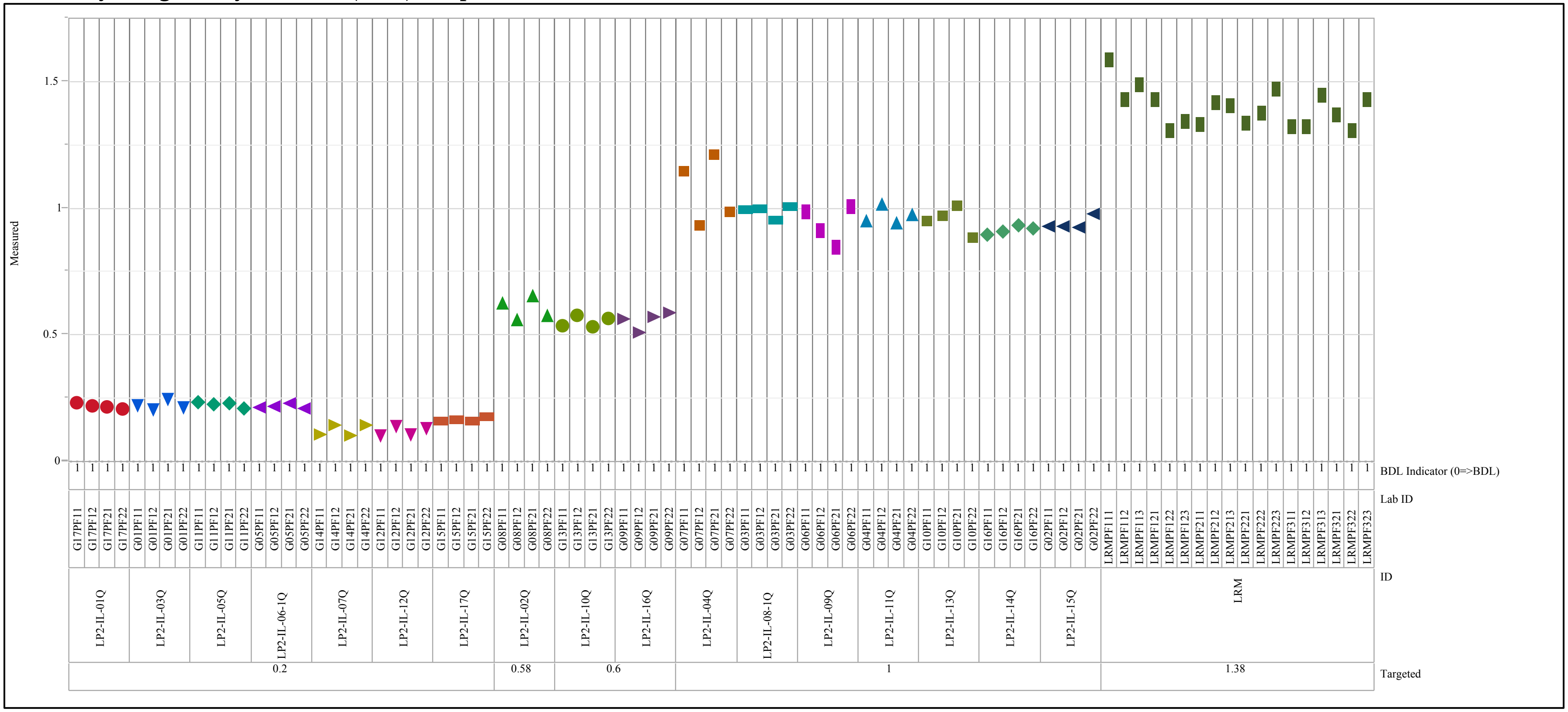


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Variability Gauge Analyte=K2O (wt%), Prep Method=LM

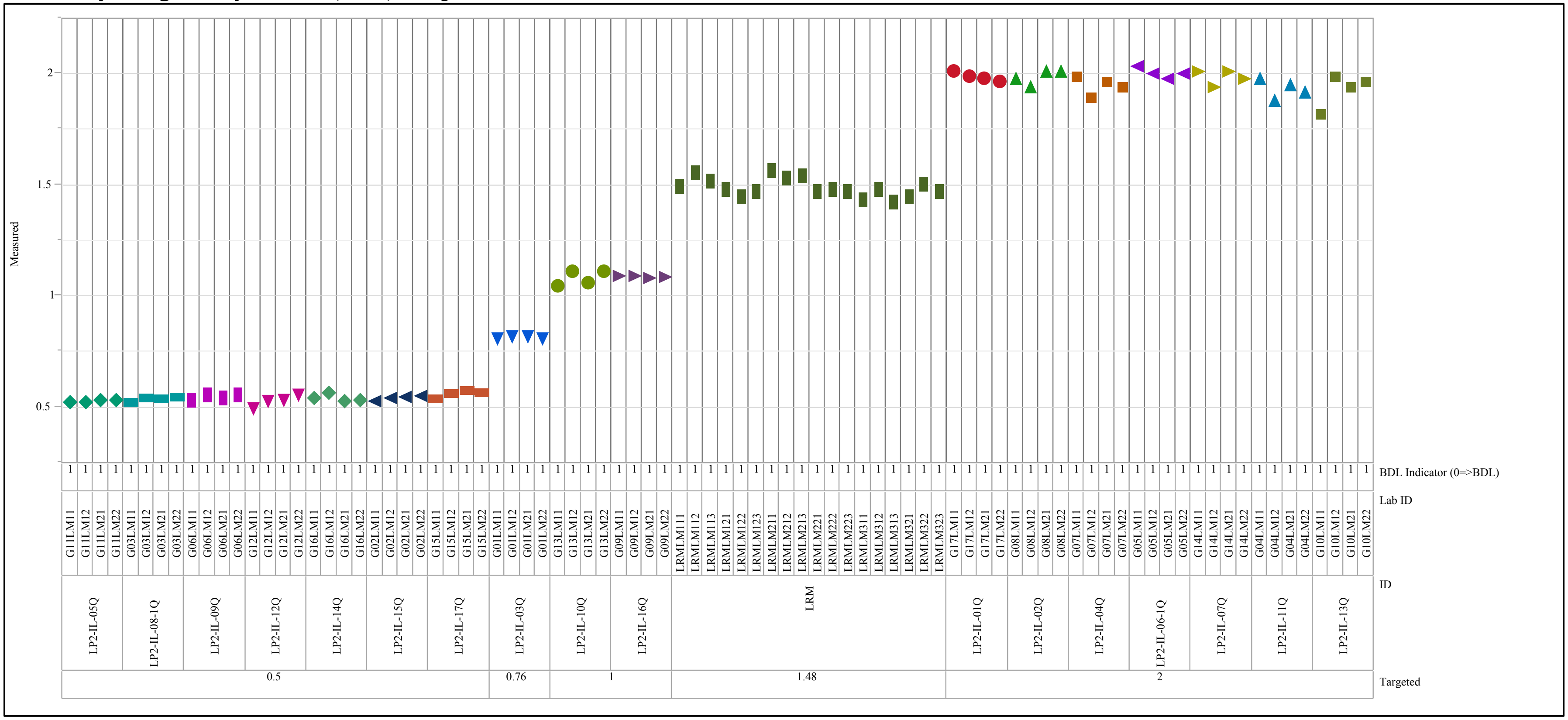


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Variability Gauge Analyte=Li2O (wt%), Prep Method=PF

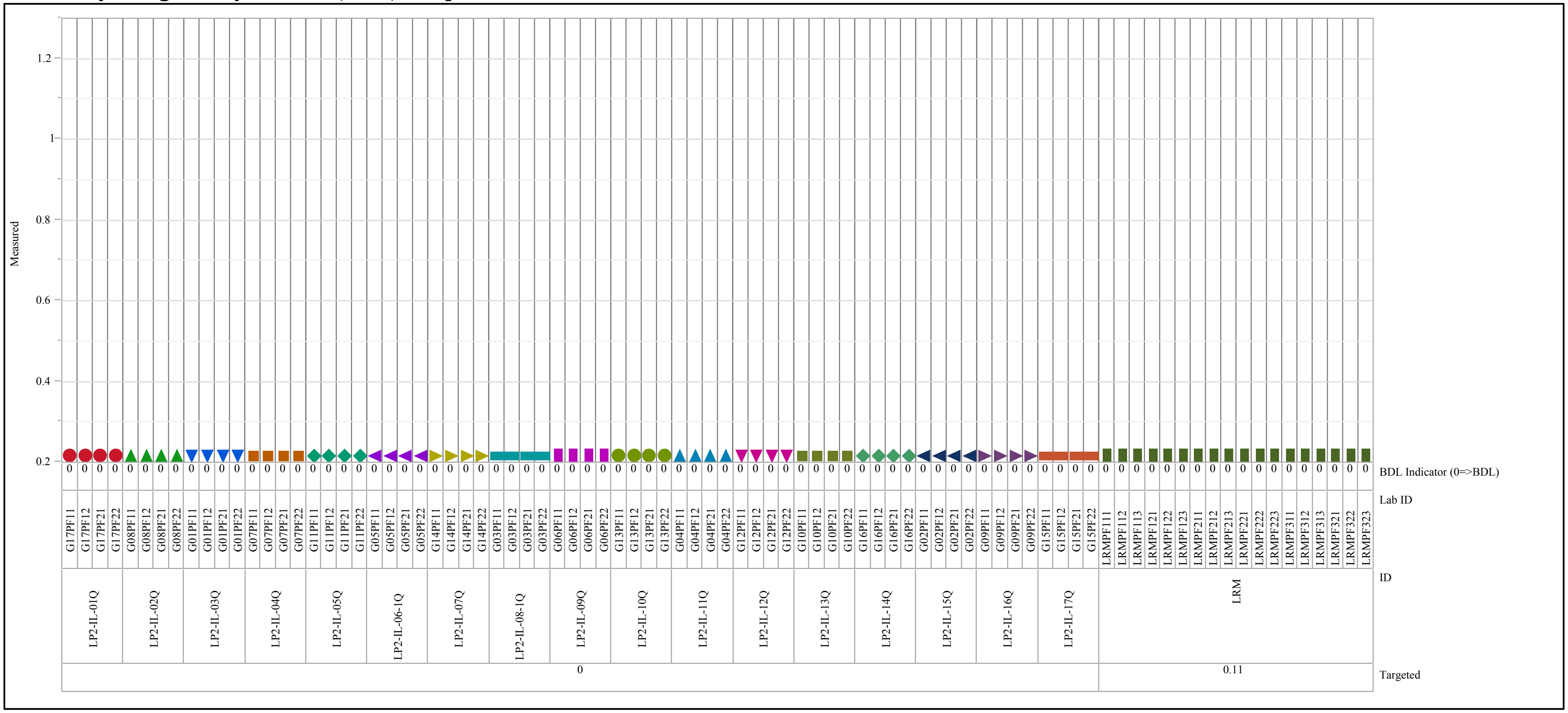


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Variability Gauge Analyte=MgO (wt%), Prep Method=LM

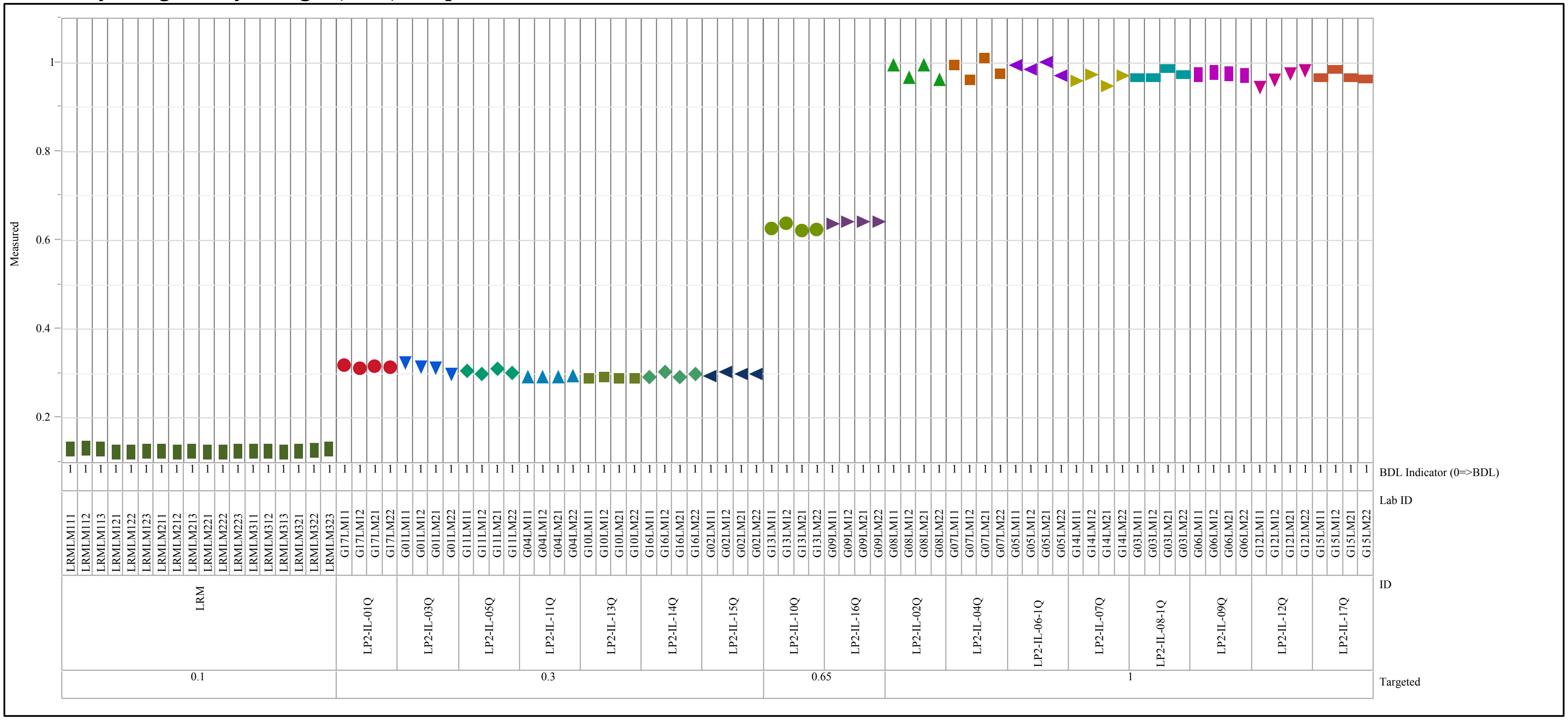


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Variability Gauge Analyte=Na2O (wt%), Prep Method=LM

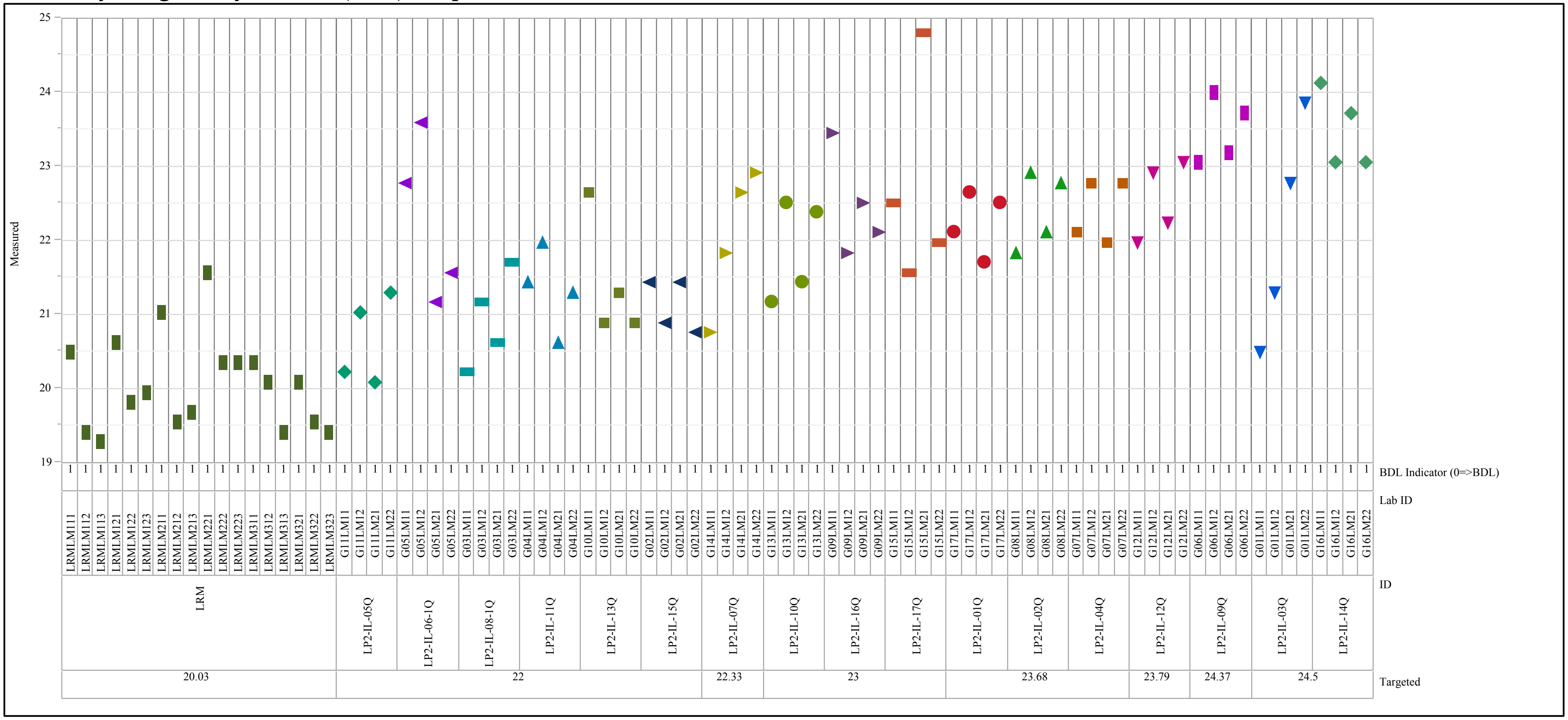


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Variability Gauge Analyte=P2O5 (wt%), Prep Method=LM

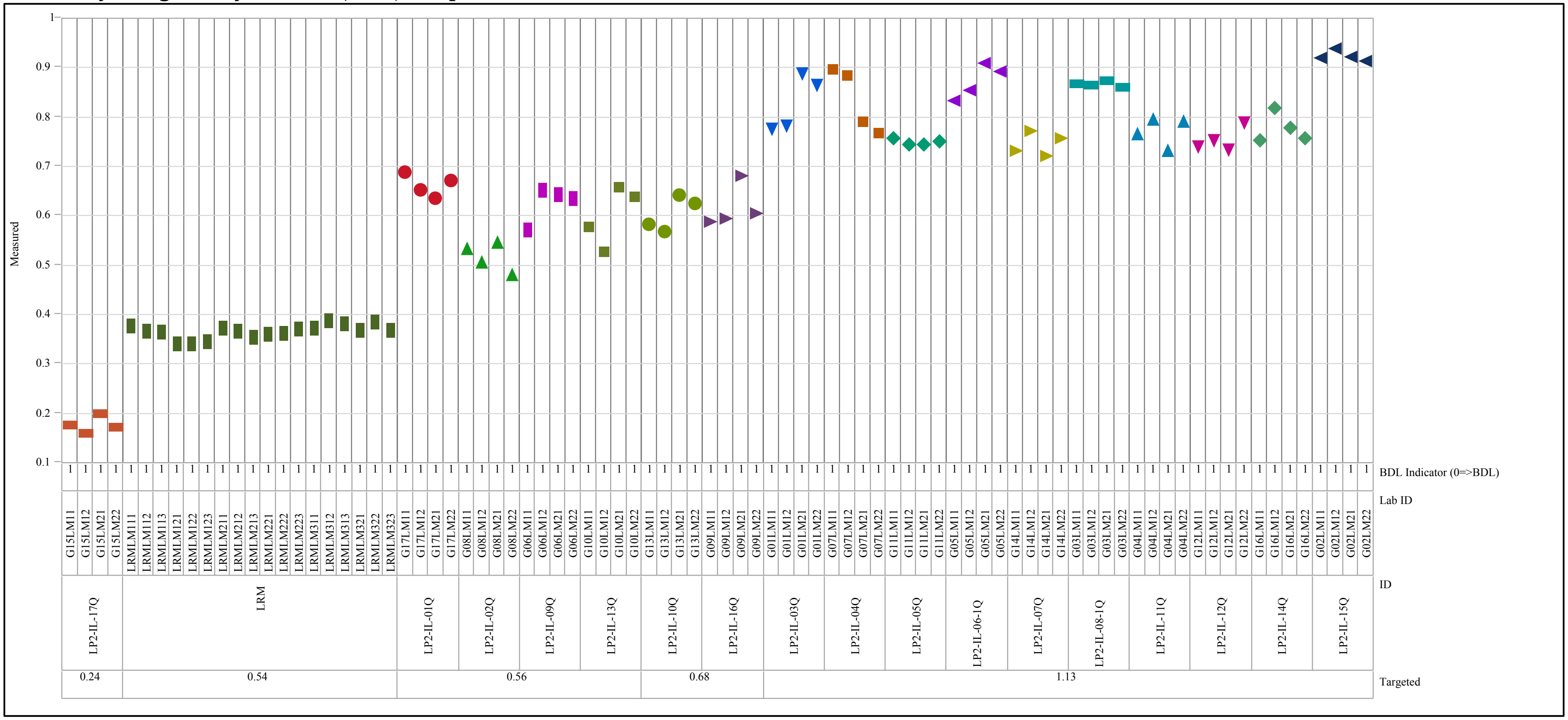


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Variability Gauge Analyte=SiO2 (wt%), Prep Method=PF

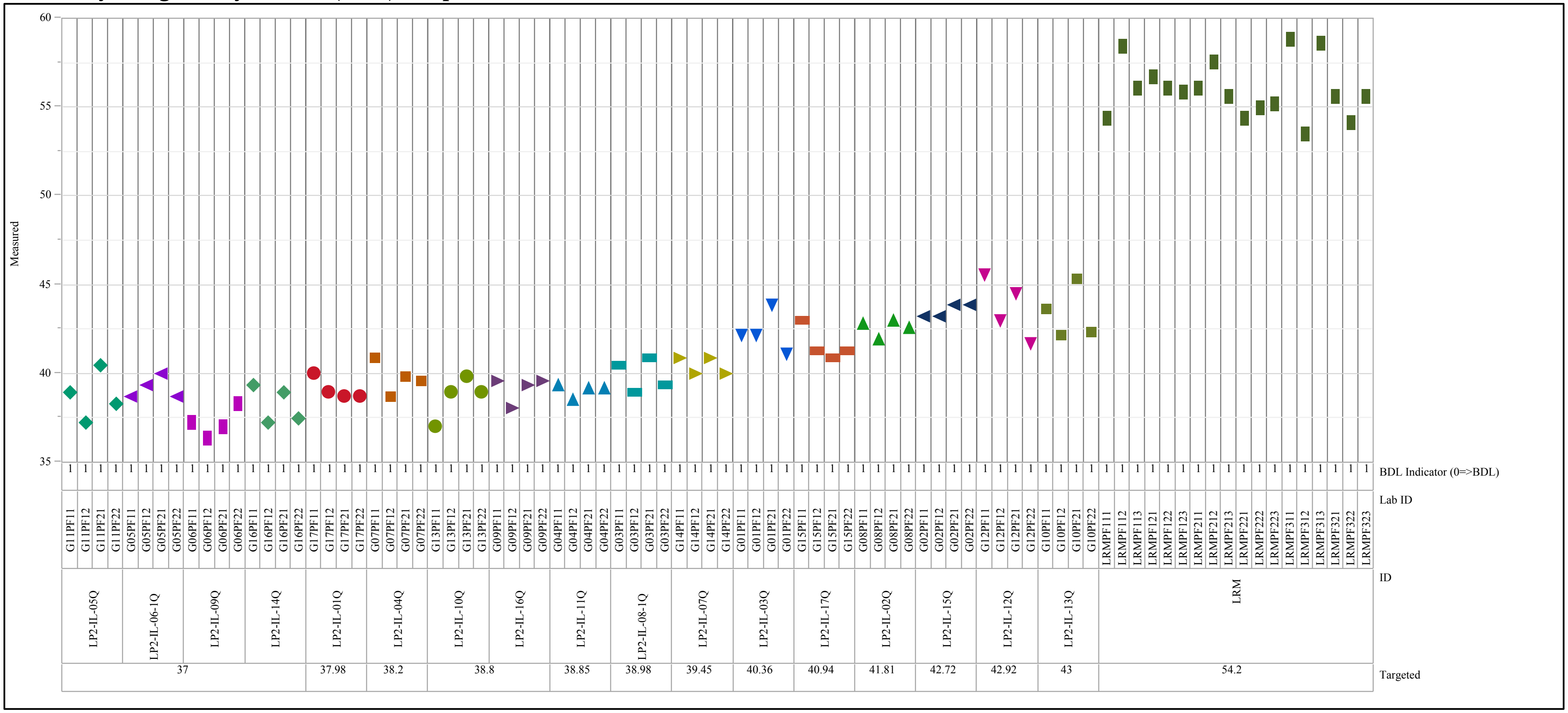


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Variability Gauge Analyte=SnO2 (wt%), Prep Method=PF

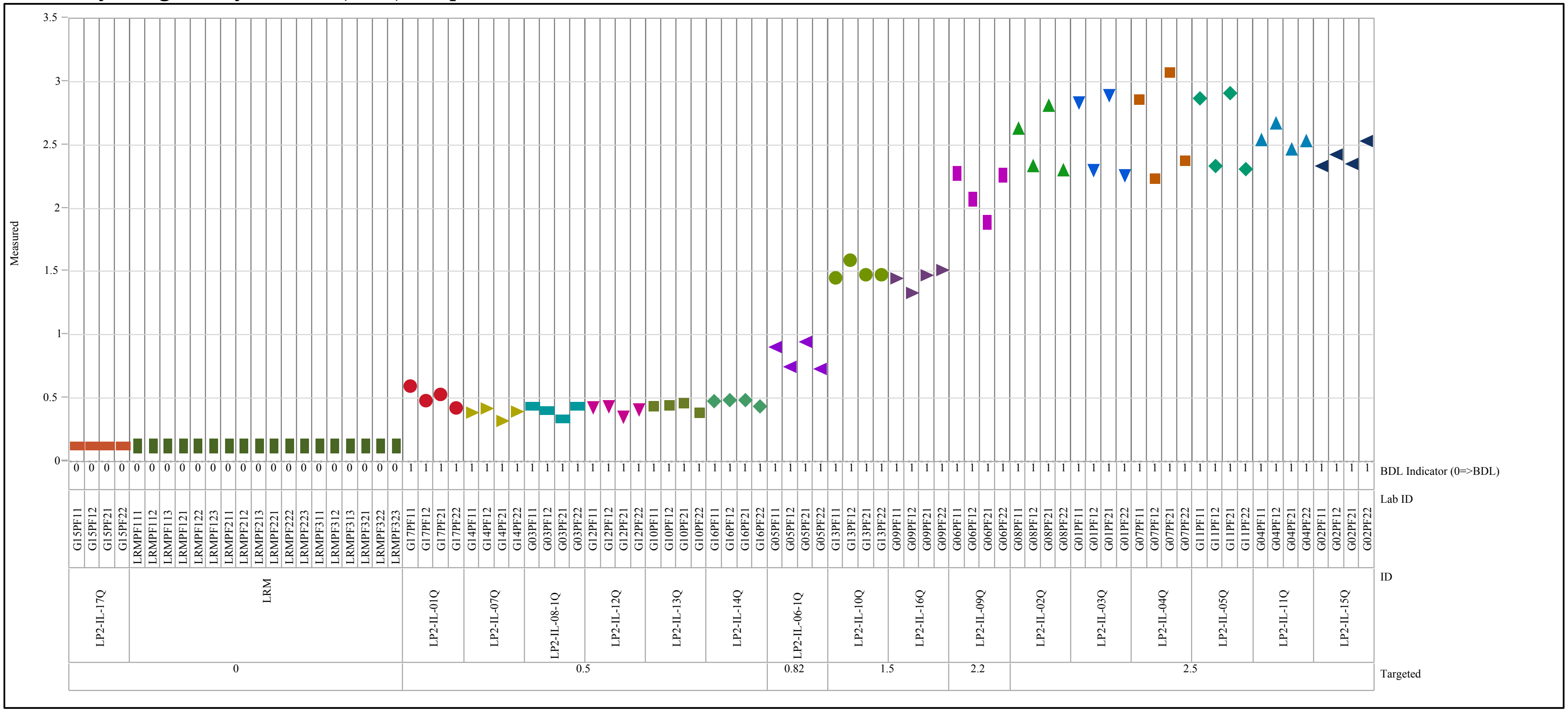


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Variability Gauge Analyte=SO3 (wt%), Prep Method=LM

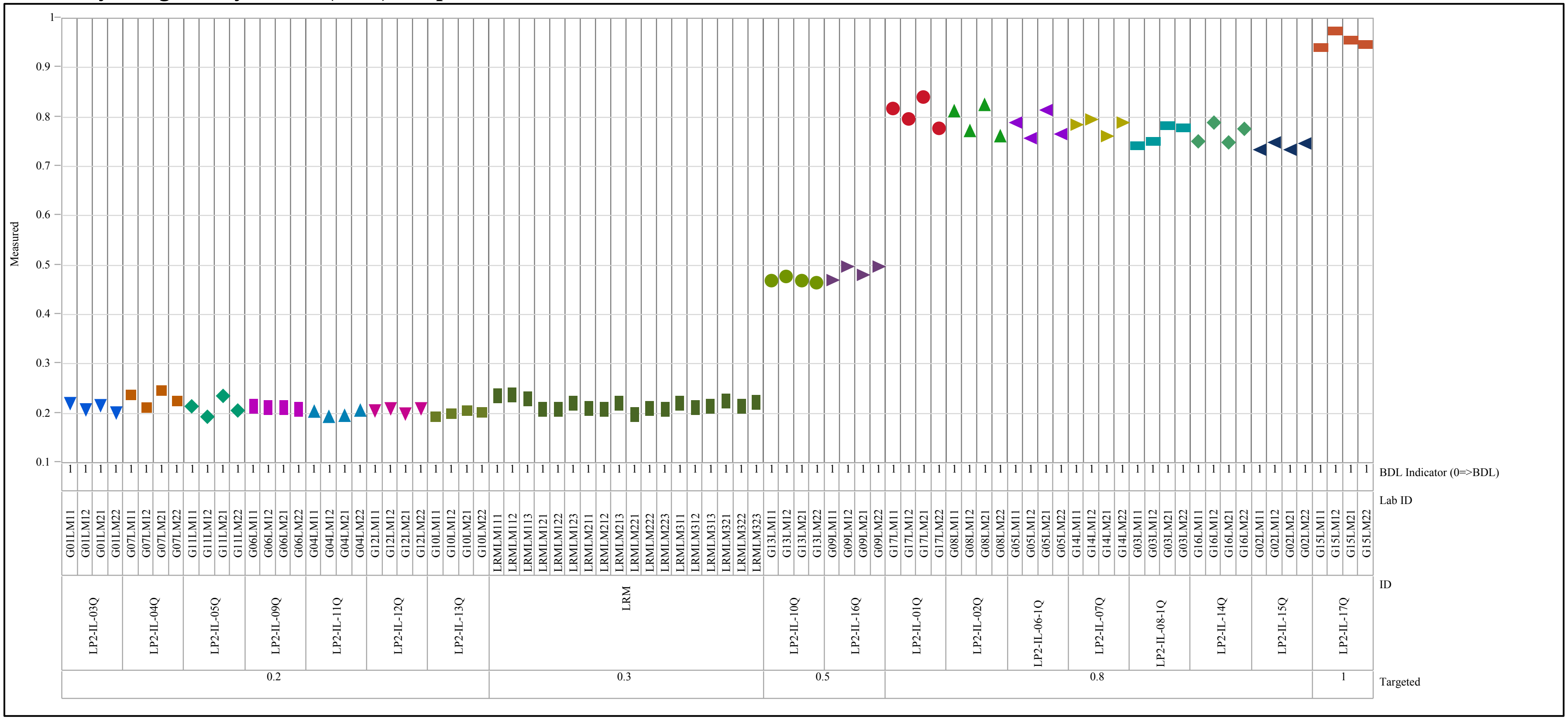


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Variability Gauge Analyte=V2O5 (wt%), Prep Method=LM

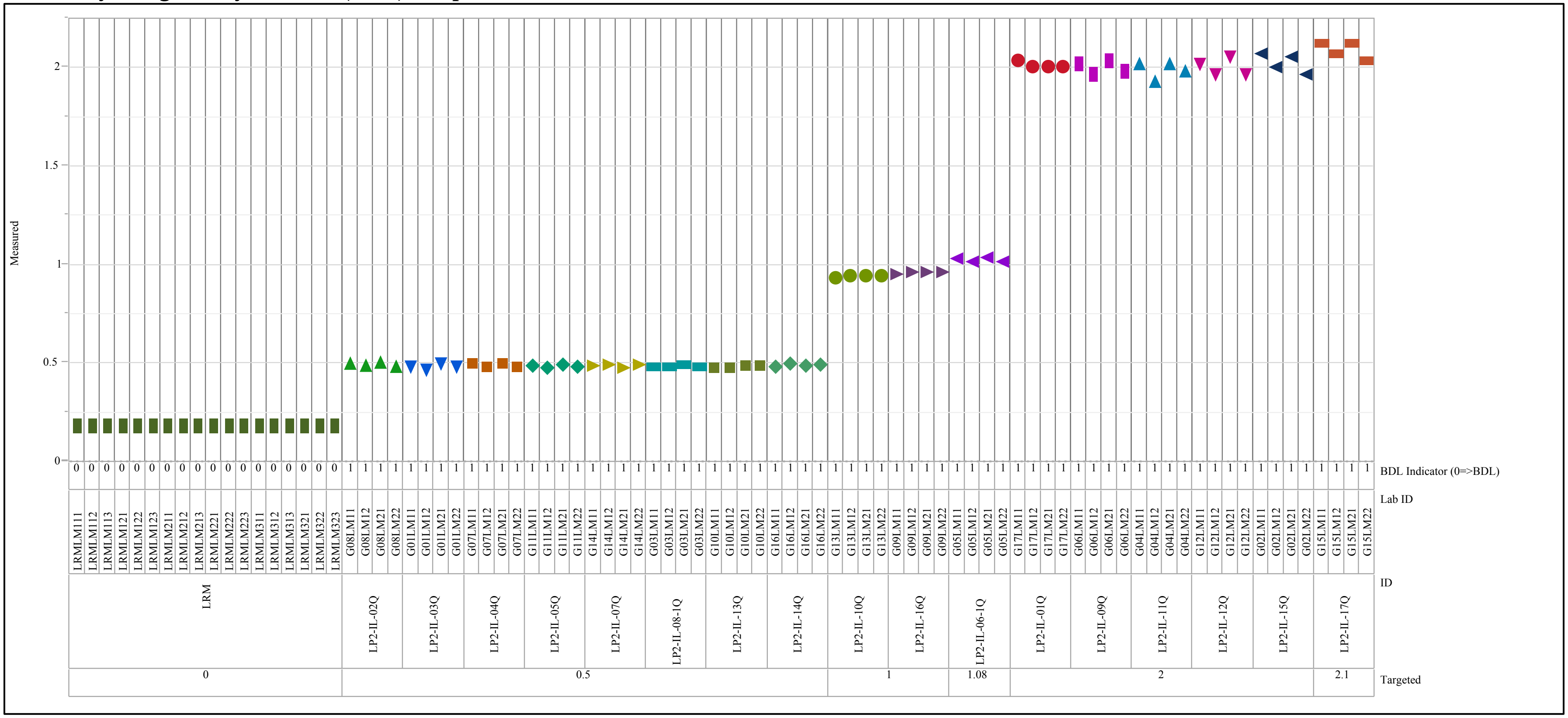


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Variability Gauge Analyte=ZnO (wt%), Prep Method=LM

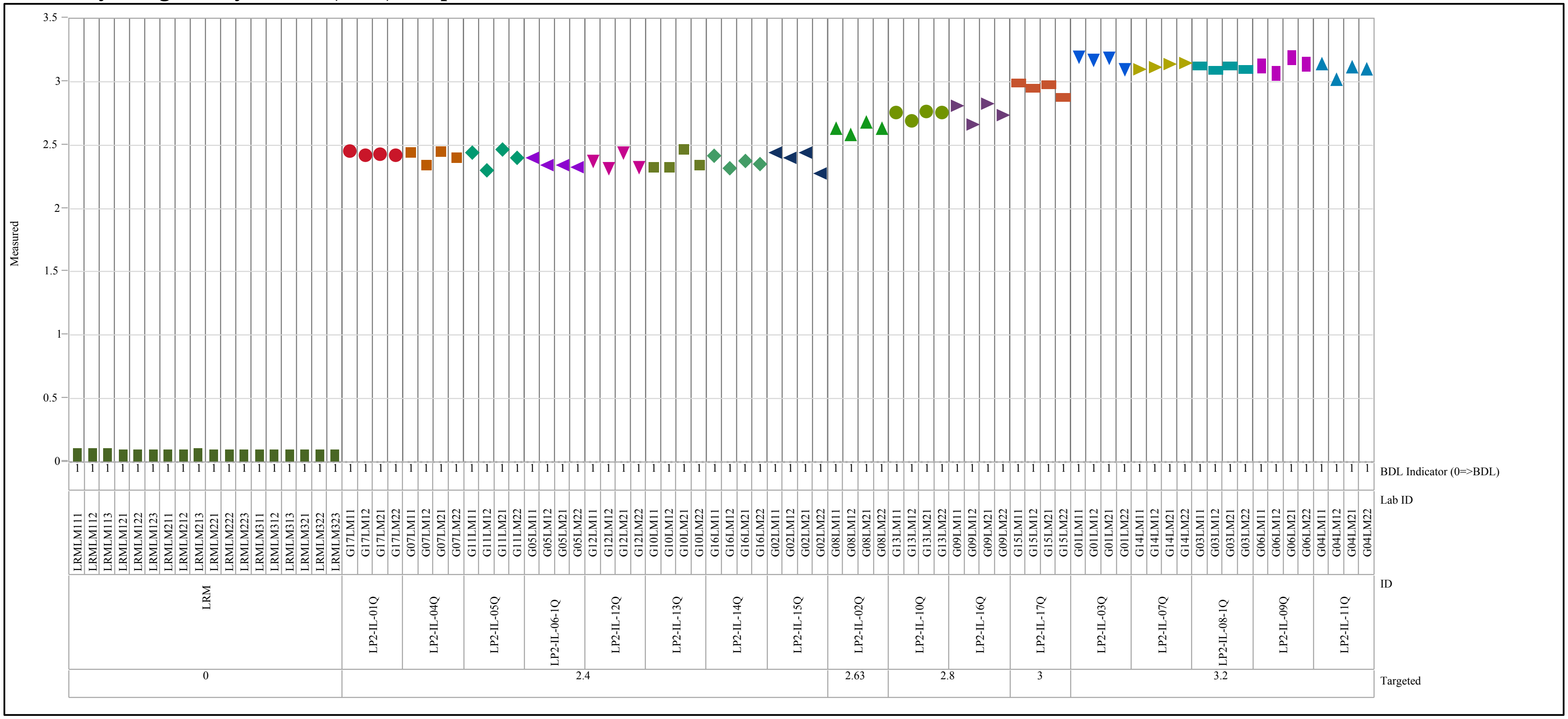


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Variability Gauge Analyte=ZrO2 (wt%), Prep Method=LM

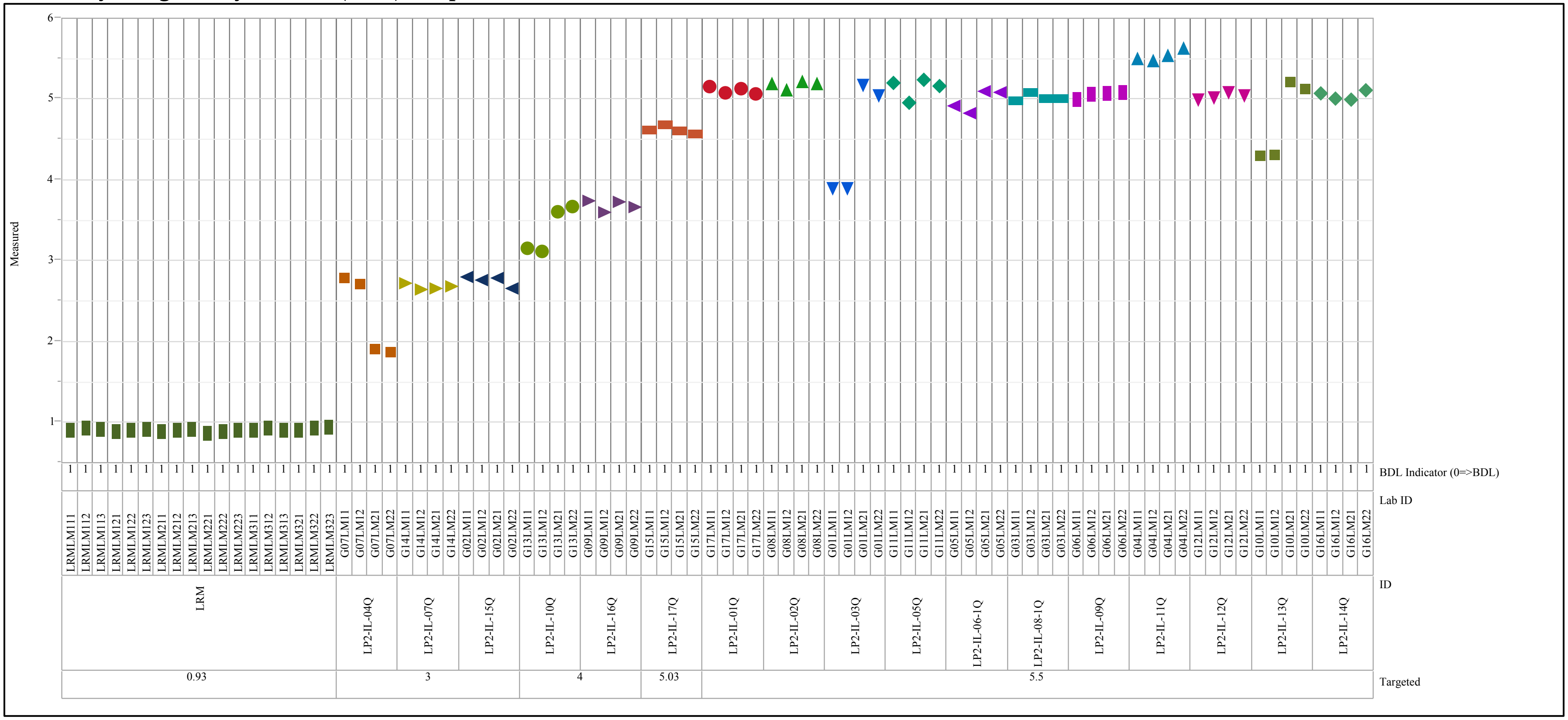
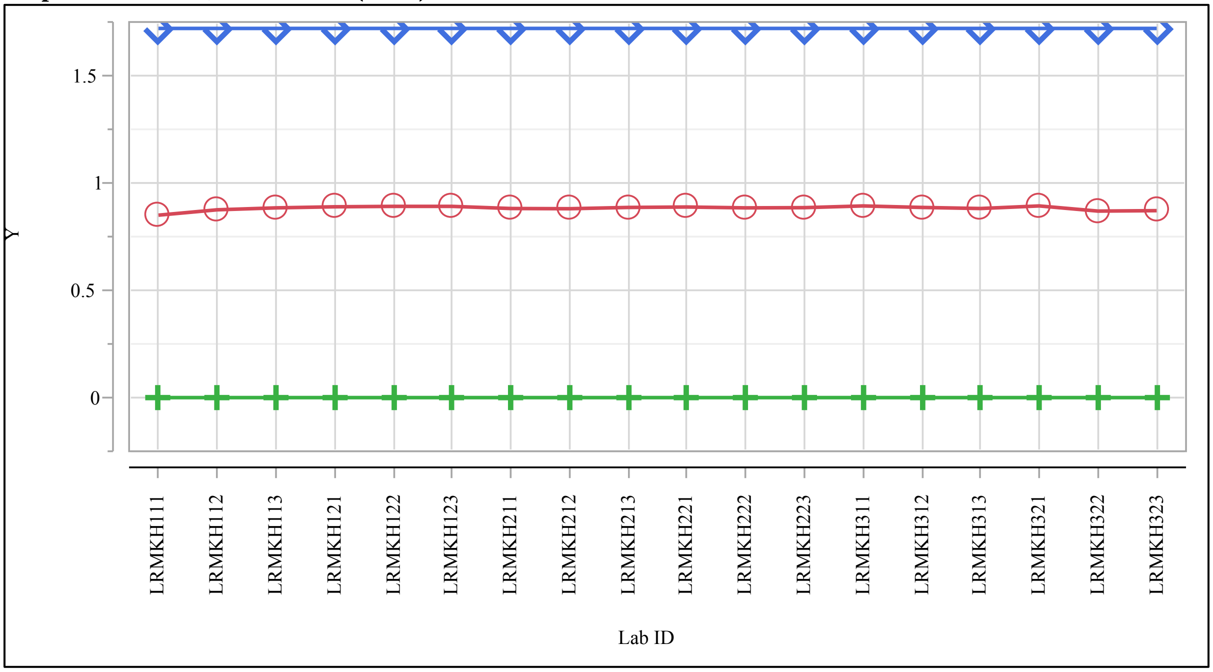


Exhibit C-3. Acceptability Evaluation for Measurements of the LRM Standard Glass

Prep Method=KH, Element=F (wt%) ar



Prep Method=LM, Element=K (wt%)

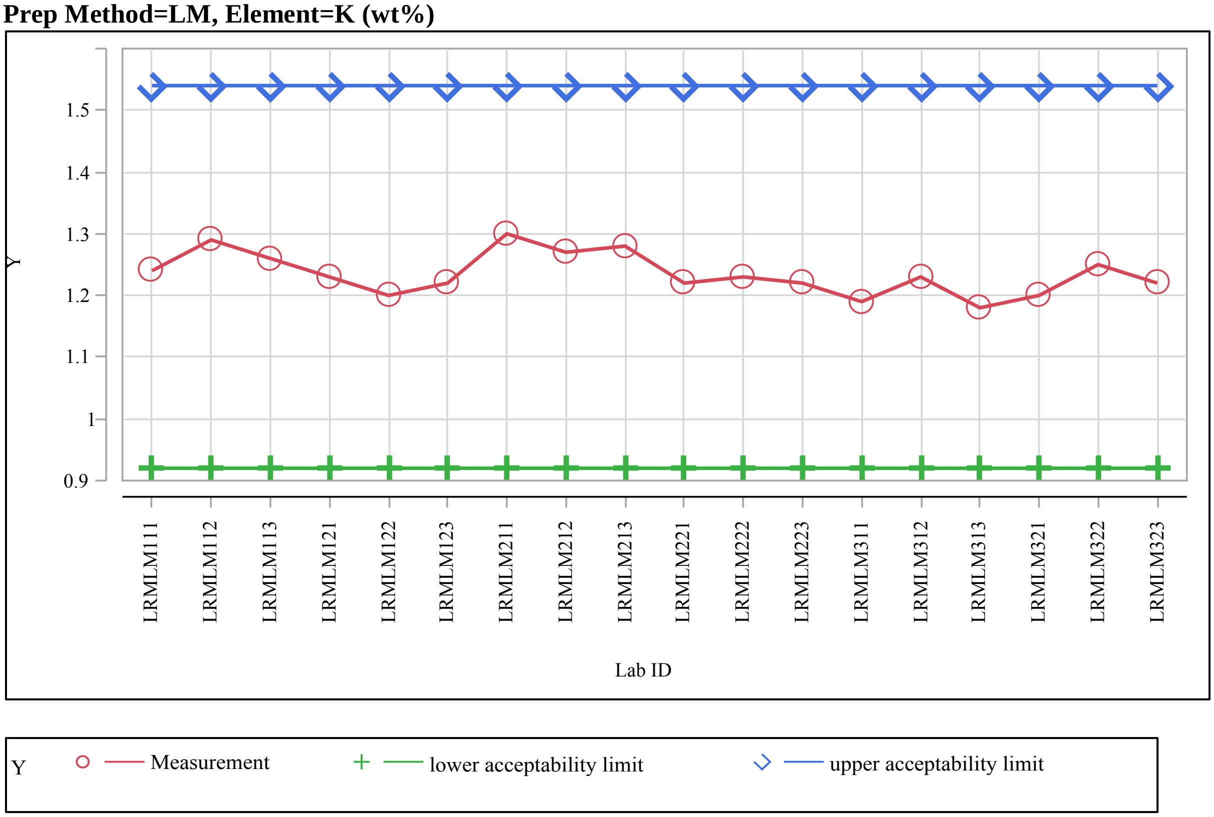
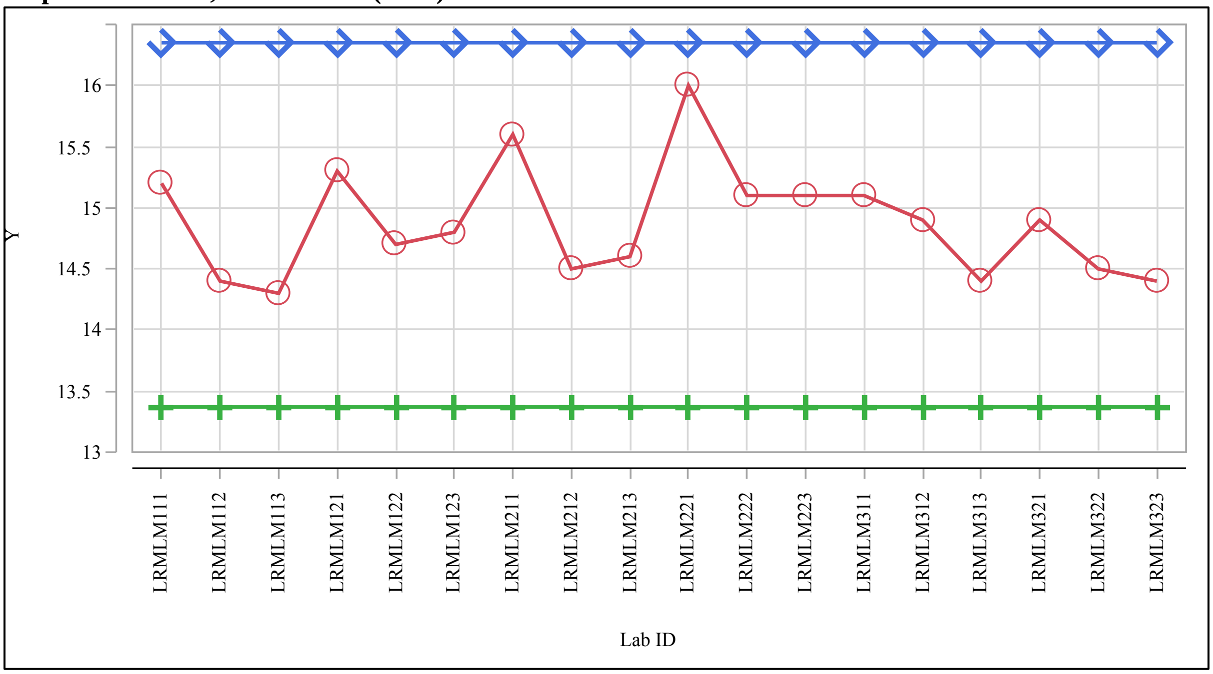
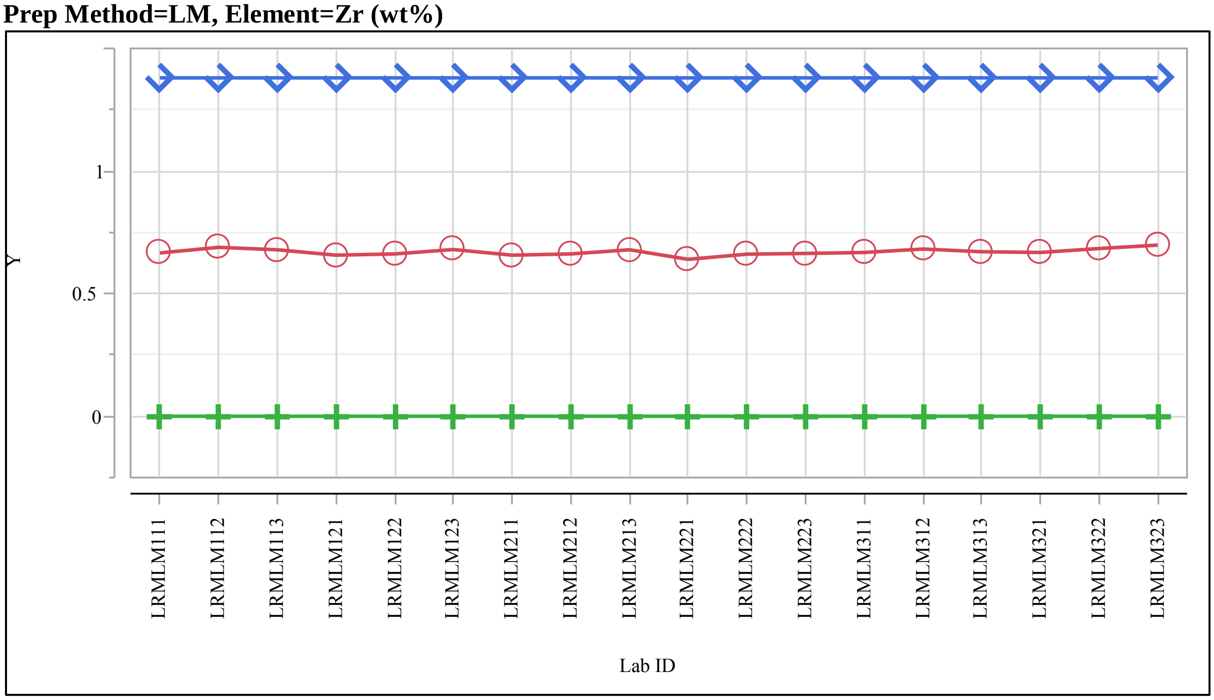


Exhibit C-3. Acceptability Evaluation for Measurements of the LRM Standard Glass (continued)

Prep Method=LM, Element=Na (wt%)



Prep Method=LM, Element=Zr (wt%)



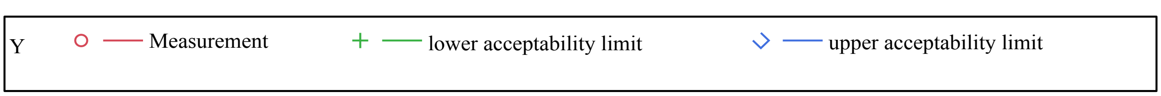
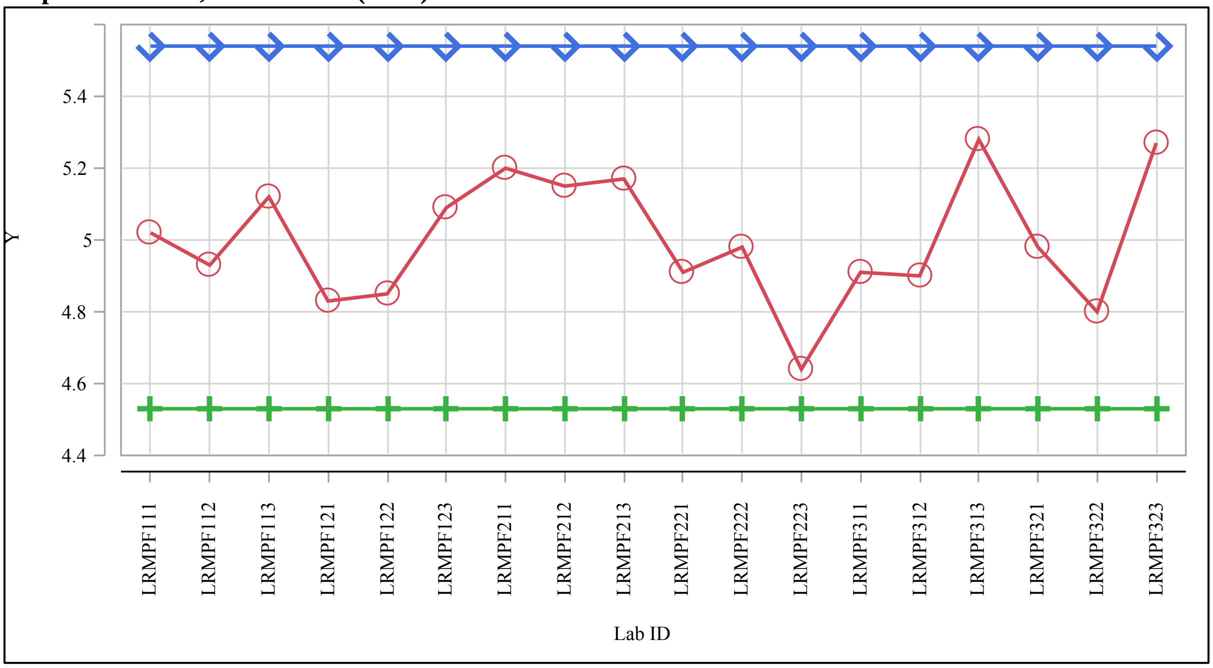


Exhibit C-3. Acceptability Evaluation for Measurements of the LRM Standard Glass (continued)

Prep Method=PF, Element=Al (wt%)



Prep Method=PF, Element=B (wt%)

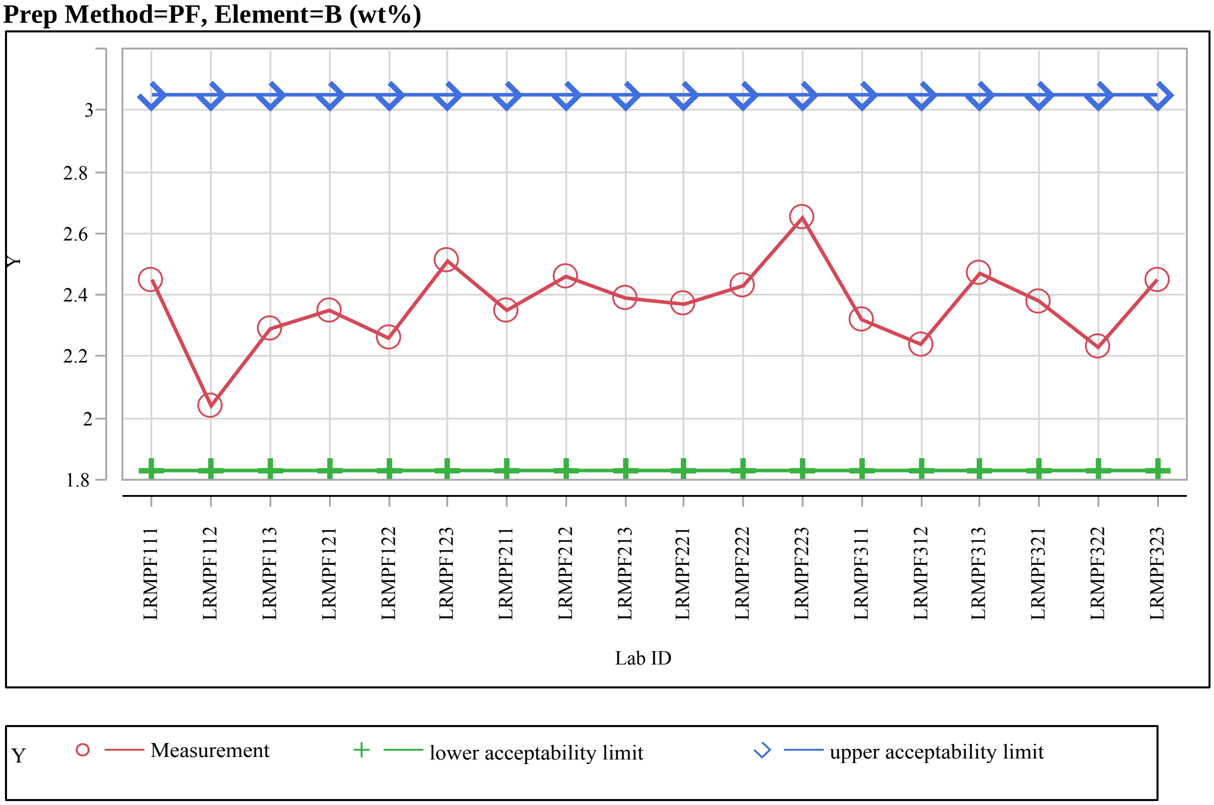
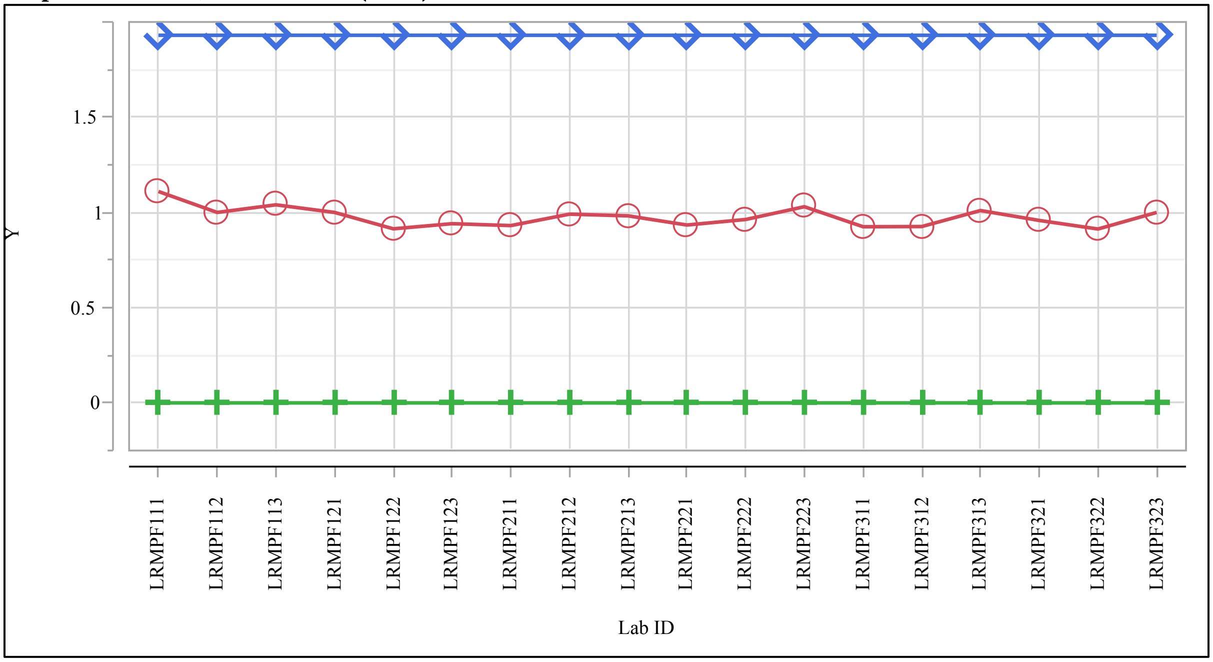
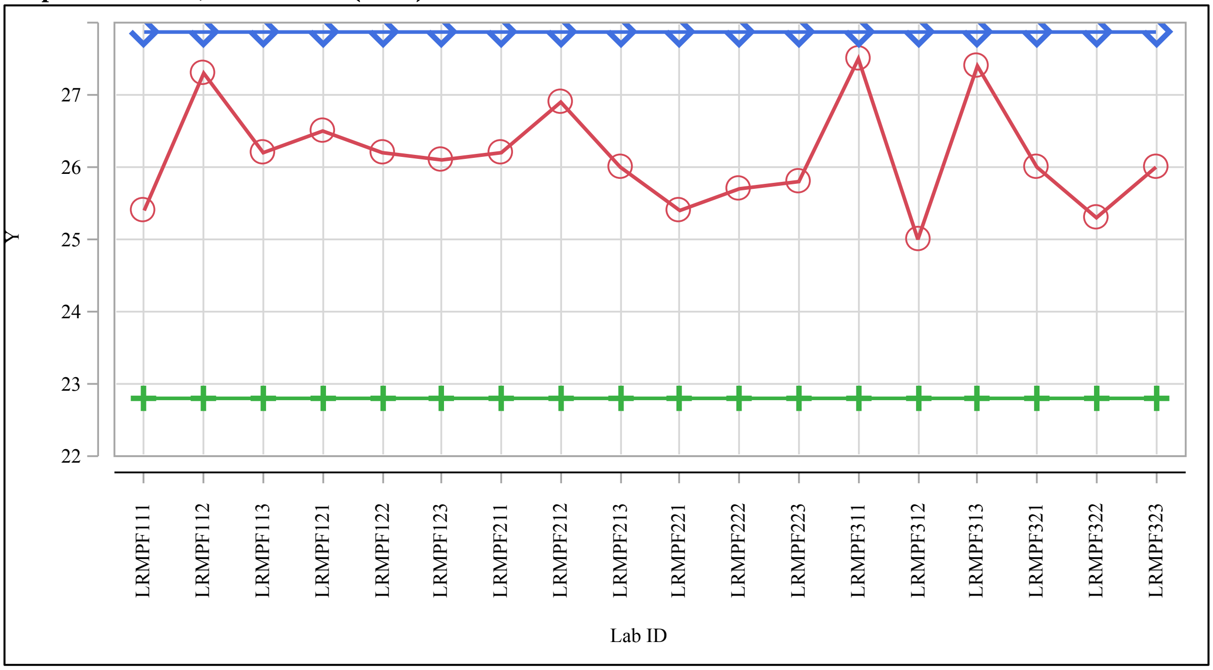


Exhibit C-3. Acceptability Evaluation for Measurements of the LRM Standard Glass (continued)

Prep Method=PF, Element=Fe (wt%)



Prep Method=PF, Element=Si (wt%)



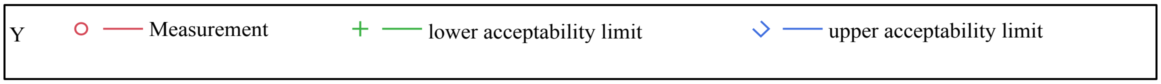


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide

Analyte=Al2O3 (wt%)

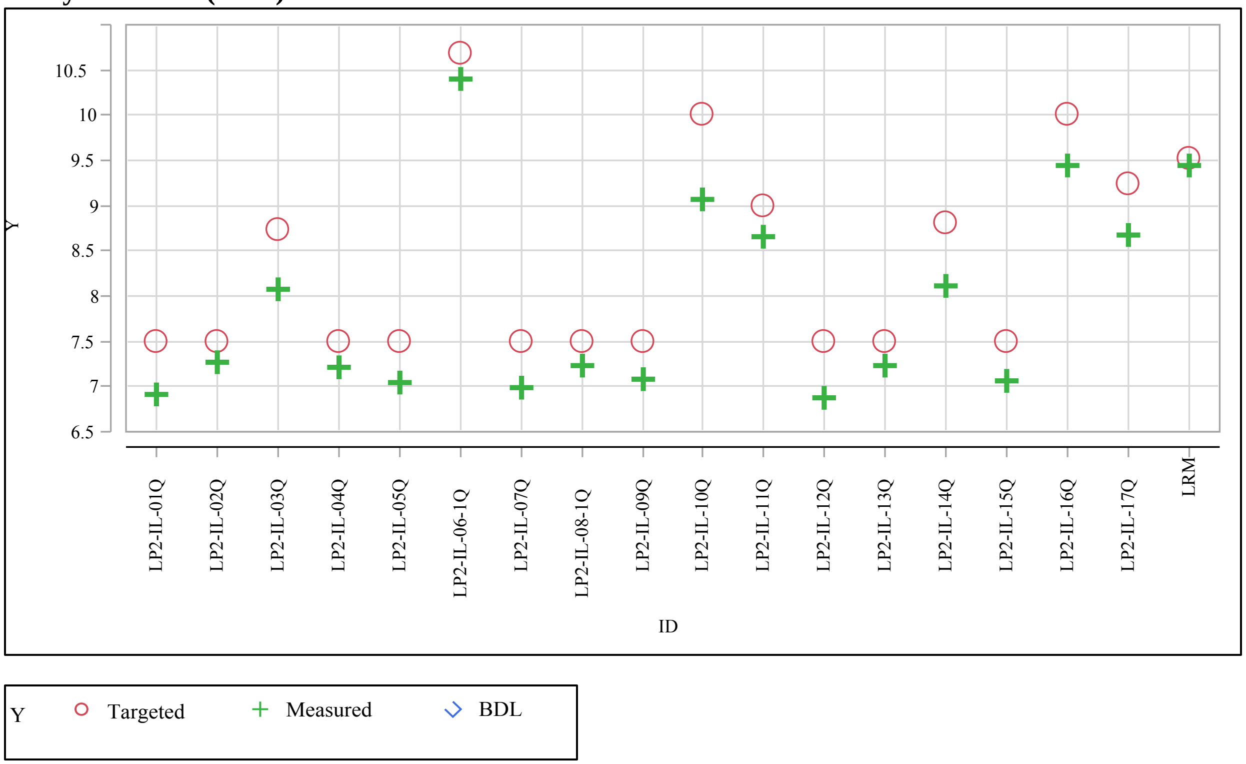


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

Analyte=B2O3 (wt%)

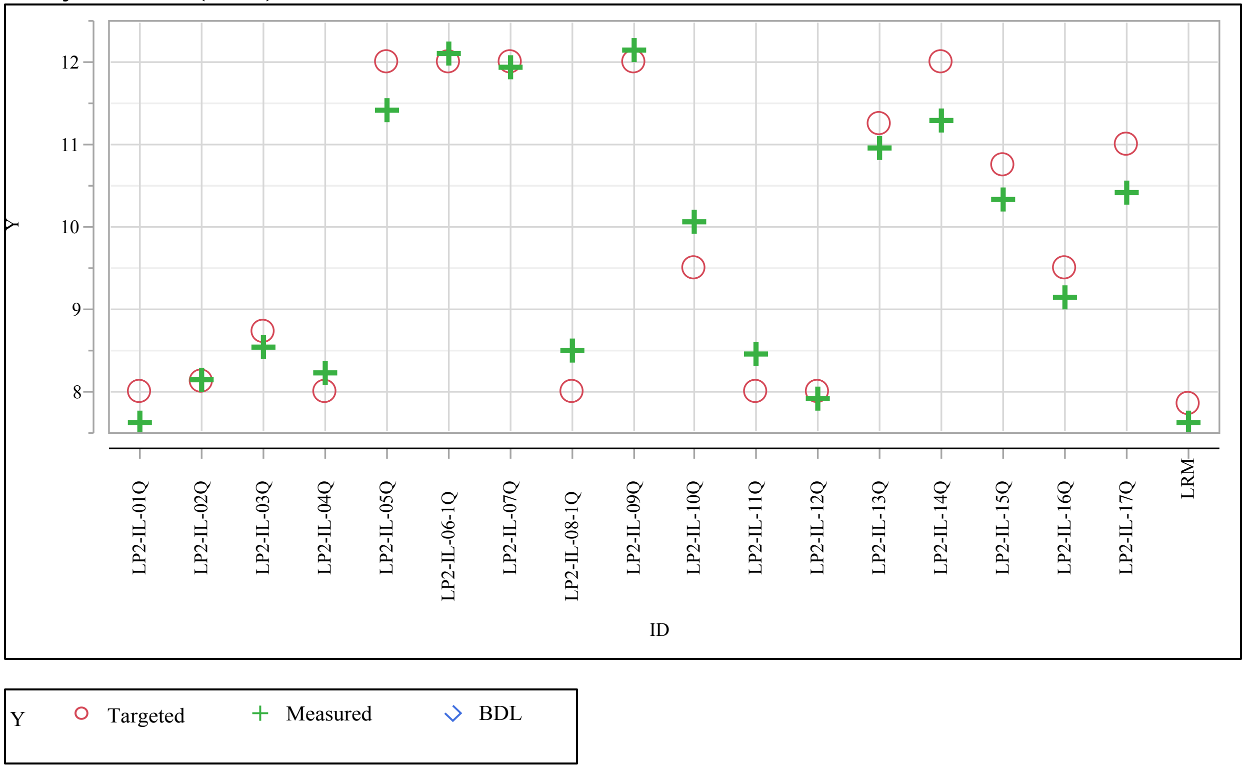


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

Analyte=CaO (wt%)

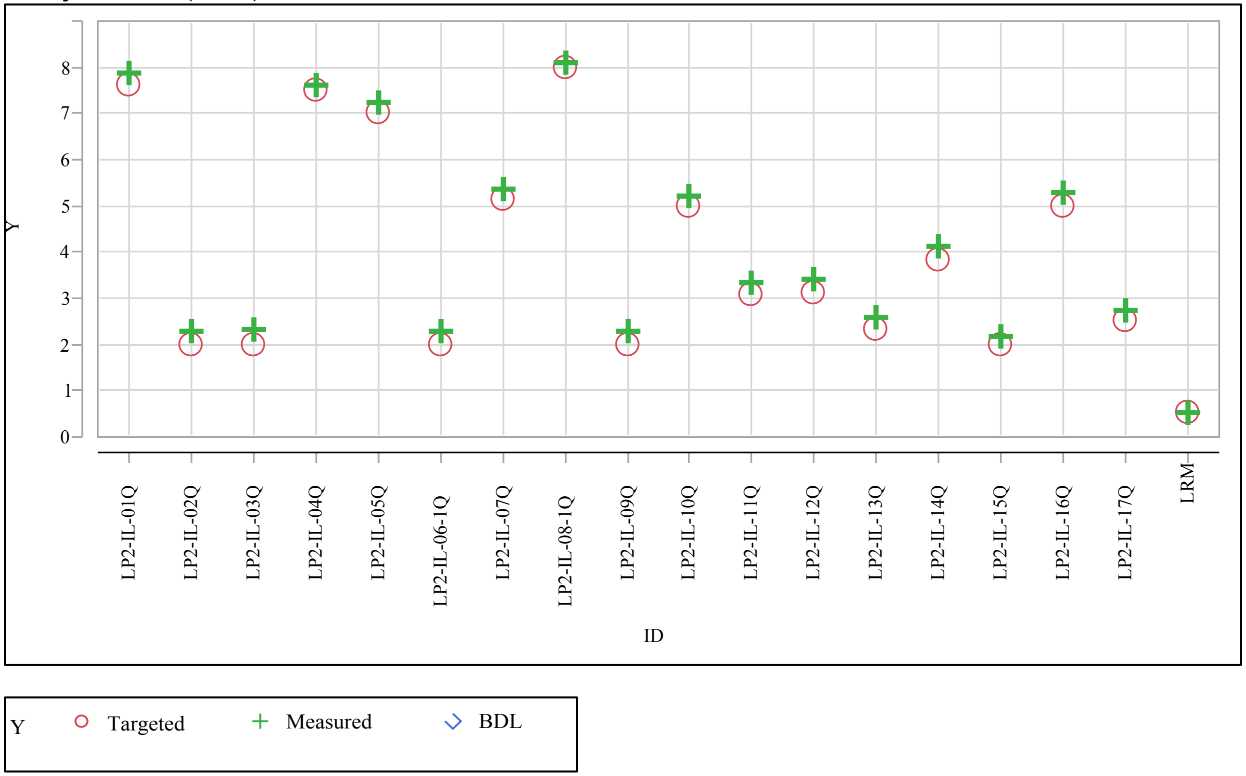


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

Analyte=Cl (wt%)

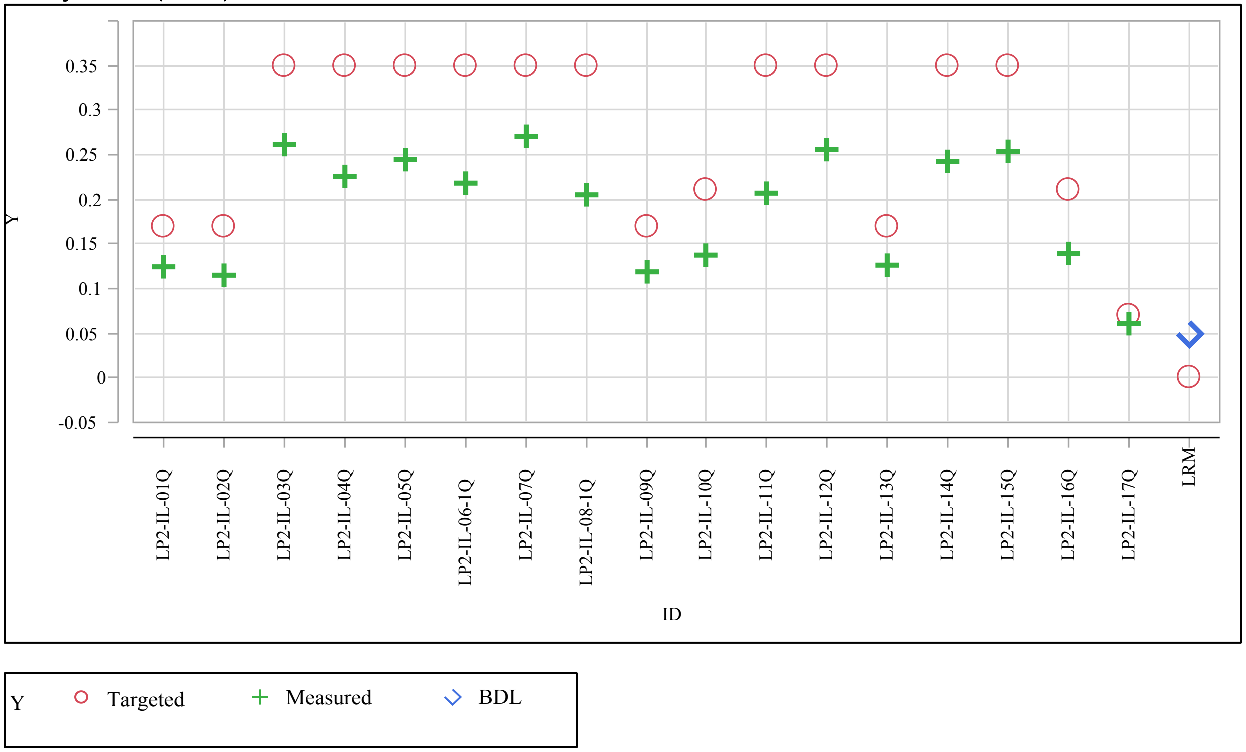


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

Analyte=Cr2O3 (wt%)

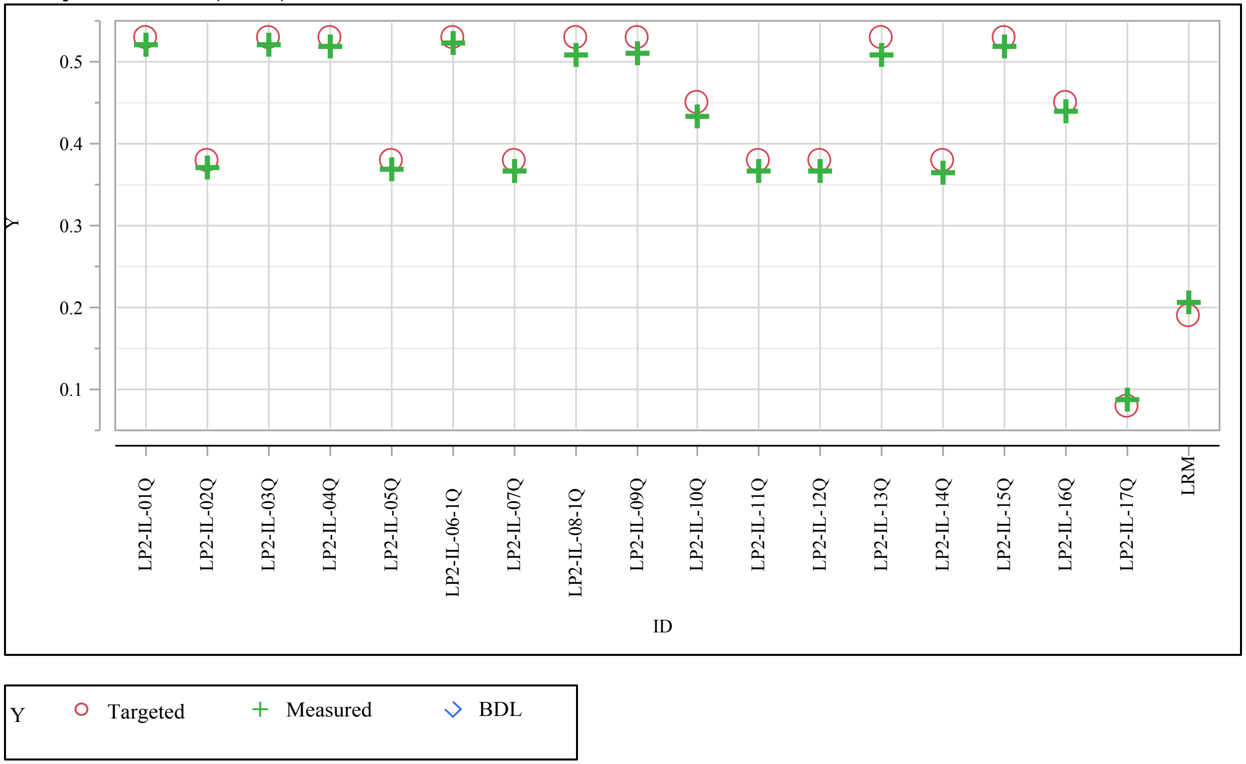


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

Analyte=F (wt%)

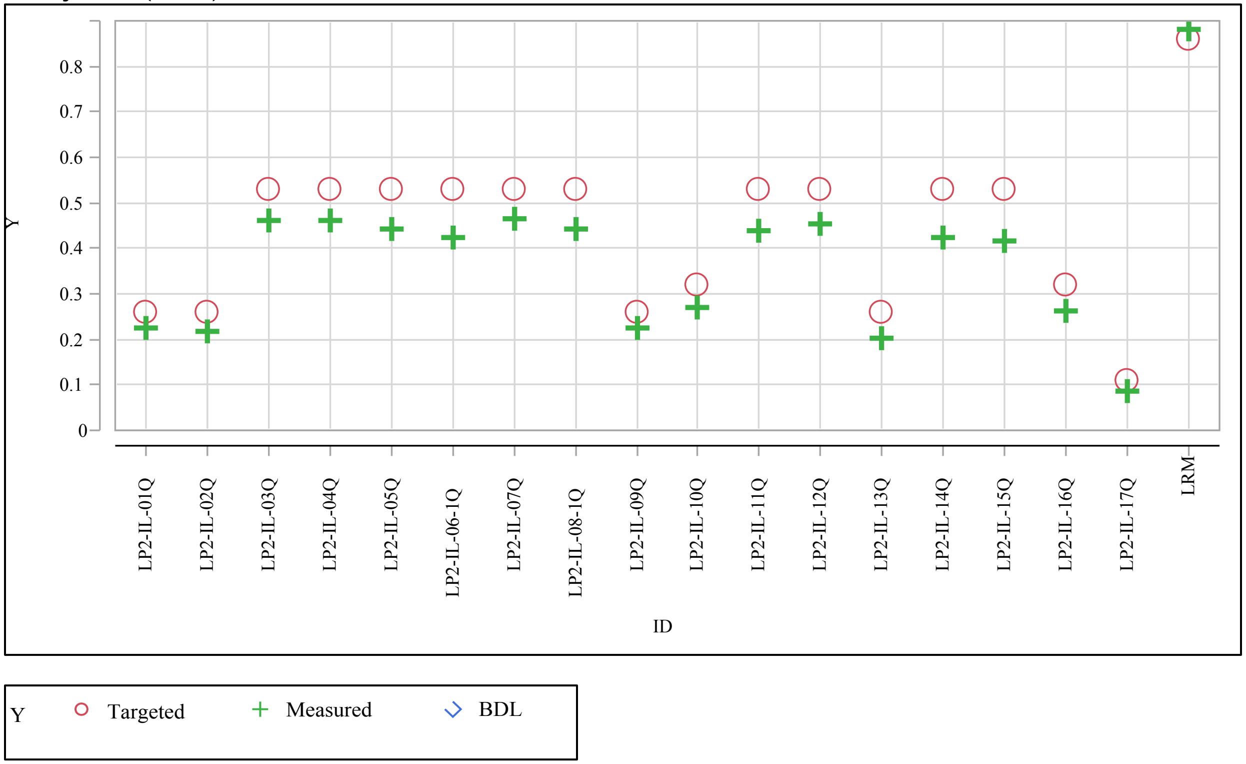


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

Analyte=Fe2O3 (wt%)

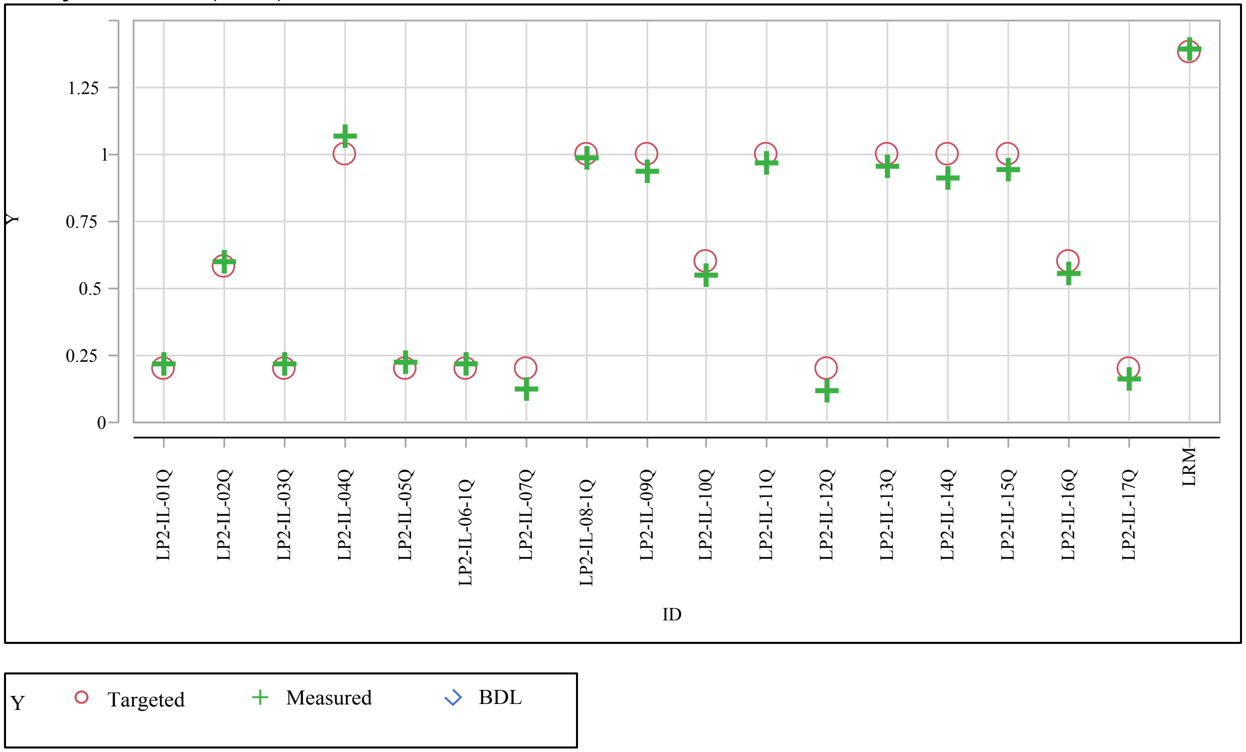


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

Analyte=K2O (wt%)

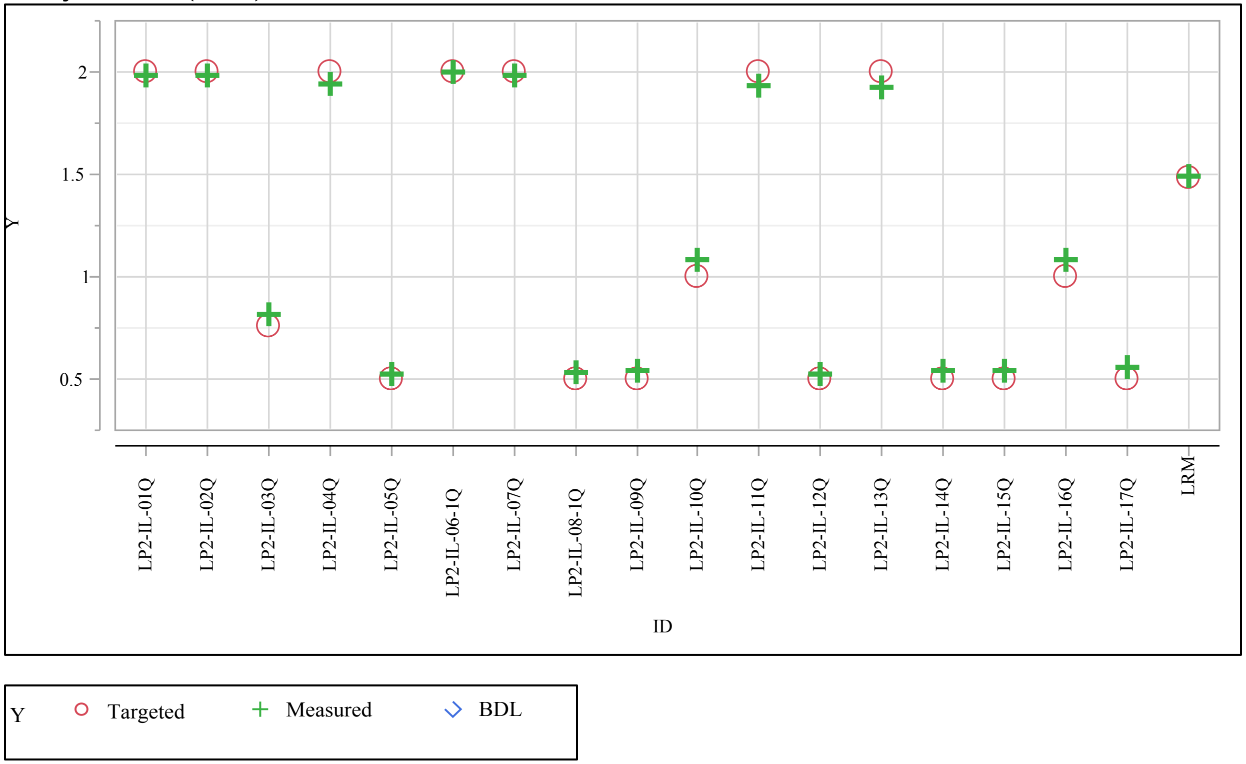


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

Analyte=Li2O (wt%)

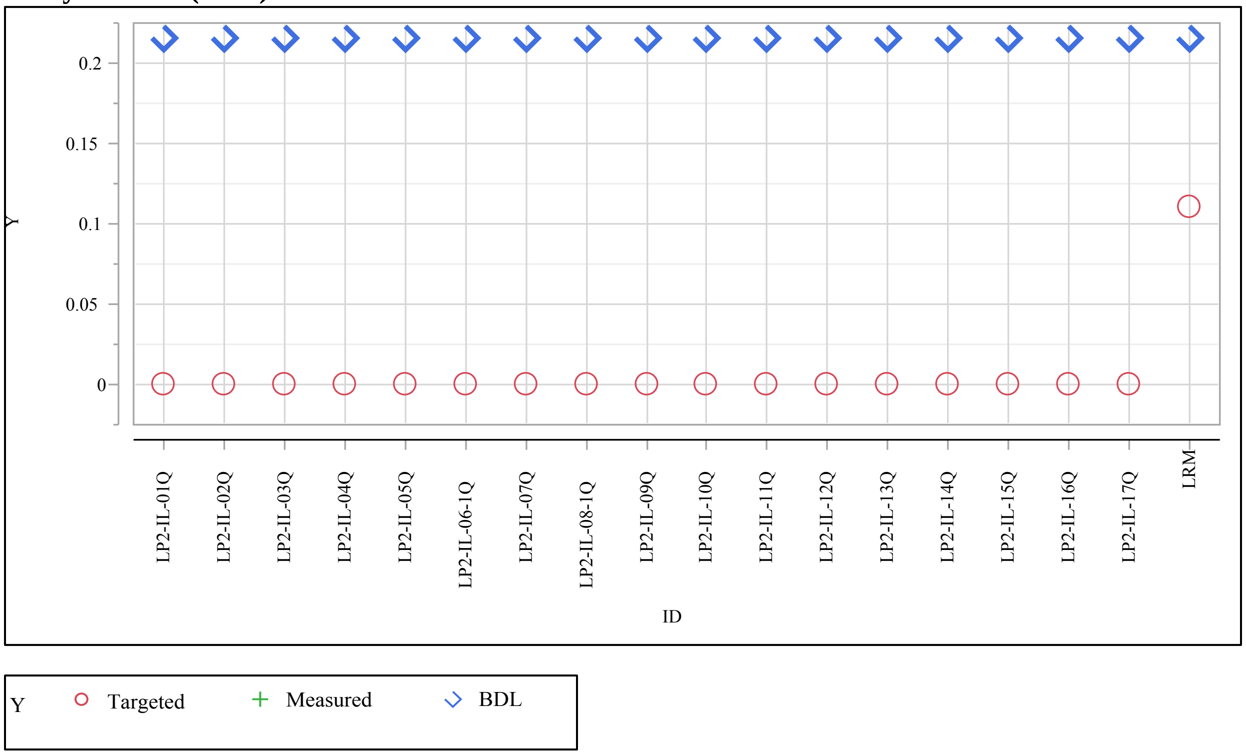


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

Analyte=MgO (wt%)

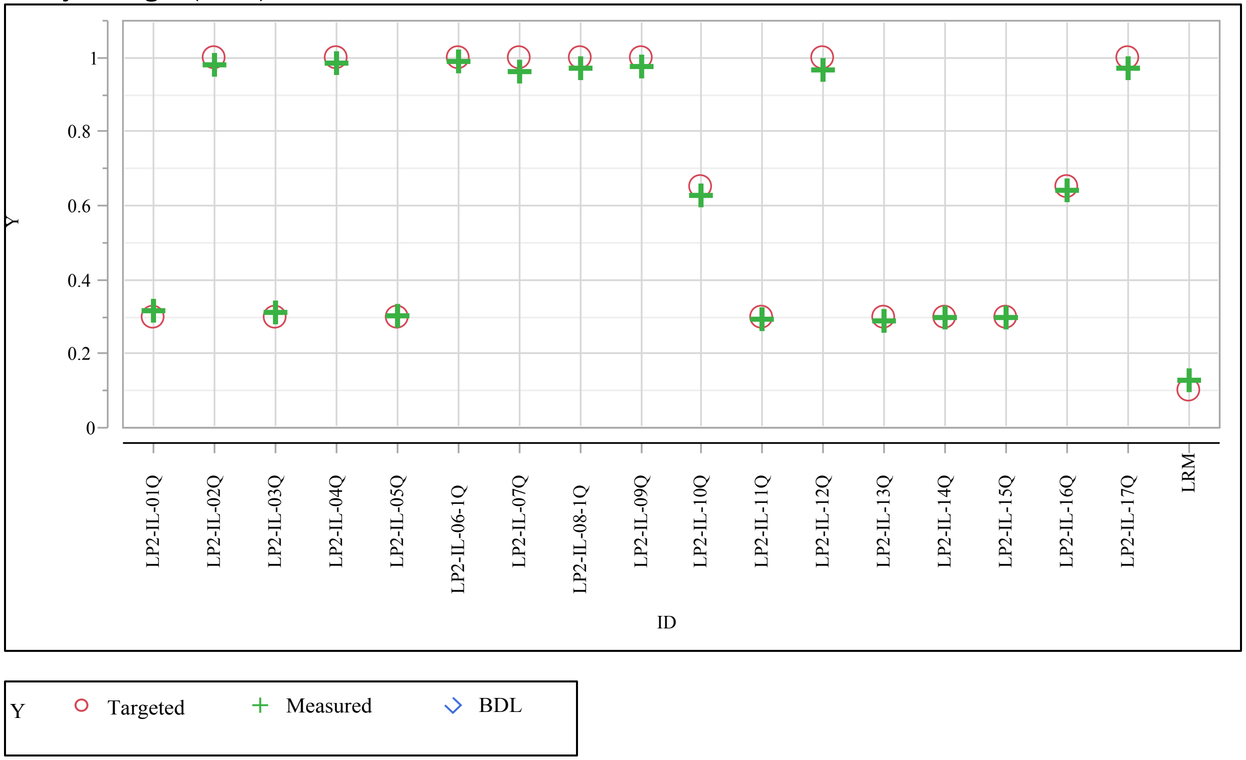


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

Analyte=Na2O (wt%)

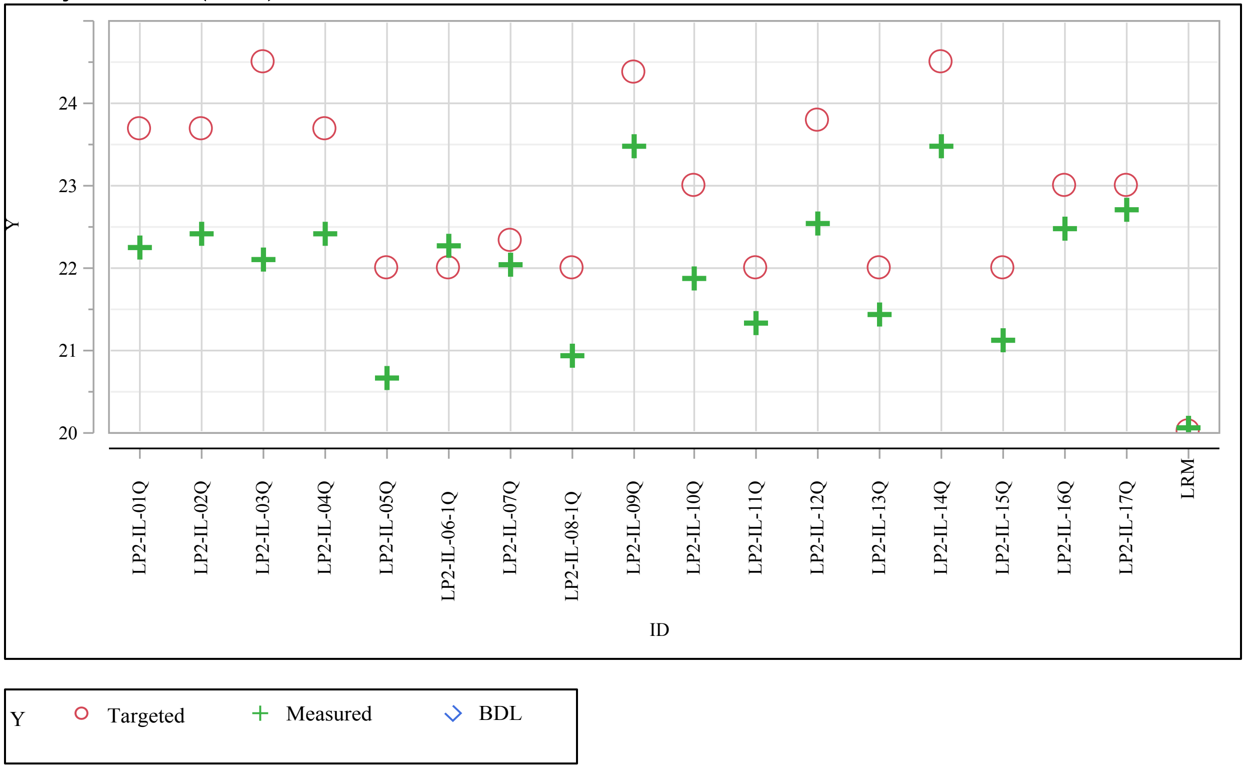


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

Analyte=P2O5 (wt%)

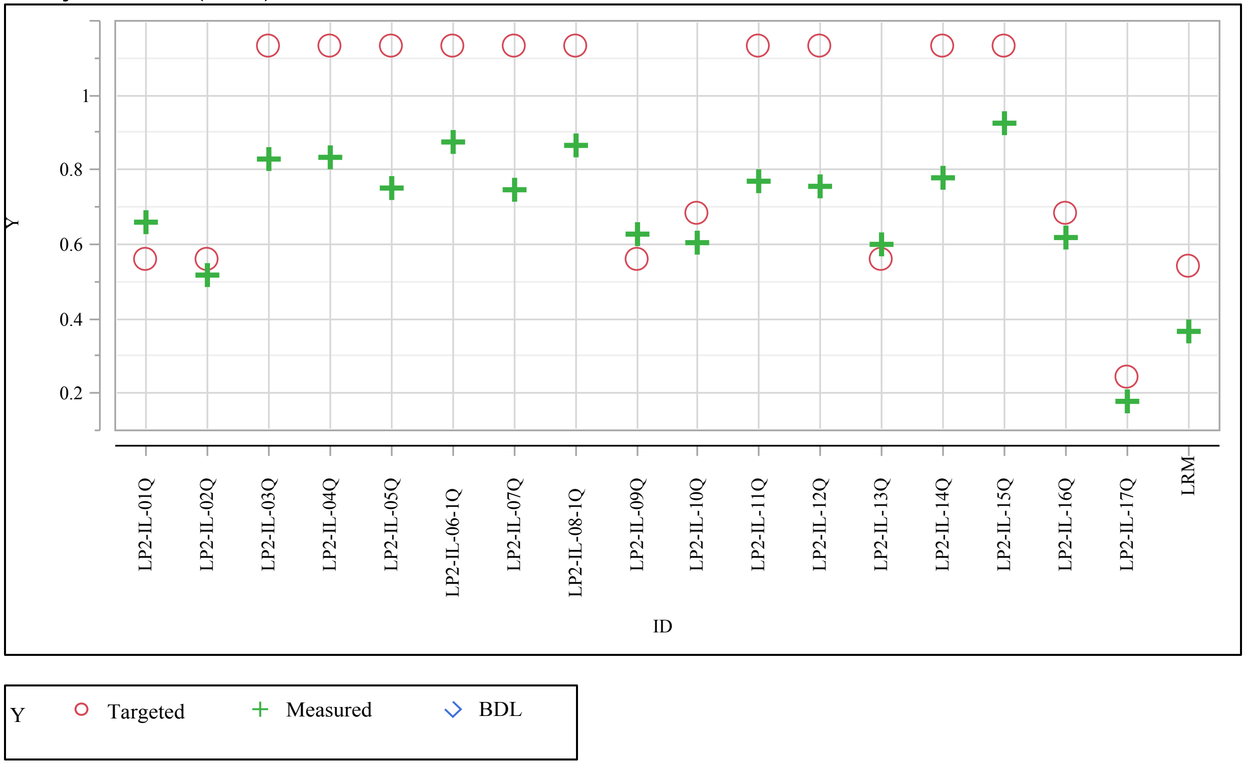


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

Analyte=SiO2 (wt%)

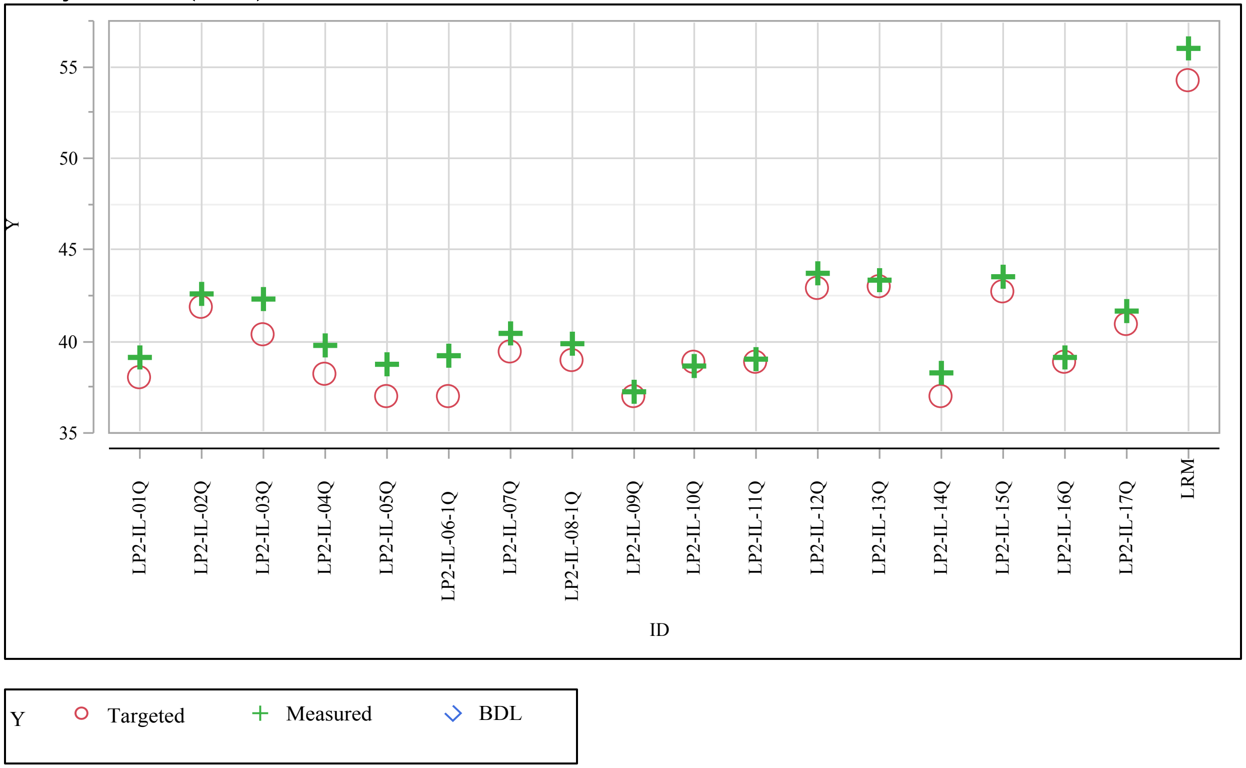


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

Analyte=SnO2 (wt%)

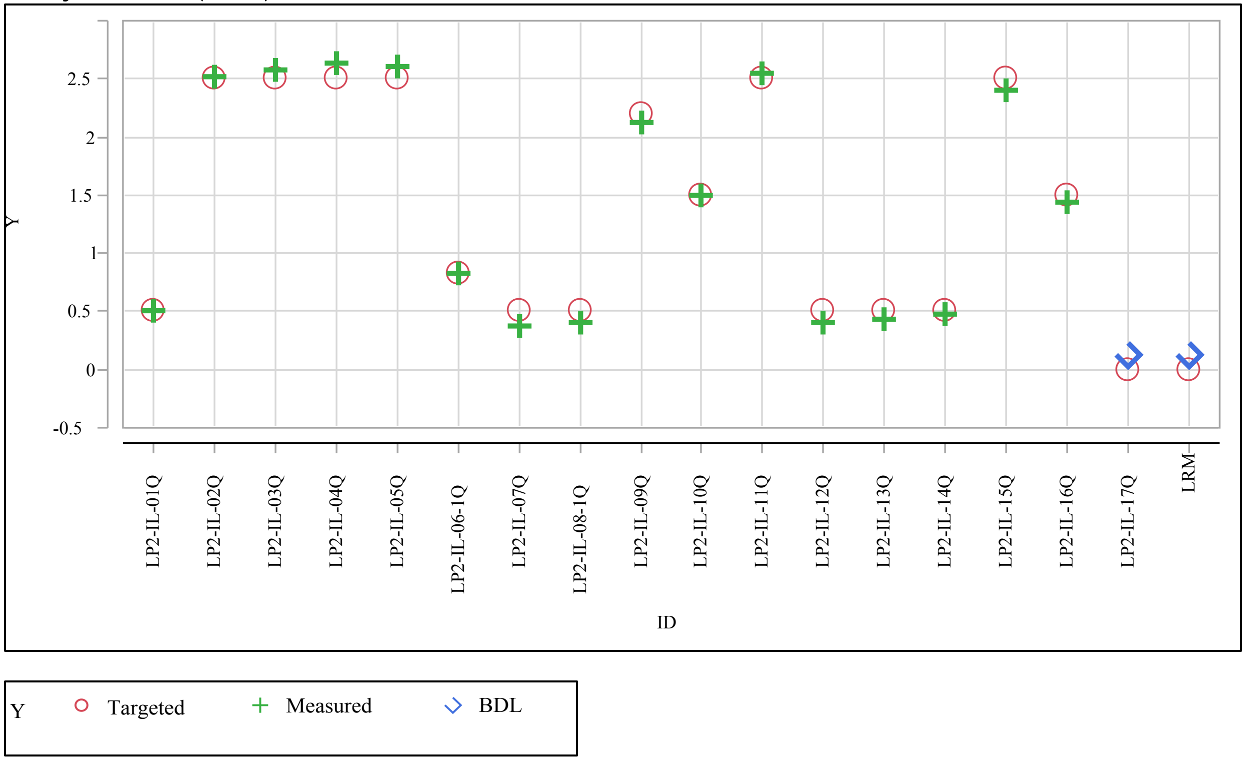


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

Analyte=SO3 (wt%)

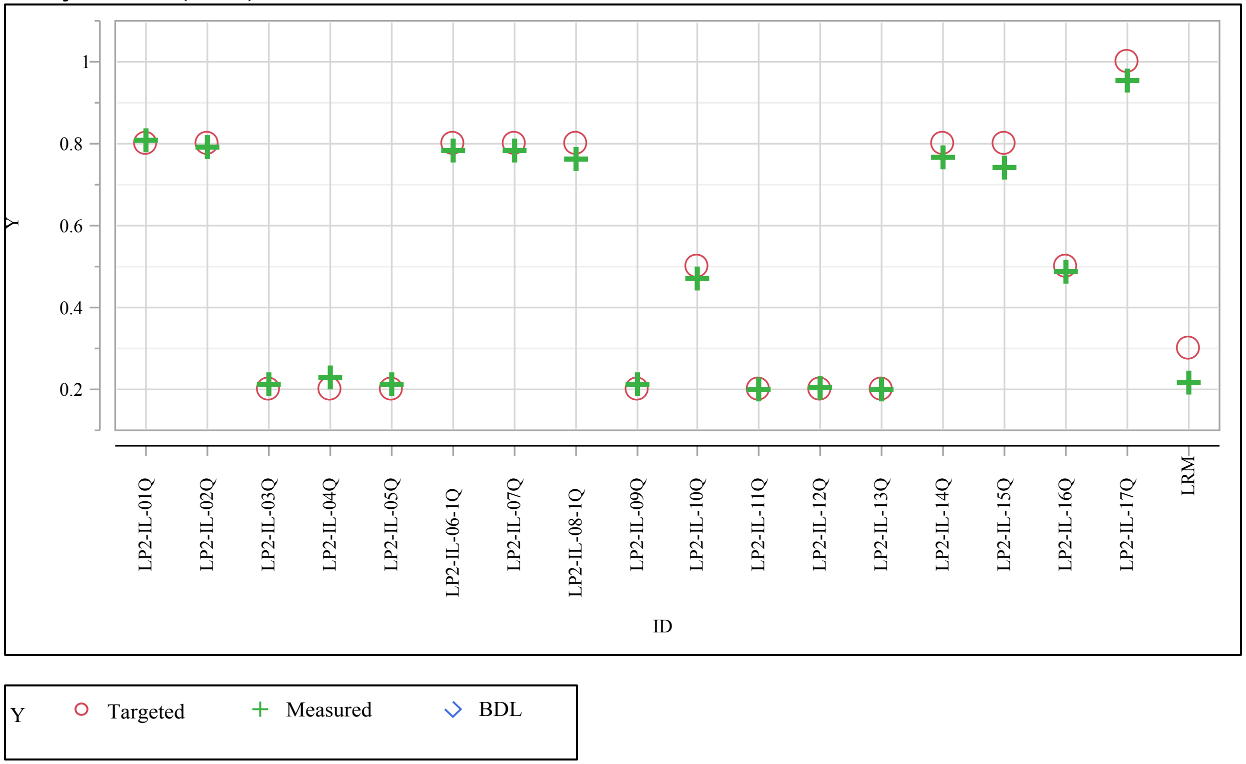


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

Analyte=V2O5 (wt%)

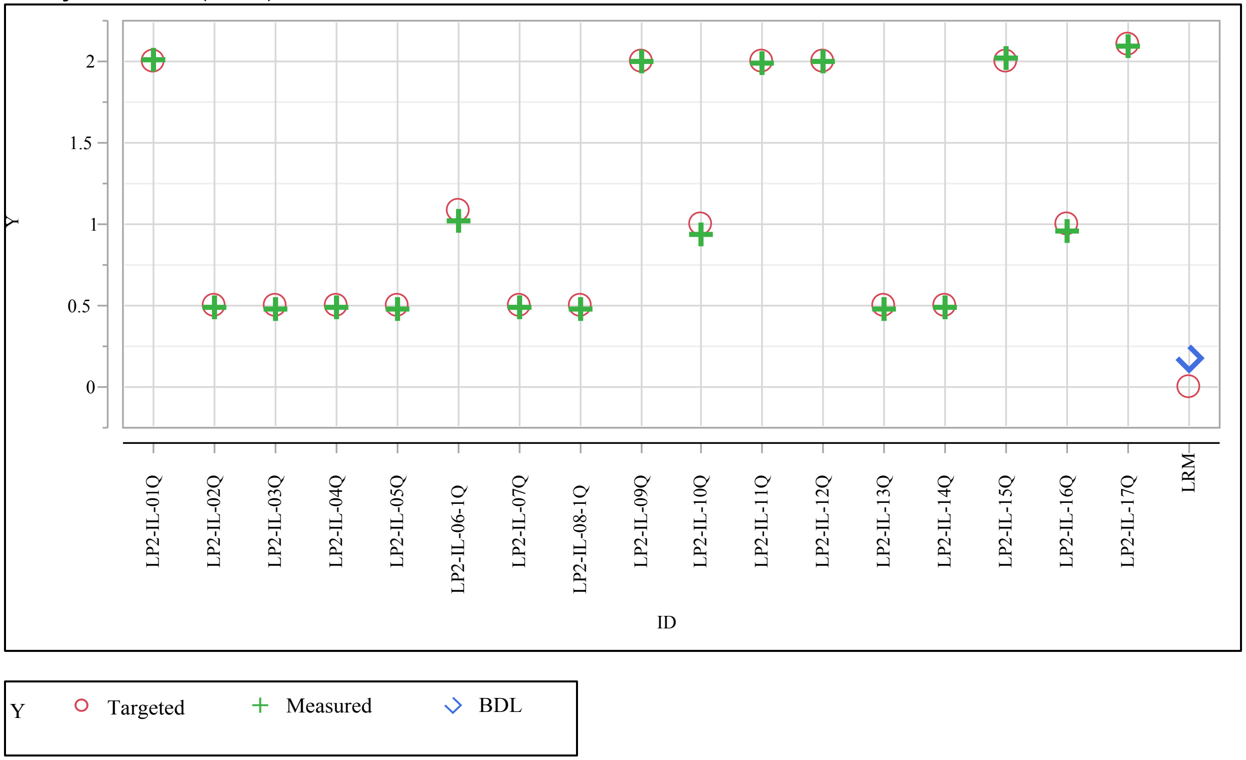


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

Analyte=ZnO (wt%)

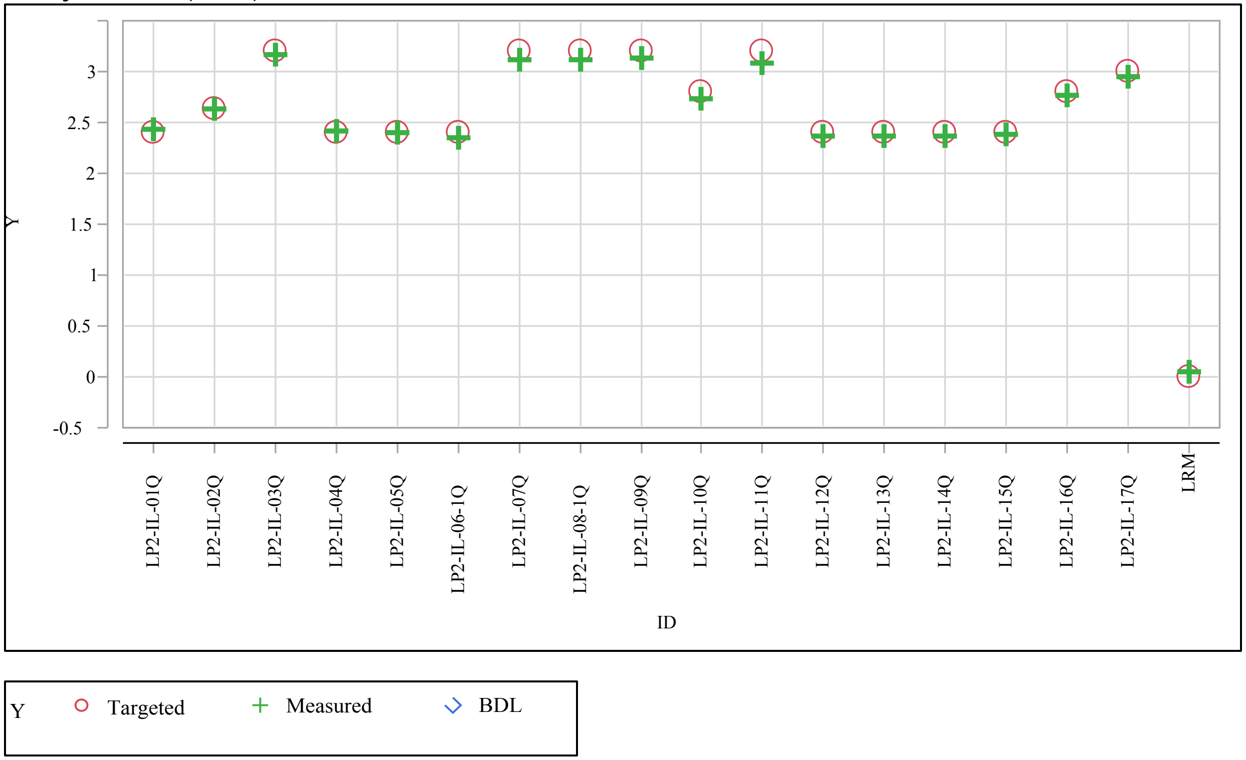


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

Analyte=ZrO2 (wt%)

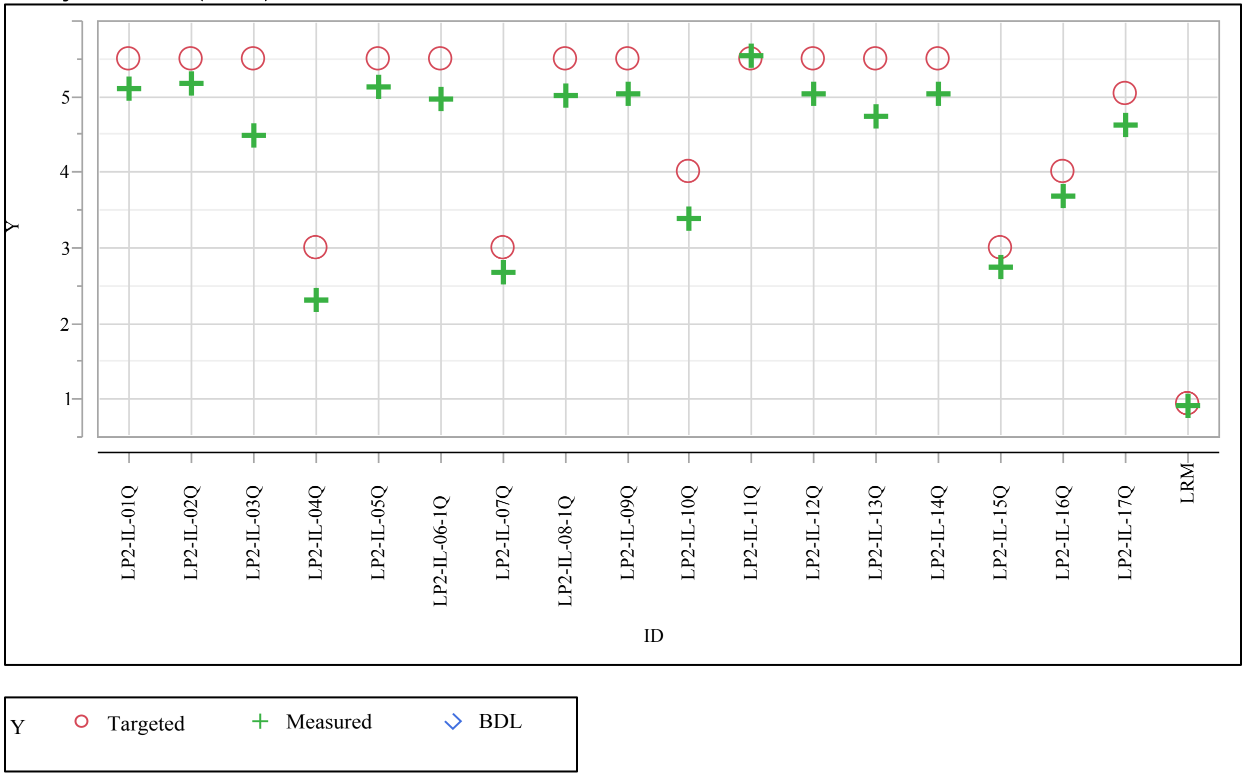
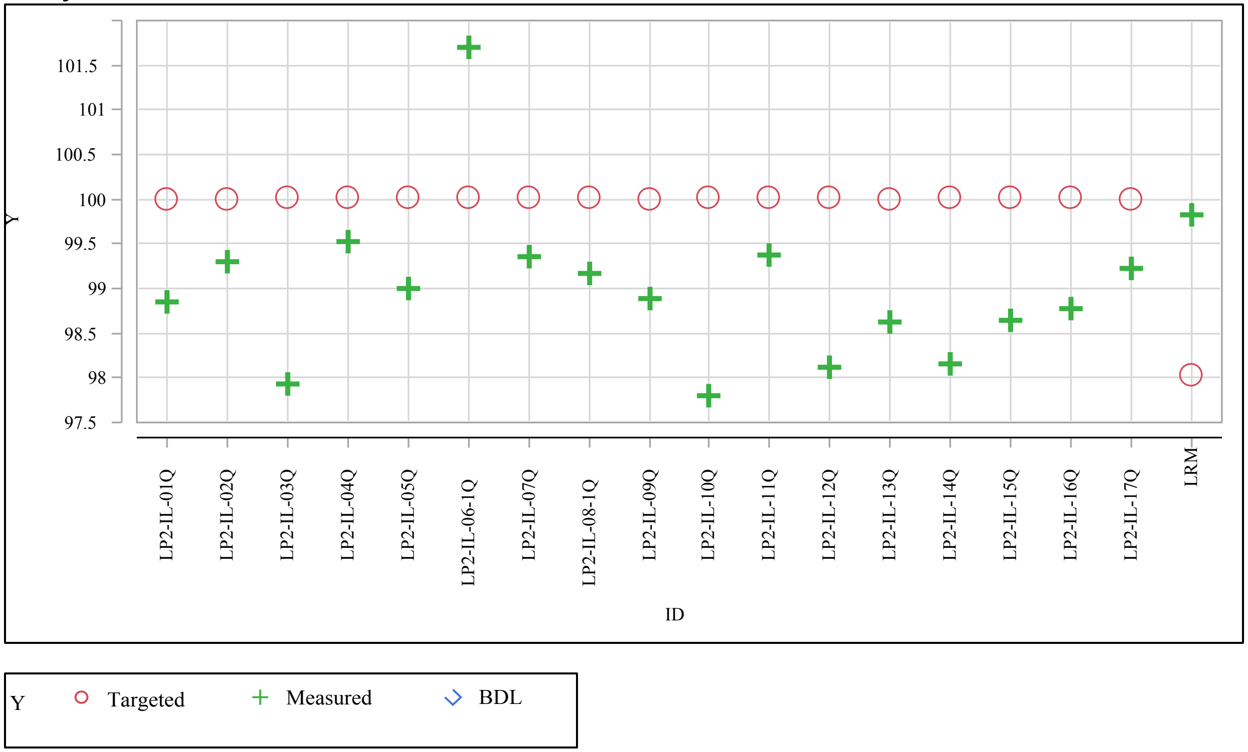


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

Analyte=Sum of Oxides



Appendix D Tables and Exhibits Supporting the PCT Results

Table D-1. PCT Measurements for LP2-IL Series Glasses (ar – as received)

Oven Run	Glass ID (with heat treatment)	Block	Seq	Lab ID	B (ar)	Li (ar)	Na (ar)	Si (ar)	B (mg/L)	Li (mg/L)	Na (mg/L)	Si (mg/L)
1	soln std	1	1	std-a1-1	19.7	10.1	83.6	46.9	19.700	10.100	83.600	46.900
1	LP2-IL-07Q	1	2	F22	64.9	<0.100	235	70.8	108.169	<0.167	391.675	118.002
1	LP2-IL-02Q	1	3	F02	16.6	<0.100	127	45.6	27.667	<0.167	211.671	76.002
1	LP2-IL-04Q	1	4	F39	20.6	<0.100	188	57.3	34.334	<0.167	313.340	95.502
1	LP2-IL-14Q	1	5	F20	62.1	<0.100	238	38.9	103.502	<0.167	396.675	64.835
1	LP2-IL-17Q	1	6	F53	37.4	<0.100	136	35.3	62.335	<0.167	226.671	58.835
1	LP2-IL-06-1Q	1	7	F47	57.8	<0.100	181	28.2	96.335	<0.167	301.673	47.001
1	LP2-IL-03Q	1	8	F42	11.9	<0.100	113	39.2	19.834	<0.167	188.337	65.335
1	LP2-IL-16Q	1	9	F17	16.3	<0.100	116	35.1	27.167	<0.167	193.337	58.501
1	ARM-1	1	10	F48	8.72	7.21	19.6	32.8	14.534	12.017	32.667	54.668
1	LP2-IL-01Q	1	11	F06	19.9	<0.100	184	52.1	33.167	<0.167	306.673	86.835
1	soln std	1	12	std-a1-2	18.4	9.30	77.6	47.4	18.400	9.300	77.600	47.400
1	LP2-IL-11Q	1	13	F50	8.16	<0.100	94.5	31.3	13.600	<0.167	157.503	52.168
1	blank	1	14	F23	<1.00	<0.100	<1.00	<0.100	<1.667	<0.167	<1.667	<0.167
1	LP2-IL-13Q	1	15	F34	42.2	<0.100	154	39.5	70.335	<0.167	256.672	65.835
1	LP2-IL-05Q	1	16	F14	21.7	<0.100	103	30.1	36.167	<0.167	171.670	50.168
1	LP2-IL-09Q	1	17	F27	76.4	<0.100	277	46.6	127.336	<0.167	461.676	77.668
1	LP2-IL-15Q	1	18	F11	32.5	<0.100	119	40.9	54.168	<0.167	198.337	68.168
1	LP2-IL-12Q	1	19	F03	19.4	<0.100	143	54.5	32.334	<0.167	238.338	90.835
1	LP2-IL-08-1Q	1	20	F19	19.1	<0.100	146	46.0	31.834	<0.167	243.338	76.668
1	LP2-IL-10Q	1	21	F36	15.4	<0.100	109	34.8	25.667	<0.167	181.670	58.001
1	soln std	1	22	std-a1-3	18.8	9.79	81.2	47.7	18.800	9.790	81.200	47.700
1	soln std	2	1	std-a2-1	20.4	10.1	81.5	47.8	20.400	10.100	81.500	47.800
1	LP2-IL-08-1Q	2	2	F09	19.4	<0.100	161	45.2	32.334	<0.167	268.339	75.335
1	ARM-1	2	3	F10	9.21	7.33	19.2	32.1	15.350	12.217	32.001	53.501
1	LP2-IL-12Q	2	4	F46	20.4	<0.100	163	55.7	34.001	<0.167	271.672	92.835
1	LP2-IL-13Q	2	5	F26	42.4	<0.100	170	40.5	70.668	<0.167	283.339	67.501
1	LP2-IL-14Q	2	6	F13	66.4	<0.100	270	39.4	110.669	<0.167	450.009	65.668
1	LP2-IL-07Q	2	7	F01	65.8	<0.100	271	69.4	109.669	<0.167	451.676	115.669
1	LP2-IL-03Q	2	8	F41	12.6	<0.100	126	40.5	21.000	<0.167	210.004	67.501
1	LP2-IL-10Q	2	9	F28	15.7	<0.100	131	34.3	26.167	<0.167	218.338	57.168
1	LP2-IL-04Q	2	10	F31	20.5	<0.100	207	57.5	34.167	<0.167	345.007	95.835

Table D-1. PCT Measurements for LP2-IL Series Glasses (ar – as received) (continued)

Oven Run	Glass ID (with heat treatment)	Block	Seq	Lab ID	B (ar)	Li (ar)	Na (ar)	Si (ar)	B (mg/L)	Li (mg/L)	Na (mg/L)	Si (mg/L)
1	LP2-IL-02Q	2	11	F44	17.6	<0.100	147	45.7	29.334	<0.167	245.005	76.168
1	soln std	2	12	std-a2-2	19.6	10.0	81.1	47.2	19.600	10.000	81.100	47.200
1	LP2-IL-16Q	2	13	F16	17.7	<0.100	127	35.8	29.501	<0.167	211.671	59.668
1	LP2-IL-17Q	2	14	F12	36.3	<0.100	151	35.8	60.501	<0.167	251.672	59.668
1	LP2-IL-01Q	2	15	F21	20.8	<0.100	208	51.7	34.667	<0.167	346.674	86.168
1	LP2-IL-15Q	2	16	F33	37.4	<0.100	144	42.5	62.335	<0.167	240.005	70.835
1	LP2-IL-11Q	2	17	F15	9.01	<0.100	95.2	31.5	15.017	<0.167	158.670	52.501
1	LP2-IL-09Q	2	18	F05	<1.00	<0.100	<1.00	<0.100	<1.667	<0.167	<1.667	<0.167
1	LP2-IL-05Q	2	19	F43	22.4	<0.100	121	30.3	37.334	<0.167	201.671	50.501
1	LP2-IL-06-1Q	2	20	F32	55.6	<0.100	192	26.7	92.669	<0.167	320.006	44.501
1	soln std	2	21	std-a2-3	20.6	10.4	82.9	48.4	20.600	10.400	82.900	48.400
1	soln std	3	1	std-a3-1	20.6	10.4	82.6	48.1	20.600	10.400	82.600	48.100
1	LP2-IL-12Q	3	2	F30	22.2	<0.100	171	58.4	37.001	<0.167	285.006	97.335
1	LP2-IL-04Q	3	3	F35	19.7	<0.100	209	57.0	32.834	<0.167	348.340	95.002
1	LP2-IL-16Q	3	4	F07	17.6	<0.100	125	36.2	29.334	<0.167	208.338	60.335
1	LP2-IL-02Q	3	5	F37	17.6	<0.100	144	46.3	29.334	<0.167	240.005	77.168
1	LP2-IL-09Q	3	6	F56	78.7	<0.100	308	46.1	131.169	<0.167	513.344	76.835
1	ARM-1	3	7	F08	9.68	7.81	19.8	32.3	16.134	13.017	33.001	53.834
1	blank	3	8	F04	<1.00	<0.100	<1.00	<0.100	<1.667	<0.167	<1.667	<0.167
1	LP2-IL-14Q	3	9	F38	66.9	<0.100	264	39.7	111.502	<0.167	440.009	66.168
1	LP2-IL-03Q	3	10	F49	13.0	<0.100	125	40.3	21.667	<0.167	208.338	67.168
1	LP2-IL-17Q	3	11	F25	35.6	<0.100	147	35.4	59.335	<0.167	245.005	59.001
1	soln std	3	12	std-a3-2	20.5	10.4	82.5	48.0	20.500	10.400	82.500	48.000
1	LP2-IL-15Q	3	13	F55	37.3	<0.100	138	42.4	62.168	<0.167	230.005	70.668
1	LP2-IL-13Q	3	14	F29	42.7	<0.100	156	40.2	71.168	<0.167	260.005	67.001
1	LP2-IL-01Q	3	15	F45	20.8	<0.100	195	50.7	34.667	<0.167	325.007	84.502
1	LP2-IL-10Q	3	16	F24	15.7	<0.100	113	34.1	26.167	<0.167	188.337	56.834
1	LP2-IL-05Q	3	17	F52	23.2	<0.100	111	31.0	38.667	<0.167	185.004	51.668
1	LP2-IL-07Q	3	18	F18	67.1	<0.100	259	72.0	111.836	<0.167	431.675	120.002
1	LP2-IL-06-1Q	3	19	F54	55.8	<0.100	176	28.0	93.002	<0.167	293.339	46.668
1	LP2-IL-08-1Q	3	20	F40	20.4	<0.100	155	45.8	34.001	<0.167	258.339	76.335
1	LP2-IL-11Q	3	21	F51	8.82	<0.100	92.2	30.8	14.700	<0.167	153.670	51.334
1	soln std	3	22	std-a3-3	20.9	10.6	83.1	48.4	20.900	10.600	83.100	48.400

Table D-1. PCT Measurements for LP2-IL Series Glasses (ar – as received) (continued)

Oven Run	Glass ID (with heat treatment)	Block	Seq	Lab ID	B (ar)	Li (ar)	Na (ar)	Si (ar)	B (mg/L)	Li (mg/L)	Na (mg/L)	Si (mg/L)
2	soln std	1	1	std-b1-1	21.0	10.5	80.7	52.8	21.000	10.500	80.700	52.800
2	blank	1	2	V03	<1.00	<0.100	<1.00	<0.100	<1.667	<0.167	<1.667	<0.167
2	LP2-IL-10CCC	1	3	V33	17.2	<0.100	122	41.3	28.667	<0.167	203.337	68.835
2	LP2-IL-17CCC	1	4	V42	34.0	<0.100	146	41.0	56.668	<0.167	243.338	68.335
2	LP2-IL-05CCC	1	5	V02	27.4	<0.100	134	37.9	45.668	<0.167	223.338	63.168
2	LP2-IL-07CCC	1	6	V36	61.6	<0.100	253	72.0	102.669	<0.167	421.675	120.002
2	LP2-IL-06-1CCC	1	7	V34	52.2	<0.100	169	29.7	87.002	<0.167	281.672	49.501
2	LP2-IL-13CCC	1	8	V46	32.8	<0.100	136	41.0	54.668	<0.167	226.671	68.335
2	LP2-IL-14CCC	1	9	V16	62.3	<0.100	249	43.9	103.835	<0.167	415.008	73.168
2	ARM-1	1	10	V17	10.6	8.59	21.4	38.5	17.667	14.317	35.667	64.168
2	LP2-IL-12CCC	1	11	V14	16.4	<0.100	143	53.9	27.334	<0.167	238.338	89.835
2	soln std	1	12	std-b1-2	20.2	10.5	81.9	51.0	20.200	10.500	81.900	51.000
2	LP2-IL-08-1CCC	1	13	V47	18.9	<0.100	149	47.7	31.501	<0.167	248.338	79.502
2	LP2-IL-09CCC	1	14	V27	74.3	<0.100	286	50.6	123.836	<0.167	476.676	84.335
2	LP2-IL-02CCC	1	15	V04	17.7	<0.100	147	49.6	29.501	<0.167	245.005	82.668
2	LP2-IL-03CCC	1	16	V19	12.4	<0.100	115	42.3	20.667	<0.167	191.671	70.501
2	LP2-IL-16CCC	1	17	V09	16.0	<0.100	120	37.4	26.667	<0.167	200.004	62.335
2	LP2-IL-01CCC	1	18	V15	31.2	<0.100	282	61.1	52.001	<0.167	470.009	101.835
2	LP2-IL-15CCC	1	19	V21	18.5	<0.100	89.5	39.0	30.834	<0.167	149.170	65.001
2	LP2-IL-04CCC	1	20	V45	22.1	<0.100	222	64.5	36.834	<0.167	370.007	107.502
2	LP2-IL-11CCC	1	21	V32	9.29	<0.100	93.8	34.6	15.484	<0.167	156.336	57.668
2	soln std	1	22	std-b1-3	20.9	10.3	81.0	48.2	20.900	10.300	81.000	48.200
2	soln std	2	1	std-b2-1	19.4	10.3	80.2	50.2	19.400	10.300	80.200	50.200
2	LP2-IL-03CCC	2	2	V56	12.1	<0.100	121	41.9	20.167	<0.167	201.671	69.835
2	LP2-IL-07CCC	2	3	V49	57.7	<0.100	245	68.5	96.169	<0.167	408.342	114.169
2	LP2-IL-17CCC	2	4	V30	32.6	<0.100	139	38.3	54.334	<0.167	231.671	63.835
2	LP2-IL-13CCC	2	5	V06	31.5	<0.100	132	38.5	52.501	<0.167	220.004	64.168
2	ARM-1	2	6	V29	11.0	8.89	22.7	37.9	18.334	14.817	37.834	63.168
2	LP2-IL-11CCC	2	7	V11	9.31	<0.100	94.0	34.4	15.517	<0.167	156.670	57.334
2	LP2-IL-02CCC	2	8	V01	17.1	<0.100	145	49.7	28.501	<0.167	241.672	82.835
2	LP2-IL-15CCC	2	9	V12	18.9	<0.100	89.7	38.4	31.501	<0.167	149.503	64.001
2	LP2-IL-05CCC	2	10	V24	25.8	<0.100	128	34.6	43.001	<0.167	213.338	57.668
2	LP2-IL-12CCC	2	11	V20	15.9	<0.100	138	51.6	26.501	<0.167	230.005	86.002

Table D-1. PCT Measurements for LP2-IL Series Glasses (ar – as received) (continued)

Oven Run	Glass ID (with heat treatment)	Block	Seq	Lab ID	B (ar)	Li (ar)	Na (ar)	Si (ar)	B (mg/L)	Li (mg/L)	Na (mg/L)	Si (mg/L)
2	soln std	2	12	std-b2-2	19.4	10.2	79.2	49.0	19.400	10.200	79.200	49.000
2	LP2-IL-08-1CCC	2	13	V25	17.1	<0.100	144	44.4	28.501	<0.167	240.005	74.001
2	LP2-IL-01CCC	2	14	V23	31.8	<0.100	283	61.1	53.001	<0.167	471.676	101.835
2	LP2-IL-10CCC	2	15	V18	16.7	<0.100	121	38.4	27.834	<0.167	201.671	64.001
2	LP2-IL-14CCC	2	16	V53	60.0	<0.100	236	42.0	100.002	<0.167	393.341	70.001
2	LP2-IL-09CCC	2	17	V38	72.4	<0.100	277	48.6	120.669	<0.167	461.676	81.002
2	LP2-IL-06-1CCC	2	18	V41	50.6	<0.100	167	28.1	84.335	<0.167	278.339	46.834
2	LP2-IL-16CCC	2	19	V37	15.9	<0.100	116	36.0	26.501	<0.167	193.337	60.001
2	LP2-IL-04CCC	2	20	V31	22.6	<0.100	224	65.3	37.667	<0.167	373.341	108.836
2	soln std	2	21	std-b2-3	19.0	10.0	80.7	47.8	19.000	10.000	80.700	47.800
2	soln std	3	1	std-b3-1	19.3	10.1	81.1	48.8	19.300	10.100	81.100	48.800
2	LP2-IL-08-1CCC	3	2	V48	17.2	<0.100	140	45.3	28.667	<0.167	233.338	75.502
2	blank	3	3	V22	<1.00	<0.100	<1.00	<0.100	<1.667	<0.167	<1.667	<0.167
2	LP2-IL-13CCC	3	4	V51	30.9	<0.100	131	38.2	51.501	<0.167	218.338	63.668
2	LP2-IL-17CCC	3	5	V52	32.6	<0.100	127	37.9	54.334	<0.167	211.671	63.168
2	LP2-IL-14CCC	3	6	V54	59.7	<0.100	245	41.4	99.502	<0.167	408.342	69.001
2	LP2-IL-09CCC	3	7	V07	74.1	<0.100	267	48.8	123.502	<0.167	445.009	81.335
2	LP2-IL-16CCC	3	8	V10	16.2	<0.100	115	36.5	27.001	<0.167	191.671	60.835
2	LP2-IL-03CCC	3	9	V26	11.9	<0.100	121	41.0	19.834	<0.167	201.671	68.335
2	LP2-IL-04CCC	3	10	V28	21.7	<0.100	229	62.1	36.167	<0.167	381.674	103.502
2	LP2-IL-10CCC	3	11	V50	16.3	<0.100	126	37.4	27.167	<0.167	210.004	62.335
2	soln std	3	12	std-b3-2	19.6	10.1	81.3	48.8	19.600	10.100	81.300	48.800
2	LP2-IL-15CCC	3	13	V40	18.0	<0.100	85.6	37.9	30.001	<0.167	142.670	63.168
2	LP2-IL-11CCC	3	14	V55	8.97	<0.100	89.7	33.0	14.950	<0.167	149.503	55.001
2	LP2-IL-02CCC	3	15	V35	16.3	<0.100	140	46.9	27.167	<0.167	233.338	78.168
2	LP2-IL-07CCC	3	16	V08	57.8	<0.100	258	68.5	96.335	<0.167	430.009	114.169
2	LP2-IL-01CCC	3	17	V44	30.5	<0.100	297	58.3	50.834	<0.167	495.010	97.169
2	LP2-IL-12CCC	3	18	V43	16.1	<0.100	152	51.0	26.834	<0.167	253.338	85.002
2	LP2-IL-06-1CCC	3	19	V39	48.1	<0.100	172	27.5	80.168	<0.167	286.672	45.834
2	LP2-IL-05CCC	3	20	V13	25.0	<0.100	137	33.5	41.668	<0.167	228.338	55.834
2	ARM-1	3	21	V05	10.0	8.11	20.9	36.0	16.667	13.517	34.834	60.001
2	soln std	3	22	std-b3-3	18.5	9.60	82.1	47.2	18.500	9.600	82.100	47.200

Table D-2. PCT Leachate pH Values for the Quenched Versions of the LP2-IL Glasses

Identifier	pH	Identifier	pH	Identifier	pH
ARM-1	10.41	LP2-IL-06-1Q-1	11.55	LP2-IL-12Q-1	11.71
ARM-2	10.42	LP2-IL-06-1Q-2	11.51	LP2-IL-12Q-2	11.56
ARM-3	10.42	LP2-IL-06-1Q-3	11.54	LP2-IL-12Q-3	11.52
BLANK-1	9.68	LP2-IL-07Q-1	11.73	LP2-IL-13Q-1	11.48
BLANK-2	8.70	LP2-IL-07Q-2	11.63	LP2-IL-13Q-2	11.45
LP2-IL-01Q-1	11.72	LP2-IL-07Q-3	11.77	LP2-IL-13Q-3	11.39
LP2-IL-01Q-2	11.91	LP2-IL-08-1Q-1	11.70	LP2-IL-14Q-1	11.66
LP2-IL-01Q-3	11.86	LP2-IL-08-1Q-2	11.61	LP2-IL-14Q-2	11.69
LP2-IL-02Q-1	11.53	LP2-IL-08-1Q-3	11.88	LP2-IL-14Q-3	11.68
LP2-IL-02Q-2	11.45	LP2-IL-09Q-1	11.87	LP2-IL-15Q-1	11.09
LP2-IL-02Q-3	11.40	LP2-IL-09Q-2	n/a	LP2-IL-15Q-2	11.04
LP2-IL-03Q-1	11.44	LP2-IL-09Q-3	11.76	LP2-IL-15Q-3	10.95
LP2-IL-03Q-2	11.51	LP2-IL-10Q-1	11.41	LP2-IL-16Q-1	11.51
LP2-IL-03Q-3	11.60	LP2-IL-10Q-2	11.51	LP2-IL-16Q-2	11.51
LP2-IL-04Q-1	11.84	LP2-IL-10Q-3	11.57	LP2-IL-16Q-3	11.58
LP2-IL-04Q-2	11.82	LP2-IL-11Q-1	11.58	LP2-IL-17Q-1	11.37
LP2-IL-04Q-3	11.95	LP2-IL-11Q-2	11.44	LP2-IL-17Q-2	11.27
LP2-IL-05Q-1	11.43	LP2-IL-11Q-3	11.52	LP2-IL-17Q-3	11.42
LP2-IL-05Q-2	11.28				
LP2-IL-05Q-3	11.29				

Table D-3. PCT Leachate pH Values for the CCC Versions of the LP2-IL Glasses

Identifier	pH	Identifier	pH	Identifier	pH
ARM-1	10.38	LP2-IL-06-1CCC-1	11.21	LP2-IL-12CCC-1	11.58
ARM-2	10.44	LP2-IL-06-1CCC-2	11.16	LP2-IL-12CCC-2	11.52
ARM-3	10.31	LP2-IL-06-1CCC-3	11.32	LP2-IL-12CCC-3	11.59
Blank-1	9.01	LP2-IL-07CCC-1	11.61	LP2-IL-13CCC-1	11.30
Blank-2	8.41	LP2-IL-07CCC-2	11.81	LP2-IL-13CCC-2	11.25
LP2-IL-01CCC-1	11.89	LP2-IL-07CCC-3	11.70	LP2-IL-13CCC-3	11.33
LP2-IL-01CCC-2	11.85	LP2-IL-08-1CCC-1	11.75	LP2-IL-14CCC-1	11.62
LP2-IL-01CCC-3	11.89	LP2-IL-08-1CCC-2	11.74	LP2-IL-14CCC-2	11.71
LP2-IL-02CCC-1	11.44	LP2-IL-08-1CCC-3	11.60	LP2-IL-14CCC-3	11.82
LP2-IL-02CCC-2	11.49	LP2-IL-09CCC-1	11.87	LP2-IL-15CCC-1	11.00
LP2-IL-02CCC-3	11.56	LP2-IL-09CCC-2	11.79	LP2-IL-15CCC-2	10.89
LP2-IL-03CCC-1	11.52	LP2-IL-09CCC-3	11.75	LP2-IL-15CCC-3	10.83
LP2-IL-03CCC-2	11.50	LP2-IL-10CCC-1	11.55	LP2-IL-16CCC-1	11.40
LP2-IL-03CCC-3	11.47	LP2-IL-10CCC-2	11.51	LP2-IL-16CCC-2	11.41
LP2-IL-04CCC-1	11.82	LP2-IL-10CCC-3	11.57	LP2-IL-16CCC-3	11.57
LP2-IL-04CCC-2	11.95	LP2-IL-11CCC-1	11.48	LP2-IL-17CCC-1	11.39
LP2-IL-04CCC-3	11.96	LP2-IL-11CCC-2	11.38	LP2-IL-17CCC-2	11.49
LP2-IL-05CCC-1	11.51	LP2-IL-11CCC-3	11.50	LP2-IL-17CCC-3	11.27
LP2-IL-05CCC-2	11.40				
LP2-IL-05CCC-3	11.58				

Exhibit D-1. PCT Measurements in Analytical Sequence by Oven Run

Oven Run=1, Analyte=B
Variability Chart for Measurement log(mg/L)

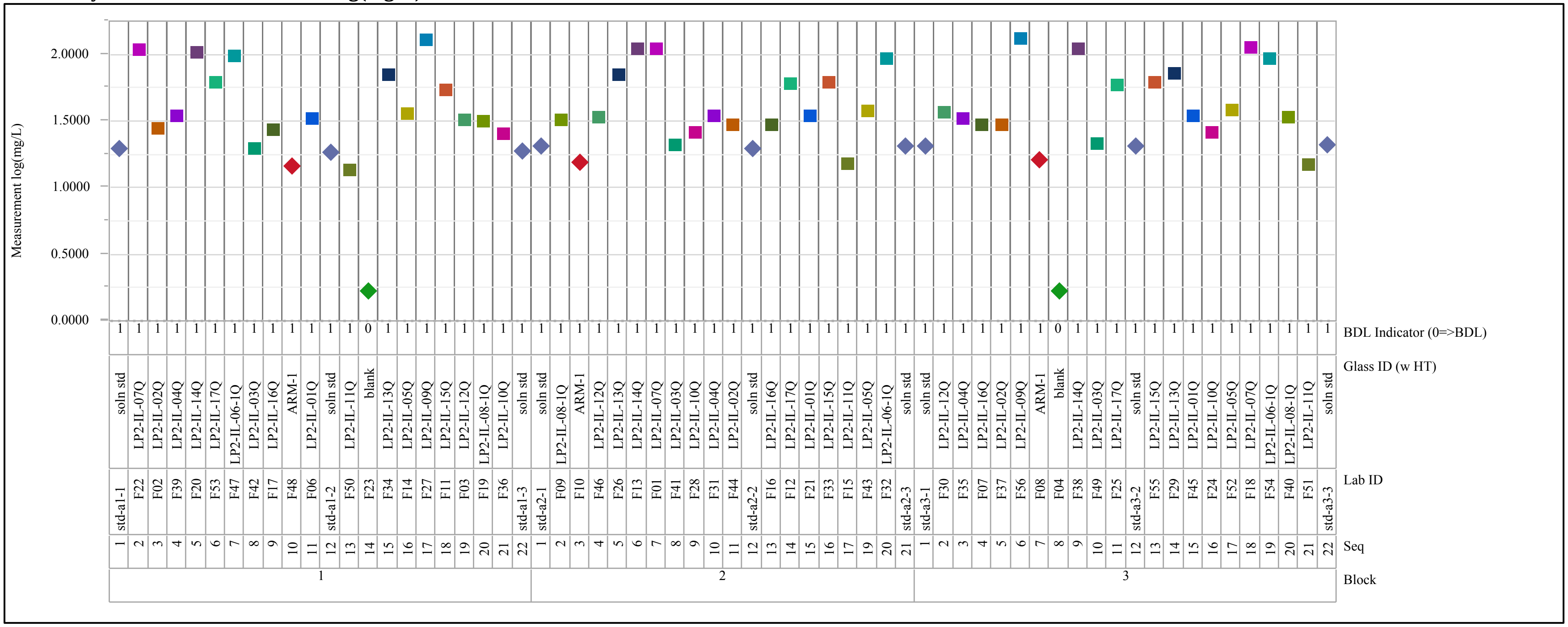


Exhibit D-1. PCT Measurements in Analytical Sequence by Oven Run (continued)

Oven Run=1, Analyte=Li
Variability Chart for Measurement log(mg/L)

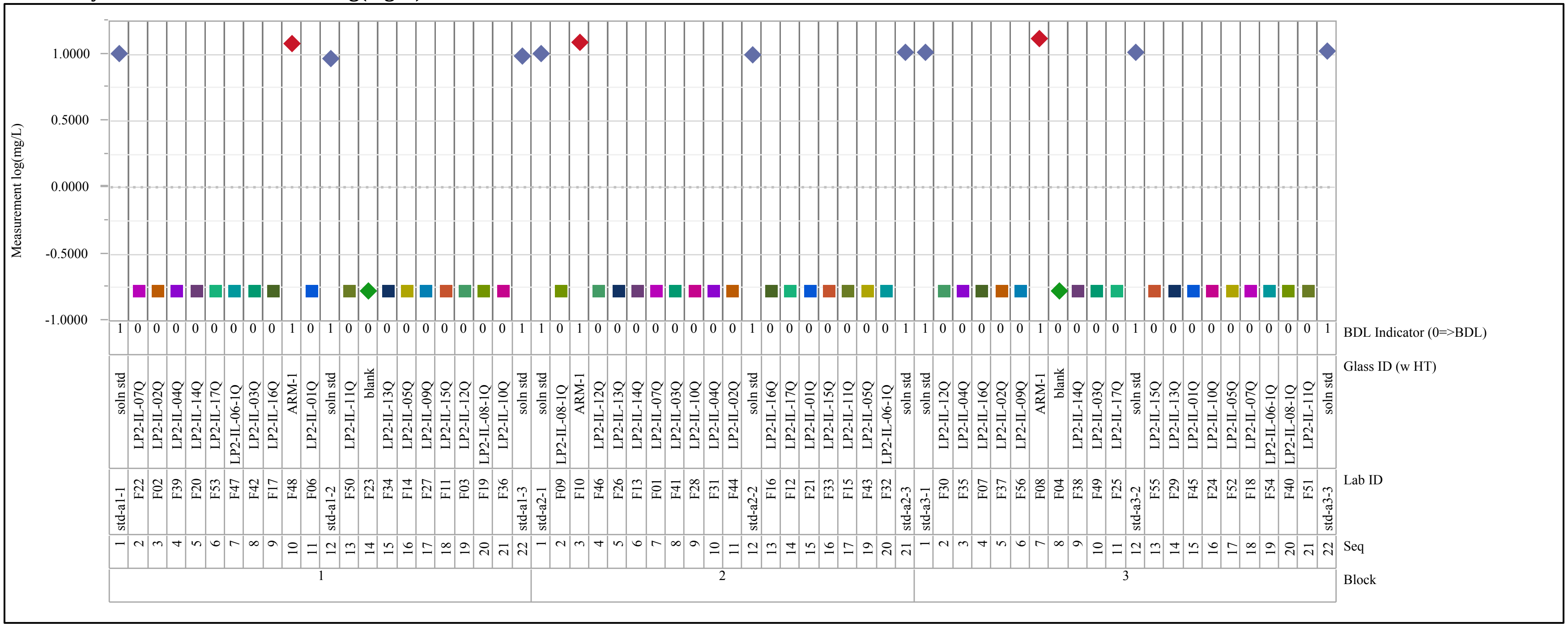


Exhibit D-1. PCT Measurements in Analytical Sequence by Oven Run (continued)

Oven Run=1, Analyte=Na
Variability Chart for Measurement log(mg/L)

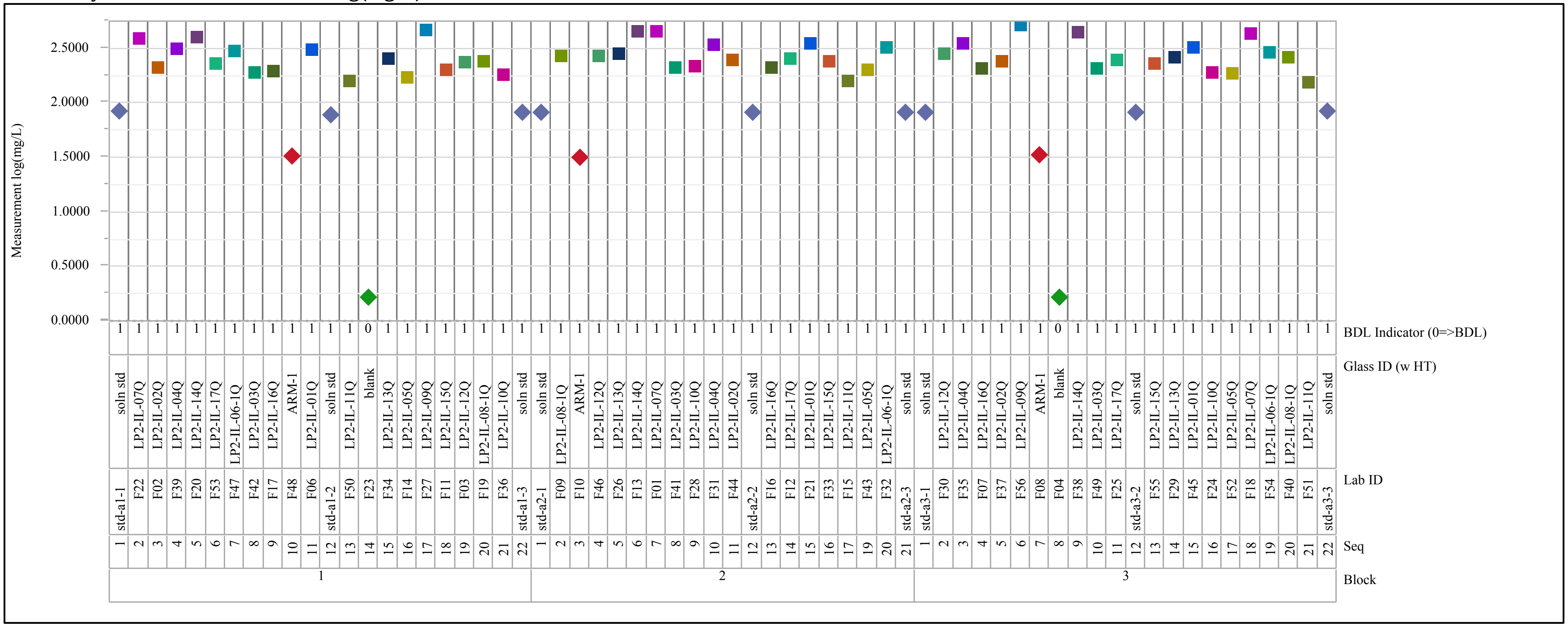


Exhibit D-1. PCT Measurements in Analytical Sequence by Oven Run (continued)

Oven Run=1, Analyte=Si
Variability Chart for Measurement log(mg/L)

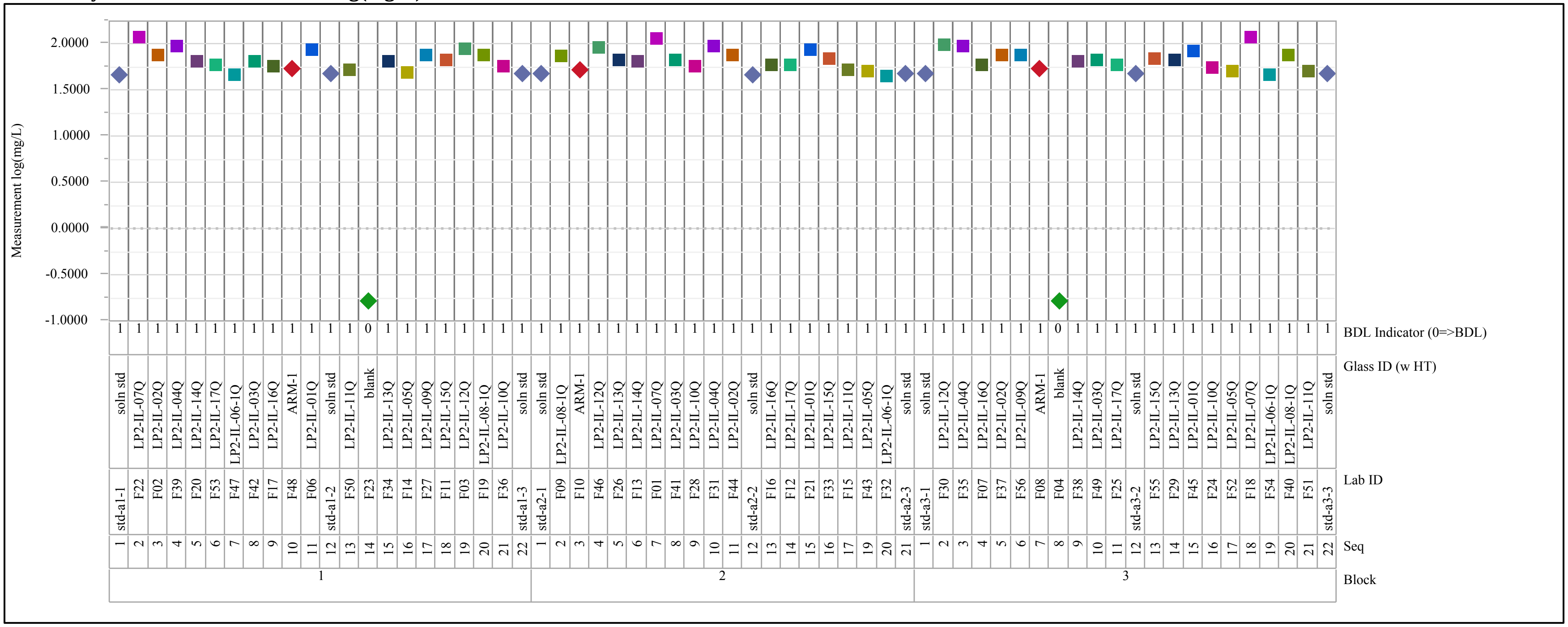


Exhibit D-1. PCT Measurements in Analytical Sequence by Oven Run (continued)

Oven Run=2, Analyte=B
Variability Chart for Measurement log(mg/L)

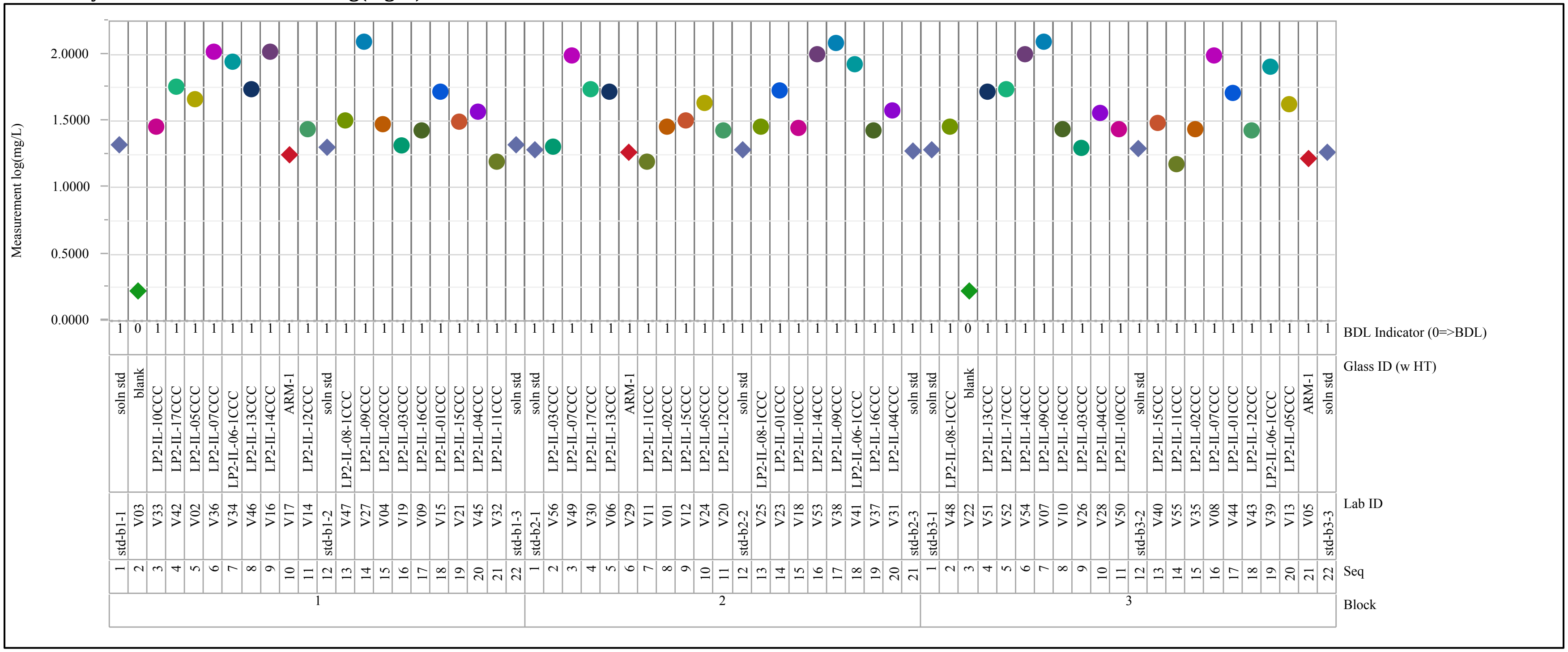


Exhibit D-1. PCT Measurements in Analytical Sequence by Oven Run (continued)

Oven Run=2, Analyte=Li
Variability Chart for Measurement log(mg/L)

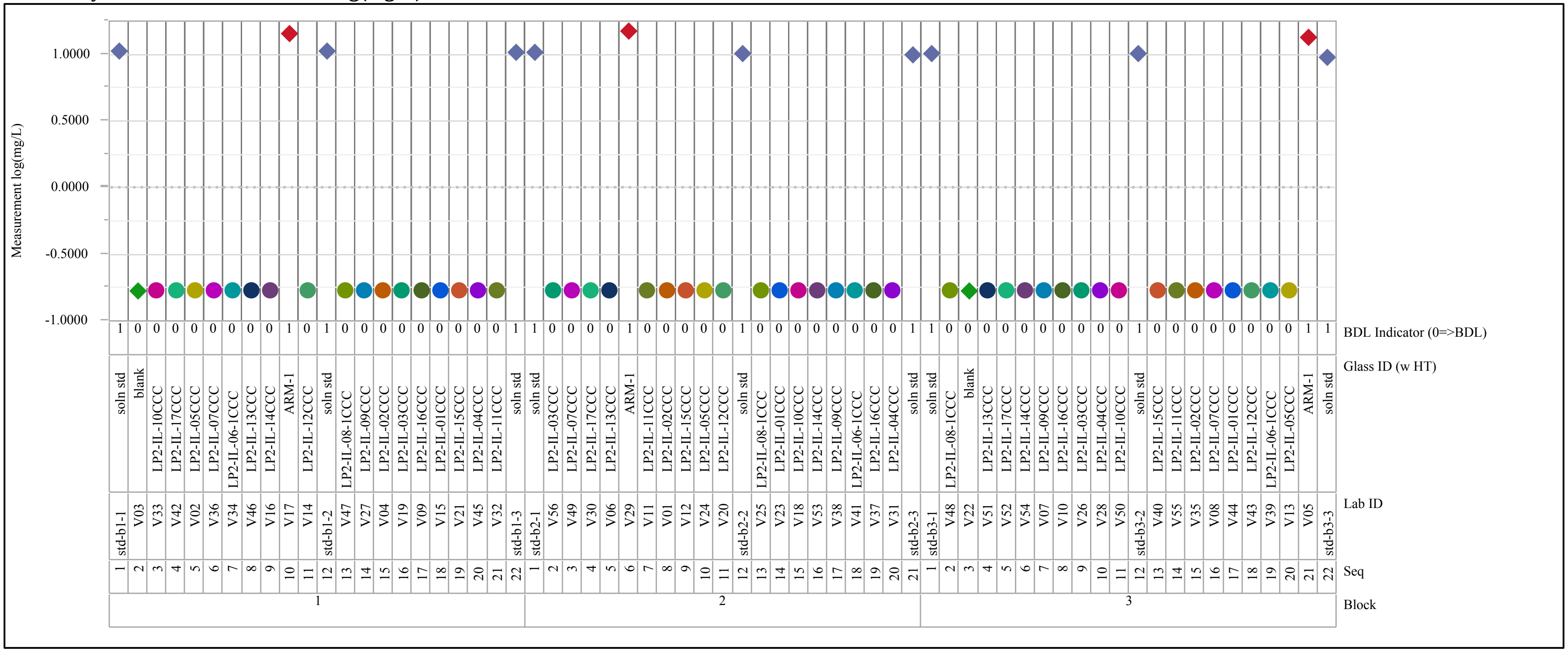


Exhibit D-1. PCT Measurements in Analytical Sequence by Oven Run (continued)

Oven Run=2, Analyte=Na
Variability Chart for Measurement log(mg/L)

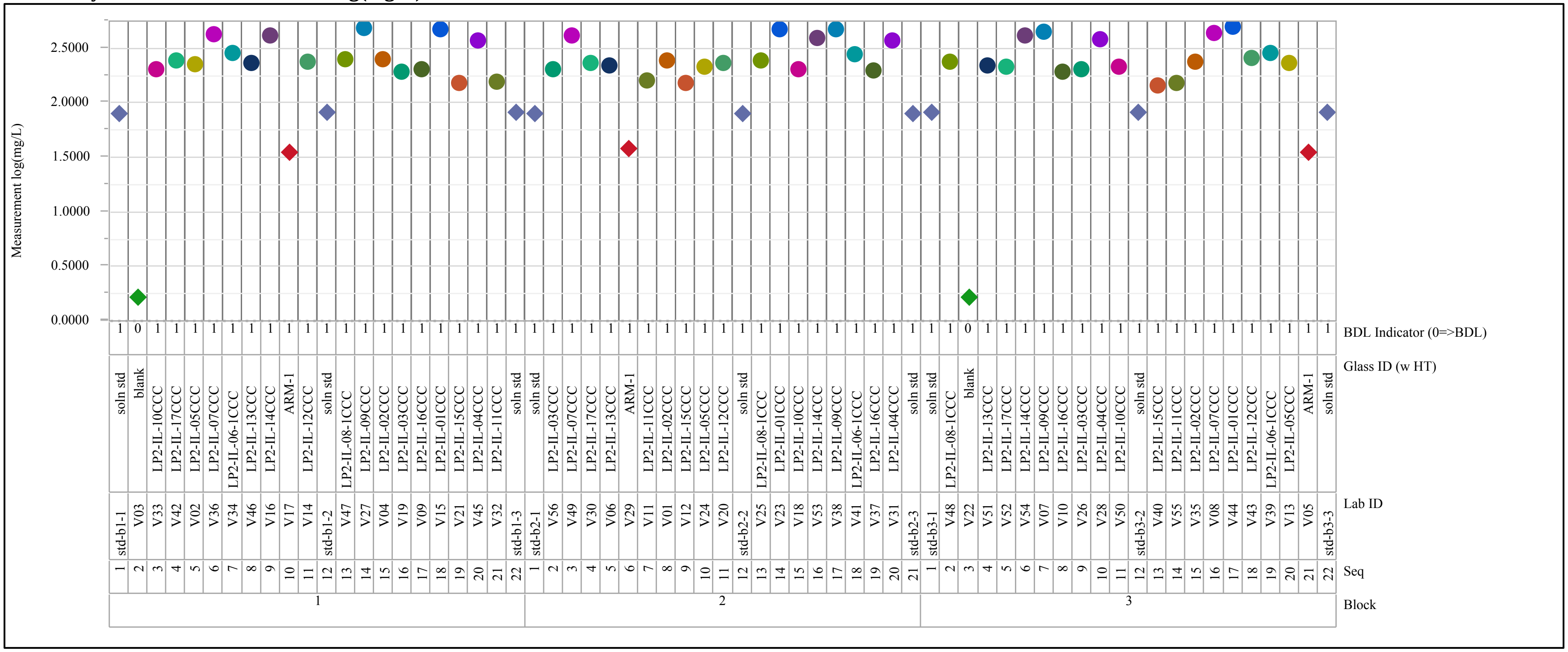


Exhibit D-1. PCT Measurements in Analytical Sequence by Oven Run (continued)

Oven Run=2, Analyte=Si
Variability Chart for Measurement log(mg/L)

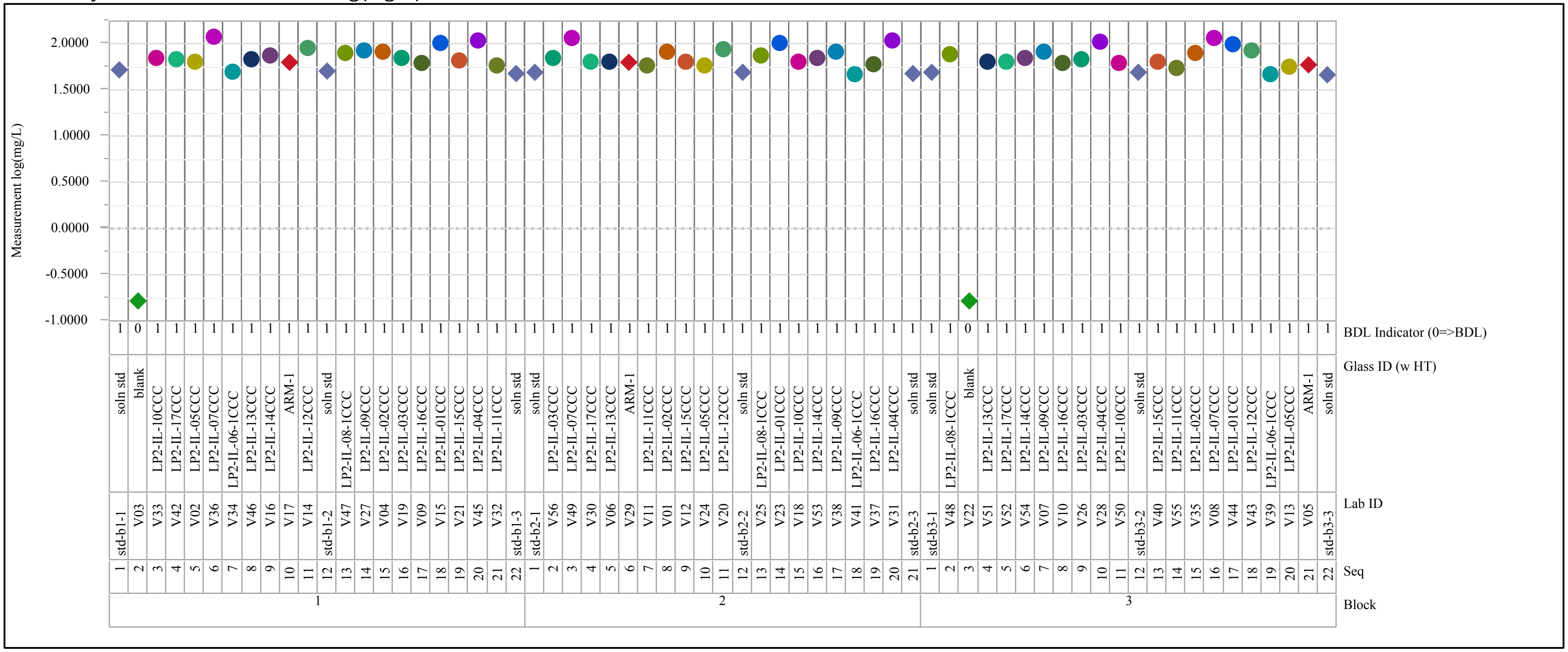


Exhibit D-2. PCT Measurements for the LP2-IL Series Glasses

Oven Run=1, Analyte=B
Variability Chart for Measurement log(mg/L)

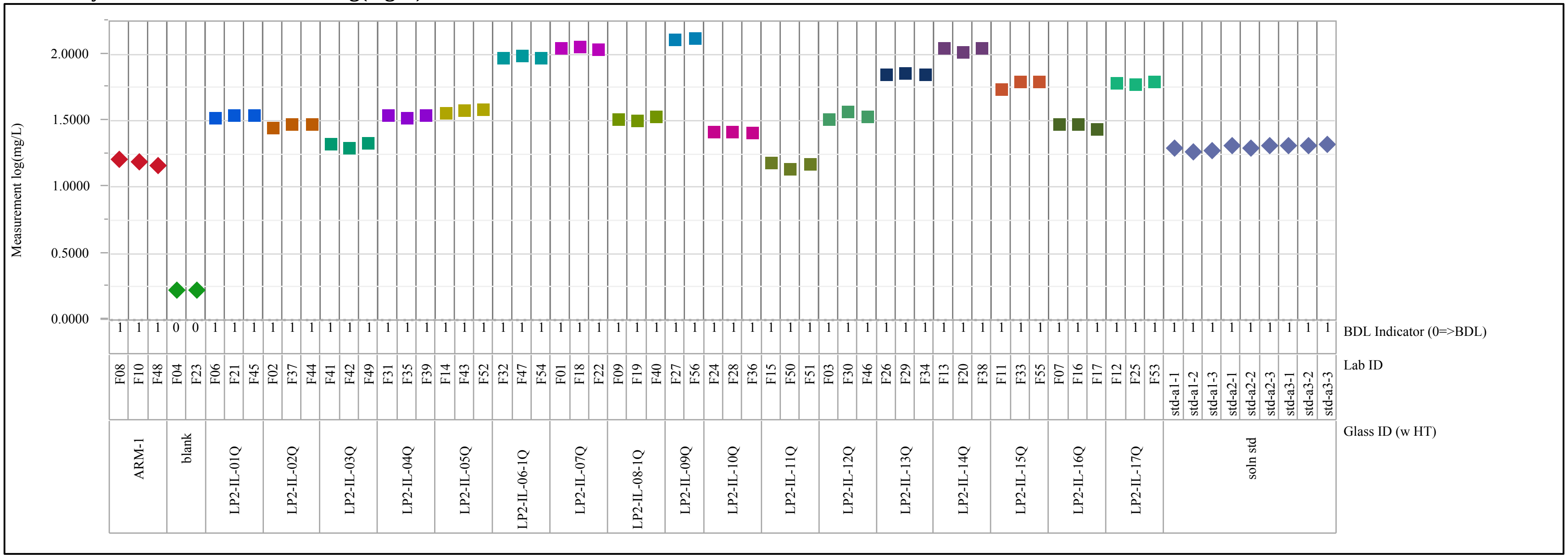


Exhibit D-2. PCT Measurements for the LP2-IL Series Glasses (continued)

Oven Run=1, Analyte=Li
Variability Chart for Measurement log(mg/L)

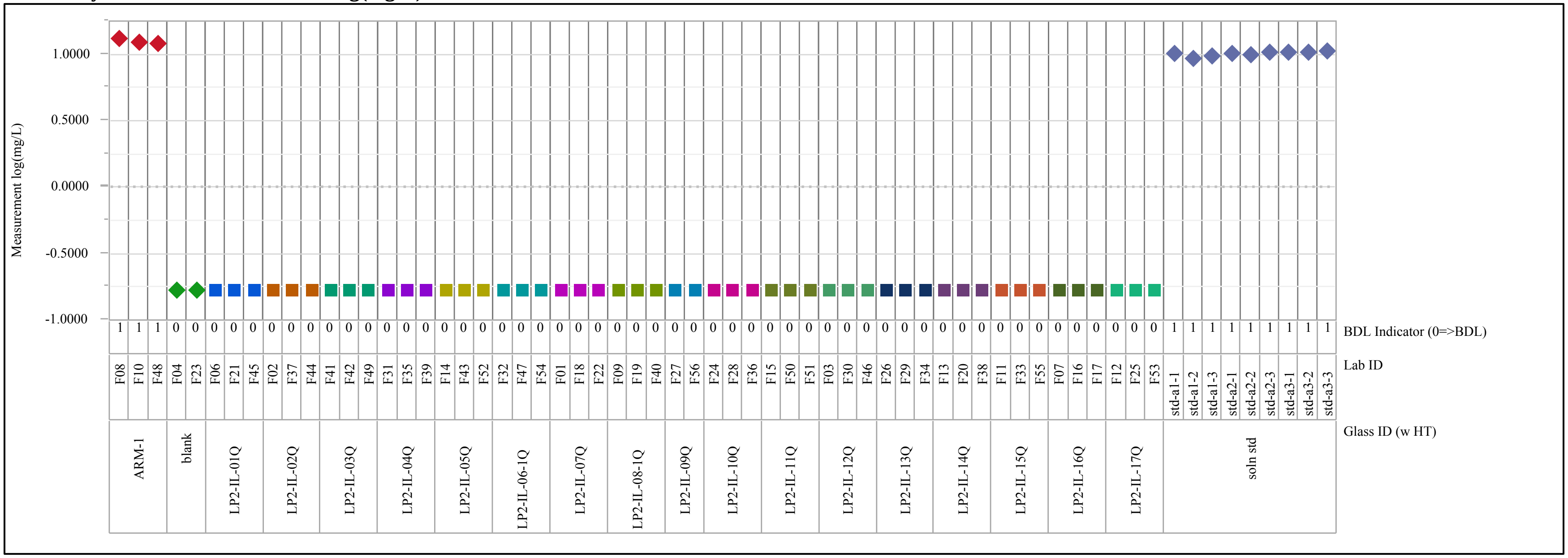


Exhibit D-2. PCT Measurements for the LP2-IL Series Glasses **(continued)**

Oven Run=1, Analyte=Na
Variability Chart for Measurement log(mg/L)

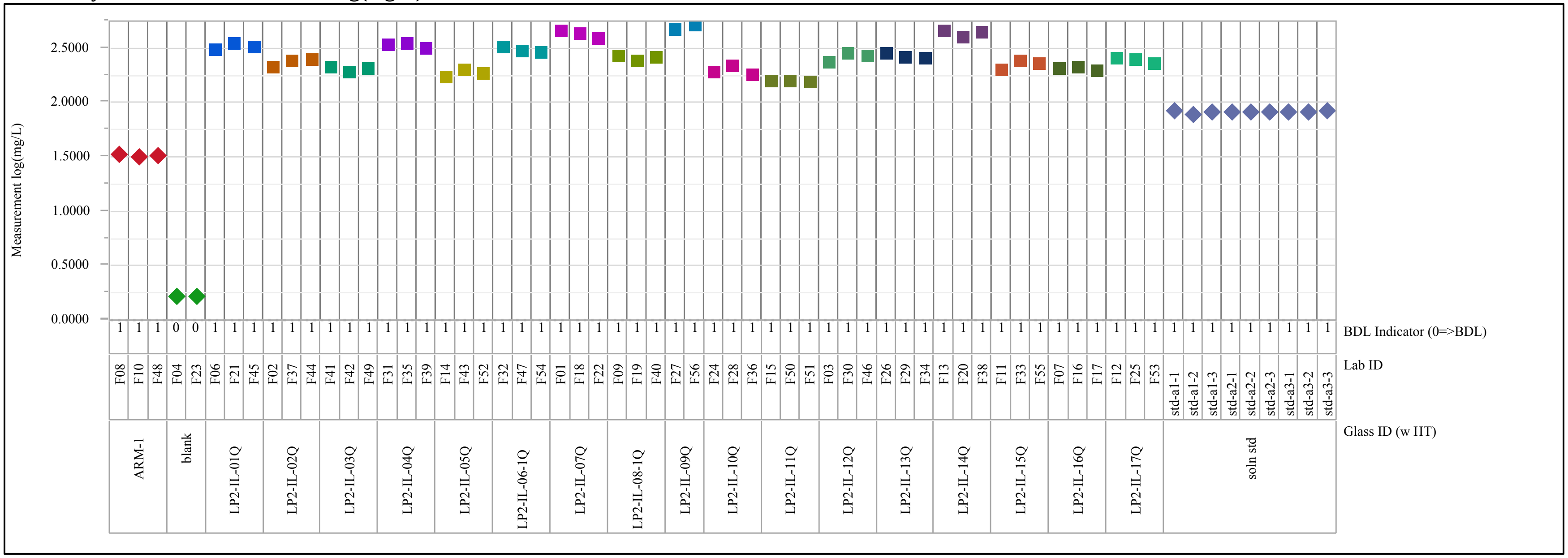


Exhibit D-2. PCT Measurements for the LP2-IL Series Glasses (continued)

Oven Run=1, Analyte=Si
Variability Chart for Measurement log(mg/L)

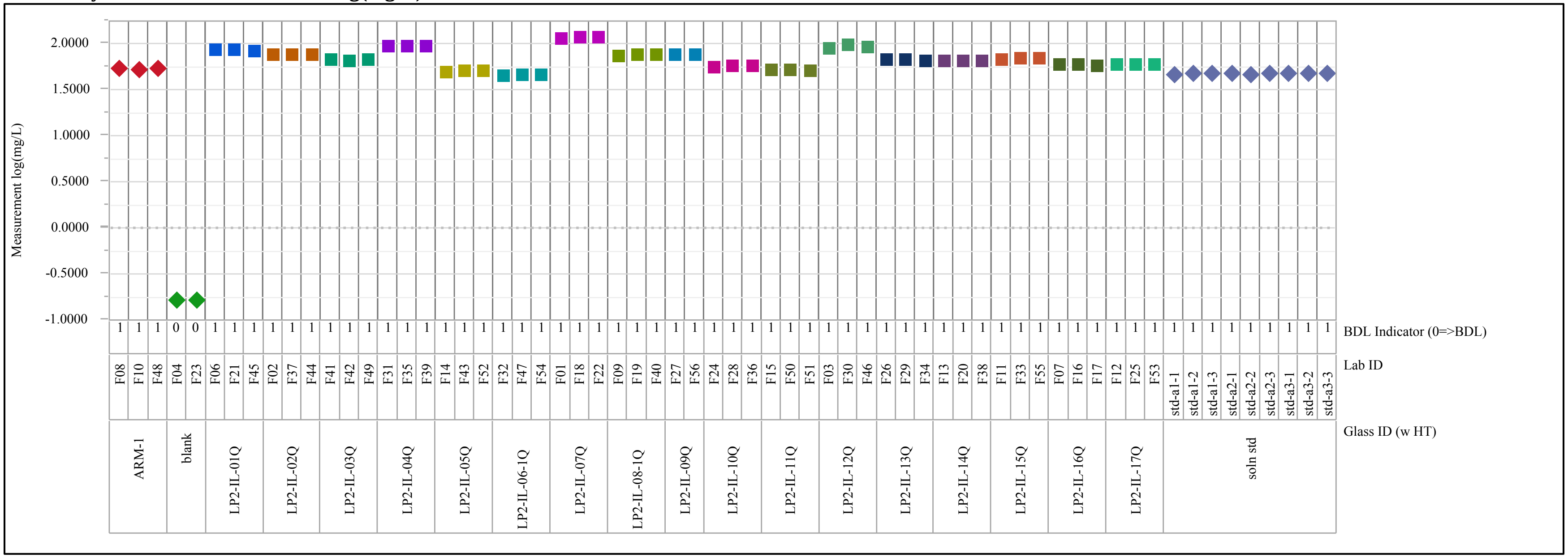


Exhibit D-2. PCT Measurements for the LP2-IL Series Glasses **(continued)**

Oven Run=2, Analyte=B
Variability Chart for Measurement log(mg/L)

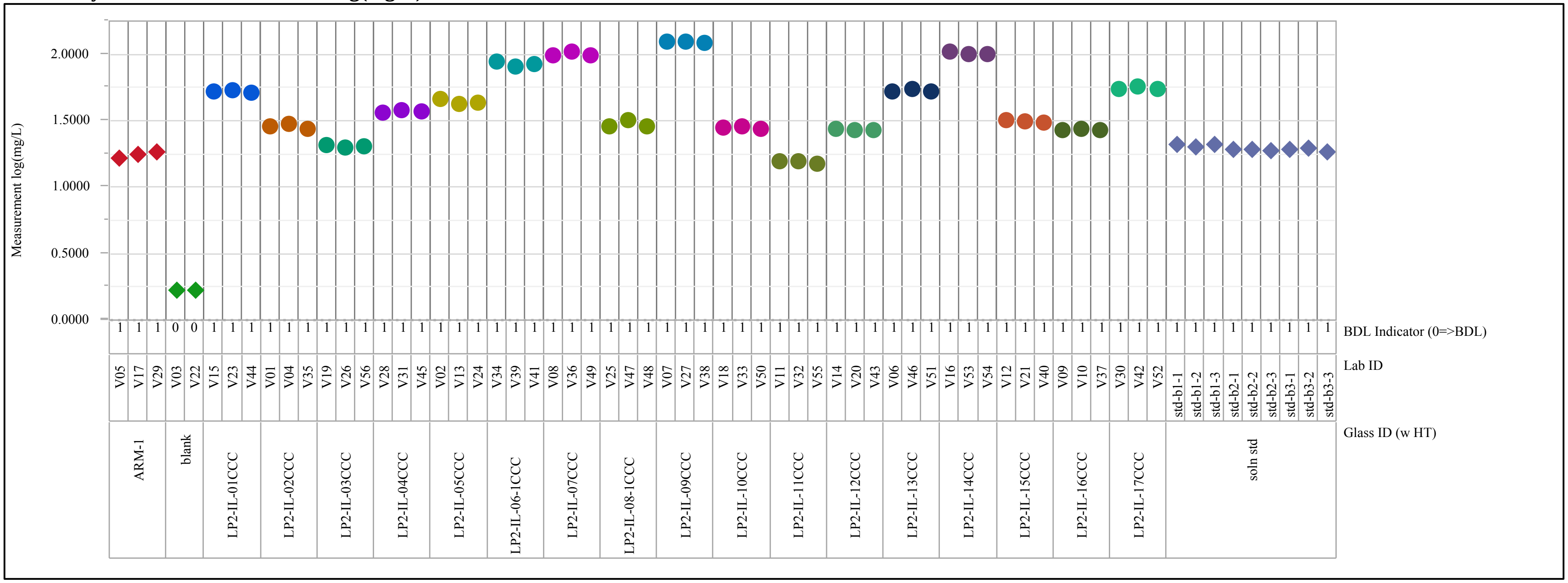


Exhibit D-2. PCT Measurements for the LP2-IL Series Glasses (continued)

Oven Run=2, Analyte=Li
Variability Chart for Measurement log(mg/L)

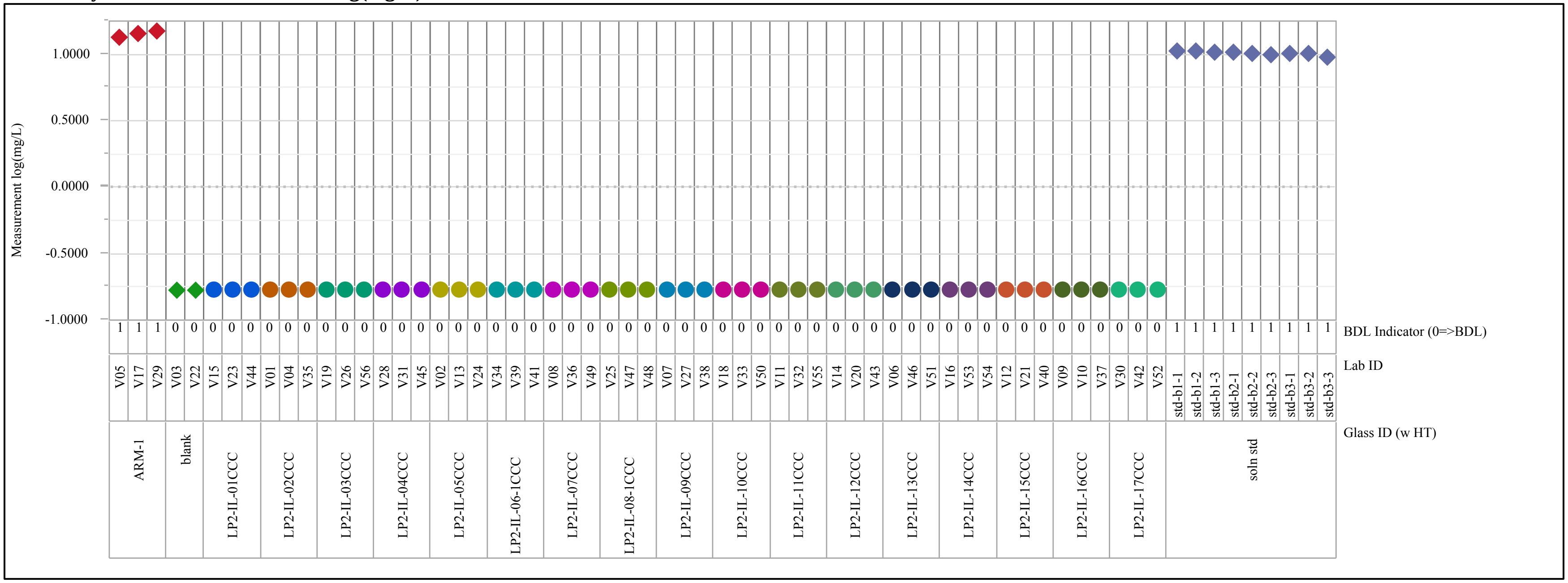


Exhibit D-2. PCT Measurements for the LP2-IL Series Glasses (continued)

Oven Run=2, Analyte=Na
Variability Chart for Measurement log(mg/L)

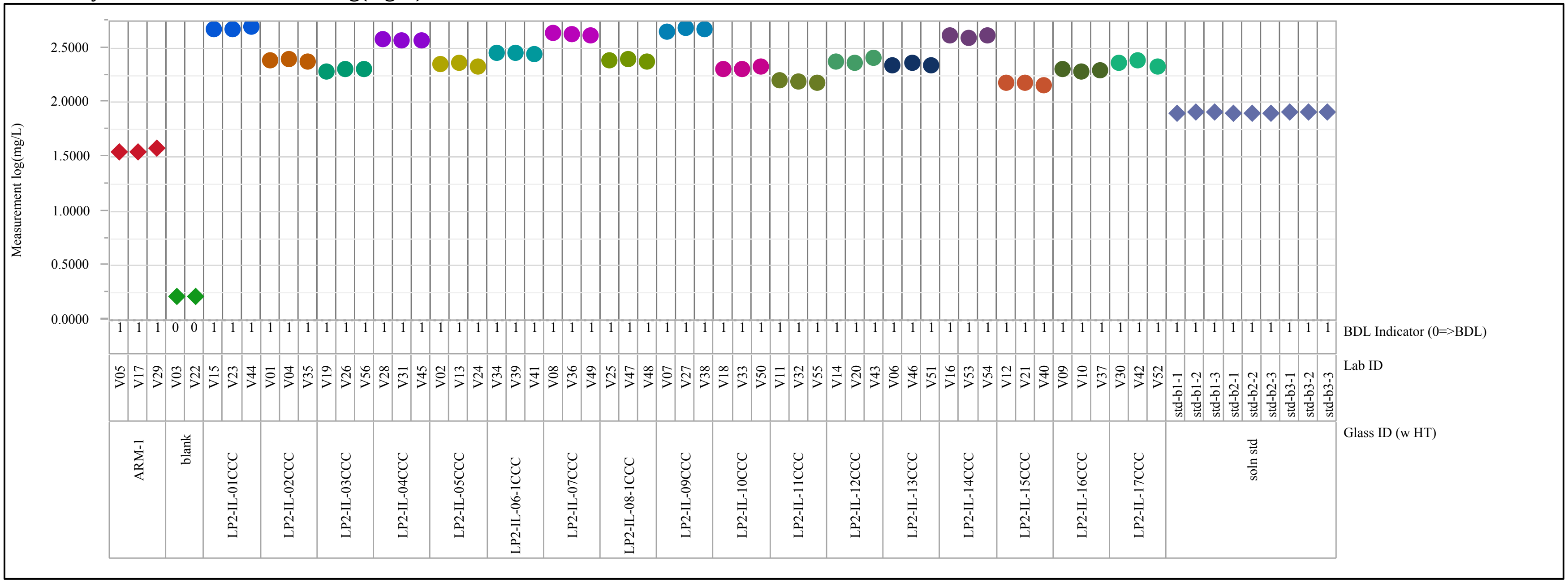


Exhibit D-2. PCT Measurements for the LP2-IL Series Glasses (continued)

Oven Run=2, Analyte=Si
Variability Chart for Measurement log(mg/L)

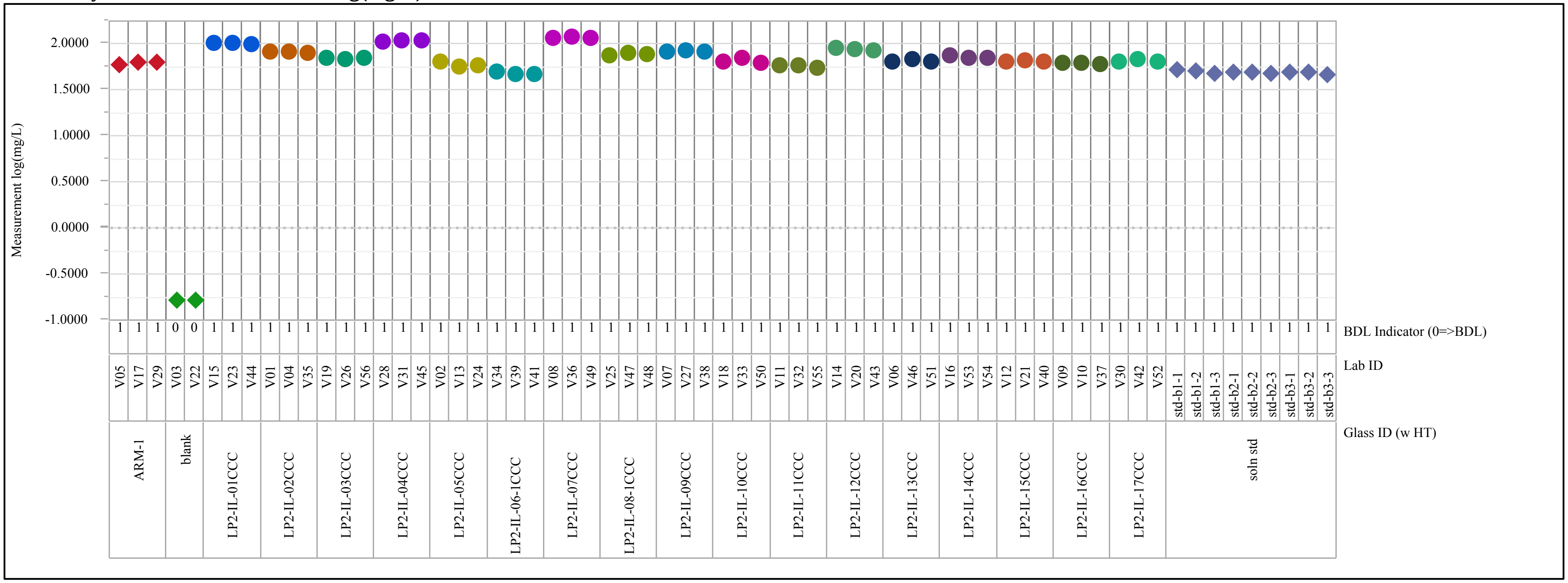


Exhibit D-3. Normalized PCT Results by Heat Treatment by Compositional View for Each Glass

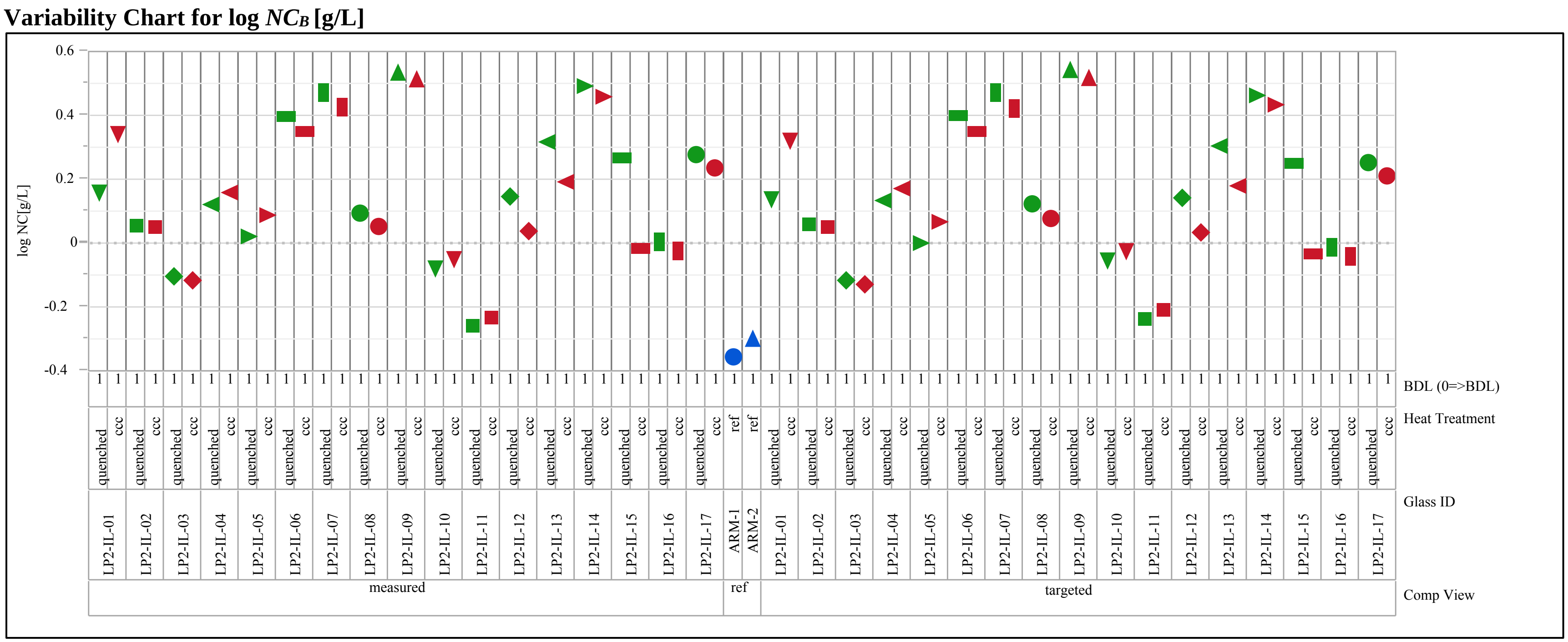


Exhibit D-3. Normalized PCT Results by Heat Treatment by Compositional View for Each Glass (continued)

Variability Chart for log NC_{Li} [g/L]

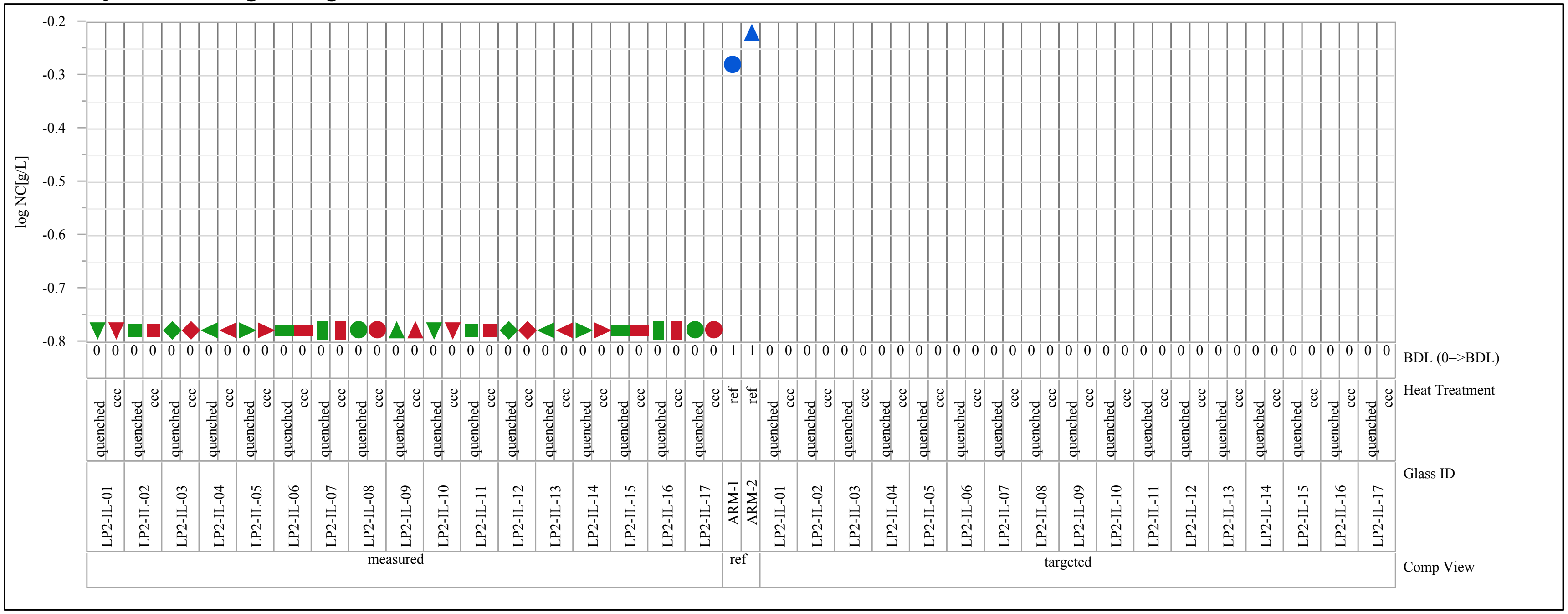


Exhibit D-3. Normalized PCT Results by Heat Treatment by Compositional View for Each Glass (continued)

Variability Chart for log NC_{Na} [g/L]

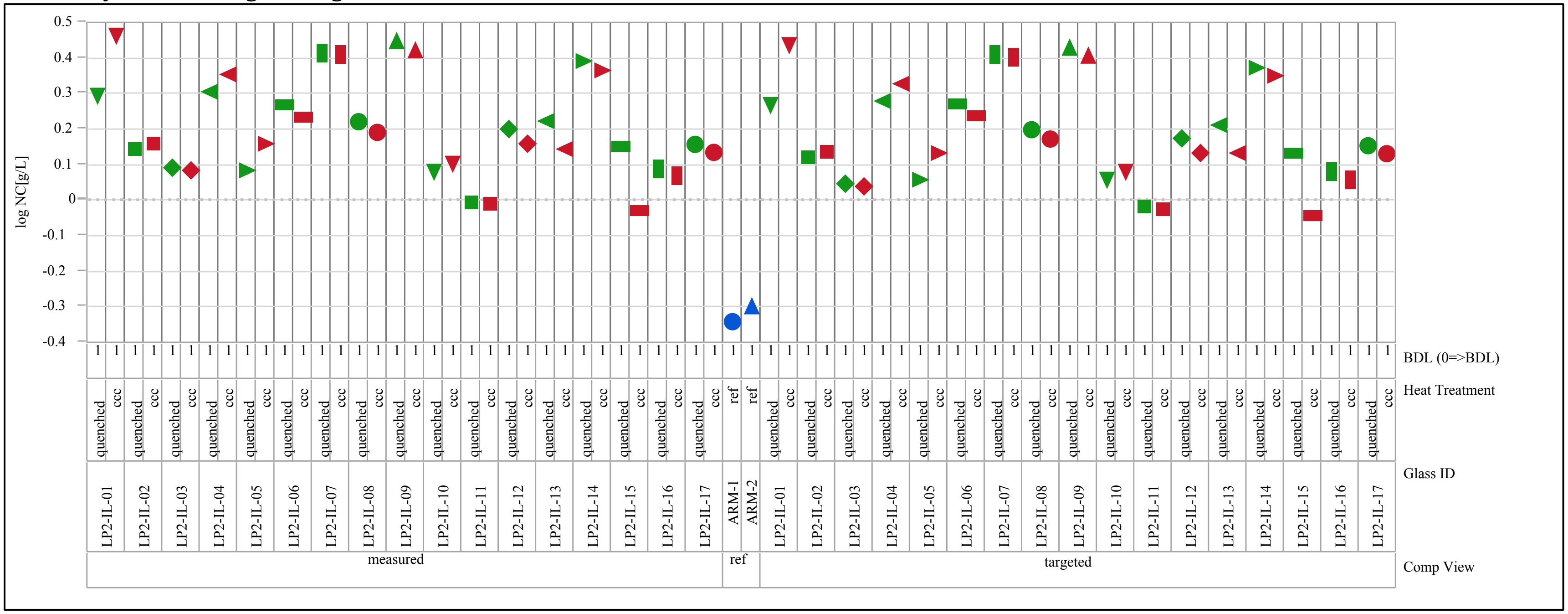
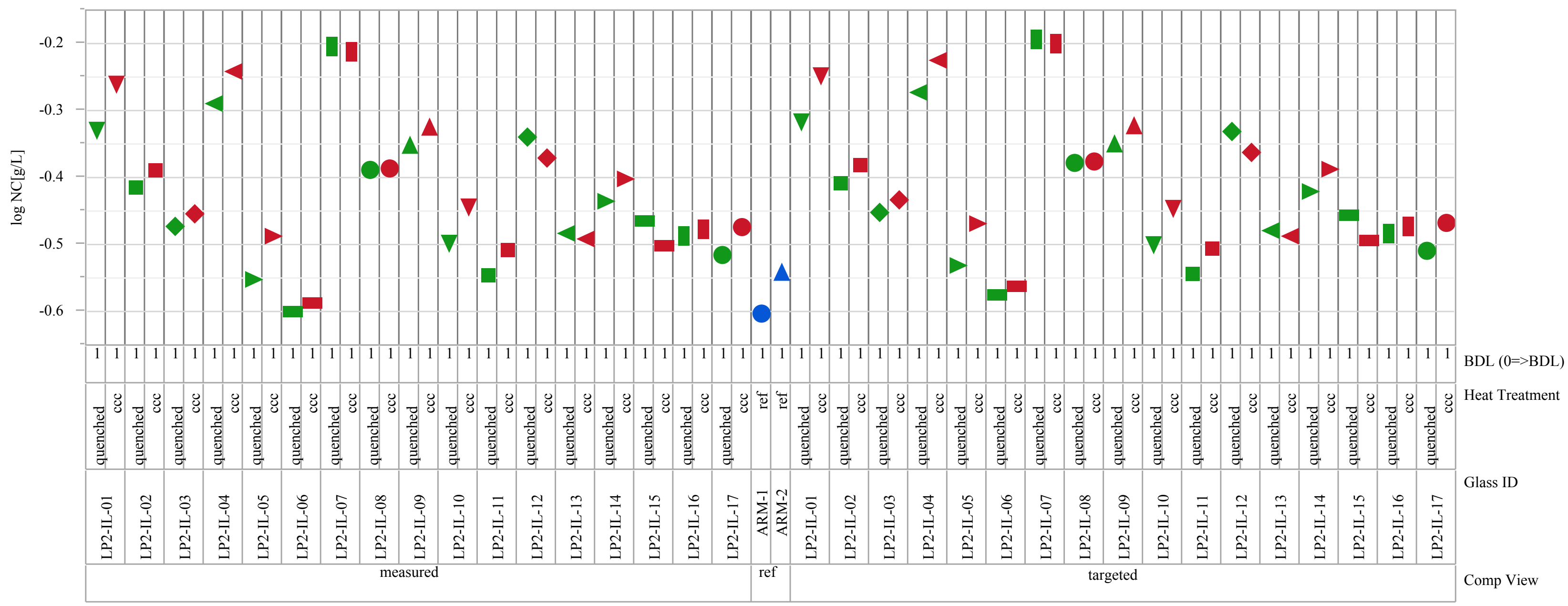


Exhibit D-3. Normalized PCT Results by Heat Treatment by Compositional View for Each Glass (continued)

Variability Chart for log *NCSi* [g/L]



Appendix E Tables and Exhibits Supporting the Chemical Analysis of the SSM Glasses

Table E-1. LM Measurements of the SSM Study Glasses – Part 1

ID	Block	Sub-Blk	Sequence	Lab ID	Ca (wt%)	Cr (wt%)	K (wt%)	Mg (wt%)	Na (wt%)
LRM	1	1	1	LRMLM111	0.316	0.129	1.16	<0.100	15.4
LP2-IL-02SSM	1	1	2	S17LM21	1.46	0.200	1.22	0.565	17.3
LP2-IL-06-1SSM	1	1	3	S05LM11	1.50	0.250	1.27	0.563	15.4
LP2-IL-04SSM	1	1	4	S01LM11	4.95	0.191	1.20	0.542	16.4
LP2-IL-04SSM	1	1	5	S01LM21	4.94	0.190	1.20	0.521	16.0
LP2-IL-05SSM	1	1	6	S13LM11	4.83	0.206	0.358	0.179	16.2
LP2-IL-01SSM	1	1	7	S09LM21	5.20	0.205	1.21	0.167	16.8
LRM	1	1	8	LRMLM112	0.322	0.131	1.16	<0.100	15.0
LP2-IL-01SSM	1	1	9	S09LM11	5.14	0.213	1.20	0.170	16.1
LP2-IL-06-1SSM	1	1	10	S05LM21	1.57	0.250	1.28	0.573	14.2
LP2-IL-02SSM	1	1	11	S17LM11	1.48	0.204	1.23	0.568	17.6
LP2-IL-03SSM	1	1	12	S10LM21	1.48	0.260	0.535	0.172	17.7
LP2-IL-05SSM	1	1	13	S13LM21	4.80	0.216	0.382	0.188	15.9
LP2-IL-03SSM	1	1	14	S10LM11	1.48	0.264	0.549	0.176	16.6
LRM	1	1	15	LRMLM113	0.326	0.132	1.13	<0.100	14.1
LRM	1	2	1	LRMLM121	0.319	0.129	1.16	<0.100	14.9
LP2-IL-04SSM	1	2	2	S01LM12	4.83	0.194	1.17	0.547	16.8
LP2-IL-06-1SSM	1	2	3	S05LM22	1.59	0.245	1.29	0.567	15.0
LP2-IL-03SSM	1	2	4	S10LM22	1.49	0.255	0.514	0.166	16.3
LP2-IL-03SSM	1	2	5	S10LM12	1.50	0.257	0.528	0.171	16.0
LP2-IL-04SSM	1	2	6	S01LM22	4.88	0.192	1.21	0.541	17.2
LP2-IL-02SSM	1	2	7	S17LM22	1.52	0.198	1.25	0.560	16.8
LRM	1	2	8	LRMLM122	0.313	0.126	1.15	<0.100	14.4
LP2-IL-06-1SSM	1	2	9	S05LM12	1.50	0.244	1.26	0.560	14.7
LP2-IL-01SSM	1	2	10	S09LM22	5.02	0.202	1.18	0.163	15.3
LP2-IL-01SSM	1	2	11	S09LM12	5.08	0.201	1.19	0.164	16.7
LP2-IL-02SSM	1	2	12	S17LM12	1.47	0.189	1.19	0.534	17.0
LP2-IL-05SSM	1	2	13	S13LM12	4.58	0.208	0.373	0.182	15.5
LP2-IL-05SSM	1	2	14	S13LM22	4.55	0.211	0.385	0.186	15.6
LRM	1	2	15	LRMLM123	0.320	0.129	1.17	<0.100	14.2
LRM	2	1	1	LRMLM211	0.324	0.132	1.15	<0.100	14.1
LP2-IL-09SSM	2	1	2	S16LM21	1.52	0.203	0.352	0.555	16.3
LP2-IL-07SSM	2	1	3	S07LM21	3.55	0.208	1.32	0.555	16.4
LP2-IL-10SSM	2	1	4	S02LM11	3.48	0.175	0.659	0.366	16.5

Table E-1. LM Measurements of the SSM Study Glasses – Part 1 (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	Ca (wt%)	Cr (wt%)	K (wt%)	Mg (wt%)	Na (wt%)
LP2-IL-11SSM	2	1	5	S12LM11	2.25	0.170	1.29	0.177	15.9
LP2-IL-07SSM	2	1	6	S07LM11	3.46	0.209	1.26	0.556	15.7
LP2-IL-08-1SSM	2	1	7	S14LM11	5.55	0.230	0.327	0.569	14.9
LRM	2	1	8	LRMLM212	0.338	0.138	1.15	<0.100	14.4
LP2-IL-12SSM	2	1	9	S11LM21	2.22	0.212	0.375	0.572	17.1
LP2-IL-08-1SSM	2	1	10	S14LM21	5.49	0.236	0.340	0.576	15.4
LP2-IL-12SSM	2	1	11	S11LM11	2.30	0.209	0.366	0.567	16.1
LP2-IL-09SSM	2	1	12	S16LM11	1.56	0.212	0.378	0.574	16.5
LP2-IL-11SSM	2	1	13	S12LM21	2.30	0.176	1.32	0.181	16.2
LP2-IL-10SSM	2	1	14	S02LM21	3.49	0.179	0.682	0.381	16.7
LRM	2	1	15	LRMLM213	0.328	0.135	1.17	<0.100	15.1
LRM	2	2	1	LRMLM221	0.325	0.130	1.17	<0.100	14.5
LP2-IL-07SSM	2	2	2	S07LM12	3.54	0.221	1.31	0.582	15.5
LP2-IL-10SSM	2	2	3	S02LM12	3.54	0.185	0.722	0.394	15.6
LP2-IL-08-1SSM	2	2	4	S14LM12	5.57	0.244	0.367	0.597	14.6
LP2-IL-08-1SSM	2	2	5	S14LM22	5.49	0.244	0.369	0.595	14.5
LP2-IL-12SSM	2	2	6	S11LM12	2.26	0.218	0.401	0.594	17.2
LP2-IL-11SSM	2	2	7	S12LM12	2.23	0.178	1.29	0.181	15.8
LRM	2	2	8	LRMLM222	0.335	0.135	1.17	<0.100	15.2
LP2-IL-12SSM	2	2	9	S11LM22	2.32	0.212	0.399	0.580	16.0
LP2-IL-11SSM	2	2	10	S12LM22	2.34	0.177	1.35	0.182	14.7
LP2-IL-09SSM	2	2	11	S16LM22	1.58	0.213	0.384	0.586	16.3
LP2-IL-09SSM	2	2	12	S16LM12	1.59	0.213	0.394	0.587	17.6
LP2-IL-10SSM	2	2	13	S02LM22	3.56	0.182	0.711	0.395	16.5
LP2-IL-07SSM	2	2	14	S07LM22	3.71	0.217	1.36	0.591	15.8
LRM	2	2	15	LRMLM223	0.335	0.134	1.20	<0.100	14.7
LRM	3	1	1	LRMLM311	0.324	0.130	1.14	<0.100	15.3
LP2-IL-15SSM	3	1	2	S15LM21	1.45	0.296	0.382	0.177	15.8
LP2-IL-15SSM	3	1	3	S15LM11	1.41	0.297	0.376	0.177	15.3
LP2-IL-17SSM	3	1	4	S04LM21	1.91	<0.100	0.372	0.579	15.7
LP2-IL-16SSM	3	1	5	S08LM11	3.73	0.207	0.714	0.371	15.5
LP2-IL-14SSM	3	1	6	S06LM11	2.91	0.145	0.359	0.169	17.9
LP2-IL-13SSM	3	1	7	S03LM11	1.82	0.293	1.41	0.167	16.4
LRM	3	1	8	LRMLM312	0.328	0.129	1.23	<0.100	15.1

Table E-1. LM Measurements of the SSM Study Glasses – Part 1 (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	Ca (wt%)	Cr (wt%)	K (wt%)	Mg (wt%)	Na (wt%)
LP2-IL-17SSM	3	1	9	S04LM11	1.90	<0.100	0.377	0.578	16.5
LP2-IL-14SSM	3	1	10	S06LM21	2.85	0.147	0.383	0.176	17.2
LP2-IL-13SSM	3	1	11	S03LM21	1.73	0.301	1.31	0.172	15.7
LP2-IL-16SSM	3	1	12	S08LM21	3.53	0.215	0.712	0.382	16.0
LRM	3	1	13	LRMLM313	0.326	0.131	1.15	<0.100	14.2
LRM	3	2	1	LRMLM321	0.322	0.132	1.23	<0.100	14.4
LP2-IL-16SSM	3	2	2	S08LM22	3.73	0.210	0.679	0.374	16.2
LP2-IL-17SSM	3	2	3	S04LM12	1.93	<0.100	0.363	0.566	16.1
LP2-IL-14SSM	3	2	4	S06LM22	2.90	0.146	0.372	0.173	16.9
LP2-IL-17SSM	3	2	5	S04LM22	1.93	<0.100	0.372	0.572	17.1
LP2-IL-15SSM	3	2	6	S15LM12	1.51	0.289	0.368	0.175	16.3
LP2-IL-13SSM	3	2	7	S03LM12	1.82	0.292	1.42	0.169	16.5
LRM	3	2	8	LRMLM322	0.325	0.133	1.22	<0.100	15.0
LP2-IL-13SSM	3	2	9	S03LM22	1.79	0.298	1.37	0.171	15.5
LP2-IL-14SSM	3	2	10	S06LM12	2.95	0.148	0.355	0.176	16.3
LP2-IL-16SSM	3	2	11	S08LM12	3.74	0.211	0.678	0.379	15.5
LP2-IL-15SSM	3	2	12	S15LM22	1.57	0.292	0.376	0.176	15.0
LRM	3	2	13	LRMLM323	0.325	0.132	1.22	<0.100	14.0

Table E-2. LM Measurements of the SSM Study Glasses – Part 2

ID	Block	Sub-Blk	Sequence	Lab ID	P (wt%)	S (wt%)	V (wt%)	Zn (wt%)	Zr (wt%)
LRM	1	1	1	LRMLM111	0.191	0.090	<0.100	<0.100	0.646
LP2-IL-02SSM	1	1	2	S17LM21	0.191	0.478	0.250	1.94	3.45
LP2-IL-06-1SSM	1	1	3	S05LM11	0.397	0.415	0.515	1.79	3.5
LP2-IL-04SSM	1	1	4	S01LM11	0.393	0.586	0.242	1.83	1.91
LP2-IL-04SSM	1	1	5	S01LM21	0.394	0.583	0.240	1.82	1.91
LP2-IL-05SSM	1	1	6	S13LM11	0.408	0.580	0.242	1.85	3.49
LP2-IL-01SSM	1	1	7	S09LM21	0.191	0.597	0.940	1.82	3.51
LRM	1	1	8	LRMLM112	0.198	0.094	<0.100	<0.100	0.671
LP2-IL-01SSM	1	1	9	S09LM11	0.203	0.628	0.972	1.81	3.42
LP2-IL-06-1SSM	1	1	10	S05LM21	0.402	0.421	0.515	1.84	3.51
LP2-IL-02SSM	1	1	11	S17LM11	0.196	0.487	0.253	1.97	3.5
LP2-IL-03SSM	1	1	12	S10LM21	0.360	0.471	0.244	2.4	3.27
LP2-IL-05SSM	1	1	13	S13LM21	0.436	0.617	0.251	1.84	3.5
LP2-IL-03SSM	1	1	14	S10LM11	0.396	0.482	0.248	2.4	3.49
LRM	1	1	15	LRMLM113	0.205	0.095	<0.100	<0.100	0.675
LRM	1	2	1	LRMLM121	0.194	0.090	<0.100	<0.100	0.65
LP2-IL-04SSM	1	2	2	S01LM12	0.407	0.613	0.246	1.8	1.86
LP2-IL-06-1SSM	1	2	3	S05LM22	0.395	0.420	0.509	1.84	3.52
LP2-IL-03SSM	1	2	4	S10LM22	0.340	0.460	0.238	2.39	3.29
LP2-IL-03SSM	1	2	5	S10LM12	0.377	0.477	0.241	2.4	3.52
LP2-IL-04SSM	1	2	6	S01LM22	0.396	0.596	0.242	1.81	1.9
LP2-IL-02SSM	1	2	7	S17LM22	0.190	0.475	0.247	2.01	3.58
LRM	1	2	8	LRMLM122	0.191	0.088	<0.100	<0.100	0.645
LP2-IL-06-1SSM	1	2	9	S05LM12	0.386	0.402	0.501	1.82	3.48
LP2-IL-01SSM	1	2	10	S09LM22	0.190	0.593	0.926	1.78	3.39
LP2-IL-01SSM	1	2	11	S09LM12	0.187	0.589	0.922	1.81	3.44
LP2-IL-02SSM	1	2	12	S17LM12	0.181	0.451	0.236	1.94	3.45
LP2-IL-05SSM	1	2	13	S13LM12	0.417	0.592	0.245	1.77	3.36
LP2-IL-05SSM	1	2	14	S13LM22	0.427	0.596	0.247	1.77	3.37
LRM	1	2	15	LRMLM123	0.194	0.093	<0.100	<0.100	0.663
LRM	2	1	1	LRMLM211	0.199	0.091	<0.100	<0.100	0.637
LP2-IL-09SSM	2	1	2	S16LM21	0.197	0.546	0.968	2.43	3.51
LP2-IL-07SSM	2	1	3	S07LM21	0.405	0.615	0.250	2.48	1.9

Table E-2. LM Measurements of the SSM Study Glasses – Part 2 (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	P (wt%)	S (wt%)	V (wt%)	Zn (wt%)	Zr (wt%)
LP2-IL-10SSM	2	1	4	S02LM11	0.244	0.508	0.495	2.17	2.62
LP2-IL-11SSM	2	1	5	S12LM11	0.400	0.447	0.964	2.46	3.57
LP2-IL-07SSM	2	1	6	S07LM11	0.406	0.632	0.253	2.4	1.86
LP2-IL-08-1SSM	2	1	7	S14LM11	0.430	0.521	0.251	2.47	3.59
LRM	2	1	8	LRMLM212	0.207	0.099	<0.100	<0.100	0.682
LP2-IL-12SSM	2	1	9	S11LM21	0.417	0.585	1.005	1.78	3.43
LP2-IL-08-1SSM	2	1	10	S14LM21	0.441	0.544	0.258	2.43	3.51
LP2-IL-12SSM	2	1	11	S11LM11	0.409	0.566	0.994	1.85	3.58
LP2-IL-09SSM	2	1	12	S16LM11	0.169	0.560	0.988	2.5	2.99
LP2-IL-11SSM	2	1	13	S12LM21	0.426	0.474	0.993	2.5	3.65
LP2-IL-10SSM	2	1	14	S02LM21	0.252	0.527	0.509	2.16	2.65
LRM	2	1	15	LRMLM213	0.202	0.098	<0.100	<0.100	0.664
LRM	2	2	1	LRMLM221	0.198	0.095	<0.100	<0.100	0.639
LP2-IL-07SSM	2	2	2	S07LM12	0.432	0.693	0.266	2.44	1.87
LP2-IL-10SSM	2	2	3	S02LM12	0.268	0.562	0.530	2.18	2.66
LP2-IL-08-1SSM	2	2	4	S14LM12	0.456	0.563	0.266	2.44	3.58
LP2-IL-08-1SSM	2	2	5	S14LM22	0.463	0.571	0.267	2.4	3.52
LP2-IL-12SSM	2	2	6	S11LM12	0.426	0.607	1.05	1.81	3.54
LP2-IL-11SSM	2	2	7	S12LM12	0.418	0.492	1.02	2.4	3.56
LRM	2	2	8	LRMLM222	0.202	0.093	<0.100	<0.100	0.682
LP2-IL-12SSM	2	2	9	S11LM22	0.419	0.593	1.02	1.86	3.61
LP2-IL-11SSM	2	2	10	S12LM22	0.424	0.492	1.01	2.54	3.7
LP2-IL-09SSM	2	2	11	S16LM22	0.211	0.611	1.03	2.52	3.7
LP2-IL-09SSM	2	2	12	S16LM12	0.162	0.596	1.01	2.53	3.05
LP2-IL-10SSM	2	2	13	S02LM22	0.263	0.545	0.521	2.19	2.69
LP2-IL-07SSM	2	2	14	S07LM22	0.428	0.674	0.262	2.56	2
LRM	2	2	15	LRMLM223	0.202	0.096	<0.100	<0.100	0.675
LRM	3	1	1	LRMLM311	0.197	0.085	<0.100	<0.100	0.64
LP2-IL-15SSM	3	1	2	S15LM21	0.397	0.508	1.02	1.82	1.85
LP2-IL-15SSM	3	1	3	S15LM11	0.415	0.518	1.03	1.76	1.87
LP2-IL-17SSM	3	1	4	S04LM21	<0.100	0.542	1.09	2.4	3.39
LP2-IL-16SSM	3	1	5	S08LM11	0.258	0.544	0.500	2.27	2.74
LP2-IL-14SSM	3	1	6	S06LM11	0.322	0.600	0.246	1.92	3.12
LP2-IL-13SSM	3	1	7	S03LM11	0.206	0.496	0.253	1.92	3.78

Table E-2. LM Measurements of the SSM Study Glasses – Part 2 (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	P (wt%)	S (wt%)	V (wt%)	Zn (wt%)	Zr (wt%)
LRM	3	1	8	LRMLM312	0.202	0.087	<0.100	<0.100	0.659
LP2-IL-17SSM	3	1	9	S04LM11	<0.100	0.541	1.09	2.38	3.34
LP2-IL-14SSM	3	1	10	S06LM21	0.429	0.615	0.255	1.93	3.73
LP2-IL-13SSM	3	1	11	S03LM21	0.206	0.509	0.261	1.82	3.57
LP2-IL-16SSM	3	1	12	S08LM21	0.260	0.559	0.523	2.15	2.63
LRM	3	1	13	LRMLM313	0.203	0.089	<0.100	<0.100	0.663
LRM	3	2	1	LRMLM321	0.194	0.088	<0.100	<0.100	0.639
LP2-IL-16SSM	3	2	2	S08LM22	0.249	0.515	0.503	2.23	2.75
LP2-IL-17SSM	3	2	3	S04LM12	<0.100	0.518	1.07	2.4	3.46
LP2-IL-14SSM	3	2	4	S06LM22	0.410	0.598	0.249	1.93	3.84
LP2-IL-17SSM	3	2	5	S04LM22	<0.100	0.516	1.06	2.41	3.5
LP2-IL-15SSM	3	2	6	S15LM12	0.392	0.487	0.998	1.9	2.05
LP2-IL-13SSM	3	2	7	S03LM12	0.201	0.486	0.252	1.92	3.82
LRM	3	2	8	LRMLM322	0.199	0.093	<0.100	<0.100	0.661
LP2-IL-13SSM	3	2	9	S03LM22	0.203	0.489	0.256	1.9	3.73
LP2-IL-14SSM	3	2	10	S06LM12	0.316	0.583	0.248	1.96	3.17
LP2-IL-16SSM	3	2	11	S08LM12	0.255	0.525	0.507	2.27	2.78
LP2-IL-15SSM	3	2	12	S15LM22	0.377	0.492	1.00	1.98	2.04
LRM	3	2	13	LRMLM323	0.194	0.096	<0.100	<0.100	0.658

Table E-3. PF Measurements of the SSM Study Glasses

ID	Block	Sub-Blk	Sequence	Lab ID	Al (wt%)	B (wt%)	Fe (wt%)	Li (wt%)	Si (wt%)	Sn (wt%)
LRM	1	1	1	LRMPF111	4.98	2.27	1.02	<0.100	25.7	<0.100
LP2-IL-06-1SSM	1	1	2	S05PF11	5.43	3.42	0.246	<0.100	17.9	0.615
LP2-IL-02SSM	1	1	3	S17PF11	3.83	2.36	0.506	<0.100	19.8	1.96
LP2-IL-02SSM	1	1	4	S17PF21	4.26	2.48	0.203	<0.100	19.2	1.89
LP2-IL-05SSM	1	1	5	S13PF11	3.76	3.43	0.218	<0.100	17.3	1.93
LP2-IL-01SSM	1	1	6	S09PF21	3.76	2.27	0.997	<0.100	18.1	0.418
LP2-IL-04SSM	1	1	7	S01PF11	3.69	2.28	0.704	<0.100	17.4	1.90
LRM	1	1	8	LRMPF112	4.99	2.25	1.02	<0.100	25.2	<0.100
LP2-IL-06-1SSM	1	1	9	S05PF21	5.53	3.61	0.216	<0.100	17.6	0.700
LP2-IL-03SSM	1	1	10	S10PF21	3.79	2.34	0.490	<0.100	19.5	1.88
LP2-IL-05SSM	1	1	11	S13PF21	3.76	3.46	0.217	<0.100	17.0	1.87
LP2-IL-03SSM	1	1	12	S10PF11	4.30	2.51	0.203	<0.100	18.1	1.87
LP2-IL-01SSM	1	1	13	S09PF11	3.81	2.28	0.783	<0.100	17.4	0.462
LP2-IL-04SSM	1	1	14	S01PF21	3.70	2.29	0.703	<0.100	18.1	1.83
LRM	1	1	15	LRMPF113	5.01	2.30	1.02	<0.100	24.9	<0.100
LRM	1	2	1	LRMPF121	5.08	2.49	0.998	<0.100	26.4	<0.100
LP2-IL-01SSM	1	2	2	S09PF22	3.78	2.40	0.954	<0.100	18.0	0.384
LP2-IL-06-1SSM	1	2	3	S05PF12	5.53	3.70	0.218	<0.100	17.7	0.596
LP2-IL-01SSM	1	2	4	S09PF12	3.77	2.39	0.745	<0.100	18.0	0.407
LP2-IL-03SSM	1	2	5	S10PF12	4.43	2.71	0.176	<0.100	19.0	1.89
LP2-IL-03SSM	1	2	6	S10PF22	3.90	2.47	0.455	<0.100	19.6	1.89
LP2-IL-04SSM	1	2	7	S01PF22	3.72	2.44	0.672	<0.100	18.6	1.85
LRM	1	2	8	LRMPF122	5.03	2.39	0.973	<0.100	26.3	<0.100
LP2-IL-05SSM	1	2	9	S13PF12	3.82	3.64	0.198	<0.100	19.1	1.88
LP2-IL-06-1SSM	1	2	10	S05PF22	5.55	3.65	0.178	<0.100	17.5	0.663
LP2-IL-05SSM	1	2	11	S13PF22	3.82	3.67	0.186	<0.100	16.7	1.84
LP2-IL-02SSM	1	2	12	S17PF12	3.88	2.51	0.470	<0.100	21.9	1.94
LP2-IL-04SSM	1	2	13	S01PF12	3.85	2.54	0.690	<0.100	17.2	1.93
LP2-IL-02SSM	1	2	14	S17PF22	4.33	2.64	0.173	<0.100	18.9	1.86
LRM	1	2	15	LRMPF123	5.17	2.47	0.998	<0.100	25.2	<0.100
LRM	2	1	1	LRMPF211	4.97	2.39	0.964	<0.100	25.5	<0.100
LP2-IL-12SSM	2	1	2	S11PF21	3.71	2.29	0.150	<0.100	19.4	0.351
LP2-IL-08-1SSM	2	1	3	S14PF11	3.63	2.33	0.686	<0.100	17.9	0.338

Table E-3. PF Measurements of the SSM Study Glasses (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	Al (wt%)	B (wt%)	Fe (wt%)	Li (wt%)	Si (wt%)	Sn (wt%)
LP2-IL-09SSM	2	1	4	S16PF21	3.62	3.39	0.645	<0.100	16.8	1.56
LP2-IL-10SSM	2	1	5	S02PF21	4.76	2.69	0.377	<0.100	17.3	1.05
LP2-IL-12SSM	2	1	6	S11PF11	3.60	2.30	0.147	<0.100	18.7	0.347
LP2-IL-11SSM	2	1	7	S12PF21	4.43	2.30	0.667	<0.100	17.5	1.80
LRM	2	1	8	LRMPF212	5.02	2.39	0.968	<0.100	25.4	<0.100
LP2-IL-07SSM	2	1	9	S07PF21	3.74	3.59	0.154	<0.100	17.7	0.353
LP2-IL-07SSM	2	1	10	S07PF11	3.64	3.50	0.148	<0.100	17.9	0.305
LP2-IL-08-1SSM	2	1	11	S14PF21	3.71	2.37	0.685	<0.100	17.7	0.334
LP2-IL-09SSM	2	1	12	S16PF11	3.64	3.46	0.644	<0.100	18.0	1.56
LP2-IL-11SSM	2	1	13	S12PF11	4.35	2.30	0.660	<0.100	17.7	1.79
LP2-IL-10SSM	2	1	14	S02PF11	4.78	2.72	0.386	<0.100	17.7	1.07
LRM	2	1	15	LRMPF213	4.92	2.36	0.950	<0.100	25.2	<0.100
LRM	2	2	1	LRMPF221	4.95	2.40	0.951	<0.100	25.7	<0.100
LP2-IL-07SSM	2	2	2	S07PF22	3.64	3.51	0.141	<0.100	19.1	0.360
LP2-IL-09SSM	2	2	3	S16PF22	3.61	3.40	0.630	<0.100	17.7	1.57
LP2-IL-09SSM	2	2	4	S16PF12	3.64	3.47	0.642	<0.100	17.7	1.60
LP2-IL-07SSM	2	2	5	S07PF12	3.71	3.56	0.143	<0.100	18.1	0.341
LP2-IL-11SSM	2	2	6	S12PF12	4.39	2.36	0.654	<0.100	18.1	1.82
LP2-IL-10SSM	2	2	7	S02PF12	4.89	2.80	0.390	<0.100	18.2	1.09
LRM	2	2	8	LRMPF222	4.98	2.37	0.953	<0.100	25.6	<0.100
LP2-IL-11SSM	2	2	9	S12PF22	4.37	2.40	0.661	<0.100	18.4	1.82
LP2-IL-12SSM	2	2	10	S11PF12	3.60	2.32	0.139	<0.100	19.6	0.373
LP2-IL-12SSM	2	2	11	S11PF22	3.72	2.39	0.142	<0.100	19.8	0.364
LP2-IL-10SSM	2	2	12	S02PF22	4.79	2.78	0.378	<0.100	17.6	1.07
LP2-IL-08-1SSM	2	2	13	S14PF22	3.61	2.32	0.665	<0.100	18.5	0.361
LP2-IL-08-1SSM	2	2	14	S14PF12	3.64	2.34	0.680	<0.100	17.9	0.355
LRM	2	2	15	LRMPF223	4.97	2.40	0.962	<0.100	25.3	<0.100
LRM	3	1	1	LRMPF311	4.97	2.33	0.998	<0.100	24.7	<0.100
LP2-IL-17SSM	3	1	2	S04PF11	4.65	3.10	0.224	<0.100	19.6	<0.100
LP2-IL-16SSM	3	1	3	S08PF21	5.11	2.72	0.493	<0.100	18.7	1.28
LP2-IL-13SSM	3	1	4	S03PF11	3.75	3.14	0.753	<0.100	19.4	0.475
LP2-IL-15SSM	3	1	5	S15PF11	3.67	2.95	0.744	<0.100	19.4	1.87
LP2-IL-14SSM	3	1	6	S06PF11	4.47	3.46	0.734	<0.100	16.9	0.432
LP2-IL-13SSM	3	1	7	S03PF21	3.82	3.24	0.764	<0.100	20.1	0.433

Table E-3. PF Measurements of the SSM Study Glasses (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	Al (wt%)	B (wt%)	Fe (wt%)	Li (wt%)	Si (wt%)	Sn (wt%)
LRM	3	1	8	LRMPF312	5.10	2.30	1.03	<0.100	25.7	<0.100
LP2-IL-14SSM	3	1	9	S06PF21	4.47	3.40	0.732	<0.100	18.3	0.412
LP2-IL-16SSM	3	1	10	S08PF11	4.90	2.65	0.466	<0.100	18.4	1.11
LP2-IL-17SSM	3	1	11	S04PF21	4.66	3.10	0.217	<0.100	18.6	<0.100
LP2-IL-15SSM	3	1	12	S15PF21	3.79	3.03	0.756	<0.100	21.4	1.96
LRM	3	1	13	LRMPF313	5.04	2.28	1.03	<0.100	25.2	<0.100
LRM	3	2	1	LRMPF321	5.04	2.44	0.992	<0.100	25.9	<0.100
LP2-IL-16SSM	3	2	2	S08PF22	4.96	2.78	0.448	<0.100	18.9	1.20
LP2-IL-17SSM	3	2	3	S04PF12	4.65	3.28	0.192	<0.100	19.5	<0.100
LP2-IL-14SSM	3	2	4	S06PF12	4.35	3.47	0.672	<0.100	18.7	0.351
LP2-IL-15SSM	3	2	5	S15PF22	3.73	3.12	0.712	<0.100	21.3	1.90
LP2-IL-17SSM	3	2	6	S04PF22	4.63	3.29	0.189	<0.100	19.3	<0.100
LP2-IL-16SSM	3	2	7	S08PF12	4.90	2.73	0.428	<0.100	18.6	1.08
LRM	3	2	8	LRMPF322	5.01	2.37	0.981	<0.100	25.5	<0.100
LP2-IL-15SSM	3	2	9	S15PF12	3.78	3.21	0.725	<0.100	20.3	1.84
LP2-IL-14SSM	3	2	10	S06PF22	4.40	3.54	0.683	<0.100	18.7	0.369
LP2-IL-13SSM	3	2	11	S03PF22	3.71	3.26	0.702	<0.100	19.8	0.380
LP2-IL-13SSM	3	2	12	S03PF12	3.74	3.29	0.710	<0.100	19.9	0.415
LRM	3	2	13	LRMPF323	4.94	2.35	0.960	<0.100	25.7	<0.100

Table E-4. KH Measurements of the SSM Study Glasses

ID	Block	Sub-Blk	Sequence	Lab ID	Cl (wt%)	F (wt%)
LRM	1	1	1	LRMKH111	<0.050	0.886
LP2-IL-02SSM	1	1	2	S17KH21	0.062	0.184
LP2-IL-06-1SSM	1	1	3	S05KH21	0.091	0.340
LP2-IL-05SSM	1	1	4	S13KH11	0.114	0.348
LP2-IL-01SSM	1	1	5	S09KH21	0.050	0.185
LP2-IL-03SSM	1	1	6	S10KH21	0.117	0.375
LP2-IL-05SSM	1	1	7	S13KH21	0.118	0.356
LRM	1	1	8	LRMKH112	<0.050	0.884
LP2-IL-01SSM	1	1	9	S09KH11	0.056	0.192
LP2-IL-03SSM	1	1	10	S10KH11	0.118	0.375
LP2-IL-04SSM	1	1	11	S01KH11	0.085	0.376
LP2-IL-06-1SSM	1	1	12	S05KH11	0.091	0.351
LP2-IL-04SSM	1	1	13	S01KH21	0.087	0.384
LP2-IL-02SSM	1	1	14	S17KH11	0.055	0.183
LRM	1	1	15	LRMKH113	<0.050	0.889
LRM	1	2	1	LRMKH121	<0.050	0.883
LP2-IL-01SSM	1	2	2	S09KH12	0.051	0.193
LP2-IL-06-1SSM	1	2	3	S05KH12	0.091	0.349
LP2-IL-04SSM	1	2	4	S01KH22	0.087	0.383
LP2-IL-05SSM	1	2	5	S13KH12	0.115	0.349
LP2-IL-03SSM	1	2	6	S10KH22	0.120	0.385
LP2-IL-02SSM	1	2	7	S17KH12	0.056	0.186
LRM	1	2	8	LRMKH122	<0.050	0.888
LP2-IL-02SSM	1	2	9	S17KH22	0.060	0.181
LP2-IL-01SSM	1	2	10	S09KH22	0.051	0.184
LP2-IL-04SSM	1	2	11	S01KH12	0.087	0.381
LP2-IL-03SSM	1	2	12	S10KH12	0.120	0.376
LP2-IL-06-1SSM	1	2	13	S05KH22	0.090	0.338
LP2-IL-05SSM	1	2	14	S13KH22	0.120	0.361
LRM	1	2	15	LRMKH123	<0.050	0.893
LRM	2	1	1	LRMKH211	<0.050	0.884
LP2-IL-07SSM	2	1	2	S07KH11	0.124	0.364
LP2-IL-09SSM	2	1	3	S16KH21	0.056	0.176
LP2-IL-08-1SSM	2	1	4	S14KH11	0.087	0.374
LP2-IL-09SSM	2	1	5	S16KH11	0.053	0.173
LP2-IL-10SSM	2	1	6	S02KH21	0.056	0.216
LP2-IL-11SSM	2	1	7	S12KH11	0.098	0.358
LRM	2	1	8	LRMKH212	<0.050	0.878
LP2-IL-11SSM	2	1	9	S12KH21	0.099	0.358
LP2-IL-08-1SSM	2	1	10	S14KH21	0.086	0.371
LP2-IL-12SSM	2	1	11	S11KH21	0.110	0.354
LP2-IL-10SSM	2	1	12	S02KH11	0.058	0.215
LP2-IL-12SSM	2	1	13	S11KH11	0.109	0.355
LP2-IL-07SSM	2	1	14	S07KH21	0.125	0.369
LRM	2	1	15	LRMKH213	<0.050	0.881
LRM	2	2	1	LRMKH221	<0.050	0.881
LP2-IL-07SSM	2	2	2	S07KH22	0.126	0.370
LP2-IL-10SSM	2	2	3	S02KH22	0.056	0.217
LP2-IL-11SSM	2	2	4	S12KH12	0.099	0.364
LP2-IL-09SSM	2	2	5	S16KH22	0.055	0.178
LP2-IL-08-1SSM	2	2	6	S14KH22	0.087	0.376
LP2-IL-12SSM	2	2	7	S11KH12	0.111	0.352

Table E-4. KH Measurements of the SSM Study Glasses (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	Cl (wt%)	F (wt%)
LRM	2	2	8	LRMKH222	<0.050	0.887
LP2-IL-10SSM	2	2	9	S02KH12	0.059	0.219
LP2-IL-09SSM	2	2	10	S16KH12	0.056	0.176
LP2-IL-12SSM	2	2	11	S11KH22	0.112	0.359
LP2-IL-08-1SSM	2	2	12	S14KH12	0.090	0.377
LP2-IL-07SSM	2	2	13	S07KH12	0.127	0.374
LP2-IL-11SSM	2	2	14	S12KH22	0.099	0.364
LRM	2	2	15	LRMKH223	<0.050	0.886
LRM	3	1	1	LRMKH311	<0.050	0.880
LP2-IL-17SSM	3	1	2	S04KH11	<0.050	0.075
LP2-IL-16SSM	3	1	3	S08KH11	0.067	0.224
LP2-IL-17SSM	3	1	4	S04KH21	<0.050	0.076
LP2-IL-15SSM	3	1	5	S15KH21	0.112	0.333
LP2-IL-15SSM	3	1	6	S15KH11	0.109	0.329
LP2-IL-14SSM	3	1	7	S06KH21	0.095	0.340
LRM	3	1	8	LRMKH312	<0.050	0.868
LP2-IL-13SSM	3	1	9	S03KH11	0.061	0.171
LP2-IL-16SSM	3	1	10	S08KH21	0.065	0.226
LP2-IL-13SSM	3	1	11	S03KH21	0.061	0.173
LP2-IL-14SSM	3	1	12	S06KH11	0.094	0.343
LRM	3	1	13	LRMKH313	<0.050	0.880
LRM	3	2	1	LRMKH321	<0.050	0.885
LP2-IL-15SSM	3	2	2	S15KH12	0.108	0.333
LP2-IL-13SSM	3	2	3	S03KH22	0.060	0.171
LP2-IL-14SSM	3	2	4	S06KH22	0.092	0.337
LP2-IL-17SSM	3	2	5	S04KH12	<0.050	0.074
LP2-IL-16SSM	3	2	6	S08KH22	0.064	0.227
LP2-IL-14SSM	3	2	7	S06KH12	0.094	0.345
LRM	3	2	8	LRMKH322	<0.050	0.885
LP2-IL-17SSM	3	2	9	S04KH22	<0.050	0.077
LP2-IL-13SSM	3	2	10	S03KH12	0.060	0.173
LP2-IL-15SSM	3	2	11	S15KH22	0.111	0.338
LP2-IL-16SSM	3	2	12	S08KH12	0.065	0.228
LRM	3	2	13	LRMKH323	<0.050	0.881

Table E-5. Comparison of Targeted and Measured SSM Glass Compositions

Glass ID	Oxide	BDL (<)	Measured (wt%)	Targeted (wt%)	Difference of Measured versus Targeted	% Difference of Measured versus Targeted
LP2-IL-01SSM	Al_2O_3		7.142	7.500	-0.358	-4.8%
LP2-IL-01SSM	B_2O_3		7.518	8.000	-0.482	-6.0%
LP2-IL-01SSM	CaO		7.150	7.620	-0.470	-6.2%
LP2-IL-01SSM	Cl		0.052	0.170	-0.118	
LP2-IL-01SSM	Cr_2O_3		0.300	0.530	-0.230	
LP2-IL-01SSM	F		0.189	0.260	-0.072	
LP2-IL-01SSM	Fe_2O_3		1.243	0.200	1.043	
LP2-IL-01SSM	K_2O		1.439	2.000	-0.561	
LP2-IL-01SSM	Li_2O	<	0.215	0.000	0.215	
LP2-IL-01SSM	MgO		0.275	0.300	-0.025	
LP2-IL-01SSM	Na_2O		21.871	23.680	-1.809	-7.6%
LP2-IL-01SSM	P_2O_5		0.442	0.560	-0.118	
LP2-IL-01SSM	SiO_2		38.240	37.980	0.260	0.7%
LP2-IL-01SSM	SnO_2		0.530	0.500	0.030	
LP2-IL-01SSM	SO_3		1.503	0.800	0.703	
LP2-IL-01SSM	V_2O_5		1.678	2.000	-0.322	
LP2-IL-01SSM	ZnO		2.247	2.400	-0.153	
LP2-IL-01SSM	ZrO_2		4.647	5.500	-0.853	-15.5%
LP2-IL-01SSM	Sum		96.682	100.000	-3.318	-3.3%
LP2-IL-02SSM	Al_2O_3		7.700	7.500	0.200	2.7%
LP2-IL-02SSM	B_2O_3		8.042	8.130	-0.088	-1.1%
LP2-IL-02SSM	CaO		2.074	2.000	0.074	
LP2-IL-02SSM	Cl		0.058	0.170	-0.112	
LP2-IL-02SSM	Cr_2O_3		0.289	0.380	-0.091	
LP2-IL-02SSM	F		0.184	0.260	-0.077	
LP2-IL-02SSM	Fe_2O_3		0.483	0.580	-0.097	
LP2-IL-02SSM	K_2O		1.473	2.000	-0.527	
LP2-IL-02SSM	Li_2O	<	0.215	0.000	0.215	
LP2-IL-02SSM	MgO		0.923	1.000	-0.077	
LP2-IL-02SSM	Na_2O		23.152	23.680	-0.528	-2.2%
LP2-IL-02SSM	P_2O_5		0.434	0.560	-0.126	
LP2-IL-02SSM	SiO_2		42.679	41.810	0.869	2.1%
LP2-IL-02SSM	SnO_2		2.428	2.500	-0.072	
LP2-IL-02SSM	SO_3		1.180	0.800	0.380	
LP2-IL-02SSM	V_2O_5		0.440	0.500	-0.060	
LP2-IL-02SSM	ZnO		2.446	2.630	-0.184	
LP2-IL-02SSM	ZrO_2		4.721	5.500	-0.779	-14.2%
LP2-IL-02SSM	Sum		98.922	100.000	-1.078	-1.1%
LP2-IL-03SSM	Al_2O_3		7.756	8.730	-0.974	-11.2%
LP2-IL-03SSM	B_2O_3		8.074	8.730	-0.656	-7.5%
LP2-IL-03SSM	CaO		2.081	2.000	0.081	
LP2-IL-03SSM	Cl		0.119	0.350	-0.231	
LP2-IL-03SSM	Cr_2O_3		0.379	0.530	-0.151	
LP2-IL-03SSM	F		0.378	0.530	-0.152	
LP2-IL-03SSM	Fe_2O_3		0.473	0.200	0.273	
LP2-IL-03SSM	K_2O		0.640	0.760	-0.120	
LP2-IL-03SSM	Li_2O	<	0.215	0.000	0.215	
LP2-IL-03SSM	MgO		0.284	0.300	-0.016	
LP2-IL-03SSM	Na_2O		22.444	24.500	-2.056	-8.4%
LP2-IL-03SSM	P_2O_5		0.844	1.130	-0.286	
LP2-IL-03SSM	SiO_2		40.754	40.360	0.394	1.0%
LP2-IL-03SSM	SnO_2		2.390	2.500	-0.110	
LP2-IL-03SSM	SO_3		1.180	0.200	0.980	
LP2-IL-03SSM	V_2O_5		0.433	0.500	-0.067	
LP2-IL-03SSM	ZnO		2.984	3.200	-0.216	
LP2-IL-03SSM	ZrO_2		4.583	5.500	-0.917	-16.7%
LP2-IL-03SSM	Sum		96.011	100.020	-4.009	-4.0%
LP2-IL-04SSM	Al_2O_3		7.067	7.500	-0.433	-5.8%

Table E-5. Comparison of Targeted and Measured SSM Glass Compositions (continued)

Glass ID	Oxide	BDL (<)	Measured (wt%)	Targeted (wt%)	Difference of Measured versus Targeted	% Difference of Measured versus Targeted
LP2-IL-04SSM	B_2O_3		7.688	8.000	-0.312	-3.9%
LP2-IL-04SSM	CaO		6.856	7.490	-0.634	-8.5%
LP2-IL-04SSM	Cl		0.087	0.350	-0.264	
LP2-IL-04SSM	Cr_2O_3		0.280	0.530	-0.250	
LP2-IL-04SSM	F		0.381	0.530	-0.149	
LP2-IL-04SSM	Fe_2O_3		0.990	1.000	-0.010	
LP2-IL-04SSM	K_2O		1.439	2.000	-0.561	
LP2-IL-04SSM	Li_2O	<	0.215	0.000	0.215	
LP2-IL-04SSM	MgO		0.892	1.000	-0.108	
LP2-IL-04SSM	Na_2O		22.377	23.680	-1.303	-5.5%
LP2-IL-04SSM	P_2O_5		0.911	1.130	-0.219	
LP2-IL-04SSM	SiO_2		38.133	38.200	-0.067	-0.2%
LP2-IL-04SSM	SnO_2		2.384	2.500	-0.116	
LP2-IL-04SSM	SO_3		1.484	0.200	1.284	
LP2-IL-04SSM	V_2O_5		0.433	0.500	-0.067	
LP2-IL-04SSM	ZnO		2.259	2.400	-0.141	
LP2-IL-04SSM	ZrO_2		2.560	3.000	-0.440	
LP2-IL-04SSM	Sum		96.435	100.010	-3.575	-3.6%
LP2-IL-05SSM	Al_2O_3		7.161	7.500	-0.339	-4.5%
LP2-IL-05SSM	B_2O_3		11.431	12.000	-0.569	-4.7%
LP2-IL-05SSM	CaO		6.562	7.030	-0.468	-6.7%
LP2-IL-05SSM	Cl		0.117	0.350	-0.233	
LP2-IL-05SSM	Cr_2O_3		0.307	0.380	-0.073	
LP2-IL-05SSM	F		0.354	0.530	-0.177	
LP2-IL-05SSM	Fe_2O_3		0.293	0.200	0.093	
LP2-IL-05SSM	K_2O		0.451	0.500	-0.049	
LP2-IL-05SSM	Li_2O	<	0.215	0.000	0.215	
LP2-IL-05SSM	MgO		0.305	0.300	0.005	
LP2-IL-05SSM	Na_2O		21.298	22.000	-0.702	-3.2%
LP2-IL-05SSM	P_2O_5		0.967	1.130	-0.163	
LP2-IL-05SSM	SiO_2		37.491	37.000	0.491	1.3%
LP2-IL-05SSM	SnO_2		2.387	2.500	-0.113	
LP2-IL-05SSM	SO_3		1.489	0.200	1.289	
LP2-IL-05SSM	V_2O_5		0.440	0.500	-0.060	
LP2-IL-05SSM	ZnO		2.250	2.400	-0.150	
LP2-IL-05SSM	ZrO_2		4.633	5.500	-0.867	-15.8%
LP2-IL-05SSM	Sum		98.151	100.020	-1.869	-1.9%
LP2-IL-06-1SSM	Al_2O_3		10.411	10.680	-0.269	-2.5%
LP2-IL-06-1SSM	B_2O_3		11.576	12.000	-0.424	-3.5%
LP2-IL-06-1SSM	CaO		2.155	2.000	0.155	
LP2-IL-06-1SSM	Cl		0.091	0.350	-0.259	
LP2-IL-06-1SSM	Cr_2O_3		0.361	0.530	-0.169	
LP2-IL-06-1SSM	F		0.345	0.530	-0.186	
LP2-IL-06-1SSM	Fe_2O_3		0.307	0.200	0.107	
LP2-IL-06-1SSM	K_2O		1.536	2.000	-0.464	
LP2-IL-06-1SSM	Li_2O	<	0.215	0.000	0.215	
LP2-IL-06-1SSM	MgO		0.938	1.000	-0.062	
LP2-IL-06-1SSM	Na_2O		19.984	22.000	-2.016	-9.2%
LP2-IL-06-1SSM	P_2O_5		0.905	1.130	-0.225	
LP2-IL-06-1SSM	SiO_2		37.812	37.000	0.812	2.2%
LP2-IL-06-1SSM	SnO_2		0.817	0.820	-0.003	
LP2-IL-06-1SSM	SO_3		1.035	0.800	0.235	
LP2-IL-06-1SSM	V_2O_5		0.910	1.080	-0.170	
LP2-IL-06-1SSM	ZnO		2.269	2.400	-0.131	
LP2-IL-06-1SSM	ZrO_2		4.731	5.500	-0.769	-14.0%
LP2-IL-06-1SSM	Sum		96.398	100.020	-3.622	-3.6%
LP2-IL-07SSM	Al_2O_3		6.958	7.500	-0.542	-7.2%
LP2-IL-07SSM	B_2O_3		11.398	12.000	-0.602	-5.0%
LP2-IL-07SSM	CaO		4.988	5.150	-0.162	-3.1%

Table E-5. Comparison of Targeted and Measured SSM Glass Compositions (continued)

Glass ID	Oxide	BDL (<)	Measured (wt%)	Targeted (wt%)	Difference of Measured versus Targeted	% Difference of Measured versus Targeted
LP2-IL-07SSM	Cl		0.126	0.350	-0.225	
LP2-IL-07SSM	Cr_2O_3		0.312	0.380	-0.068	
LP2-IL-07SSM	F		0.369	0.530	-0.161	
LP2-IL-07SSM	Fe_2O_3		0.209	0.200	0.009	
LP2-IL-07SSM	K_2O		1.581	2.000	-0.419	
LP2-IL-07SSM	Li_2O	<	0.215	0.000	0.215	
LP2-IL-07SSM	MgO		0.947	1.000	-0.053	
LP2-IL-07SSM	Na_2O		21.366	22.330	-0.964	-4.3%
LP2-IL-07SSM	P_2O_5		0.957	1.130	-0.173	
LP2-IL-07SSM	SiO_2		38.935	39.450	-0.515	-1.3%
LP2-IL-07SSM	SnO_2		0.431	0.500	-0.069	
LP2-IL-07SSM	SO_3		1.632	0.800	0.832	
LP2-IL-07SSM	V_2O_5		0.460	0.500	-0.040	
LP2-IL-07SSM	ZnO		3.075	3.200	-0.125	
LP2-IL-07SSM	ZrO_2		2.577	3.000	-0.423	
LP2-IL-07SSM	Sum		96.537	100.020	-3.483	-3.5%
LP2-IL-08-1SSM	Al_2O_3		6.892	7.500	-0.608	-8.1%
LP2-IL-08-1SSM	B_2O_3		7.535	8.000	-0.465	-5.8%
LP2-IL-08-1SSM	CaO		7.731	8.000	-0.269	-3.4%
LP2-IL-08-1SSM	Cl		0.088	0.350	-0.263	
LP2-IL-08-1SSM	Cr_2O_3		0.349	0.530	-0.181	
LP2-IL-08-1SSM	F		0.375	0.530	-0.156	
LP2-IL-08-1SSM	Fe_2O_3		0.971	1.000	-0.029	
LP2-IL-08-1SSM	K_2O		0.423	0.500	-0.077	
LP2-IL-08-1SSM	Li_2O	<	0.215	0.000	0.215	
LP2-IL-08-1SSM	MgO		0.969	1.000	-0.031	
LP2-IL-08-1SSM	Na_2O		20.018	22.000	-1.982	-9.0%
LP2-IL-08-1SSM	P_2O_5		1.025	1.130	-0.105	
LP2-IL-08-1SSM	SiO_2		38.507	38.980	-0.473	-1.2%
LP2-IL-08-1SSM	SnO_2		0.441	0.500	-0.059	
LP2-IL-08-1SSM	SO_3		1.373	0.800	0.573	
LP2-IL-08-1SSM	V_2O_5		0.465	0.500	-0.035	
LP2-IL-08-1SSM	ZnO		3.031	3.200	-0.169	
LP2-IL-08-1SSM	ZrO_2		4.795	5.500	-0.705	-12.8%
LP2-IL-08-1SSM	Sum		95.200	100.020	-4.820	-4.8%
LP2-IL-09SSM	Al_2O_3		6.854	7.500	-0.646	-8.6%
LP2-IL-09SSM	B_2O_3		11.044	12.000	-0.956	-8.0%
LP2-IL-09SSM	CaO		2.186	2.000	0.186	
LP2-IL-09SSM	Cl		0.055	0.170	-0.115	
LP2-IL-09SSM	Cr_2O_3		0.307	0.530	-0.223	
LP2-IL-09SSM	F		0.176	0.260	-0.084	
LP2-IL-09SSM	Fe_2O_3		0.915	1.000	-0.085	
LP2-IL-09SSM	K_2O		0.454	0.500	-0.046	
LP2-IL-09SSM	Li_2O	<	0.215	0.000	0.215	
LP2-IL-09SSM	MgO		0.954	1.000	-0.046	
LP2-IL-09SSM	Na_2O		22.478	24.370	-1.892	-7.8%
LP2-IL-09SSM	P_2O_5		0.423	0.560	-0.137	
LP2-IL-09SSM	SiO_2		37.545	37.000	0.545	1.5%
LP2-IL-09SSM	SnO_2		1.996	2.200	-0.204	
LP2-IL-09SSM	SO_3		1.444	0.200	1.244	
LP2-IL-09SSM	V_2O_5		1.783	2.000	-0.217	
LP2-IL-09SSM	ZnO		3.106	3.200	-0.094	
LP2-IL-09SSM	ZrO_2		4.475	5.500	-1.025	-18.6%
LP2-IL-09SSM	Sum		96.412	99.990	-3.578	-3.6%
LP2-IL-10SSM	Al_2O_3		9.079	10.000	-0.921	-9.2%
LP2-IL-10SSM	B_2O_3		8.847	9.500	-0.653	-6.9%
LP2-IL-10SSM	CaO		4.922	5.000	-0.078	-1.6%
LP2-IL-10SSM	Cl		0.057	0.210	-0.153	

Table E-5. Comparison of Targeted and Measured SSM Glass Compositions (continued)

Glass ID	Oxide	BDL (<)	Measured (wt%)	Targeted (wt%)	Difference of Measured versus Targeted	% Difference of Measured versus Targeted
LP2-IL-10SSM	Cr_2O_3		0.263	0.450	-0.187	
LP2-IL-10SSM	F		0.217	0.320	-0.103	
LP2-IL-10SSM	Fe_2O_3		0.547	0.600	-0.053	
LP2-IL-10SSM	K_2O		0.835	1.000	-0.165	
LP2-IL-10SSM	Li_2O	<	0.215	0.000	0.215	
LP2-IL-10SSM	MgO		0.637	0.650	-0.013	
LP2-IL-10SSM	Na_2O		22.006	23.000	-0.994	-4.3%
LP2-IL-10SSM	P_2O_5		0.588	0.680	-0.092	
LP2-IL-10SSM	SiO_2		37.866	38.800	-0.934	-2.4%
LP2-IL-10SSM	SnO_2		1.358	1.500	-0.142	
LP2-IL-10SSM	SO_3		1.337	0.500	0.837	
LP2-IL-10SSM	V_2O_5		0.917	1.000	-0.083	
LP2-IL-10SSM	ZnO		2.707	2.800	-0.093	
LP2-IL-10SSM	ZrO_2		3.586	4.000	-0.414	
LP2-IL-10SSM	Sum		95.986	100.010	-4.024	-4.0%
LP2-IL-11SSM	Al_2O_3		8.285	9.000	-0.715	-7.9%
LP2-IL-11SSM	B_2O_3		7.535	8.000	-0.465	-5.8%
LP2-IL-11SSM	CaO		3.190	3.080	0.110	
LP2-IL-11SSM	Cl		0.099	0.350	-0.251	
LP2-IL-11SSM	Cr_2O_3		0.256	0.380	-0.124	
LP2-IL-11SSM	F		0.361	0.530	-0.169	
LP2-IL-11SSM	Fe_2O_3		0.944	1.000	-0.056	
LP2-IL-11SSM	K_2O		1.581	2.000	-0.419	
LP2-IL-11SSM	Li_2O	<	0.215	0.000	0.215	
LP2-IL-11SSM	MgO		0.299	0.300	-0.001	
LP2-IL-11SSM	Na_2O		21.096	22.000	-0.904	-4.1%
LP2-IL-11SSM	P_2O_5		0.956	1.130	-0.174	
LP2-IL-11SSM	SiO_2		38.347	38.850	-0.503	-1.3%
LP2-IL-11SSM	SnO_2		2.295	2.500	-0.205	
LP2-IL-11SSM	SO_3		1.189	0.200	0.989	
LP2-IL-11SSM	V_2O_5		1.779	2.000	-0.221	
LP2-IL-11SSM	ZnO		3.081	3.200	-0.119	
LP2-IL-11SSM	ZrO_2		4.890	5.500	-0.610	-11.1%
LP2-IL-11SSM	Sum		96.398	100.020	-3.622	-3.6%
LP2-IL-12SSM	Al_2O_3		6.911	7.500	-0.589	-7.9%
LP2-IL-12SSM	B_2O_3		7.486	8.000	-0.514	-6.4%
LP2-IL-12SSM	CaO		3.183	3.120	0.063	
LP2-IL-12SSM	Cl		0.111	0.350	-0.240	
LP2-IL-12SSM	Cr_2O_3		0.311	0.380	-0.069	
LP2-IL-12SSM	F		0.355	0.530	-0.175	
LP2-IL-12SSM	Fe_2O_3		0.207	0.200	0.007	
LP2-IL-12SSM	K_2O		0.464	0.500	-0.036	
LP2-IL-12SSM	Li_2O	<	0.215	0.000	0.215	
LP2-IL-12SSM	MgO		0.959	1.000	-0.041	
LP2-IL-12SSM	Na_2O		22.377	23.790	-1.413	-5.9%
LP2-IL-12SSM	P_2O_5		0.957	1.130	-0.173	
LP2-IL-12SSM	SiO_2		41.449	42.920	-1.471	-3.4%
LP2-IL-12SSM	SnO_2		0.455	0.500	-0.045	
LP2-IL-12SSM	SO_3		1.468	0.200	1.268	
LP2-IL-12SSM	V_2O_5		1.816	2.000	-0.184	
LP2-IL-12SSM	ZnO		2.272	2.400	-0.128	
LP2-IL-12SSM	ZrO_2		4.782	5.500	-0.718	-13.1%
LP2-IL-12SSM	Sum		95.777	100.020	-4.243	-4.2%
LP2-IL-13SSM	Al_2O_3		7.095	7.500	-0.405	-5.4%
LP2-IL-13SSM	B_2O_3		10.408	11.260	-0.852	-7.6%
LP2-IL-13SSM	CaO		2.505	2.320	0.185	
LP2-IL-13SSM	Cl		0.061	0.170	-0.110	
LP2-IL-13SSM	Cr_2O_3		0.433	0.530	-0.097	

Table E-5. Comparison of Targeted and Measured SSM Glass Compositions (continued)

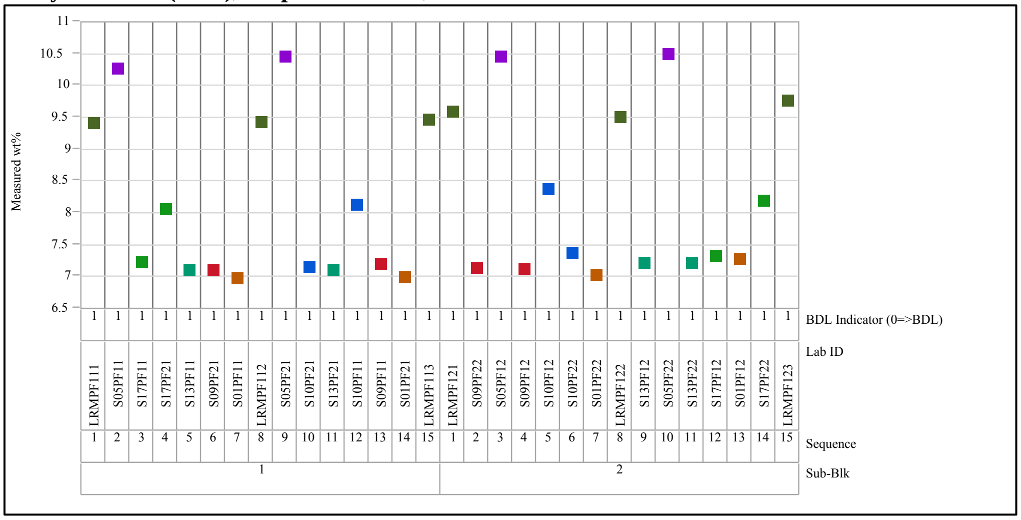
Glass ID	Oxide	BDL (<)	Measured (wt%)	Targeted (wt%)	Difference of Measured versus Targeted	% Difference of Measured versus Targeted
LP2-IL-13SSM	F		0.172	0.260	-0.088	
LP2-IL-13SSM	Fe_2O_3		1.047	1.000	0.047	
LP2-IL-13SSM	K_2O		1.659	2.000	-0.341	
LP2-IL-13SSM	Li_2O	<	0.215	0.000	0.215	
LP2-IL-13SSM	MgO		0.281	0.300	-0.019	
LP2-IL-13SSM	Na_2O		21.602	22.000	-0.398	-1.8%
LP2-IL-13SSM	P_2O_5		0.467	0.560	-0.093	
LP2-IL-13SSM	SiO_2		42.358	43.000	-0.642	-1.5%
LP2-IL-13SSM	SnO_2		0.541	0.500	0.041	
LP2-IL-13SSM	SO_3		1.236	0.200	1.036	
LP2-IL-13SSM	V_2O_5		0.456	0.500	-0.044	
LP2-IL-13SSM	ZnO		2.353	2.400	-0.047	
LP2-IL-13SSM	ZrO_2		5.032	5.500	-0.468	-8.5%
LP2-IL-13SSM	Sum		97.920	100.000	-2.080	-2.1%
LP2-IL-14SSM	Al_2O_3		8.356	8.800	-0.444	-5.0%
LP2-IL-14SSM	B_2O_3		11.165	12.000	-0.835	-7.0%
LP2-IL-14SSM	CaO		4.061	3.830	0.231	
LP2-IL-14SSM	Cl		0.094	0.350	-0.256	
LP2-IL-14SSM	Cr_2O_3		0.214	0.380	-0.166	
LP2-IL-14SSM	F		0.341	0.530	-0.189	
LP2-IL-14SSM	Fe_2O_3		1.008	1.000	0.008	
LP2-IL-14SSM	K_2O		0.442	0.500	-0.058	
LP2-IL-14SSM	Li_2O	<	0.215	0.000	0.215	
LP2-IL-14SSM	MgO		0.288	0.300	-0.012	
LP2-IL-14SSM	Na_2O		23.017	24.500	-1.483	-6.1%
LP2-IL-14SSM	P_2O_5		0.846	1.130	-0.284	
LP2-IL-14SSM	SiO_2		38.828	37.000	1.828	4.9%
LP2-IL-14SSM	SnO_2		0.496	0.500	-0.004	
LP2-IL-14SSM	SO_3		1.496	0.800	0.696	
LP2-IL-14SSM	V_2O_5		0.445	0.500	-0.055	
LP2-IL-14SSM	ZnO		2.409	2.400	0.009	
LP2-IL-14SSM	ZrO_2		4.681	5.500	-0.819	-14.9%
LP2-IL-14SSM	Sum		98.403	100.020	-1.617	-1.6%
LP2-IL-15SSM	Al_2O_3		7.071	7.500	-0.429	-5.7%
LP2-IL-15SSM	B_2O_3		9.909	10.750	-0.841	-7.8%
LP2-IL-15SSM	CaO		2.078	2.000	0.078	
LP2-IL-15SSM	Cl		0.110	0.350	-0.240	
LP2-IL-15SSM	Cr_2O_3		0.429	0.530	-0.101	
LP2-IL-15SSM	F		0.333	0.530	-0.197	
LP2-IL-15SSM	Fe_2O_3		1.050	1.000	0.050	
LP2-IL-15SSM	K_2O		0.452	0.500	-0.048	
LP2-IL-15SSM	Li_2O	<	0.215	0.000	0.215	
LP2-IL-15SSM	MgO		0.292	0.300	-0.008	
LP2-IL-15SSM	Na_2O		21.029	22.000	-0.971	-4.4%
LP2-IL-15SSM	P_2O_5		0.906	1.130	-0.224	
LP2-IL-15SSM	SiO_2		44.070	42.720	1.350	3.2%
LP2-IL-15SSM	SnO_2		2.403	2.500	-0.097	
LP2-IL-15SSM	SO_3		1.252	0.800	0.452	
LP2-IL-15SSM	V_2O_5		1.807	2.000	-0.193	
LP2-IL-15SSM	ZnO		2.322	2.400	-0.078	
LP2-IL-15SSM	ZrO_2		2.637	3.000	-0.363	
LP2-IL-15SSM	Sum		98.364	100.010	-1.646	-1.6%
LP2-IL-16SSM	Al_2O_3		9.386	10.000	-0.614	-6.1%
LP2-IL-16SSM	B_2O_3		8.758	9.500	-0.742	-7.8%
LP2-IL-16SSM	CaO		5.153	5.000	0.153	3.1%
LP2-IL-16SSM	Cl		0.065	0.210	-0.145	
LP2-IL-16SSM	Cr_2O_3		0.308	0.450	-0.142	
LP2-IL-16SSM	F		0.226	0.320	-0.094	

Table E-5. Comparison of Targeted and Measured SSM Glass Compositions (continued)

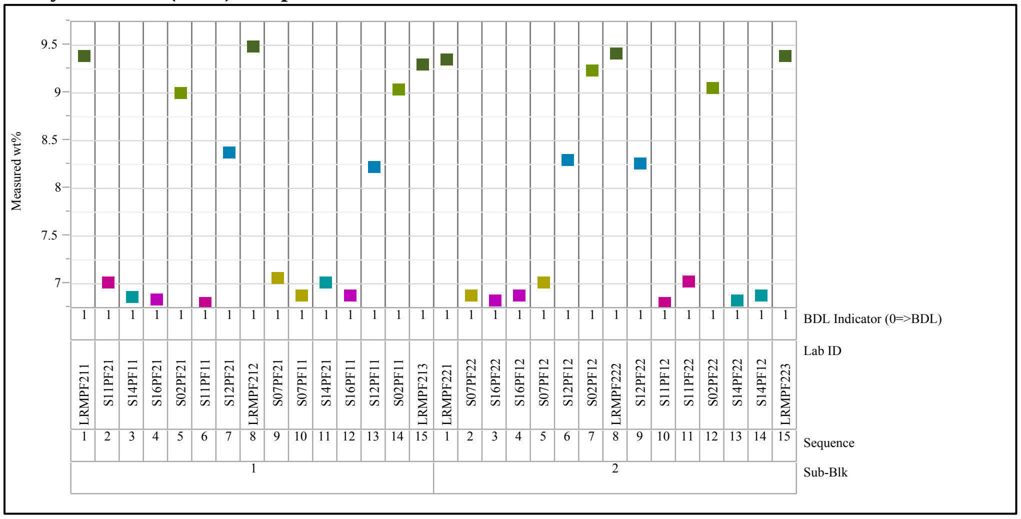
Glass ID	Oxide	BDL (<)	Measured (wt%)	Targeted (wt%)	Difference of Measured versus Targeted	% Difference of Measured versus Targeted
LP2-IL-16SSM	Fe_2O_3		0.656	0.600	0.056	
LP2-IL-16SSM	K_2O		0.838	1.000	-0.162	
LP2-IL-16SSM	Li_2O	<	0.215	0.000	0.215	
LP2-IL-16SSM	MgO		0.624	0.650	-0.026	
LP2-IL-16SSM	Na_2O		21.298	23.000	-1.702	-7.4%
LP2-IL-16SSM	P_2O_5		0.585	0.680	-0.095	
LP2-IL-16SSM	SiO_2		39.898	38.800	1.098	2.8%
LP2-IL-16SSM	SnO_2		1.482	1.500	-0.018	
LP2-IL-16SSM	SO_3		1.338	0.500	0.838	
LP2-IL-16SSM	V_2O_5		0.907	1.000	-0.093	
LP2-IL-16SSM	ZnO		2.776	2.800	-0.024	
LP2-IL-16SSM	ZrO_2		3.681	4.000	-0.319	
LP2-IL-16SSM	Sum		98.196	100.010	-1.814	-1.8%
LP2-IL-17SSM	Al_2O_3		8.781	9.230	-0.449	-4.9%
LP2-IL-17SSM	B_2O_3		10.280	11.000	-0.720	-6.5%
LP2-IL-17SSM	CaO		2.683	2.500	0.183	
LP2-IL-17SSM	Cl	<	0.050	0.070	-0.020	
LP2-IL-17SSM	Cr_2O_3	<	0.146	0.080	0.066	
LP2-IL-17SSM	F		0.076	0.110	-0.035	
LP2-IL-17SSM	Fe_2O_3		0.294	0.200	0.094	
LP2-IL-17SSM	K_2O		0.447	0.500	-0.053	
LP2-IL-17SSM	Li_2O	<	0.215	0.000	0.215	
LP2-IL-17SSM	MgO		0.951	1.000	-0.049	
LP2-IL-17SSM	Na_2O		22.040	23.000	-0.960	-4.2%
LP2-IL-17SSM	P_2O_5	<	0.229	0.240	-0.011	
LP2-IL-17SSM	SiO_2		41.182	40.940	0.242	0.6%
LP2-IL-17SSM	SnO_2	<	0.127	0.000	0.127	
LP2-IL-17SSM	SO_3		1.321	1.000	0.321	
LP2-IL-17SSM	V_2O_5		1.924	2.100	-0.176	
LP2-IL-17SSM	ZnO		2.984	3.000	-0.016	
LP2-IL-17SSM	ZrO_2		4.623	5.030	-0.407	-8.1%
LP2-IL-17SSM	Sum		98.353	100.000	-1.647	-1.6%
LRM	Al_2O_3		9.465	9.510	-0.045	-0.5%
LRM	B_2O_3		7.611	7.850	-0.239	-3.0%
LRM	CaO		0.455	0.540	-0.085	
LRM	Cl	<	0.050	0.000	0.050	
LRM	Cr_2O_3		0.192	0.190	0.002	
LRM	F		0.883	0.860	0.023	
LRM	Fe_2O_3		1.411	1.380	0.031	
LRM	K_2O		1.414	1.480	-0.066	
LRM	Li_2O	<	0.215	0.110	0.105	
LRM	MgO	<	0.166	0.100	0.066	
LRM	Na_2O		19.771	20.030	-0.259	-1.3%
LRM	P_2O_5		0.455	0.540	-0.085	
LRM	SiO_2		54.564	54.200	0.364	0.7%
LRM	SnO_2	<	0.127	0.000	0.127	
LRM	SO_3		0.230	0.300	-0.070	
LRM	V_2O_5	<	0.179	0.000	0.179	
LRM	ZnO	<	0.124	0.000	0.124	
LRM	ZrO_2		0.889	0.930	-0.041	
LRM	Sum		98.202	98.020	0.182	0.2%

Exhibit E-1. Plots of Oxide Measurements in Analytical Sequence

Analyte=Al2O3 (wt%), Prep Method=PF, Block=1



Analyte=Al2O3 (wt%), Prep Method=PF, Block=2



Analyte=Al2O3 (wt%), Prep Method=PF, Block=3

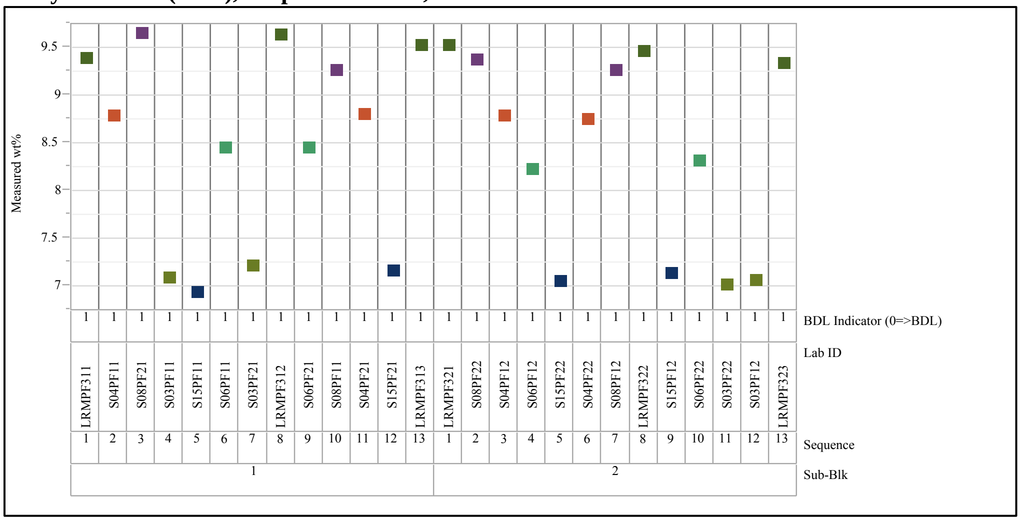
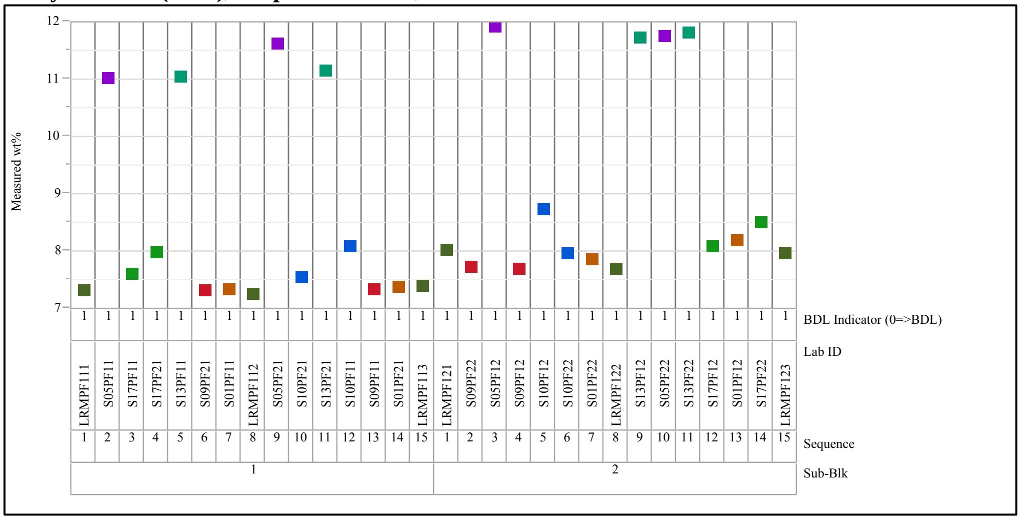
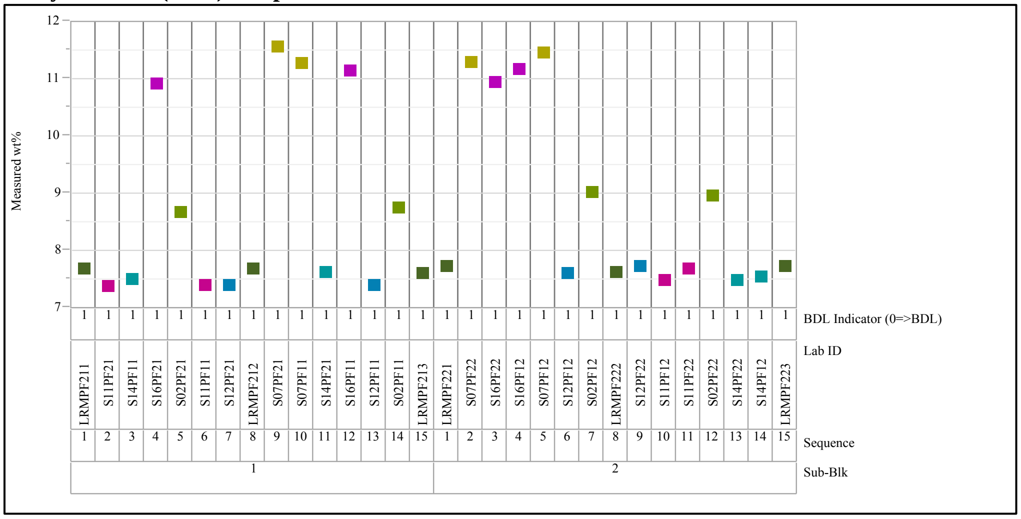


Exhibit E-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=B2O3 (wt%), Prep Method=PF, Block=1



Analyte=B2O3 (wt%), Prep Method=PF, Block=2



Analyte=B2O3 (wt%), Prep Method=PF, Block=3

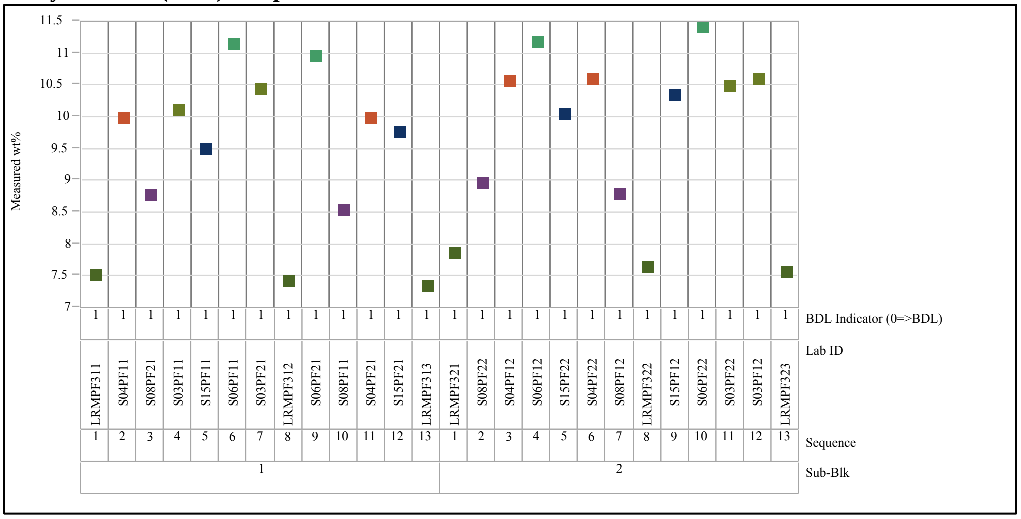
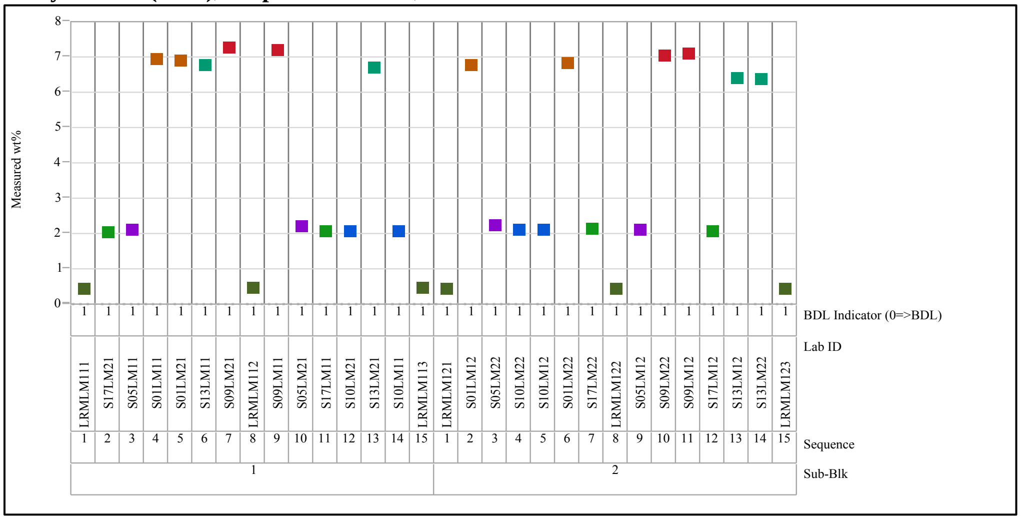
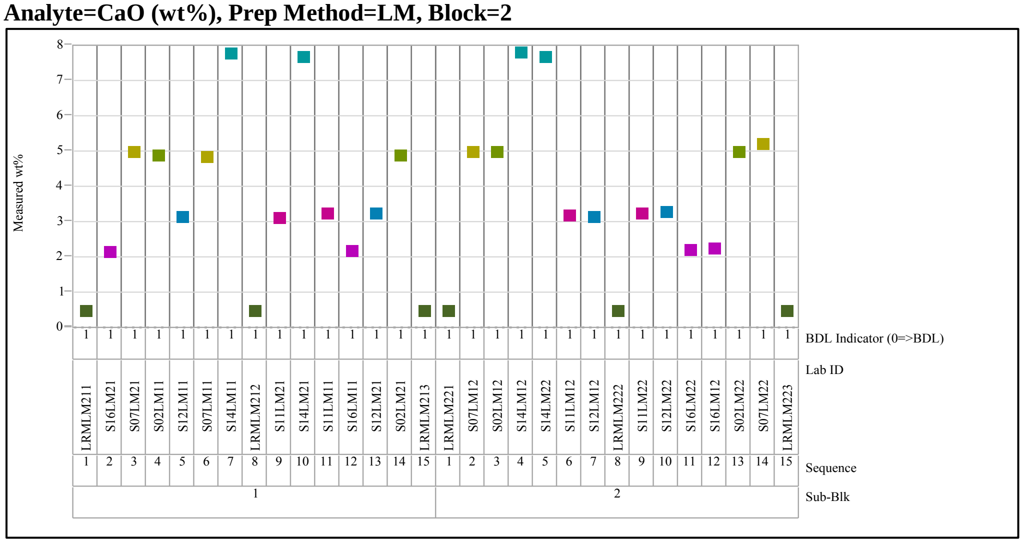


Exhibit E-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=CaO (wt%), Prep Method=LM, Block=1



Analyte=CaO (wt%), Prep Method=LM, Block=2



Analyte=CaO (wt%), Prep Method=LM, Block=3

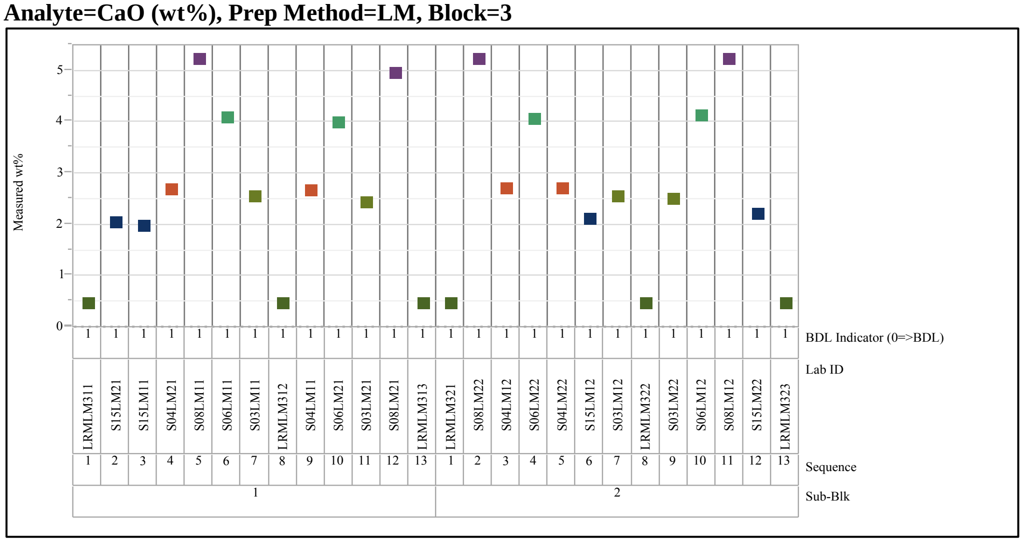
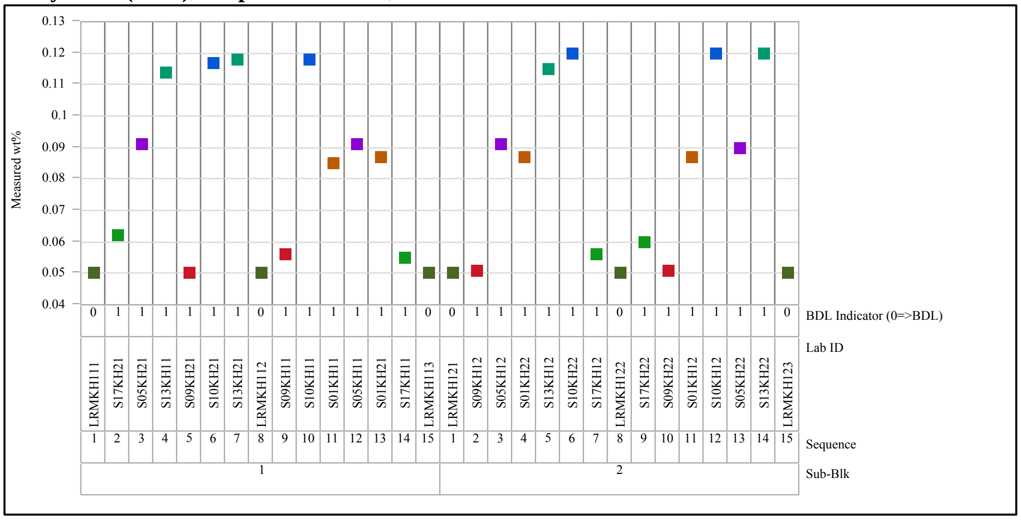
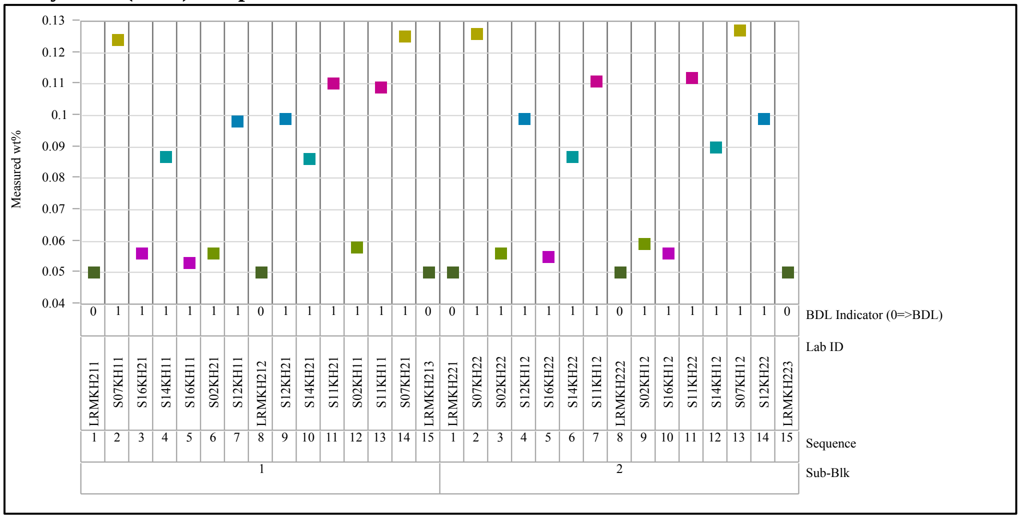


Exhibit E-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Cl (wt%), Prep Method=KH, Block=1



Analyte=Cl (wt%), Prep Method=KH, Block=2



Analyte=Cl (wt%), Prep Method=KH, Block=3

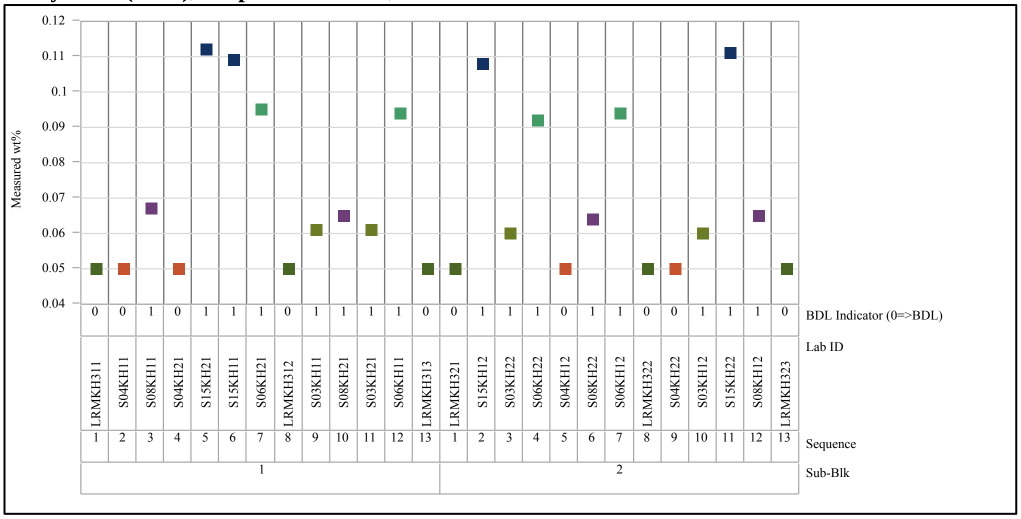
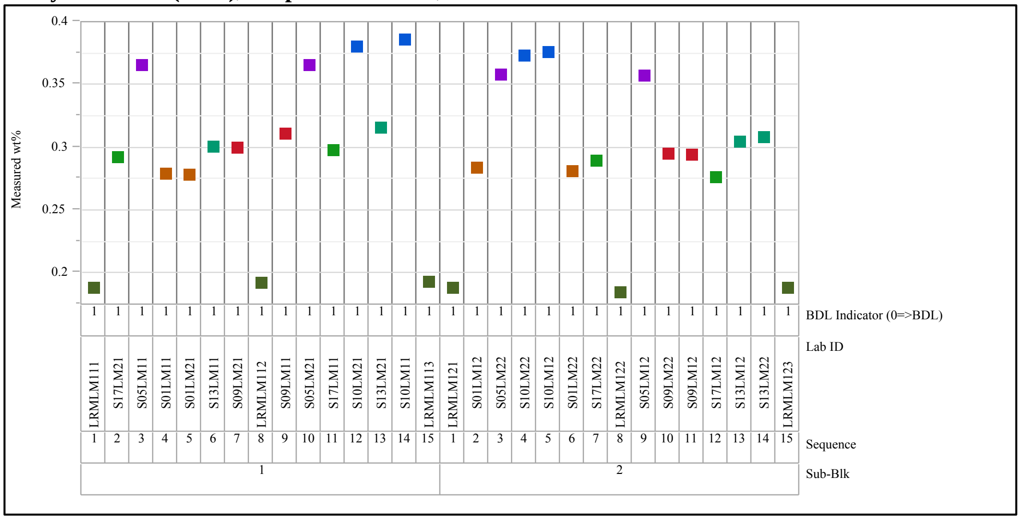
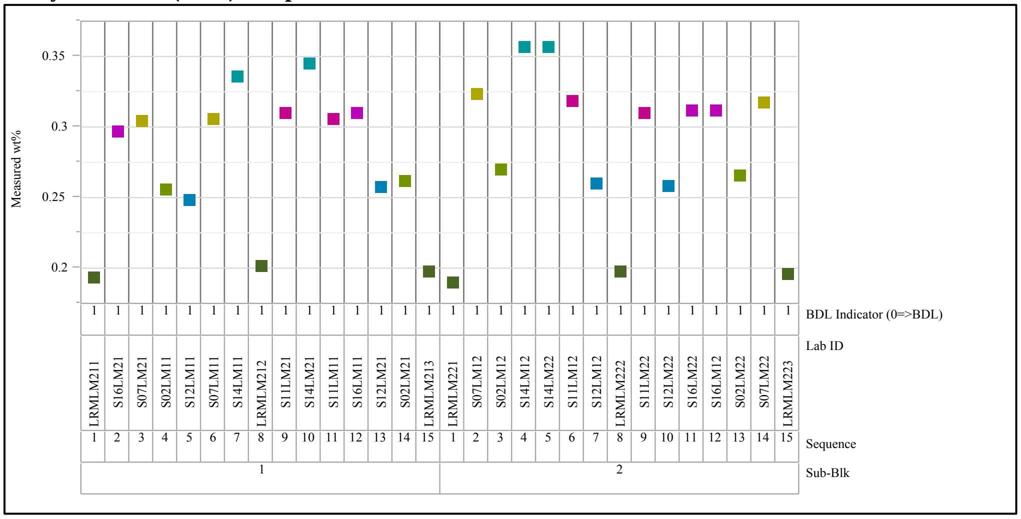


Exhibit E-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Cr2O3 (wt%), Prep Method=LM, Block=1



Analyte=Cr2O3 (wt%), Prep Method=LM, Block=2



Analyte=Cr2O3 (wt%), Prep Method=LM, Block=3

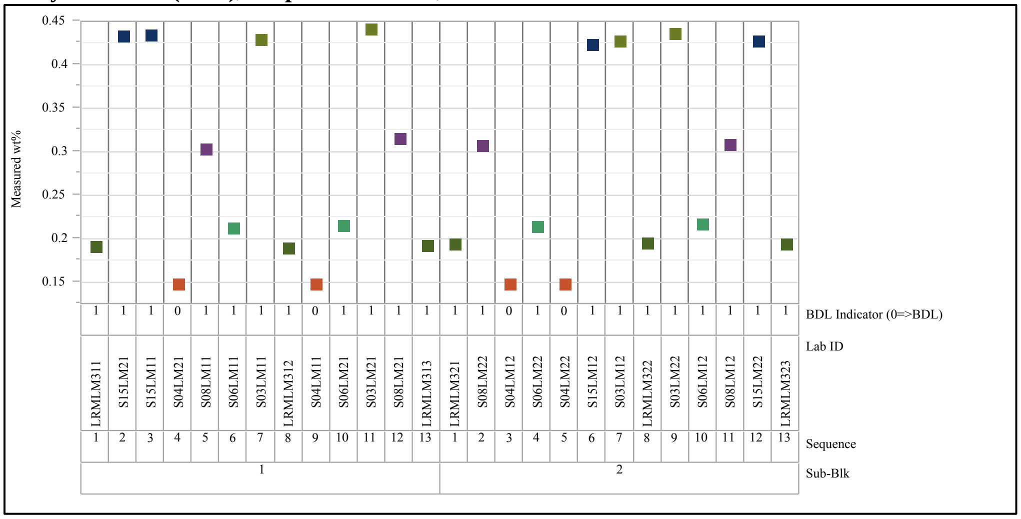
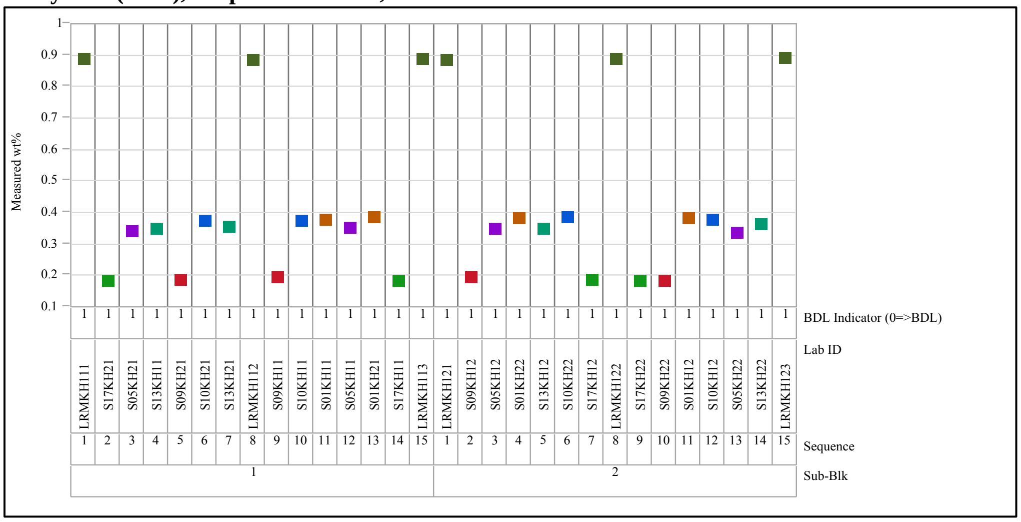
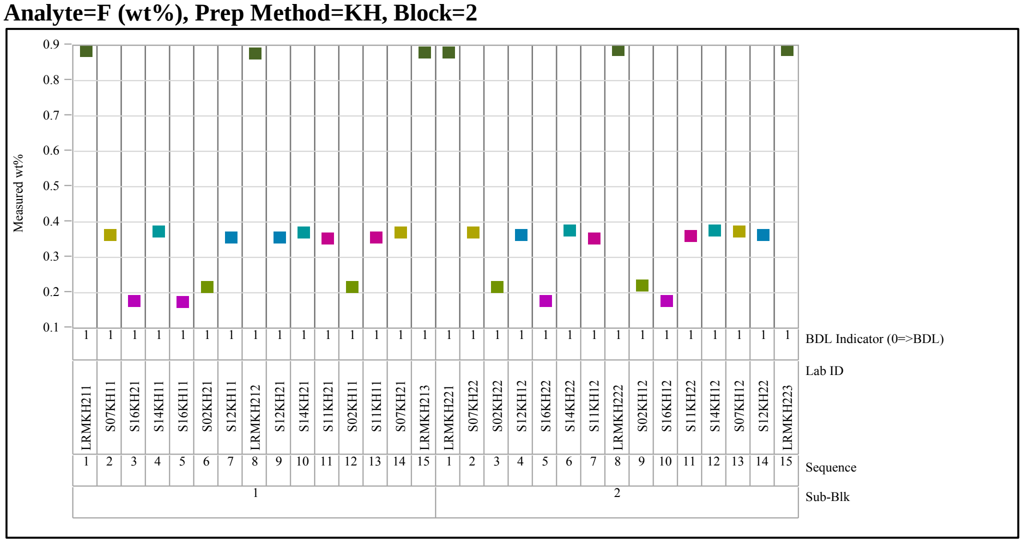


Exhibit E-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=F (wt%), Prep Method=KH, Block=1



Analyte=F (wt%), Prep Method=KH, Block=2



Analyte=F (wt%), Prep Method=KH, Block=3

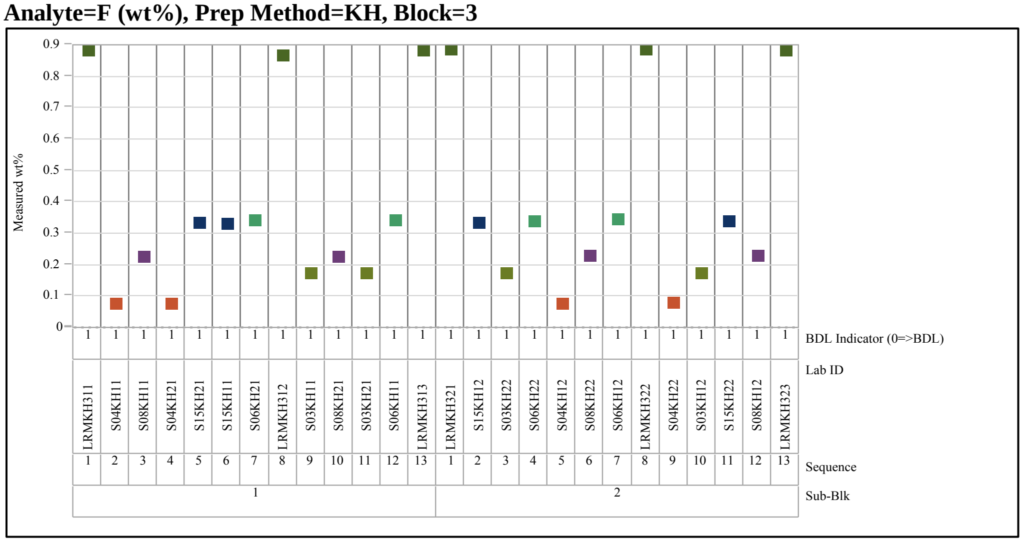
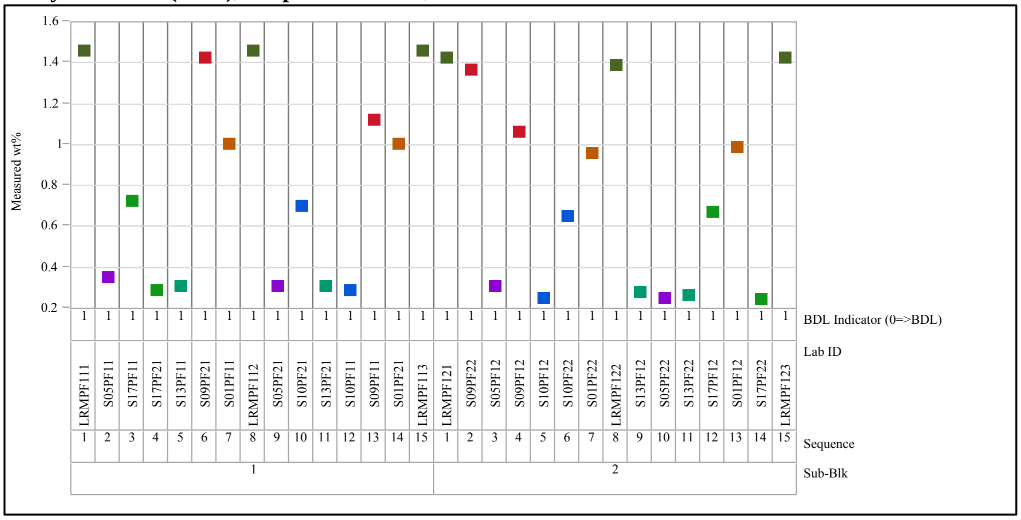
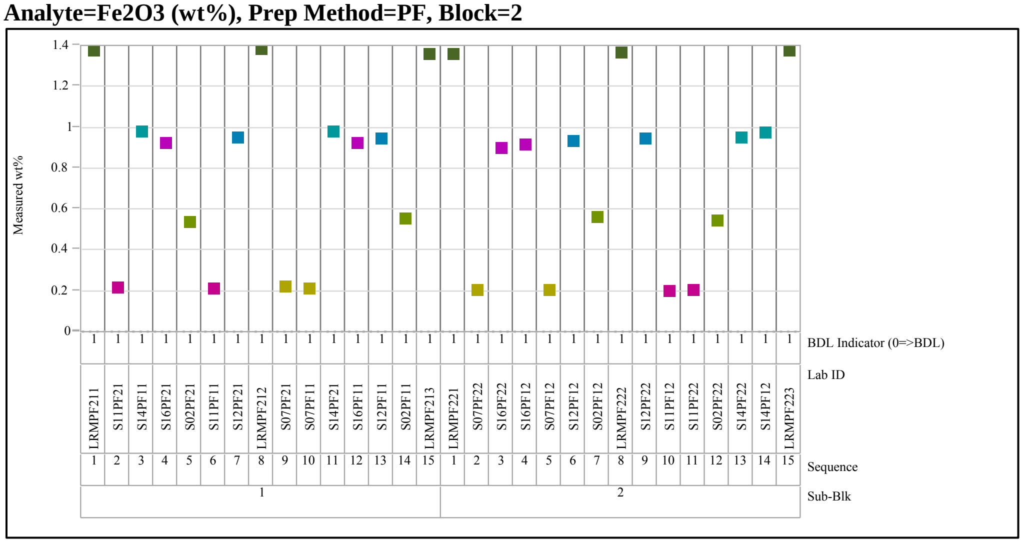


Exhibit E-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Fe2O3 (wt%), Prep Method=PF, Block=1



Analyte=Fe2O3 (wt%), Prep Method=PF, Block=2



Analyte=Fe2O3 (wt%), Prep Method=PF, Block=3

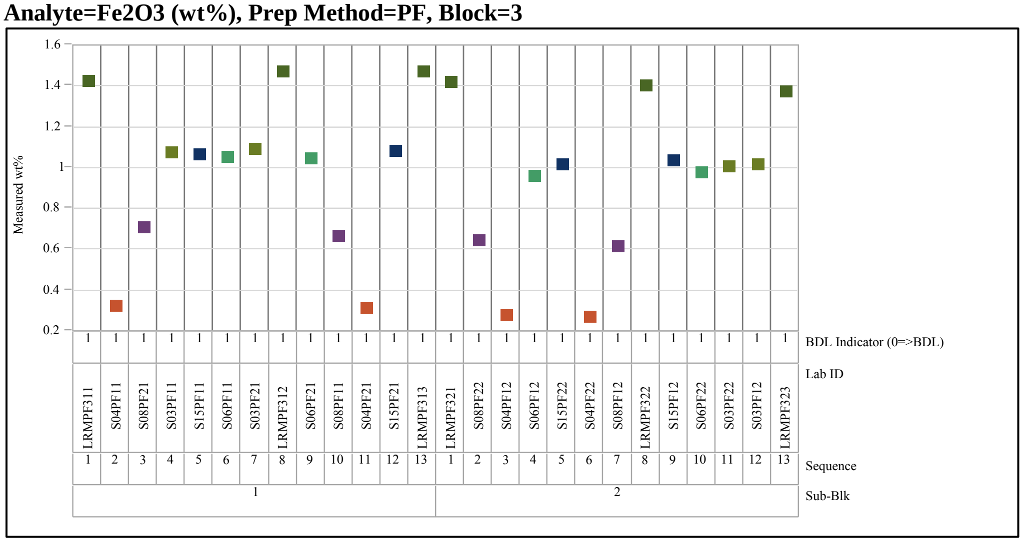
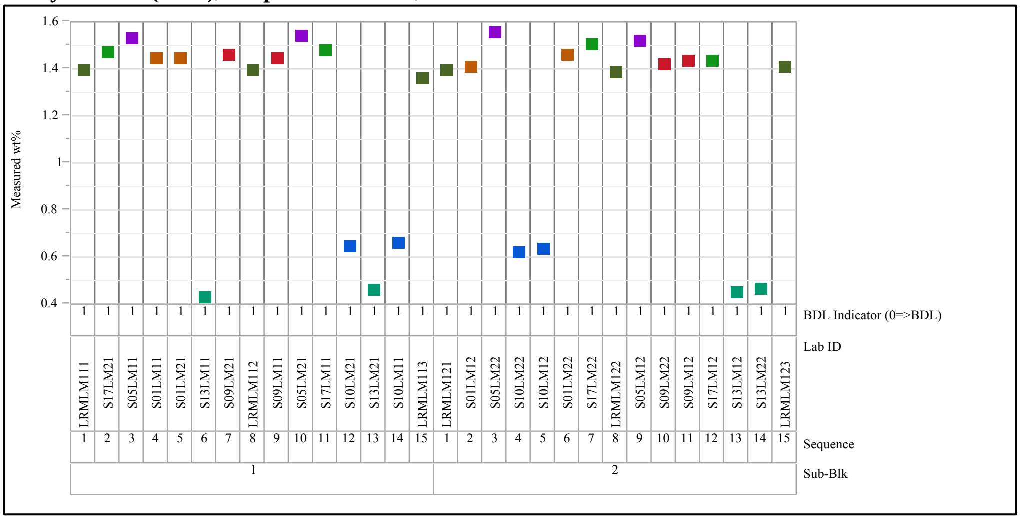
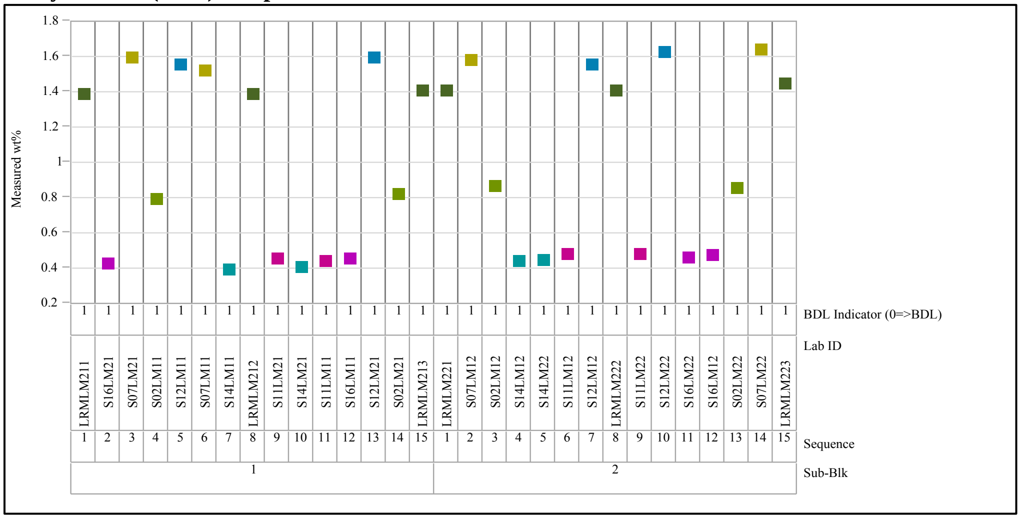


Exhibit E-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=K2O (wt%), Prep Method=LM, Block=1



Analyte=K2O (wt%), Prep Method=LM, Block=2



Analyte=K2O (wt%), Prep Method=LM, Block=3

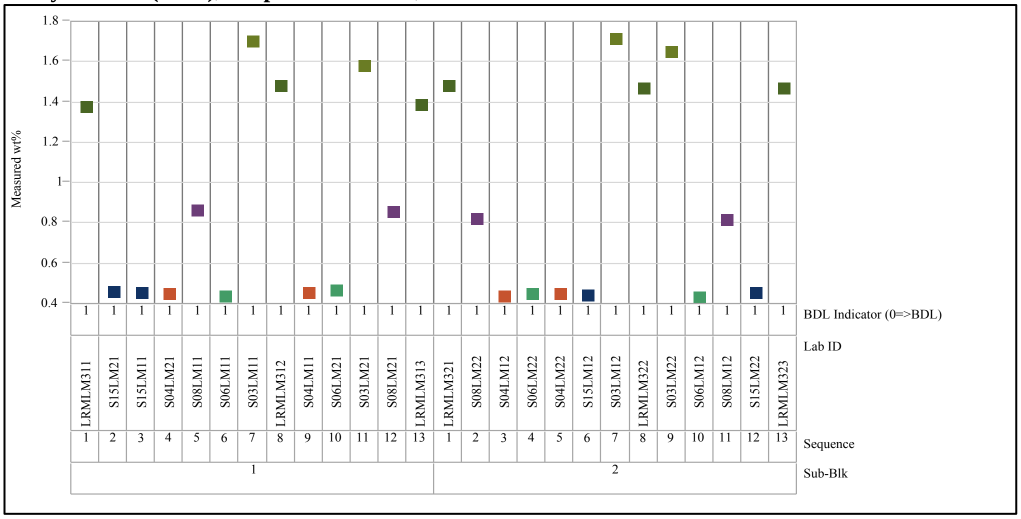
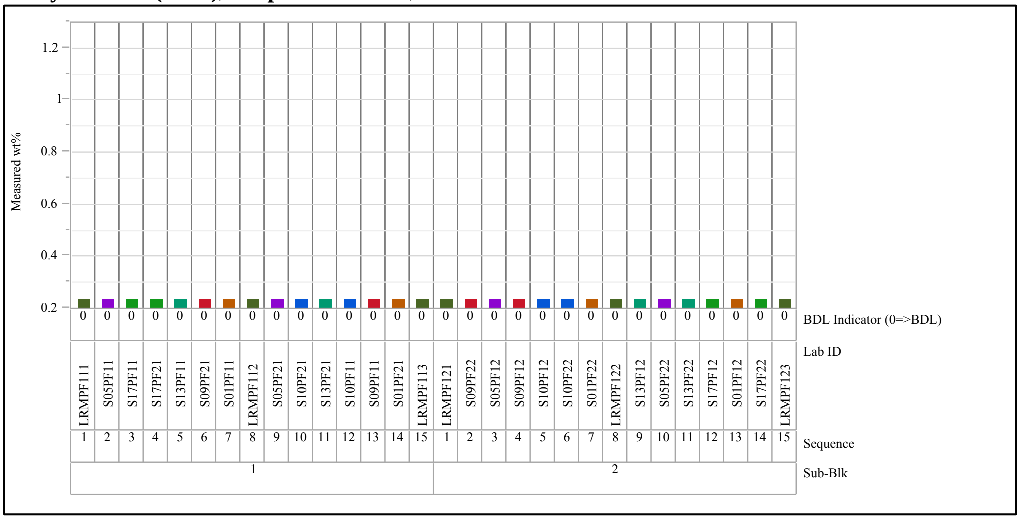
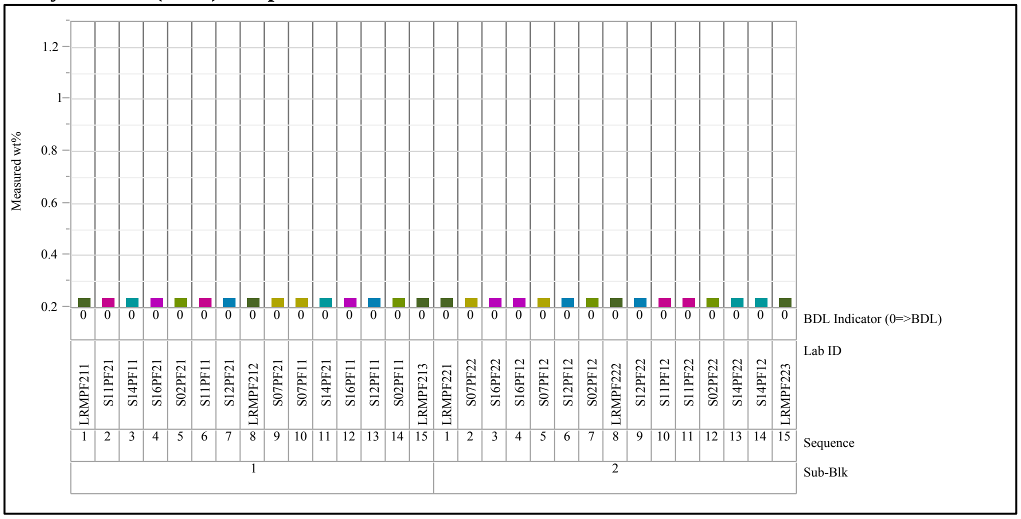


Exhibit E-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Li2O (wt%), Prep Method=PF, Block=1



Analyte=Li2O (wt%), Prep Method=PF, Block=2



Analyte=Li2O (wt%), Prep Method=PF, Block=3

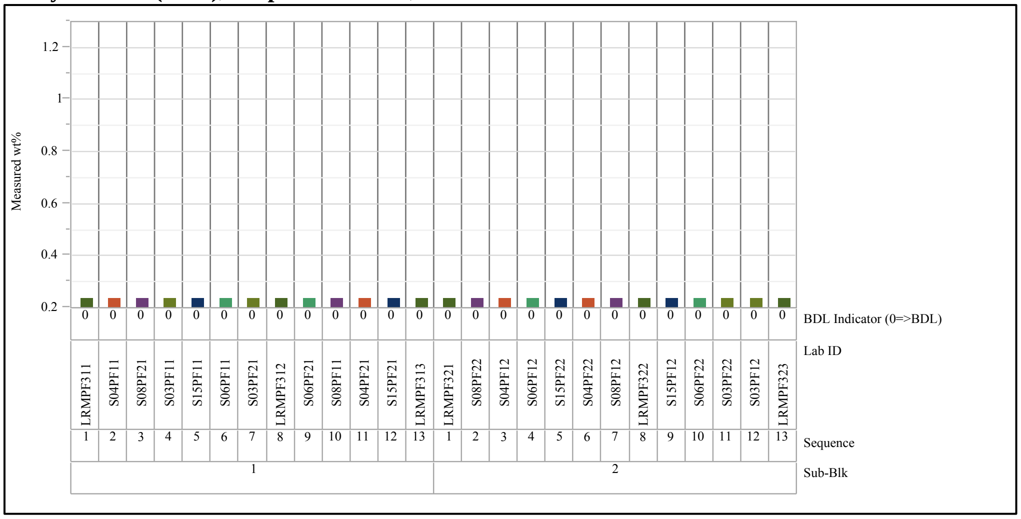
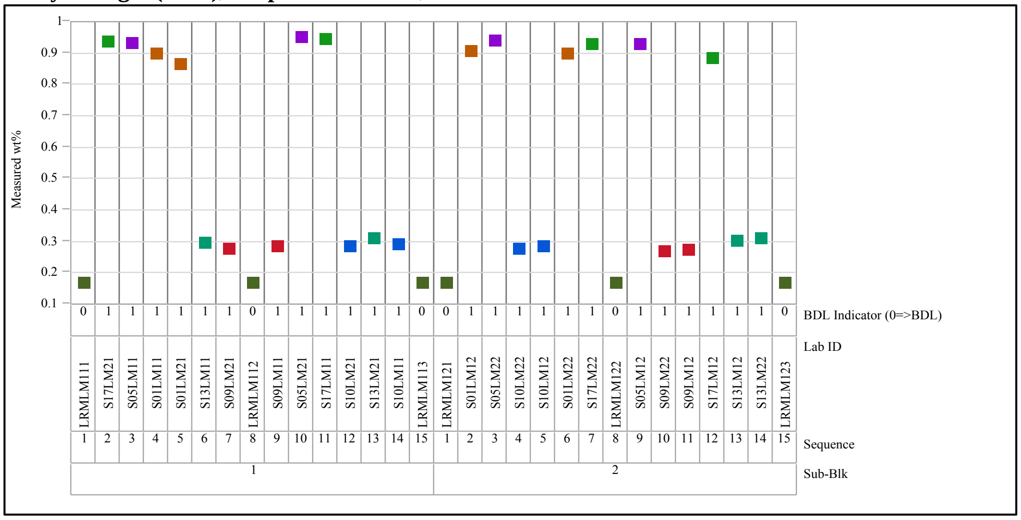
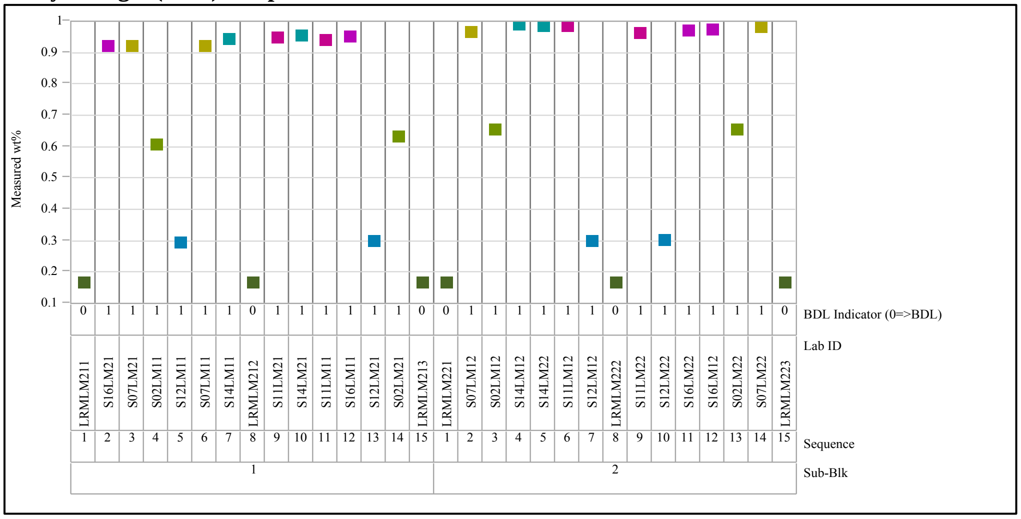


Exhibit E-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=MgO (wt%), Prep Method=LM, Block=1



Analyte=MgO (wt%), Prep Method=LM, Block=2



Analyte=MgO (wt%), Prep Method=LM, Block=3

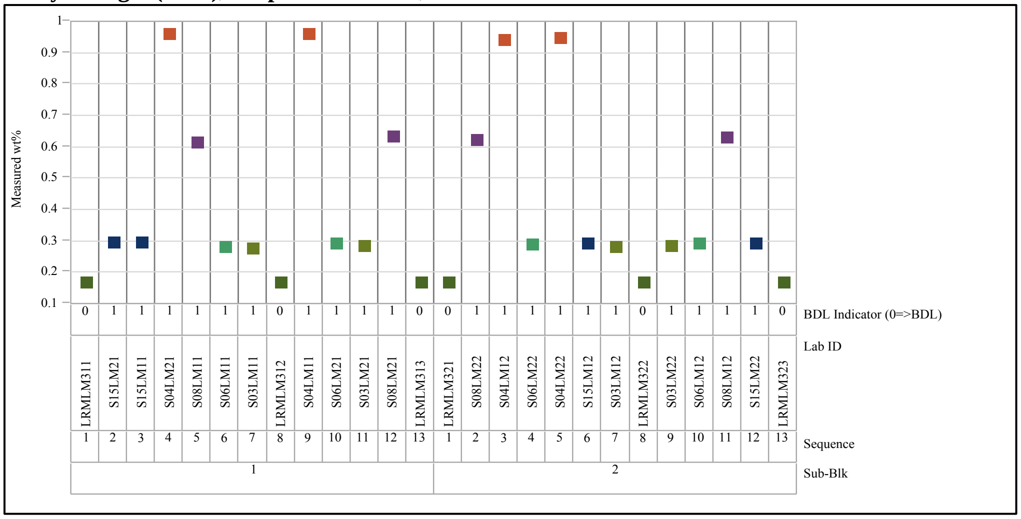
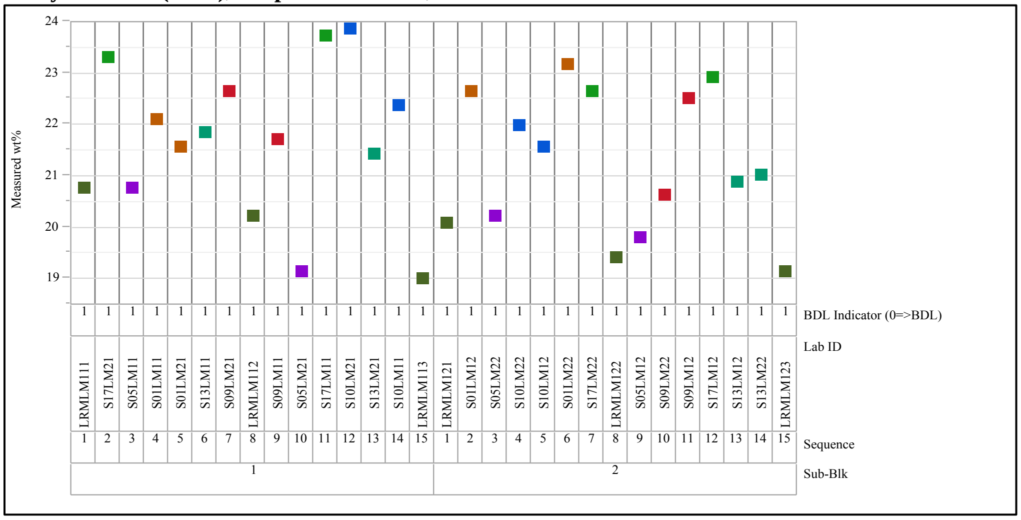
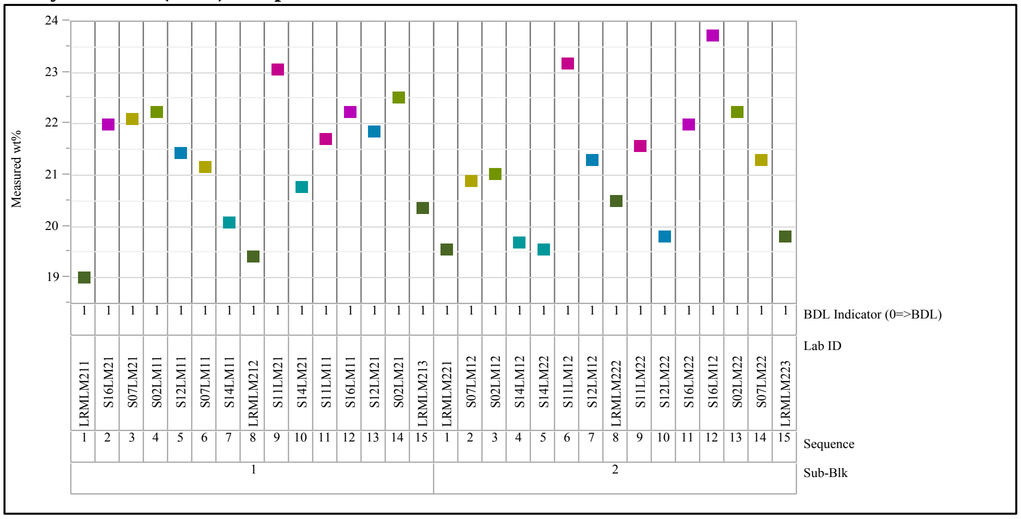


Exhibit E-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Na2O (wt%), Prep Method=LM, Block=1



Analyte=Na2O (wt%), Prep Method=LM, Block=2



Analyte=Na2O (wt%), Prep Method=LM, Block=3

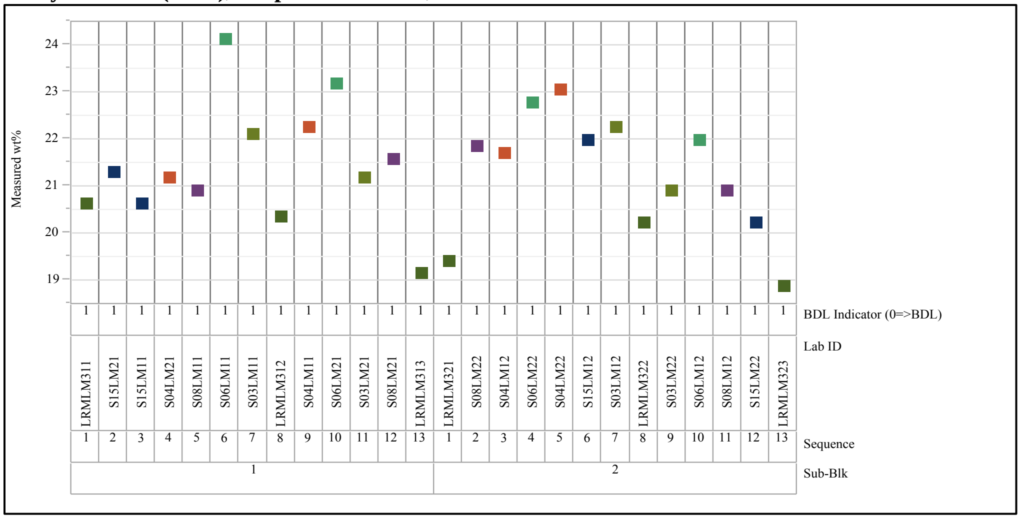
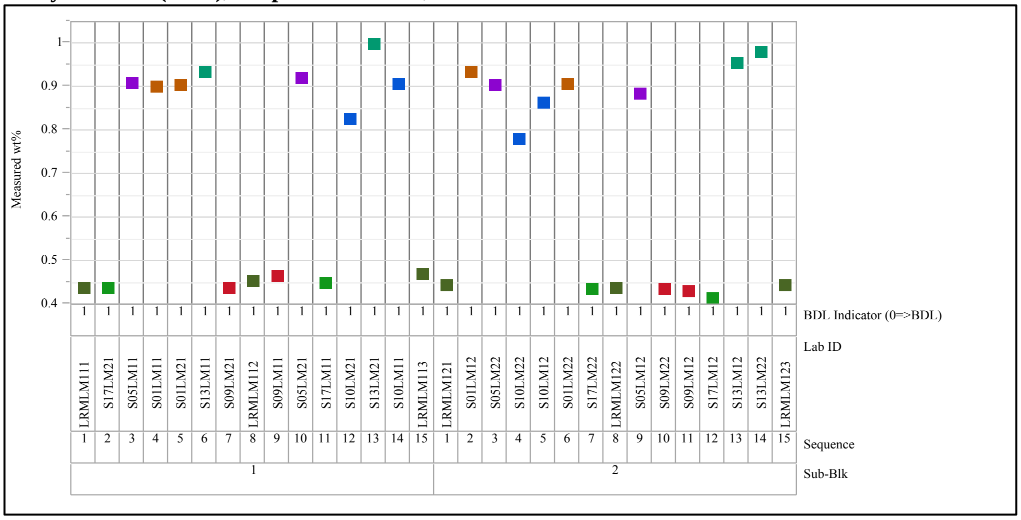
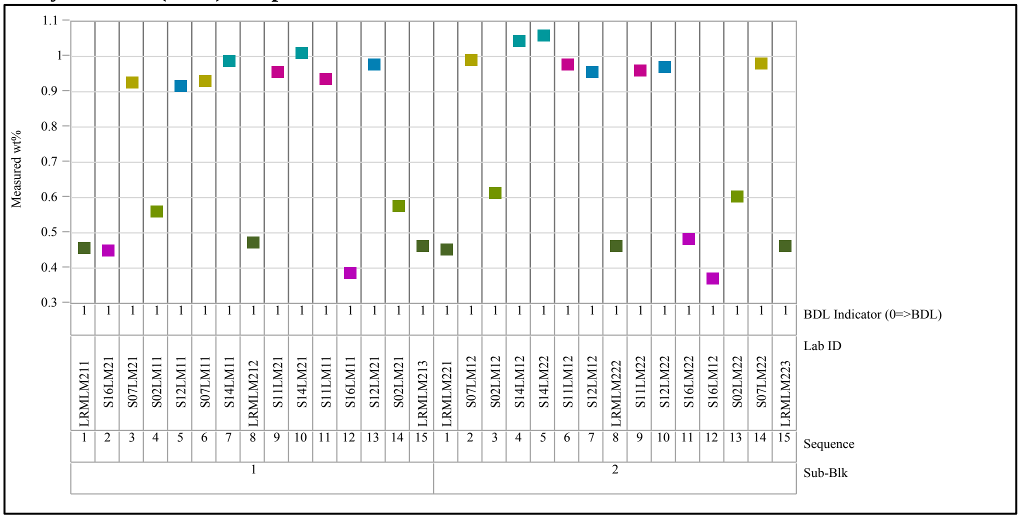


Exhibit E-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=P2O5 (wt%), Prep Method=LM, Block=1



Analyte=P2O5 (wt%), Prep Method=LM, Block=2



Analyte=P2O5 (wt%), Prep Method=LM, Block=3

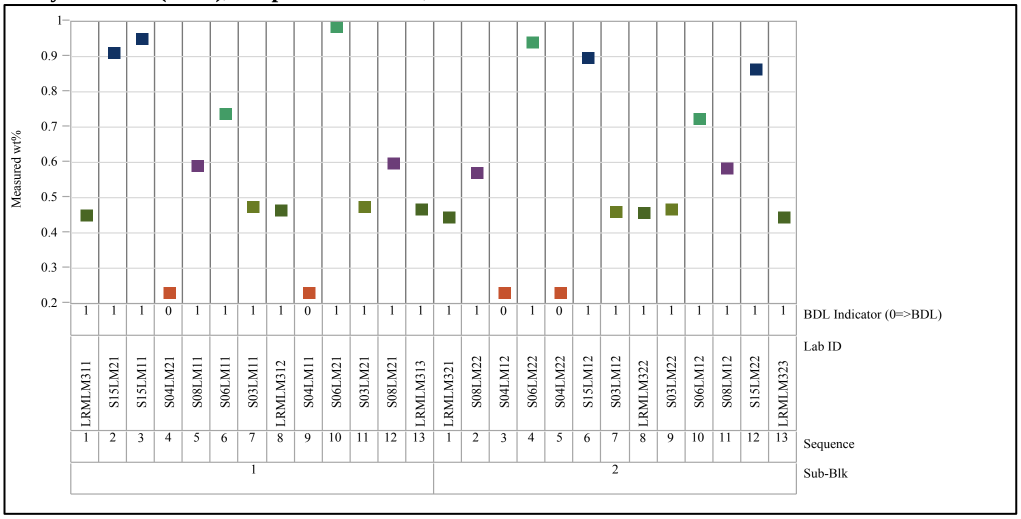
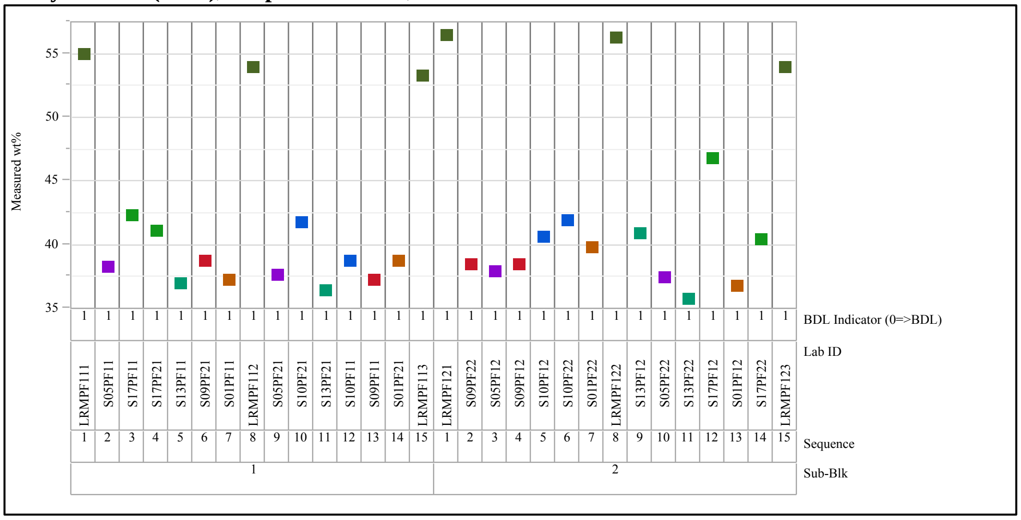
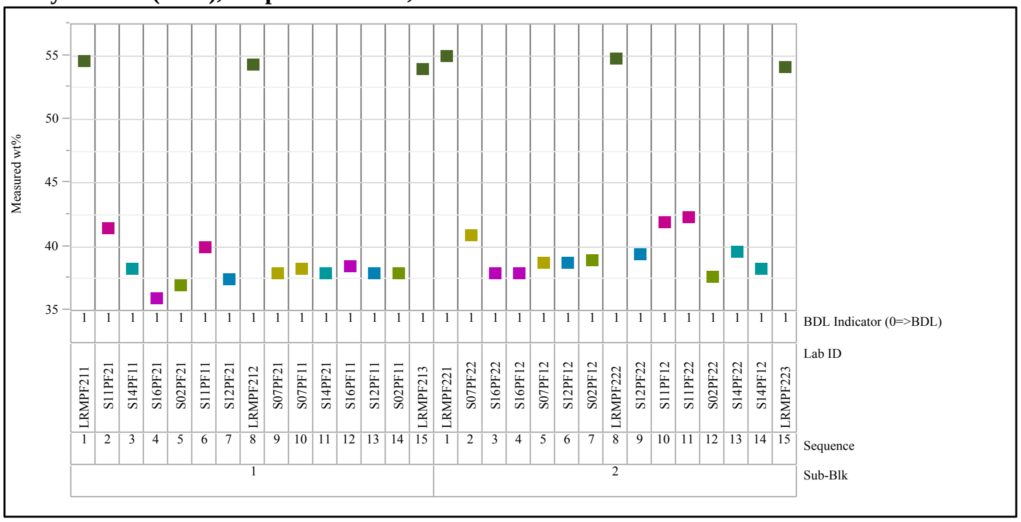


Exhibit E-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=SiO2 (wt%), Prep Method=PF, Block=1



Analyte=SiO2 (wt%), Prep Method=PF, Block=2



Analyte=SiO2 (wt%), Prep Method=PF, Block=3

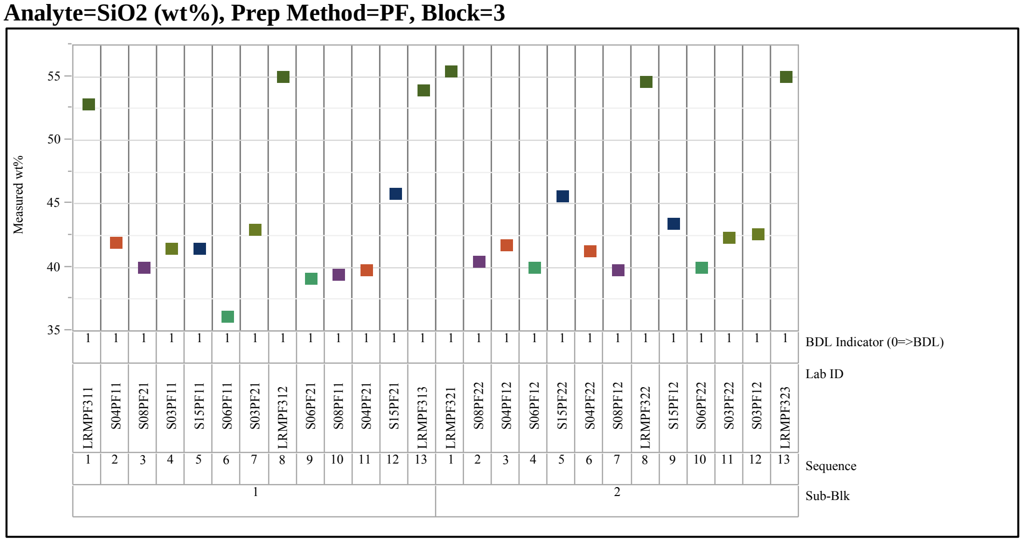
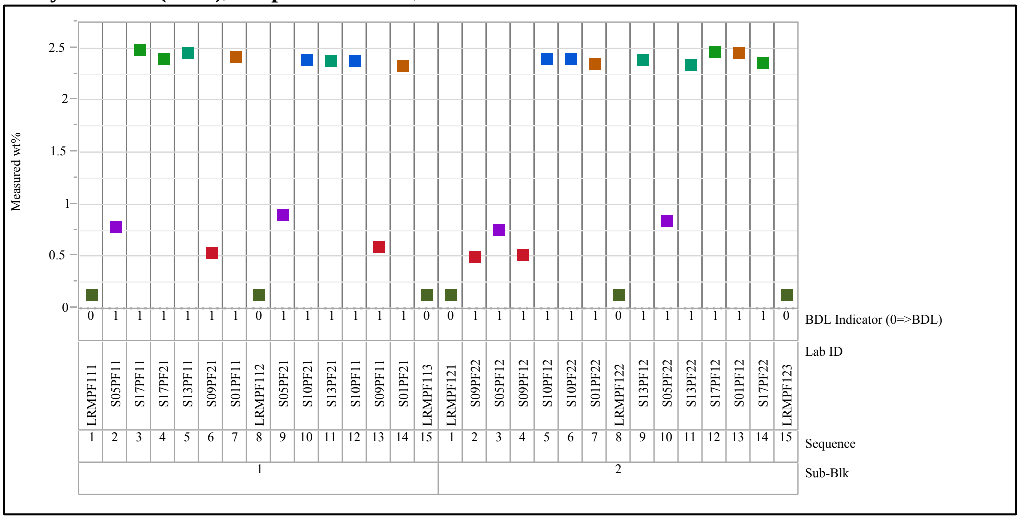
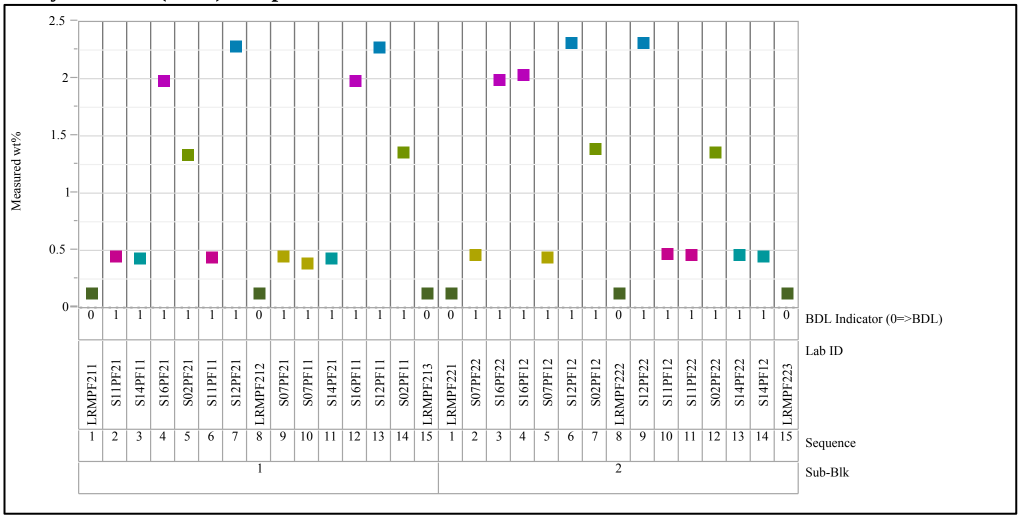


Exhibit E-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=SnO2 (wt%), Prep Method=PF, Block=1



Analyte=SnO2 (wt%), Prep Method=PF, Block=2



Analyte=SnO2 (wt%), Prep Method=PF, Block=3

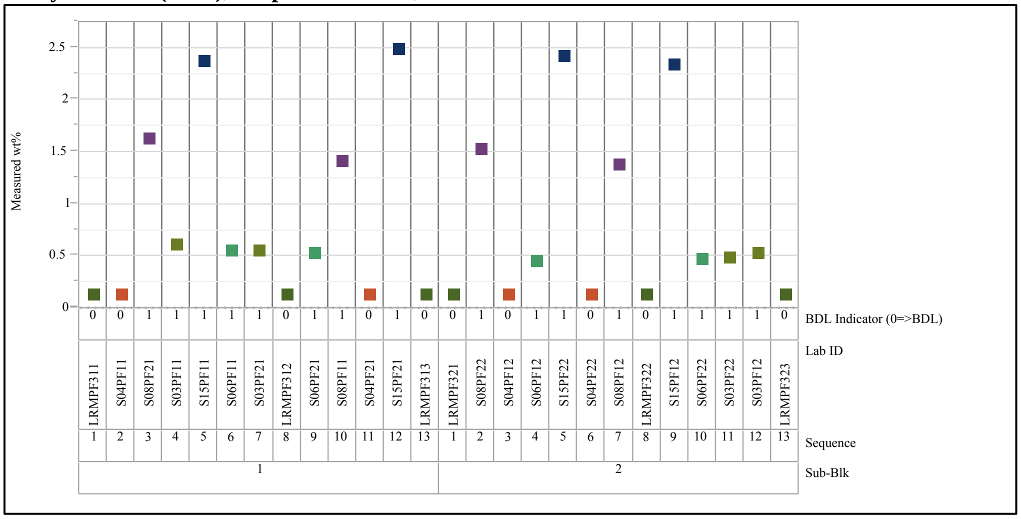
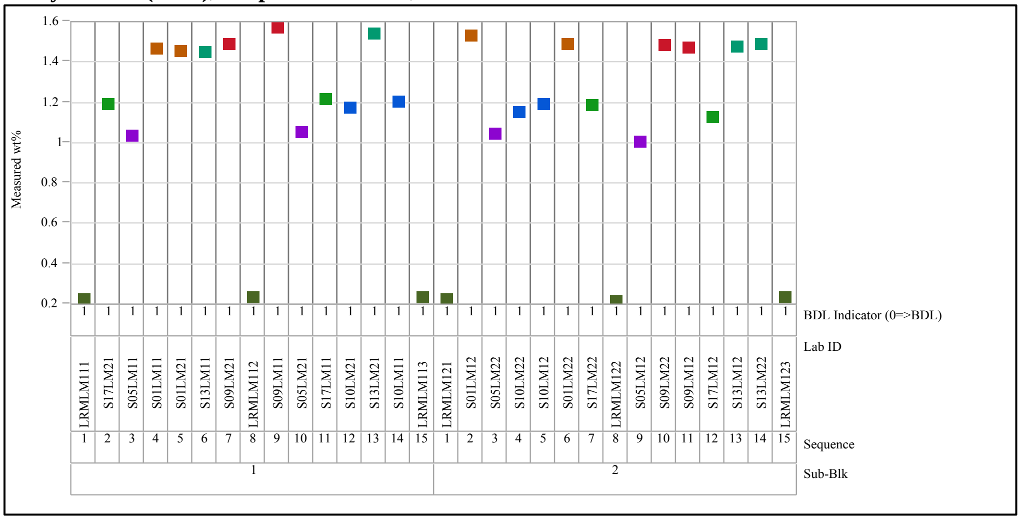
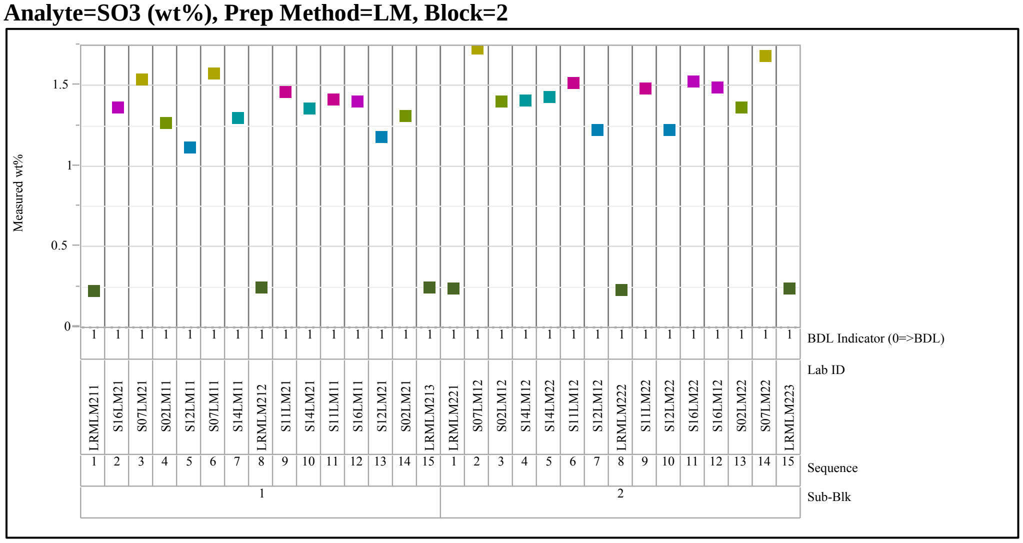


Exhibit E-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=SO3 (wt%), Prep Method=LM, Block=1



Analyte=SO3 (wt%), Prep Method=LM, Block=2



Analyte=SO3 (wt%), Prep Method=LM, Block=3

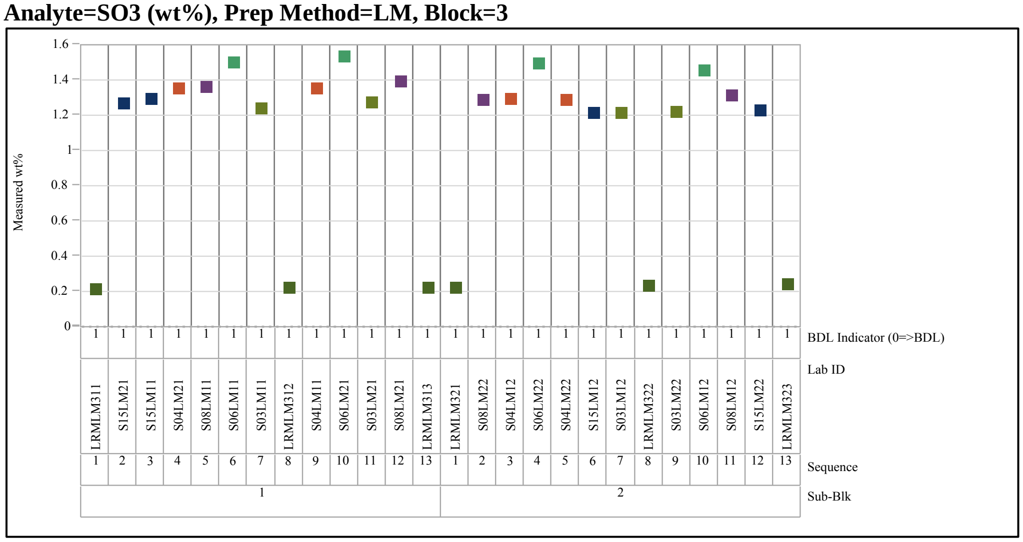
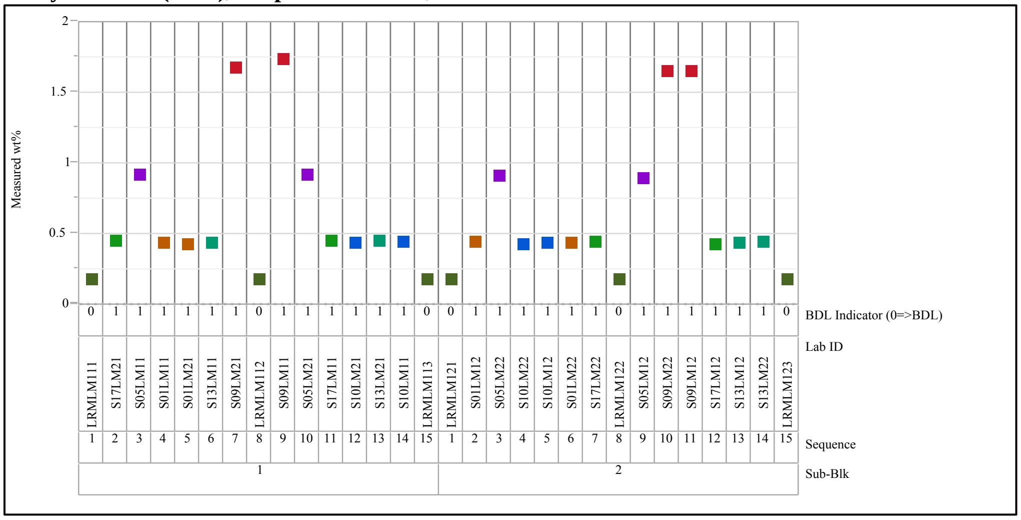
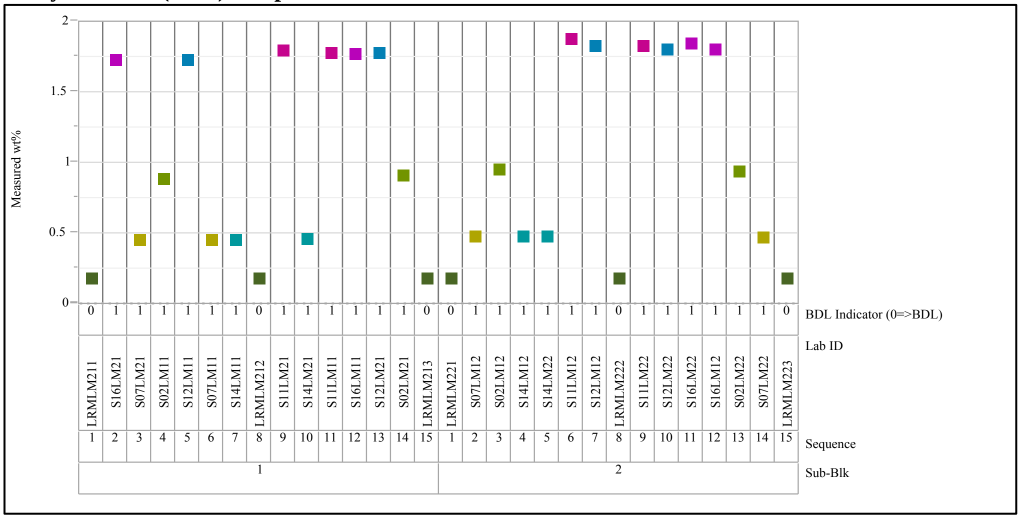


Exhibit E-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=V2O5 (wt%), Prep Method=LM, Block=1



Analyte=V2O5 (wt%), Prep Method=LM, Block=2



Analyte=V2O5 (wt%), Prep Method=LM, Block=3

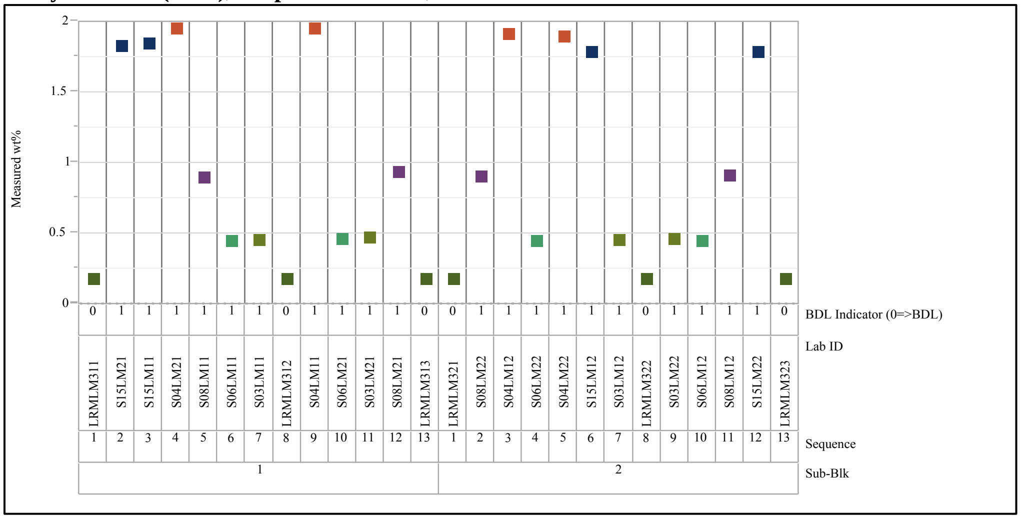
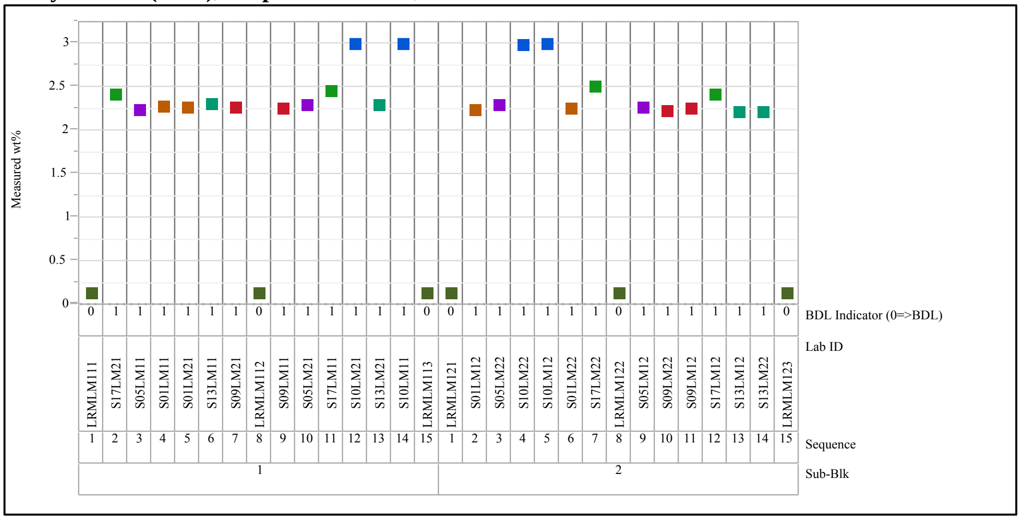
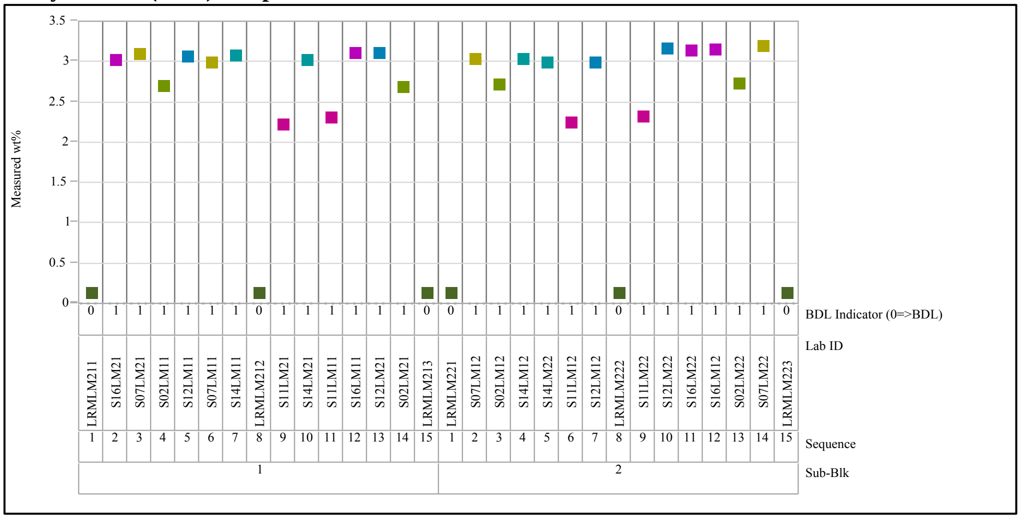


Exhibit E-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=ZnO (wt%), Prep Method=LM, Block=1



Analyte=ZnO (wt%), Prep Method=LM, Block=2



Analyte=ZnO (wt%), Prep Method=LM, Block=3

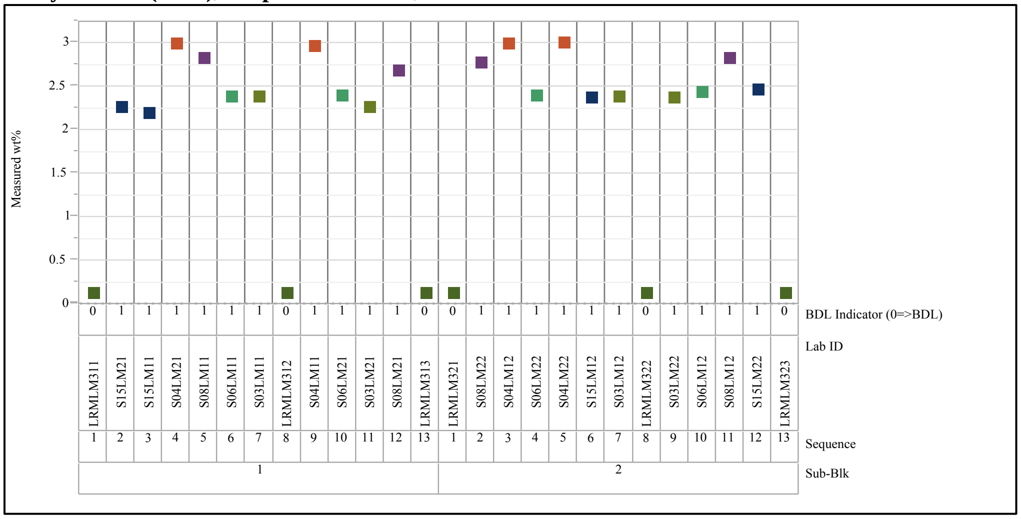
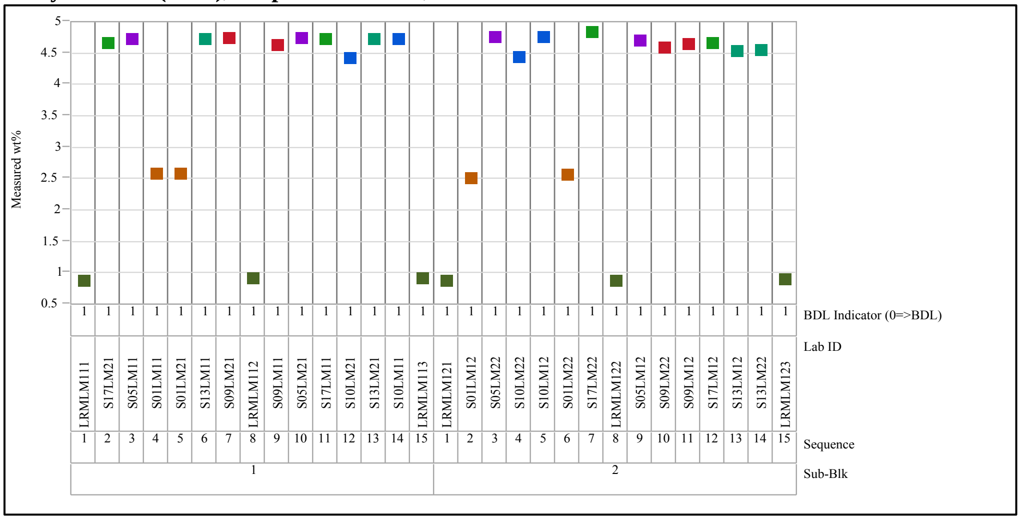
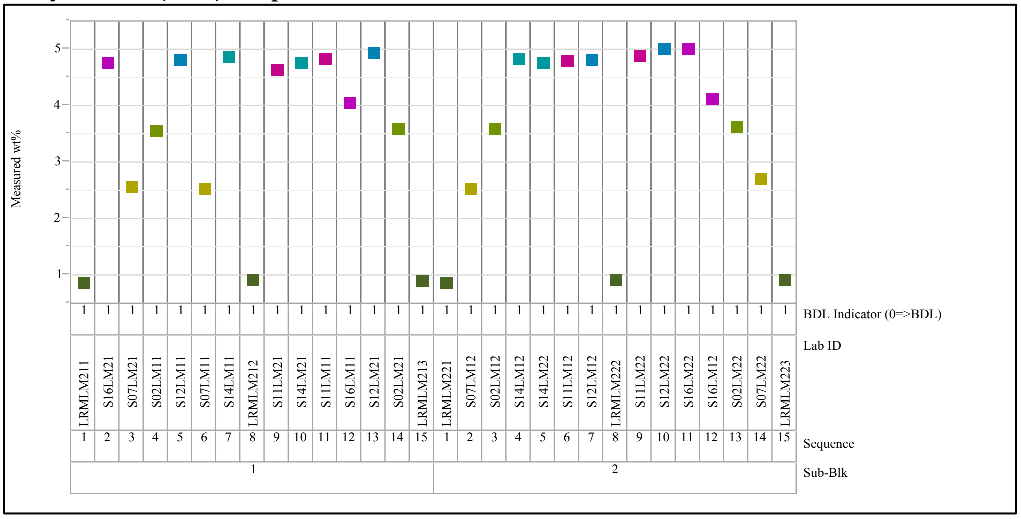


Exhibit E-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=ZrO2 (wt%), Prep Method=LM, Block=1



Analyte=ZrO2 (wt%), Prep Method=LM, Block=2



Analyte=ZrO2 (wt%), Prep Method=LM, Block=3

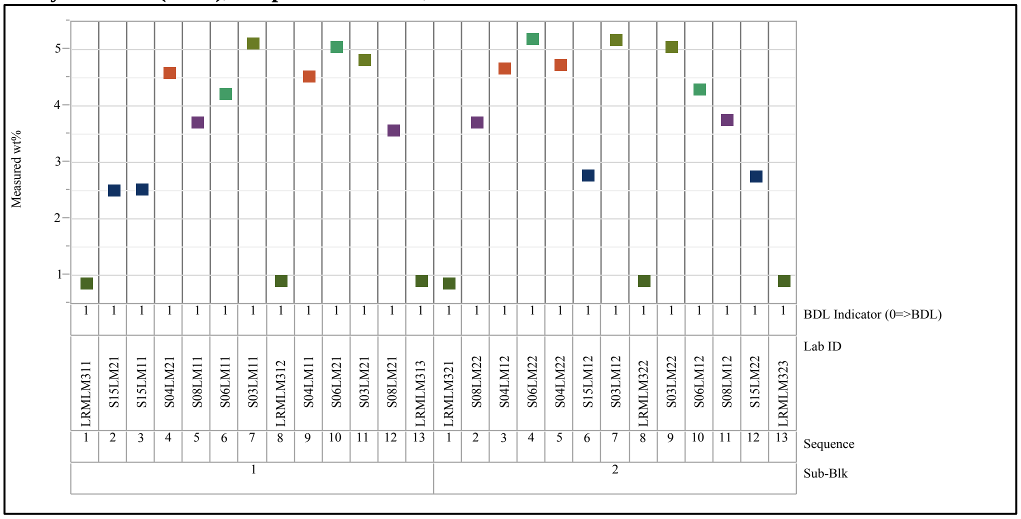


Exhibit E-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentrations

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

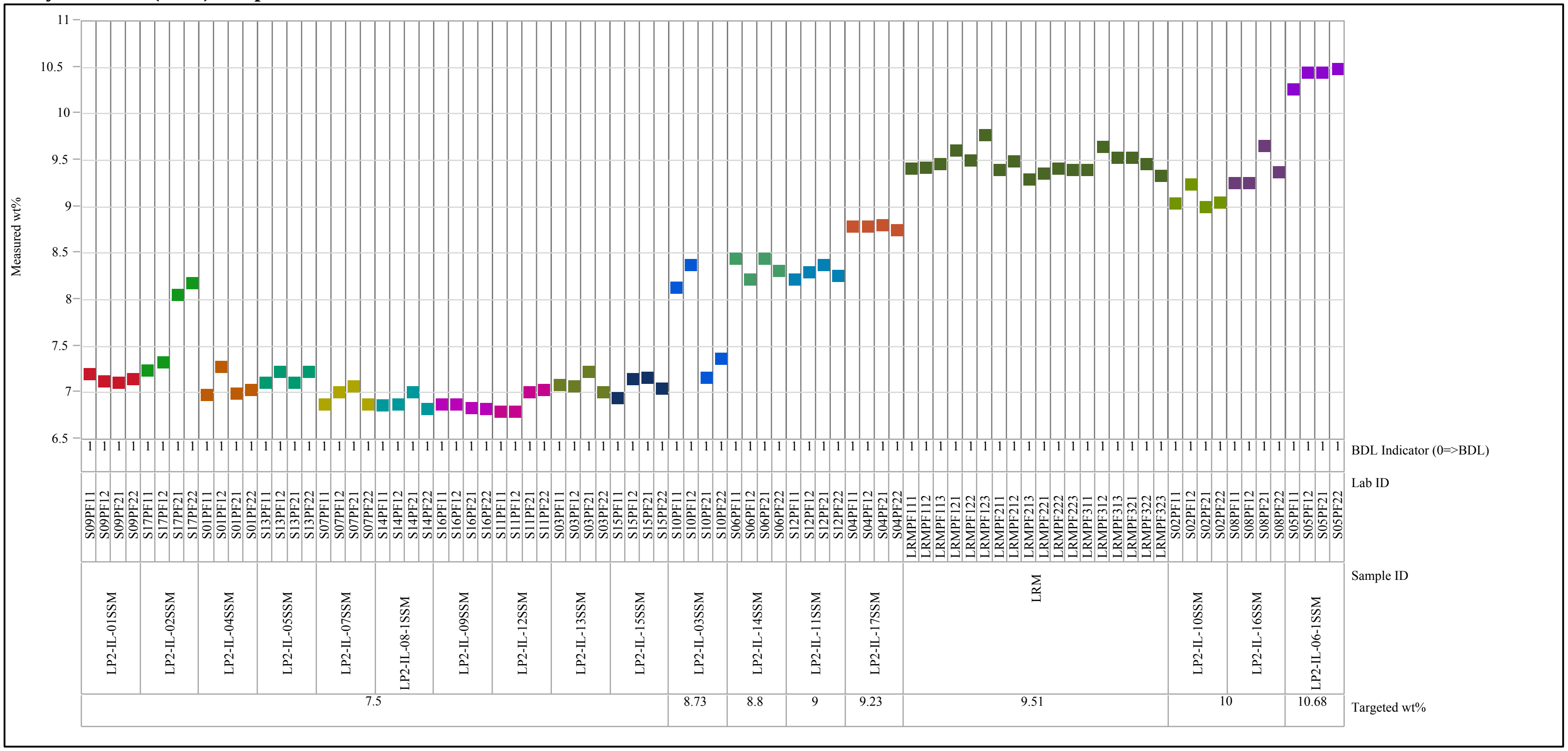


Exhibit E-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentrations (continued)

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

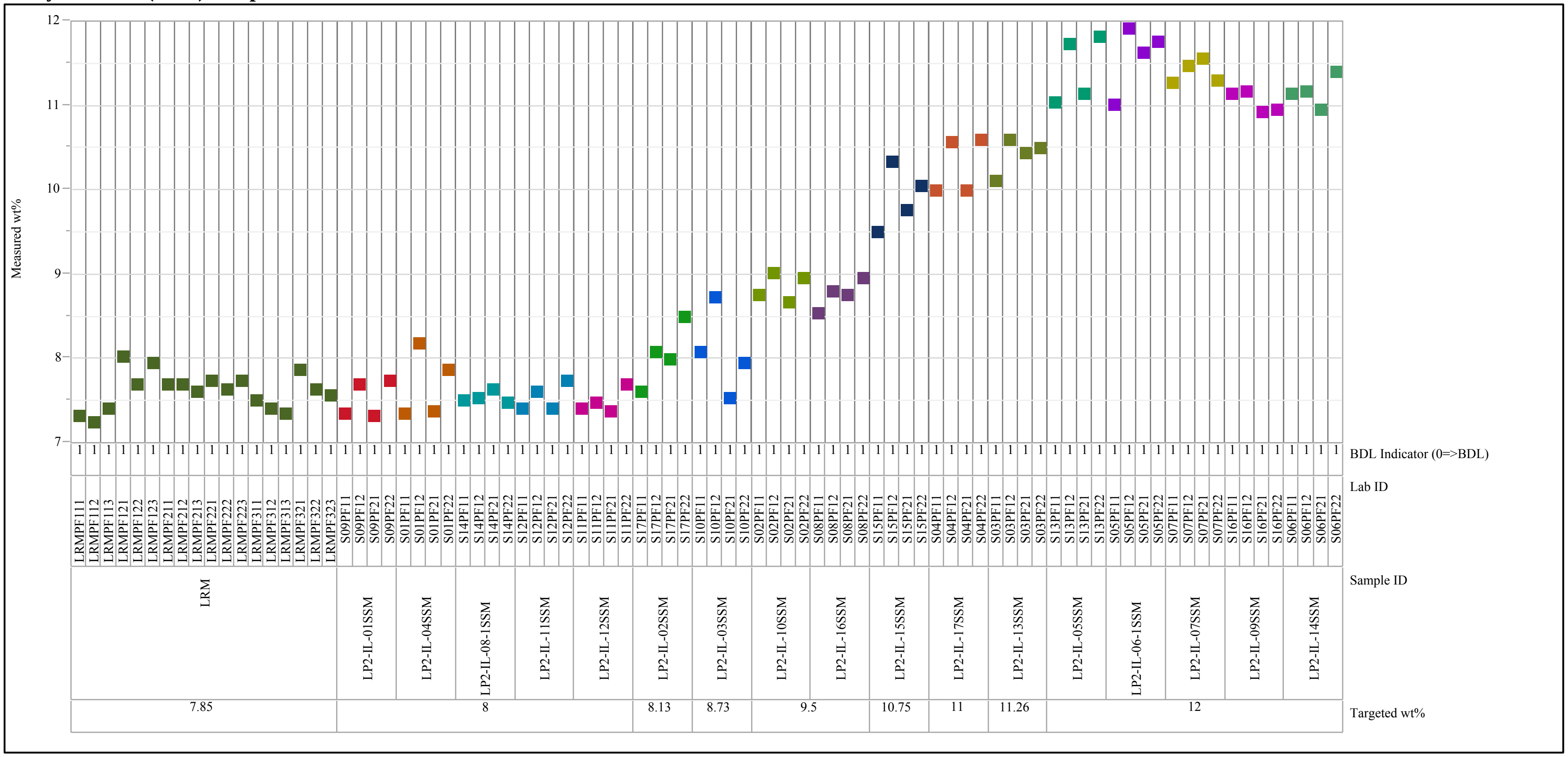


Exhibit E-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentrations (continued)

Analyte=CaO (wt%), Prep Method=LM

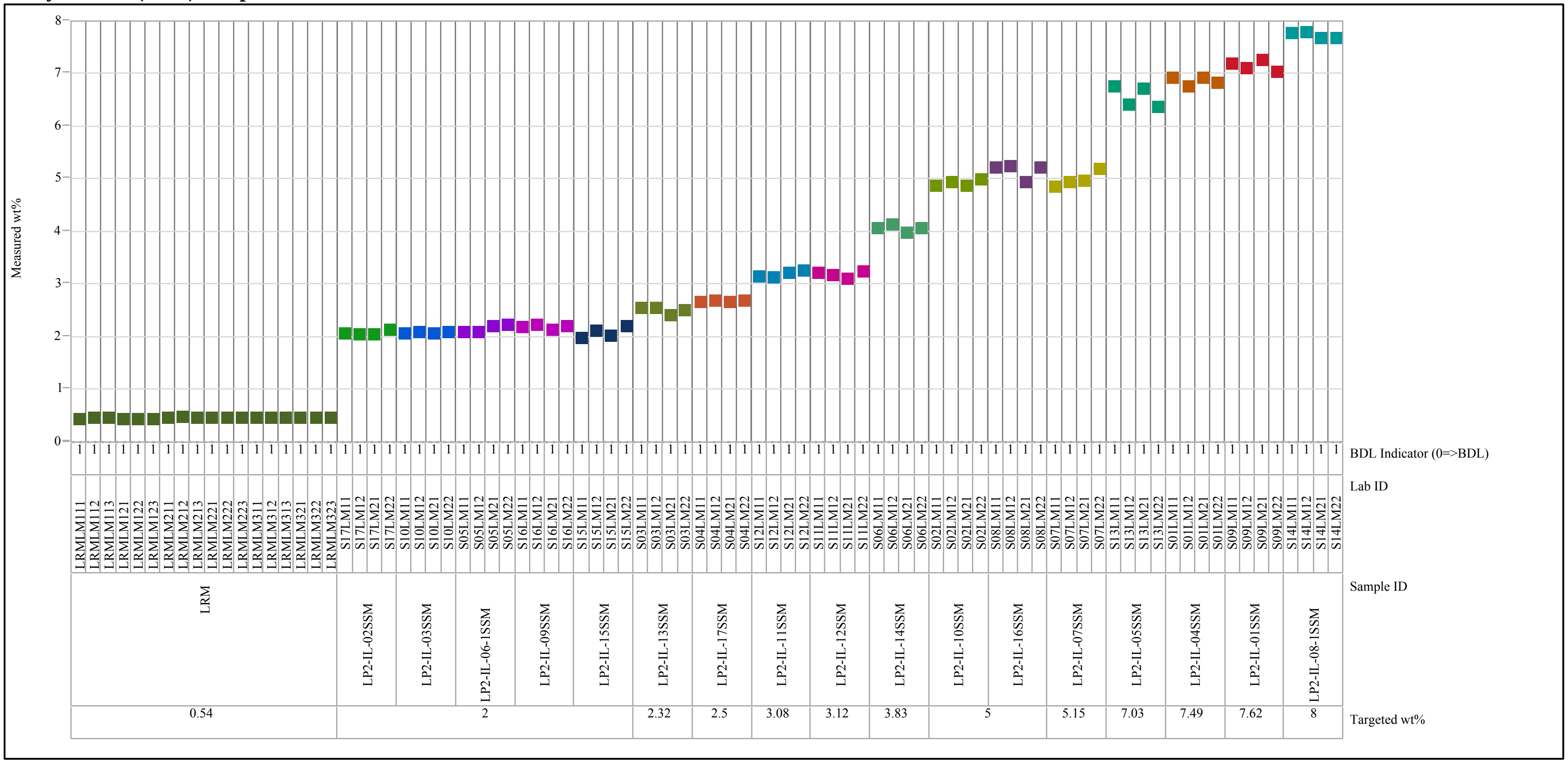


Exhibit E-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentrations (continued)

Analyte=Cl (wt%), Prep Method=KH

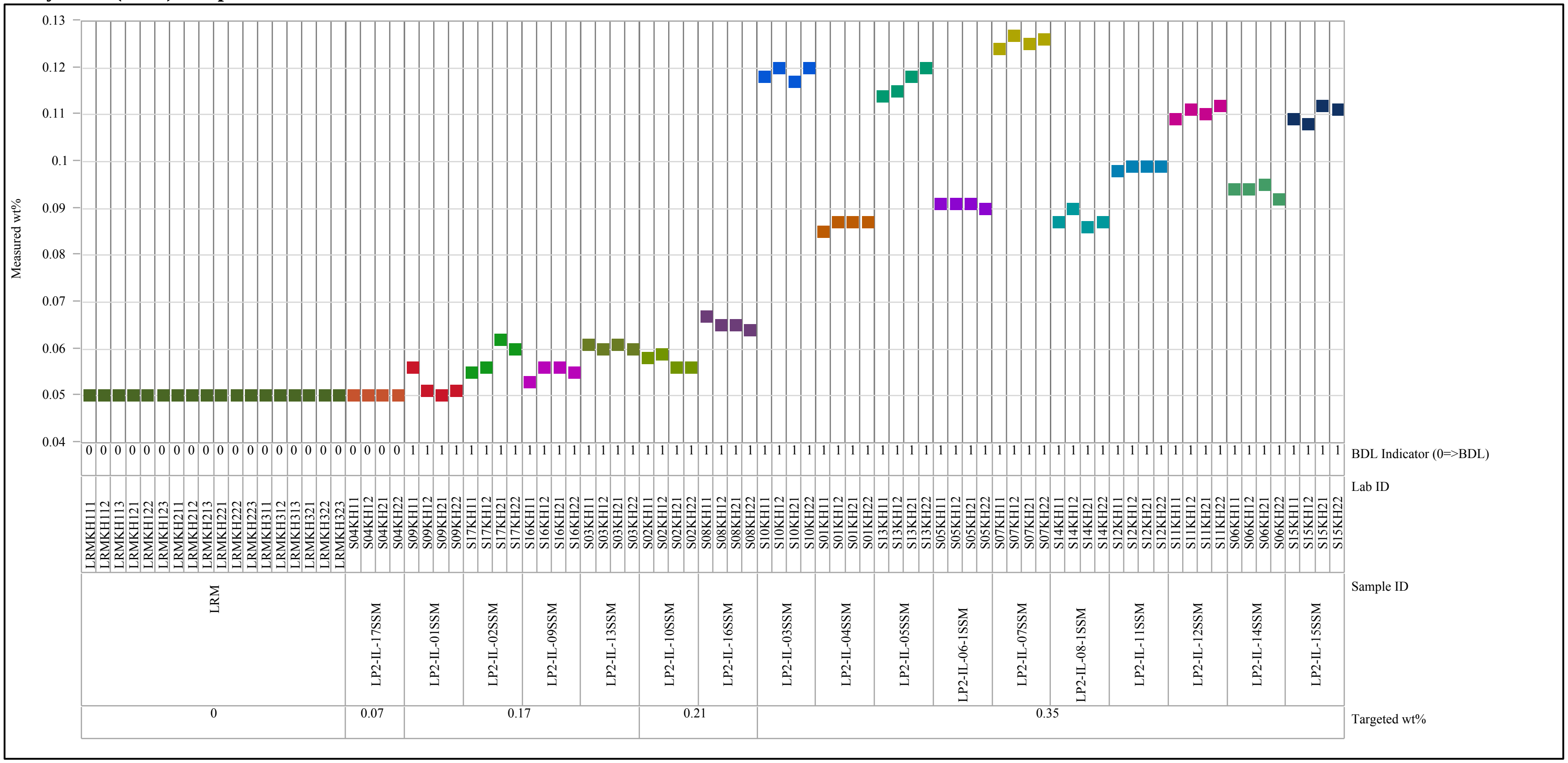


Exhibit E-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentrations (continued)

Analyte=Cr2O3 (wt%), Prep Method=LM

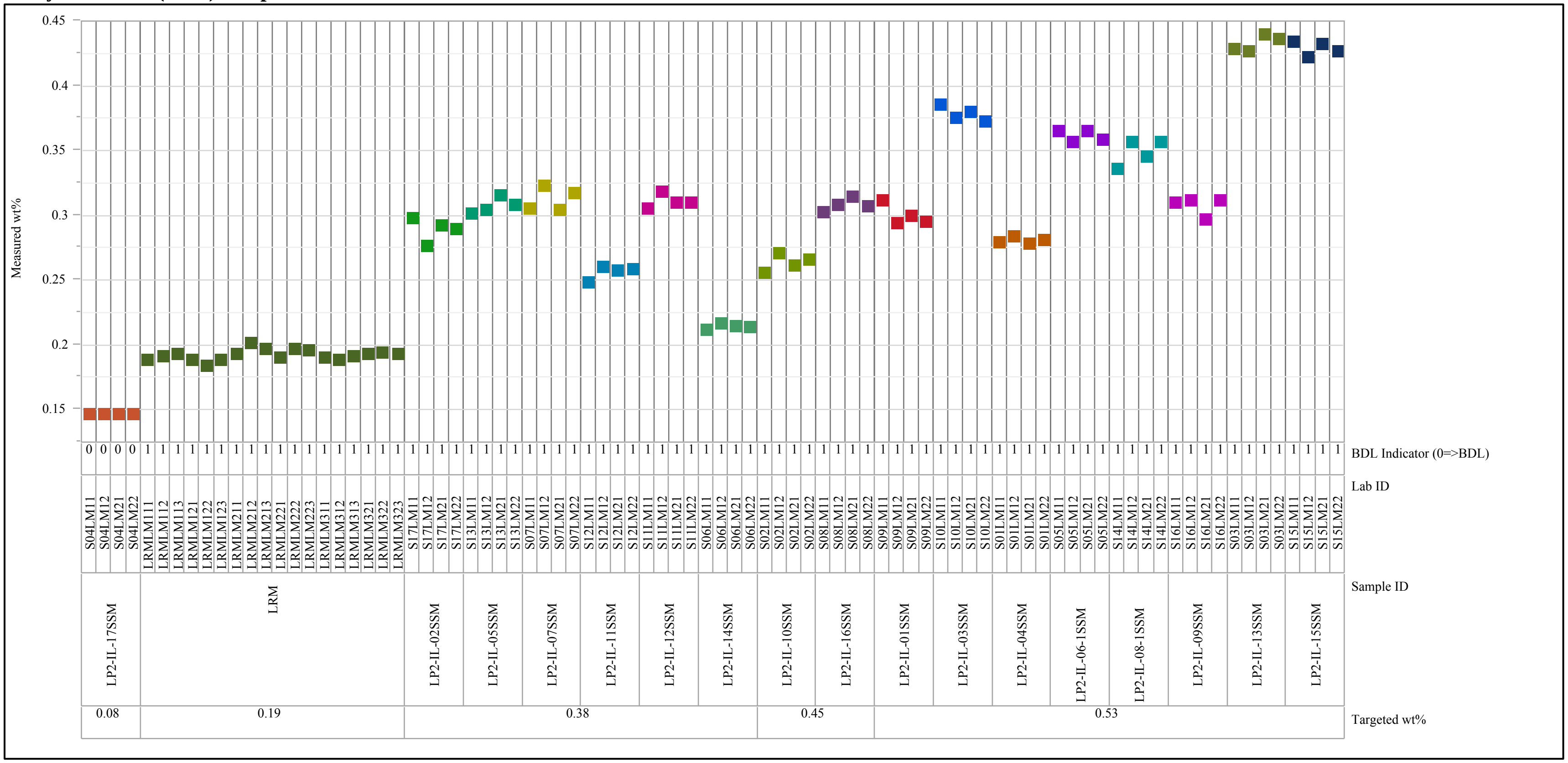


Exhibit E-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentrations (continued)

Analyte=F (wt%), Prep Method=KH

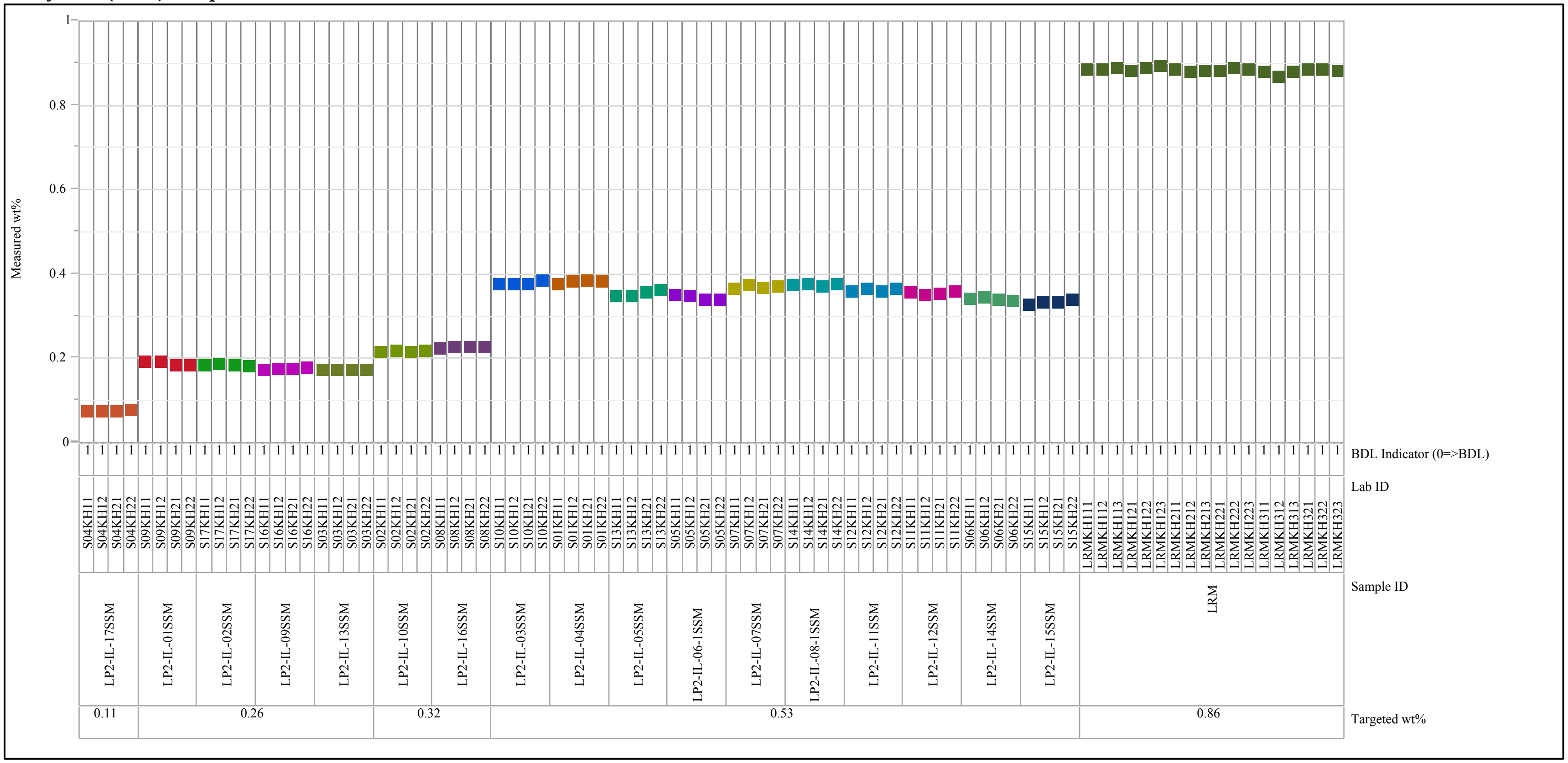


Exhibit E-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentrations (continued)

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

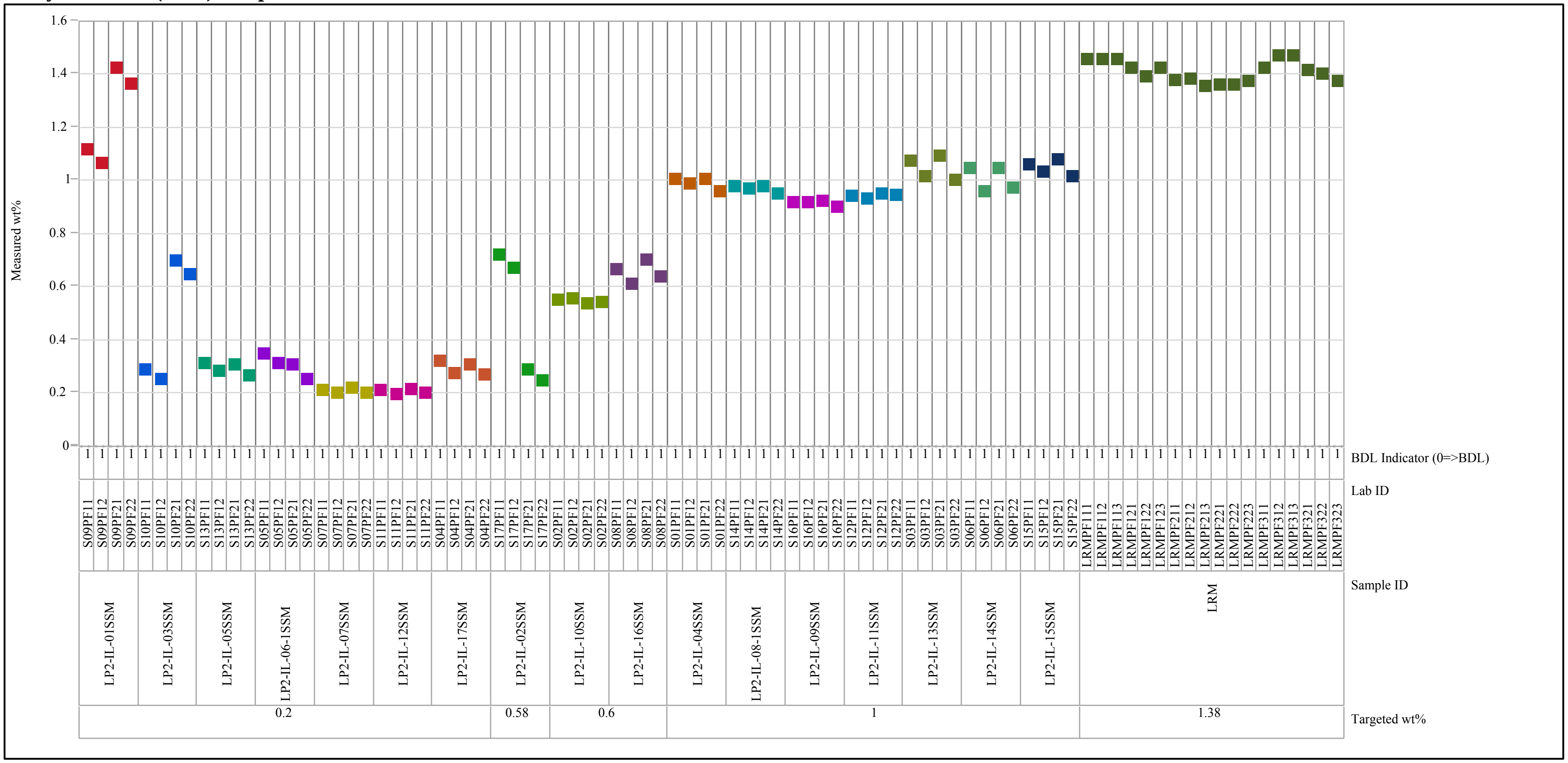


Exhibit E-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentrations (continued)

Analyte=K2O (wt%), Prep Method=LM

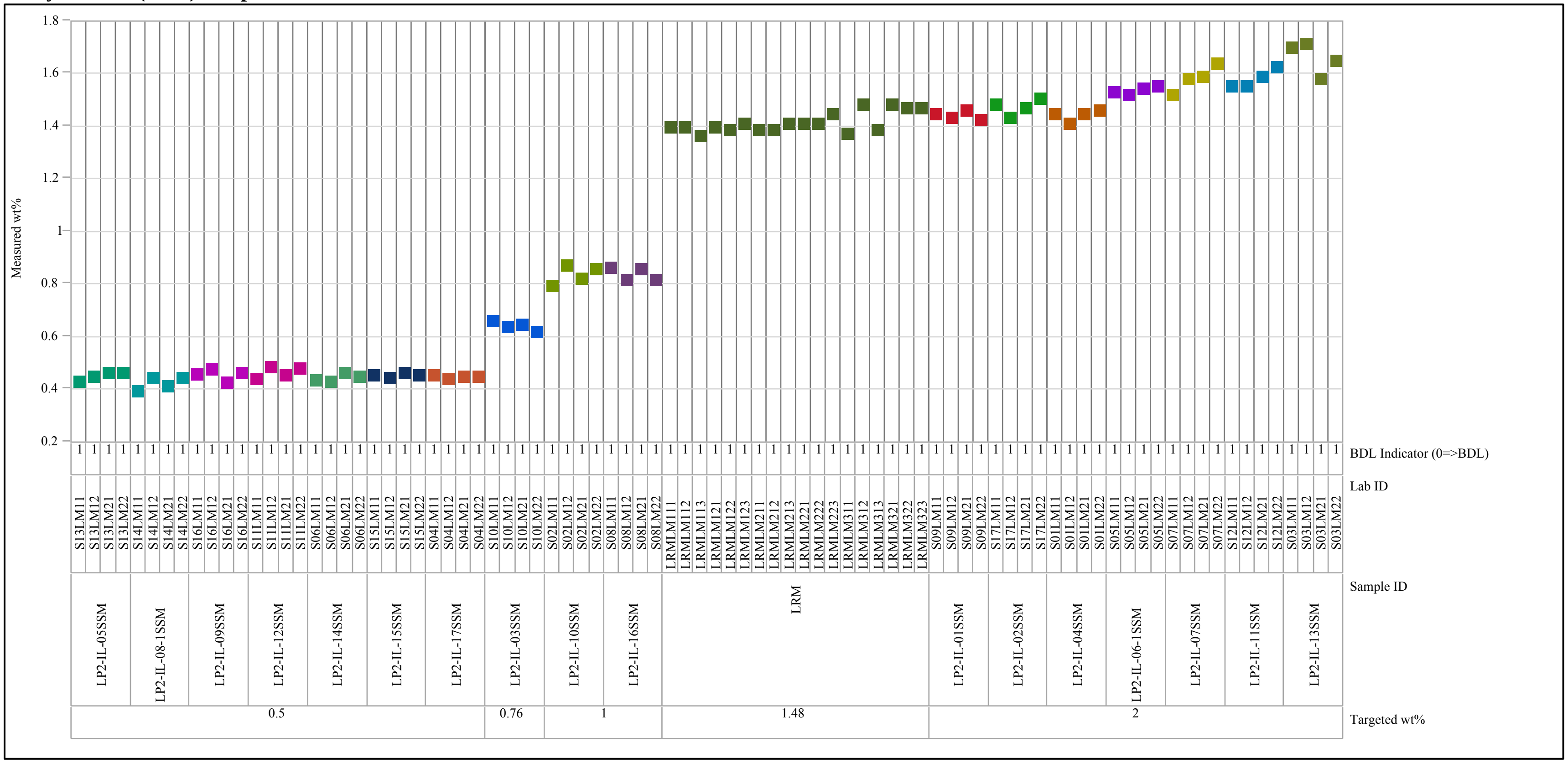


Exhibit E-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentrations (continued)

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

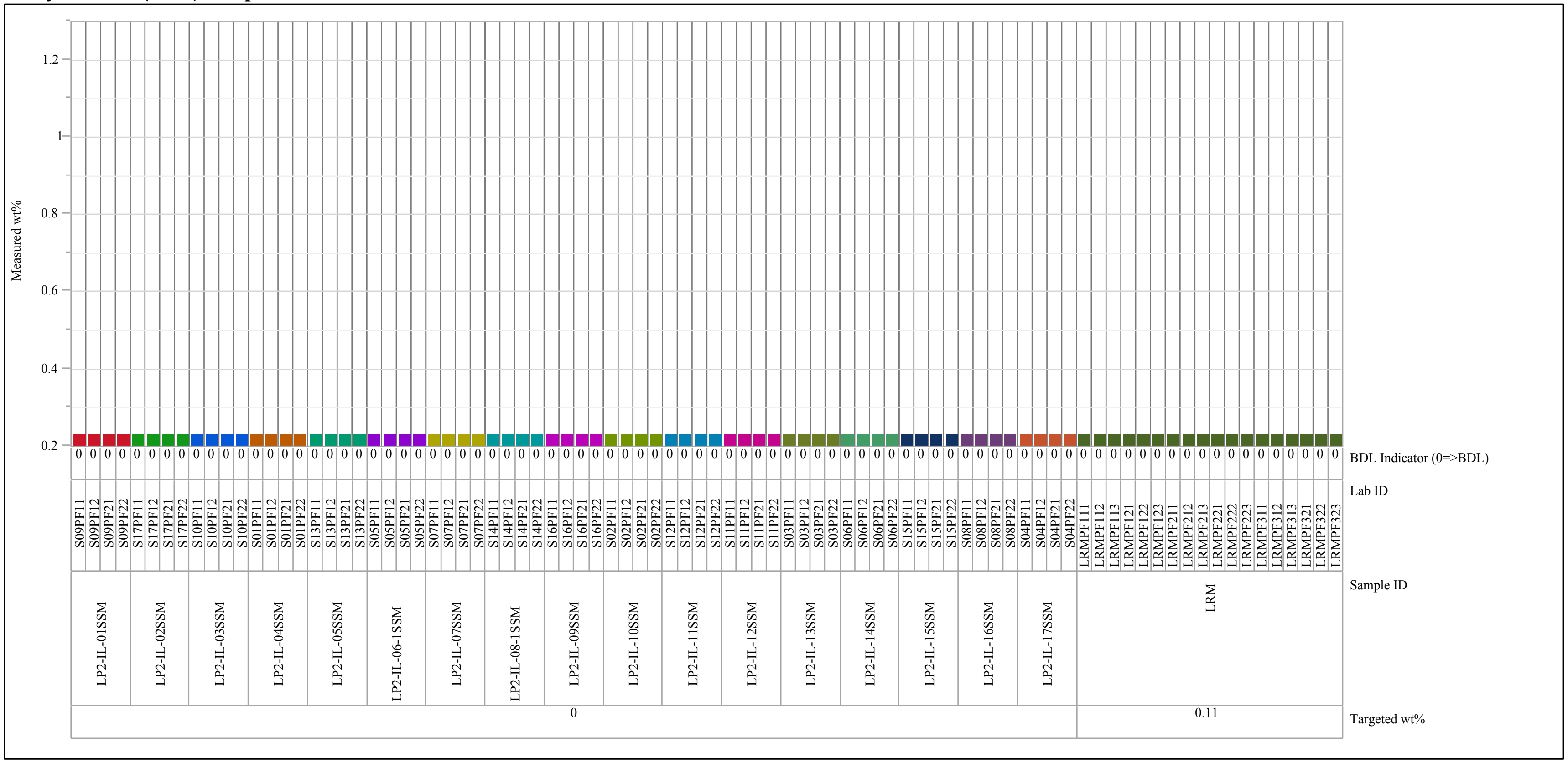


Exhibit E-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentrations (continued)

Analyte=MgO (wt%), Prep Method=LM

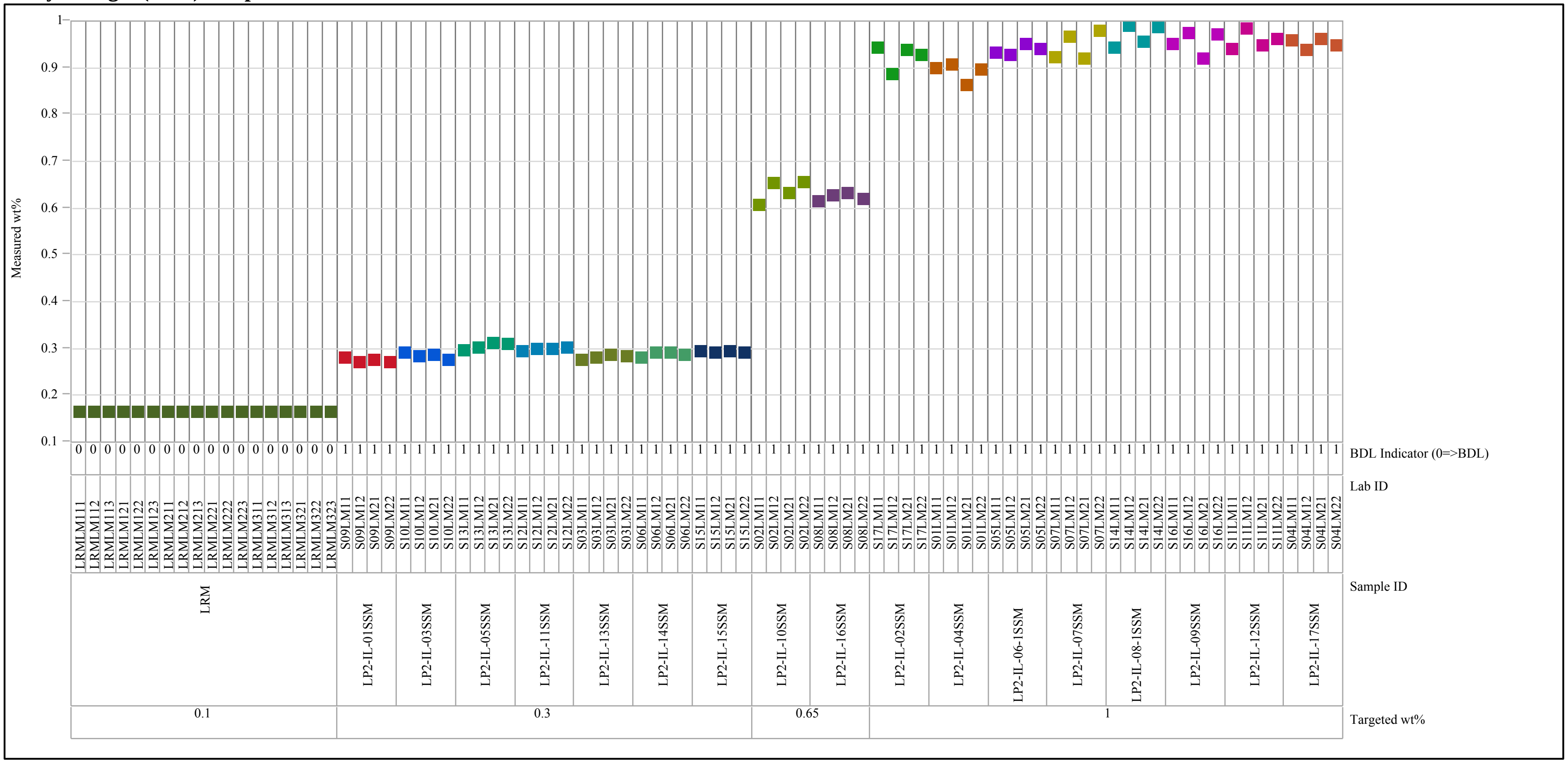


Exhibit E-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentrations (continued)

Analyte=Na2O (wt%), Prep Method=LM

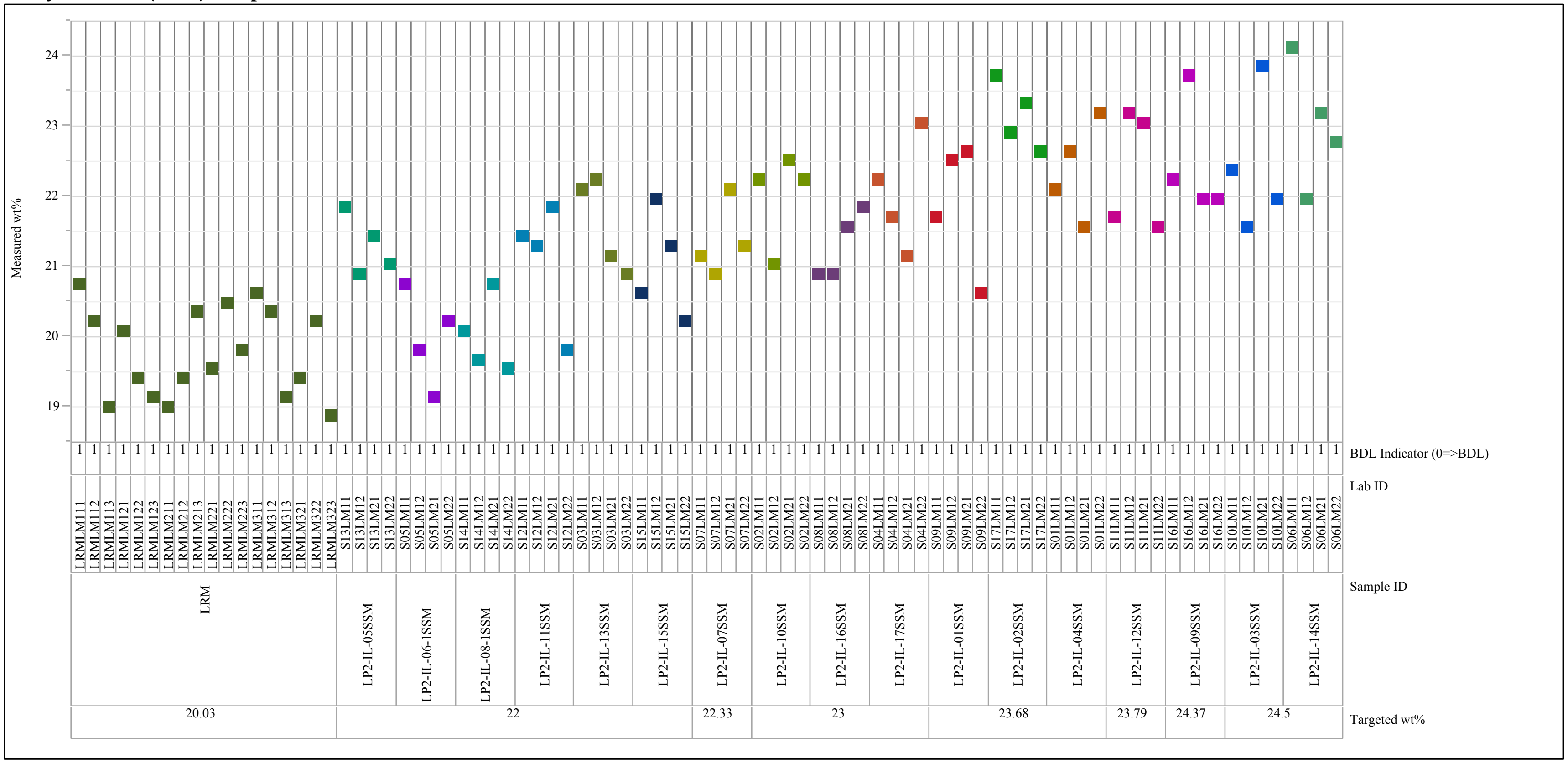


Exhibit E-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentrations (continued)

Analyte=P2O5 (wt%), Prep Method=LM

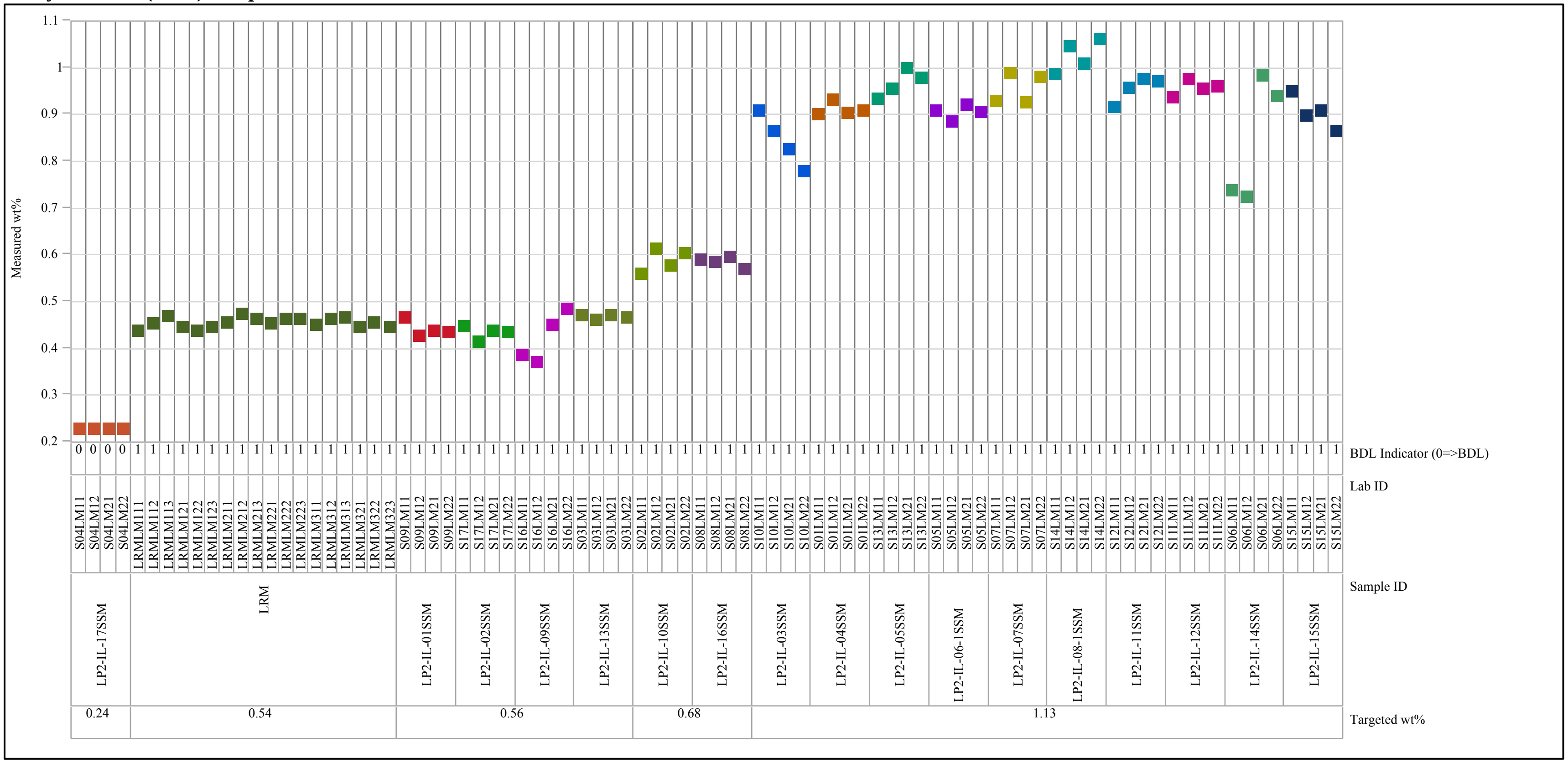


Exhibit E-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentrations (continued)

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

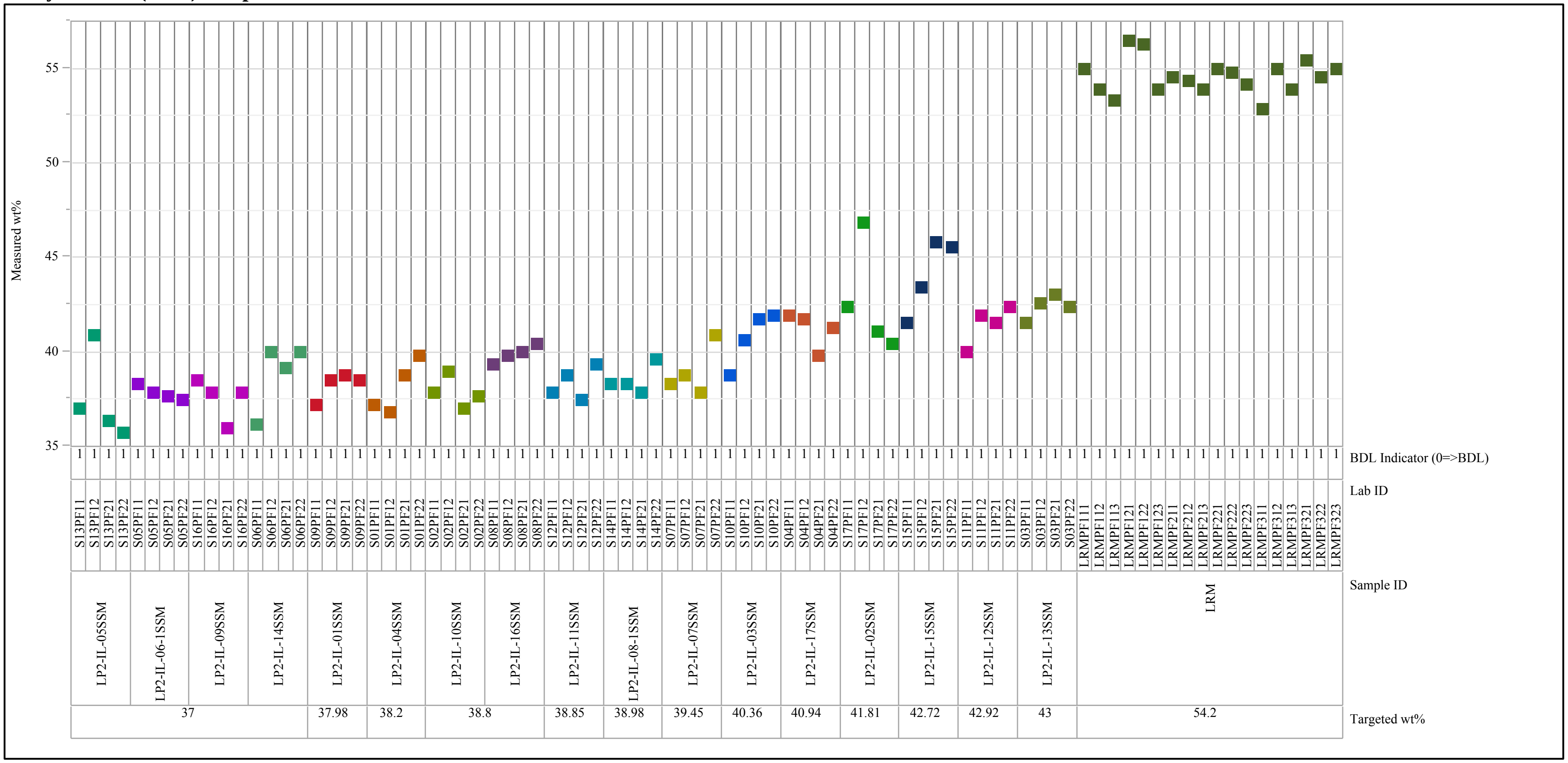


Exhibit E-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentrations (continued)

Analyte=SnO2 (wt%), Prep Method=PF

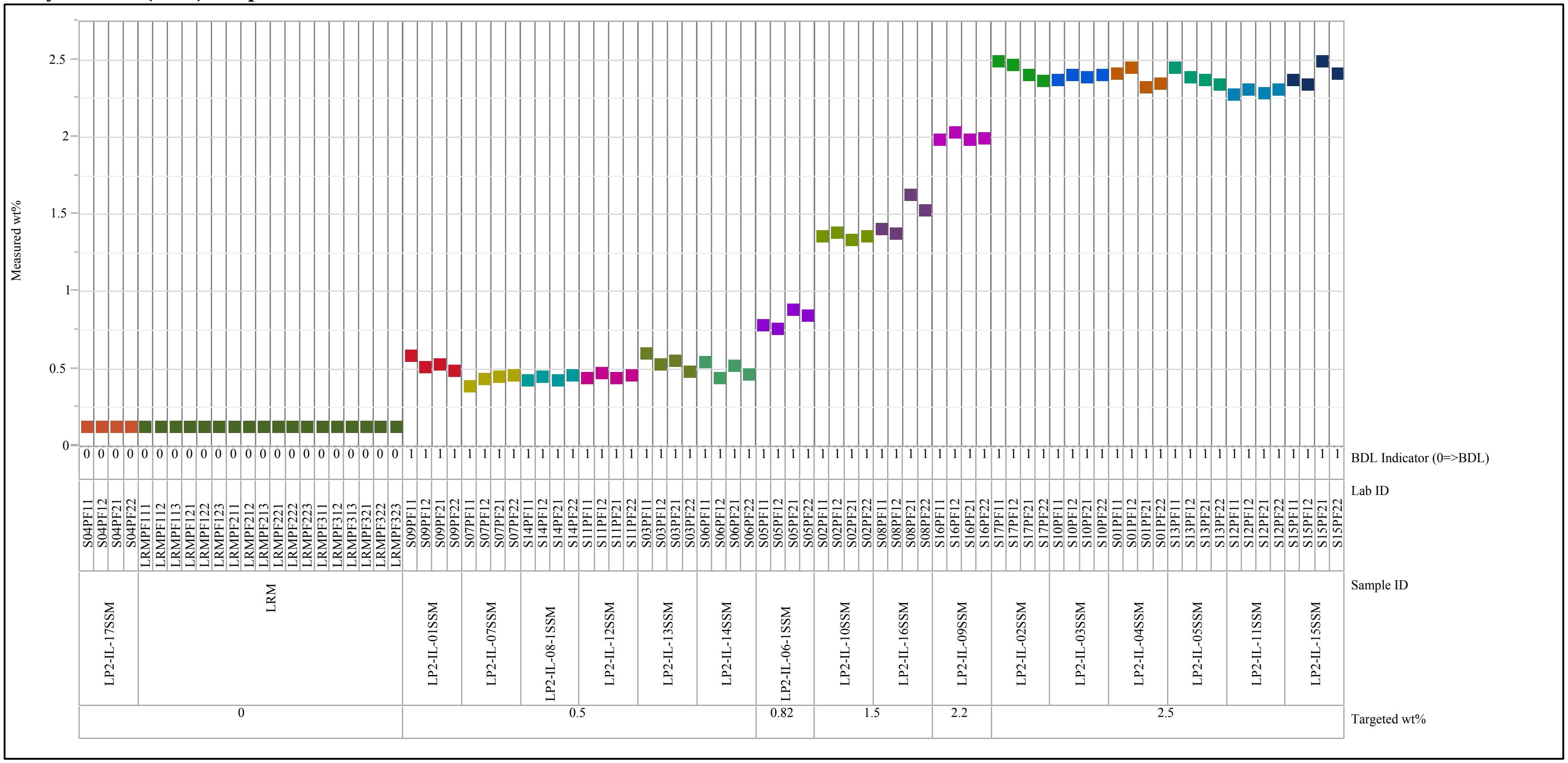


Exhibit E-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentrations (continued)

Analyte=SO3 (wt%), Prep Method=LM

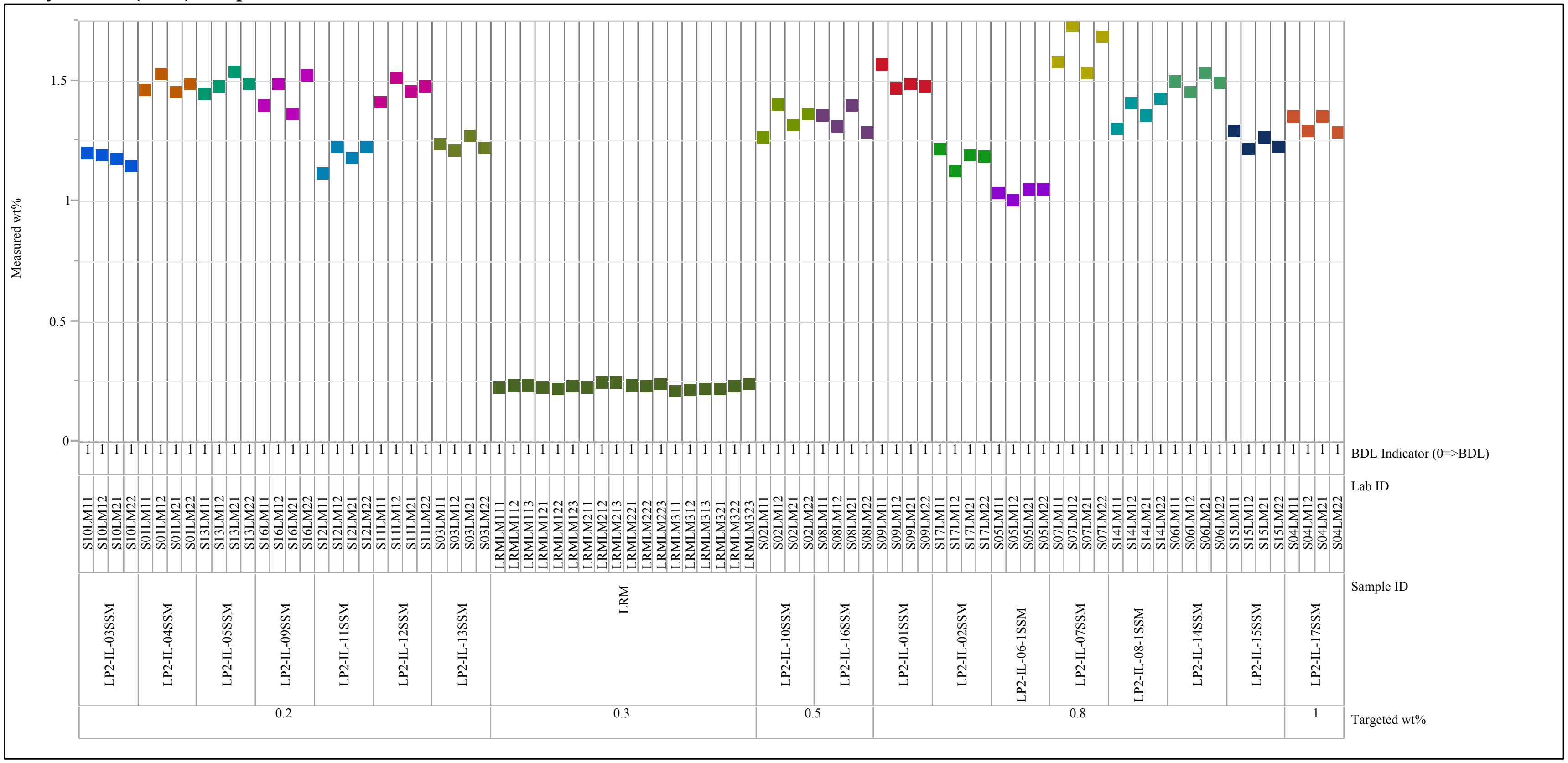


Exhibit E-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentrations (continued)

Analyte=V2O5 (wt%), Prep Method=LM

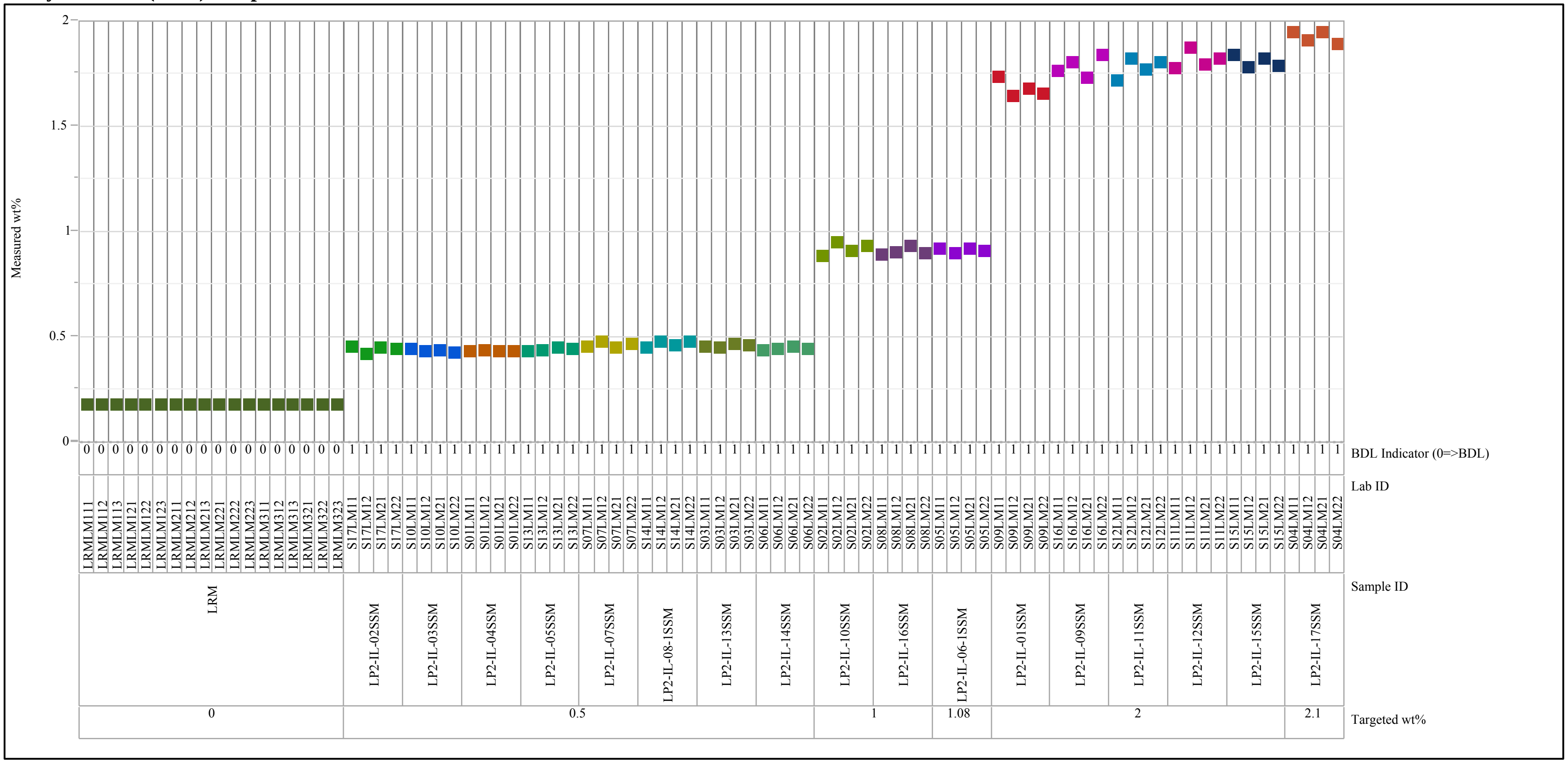


Exhibit E-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentrations (continued)

Analyte=ZnO (wt%), Prep Method=LM

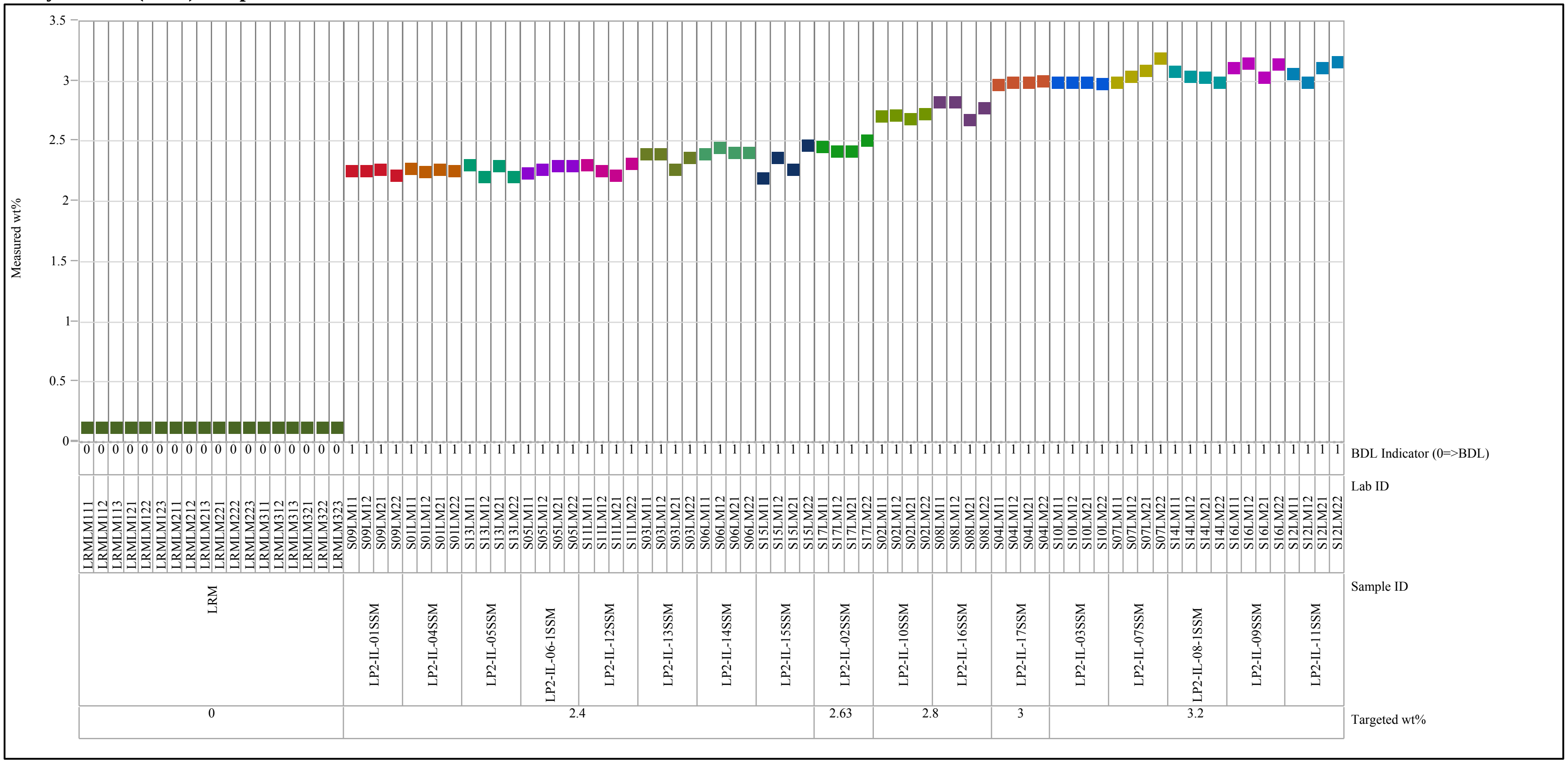


Exhibit E-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentrations (continued)

Analyte=ZrO2 (wt%), Prep Method=LM

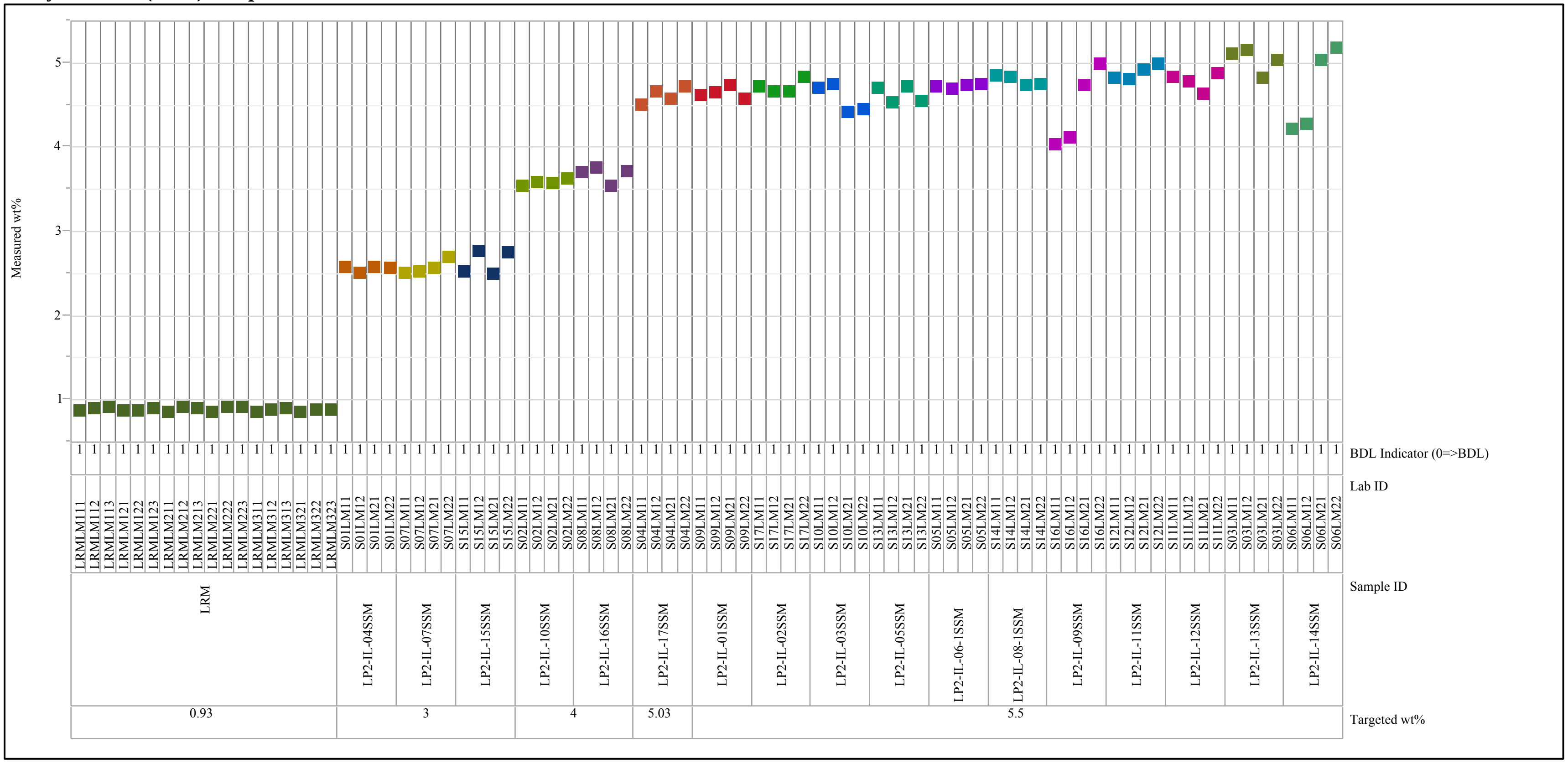
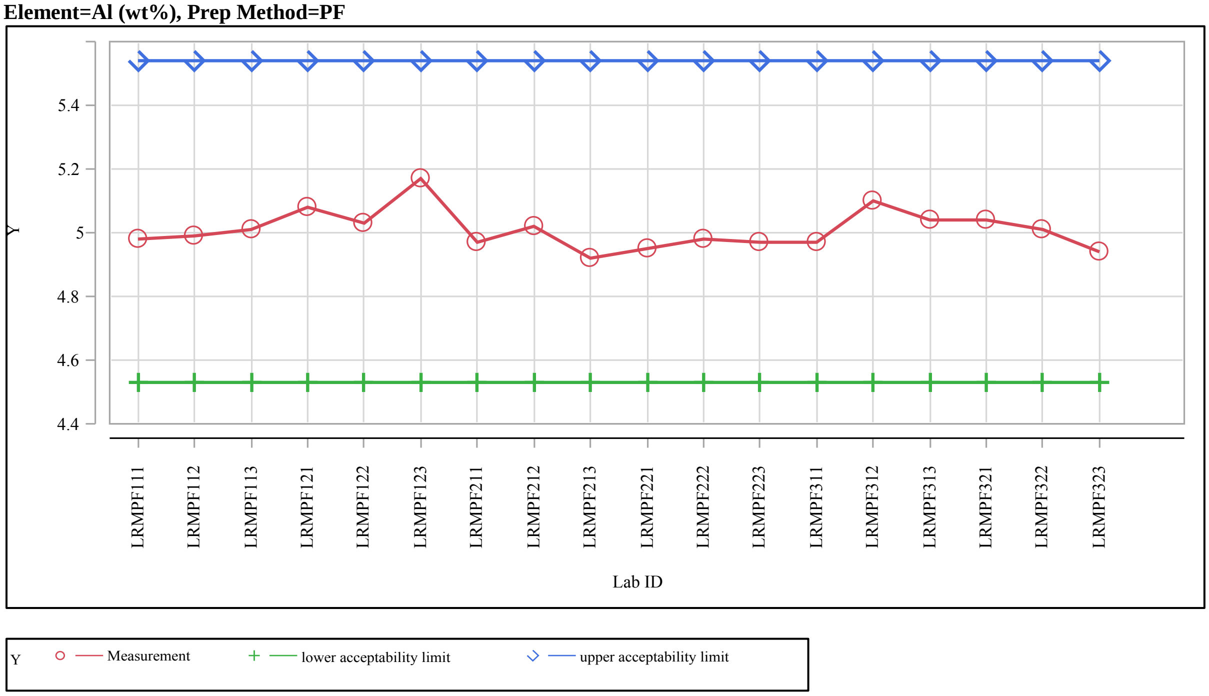


Exhibit E-3. Acceptability Evaluation for Measurements of the LRM Standard Glass

Element=Al (wt%), Prep Method=PF



Element=B (wt%), Prep Method=PF

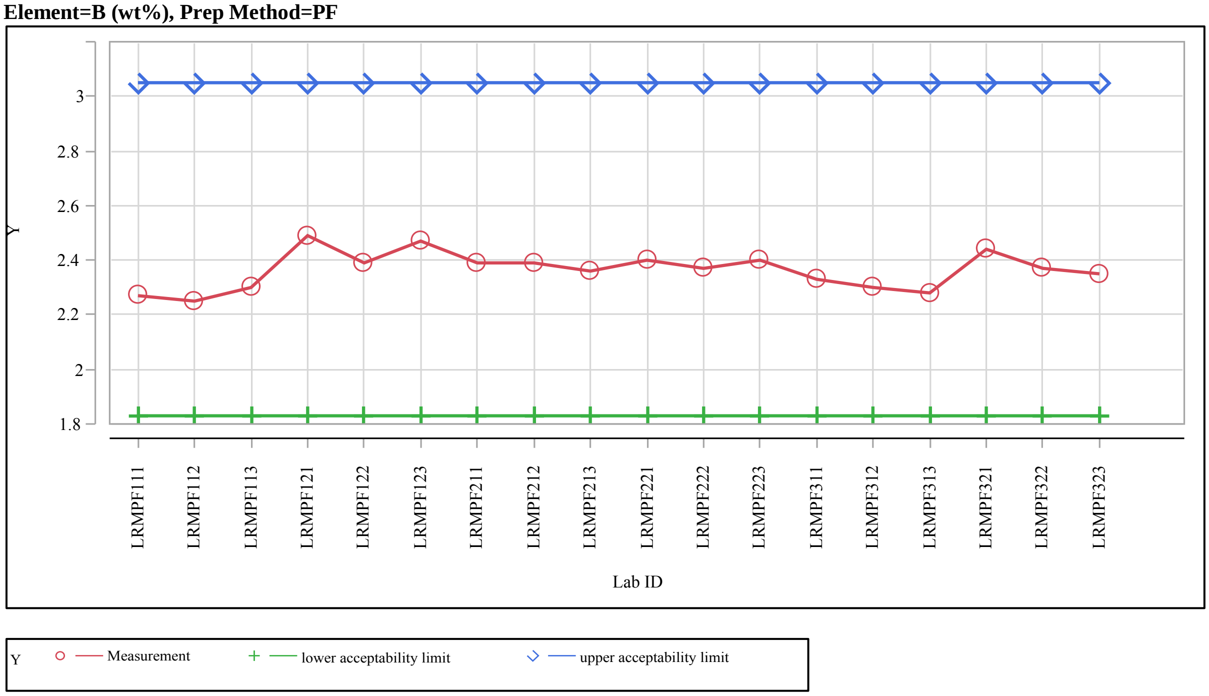
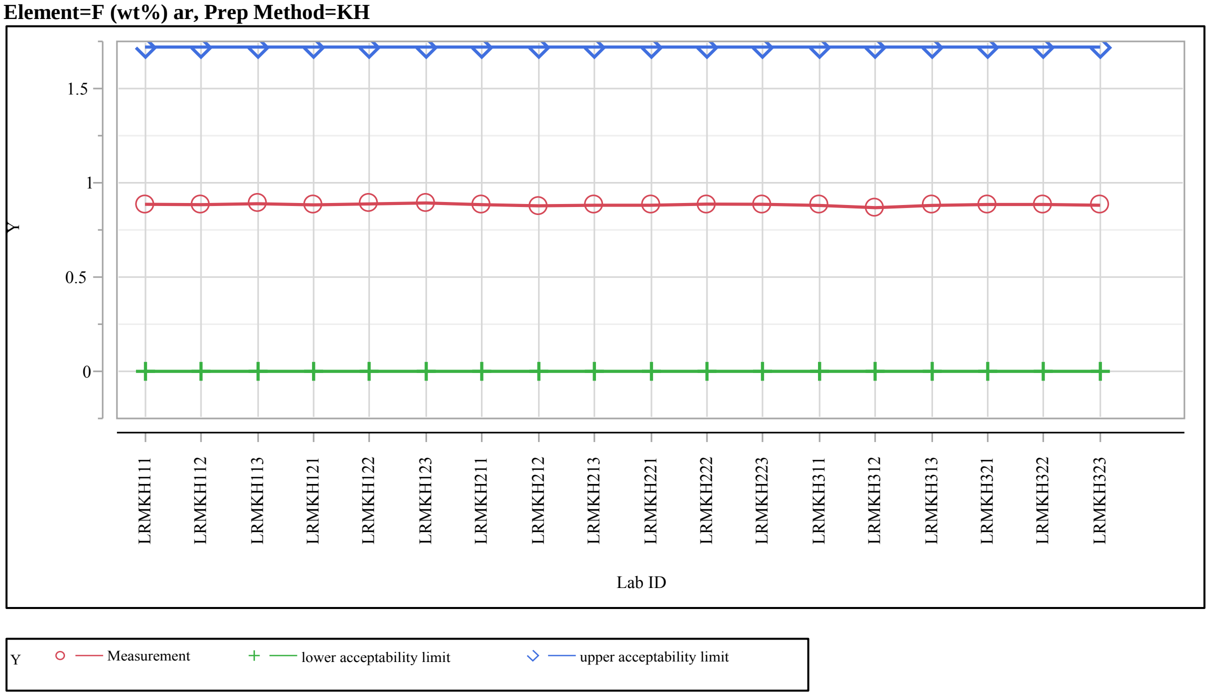


Exhibit E-3. Acceptability Evaluation for Measurements of the LRM Standard Glass (continued)

Element=F (wt%) ar, Prep Method=KH



Element=Fe (wt%), Prep Method=PF

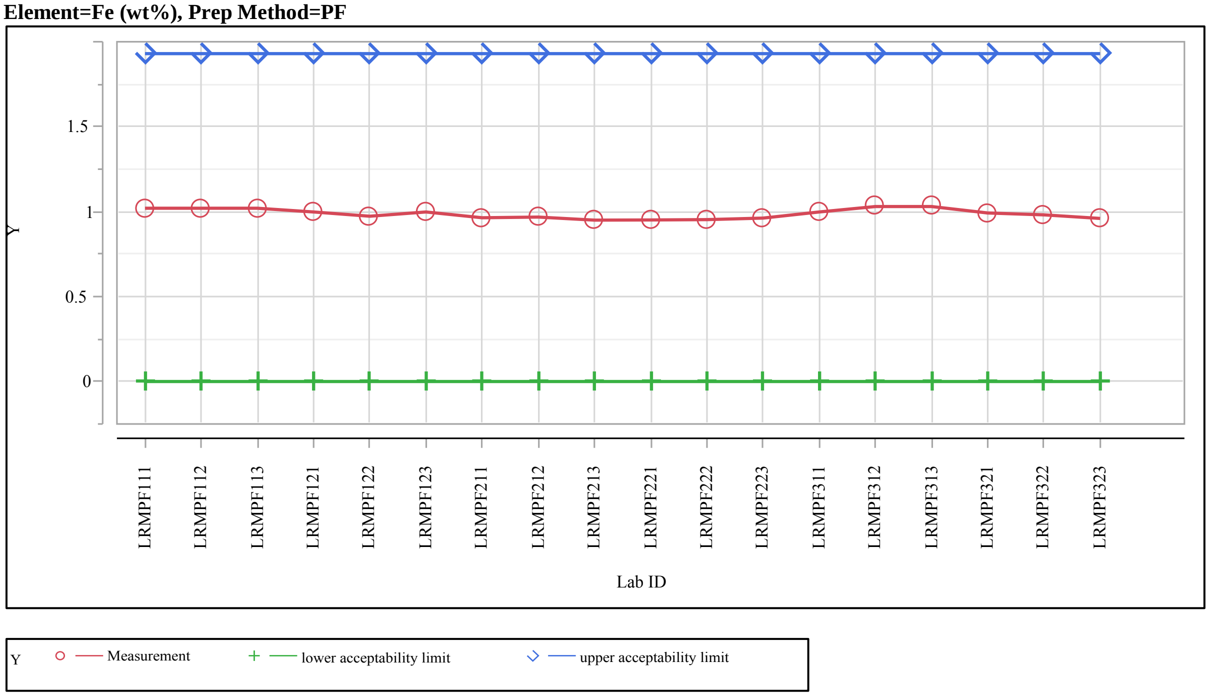
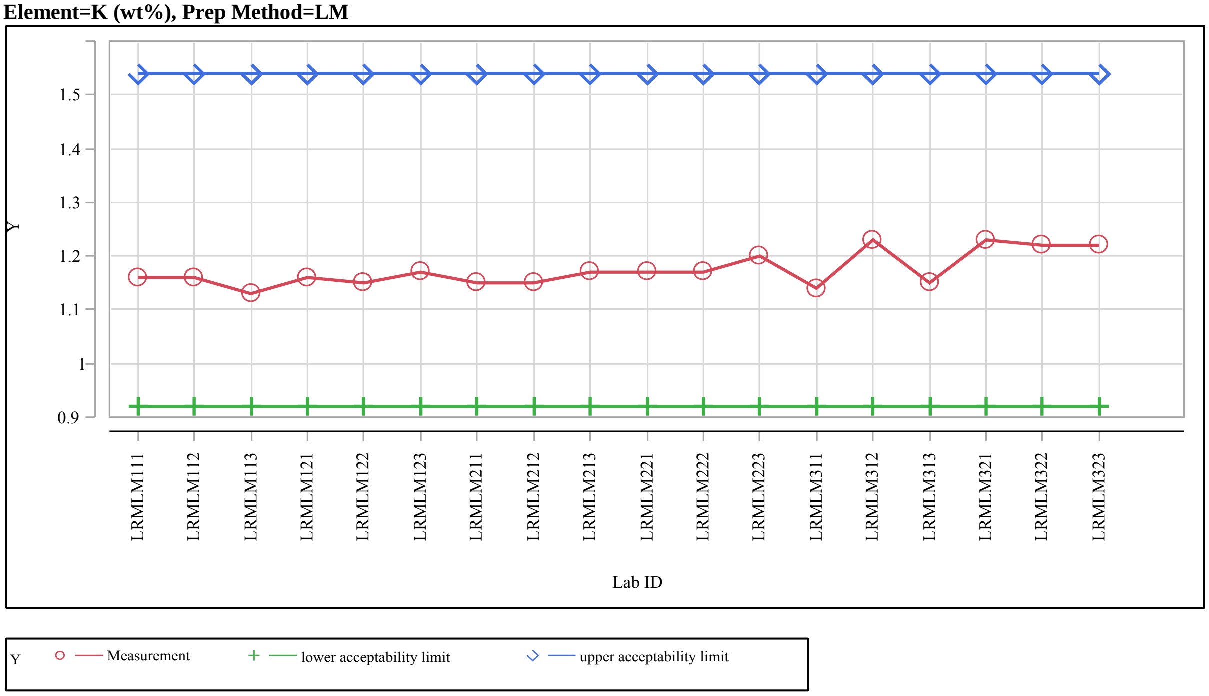


Exhibit E-3. Acceptability Evaluation for Measurements of the LRM Standard Glass (continued)

Element=K (wt%), Prep Method=LM



Element=Na (wt%), Prep Method=LM

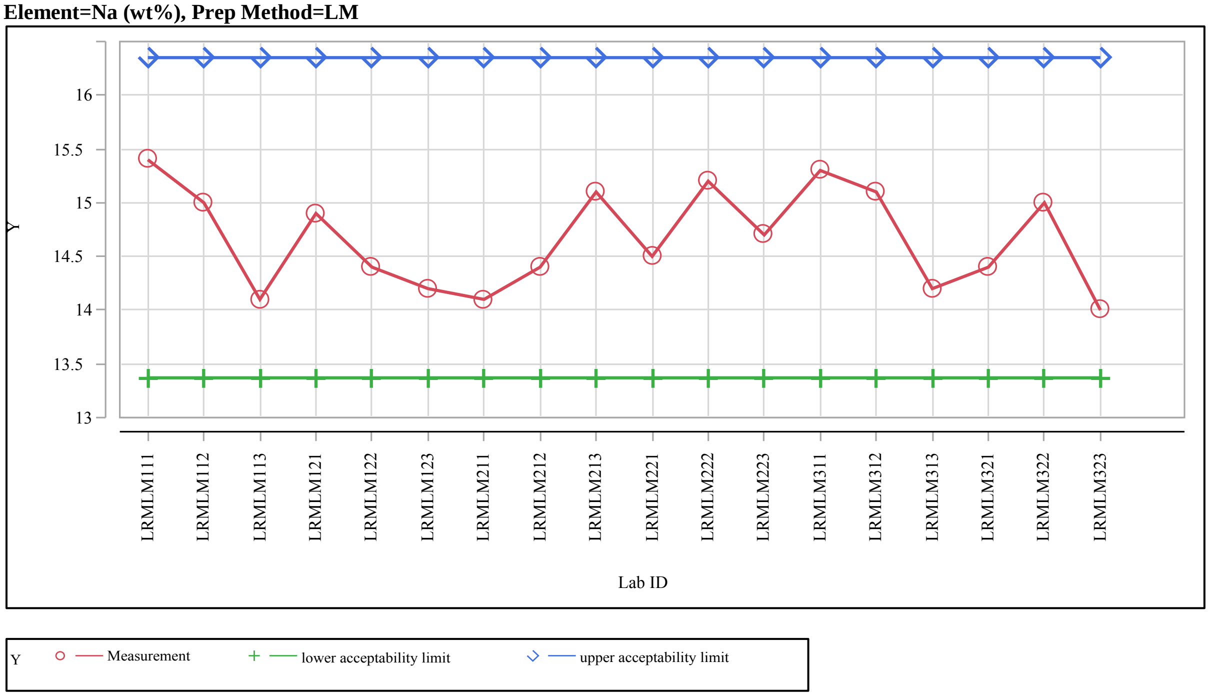
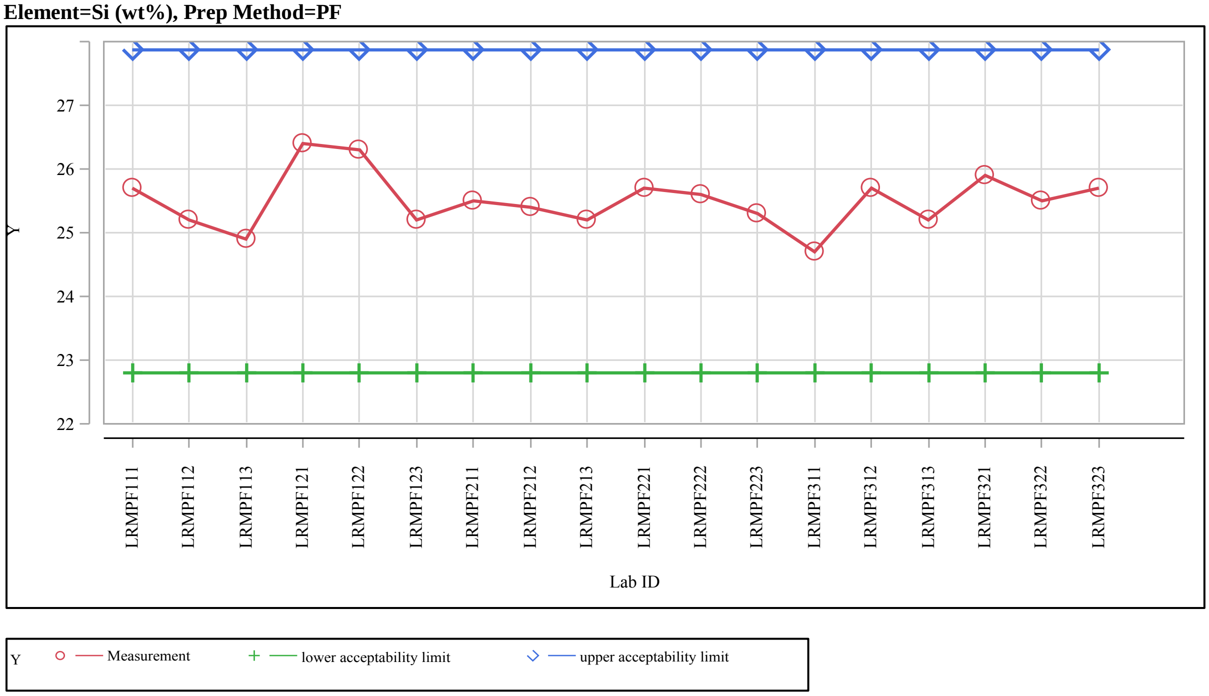


Exhibit E-3. Acceptability Evaluation for Measurements of the LRM Standard Glass (continued)

Element=Si (wt%), Prep Method=PF



Element=Zr (wt%), Prep Method=LM

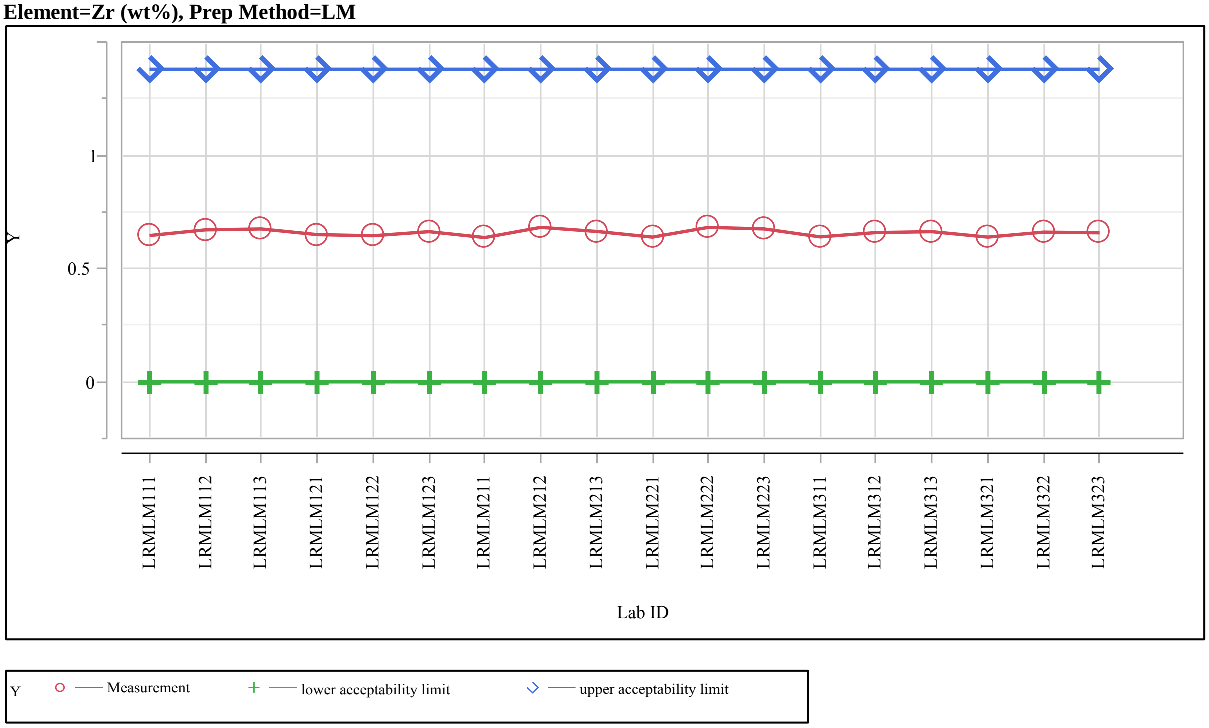
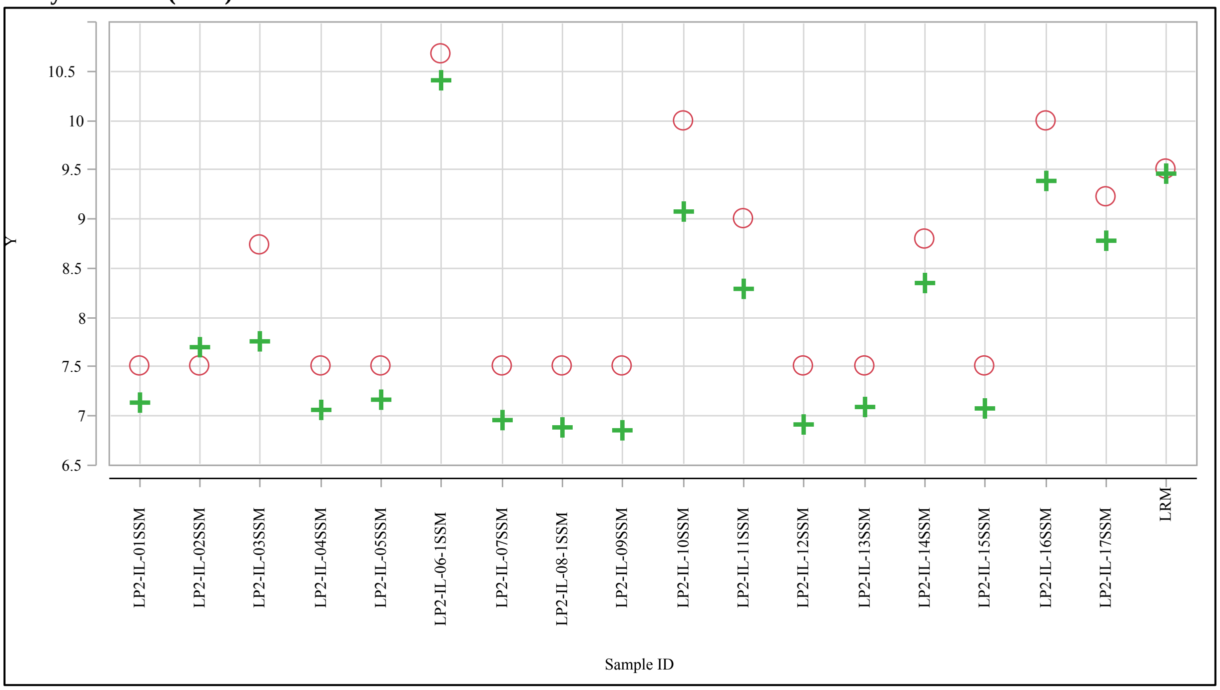
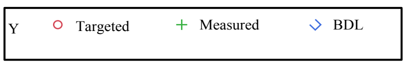


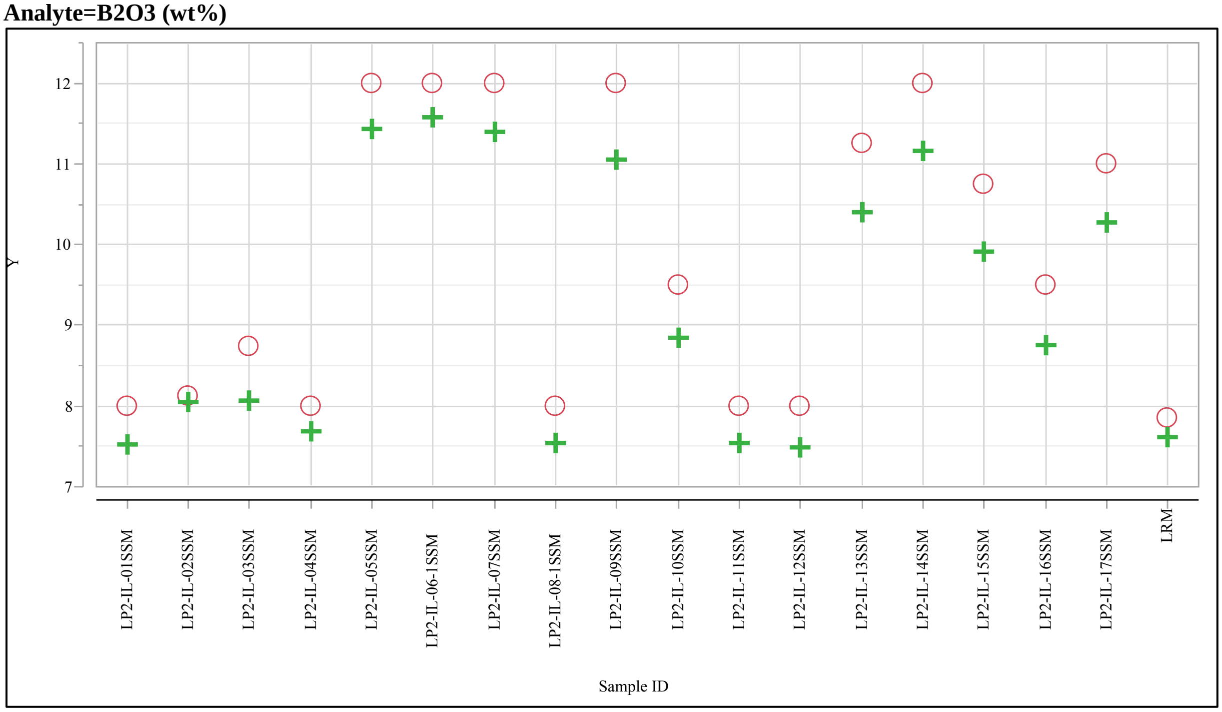
Exhibit E-4. Measured versus Targeted Concentrations by SSM Glass ID by Oxide

Analyte=Al2O3 (wt%)





Analyte=B2O3 (wt%)



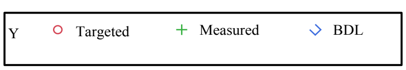
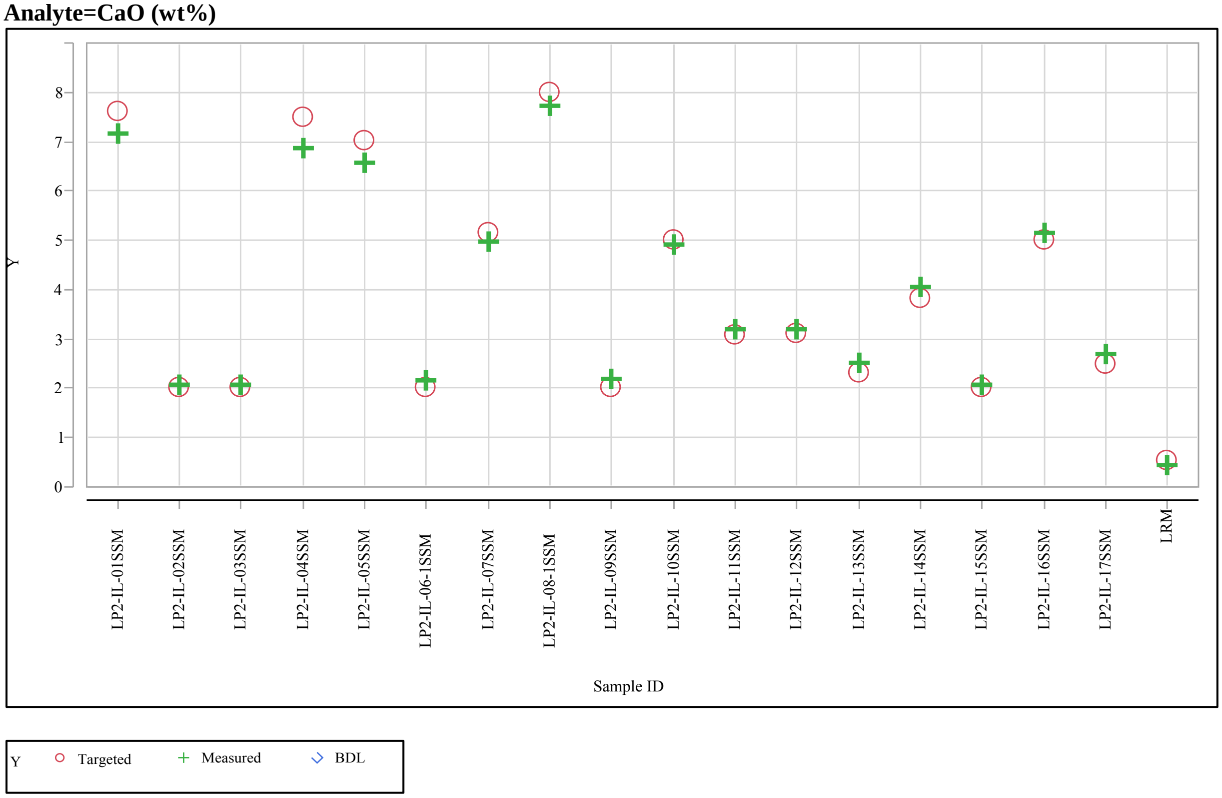


Exhibit E-4. Measured versus Targeted Concentrations by SSM Glass ID by Oxide (continued)

Analyte=CaO (wt%)



Analyte=Cl (wt%)

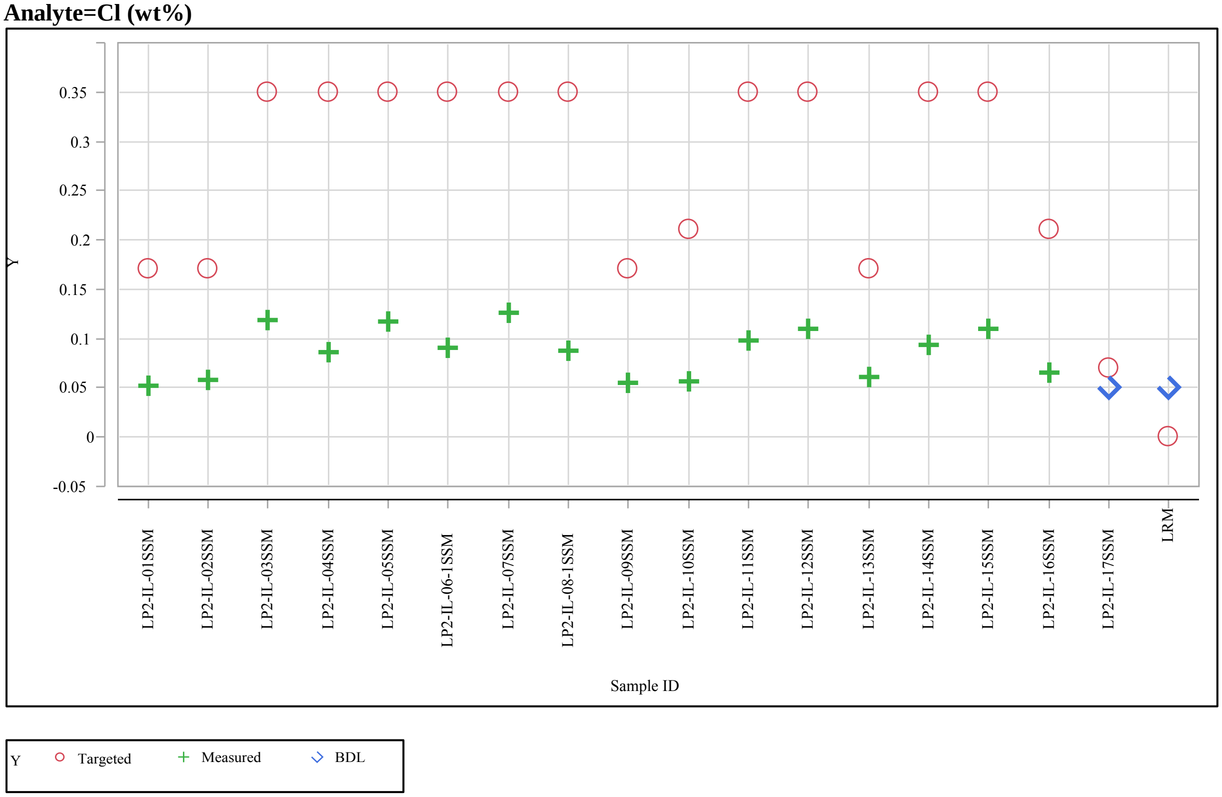
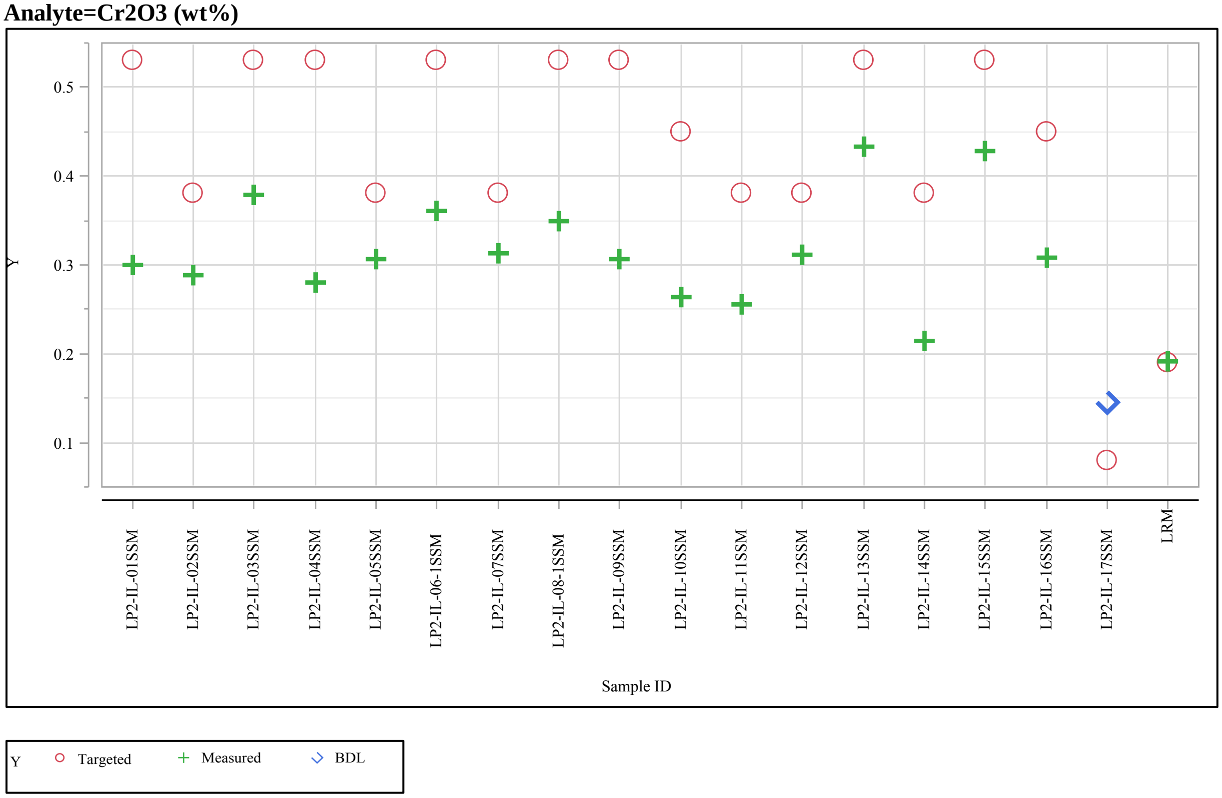


Exhibit E-4. Measured versus Targeted Concentrations by SSM Glass ID by Oxide (continued)

Analyte=Cr2O3 (wt%)



Analyte=F (wt%)

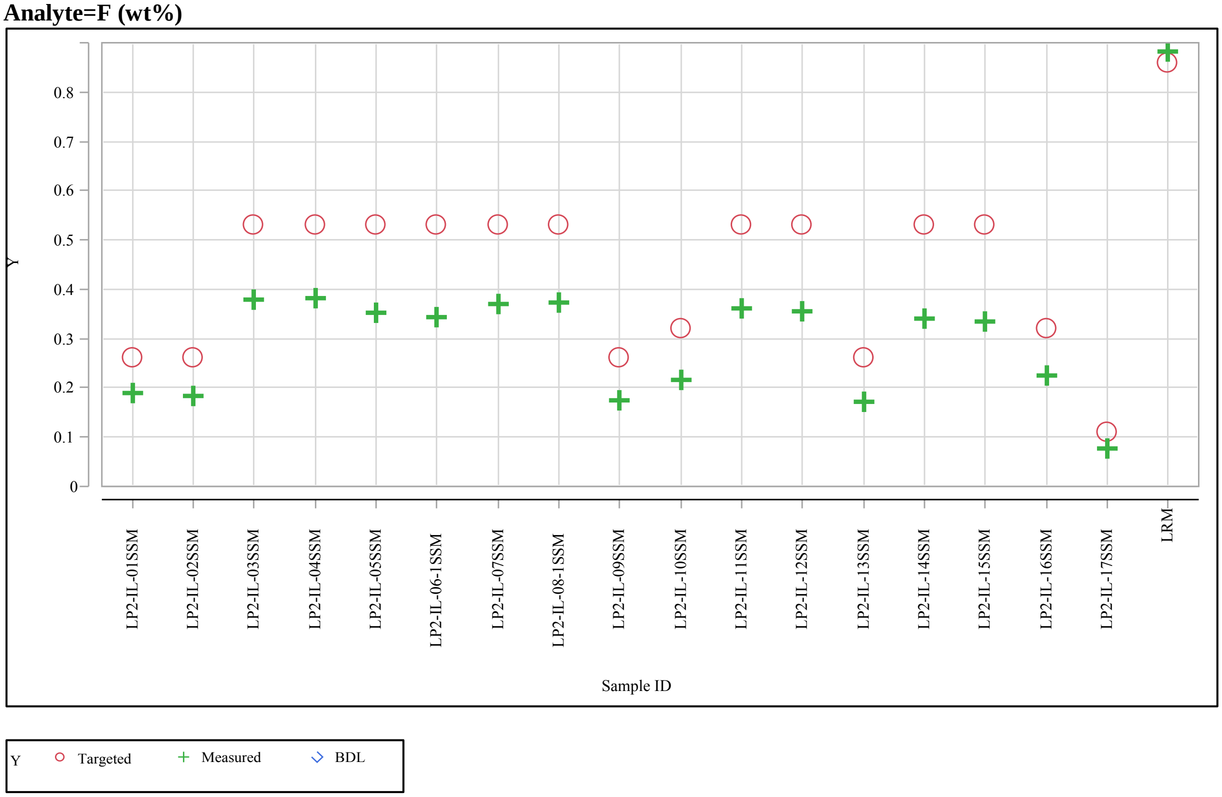
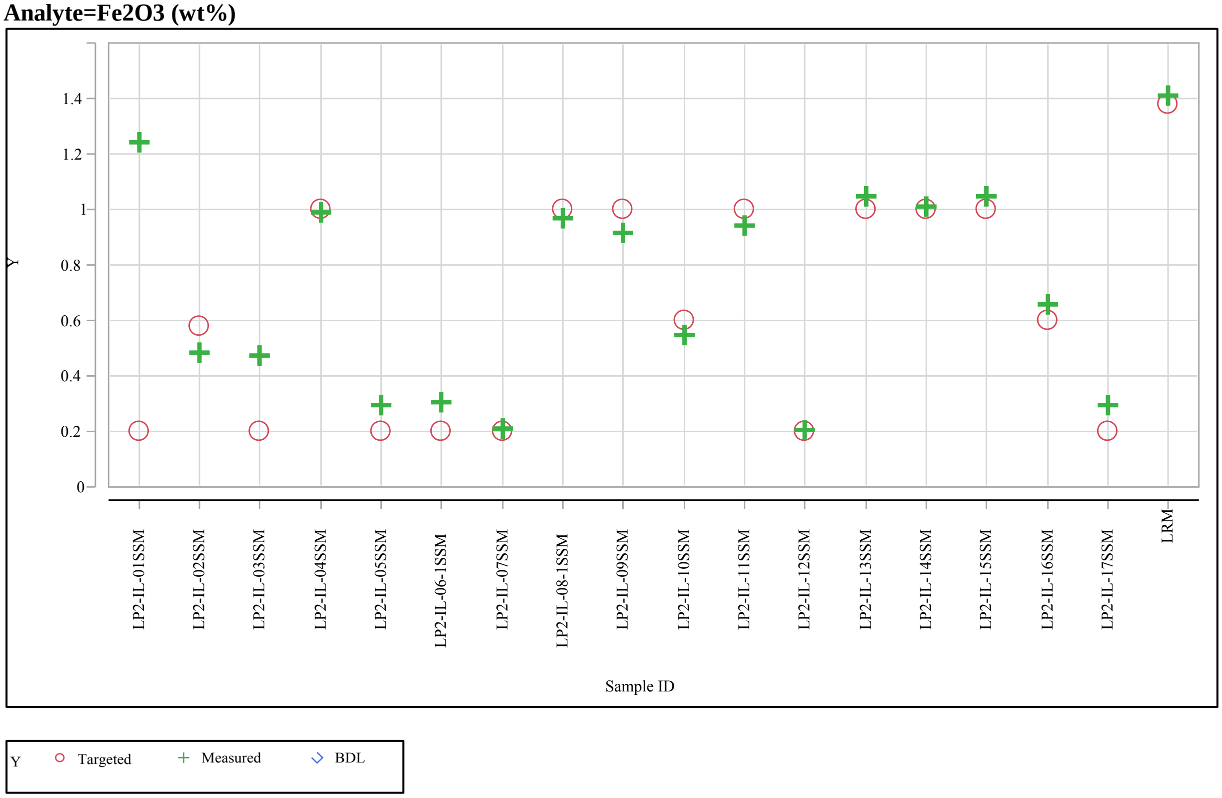


Exhibit E-4. Measured versus Targeted Concentrations by SSM Glass ID by Oxide (continued)

Analyte=Fe2O3 (wt%)



Analyte=K2O (wt%)

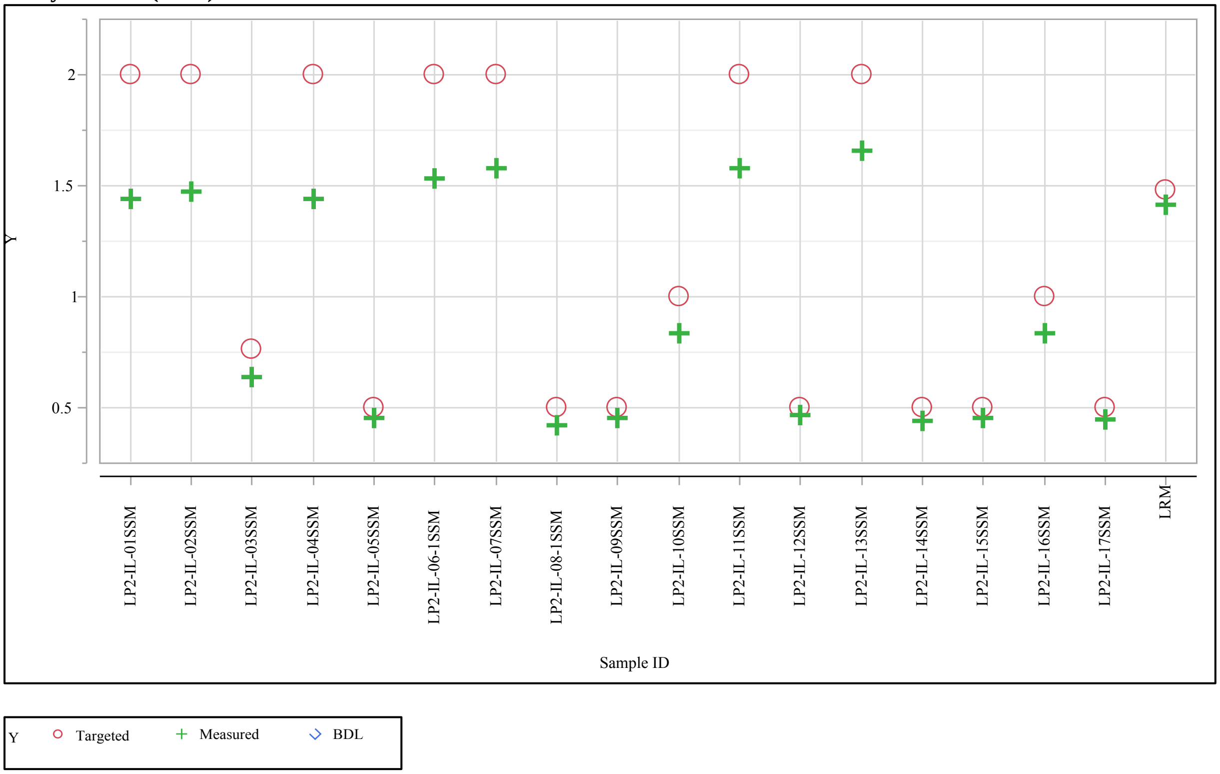
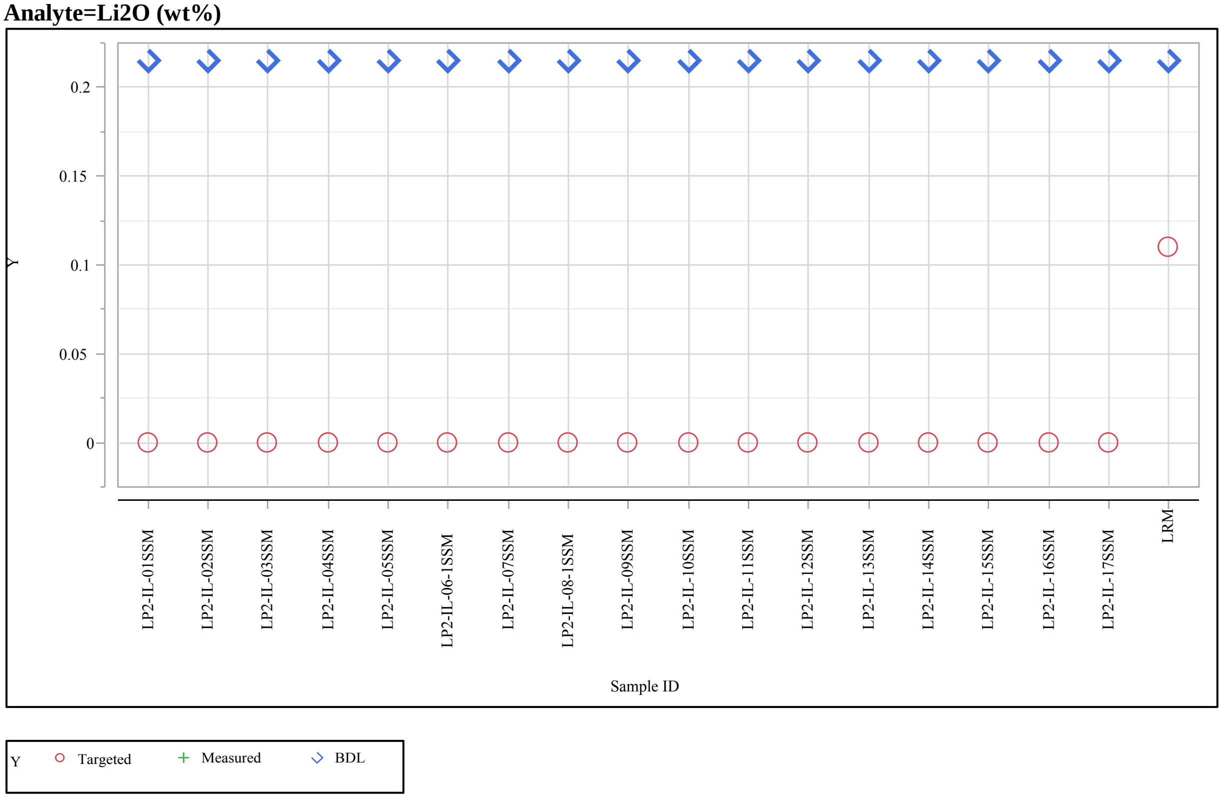


Exhibit E-4. Measured versus Targeted Concentrations by SSM Glass ID by Oxide (continued)

Analyte=Li2O (wt%)



Analyte=MgO (wt%)

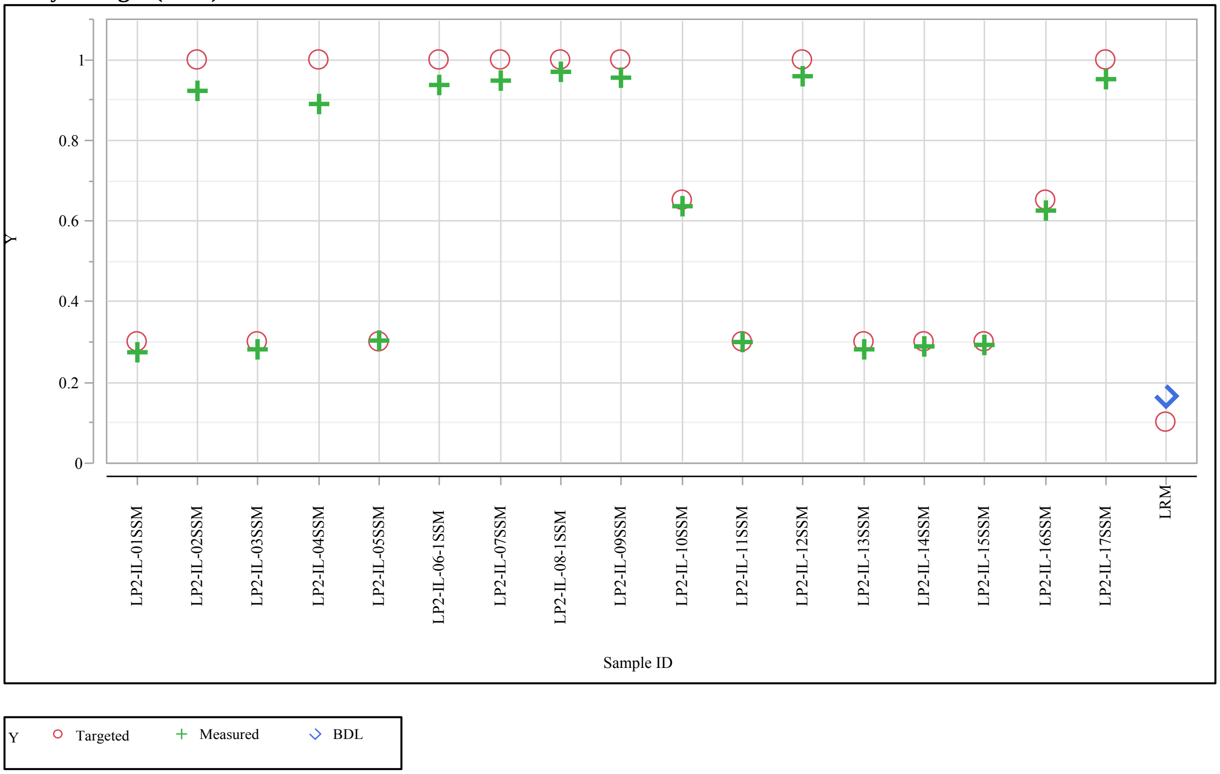
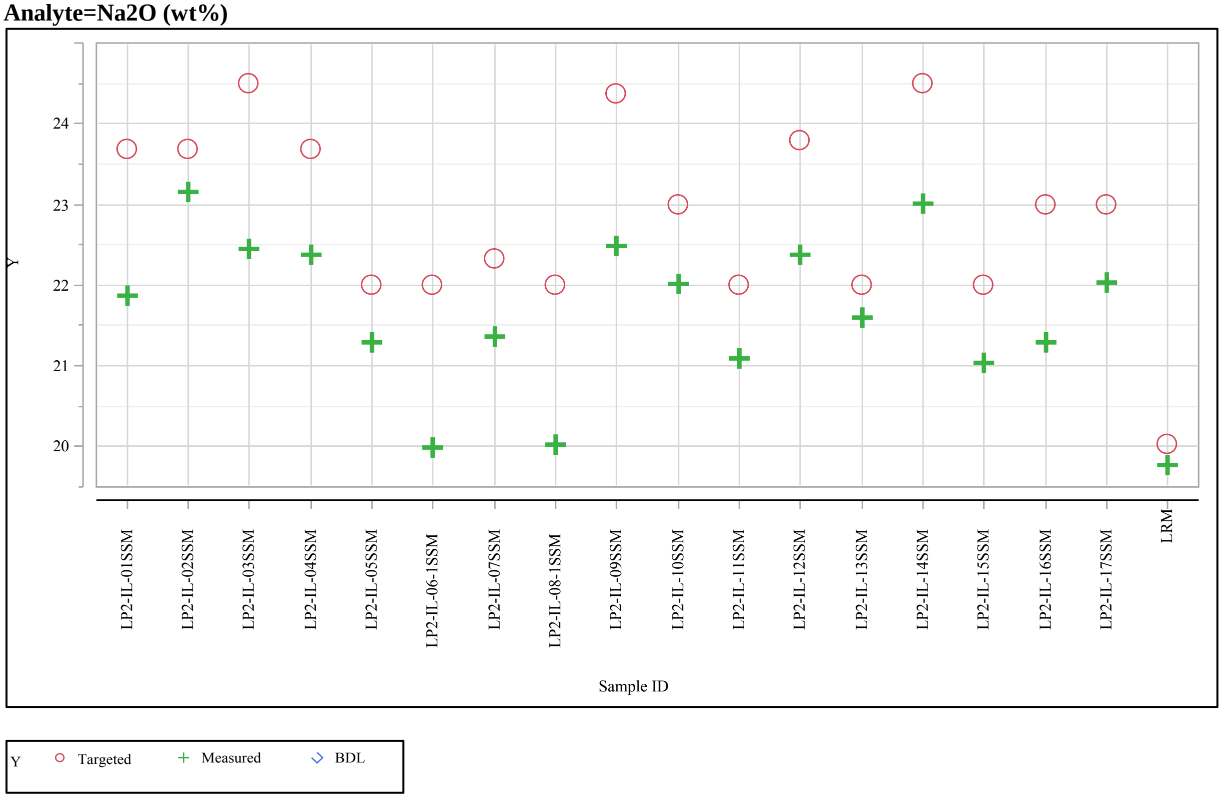


Exhibit E-4. Measured versus Targeted Concentrations by SSM Glass ID by Oxide (continued)

Analyte=Na2O (wt%)



Analyte=P2O5 (wt%)

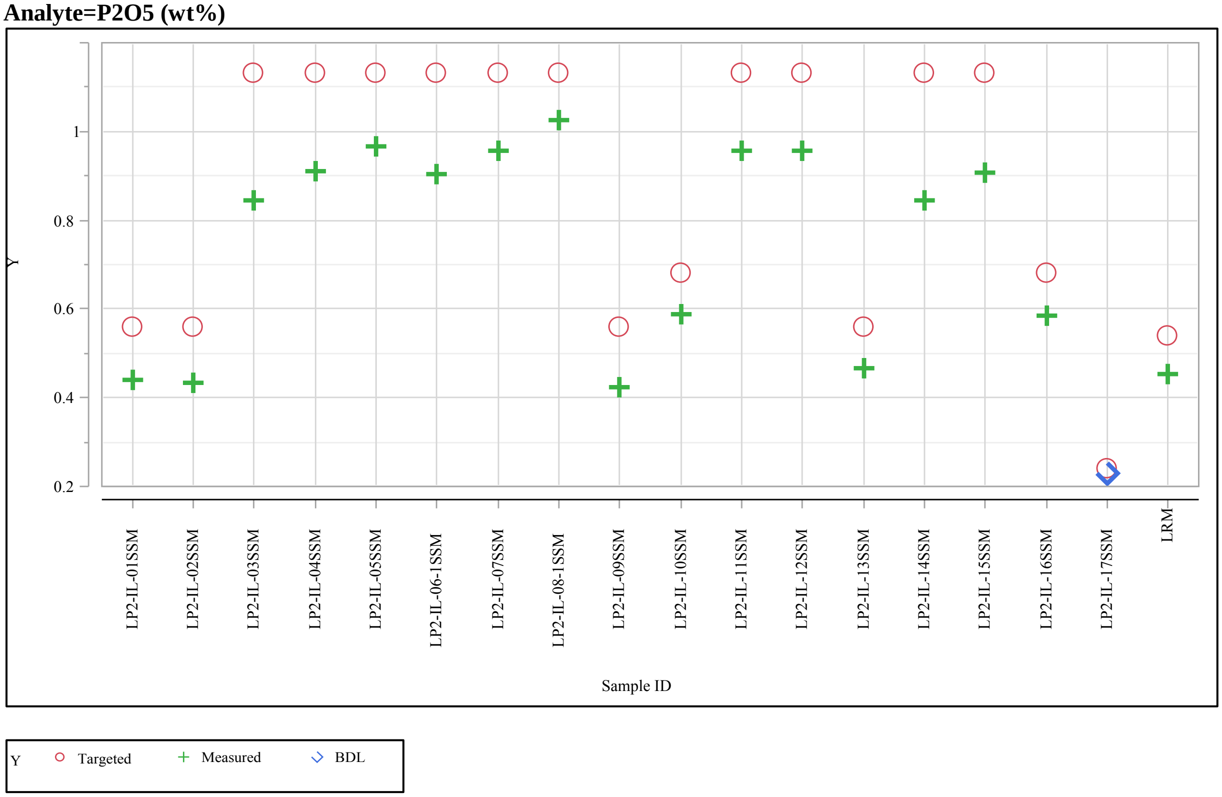
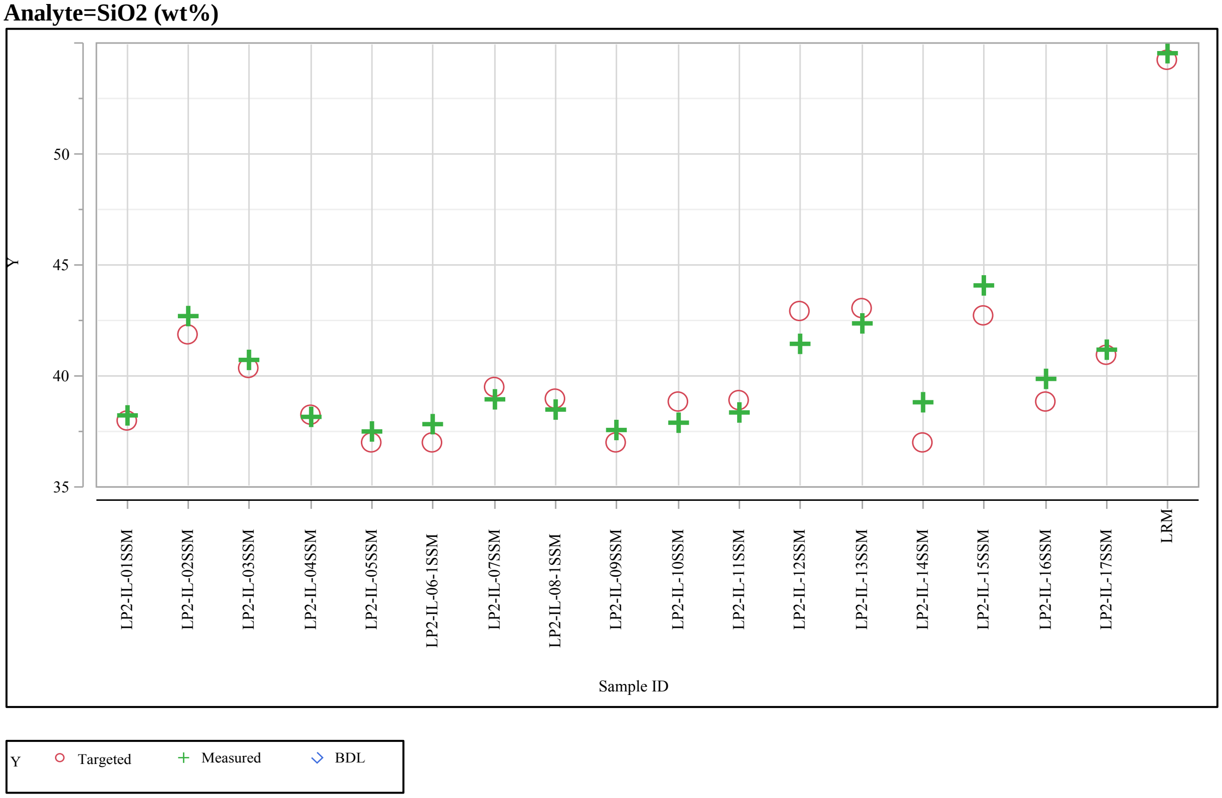


Exhibit E-4. Measured versus Targeted Concentrations by SSM Glass ID by Oxide (continued)

Analyte=SiO2 (wt%)



Analyte=SnO2 (wt%)

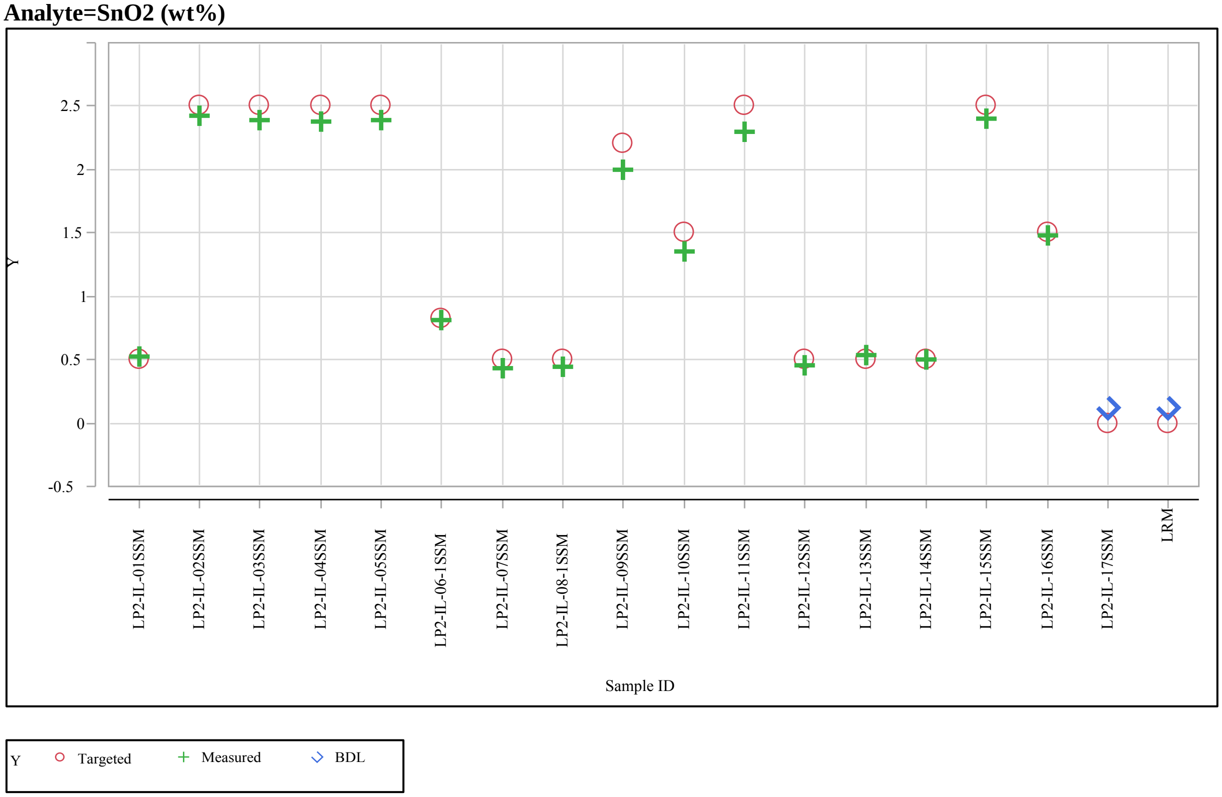
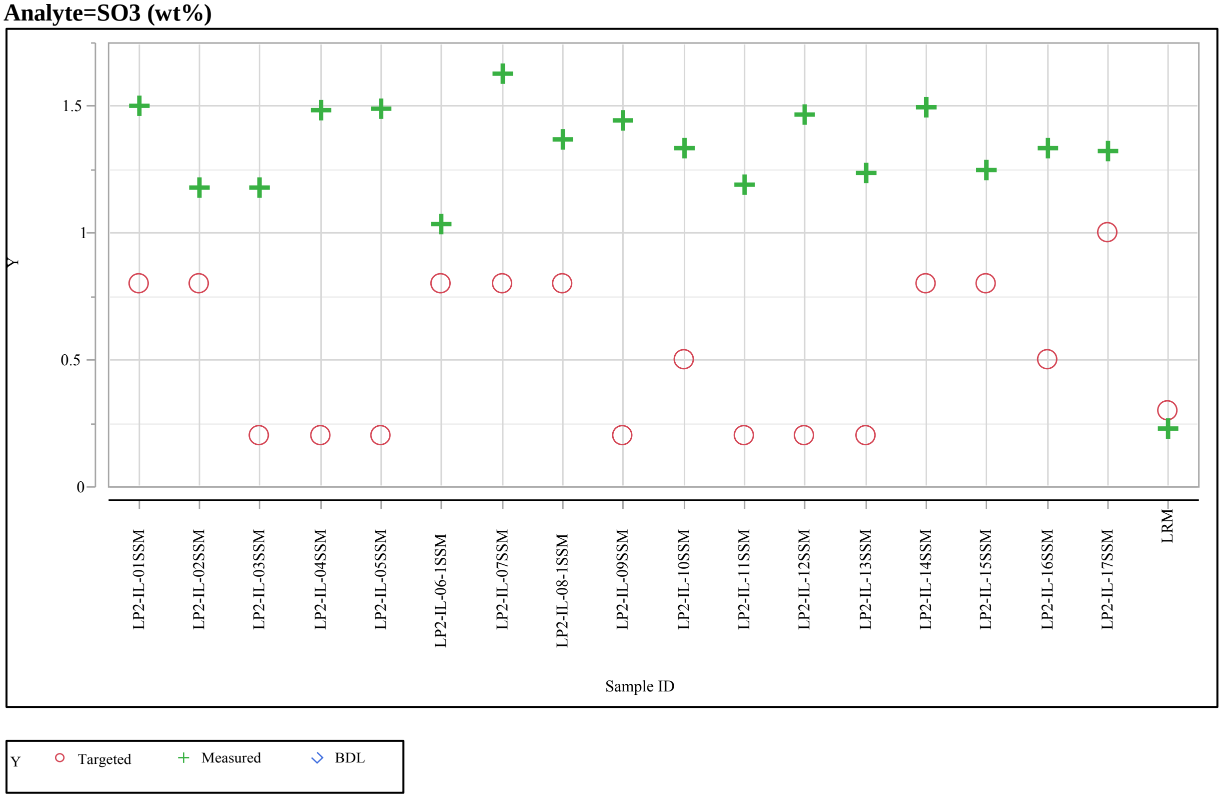


Exhibit E-4. Measured versus Targeted Concentrations by SSM Glass ID by Oxide (continued)

Analyte=SO3 (wt%)



Analyte=V2O5 (wt%)

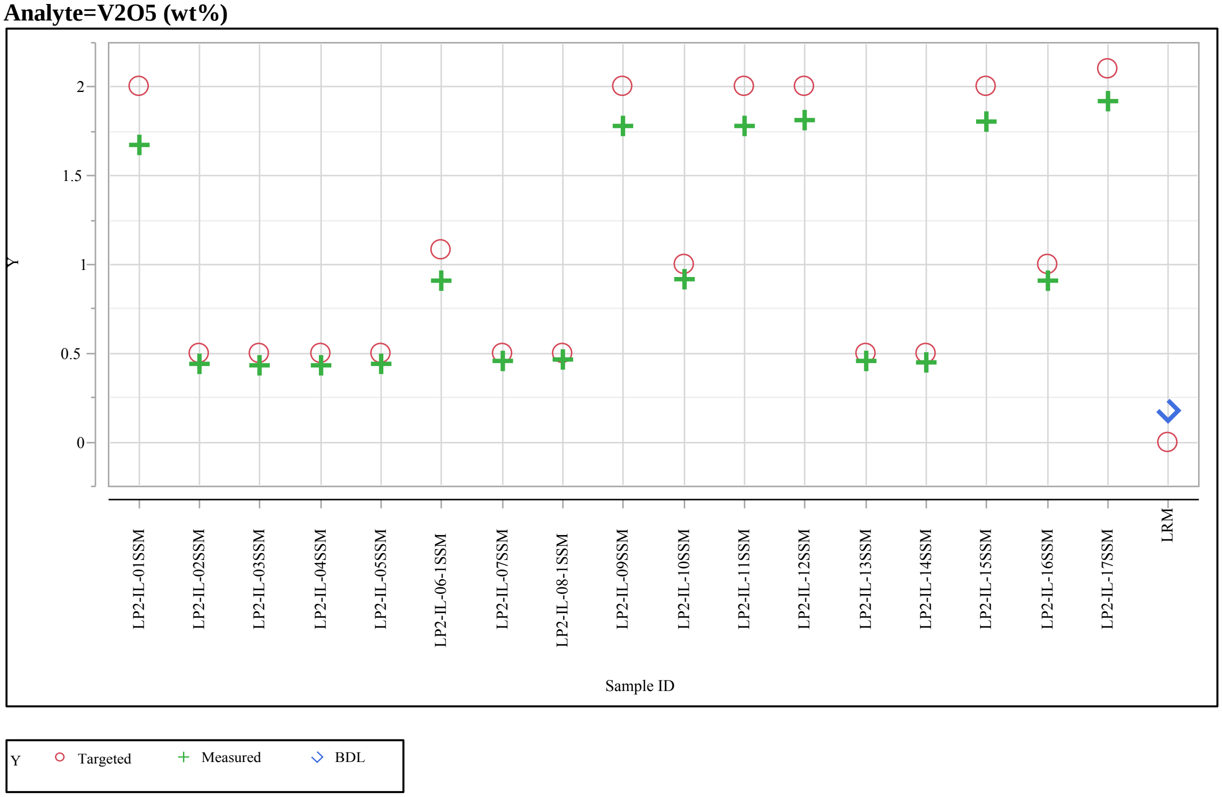
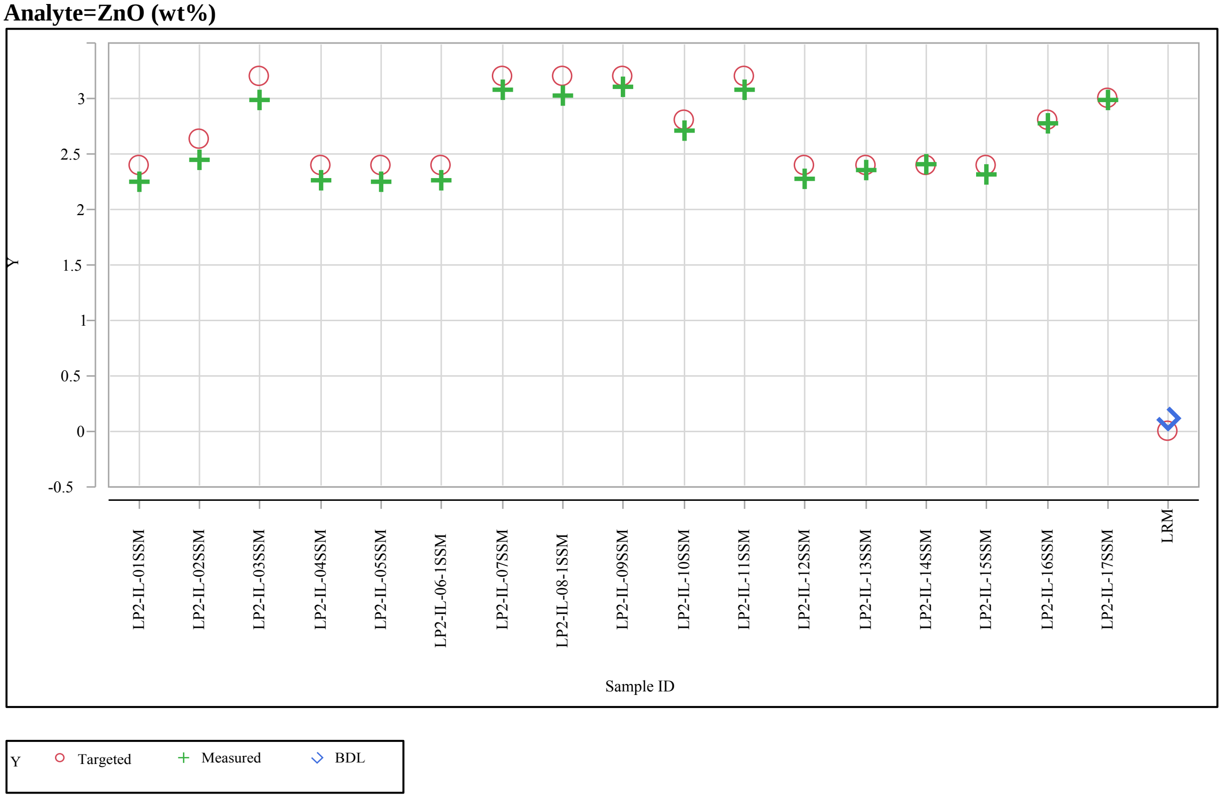


Exhibit E-4. Measured versus Targeted Concentrations by SSM Glass ID by Oxide (continued)

Analyte=ZnO (wt%)



Analyte=ZrO2 (wt%)

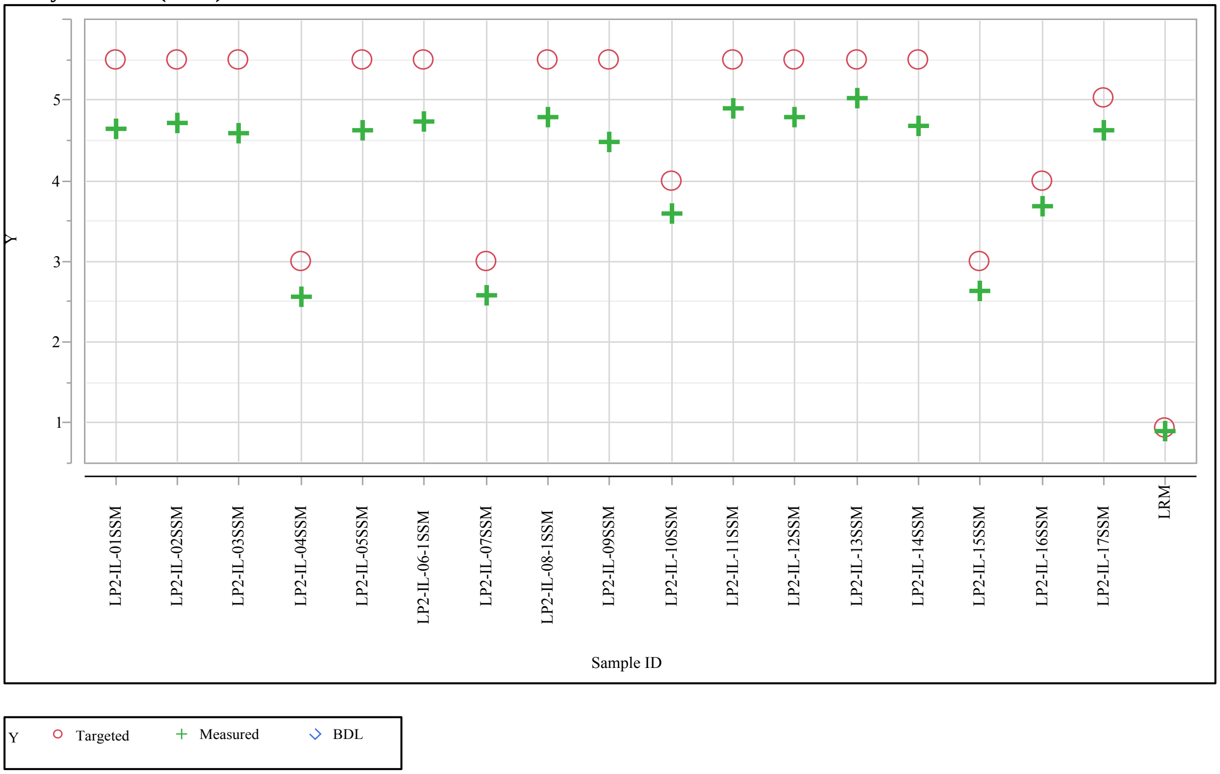
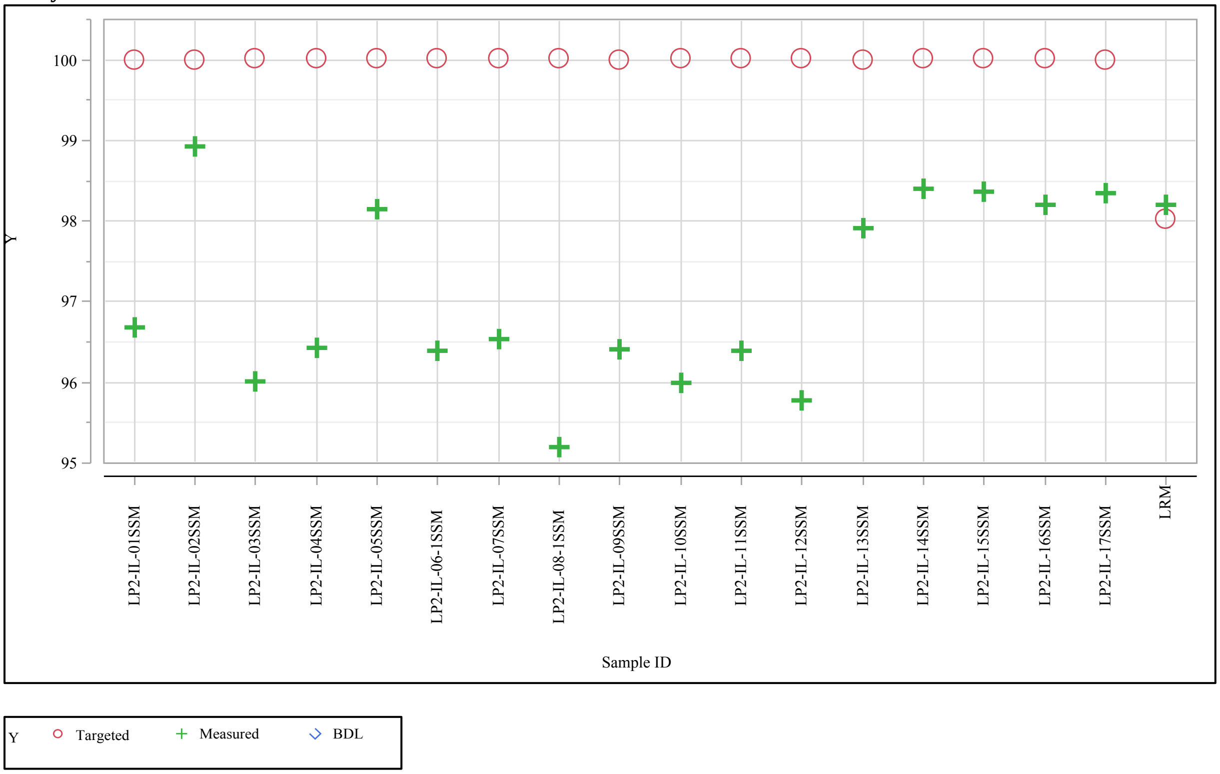


Exhibit E-4. Measured versus Targeted Concentrations by SSM Glass ID by Oxide (continued)

Analyte=Sum of Oxides



Appendix F Comparisons of the Baseline and SSM Versions of the Study Glasses

Exhibit F-1. Comparisons of the Measured Compositions of the Baseline and Sulfur Saturated Versions of the Study Glasses

Analyte=Al2O3 (wt%)

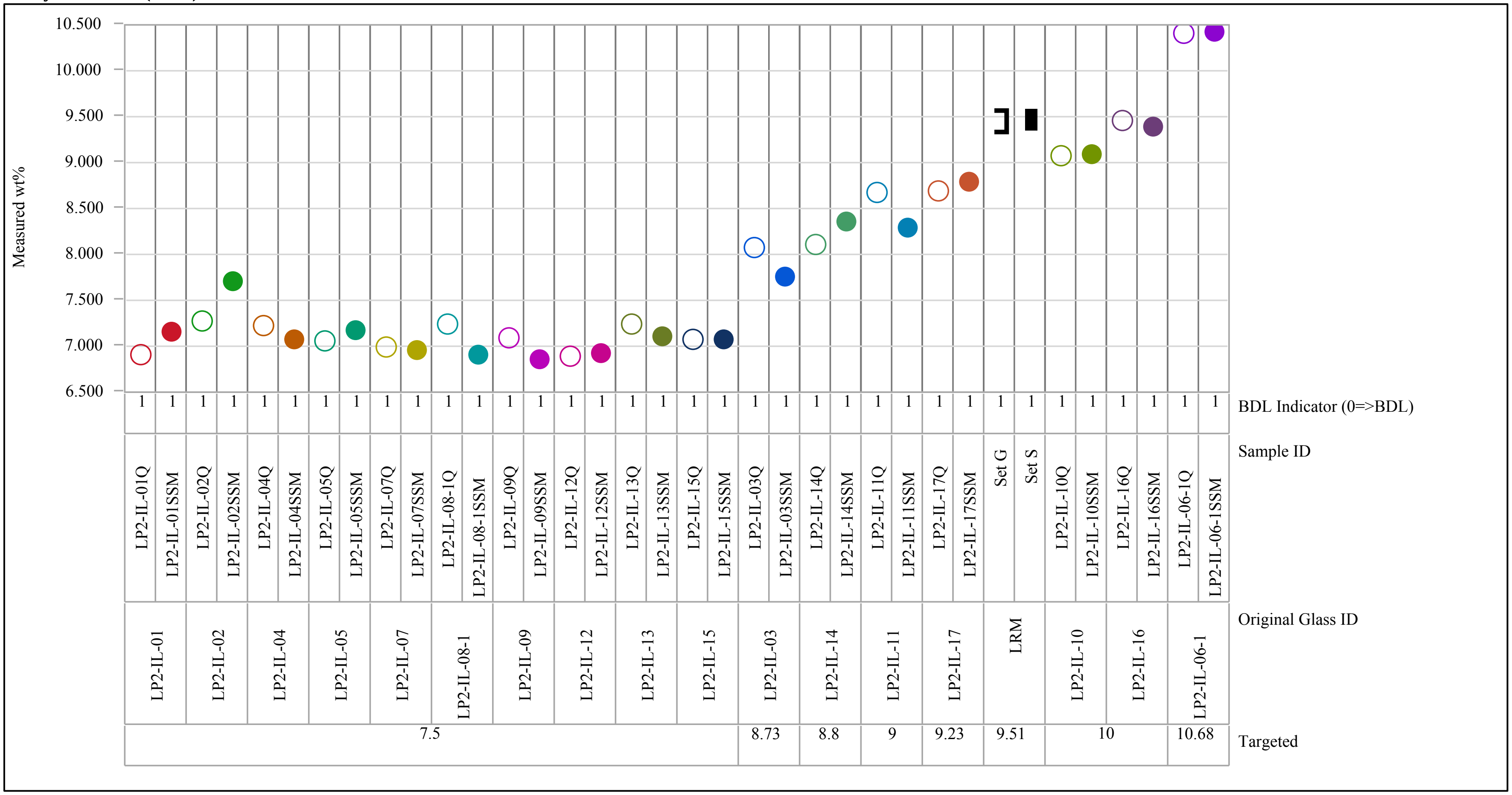


Exhibit F-1. Comparisons of the Measured Compositions of the Baseline and Sulfur Saturated Versions of the Study Glasses (continued)

Analyte=B2O3 (wt%)

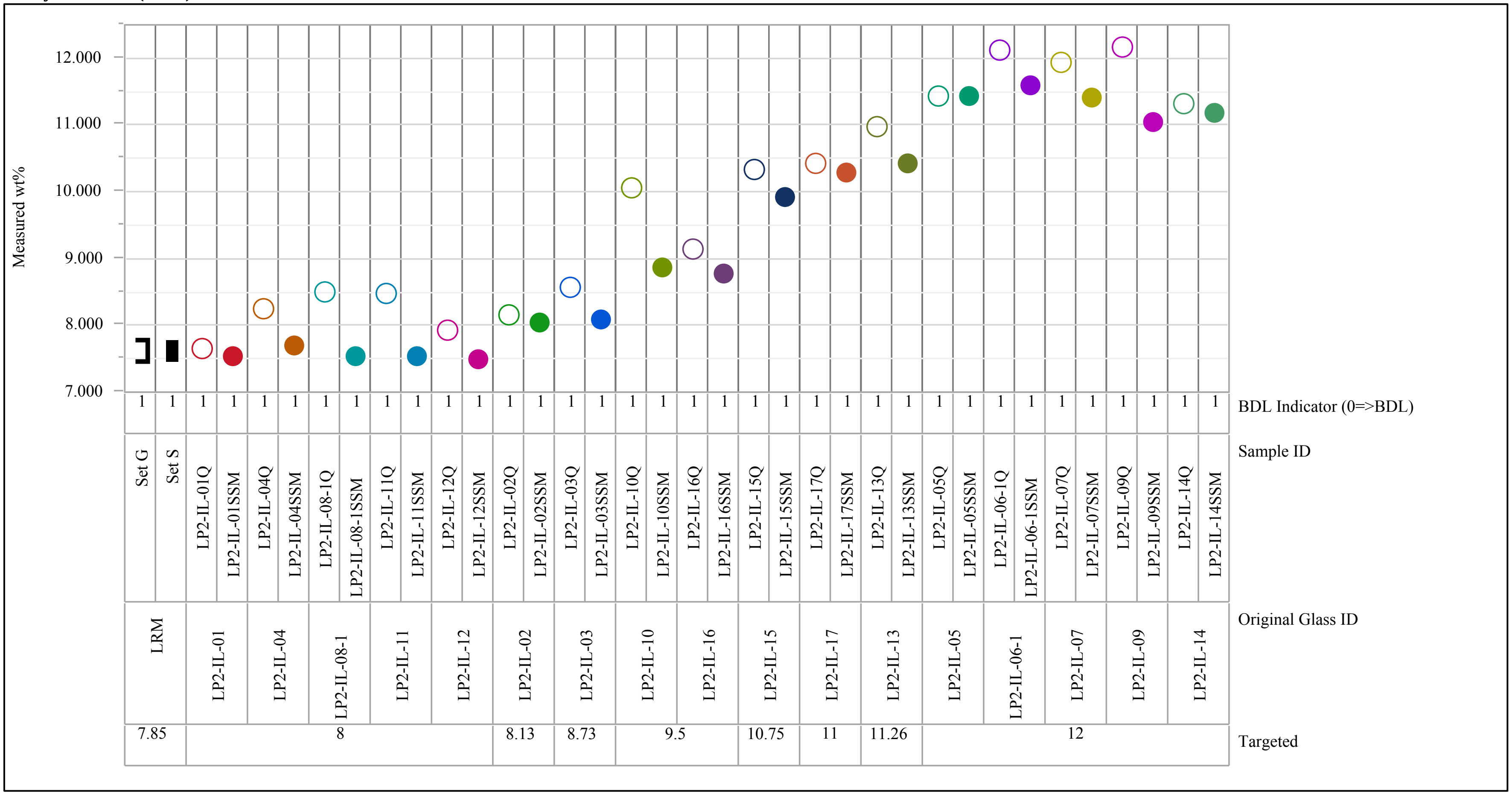


Exhibit F-1. Comparisons of the Measured Compositions of the Baseline and Sulfur Saturated Versions of the Study Glasses (continued)

Analyte=CaO (wt%)

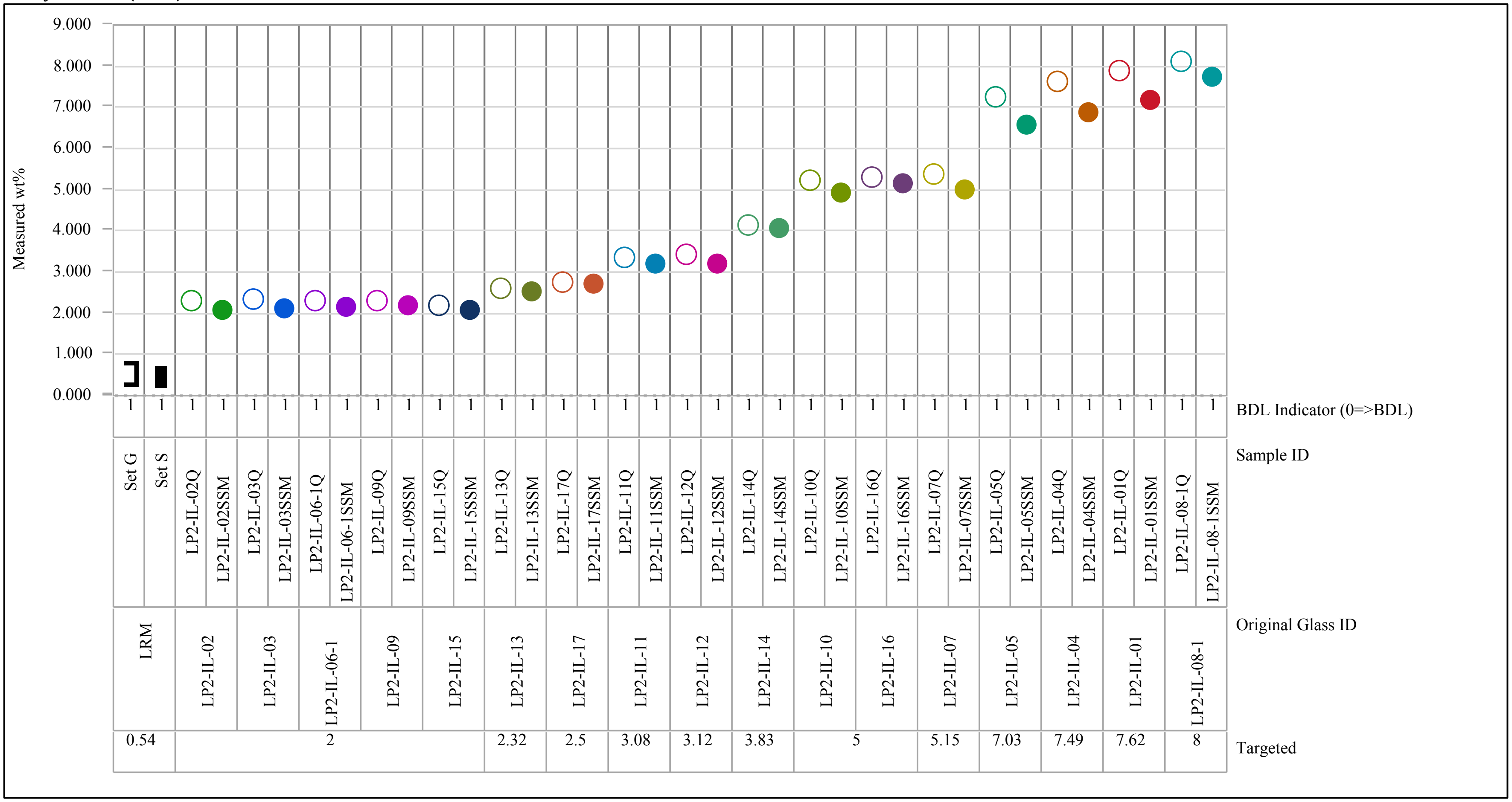


Exhibit F-1. Comparisons of the Measured Compositions of the Baseline and Sulfur Saturated Versions of the Study Glasses (continued)

Analyte=Cl (wt%)

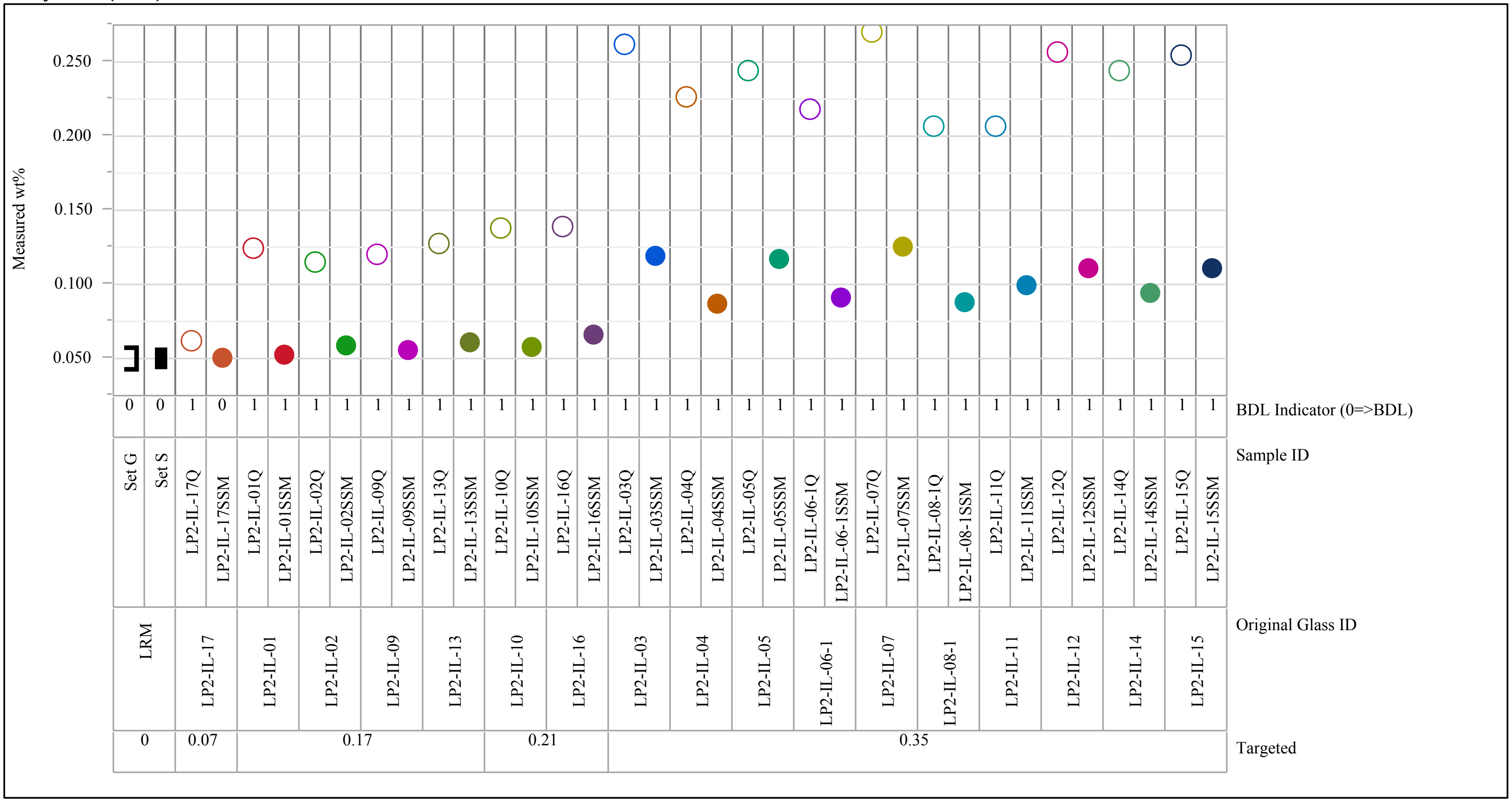


Exhibit F-1. Comparisons of the Measured Compositions of the Baseline and Sulfur Saturated Versions of the Study Glasses (continued)

Analyte=Cr2O3 (wt%)

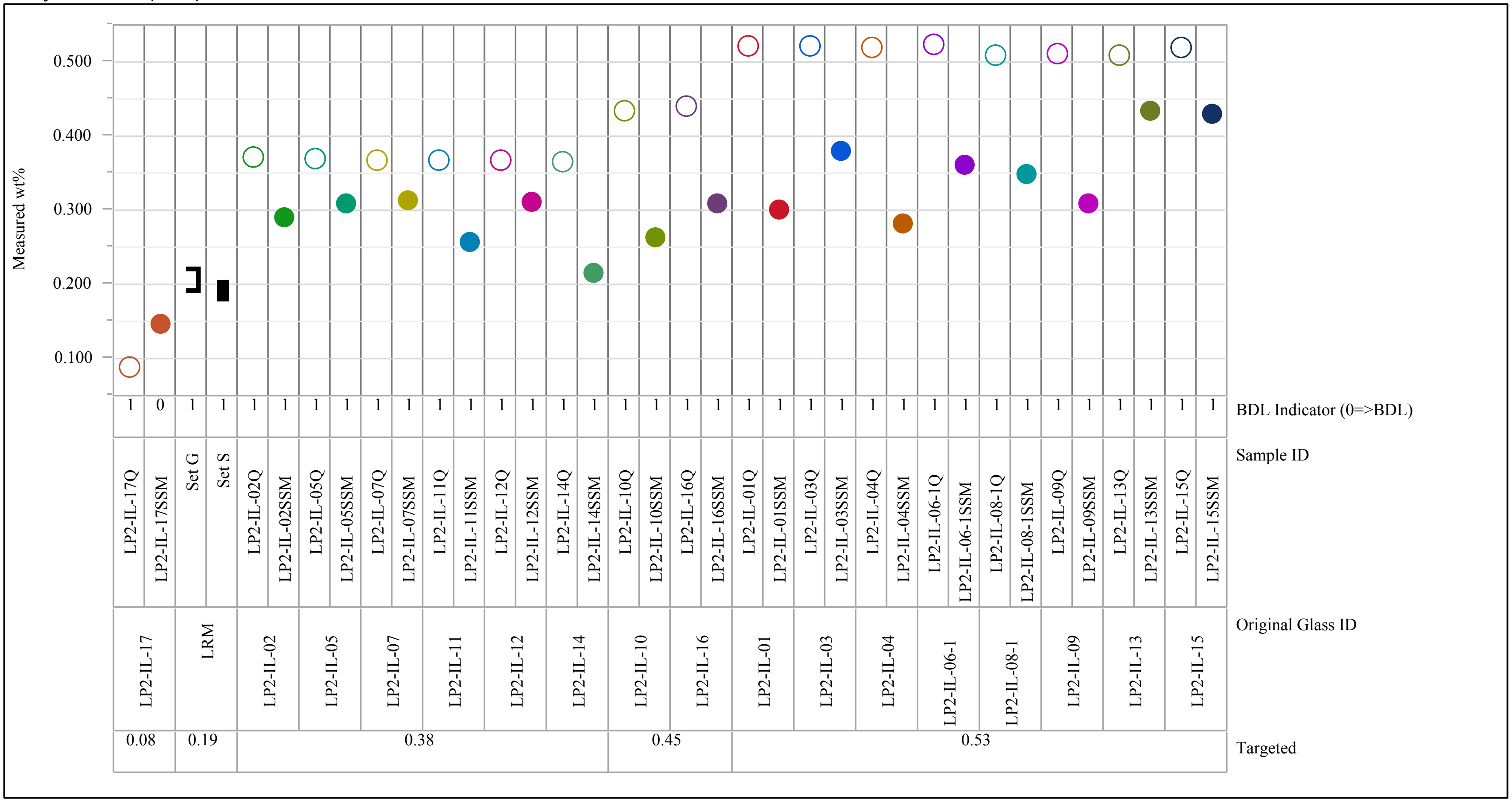


Exhibit F-1. Comparisons of the Measured Compositions of the Baseline and Sulfur Saturated Versions of the Study Glasses (continued)

Analyte=F (wt%)

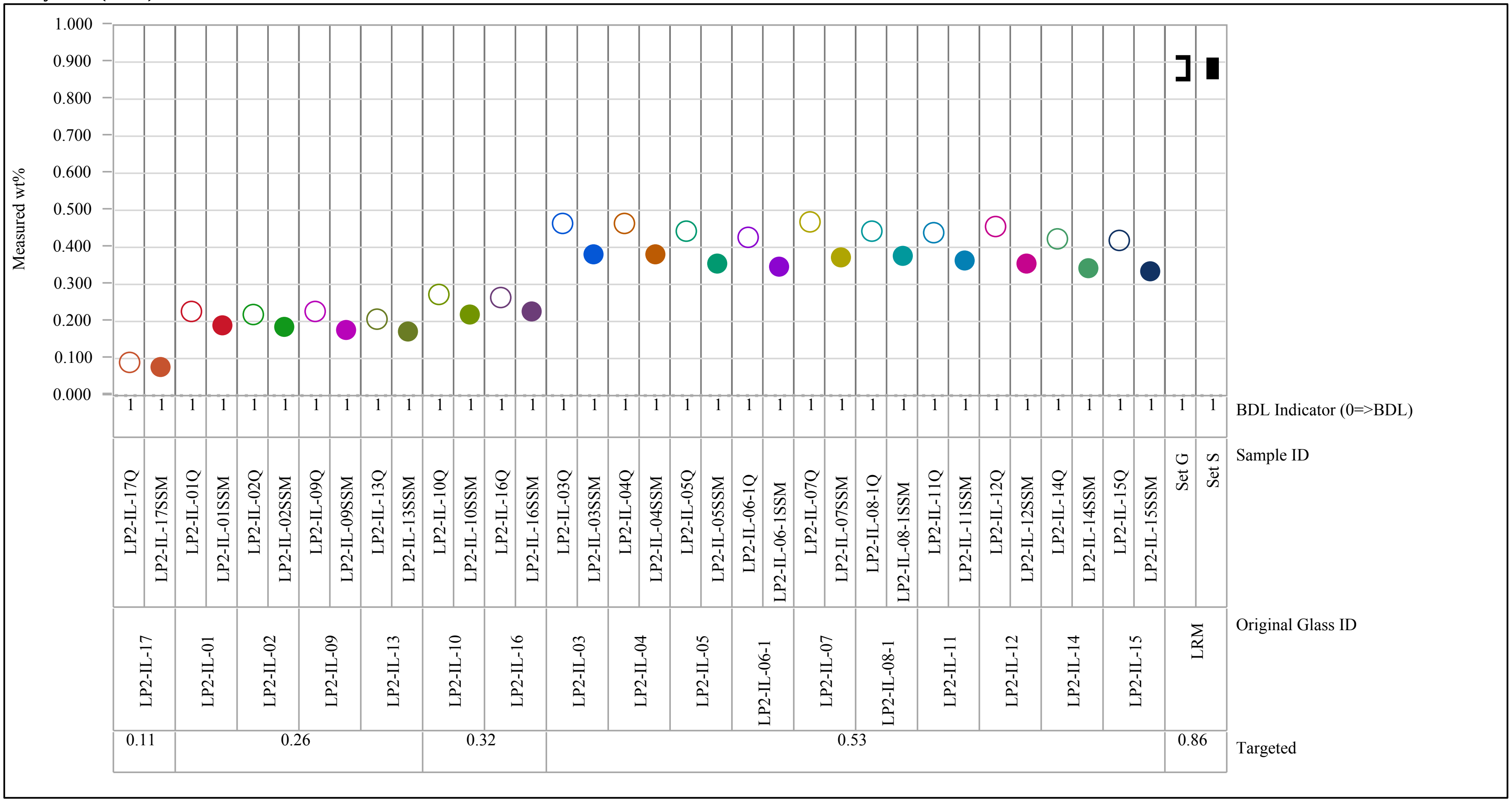


Exhibit F-1. Comparisons of the Measured Compositions of the Baseline and Sulfur Saturated Versions of the Study Glasses (continued)

Analyte=Fe2O3 (wt%)

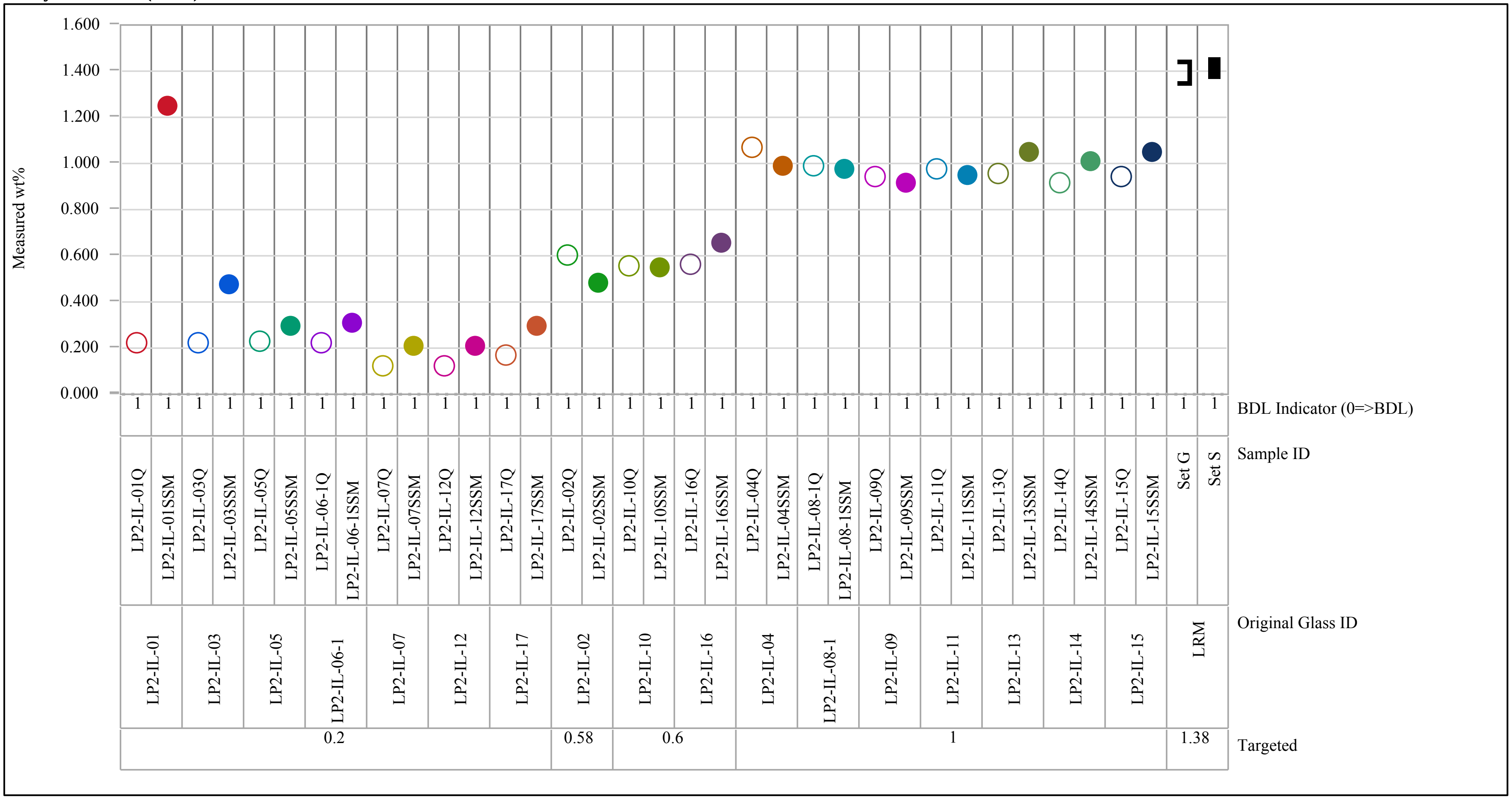


Exhibit F-1. Comparisons of the Measured Compositions of the Baseline and Sulfur Saturated Versions of the Study Glasses (continued)

Analyte=K2O (wt%)

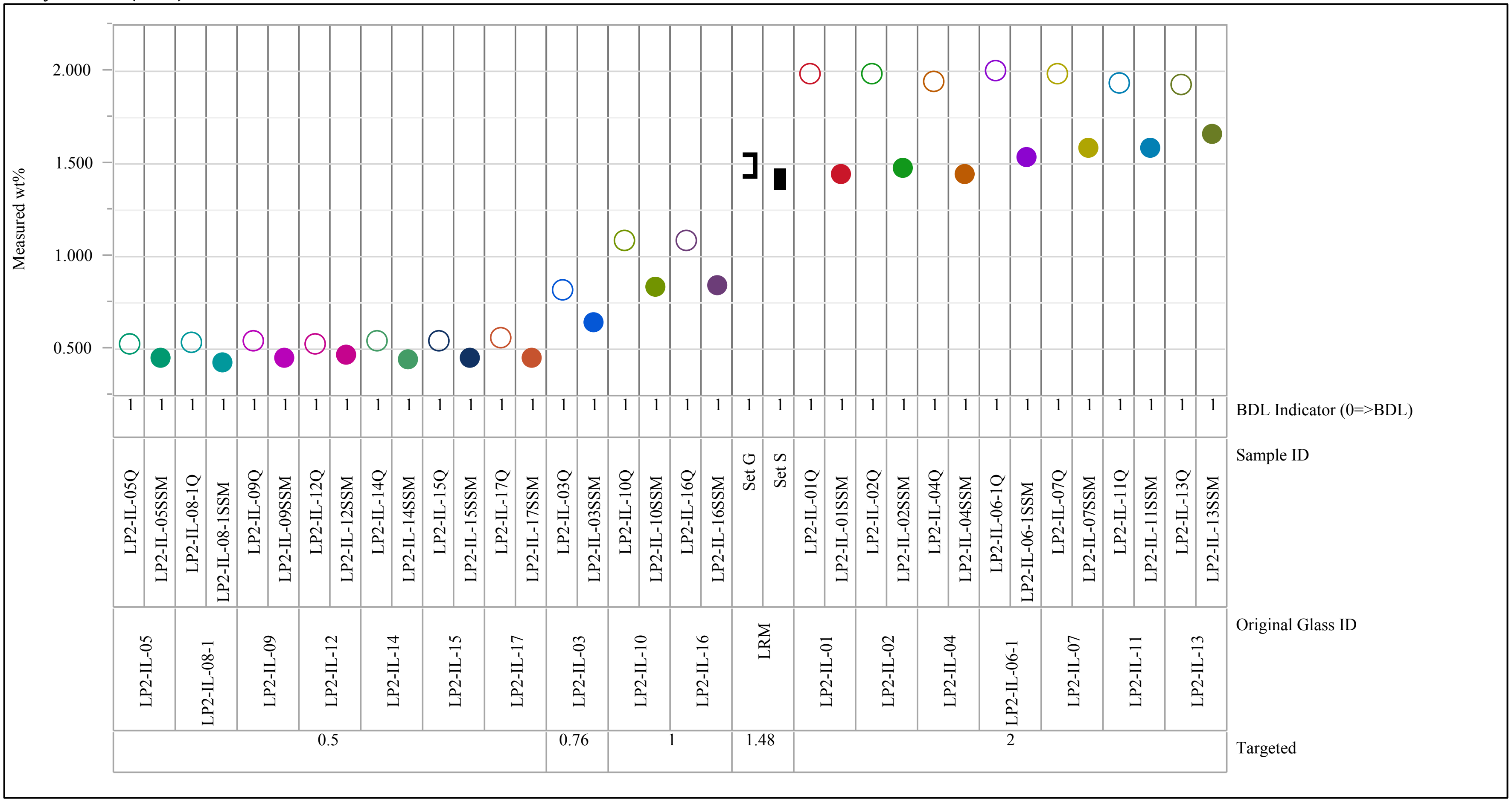


Exhibit F-1. Comparisons of the Measured Compositions of the Baseline and Sulfur Saturated Versions of the Study Glasses (continued)

Analyte=Li2O (wt%)

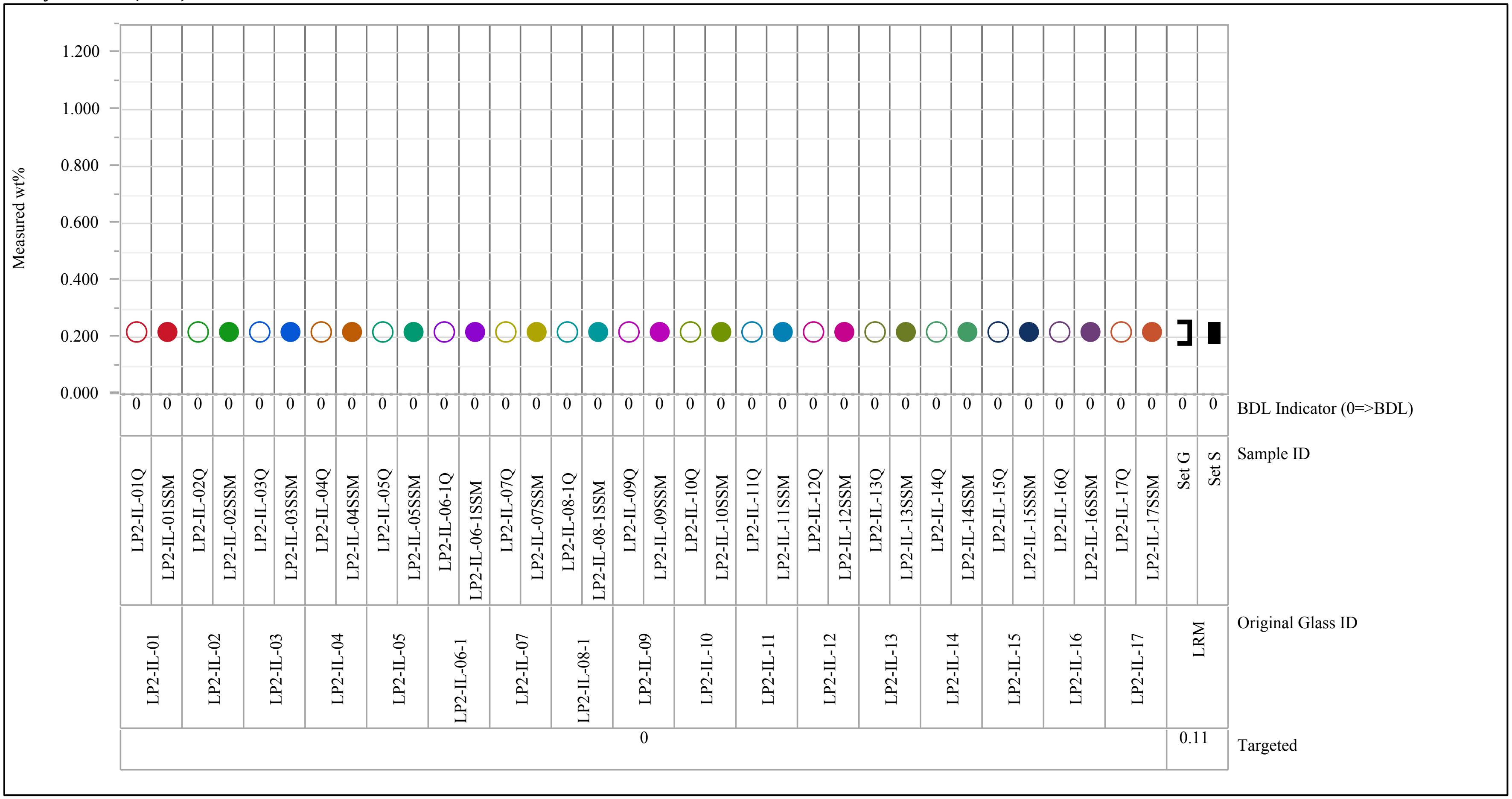


Exhibit F-1. Comparisons of the Measured Compositions of the Baseline and Sulfur Saturated Versions of the Study Glasses (continued)

Analyte=MgO (wt%)

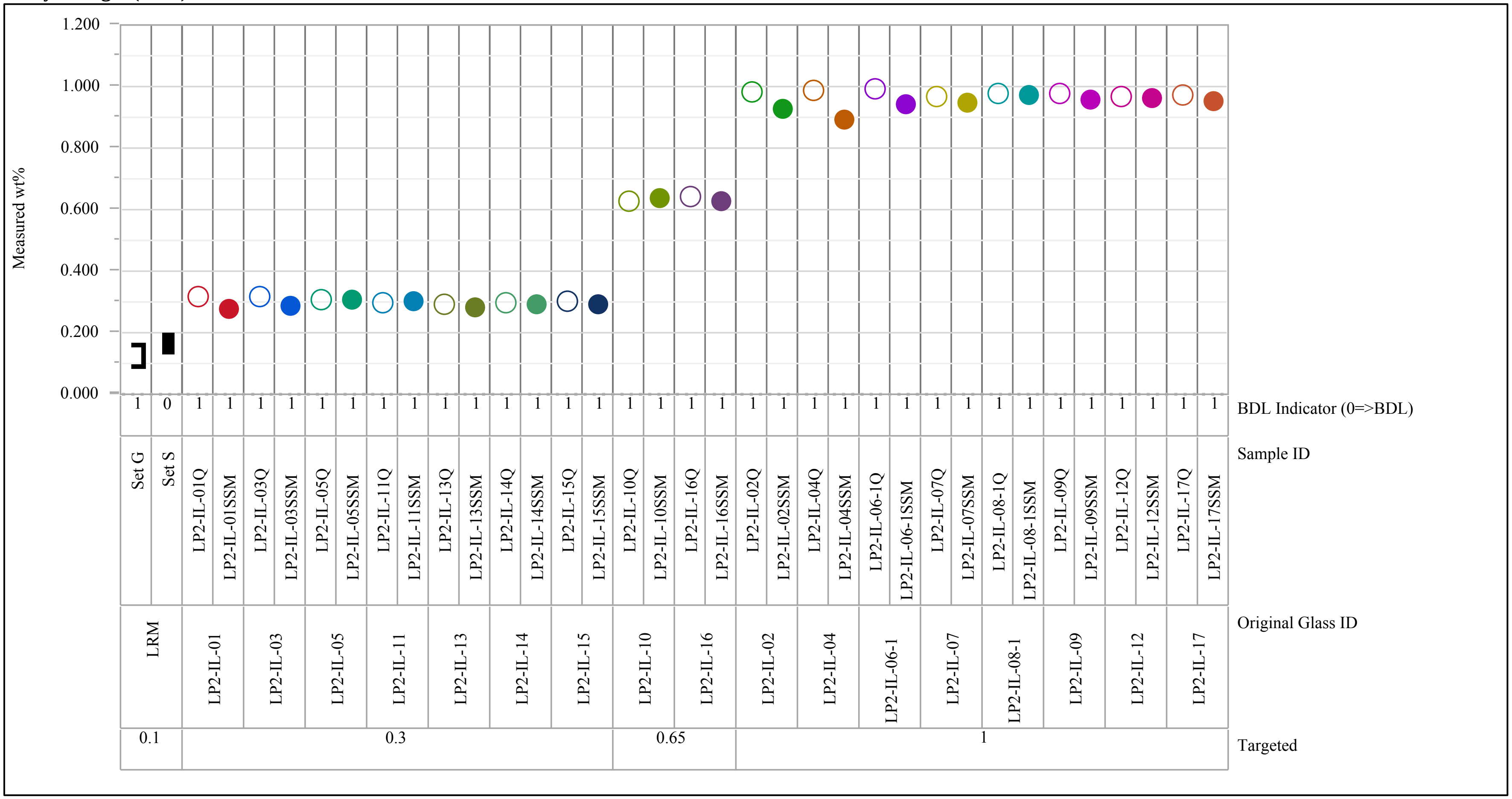


Exhibit F-1. Comparisons of the Measured Compositions of the Baseline and Sulfur Saturated Versions of the Study Glasses (continued)

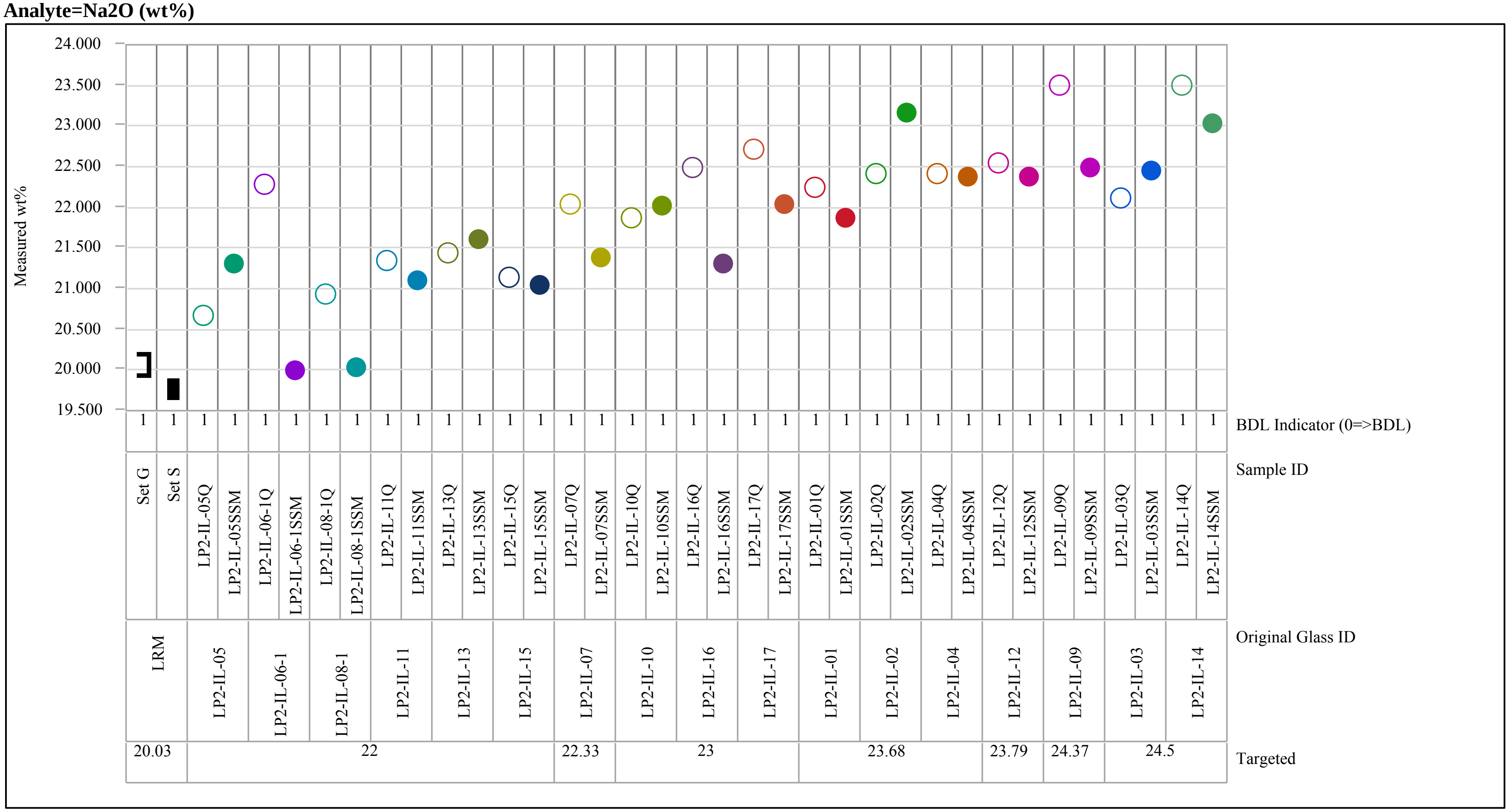


Exhibit F-1. Comparisons of the Measured Compositions of the Baseline and Sulfur Saturated Versions of the Study Glasses (continued)

Analyte=P2O5 (wt%)

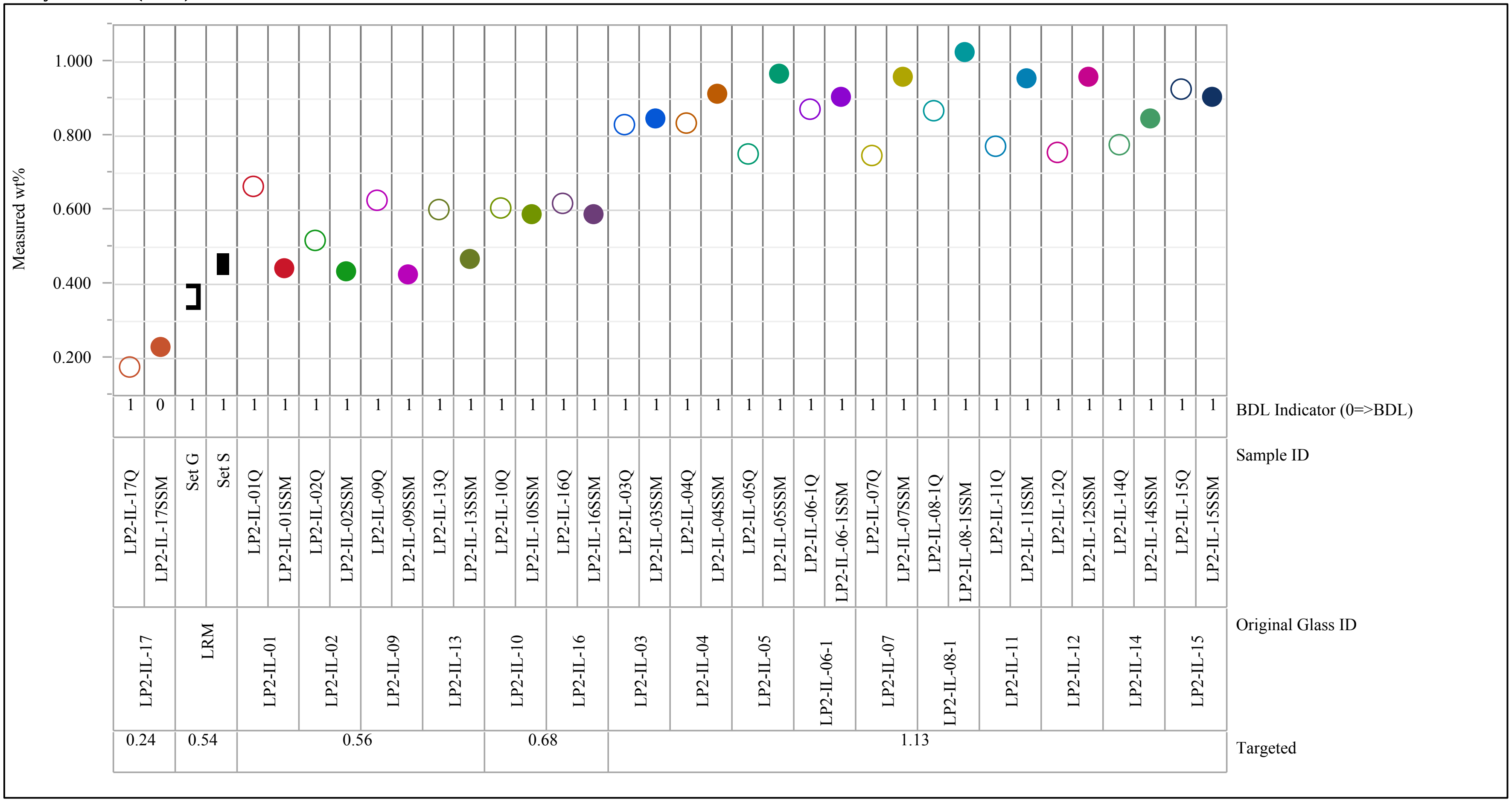


Exhibit F-1. Comparisons of the Measured Compositions of the Baseline and Sulfur Saturated Versions of the Study Glasses (continued)

Analyte=SiO2 (wt%)

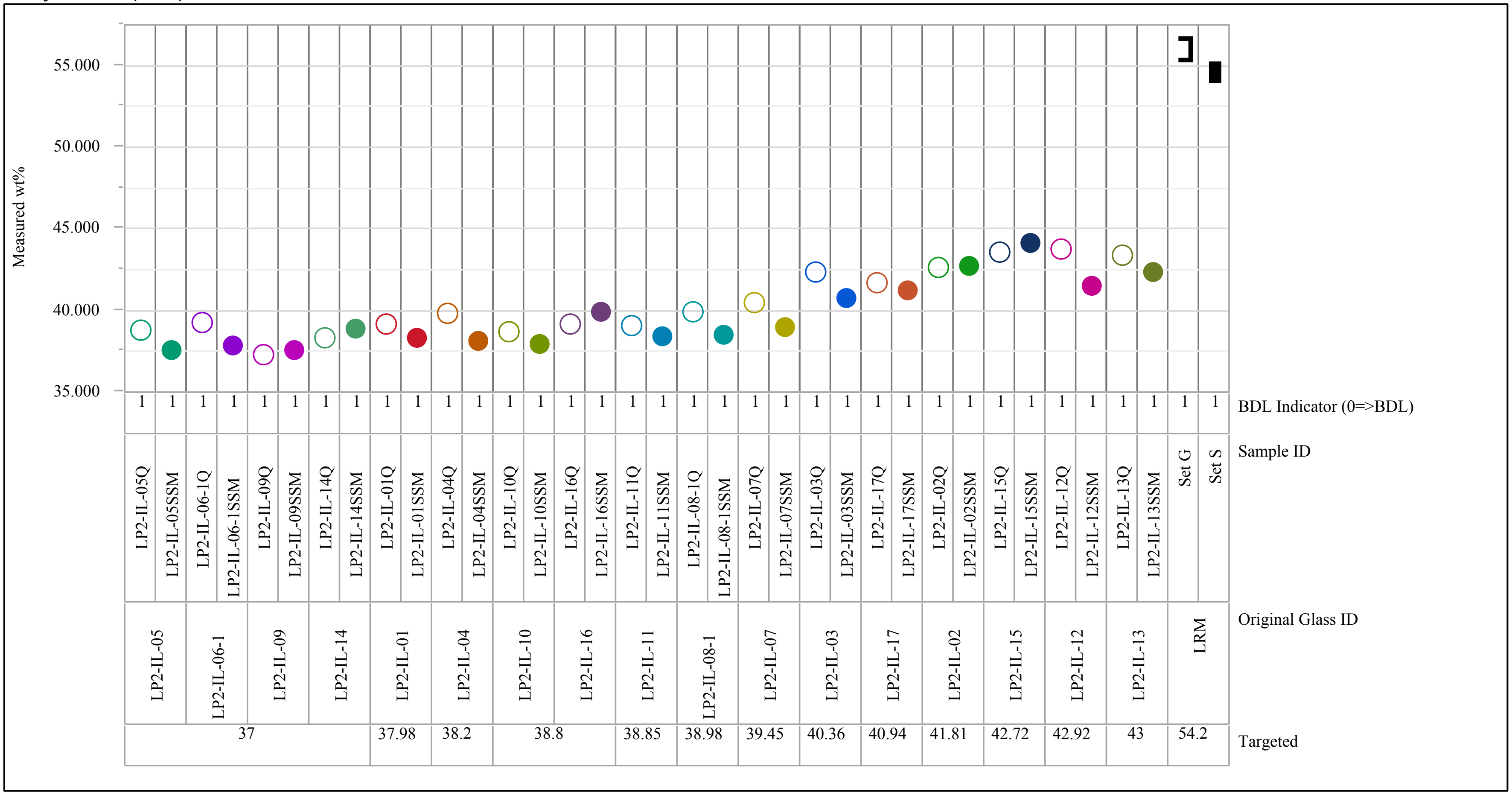


Exhibit F-1. Comparisons of the Measured Compositions of the Baseline and Sulfur Saturated Versions of the Study Glasses (continued)

Analyte=SnO2 (wt%)

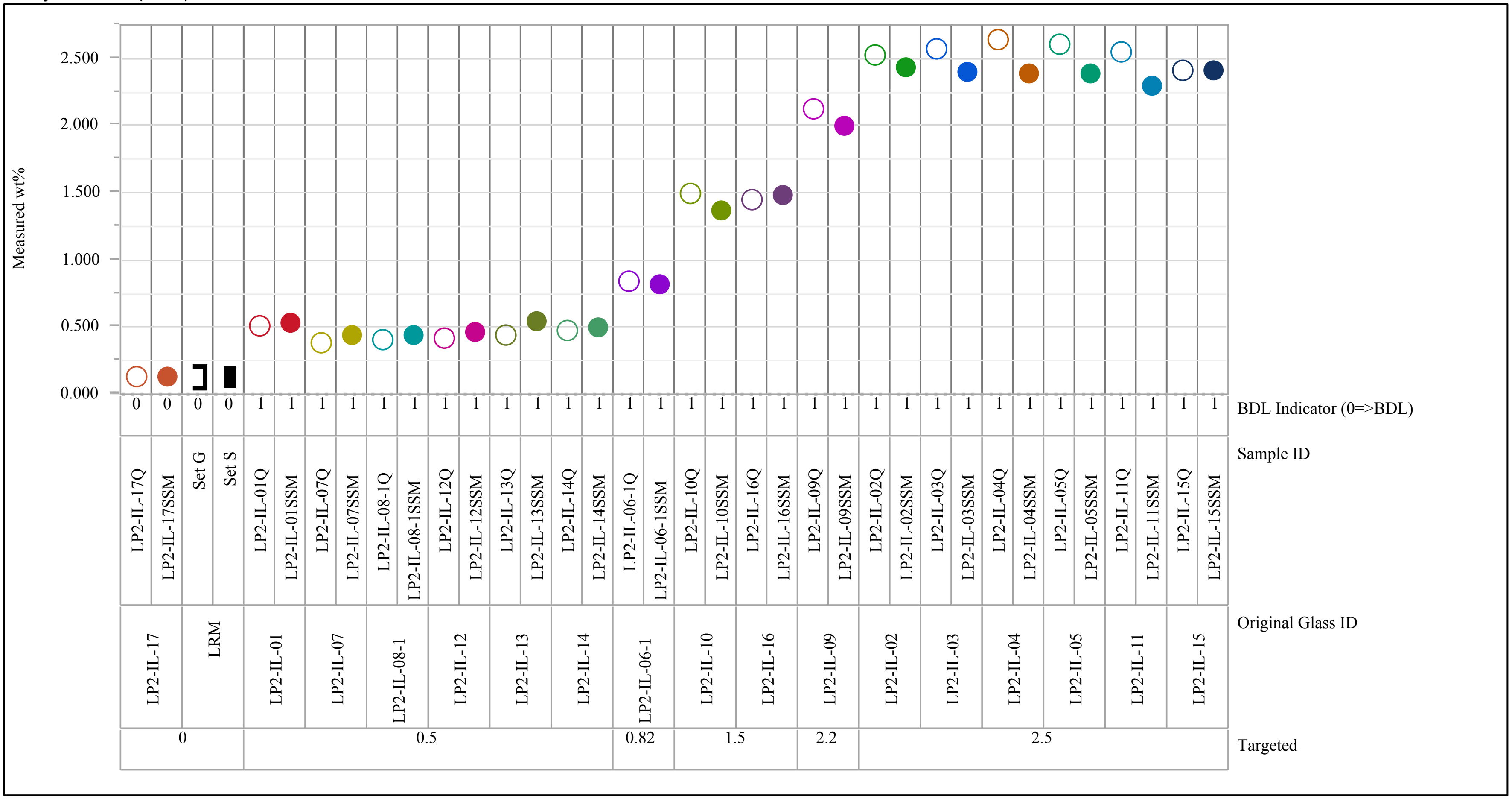


Exhibit F-1. Comparisons of the Measured Compositions of the Baseline and Sulfur Saturated Versions of the Study Glasses (continued)

Analyte=SO3 (wt%)

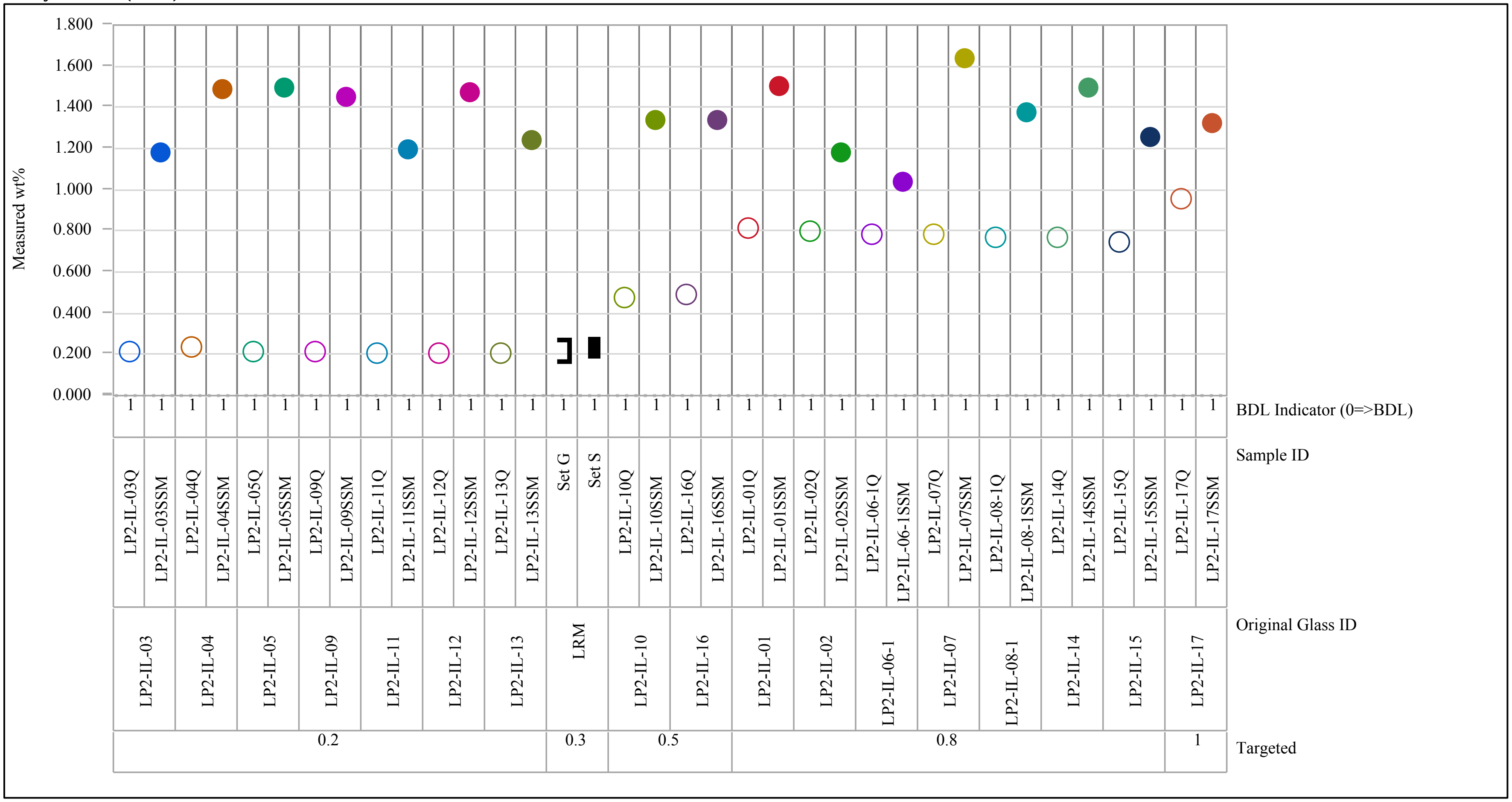


Exhibit F-1. Comparisons of the Measured Compositions of the Baseline and Sulfur Saturated Versions of the Study Glasses (continued)

Analyte=V2O5 (wt%)

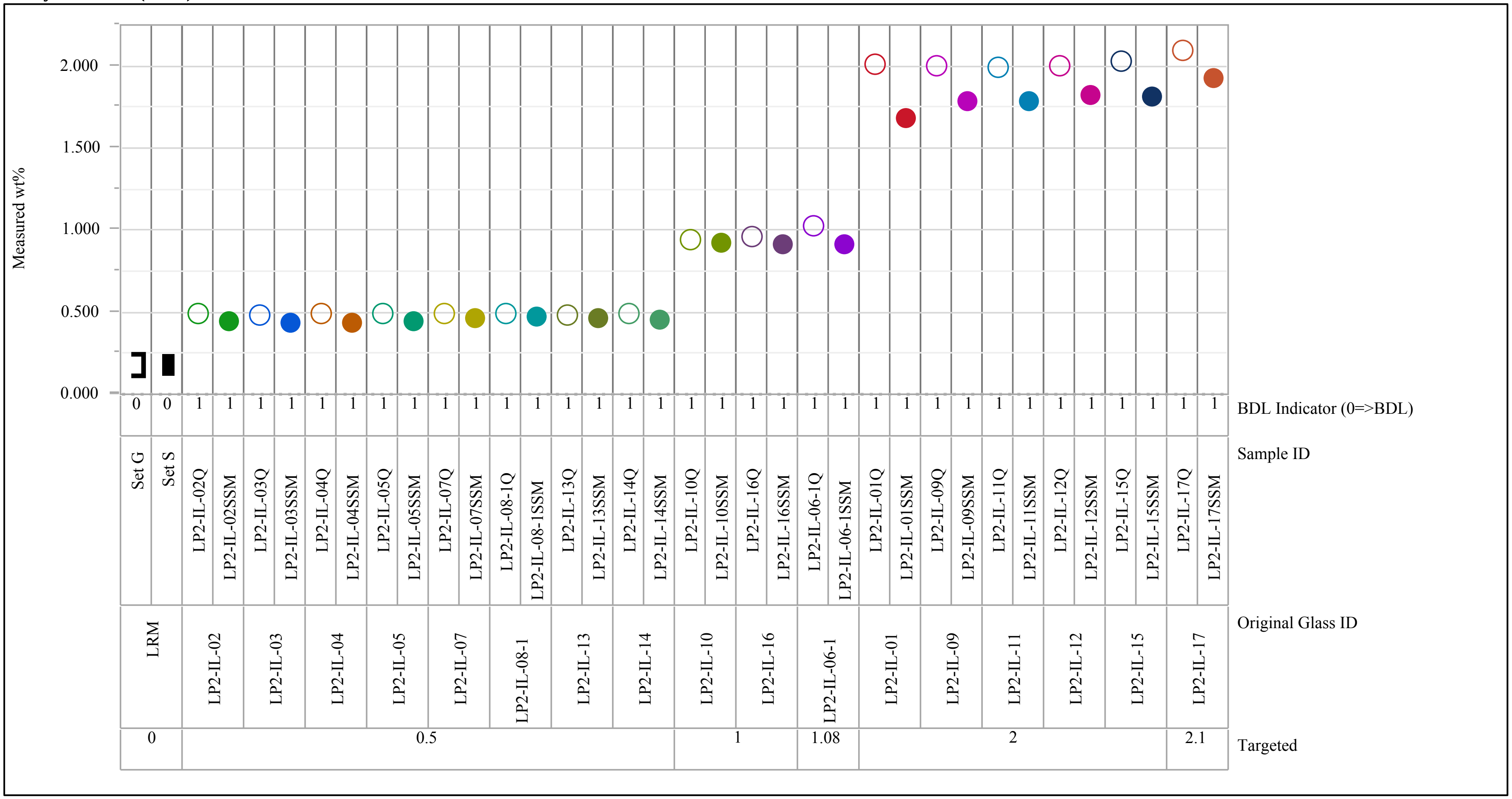


Exhibit F-1. Comparisons of the Measured Compositions of the Baseline and Sulfur Saturated Versions of the Study Glasses (continued)

Analyte=ZnO (wt%)

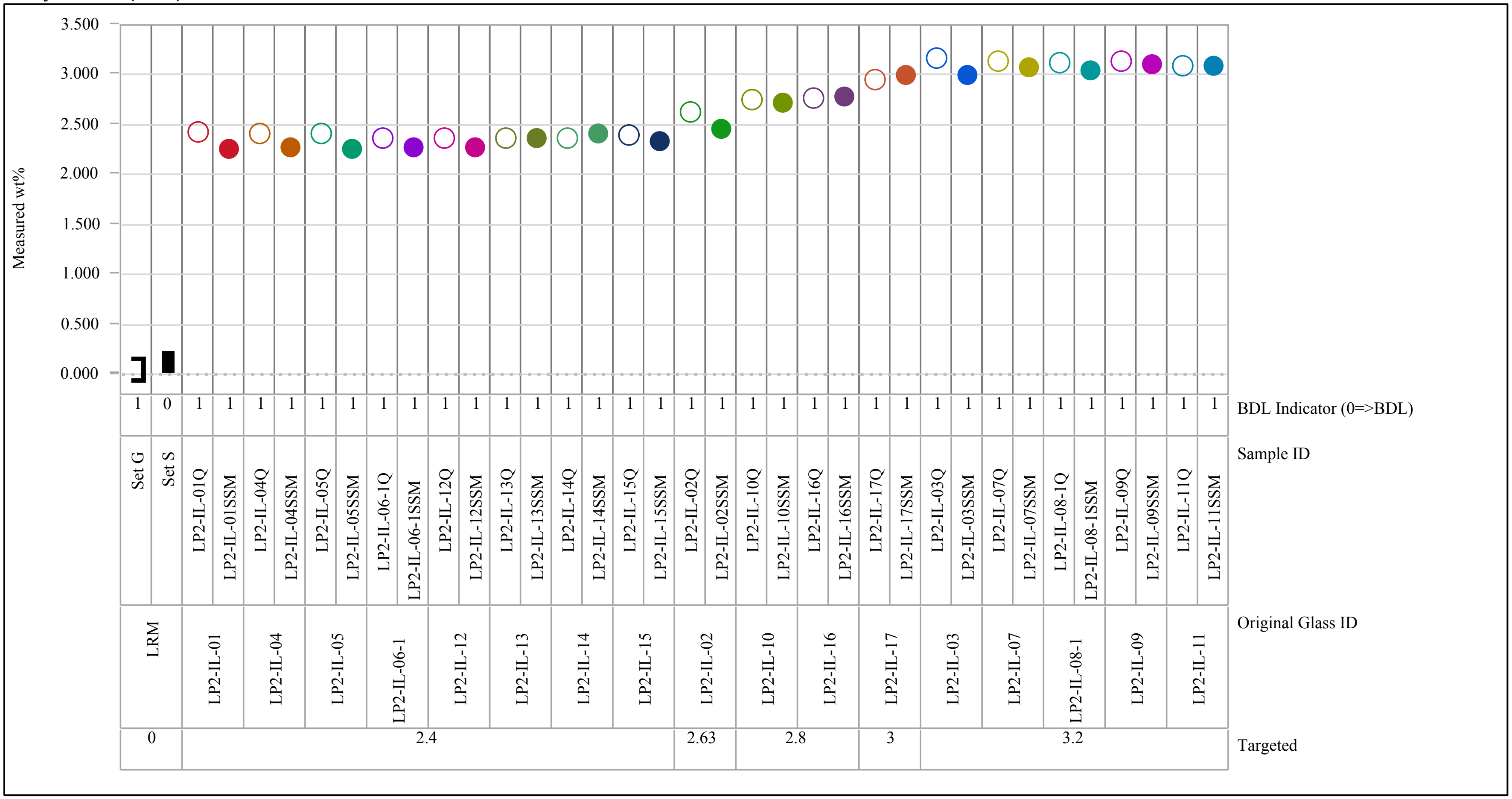


Exhibit F-1. Comparisons of the Measured Compositions of the Baseline and Sulfur Saturated Versions of the Study Glasses (continued)

Analyte=ZrO2 (wt%)

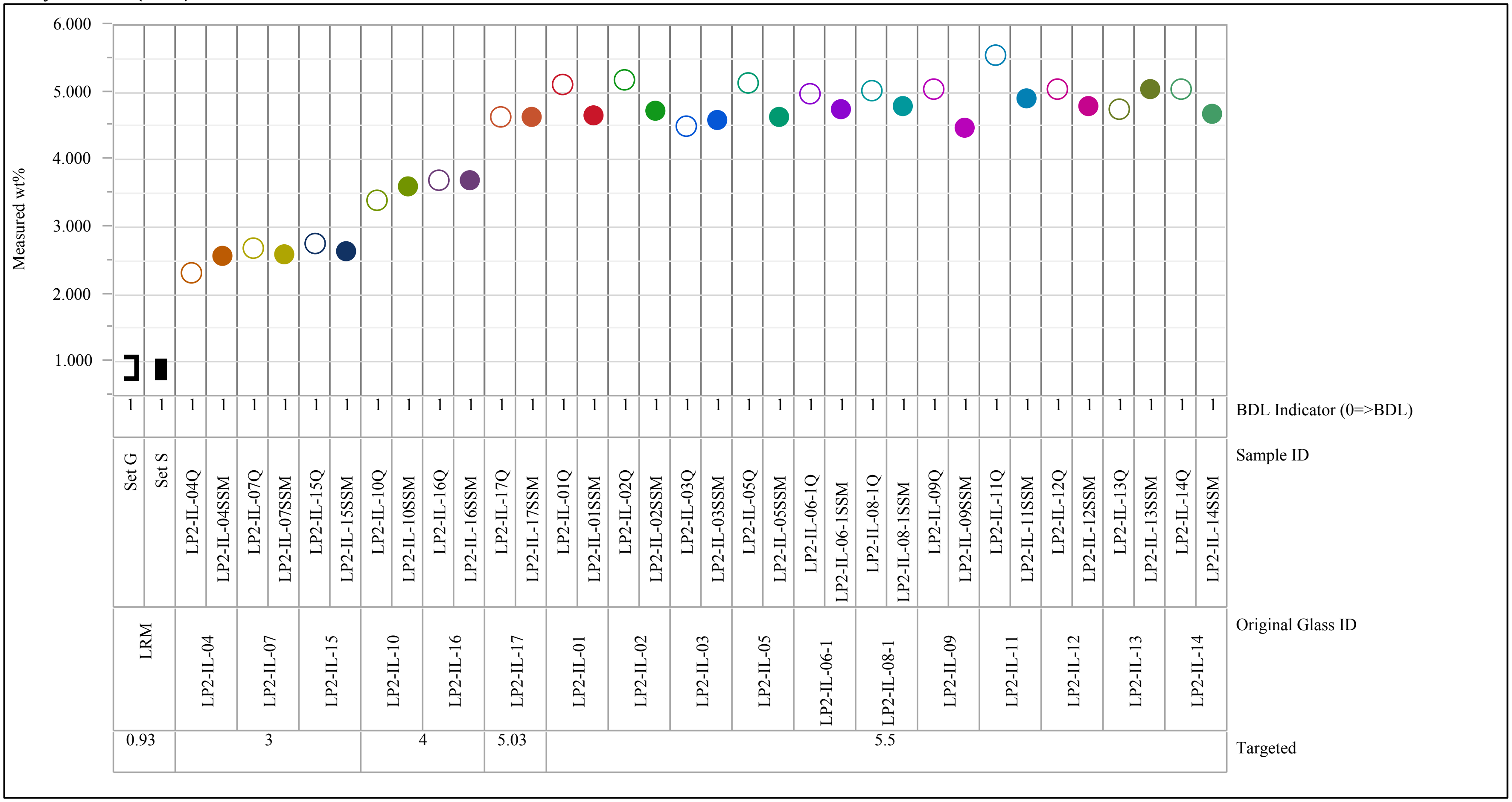
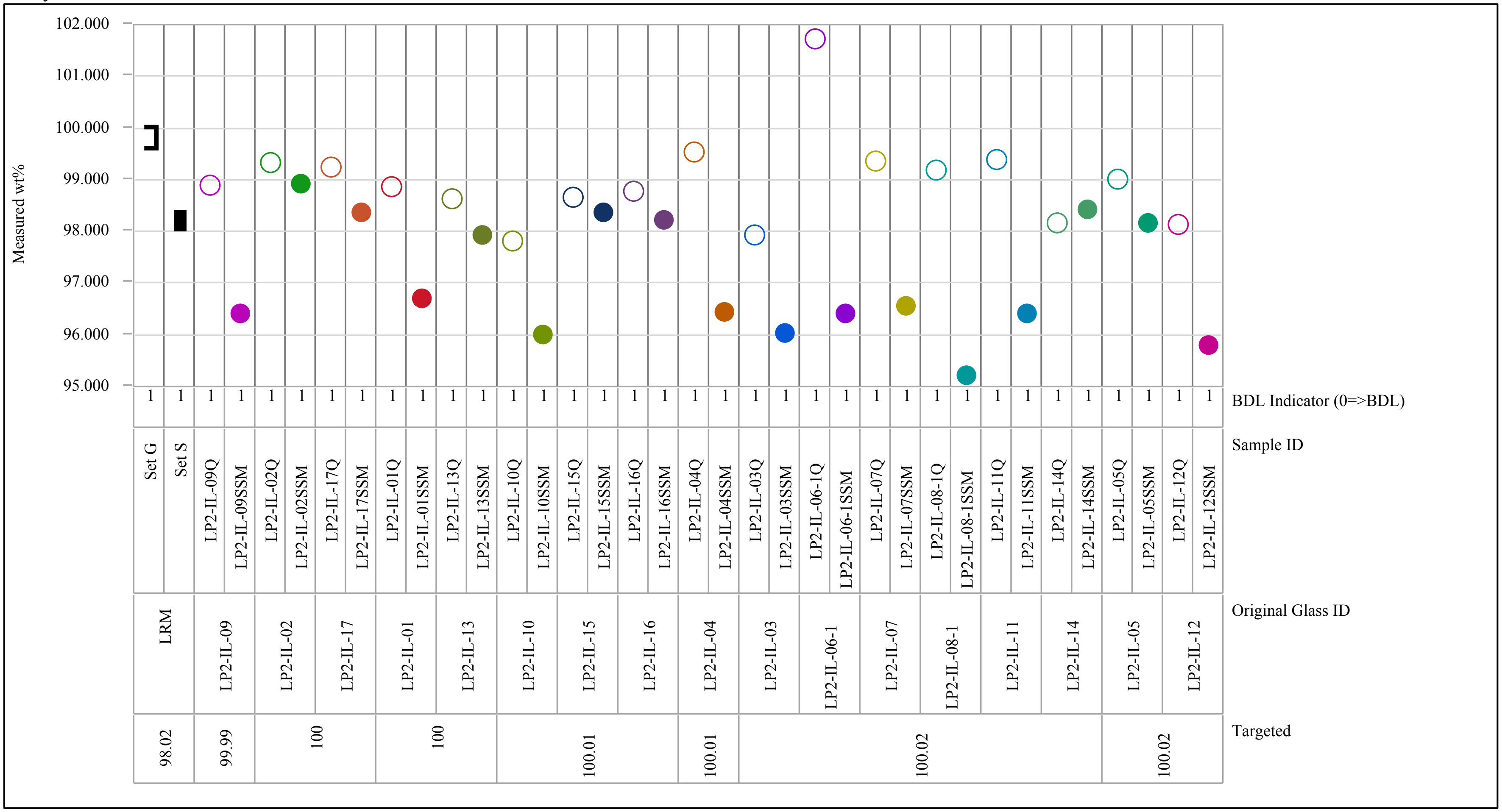


Exhibit F-1. Comparisons of the Measured Compositions of the Baseline and Sulfur Saturated Versions of the Study Glasses (continued)

Analyte=Sum of Oxides



Appendix G Tables and Exhibits Supporting the Wash Solution Chemical Composition Analysis

Table G-1. Measurements (mg/L) of Wash Solutions by ICP-AES (Part 1 of 2)

Soln ID	Blk	Seq	Lab ID	Al	B	Ca	Cr	Fe	K	Li	Mg
Soln Std	1	1	solnstd1-1	3.76	20.0	<1.00	<1.00	4.06	9.08	9.85	<1.00
LP2-IL-02-SSM-W	1	2	P09-1	<1.00	26.6	1.50	22.1	<1.00	104	<1.00	<1.00
LP2-IL-11-SSM-W	1	3	P08-1	<1.00	17.1	1.40	28.3	<1.00	75.5	<1.00	<1.00
LP2-IL-07-SSM-W	1	4	P06-1	<1.00	25.9	3.11	14.3	<1.00	85.9	<1.00	<1.00
High-Purity Standards SM-744-063	1	5	hpstd-11	52.5	<1.00	<1.00	<1.00	50.9	<1.00	<1.00	<1.00
LP2-IL-06-1-SSM-W	1	6	P03-1	1.13	31.6	2.38	37.5	<1.00	103	<1.00	<1.00
LP2-IL-10-SSM-W	1	7	P01-1	<1.00	19.3	3.59	44.1	<1.00	51.9	<1.00	<1.00
First blank	1	8	blank1-1	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
LP2-IL-08-1-SSM-W	1	9	P14-1	<1.00	15.9	1.67	43.5	<1.00	31.6	<1.00	<1.00
LP2-IL-01-SSM-W	1	10	P17-1	<1.00	19.8	2.34	34.2	<1.00	82.0	<1.00	<1.00
Soln Std	1	11	soln std 1-2	3.84	19.6	<1.00	<1.00	4.02	9.56	9.82	<1.00
LP2-IL-09-SSM-W	1	12	P11-1	<1.00	26.2	1.34	39.2	<1.00	13.8	<1.00	<1.00
LP2-IL-12-SSM-W	1	13	P13-1	<1.00	19.6	1.65	17.1	<1.00	17.0	<1.00	<1.00
LP2-IL-04-SSM-W	1	14	P15-1	<1.00	18.5	2.01	61.2	<1.00	98.2	<1.00	<1.00
Second blank	1	15	blank2-1	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
LP2-IL-14-SSM-W	1	16	P05-1	<1.00	24.1	2.73	31.2	<1.00	20.7	<1.00	<1.00
LP2-IL-05-SSM-W	1	17	P16-1	<1.00	23.5	<1.00	12.9	<1.00	24.8	<1.00	<1.00
High-Purity Standards SM-744-063	1	18	hpstd-12	50.8	<1.00	<1.00	<1.00	49.8	<1.00	<1.00	<1.00
LP2-IL-16-SSM-W	1	19	P12-1	<1.00	22.4	1.64	35.5	<1.00	62.8	<1.00	<1.00
LP2-IL-17-SSM-W	1	20	P10-1	<1.00	26.2	5.25	1.86	<1.00	27.4	<1.00	<1.00
High-Purity Standards SM-744-063	1	21	hpstd-13	51.2	<1.00	<1.00	<1.00	50.0	<1.00	<1.00	<1.00
LP2-IL-15-SSM-W	1	22	P04-1	<1.00	22.7	<1.00	21.6	<1.00	22.4	<1.00	<1.00
LP2-IL-03-SSM-W	1	23	P07-1	1.36	27.2	<1.00	35.7	<1.00	41.4	<1.00	<1.00
LP2-IL-13-SSM-W	1	24	P02-1	<1.00	25.0	2.66	19.0	<1.00	90.4	<1.00	<1.00
Soln Std	1	25	soln std 1-3	3.79	19.3	<1.00	<1.00	4.05	9.58	9.73	<1.00
Soln Std	2	1	solnstd2-1	3.70	20.2	<1.00	<1.00	3.92	9.67	9.86	<1.00
LP2-IL-01-SSM-W	2	2	P17-2	<1.00	21.3	2.15	34.8	<1.00	95.5	<1.00	<1.00
LP2-IL-10-SSM-W	2	3	P01-2	<1.00	20.3	3.41	45.1	<1.00	60.5	<1.00	<1.00
LP2-IL-15-SSM-W	2	4	P04-2	<1.00	23.1	<1.00	21.5	<1.00	24.6	<1.00	<1.00
High-Purity Standards SM-744-063	2	5	hpstd-21	51.9	1.20	<1.00	<1.00	50.56	<1.00	<1.00	<1.00
LP2-IL-11-SSM-W	2	6	P08-2	<1.00	17.3	1.39	28.4	<1.00	91.8	<1.00	<1.00
LP2-IL-09-SSM-W	2	7	P11-2	<1.00	27.5	1.17	39.7	<1.00	17.3	<1.00	<1.00
First blank	2	8	blank1-2	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
LP2-IL-02-SSM-W	2	9	P09-2	<1.00	26.4	1.28	22.0	<1.00	115	<1.00	<1.00
LP2-IL-04-SSM-W	2	10	P15-2	<1.00	19.0	1.85	62.1	<1.00	120	<1.00	<1.00
Soln Std	2	11	soln std 2-2	3.71	20.4	<1.00	<1.00	3.84	9.81	9.72	<1.00
LP2-IL-05-SSM-W	2	12	P16-2	<1.00	24.7	<1.00	13.0	<1.00	25.6	<1.00	<1.00

Table G-1. Measurements (mg/L) of Wash Solutions by ICP-AES (Part 1 of 2) (continued)

Soln ID	Blk	Seq	Lab ID	Al	B	Ca	Cr	Fe	K	Li	Mg
LP2-IL-07-SSM-W	2	13	P06-2	<1.00	28.0	2.87	14.4	<1.00	98.2	<1.00	<1.00
LP2-IL-14-SSM-W	2	14	P05-2	<1.00	24.9	2.54	31.6	<1.00	21.9	<1.00	<1.00
Second blank	2	15	blank2-2	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
LP2-IL-13-SSM-W	2	16	P02-2	<1.00	25.7	2.51	19.02	<1.00	94.7	<1.00	<1.00
LP2-IL-17-SSM-W	2	17	P10-2	<1.00	27.4	5.10	1.70	<1.00	26.6	<1.00	<1.00
High-Purity Standards SM-744-063	2	18	hpstd-22	51.1	1.69	<1.00	<1.00	49.6	<1.00	<1.00	<1.00
LP2-IL-06-1-SSM-W	2	19	P03-2	<1.00	33.1	2.19	38.3	<1.00	109	<1.00	<1.00
LP2-IL-16-SSM-W	2	20	P12-2	<1.00	22.9	1.48	35.7	<1.00	55.4	<1.00	<1.00
High-Purity Standards SM-744-063	2	21	hpstd-23	51.7	1.22	<1.00	<1.00	50.2	<1.00	<1.00	<1.00
LP2-IL-03-SSM-W	2	22	P07-2	1.33	27.3	<1.00	36.5	<1.00	42.9	<1.00	<1.00
LP2-IL-12-SSM-W	2	23	P13-2	<1.00	19.2	1.46	17.0	<1.00	21.3	<1.00	<1.00
LP2-IL-08-1-SSM-W	2	24	P14-2	<1.00	17.3	1.47	43.8	<1.00	36.8	<1.00	<1.00
Soln Std	2	25	soln std 2-3	3.72	20.0	<1.00	<1.00	3.84	9.77	9.71	<1.00
Soln Std	3	1	solnstd3-1	3.66	19.8	<1.00	<1.00	3.89	9.16	9.68	<1.00
LP2-IL-09-SSM-W	3	2	P11-3	<1.00	29.2	1.42	39.7	<1.00	13.9	<1.00	<1.00
LP2-IL-12-SSM-W	3	3	P13-3	<1.00	19.8	1.62	17.1	<1.00	17.8	<1.00	<1.00
LP2-IL-13-SSM-W	3	4	P02-3	<1.00	25.2	2.62	18.8	<1.00	79.9	<1.00	<1.00
High-Purity Standards SM-744-063	3	5	hpstd-31	50.7	1.68	<1.00	<1.00	49.3	<1.00	<1.00	<1.00
LP2-IL-02-SSM-W	3	6	P09-3	<1.00	26.3	1.46	21.6	<1.00	99.1	<1.00	<1.00
LP2-IL-14-SSM-W	3	7	P05-3	<1.00	25.1	2.71	31.2	<1.00	17.7	<1.00	<1.00
First blank	3	8	blank1-3	<1.00	1.15	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
LP2-IL-08-1-SSM-W	3	9	P14-3	<1.00	17.1	1.68	43.4	<1.00	27.9	<1.00	<1.00
LP2-IL-15-SSM-W	3	10	P04-3	<1.00	23.3	2.58	21.5	<1.00	19.5	<1.00	<1.00
Soln Std	3	11	soln std 3-2	3.69	19.2	<1.00	<1.00	3.86	9.20	9.66	<1.00
LP2-IL-07-SSM-W	3	12	P06-3	<1.00	27.8	2.99	14.2	<1.00	87.3	<1.00	<1.00
LP2-IL-10-SSM-W	3	13	P01-3	<1.00	20.7	3.59	44.9	<1.00	47.0	<1.00	<1.00
LP2-IL-06-1-SSM-W	3	14	P03-3	<1.00	33.1	2.32	37.4	<1.00	98.4	<1.00	<1.00
Second blank	3	15	blank2-3	<1.00	1.28	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
LP2-IL-03-SSM-W	3	16	P07-3	1.19	27.4	<1.00	35.9	<1.00	37.4	<1.00	<1.00
LP2-IL-05-SSM-W	3	17	P16-3	<1.00	25.0	<1.00	12.9	<1.00	20.0	<1.00	<1.00
High-Purity Standards SM-744-063	3	18	hpstd-32	51.0	1.85	<1.00	<1.00	49.9	<1.00	<1.00	<1.00
LP2-IL-11-SSM-W	3	19	P08-3	<1.00	17.6	1.28	27.8	<1.00	70.7	<1.00	<1.00
LP2-IL-17-SSM-W	3	20	P10-3	<1.00	26.7	5.12	1.81	<1.00	21.7	<1.00	<1.00
High-Purity Standards SM-744-063	3	21	hpstd-33	51.5	1.63	<1.00	<1.00	50.1	<1.00	<1.00	<1.00
LP2-IL-01-SSM-W	3	22	P17-3	<1.00	22.2	2.41	34.6	<1.00	70.0	<1.00	<1.00
LP2-IL-16-SSM-W	3	23	P12-3	<1.00	23.8	1.76	35.2	<1.00	52.5	<1.00	<1.00
LP2-IL-04-SSM-W	3	24	P15-3	<1.00	19.4	2.02	61.4	<1.00	112	<1.00	<1.00
Soln Std	3	25	soln std 3-3	3.67	19.5	<1.00	<1.00	3.90	9.38	9.62	<1.00

Table G-2. Measurements (mg/L) of Wash Solutions by ICP-AES (Part 2 of 2)

Soln ID	Blk	Seq	Lab ID	Na	P	S	Si	Sn	V	Zn	Zr
Soln Std	1	1	solnstd1-1	80.1	<1.00	<1.00	53.7	<1.00	<1.00	<1.00	<1.00
LP2-IL-02-SSM-W	1	2	P09-1	936	15.7	615	14.2	<1.00	6.05	<1.00	<1.00
LP2-IL-11-SSM-W	1	3	P08-1	783	21.4	460	8.65	<1.00	31.8	<1.00	<1.00
LP2-IL-07-SSM-W	1	4	P06-1	772	10.5	498	9.22	<1.00	4.37	<1.00	<1.00
High-Purity Standards SM-744-063	1	5	hpstd-11	144	<1.00	10.2	<1.00	<1.00	<1.00	<1.00	<1.00
LP2-IL-06-1-SSM-W	1	6	P03-1	992	21.3	612	5.90	<1.00	16.0	<1.00	<1.00
LP2-IL-10-SSM-W	1	7	P01-1	806	10.1	507	8.65	<1.00	10.7	<1.00	<1.00
First blank	1	8	blank1-1	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
LP2-IL-08-1-SSM-W	1	9	P14-1	916	7.89	555	7.29	<1.00	4.85	<1.00	<1.00
LP2-IL-01-SSM-W	1	10	P17-1	667	6.18	376	20.5	<1.00	22.7	<1.00	<1.00
Soln Std	1	11	soln std 1-2	81.7	<1.00	<1.00	53.3	<1.00	<1.00	<1.00	<1.00
LP2-IL-09-SSM-W	1	12	P11-1	593	8.70	336	16.7	<1.00	19.1	<1.00	<1.00
LP2-IL-12-SSM-W	1	13	P13-1	794	21.0	466	17.2	<1.00	28.4	<1.00	<1.00
LP2-IL-04-SSM-W	1	14	P15-1	771	16.0	507	8.70	<1.00	5.75	<1.00	<1.00
Second blank	1	15	blank2-1	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
LP2-IL-14-SSM-W	1	16	P05-1	778	16.3	424	6.95	<1.00	4.92	<1.00	<1.00
LP2-IL-05-SSM-W	1	17	P16-1	699	7.42	417	8.95	<1.00	3.77	<1.00	<1.00
High-Purity Standards SM-744-063	1	18	hpstd-12	143	<1.00	10.4	<1.00	<1.00	<1.00	<1.00	<1.00
LP2-IL-16-SSM-W	1	19	P12-1	839	9.57	531	7.96	<1.00	11.0	<1.00	<1.00
LP2-IL-17-SSM-W	1	20	P10-1	868	5.35	596	10.2	<1.00	21.7	<1.00	<1.00
High-Purity Standards SM-744-063	1	21	hpstd-13	141	<1.00	10.2	<1.00	<1.00	<1.00	<1.00	<1.00
LP2-IL-15-SSM-W	1	22	P04-1	964	21.1	542	9.00	<1.00	27.0	<1.00	<1.00
LP2-IL-03-SSM-W	1	23	P07-1	1066	31.7	576	15.0	1.12	7.83	<1.00	<1.00
LP2-IL-13-SSM-W	1	24	P02-1	782	10.4	506	9.07	<1.00	4.29	<1.00	<1.00
Soln Std	1	25	soln std 1-3	80.4	<1.00	<1.00	51.1	<1.00	<1.00	<1.00	<1.00
Soln Std	2	1	solnstd2-1	80.3	<1.00	<1.00	51.8	<1.00	<1.00	<1.00	<1.00
LP2-IL-01-SSM-W	2	2	P17-2	659	5.97	367	17.9	<1.00	22.7	<1.00	<1.00
LP2-IL-10-SSM-W	2	3	P01-2	808	9.71	505	6.55	<1.00	10.7	<1.00	<1.00
LP2-IL-15-SSM-W	2	4	P04-2	934	21.55	531	9.54	<1.00	27.0	<1.00	<1.00
High-Purity Standards SM-744-063	2	5	hpstd-21	143	<1.00	10.3	<1.00	<1.00	<1.00	<1.00	<1.00
LP2-IL-11-SSM-W	2	6	P08-2	766	20.80	445	6.65	1.04	31.8	<1.00	<1.00
LP2-IL-09-SSM-W	2	7	P11-2	602	8.16	327	16.6	<1.00	19.1	<1.00	<1.00
First blank	2	8	blank1-2	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
LP2-IL-02-SSM-W	2	9	P09-2	955	14.9	599	11.8	1.18	6.03	<1.00	<1.00
LP2-IL-04-SSM-W	2	10	P15-2	778	15.9	472	7.83	<1.00	5.58	<1.00	<1.00
Soln Std	2	11	soln std 2-2	76.9	<1.00	<1.00	50.1	<1.00	<1.00	<1.00	<1.00
LP2-IL-05-SSM-W	2	12	P16-2	689	6.76	409	8.64	<1.00	3.60	<1.00	<1.00
LP2-IL-07-SSM-W	2	13	P06-2	766	10.3	485	7.56	<1.00	4.19	<1.00	<1.00
LP2-IL-14-SSM-W	2	14	P05-2	768	16.0	413	7.34	<1.00	4.75	<1.00	<1.00
Second blank	2	15	blank2-2	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
LP2-IL-13-SSM-W	2	16	P02-2	761	10.2	499	9.83	<1.00	4.09	<1.00	<1.00

Table G-2. Measurements (mg/L) of Wash Solutions by ICP-AES (Part 2 of 2) (continued)

Soln ID	Blk	Seq	Lab ID	Na	P	S	Si	Sn	V	Zn	Zr
LP2-IL-17-SSM-W	2	17	P10-2	862	5.04	572	9.64	<1.00	21.8	<1.00	<1.00
High-Purity Standards SM-744-063	2	18	hpstd-22	144	<1.00	10.6	<1.00	<1.00	<1.00	<1.00	<1.00
LP2-IL-06-1-SSM-W	2	19	P03-2	1009	21.3	599	5.06	<1.00	16.2	<1.00	<1.00
LP2-IL-16-SSM-W	2	20	P12-2	843	9.50	519	6.72	<1.00	11.0	<1.00	<1.00
High-Purity Standards SM-744-063	2	21	hpstd-23	141	<1.00	10.7	<1.00	<1.00	<1.00	<1.00	<1.00
LP2-IL-03-SSM-W	2	22	P07-2	1029	32.5	550	14.4	1.32	7.77	<1.00	<1.00
LP2-IL-12-SSM-W	2	23	P13-2	806	20.5	460	15.4	<1.00	28.3	<1.00	<1.00
LP2-IL-08-1-SSM-W	2	24	P14-2	850	7.61	534	5.63	<1.00	4.70	<1.00	<1.00
Soln Std	2	25	soln std 2-3	80.7	<1.00	<1.00	51.0	<1.00	<1.00	<1.00	<1.00
Soln Std	3	1	solnstd3-1	83.0	<1.00	<1.00	53.2	<1.00	<1.00	<1.00	<1.00
LP2-IL-09-SSM-W	3	2	P11-3	612	8.58	333	20.0	<1.00	19.3	<1.00	<1.00
LP2-IL-12-SSM-W	3	3	P13-3	841	19.9	466	18.0	<1.00	28.4	<1.00	<1.00
LP2-IL-13-SSM-W	3	4	P02-3	767	10.1	503	10.1	<1.00	4.28	<1.00	<1.00
High-Purity Standards SM-744-063	3	5	hpstd-31	136	<1.00	10.0	<1.00	<1.00	<1.00	<1.00	<1.00
LP2-IL-02-SSM-W	3	6	P09-3	979	14.5	605	12.9	1.17	6.11	<1.00	<1.00
LP2-IL-14-SSM-W	3	7	P05-3	791	15.6	394	9.48	<1.00	5.02	<1.00	<1.00
First blank	3	8	blank1-3	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
LP2-IL-08-1-SSM-W	3	9	P14-3	890	7.69	543	7.18	<1.00	4.84	<1.00	<1.00
LP2-IL-15-SSM-W	3	10	P04-3	920	22.4	552	10.9	1.04	27.2	<1.00	<1.00
Soln Std	3	11	soln std 3-2	77.2	<1.00	<1.00	51.4	<1.00	<1.00	<1.00	<1.00
LP2-IL-07-SSM-W	3	12	P06-3	786	9.92	502	9.22	<1.00	4.34	<1.00	<1.00
LP2-IL-10-SSM-W	3	13	P01-3	842	9.83	513	8.98	<1.00	10.8	<1.00	<1.00
LP2-IL-06-1-SSM-W	3	14	P03-3	988	20.7	600	7.56	<1.00	16.0	<1.00	<1.00
Second blank	3	15	blank2-3	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
LP2-IL-03-SSM-W	3	16	P07-3	983	31.9	557	18.1	1.41	7.89	<1.00	<1.00
LP2-IL-05-SSM-W	3	17	P16-3	705	7.13	417	11.1	1.13	3.83	<1.00	<1.00
High-Purity Standards SM-744-063	3	18	hpstd-32	144	<1.00	10.2	<1.00	<1.00	<1.00	<1.00	<1.00
LP2-IL-11-SSM-W	3	19	P08-3	772	20.5	459	7.53	<1.00	31.5	<1.00	<1.00
LP2-IL-17-SSM-W	3	20	P10-3	919	4.78	592	10.5	<1.00	21.5	<1.00	<1.00
High-Purity Standards SM-744-063	3	21	hpstd-33	140	<1.00	10.1	<1.00	<1.00	<1.00	<1.00	<1.00
LP2-IL-01-SSM-W	3	22	P17-3	633	5.69	375	20.6	<1.00	22.8	<1.00	<1.00
LP2-IL-16-SSM-W	3	23	P12-3	878	9.28	514	8.16	<1.00	11.0	<1.00	<1.00
LP2-IL-04-SSM-W	3	24	P15-3	830	16.5	482	8.60	1.14	5.75	<1.00	<1.00
Soln Std	3	25	soln std 3-3	81.2	<1.00	<1.00	52.6	1.03	<1.00	<1.00	<1.00

Table G-3. Measurements (mg/L) of Wash Solutions by IC

Soln ID	Blk	Seq	Lab ID	Cl	F	PO4	SO4
Chk Strd	1	1	5 ppm check std	5.15	5.17	5.04	5.48
Soln Std	1	2	Soln Std 1-1	<10.0	<10.0	<100	<100
LP2-IL-17-SSM-W	1	3	P10-1	<10.0	<10.0	<100	1720
LP2-IL-11-SSM-W	1	4	P08-1	23.7	<10.0	<100	1370
LP2-IL-14-SSM-W	1	5	P05-1	16.9	<10.0	<100	1380
High-Purity Standards SM-744-063	1	6	hpstd-11	<10.0	<10.0	<100	<100
LP2-IL-10-SSM-W	1	7	P01-1	10.8	<10.0	<100	1510
LP2-IL-09-SSM-W	1	8	P11-1	<10.0	<10.0	<100	1020
First blank	1	9	BLANK1-1	<10.0	<10.0	<100	<100
LP2-IL-12-SSM-W	1	10	P13-1	20.3	<10.0	<100	1380
LP2-IL-16-SSM-W	1	11	P12-1	12.8	<10.0	<100	1570
Soln Std	1	12	Soln Std 1-2	<10.0	<10.0	<100	<100
Chk Strd	1	13	5 ppm check std	4.90	5.06	4.87	5.45
LP2-IL-06-1-SSM-W	1	14	P03-1	28.3	<10.0	<100	1780
LP2-IL-01-SSM-W	1	15	P17-1	<10.0	<10.0	<100	1150
LP2-IL-05-SSM-W	1	16	P16-1	20.2	<10.0	<100	1260
Second blank	1	17	Blank2-1	<10.0	<10.0	<100	<100
LP2-IL-08-1-SSM-W	1	18	P14-1	19.3	<10.0	<100	1620
LP2-IL-15-SSM-W	1	19	P04-1	27.9	<10.0	<100	1630
High-Purity Standards SM-744-063	1	20	hpstd-12	<10.0	<10.0	<100	<100
LP2-IL-04-SSM-W	1	21	P15-1	16.3	<10.0	<100	1460
LP2-IL-03-SSM-W	1	22	P07-1	29.7	13.2	<100	1680
High-Purity Standards SM-744-063	1	23	hpstd-13	<10.0	<10.0	<100	<100
LP2-IL-07-SSM-W	1	24	P06-1	23.7	<10.0	<100	1470
LP2-IL-02-SSM-W	1	25	P09-1	11.7	<10.0	<100	1800
LP2-IL-13-SSM-W	1	26	P02-1	11.1	<10.0	<100	1490
Soln Std	1	27	Soln Std 1-3	<10.0	<10.0	<100	<100
Chk Strd	1	28	5 ppm check std	4.94	4.99	4.87	5.47
Chk Strd	2	1	5 ppm check std	5.04	5.12	4.99	5.37
Soln Std	2	2	Soln Std 1-1	<10.0	<10.0	<100	<100
LP2-IL-08-1-SSM-W	2	3	P14-2	20.0	10.2	<100	1580
LP2-IL-03-SSM-W	2	4	P07-2	29.7	13.6	<100	1650
LP2-IL-17-SSM-W	2	5	P10-2	<10.0	<10.0	<100	1710
High-Purity Standards SM-744-063	2	6	hpstd-21	<10.0	<10.0	<100	<100
LP2-IL-15-SSM-W	2	7	P04-2	28.9	<10.0	<100	1590
LP2-IL-05-SSM-W	2	8	P16-2	20.3	<10.0	<100	1220
First blank	2	9	BLANK1-2	<10.0	<10.0	<100	<100
LP2-IL-04-SSM-W	2	10	P15-2	17.3	10.3	<100	1420
LP2-IL-13-SSM-W	2	11	P02-2	11.3	<10.0	<100	1470
Soln Std	2	12	Soln Std 2-2	<10.0	<10.0	<100	<100
Chk Strd	2	13	5 ppm check std	4.88	5.04	4.94	5.34
LP2-IL-12-SSM-W	2	14	P13-2	23.0	<10.0	<100	1350
LP2-IL-10-SSM-W	2	15	P01-2	10.9	<10.0	<100	1490
LP2-IL-07-SSM-W	2	16	P06-2	22.7	<10.0	<100	1440
Second blank	2	17	Blank2-2	<10.0	<10.0	<100	<100
LP2-IL-09-SSM-W	2	18	P11-2	<10.0	<10.0	<100	987
LP2-IL-16-SSM-W	2	19	P12-2	13.2	<10.0	<100	1500
High-Purity Standards SM-744-063	2	20	hpstd-22	<10.0	<10.0	<100	<100
LP2-IL-02-SSM-W	2	21	P09-2	12.3	<10.0	<100	1760
LP2-IL-14-SSM-W	2	22	P05-2	15.2	<10.0	<100	1350
High-Purity Standards SM-744-063	2	23	hpstd-23	<10.0	<10.0	<100	<100
LP2-IL-11-SSM-W	2	24	P08-2	22.7	<10.0	<100	1340
LP2-IL-06-1-SSM-W	2	25	P03-2	27.2	<10.0	<100	1770
LP2-IL-01-SSM-W	2	26	P17-2	<10.0	<10.0	<100	1110
Soln Std	2	27	Soln Std 2-3	<10.0	<10.0	<100	<100
Chk Strd	2	28	5 ppm check std	4.97	5.04	4.99	5.39
Chk Strd	3	1	5 ppm check std	5.16	5.17	5.09	5.39
Soln Std	3	2	Soln Std 3-1	<10.0	<10.0	<100	<100
LP2-IL-09-SSM-W	3	3	P11-3	<10.0	<10.0	<100	980
LP2-IL-12-SSM-W	3	4	P13-3	21.3	10.8	<100	1360

Table G-3. Measurements (mg/L) of Wash Solutions by IC (continued)

Soln ID	Blk	Seq	Lab ID	Cl	F	PO4	SO4
LP2-IL-13-SSM-W	3	5	P02-3	12.0	<10.0	<100	1500
High-Purity Standards SM-744-063	3	6	hpstd-31	<10.0	<10.0	<100	<100
LP2-IL-02-SSM-W	3	7	P09-3	11.9	<10.0	<100	1790
LP2-IL-14-SSM-W	3	8	P05-3	15.6	<10.0	<100	1350
First blank	3	9	BLANK1-3	<10.0	<10.0	<100	<100
LP2-IL-08-1-SSM-W	3	10	P14-3	19.8	10.8	<100	1600
LP2-IL-15-SSM-W	3	11	P04-3	29.3	10.5	<100	1630
Soln Std	3	12	Soln Std 3-2	<10.0	<10.0	<100	<100
Chk Strd	3	13	5 ppm check std	5.03	5.08	5.07	5.43
LP2-IL-07-SSM-W	3	14	P06-3	26.4	<10.0	<100	1430
LP2-IL-10-SSM-W	3	15	P01-3	10.9	<10.0	<100	1510
LP2-IL-06-1-SSM-W	3	16	P03-3	26.7	11.0	<100	1780
Second blank	3	17	Blank2-3	<10.0	<10.0	<100	<100
LP2-IL-03-SSM-W	3	18	P07-3	31.5	14.4	<100	1700
LP2-IL-05-SSM-W	3	19	P16-3	20.6	<10.0	<100	1240
High-Purity Standards SM-744-063	3	20	hpstd-32	<10.0	<10.0	<100	<100
LP2-IL-11-SSM-W	3	21	P08-3	22.7	11.0	<100	1360
LP2-IL-17-SSM-W	3	22	P10-3	<10.0	<10.0	<100	1760
High-Purity Standards SM-744-063	3	23	hpstd-33	<10.0	<10.0	<100	<100
LP2-IL-01-SSM-W	3	24	P17-3	<10.0	<10.0	<100	1130
LP2-IL-16-SSM-W	3	25	P12-3	12.4	<10.0	<100	1560
LP2-IL-04-SSM-W	3	26	P15-3	16.5	<10.0	<100	1470
Soln Std	3	27	Soln Std 3-3	<10.0	<10.0	<100	<100
Chk Strd	3	28	5 ppm check std	5.09	5.09	5.10	5.40

Table G-4. Results for Standards Utilized During the Measurement of the Wash Solutions

Solution ID	Analyte	Instrument	Reference Value (mg/L)	Mean (mg/L)	Number of Measurements
High-Purity Standards SM-744-063	Al	ICP-AES	50	51.38	9
High-Purity Standards SM-744-063	Fe	ICP-AES	50	50.04	9
High-Purity Standards SM-744-063	Na	ICP-AES	150	141.78	9
High-Purity Standards SM-744-063	S	ICP-AES	10	10.30	9
Soln Std	Al	ICP-AES	4	3.73	9
Soln Std	B	ICP-AES	20	19.78	9
Soln Std	Fe	ICP-AES	4	3.93	9
Soln Std	K	ICP-AES	10	9.47	9
Soln Std	Li	ICP-AES	10	9.74	9
Soln Std	Na	ICP-AES	81	80.17	9
Soln Std	Si	ICP-AES	50	52.02	9

Table G-5. Average Measurements (mg/L) of Wash Solutions

Soln ID	Al[ICP]	B[ICP]	Ca[ICP]	Cl[IC]	Cr[ICP]	F[IC]	Fe[ICP]	K[ICP]	Li[ICP]	Mg[ICP]	Na[ICP]
LP2-IL-01-SSM-W	<1.00	21.10	2.30	<10.00	34.53	<10.00	<1.00	82.50	<1.00	<1.00	653.00
LP2-IL-02-SSM-W	<1.00	26.43	1.41	11.97	21.90	<10.00	<1.00	106.03	<1.00	<1.00	956.67
LP2-IL-03-SSM-W	1.29	27.30	<1.00	30.30	36.03	13.73	<1.00	40.57	<1.00	<1.00	1026.00
LP2-IL-04-SSM-W	<1.00	18.97	1.96	16.70	61.57	<10.10	<1.00	110.07	<1.00	<1.00	793.00
LP2-IL-05-SSM-W	<1.00	24.40	<1.00	20.37	12.93	<10.00	<1.00	23.47	<1.00	<1.00	697.67
LP2-IL-06-1-SSM-W	<1.04	32.60	2.30	27.40	37.73	<10.33	<1.00	103.47	<1.00	<1.00	996.33
LP2-IL-07-SSM-W	<1.00	27.23	2.99	24.27	14.30	<10.00	<1.00	90.47	<1.00	<1.00	774.67
LP2-IL-08-1-SSM-W	<1.00	16.77	1.61	19.70	43.57	<10.33	<1.00	32.10	<1.00	<1.00	885.33
LP2-IL-09-SSM-W	<1.00	27.63	1.31	<10.00	39.53	<10.00	<1.00	15.00	<1.00	<1.00	602.33
LP2-IL-10-SSM-W	<1.00	20.10	3.53	10.87	44.70	<10.00	<1.00	53.13	<1.00	<1.00	818.67
LP2-IL-11-SSM-W	<1.00	17.33	1.36	23.03	28.17	<10.33	<1.00	79.33	<1.00	<1.00	773.67
LP2-IL-12-SSM-W	<1.00	19.53	1.58	21.53	17.07	<10.27	<1.00	18.70	<1.00	<1.00	813.67
LP2-IL-13-SSM-W	<1.00	25.30	2.60	11.47	18.94	<10.00	<1.00	88.33	<1.00	<1.00	770.00
LP2-IL-14-SSM-W	<1.00	24.70	2.66	15.90	31.33	<10.00	<1.00	20.10	<1.00	<1.00	779.00
LP2-IL-15-SSM-W	<1.00	23.03	<1.53	28.70	21.53	<10.17	<1.00	22.17	<1.00	<1.00	939.33
LP2-IL-16-SSM-W	<1.00	23.03	1.63	12.80	35.47	<10.00	<1.00	56.90	<1.00	<1.00	853.33
LP2-IL-17-SSM-W	<1.00	26.77	5.16	<10.00	1.79	<10.00	<1.00	25.23	<1.00	<1.00	883.00

Soln ID	P[ICP]	PO4[IC]	PO4[ICP]	S[ICP]	Si[ICP]	Sn[ICP]	SO4[IC]	SO4[ICP]	V[ICP]	Zn[ICP]	Zr[ICP]
LP2-IL-01-SSM-W	5.95	<100.00	18.23	372.67	19.67	<1.00	1130.00	1116.47	22.73	<1.00	<1.00
LP2-IL-02-SSM-W	15.03	<100.00	46.10	606.33	12.97	<1.12	1783.33	1816.51	6.06	<1.00	<1.00
LP2-IL-03-SSM-W	32.03	<100.00	98.22	561.00	15.83	1.28	1676.67	1680.70	7.83	<1.00	<1.00
LP2-IL-04-SSM-W	16.13	<100.00	49.47	487.00	8.38	<1.05	1450.00	1459.00	5.69	<1.00	<1.00
LP2-IL-05-SSM-W	7.10	<100.00	21.78	414.33	9.56	<1.04	1240.00	1241.30	3.73	<1.00	<1.00
LP2-IL-06-1-SSM-W	21.10	<100.00	64.70	603.67	6.17	<1.00	1776.67	1808.52	16.07	<1.00	<1.00
LP2-IL-07-SSM-W	10.24	<100.00	31.40	495.00	8.67	<1.00	1446.67	1482.97	4.30	<1.00	<1.00
LP2-IL-08-1-SSM-W	7.73	<100.00	23.70	544.00	6.70	<1.00	1600.00	1629.77	4.80	<1.00	<1.00
LP2-IL-09-SSM-W	8.48	<100.00	26.00	332.00	17.77	<1.00	995.67	994.64	19.17	<1.00	<1.00
LP2-IL-10-SSM-W	9.88	<100.00	30.29	508.33	8.06	<1.00	1503.33	1522.92	10.73	<1.00	<1.00
LP2-IL-11-SSM-W	20.90	<100.00	64.08	454.67	7.61	<1.01	1356.67	1362.14	31.70	<1.00	<1.00
LP2-IL-12-SSM-W	20.47	<100.00	62.75	464.00	16.87	<1.00	1363.33	1390.10	28.37	<1.00	<1.00
LP2-IL-13-SSM-W	10.23	<100.00	31.38	502.67	9.67	<1.00	1486.67	1505.94	4.22	<1.00	<1.00
LP2-IL-14-SSM-W	15.97	<100.00	48.96	410.33	7.92	<1.00	1360.00	1229.32	4.90	<1.00	<1.00
LP2-IL-15-SSM-W	21.68	<100.00	66.49	541.67	9.81	<1.01	1616.67	1622.78	27.07	<1.00	<1.00
LP2-IL-16-SSM-W	9.45	<100.00	28.98	521.33	7.61	<1.00	1543.33	1561.86	11.00	<1.00	<1.00
LP2-IL-17-SSM-W	5.06	<100.00	15.50	586.67	10.11	<1.00	1730.00	1757.59	21.67	<1.00	<1.00

("<" implies that one or more of the values averaged were BDL)

Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence

Analyte=Al (mg/L), Instrument=ICP, Blk=1
Variability Chart for Measured (mg/L)

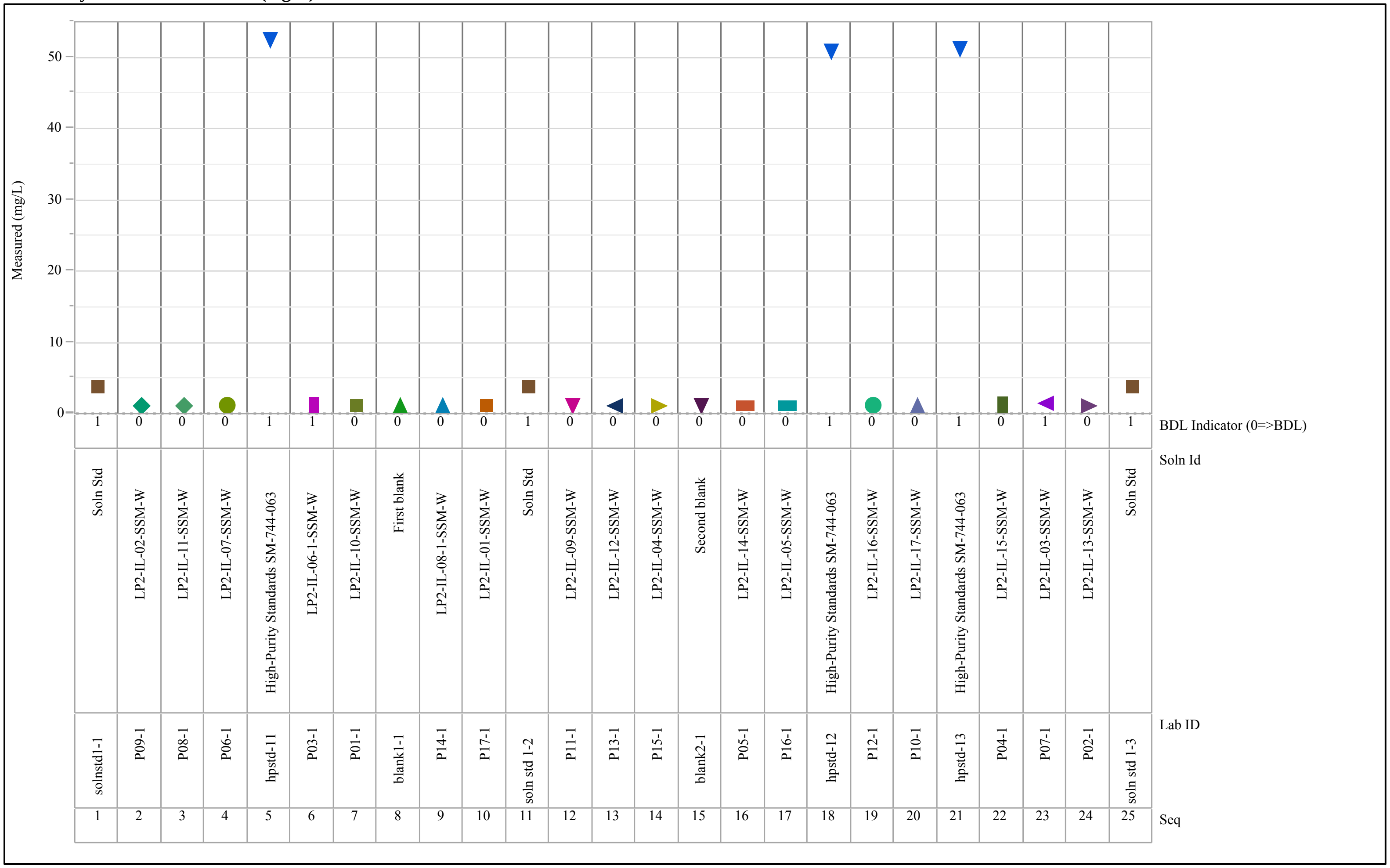


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Al (mg/L), Instrument=ICP, Blk=2
Variability Chart for Measured (mg/L)

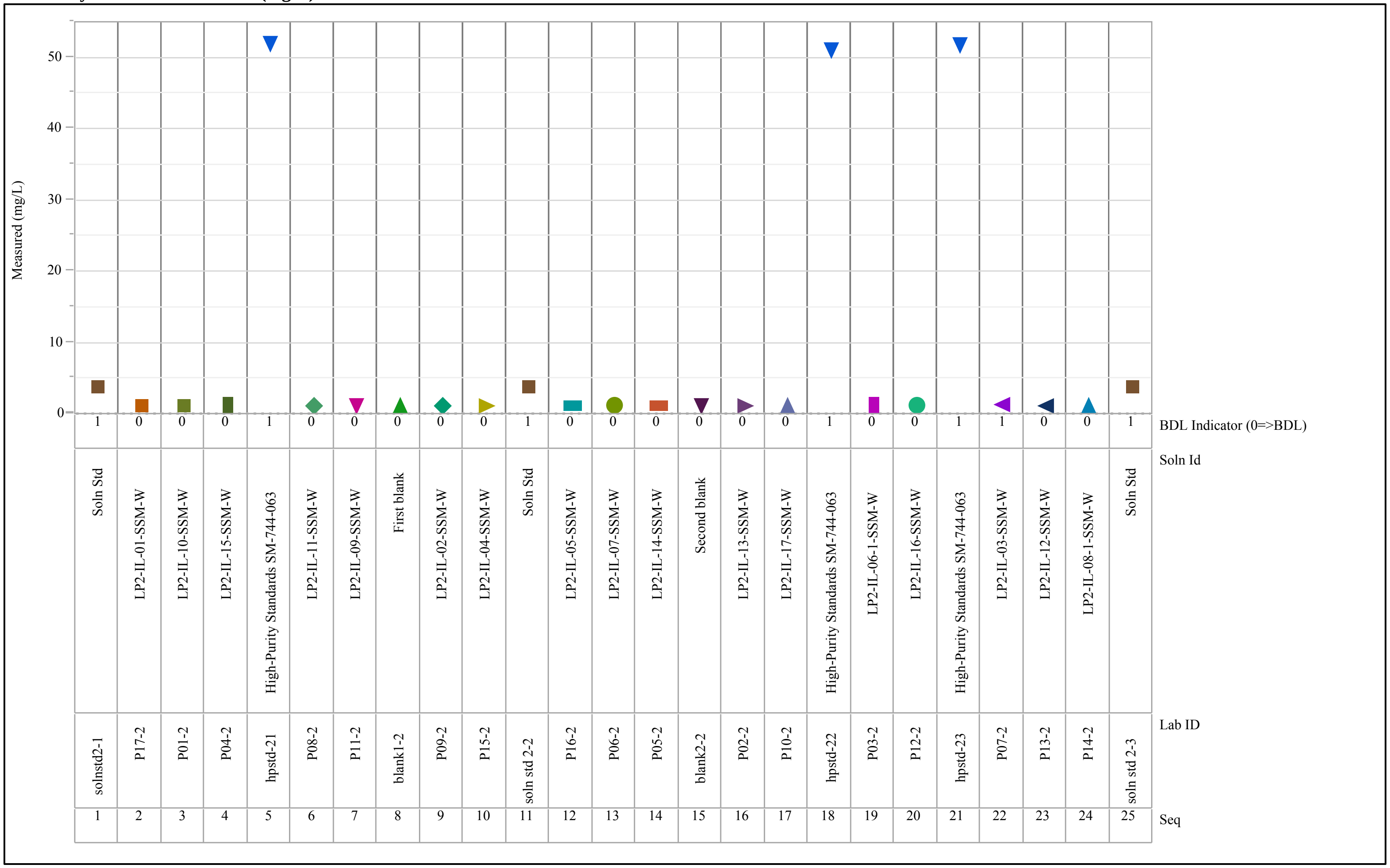


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Al (mg/L), Instrument=ICP, Blk=3
Variability Chart for Measured (mg/L)

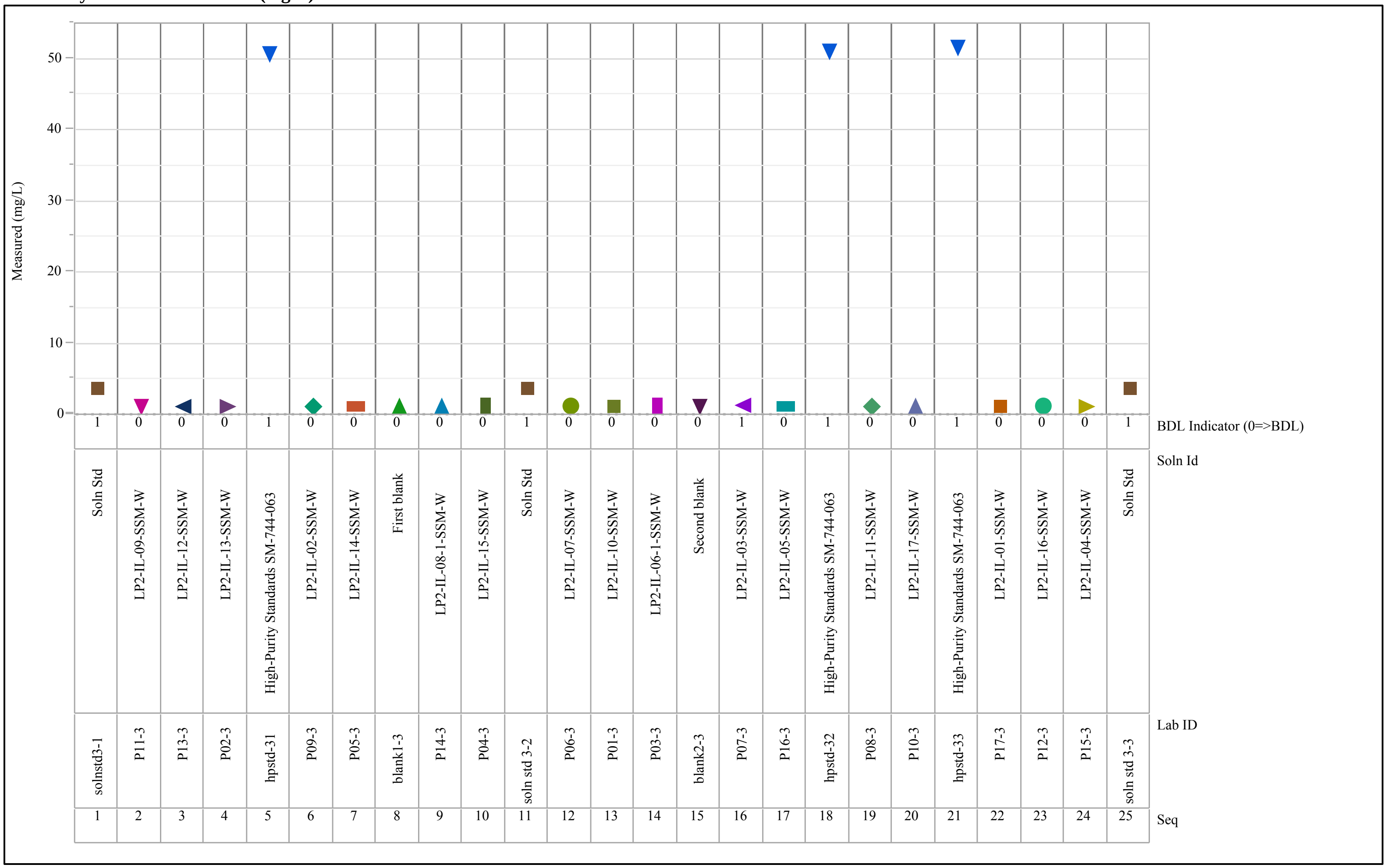


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=B (mg/L), Instrument=ICP, Blk=1
Variability Chart for Measured (mg/L)

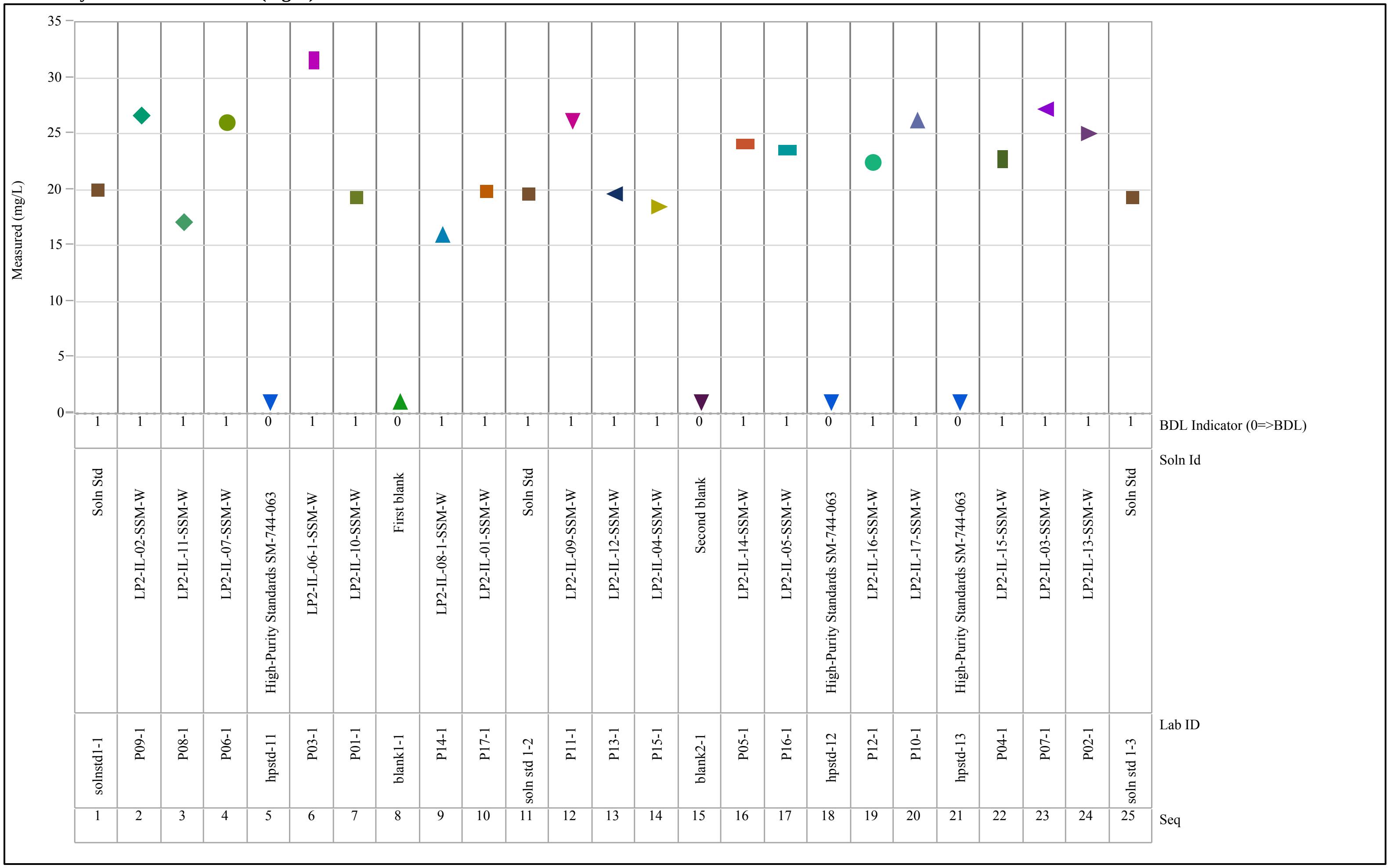


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=B (mg/L), Instrument=ICP, Blk=2
Variability Chart for Measured (mg/L)

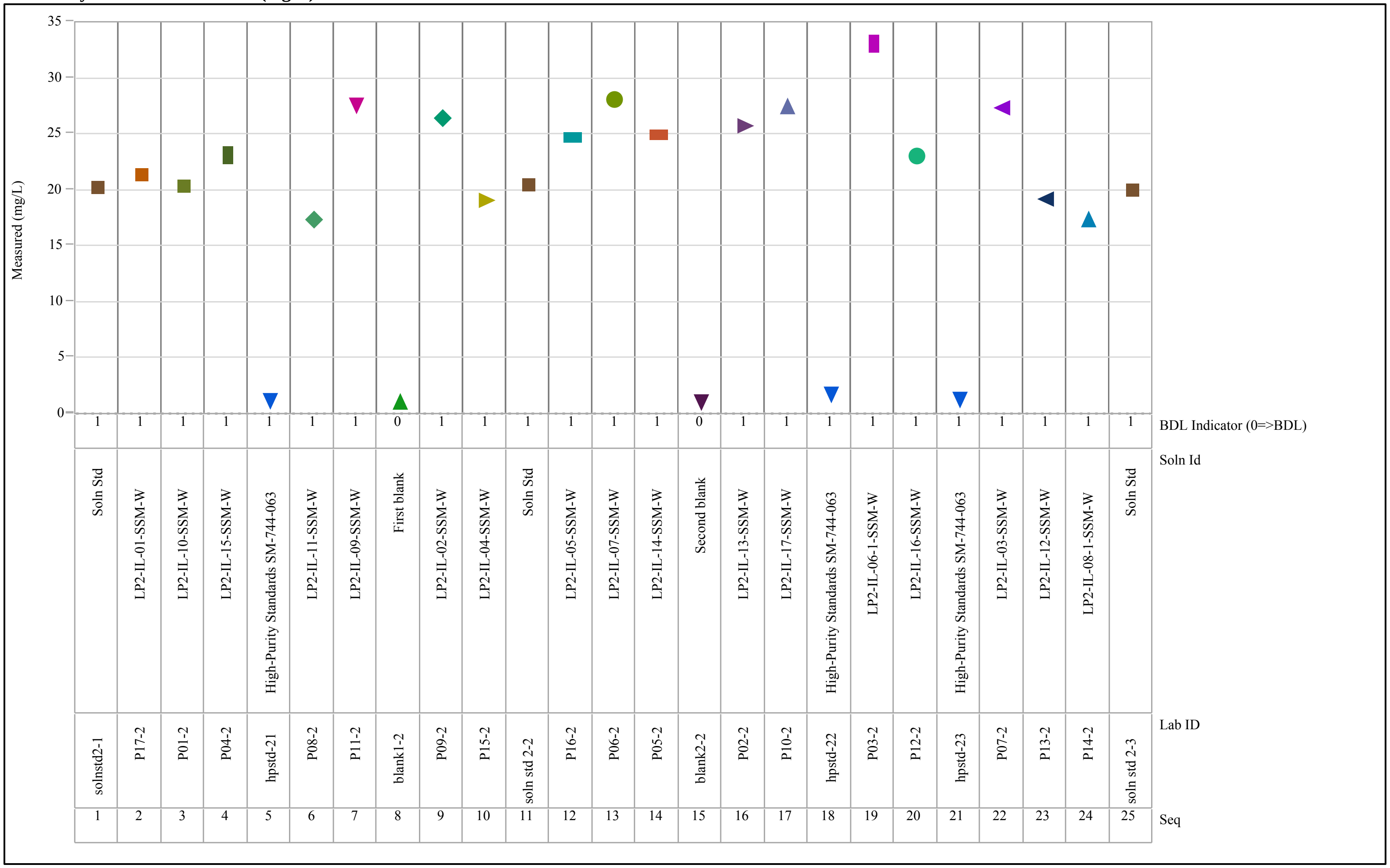


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=B (mg/L), Instrument=ICP, Blk=3
Variability Chart for Measured (mg/L)

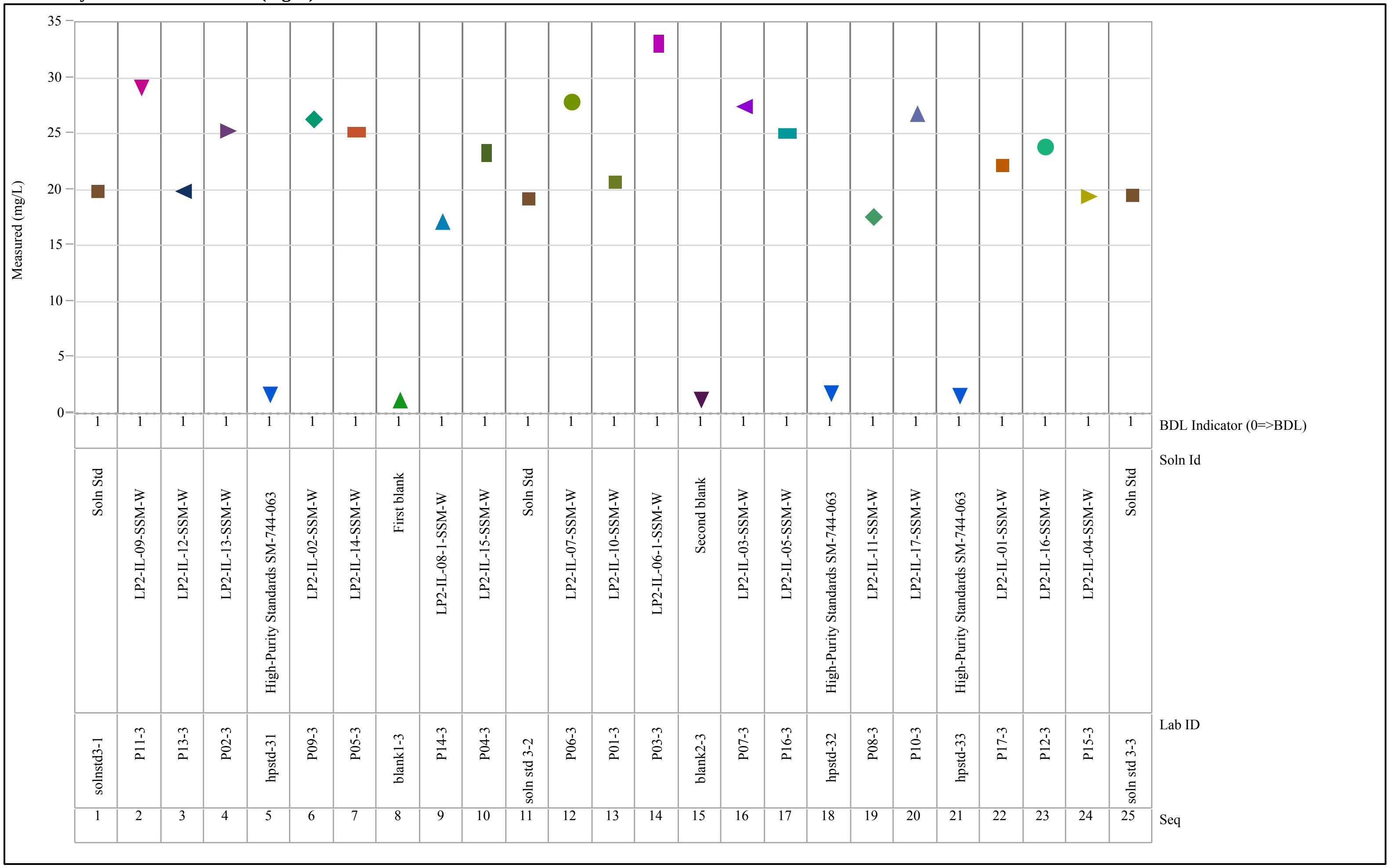


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Ca (mg/L), Instrument=ICP, Blk=1
Variability Chart for Measured (mg/L)

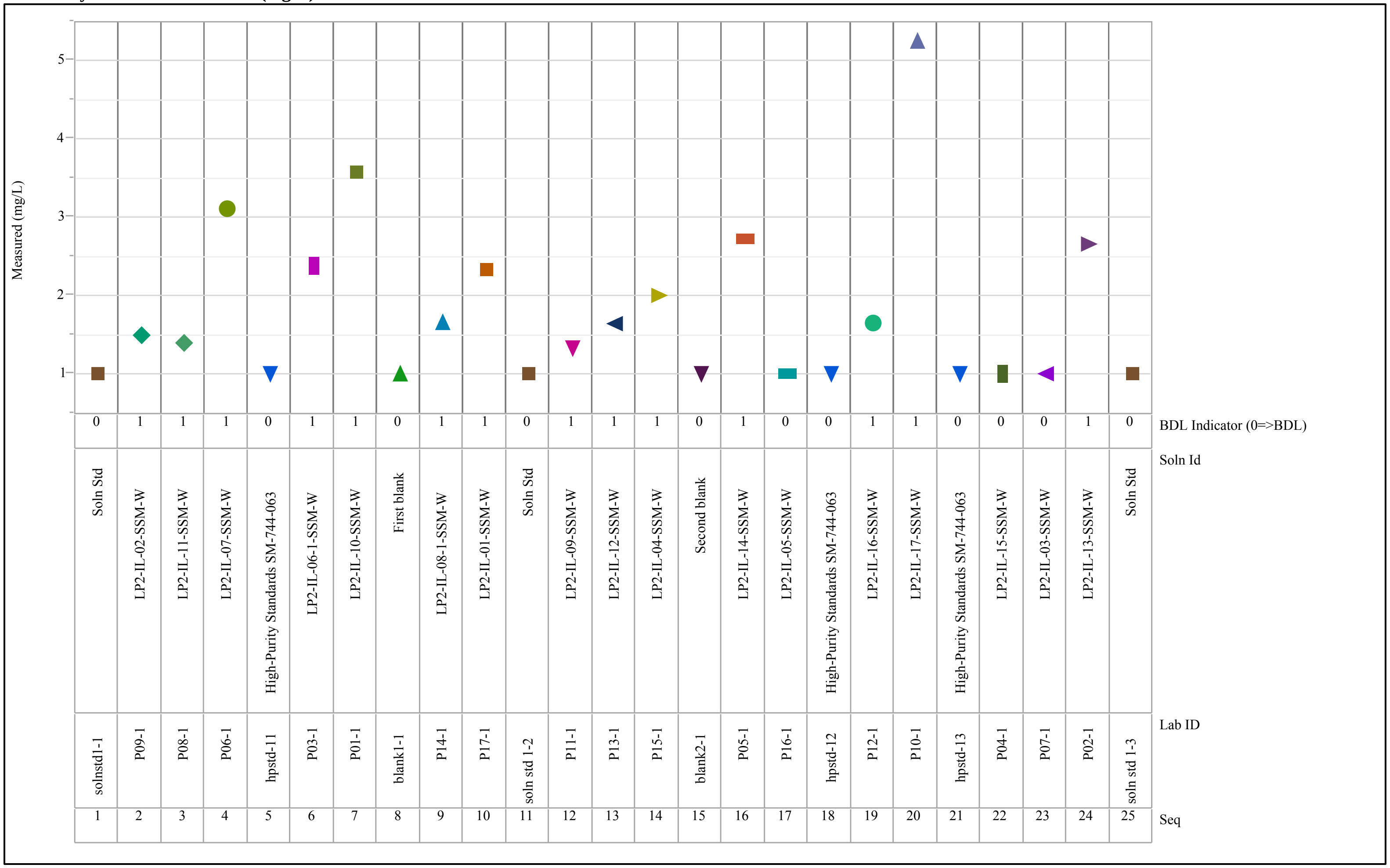


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Ca (mg/L), Instrument=ICP, Blk=2
Variability Chart for Measured (mg/L)

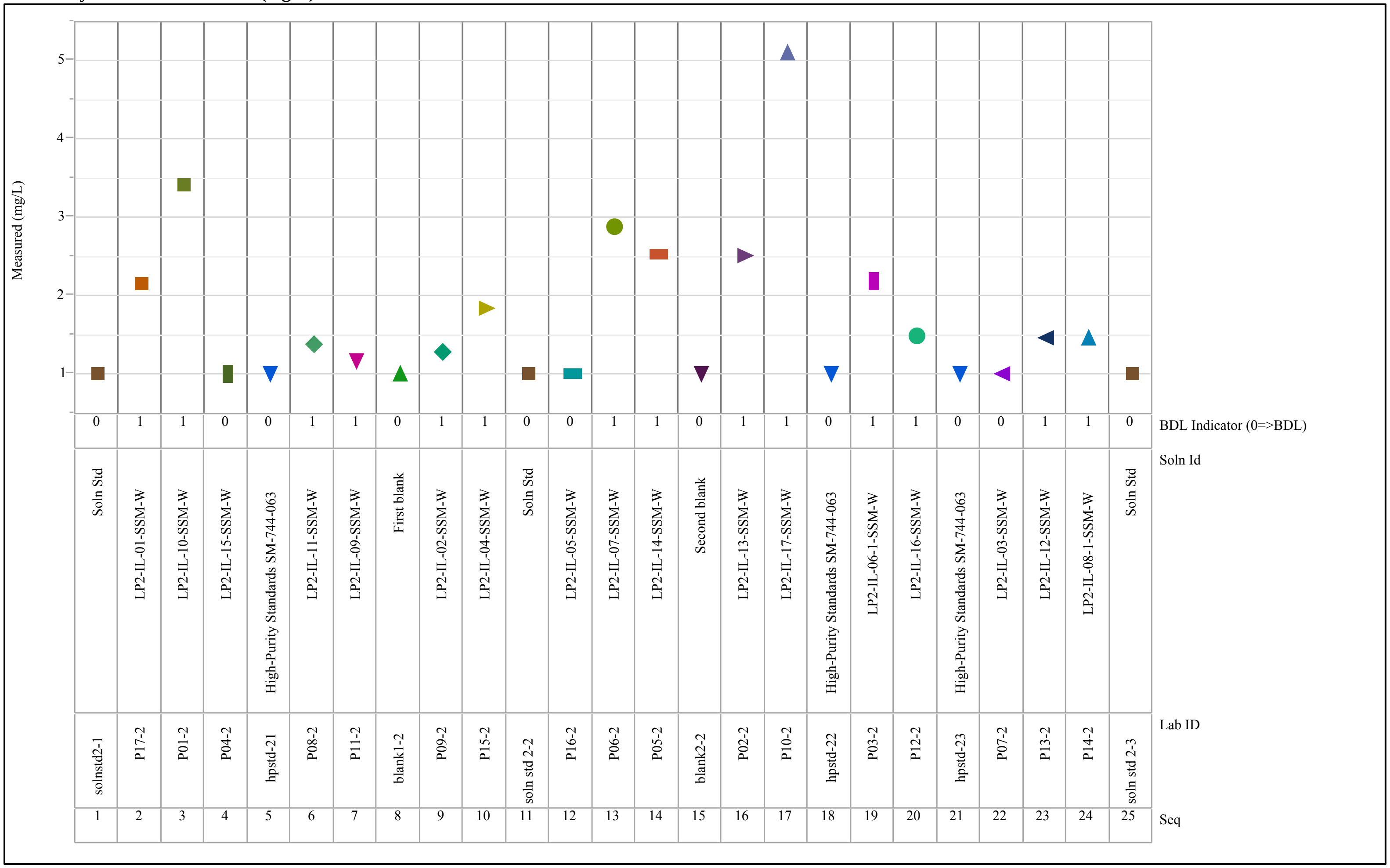


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Ca (mg/L), Instrument=ICP, Blk=3
Variability Chart for Measured (mg/L)

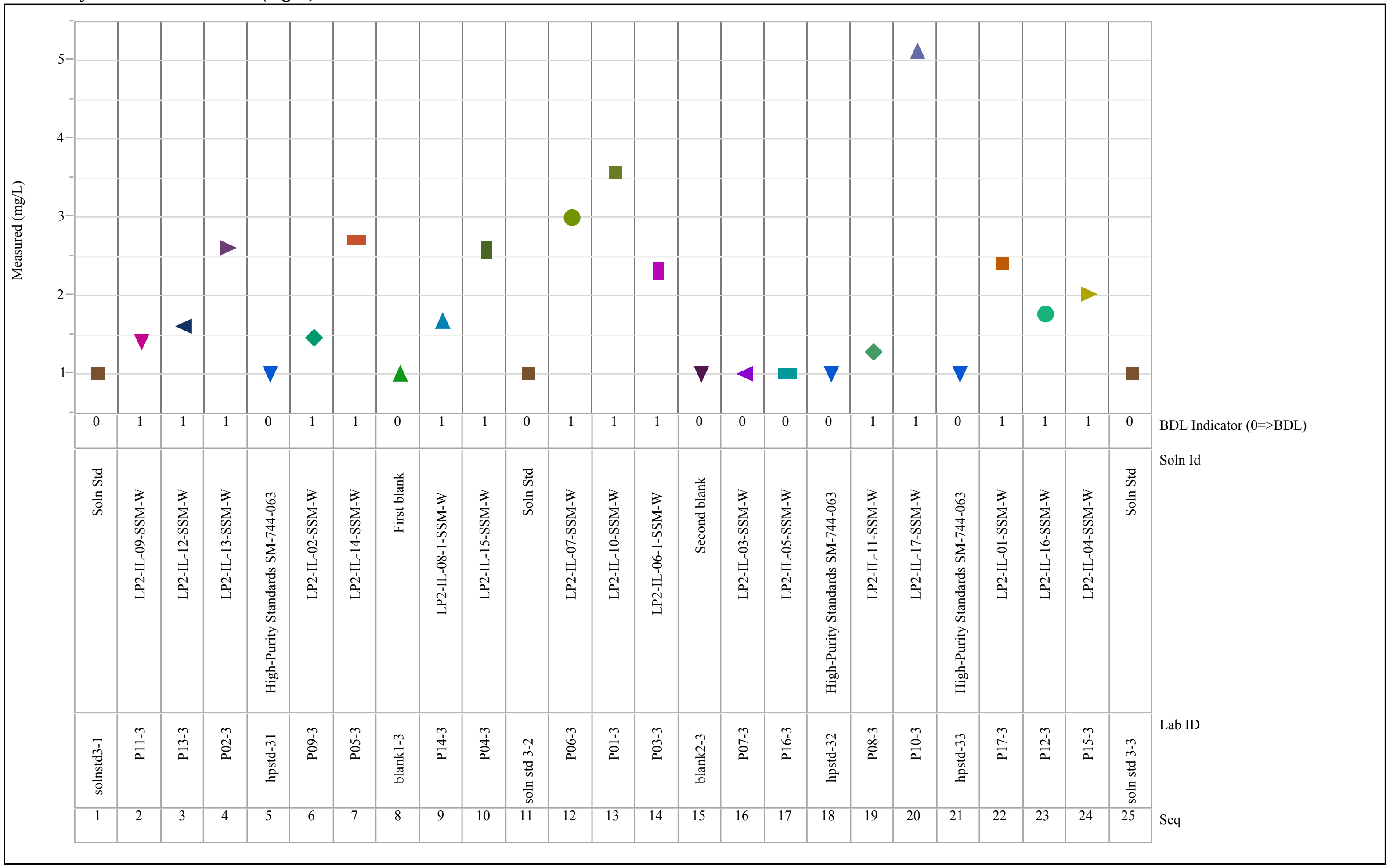


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Cl (mg/L), Instrument=IC, Blk=1
Variability Chart for Measured (mg/L)

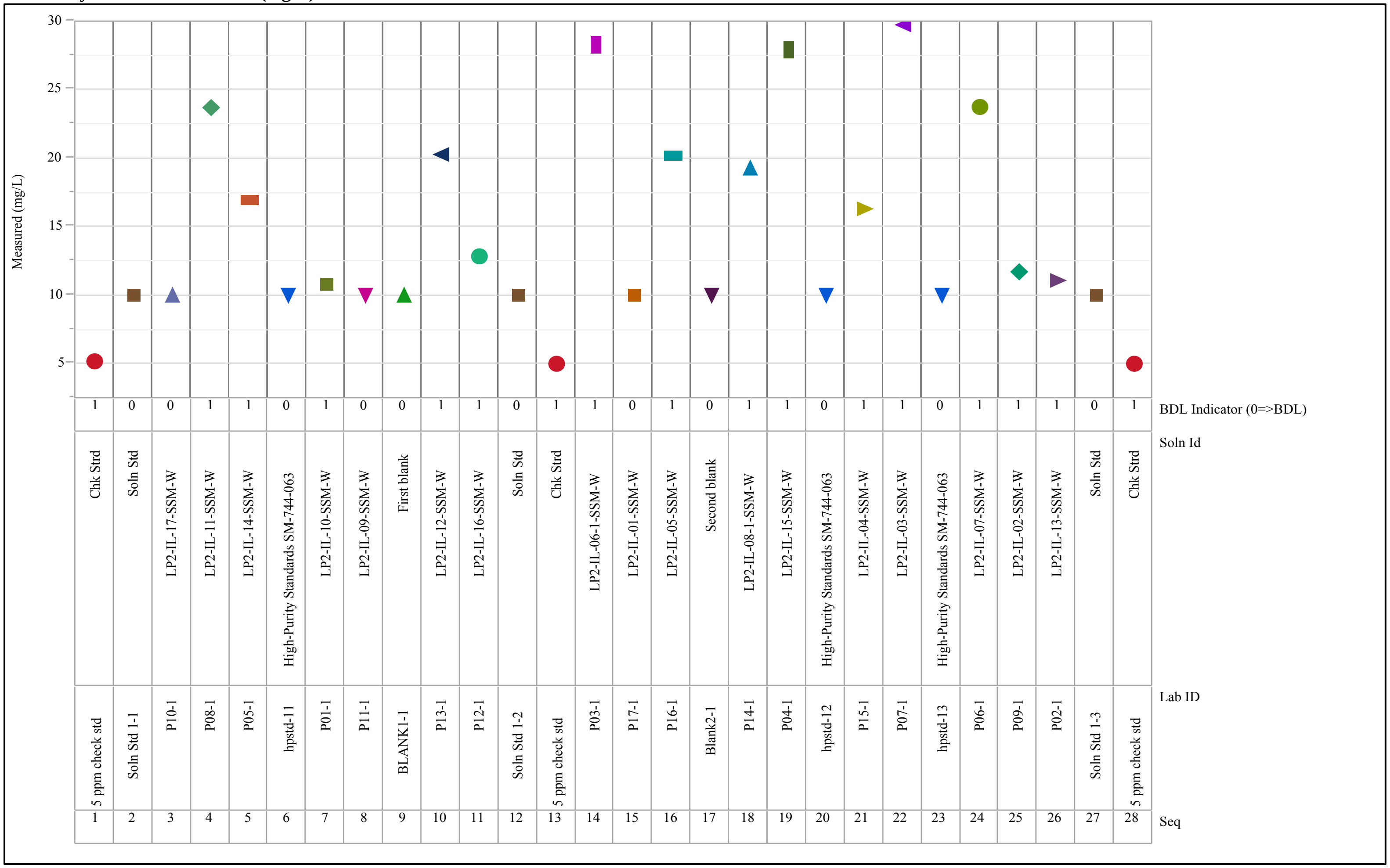


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Cl (mg/L), Instrument=IC, Blk=2
Variability Chart for Measured (mg/L)

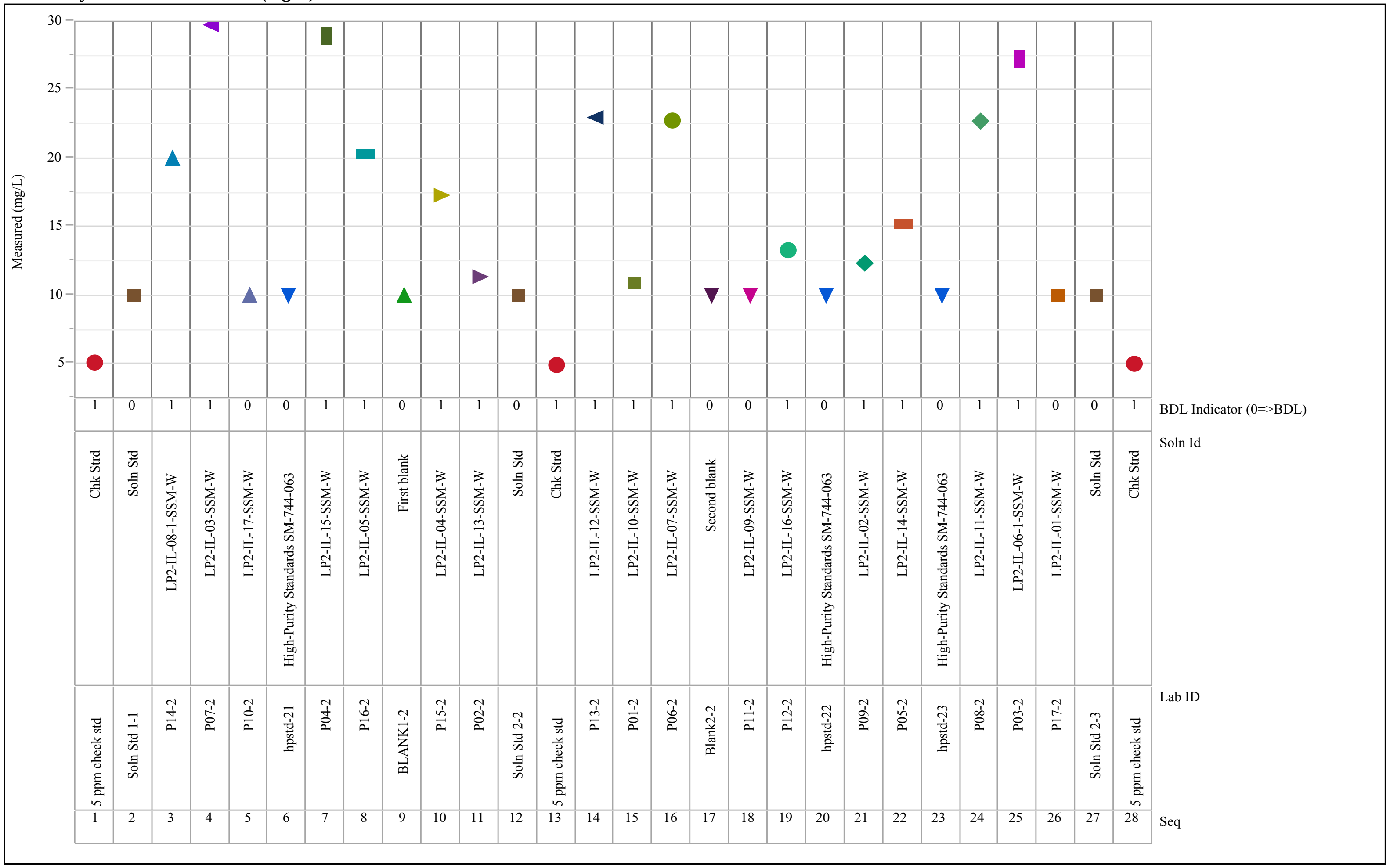


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Cl (mg/L), Instrument=IC, Blk=3
Variability Chart for Measured (mg/L)

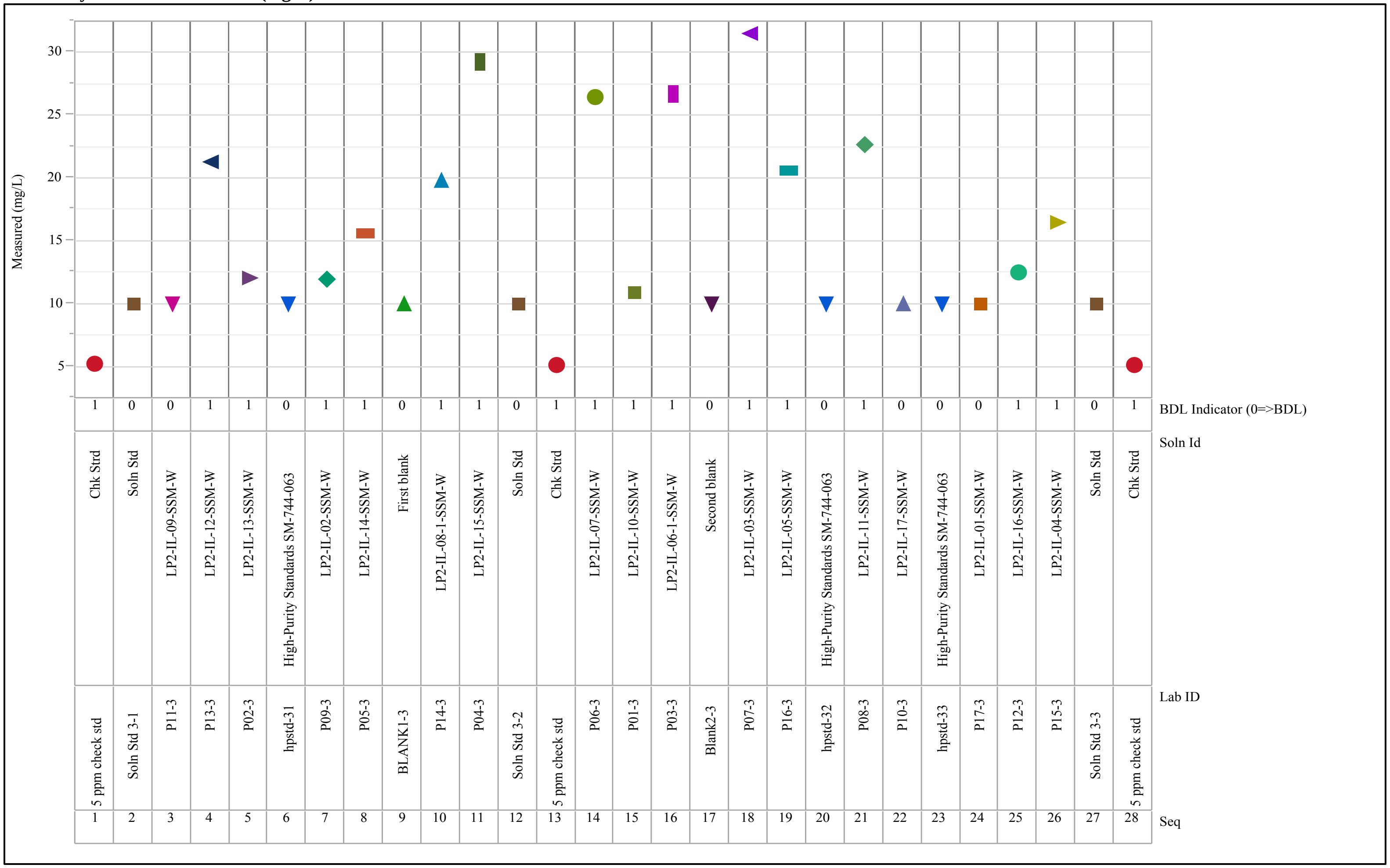


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Cr (mg/L), Instrument=ICP, Blk=1
Variability Chart for Measured (mg/L)

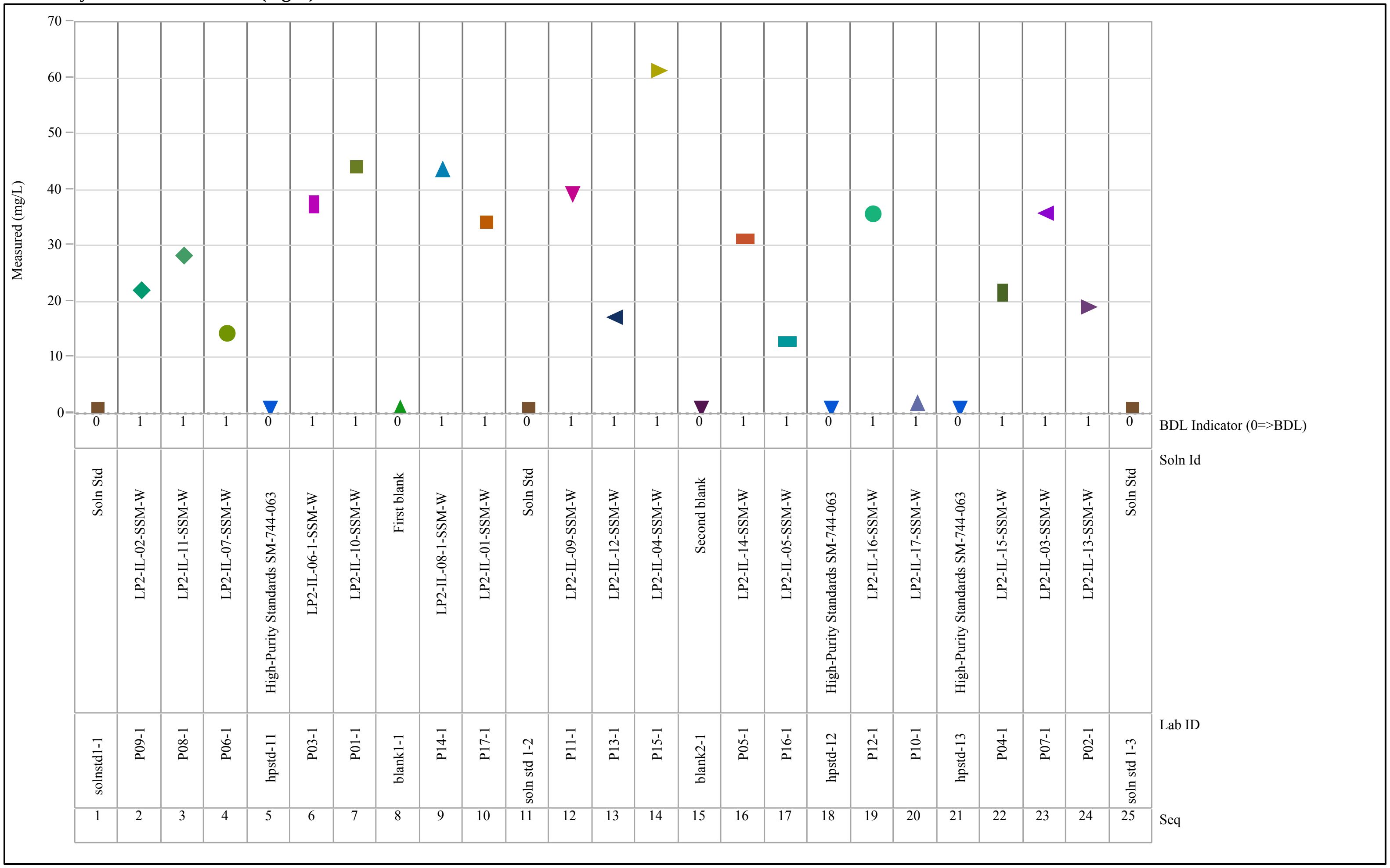


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Cr (mg/L), Instrument=ICP, Blk=2
Variability Chart for Measured (mg/L)

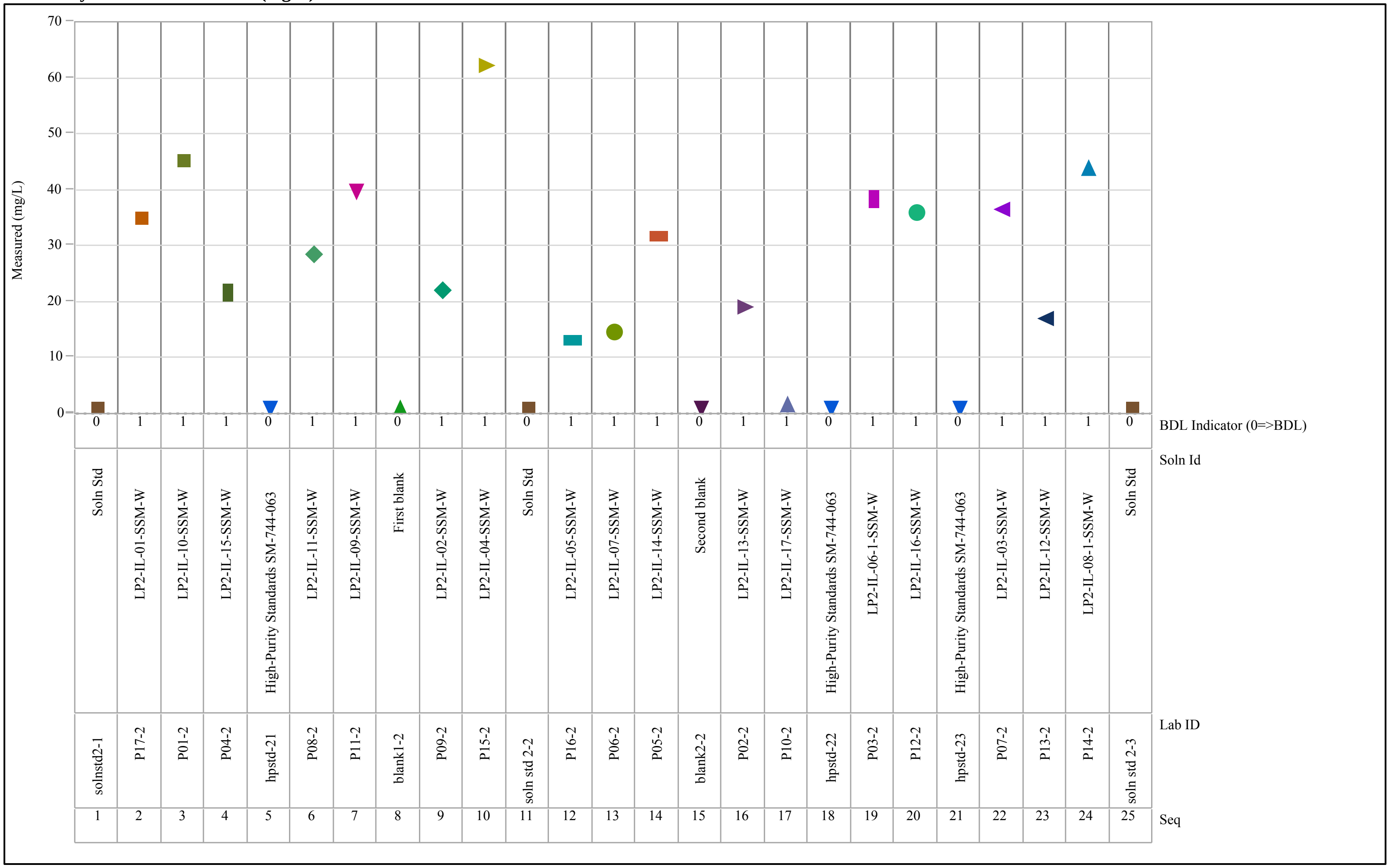


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Cr (mg/L), Instrument=ICP, Blk=3
Variability Chart for Measured (mg/L)

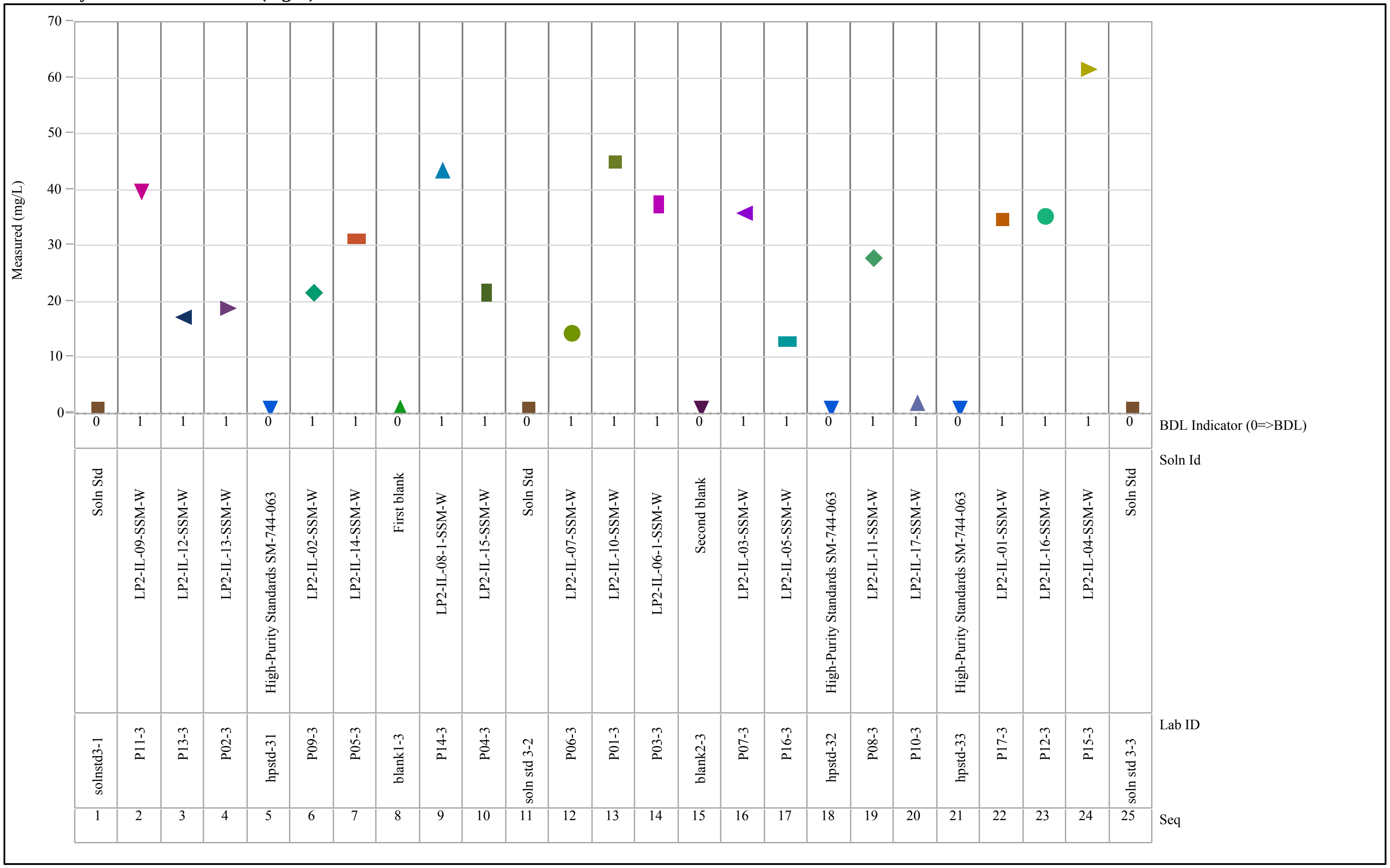


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=F (mg/L), Instrument=IC, Blk=1
Variability Chart for Measured (mg/L)

Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=F (mg/L), Instrument=IC, Blk=2
Variability Chart for Measured (mg/L)

Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=F (mg/L), Instrument=IC, Blk=3
Variability Chart for Measured (mg/L)

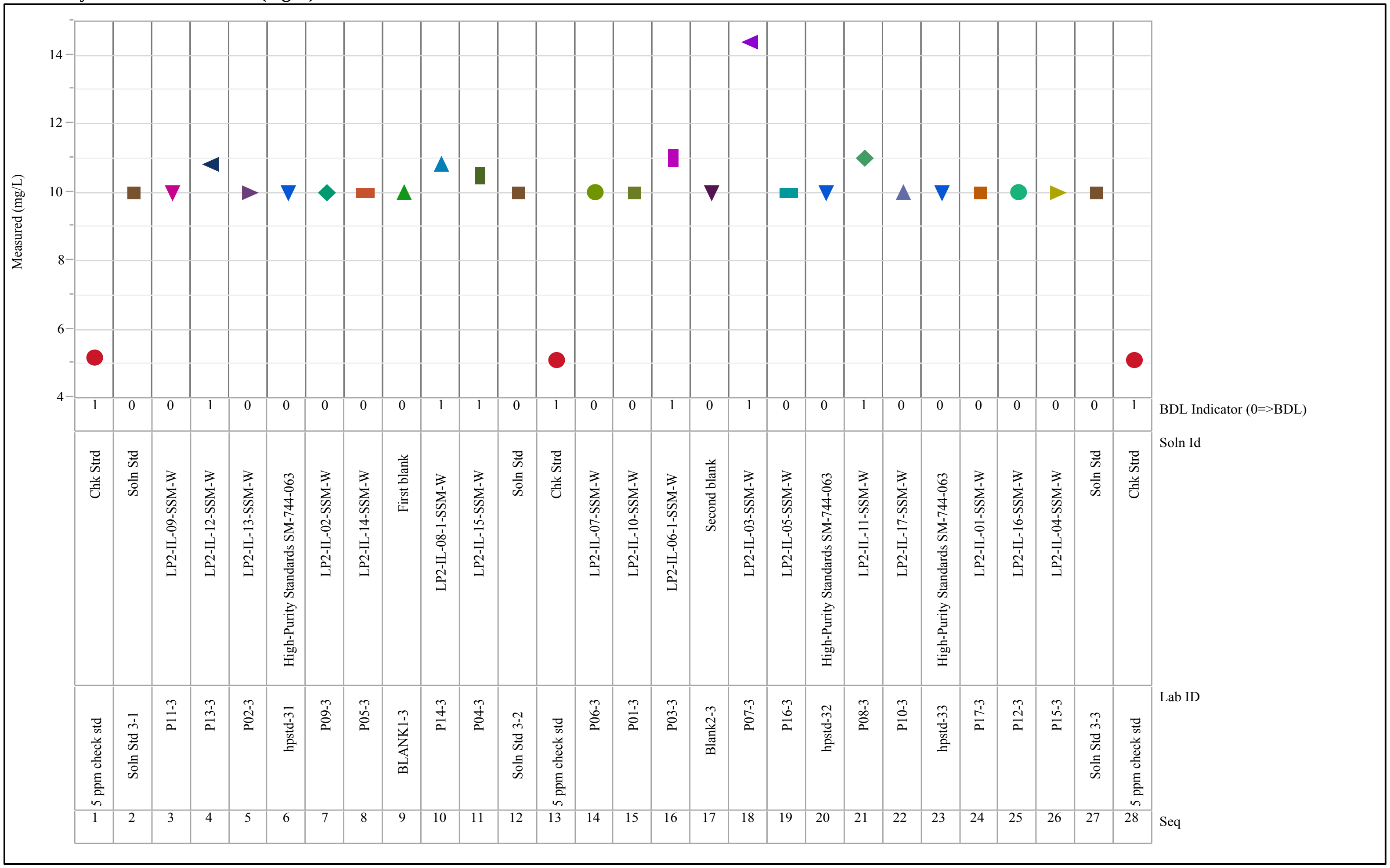


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Fe (mg/L), Instrument=ICP, Blk=1
Variability Chart for Measured (mg/L)

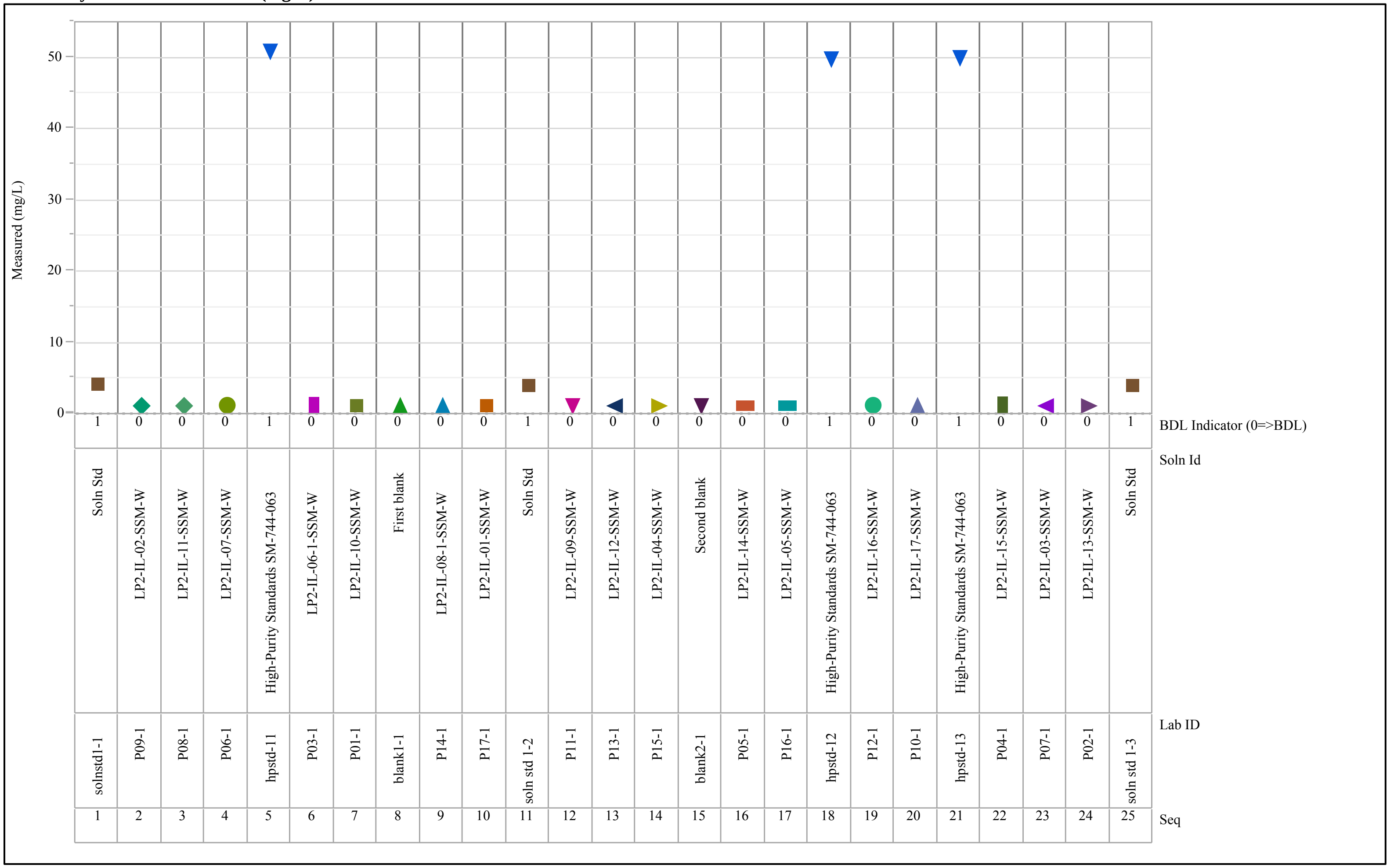


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Fe (mg/L), Instrument=ICP, Blk=2
Variability Chart for Measured (mg/L)

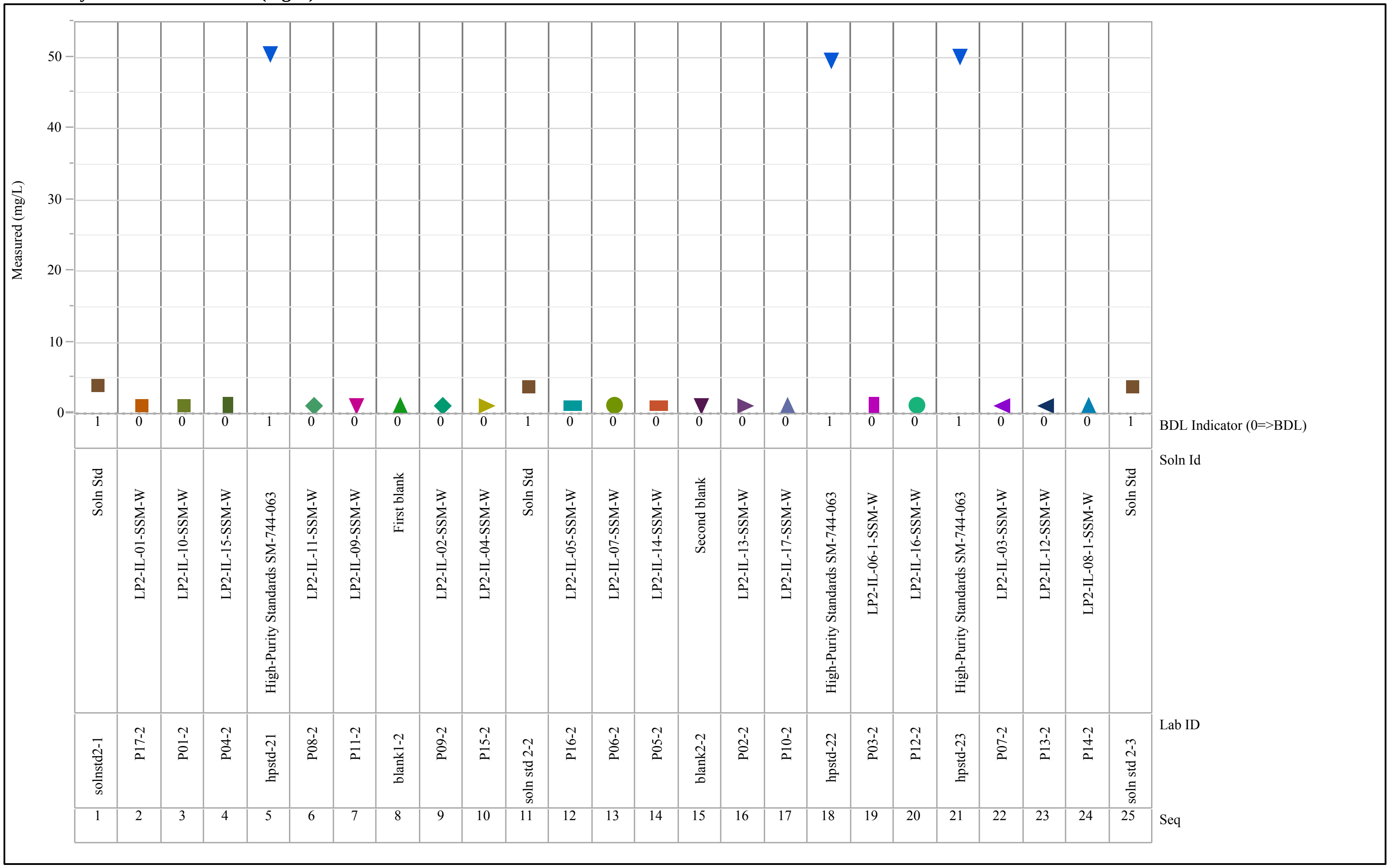


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Fe (mg/L), Instrument=ICP, Blk=3
Variability Chart for Measured (mg/L)

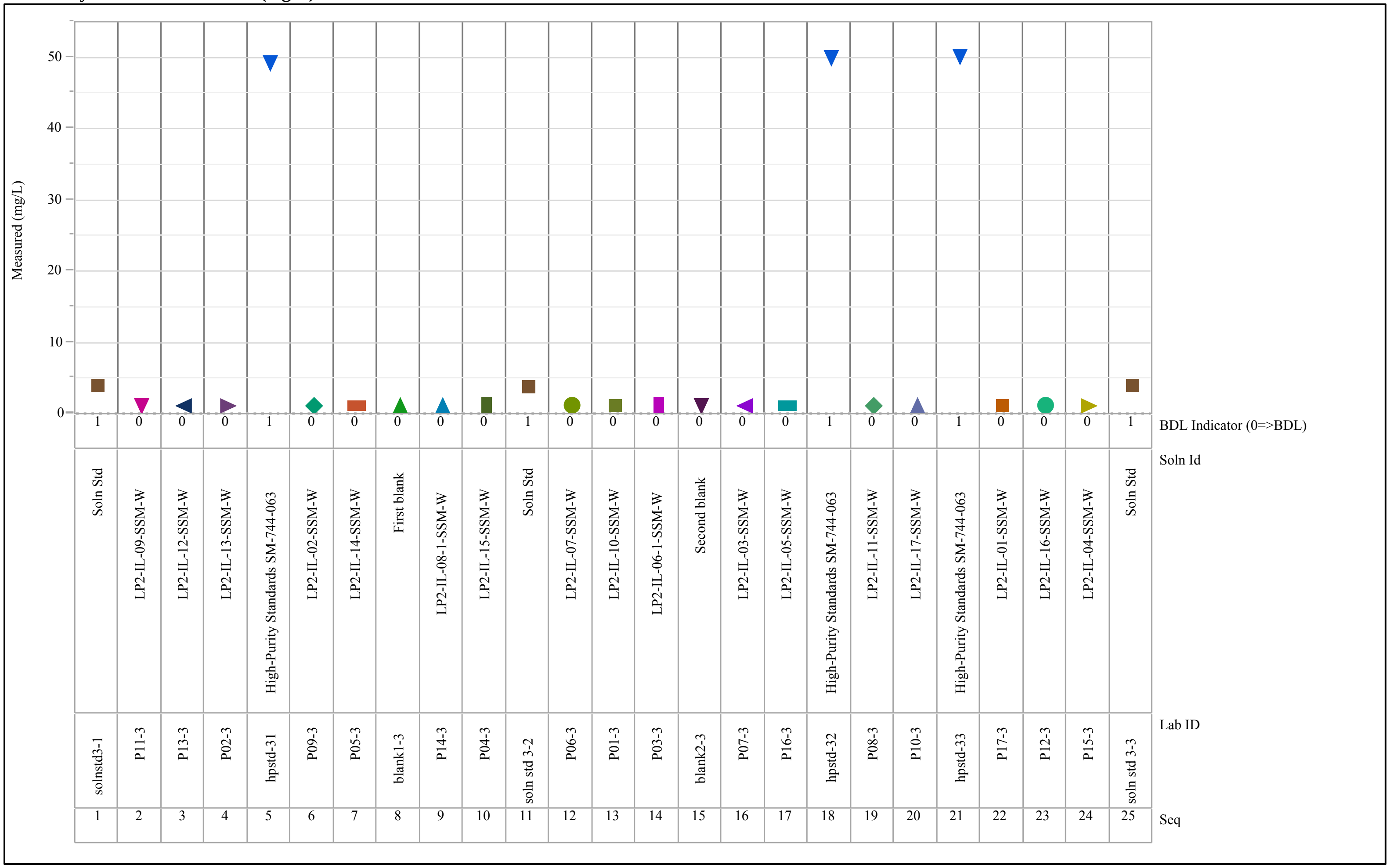


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=K (mg/L), Instrument=ICP, Blk=1
Variability Chart for Measured (mg/L)

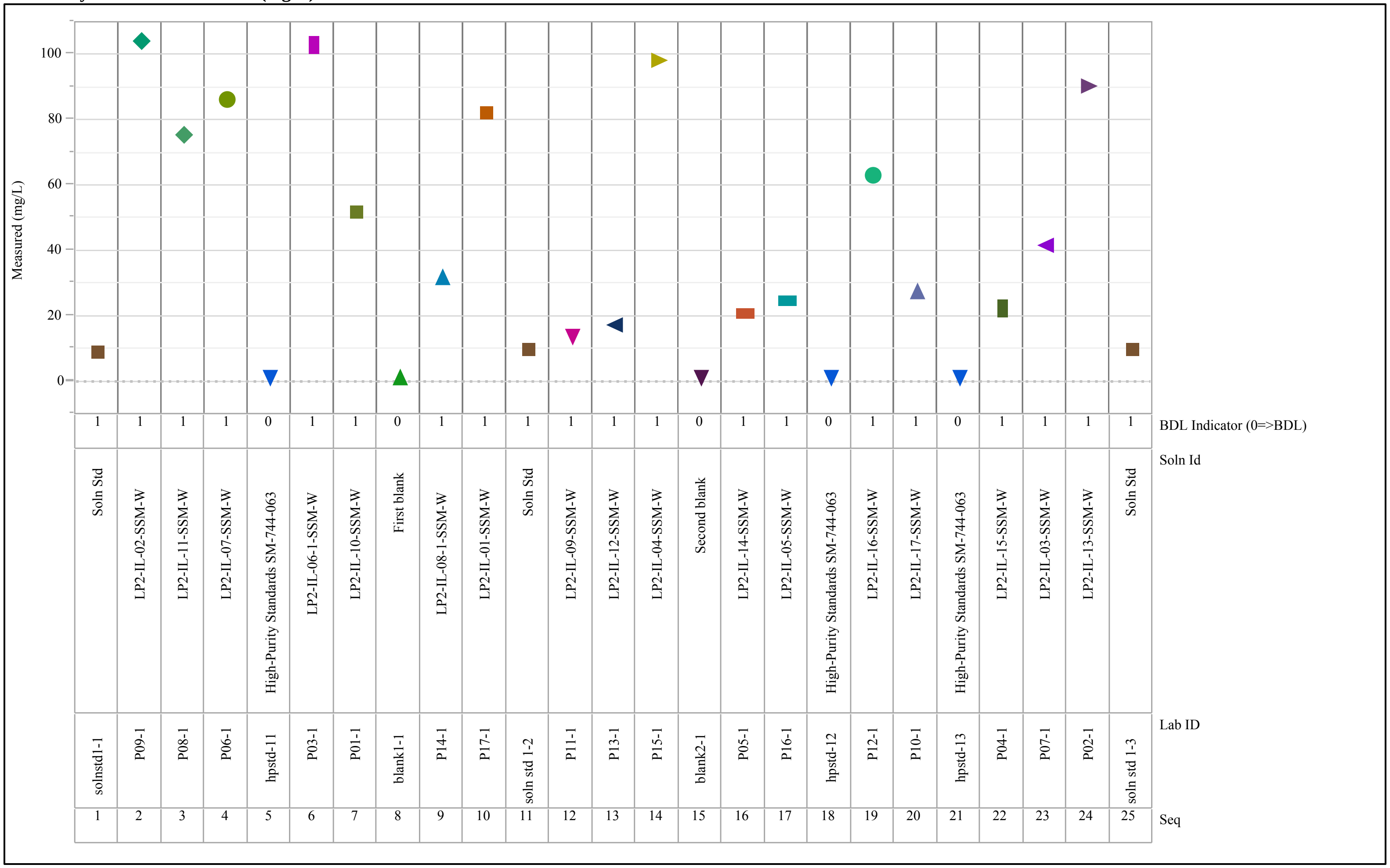


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=K (mg/L), Instrument=ICP, Blk=2
Variability Chart for Measured (mg/L)

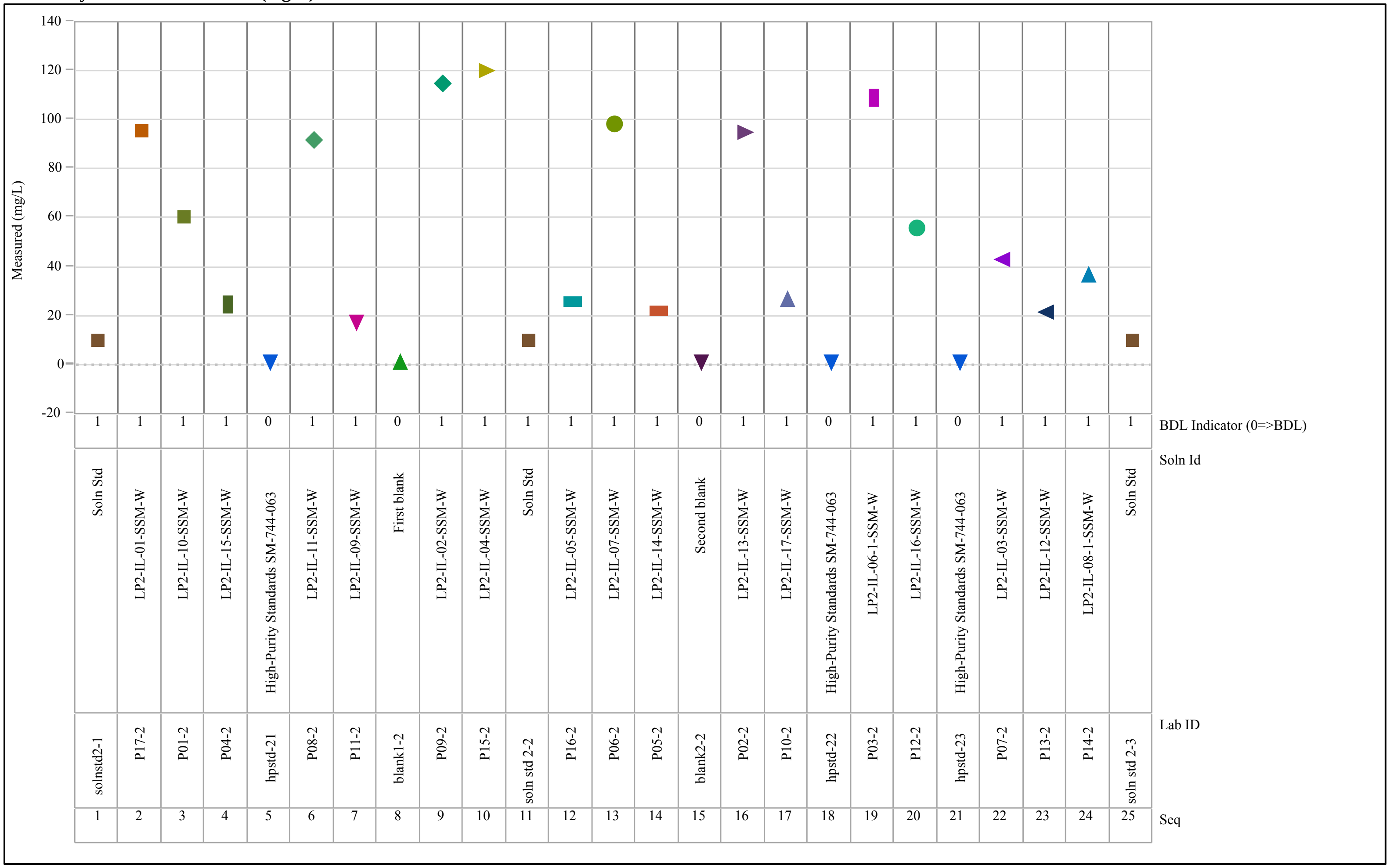


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=K (mg/L), Instrument=ICP, Blk=3
Variability Chart for Measured (mg/L)

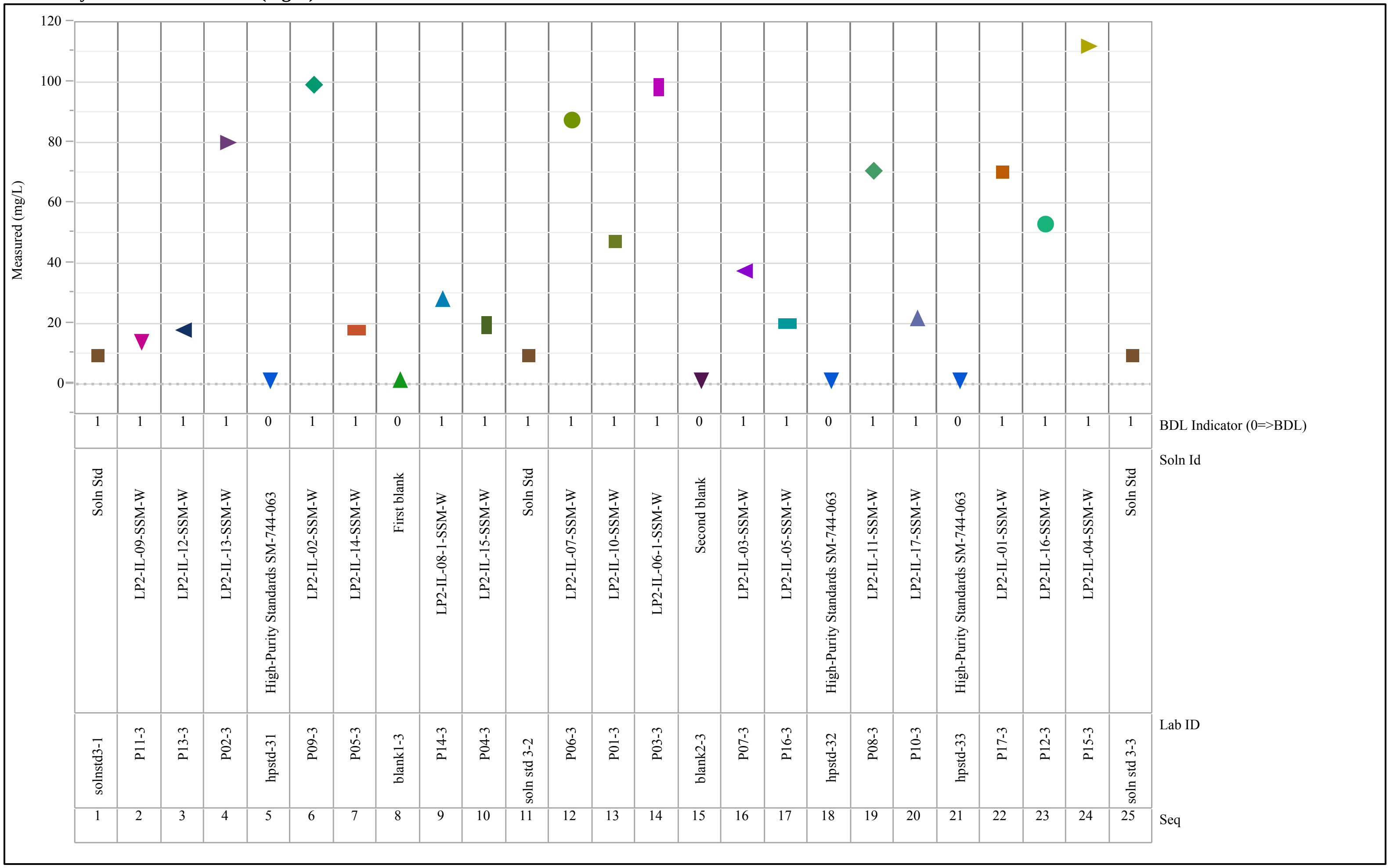


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Li (mg/L), Instrument=ICP, Blk=1
Variability Chart for Measured (mg/L)

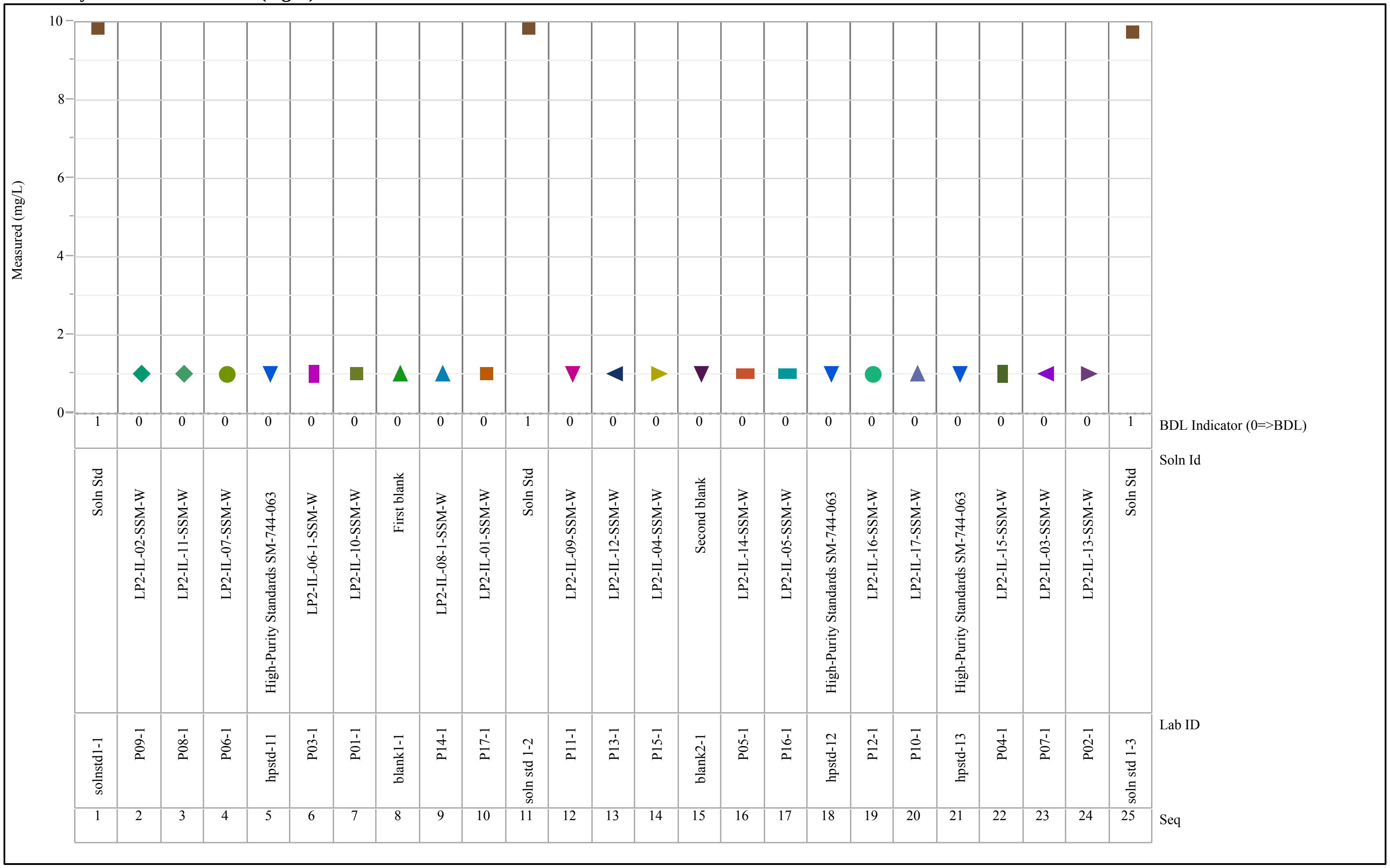


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Li (mg/L), Instrument=ICP, Blk=2
Variability Chart for Measured (mg/L)

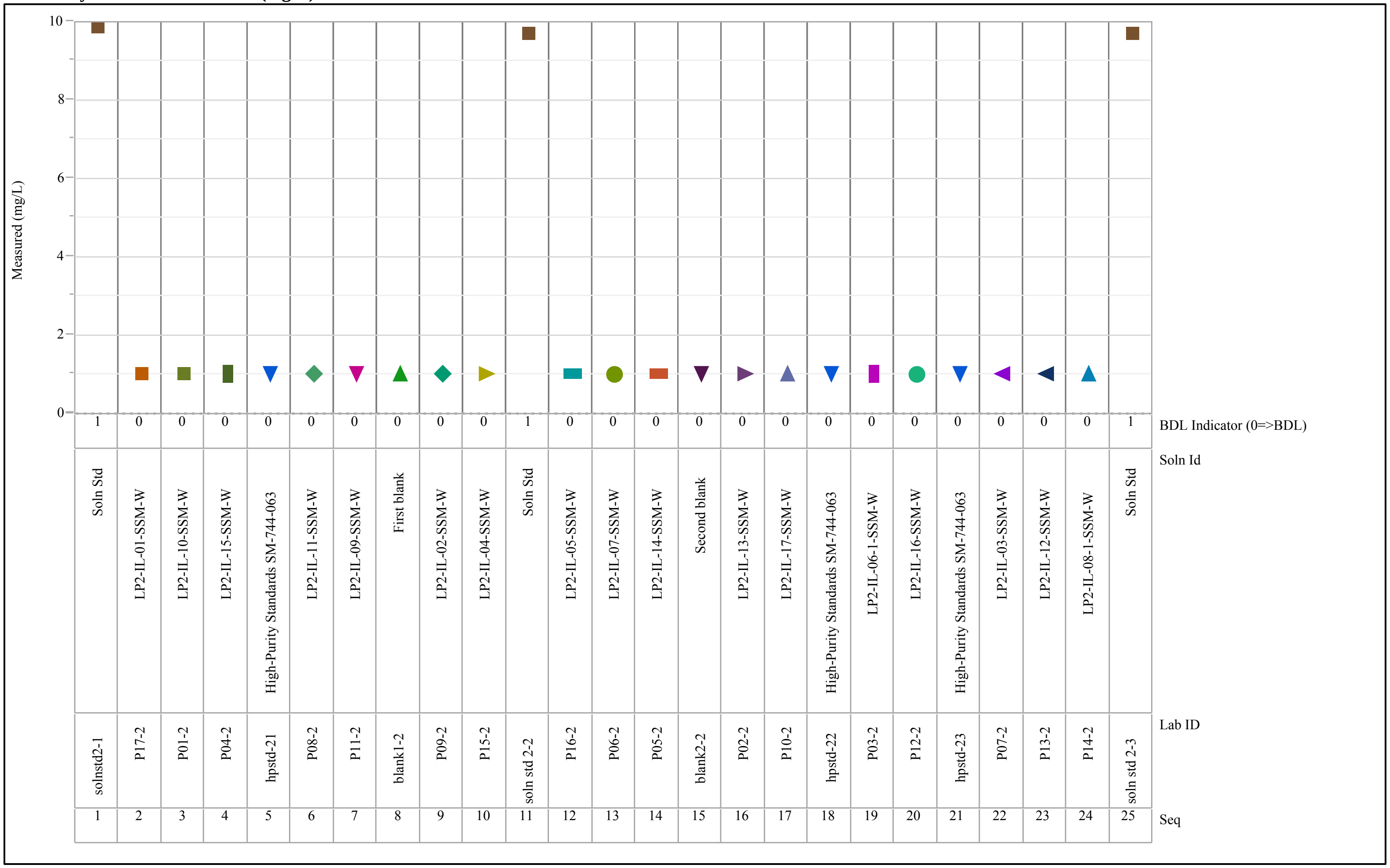


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Li (mg/L), Instrument=ICP, Blk=3
Variability Chart for Measured (mg/L)

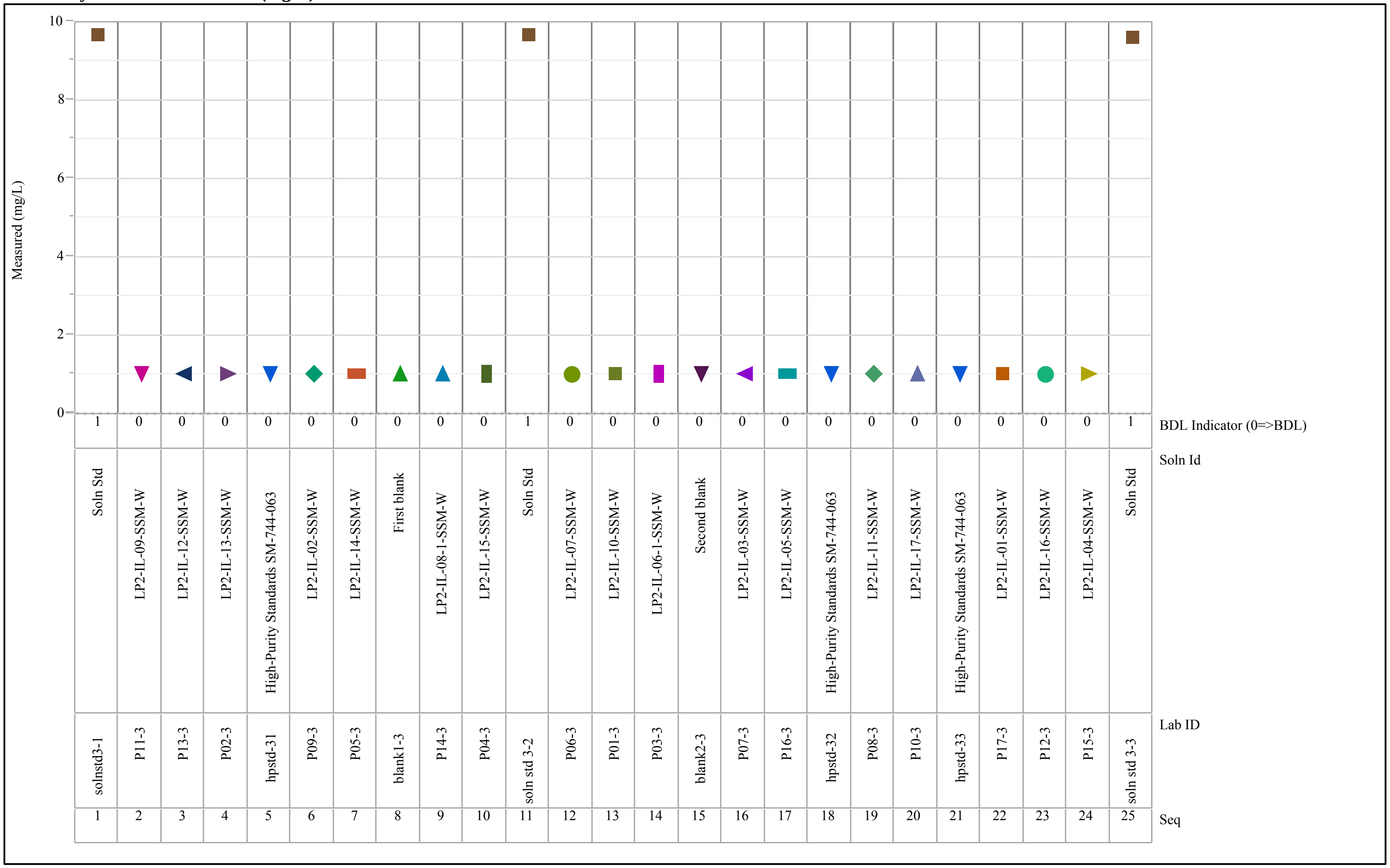


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Mg (mg/L), Instrument=ICP, Blk=1
Variability Chart for Measured (mg/L)

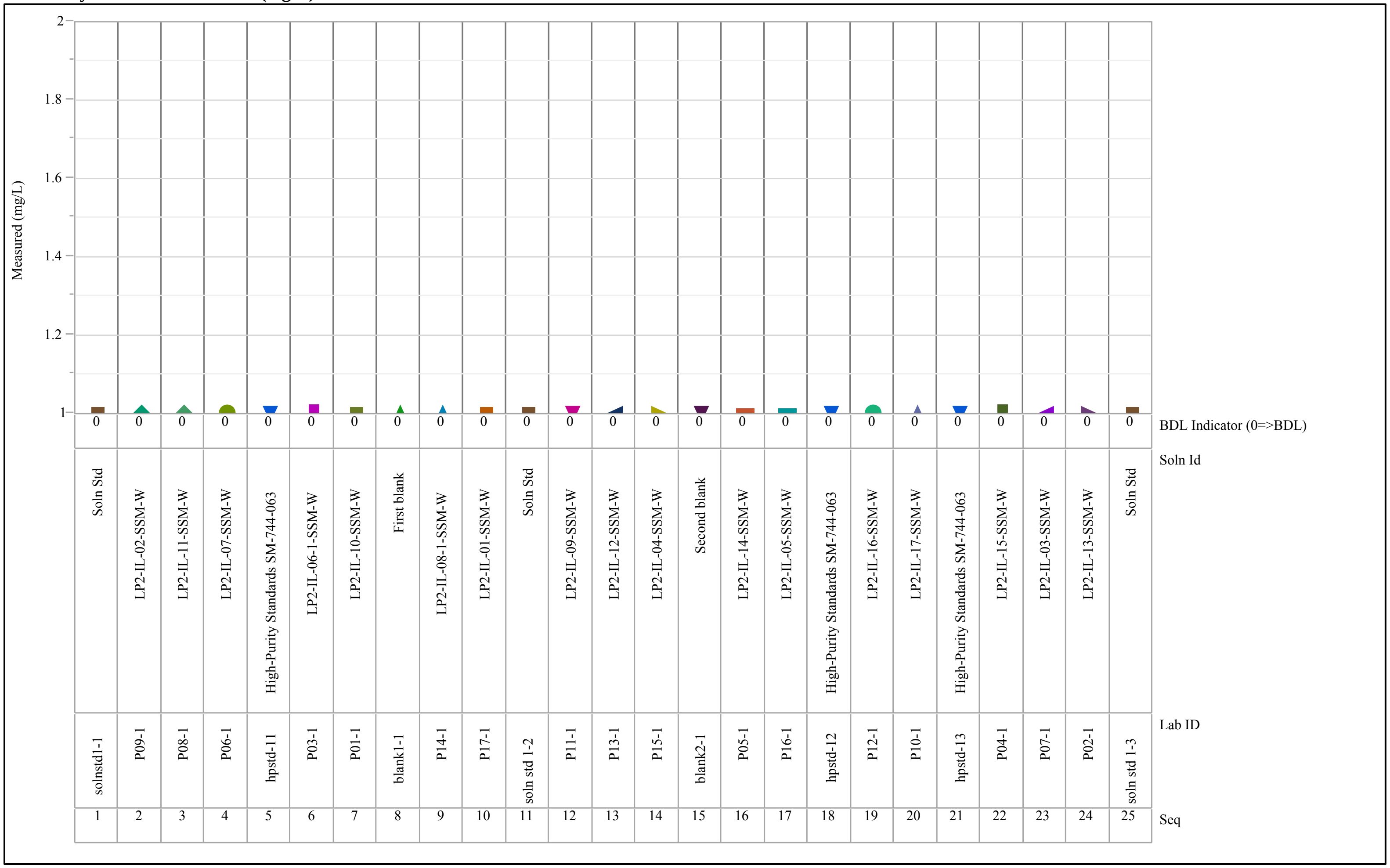


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Mg (mg/L), Instrument=ICP, Blk=2
Variability Chart for Measured (mg/L)

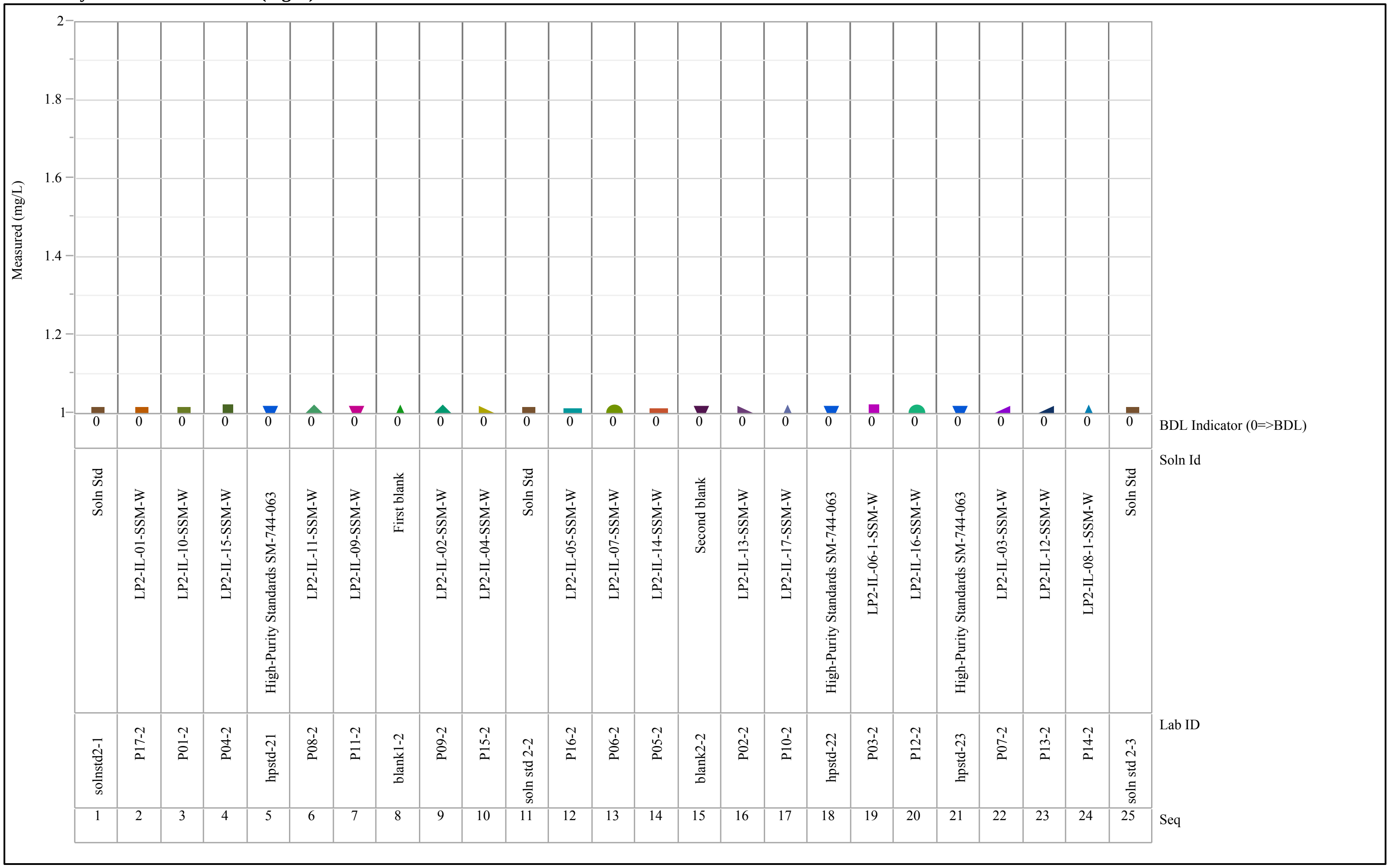


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Mg (mg/L), Instrument=ICP, Blk=3
Variability Chart for Measured (mg/L)

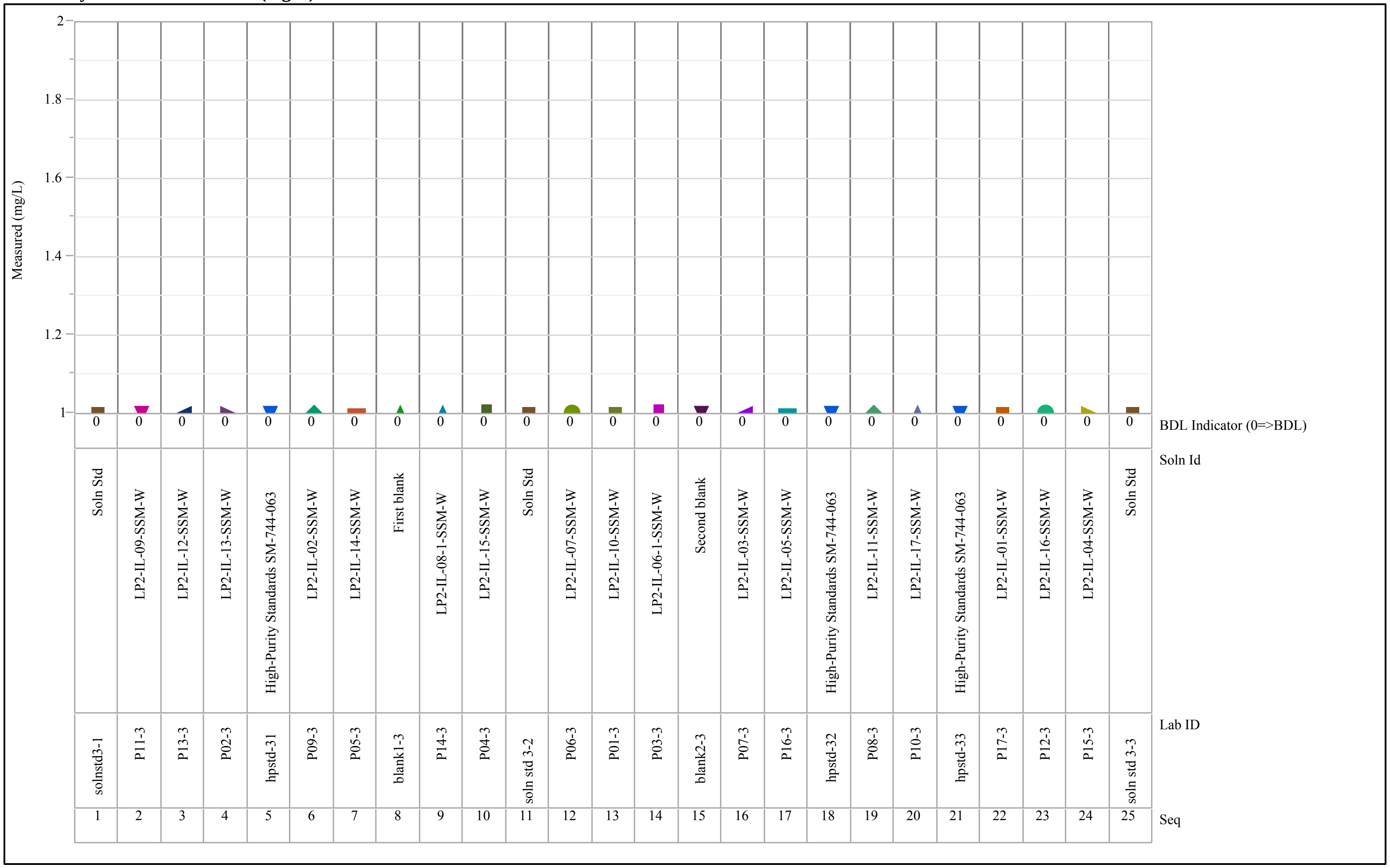


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Na (mg/L), Instrument=ICP, Blk=1
Variability Chart for Measured (mg/L)

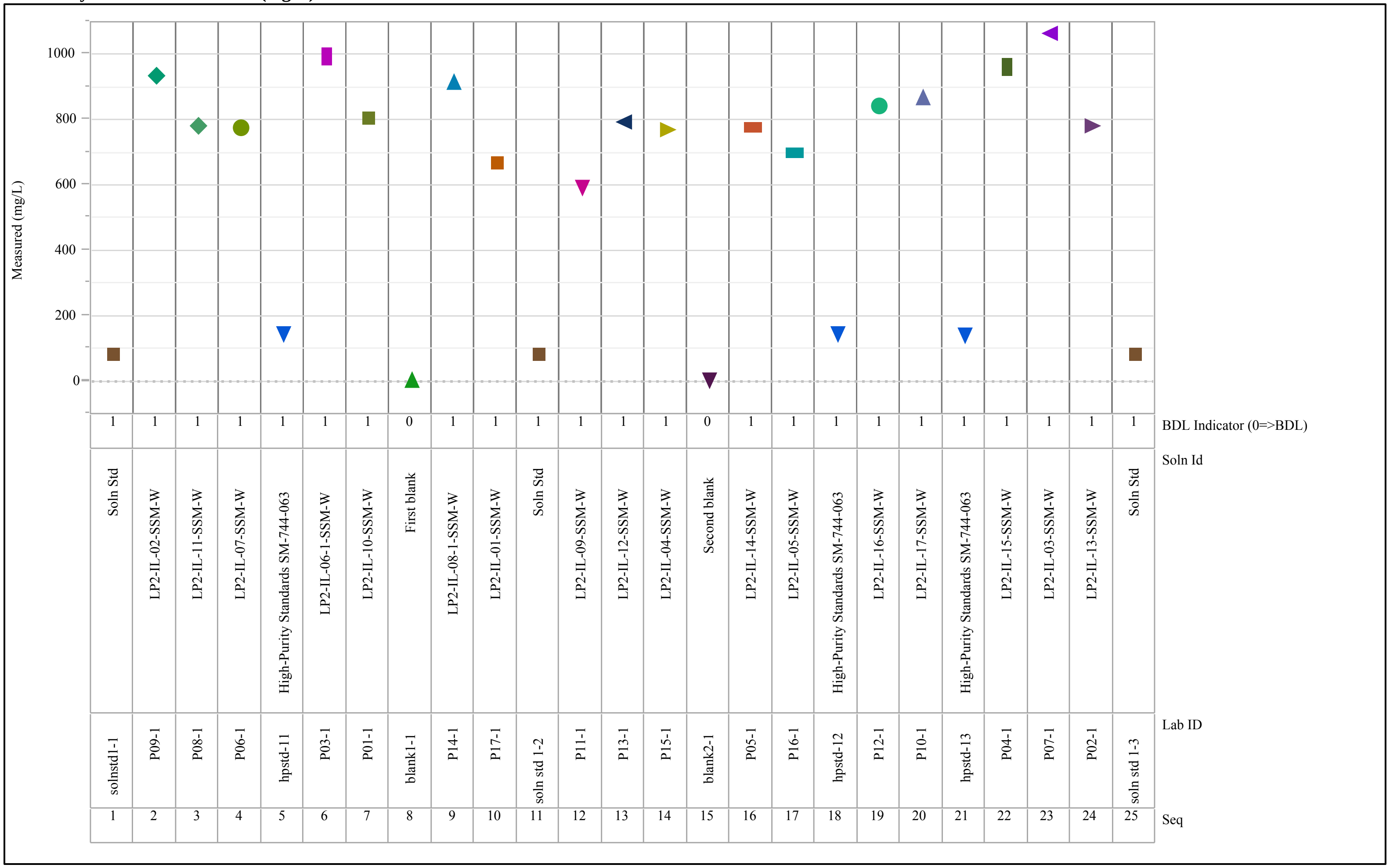


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Na (mg/L), Instrument=ICP, Blk=2
Variability Chart for Measured (mg/L)

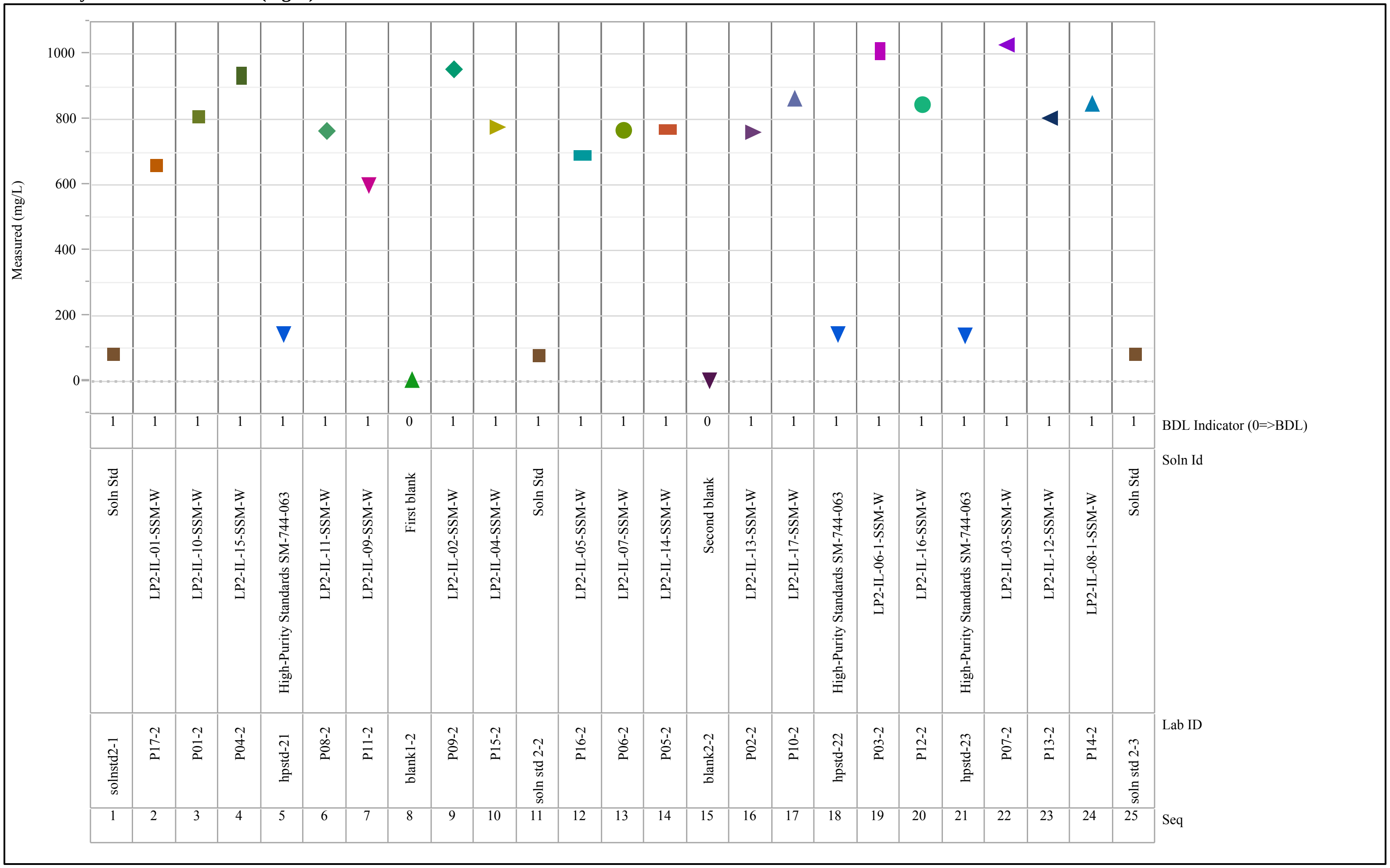


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Na (mg/L), Instrument=ICP, Blk=3
Variability Chart for Measured (mg/L)

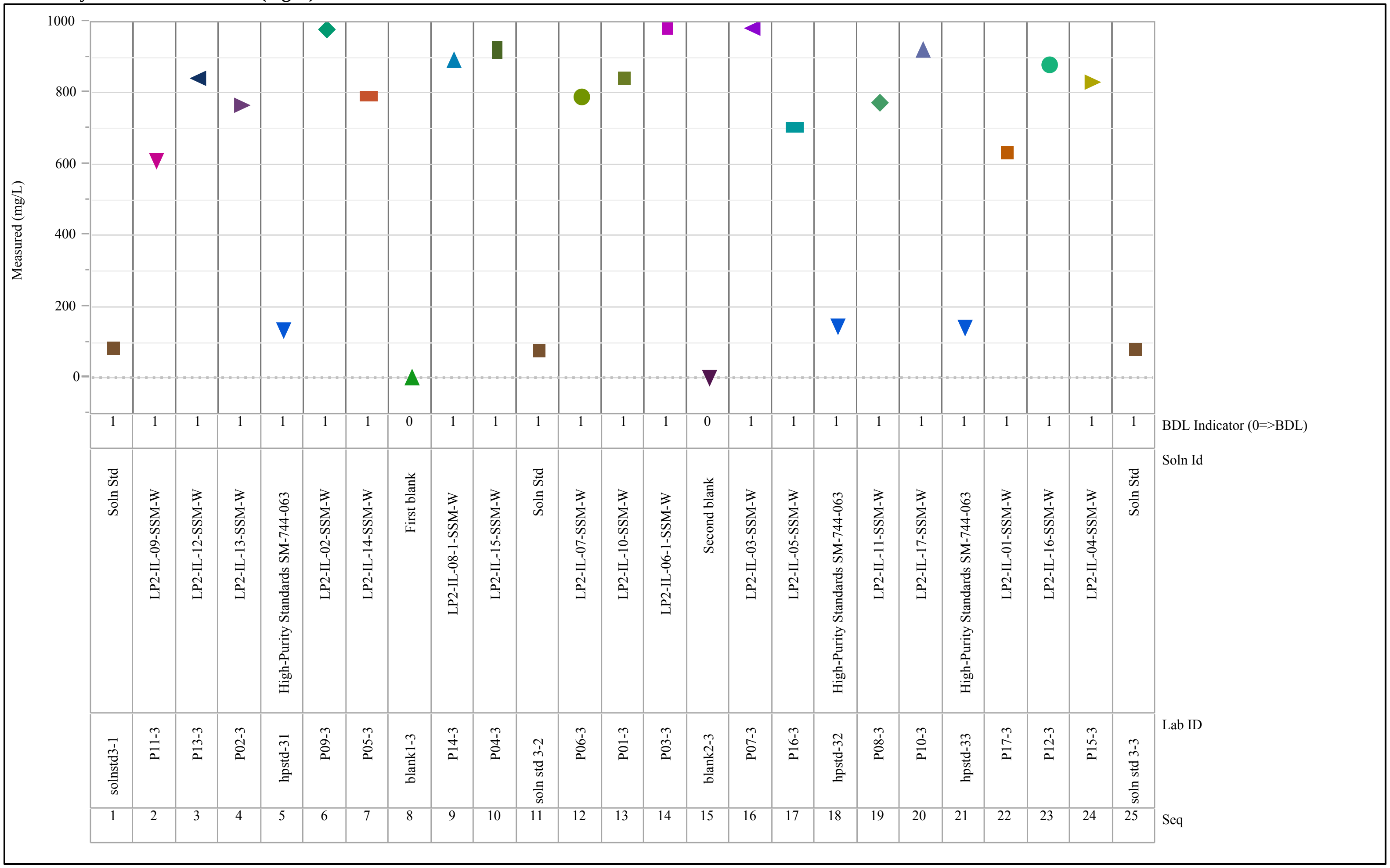


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=P (mg/L), Instrument=ICP, Blk=1
Variability Chart for Measured (mg/L)

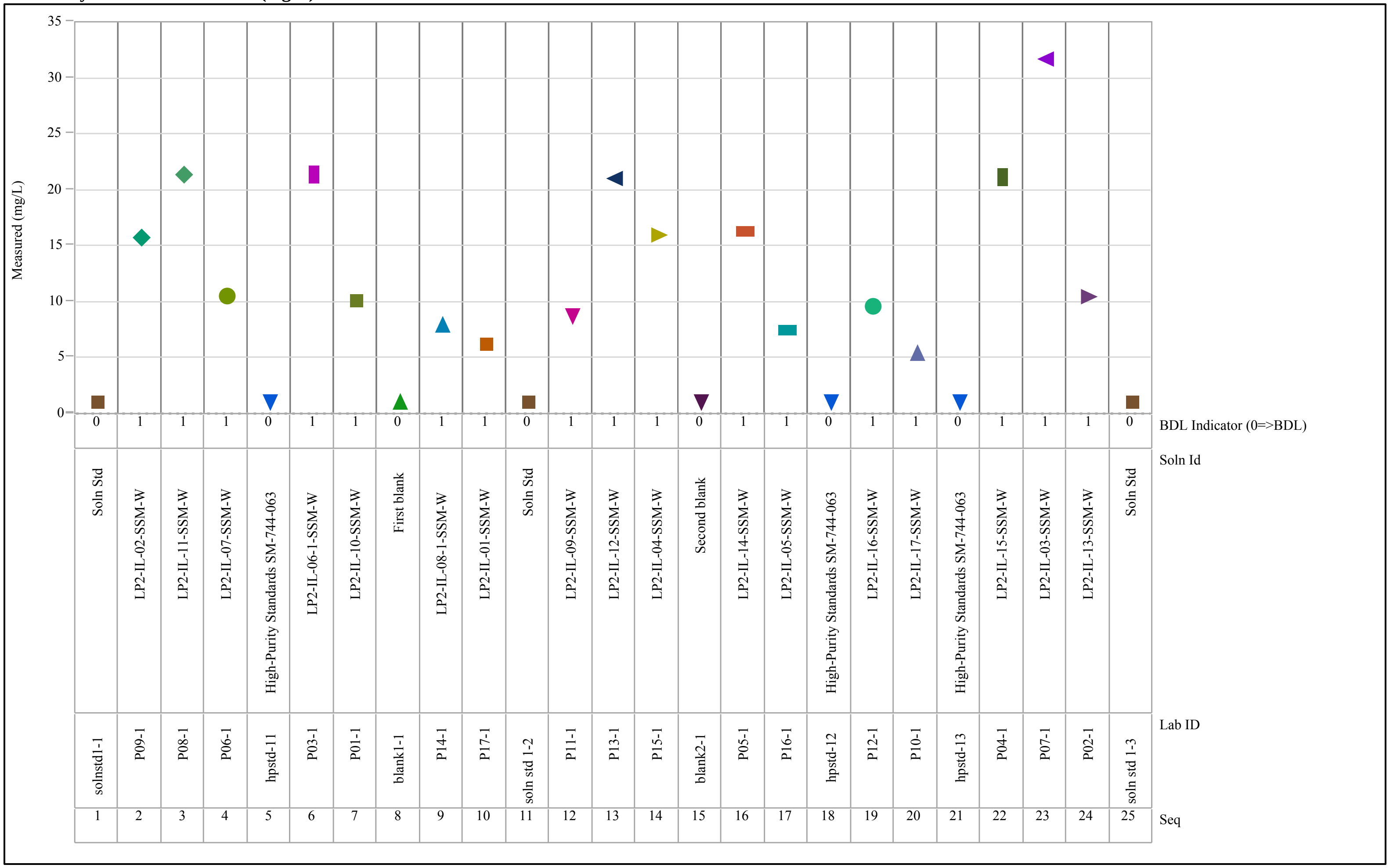


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=P (mg/L), Instrument=ICP, Blk=2
Variability Chart for Measured (mg/L)

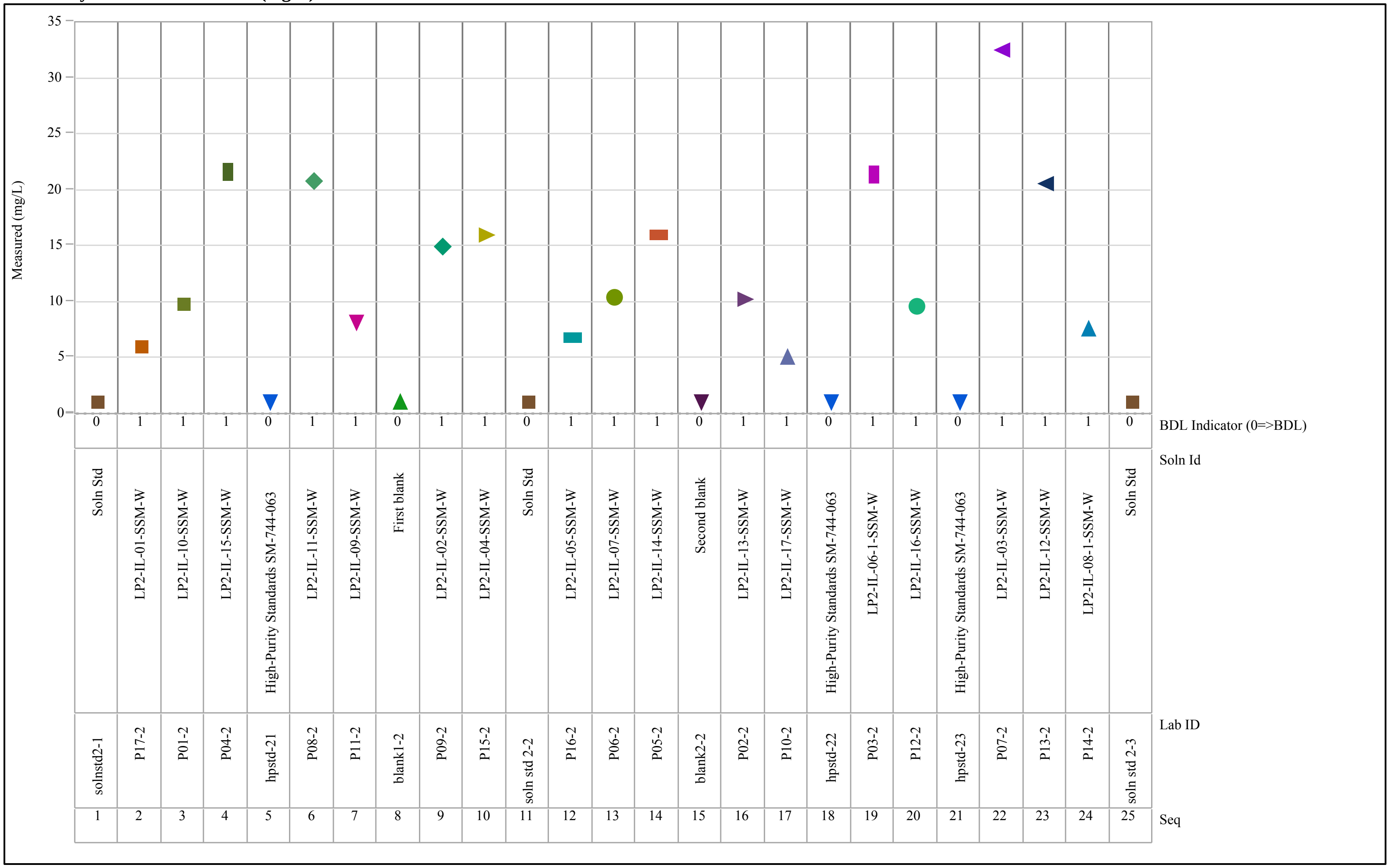


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=P (mg/L), Instrument=ICP, Blk=3
Variability Chart for Measured (mg/L)

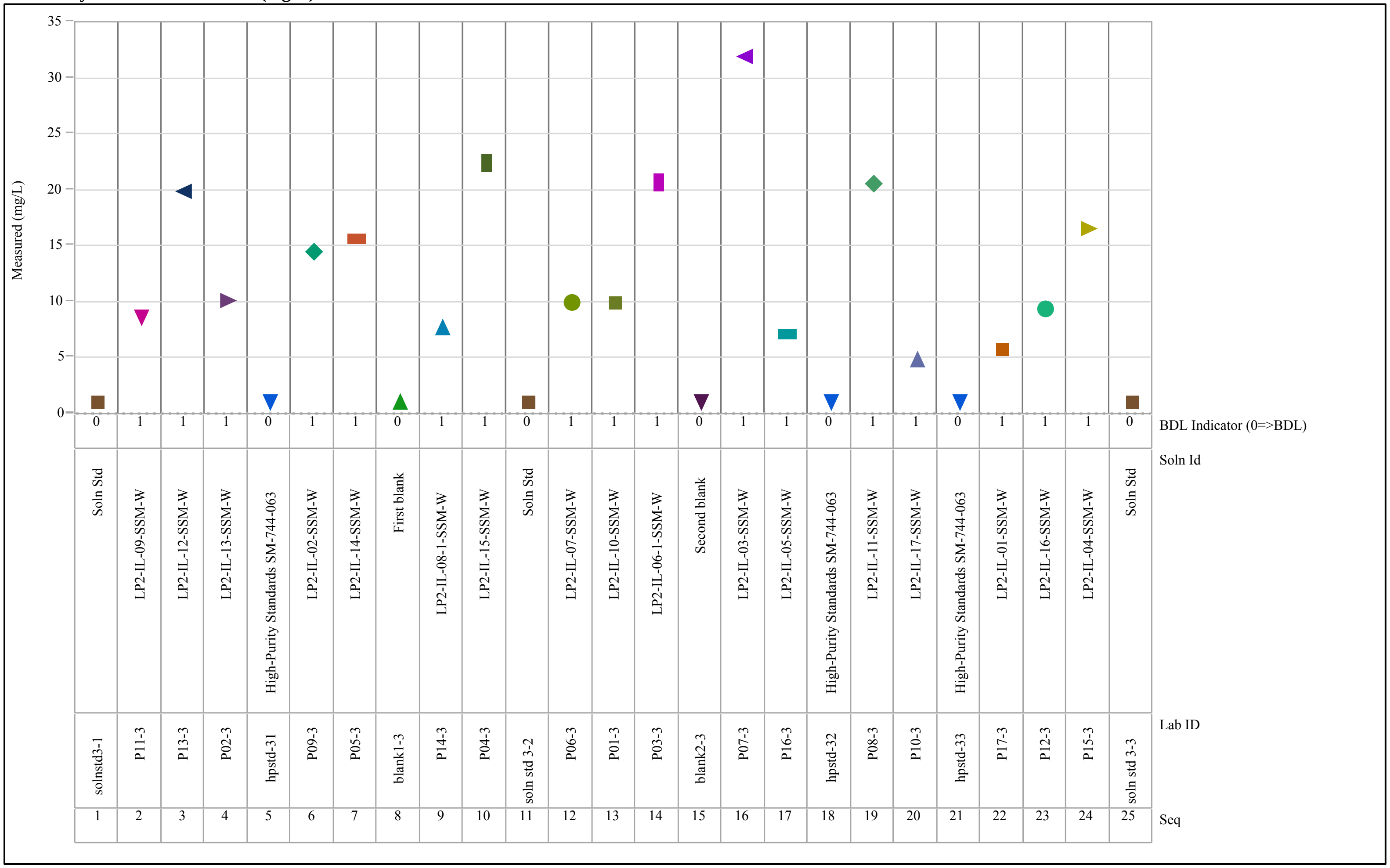


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=PO4 IC (mg/L), Instrument=IC, Blk=1
Variability Chart for Measured (mg/L)

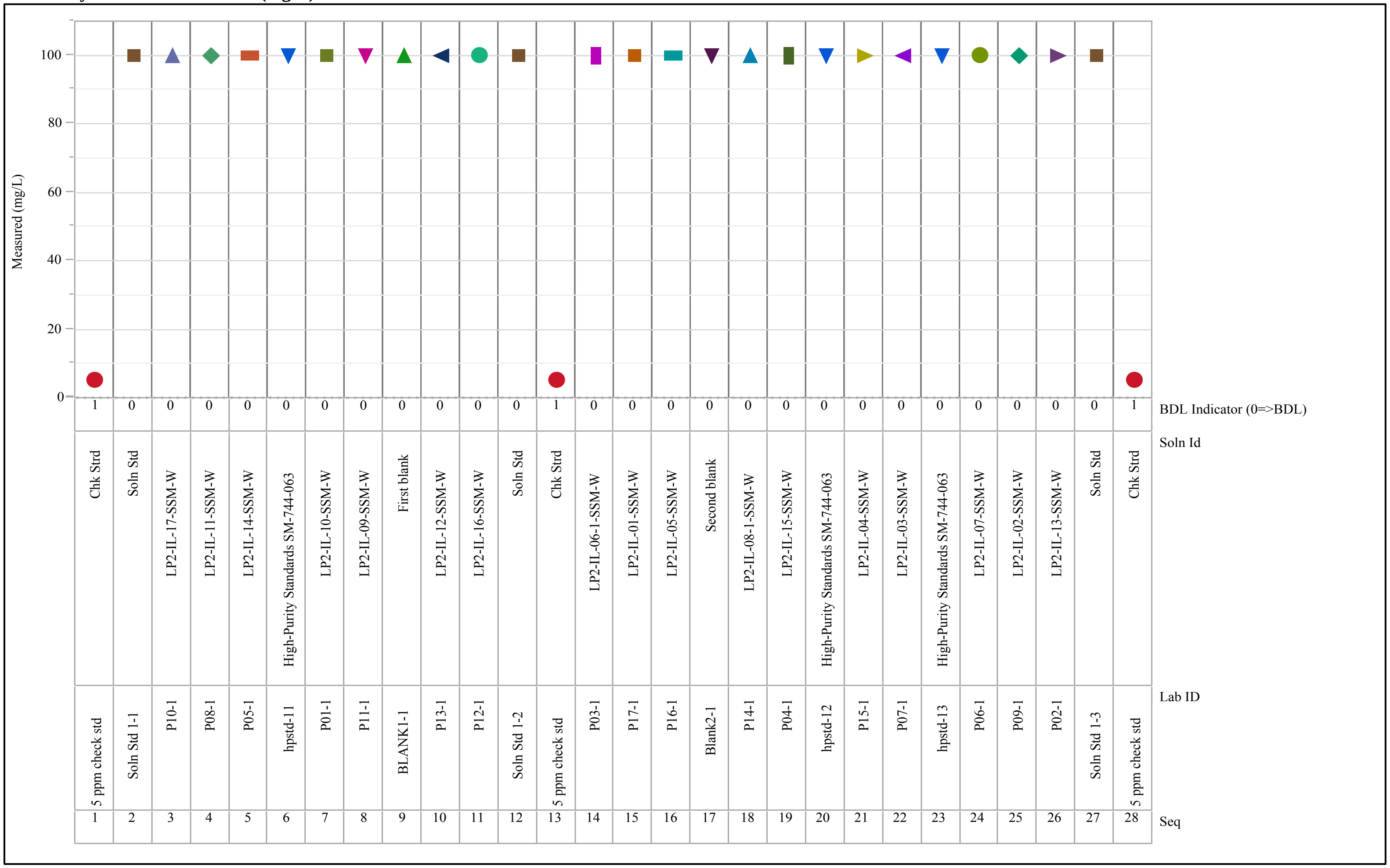


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=PO4 IC (mg/L), Instrument=IC, Blk=2
Variability Chart for Measured (mg/L)

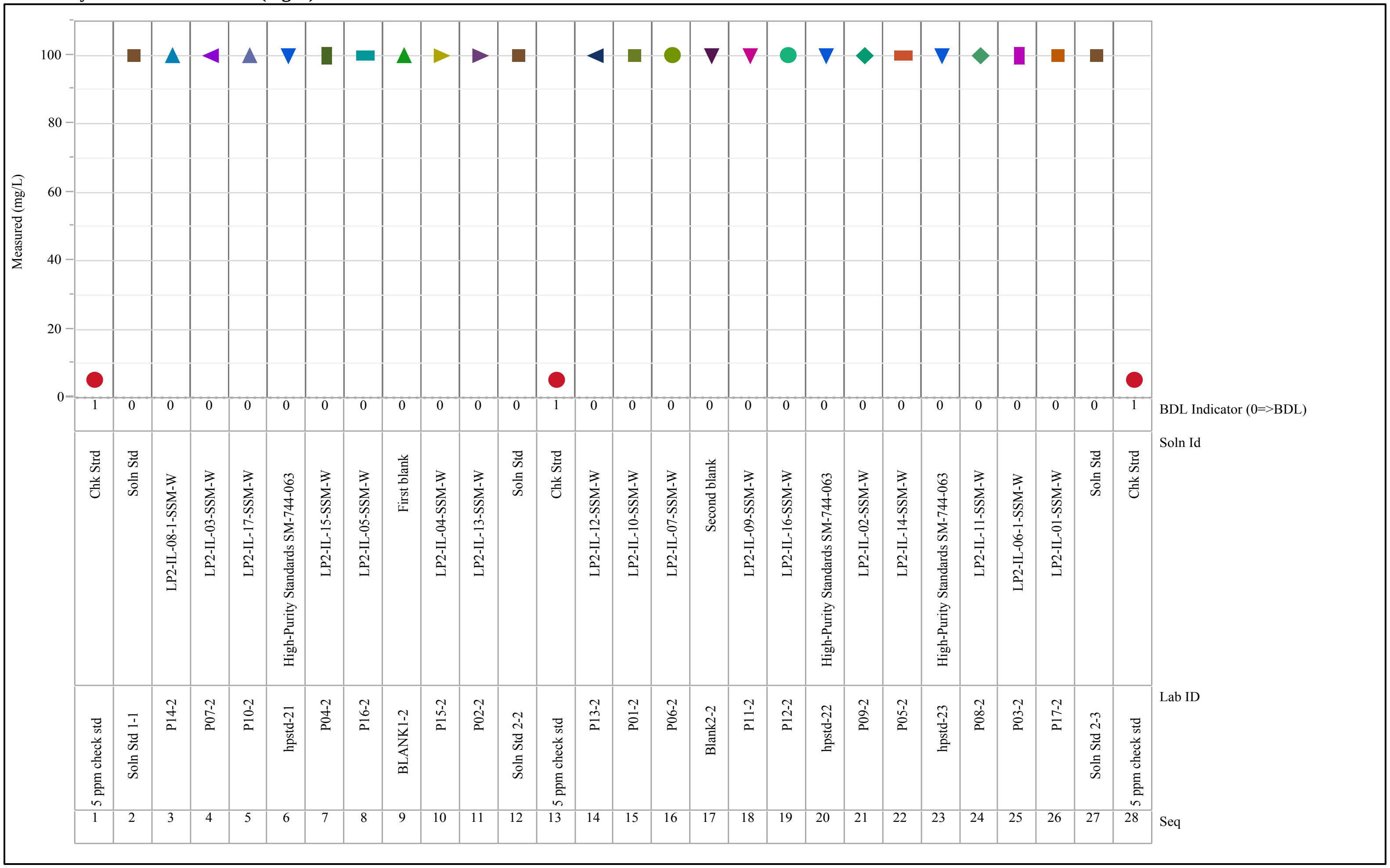


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=PO4 IC (mg/L), Instrument=IC, Blk=3
Variability Chart for Measured (mg/L)

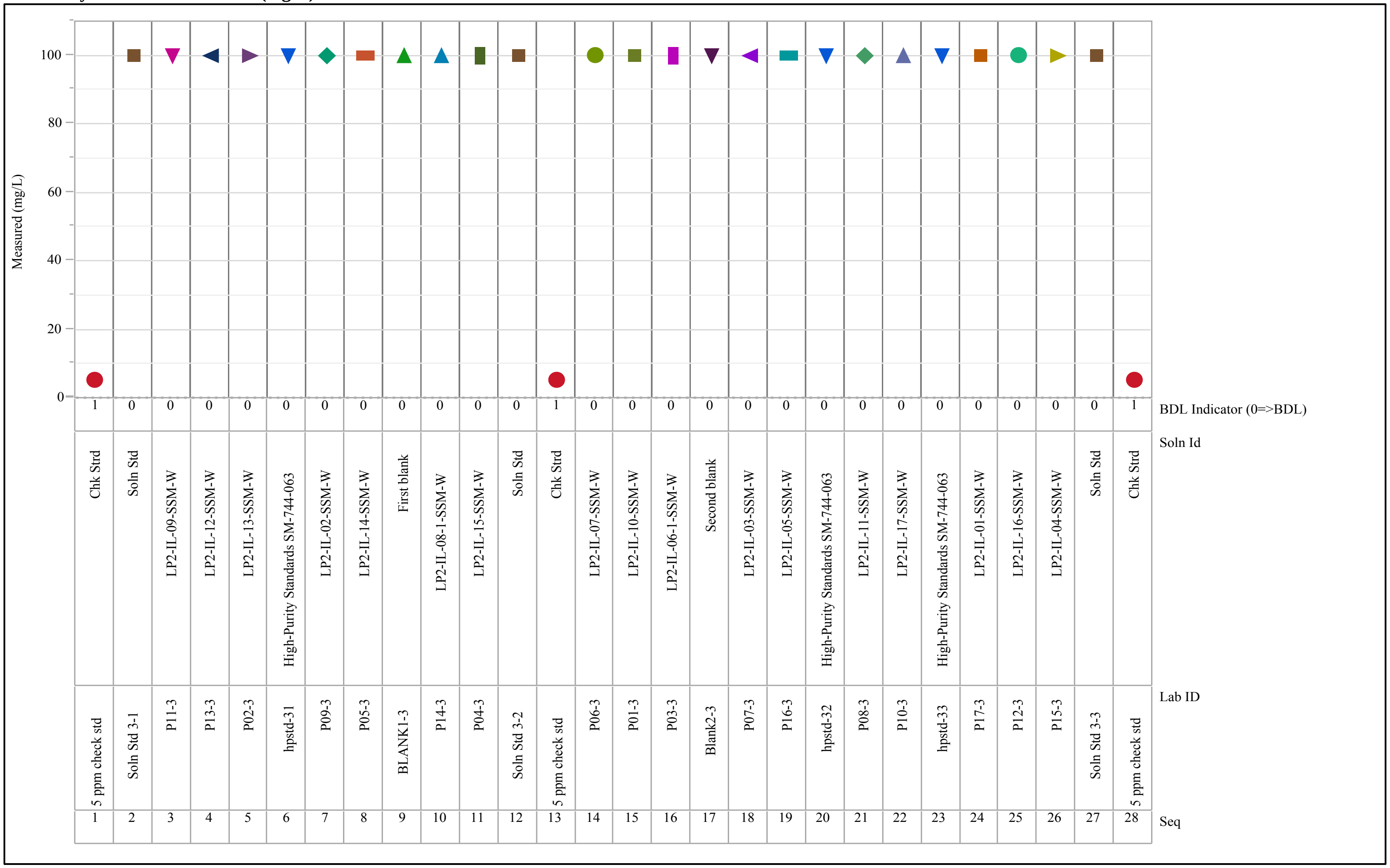


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=S (mg/L), Instrument=ICP, Blk=1
Variability Chart for Measured (mg/L)

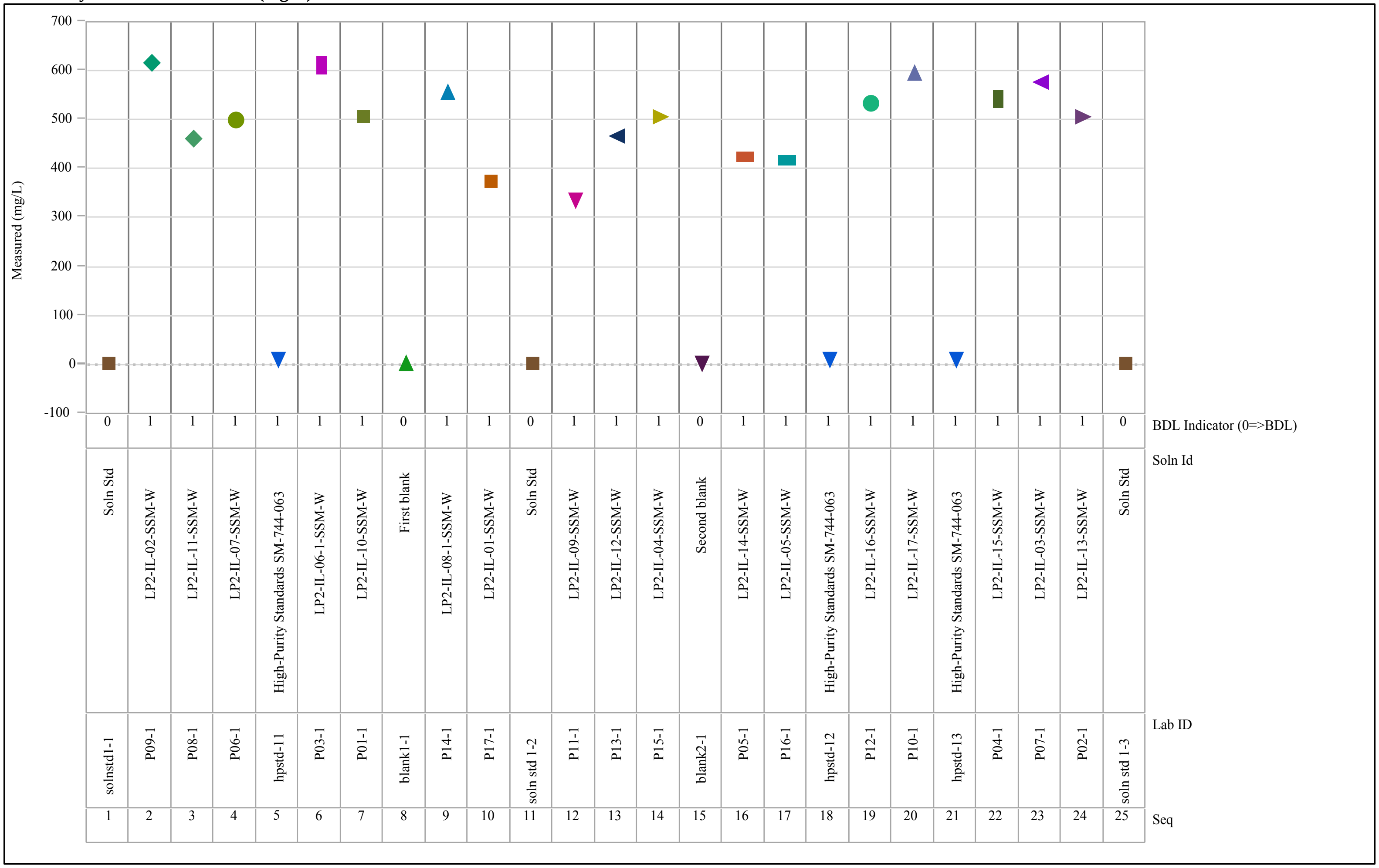


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=S (mg/L), Instrument=ICP, Blk=2
Variability Chart for Measured (mg/L)

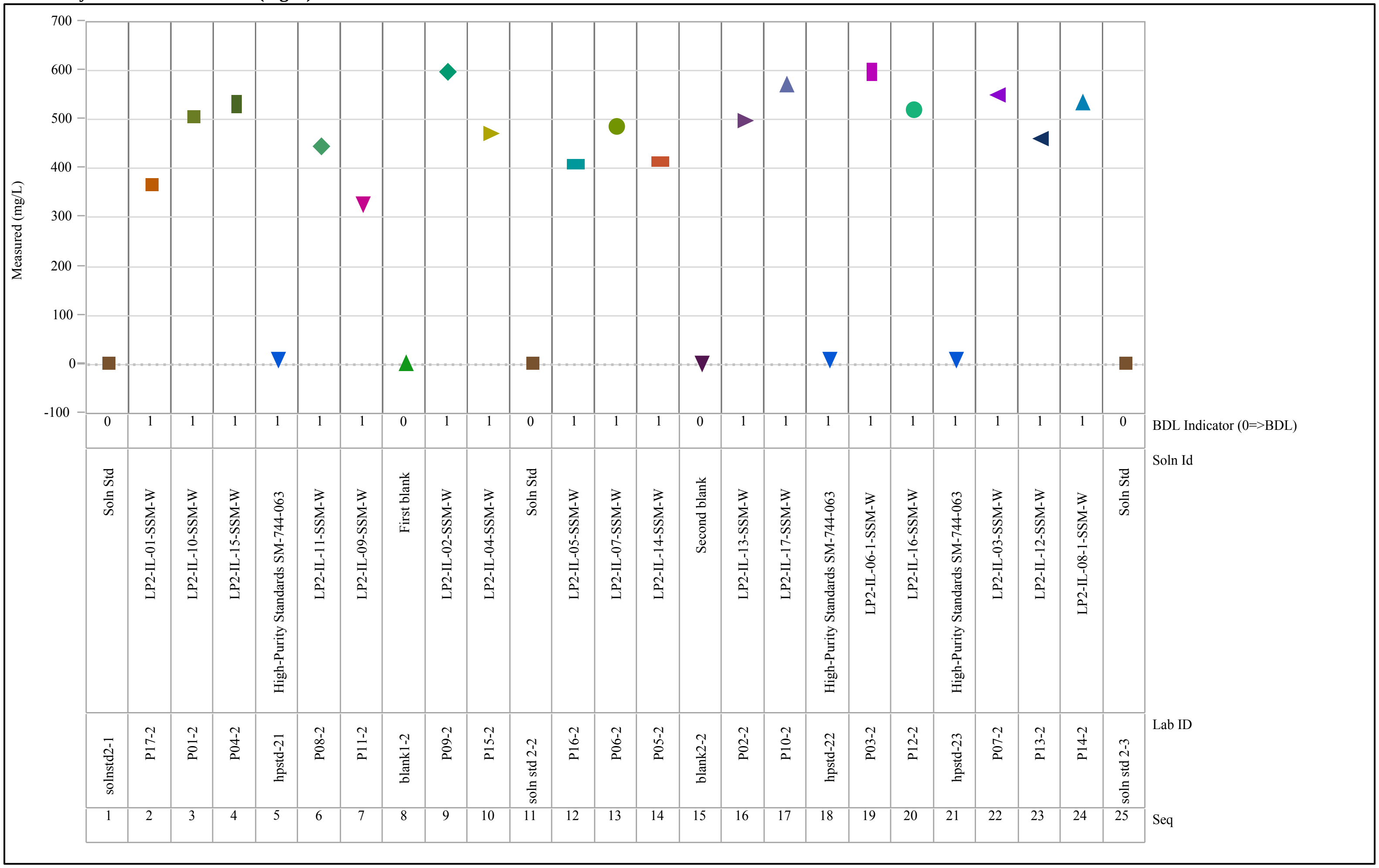


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=S (mg/L), Instrument=ICP, Blk=3
Variability Chart for Measured (mg/L)

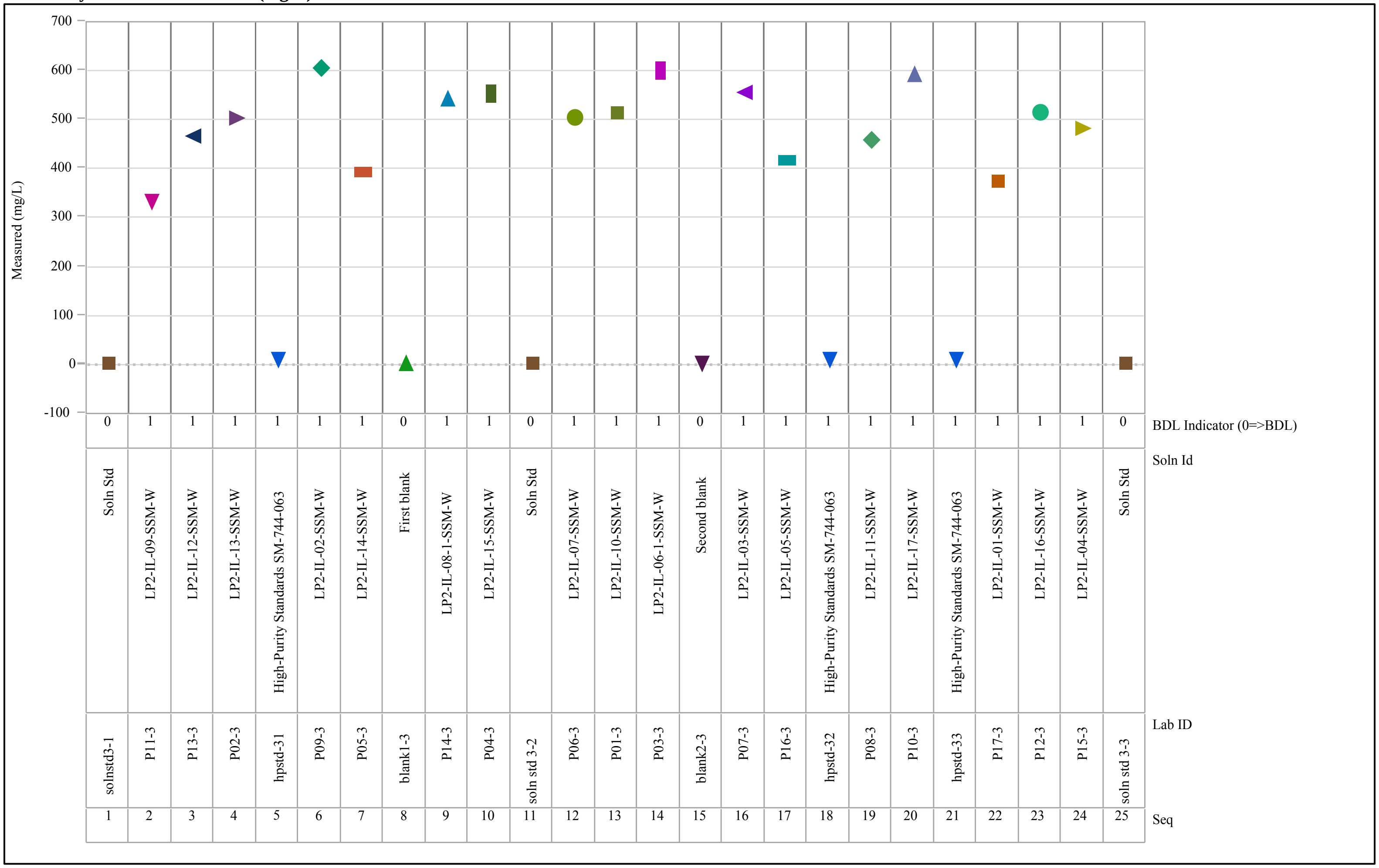


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Si (mg/L), Instrument=ICP, Blk=1
Variability Chart for Measured (mg/L)

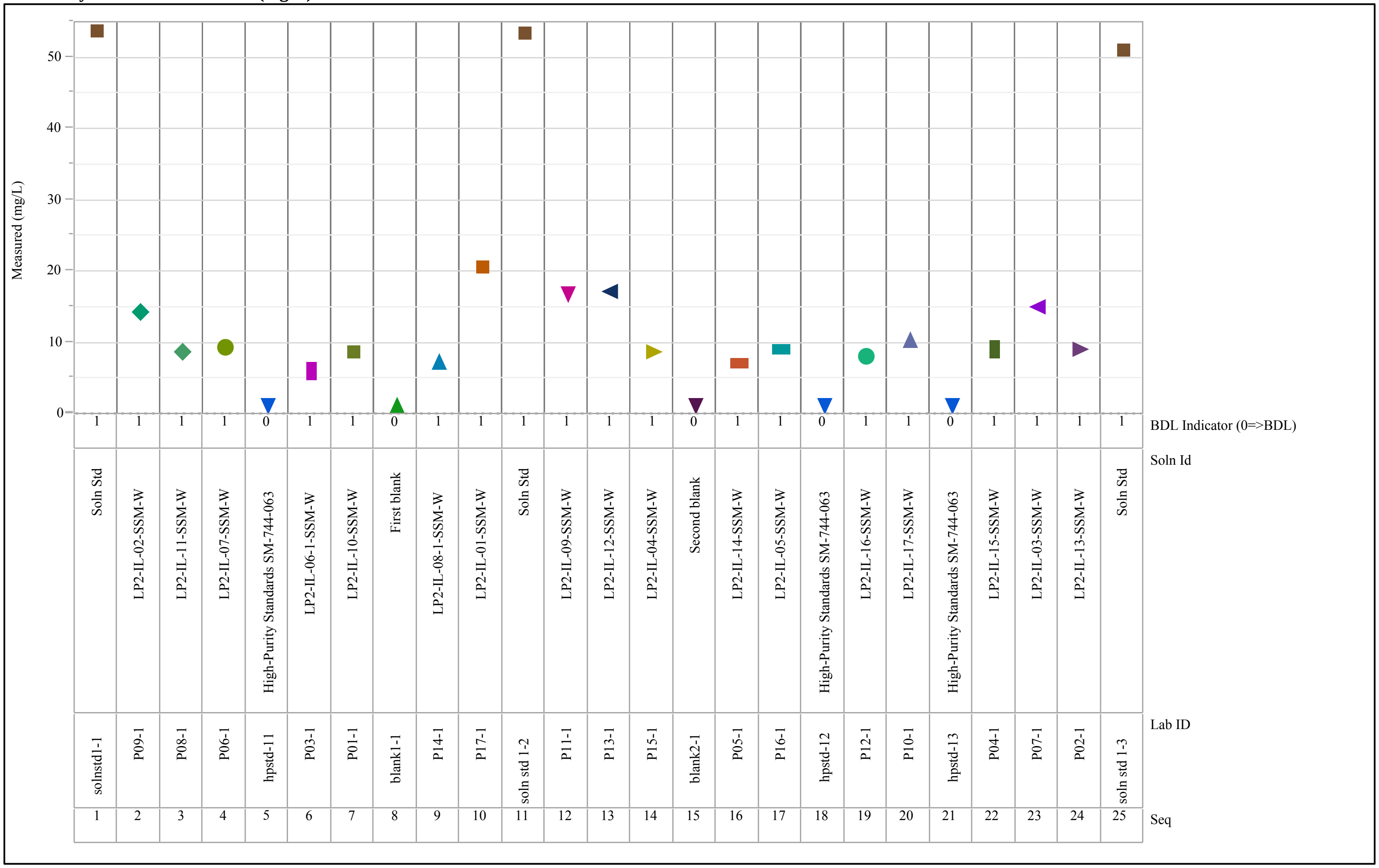


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Si (mg/L), Instrument=ICP, Blk=2
Variability Chart for Measured (mg/L)

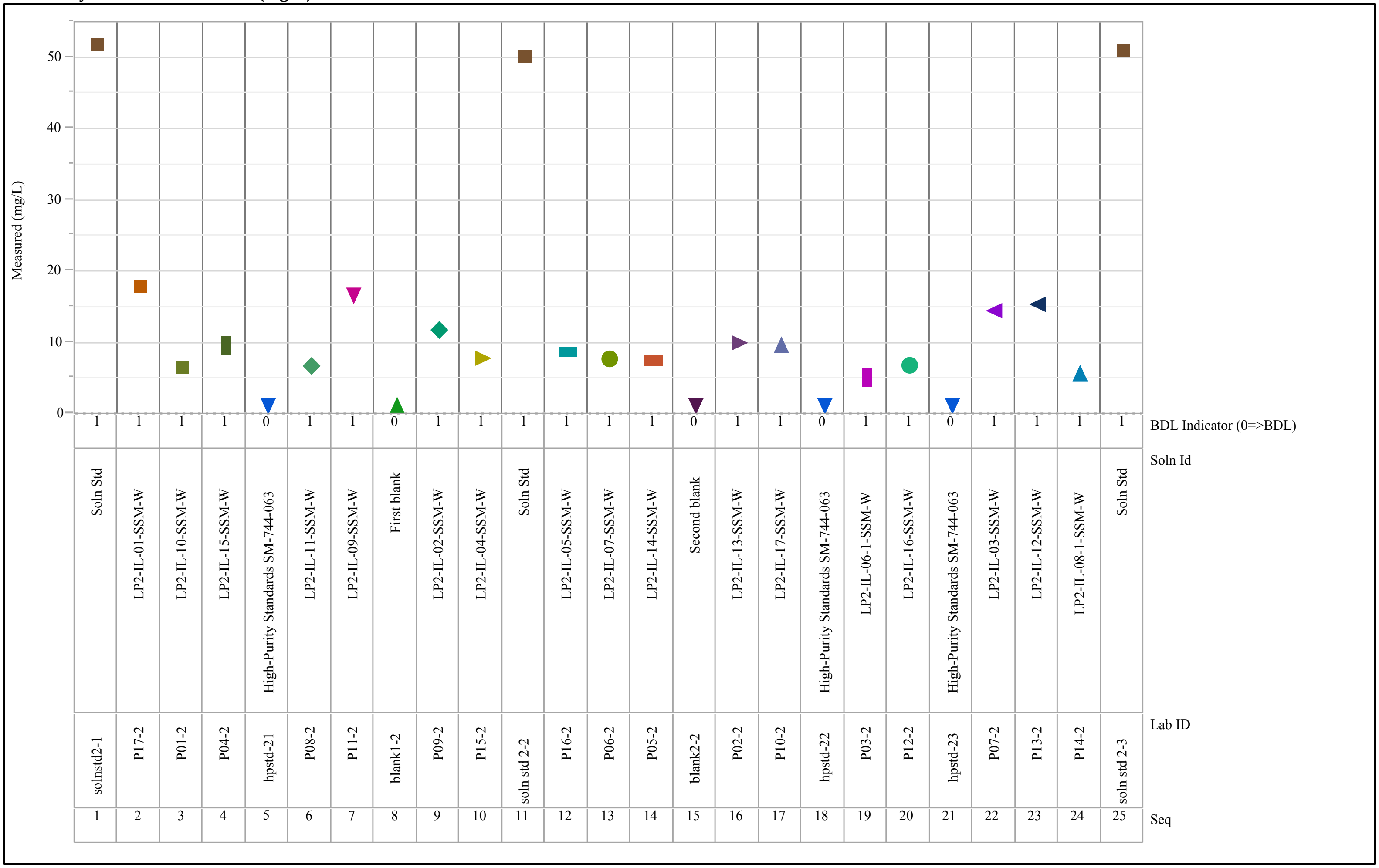


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Si (mg/L), Instrument=ICP, Blk=3
Variability Chart for Measured (mg/L)

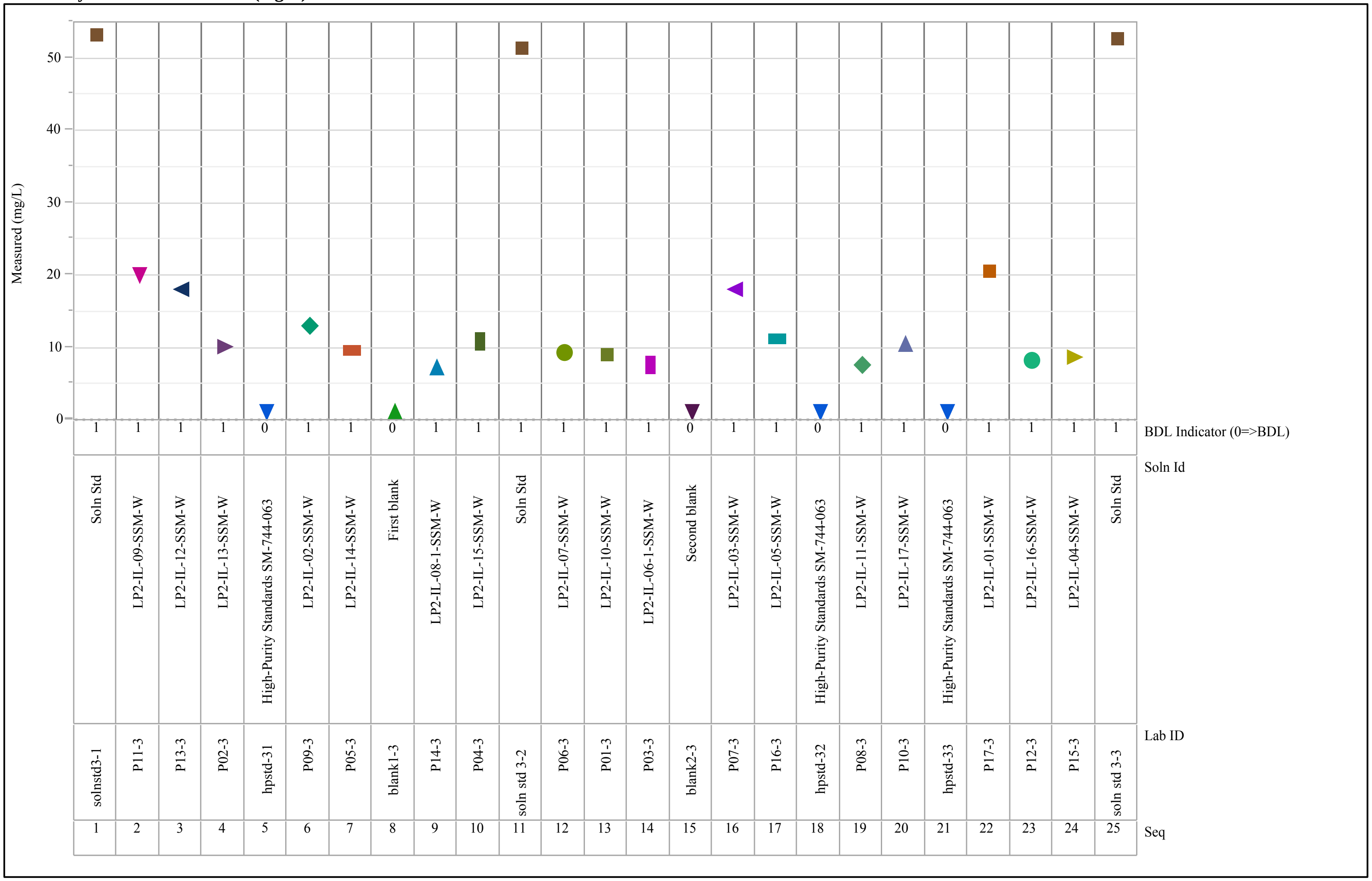


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Sn (mg/L), Instrument=ICP, Blk=1
Variability Chart for Measured (mg/L)

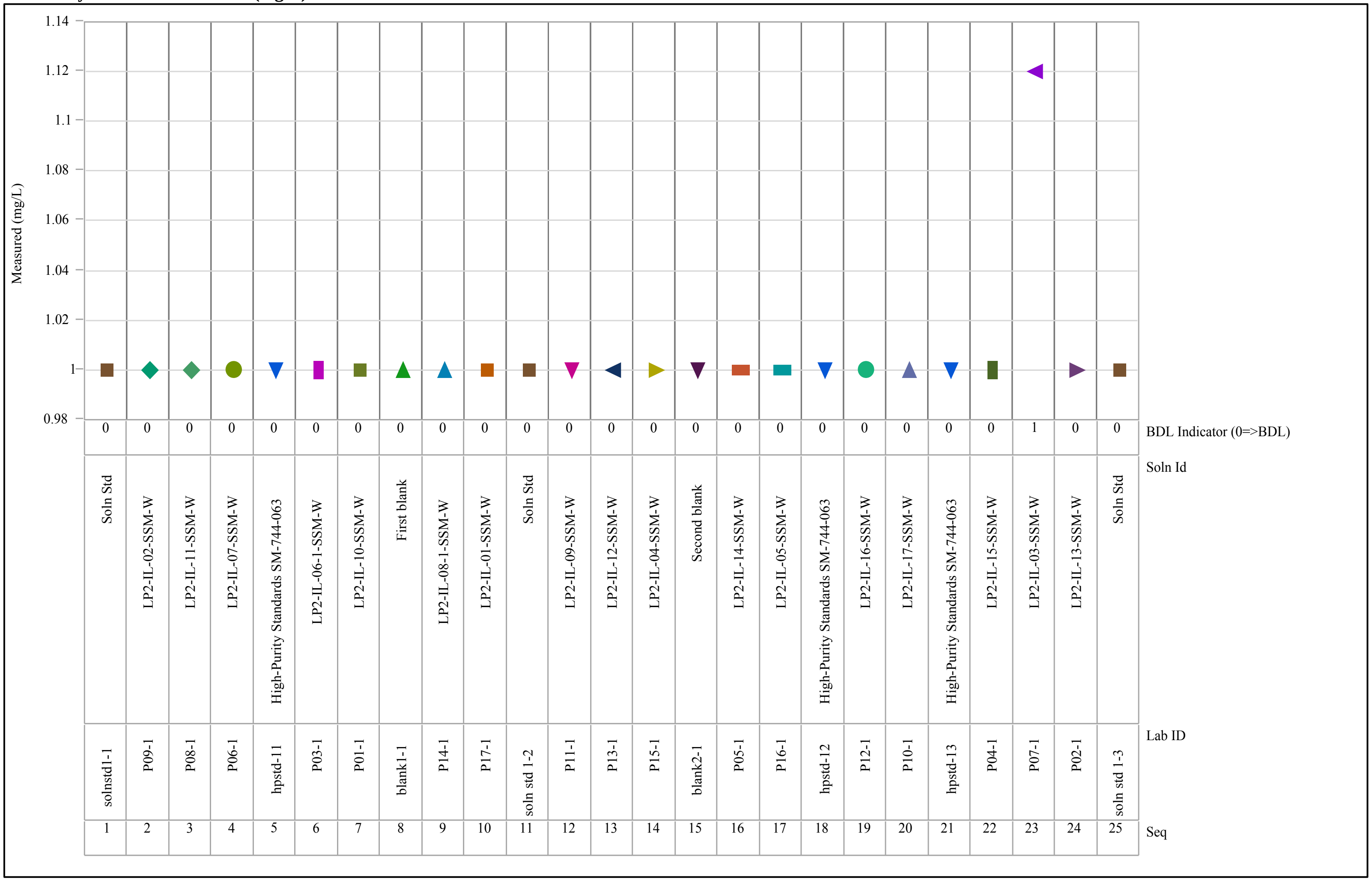


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Sn (mg/L), Instrument=ICP, Blk=2
Variability Chart for Measured (mg/L)

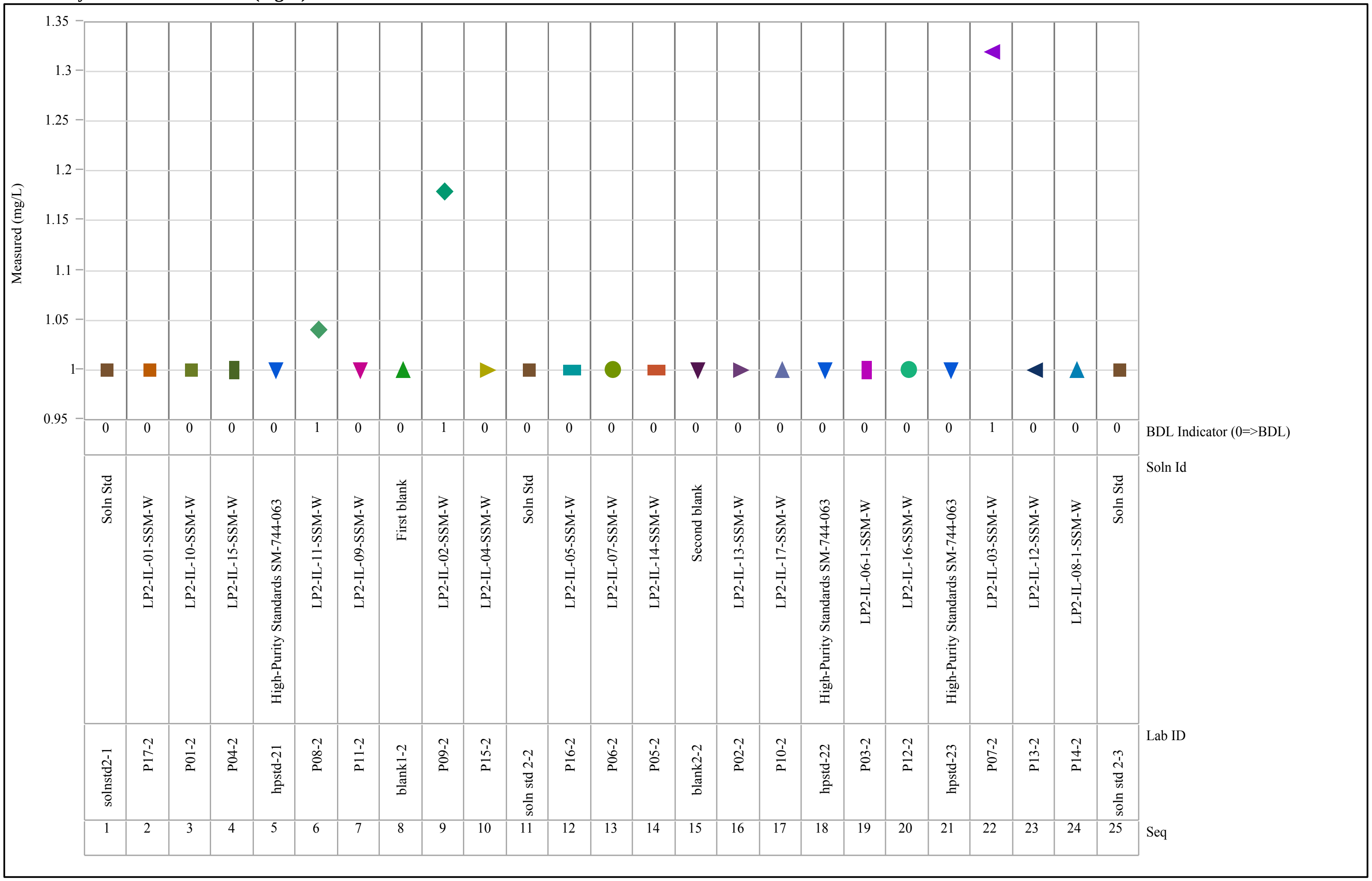


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Sn (mg/L), Instrument=ICP, Blk=3
Variability Chart for Measured (mg/L)

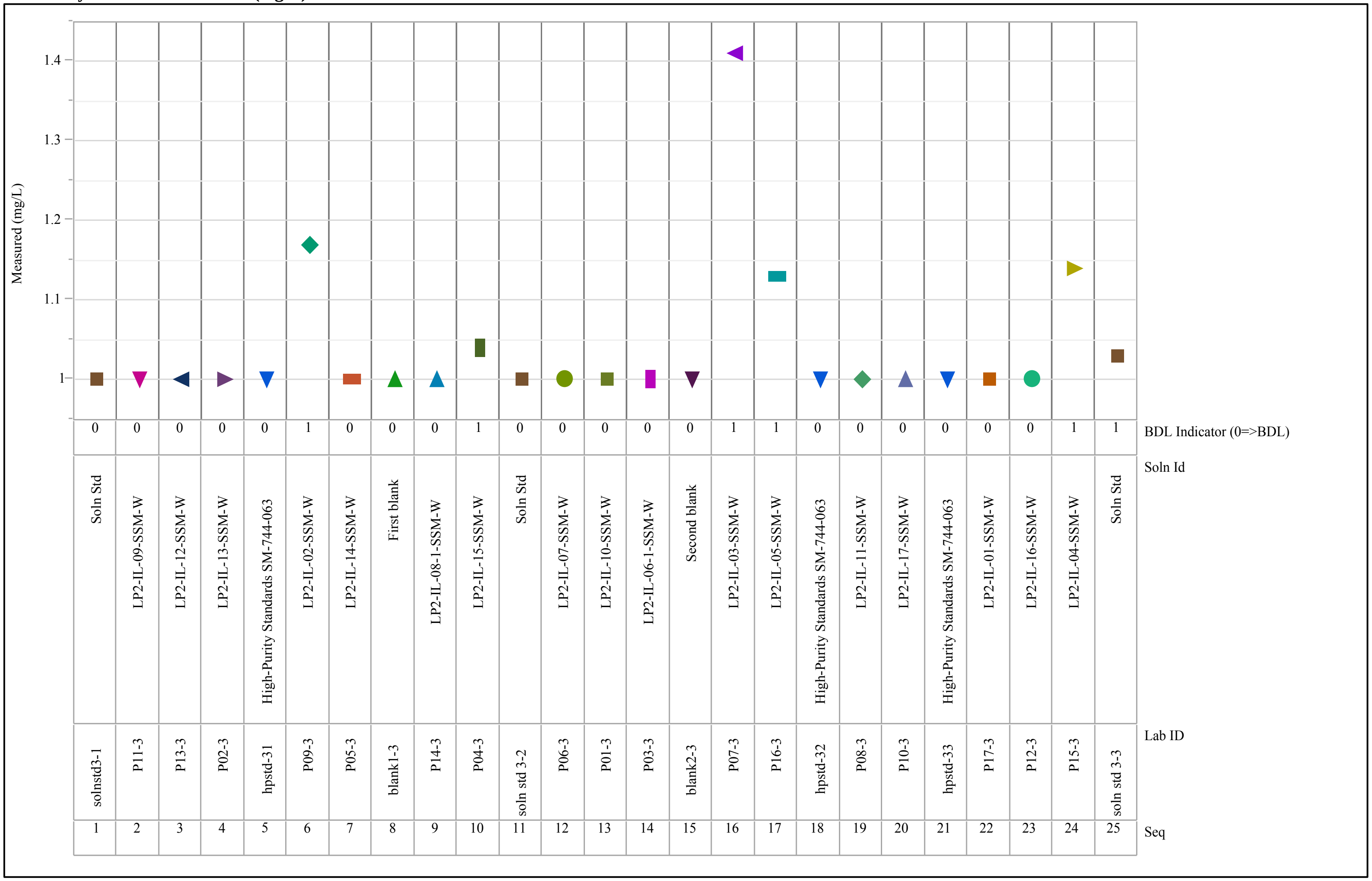


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=SO4 IC (mg/L), Instrument=IC, Blk=1
Variability Chart for Measured (mg/L)

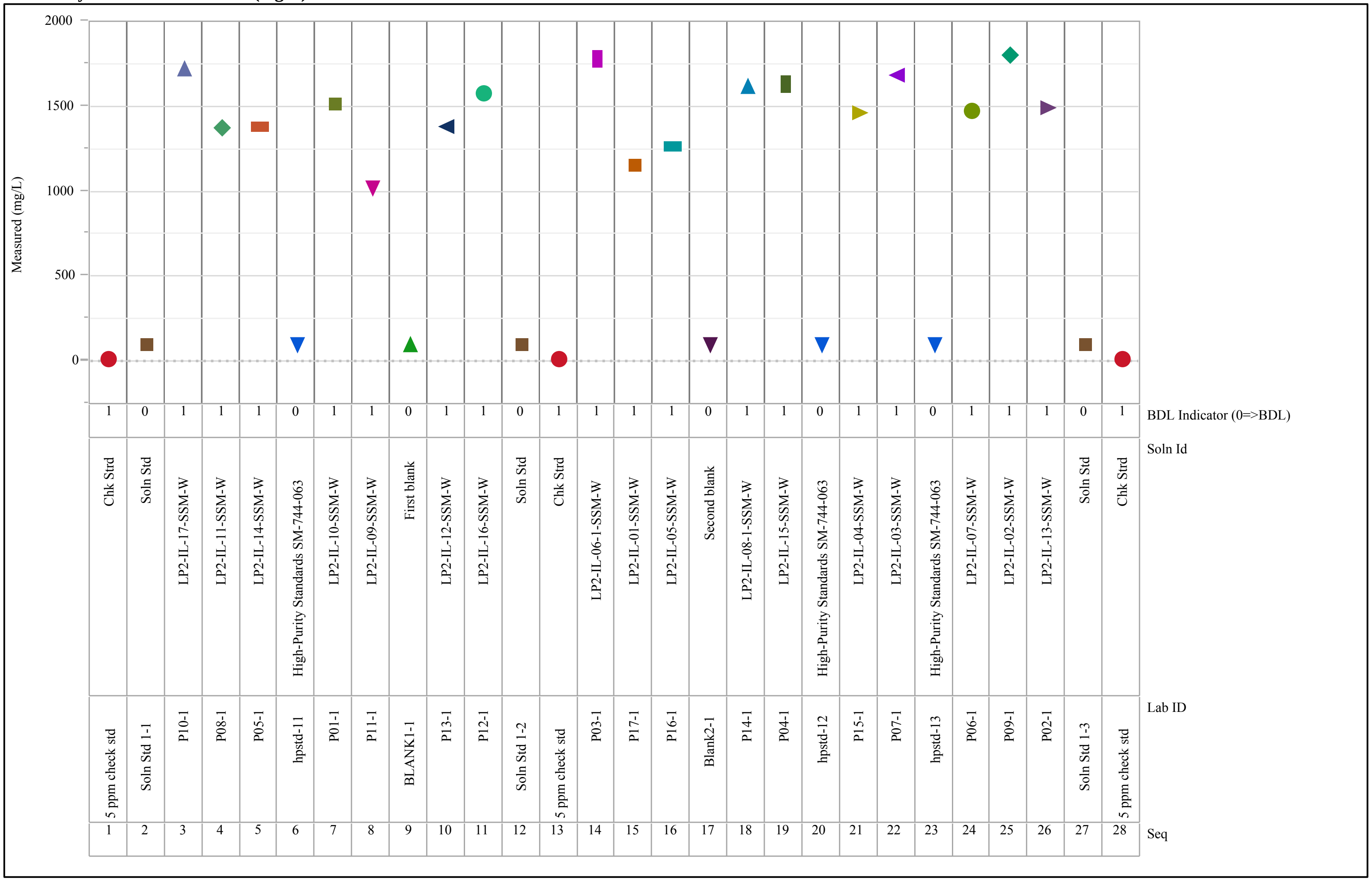


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=SO4 IC (mg/L), Instrument=IC, Blk=2
Variability Chart for Measured (mg/L)

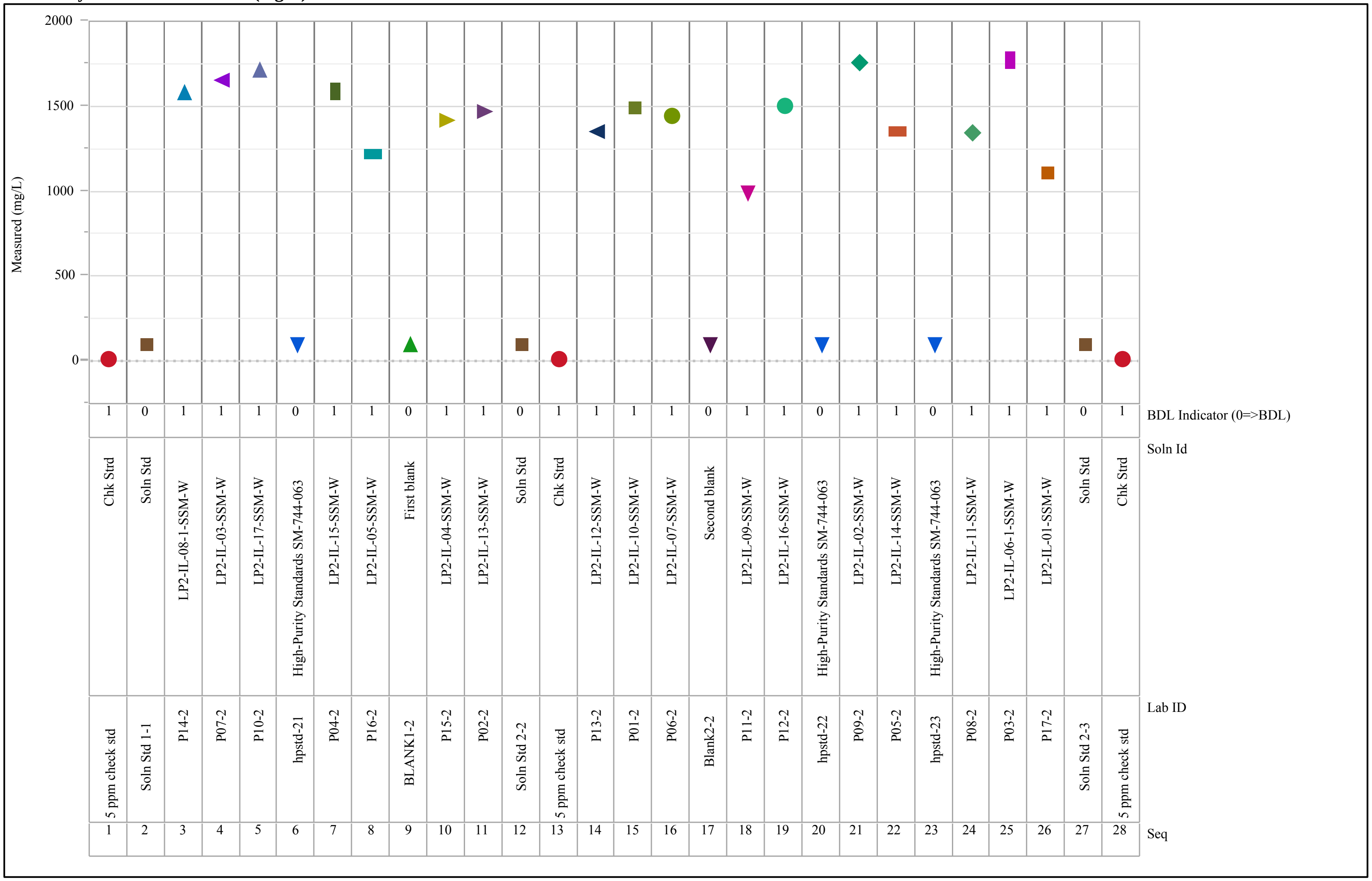


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=SO4 IC (mg/L), Instrument=IC, Blk=3
Variability Chart for Measured (mg/L)

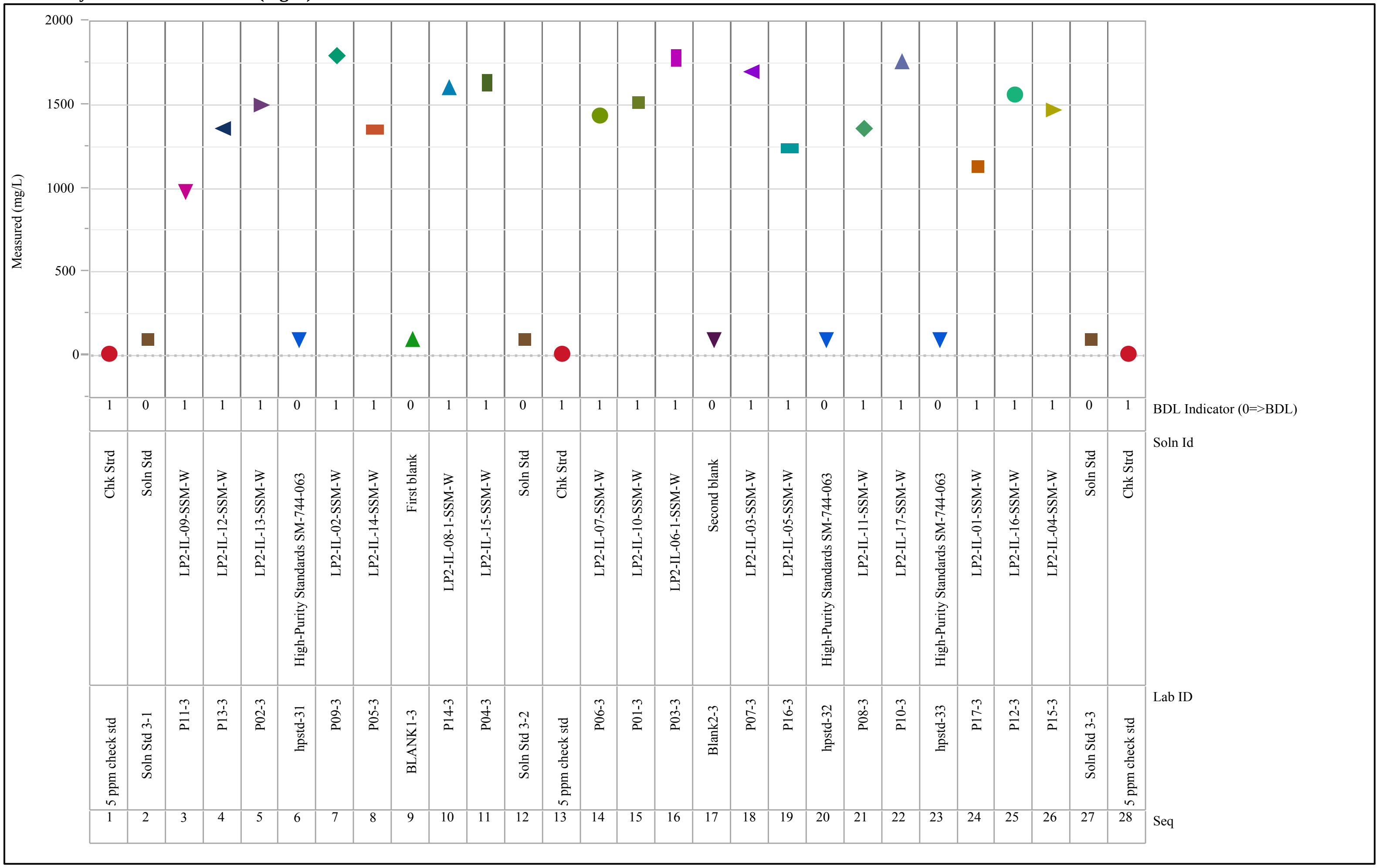


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=V (mg/L), Instrument=ICP, Blk=1
Variability Chart for Measured (mg/L)

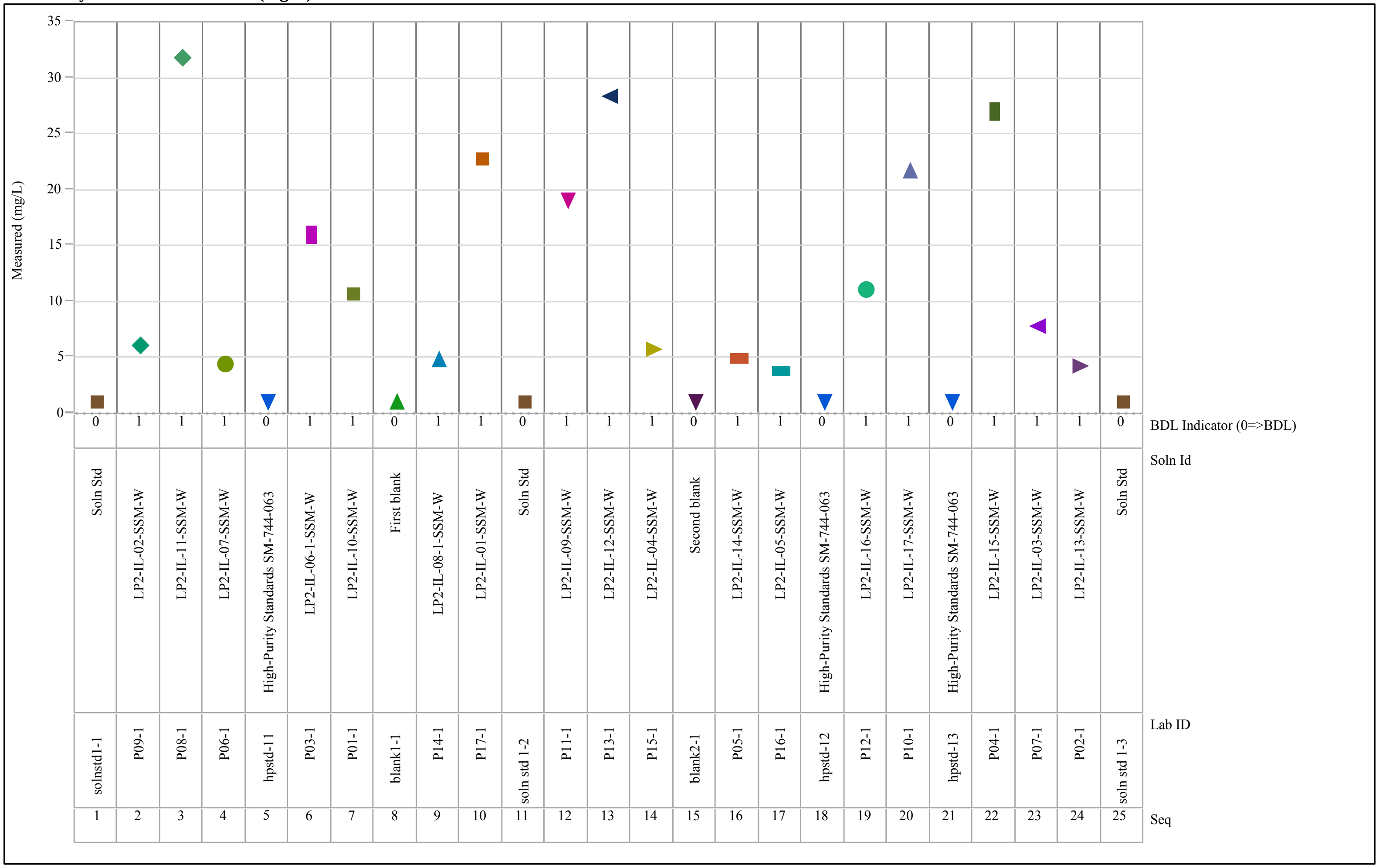


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=V (mg/L), Instrument=ICP, Blk=2
Variability Chart for Measured (mg/L)

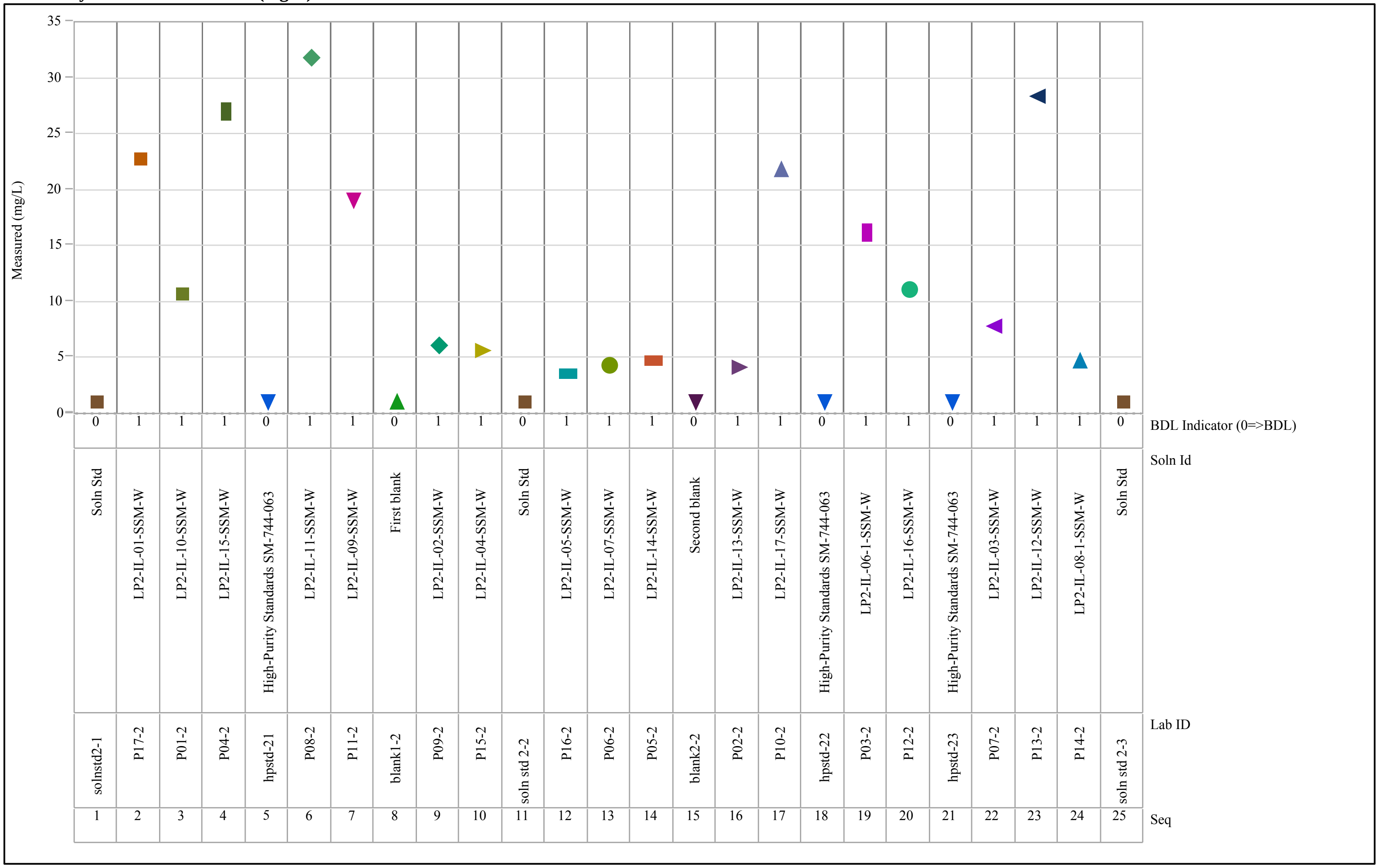


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=V (mg/L), Instrument=ICP, Blk=3
Variability Chart for Measured (mg/L)

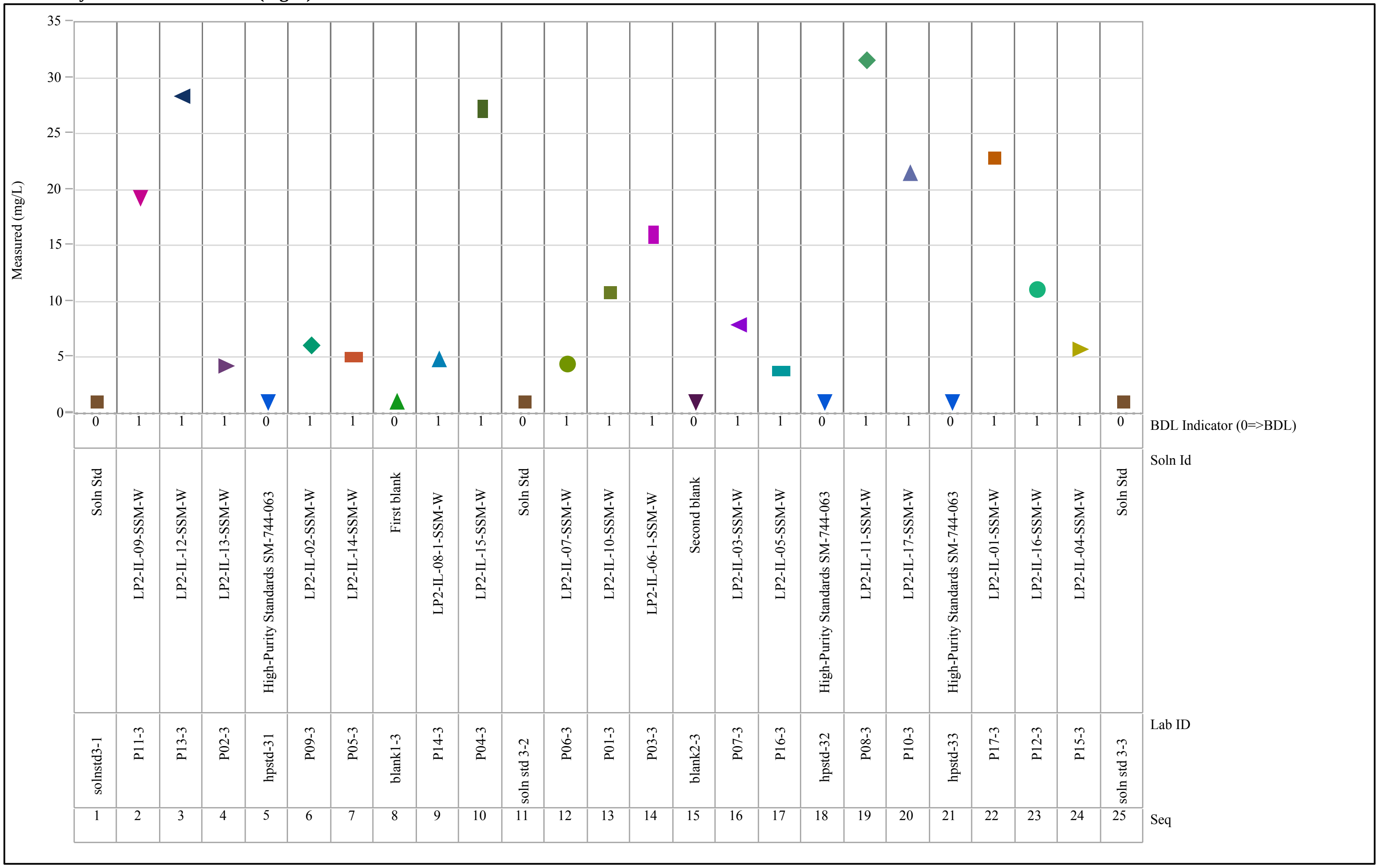


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Zn (mg/L), Instrument=ICP, Blk=1
Variability Chart for Measured (mg/L)

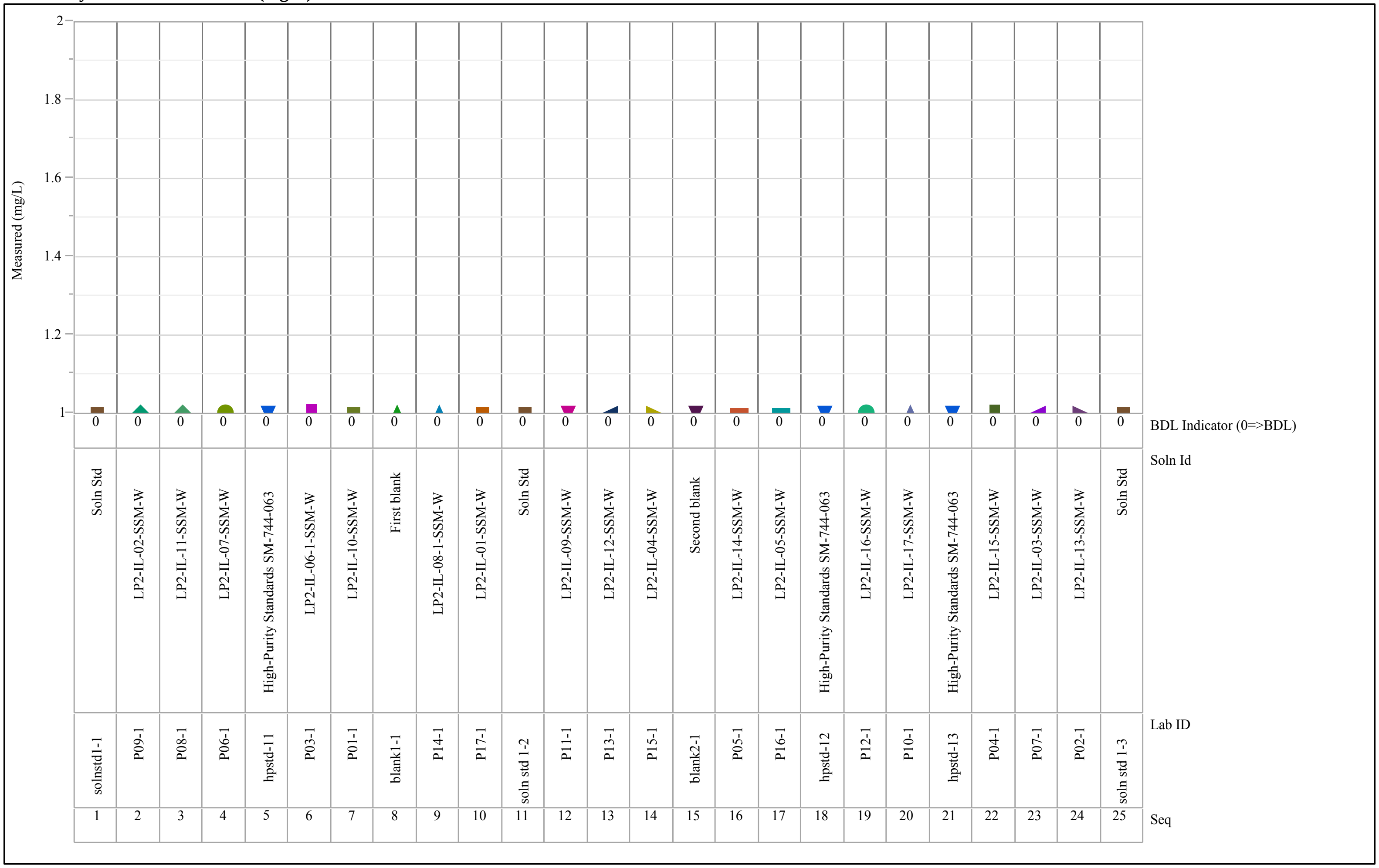


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Zn (mg/L), Instrument=ICP, Blk=2
Variability Chart for Measured (mg/L)

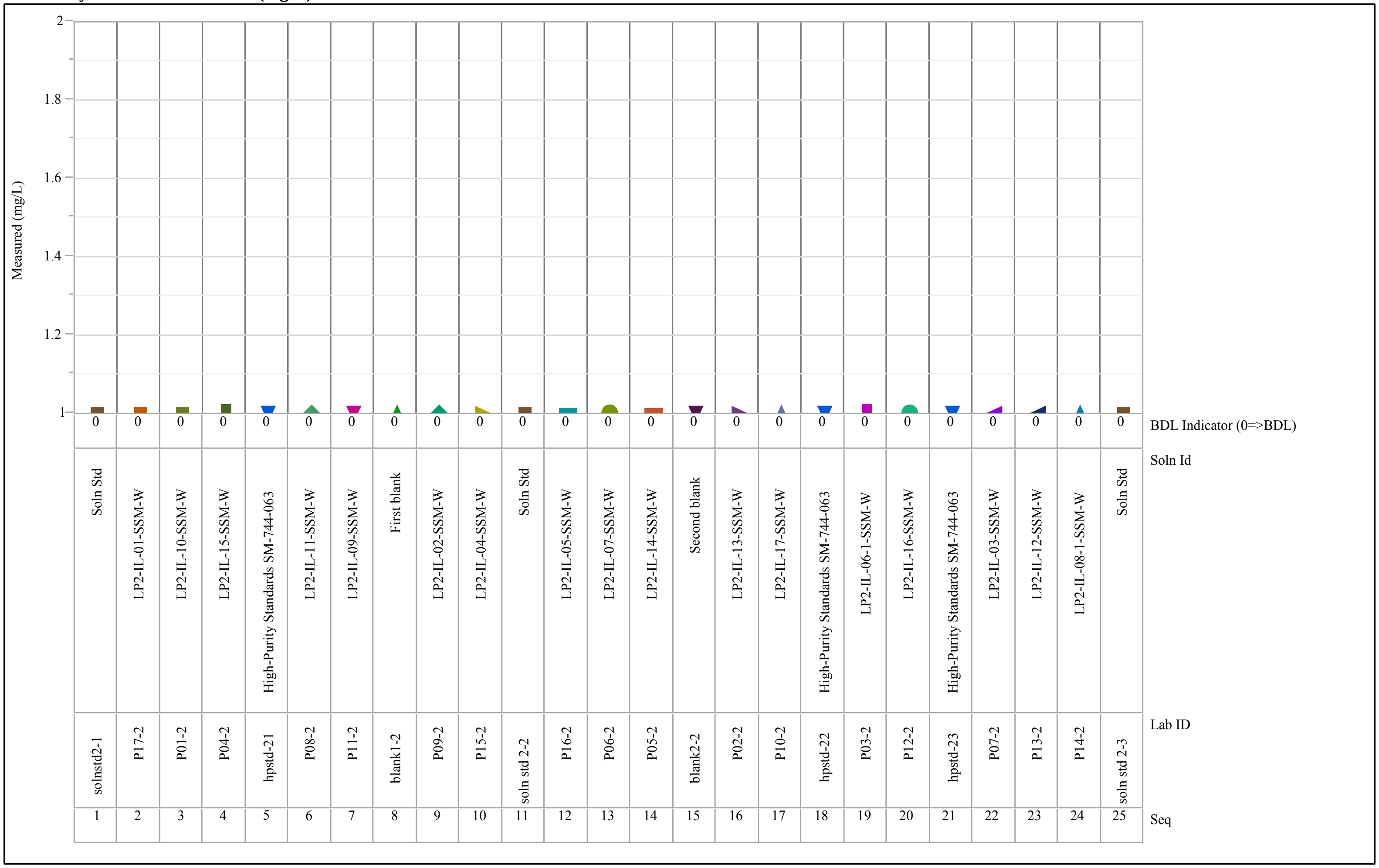


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Zn (mg/L), Instrument=ICP, Blk=3
Variability Chart for Measured (mg/L)

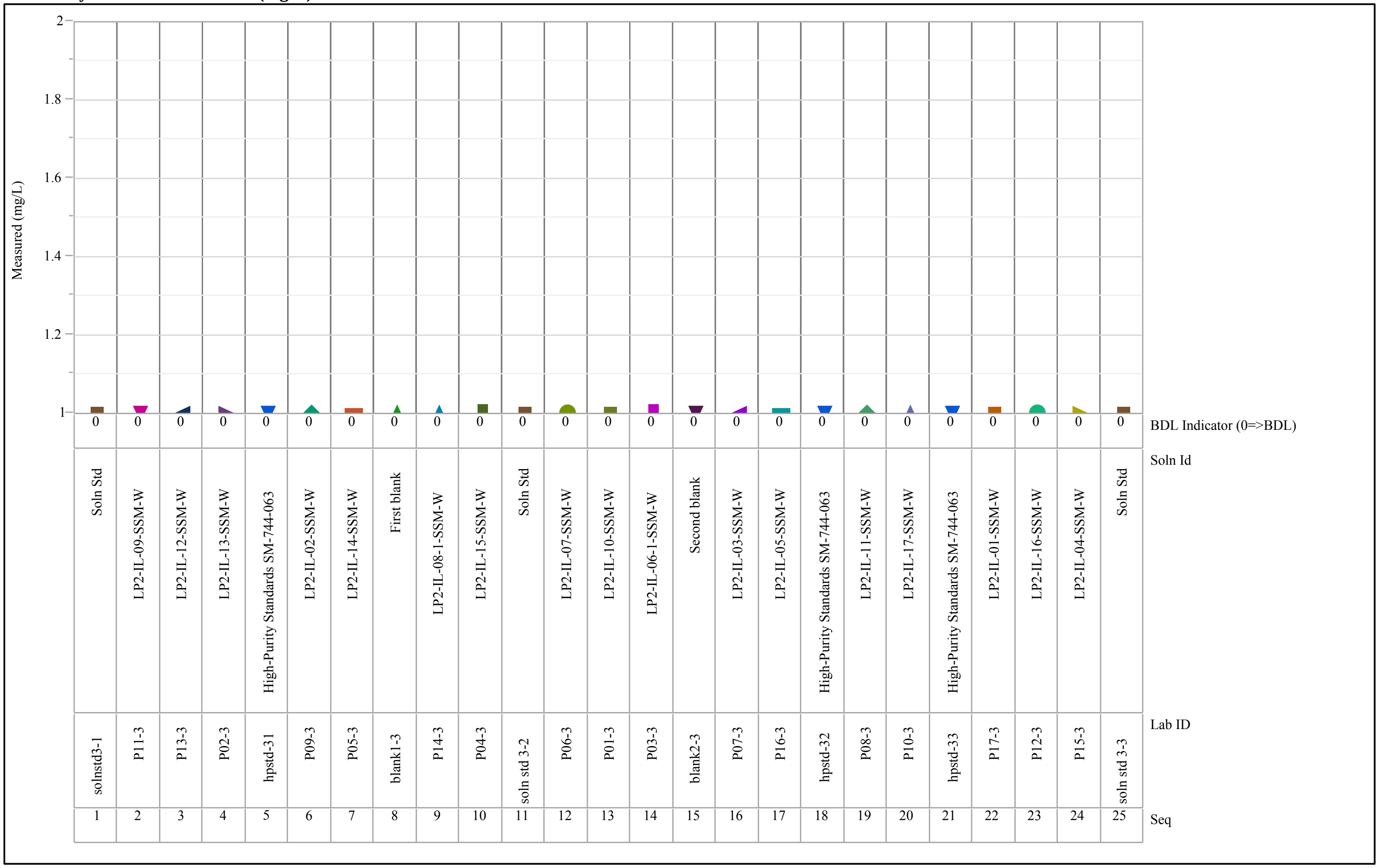


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Zr (mg/L), Instrument=ICP, Blk=1
Variability Chart for Measured (mg/L)

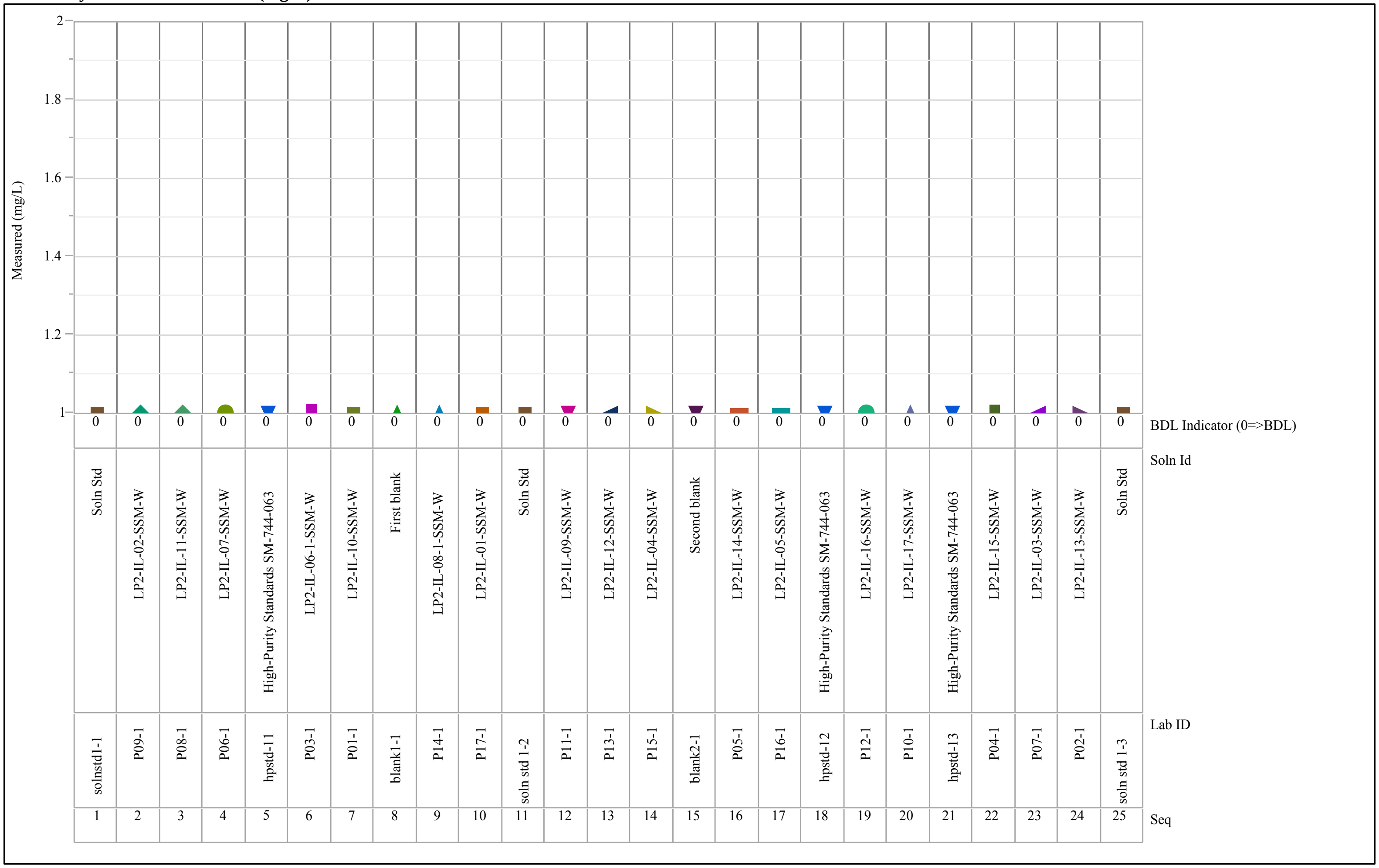


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Zr (mg/L), Instrument=ICP, Blk=2
Variability Chart for Measured (mg/L)

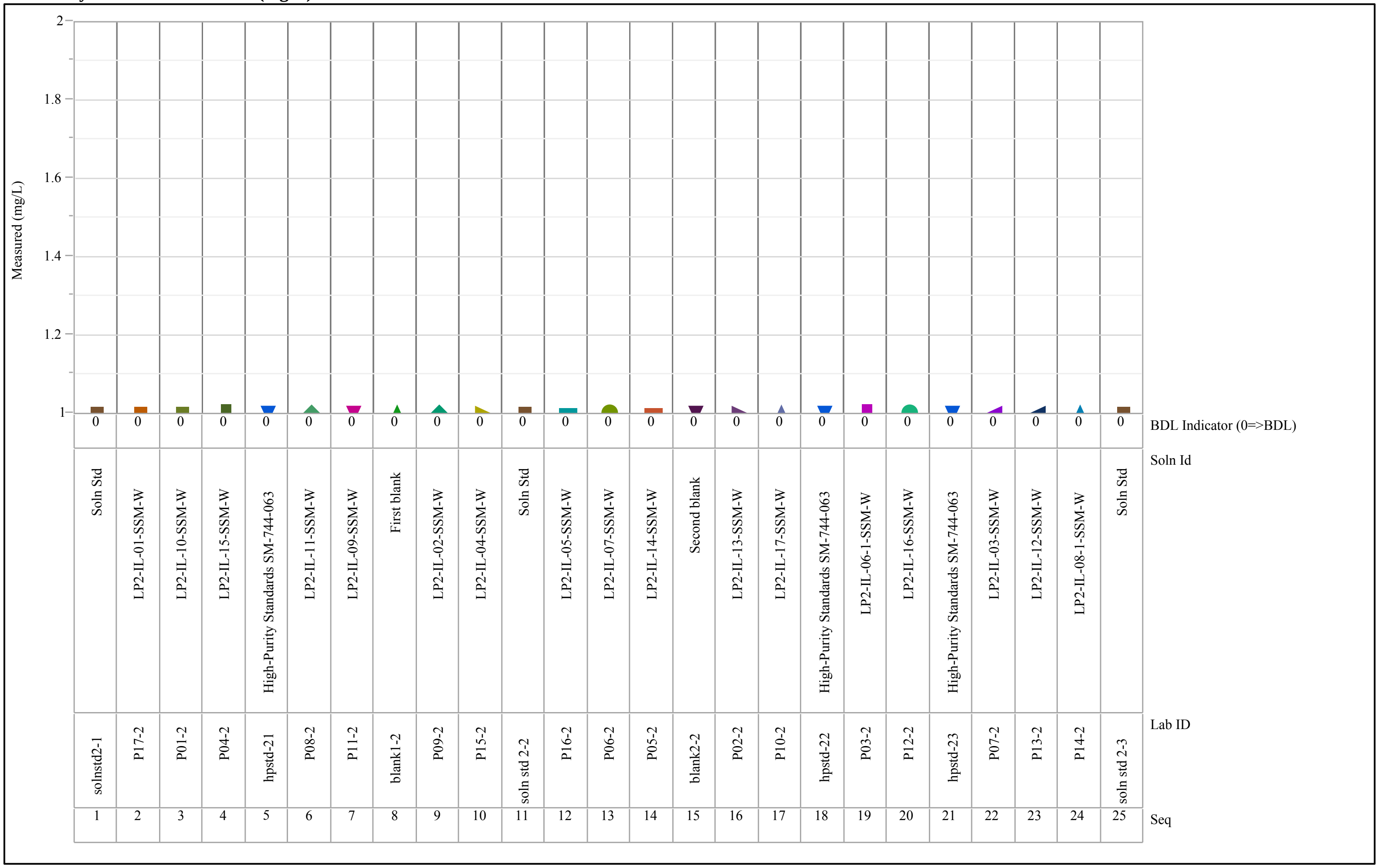


Exhibit G-1. Measurements by Analyte, Instrument, and Block in Analytical Sequence (continued)

Analyte=Zr (mg/L), Instrument=ICP, Blk=3
Variability Chart for Measured (mg/L)

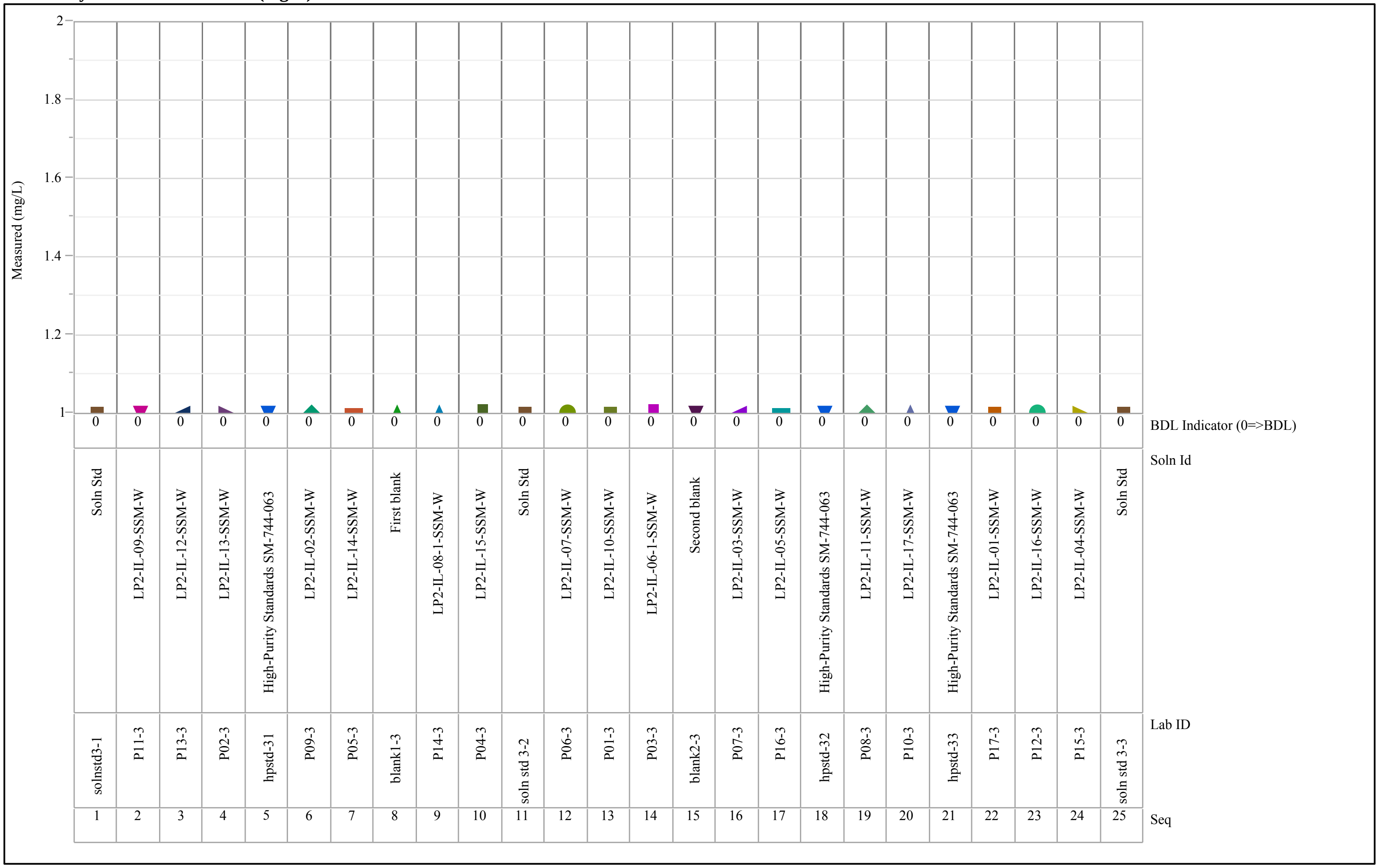


Exhibit G-2. Analysis of Wash Solutions by Solution Identifier

Analyte=Al (mg/L)
Variability Chart for Measured (mg/L)

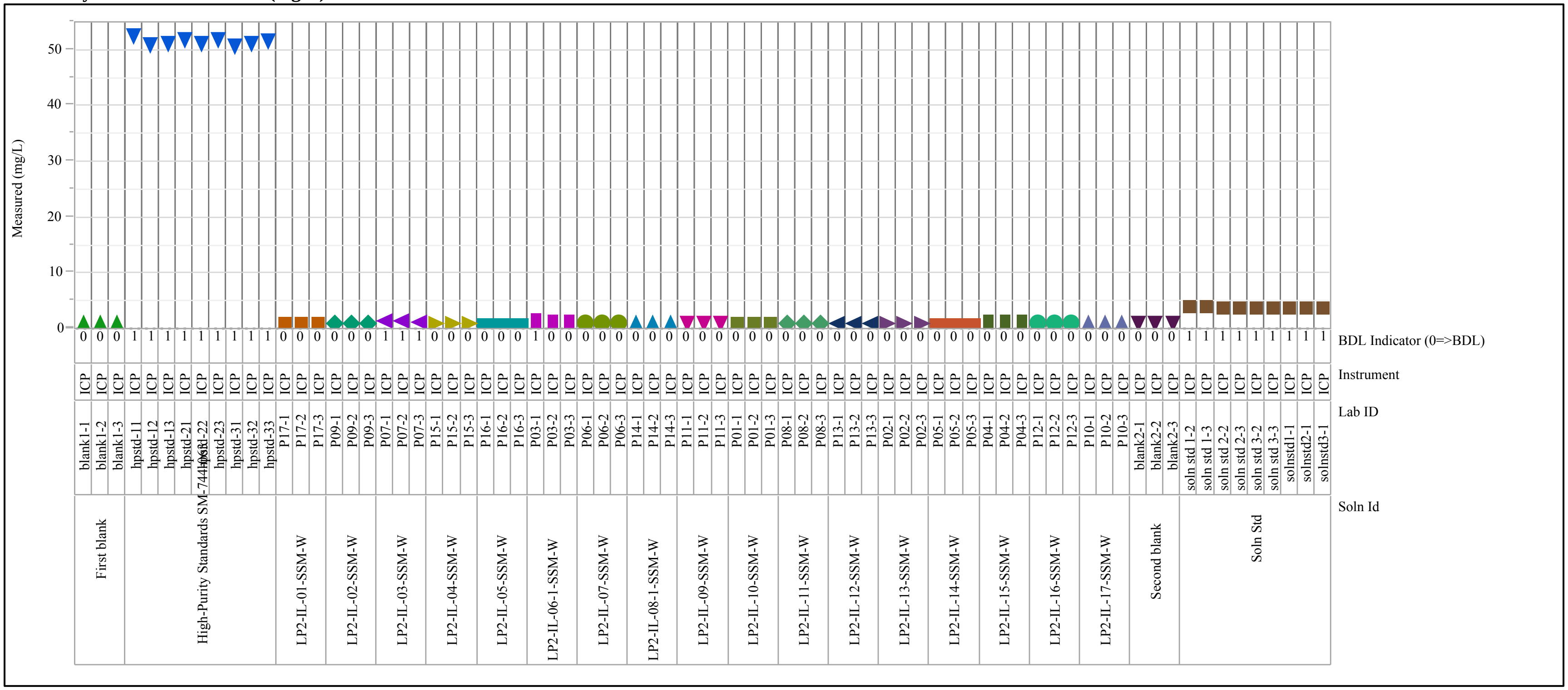


Exhibit G-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=B (mg/L)
Variability Chart for Measured (mg/L)

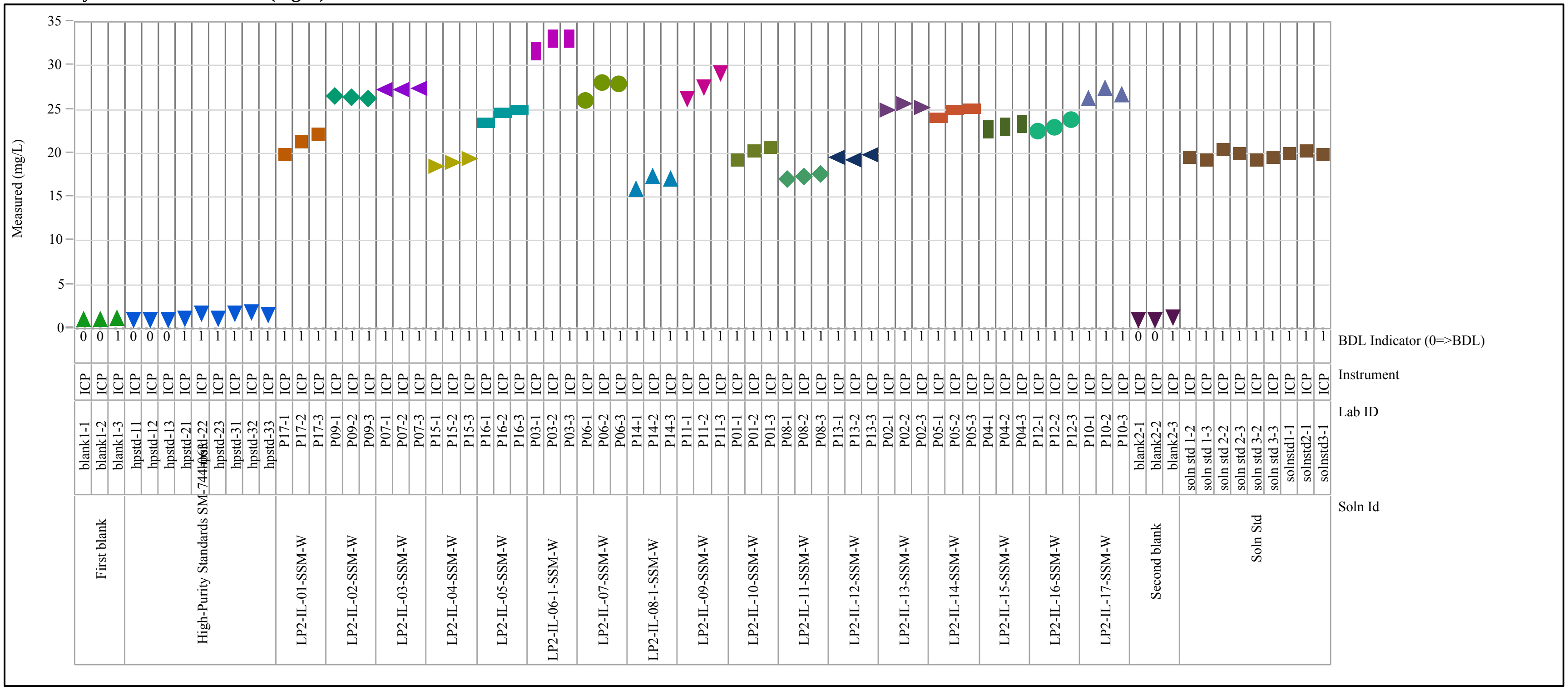


Exhibit G-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Ca (mg/L)
Variability Chart for Measured (mg/L)

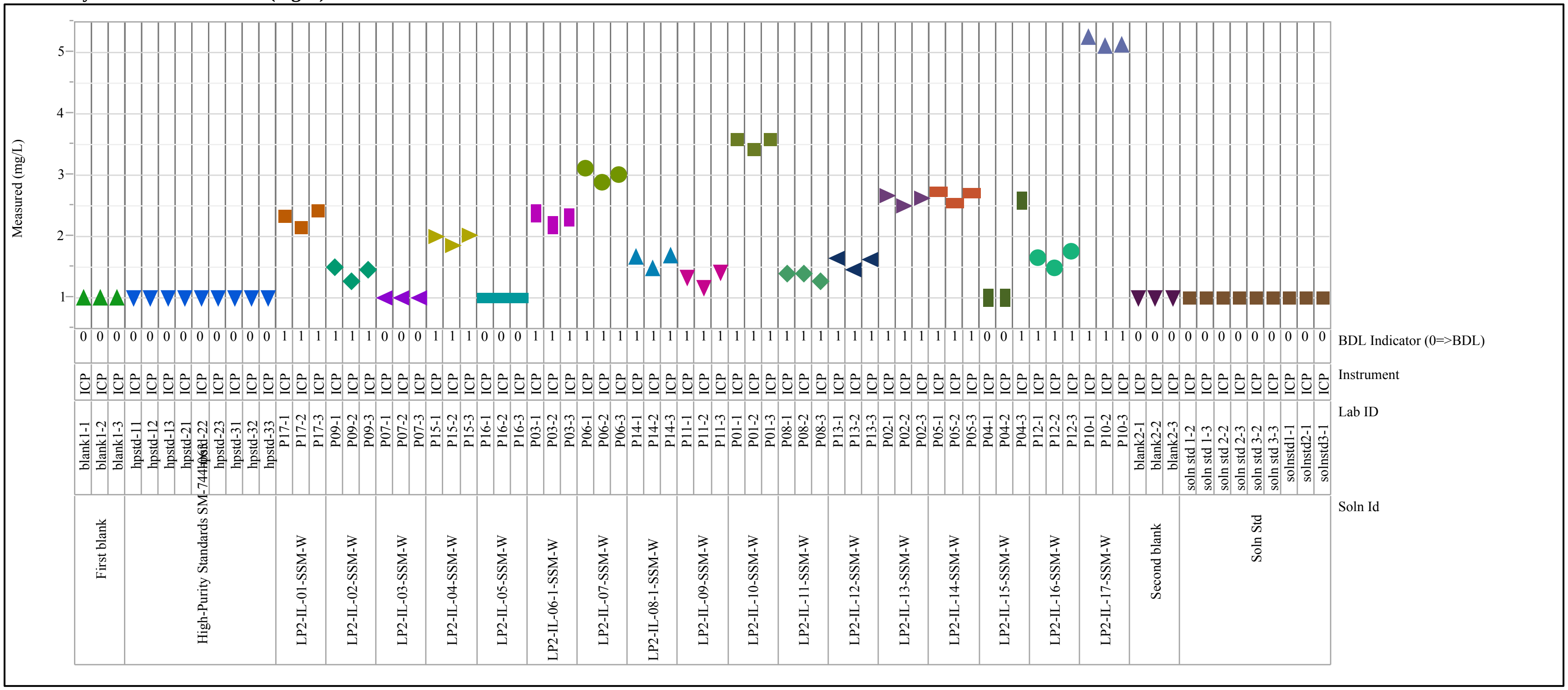


Exhibit G-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Cl (mg/L)
Variability Chart for Measured (mg/L)

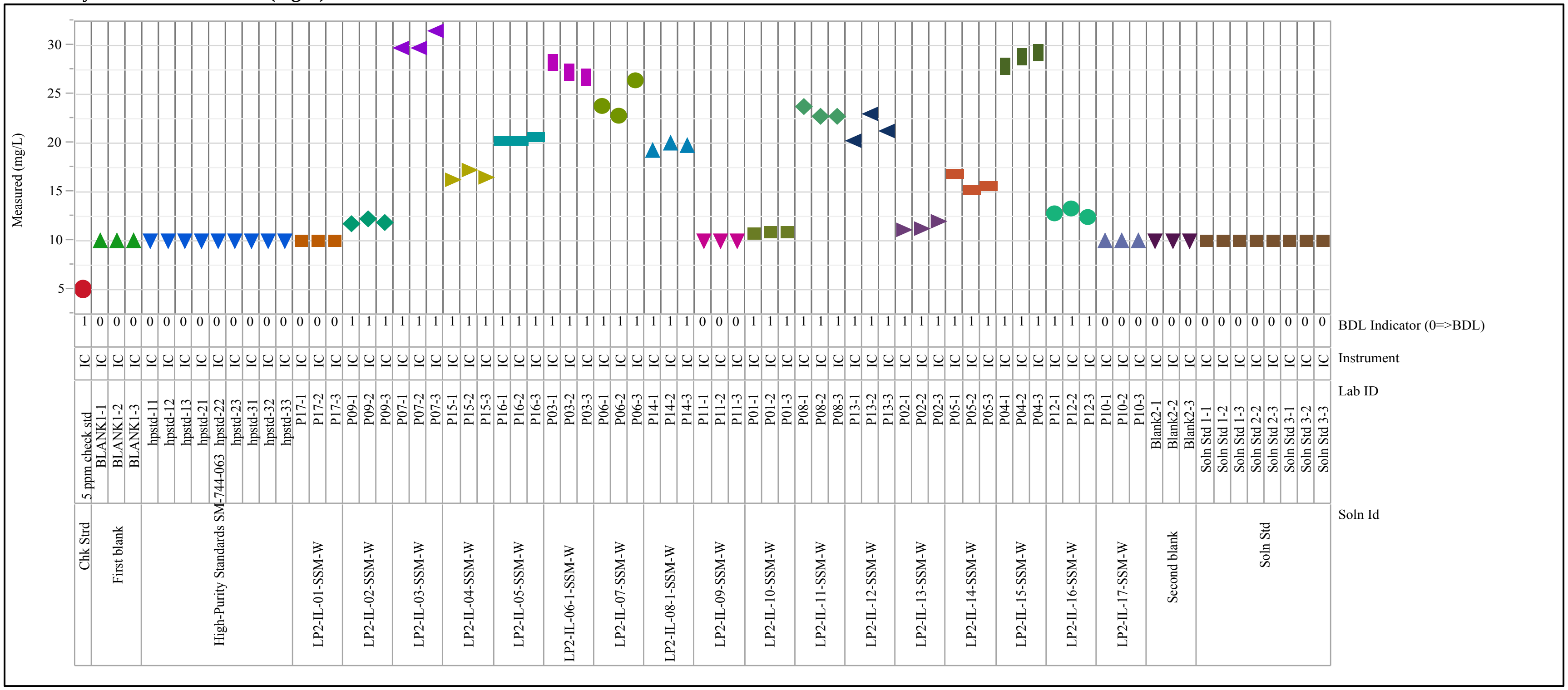


Exhibit G-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Cr (mg/L)
Variability Chart for Measured (mg/L)

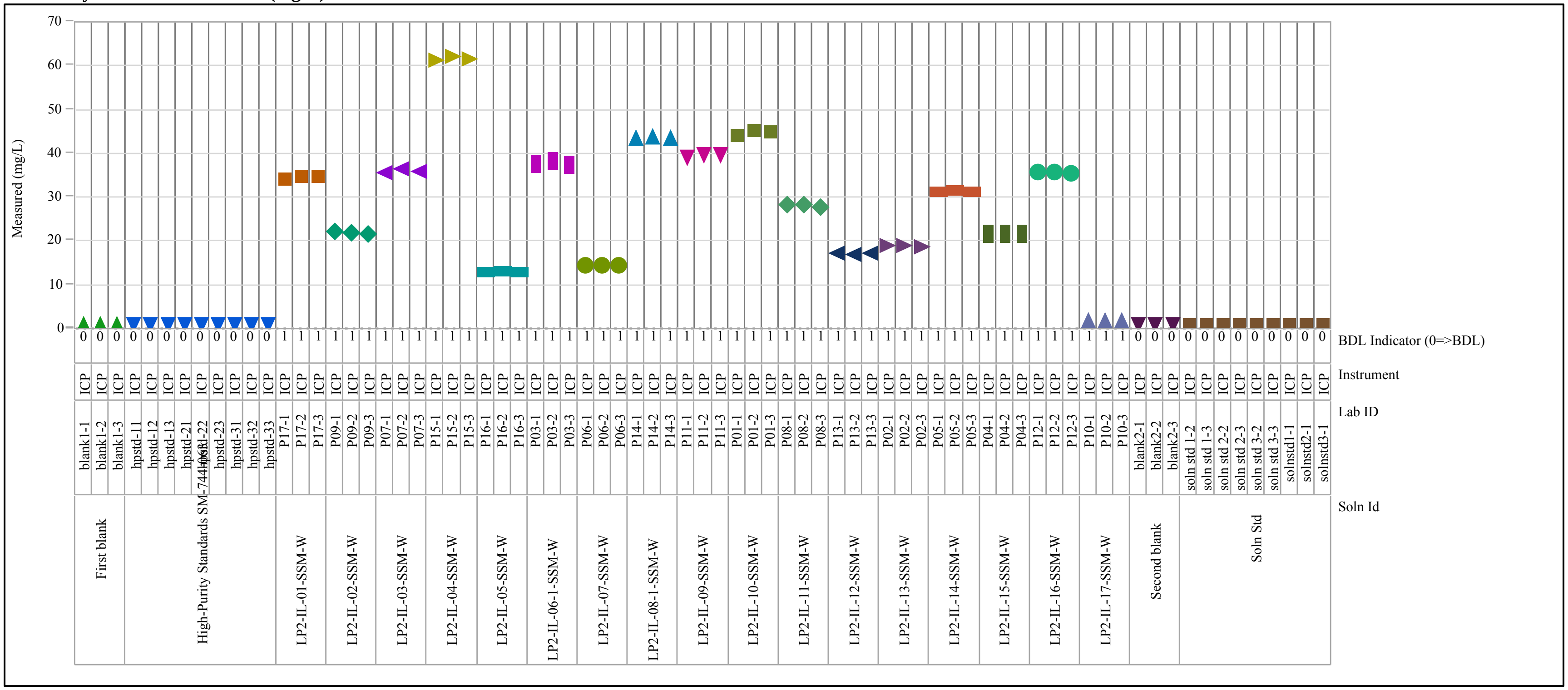


Exhibit G-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=F (mg/L)
Variability Chart for Measured (mg/L)

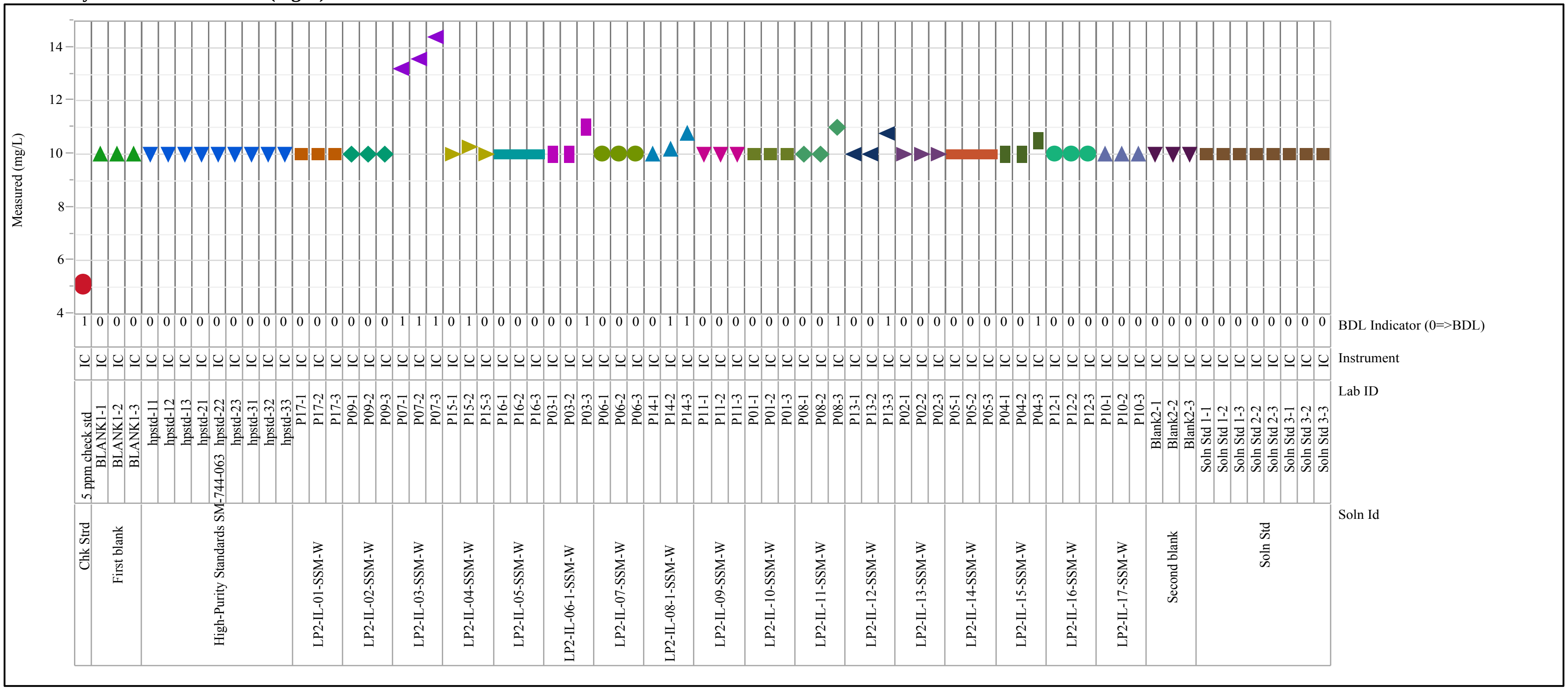


Exhibit G-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Fe (mg/L)
Variability Chart for Measured (mg/L)

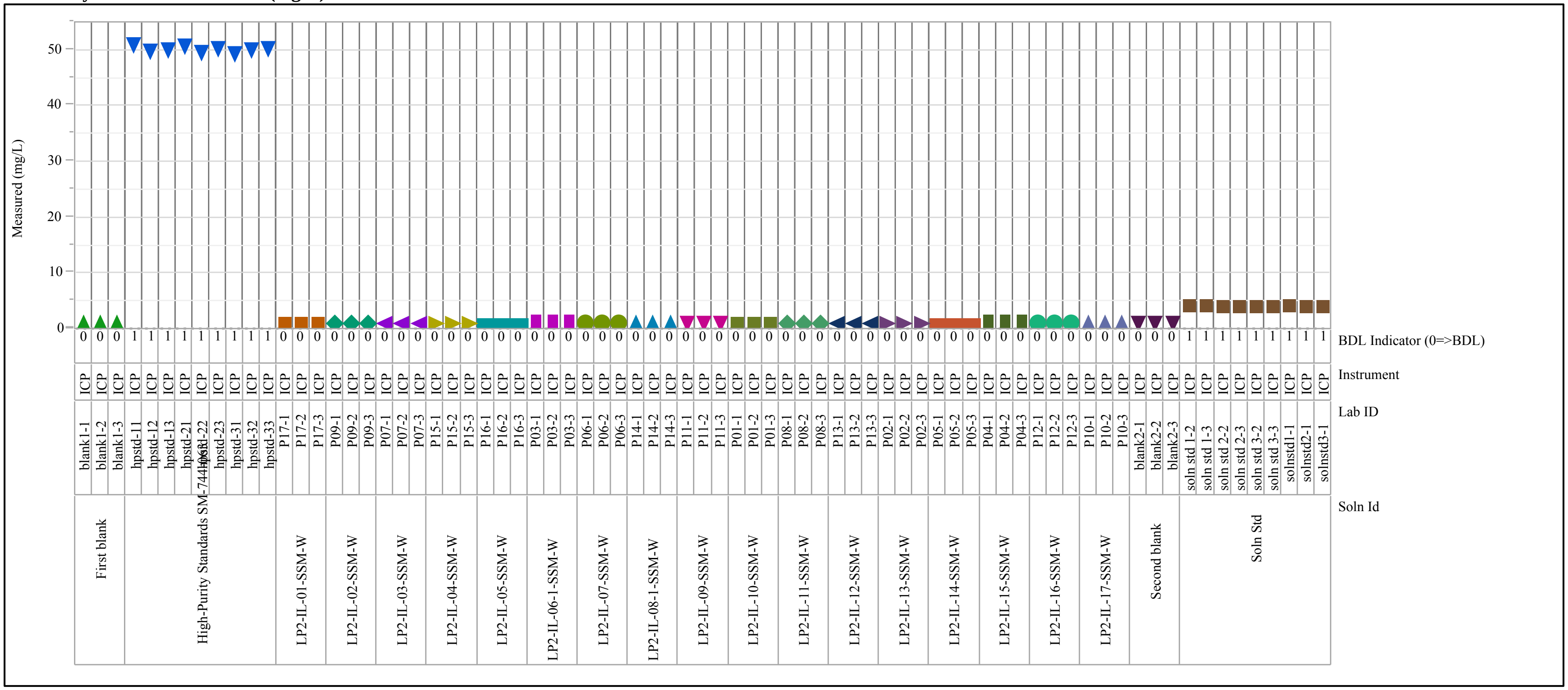


Exhibit G-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=K (mg/L)
Variability Chart for Measured (mg/L)

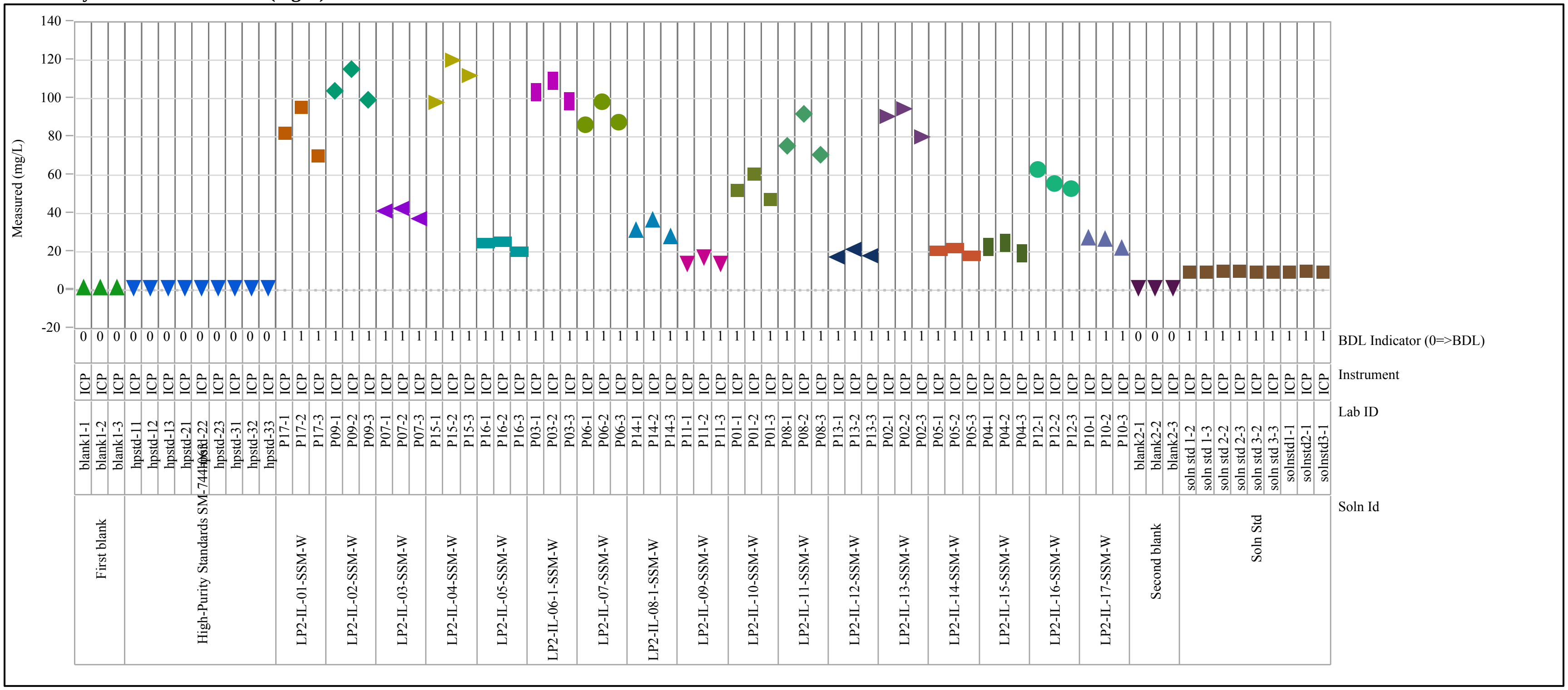


Exhibit G-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Li (mg/L)
Variability Chart for Measured (mg/L)

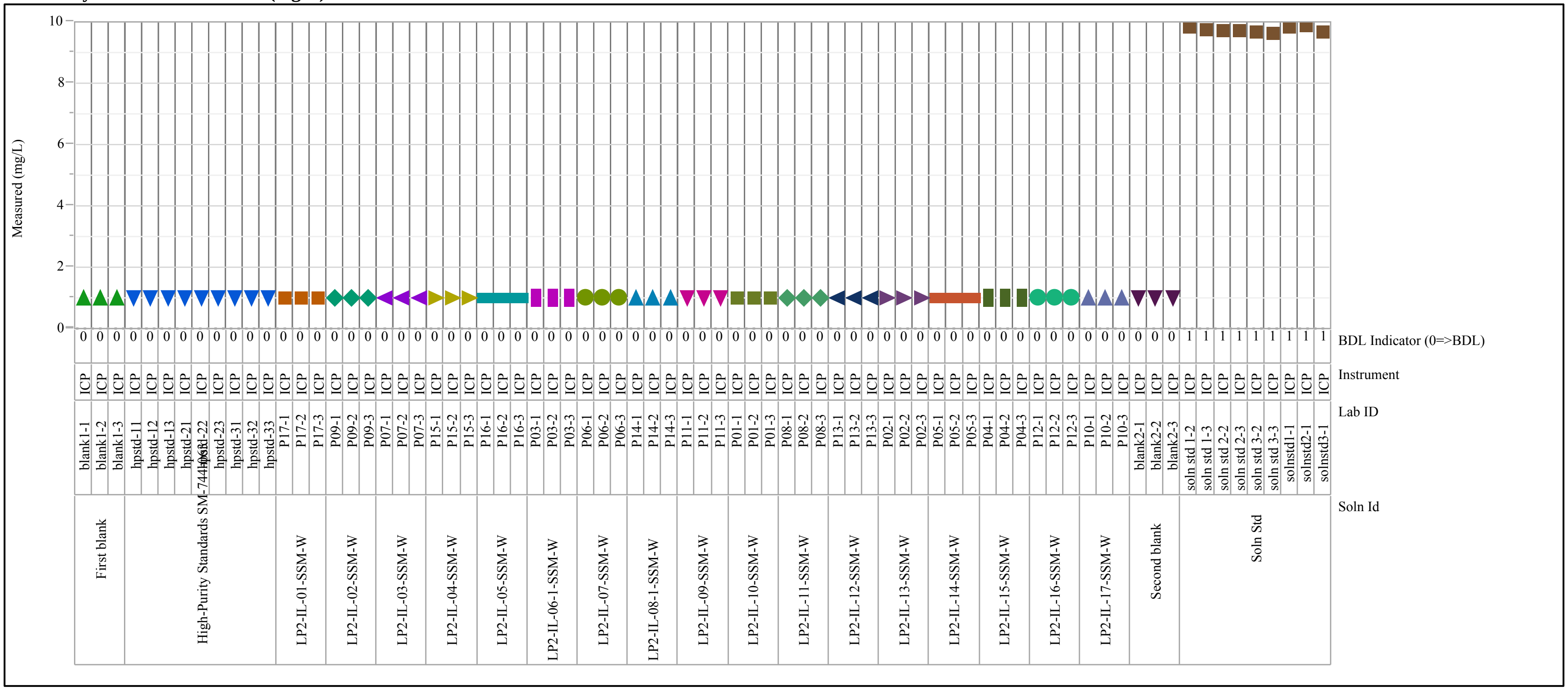


Exhibit G-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Mg (mg/L)
Variability Chart for Measured (mg/L)

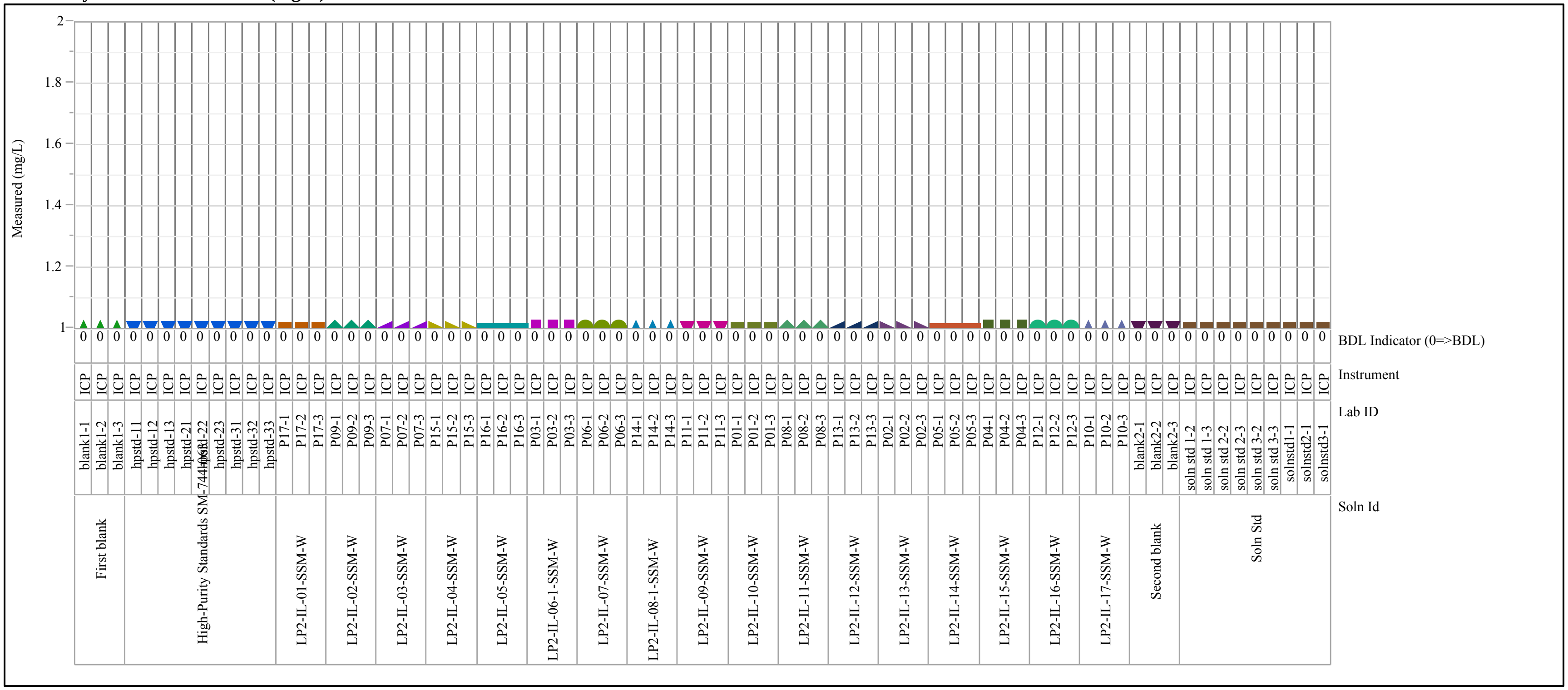


Exhibit G-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Na (mg/L)
Variability Chart for Measured (mg/L)

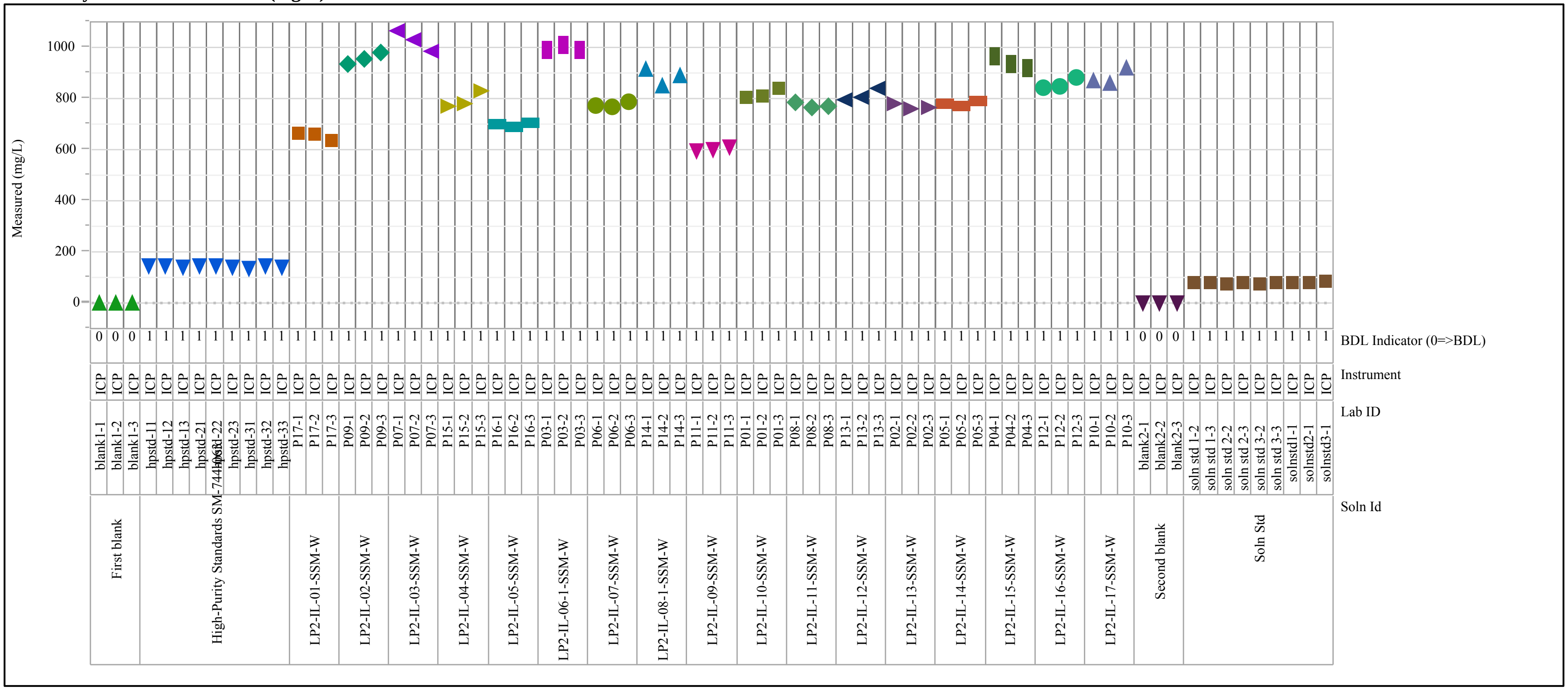


Exhibit G-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=P (mg/L)
Variability Chart for Measured (mg/L)

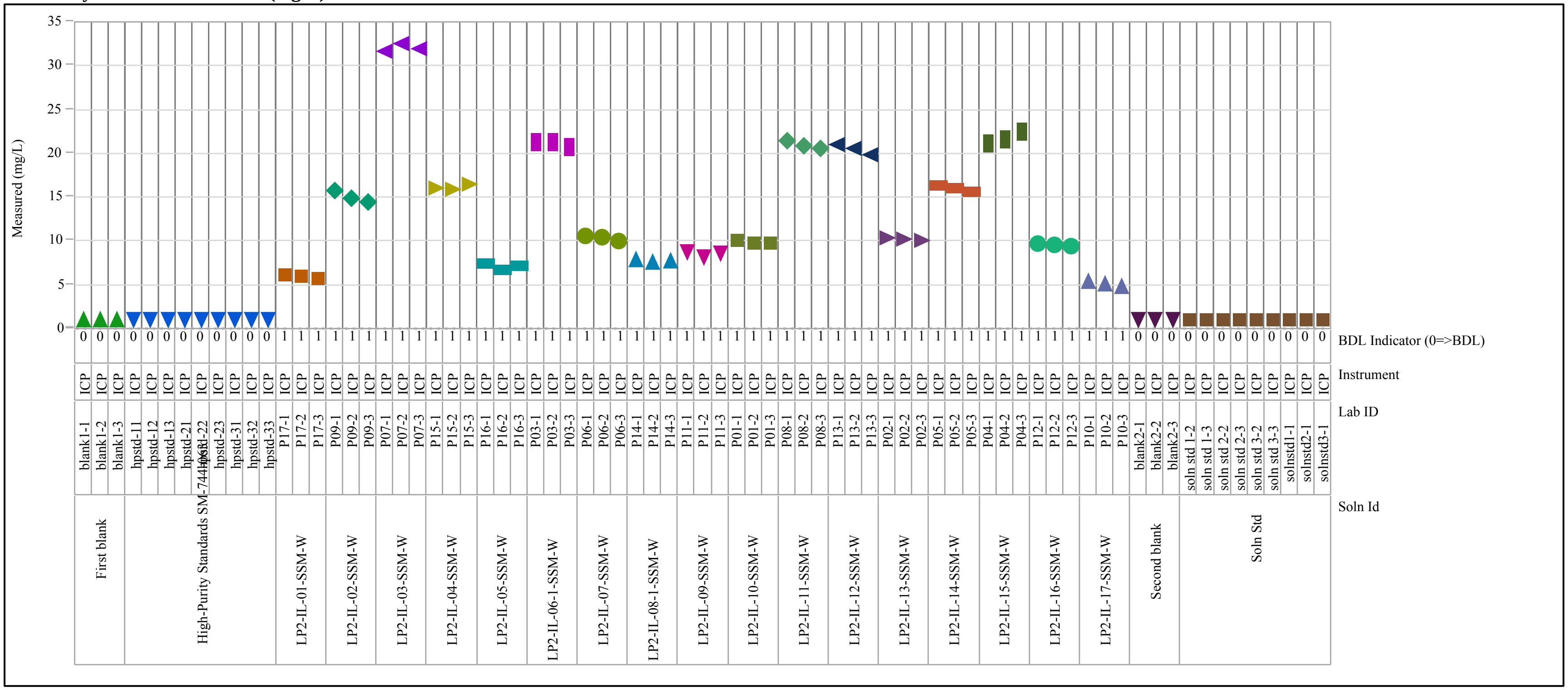


Exhibit G-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=PO4 IC (mg/L)
Variability Chart for Measured (mg/L)

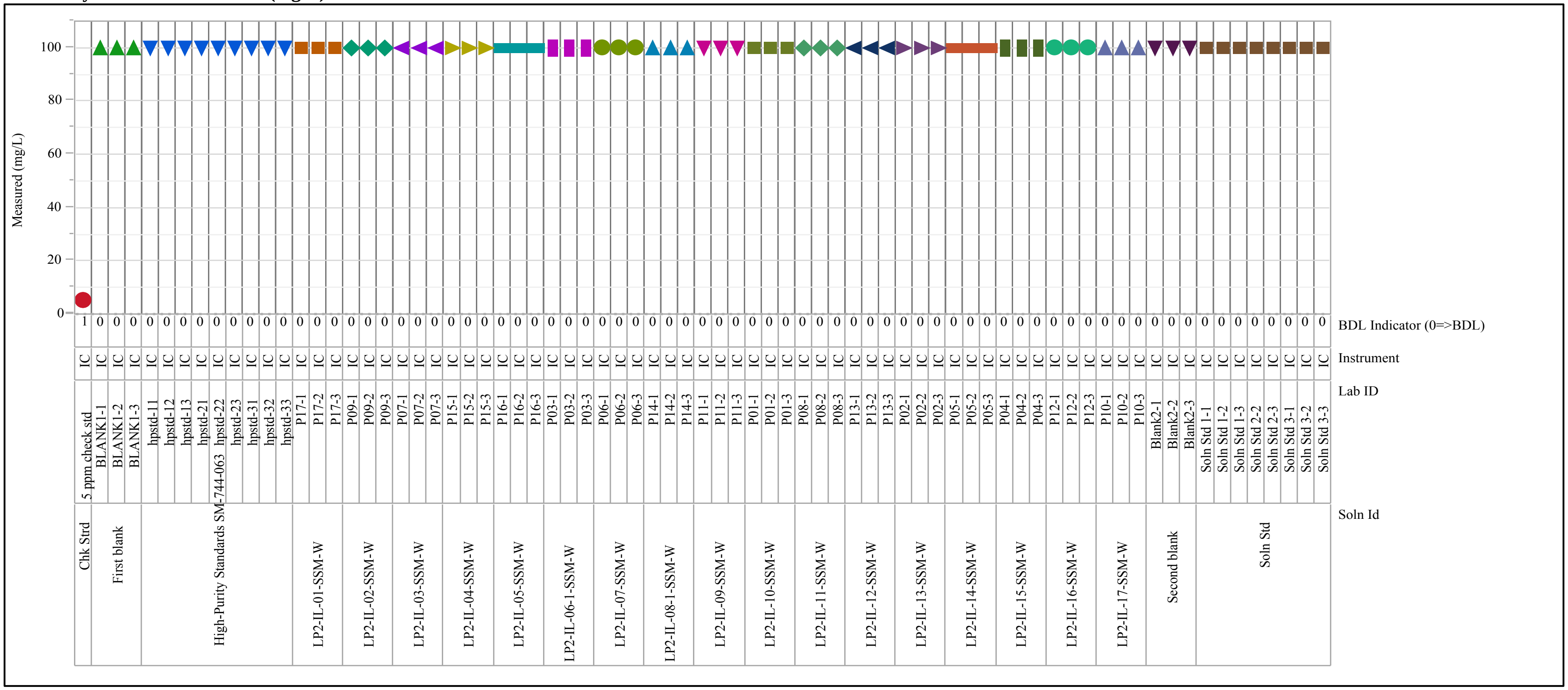


Exhibit G-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=S (mg/L)
Variability Chart for Measured (mg/L)

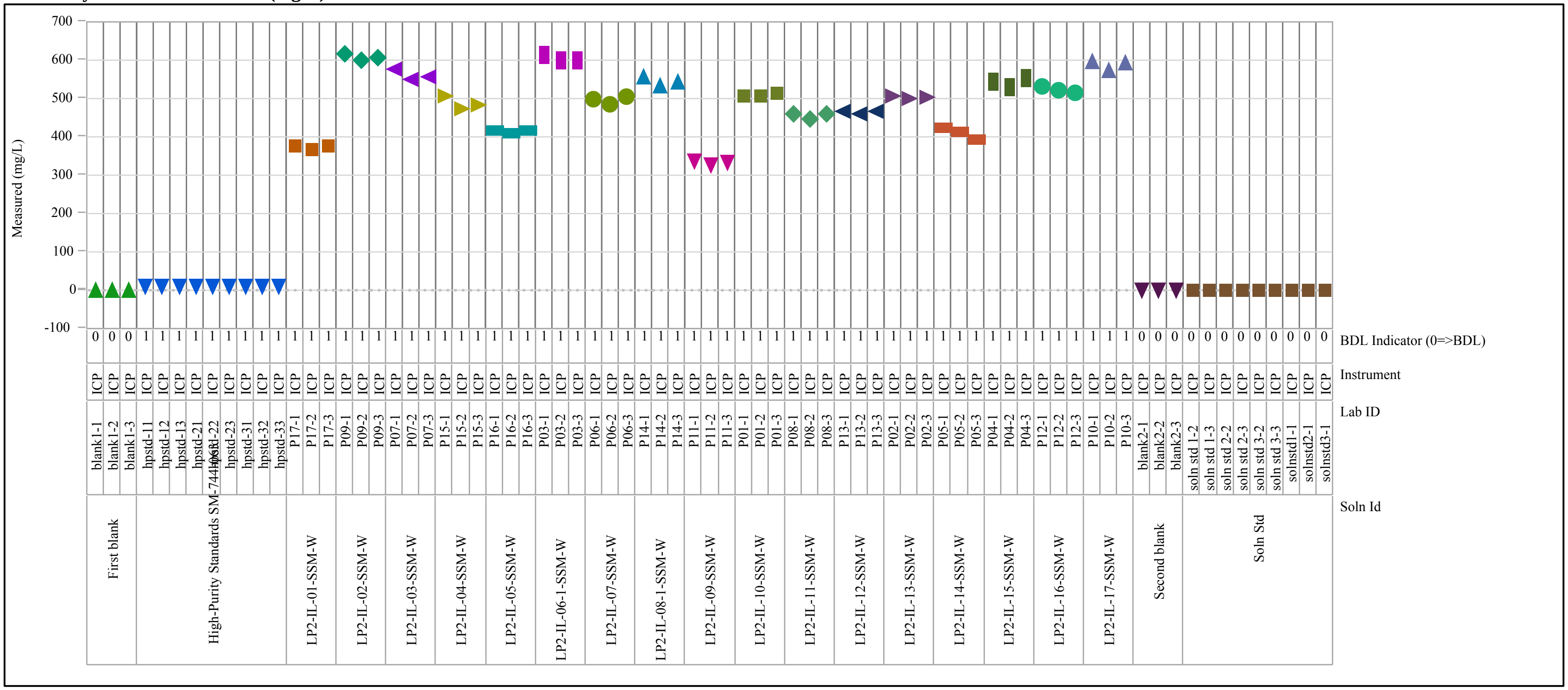


Exhibit G-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Si (mg/L)
Variability Chart for Measured (mg/L)

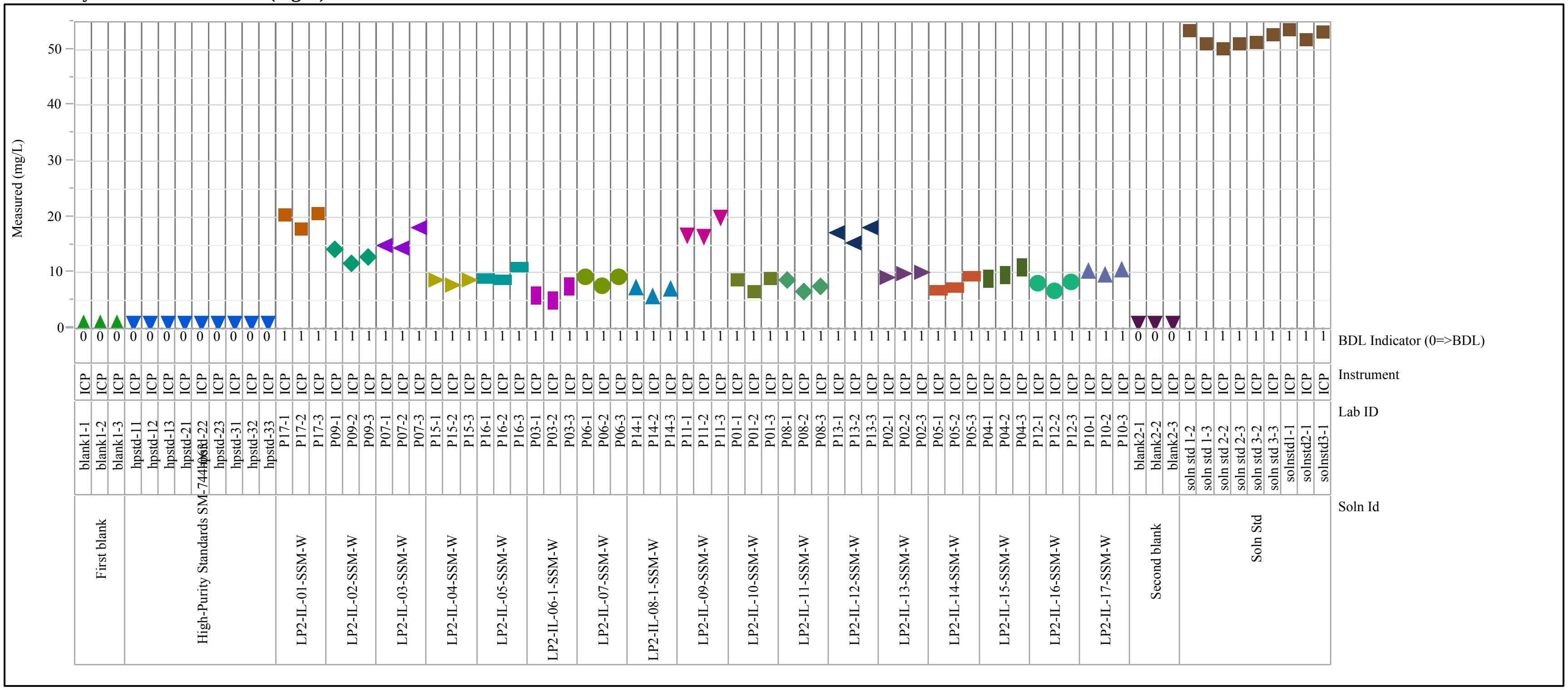


Exhibit G-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Sn (mg/L)
Variability Chart for Measured (mg/L)

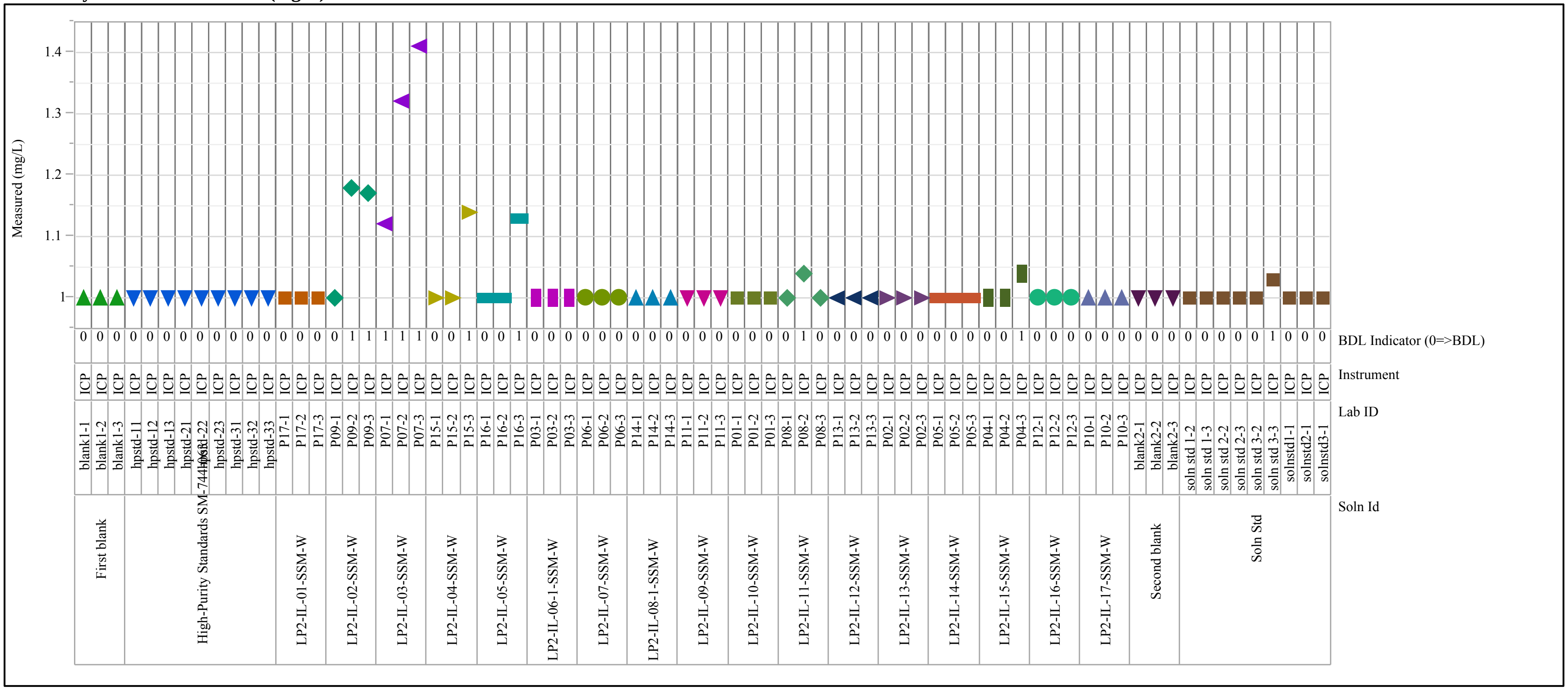


Exhibit G-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=SO4 IC (mg/L)
Variability Chart for Measured (mg/L)

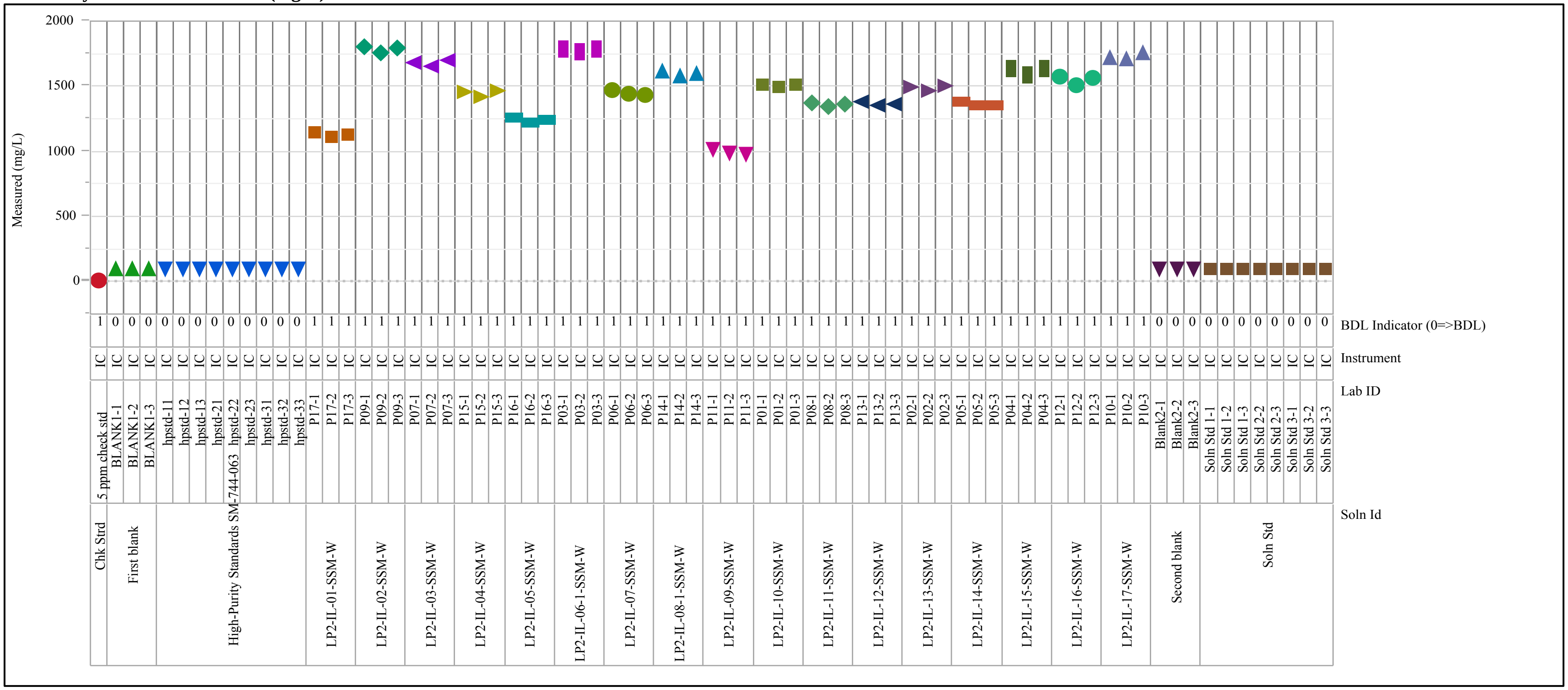


Exhibit G-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=V (mg/L)
Variability Chart for Measured (mg/L)

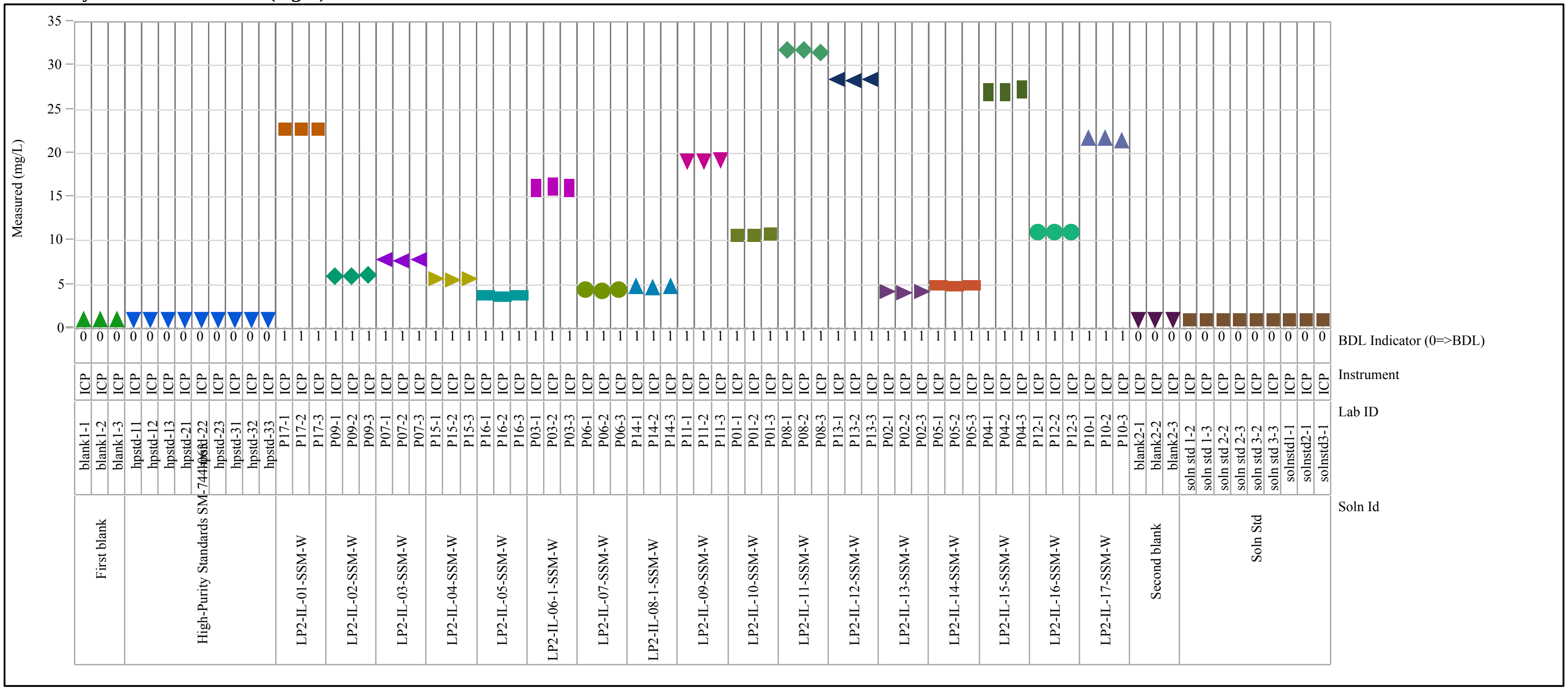


Exhibit G-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Zn (mg/L)
Variability Chart for Measured (mg/L)

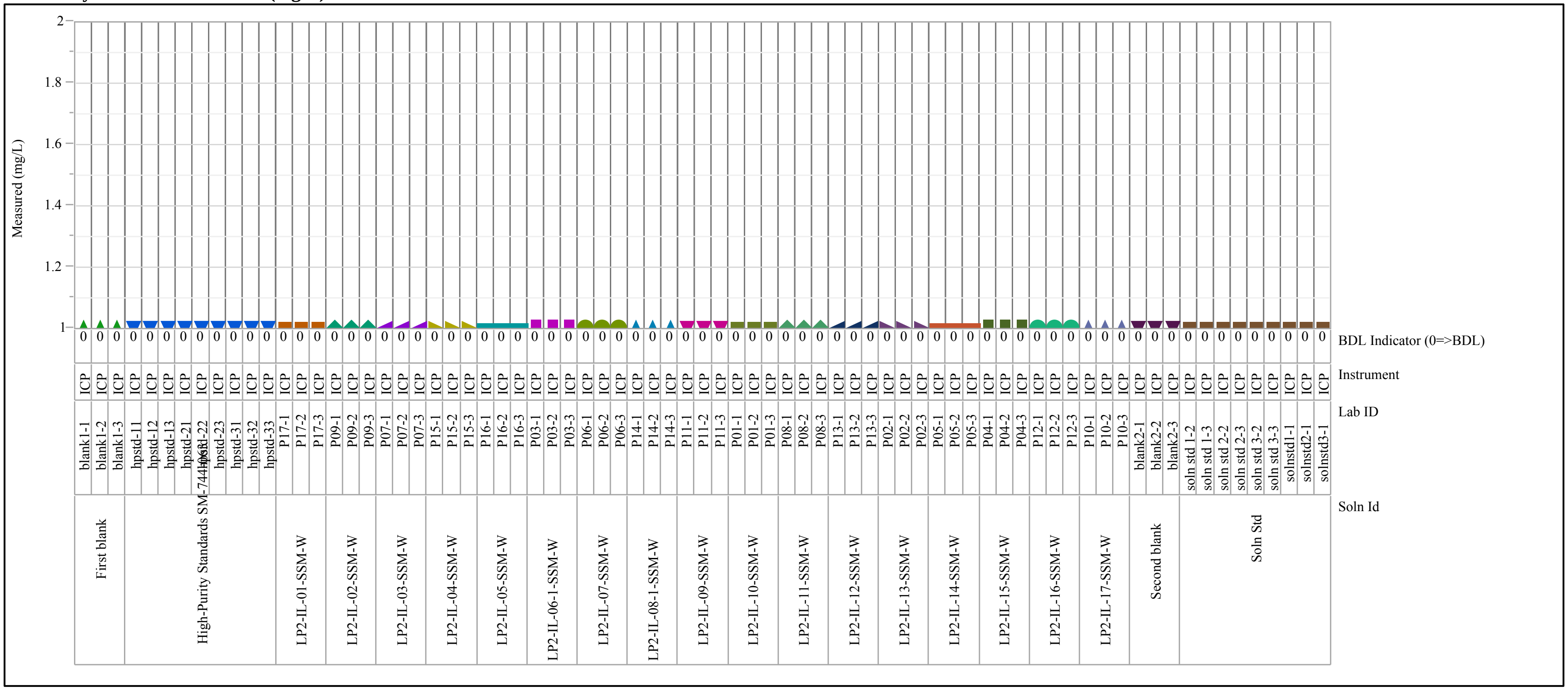
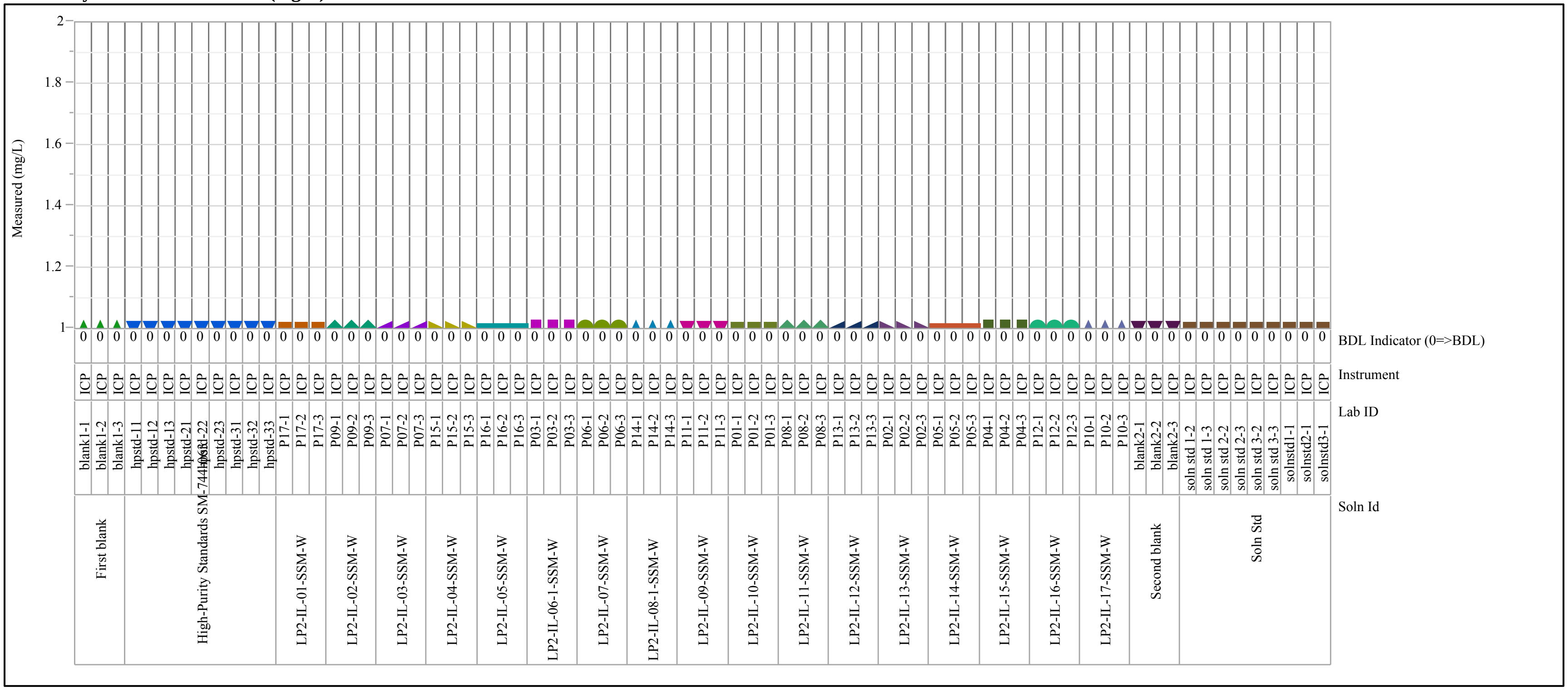


Exhibit G-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Zr (mg/L)
Variability Chart for Measured (mg/L)



Distribution:

J. W. Amoroso, 999-W
T. B. Brown, 773-A
M. E. Caldwell, 999-W
A. D. Cozzi, 999-W
C. L. Crawford, 773-42A
D. E. Dooley, 773-A
W. C. Eaton, PNNL
T. B. Edwards, 999-W
A. P. Fellinger, 773-42A
S. D. Fink, 773-A
K. M. Fox, 999-W
C. C. Herman, 773-A
A. M. Howe, 999-W
C. M. Jantzen, 773-A
T. Jin, PNNL
F. C. Johnson, 999-W
D. S. Kim, PNNL
A. A. Kruger, DOE-ORP
J. Matyáš, PNNL
D. J. McCabe, 773-42A
D. L. McClane, 999-W
G. A. Morgan, 999-W
F. M. Pennebaker, 773-42A
A. A. Ramsey, 999-W
W. G. Ramsey, 999-W
W. T. Riley, 999-1W
R. L. Russell, PNNL
M. J. Schweiger, PNNL
G. N. Smoland, 999-1W
C. L. Trivelpiece, 999-W
J. D. Vienna, PNNL
B. J. Wiedenman, 773-42A
W. R. Wilmarth, 773-A
Records Administration (EDWS)