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Sulfur Solubility Testing and Characterization of LAW Phase 1 Matrix Glasses

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EXECUTIVE SUMMARY

In this report, the Savannah River National Laboratory (SRNL) provides chemical analysis results for a series of simulated low-activity waste (LAW) glass compositions. These data will be used in the development of improved sulfur solubility models for LAW glass. A procedure developed at 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.

Chemical analyses were performed on a representative sample of each of the sulfur saturated glasses to allow for comparisons with the targeted compositions. Each of the duplicate samples was analyzed twice for each element of interest by Inductively Coupled Plasma – Atomic Emission Spectroscopy (ICP-AES) or Ion Chromatography (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.

A review of the individual glass composition measurements identified some minor shifts between measurement sub-blocks as a result of instrument calibrations. Some degree of scatter among the B_2O_3, Na_2O, SiO_2, and ZrO_2 measurements 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. There were no issues with measurements of the Low-level Reference Material (LRM) standard glass. As expected, most of the measured concentrations of SO_3 were higher than targeted due to the use of the sulfur saturation method in fabricating these glasses. Other minor differences between the targeted and measured concentrations of some of the glass components were noted.

Chemical analyses were also performed on a representative sample of each of the wash solutions resulting from the preparation of the sulfur saturated glasses. The samples were diluted and acidified as appropriate in preparation for the analyses and to dissolve any solids, and then analyzed in triplicate for each element of interest by ICP-AES or IC. 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. 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 150-900 mg/L. Further comparisons between the compositions of the glasses and the compositions of the wash solutions may be of interest, although the current sulfer saturation method used does not allow for a complete mass balance to be developed.

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LIST OF ABBREVIATIONS

BDL	Below Detection Limit
DI	De-ionized
DOE	U.S. Department of Energy
IC	Ion Chromatography
ICP-AES	Inductively Coupled Plasma – Atomic Emission Spectroscopy
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
PF	Peroxide Fusion
PNNL	Pacific Northwest National Laboratory
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

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] One of these areas is enhancing waste glass property/composition models and broadening the compositional regions over which those models are applicable.

In this report, SRNL provides chemical analysis results for several simulated LAW glass compositions that were fabricated using a method designed to maximize retained sulfate. These data will be used in the development of improved sulfur solubility models for LAW glass. The base glass compositions were provided by Pacific Northwest National Laboratory (PNNL) as part of an ongoing development task.[2]

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 C3489-00079-12.

2.2 Glasses Selected for Study

The base glass compositions (without sulfur) were selected and fabricated at PNNL. Identifiers for each of the glasses are listed in Table 2-1. Note that the glass originally labeled LAW-ORP-LD1-3 was later changed to the designation LAW-ORP-LD1-M by PNNL. This glass appears as LAW-ORP-LD1-3 in the analytical study plan.[4] 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. SSMs for three of the glasses were prepared at both laboratories to provide an opportunity for comparisons to be made.

In the sections that follow, the procedure used for producing the SSMs and removing excess sulfur is 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. Identifiers and Labs Responsible for Preparing Each Sulfur Saturated Melt (SSM)

Glass Identifier	SSM Preparation
New-OL-8445	SRNL
New-OL-8788Mod	SRNL
New-OL-14844	SRNL
New-OL-15493	SRNL
New-OL-17130	SRNL
New-OL-45748	SRNL
New-OL-54017	SRNL
New-OL-57284	SRNL
New-OL-62380	SRNL
New-OL-62909Mod	PNNL
New-OL-65959Mod	PNNL
New-OL-80309	SRNL
New-OL-90780	SRNL
New-OL-100210	SRNL
New-OL-108249Mod	PNNL & SRNL
New-OL-116208Mod	PNNL & SRNL
New-OL-122817	SRNL
New-OL-127708Mod	SRNL
New-IL-456	SRNL
New-IL-1721	PNNL & SRNL
New-IL-5253	SRNL
New-IL-5255	SRNL
New-IL-42295	SRNL
New-IL-70316	SRNL
New-IL-87749	SRNL
New-IL-93907	SRNL
New-IL-94020	PNNL
New-IL-103151	SRNL
New-IL-151542	SRNL
New-IL-166697	PNNL
New-IL-166731	PNNL
EWG-LAW-Centroid-2	SRNL
LAW-ORP-LD1-1	SRNL
LAW-ORP-LD1-2	PNNL
LAW-ORP-LD1-M	PNNL

2.3 Preparation of Sulfur Saturated Melts

An outline of the preparation of the SSMs and the removal (washing) of excess sulfur is shown in Figure 2-1. This methodology was developed at PNNL and is outlined in a test instruction.[3] Implementation of the methodology at SRNL is described in the following paragraphs.

The as-received, base glasses were first ground for 2 minutes in an Angstrom, Inc. TE250 Laboratory Ring Pulverizer using a tungsten carbide ring and puck. The resulting powder was screened through a 100 mesh (149 μm) sieve. Any glass that did not pass through the sieve was ground for an additional 30 second period and screened again. This process was repeated until all the glass powder passed through the 100 mesh sieve.

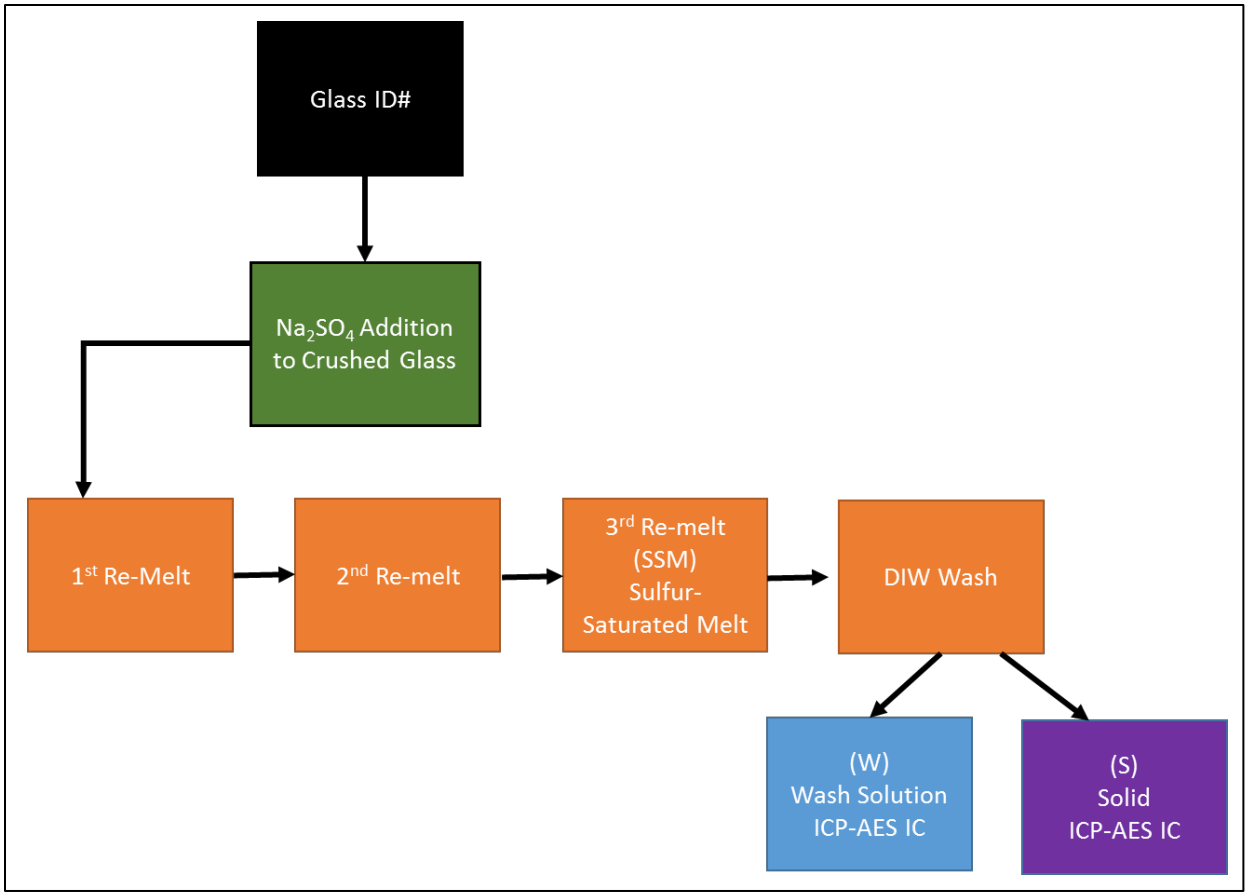

Figure 2-1. Outline of the Preparation of Glasses for Sulfur Solubility Determination[3]

For each of the study glasses, a laboratory balance was used to weigh out 100 g of ground baseline glass and 7.64 g of Na_2SO_4. These were combined by blending in the ring pulverizer for 30 seconds using only the tungsten carbide puck. The milling container was housed in a plastic bag to contain potential dust. A clean Pt/Au alloy crucible was used for melting the glass powder with added Na_2SO_4. The mass of the crucible before and after the addition of the powdered glass and Na_2SO_4 was recorded to track the mass change of the sample before and after melting.

A lid was fitted to the crucible and it was placed into an electric resistance heated furnace at 1150 °C for approximately 1 hour. The crucible was then removed from the furnace, the lid was removed, and the glass was poured onto a stainless steel quench plate. Once cool, the quenched glass was placed back into the crucible and the mass was recorded. The same crucible and lid were used for the subsequent melts of each glass with no cleaning performed between melts. Details of the melting process, mass changes, and any observations of the glass were recorded on the data sheets.

Each of the study glasses (including any material that had remained adhered to the crucibles and any excess sulfate) was then ground in the ring pulverizer for 2 minutes using the tungsten carbide ring and puck. The resulting powder was screened through a 100 mesh (149 µm) sieve. Any glass that did not pass through the sieve was ground for an additional 30 second period and screened again. This process was repeated until all the glass powder passed through the 100 mesh sieve. Each glass was re-melted at

1150 °C for approximately 1 hour in its Pt/Au crucible with a tightly fitted lid. The glasses were then poured onto quench plates and allowed to cool.

The grinding and melting steps described in the previous paragraphs were repeated a third time, with the resulting glasses being described as sulfur saturated melts (SSMs, refer to Figure 2-1). The suffix "-SM" was appended to the identifiers given in Table 2-1 to indicate the sulfur saturated melts. The suffix "-PSM" was appended to the identifiers given in Table 2-1 to indicate the sulfur saturated melts that were prepared at PNNL. Complete details of the grinding and melting processes were recorded on log sheets for each of the study glasses. These log sheets are included as Exhibit 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. Observations associated with these micrographs are given in Exhibit B-3 of Appendix B.

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 (also refer to Figure 2-1).[3] Implementation of the methodology at SRNL is described in the following paragraphs.

Each of the SSMs (including any material that had remained adhered to the crucibles and any excess sulfate) was ground in the ring pulverizer for 2 minutes using the tungsten carbide ring and puck. The resulting powder was screened through a 120 mesh (125 μm) sieve. Any material that did not pass through the sieve was ground for an additional 30 second period and screened again.

The ground SSMs were next washed and filtered to remove excess sulfur. For each glass, the mass of an empty petri dish with a new 0.2 μm Polyvinylidene difluoride (PVDF) membrane disc filter was measured and recorded. Four grams of the ground SSM were measured and added to a 250 mL beaker. Fifty grams of de-ionized (DI) water were measured and added to the beaker with the SSM powder. The beaker was placed in an ultrasonic bath for 3 minutes to wash the glass powder. The tare mass of an empty flask (with volume >100 mL) was measured and recorded. A 47 mm magnetic filter funnel with the 0.2 μm PVDF membrane disc filter (mass recorded earlier with petri dish) was installed onto the flask. After washing in the ultrasonic bath, the water and glass from the beaker were transferred to the filter funnel using a pipette. The liquid passed through the membrane filter into the flask, assisted via a vacuum pump.

After emptying with the pipette, an additional 50 g of DI water was added to the beaker and the mass was recorded. The pipette was used to rinse the beaker and the sides of the funnel with the additional DI water such that all of the glass powder was transferred to the membrane filter. The membrane filter with wet glass was transferred back into the petri dish using tweezers. Approximately 10 mL of the recovered solution was retained in a labeled vial for later analysis. The suffix "-WS" was appended to the identifiers given in Table 2-1 to identify the wash solutions resulting from the preparation of each glass. The suffix "-PWS" was appended to the identifiers given in Table 2-1 to indicate the wash solutions that were prepared at PNNL.

The mass of the wet glass, filter, and petri dish was measured and recorded, as was the mass of the recovered solution and flask. The petri dish with glass powder and membrane filter was covered to prevent cross-contamination of samples, and then placed in a 90 °C oven overnight to dry. The mass of the glass powder and filter in the petri dish was measured and recorded after drying. The dried glass powder sample was placed into a labeled vial for further analysis. The washing and filtering steps

described above were repeated a second time to obtain an additional 4 g of washed glass for each composition.

Complete details of the grinding, washing, and filtering process to remove excess sulfur were recorded on log sheets for each of the glasses. These log sheets are included as Exhibit A-2 of Appendix A. Note that the sheets were modified to incorporate both of the washing and filtering cycles for each composition, so "first" and "second" in the upper right corner of the sheets are not circled.

Glass New-OL-15493 was washed and filtered three different times, first due to an issue with sticking to the filter and second due to visible solids floating on top of the solution (Figure 2-2). The third preparation of this glass was completed without either of these issues, and was thus used for further analyses. The origins of the sticking and floating solids issues were not identified.

Figure 2-2. Dark colored solids floating on the surface of powdered glass New-OL-15493 in DI water

2.5 Glass Composition Analysis

Chemical analyses were performed under the auspices of an analytical plan[4] 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),[5] lithium metaborate fusion (LM),[6] and potassium hydroxide fusion (KH),[7] 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)[8] or ion chromatography (IC),[9] 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)[10] 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.[10] The LRM glass was sourced from SRNL for the glasses identified as Set 1 in the analytical plan, and the LRM glass was sourced from PNNL for the glasses identified as Set 2 in the analytical plan. The preparation and measurement methods used for each of the reported glass components are listed in Table 2-2.

Note that three glass components were omitted from the analyses after discussion with PNNL. Cs_2O was present only in glass LAW-ORP-LD1 and at a low targeted concentration, 0.13 wt %. An additional measurement method would have been required to determine the Cs_2O concentration of this glass. NiO and PbO were present only in glass LAW-ORP-LD1 and at targeted concentrations (0.04 and 0.01 wt %, respectively) that were likely to be below the analytical detection limits.

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
Cs	Not measured	
F	KH	IC
Fe	PF	ICP-AES
K	LM	ICP-AES
Li	PF	ICP-AES
Mg	LM	ICP-AES
Na	LM	ICP-AES
Ni	Not measured	
P	LM	ICP-AES
PbO	Not measured	
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 Wash Solution Analysis

Chemical analyses were performed under the auspices of an analytical plan[4] 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 and acidified as appropriate in preparation for the analyses and to dissolve any solids.

Each of the samples was analyzed in triplicate for each element of interest by ICP-AES[8] and IC.[9] Note that IC analyses of the wash solutions were not included in the analytical plan as issued; PNNL requested that these analyses be added to the study after the work was in progress. The IC measurements were added by following the same calibration blocks as planned for the ICP-AES analyses (see Table 7 in SRNL-L3100-2016-00141). 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 solution standards included a commercially prepared standard solution for the ICP-AES analyses, a reference solution prepared at SRNL for the IC analyses, and a reference solution prepared at PNNL containing sodium sulfate that was included with both the ICP-AES and IC 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 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.)[11] 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. 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 issues are seen. For example, see the measurements of Fe_2O_3 concentration in Group B, Block 1, and the measurements of SiO_2 concentration in Group D, Block 2. Taking the average of the measurements for each of these oxides is assumed to negate these minor calibration shifts.

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 B_2O_3, Na_2O, SiO_2, and ZrO_2 measurements was noted for the study glasses. The measured B_2O_3 concentrations for the glasses in Analytical Group C were somewhat below the targeted values. 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 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.[8] 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 of 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 low measured B_2O_3 concentrations for those glasses in Analytical Group C are again visible.
- The measured concentrations of chlorine are low for all the study glasses, which is likely due to volatility over the multiple melting cycles.
- The measured concentrations of Cr_2O_3 are somewhat low for those glasses that targeted higher concentrations of this component (0.3 to 0.5 wt %).
- The measured concentrations of fluorine are low for most of the study glasses, which again is likely due to volatility over the multiple melting cycles.
- 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 concentrations of Li_2O are low for most of the study glasses, which may be due to volatility over the multiple melting cycles.
- The measured concentrations of MgO are low for those glasses that targeted higher concentrations of this component (2.5-3.5 wt %).
- The measured Na_2O concentrations are low for the two study glasses, New-OL-100210-SM and New-OL-15493-SM, that targeted relatively high concentrations (> 25 wt %).
- The measured concentrations of P_2O_5 are low for those glasses that targeted higher concentrations of this component (1-1.5 wt %).
- As expected, most of the measured concentrations of SO_3 are higher than targeted due to the use of the sulfur saturation method in fabricating these glasses.
- There are some deviations in the measured SiO_2 concentrations, both above and below the targeted values for the study glasses.
- The measured V_2O_5 and ZrO_2 concentrations are low for some of the study glasses.

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 of the measured sums of oxides for the study glasses fall within the interval of 94.3 to 106.4 wt %, indicating acceptable 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 observations listed above. Note that no shading was used for the comparison of SO_3 concentrations, since the use of the sulfur saturation method means that there is no targeted SO_3 concentration for comparison.

Exhibit C-5 in Appendix C provides a comparison of the measured SO_3 concentrations among the Phase I sulfate solubility study glasses fabricated earlier with specific, targeted SO_3 concentrations[12,13] and those of the current study that were fabricated using the sulfur saturation method. A review of Exhibit C-5 shows that, in general, the sulfur saturation method led to higher retained SO_3 concentrations in the glasses, as expected. In some cases the original, targeted SO_3 concentrations in glass were relatively low

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

(< 0.5 wt %), resulting in more obvious differences. Glass New-OL-80309 targeted a relatively high SO_3 concentration originally, and the measured SO_3 concentration measured after fabrication with the sulfur saturation method was about the same. Two of the three glasses that were fabricated by the sulfur saturation method at both SRNL and PNNL had measured SO_3 concentrations that were similar (New-IL-1721 and New-OL-108-249Mod). The third glass that was fabricated at both laboratories, New-OL-116208Mod, had a somewhat lower measured SO_3 concentration when fabricated at SRNL. Glass New-OL-8788Mod exhibited the lowest SO_3 solubility.

3.2 Review and Evaluation of Wash Solution Measurements

Table D-1 and Table D-2 in Appendix D provide the elemental concentration measurements in mg/L for the wash solutions as measured by ICP-AES. Table D-3 in Appendix D 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 D. 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.)[11] was used to support these analyses.

3.2.1 Treatment of Detection Limits

The elemental and anion concentrations in Table D-1 through Table D-3 of Appendix D 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 glass. 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.

3.2.2 Measurements in Analytical Sequence

Exhibit D-1 in Appendix D 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 D-1 through Table D-3 in Appendix D, 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.

3.2.3 Composition Measurements by Glass Identifier

Exhibit D-2 in Appendix D 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 D-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. All measurements of the blanks were below detection limits, as expected. 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.

3.2.4 Results for the Standard Solutions

Table D-4 in Appendix D 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. Note that the reference values for the PNNL sodium sulfate standard solution were not provided; thus, results for this standard are not included in Table D-4. Also note that the detection limits for the PNNL sodium sulfate standard solution are generally higher than those for the other standard solutions and those for the wash solutions. This is because a limited amount of the sodium sulfate standard solution was provided, which in turn limited the number of dilutions that could be performed for the analyses.

3.2.5 Measured Compositions of the Wash Solutions

From the discussion of Section 3.2.3, all of the measurements for each analyte for each wash solution (i.e., all of the measurements in Table D-1 through Table D-3 of Appendix D) were averaged to determine a representative chemical composition for each solution. Table D-5 and Table D-6 in Appendix D provide a summary of the average measured compositions of the wash solutions.

The following observations are offered from a review of Table D-5 and Table D-6:

- The measured concentrations of Al, Fe, Mg, Sn, Zn, and Zr in the wash solutions were at or below the detection limits.
- The measured concentrations of B in the wash solutions were on the order of 10-30 mg/L, with some higher than this range.
- The measured concentrations of Ca in the wash solutions ranged from the detection limits to about 30 mg/L.
- The measured concentrations of Cl ranged over about 10-40 mg/L for those solutions from glasses that contained Cl.
- The measured concentrations of Cr, K, Si, and V in the wash solutions were about 5-50 mg/L, with higher values for some of the wash solutions.
- The measured concentrations of F in the wash solutions were frequently below the detection limits, with a few measurements in the range of 10-25 mg/L.
- The measured concentrations of Na in the wash solutions were in the range of 250-1350 mg/L, with several at the higher end of the range.
- The measured concentrations of P were similar by both the ICP-AES and IC methods (ICP-AES data converted to PO_4^{3-} basis for comparison), and were generally less than 10 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 150-900 mg/L.

4.0 Summary

In this report, SRNL provides chemical analysis results for a series of simulated LAW glass compositions. These data will be used in the development of improved sulfur solubility models for LAW glass. 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.

Chemical analyses were performed on a representative sample of each of the 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. Three glass components were omitted from the analyses after discussion with PNNL: Cs_2O, NiO, and PbO.

A review of the individual glass composition measurements identified some minor shifts between measurement sub-blocks as a result of instrument calibrations. Some degree of scatter among the B_2O_3, Na_2O, SiO_2, and ZrO_2 measurements 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. There were no issues with measurements of the LRM standard glass. As expected, most of the measured concentrations of SO_3 were higher than originally targeted due to the use of the sulfur saturation method in fabricating these glasses. Other minor differences between the targeted and measured concentrations of some of the glass components were noted.

Two of the three glasses that were fabricated by the sulfur saturation method at both SRNL and PNNL had measured SO_3 concentrations that were similar (New-IL-1721 and New-OL-108-249Mod). The third glass that was fabricated at both laboratories, New-OL-116208Mod, had a somewhat lower measured SO_3 concentration when fabricated at SRNL. Of the glasses included in the study, glass New-OL-8788Mod exhibited the lowest SO_3 solubility.

Chemical analyses were also performed on a representative sample of each of the wash solutions resulting from the preparation of the sulfur saturated glasses. The samples were diluted and acidified as appropriate in preparation for the analyses and to dissolve any solids, and then analyzed in triplicate for each element of interest by ICP-AES or IC. All measurements of the blanks were below detection limits, as expected. 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. These observations were not considered to indicate an error in preparation or measurement that had to be addressed in treatment of the data. 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 150-900 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: New-IL-1721				Date: 4-27-16	
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 4-27-16 1:52 pm	Additional milling intervals: 30 seconds x 1	Sieve size: 100 mesh	Archive sample mass (target 5 grams): 4.865	
Mixture Masses		**Angstrom Mill (puck only + bag) 30 sec.** Date/time in: 4-27-16 2:30 pm	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
95.514	7.640		178.259	281.213	AD-0044
Glass melt details					
Crucible ID:	810-3				
Furnace ID:	MS+E-006-15				
Temperature and date/time into the furnace:	1150°C 4-27-16 2:39 pm				
Temperature and date/time out of the furnace:	1150°C 4-27-16 3:40 pm				
Quench details					
Viscosity notes (describe consistency):					
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	Translucent green with a sigificant amount of yellow sulfate on surface of glass & left in crucible				
Crucible and glass mass after cooling (g):	280.963				
Photos and microscopy					
Describe features present (include file names and locations): —					
Person(s) performing work					
Initial and date: MEC 4.27.16					

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

Second Re-melt: History and Observations

Glass ID: New-IL-1721			Date: 4.28.16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 4.28.16 7:53	Additional milling intervals: 30 seconds x 2		Sieve size: 100 Mesh	
Mixture Masses		**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
—	—		178.272	278.174	AD-0044
Glass melt details					
Crucible ID:	810-3				
Furnace ID:	MSRE-0006-15				
Temperature and date/time into the furnace:	1150°C 4.28.16 9:24 am				
Temperature and date/time out of the furnace:	1150°C 4.28.16 10:24 am				
Quench details					
Viscosity notes (describe consistency):	Thinner than DWPF glass				
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	Few air bubbles Opaque light/dark green w/significant amount of yellow sulfate on surface of glass and left on crucible. No undissolved particles				
Crucible and glass mass after cooling (g):	277.770				
Person(s) performing work					
Initial and date:	MEL 4.28.16				

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

Third Re-melt: History and Observations

Glass ID: New-IL-1721			Date: 4.28.16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 4.28.16 10:37 am	Additional milling intervals: 30 seconds x 1		Sieve size: 100 Mesh	
Mixture Masses: Baseline glass (g) —	Na_2SO_4 (g) —	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 179.270	Crucible with glass mass (g): 276.434	Balance ID: AD.00414
Glass melt details					
Crucible ID:	810-3				
Furnace ID:	MS&E-006-15				
Temperature and date/time into the furnace:	1150°C 4.28.16 12:41 pm				
Temperature and date/time out of the furnace:	1150°C 4.28.16 1:41 pm				
Quench details					
Viscosity notes (describe consistency):	Same as 2nd melt				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	Same as 2nd melt				
Crucible and glass mass after cooling (g):	276.090				
Photos and microscopy					
Describe features present (include file names and locations): —					
Person(s) performing work					
Initial and date: MEC 4.29.16					

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

First Re-melt: History and Observations

Glass ID: New - IL-42295				Date: 5-6-16	
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 5-6-16 8:25am	Additional milling intervals: 30 seconds x 1	Sieve size: 100mesh	Archive sample mass (target 5 grams): 4.639	
Mixture Masses		**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
94.477	7.641	5-6-16 9.00am	175.064	277.182	AD-0044
Glass melt details					
Crucible ID:	838-8				
Furnace ID:	MS+E-006-1.5				
Temperature and date/time into the furnace:	1150°C 5-6-16 9:05am				
Temperature and date/time out of the furnace:	1150°C 5-6-16 10:05 am				
Quench details					
Viscosity notes (describe consistency):	Thinner than DWPF Glass				
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	A few bubbles Translucent dark hunter/olive green glass w/sign. fraction amount of yellow solids on glass and crucible.				
Crucible and glass mass after cooling (g):	276.952				
Photos and microscopy					
Describe features present (include file names and locations):	—				
Person(s) performing work					
Initial and date:	MEC 5-6-16				

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

Second Re-melt: History and Observations

Glass ID: New-IL-42295			Date: 5·6·2016		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 5·6·2016 10:33 am	Additional milling intervals: 30 seconds x 2		Sieve size: 100 Mesh	
Mixture Masses: Baseline glass (g)	Na_2SO_4 (g)	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 175.085	Crucible with glass mass (g): 275.792 ~~785~~ MEC 5.6.16	Balance ID: AD 0044
—	—				
Glass melt details					
Crucible ID:	838-8				
Furnace ID:	MS&E-0000-15				
Temperature and date/time into the furnace:	1150°C 5·6·16 1:51 pm				
Temperature and date/time out of the furnace:	1150°C 5·6·16 2:51				
Quench details					
Viscosity notes (describe consistency):	Sml				
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	40ml				
Crucible and glass mass after cooling (g):	275.618				
Person(s) performing work					
Initial and date: MEC 5.6.16					

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

Third Re-melt: History and Observations

Glass ID: New-IL-42295			Date: 5-9-16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 9:00 am 5-9-16	Additional milling intervals: 30 seconds x 3		Sieve size: 100 mesh	
Mixture Masses		**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
—	—		175.085	274.221	AD-0044
Glass melt details					
Crucible ID:	838-8				
Furnace ID:	MS+E-006-15				
Temperature and date/time into the furnace:	1150°C 5-9-16 11:00am				
Temperature and date/time out of the furnace:	1150°C 5-9-16 11:55am				
Quench details					
Viscosity notes (describe consistency):	same as 1st + 2nd melt				
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	Opaque green with a significant amount of yellow sulfate on glass & crucible.				
Crucible and glass mass after cooling (g):	274.023				
Photos and microscopy					
Describe features present (include file names and locations): —					
Person(s) performing work					
Initial and date: PJW 5-9-16					

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

First Re-melt: History and Observations

Glass ID: LAW-ORP-LD1-1				Date: 5/16/16	
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 5.16.16 3:00	Additional milling intervals: 30 seconds x 1	Sieve size: 100 Mesh	Archive sample mass (target 5 grams): 4.826	
Mixture Masses		**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
93.3603 ~~4.8220~~ ml 5/16/16	7.641	5.16.16 4:02 PM	177.536	278.541	AD0044
Glass melt details					
Crucible ID:	838-7				
Furnace ID:	MSLE-006-15				
Temperature and date/time into the furnace:	1150°C 5/17/16 8:20 AM				
Temperature and date/time out of the furnace:	5/17/ 8:20 AM				
Quench details					
Viscosity notes (describe consistency):	Slightly thinner/similar to DWPF glass				
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	Dark green (translucent) glass w/ significant amounts of bright yellow sulfate on surface of glass and crucible. Bubbles present No undissolved solids				
Crucible and glass mass after cooling (g):	279.811				
Photos and microscopy					
Describe features present (include file names and locations): —					
Person(s) performing work					
Initial and date: MEC 5.16.16					

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

Second Re-melt: History and Observations

Glass ID: LAW-ORP-LD1-1			Date: 5/17/16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 12:20pm 5/17/16	Additional milling intervals: 30 seconds x 2		Sieve size: 100 mesh	
Mixture Masses: Baseline glass (g)	Na_2SO_4 (g)	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
—	—		177.573	278.710	AD-0044
Glass melt details					
Crucible ID:	838.7				
Furnace ID:	M S & E - 0016 - 15				
Temperature and date/time into the furnace:	1150°C 5/17/16 12:58pm				
Temperature and date/time out of the furnace:	1150°C 5/17/16 2:10 pm				
Quench details					
Viscosity notes (describe consistency):	same as 1st melt				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	same as 1st melt				
Crucible and glass mass after cooling (g):	278.422				
Person(s) performing work					
Initial and date: pjw 5/17/16					

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

Third Re-melt: History and Observations

Glass ID: LAW-ORP-LD1-1			Date: 5-17-16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 2:40 pm 5-17-16	Additional milling intervals: 30 seconds x 3		Sieve size: 100 mesh	
Mixture Masses		**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
—	—		177.561	277.452	AD-0044
Glass melt details					
Crucible ID:	838-7				
Furnace ID:	MS+E-006-15				
Temperature and date/time into the furnace:	1150°C 5-18-16 8:38am				
Temperature and date/time out of the furnace:	1150° C 5-18-16 9:38am				
Quench details					
Viscosity notes (describe consistency):	Same as 1st melt				
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	Dark green glass - opaque with a significant amount of yellow sulfate on glass & crucible				
Crucible and glass mass after cooling (g):	276.718				
Photos and microscopy					
Describe features present (include file names and locations): —					
Person(s) performing work					
Initial and date: pjw 5-17-16 pjw 5-18-16					

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

First Re-melt: History and Observations

Glass ID: NEW- ~~ALM~~ - IL-103151	Date: 5·10·16

Glass Preparation details

Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 5·10·16 2:31 PM	Additional milling intervals: 30 seconds x 1	Sieve size: 100 Mesh	Archive sample mass (target 5 grams): 4.420

Mixture Masses		Angstrom Mill (puck only + bag) 30 sec.	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)	Date/time in: 5·10·16 3:04 PM	175.~~703~~ 702	277.547	AD 0044
94.493	7.643				

Glass melt details

Crucible ID:	838-12
Furnace ID:	MSLE-000-15 9:39 AM
Temperature and date/time into the furnace:	1150°C 5·12·16 9:39 AM mc 5·12·16
Temperature and date/time out of the furnace:	1150°C 5·12·16

Quench details

Viscosity notes (describe consistency):	Thinner than DWPF glass
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	No undissolved particles Translucent green with significant amounts of yellow sulfate on glass and crucible A few bubbles
Crucible and glass mass after cooling (g):	277.232

Photos and microscopy

Describe features present (include file names and locations):

—

Person(s) performing work

Initial and date:

MEC 5·10·16

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

Second Re-melt: History and Observations

Glass ID: NEW-IL-103151			Date: 5-12-16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 5-12-16 10:31	Additional milling intervals: 30 seconds x 2		Sieve size: 100 Mesh	
Mixture Masses: Baseline glass (g) —	Na_2SO_4 (g) —	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 175.787	Crucible with glass mass (g): 276.652	Balance ID: AD-00114
Glass melt details					
Crucible ID:	838-12				
Furnace ID:	MSE-000-15 5-16-16 08:50 am				
Temperature and date/time into the furnace:	1150°C ~~MSE-8~~ ✓ ↓				
Temperature and date/time out of the furnace:	1150°C 5-16-16 09:50 am				
Quench details					
Viscosity notes (describe consistency):	Similar to DWPF glass (Maybe thinner)				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	Translucent green glass with a significant amount of yellow sulfate on glass and crucible - air bubbles - NO undissolved solids				
Crucible and glass mass after cooling (g):	276.060				
Person(s) performing work					
Initial and date: pjw 5-12-16 MEC 5.12.16 pjw 5-16-16					

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

Third Re-melt: History and Observations

Glass ID: NEW-IL-103151			Date: 5-16-16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 12:25 5-16-16	Additional milling intervals: 30 seconds x 2		Sieve size: 100 Mesh	
Mixture Masses: Baseline glass (g) —	Na_2SO_4 (g) —	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 175.756	Crucible with glass mass (g): 274.828	Balance ID: MD 00010
Glass melt details					
Crucible ID:	438-12				
Furnace ID:	MSPE-000-12				
Temperature and date/time into the furnace:	1150°C 5-16-16 12:50 pm				
Temperature and date/time out of the furnace:	1150°C 5-16-16 1:50 pm				
Quench details					
Viscosity notes (describe consistency):	same as 2nd melt				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	same as 1st + 2nd melt except glass is opaque.				
Crucible and glass mass after cooling (g):	274.604				
Photos and microscopy					
Describe features present (include file names and locations): —					
Person(s) performing work					
Initial and date: pjw 5-16-16					

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

First Re-melt: History and Observations

Glass ID: New-OL-108249Mod				Date: 4/25/16	
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 4/25/16 9:25am	Additional milling intervals: 30 seconds x 1	Sieve size: 100 mesh	Archive sample mass (target 5 grams): 4.786	
Mixture Masses		**Angstrom Mill (puck only + bag) 30 sec.** Date/time in: 4/25/16 10:15	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
94.200	7.640		177.548	279.388	AD-0044
Glass melt details					
Crucible ID:	838-7				
Furnace ID:	MS4E-006-15				
Temperature and date/time into the furnace:	1150°C 4/25/16 10:25 am				
Temperature and date/time out of the furnace:	1150°C 4/25/16 11:25 am				
Quench details					
Viscosity notes (describe consistency):	~~Slightly~~ Thinner than DWPF glass pjw 4/25/16				
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	No undissolved particles. Creamy olive green. Significant amount of yellow sulfate on glass + crucible.				
Crucible and glass mass after cooling (g):	279.105				
Photos and microscopy					
Describe features present (include file names and locations):	—				
Person(s) performing work					
Initial and date:	pjw 4/25/16				

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

Second Re-melt: History and Observations

Glass ID: New-DL-108249 mod	Date: 4/25/16

Glass Preparation details

Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 4/25/16 1:00pm	Additional milling intervals: 30 seconds x 2	Sieve size: 100 mesh

Mixture Masses		Angstrom Mill (puck only + bag) 30 sec. Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
—	—		177.649	276.554	AD-0044

Glass melt details

Crucible ID:	838-7
Furnace ID:	MSRE-006-15
Temperature and date/time into the furnace:	1150°C 4-25-16 1:39 pm
Temperature and date/time out of the furnace:	1150°C 4-25-16 2:37 pm

Quench details

Viscosity notes (describe consistency):	Same as 1st melt
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	Same as 1st melt
Crucible and glass mass after cooling (g):	276.407

Person(s) performing work

Initial and date:

pjw 4/25/16 MEC 4-25-16

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

Third Re-melt: History and Observations

Glass ID: New-OL-10824mod			Date: 4/26/16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 4/26/16 7:45am	Additional milling intervals: 30 seconds x 2		Sieve size: 100 mesh	
Mixture Masses: Baseline glass (g)	Na_2SO_4 (g)	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
—	—		177.685	274.825	AJ-0044
Glass melt details					
Crucible ID:	838-7				
Furnace ID:	M5+E-006-15				
Temperature and date/time into the furnace:	1150°C 4/26/16 8:21 am				
Temperature and date/time out of the furnace:	1150°C 4/26/16 9:20 am				
Quench details					
Viscosity notes (describe consistency):	Same as 1st & 2nd melts				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	Same as 1st & 2nd melts				
Crucible and glass mass after cooling (g):	274.600				
Photos and microscopy					
Describe features present (include file names and locations): —					
Person(s) performing work					
Initial and date: MEC 4.26.16					

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

First Re-melt: History and Observations

Glass ID: New-OL-90780				Date: 4/20/16	
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 4/20/16 2:45 pm	Additional milling intervals: 30 seconds x 1	Sieve size: 100 Mesh	Archive sample mass (target 5 grams): 4.868	
Mixture Masses: Baseline glass (g)	Mixture Masses: Na_2SO_4 (g)	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in: 4/20/16 3:12 pm	Empty crucible mass (g): 175.716	Crucible with glass mass (g): 277.545	Balance ID: AD-0044
94.835	7.642				
Glass melt details					
Crucible ID:	838-12				
Furnace ID:	MS&E-006-15				
Temperature and date/time into the furnace:	1150°C 4/21/16 9:24 am				
Temperature and date/time out of the furnace:	1150°C 4/21/16 10:24 am				
Quench details					
Viscosity notes (describe consistency):	Thinner than DWPF glass				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	No undissolved particles Light green ~~slightly~~ opaque glass with significant amounts of yellow sulfate on glass and crucible. Few bubbles				
Crucible and glass mass after cooling (g):	277.395				
Photos and microscopy					
Describe features present (include file names and locations): —					
Person(s) performing work					
Initial and date: MEC 4.20.16					

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

Second Re-melt: History and Observations

Glass ID: New-OL-90780			Date: 4-21-16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 4-21-16 11:08	Additional milling intervals: 30 seconds x 3		Sieve size: 100 Mesh	
Mixture Masses		**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
—	—		175.800	274.974	AD-0044
Glass melt details					
Crucible ID:	838-12				
Furnace ID:	M5&E-0000-15				
Temperature and date/time into the furnace:	1150°C 4-21-16 11:46 am				
Temperature and date/time out of the furnace:	1150°C 4-21-16 12:47 pm				
Quench details					
Viscosity notes (describe consistency):	Same as 1st melt				
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	Same as 1st melt				
Crucible and glass mass after cooling (g):	274.779				
Person(s) performing work					
Initial and date: MEC 4.21.16					

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

Third Re-melt: History and Observations

Glass ID: New-OL-90780			Date: 4/21/16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 4-21-16 2:00 pm	Additional milling intervals: 30 seconds x 3		Sieve size: 100 Mesh	
Mixture Masses: Baseline glass (g)	Na_2SO_4 (g)	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 175.814	Crucible with glass mass (g): 273.064	Balance ID: AD-0044
—	—				
Glass melt details					
Crucible ID:	838-12				
Furnace ID:	MSE-0016-15				
Temperature and date/time into the furnace:	1150°C 4-21-16 2:29 pm				
Temperature and date/time out of the furnace:	1150°C 4-21-16 3:29 pm				
Quench details					
Viscosity notes (describe consistency):	Same as 1st & 2nd melt				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	Same as 1st & 2nd melt				
Crucible and glass mass after cooling (g):	272.875				
Photos and microscopy					
Describe features present (include file names and locations): —					
Person(s) performing work					
Initial and date: MEC 4.21.16					

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

First Re-melt: History and Observations

Glass ID: EWG-LAW-Centroid-2				Date: 5-18-16	
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	**Date/Time in:** 07:45	**Additional milling intervals:** 30 seconds x 1	**Sieve size:** 100mesh	**Archive sample mass (target 5 grams):** 4.589	
Mixture Masses		**Angstrom Mill (puck only + bag) 30 sec. Date/time in:** 08:15 5-18-16	**Empty crucible mass (g):** 173.990	**Crucible with glass mass (g):** 276.373	**Balance ID:** AD-0044
Baseline glass (g) 95.001	**Na_2SO_4 (g)** 7.641				
Glass melt details					
Crucible ID:	908-4				
Furnace ID:	MSTE-006-15				
Temperature and date/time into the furnace:	1150°C 5-18-16 8:38am				
Temperature and date/time out of the furnace:	1150°C 5-18-16 9:39am				
Quench details					
Viscosity notes (describe consistency):	thinner than DWPF glass				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	Translucent green glass with a significant amount of yellow sulfate on glass + crucible. - Air bubbles -				
Crucible and glass mass after cooling (g):	276.157				
Photos and microscopy					
Describe features present (include file names and locations): —					
Person(s) performing work					
Initial and date: pjw 5-18-16					

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

Second Re-melt: History and Observations

Glass ID: EW6-LAW-Control-2			Date: 5-18-16	
Glass Preparation details				
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 10:43 5-18-16	Additional milling intervals: 30 seconds x 2	Sieve size: 100 mesh	
Mixture Masses: Baseline glass (g) —	Mixture Masses: Na_2SO_4 (g) —	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 174.058	Crucible with glass mass (g): 275.085	Balance ID: AD-0044
Glass melt details				
Crucible ID:	908-4			
Furnace ID:	MS&E-006-15			
Temperature and date/time into the furnace:	1150°C 5-18-16 11:07 AM			
Temperature and date/time out of the furnace:	1150°C 5-18-16 12:07 pm			
Quench details				
Viscosity notes (describe consistency):	Same as 1st melt.			
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	Same as 1st melt			
Crucible and glass mass after cooling (g):	274.800			
Person(s) performing work				
Initial and date: pjw 5-18-16				

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

Third Re-melt: History and Observations

Glass ID: EWG-LAW-Centroid-2			Date: 5-18-16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 12:35 5-18-16	Additional milling intervals: 30 seconds x 3		Sieve size: 100 mesh	
Mixture Masses		**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
—	—		174.003	273.658	AD-0044
Glass melt details					
Crucible ID:	908-4				
Furnace ID:	MS&E-006-15				
Temperature and date/time into the furnace:	1150°C 5-18-16 1:09 pm				
Temperature and date/time out of the furnace:	1150°C 5-18-16				
Quench details					
Viscosity notes (describe consistency):	Same as 1st melt				
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	green Opaque glass with a significant amount of yellow sulfate on glass & crucible.				
Crucible and glass mass after cooling (g):	273.319				
Photos and microscopy					
Describe features present (include file names and locations): —					
Person(s) performing work					
Initial and date: pjw 5-18-16					

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

First Re-melt: History and Observations

Glass ID: New-IL-87749	Date: 5-9-16

Glass Preparation details

Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 1:15 pm 5-9-16	Additional milling intervals: 30 seconds x 1	Sieve size: 100 mesh	Archive sample mass (target 5 grams): 4.884

Mixture Masses		Angstrom Mill (puck only + bag) 30 sec. Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
94.437	7.640	5-9-16 1:45pm	177.539	279.337	AD-0044

Glass melt details

Crucible ID:	838-7
Furnace ID:	MSTE-006-15
Temperature and date/time into the furnace:	1150°C 5-9-16 1:52 pm
Temperature and date/time out of the furnace:	1150°C 5-9-16 2:51 pm

Quench details

Viscosity notes (describe consistency):	Thinner than DWPF glass
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	Translucent darker green w/ signif. amounts of yellow sulfate on surface of glass & in crucible Bubbles present No undissolved particles
Crucible and glass mass after cooling (g):	279.030

Photos and microscopy

Describe features present (include file names and locations):

—

Person(s) performing work

Initial and date:

pjw 5-9-16

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

Second Re-melt: History and Observations

Glass ID: New-IL-877A9			Date: 5/9/16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 5/9/16 3:25 PM	Additional milling intervals: 30 seconds x 2		Sieve size: 100 Mesh	
Mixture Masses: Baseline glass (g)	Mixture Masses: Na_2SO_4 (g)	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
—	—		177.565	277.960	AD-0044
Glass melt details					
Crucible ID:	838-7				
Furnace ID:	MS&E-006-15				
Temperature and date/time into the furnace:	1150°C 5/10/16 8:34 AM				
Temperature and date/time out of the furnace:	1150°C 5/10/16 9:34 AM				
Quench details					
Viscosity notes (describe consistency):	Same as 1st Pour				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	Opaque lighter green glass with significant amounts of sulfate on glass and in crucible. Bubbles present. No undissolved particles				
Crucible and glass mass after cooling (g):	277.737				
Person(s) performing work					
Initial and date: MC 5.10.16					

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

Third Re-melt: History and Observations

Glass ID: New IL-87749	Date: 5/10/16

Glass Preparation details

Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 10:09 AM 5.10.16	Additional milling intervals: 30 seconds x 2	Sieve size: 100 Mesh

Mixture Masses		Angstrom Mill (puck only + bag) 30 sec. Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
—	—		177.573	276.555	AD 00414

Glass melt details

Crucible ID:	838-7
Furnace ID:	MS&E-000-15
Temperature and date/time into the furnace:	1150°C 5.10.16 10:58 AM
Temperature and date/time out of the furnace:	1150°C 5.10.16 11:57 AM

Quench details

Viscosity notes (describe consistency):	Same as 1st & 2nd Pour
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	More opaque than 2nd pour Bubbles (few) Lighter green Significant amount of sulfate on surface of glass and in crucible
Crucible and glass mass after cooling (g):	276.400

Photos and microscopy

Describe features present (include file names and locations):

—

Person(s) performing work

Initial and date:

MEC 5/10/16

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

First Re-melt: History and Observations

Glass ID: New-IL-70316	Date: 5-5-16

Glass Preparation details

Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 5/5/16 7:30am	Additional milling intervals: 30 seconds x 1	Sieve size: 100mesh	Archive sample mass (target 5 grams): 4.702

Mixture Masses		Angstrom Mill (puck only + bag) 30 sec. Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
95.349	7.640	5-5-16 8:15am	176.528	279.326	AD-0044

Glass melt details

Crucible ID:	838-1
Furnace ID:	MS+E-006-15
Temperature and date/time into the furnace:	1150°C 5-5-16 8:23 am
Temperature and date/time out of the furnace:	1150°C 5-5-16 9:23 am

Quench details

Viscosity notes (describe consistency):	thinner than DWPF glass
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	No undissolved solids. Small air bubbles- Translucent green glass with a significant amount of yellow sulfate on glass + crucible.
Crucible and glass mass after cooling (g):	279.133

Photos and microscopy

Describe features present (include file names and locations):

none

Person(s) performing work

Initial and date:

PJW 5-5-16

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

Second Re-melt: History and Observations

Glass ID: New-IL-70314	Date: 5-5-16

Glass Preparation details

Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 9:45am 5-5-16	Additional milling intervals: 30 seconds x 2	Sieve size: 100 mesh

Mixture Masses		Angstrom Mill (puck only + bag) 30 sec. Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
—	—		176.576	278.105	AD-0044

Glass melt details

Crucible ID:	838-1
Furnace ID:	MS+E-006-15
Temperature and date/time into the furnace:	1150°C 5-5-16 10:08am
Temperature and date/time out of the furnace:	1150°C 5-5-16 11:08

Quench details

Viscosity notes (describe consistency):	Same as 1st melt.
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	NO undissolved solids. Creamy green glass with a significant amount of yellow sulfate on glass & crucible.
Crucible and glass mass after cooling (g):	277.956

Person(s) performing work

Initial and date:

pjw 5-5-16

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

Third Re-melt: History and Observations

Glass ID: New-IL-70316		Date: 5-5-16		
Glass Preparation details				
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 12:24 pm 5-5-16	Additional milling intervals: 30 seconds x 2	Sieve size: 100 mesh	
Mixture Masses: Baseline glass (g) —	Na_2SO_4 (g) —	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 176.579	Crucible with glass mass (g): 276.921
Balance ID: AD-0044				
Glass melt details				
Crucible ID:	838-1			
Furnace ID:	MS+E-00615			
Temperature and date/time into the furnace:	1150°C 5-5-16 12:48 pm			
Temperature and date/time out of the furnace:	1150°C 5-5-16 12:49 pm			
Quench details				
Viscosity notes (describe consistency):	Same as 1st & 2nd melt			
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	same as 2nd melt.			
Crucible and glass mass after cooling (g):	276.790			
Photos and microscopy				
Describe features present (include file names and locations): —				
Person(s) performing work				
Initial and date: [signature] 5-5-16				

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

First Re-melt: History and Observations

Glass ID: New-IL-5255				Date: 5-3-16	
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 8:55 5-3-16	Additional milling intervals: 30 seconds x 1	Sieve size: 100mesh	Archive sample mass (target 5 grams): 4.828	
Mixture Masses: Baseline glass (g)	Mixture Masses: Na_2SO_4 (g)	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
94.436	7.640	9:20 5-3-16	179.877	281.764	AD-0044
Glass melt details					
Crucible ID:	857-10				
Furnace ID:	MS&E-006-15				
Temperature and date/time into the furnace:	1150°C 5-3-16 9:50 am				
Temperature and date/time out of the furnace:	1150°C 5-3-16 10:49 am				
Quench details					
Viscosity notes (describe consistency):	Thinner than DWPF glass				
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	No undissolved solids - Small air bubbles - Translucent green glass with light yellow sulfate on glass + crucible				
Crucible and glass mass after cooling (g):	281.535				
Photos and microscopy					
Describe features present (include file names and locations): none					
Person(s) performing work					
Initial and date: pjw 5-3-16					

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

Second Re-melt: History and Observations

Glass ID: New-IL-5255			Date: 5-3-16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 5-3-16 12:20	Additional milling intervals: 30 seconds x 2		Sieve size: 100 mesh	
Mixture Masses		**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
—	—		179.920		AD-0044

Glass melt details	
Crucible ID:	857-10
Furnace ID:	M5+E-006-15 9:48 am
Temperature and date/time into the furnace:	1150°C - 5-4-16 ↓
Temperature and date/time out of the furnace:	1150°C - 5-4-16 10:48 am
Quench details	
Viscosity notes (describe consistency):	same as 1st melt
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	same as 1st melt
Crucible and glass mass after cooling (g):	280.407
Person(s) performing work	
Initial and date:	Pjw - 5-3-16 Pjw - 5-4-16

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

Third Re-melt: History and Observations

Glass ID: New-IL-5255			Date: 5-4-16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 12:32	Additional milling intervals: 30 seconds x 2		Sieve size: 100 mesh,	
Mixture Masses: Baseline glass (g) —	Na_2SO_4 (g) —	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 179.907	Crucible with glass mass (g): 279.217	Balance ID: AD-0044
Glass melt details					
Crucible ID:	857-10				
Furnace ID:	MS+E-006-15				
Temperature and date/time into the furnace:	1150°C 5-4-16 1:05 pm				
Temperature and date/time out of the furnace:	1150°C 5-4-16 2:15 pm				
Quench details					
Viscosity notes (describe consistency):	Same as 1st & 2nd melt.				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	no undissolved solids - milky green glass with a significant amount of light yellow sulfate on glass & crucible				
Crucible and glass mass after cooling (g):	278.971				
Photos and microscopy					
Describe features present (include file names and locations): —					
Person(s) performing work					
Initial and date: pjw 5-4-16					

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

First Re-melt: History and Observations

Glass ID: New-IL-5253				Date: 5/2/16	
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 5/2/16 9:10	Additional milling intervals: 30 seconds x 1	Sieve size: 100 mesh	Archive sample mass (target 5 grams): 4.957	
Mixture Masses: Baseline glass (g)	Mixture Masses: Na_2SO_4 (g)	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in: 5/2/16 10:30	Empty crucible mass (g): 174.078	Crucible with glass mass (g): 280.339	Balance ID: ~~AD~~-0045
93.862	7.641				
Glass melt details					
Crucible ID:	838-13				
Furnace ID:	M5+E- 006-15				
Temperature and date/time into the furnace:	1150°C 5/2/16 10:47 am				
Temperature and date/time out of the furnace:	1150° C 5/2/16 11:47 ~~p~~ am				
Quench details					
Viscosity notes (describe consistency):	thinner than DWPF glass				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	No undissolved solids - Small air bubbles - Translucent dark green (Army/Olive) glass. Significant amount of light yellow sulfate on glass - White/Yellow sulfate in crucible.				
Crucible and glass mass after cooling (g):	280.015				
Photos and microscopy					
Describe features present (include file names and locations): none					
Person(s) performing work					
Initial and date: RJW 5/2/16					

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

Second Re-melt: History and Observations

Glass ID: New-IL-5253			Date: 5-2-16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 5-2-16 12:50	Additional milling intervals: 30 seconds x 3		Sieve size: 100 mesh	
Mixture Masses		**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
—	—		179.085	278.700	AD.0044
Glass melt details					
Crucible ID:	838-13				
Furnace ID:	MS+E-006-15				
Temperature and date/time into the furnace:	1150°C 5-2-16 1:24 pm				
Temperature and date/time out of the furnace:	1150°C 5-2-16 2:24 pm				
Quench details					
Viscosity notes (describe consistency):	Same as 1st melt.				
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	Same as 1st melt.				
Crucible and glass mass after cooling (g):	278.318				
Person(s) performing work					
Initial and date: pjw 5-2-16					

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

Third Re-melt: History and Observations

Glass ID: New-IL-5253	Date: 5-2-16

Glass Preparation details

Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 5-3-16 7:20	Additional milling intervals: 30 seconds x 2	Sieve size: 100 mesh

Mixture Masses		Angstrom Mill (puck only + bag) 30 sec. Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
—	—		179.091	277.002	AD-0044

Glass melt details

Crucible ID:	838-13
Furnace ID:	MS+E-006-15
Temperature and date/time into the furnace:	1150°C 5-3-16 8:48am
Temperature and date/time out of the furnace:	1150°C 5-3-16 9:48am

Quench details

Viscosity notes (describe consistency):	same as 1st & 2nd melt
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	same as 1st & 2nd melt
Crucible and glass mass after cooling (g):	276.737

Photos and microscopy

Describe features present (include file names and locations):

—

Person(s) performing work

Initial and date:

PJW 5-3-16

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

First Re-melt: History and Observations

Glass ID: New-OL-122817				Date: 4.26.16	
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 4.26.16 10:23	Additional milling intervals: 30 seconds x_____	Sieve size: 100 Mesh	Archive sample mass (target 5 grams): 4.552	
Mixture Masses: Baseline glass (g)	Na_2SO_4 (g)	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
269.537	7.645	4.26.16 10:55 Am	175.071	276.756 ~~269.537~~ MEC 4.26.16	AD-0044
Glass melt details					
Crucible ID:	838-8				
Furnace ID:	MS&E-0006-15				
Temperature and date/time into the furnace:	1150°C 4.26.16 11:00 Am				
Temperature and date/time out of the furnace:	1150°C 4.26.16 11:57 Am				
Quench details					
Viscosity notes (describe consistency):	Thinner than DWPF glass				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	Few air bubbles No undissolved particles Translucent green Significant amount of sulfate on surface of glass and left in crucible.				
Crucible and glass mass after cooling (g):	276.404				
Photos and microscopy					
Describe features present (include file names and locations): none					
Person(s) performing work					
Initial and date: pjw 4-26-16					

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

Second Re-melt: History and Observations

Glass ID: New- DL- 122817		Date: 4-26-16		
Glass Preparation details				
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: ~~4-26-16~~ 4-27-16 7:45am PW	Additional milling intervals: 30 seconds x 2	Sieve size: 100 mesh	
Mixture Masses: Baseline glass (g)	Na_2SO_4 (g)	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 175.129	Crucible with glass mass (g): 274.812 / Balance ID: AD-0044
—	—			
Glass melt details				
Crucible ID:	838-8			
Furnace ID:	MSE-006-15	~~8:28 am~~ PW		
Temperature and date/time into the furnace:	1150°C	4-27-16	8:28am	
Temperature and date/time out of the furnace:	1150°C	4-27-16	9:32 Am	
Quench details				
Viscosity notes (describe consistency):	Same as 1st melt			
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	Opaque ~~light~~ green glass with significant amounts of sulfate on surface of glass and left on crucible. No air bubbles. No undissolved solids.			
Crucible and glass mass after cooling (g):	274.336			
Person(s) performing work				
Initial and date:	PJM 4/27/16	MEC 4.27.16		

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

Third Re-melt: History and Observations

Glass ID: New-DL-122817	Date: 4-27-16

Glass Preparation details

Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 4-27-16 10:02am	Additional milling intervals: 30 seconds x 2	Sieve size: 100 mesh

Mixture Masses		Angstrom Mill (puck only + bag) 30 sec. Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
—	—		175.128 ~~175.128~~	272.738	AD-0044

Glass melt details

Crucible ID:	838-8
Furnace ID:	MS+E-006-15
Temperature and date/time into the furnace:	1150°C 4-27-16 1:03 pm
Temperature and date/time out of the furnace:	1150°C 4-27-16

Quench details

Viscosity notes (describe consistency):	Same as 1st + 2nd melt
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	same as 2nd melt
Crucible and glass mass after cooling (g):	272.202

Photos and microscopy

Describe features present (include file names and locations):

—

Person(s) performing work

Initial and date:

pjw 4-27-16

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

First Re-melt: History and Observations

Glass ID: New-OL-100210			Date: 4/22/16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 4/22/16 7:30 am	Additional milling intervals: 30 seconds x 1		Sieve size: 100 mesh	Archive sample mass (target 5 grams): 4.827

Mixture Masses		Angstrom Mill (puck only + bag) 30 sec. Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
95.211	7.642	4/22/16 8:05	176.535	279.170	AD-0044

Glass melt details	
Crucible ID:	838-1
Furnace ID:	MS+E-006-15
Temperature and date/time into the furnace:	1150°C 4/22/16 8:23 am
Temperature and date/time out of the furnace:	1150°C 4/22/16
Quench details	
Viscosity notes (describe consistency):	Slightly thinner than DWPF Glass
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	No undissolved particles Air bubbles present Translucent green with significant amount of a creamy yellow crystalline on glass and in crucible
Crucible and glass mass after cooling (g):	278.677
Photos and microscopy	
Describe features present (include file names and locations):	—
Person(s) performing work	
Initial and date:	MEC 4-22-16

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

Second Re-melt: History and Observations

Glass ID: New-OL-100210		Date: 4/22/16			
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 4-22-16 10:07 Am	Additional milling intervals: 30 seconds x 3		Sieve size: 100 mesh	
Mixture Masses		**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 176.572	Crucible with glass mass (g):	Balance ID: AJD-0044
Baseline glass (g)	Na_2SO_4 (g)				
—	—				
Glass melt details					
Crucible ID:	838-1				
Furnace ID:	M.S+E-006-15				
Temperature and date/time into the furnace:	1150°C - 4/22/16 10:46				
Temperature and date/time out of the furnace:	1150°C - 4/22/16 11:46				
Quench details					
Viscosity notes (describe consistency):	Same as 1st				
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	Air bubbles. Glass is more opaque than 1st melt				
Crucible and glass mass after cooling (g):	276.470				
Person(s) performing work					
Initial and date: MEC 4-22-16					

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

Third Re-melt: History and Observations

Glass ID: New-DL-100210			Date: 4-22-16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 4-22-16 1:55 pm	Additional milling intervals: 30 seconds x 3		Sieve size: 100 Mesh	
Mixture Masses: Baseline glass (g) —	Na_2SO_4 (g) —	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 170.5510	Crucible with glass mass (g): 274.104	Balance ID: AD-0044
Glass melt details					
Crucible ID:	838-1				
Furnace ID:	MS&E-006-15				
Temperature and date/time into the furnace:	1150°C 4/25/16 8:46 am				
Temperature and date/time out of the furnace:	1150°C 4/25/16 9:40 am				
Quench details					
Viscosity notes (describe consistency):	same as 1st & 2nd melt				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	Same as 2nd melt				
Crucible and glass mass after cooling (g):	273.320				
Photos and microscopy					
Describe features present (include file names and locations): —					
Person(s) performing work					
Initial and date: PJW 4/25/16 MEC 4/26/16					

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

First Re-melt: History and Observations

Glass ID: New-OL-~~62~~ 40309				Date: 4/20/16	
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 4/20/16 7:45	Additional milling intervals: 30 seconds x 1	Sieve size: 100 Mesh	Archive sample mass (target 5 grams): 4.750	
Mixture Masses: Baseline glass (g)	Na_2SO_4 (g)	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in: 4/20/16 8:20	Empty crucible mass (g): 188.878	Crucible with glass mass (g): 290.128 pw 4/20/16 ~~288.51~~	Balance ID: AD-004 4
93.932	7.642				
Glass melt details					
Crucible ID:	857-2				
Furnace ID:	MS&E-006-15				
Temperature and date/time into the furnace:	1150°C 4/20/16 8:29am				
Temperature and date/time out of the furnace:	1150°C 4/20/16 9:29am				
Quench details					
Viscosity notes (describe consistency):	thinner than DWPF glass				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	no undissolved particles. Army greenish glass with yellow sulfate. A significant amount of yellow sulfate on glass + white sulfate in crucible.				
Crucible and glass mass after cooling (g):	289.956				
Photos and microscopy					
Describe features present (include file names and locations): None					
Person(s) performing work					
Initial and date: pjw 4/20/16					

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

Second Re-melt: History and Observations

Glass ID: New-02-80309			Date: 4/20/16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 4/20/16 10:00	Additional milling intervals: 30 seconds x 2		Sieve size: 100 mesh	
Mixture Masses: Baseline glass (g) —	Na_2SO_4 (g) —	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 188.915	Crucible with glass mass (g): 288.202	Balance ID: AD-0044
Glass melt details					
Crucible ID:	857-2				
Furnace ID:	MS+E-006-15				
Temperature and date/time into the furnace:	1150°C 4/20/16 10:33am				
Temperature and date/time out of the furnace:	1150°C 4/20/15 11:29am				
Quench details					
Viscosity notes (describe consistency):	same as 1st melt				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	same as 1st melt				
Crucible and glass mass after cooling (g):	288.050				
Person(s) performing work					
Initial and date: pjw 4/20/16					

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

Third Re-melt: History and Observations

Glass ID: New-DL-80309			Date: 4/20/16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 12:25pm	Additional milling intervals: 30 seconds x 2		Sieve size: 100 mesh	
Mixture Masses		**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
—	—		188.981	286.348	AD-0044
Glass melt details					
Crucible ID:	857-2				
Furnace ID:	MS+E-006-15				
Temperature and date/time into the furnace:	1150°C 4/20/16 12:48 pm				
Temperature and date/time out of the furnace:	1150°C 4/20/16 1:48 pm				
Quench details					
Viscosity notes (describe consistency):	same as 1st + 2nd melt				
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	same as 1st + 2nd melt				
Crucible and glass mass after cooling (g):	286.183				
Photos and microscopy					
Describe features present (include file names and locations): —					
Person(s) performing work					
Initial and date: pjw 4/20/16					

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

First Re-melt: History and Observations

Glass ID: New-OL-62380	Date: 4/19/16

Glass Preparation details

Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 4/19/16 7:45	Additional milling intervals: 30 seconds x 1	Sieve size: 100 mesh	Archive sample mass (target 5 grams): 4.975

Mixture Masses		Angstrom Mill (puck only + bag) 30 sec. Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
94.708	7.643	4/19/16 8:30	179.077	281.168	AD-0044

Glass melt details

Crucible ID:	939-13
Furnace ID:	MS&E-006-15
Temperature and date/time into the furnace:	1150°C 4/19/16 8:39 am
Temperature and date/time out of the furnace:	1150°C 4/19/16 9:38 am

Quench details

Viscosity notes (describe consistency):	Thinner than D
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	No undissolved solids Translucent Olive green w/ significant amount of pale yellow sulfate on glass and crucible Some tiny air bubbles
Crucible and glass mass after cooling (g):	281.005

Photos and microscopy

Describe features present (include file names and locations):

None

Person(s) performing work

Initial and date:

MEC 4/19/16

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

Second Re-melt: History and Observations

Glass ID: New-OL-62380			Date: 4/19/16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 10:17	Additional milling intervals: 30 seconds x 2		Sieve size: 100 mesh	
Mixture Masses: Baseline glass (g) —	Na_2SO_4 (g) —	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 179.133	Crucible with glass mass (g): 278.677	Balance ID: AD-0044
Glass melt details					
Crucible ID:	838-13				
Furnace ID:	MS&E 006-15				
Temperature and date/time into the furnace:	1150°C	4/19/16	10:48		
Temperature and date/time out of the furnace:	1150°C	4/19/16	11:48		
Quench details					
Viscosity notes (describe consistency):	Same as 1st pour				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	Same as 1st melt				
Crucible and glass mass after cooling (g):	278.512				
Person(s) performing work					
Initial and date: MEC 4/19/16					

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

Third Re-melt: History and Observations

Glass ID: New-OL-62380			Date: 4/19/16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 4/19/16 12:15	Additional milling intervals: 30 seconds x 3		Sieve size: 100 Mesh	
Mixture Masses: Baseline glass (g)	Mixture Masses: Na_2SO_4 (g)	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 179.104	Crucible with glass mass (g): 277.360	Balance ID: AD-0044
—	—				
Glass melt details					
Crucible ID:	838-13				
Furnace ID:	MSE-000-15				
Temperature and date/time into the furnace:	1150°C	4/19/16	12:47		
Temperature and date/time out of the furnace:	1150°C	4/19/16	1:48		
Quench details					
Viscosity notes (describe consistency):	Same as 1st & 2nd pours				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	Same as 1st & 2nd melts				
Crucible and glass mass after cooling (g):	277.181				
Photos and microscopy					
Describe features present (include file names and locations): N/A					
Person(s) performing work					
Initial and date: MEC 4/19/16					

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

First Re-melt: History and Observations

Glass ID: New-DL-57284				Date: 4/14/16	
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 12:50 4/14/16	Additional milling intervals: 30 seconds x 1	Sieve size: 100 mesh	Archive sample mass (target 5 grams): 4.625	
Mixture Masses		**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
94.951	7.640	4/14/16	179.886	282.013	AD-0044

Glass melt details	
Crucible ID:	857.10
Furnace ID:	MS+E-006-15
Temperature and date/time into the furnace:	1150°C 4/14/16 1:40pm
Temperature and date/time out of the furnace:	1150°C 4/14/16 2:40pm
Quench details	
Viscosity notes (describe consistency):	Similar to DWPF glass
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	ND undissolved solids. Air bubbles - Translucent green glass. Significant amount of sulfate (creamy yellow) on glass and crucible.
Crucible and glass mass after cooling (g):	281.671

Photos and microscopy
Describe features present (include file names and locations): None
Person(s) performing work
Initial and date: Djw 4/14/16

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

Second Re-melt: History and Observations

Glass ID: New-OL- 57284		Date: 4/18/16		
Glass Preparation details				
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 10:25 4/18/16	Additional milling intervals: 30 seconds x 3	Sieve size: 100 mesh	
Mixture Masses: Baseline glass (g) —	Na_2SO_4 (g) —	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 179.912	Crucible with glass mass (g): 279.829
Balance ID: AD-0044				
Glass melt details				
Crucible ID:	857-10			
Furnace ID:	MS+E-006-15			
Temperature and date/time into the furnace:	1150°C 4/18/16 11:01 am			
Temperature and date/time out of the furnace:	1150°C 4/18/16 12:00 pm			
Quench details				
Viscosity notes (describe consistency):	Same as 1st melt.			
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	No undissolved solids - Opaque green glass - Creamy yellow sulfate on glass & crucible.			
Crucible and glass mass after cooling (g):	279.439			
Person(s) performing work				
Initial and date: pjw 4/18/16				

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

Third Re-melt: History and Observations

Glass ID: New-OL-57284			Date: 4/18/16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 4/18/16 12:54	Additional milling intervals: 30 seconds x 3		Sieve size: 100 Mesh	
Mixture Masses: Baseline glass (g)	Na_2SO_4 (g)	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 179.912	Crucible with glass mass (g): 276.725	Balance ID: AD 0044
—	—				
Glass melt details					
Crucible ID:	857-10				
Furnace ID:	MSE-006-15				
Temperature and date/time into the furnace:	1150°C	4/18/16	1:28		
Temperature and date/time out of the furnace:	1150°C	4/18/16	2:28		
Quench details					
Viscosity notes (describe consistency):	Same as first melt				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	Same as second melt				
Crucible and glass mass after cooling (g):	276.390				
Photos and microscopy					
Describe features present (include file names and locations): N/A					
Person(s) performing work					
Initial and date: MEC 4/19/16					

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

First Re-melt: History and Observations

Glass ID: New-OL-54017	Date: 4-8-16

Glass Preparation details

Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 8:23	Additional milling intervals: 30 seconds x 1	Sieve size: 100mesh	Archive sample mass (target 5 grams): 4.734

Mixture Masses		Angstrom Mill (puck only + bag) 30 sec.	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)	Date/time in: 8:50 4-8-16			
94.005	7.643		178.254	280.116	AD-0044

Glass melt details

Crucible ID:	810-3
Furnace ID:	MS+E-006-15
Temperature and date/time into the furnace:	1150°C 4-8-16 9:19am
Temperature and date/time out of the furnace:	1150°C 4-8-16 10:19am

Quench details

Viscosity notes (describe consistency):	Similar to DWPF glass
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	No undissolved, very dark green glass with white sulfate. A significant amount of sulfate on glass + crucible.
Crucible and glass mass after cooling (g):	279.963 g

Photos and microscopy

Describe features present (include file names and locations):

none

Person(s) performing work

Initial and date:

RJM 4-8-16

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

Second Re-melt: History and Observations

Glass ID: New-OL- 54017			Date: 4-8-16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 01:50pm 4-8-16	Additional milling intervals: 30 seconds x 2		Sieve size: 100 mesh	
Mixture Masses: Baseline glass (g) —	Na_2SO_4 (g) —	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 178.662	Crucible with glass mass (g): 277.834	Balance ID: AD-0044
Glass melt details					
Crucible ID:	810-3				
Furnace ID:	M3+E-006-15				
Temperature and date/time into the furnace:	1150°C ↓	4-11-16 ↓	9:42am ↓		
Temperature and date/time out of the furnace:	1150°C	4-11-16	10:43am		
Quench details					
Viscosity notes (describe consistency):	Same as 1st melt.				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	Same as 1st melt.				
Crucible and glass mass after cooling (g):	277.716				
Person(s) performing work					
Initial and date: pjw 4-11-16					

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

Third Re-melt: History and Observations

Glass ID: NEW-OL-54017			Date: 4-11-16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 11:00 4-11-16	Additional milling intervals: 30 seconds x 3		Sieve size: 100 Mesh	
Mixture Masses		**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
—	—		178.715		AD-00441
Glass melt details					
Crucible ID:	810-3				
Furnace ID:	MS&E-006-15				
Temperature and date/time into the furnace:	1150°C 4/11/16 1:43 pm				
Temperature and date/time out of the furnace:	1150°C 4/11/16 2:43 pm				
Quench details					
Viscosity notes (describe consistency):	same as 1st melt				
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	same as 1st & 2nd melt.				
Crucible and glass mass after cooling (g):	278.828				
Photos and microscopy					
Describe features present (include file names and locations): —					
Person(s) performing work					
Initial and date: RJM 4/11/16					

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

First Re-melt: History and Observations

Glass ID: NEW-IL-456				Date: 4/13/16	
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 4/13/16 12:36	Additional milling intervals: 30 seconds x 1	Sieve size: 100 Mesh	Archive sample mass (target 5 grams): 4.736	
Mixture Masses: Baseline glass (g)	Mixture Masses: Na_2SO_4 (g)	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
~~267.497~~ ~~279.94.371~~	7.640	4/13/16 2:05	175.070	~~776.803~~ ~~274.464~~	AD.0044
Glass melt details					
Crucible ID:	838-8				
Furnace ID:	MS+E-006-15				
Temperature and date/time into the furnace:	1150°C	4/13/16	2:11 pm		
Temperature and date/time out of the furnace:	1150°C	4/13/16	3:11 pm		
Quench details					
Viscosity notes (describe consistency):	thinner than DWPF glass w/ sulfate				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	No undissolved. Tiny air bubbles - Translucent green glass. Significant amount of yellow sulfate on glass & crucible.				
Crucible and glass mass after cooling (g):	276.589				
Photos and microscopy					
Describe features present (include file names and locations):	none				
Person(s) performing work					
Initial and date:	PJW 4/13/16				

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

Second Re-melt: History and Observations

Glass ID: NEW-IL-450			Date: 4/14/16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 08:10am 4/14/16	Additional milling intervals: 30 seconds x 2		Sieve size: 100 mesh	
Mixture Masses: Baseline glass (g)	Na_2SO_4 (g)	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
—	—		175.090	275.225	AD 0044
Glass melt details					
Crucible ID:	838-8				
Furnace ID:	MS+E-006-15				
Temperature and date/time into the furnace:	1150°C 4/14/16 08:41 am				
Temperature and date/time out of the furnace:	1150°C 4/14/16 ~~08~~ pw 4/14/16 09:41am				
Quench details					
Viscosity notes (describe consistency):	Same as 1st melt				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	Same as 1st melt — with less sulfate on crucible.				
Crucible and glass mass after cooling (g):	275.039				
Person(s) performing work					
Initial and date: pjw 4/14/16					

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

Third Re-melt: History and Observations

Glass ID: NEW-IL-456			Date: 4/14/16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 9:55am 4/14/16	Additional milling intervals: 30 seconds x 2		Sieve size: 100 mesh,	
Mixture Masses: Baseline glass (g)	Na_2SO_4 (g)	Angstrom Mill (puck only + bag) 30 sec. Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
—	—		175.092	273.6341	AD-0044
Glass melt details					
Crucible ID:	838-8				
Furnace ID:	MS+E-006-15				
Temperature and date/time into the furnace:	1150°C 4/14/16 12:38 pm				
Temperature and date/time out of the furnace:	1150°C 4/14/16 1:38 pm				
Quench details					
Viscosity notes (describe consistency):	Same as 1st + 2nd melt.				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	no undissolved solids - Creamy green glass - Significant amount of yellow sulfate on glass - tiny bubbles in crucible with little sulfate.				
Crucible and glass mass after cooling (g):	273.490 g				
Photos and microscopy					
Describe features present (include file names and locations):	~~None~~ PW 4/14/16				
Person(s) performing work					
Initial and date:	pjw 4/14/16				

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

First Re-melt: History and Observations

Glass ID: NEW-OL-110208Mod	Date: 4/12/16

Glass Preparation details

Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 4/12/16 10:42	Additional milling intervals: *30 seconds x 1	Sieve size: 100 Mesh	Archive sample mass (target 5 grams): 4.970

Mixture Masses		Angstrom Mill (puck only + bag) 30 sec. Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
268.954	7.642	4/12/16 12:40	173.988	276.211	AD-0044

Glass melt details

Crucible ID:	957-3
Furnace ID:	~~HG~~ MS?E -0000-15
Temperature and date/time into the furnace:	1150°C 4/12/16 12:49 pm
Temperature and date/time out of the furnace:	1150°C 4/12/16 1:49 pm

Quench details

Viscosity notes (describe consistency):	Thinner than DWPF glass w/sulfate
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	No undissolved solids No bubbles Milky green w/ yellow sulfate Significant amount of sulfate on glass and in crucible *Difficult to see
Crucible and glass mass after cooling (g):	275.973

Photos and microscopy

Describe features present (include file names and locations):

None

Person(s) performing work

Initial and date:

MEC 4/12/16

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

Second Re-melt: History and Observations

Glass ID: NEW-OL-116208Mod			Date: 4/13/16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 7:10 4/13/16	Additional milling intervals: 30 seconds x 1		Sieve size: 100 mesh	
Mixture Masses: Baseline glass (g) —	Na_2SO_4 (g) —	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 174.069	Crucible with glass mass (g):	Balance ID: AD-0044
Glass melt details					
Crucible ID:	857-3				
Furnace ID:	MSTE-006-15				
Temperature and date/time into the furnace:	1150°C 4/13/16 8:18 am				
Temperature and date/time out of the furnace:	1150°C 4/13/16 9:18 am				
Quench details					
Viscosity notes (describe consistency):	Same as 1st melt.				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	Same as 1st melt.				
Crucible and glass mass after cooling (g):	274.335 g				
Person(s) performing work					
Initial and date: pjw 4/13/16					

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

Third Re-melt: History and Observations

Glass ID: NEW-OL-116208Mod			Date: 4/13/16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 10:10am 4/13/16	Additional milling intervals: 30 seconds x 2		Sieve size: 100 mesh	
Mixture Masses		**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
—	—		174.129	273.128	AD-0044

Glass melt details	
Crucible ID:	857-3
Furnace ID:	MS3E-006-15
Temperature and date/time into the furnace:	1150°C 4/13/16 10:44am
Temperature and date/time out of the furnace:	1150°C 4/13/16 11:44am
Quench details	
Viscosity notes (describe consistency):	same as 1st + 2nd melt.
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	same as 1st + 2nd melt.
Crucible and glass mass after cooling (g):	272.924

Photos and microscopy
Describe features present (include file names and locations): —

Person(s) performing work
Initial and date: pjw 4/13/16

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

First Re-melt: History and Observations

Glass ID: New-DL-45748				Date: 4-7-16	
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 2:10 pm 4-7-16	Additional milling intervals: 30 seconds x 1	Sieve size: 100 mesh	Archive sample mass (target 5 grams): 4.7616	
Mixture Masses: Baseline glass (g) 94.442; Na_2SO_4 (g) 7.644	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 177.555	Crucible with glass mass (g): 279.366 ~~277.998~~	Balance ID: AD-0044	
Glass melt details					PJW 4/7/16
Crucible ID:	838-7				
Furnace ID:	M54E-006-15				
Temperature and date/time into the furnace:	1150°C 4-8-16 8:18 am				
Temperature and date/time out of the furnace:	1150°C 4-8-16 9:18 am				
Quench details					
Viscosity notes (describe consistency):	A little thinner than DWPF glass				
Observations (examples below): Undissolved particles; Crystallization/phase separation; Volatilization; Color; Residues on the pour plate; Bubbles; Surface appearance	No visual undissolved solids - Dark tan glass with yellow sulfate on glass & crucible. Sm air bubbles.				
Crucible and glass mass after cooling (g):	279.265				
Photos and microscopy					
Describe features present (include file names and locations): none					
Person(s) performing work					
Initial and date: pjw 4-8-16					

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

Second Re-melt: History and Observations

Glass ID: New-04-45748		Date: 4-11-16		
Glass Preparation details				
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 10:05am 4-11-16 ~~4-8-16~~	Additional milling intervals: 30 seconds x 3	Sieve size: 100 mesh	
Mixture Masses: Baseline glass (g) —	Na_2SO_4 (g) —	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 177.710 ~~178.662~~	Crucible with glass mass (g): 276.761
				Balance ID: AD-0044
Glass melt details				
Crucible ID:	838-7			
Furnace ID:	MS+E-006-15			
Temperature and date/time into the furnace:	1150°C 4-11-16 12:41			
Temperature and date/time out of the furnace:	1150°C 4/11/16 1:41			
Quench details				
Viscosity notes (describe consistency):	same as 1st melt.			
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	same as 1st melt.			
Crucible and glass mass after cooling (g):	276.629			
Person(s) performing work				
Initial and date: pjw 4-11-16				

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

Third Re-melt: History and Observations

Glass ID: NEW-01-45748			Date: 4/12/16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 7:20 4/12/16	Additional milling intervals: 30 seconds x 2		Sieve size: 100 Mesh	
Mixture Masses		Angstrom Mill (puck only + bag) 30 sec. Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
—	—		177.636	275.273	AD-0044

Glass melt details	
Crucible ID:	838-7
Furnace ID:	M S+E-006-15
Temperature and date/time into the furnace:	1150°C 4/12/16 8:56 a.m.
Temperature and date/time out of the furnace:	1150° C 4/12/16 9:57 a.m.
Quench details	
Viscosity notes (describe consistency):	Same as 1st melt.
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	Same as 1st melt.
Crucible and glass mass after cooling (g):	~~274~~. 275.007
Photos and microscopy	
Describe features present (include file names and locations):	—
Person(s) performing work	
Initial and date:	pjw 4/12/16 MSE 4/12/16

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

First Re-melt: History and Observations

Glass ID: New-OL-15493			Date: 4-6-16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 12:50 4-6-16	Additional milling intervals: 30 seconds x 1	Sieve size: 100 mesh	Archive sample mass (target 5 grams): 4.814	
Mixture Masses: Baseline glass (g)	Na_2SO_4 (g)	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
95.007	2.642 g		179.081	281.~~371~~	FD-0044
Glass melt details					
Crucible ID:	838-13				
Furnace ID:	MS+E-006-15				
Temperature and date/time into the furnace:	1150°C 1:35 pm 4/6/16				
Temperature and date/time out of the furnace:	1150°C 4/6/16 2:35 pm				
Quench details					
Viscosity notes (describe consistency):	Very thin glass with sulfate				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	No visible undissolved solids. Translucent green glass with tiny bubbles. Significant amount of sulfate on glass & in crucible.				
Crucible and glass mass after cooling (g):	281.137				
Photos and microscopy					
Describe features present (include file names and locations): None					
Person(s) performing work					
Initial and date: pjw 4-6-16					

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

Second Re-melt: History and Observations

Glass ID: New-DL-15493			Date: 4-7-16	
Glass Preparation details				
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 7:13am 4-7-16	Additional milling intervals: 30 seconds x 1	Sieve size: 100 mesh	
Mixture Masses: Baseline glass (g)	Mixture Masses: Na_2SO_4 (g)	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g): / Balance ID:
—	—		179.300	279.348 / AD-0044
Glass melt details				
Crucible ID:	838-13			
Furnace ID:	MS+E-006-15	~~11:30 am~~ 11:30 am pw 4-7-16		
Temperature and date/time into the furnace:	1150°C 4-7-16	~~12:34 pm~~		
Temperature and date/time out of the furnace:	1150°C 4-7-16	12:34 pm		
Quench details				
Viscosity notes (describe consistency):	same as 1st melt			
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	NO undissolved.- Creamy green with sulfate on glass. & crucible.			
Crucible and glass mass after cooling (g):	278.945			
Person(s) performing work				
Initial and date: Pjw 4-7-16				

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

Third Re-melt: History and Observations

Glass ID: New-02-15493			Date: 4-7-16	
Glass Preparation details				
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 1:00 pm 4-7-16	Additional milling intervals: 30 seconds x 1	Sieve size: 100 mesh	
Mixture Masses: Baseline glass (g) —	Na_2SO_4 (g) —	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 179.267	Crucible with glass mass (g): 277.892 / Balance ID: AD-0044
Glass melt details				
Crucible ID:	838-13			
Furnace ID:	MS&E-006-15			
Temperature and date/time into the furnace:	1150°C 4-7-16 1:22 pm			
Temperature and date/time out of the furnace:	1150°C 4-7-16 2:22 pm			
Quench details				
Viscosity notes (describe consistency):	same as 1st + 2nd melt.			
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	same as 2nd melt			
Crucible and glass mass after cooling (g):	277.683			
Photos and microscopy				
Describe features present (include file names and locations): —				
Person(s) performing work				
Initial and date: pgw 4-7-16				

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

First Re-melt: History and Observations

Glass ID: New-OL-17130				Date: 4-6-16	
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 8:25am 4-6-16	Additional milling intervals: 30 seconds x 1	Sieve size: 100 Mesh	Archive sample mass (target 5 grams): 5.007 g	
Mixture Masses: Baseline glass (g)	Na_2SO_4 (g)	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in: 9:10am 4-6-16	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
93.796	7.641		175.721	276.509	AD-0044
Glass melt details					
Crucible ID:	838-12				
Furnace ID:	MS+E-006-15 ~~9:21am~~				
Temperature and date/time into the furnace:	1150°C 4-6-16 9:21am				
Temperature and date/time out of the furnace:	1150°C 4-6-16 10:21am				
Quench details					
Viscosity notes (describe consistency):	Thin glass mixed with sulfate.				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	No visible undissolved - translucent green glass, small bubbles. Significant sulfate on glass + in crucible.				
Crucible and glass mass after cooling (g):	276.266				
Photos and microscopy					
Describe features present (include file names and locations): None					
Person(s) performing work					
Initial and date: Pjw 4-6-16					

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

Second Re-melt: History and Observations

Glass ID: New-DL-17130		Date: 4-6-16			
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 10:47 4-6-16	Additional milling intervals: 30 seconds x 4		Sieve size: 100 mesh	
Mixture Masses: Baseline glass (g)	Na_2SO_4 (g)	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
—	—		175.725	274.172	AD-0044
Glass melt details					
Crucible ID:	838-12				
Furnace ID:	M S + E - 006 - 15				
Temperature and date/time into the furnace:	1150°C 4-6-16 12:13 pm				
Temperature and date/time out of the furnace:	1150°C 4-6-16 1:13 pm				
Quench details					
Viscosity notes (describe consistency):	SAME as 1st melt.				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	No visible undissolved. - Milky green glass with significant amount of sulfate on glass + in crucible.				
Crucible and glass mass after cooling (g):	273.974				
Person(s) performing work					
Initial and date: PJW 4-6-16					

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

Third Re-melt: History and Observations

Glass ID: New - 02-17130			Date: 4-6-16	
Glass Preparation details				
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 2:50 pm 4-6-16	Additional milling intervals: 30 seconds x 3		Sieve size: 100 mesh
Mixture Masses: Baseline glass (g) —	Na_2SO_4 (g) —	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 175.747	Crucible with glass mass (g): 272.064
				Balance ID: AD-0044
Glass melt details				
Crucible ID:	838-12			
Furnace ID:	M54E-006-15	~~11:30 am~~		
Temperature and date/time into the furnace:	1150°C	4-7-16	11:30 am ~~12:34 pm~~	pjw 4-7-16
Temperature and date/time out of the furnace:	1150°C	4-7-16	12:34 pm	
Quench details				
Viscosity notes (describe consistency):	Same as 1st + 2nd melt			
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	Same as 2nd melt.			
Crucible and glass mass after cooling (g):	271.800			
Photos and microscopy				
Describe features present (include file names and locations): ~~None~~				
Person(s) performing work				
Initial and date: pjw 4-7-16				

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

First Re-melt: History and Observations

Glass ID: New-OL-127708 mod			Date: 3/23/16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 08:30 3/23/16	Additional milling intervals: 30 seconds x 1	Sieve size: 100 mesh	Archive sample mass (target 5 grams): 5.028	
Mixture Masses: Baseline glass (g): ~~25 86.828~~ ~~263.370~~ 93.944	Na$_2$SO$_4$ (g): 7.642	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 176.542	Crucible with glass mass (g): 277.745	Balance ID: AD-0044

3/23/16 RJW

98572

Glass melt details	
Crucible ID: 838-1	—
Furnace ID: MS+E-006-15	—
Temperature and date/time into the furnace: 1150°C 3/23/16 09:41	—
Temperature and date/time out of the furnace: 1150°C 3/23/16 10:49	—
Quench details	
Viscosity notes (describe consistency):	sulfate poured first - Glass poured similar to DWPF glass.
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	translucent green glass, some small bubbles, no visible undissolved, significant sulfate on glass and in crucible
Crucible and glass mass after cooling (g): 277.047	—
Photos and microscopy	
Describe features present (include file names and locations): none	
Person(s) performing work	
Initial and date: RJW 3/23/16 KMF 3/23/16	

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

Second Re-melt: History and Observations

Glass ID: New-QL-127708 Mod			Date: 3/23/16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 12:30 3/23/16	Additional milling intervals: 30 seconds x 3		Sieve size: 100 mesh	
Mixture Masses: Baseline glass (g) / Na_2SO_4 (g)		**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
KMF 3/23/16 ~~43.944 g~~ / ~~7.6425 g~~		NA	176.811	275.456	AD-0044
Glass melt details					
Crucible ID: 838-1					
Furnace ID: MS+E 006-15					
Temperature and date/time into the furnace:		1150°C 3/23/16 1:46 pm			
Temperature and date/time out of the furnace:		1150°C 3/23/16 2:47 pm			
Quench details					
Viscosity notes (describe consistency):		Same as 1st melt			
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance		No undissolved solids, sulfate on glass and in crucible. Glass is milky green - color changed from 1st melt.			
Crucible and glass mass after cooling (g):		275.275 g			
Person(s) performing work					
Initial and date: PW - 3/23/16 KMF 3/23/16					

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

Third Re-melt: History and Observations

Glass ID: New-CL-127708Mod				Date: 3/24/16		
Glass Preparation details						
Angstrom Mill (ring & puck) 2 minutes		Date/Time in: 07:35 3/24/16	Additional milling intervals: 30 seconds x 3		Sieve size: 100 mesh	
Mixture Masses		**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:	
Baseline glass (g)	Na_2SO_4 (g)					
—	—	NA	177.517	273.975	AD-0044	

Glass melt details	
Crucible ID:	838-1
Furnace ID:	MS 4E 006-15
Temperature and date/time into the furnace:	1150°C 3/24/16 08:29
Temperature and date/time out of the furnace:	1150°C 3/24/16
Quench details	
Viscosity notes (describe consistency):	Same as 1st & 2nd melt
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	Same as 2nd melt
Crucible and glass mass after cooling (g):	273.126 g.
Photos and microscopy	
Describe features present (include file names and locations): —	
Person(s) performing work	
Initial and date: [signature] 3/24/16	

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

First Re-melt: History and Observations

Glass ID: New-OL-8445				Date: 3/29/16	
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 09:30 3/29/16	Additional milling intervals: 30 seconds x 1	Sieve size: 100 mesh	Archive sample mass (target 5 grams): 4.808	
Mixture Masses: Baseline glass (g)	Mixture Masses: Na_2SO_4 (g)	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in: 10:00 am 3/29/16	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
95.475	7.641		178.256	281.008	AD-0044
Glass melt details					
Crucible ID:	810-3				
Furnace ID:	MS+E-006-15				
Temperature and date/time into the furnace:	1150°C 3/29/16 10:26				
Temperature and date/time out of the furnace:	1150°C 3/29/16 11:26				
Quench details					
Viscosity notes (describe consistency):	poured similar to DWPF glass sulfate liquid poured first-Glass				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	creamy green glass, No undissolved solids - significant amount of sulfate on glass and in crucible.				
Crucible and glass mass after cooling (g):	280.597 g				
Photos and microscopy					
Describe features present (include file names and locations): None					
Person(s) performing work					
Initial and date: Pjw 3/29/16					

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

Second Re-melt: History and Observations

Glass ID: New-04-8445			Date: 3/29/16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 1:06 pm 3/29/16	Additional milling intervals: 30 seconds x 4		Sieve size: 100 mesh	
Mixture Masses: Baseline glass (g) —	Na_2SO_4 (g) —	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 178.301	Crucible with glass mass (g):	Balance ID: AD-DD44
Glass melt details					
Crucible ID:	810-3				
Furnace ID:	MS+E-006-15				
Temperature and date/time into the furnace:	1150°C 3/29/16 1:52pm				
Temperature and date/time out of the furnace:	1150°C 3/29/16				
Quench details					
Viscosity notes (describe consistency):	Same as 1st melt.				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	Similar to 1st melt. - glass is a milky green.				
Crucible and glass mass after cooling (g):	277.723				
Person(s) performing work					
Initial and date: pjw 3/29/16					

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

Third Re-melt: History and Observations

Glass ID: New-DL-8445	Date: 3/30/16 ~~3/29/16~~

Glass Preparation details

Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 07:45 am 3/30/16	Additional milling intervals: 30 seconds x 3	Sieve size: 100 mesh

Mixture Masses		Angstrom Mill (puck only + bag) 30 sec. Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
—	—		178.318	275.959	AD-0044

Glass melt details

Crucible ID:	810-3
Furnace ID:	MS+E-006-15
Temperature and date/time into the furnace:	1150°C 3/30/16 8:27 am
Temperature and date/time out of the furnace:	1150°C 3/30/16

Quench details

Viscosity notes (describe consistency):	same as 1st melt
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	same as 2nd melt
Crucible and glass mass after cooling (g):	275.658 g

Photos and microscopy

Describe features present (include file names and locations):

—

Person(s) performing work

Initial and date:

RJM 3/30/16

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

First Re-melt: History and Observations

Glass ID: New-IL-93907			Date: 3/24/16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 09:00 3/24/16	Additional milling intervals: 30 seconds x 1	Sieve size: 100 mesh	Archive sample mass (target 5 grams): 4.719	
Mixture Masses: Baseline glass (g)	Na_2SO_4 (g)	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in: 10:00 3/24/16	Empty crucible mass (g):	Crucible with glass mass (g): 291.161 3/24/16 ~~289.693~~	Balance ID:
94.913g	7.640		188.826		AD-0044
Glass melt details					
Crucible ID: 857-2	857-2				
Furnace ID:	MS&E-006-15				
Temperature and date/time into the furnace:	1150°C 3/24/16 12:46pm				
Temperature and date/time out of the furnace:	1150°C 3/24/16 1:46pm				
Quench details					
Viscosity notes (describe consistency):	liquid phase poured out 1st - Patty poured similar to DWPF glass.				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	No undissolved solids - some small bubbles - translucent green glass - significant sulfate on glass - Sulfate is bright yellow. Crucible has small amount of sulfate around edge of pour.				
Crucible and glass mass after cooling (g):	290.925 g.				
Photos and microscopy					
Describe features present (include file names and locations): none					
Person(s) performing work					
Initial and date: pjw 3/24/16					

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

Second Re-melt: History and Observations

Glass ID: New-IL-93907		Date: 3/28/16			
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 08:00 3/28/16	Additional milling intervals: 30 seconds x 3		Sieve size: 100 mesh	
Mixture Masses		**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
—	—		188.915	288.083	AD-0044
Glass melt details					
Crucible ID:	857-2				
Furnace ID:	MS&E-006-15				
Temperature and date/time into the furnace:	1150°C 3/28/16 9:30am				
Temperature and date/time out of the furnace:	1150°C 3/28/16 10:30am				
Quench details					
Viscosity notes (describe consistency):	same as 1st melt				
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	No undissolved solids - Yellow sulfate on glass & around pour of glass in crucible. Glass in milky green.				
Crucible and glass mass after cooling (g):	287.903				
Person(s) performing work					
Initial and date: pjw 3/28/16					

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

Third Re-melt: History and Observations

Glass ID: New-IL-93907		Date: 3/28/16		
Glass Preparation details				
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 2:35pm 3/28/16	Additional milling intervals: 30 seconds x 3	Sieve size: 100 mesh	
Mixture Masses: Baseline glass (g) —	Mixture Masses: Na_2SO_4 (g) —	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 188833	Crucible with glass mass (g): 285.039 / Balance ID: AD-0044
Glass melt details				
Crucible ID:	857-2			
Furnace ID:	MS&E-006-15			
Temperature and date/time into the furnace:	1150°C 3/29/16 8:21 am			
Temperature and date/time out of the furnace:	1150°C 3/29/16 9:21 am			
Quench details				
Viscosity notes (describe consistency):	same as 1st melt.			
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	same as 2nd melt.			
Crucible and glass mass after cooling (g):	284.543			
Photos and microscopy				
Describe features present (include file names and locations): —				
Person(s) performing work				
Initial and date: RJW 3/28/16 RJW 3/29/16				

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

First Re-melt: History and Observations

Glass ID: New-IL-151542				Date: 3/24/16	
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 1:35 3/24/16	Additional milling intervals: 30 seconds x 1	Sieve size: 100 mesh	Archive sample mass (target 5 grams): 4.898 g	
Mixture Masses: Baseline glass (g)	Mixture Masses: Na_2SO_4 (g)	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
95261	7.640		174.008	276.642 g 95	AD-0044
Glass melt details					
Crucible ID:	857-3				
Furnace ID:	MS+E 006-15				
Temperature and date/time into the furnace:	1150°C 3/24/16 2:25 pm				
Temperature and date/time out of the furnace:	1150°C 3/24/16 3: pm				
Quench details					
Viscosity notes (describe consistency):	1: (Sulfate) liquid poured out first - glass poured similar to DWPF glass.				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	No undissolved solids - some small bubbles. Significant sulfate on glass and in crucible around edge of pour. Translucent green glass. Sulfate is bright yellow.				
Crucible and glass mass after cooling (g):	276.346				
Photos and microscopy					
Describe features present (include file names and locations): none					
Person(s) performing work					
Initial and date: PJW 3/24/16					

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

Second Re-melt: History and Observations

Glass ID: New-IL-151542		Date: 3/28/16			
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 10:15 3/28/16	Additional milling intervals: 30 seconds x 2		Sieve size: 100 mesh	
Mixture Masses: Baseline glass (g) —	Na_2SO_4 (g) —	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 174.035	Crucible with glass mass (g): 274.310	Balance ID: AD-0044
Glass melt details					
Crucible ID:	857-3				
Furnace ID:	MS&E-006-15				
Temperature and date/time into the furnace:	1150°C 3/28/16 11:07				
Temperature and date/time out of the furnace:	1150°C 3/28/16 12:07				
Quench details					
Viscosity notes (describe consistency):					
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	Undissolved solids. Yellow sulfate on glass & around pour of glass in crucible. Glass is milky green.				
Crucible and glass mass after cooling (g):	274.022				
Person(s) performing work					
Initial and date: pjw 3/28/16					

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

Third Re-melt: History and Observations

Glass ID: New-IL-151542	Date: 3/28/16

Glass Preparation details

Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 1:00 pm 3/28/16	Additional milling intervals: 30 seconds x 2	Sieve size: 100 mesh

Mixture Masses		Angstrom Mill (puck only + bag) 30 sec. Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
—	—		174.015	272.691	AD-0044

Glass melt details

Crucible ID:	857-3
Furnace ID:	MS+E-006-15
Temperature and date/time into the furnace:	1150°C 3/28/16 1:58 pm
Temperature and date/time out of the furnace:	1150°C 3/28/16

Quench details

Viscosity notes (describe consistency):	Same as 1st melt.
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	Same as 2nd melt
Crucible and glass mass after cooling (g):	~~285.039~~ 3/28/16 pjw 272.487g

Photos and microscopy

Describe features present (include file names and locations):

—

Person(s) performing work

Initial and date:

pjw 3/28/16

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

First Re-melt: History and Observations

Glass ID: New-OL-14844			Date: 3/31/16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 07:30 am 3/31/16	Additional milling intervals: 30 seconds x 1 *	Sieve size: 100 mesh	Archive sample mass (target 5 grams): 4.764	
Mixture Masses: Baseline glass (g)	Mixture Masses: Na_2SO_4 (g)	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
94.277	7.640	3/31/16 09:30	188.818	290.519	AD-0044
Glass melt details					
Crucible ID:	857-2				
Furnace ID:	MS&E-006-15				
Temperature and date/time into the furnace:	1150°C 3/31/16 09:55am				
Temperature and date/time out of the furnace:	1150°C 3/31/16 10:55am				
Quench details					
Viscosity notes (describe consistency):	Very thin. Mixed with sulfate.				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	No undissolved particles - significant amount of sulfate on glass + in crucible. Some small bubbles. Translucent green glass (shiny in areas) Sulfate is yellow. *Difficult to sieve, very clumpy				
Crucible and glass mass after cooling (g):	240.288g				
Photos and microscopy					
Describe features present (include file names and locations): ~~*Difficult to sieve, very clumpy.~~ None					
Person(s) performing work					
Initial and date: RJM 3/31/16					

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

Second Re-melt: History and Observations

Glass ID: New-OL-14844			Date: 4-5-16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 8:30am 4-5-16	Additional milling intervals: 30 seconds x 1		Sieve size: 100 mesh	
Mixture Masses: Baseline glass (g) —	Na_2SO_4 (g) —	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in:	Empty crucible mass (g): 188.912	Crucible with glass mass (g): 288.393	Balance ID: AD-0044
Glass melt details					
Crucible ID:	857-2				
Furnace ID:	M&E-006-15				
Temperature and date/time into the furnace:	1150°C 4-5-16 9:15 am				
Temperature and date/time out of the furnace:	1150°C 4-5-16 10:15 am				
Quench details					
Viscosity notes (describe consistency):	Very thin - glass mixed with sulfate				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	Same as 1st melt.				
Crucible and glass mass after cooling (g):	288.212				
Person(s) performing work					
Initial and date: pjw 4-5-16					

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

Third Re-melt: History and Observations

Glass ID: New-DL-14844	Date: 4-5-16

Glass Preparation details

Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 12:40 4-5-16	Additional milling intervals: 30 seconds x 2	Sieve size: 100 mesh

Mixture Masses		Angstrom Mill (puck only + bag) 30 sec. Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
—	—		188.943	286.833	AD-0044

Glass melt details

Crucible ID:	857-2
Furnace ID:	MS+E-006-15
Temperature and date/time into the furnace:	1150°C 4-5-16 1:09 pm
Temperature and date/time out of the furnace:	1150°C 4-5-16 2:13 pm

Quench details

Viscosity notes (describe consistency):	Same as 1st + 2nd melt.
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	Same as 1st + 2nd melt.
Crucible and glass mass after cooling (g):	286.649

Photos and microscopy

Describe features present (include file names and locations):

—

Person(s) performing work

Initial and date:

PJW 4-5-16

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

First Re-melt: History and Observations

Glass ID: New-QL-8788 Mod			Date: 3-30-16		
Glass Preparation details					
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 2:30 pm 3/30/16	Additional milling intervals: 30 seconds x 1	Sieve size: 100 mesh	Archive sample mass (target 5 grams): 4.922	
Mixture Masses: Baseline glass (g)	Na_2SO_4 (g)	Angstrom Mill (puck only + bag) 30 sec. Date/time in: 3:10 pm 3/30/16	Empty crucible mass (g): 173.997	Crucible with glass mass (g): 275.980	Balance ID: AD-0044
94.832	7.642				
Glass melt details					
Crucible ID:	857-3				
Furnace ID:	MS&E-006-15				
Temperature and date/time into the furnace:	1150°C 3/31/16 09:55 am				
Temperature and date/time out of the furnace:	1150°C 3/31/16 10:55 am				
Quench details					
Viscosity notes (describe consistency):	Very thick after several drops of sulfate.				
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	No undissolved particles- significant amount of sulfate on glass & in crucible. Glass is light (toffee) brown. ~~Some small bubbles. Translucent green glass (shiny where no sulfate is touching) Sulfate is yellow.~~ Sulfate is yellow DW 3/30/16				
Crucible and glass mass after cooling (g):	275.450				
Photos and microscopy					
Describe features present (include file names and locations): none					
Person(s) performing work					
Initial and date: 3/30/16 Rjm Rjm 3/31/16					

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

Second Re-melt: History and Observations

Glass ID: New-DL-8788 Mod			Date: 4-5-16	
Glass Preparation details				
Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 9:40am 4-5-16	Additional milling intervals: 30 seconds x 3	Sieve size: 100 mesh	
Mixture Masses: Baseline glass (g) —	Na_2SO_4 (g) —	**Angstrom Mill (puck only + bag) 30 sec.** Date/time in: NA	Empty crucible mass (g): 174.027	Crucible with glass mass (g): 273.097
				Balance ID: AD-0044
Glass melt details				
Crucible ID:	857-3			
Furnace ID:	M&E-DD6-15 ~~10:15 am~~			
Temperature and date/time into the furnace:	1150°C 4-5-16 10:15 am			
Temperature and date/time out of the furnace:	1150°C 4-5-16 11:15			
Quench details				
Viscosity notes (describe consistency):	same as 1st melt			
Observations (examples below): Undissolved particles, Crystallization/phase separation, Volatilization, Color, Residues on the pour plate, Bubbles, Surface appearance	same as 1st melt.			
Crucible and glass mass after cooling (g):	272.932			
Person(s) performing work				
Initial and date: pjw 4-5-16				

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

Third Re-melt: History and Observations

Glass ID: New- DL-8788 Mod	Date: 4-5-16

Glass Preparation details

Angstrom Mill (ring & puck) 2 minutes	Date/Time in: 1:50 pm 4-5-16	Additional milling intervals: 30 seconds x_____	Sieve size: 100 mesh

Mixture Masses		Angstrom Mill (puck only + bag) 30 sec. Date/time in:	Empty crucible mass (g):	Crucible with glass mass (g):	Balance ID:
Baseline glass (g)	Na_2SO_4 (g)				
—	—	NA	174.076	270.983	AD-0044

Glass melt details

Crucible ID:	857-3
Furnace ID:	MS+E-006-15
Temperature and date/time into the furnace:	1150°C 4-5-16 2:27 pm
Temperature and date/time out of the furnace:	1150°C 4-5-16 3:27 pm

Quench details

Viscosity notes (describe consistency):	Same as 1st + 2nd melt
Observations (examples below): Undissolved particles Crystallization/phase separation Volatilization Color Residues on the pour plate Bubbles Surface appearance	Same as 1st & 2nd melt.
Crucible and glass mass after cooling (g):	270.717

Photos and microscopy

Describe features present (include file names and locations):

—

Person(s) performing work

Initial and date:

Pjw 4-5-16

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

Glass Grinding, Washing, and Filtering

Glass ID: New-04-8445	(Circle): First 4 g Second 4 g	
Tungsten Carbide Mill (ring & puck)		
Date: 5-24-16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120 mesh SN- 153424946

DI Water Wash and Filter			
Balance M&TE Information:	BL02 / DWB-539		
Date	6-6-16	Mass of Water Added, 2nd (Target 50 g)	1: 50.1802 / 2: 50.6060
Tare Mass of New Filter Plus Petri Dish	1: 34.4930 / 2: 34.3732	Mass of recovered solution and flask	695.0
Mass of Super-Saturated Glass (Target 4 g)	1: 3.9986 / 2: 4.0074	Mass of wet sample plus filter and petri dish	1: 39.1086 / 2: 39.2226
Mass of Water Added, 1st (Target 50 g)	1: 50.2332 / 2: 50.2575	Mass of dry sample plus filter and petri dish	38.3930 / 38.2908
Tare Mass of Solution Flask	504.60		

Notes and Observations (if needed):

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

Glass Grinding, Washing, and Filtering

Glass ID: New-OL-116208 Mod		(Circle): First 4 g Second 4 g	
Tungsten Carbide Mill (ring & puck)			
Date: 5-24-16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120Mesh S/N- 153424446	
DI Water Wash and Filter			
Balance M&TE Information: ACTL BL02 / DWB 539			
Date	6/7/16	Mass of Water Added, 2nd (Target 50 g)	1: 50.0260 / 2: 50.0395
Tare Mass of New Filter Plus Petri Dish	1: 32.9972 / 2: 34.0650	Mass of recovered solution and flask	698.7
Mass of Super-Saturated Glass (Target 4 g)	1: 4.0064 / 2: 4.0131	Mass of wet sample plus filter and petri dish	1: 37.5691 / 2: 38.7659
Mass of Water Added, 1st (Target 50 g)	1: 50.0563 / 2: 50.0914 ~~50.0260~~	Mass of dry sample plus filter and petri dish	1: 36.6633 / 2: 37.7689
Tare Mass of Solution Flask	504.3 g		
Notes and Observations (if needed):			

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

Glass Grinding, Washing, and Filtering

Glass ID: New-IL-70316		(Circle): First 4 g Second 4 g	
Tungsten Carbide Mill (ring & puck)			
Date: 5-24-16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120mesh S/N- 153424946	
DI Water Wash and Filter			
Balance M&TE Information:			
Date	6/7/16	Mass of Water Added, 2nd (Target 50 g)	1: 50.0390 / 2: 50.0656
Tare Mass of New Filter Plus Petri Dish	1: 33.7088 ~~33.7052~~ / 2: 34.3229	Mass of recovered solution and flask	696.1
Mass of Super-Saturated Glass (Target 4 g)	1: 4.0184 / 2: 4.0004	Mass of wet sample plus filter and petri dish	1: 38.6485 / 2: 39.0975
Mass of Water Added, 1st (Target 50 g)	1: 50.0145 ~~40.~~ / 2: 50.0200	Mass of dry sample plus filter and petri dish	1: 37.6521 / 2: 38.1305 ~~1564~~
Tare Mass of Solution Flask	504.5 g		
Notes and Observations (if needed):			

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

Glass Grinding, Washing, and Filtering

Glass ID: New-04-5041 7	(Circle): First 4 g Second 4 g	
Tungsten Carbide Mill (ring & puck)		
Date: 5-24-16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120 mesh S/N - 1534 7946

DI Water Wash and Filter			
Balance M&TE Information: ACTL BL-02 / DWB 539			
Date	6/7/16	Mass of Water Added, 2nd (Target 50 g)	50.1841 / 50.0175
Tare Mass of New Filter Plus Petri Dish	34.8004 / 34.3524	Mass of recovered solution and flask	696.1
Mass of Super-Saturated Glass (Target 4 g)	4.0006 / 4.0005	Mass of wet sample plus filter and petri dish	39.5371 / 39.0510
Mass of Water Added, 1st (Target 50 g)	50.0060 / 50.0300	Mass of dry sample plus filter and petri dish	6121 38.~~0115~~ / 38.1457
Tare Mass of Solution Flask	504.5		

Notes and Observations (if needed):

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

Glass Grinding, Washing, and Filtering

Glass ID: New-DL-122817	(Circle): First 4 g Second 4 g		
Tungsten Carbide Mill (ring & puck)			
Date: 5-24-16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120 mesh S/N-153 424946	
DI Water Wash and Filter			
Balance M&TE Information: ACTL BL-02 / DWB 539			
Date	6/8/16	Mass of Water Added, 2nd (Target 50 g)	50.0740 / 50.0021
Tare Mass of New Filter Plus Petri Dish	1: 34.8004 / 2:	Mass of recovered solution and flask	695.8
Mass of Super-Saturated Glass (Target 4 g)	4.0089 / 4.0090	Mass of wet sample plus filter and petri dish	39.5560 / 39.3146
Mass of Water Added, 1st (Target 50 g)	50.1176 / 50.0627	Mass of dry sample plus filter and petri dish	38.5096 / 38.1867
Tare Mass of Solution Flask	504.6		
Notes and Observations (if needed):			

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

Glass Grinding, Washing, and Filtering

Glass ID: New-DL-127708 Mod	(Circle): First 4 g Second 4 g		
Tungsten Carbide Mill (ring & puck)			
Date: 5-25-16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120 mesh S/N-153424946	
DI Water Wash and Filter			
Balance M&TE Information: ACTL BL02 / DWB 539			
Date	6/7/16	Mass of Water Added, 2nd (Target 50 g)	50.1736 / 50.2308
Tare Mass of New Filter Plus Petri Dish	1: 34.4550 / 2: 33.0491	Mass of recovered solution and flask	687.6
Mass of Super-Saturated Glass (Target 4 g)	4.0156 / 4.0032	Mass of wet sample plus filter and petri dish	39.2939 / 37.9353
Mass of Water Added, 1st (Target 50 g)	50.0490 / 50.0101	Mass of dry sample plus filter and petri dish	36.2461 / 36.9417
Tare Mass of Solution Flask	504.5		
Notes and Observations (if needed):			

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

Glass Grinding, Washing, and Filtering

Glass ID: New-DL-15493	(Circle): First 4 g Second 4 g	
Tungsten Carbide Mill (ring & puck)		
Date: 5-25-16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120 mesh S/N-153924946
DI Water Wash and Filter		
Balance M&TE Information: ACTL BL02 / DWB-539		

Date	6/13/16	Mass of Water Added, 2nd (Target 50 g)	50.0787 / 52.0525
Tare Mass of New Filter Plus Petri Dish	34.490 / 34.3524	Mass of recovered solution and flask	692.4
Mass of Super-Saturated Glass (Target 4 g)	4.0204 / 4.0012	Mass of wet sample plus filter and petri dish	39.5763 / 39.4583
Mass of Water Added, 1st (Target 50 g)	50.2202 / 50.0310	Mass of dry sample plus filter and petri dish	38.5740 / 38.4421
Tare Mass of Solution Flask	504.6		

Notes and Observations (if needed):
Sample stuck to filter. - Going to grind & Seive more glass to wash.

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

Glass Grinding, Washing, and Filtering

Glass ID: New-DL-15493	(Circle): First 4 g Second 4 g		
Tungsten Carbide Mill (ring & puck)			
Date: 6/29/16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120 mesh S/N-150413605	
DI Water Wash and Filter			
Balance M&TE Information: ACTL BL-02 / DWB-539			
Date	6/29/16	Mass of Water Added, 2nd (Target 50 g)	
Tare Mass of New Filter Plus Petri Dish	34.6060	Mass of recovered solution and flask	
Mass of Super-Saturated Glass (Target 4 g)	4.0393	Mass of wet sample plus filter and petri dish	
Mass of Water Added, 1st (Target 50 g)	50.2365	Mass of dry sample plus filter and petri dish	
Tare Mass of Solution Flask	504.5		

Notes and Observations (if needed):

After sonicating sample, noticed a lot of solids (trash) floating on top – Received 120 mesh – Starting over with new sieved glass.

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

Glass Grinding, Washing, and Filtering

Glass ID: New-DL-1549 3	(Circle): First 4 g Second 4 g		
Tungsten Carbide Mill (ring & puck)			
Date: 6/29/16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120 mesh SN150413605	
DI Water Wash and Filter			
Balance M&TE Information: ACTL-BL02/DWB-539			
Date	7-1-16	Mass of Water Added, 2nd (Target 50 g)	50.1883/50.0558
Tare Mass of New Filter Plus Petri Dish	34.7420/34.6890	Mass of recovered solution and flask	686.8
Mass of Super-Saturated Glass (Target 4 g)	4.0133/4.0152	Mass of wet sample plus filter and petri dish	39.3654/39.4768
Mass of Water Added, 1st (Target 50 g)	50.2422/50.3201	Mass of dry sample plus filter and petri dish	
Tare Mass of Solution Flask	504.5		

Notes and Observations (if needed):

Note that masses of dried samples were not recorded.
Kevin Fox 8/4/16

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

Glass Grinding, Washing, and Filtering

Glass ID: New-DL-57284		(Circle): First 4 g Second 4 g	
Tungsten Carbide Mill (ring & puck)			
Date: 5-25-16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120 Mesh S/N 153428946	
DI Water Wash and Filter			
Balance M&TE Information: ACTL-BL02 / DWB 539			
Date	6/13/16	Mass of Water Added, 2nd (Target 50 g)	50.2107 / 50.3057
Tare Mass of New Filter Plus Petri Dish	34.3781 / 34.4564	Mass of recovered solution and flask	698.2
Mass of Super-Saturated Glass (Target 4 g)	4.0541 / 4.0150	Mass of wet sample plus filter and petri dish	39.1544 / 39.1442
Mass of Water Added, 1st (Target 50 g)	50.6995 / 50.1927	Mass of dry sample plus filter and petri dish	38.2390 / 38.2382
Tare Mass of Solution Flask	504.5		
Notes and Observations (if needed):			

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

Glass Grinding, Washing, and Filtering

Glass ID: New-DL-62380	(Circle): First 4 g Second 4 g	
Tungsten Carbide Mill (ring & puck)		
Date: 5-25-16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120mesh S/N 153424946

DI Water Wash and Filter			
Balance M&TE Information:			
Date	6/14/16	Mass of Water Added, 2nd (Target 50 g)	50.1905/51.4095
Tare Mass of New Filter Plus Petri Dish	34.8115 / 34.1176	Mass of recovered solution and flask	695.7
Mass of Super-Saturated Glass (Target 4 g)	4.0341 / 4.0141	Mass of wet sample plus filter and petri dish	39.7927 / 38.9609 ~~38.1600~~
Mass of Water Added, 1st (Target 50 g)	50.2780/51.3941	Mass of dry sample plus filter and petri dish	38.9322/38.0312
Tare Mass of Solution Flask	504.5		

Notes and Observations (if needed):

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

Glass Grinding, Washing, and Filtering

Glass ID: New-02-100210	(Circle): First 4 g	Second 4 g

Tungsten Carbide Mill (ring & puck)

Date:	Additional Milling Time Intervals:	Sieve Size and ID:
5-25-16	30 seconds x 0	120 mesh S/N 153424 946

DI Water Wash and Filter

Balance M&TE Information: ACTL-BL02 / DWB 539

Date	6/15/16	Mass of Water Added, 2nd (Target 50 g)	50.1122 / 51.5822
Tare Mass of New Filter Plus Petri Dish	34.4326 / 34.4670	Mass of recovered solution and flask	690.4
Mass of Super-Saturated Glass (Target 4 g)	4.0693 / 4.0533	Mass of wet sample plus filter and petri dish	39.3062 / 39.2446
Mass of Water Added, 1st (Target 50 g)	51.0464 / 50.9946	Mass of dry sample plus filter and petri dish	38.2150 / 38.2496
Tare Mass of Solution Flask	504.6		

Notes and Observations (if needed):

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

Glass Grinding, Washing, and Filtering

Glass ID: New-OL-80309	(Circle): First 4 g	Second 4 g

Tungsten Carbide Mill (ring & puck)

Date:	Additional Milling Time Intervals:	Sieve Size and ID:
5-25-16	30 seconds x 0	120 mesh S/N 153424 9416

DI Water Wash and Filter

Balance M&TE Information: ACTL-BL-02 / DWB-539

Date	6/20/16	Mass of Water Added, 2nd (Target 50 g)	52.16789/50.1760
Tare Mass of New Filter Plus Petri Dish	33.1304/33.8916	Mass of recovered solution and flask	687.2
Mass of Super-Saturated Glass (Target 4 g)	4.0369/4.0107	Mass of wet sample plus filter and petri dish	37.6992/38.4613
Mass of Water Added, 1st (Target 50 g)	52.7390/50.6475	Mass of dry sample plus filter and petri dish	36.7765/37.6108
Tare Mass of Solution Flask	504.5		

Notes and Observations (if needed):

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

Glass Grinding, Washing, and Filtering

Glass ID: New-IL-456	(Circle): First 4 g Second 4 g	
Tungsten Carbide Mill (ring & puck)		
Date: 5-25-16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120mesh S/N - 153424446
DI Water Wash and Filter		
Balance M&TE Information: ACTL-BL02 / DWB-539		
Date	6/21/16	Mass of Water Added, 2nd (Target 50 g) 50.0091 / 50.0917
Tare Mass of New Filter Plus Petri Dish	34.8029 / 34.4426	Mass of recovered solution and flask 694.1
Mass of Super-Saturated Glass (Target 4 g)	4.0070 / 4.0475	Mass of wet sample plus filter and petri dish 39.4331 / 39.0860
Mass of Water Added, 1st (Target 50 g)	50.2932 / 50.1057	Mass of dry sample plus filter and petri dish 38.5688 / 38.2154
Tare Mass of Solution Flask	504.5	
Notes and Observations (if needed):		

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

Glass Grinding, Washing, and Filtering

Glass ID: New-DL-90780	(Circle): First 4 g Second 4 g		
Tungsten Carbide Mill (ring & puck)			
Date: 5-26-16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120 mesh S/N-1534749 46	
DI Water Wash and Filter			
Balance M&TE Information: ACTL-BL02 / DWB-539			
Date	6/21/16	Mass of Water Added, 2nd (Target 50 g)	50.1091 / 50.0937
Tare Mass of New Filter Plus Petri Dish	34.5684 34.3284 / ~~34.56~~ pw	Mass of recovered solution and flask	687.0
Mass of Super-Saturated Glass (Target 4 g)	4.0982 / 4.0804	Mass of wet sample plus filter and petri dish	39.2645 / 39.4045
Mass of Water Added, 1st (Target 50 g)	50.2140 / 50.1813	Mass of dry sample plus filter and petri dish	38.2951 / 38.4714 ~~687.0~~ pw wall/w
Tare Mass of Solution Flask	504.5		
Notes and Observations (if needed):			

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

Glass Grinding, Washing, and Filtering

Glass ID: New-DL-108249mod	(Circle): First 4 g Second 4 g		
Tungsten Carbide Mill (ring & puck)			
Date: 5-26-16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120mesh S/N-1534249A6	
DI Water Wash and Filter			
Balance M&TE Information: ACTL-BL02 / DWB-539			
Date 6/22/16	6/22/16	Mass of Water Added, 2nd (Target 50 g)	50.0645/50.3238
Tare Mass of New Filter Plus Petri Dish	32.9017/39.0801	Mass of recovered solution and flask	696.3
Mass of Super-Saturated Glass (Target 4 g)	4.0616/4.1772	Mass of wet sample plus filter and petri dish	37.9307/39.2859
Mass of Water Added, 1st (Target 50 g)	50.1136/50.1356	Mass of dry sample plus filter and petri dish	36.8987/38.1783
Tare Mass of Solution Flask	504.4		
Notes and Observations (if needed):			

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

Glass Grinding, Washing, and Filtering

Glass ID: New-IL-1721	(Circle): First 4 g	Second 4 g

Tungsten Carbide Mill (ring & puck)

Date:	Additional Milling Time Intervals:	Sieve Size and ID:
5-26-16	30 seconds x 0	120 mesh S/N-153424946

DI Water Wash and Filter

Balance M&TE Information: ACTL-BL02 / JWB-539

Date	6/22/16	Mass of Water Added, 2nd (Target 50 g)	50.2358/52.5583
Tare Mass of New Filter Plus Petri Dish	34.4375/33.7868	Mass of recovered solution and flask	695.0
Mass of Super-Saturated Glass (Target 4 g)	4.0054/4.0226	Mass of wet sample plus filter and petri dish	39.0735/38.3249
Mass of Water Added, 1st (Target 50 g)	50.2316/50.0368	Mass of dry sample plus filter and petri dish	38.1671/37.5384
Tare Mass of Solution Flask	504.5		

Notes and Observations (if needed):

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

Glass Grinding, Washing, and Filtering

Glass ID: New-DL-45748	(Circle): First 4 g Second 4 g	
Tungsten Carbide Mill (ring & puck)		
Date: 5-26-16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120 mesh S/N-153924946

DI Water Wash and Filter			
Balance M&TE Information: ACTL-BL02 / DWB-539			
Date	6/22/16	Mass of Water Added, 2nd (Target 50 g)	50.2658/50.2607
Tare Mass of New Filter Plus Petri Dish	34.5131/33.1263	Mass of recovered solution and flask	696.0
Mass of Super-Saturated Glass (Target 4 g)	4.0122/4.0143	Mass of wet sample plus filter and petri dish	39.1342/37.7417
Mass of Water Added, 1st (Target 50 g)	50.2367/50.0197	Mass of dry sample plus filter and petri dish	38.1405/36.8178
Tare Mass of Solution Flask	504.5		

Notes and Observations (if needed):

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

Glass Grinding, Washing, and Filtering

Glass ID: New-DL-14844		(Circle): First 4 g Second 4 g	
Tungsten Carbide Mill (ring & puck)			
Date: 5-26-16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120 mesh S/N-153924946	
DI Water Wash and Filter			
Balance M&TE Information: ACTL-BL02 / DWB-539			
Date	6/22/16	Mass of Water Added, 2nd (Target 50 g)	50.1870 / 50.2286
Tare Mass of New Filter Plus Petri Dish	34.5172 / 34.7809	Mass of recovered solution and flask	697.8
Mass of Super-Saturated Glass (Target 4 g)	4.0368 / 4.0173	Mass of wet sample plus filter and petri dish	39.4306 / 39.6271
Mass of Water Added, 1st (Target 50 g)	50.0193 / 50.2274	Mass of dry sample plus filter and petri dish	38.2725 / 38.5940
Tare Mass of Solution Flask	504.5		
Notes and Observations (if needed):			

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

Glass Grinding, Washing, and Filtering

Glass ID: NEW-IL-5253		(Circle): First 4 g Second 4 g	
Tungsten Carbide Mill (ring & puck)			
Date: 5-31-16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120 Mesh S/N. 1534249416	
DI Water Wash and Filter			
Balance M&TE Information: ACTL-BL02 / DWB-539			
Date	6/23/16	Mass of Water Added, 2nd (Target 50 g)	50.62 49/50.2258
Tare Mass of New Filter Plus Petri Dish	34.3607/34.1040	Mass of recovered solution and flask	697.9
Mass of Super-Saturated Glass (Target 4 g)	4.0192/4.1555	Mass of wet sample plus filter and petri dish	38.9402/38.7121
Mass of Water Added, 1st (Target 50 g)	51.4677/50.1284	Mass of dry sample plus filter and petri dish	37.9464/37.8470
Tare Mass of Solution Flask	504.5		
Notes and Observations (if needed):			

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

Glass Grinding, Washing, and Filtering

Glass ID: NEW-IL-151542		(Circle): First 4 g Second 4 g	
Tungsten Carbide Mill (ring & puck)			
Date: 5.31.16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120 Mesh S/N-1534249460	
DI Water Wash and Filter			
Balance M&TE Information: ACTL-BL02 / DWB-539			
Date	6/23/16	Mass of Water Added, 2nd (Target 50 g)	50.1247/50.0808
Tare Mass of New Filter Plus Petri Dish	32.9340/33.8204	Mass of recovered solution and flask	695.1
Mass of Super-Saturated Glass (Target 4 g)	4.0393/4.0751	Mass of wet sample plus filter and petri dish	37.3946/38.5360
Mass of Water Added, 1st (Target 50 g)	50.0191/50.1258	Mass of dry sample plus filter and petri dish	36.5604/37.2045
Tare Mass of Solution Flask	504.5		
Notes and Observations (if needed):			

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

Glass Grinding, Washing, and Filtering

Glass ID: New-DL-8788 MOD		(Circle): First 4 g Second 4 g	
Tungsten Carbide Mill (ring & puck)			
Date: 5-31-16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120 mesh S/N-153424946	
DI Water Wash and Filter			
Balance M&TE Information: ACTL-BL02 / DWB-539			
Date	6/24/16	Mass of Water Added, 2nd (Target 50 g)	50.1092 / 50.4667
Tare Mass of New Filter Plus Petri Dish	34.4629 / 34.6310	Mass of recovered solution and flask	693.1
Mass of Super-Saturated Glass (Target 4 g)	4.0159 / 4.0853	Mass of wet sample plus filter and petri dish	38.9695 / 39.513
Mass of Water Added, 1st (Target 50 g)	50.2846 / 50.1265	Mass of dry sample plus filter and petri dish	38.1804 / 38.4355 ~~693.1~~ PW 6/27/16
Tare Mass of Solution Flask	504.5		
Notes and Observations (if needed):			

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

Glass Grinding, Washing, and Filtering

Glass ID: NEW-OL-17130		(Circle): First 4 g Second 4 g	
Tungsten Carbide Mill (ring & puck)			
Date: 5.31.16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120 Mesh S/N - 153424940	
DI Water Wash and Filter			
Balance M&TE Information: ACTL-BL02 / DWB-539			
Date	6/27/16	Mass of Water Added, 2nd (Target 50 g)	50.1123/50.2243
Tare Mass of New Filter Plus Petri Dish	34.4503/34.8537	Mass of recovered solution and flask	672.3
Mass of Super-Saturated Glass (Target 4 g)	4.0358/4.0131	Mass of wet sample plus filter and petri dish	39.1659/39.4551
Mass of Water Added, 1st (Target 50 g)	50.5360/50.0794	Mass of dry sample plus filter and petri dish	38.2859/38.6035
Tare Mass of Solution Flask	504.5		
Notes and Observations (if needed):			

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

Glass Grinding, Washing, and Filtering

Glass ID: NEW-IL-5255		(Circle): First 4 g Second 4 g	
Tungsten Carbide Mill (ring & puck)			
Date: 6-1-16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120 Mesh S/N-153424946	
DI Water Wash and Filter			
Balance M&TE Information: ACTL-BLD2 / DWB-539			
Date	6/28/16	Mass of Water Added, 2nd (Target 50 g)	51.6788/50.1501
Tare Mass of New Filter Plus Petri Dish	33.0064/34.1484	Mass of recovered solution and flask	688.2
Mass of Super-Saturated Glass (Target 4 g)	4.0274/4.0409	Mass of wet sample plus filter and petri dish	37.6348/38.6600
Mass of Water Added, 1st (Target 50 g)	50.0918/50.2459	Mass of dry sample plus filter and petri dish	37.7083 36.6867/~~7083~~
Tare Mass of Solution Flask	504.5		
Notes and Observations (if needed):			

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

Glass Grinding, Washing, and Filtering

Glass ID: NEW-IL-93907		(Circle): First 4 g Second 4 g	
Tungsten Carbide Mill (ring & puck)			
Date: 6-2-16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120 Mesh S/N - 1534249446	
DI Water Wash and Filter			
Balance M&TE Information: ACTL-BL02 / DWB-539			
Date	6/28/16	Mass of Water Added, 2nd (Target 50 g)	50.0445/50.1559
Tare Mass of New Filter Plus Petri Dish	34.3820/32893 2	Mass of recovered solution and flask	691.3
Mass of Super-Saturated Glass (Target 4 g)	4.0991/4.0207	Mass of wet sample plus filter and petri dish	38.8279/37.3886
Mass of Water Added, 1st (Target 50 g)	50.1143/50.3097	Mass of dry sample plus filter and petri dish	38.2778/36.6838 38.3
Tare Mass of Solution Flask	504.6		
Notes and Observations (if needed):			

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

Glass Grinding, Washing, and Filtering

Glass ID: NEW-IL-42295		(Circle): First 4 g Second 4 g	
Tungsten Carbide Mill (ring & puck)			
Date: 6-1-16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120 Mesh S/N- 1534249416	
DI Water Wash and Filter			
Balance M&TE Information: ACTL-BL-02 / DWB-539			
Date	6-29-16	Mass of Water Added, 2nd (Target 50 g)	50.2762/50.5045
Tare Mass of New Filter Plus Petri Dish	33.7880/34.4694	Mass of recovered solution and flask	689.1
Mass of Super-Saturated Glass (Target 4 g)	4.0239/4.0104	Mass of wet sample plus filter and petri dish	38.6006/39.1935
Mass of Water Added, 1st (Target 50 g)	50.0722/50.2665	Mass of dry sample plus filter and petri dish	37.5638/38.3493
Tare Mass of Solution Flask	504.5		
Notes and Observations (if needed):			

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

Glass Grinding, Washing, and Filtering

Glass ID: New-IL-87749	(Circle): First 4 g Second 4 g		
Tungsten Carbide Mill (ring & puck)			
Date: 6-2-16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120 mesh SN-15344946	
DI Water Wash and Filter			
Balance M&TE Information: ACTL-BL02 / DWB-539			
Date	6/29/16	Mass of Water Added, 2nd (Target 50 g)	50.8262 / 50.1092
Tare Mass of New Filter Plus Petri Dish	34.5575 / 34.5735 34.57	Mass of recovered solution and flask	696.8
Mass of Super-Saturated Glass (Target 4 g)	4.0036 / 4.0364	Mass of wet sample plus filter and petri dish	39.1038 / 39.1926
Mass of Water Added, 1st (Target 50 g)	50.1314 / 50.6795	Mass of dry sample plus filter and petri dish	38.1659 / 38.2103
Tare Mass of Solution Flask	504.5		
Notes and Observations (if needed):			

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

Glass Grinding, Washing, and Filtering

Glass ID: New-IL-103151	(Circle): First 4 g Second 4 g	
Tungsten Carbide Mill (ring & puck)		
Date: 6-2-16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120 mesh S/N- 153424946

DI Water Wash and Filter			
Balance M&TE Information: ACTL-BL02 / DWB-539			
Date	6/29/16 / 6/30/16	Mass of Water Added, 2nd (Target 50 g)	5.0405 / 45.0681 → 50.0359 / 50.1036
Tare Mass of New Filter Plus Petri Dish	34.9567 / 34.2059	Mass of recovered solution and flask	672.2
Mass of Super-Saturated Glass (Target 4 g)	4.0325 / 4.0626	Mass of wet sample plus filter and petri dish	39.6382 / 38.6955
Mass of Water Added, 1st (Target 50 g)	50.1655 / 50.0567	Mass of dry sample plus filter and petri dish	38.5850 / 37.9288
Tare Mass of Solution Flask	504.5		

Notes and Observations (if needed):
6/29/16
Started ~ 12:00 p.m. - Sample was very slow filtering. ~ 5:00 p.m. - I put the filtered liquid in a tared bottle and covered the rest with Parafilm. I had completed 2nd sample + 5 g. of rinse H_2O. Started back filtering on 6/30/16 with 45 g of rinse H_2O.

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

Glass Grinding, Washing, and Filtering

Glass ID: LAW-ORP-LDI-1	(Circle): First 4 g Second 4 g	
Tungsten Carbide Mill (ring & puck)		
Date: 6-2-16	Additional Milling Time Intervals: 30 seconds x 0	Sieve Size and ID: 120 mesh S/N 15329946
DI Water Wash and Filter		
Balance M&TE Information: ACTL-BL02 / DWB-539		

Date ~~6-2-16~~ PW	6-30-16	Mass of Water Added, 2nd (Target 50 g)	50.2349/50.2617
Tare Mass of New Filter Plus Petri Dish	33.1870/34.5543	Mass of recovered solution and flask	694.2
Mass of Super-Saturated Glass (Target 4 g)	4.0450/4.0440	Mass of wet sample plus filter and petri dish	37.7365/39.0452
Mass of Water Added, 1st (Target 50 g)	50.1243/50.1240	Mass of dry sample plus filter and petri dish	36.6863/38.0929
Tare Mass of Solution Flask	504.5		

Notes and Observations (if needed):

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

Glass Grinding, Washing, and Filtering

Glass ID: EWG-LAW-Centroid-2	(Circle): First 4 g	Second 4 g

Tungsten Carbide Mill (ring & puck)

Date:	Additional Milling Time Intervals:	Sieve Size and ID:
6-2-16	30 seconds x 0	120 mesh S/N 153424946

DI Water Wash and Filter

Balance M&TE Information: ACTL-BL02 / DWB-539

Date	6/30/16	Mass of Water Added, 2nd (Target 50 g)	50.3475 / 50.0255
Tare Mass of New Filter Plus Petri Dish	33.0568 / 35.0407	Mass of recovered solution and flask	691.8
Mass of Super-Saturated Glass (Target 4 g)	4.0090 / 4.0548	Mass of wet sample plus filter and petri dish	37.6784 / 39.6061
Mass of Water Added, 1st (Target 50 g)	50.0479 / 50.1676	Mass of dry sample plus filter and petri dish	36.7504 / 38.6529
Tare Mass of Solution Flask	504.5		

Notes and Observations (if needed):

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)
New-OL-8445	178.256	281.008	280.597	178.301	nm	277.723	178.318	275.959	275.658
New-OL-8788Mod	173.997	275.980	275.450	174.027	273.097	272.932	174.076	270.983	270.717
New-OL-14844	188.818	290.519	290.288	188.912	288.393	288.212	188.943	286.833	286.649
New-OL-15493	179.081	281.371	281.137	179.300	279.348	278.945	179.267	277.892	277.683
New-OL-17130	175.721	276.509	276.266	175.725	274.172	273.974	175.747	272.064	271.800
New-OL-45748	177.555	279.366	279.265	177.710	276.761	276.629	177.630	275.273	275.007
New-OL-54017	178.254	280.116	279.963	178.662	277.834	277.716	178.715	nm	278.828
New-OL-57284	179.886	282.013	281.671	179.912	279.829	279.439	179.912	276.725	276.390
New-OL-62380	179.077	281.168	281.005	179.133	278.677	278.512	179.104	277.360	277.181
New-OL-80309	188.878	290.128	289.956	188.915	288.202	288.050	188.981	286.348	286.183
New-OL-90780	175.716	277.545	277.395	175.800	274.974	274.779	175.814	273.064	272.875
New-OL-100210	176.535	279.170	278.677	176.572	nm	276.470	176.556	274.104	273.320
New-OL-108249Mod	177.548	279.388	279.105	177.649	276.554	276.407	177.685	274.825	274.600
New-OL-116208Mod	173.988	276.211	275.973	174.069	nm	274.335	174.129	273.128	272.924
New-OL-122817	175.071	276.756	276.404	175.129	274.812	274.336	175.128	272.738	272.202
New-OL-127708Mod	176.542	277.745	277.047	176.811	275.456	275.275	177.517	273.975	273.126
New-IL-456	175.070	276.803	276.589	175.090	275.225	275.039	175.092	273.634	273.490
New-IL-1721	178.259	281.213	280.963	178.272	278.174	277.770	178.270	276.434	276.090

nm – not measured

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

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)
New-IL-5253	179.078	280.339	280.015	179.085	278.700	278.318	179.091	277.002	276.737
New-IL-5255	179.877	281.764	281.535	179.920	nm	280.407	179.907	279.217	278.971
New-IL-42295	175.064	277.182	276.952	175.085	275.792	275.618	175.085	274.221	274.023
New-IL-70316	176.528	279.326	279.133	176.576	278.105	277.956	176.579	276.921	276.790
New-IL-87749	177.539	279.337	279.030	177.565	277.960	277.737	177.572	276.555	276.400
New-IL-93907	188.826	291.161	290.925	188.915	288.083	287.903	188.833	285.039	284.543
New-IL-103151	175.702	277.547	277.232	175.787	276.652	276.060	175.756	274.828	274.604
New-IL-151542	174.008	276.642	276.366	174.035	274.310	274.022	174.015	272.691	272.487
EWG-LAW-Centroid-2	173.990	276.373	276.157	174.058	275.085	274.800	174.003	273.658	273.319
LAW-ORP-LD1(1)	177.536	278.541	279.811	177.573	278.710	278.422	177.531	277.452	276.718

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 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 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)		
New-OL-8445	34.483	3.9986	50.2332	50.1802	39.1086	38.393	34.3732	4.0074	50.2575	50.606	39.2226	38.2908	504.6	695
New-OL-8788Mod	34.4629	4.0157	50.2846	50.1092	38.9695	38.1804	34.631	4.0853	50.1265	50.4667	39.1513	38.4355	504.5	693.1
New-OL-14844	34.5172	4.0368	50.0193	50.187	39.4306	38.2725	34.7809	4.0173	50.2274	50.2286	39.6271	38.594	504.5	697.8
New-OL-15493	34.742	4.0133	50.2422	50.1883	39.3654	nm	34.689	4.0152	50.3201	50.0558	39.4768	nm	504.5	686.8
New-OL-17130	34.4503	4.0358	50.536	50.1123	39.1659	38.2859	34.8537	4.0131	50.0794	50.2243	39.4551	38.6035	504.5	672.3
New-OL-45748	34.5131	4.0122	50.2367	50.2658	39.1342	38.1405	33.1263	4.0143	50.0197	50.2607	37.7417	36.8178	504.5	696
New-OL-54017	34.8004	4.0006	50.006	50.1844	39.5371	38.6121	34.3524	4.0005	50.03	50.0175	39.051	38.1457	504.5	696.1
New-OL-57284	34.3781	4.0541	50.6995	50.2107	39.1544	38.239	34.4564	4.015	50.1927	50.3057	39.1442	38.2382	504.5	698.2
New-OL-62380	34.8115	4.0341	50.278	50.1905	39.7927	38.9322	34.1176	4.0141	51.3941	51.4085	38.9609	38.0312	504.5	695.7
New-OL-80309	33.1304	4.0369	52.739	52.6789	37.6992	36.7765	33.8916	4.0107	50.6475	50.176	38.4613	37.6108	504.5	687.2
New-OL-90780	34.3284	4.0982	50.214	50.1091	39.2645	38.2951	34.5684	4.0804	50.1813	50.0937	39.4045	38.4714	504.5	687
New-OL-100210	34.4326	4.0693	51.0164	50.1122	39.3062	38.215	34.467	4.0533	50.8946	51.5822	39.2446	38.2496	504.6	690.4
New-OL-108249Mod	32.9017	4.0616	50.1136	50.0645	37.9307	36.8987	39.0801	4.1772	50.1356	50.3238	39.2859	38.1783	504.4	696.3
New-OL-116208Mod	32.8972	4.0064	50.0563	50.026	37.5691	36.663	34.065	4.0131	50.0914	50.0395	38.7659	37.7689	504.5	698.7
New-OL-122817	34.8004	4.0089	50.1176	50.074	39.556	38.5096	nm	4.009	50.0627	50.0021	39.3146	38.1867	504.6	695.8
New-OL-127708Mod	34.455	4.0156	50.049	50.1736	39.2939	38.2461	33.0491	4.0032	50.0101	50.2308	37.8353	36.9417	504.5	687.6

nm – not measured

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

Glass Identifier	First Wash Sample						Second Wash Sample						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 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)		
New-IL-456	34.8029	4.007	50.2932	50.0091	39.4331	38.5688	34.4836	4.0475	50.1057	50.0917	39.086	38.2154	504.5	694.1
New-IL-1721	34.4375	4.0054	50.2316	50.2358	39.0735	38.1671	33.7868	4.0226	50.0368	52.5583	38.3249	37.5384	504.5	695
New-IL-5253	34.3667	4.0192	51.4677	50.6249	38.9402	37.9464	34.104	4.1555	50.1284	50.2258	38.7121	37.847	504.5	697.9
New-IL-5255	33.0064	4.0274	50.0918	51.6788	37.6348	36.6867	34.1484	4.0409	50.2459	50.1501	38.66	37.7083	504.5	688.2
New-IL-42295	33.788	4.0239	50.0722	50.2762	38.6006	37.5638	34.4694	4.0104	50.2665	50.5045	39.1935	38.3493	504.5	689.1
New-IL-70316	33.7688	4.0184	50.0145	50.038	38.6485	37.6527	34.3228	4.0004	50.02	50.0656	39.0975	38.1305	504.5	696.1
New-IL-87749	34.5575	4.0036	50.1314	50.8262	39.1038	38.1657	34.5735	4.0364	50.6775	50.1092	39.1926	38.2103	504.5	696.8
New-IL-93907	34.382	4.0991	50.1143	50.0445	38.8279	38.2778	32.8932	4.0207	50.3097	50.1559	37.3886	36.6838	504.6	691.3
New-IL-103151	34.9567	4.0325	50.1655	50.0359	39.6382	38.585	34.2059	4.0626	50.0567	50.1036	38.6955	37.9288	504.5	672.2
New-IL-151542	32.934	4.0393	50.0191	50.1247	37.3946	36.5604	33.8204	4.0751	50.1258	50.0808	38.536	37.5045	504.5	695.1
EWG-LAW-Centroid-2	33.0508	4.009	50.0479	50.3475	37.6784	36.7504	35.0407	4.0548	50.1676	50.0255	39.6061	38.6529	504.5	691.8
LAW-ORP-LD1(1)	33.107	4.045	50.1243	50.2349	37.7365	36.6863	34.5543	4.044	50.124	50.2617	39.0452	38.0929	504.5	694.2

nm – not measured

Appendix B Photographs, Micrographs, and Observations of the Sulfur Saturated Melts

Exhibit B-1. Photographs of the Sulfur Saturated Melts

EWG-LAW-Centroid-2-SM

LAW-ORP-LD1-1-SM

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

New-IL-103151-SM

New-IL-151542-SM

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

New-IL-1721-SM

New-IL-42295-SM

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

New-IL-456-SM

New-IL-5253-SM

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

New-IL-5255-SM

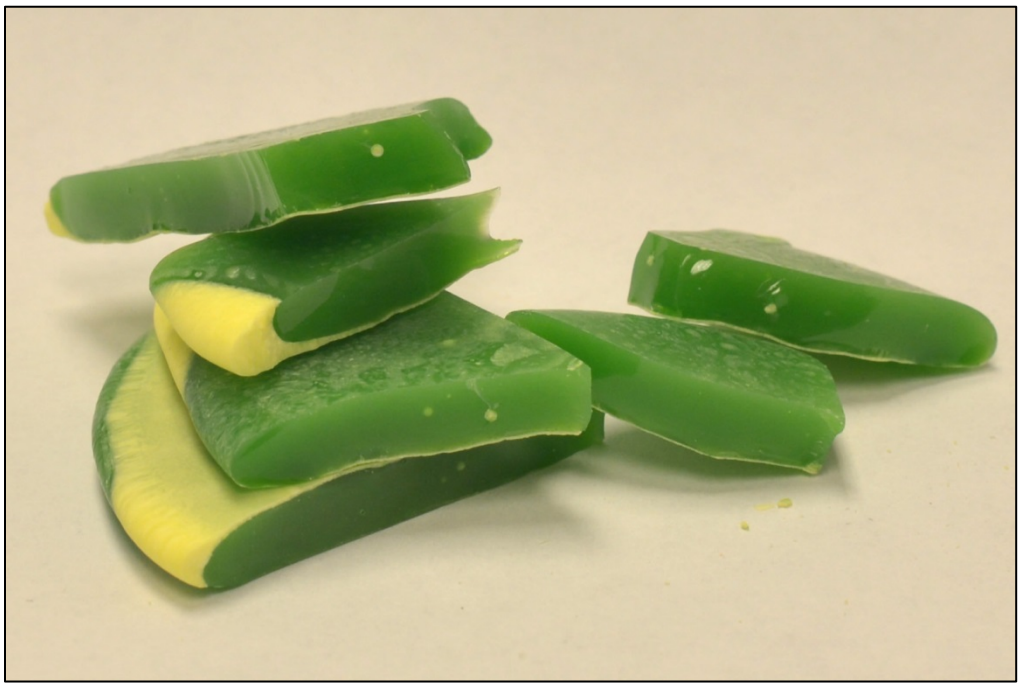
New-IL-70316-SM

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

New-IL-87749-SM

New-IL-93907-SM

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

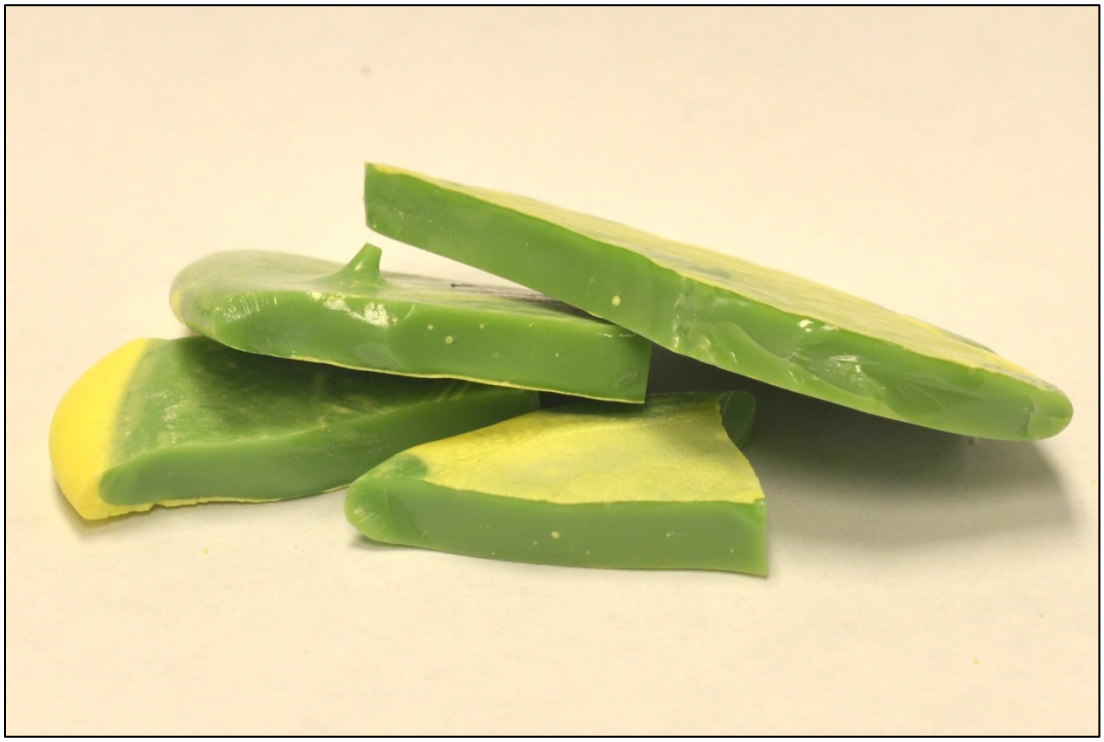


New-OL-100210-SM

New-OL-108249Mod-SM

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

New-OL-116208Mod-SM



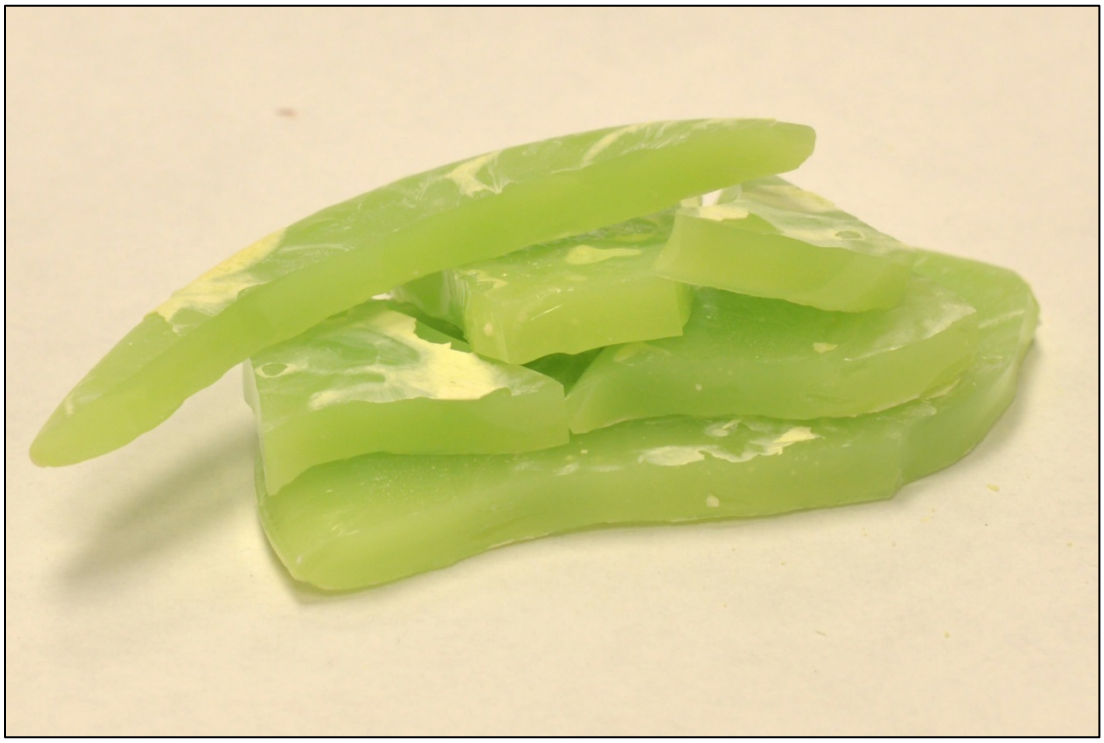
New-OL-122817-SM

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

New-OL-127708Mod-SM

New-OL-14844-SM

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



New-OL-15493-SM

New-OL-17130-SM

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

New-OL-45748-SM

New-OL-54017-SM

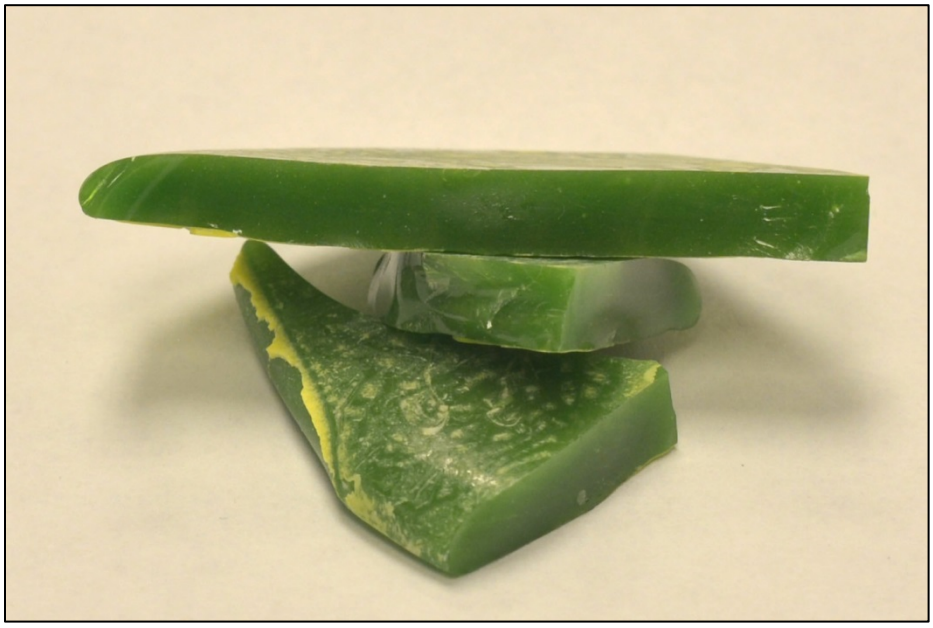
Exhibit B-1. Photographs of the Sulfur Saturated Melts **(continued)**

New-OL-57284-SM

New-OL-62380-SM

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

New-OL-80309-SM



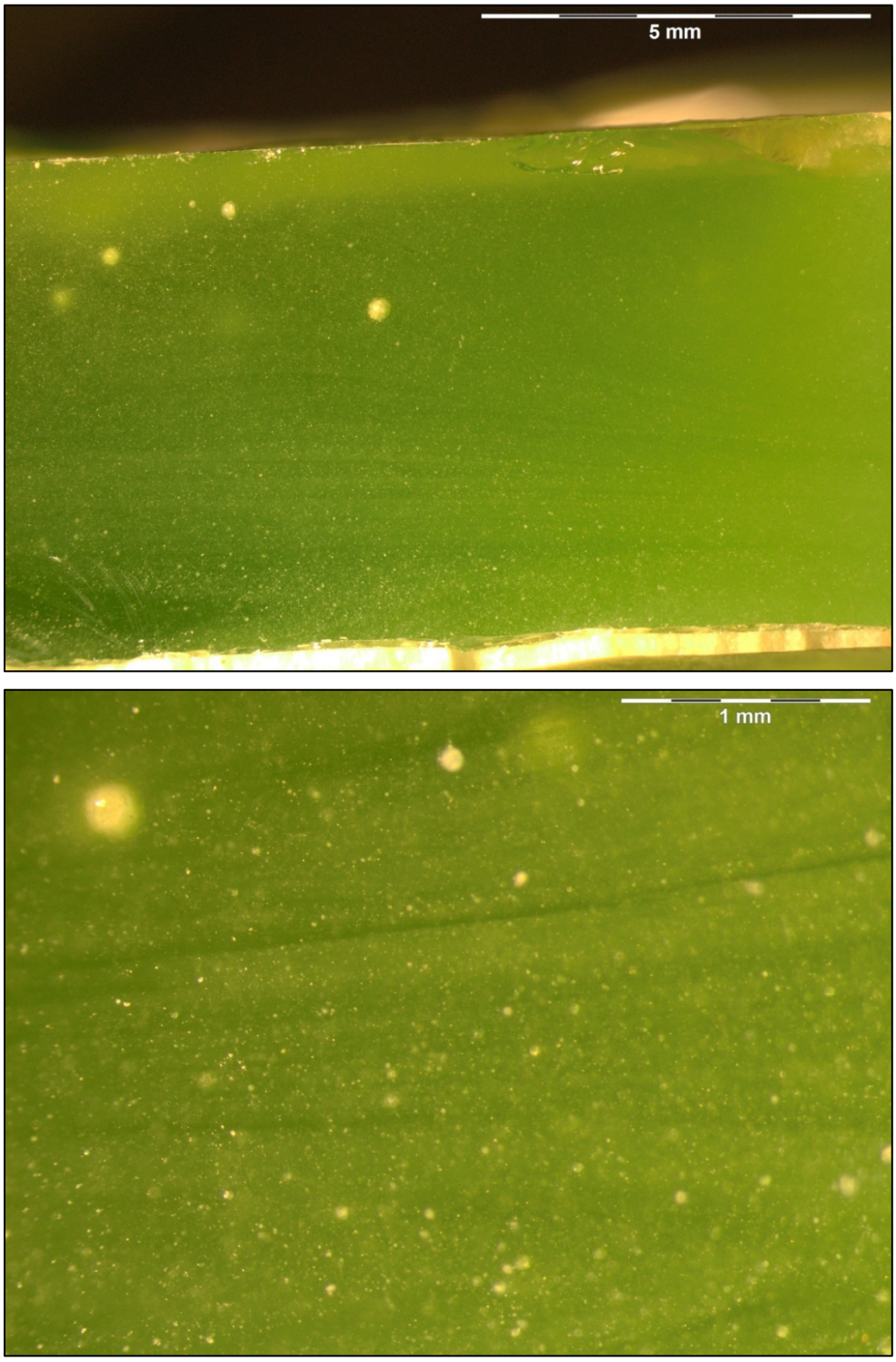
New-OL-8445-SM

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

New-OL-8788Mod-SM

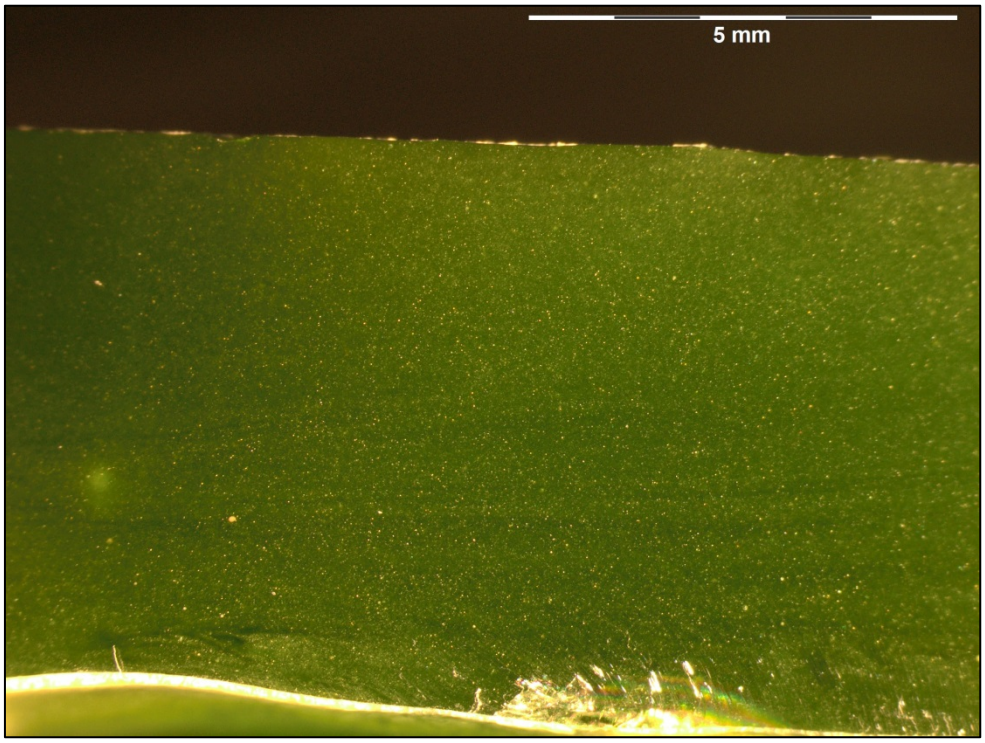
New-OL-90780-SM

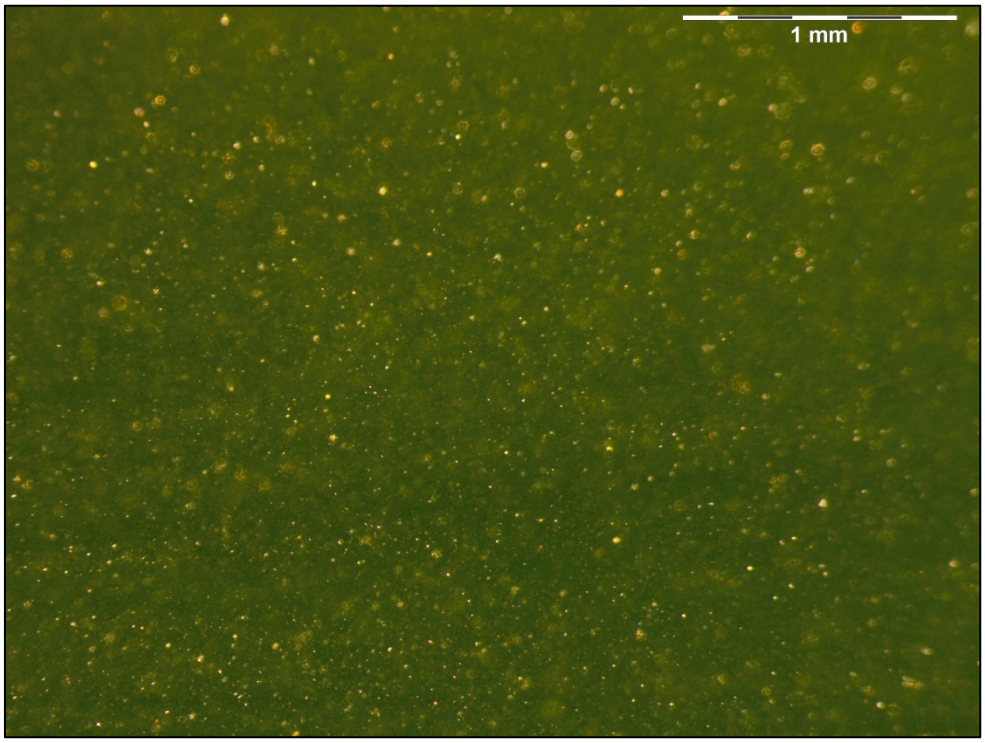
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts



EWG-LAW-Centroid-2-SM

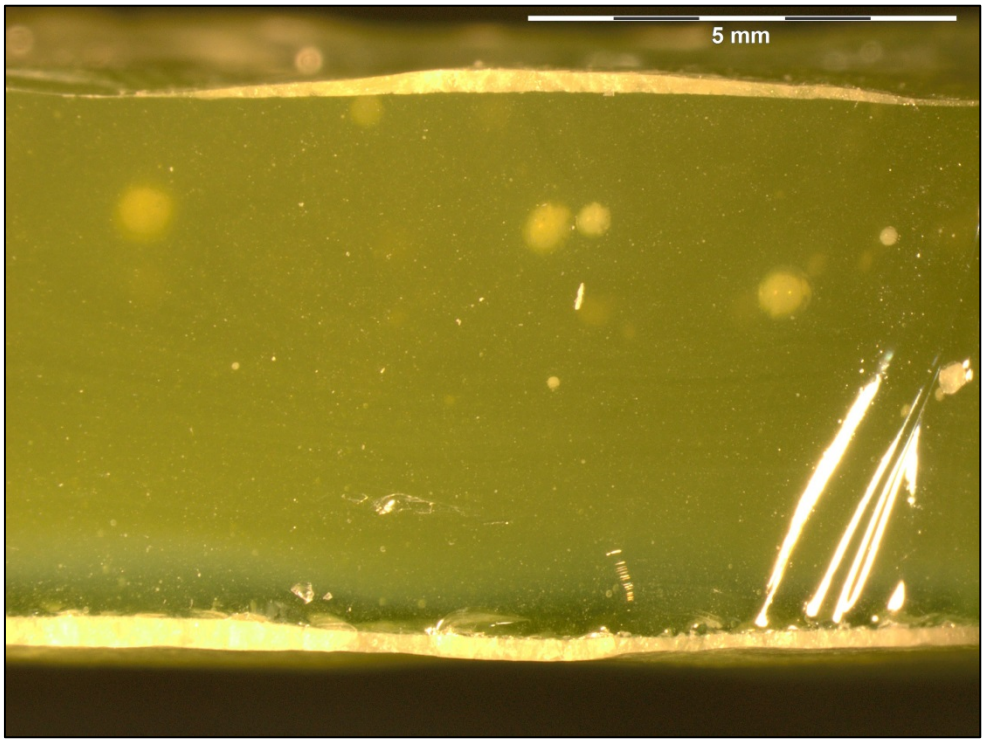
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**

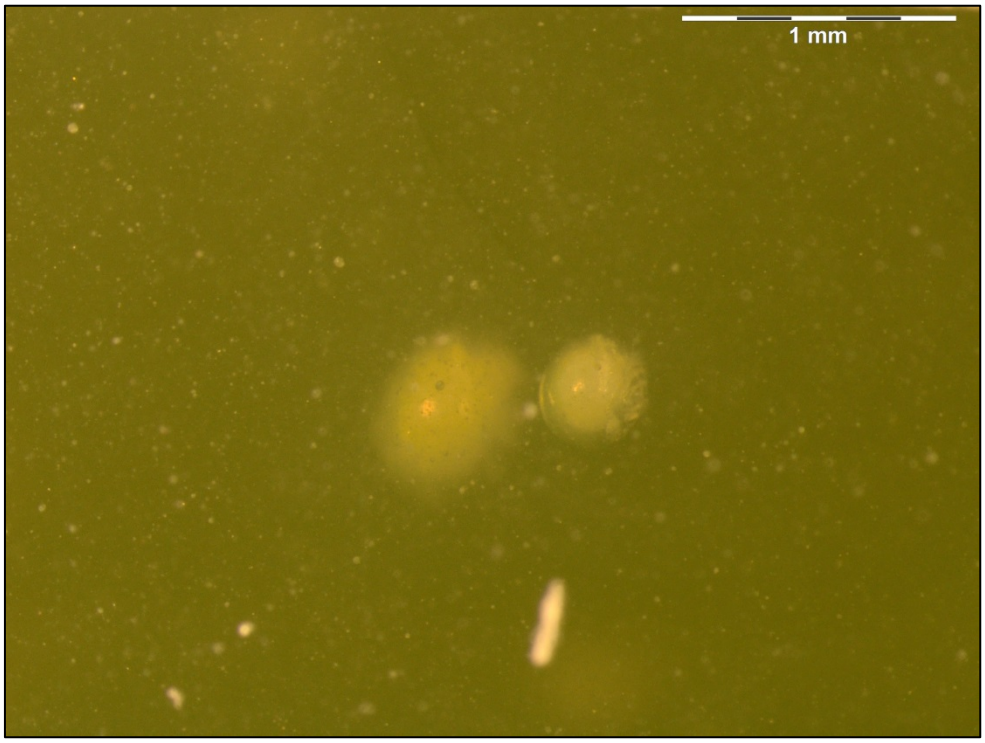




LAW-ORP-LD1-1-SM

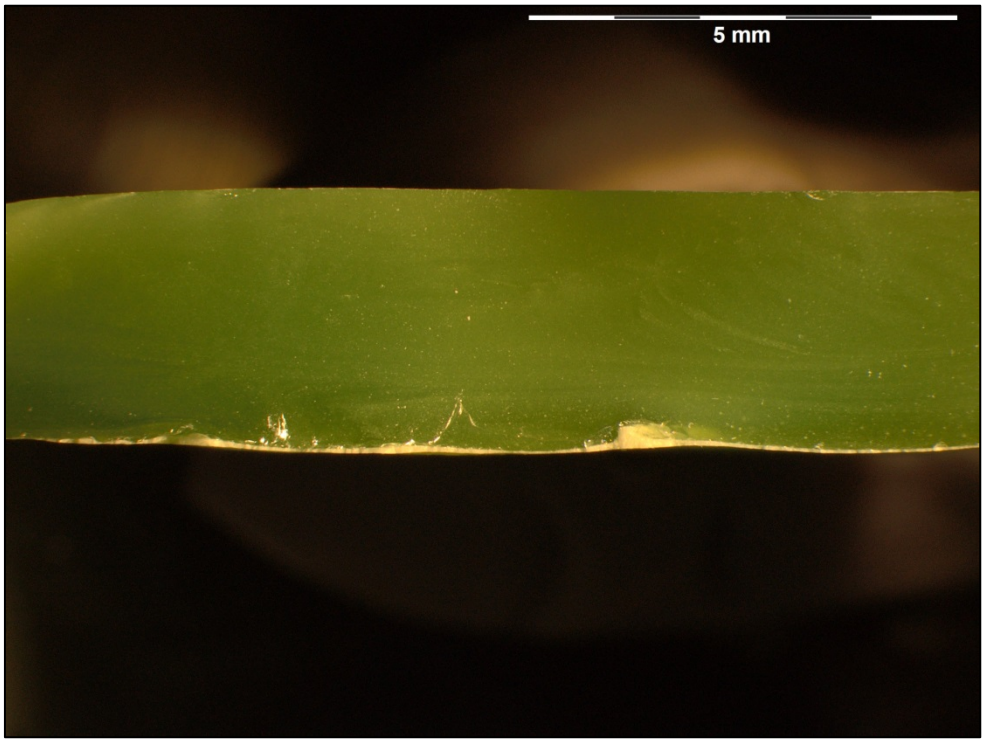
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**

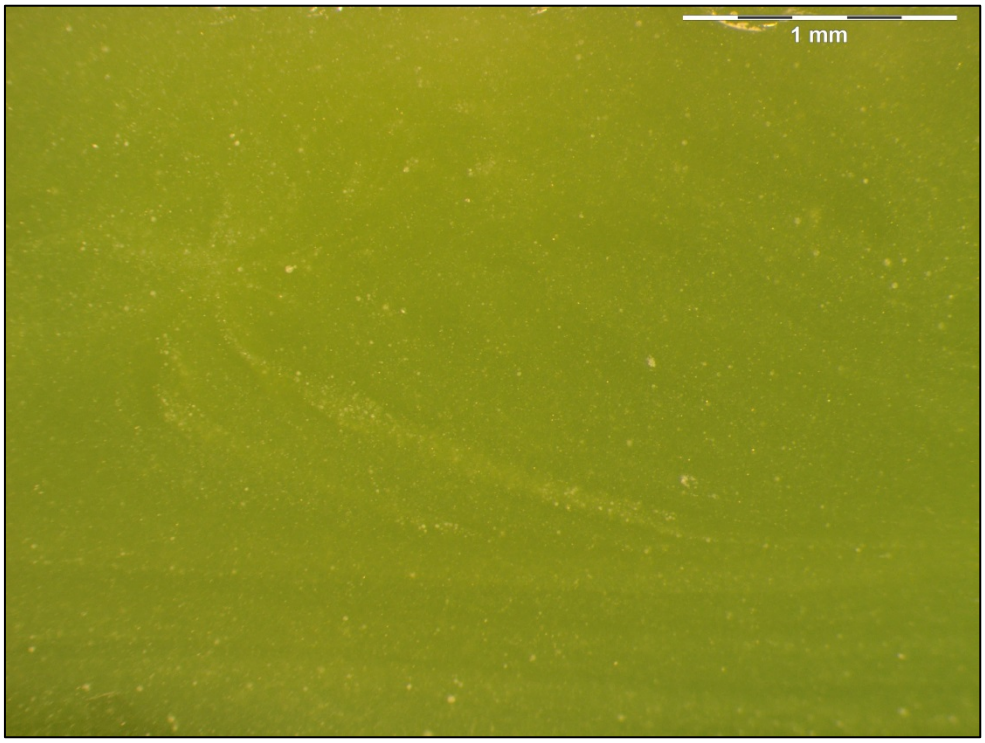




New-IL-103151-SM

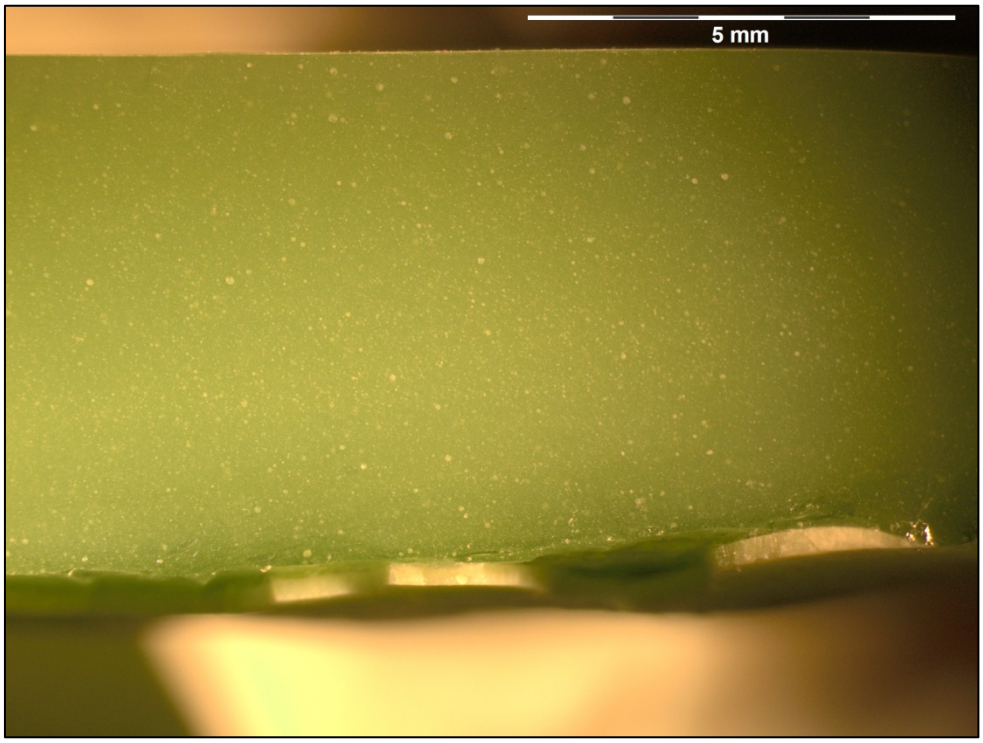
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**

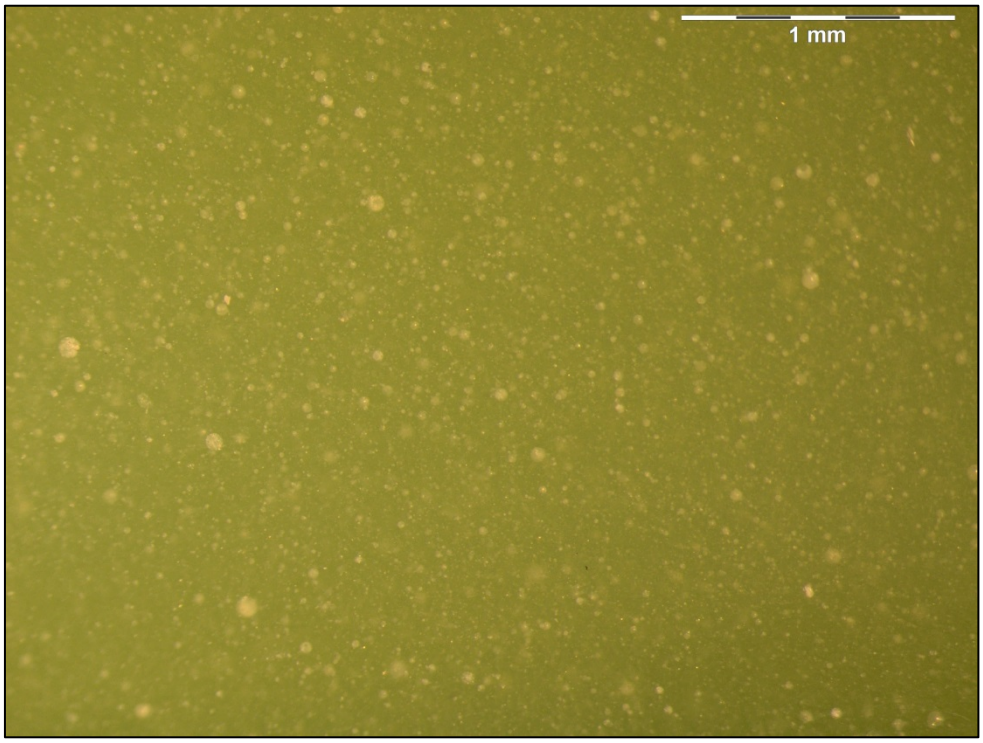




New-IL-151542-SM

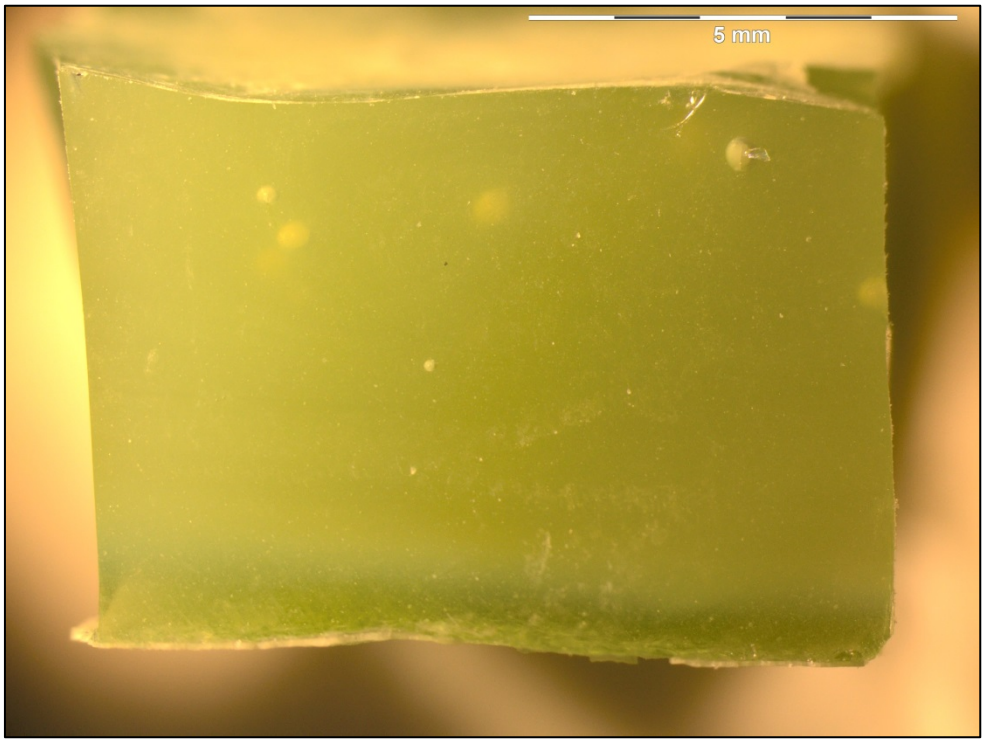
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**

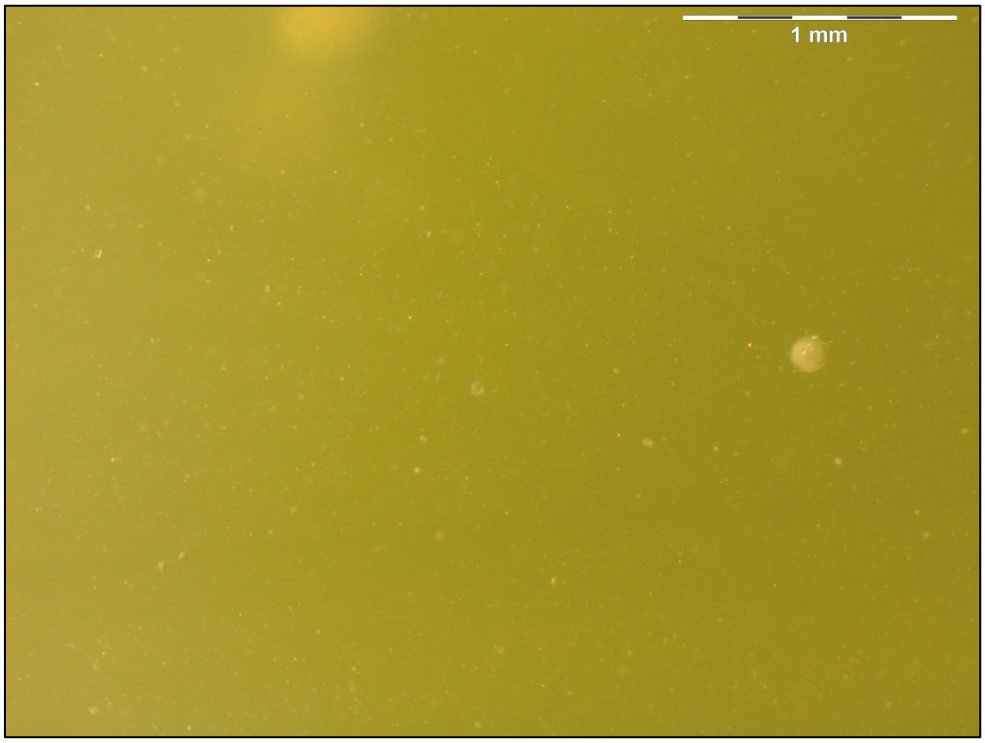




New-IL-1721-SM

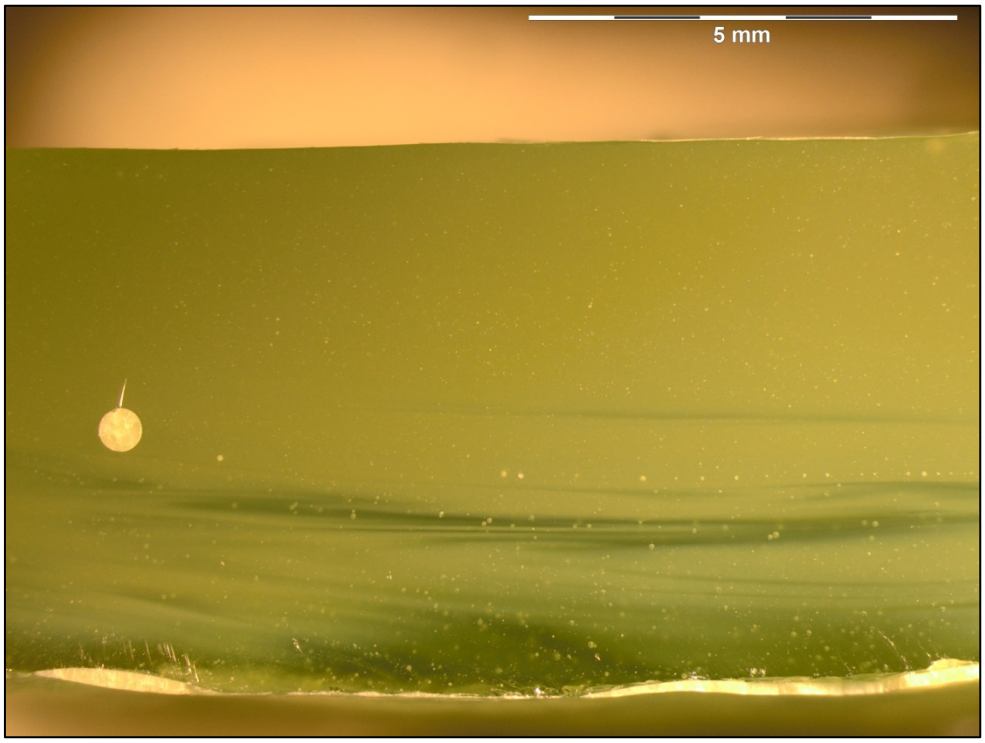
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**

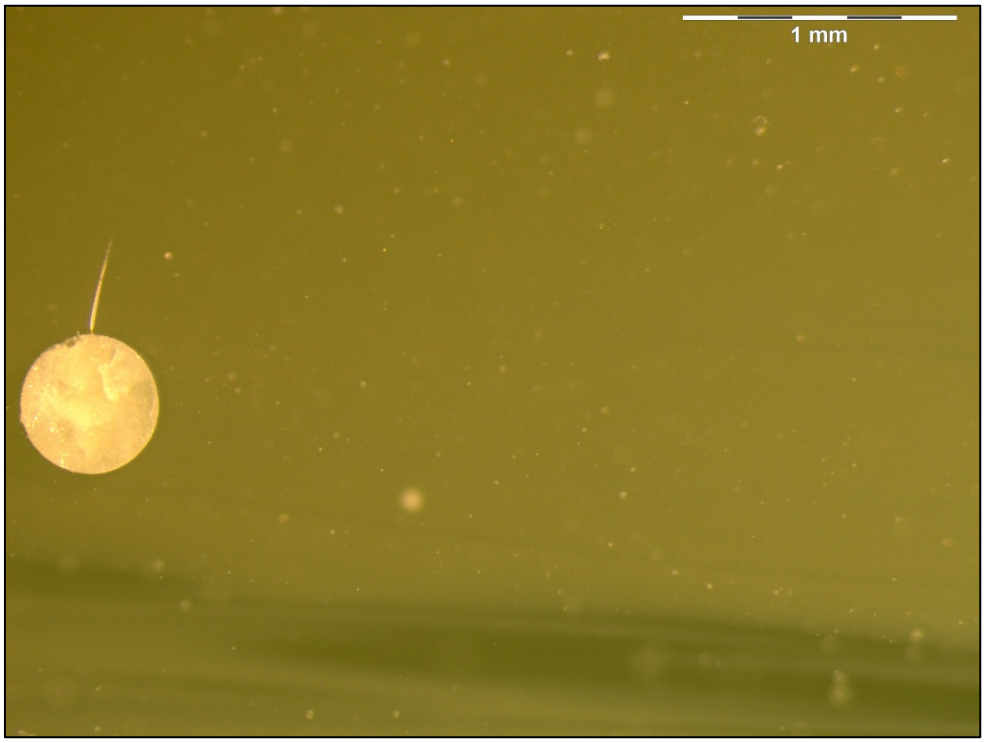




New-IL-42295-SM

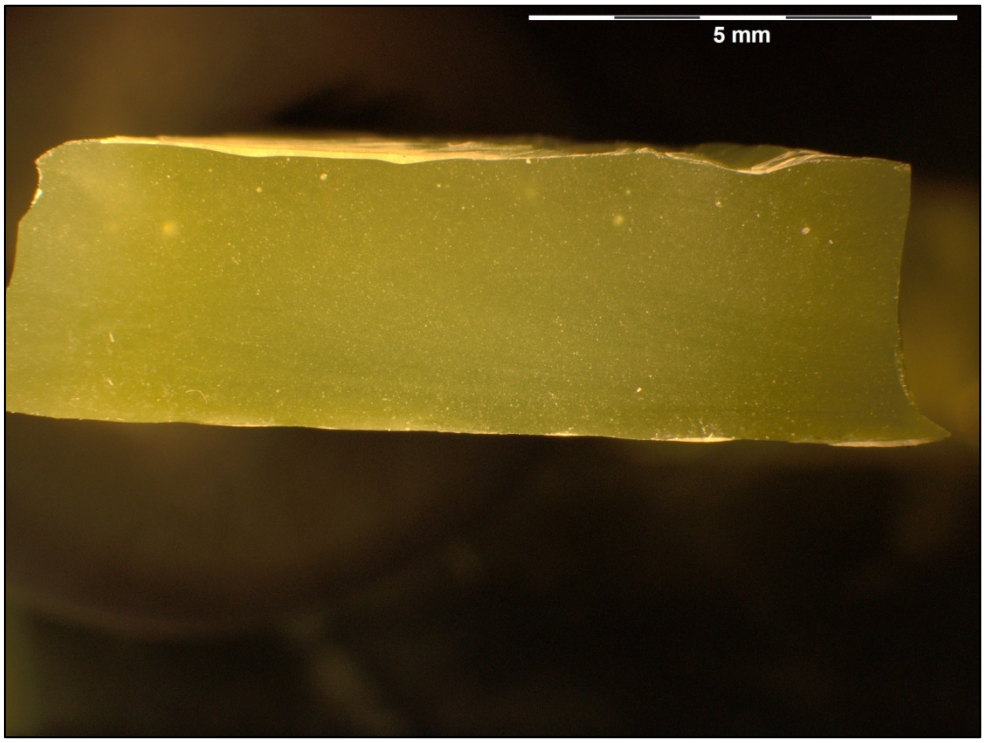
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**

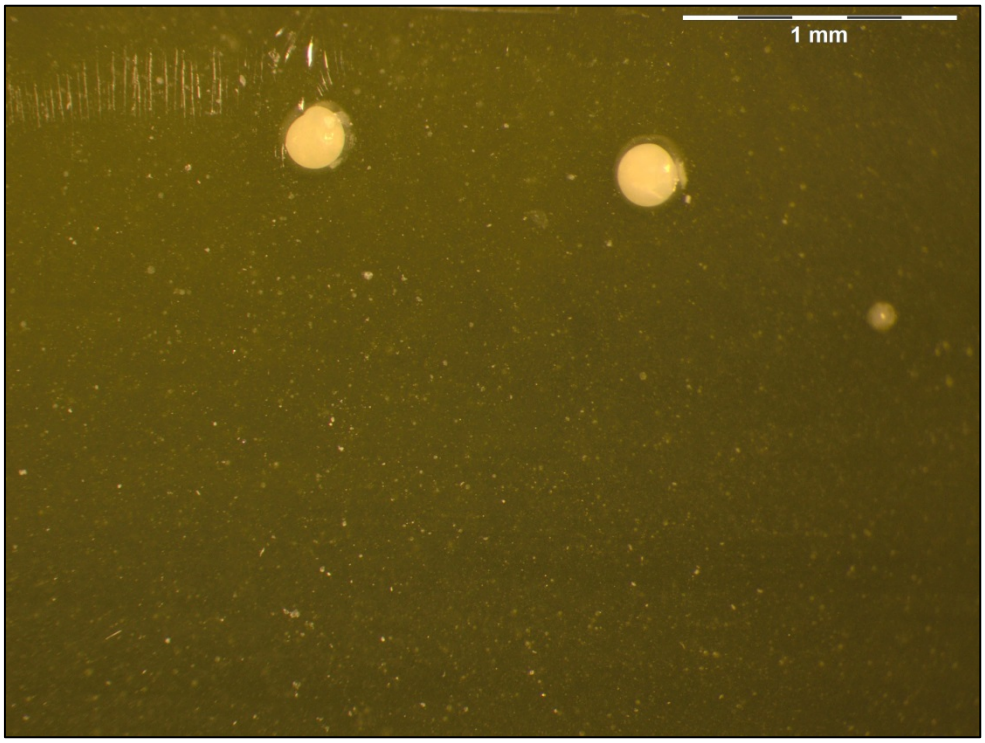




New-IL-456-SM

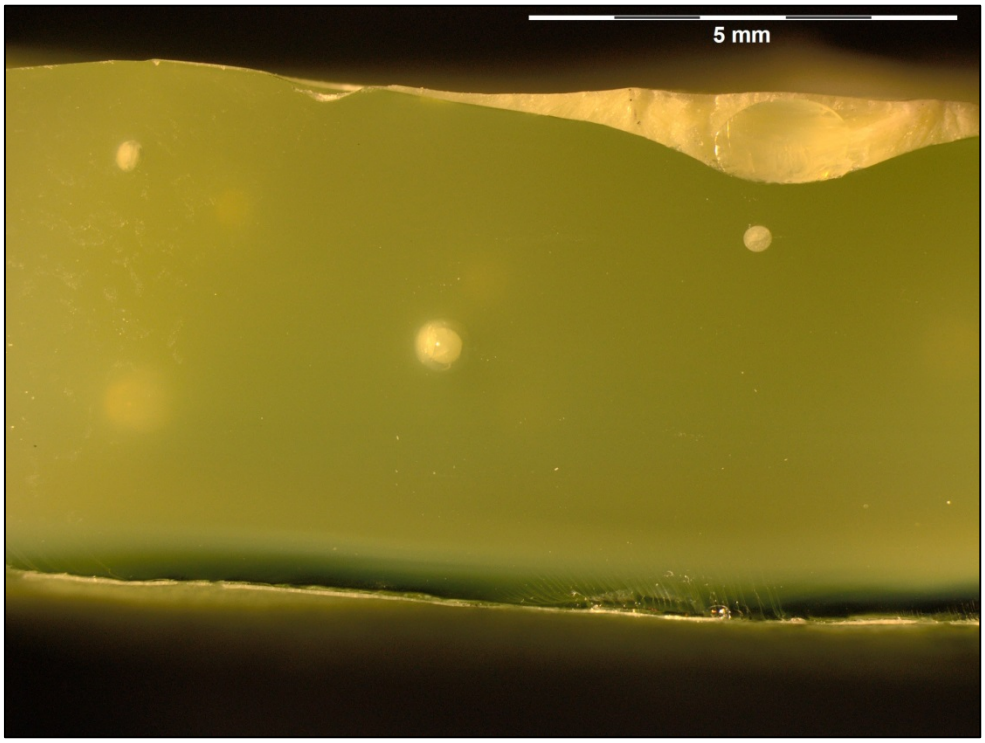
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**

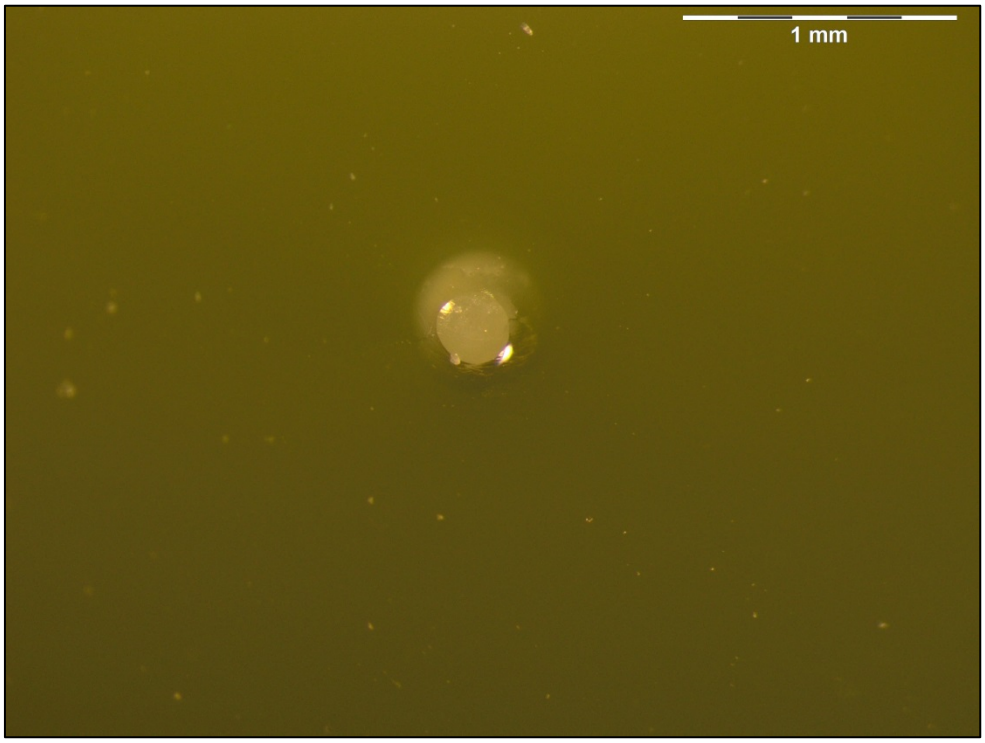




New-IL-5253-SM

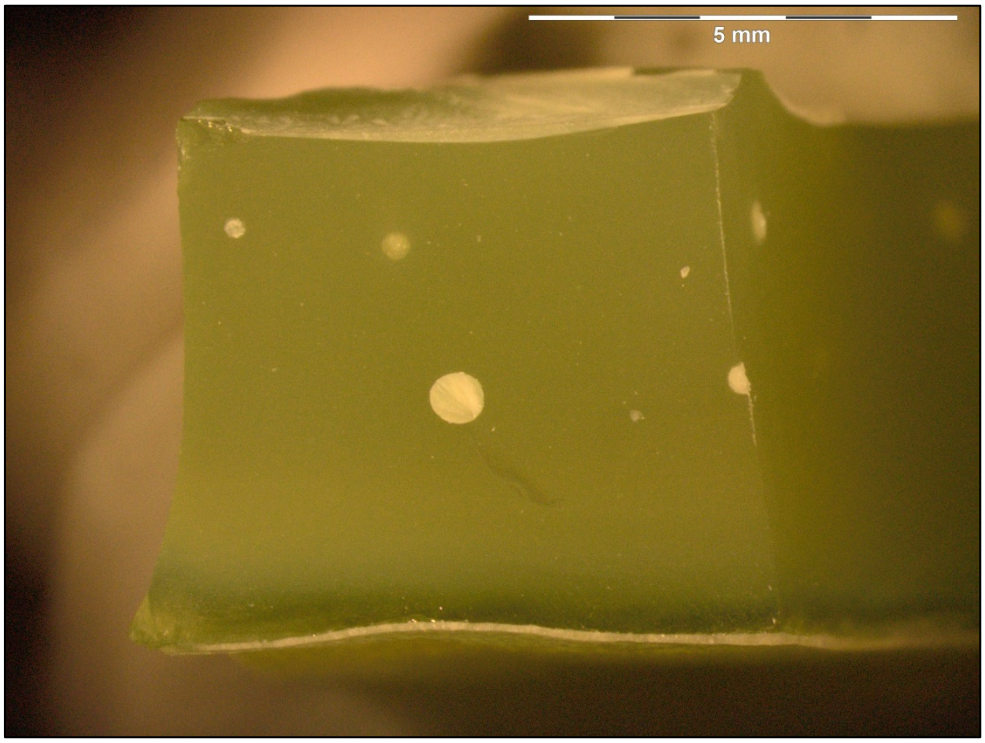
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**

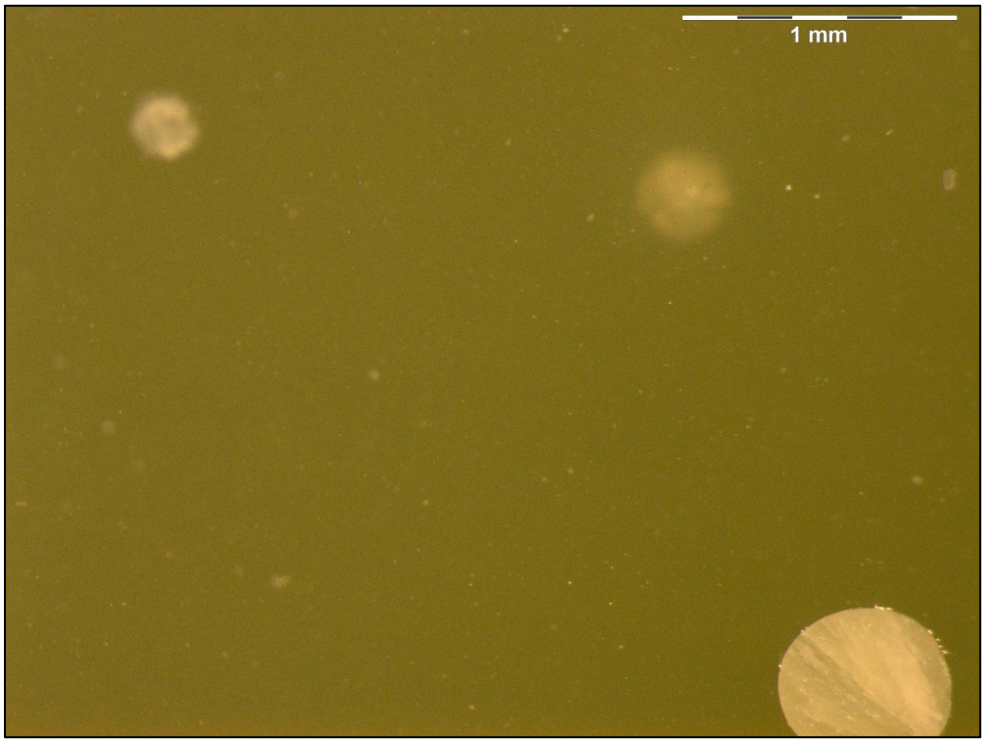




New-IL-5255-SM

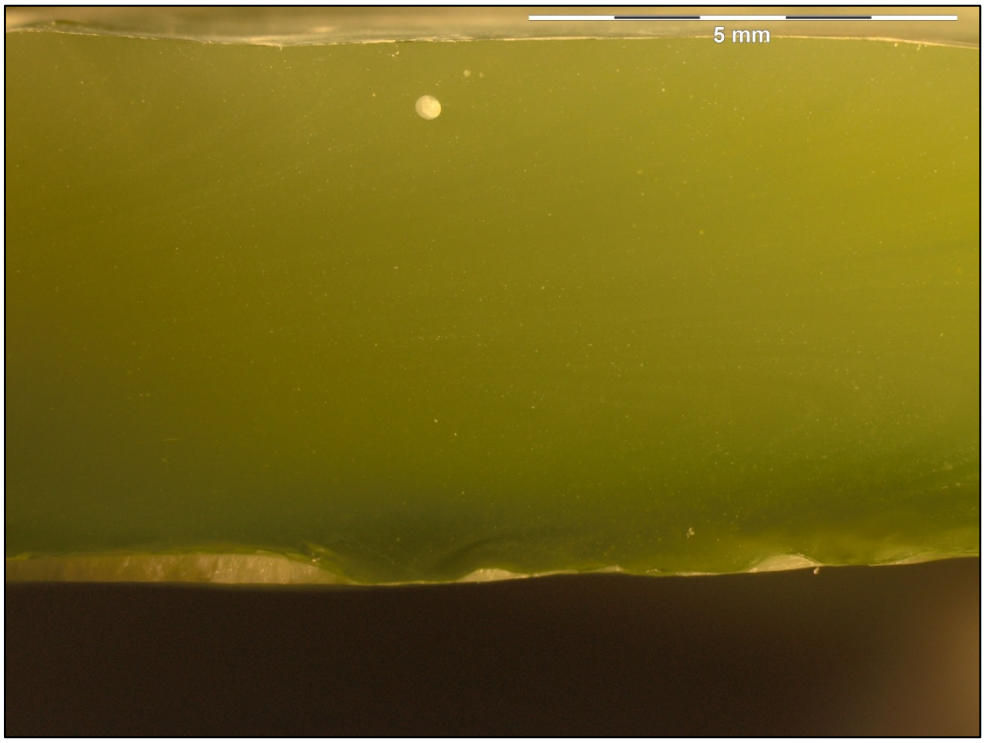
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**

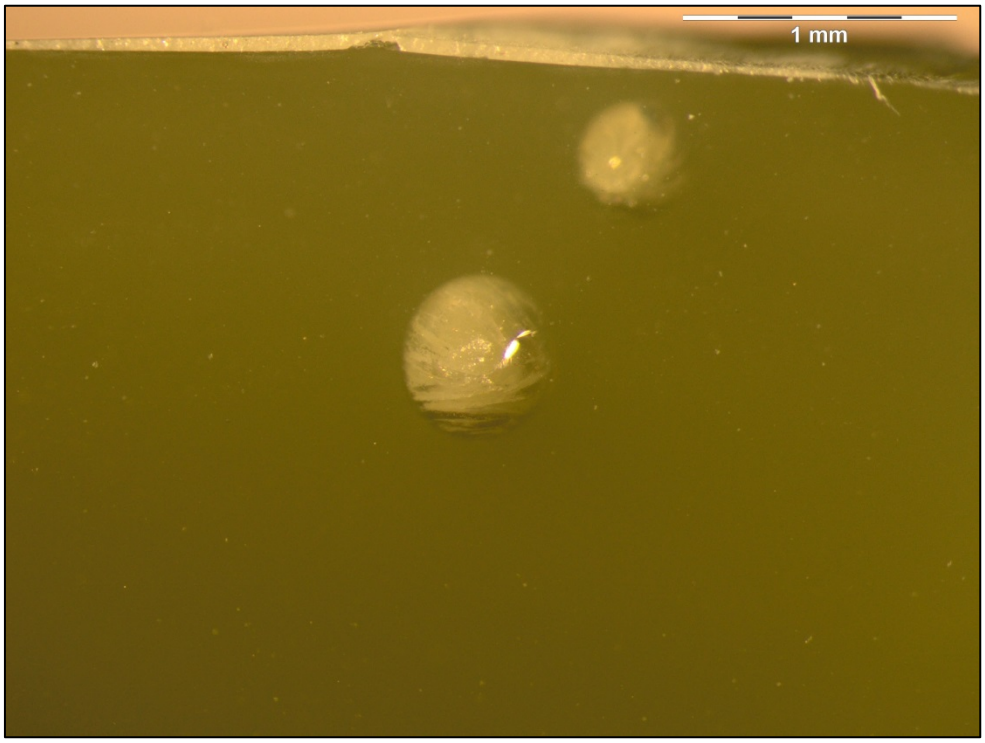




New-IL-70316-SM

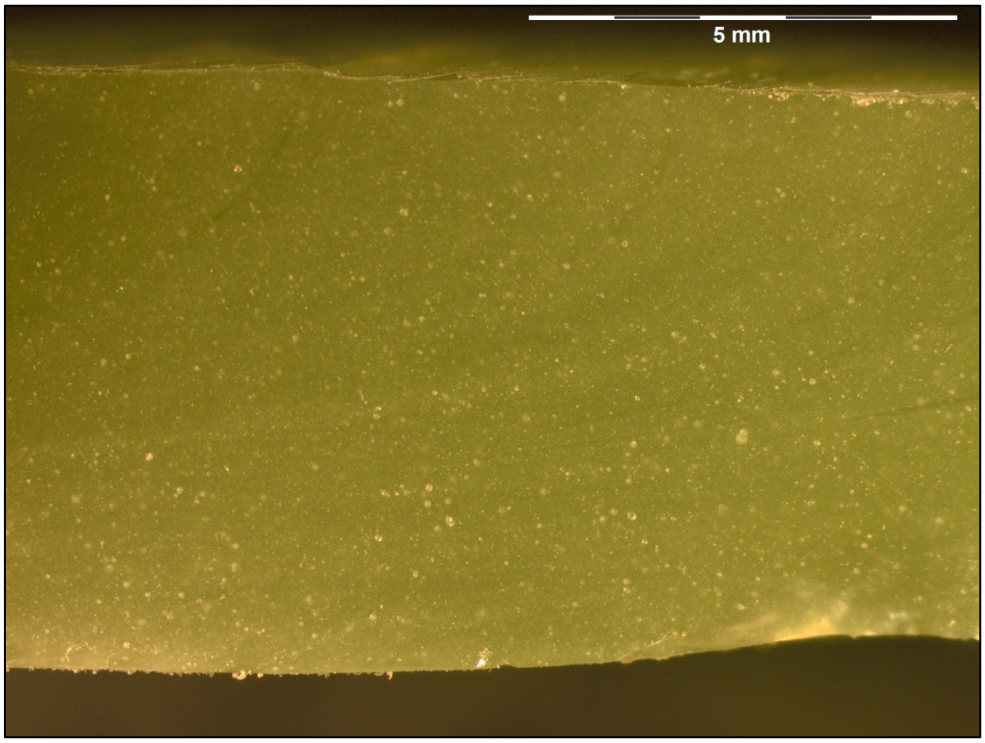
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**

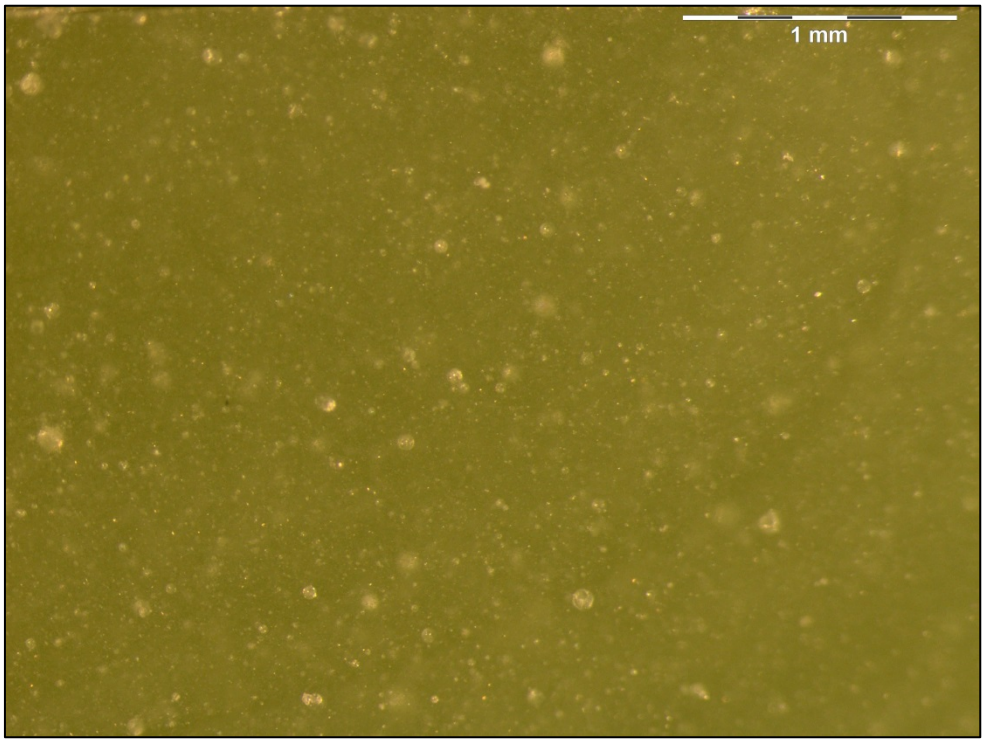




New-IL-87749-SM

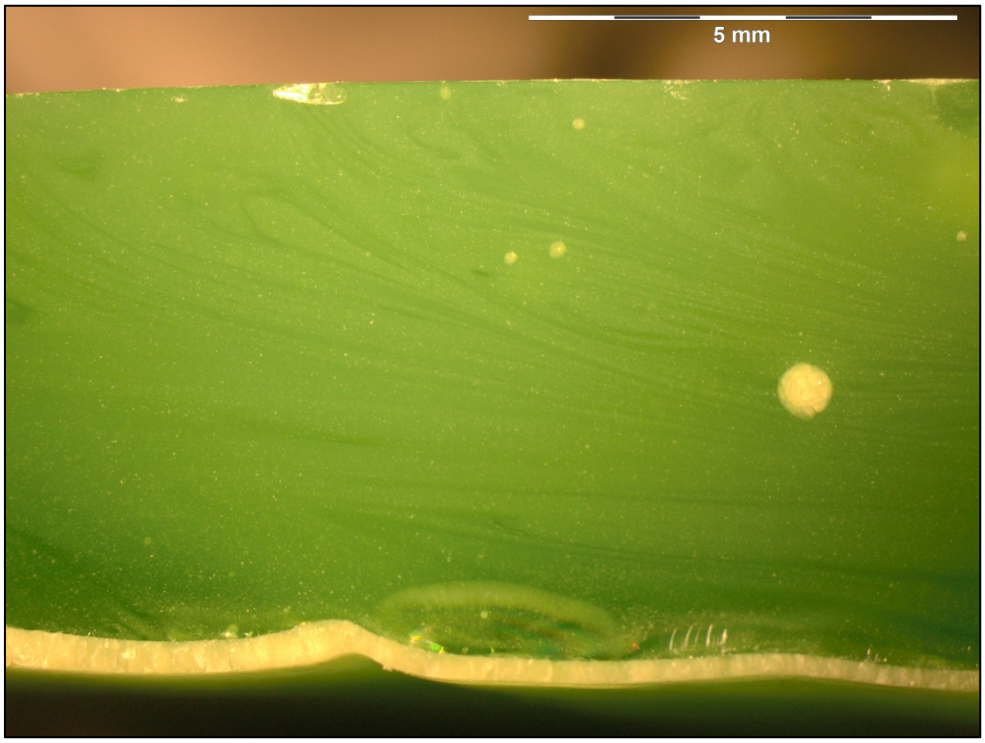
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**

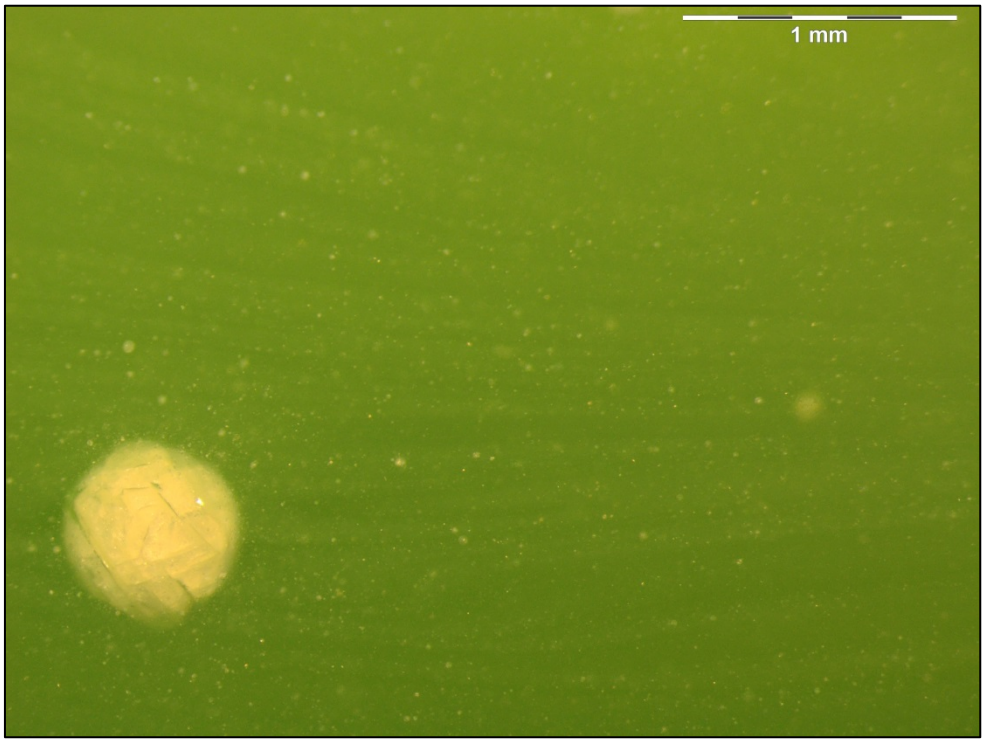




New-IL-93907-SM

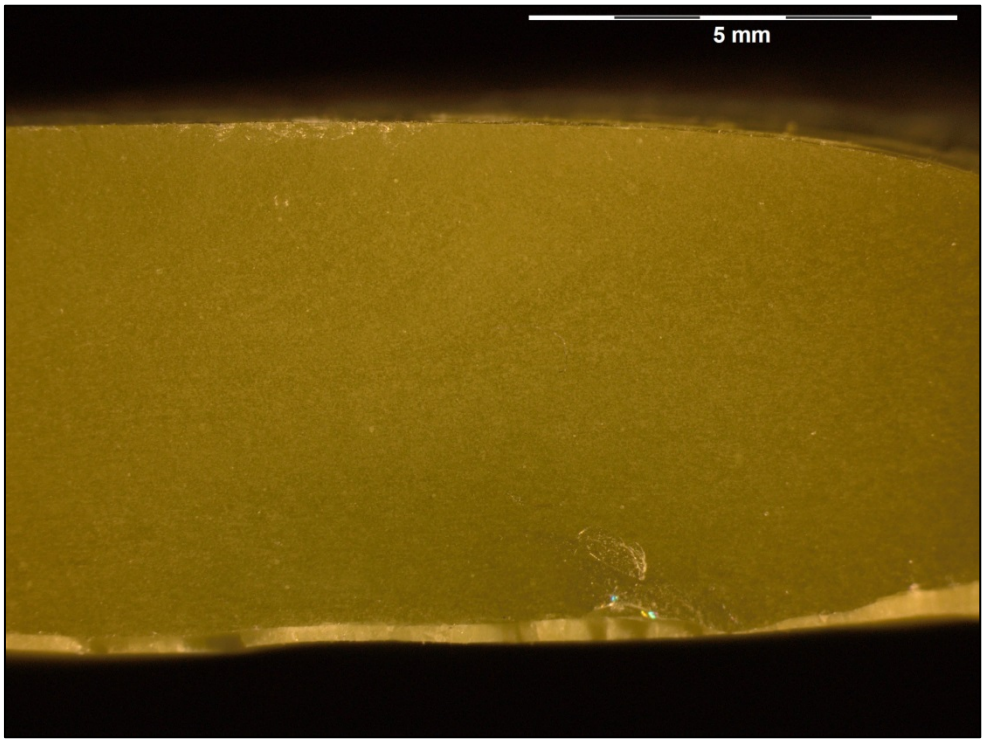
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**

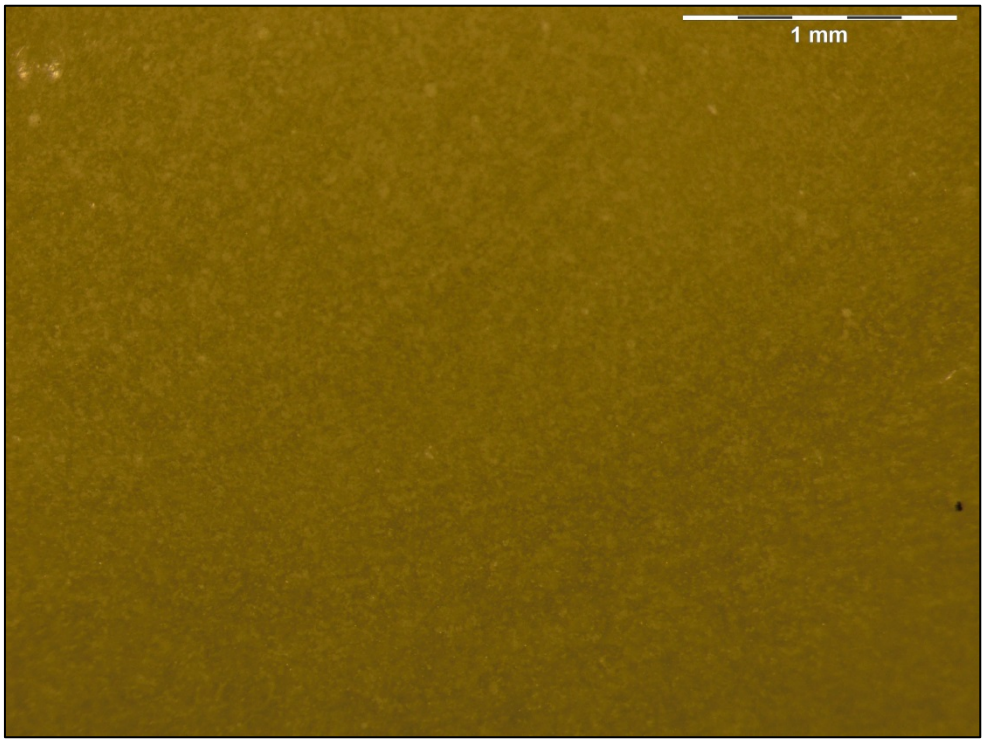




New-OL-100210-SM

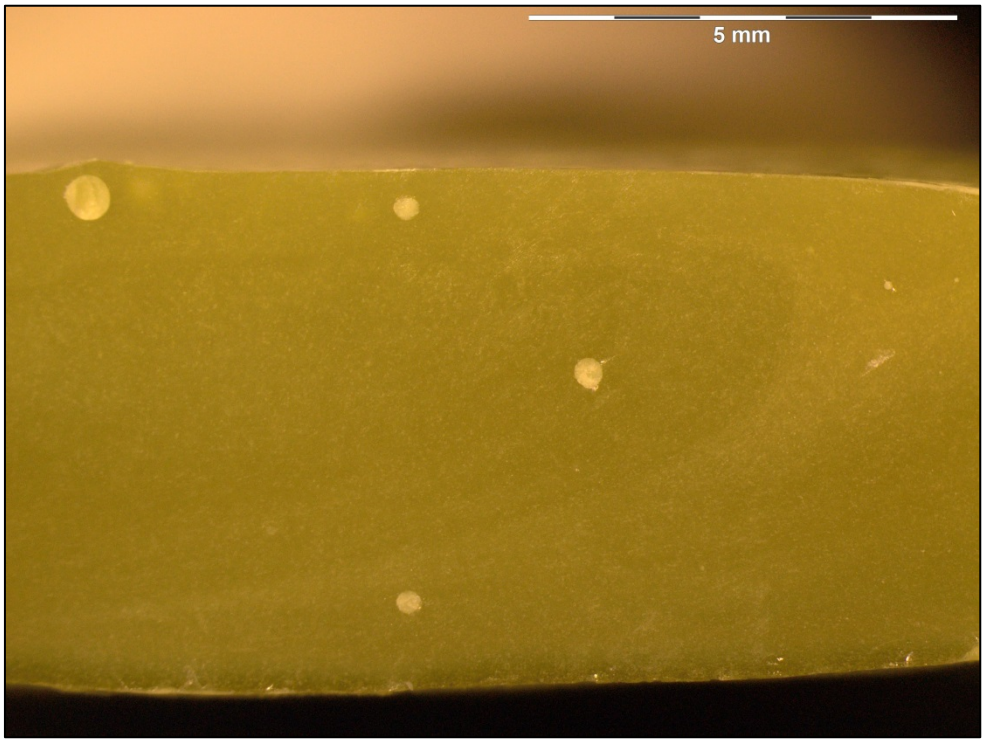
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**

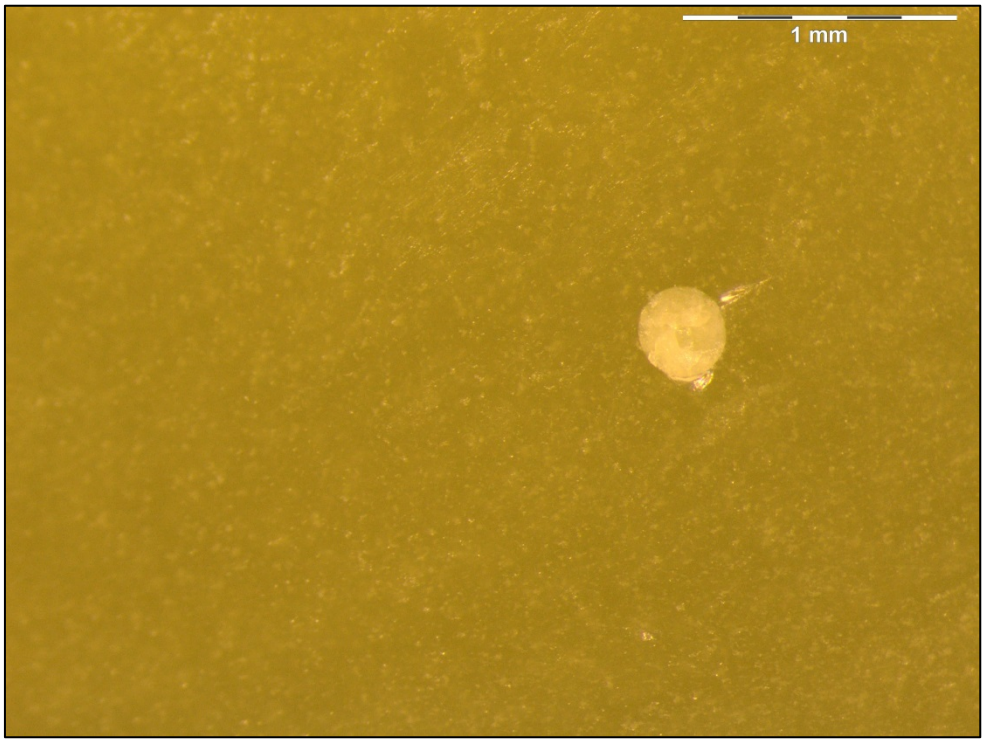




New-OL-108249Mod-SM

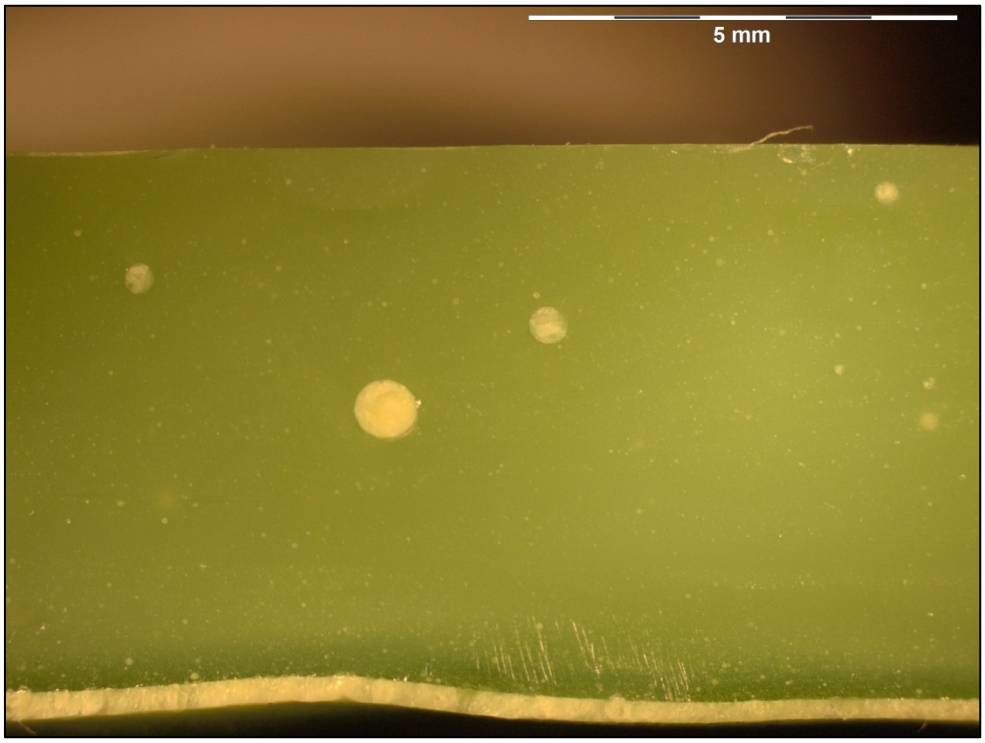
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**





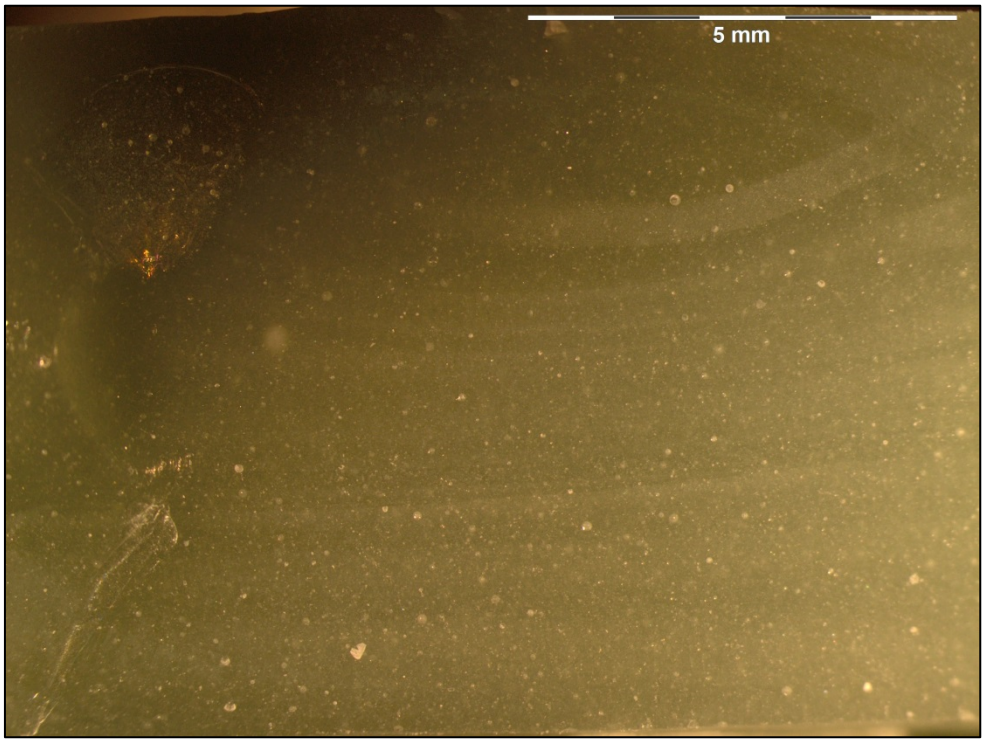
New-OL-116208Mod-SM

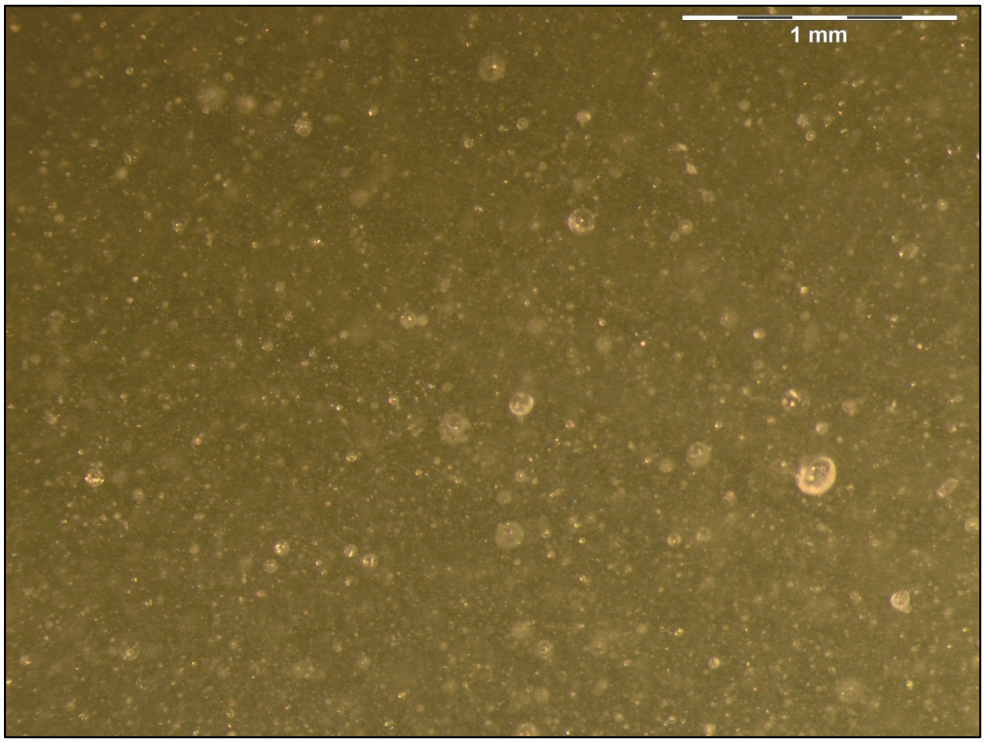
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**



New-OL-122817-SM

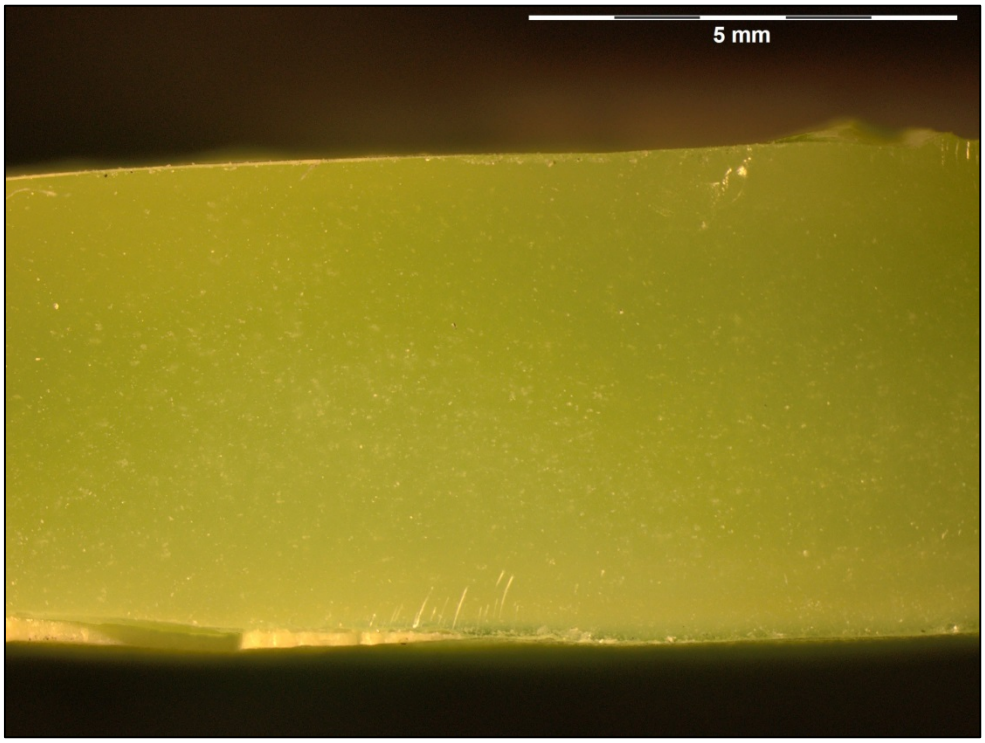
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**

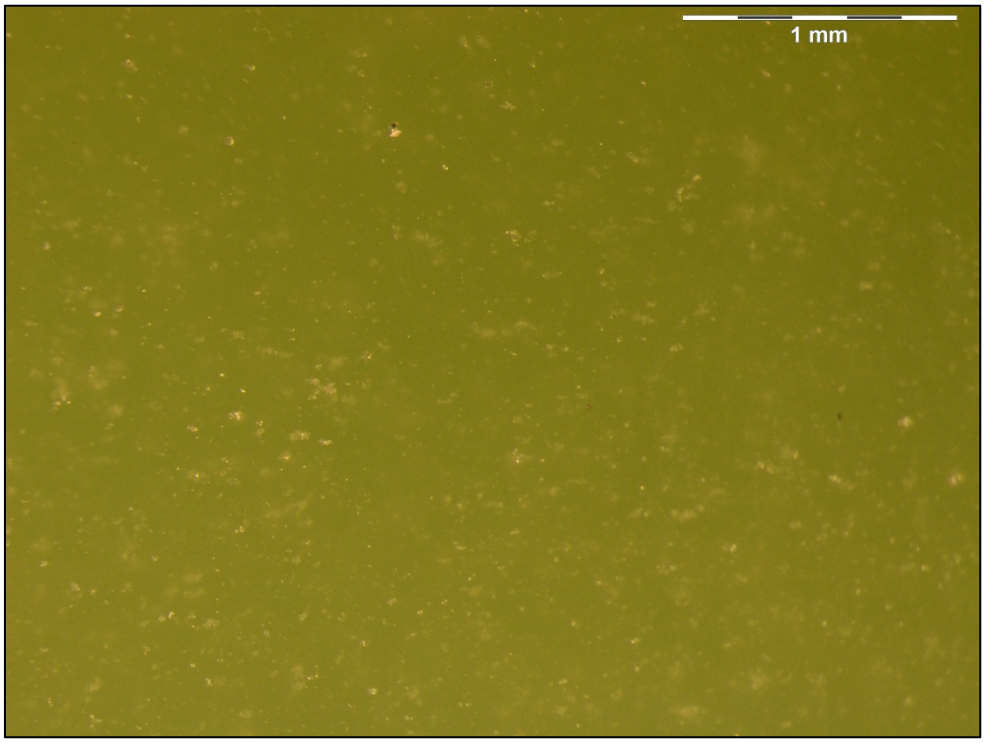




New-OL-127708Mod-SM

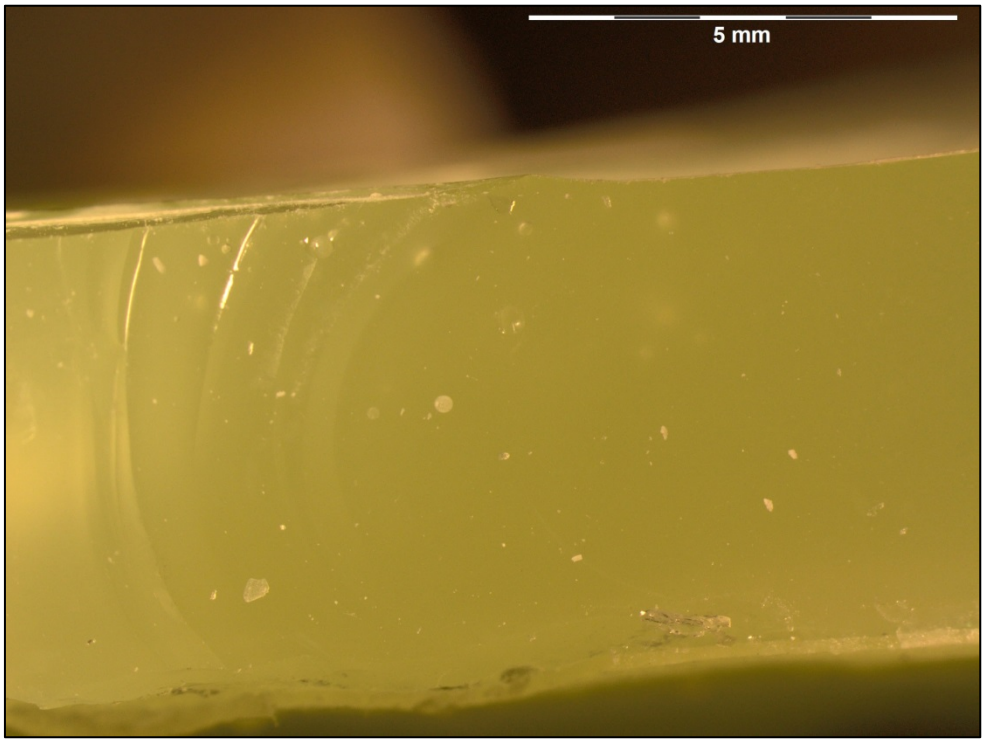
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**

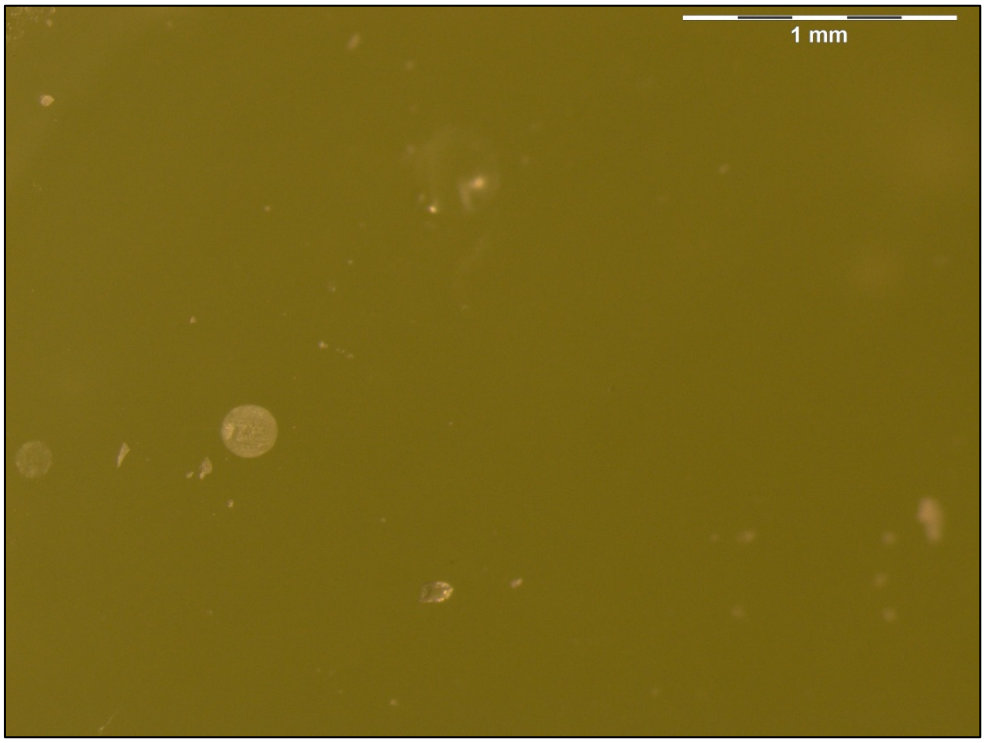




New-OL-14844-SM

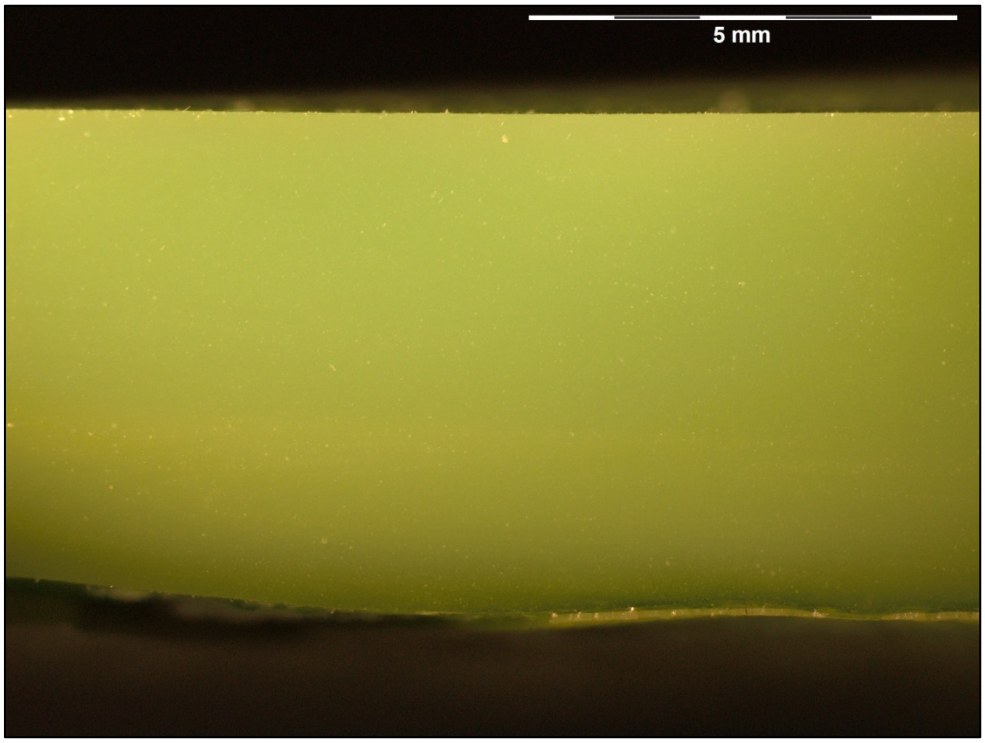
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**

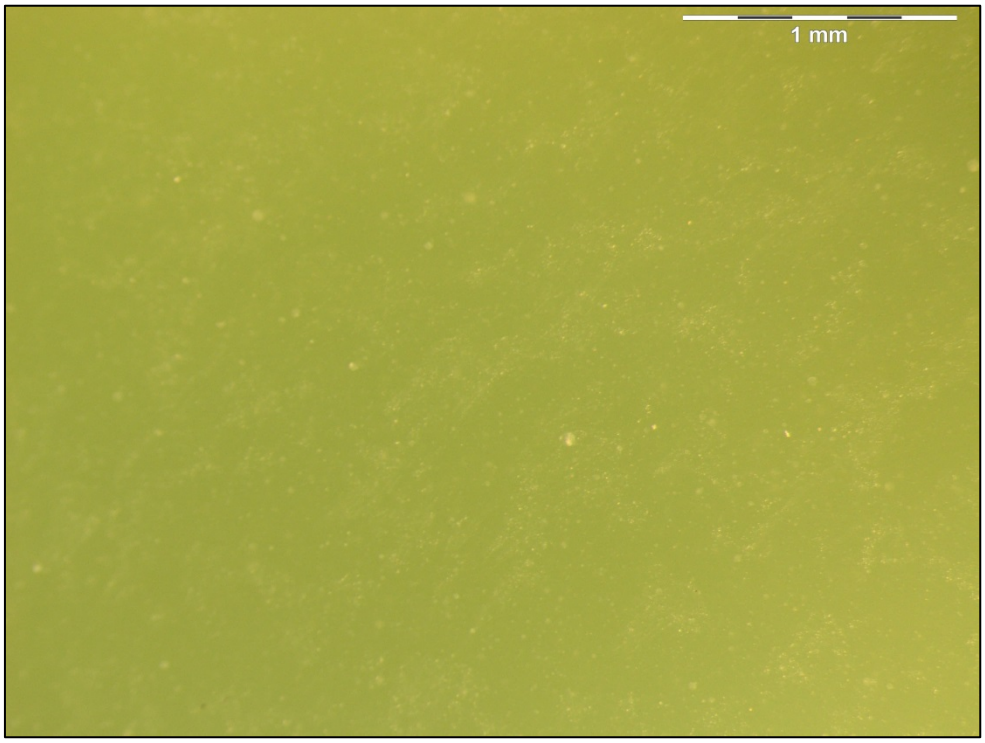




New-OL-15493-SM

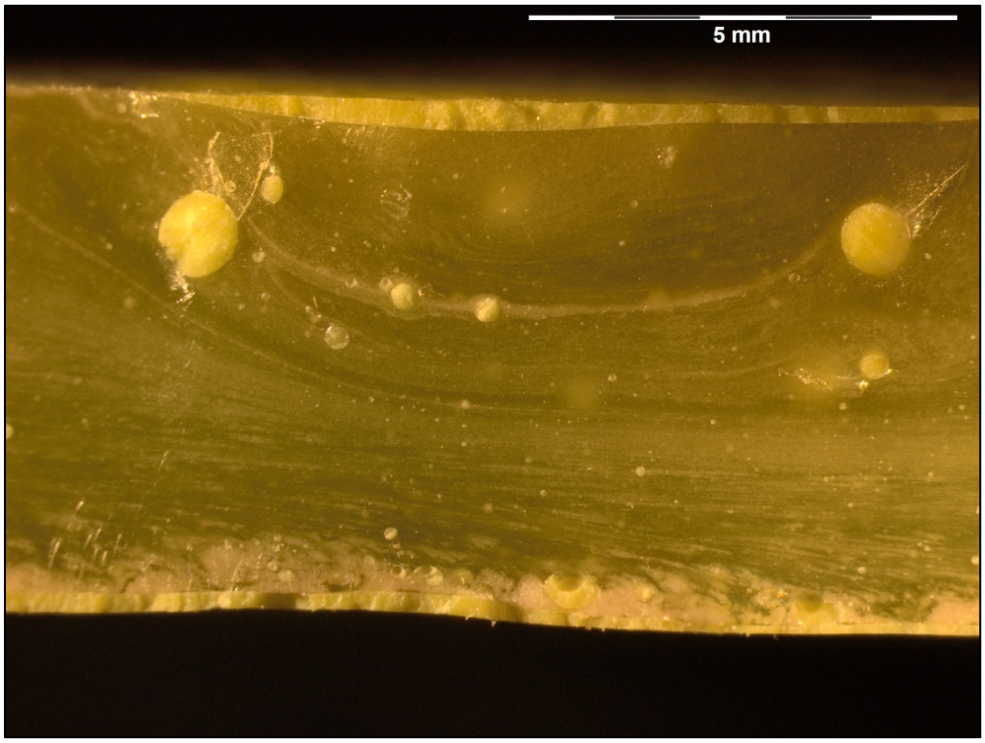
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**

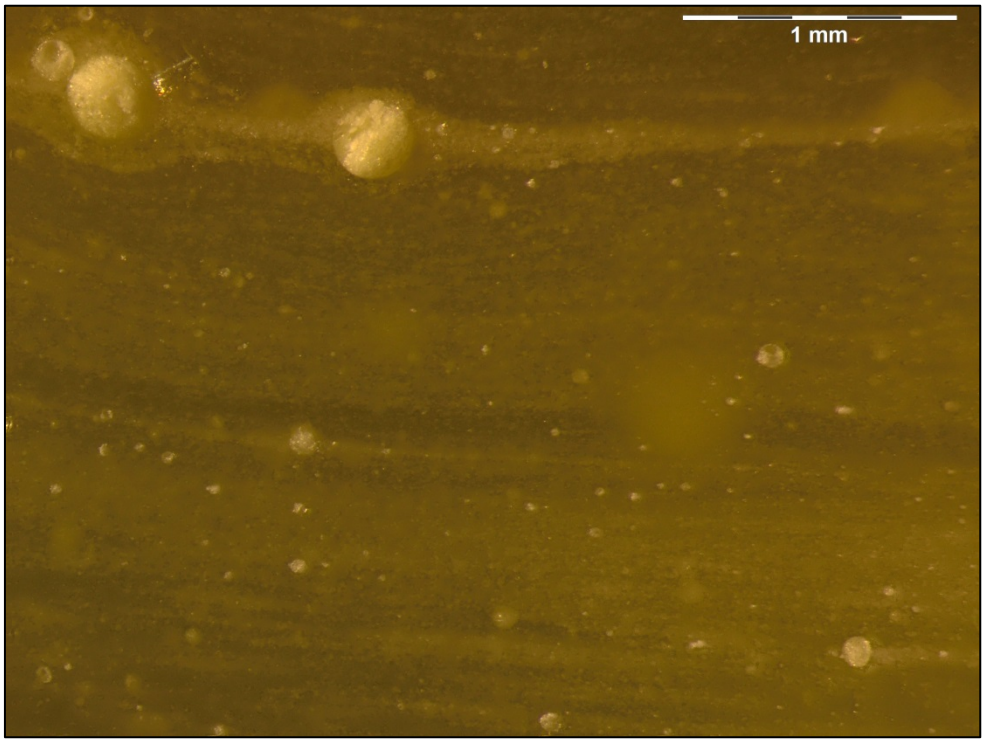




New-OL-17130-SM

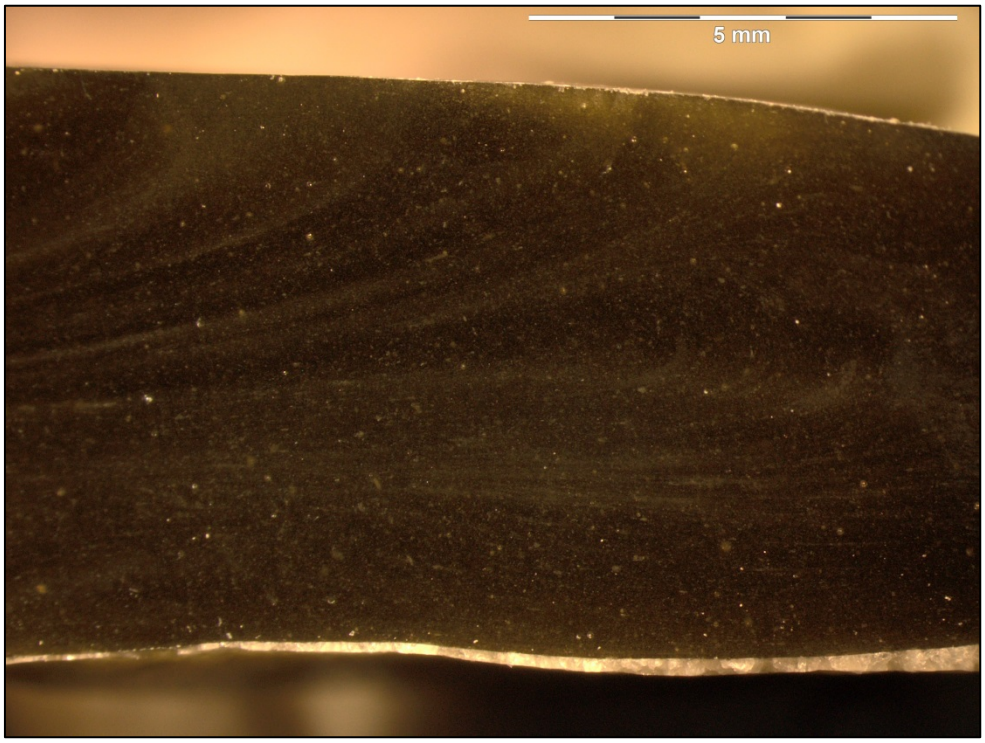
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**

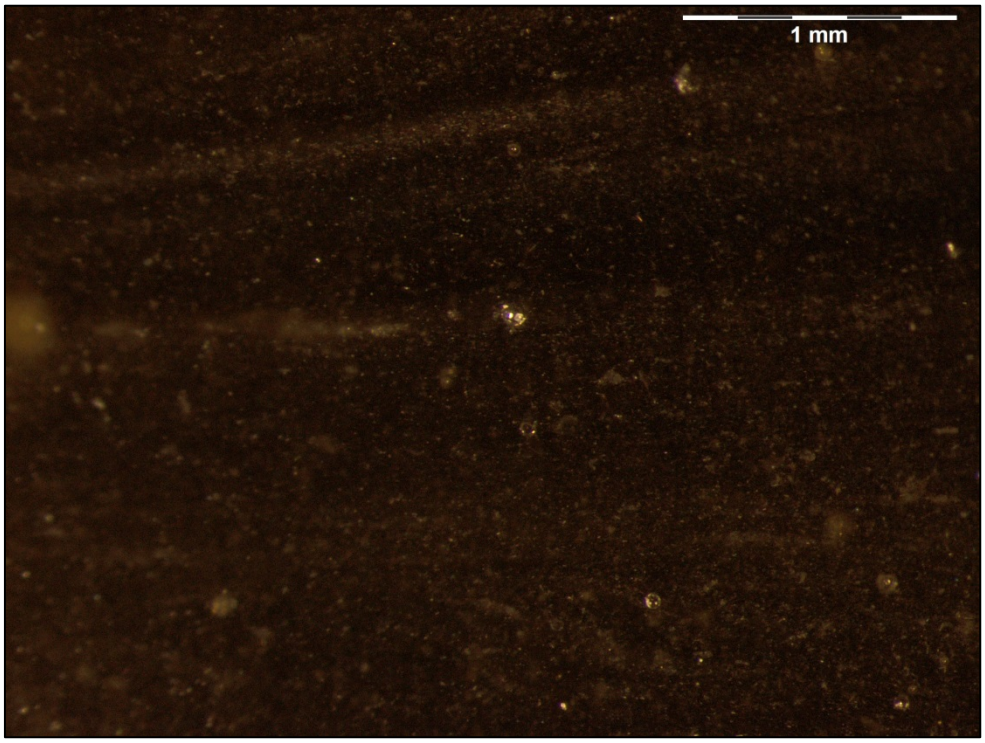




New-OL-45748-SM

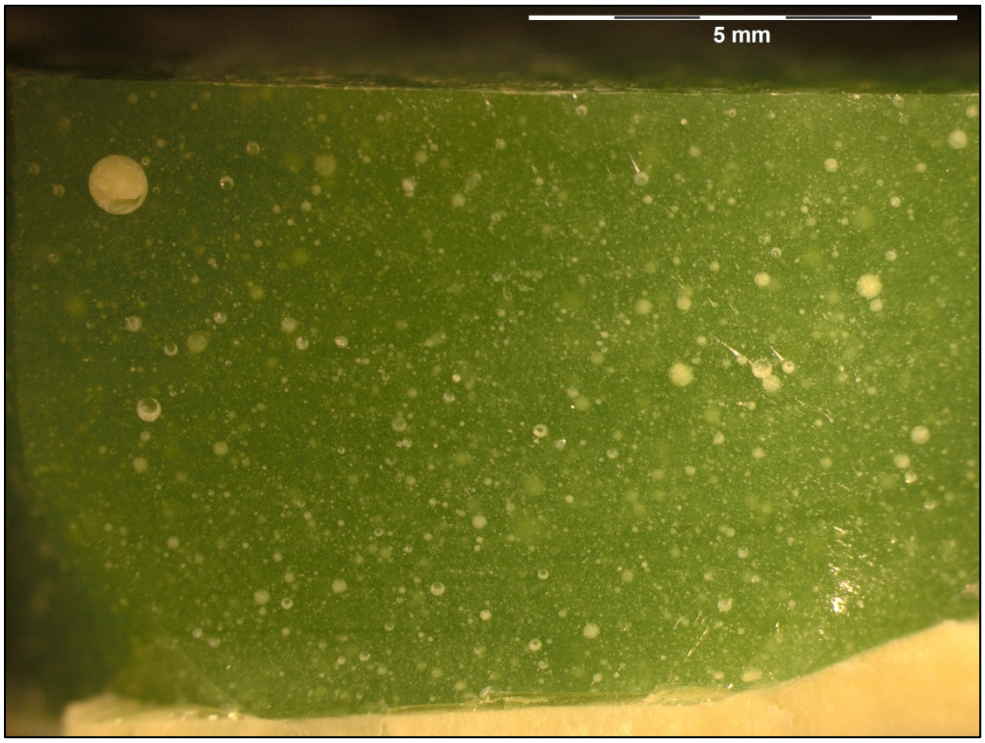
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**

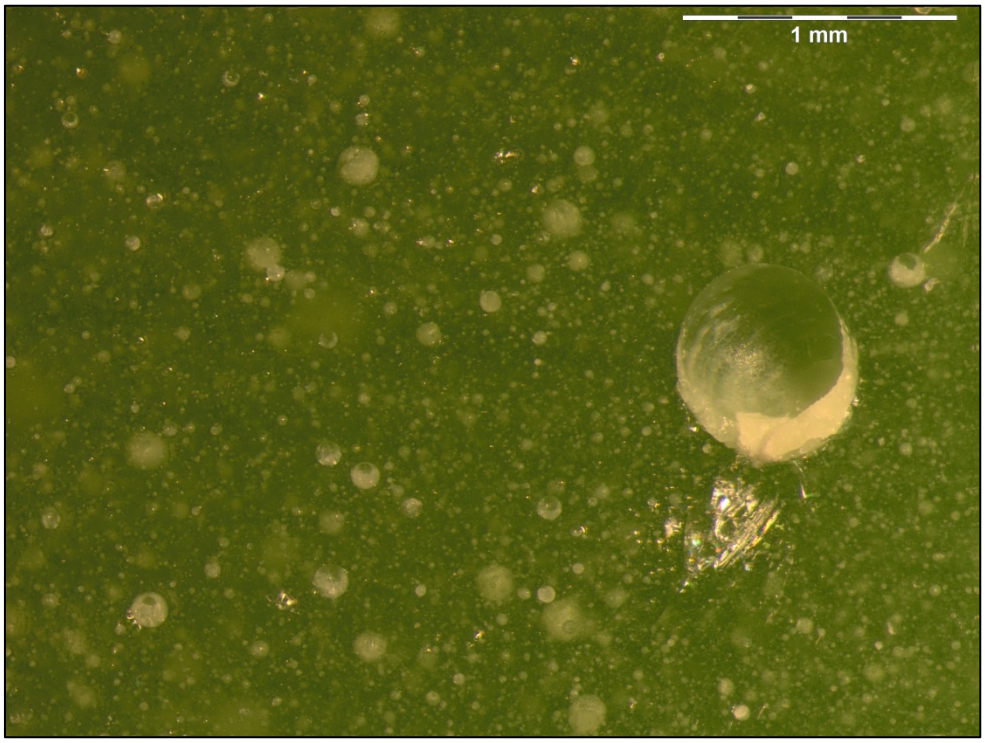




New-OL-54017-SM

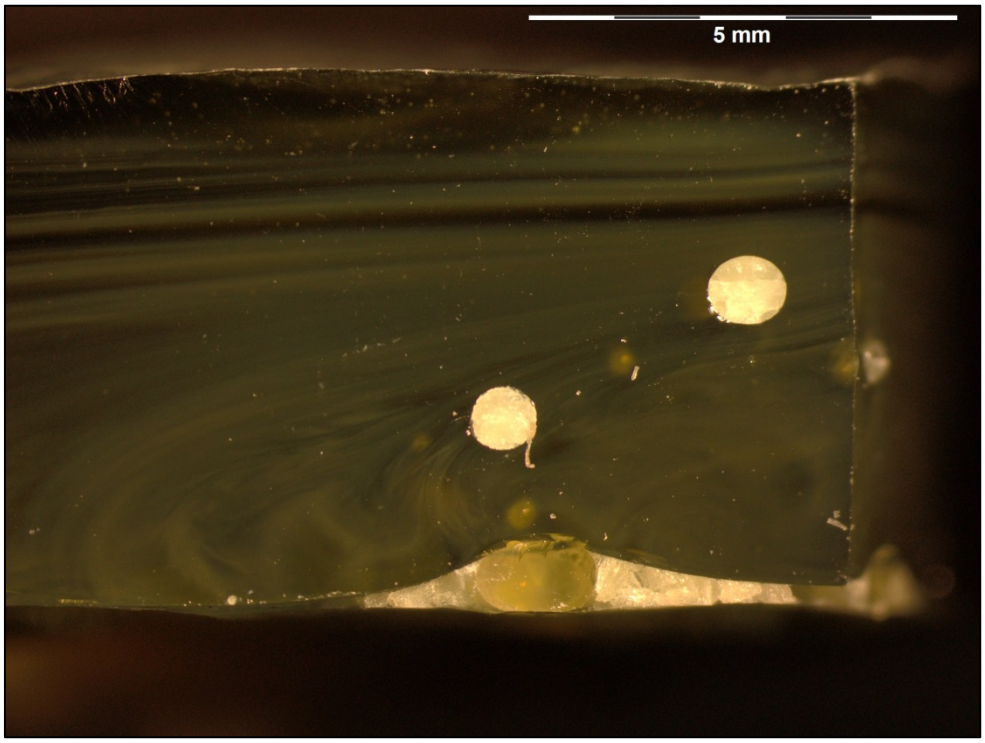
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**

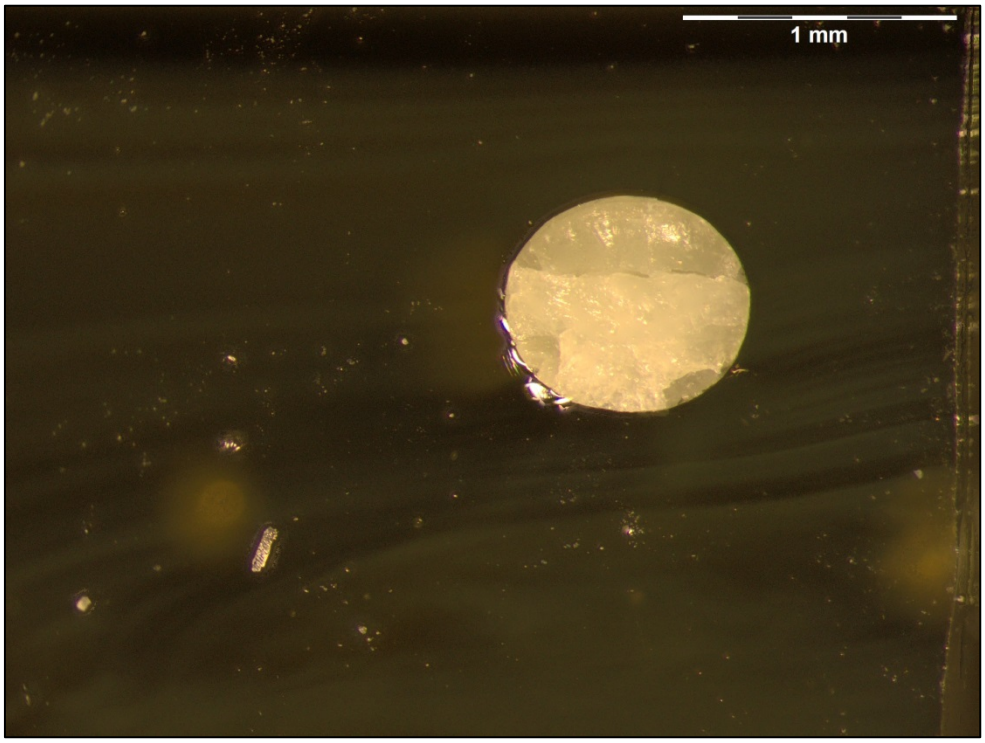




New-OL-57284-SM

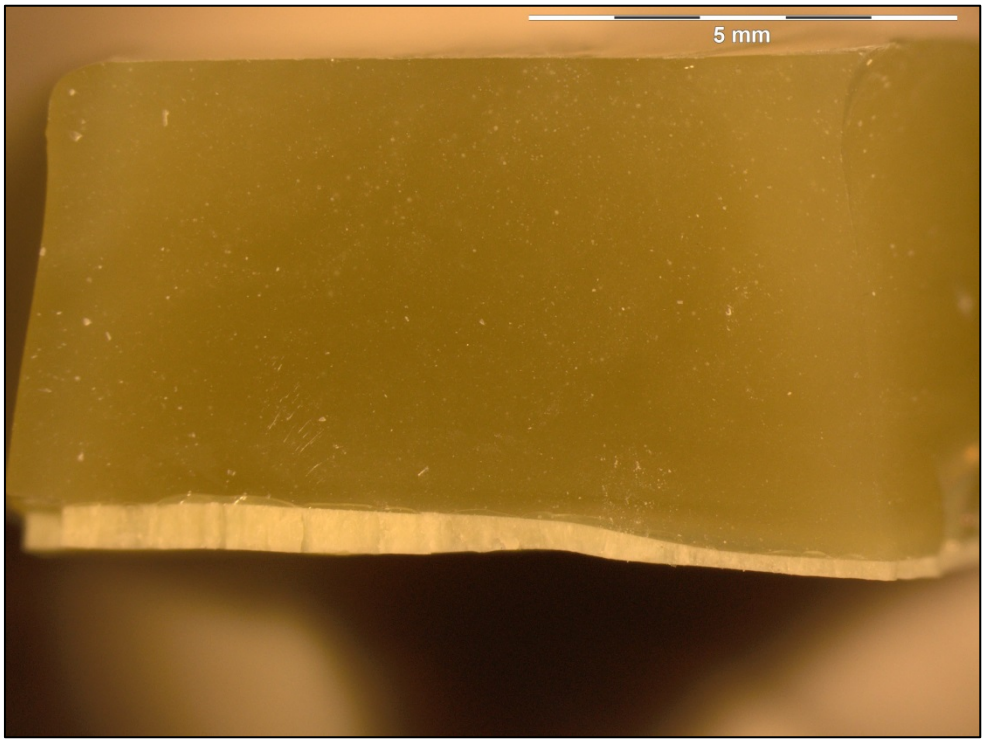
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**

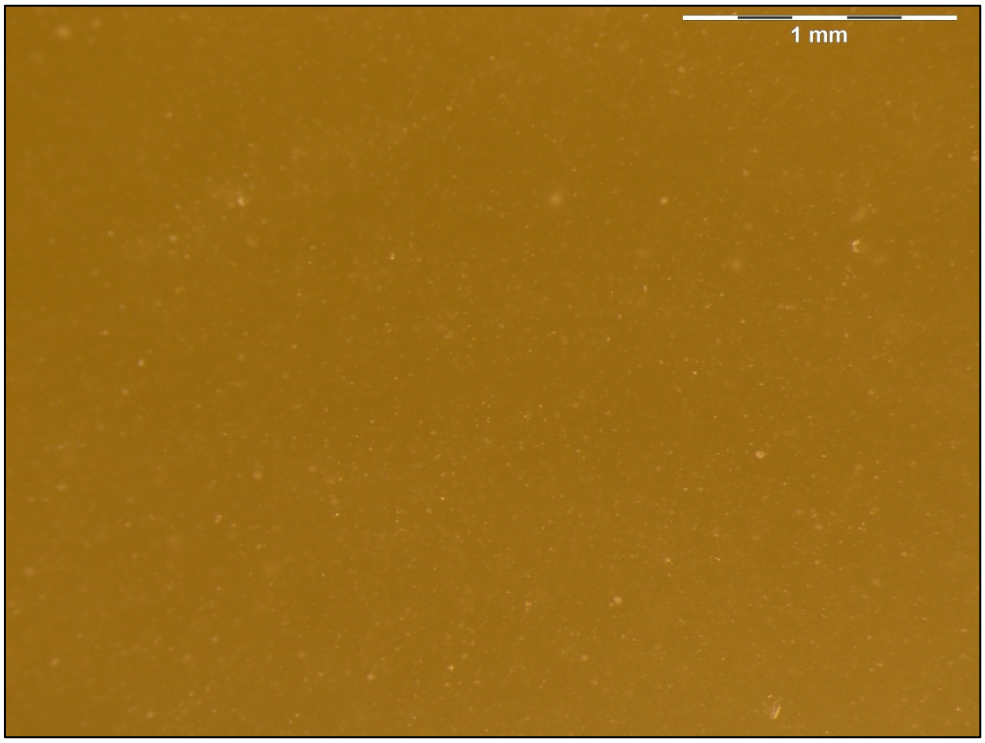




New-OL-62380-SM

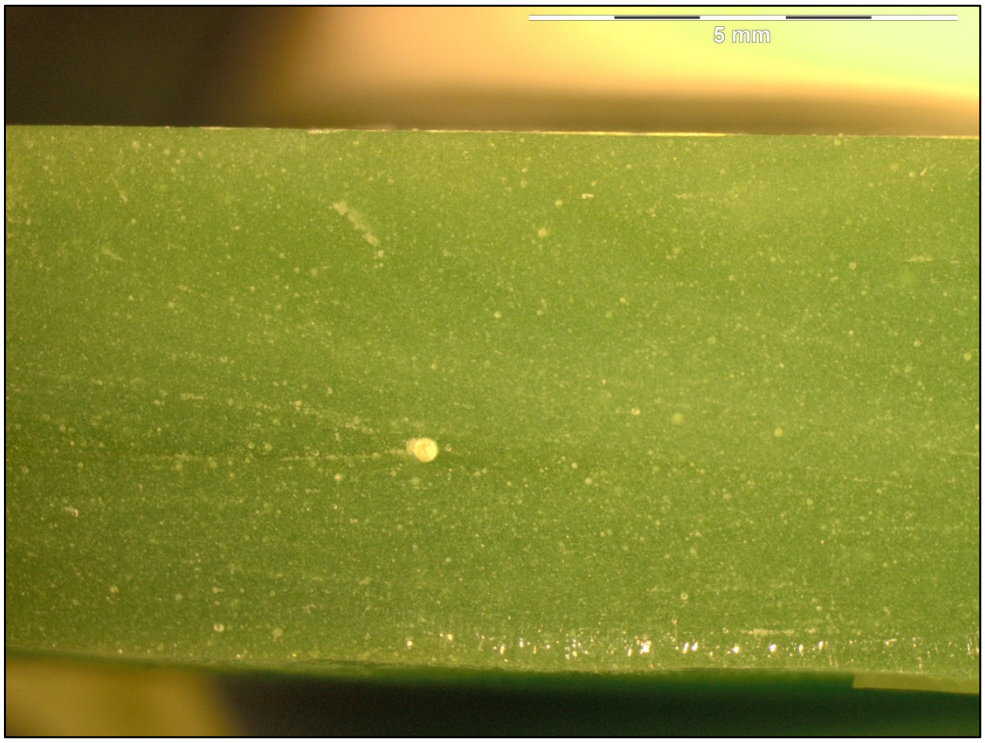
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**

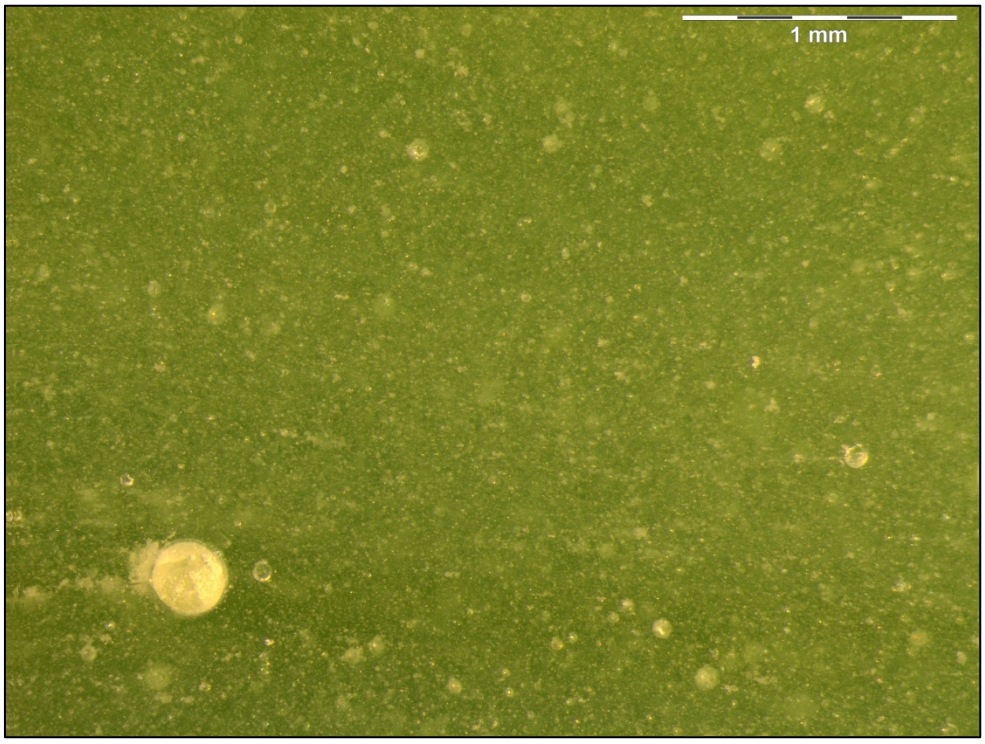




New-OL-80309-SM

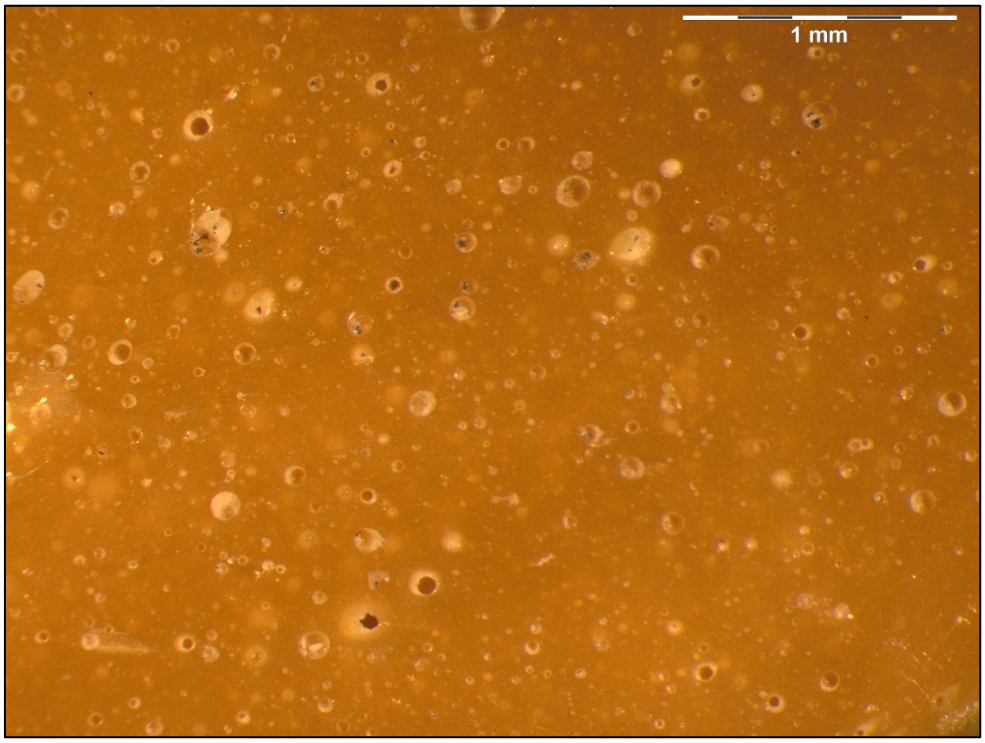
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**





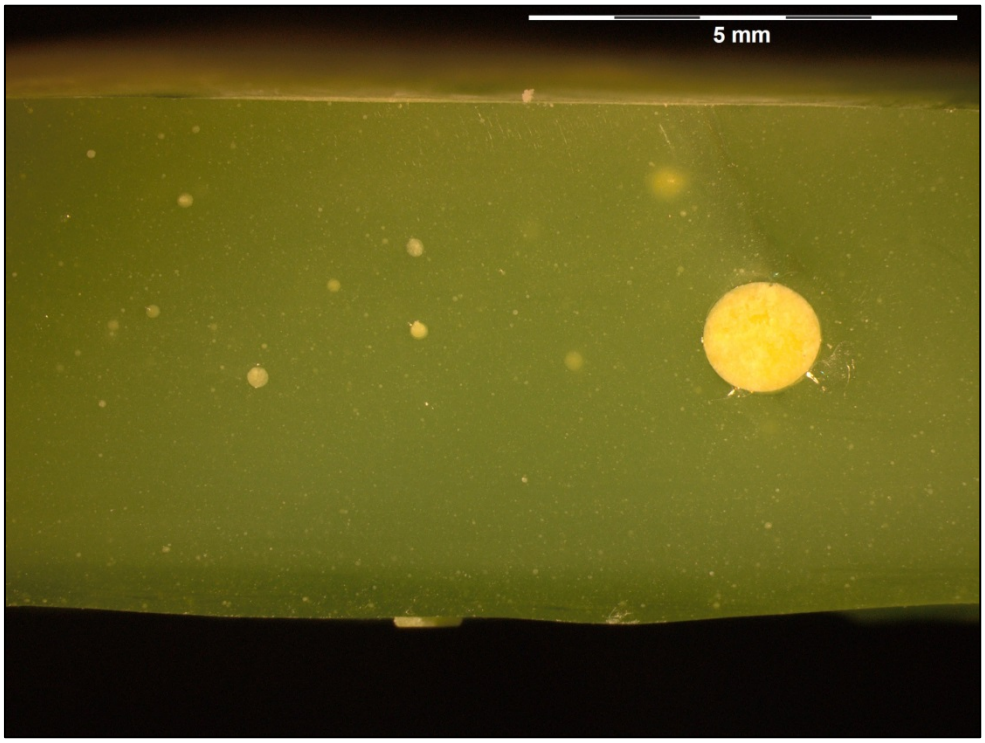
New-OL-8445-SM

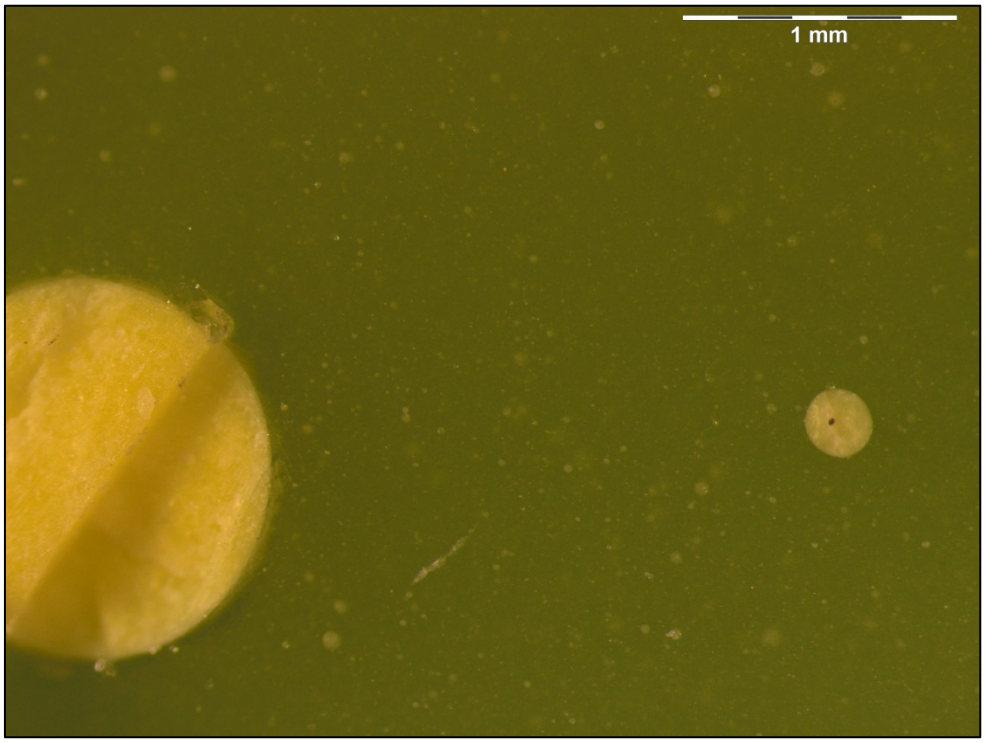
Exhibit B-2. Optical Micrographs of the Sulfur Saturated Melts **(continued)**



New-OL-8788Mod-SM

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





New-OL-90780-SM

Exhibit B-3. Observations from Optical Microscopy of the Sulfur Saturated Melts

Glass ID	Observations
EWG-LAW-Centroid-2-SM	Very few sulfur-filled bubbles; glass is slightly opaque with obvious swirling
LAW-ORP-LD1-1-SM	Very few sulfur-filled bubbles; sulfur inclusion; glass is darker and translucent; some swirling
New-IL-103151-SM	Glass is almost completely translucent with very faint swirling; large sulfur-filled bubbles throughout glass; many sulfur inclusions
New-IL-151542-SM	Very few sulfur-filled bubbles; slightly translucent glass with some swirling; sulfur inclusions; many very small clear bubbles
New-IL-1721-SM	Many small clear bubbles; many sulfur inclusions; glass is opaque; no visible sulfur filled bubbles
New-IL-42295-SM	Some smaller sulfur-filled bubbles; glass is slightly translucent with some faint swirling
New-IL-456-SM	A few larger sulfur-filled bubbles; glass is relatively translucent with swirls of opaque yellow; many small clear bubbles
New-IL-5253-SM	Many sulfur inclusions; very few mid-sized sulfur-filled bubbles; glass is darker and somewhat translucent with swirling; possibly some smaller clear bubbles
New-IL-5255-SM	Very few bubbles; only a few sulfur-filled bubbles; glass is opaque and light in color
New-IL-70316-SM	Few scattered bubbles; some larger bubbles; glass is opaque; sulfur inclusions
New-IL-87749-SM	Some medium-sized sulfur-filled bubbles; glass is relatively translucent with faint swirling; sulfur inclusions; many small clear bubbles
New-IL-93907-SM	Some large clear bubbles; many sulfur inclusions; many smaller bubbles; glass is not completely opaque and has some faint swirling
New-OL-100210-SM	Some small clear bubbles; many visible sulfur inclusions; glass contains swirls and is not completely opaque; some larger sulfur-filled bubbles
New-OL-108249MOD-SM	A few mid-sized bubbles; glass is uniformly opaque; many sulfur inclusions
New-OL-116208MOD-SM	Few bubbles; bubbles range in size from small to large; many yellow bubbles; many sulfur inclusions; glass is opaque
New-OL-122817-SM	Many very small bubbles; a few larger bubbles; possible very light-colored crystals
New-OL-127708MOD-SM	Many small bubbles; very few larger bubbles; glass is opaque with sulfur inclusions
New-OL-14844-SM	Many small clear bubbles; possible crystals; glass is slightly translucent; no visible sulfur-filled bubbles
New-OL-15493-SM	Only a few random clusters of smaller bubbles; glass is completely opaque; no visible particles

Exhibit B-3. Observations from Optical Microscopy of the Sulfur Saturated Melts **(continued)**

Glass ID	Observations
New-OL-17130-SM	Virtually no bubbles present; very small sulfur inclusions; uniformly opaque with some faint swirling
New-OL-45748-SM	Many smaller sulfur-filled bubbles; opaque glass with obvious yellow swirling; many larger sulfur-filled bubbles; many sulfur inclusions
New-OL-54017-SM	Very few bubbles; white inclusions; very small bubbles; glass is dark and opaque
New-OL-57284-SM	Many bubbles; sulfur inclusions; bubbles seem to contain sulfur; bubbles range from small to large
New-OL-62380-SM	Very few small bubbles; a few large sulfur-filled bubbles; swirls in glass; glass is not completely opaque; some small bubbles seem clear
New-OL-80309-SM	More opaque glass with very few bubbles; many sulfur inclusions; possible crystallization; a couple larger clear bubbles
New-OL-8445-SM	Bubbles present; many sulfur inclusions; some bubbles are yellow; glass is opaque; bubbles are small
New-OL-87788MOD-SM	Glass is light brown; completely opaque; many large hollow bubbles; many large sulfur-filled bubbles
New-OL-90780-SM	Many smaller sulfur-lined bubbles; some larger sulfur-filled bubbles; many sulfur inclusions; glass is uniformly opaque

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

Table C-1. LM Elemental Measurements of the SM Study Glasses, Part 1

ID	Block	Sub-Blk	Sequence	Lab ID	Ca (wt%)	Cr (wt%)	K (wt%)	Mg (wt%)	Na (wt%)	P (wt%)
LRM	1	1	1	LRMLM111	0.330	0.137	1.23	<0.100	15.3	0.209
New-OL-62380-SM	1	1	2	K25LM11	8.03	0.048	0.953	<0.100	10.5	0.131
New-OL-8445-SM	1	1	3	K20LM21	8.28	0.175	0.976	1.82	8.30	0.534
New-OL-80309-SM	1	1	4	K12LM11	<0.100	0.023	0.990	1.90	11.2	<0.100
New-OL-57284-SM	1	1	5	K13LM21	2.03	0.192	1.11	<0.100	10.5	0.536
New-OL-14844-SM	1	1	6	K05LM21	8.27	0.099	0.852	1.85	11.2	0.530
New-OL-45748-SM	1	1	7	K16LM11	8.42	0.145	<0.100	<0.100	8.94	0.609
New-OL-14844-SM	1	1	8	K05LM11	8.50	0.101	0.874	1.89	11.5	0.515
New-OL-57284-SM	1	1	9	K13LM11	2.06	0.198	1.15	<0.100	10.6	0.549
New-OL-17130-SM	1	1	10	K22LM11	1.19	0.194	<0.100	<0.100	13.1	0.539
New-OL-17130-SM	1	1	11	K22LM21	1.19	0.196	<0.100	<0.100	13.1	0.538
LRM	1	1	12	LRMLM112	0.346	0.141	1.29	<0.100	16.0	0.218
New-OL-8445-SM	1	1	13	K20LM11	8.57	0.181	1.03	1.89	8.60	0.559
New-OL-62380-SM	1	1	14	K25LM21	8.53	0.050	0.982	<0.100	11.2	0.139
New-OL-45748-SM	1	1	15	K16LM21	8.89	0.143	<0.100	<0.100	9.46	0.611
New-OL-54017-SM	1	1	16	K09LM11	7.63	0.032	<0.100	1.93	11.7	<0.100
New-OL-15493-SM	1	1	17	K08LM11	8.26	0.021	1.02	1.85	17.6	<0.100
New-OL-80309-SM	1	1	18	K12LM21	<0.100	0.024	1.08	2.00	11.9	<0.100
New-OL-54017-SM	1	1	19	K09LM21	7.77	0.033	<0.100	1.97	12.0	<0.100
New-OL-8788Mod-SM	1	1	20	K14LM21	<0.100	0.193	1.13	2.00	10.6	0.574
New-OL-8788Mod-SM	1	1	21	K14LM11	<0.100	0.190	1.13	1.99	10.5	0.569
New-OL-15493-SM	1	1	22	K08LM21	8.46	0.021	1.03	1.88	17.7	<0.100
LRM	1	1	23	LRMLM113	0.350	0.142	1.31	<0.100	16.2	0.222
LRM	1	2	1	LRMLM121	0.333	0.138	1.24	<0.100	15.3	0.211
New-OL-62380-SM	1	2	2	K25LM22	8.22	0.050	0.948	<0.100	10.8	0.134
New-OL-15493-SM	1	2	3	K08LM12	8.00	0.021	0.947	1.78	17.4	<0.100
New-OL-54017-SM	1	2	4	K09LM22	7.52	0.032	<0.100	1.89	11.7	<0.100
New-OL-57284-SM	1	2	5	K13LM12	2.08	0.191	1.10	<0.100	10.9	0.529
New-OL-14844-SM	1	2	6	K05LM22	8.54	0.098	0.837	1.87	11.7	0.523
New-OL-8788Mod-SM	1	2	7	K14LM12	<0.100	0.184	1.07	1.88	10.1	0.544
New-OL-17130-SM	1	2	8	K22LM12	1.16	0.191	<0.100	<0.100	13.2	0.524
New-OL-80309-SM	1	2	9	K12LM12	<0.100	0.025	1.01	1.94	11.8	<0.100
New-OL-80309-SM	1	2	10	K12LM22	<0.100	0.025	1.04	1.93	11.7	<0.100
New-OL-14844-SM	1	2	11	K05LM12	8.75	0.100	0.872	1.92	11.9	0.510
LRM	1	2	12	LRMLM122	0.344	0.139	1.28	<0.100	15.9	0.213
New-OL-8788Mod-SM	1	2	13	K14LM22	<0.100	0.184	1.07	1.91	10.3	0.539
New-OL-8445-SM	1	2	14	K20LM12	8.53	0.181	1.04	1.85	8.59	0.559

Table C-1. LM Elemental Measurements of the SM Study Glasses, Part 1 (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	Ca (wt%)	Cr (wt%)	K (wt%)	Mg (wt%)	Na (wt%)	P (wt%)
New-OL-8445-SM	1	2	15	K20LM22	8.52	0.185	1.07	1.85	8.59	0.571
New-OL-15493-SM	1	2	16	K08LM22	8.21	0.022	1.06	1.81	17.5	<0.100
New-OL-45748-SM	1	2	17	K16LM12	8.70	0.152	<0.100	<0.100	9.29	0.644
New-OL-62380-SM	1	2	18	K25LM12	8.37	0.053	1.06	<0.100	11.0	0.147
New-OL-54017-SM	1	2	19	K09LM12	7.50	0.034	<0.100	1.87	11.6	<0.100
New-OL-45748-SM	1	2	20	K16LM22	8.68	0.150	<0.100	<0.100	9.25	0.656
New-OL-57284-SM	1	2	21	K13LM22	2.11	0.205	1.23	<0.100	11.0	0.579
New-OL-17130-SM	1	2	22	K22LM22	1.17	0.200	<0.100	<0.100	13.3	0.564
LRM	1	2	23	LRMLM123	0.365	0.146	1.38	<0.100	15.9	0.229
LRM	1	3	1	LRMLM131	0.333	0.137	1.19	<0.100	14.9	0.211
New-OL-127708Mod-SM	1	3	2	K21LM21	0.215	0.034	1.04	1.91	10.1	<0.100
New-OL-122817-SM	1	3	3	K01LM21	8.28	0.166	1.01	<0.100	12.9	0.588
New-OL-116208Mod-SM	1	3	4	K28LM11	8.59	0.096	<0.100	2.14	11.6	0.530
New-OL-100210-SM	1	3	5	K24LM11	1.40	0.176	<0.100	1.96	17.4	0.531
New-IL-5253-SM	1	3	6	K07LM11	1.98	0.050	0.153	1.40	11.3	0.146
New-IL-5253-SM	1	3	7	K07LM21	2.00	0.050	0.156	1.40	11.3	0.149
New-IL-5255-SM	1	3	8	K11LM21	2.03	0.045	0.153	1.40	13.0	0.125
New-OL-127708Mod-SM	1	3	9	K21LM11	0.219	0.034	1.06	1.91	9.99	<0.100
New-OL-90780-SM	1	3	10	K03LM11	<0.100	0.151	1.02	1.99	11.6	0.544
New-OL-90780-SM	1	3	11	K03LM21	<0.100	0.148	1.04	2.00	11.7	0.541
LRM	1	3	12	LRMLM132	0.336	0.139	1.22	<0.100	14.8	0.214
New-IL-1721-SM	1	3	13	K10LM11	2.00	0.123	0.768	0.283	12.2	0.347
New-OL-116208Mod-SM	1	3	14	K28LM21	8.67	0.098	<0.100	2.16	11.5	0.546
New-IL-5255-SM	1	3	15	K11LM11	2.05	0.046	0.153	1.41	13.0	0.111
New-IL-1721-SM	1	3	16	K10LM21	2.02	0.125	0.782	0.286	12.2	0.346
New-OL-108249Mod-SM	1	3	17	K02LM11	7.14	0.106	0.946	<0.100	11.6	0.575
New-OL-122817-SM	1	3	18	K01LM11	8.47	0.170	1.04	<0.100	13.1	0.608
New-IL-456-SM	1	3	19	K23LM21	6.06	0.050	0.161	1.33	11.2	0.144
New-IL-456-SM	1	3	20	K23LM11	6.09	0.050	0.160	1.34	11.2	0.137
New-OL-108249Mod-SM	1	3	21	K02LM21	7.05	0.107	0.922	<0.100	11.4	0.580
New-OL-100210-SM	1	3	22	K24LM21	1.36	0.179	<0.100	1.92	16.7	0.548
LRM	1	3	23	LRMLM133	0.348	0.143	1.17	<0.100	14.5	0.222
LRM	1	4	1	LRMLM141	0.325	0.133	1.11	<0.100	14.7	0.206
New-OL-127708Mod-SM	1	4	2	K21LM22	0.212	0.032	1.08	1.82	9.96	<0.100
New-OL-127708Mod-SM	1	4	3	K21LM12	0.213	0.032	1.07	1.80	9.80	<0.100
New-IL-456-SM	1	4	4	K23LM22	5.87	0.046	0.152	1.26	11.2	0.134
New-OL-116208Mod-SM	1	4	5	K28LM12	8.18	0.094	<0.100	2.02	11.1	0.522
New-IL-5255-SM	1	4	6	K11LM22	1.91	0.044	0.150	1.30	12.8	0.120

Table C-1. LM Elemental Measurements of the SM Study Glasses, Part 1 (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	Ca (wt%)	Cr (wt%)	K (wt%)	Mg (wt%)	Na (wt%)	P (wt%)
New-OL-122817-SM	1	4	7	K01LM22	8.25	0.164	0.992	<0.100	13.1	0.579
New-OL-116208Mod-SM	1	4	8	K28LM22	8.21	0.094	<0.100	2.01	11.2	0.525
New-OL-100210-SM	1	4	9	K24LM12	1.29	0.173	<0.100	1.81	16.7	0.524
New-IL-456-SM	1	4	10	K23LM12	5.79	0.048	0.154	1.23	11.0	0.132
New-OL-90780-SM	1	4	11	K03LM22	<0.100	0.146	1.11	1.86	11.4	0.531
LRM	1	4	12	LRMLM142	0.338	0.137	1.10	<0.100	14.7	0.208
New-OL-90780-SM	1	4	13	K03LM12	<0.100	0.146	1.05	1.85	11.3	0.527
New-OL-122817-SM	1	4	14	K01LM12	8.12	0.165	1.02	<0.100	13.0	0.585
New-IL-1721-SM	1	4	15	K10LM12	1.86	0.118	0.746	0.275	11.9	0.332
New-OL-108249Mod-SM	1	4	16	K02LM12	6.81	0.100	0.907	<0.100	11.4	0.547
New-OL-100210-SM	1	4	17	K24LM22	1.31	0.170	<0.100	1.84	17.0	0.518
New-OL-108249Mod-SM	1	4	18	K02LM22	6.96	0.102	0.880	<0.100	11.6	0.550
New-IL-5253-SM	1	4	19	K07LM12	1.90	0.048	0.150	1.32	11.2	0.140
New-IL-5255-SM	1	4	20	K11LM12	1.93	0.044	0.148	1.31	12.8	0.104
New-IL-5253-SM	1	4	21	K07LM22	1.89	0.048	0.158	1.30	11.1	0.148
New-IL-1721-SM	1	4	22	K10LM22	1.89	0.121	0.767	0.280	12.0	0.332
LRM	1	4	23	LRMLM143	0.338	0.137	1.11	<0.100	14.7	0.209
LRM	1	5	1	LRMLM151	0.333	0.135	1.21	<0.100	15.2	0.204
New-IL-42295-SM	1	5	2	K27LM11	2.00	0.046	0.157	1.36	13.4	0.129
EWG-LAW-Centroid-2-SM	1	5	3	K06LM21	3.96	0.075	0.307	0.767	14.3	0.234
New-IL-93907-SM	1	5	4	K18LM21	2.08	0.046	0.753	0.275	11.9	0.137
New-IL-103151-SM	1	5	5	K26LM21	2.09	0.041	0.743	1.40	16.4	0.129
New-IL-93907-SM	1	5	6	K18LM11	2.09	0.047	0.772	0.277	11.9	0.136
New-IL-151542-SM	1	5	7	K15LM21	6.64	0.114	0.156	1.41	13.4	0.287
LAW-ORP-LD1-1-SM	1	5	8	K19LM21	5.69	0.229	0.118	0.531	14.9	0.106
New-IL-70316-SM	1	5	9	K17LM11	6.49	0.040	0.721	1.39	14.8	0.138
LRM	1	5	10	LRMLM152	0.345	0.140	1.30	<0.100	15.7	0.215
EWG-LAW-Centroid-2-SM	1	5	11	K06LM11	4.10	0.073	0.288	0.762	14.6	0.221
New-IL-70316-SM	1	5	12	K17LM21	6.67	0.038	0.686	1.42	15.1	0.131
New-IL-103151-SM	1	5	13	K26LM11	2.12	0.040	0.723	1.41	16.6	0.133
New-IL-151542-SM	1	5	14	K15LM11	6.68	0.111	0.151	1.41	13.5	0.299
New-IL-87749-SM	1	5	15	K04LM11	6.76	0.040	0.750	0.272	14.1	0.143
New-IL-87749-SM	1	5	16	K04LM21	6.50	0.038	0.713	0.262	13.7	0.136
New-IL-42295-SM	1	5	17	K27LM21	2.07	0.047	0.172	1.38	13.8	0.133
LAW-ORP-LD1-1-SM	1	5	18	K19LM11	5.82	0.232	0.121	0.537	15.3	0.108
LRM	1	5	19	LRMLM153	0.356	0.142	1.37	<0.100	16.3	0.220
LRM	1	6	1	LRMLM161	0.324	0.135	1.17	<0.100	15.0	0.203
LAW-ORP-LD1-1-SM	1	6	2	K19LM12	5.27	0.220	0.111	0.513	13.8	0.101

Table C-1. LM Elemental Measurements of the SM Study Glasses, Part 1 (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	Ca (wt%)	Cr (wt%)	K (wt%)	Mg (wt%)	Na (wt%)	P (wt%)
New-IL-42295-SM	1	6	3	K27LM22	1.81	0.049	0.163	1.25	12.4	0.131
LAW-ORP-LD1-1-SM	1	6	4	K19LM22	5.20	0.221	0.115	0.518	13.7	0.103
New-IL-93907-SM	1	6	5	K18LM22	1.87	0.049	0.736	0.275	11.0	0.136
New-IL-70316-SM	1	6	6	K17LM22	6.01	0.041	0.685	1.30	13.8	0.134
New-IL-87749-SM	1	6	7	K04LM12	6.16	0.041	0.685	0.263	13.0	0.136
New-IL-70316-SM	1	6	8	K17LM12	6.36	0.041	0.656	1.35	14.7	0.132
New-IL-87749-SM	1	6	9	K04LM22	6.15	0.040	0.662	0.257	13.0	0.134
LRM	1	6	10	LRMLM162	0.331	0.137	1.20	<0.100	15.2	0.209
EWG-LAW-Centroid-2-SM	1	6	11	K06LM22	3.89	0.077	0.298	0.755	14.0	0.232
New-IL-42295-SM	1	6	12	K27LM12	1.98	0.049	0.160	1.33	13.5	0.129
New-IL-151542-SM	1	6	13	K15LM12	6.44	0.112	0.150	1.36	13.1	0.295
New-IL-93907-SM	1	6	14	K18LM12	1.98	0.049	0.739	0.276	11.6	0.136
New-IL-103151-SM	1	6	15	K26LM12	2.07	0.043	0.710	1.36	15.8	0.135
New-IL-151542-SM	1	6	16	K15LM22	6.63	0.113	0.150	1.38	13.4	0.293
EWG-LAW-Centroid-2-SM	1	6	17	K06LM12	3.99	0.077	0.300	0.777	14.2	0.234
New-IL-103151-SM	1	6	18	K26LM22	2.07	0.045	0.724	1.37	15.9	0.132
LRM	1	6	19	LRMLM163	0.343	0.140	1.26	<0.100	15.3	0.215
LRM	2	1	1	LRMLM211	0.309	0.133	1.19	<0.100	14.9	0.197
LAW-ORP-LD1-M-PSM	2	1	2	M04LM21	5.28	0.186	0.116	0.567	14.5	0.112
New-IL-166697-PSM	2	1	3	M09LM21	1.97	0.104	0.694	0.279	13.1	<0.100
New-OL-65959Mod-PSM	2	1	4	M05LM11	<0.100	0.033	<0.100	1.87	13.1	<0.100
New-IL-94020-PSM	2	1	5	M08LM21	2.52	0.049	0.149	1.38	11.4	0.120
New-OL-108249Mod-PSM	2	1	6	M06LM21	6.91	0.110	0.846	<0.100	11.7	0.579
LAW-ORP-LD1-2-PSM	2	1	7	M10LM21	5.37	0.224	0.132	0.547	14.9	0.114
New-IL-1721-PSM	2	1	8	M07LM11	1.89	0.123	0.717	0.268	12.2	0.209
New-IL-1721-PSM	2	1	9	M07LM21	1.96	0.126	0.741	0.268	12.6	0.195
LAW-ORP-LD1-2-PSM	2	1	10	M10LM11	5.71	0.236	0.132	0.569	15.7	0.119
New-OL-62909Mod-PSM	2	1	11	M02LM11	8.67	0.195	<0.100	1.97	10.3	0.340
LRM	2	1	12	LRMLM212	0.326	0.143	1.26	<0.100	15.6	0.215
LAW-ORP-LD1-M-PSM	2	1	13	M04LM11	5.36	0.189	0.119	0.562	14.7	0.109
New-OL-116208Mod-PSM	2	1	14	M03LM11	8.61	0.107	<0.100	2.11	12.0	0.491
New-IL-166731-PSM	2	1	15	M01LM11	2.01	0.106	0.157	1.37	13.8	0.105
New-IL-166697-PSM	2	1	16	M09LM11	2.00	0.110	0.738	0.289	13.4	<0.100
New-OL-62909Mod-PSM	2	1	17	M02LM21	8.66	0.192	<0.100	1.97	10.3	0.201
New-OL-108249Mod-PSM	2	1	18	M06LM11	7.13	0.117	0.878	<0.100	12.0	0.616
New-OL-65959Mod-PSM	2	1	19	M05LM21	<0.100	0.035	<0.100	1.93	13.6	<0.100
New-IL-166731-PSM	2	1	20	M01LM21	2.10	0.106	0.157	1.40	14.1	0.108
New-OL-116208Mod-PSM	2	1	21	M03LM21	8.90	0.111	<0.100	2.16	12.4	0.562

Table C-1. LM Elemental Measurements of the SM Study Glasses, Part 1 (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	Ca (wt%)	Cr (wt%)	K (wt%)	Mg (wt%)	Na (wt%)	P (wt%)
New-IL-94020-PSM	2	1	22	M08LM11	2.53	0.052	0.161	1.38	11.6	0.143
LRM	2	1	23	LRMLM213	0.328	0.144	1.29	<0.100	15.7	0.213
LRM	2	2	1	LRMLM221	0.323	0.135	1.23	<0.100	14.2	0.200
LAW-ORP-LD1-M-PSM	2	2	2	M04LM12	4.88	0.180	0.111	0.561	13.4	0.100
New-OL-108249Mod-PSM	2	2	3	M06LM22	6.65	0.108	0.846	<0.100	11.3	0.568
New-IL-1721-PSM	2	2	4	M07LM22	1.83	0.117	0.690	0.261	11.8	0.182
LAW-ORP-LD1-2-PSM	2	2	5	M10LM12	5.47	0.219	0.122	0.552	15.1	0.106
New-OL-62909Mod-PSM	2	2	6	M02LM22	8.29	0.182	<0.100	1.90	9.85	0.190
New-OL-116208Mod-PSM	2	2	7	M03LM12	8.46	0.104	<0.100	2.08	11.8	0.469
LAW-ORP-LD1-M-PSM	2	2	8	M04LM22	5.22	0.179	0.109	0.555	14.2	0.101
New-IL-94020-PSM	2	2	9	M08LM22	2.43	0.049	0.145	1.34	11.1	0.119
New-OL-108249Mod-PSM	2	2	10	M06LM12	6.66	0.111	0.840	<0.100	11.3	0.577
New-OL-116208Mod-PSM	2	2	11	M03LM22	8.16	0.104	<0.100	2.01	11.5	0.513
LRM	2	2	12	LRMLM222	0.316	0.134	1.22	<0.100	14.6	0.196
New-IL-166697-PSM	2	2	13	M09LM12	1.90	0.102	0.670	0.280	12.6	<0.100
New-OL-65959Mod-PSM	2	2	14	M05LM22	<0.100	0.033	<0.100	1.82	12.6	<0.100
New-IL-166731-PSM	2	2	15	M01LM12	1.91	0.098	0.139	1.30	12.8	0.104
New-IL-166731-PSM	2	2	16	M01LM22	1.92	0.098	0.141	1.30	12.8	0.113
New-IL-1721-PSM	2	2	17	M07LM12	1.85	0.118	0.688	0.265	11.8	0.205
New-OL-62909Mod-PSM	2	2	18	M02LM12	8.08	0.187	<0.100	1.85	9.59	0.322
New-IL-166697-PSM	2	2	19	M09LM22	1.88	0.103	0.688	0.282	12.6	<0.100
New-OL-65959Mod-PSM	2	2	20	M05LM12	<0.100	0.033	<0.100	1.84	12.9	<0.100
LAW-ORP-LD1-2-PSM	2	2	21	M10LM22	5.53	0.216	0.126	0.541	15.2	0.105
New-IL-94020-PSM	2	2	22	M08LM12	2.45	0.049	0.141	1.35	11.1	0.129
LRM	2	2	23	LRMLM223	0.312	0.134	1.19	<0.100	15.0	0.194

Table C-2. LM Elemental Measurements of the SM Study Glasses, Part 2

ID	Block	Sub-Blk	Sequence	Lab ID	S (wt%)	V (wt%)	Zn (wt%)	Zr (wt%)
LRM	1	1	1	LRMLM111	0.081	<0.100	<0.100	0.702
New-OL-62380-SM	1	1	2	K25LM11	0.587	1.36	3.75	4.43
New-OL-8445-SM	1	1	3	K20LM21	0.560	<0.100	0.730	4.46
New-OL-80309-SM	1	1	4	K12LM11	0.648	2.07	3.92	4.68
New-OL-57284-SM	1	1	5	K13LM21	0.355	2.05	3.82	3.52
New-OL-14844-SM	1	1	6	K05LM21	0.559	1.98	3.80	4.13
New-OL-45748-SM	1	1	7	K16LM11	0.629	1.52	3.86	<0.100
New-OL-14844-SM	1	1	8	K05LM11	0.568	2.03	3.94	4.13
New-OL-57284-SM	1	1	9	K13LM11	0.365	2.07	3.86	3.52
New-OL-17130-SM	1	1	10	K22LM11	0.944	2.07	0.780	<0.100
New-OL-17130-SM	1	1	11	K22LM21	0.948	2.07	0.772	<0.100
LRM	1	1	12	LRMLM112	0.086	<0.100	<0.100	0.726
New-OL-8445-SM	1	1	13	K20LM11	0.585	<0.100	0.763	4.55
New-OL-62380-SM	1	1	14	K25LM21	0.615	1.43	3.96	4.72
New-OL-45748-SM	1	1	15	K16LM21	0.630	1.59	4.00	<0.100
New-OL-54017-SM	1	1	16	K09LM11	0.514	1.00	3.92	<0.100
New-OL-15493-SM	1	1	17	K08LM11	0.850	1.94	0.756	<0.100
New-OL-80309-SM	1	1	18	K12LM21	0.686	2.18	4.18	4.99
New-OL-54017-SM	1	1	19	K09LM21	0.541	1.02	4.02	<0.100
New-OL-8788Mod-SM	1	1	20	K14LM21	0.248	<0.100	4.17	4.12
New-OL-8788Mod-SM	1	1	21	K14LM11	0.245	<0.100	4.15	4.09
New-OL-15493-SM	1	1	22	K08LM21	0.871	1.97	0.761	<0.100
LRM	1	1	23	LRMLM113	0.087	<0.100	<0.100	0.736
LRM	1	2	1	LRMLM121	0.086	<0.100	<0.100	0.693
New-OL-62380-SM	1	2	2	K25LM22	0.598	1.36	3.86	4.51
New-OL-15493-SM	1	2	3	K08LM12	0.812	1.87	0.713	<0.100
New-OL-54017-SM	1	2	4	K09LM22	0.513	0.920	3.91	<0.100
New-OL-57284-SM	1	2	5	K13LM12	0.353	2.09	3.93	3.53
New-OL-14844-SM	1	2	6	K05LM22	0.550	2.01	3.93	4.21
New-OL-8788Mod-SM	1	2	7	K14LM12	0.234	<0.100	3.95	3.90
New-OL-17130-SM	1	2	8	K22LM12	0.922	2.03	0.757	<0.100
New-OL-80309-SM	1	2	9	K12LM12	0.662	2.12	4.05	4.76
New-OL-80309-SM	1	2	10	K12LM22	0.659	2.10	4.01	4.90
New-OL-14844-SM	1	2	11	K05LM12	0.570	2.05	4.01	4.25
LRM	1	2	12	LRMLM122	0.086	<0.100	<0.100	0.712
New-OL-8788Mod-SM	1	2	13	K14LM22	0.237	<0.100	4.06	3.92
New-OL-8445-SM	1	2	14	K20LM12	0.588	<0.100	0.762	4.53
New-OL-8445-SM	1	2	15	K20LM22	0.604	<0.100	0.780	4.54
New-OL-15493-SM	1	2	16	K08LM22	0.892	1.91	0.775	<0.100
New-OL-45748-SM	1	2	17	K16LM12	0.675	1.54	3.95	<0.100
New-OL-62380-SM	1	2	18	K25LM12	0.655	1.38	3.89	4.57
New-OL-54017-SM	1	2	19	K09LM12	0.565	0.984	3.86	<0.100
New-OL-45748-SM	1	2	20	K16LM22	0.689	1.53	3.89	<0.100
New-OL-57284-SM	1	2	21	K13LM22	0.394	2.11	3.99	3.55
New-OL-17130-SM	1	2	22	K22LM22	0.997	2.06	0.799	<0.100
LRM	1	2	23	LRMLM123	0.095	<0.100	<0.100	0.731
LRM	1	3	1	LRMLM131	0.088	<0.100	<0.100	0.686
New-OL-127708Mod-SM	1	3	2	K21LM21	0.342	<0.100	0.762	<0.100
New-OL-122817-SM	1	3	3	K01LM21	0.787	2.04	0.770	<0.100
New-OL-116208Mod-SM	1	3	4	K28LM11	0.512	0.627	0.779	4.40
New-OL-100210-SM	1	3	5	K24LM11	0.593	<0.100	4.12	<0.100
New-IL-5253-SM	1	3	6	K07LM11	0.598	1.61	3.22	3.29
New-IL-5253-SM	1	3	7	K07LM21	0.578	1.63	3.25	3.31
New-IL-5255-SM	1	3	8	K11LM21	0.642	1.60	3.25	2.97
New-OL-127708Mod-SM	1	3	9	K21LM11	0.345	<0.100	0.772	<0.100
New-OL-90780-SM	1	3	10	K03LM11	0.611	2.08	0.789	<0.100
New-OL-90780-SM	1	3	11	K03LM21	0.604	2.09	0.789	<0.100
LRM	1	3	12	LRMLM132	0.089	<0.100	<0.100	0.692
New-IL-1721-SM	1	3	13	K10LM11	0.663	1.61	1.61	1.04

Table C-2. LM Elemental Measurements of the SM Study Glasses, Part 2 (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	S (wt%)	V (wt%)	Zn (wt%)	Zr (wt%)
New-OL-116208Mod-SM	1	3	14	K28LM21	0.518	0.634	0.784	4.61
New-IL-5255-SM	1	3	15	K11LM11	0.644	1.60	3.30	2.71
New-IL-1721-SM	1	3	16	K10LM21	0.680	1.62	1.64	1.04
New-OL-108249Mod-SM	1	3	17	K02LM11	0.524	<0.100	4.17	<0.100
New-OL-122817-SM	1	3	18	K01LM11	0.811	2.12	0.794	<0.100
New-IL-456-SM	1	3	19	K23LM21	0.799	1.58	1.56	1.03
New-IL-456-SM	1	3	20	K23LM11	0.803	1.58	1.56	0.888
New-OL-108249Mod-SM	1	3	21	K02LM21	0.536	<0.100	4.10	<0.100
New-OL-100210-SM	1	3	22	K24LM21	0.610	<0.100	4.07	<0.100
LRM	1	3	23	LRMLM133	0.089	<0.100	<0.100	0.707
LRM	1	4	1	LRMLM141	0.081	<0.100	<0.100	0.673
New-OL-127708Mod-SM	1	4	2	K21LM22	0.335	<0.100	0.755	<0.100
New-OL-127708Mod-SM	1	4	3	K21LM12	0.339	<0.100	0.747	<0.100
New-IL-456-SM	1	4	4	K23LM22	0.748	1.49	1.47	0.985
New-OL-116208Mod-SM	1	4	5	K28LM12	0.505	0.618	0.769	4.18
New-IL-5255-SM	1	4	6	K11LM22	0.631	1.50	3.03	2.81
New-OL-122817-SM	1	4	7	K01LM22	0.781	2.01	0.748	<0.100
New-OL-116208Mod-SM	1	4	8	K28LM22	0.501	0.617	0.770	4.35
New-OL-100210-SM	1	4	9	K24LM12	0.587	<0.100	3.79	<0.100
New-IL-456-SM	1	4	10	K23LM12	0.773	1.46	1.45	0.862
New-OL-90780-SM	1	4	11	K03LM22	0.602	1.95	0.770	<0.100
LRM	1	4	12	LRMLM142	0.083	<0.100	<0.100	0.690
New-OL-90780-SM	1	4	13	K03LM12	0.596	1.94	0.771	<0.100
New-OL-122817-SM	1	4	14	K01LM12	0.788	1.98	0.769	<0.100
New-IL-1721-SM	1	4	15	K10LM12	0.642	1.49	1.50	0.993
New-OL-108249Mod-SM	1	4	16	K02LM12	0.506	<0.100	3.88	<0.100
New-OL-100210-SM	1	4	17	K24LM22	0.577	<0.100	3.88	<0.100
New-OL-108249Mod-SM	1	4	18	K02LM22	0.509	<0.100	3.96	<0.100
New-IL-5253-SM	1	4	19	K07LM12	0.578	1.54	3.09	3.17
New-IL-5255-SM	1	4	20	K11LM12	0.621	1.50	3.08	2.57
New-IL-5253-SM	1	4	21	K07LM22	0.584	1.53	3.04	3.15
New-IL-1721-SM	1	4	22	K10LM22	0.654	1.51	1.51	0.994
LRM	1	4	23	LRMLM143	0.090	<0.100	<0.100	0.689
LRM	1	5	1	LRMLM151	0.088	<0.100	<0.100	0.677
New-IL-42295-SM	1	5	2	K27LM11	0.649	1.59	1.58	3.37
EWG-LAW-Centroid-2-SM	1	5	3	K06LM21	0.578	1.07	2.42	2.16
New-IL-93907-SM	1	5	4	K18LM21	0.456	0.259	1.66	1.11
New-IL-103151-SM	1	5	5	K26LM21	0.603	1.60	3.32	1.10
New-IL-93907-SM	1	5	6	K18LM11	0.463	0.263	1.67	1.12
New-IL-151542-SM	1	5	7	K15LM21	0.685	1.67	1.66	0.829
LAW-ORP-LD1-1-SM	1	5	8	K19LM21	0.512	0.501	2.40	2.12
New-IL-70316-SM	1	5	9	K17LM11	0.671	1.60	1.64	1.09
LRM	1	5	10	LRMLM152	0.091	<0.100	<0.100	0.701
EWG-LAW-Centroid-2-SM	1	5	11	K06LM11	0.570	1.10	2.50	2.17
New-IL-70316-SM	1	5	12	K17LM21	0.636	1.63	1.67	1.10
New-IL-103151-SM	1	5	13	K26LM11	0.587	1.61	3.37	1.12
New-IL-151542-SM	1	5	14	K15LM11	0.667	1.66	1.66	0.839
New-IL-87749-SM	1	5	15	K04LM11	0.688	1.63	1.66	1.08
New-IL-87749-SM	1	5	16	K04LM21	0.655	1.57	1.61	1.05
New-IL-42295-SM	1	5	17	K27LM21	0.684	1.62	1.62	3.45
LAW-ORP-LD1-1-SM	1	5	18	K19LM11	0.525	0.507	2.43	2.17
LRM	1	5	19	LRMLM153	0.090	<0.100	<0.100	0.721
LRM	1	6	1	LRMLM161	0.086	<0.100	<0.100	0.662
LAW-ORP-LD1-1-SM	1	6	2	K19LM12	0.481	0.476	2.21	1.97
New-IL-42295-SM	1	6	3	K27LM22	0.650	1.46	1.45	3.15
LAW-ORP-LD1-1-SM	1	6	4	K19LM22	0.489	0.483	2.18	1.97
New-IL-93907-SM	1	6	5	K18LM22	0.448	0.259	1.51	1.02
New-IL-70316-SM	1	6	6	K17LM22	0.637	1.48	1.49	1.03
New-IL-87749-SM	1	6	7	K04LM12	0.645	1.50	1.51	1.00
New-IL-70316-SM	1	6	8	K17LM12	0.622	1.55	1.57	1.04

Table C-2. LM Elemental Measurements of the SM Study Glasses, Part 2 (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	S (wt%)	V (wt%)	Zn (wt%)	Zr (wt%)
New-IL-87749-SM	1	6	9	K04LM22	0.628	1.49	1.51	0.974
LRM	1	6	10	LRMLM162	0.089	<0.100	<0.100	0.677
EWG-LAW-Centroid-2-SM	1	6	11	K06LM22	0.565	1.03	2.34	2.09
New-IL-42295-SM	1	6	12	K27LM12	0.642	1.56	1.55	3.35
New-IL-151542-SM	1	6	13	K15LM12	0.656	1.59	1.58	0.820
New-IL-93907-SM	1	6	14	K18LM12	0.449	0.261	1.57	1.05
New-IL-103151-SM	1	6	15	K26LM12	0.577	1.55	3.28	1.09
New-IL-151542-SM	1	6	16	K15LM22	0.658	1.62	1.62	0.819
EWG-LAW-Centroid-2-SM	1	6	17	K06LM12	0.586	1.05	2.40	2.12
New-IL-103151-SM	1	6	18	K26LM22	0.604	1.56	3.29	1.07
LRM	1	6	19	LRMLM163	0.091	<0.100	<0.100	0.691
LRM	2	1	1	LRMLM211	0.085	<0.100	<0.100	0.636
LAW-ORP-LD1-M-PSM	2	1	2	M04LM21	0.421	0.471	2.20	1.98
New-IL-166697-PSM	2	1	3	M09LM21	0.599	1.55	3.09	0.389
New-OL-65959Mod-PSM	2	1	4	M05LM11	0.680	1.87	3.80	<0.100
New-IL-94020-PSM	2	1	5	M08LM21	0.437	0.248	3.07	0.841
New-OL-108249Mod-PSM	2	1	6	M06LM21	0.509	0.002	3.84	<0.100
LAW-ORP-LD1-2-PSM	2	1	7	M10LM21	0.529	0.497	2.24	2.03
New-IL-1721-PSM	2	1	8	M07LM11	0.719	1.51	1.47	0.661
New-IL-1721-PSM	2	1	9	M07LM21	0.715	1.55	1.52	0.606
LAW-ORP-LD1-2-PSM	2	1	10	M10LM11	0.566	0.521	2.37	2.14
New-OL-62909Mod-PSM	2	1	11	M02LM11	0.526	<0.100	0.785	3.60
LRM	2	1	12	LRMLM212	0.090	<0.100	<0.100	0.666
LAW-ORP-LD1-M-PSM	2	1	13	M04LM11	0.419	0.484	2.25	2.02
New-OL-116208Mod-PSM	2	1	14	M03LM11	0.593	0.627	0.760	4.47
New-IL-166731-PSM	2	1	15	M01LM11	0.618	1.55	3.12	0.422
New-IL-166697-PSM	2	1	16	M09LM11	0.628	1.56	3.15	0.396
New-OL-62909Mod-PSM	2	1	17	M02LM21	0.523	<0.100	0.766	3.06
New-OL-108249Mod-PSM	2	1	18	M06LM11	0.534	<0.100	3.96	<0.100
New-OL-65959Mod-PSM	2	1	19	M05LM21	0.713	1.91	3.89	<0.100
New-IL-166731-PSM	2	1	20	M01LM21	0.613	1.59	3.21	0.425
New-OL-116208Mod-PSM	2	1	21	M03LM21	0.624	0.648	0.787	4.46
New-IL-94020-PSM	2	1	22	M08LM11	0.460	0.260	3.08	0.986
LRM	2	1	23	LRMLM213	0.089	<0.100	<0.100	0.665
LRM	2	2	1	LRMLM221	0.083	<0.100	<0.100	0.648
LAW-ORP-LD1-M-PSM	2	2	2	M04LM12	0.396	0.465	2.05	1.85
New-OL-108249Mod-PSM	2	2	3	M06LM22	0.488	<0.100	3.69	<0.100
New-IL-1721-PSM	2	2	4	M07LM22	0.652	1.46	1.45	0.593
LAW-ORP-LD1-2-PSM	2	2	5	M10LM12	0.511	0.491	2.29	2.07
New-OL-62909Mod-PSM	2	2	6	M02LM22	0.483	<0.100	0.717	3.76
New-OL-116208Mod-PSM	2	2	7	M03LM12	0.563	0.608	0.733	4.38
LAW-ORP-LD1-M-PSM	2	2	8	M04LM22	0.397	0.459	2.17	1.97
New-IL-94020-PSM	2	2	9	M08LM22	0.419	0.240	2.95	0.852
New-OL-108249Mod-PSM	2	2	10	M06LM12	0.498	<0.100	3.66	<0.100
New-OL-116208Mod-PSM	2	2	11	M03LM22	0.566	0.605	0.729	4.11
LRM	2	2	12	LRMLM222	0.079	<0.100	<0.100	0.647
New-IL-166697-PSM	2	2	13	M09LM12	0.559	1.48	3.00	0.387
New-OL-65959Mod-PSM	2	2	14	M05LM22	0.635	1.80	3.64	<0.100
New-IL-166731-PSM	2	2	15	M01LM12	0.556	1.48	2.97	0.410
New-IL-166731-PSM	2	2	16	M01LM22	0.555	1.47	2.99	0.434
New-IL-1721-PSM	2	2	17	M07LM12	0.663	1.47	1.47	0.657
New-OL-62909Mod-PSM	2	2	18	M02LM12	0.494	<0.100	0.729	3.20
New-IL-166697-PSM	2	2	19	M09LM22	0.576	1.48	2.95	0.372
New-OL-65959Mod-PSM	2	2	20	M05LM12	0.663	1.82	3.71	<0.100
LAW-ORP-LD1-2-PSM	2	2	21	M10LM22	0.499	0.479	2.30	2.08
New-IL-94020-PSM	2	2	22	M08LM12	0.416	0.239	2.96	0.944
LRM	2	2	23	LRMLM223	0.082	<0.100	<0.100	0.639

Table C-3. PF Elemental Measurements of the SM 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	5.15	2.33	0.928	<0.100	25.4	<0.100
New-OL-17130-SM	1	1	2	K22PF11	1.91	4.21	1.00	2.14	22.5	2.37
New-OL-8788Mod-SM	1	1	3	K14PF21	6.92	1.94	1.03	1.04	23.3	<0.100
New-OL-80309-SM	1	1	4	K12PF11	1.98	4.37	1.03	2.20	17.0	3.48
New-OL-62380-SM	1	1	5	K25PF11	1.85	4.07	0.963	<0.100	16.1	3.52
New-OL-54017-SM	1	1	6	K09PF21	1.95	1.94	1.02	<0.100	23.4	3.93
New-OL-14844-SM	1	1	7	K05PF11	1.97	1.94	<0.100	2.23	17.0	<0.100
New-OL-14844-SM	1	1	8	K05PF21	2.03	2.01	<0.100	2.29	17.5	<0.100
New-OL-8445-SM	1	1	9	K20PF11	7.08	4.64	<0.100	0.852	17.5	<0.100
New-OL-15493-SM	1	1	10	K08PF21	1.90	1.80	<0.100	<0.100	18.8	2.35
New-OL-80309-SM	1	1	11	K12PF21	2.07	4.62	1.07	2.28	17.8	3.63
LRM	1	1	12	LRMPF112	5.14	2.35	0.919	<0.100	25.3	<0.100
New-OL-15493-SM	1	1	13	K08PF11	1.86	1.75	<0.100	<0.100	18.3	2.30
New-OL-62380-SM	1	1	14	K25PF21	1.93	4.31	1.01	<0.100	16.6	3.68
New-OL-17130-SM	1	1	15	K22PF21	1.90	4.27	1.00	2.13	22.5	2.38
New-OL-57284-SM	1	1	16	K13PF21	1.97	4.46	<0.100	<0.100	22.7	<0.100
New-OL-57284-SM	1	1	17	K13PF11	2.08	4.68	<0.100	<0.100	24.2	<0.100
New-OL-45748-SM	1	1	18	K16PF11	7.84	2.02	1.05	2.29	17.7	3.82
New-OL-54017-SM	1	1	19	K09PF11	2.01	1.98	1.06	<0.100	24.0	4.04
New-OL-8788Mod-SM	1	1	20	K14PF11	7.13	2.00	1.06	1.06	24.0	<0.100
New-OL-8445-SM	1	1	21	K20PF21	7.01	4.57	<0.100	0.850	17.4	<0.100
New-OL-45748-SM	1	1	22	K16PF21	7.89	2.02	1.06	2.32	17.7	3.86
LRM	1	1	23	LRMPF113	5.10	2.35	0.914	<0.100	25.1	<0.100
LRM	1	2	1	LRMPF121	5.20	2.44	0.988	<0.100	25.7	<0.100
New-OL-62380-SM	1	2	2	K25PF12	1.95	4.35	1.07	<0.100	17.0	3.73
New-OL-80309-SM	1	2	3	K12PF12	2.00	4.44	1.09	2.19	17.5	3.57
New-OL-15493-SM	1	2	4	K08PF12	1.85	1.72	<0.100	<0.100	18.2	2.30
New-OL-14844-SM	1	2	5	K05PF12	2.03	1.98	<0.100	2.26	17.5	<0.100
New-OL-62380-SM	1	2	6	K25PF22	2.01	4.43	1.10	<0.100	17.4	3.81
New-OL-45748-SM	1	2	7	K16PF12	7.87	2.01	1.10	2.26	17.7	3.87
New-OL-8788Mod-SM	1	2	8	K14PF12	7.17	1.97	1.11	1.03	24.2	<0.100
New-OL-8445-SM	1	2	9	K20PF12	7.07	4.57	<0.100	0.817	17.6	<0.100
New-OL-80309-SM	1	2	10	K12PF22	2.10	4.71	1.12	2.27	18.0	3.64
New-OL-14844-SM	1	2	11	K05PF22	2.03	1.98	<0.100	2.25	17.5	<0.100
LRM	1	2	12	LRMPF122	5.17	2.37	0.974	<0.100	25.5	<0.100
New-OL-15493-SM	1	2	13	K08PF22	1.89	1.77	<0.100	<0.100	18.9	2.37
New-OL-8788Mod-SM	1	2	14	K14PF22	6.92	1.88	1.08	1.00	23.5	<0.100

Table C-3. PF Elemental Measurements of the SM Study Glasses (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	Al (wt%)	B (wt%)	Fe (wt%)	Li (wt%)	Si (wt%)	Sn (wt%)
New-OL-8445-SM	1	2	15	K20PF22	6.72	4.31	<0.100	0.784	16.8	<0.100
New-OL-45748-SM	1	2	16	K16PF22	7.42	1.81	1.05	2.15	16.7	3.68
New-OL-57284-SM	1	2	17	K13PF22	1.88	4.23	<0.100	<0.100	21.6	<0.100
New-OL-57284-SM	1	2	18	K13PF12	1.90	4.20	<0.100	<0.100	22.2	<0.100
New-OL-54017-SM	1	2	19	K09PF12	1.85	1.76	1.03	<0.100	22.2	3.76
New-OL-17130-SM	1	2	20	K22PF12	1.80	3.90	0.975	1.98	21.2	2.23
New-OL-54017-SM	1	2	21	K09PF22	1.94	1.89	1.06	<0.100	23.2	3.91
New-OL-17130-SM	1	2	22	K22PF22	1.85	4.01	1.01	2.04	21.9	2.30
LRM	1	2	23	LRMPF123	5.40	2.44	1.01	<0.100	27.0	<0.100
LRM	1	3	1	LRMPF131	4.95	2.38	1.06	0.122	24.4	<0.100
New-OL-122817-SM	1	3	2	K01PF21	1.92	1.83	1.13	<0.100	20.2	2.39
New-IL-456-SM	1	3	3	K23PF21	3.19	2.38	0.926	1.45	19.2	2.61
New-IL-5255-SM	1	3	4	K11PF21	3.20	3.38	0.952	1.44	16.5	2.68
New-IL-5253-SM	1	3	5	K07PF11	3.25	3.51	0.940	1.44	18.0	2.67
New-OL-100210-SM	1	3	6	K24PF21	1.86	1.80	<0.100	<0.100	20.7	2.47
New-IL-1721-SM	1	3	7	K10PF21	3.17	3.38	0.917	1.42	19.1	2.69
New-OL-127708Mod-SM	1	3	8	K21PF11	5.57	4.13	1.10	1.04	21.2	3.36
New-OL-108249Mod-SM	1	3	9	K02PF11	6.24	1.90	1.15	2.13	16.0	3.68
New-IL-5253-SM	1	3	10	K07PF21	3.23	3.47	0.922	1.43	17.9	2.66
New-OL-116208Mod-SM	1	3	11	K28PF21	1.90	1.84	1.10	2.09	15.4	3.35
LRM	1	3	12	LRMPF132	5.07	2.45	1.08	0.123	25.0	<0.100
New-IL-1721-SM	1	3	13	K10PF11	3.26	3.52	0.935	1.45	19.5	2.68
New-OL-100210-SM	1	3	14	K24PF11	1.86	1.83	<0.100	<0.100	20.8	2.45
New-IL-5255-SM	1	3	15	K11PF11	3.23	3.43	0.938	1.45	16.5	2.68
New-OL-122817-SM	1	3	16	K01PF11	1.89	1.87	1.10	<0.100	19.9	2.34
New-OL-116208Mod-SM	1	3	17	K28PF11	1.95	1.90	1.13	2.15	15.8	3.46
New-OL-90780-SM	1	3	18	K03PF11	7.13	4.16	<0.100	2.03	15.9	2.37
New-OL-90780-SM	1	3	19	K03PF21	7.24	4.19	<0.100	2.05	16.3	2.39
New-OL-127708Mod-SM	1	3	20	K21PF21	5.69	4.31	1.13	1.07	21.6	3.45
New-IL-456-SM	1	3	21	K23PF11	3.30	2.52	0.967	1.50	19.8	2.72
New-OL-108249Mod-SM	1	3	22	K02PF21	6.41	2.01	1.17	2.19	16.5	3.80
LRM	1	3	23	LRMPF133	5.23	2.56	1.11	0.124	25.8	<0.100
LRM	1	4	1	LRMPF141	4.95	2.32	0.955	<0.100	25.2	<0.100
New-OL-127708Mod-SM	1	4	2	K21PF12	5.41	3.93	0.955	0.912	21.1	3.17
New-OL-116208Mod-SM	1	4	3	K28PF22	1.82	1.76	1.00	2.04	15.9	3.36
New-OL-100210-SM	1	4	4	K24PF12	1.82	1.80	<0.100	<0.100	21.9	2.45
New-IL-1721-SM	1	4	5	K10PF12	3.23	3.50	0.828	1.36	20.4	2.68
New-OL-122817-SM	1	4	6	K01PF12	1.79	1.77	0.987	<0.100	20.4	2.26

Table C-3. PF Elemental Measurements of the SM Study Glasses (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	Al (wt%)	B (wt%)	Fe (wt%)	Li (wt%)	Si (wt%)	Sn (wt%)
New-IL-5253-SM	1	4	7	K07PF12	3.18	3.48	0.818	1.34	18.4	2.61
New-OL-108249Mod-SM	1	4	8	K02PF22	6.20	1.81	1.02	2.04	16.2	3.64
New-IL-5255-SM	1	4	9	K11PF12	3.23	3.50	0.839	1.38	17.2	2.65
New-IL-1721-SM	1	4	10	K10PF22	3.14	3.42	0.805	1.34	19.7	2.62
New-OL-90780-SM	1	4	11	K03PF22	6.98	3.96	<0.100	1.88	15.8	2.22
LRM	1	4	12	LRMPF142	4.93	2.31	0.945	<0.100	25.2	<0.100
New-IL-456-SM	1	4	13	K23PF22	3.08	2.32	0.796	1.32	19.3	2.52
New-OL-108249Mod-SM	1	4	14	K02PF12	6.21	1.81	1.03	2.03	16.2	3.56
New-OL-116208Mod-SM	1	4	15	K28PF12	1.81	1.72	0.995	2.02	15.8	3.33
New-OL-90780-SM	1	4	16	K03PF12	7.12	4.10	<0.100	1.92	16.2	2.26
New-OL-100210-SM	1	4	17	K24PF22	1.78	1.70	<0.100	<0.100	21.6	2.39
New-IL-5255-SM	1	4	18	K11PF22	3.20	3.44	0.849	1.37	17.2	2.62
New-IL-5253-SM	1	4	19	K07PF22	3.17	3.34	0.808	1.33	18.4	2.58
New-OL-122817-SM	1	4	20	K01PF22	1.84	1.83	1.02	<0.100	21.0	2.32
New-IL-456-SM	1	4	21	K23PF12	3.12	2.34	0.825	1.35	19.8	2.53
New-OL-127708Mod-SM	1	4	22	K21PF22	5.51	4.04	0.981	0.923	21.5	3.29
LRM	1	4	23	LRMPF143	4.95	2.29	0.950	<0.100	25.2	<0.100
LRM	1	5	1	LRMPF151	4.90	2.33	0.922	<0.100	24.7	<0.100
EWG-LAW-Centroid-2-SM	1	5	2	K06PF11	4.42	2.75	0.597	0.695	17.6	1.39
New-IL-93907-SM	1	5	3	K18PF11	5.65	3.23	0.800	1.28	19.3	2.47
New-IL-93907-SM	1	5	4	K18PF21	5.68	3.33	0.770	1.29	19.5	2.53
New-IL-103151-SM	1	5	5	K26PF11	3.11	2.19	0.772	0.301	18.7	1.79
EWG-LAW-Centroid-2-SM	1	5	6	K06PF21	4.28	2.62	0.572	0.668	17.0	1.34
New-IL-42295-SM	1	5	7	K27PF21	2.91	3.08	0.739	1.24	18.1	0.618
New-IL-87749-SM	1	5	8	K04PF21	5.42	2.10	0.727	1.26	16.1	1.83
New-IL-87749-SM	1	5	9	K04PF11	5.35	2.10	0.723	1.26	15.9	1.81
LRM	1	5	10	LRMPF152	4.82	2.20	0.903	<0.100	24.4	<0.100
New-IL-103151-SM	1	5	11	K26PF21	3.07	2.20	0.769	0.300	18.7	1.76
LAW-ORP-LD1-1-SM	1	5	12	K19PF11	5.00	3.34	0.601	<0.100	16.7	<0.100
New-IL-151542-SM	1	5	13	K15PF11	2.98	2.64	0.744	0.287	17.1	2.45
New-IL-151542-SM	1	5	14	K15PF21	2.93	2.59	0.737	0.279	16.9	2.39
LAW-ORP-LD1-1-SM	1	5	15	K19PF21	4.94	3.29	0.588	<0.100	16.5	<0.100
New-IL-70316-SM	1	5	16	K17PF11	2.98	2.15	0.739	0.284	16.8	2.44
New-IL-70316-SM	1	5	17	K17PF21	2.99	2.12	0.745	0.287	16.9	2.44
New-IL-42295-SM	1	5	18	K27PF11	2.93	3.10	0.738	1.24	18.0	0.600
LRM	1	5	19	LRMPF153	4.82	2.19	0.906	<0.100	24.6	<0.100
LRM	1	6	1	LRMPF161	4.89	2.33	0.926	<0.100	24.9	<0.100
New-IL-70316-SM	1	6	2	K17PF12	3.14	2.31	0.781	0.307	17.7	2.57

Table C-3. PF Elemental Measurements of the SM Study Glasses (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	Al (wt%)	B (wt%)	Fe (wt%)	Li (wt%)	Si (wt%)	Sn (wt%)
EWG-LAW-Centroid-2-SM	1	6	3	K06PF22	4.50	2.88	0.606	0.709	18.0	1.41
LAW-ORP-LD1-1-SM	1	6	4	K19PF12	5.08	3.41	0.609	<0.100	16.9	<0.100
New-IL-151542-SM	1	6	5	K15PF12	3.21	2.89	0.796	0.314	18.4	2.62
New-IL-93907-SM	1	6	6	K18PF12	5.93	3.56	0.838	1.35	20.3	2.59
New-IL-70316-SM	1	6	7	K17PF22	3.09	2.21	0.766	0.302	17.4	2.54
New-IL-93907-SM	1	6	8	K18PF22	5.78	3.37	0.782	1.32	19.8	2.53
New-IL-87749-SM	1	6	9	K04PF22	5.64	2.27	0.759	1.32	16.8	1.90
LRM	1	6	10	LRMPF162	4.94	2.31	0.930	<0.100	25.2	<0.100
New-IL-103151-SM	1	6	11	K26PF12	3.19	2.29	0.800	0.317	19.4	1.84
New-IL-42295-SM	1	6	12	K27PF12	3.06	3.27	0.777	1.31	18.8	0.645
New-IL-151542-SM	1	6	13	K15PF22	3.13	2.81	0.787	0.306	18.0	2.52
EWG-LAW-Centroid-2-SM	1	6	14	K06PF12	4.59	2.92	0.621	0.730	18.4	1.46
New-IL-42295-SM	1	6	15	K27PF22	3.04	3.29	0.772	1.30	18.8	0.621
New-IL-87749-SM	1	6	16	K04PF12	5.54	2.22	0.751	1.31	16.5	1.87
New-IL-103151-SM	1	6	17	K26PF22	3.16	2.25	0.787	0.307	19.1	1.81
LAW-ORP-LD1-1-SM	1	6	18	K19PF22	5.15	3.49	0.609	<0.100	17.2	<0.100
LRM	1	6	19	LRMPF163	4.97	2.27	0.931	<0.100	25.2	<0.100
LRM	2	1	1	LRMPF211	5.23	2.58	1.02	<0.100	25.2	<0.100
New-OL-65959Mod-PSM	2	1	2	M05PF21	6.96	3.83	<0.100	2.08	15.7	3.17
New-IL-1721-PSM	2	1	3	M07PF11	3.25	3.51	0.844	1.44	19.8	2.66
New-IL-1721-PSM	2	1	4	M07PF21	3.26	3.56	0.871	1.45	20.1	2.69
LAW-ORP-LD1-2-PSM	2	1	5	M10PF21	5.26	3.55	0.687	<0.100	17.2	<0.100
LAW-ORP-LD1-M-PSM	2	1	6	M04PF11	7.64	3.42	0.663	<0.100	16.4	<0.100
New-IL-94020-PSM	2	1	7	M08PF11	6.12	2.59	0.907	1.47	20.9	2.76
New-OL-62909Mod-PSM	2	1	8	M02PF21	6.51	2.85	<0.100	1.07	16.2	3.36
New-IL-166731-PSM	2	1	9	M01PF21	6.18	3.02	0.363	1.51	18.1	2.58
New-OL-116208Mod-PSM	2	1	10	M03PF11	1.97	1.97	1.10	2.21	16.7	3.56
New-OL-62909Mod-PSM	2	1	11	M02PF11	6.49	2.86	<0.100	1.07	16.2	3.29
LRM	2	1	12	LRMPF212	5.18	2.44	1.01	<0.100	25.1	<0.100
New-IL-94020-PSM	2	1	13	M08PF21	6.05	2.51	0.866	1.45	20.3	2.70
New-IL-166697-PSM	2	1	14	M09PF11	5.96	3.14	0.876	1.48	17.5	2.72
LAW-ORP-LD1-2-PSM	2	1	15	M10PF11	5.29	3.63	0.700	<0.100	17.3	<0.100
LAW-ORP-LD1-M-PSM	2	1	16	M04PF21	7.51	3.44	0.658	<0.100	16.4	<0.100
New-OL-116208Mod-PSM	2	1	17	M03PF21	1.87	1.87	1.06	2.12	15.9	3.38
New-OL-108249Mod-PSM	2	1	18	M06PF21	6.04	1.82	1.02	2.06	15.6	4.62
New-IL-166731-PSM	2	1	19	M01PF11	6.17	2.95	0.344	1.51	18.0	2.56
New-OL-65959Mod-PSM	2	1	20	M05PF11	6.98	3.93	<0.100	2.08	16.0	3.16
New-OL-108249Mod-PSM	2	1	21	M06PF11	6.00	1.77	1.00	2.06	15.3	4.55

Table C-3. PF Elemental Measurements of the SM Study Glasses (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	Al (wt%)	B (wt%)	Fe (wt%)	Li (wt%)	Si (wt%)	Sn (wt%)
New-IL-166697-PSM	2	1	22	M09PF21	5.84	3.06	0.860	1.47	17.1	2.67
LRM	2	1	23	LRMPF213	5.16	2.43	1.00	<0.100	25.3	<0.100
LRM	2	2	1	LRMPF221	5.36	2.52	0.978	<0.100	26.9	<0.100
LAW-ORP-LD1-2-PSM	2	2	2	M10PF22	5.46	3.76	0.641	<0.100	18.3	<0.100
New-OL-116208Mod-PSM	2	2	3	M03PF12	1.91	1.88	1.03	2.17	17.0	3.53
New-IL-166697-PSM	2	2	4	M09PF22	6.26	3.32	0.845	1.50	18.8	2.86
New-IL-94020-PSM	2	2	5	M08PF22	6.20	2.53	0.811	1.44	21.6	2.78
LAW-ORP-LD1-2-PSM	2	2	6	M10PF12	5.41	3.66	0.639	<0.100	18.0	<0.100
New-IL-1721-PSM	2	2	7	M07PF12	3.22	3.49	0.766	1.41	20.3	2.64
New-IL-1721-PSM	2	2	8	M07PF22	3.29	3.58	0.802	1.44	20.8	2.67
New-OL-65959Mod-PSM	2	2	9	M05PF22	7.13	3.94	<0.100	2.09	16.3	3.15
New-OL-108249Mod-PSM	2	2	10	M06PF12	6.30	1.75	0.972	2.10	16.4	4.74
New-IL-166697-PSM	2	2	11	M09PF12	5.96	3.04	0.795	1.44	17.7	2.69
LRM	2	2	12	LRMPF222	5.29	2.41	0.950	<0.100	26.6	<0.100
New-OL-116208Mod-PSM	2	2	13	M03PF22	1.89	1.86	1.03	2.17	16.6	3.51
LAW-ORP-LD1-M-PSM	2	2	14	M04PF22	7.88	3.50	0.605	<0.100	17.2	<0.100
New-OL-62909Mod-PSM	2	2	15	M02PF12	6.48	2.71	<0.100	1.01	16.0	3.21
New-IL-94020-PSM	2	2	16	M08PF12	6.11	2.36	0.821	1.42	20.6	2.63
New-OL-108249Mod-PSM	2	2	17	M06PF22	6.38	1.76	0.986	2.13	16.4	4.79
New-IL-166731-PSM	2	2	18	M01PF22	6.10	2.80	0.267	1.44	17.8	2.43
New-OL-65959Mod-PSM	2	2	19	M05PF12	7.14	4.01	<0.100	2.08	16.4	3.22
LAW-ORP-LD1-M-PSM	2	2	20	M04PF12	7.85	3.47	0.592	<0.100	17.1	<0.100
New-OL-62909Mod-PSM	2	2	21	M02PF22	6.34	2.63	<0.100	0.993	15.7	3.14
New-IL-166731-PSM	2	2	22	M01PF12	6.16	2.81	0.250	1.45	17.9	2.48
LRM	2	2	23	LRMPF223	5.13	2.30	0.912	<0.100	25.8	<0.100

Table C-4. KH Elemental Measurements of the SM Study Glasses

ID	Block	Sub-Blk	Sequence	Lab ID	Cl (wt%) ar	F (wt%) ar
LRM	1	1	1	LRMKH111	<0.050	0.897
New-OL-45748-SM	1	1	2	K16KH11	0.095	0.473
New-OL-8445-SM	1	1	3	K20KH11	0.123	0.479
New-OL-57284-SM	1	1	4	K13KH21	0.146	0.458
New-OL-14844-SM	1	1	5	K05KH11	0.070	0.542
New-OL-17130-SM	1	1	6	K22KH21	0.204	0.435
New-OL-17130-SM	1	1	7	K22KH11	0.200	0.432
New-OL-54017-SM	1	1	8	K09KH21	<0.050	0.054
New-OL-14844-SM	1	1	9	K05KH21	0.071	0.543
New-OL-62380-SM	1	1	10	K25KH21	<0.050	0.090
New-OL-80309-SM	1	1	11	K12KH21	<0.050	0.058
LRM	1	1	12	LRMKH112	<0.050	0.899
New-OL-80309-SM	1	1	13	K12KH11	<0.050	0.060
New-OL-54017-SM	1	1	14	K09KH11	<0.050	0.052
New-OL-62380-SM	1	1	15	K25KH11	<0.050	0.092
New-OL-15493-SM	1	1	16	K08KH21	<0.050	0.057
New-OL-8445-SM	1	1	17	K20KH21	0.122	0.489
New-OL-45748-SM	1	1	18	K16KH21	0.095	0.470
New-OL-8788Mod-SM	1	1	19	K14KH21	0.117	0.481
New-OL-57284-SM	1	1	20	K13KH11	0.148	0.432
New-OL-15493-SM	1	1	21	K08KH11	<0.050	0.055
New-OL-8788Mod-SM	1	1	22	K14KH11	0.117	0.476
LRM	1	1	23	LRMKH113	<0.050	0.904
LRM	1	2	1	LRMKH121	<0.050	0.910
New-OL-62380-SM	1	2	2	K25KH22	<0.050	0.092
New-OL-17130-SM	1	2	3	K22KH12	0.205	0.440
New-OL-15493-SM	1	2	4	K08KH12	<0.050	0.057
New-OL-15493-SM	1	2	5	K08KH22	<0.050	0.058
New-OL-8445-SM	1	2	6	K20KH22	0.126	0.495
New-OL-8788Mod-SM	1	2	7	K14KH12	0.120	0.482
New-OL-80309-SM	1	2	8	K12KH12	<0.050	0.062
New-OL-57284-SM	1	2	9	K13KH12	0.154	0.461
New-OL-54017-SM	1	2	10	K09KH12	<0.050	0.055
New-OL-62380-SM	1	2	11	K25KH12	<0.050	0.094
LRM	1	2	12	LRMKH122	<0.050	0.910
New-OL-45748-SM	1	2	13	K16KH22	0.098	0.478
New-OL-80309-SM	1	2	14	K12KH22	<0.050	0.061
New-OL-45748-SM	1	2	15	K16KH12	0.095	0.482
New-OL-8445-SM	1	2	16	K20KH12	0.125	0.487
New-OL-54017-SM	1	2	17	K09KH22	<0.050	0.056
New-OL-17130-SM	1	2	18	K22KH22	0.208	0.445
New-OL-8788Mod-SM	1	2	19	K14KH22	0.120	0.484
New-OL-57284-SM	1	2	20	K13KH22	0.151	0.463
New-OL-14844-SM	1	2	21	K05KH22	0.075	0.552
New-OL-14844-SM	1	2	22	K05KH12	0.071	0.547
LRM	1	2	23	LRMKH123	<0.050	0.911
LRM	1	3	1	LRMKH131	<0.050	0.914
New-IL-1721-SM	1	3	2	K10KH11	0.081	0.291
New-OL-90780-SM	1	3	3	K03KH11	0.112	0.488
New-IL-5253-SM	1	3	4	K07KH11	<0.050	0.115
New-OL-116208Mod-SM	1	3	5	K28KH21	0.092	0.576
New-OL-108249Mod-SM	1	3	6	K02KH11	0.098	0.528
New-OL-100210-SM	1	3	7	K24KH11	0.169	0.514
New-OL-127708Mod-SM	1	3	8	K21KH11	<0.050	0.049
New-IL-5253-SM	1	3	9	K07KH21	<0.050	0.114
New-OL-127708Mod-SM	1	3	10	K21KH21	<0.050	0.049
New-IL-5255-SM	1	3	11	K11KH11	<0.050	0.116
LRM	1	3	12	LRMKH132	<0.050	0.926
New-IL-456-SM	1	3	13	K23KH21	<0.050	0.116

Table C-4. KH Elemental Measurements of the SM Study Glasses (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	Cl (wt%) ar	F (wt%) ar
New-OL-122817-SM	1	3	14	K01KH21	0.116	0.463
New-OL-90780-SM	1	3	15	K03KH21	0.114	0.492
New-IL-5255-SM	1	3	16	K11KH21	<0.050	0.118
New-OL-108249Mod-SM	1	3	17	K02KH21	0.099	0.530
New-OL-100210-SM	1	3	18	K24KH21	0.162	0.515
New-OL-122817-SM	1	3	19	K01KH11	0.118	0.473
New-IL-456-SM	1	3	20	K23KH11	<0.050	0.116
New-OL-116208Mod-SM	1	3	21	K28KH11	0.092	0.582
New-IL-1721-SM	1	3	22	K10KH21	0.083	0.294
LRM	1	3	23	LRMKH133	<0.050	0.933
LRM	1	4	1	LRMKH141	<0.050	0.952
New-OL-108249Mod-SM	1	4	2	K02KH12	0.098	0.536
New-OL-116208Mod-SM	1	4	3	K28KH12	0.090	0.584
New-IL-5253-SM	1	4	4	K07KH12	<0.050	0.115
New-OL-108249Mod-SM	1	4	5	K02KH22	0.098	0.535
New-OL-90780-SM	1	4	6	K03KH12	0.109	0.497
New-OL-122817-SM	1	4	7	K01KH22	0.118	0.471
New-IL-1721-SM	1	4	8	K10KH12	0.081	0.295
New-OL-90780-SM	1	4	9	K03KH22	0.109	0.491
New-IL-456-SM	1	4	10	K23KH22	<0.050	0.118
New-OL-122817-SM	1	4	11	K01KH12	0.119	0.473
LRM	1	4	12	LRMKH142	<0.050	0.916
New-IL-5255-SM	1	4	13	K11KH12	<0.050	0.118
New-IL-5253-SM	1	4	14	K07KH22	<0.050	0.115
New-IL-456-SM	1	4	15	K23KH12	<0.050	0.116
New-OL-127708Mod-SM	1	4	16	K21KH12	<0.050	0.050
New-OL-100210-SM	1	4	17	K24KH22	0.159	0.509
New-IL-5255-SM	1	4	18	K11KH22	<0.050	0.118
New-OL-116208Mod-SM	1	4	19	K28KH22	0.090	0.583
New-IL-1721-SM	1	4	20	K10KH22	0.082	0.294
New-OL-127708Mod-SM	1	4	21	K21KH22	<0.050	0.051
New-OL-100210-SM	1	4	22	K24KH12	0.164	0.523
LRM	1	4	23	LRMKH143	<0.050	0.930
LRM	1	5	1	LRMKH151	<0.050	0.904
New-IL-87749-SM	1	5	2	K04KH21	<0.050	0.117
New-IL-103151-SM	1	5	3	K26KH21	<0.050	0.124
EWG-LAW-Centroid-2-SM	1	5	4	K06KH11	0.067	0.229
New-IL-93907-SM	1	5	5	K18KH11	<0.050	0.111
EWG-LAW-Centroid-2-SM	1	5	6	K06KH21	0.067	0.226
LAW-ORP-LD1-1-SM	1	5	7	K19KH11	0.092	0.110
New-IL-93907-SM	1	5	8	K18KH21	<0.050	0.110
New-IL-151542-SM	1	5	9	K15KH21	0.078	0.316
LRM	1	5	10	LRMKH152	<0.050	0.904
New-IL-70316-SM	1	5	11	K17KH21	<0.050	0.119
New-IL-42295-SM	1	5	12	K27KH11	<0.050	0.118
New-IL-87749-SM	1	5	13	K04KH11	<0.050	0.119
New-IL-42295-SM	1	5	14	K27KH21	<0.050	0.115
New-IL-70316-SM	1	5	15	K17KH11	<0.050	0.118
LAW-ORP-LD1-1-SM	1	5	16	K19KH21	0.092	0.107
New-IL-151542-SM	1	5	17	K15KH11	0.079	0.311
New-IL-103151-SM	1	5	18	K26KH11	<0.050	0.123
LRM	1	5	19	LRMKH153	<0.050	0.915
LRM	1	6	1	LRMKH161	<0.050	0.921
LAW-ORP-LD1-1-SM	1	6	2	K19KH12	0.093	0.113
New-IL-151542-SM	1	6	3	K15KH12	0.078	0.315
New-IL-42295-SM	1	6	4	K27KH22	<0.050	0.120
New-IL-151542-SM	1	6	5	K15KH22	0.081	0.319
New-IL-70316-SM	1	6	6	K17KH22	<0.050	0.122
New-IL-93907-SM	1	6	7	K18KH12	<0.050	0.116
New-IL-42295-SM	1	6	8	K27KH12	<0.050	0.122

Table C-4. KH Elemental Measurements of the SM Study Glasses (continued)

ID	Block	Sub-Blk	Sequence	Lab ID	Cl (wt%) ar	F (wt%) ar
New-IL-103151-SM	1	6	9	K26KH22	<0.050	0.129
LRM	1	6	10	LRMKH162	<0.050	0.925
EWG-LAW-Centroid-2-SM	1	6	11	K06KH22	0.068	0.230
New-IL-87749-SM	1	6	12	K04KH22	<0.050	0.129
EWG-LAW-Centroid-2-SM	1	6	13	K06KH12	0.070	0.236
LAW-ORP-LD1-1-SM	1	6	14	K19KH22	0.092	0.114
New-IL-87749-SM	1	6	15	K04KH12	<0.050	0.126
New-IL-103151-SM	1	6	16	K26KH12	<0.050	0.128
New-IL-93907-SM	1	6	17	K18KH22	<0.050	0.115
New-IL-70316-SM	1	6	18	K17KH12	<0.050	0.124
LRM	1	6	19	LRMKH143	<0.050	0.926
LRM	2	1	1	LRMKH211	<0.050	0.874
LAW-ORP-LD1-M-PSM	2	1	2	M04KH21	0.053	0.088
New-IL-94020-PSM	2	1	3	M08KH21	<0.050	0.096
New-OL-108249Mod-PSM	2	1	4	M06KH21	0.092	0.478
LAW-ORP-LD1-2-PSM	2	1	5	M10KH11	0.064	0.090
LAW-ORP-LD1-M-PSM	2	1	6	M04KH11	0.056	0.094
New-IL-94020-PSM	2	1	7	M08KH11	<0.050	0.096
LAW-ORP-LD1-2-PSM	2	1	8	M10KH21	0.065	0.094
New-OL-62909Mod-PSM	2	1	9	M02KH21	0.080	0.465
New-IL-166697-PSM	2	1	10	M09KH21	0.076	0.289
New-IL-1721-PSM	2	1	11	M07KH21	0.086	0.262
LRM	2	1	12	LRMKH212	<0.050	0.875
New-OL-62909Mod-PSM	2	1	13	M02KH11	0.085	0.466
New-IL-166731-PSM	2	1	14	M01KH21	0.068	0.326
New-IL-166731-PSM	2	1	15	M01KH11	0.068	0.306
New-OL-116208Mod-PSM	2	1	16	M03KH21	0.094	0.511
New-OL-65959Mod-PSM	2	1	17	M05KH11	<0.050	0.050
New-IL-1721-PSM	2	1	18	M07KH11	0.090	0.311
New-OL-108249Mod-PSM	2	1	19	M06KH11	0.094	0.468
New-IL-166697-PSM	2	1	20	M09KH11	0.079	0.298
New-OL-65959Mod-PSM	2	1	21	M05KH21	<0.050	0.048
New-OL-116208Mod-PSM	2	1	22	M03KH11	0.092	0.492
LRM	2	1	23	LRMKH212	<0.050	0.872
LRM	2	2	1	LRMKH221	<0.050	0.895
New-IL-166697-PSM	2	2	2	M09KH22	0.079	0.289
New-OL-65959Mod-PSM	2	2	3	M05KH22	<0.050	0.053
LAW-ORP-LD1-2-PSM	2	2	4	M10KH12	0.061	0.094
LAW-ORP-LD1-M-PSM	2	2	5	M04KH22	0.054	0.092
LAW-ORP-LD1-2-PSM	2	2	6	M10KH22	0.067	0.097
New-IL-166731-PSM	2	2	7	M01KH22	0.070	0.306
New-IL-166731-PSM	2	2	8	M01KH12	0.070	0.317
New-OL-65959Mod-PSM	2	2	9	M05KH12	<0.050	0.053
New-IL-1721-PSM	2	2	10	M07KH12	0.090	0.266
New-IL-166697-PSM	2	2	11	M09KH12	0.080	0.286
LRM	2	2	12	LRMKH222	<0.050	0.880
New-IL-94020-PSM	2	2	13	M08KH12	<0.050	0.103
New-OL-62909Mod-PSM	2	2	14	M02KH12	0.094	0.475
New-OL-108249Mod-PSM	2	2	15	M06KH12	0.095	0.472
New-IL-1721-PSM	2	2	16	M07KH22	0.092	0.279
New-IL-94020-PSM	2	2	17	M08KH22	<0.050	0.103
New-OL-108249Mod-PSM	2	2	18	M06KH22	0.095	0.479
New-OL-116208Mod-PSM	2	2	19	M03KH12	0.094	0.491
New-OL-116208Mod-PSM	2	2	20	M03KH22	0.100	0.521
LAW-ORP-LD1-M-PSM	2	2	21	M04KH12	0.058	0.093
New-OL-62909Mod-PSM	2	2	22	M02KH22	0.085	0.473
LRM	2	2	23	LRMKH223	<0.050	0.886

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
EWG-LAW-Centroid-2-SM	Al_2O_3		8.404	9.000	-0.596	-6.6%
EWG-LAW-Centroid-2-SM	B_2O_3		8.992	10.000	-1.008	-10.1%
EWG-LAW-Centroid-2-SM	CaO		5.576	5.500	0.076	1.4%
EWG-LAW-Centroid-2-SM	Cl		0.068	0.210	-0.142	
EWG-LAW-Centroid-2-SM	Cr_2O_3		0.110	0.140	-0.030	
EWG-LAW-Centroid-2-SM	F		0.230	0.320	-0.090	
EWG-LAW-Centroid-2-SM	Fe_2O_3		0.856	1.000	-0.144	
EWG-LAW-Centroid-2-SM	K_2O		0.359	0.400	-0.041	
EWG-LAW-Centroid-2-SM	Li_2O		1.508	2.000	-0.492	
EWG-LAW-Centroid-2-SM	MgO		1.269	1.500	-0.231	
EWG-LAW-Centroid-2-SM	Na_2O		19.243	19.000	0.243	1.3%
EWG-LAW-Centroid-2-SM	P_2O_5		0.528	0.680	-0.152	
EWG-LAW-Centroid-2-SM	SiO_2		37.973	39.550	-1.577	-4.0%
EWG-LAW-Centroid-2-SM	SnO_2		1.777	2.000	-0.223	
EWG-LAW-Centroid-2-SM	SO_3		1.435	0.700	0.735	
EWG-LAW-Centroid-2-SM	V_2O_5		1.897	2.000	-0.103	
EWG-LAW-Centroid-2-SM	ZnO		3.006	3.000	0.006	
EWG-LAW-Centroid-2-SM	ZrO_2		2.884	3.000	-0.116	
EWG-LAW-Centroid-2-SM	Sum		96.115	100.000	-3.885	-3.9%
LAW-ORP-LD1-1-SM	Al_2O_3		9.528	10.150	-0.622	-6.1%
LAW-ORP-LD1-1-SM	B_2O_3		10.891	12.040	-1.149	-9.5%
LAW-ORP-LD1-1-SM	CaO		7.689	8.010	-0.321	-4.0%
LAW-ORP-LD1-1-SM	Cl		0.092	0.330	-0.238	
LAW-ORP-LD1-1-SM	Cr_2O_3		0.330	0.500	-0.170	
LAW-ORP-LD1-1-SM	F		0.111	0.170	-0.059	
LAW-ORP-LD1-1-SM	Fe_2O_3		0.860	1.000	-0.140	
LAW-ORP-LD1-1-SM	K_2O		0.140	0.160	-0.020	
LAW-ORP-LD1-1-SM	Li_2O	<	0.215	0.000	0.215	
LAW-ORP-LD1-1-SM	MgO		0.870	1.000	-0.130	
LAW-ORP-LD1-1-SM	Na_2O		19.445	20.980	-1.535	-7.3%
LAW-ORP-LD1-1-SM	P_2O_5		0.239	0.290	-0.051	
LAW-ORP-LD1-1-SM	SiO_2		35.994	37.140	-1.146	-3.1%
LAW-ORP-LD1-1-SM	SnO_2	<	0.127	0.000	0.127	
LAW-ORP-LD1-1-SM	SO_3		1.253	1.060	0.193	
LAW-ORP-LD1-1-SM	V_2O_5		0.878	1.000	-0.122	
LAW-ORP-LD1-1-SM	ZnO		2.869	3.000	-0.131	
LAW-ORP-LD1-1-SM	ZrO_2		2.779	3.000	-0.221	
LAW-ORP-LD1-1-SM	Sum		94.311	99.830	-5.519	-5.5%
LAW-ORP-LD1-2-PSM	Al_2O_3		10.118	10.150	-0.032	-0.3%
LAW-ORP-LD1-2-PSM	B_2O_3		11.753	12.040	-0.287	-2.4%
LAW-ORP-LD1-2-PSM	CaO		7.724	8.010	-0.286	-3.6%
LAW-ORP-LD1-2-PSM	Cl		0.064	0.330	-0.266	
LAW-ORP-LD1-2-PSM	Cr_2O_3		0.327	0.500	-0.173	
LAW-ORP-LD1-2-PSM	F		0.094	0.170	-0.076	
LAW-ORP-LD1-2-PSM	Fe_2O_3		0.953	1.000	-0.047	
LAW-ORP-LD1-2-PSM	K_2O		0.154	0.160	-0.006	
LAW-ORP-LD1-2-PSM	Li_2O	<	0.215	0.000	0.215	
LAW-ORP-LD1-2-PSM	MgO		0.916	1.000	-0.084	
LAW-ORP-LD1-2-PSM	Na_2O		20.523	20.980	-0.457	-2.2%
LAW-ORP-LD1-2-PSM	P_2O_5		0.254	0.290	-0.036	
LAW-ORP-LD1-2-PSM	SiO_2		37.866	37.140	0.726	2.0%
LAW-ORP-LD1-2-PSM	SnO_2	<	0.127	0.000	0.127	
LAW-ORP-LD1-2-PSM	SO_3		1.314	1.060	0.254	
LAW-ORP-LD1-2-PSM	V_2O_5		0.887	1.000	-0.113	
LAW-ORP-LD1-2-PSM	ZnO		2.863	3.000	-0.137	
LAW-ORP-LD1-2-PSM	ZrO_2		2.810	3.000	-0.190	
LAW-ORP-LD1-2-PSM	Sum		98.962	99.830	-0.868	-0.9%

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
LAW-ORP-LD1-M-PSM	Al_2O_3		14.587	14.736	-0.149	-1.0%
LAW-ORP-LD1-M-PSM	B_2O_3		11.133	11.424	-0.291	-2.5%
LAW-ORP-LD1-M-PSM	CaO		7.255	7.600	-0.345	-4.5%
LAW-ORP-LD1-M-PSM	Cl		0.055	0.313	-0.258	
LAW-ORP-LD1-M-PSM	Cr_2O_3		0.268	0.474	-0.206	
LAW-ORP-LD1-M-PSM	F		0.092	0.161	-0.069	
LAW-ORP-LD1-M-PSM	Fe_2O_3		0.900	0.949	-0.049	
LAW-ORP-LD1-M-PSM	K_2O		0.137	0.152	-0.015	
LAW-ORP-LD1-M-PSM	Li_2O	<	0.215	0.000	0.215	
LAW-ORP-LD1-M-PSM	MgO		0.931	0.949	-0.018	
LAW-ORP-LD1-M-PSM	Na_2O		19.142	19.907	-0.765	-3.8%
LAW-ORP-LD1-M-PSM	P_2O_5		0.242	0.275	-0.033	
LAW-ORP-LD1-M-PSM	SiO_2		35.887	35.241	0.647	1.8%
LAW-ORP-LD1-M-PSM	SnO_2	<	0.127	0.000	0.127	
LAW-ORP-LD1-M-PSM	SO_3		1.019	1.006	0.013	
LAW-ORP-LD1-M-PSM	V_2O_5		0.839	0.949	-0.110	
LAW-ORP-LD1-M-PSM	ZnO		2.698	2.847	-0.149	
LAW-ORP-LD1-M-PSM	ZrO_2		2.641	2.847	-0.206	
LAW-ORP-LD1-M-PSM	Sum		98.167	99.829	-1.662	-1.7%
LRM	Al_2O_3		9.599	9.510	0.089	0.9%
LRM	B_2O_3		7.634	7.850	-0.216	-2.8%
LRM	CaO		0.468	0.540	-0.072	
LRM	Cl	<	0.050	0.000	0.050	
LRM	Cr_2O_3		0.202	0.190	0.012	
LRM	F		0.898	0.860	0.038	
LRM	Fe_2O_3		1.383	1.380	0.003	
LRM	K_2O		1.482	1.480	0.002	
LRM	Li_2O	<	0.221	0.110	0.111	
LRM	MgO	<	0.166	0.100	0.066	
LRM	Na_2O		20.535	20.030	0.505	2.5%
LRM	P_2O_5		0.482	0.540	-0.058	
LRM	SiO_2		54.258	54.200	0.058	0.1%
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	<	0.124	0.000	0.124	
LRM	ZrO_2		0.927	0.930	-0.003	
LRM	Sum		98.953	98.020	0.933	1.0%
New-IL-103151-SM	Al_2O_3		5.919	6.250	-0.331	-5.3%
New-IL-103151-SM	B_2O_3		7.188	8.000	-0.812	-10.2%
New-IL-103151-SM	CaO		2.921	2.750	0.171	
New-IL-103151-SM	Cl	<	0.050	0.120	-0.070	
New-IL-103151-SM	Cr_2O_3		0.062	0.080	-0.018	
New-IL-103151-SM	F		0.126	0.180	-0.054	
New-IL-103151-SM	Fe_2O_3		1.118	1.250	-0.132	
New-IL-103151-SM	K_2O		0.873	1.000	-0.127	
New-IL-103151-SM	Li_2O		0.659	1.000	-0.341	
New-IL-103151-SM	MgO		2.297	2.500	-0.203	
New-IL-103151-SM	Na_2O		21.804	22.490	-0.686	-3.1%
New-IL-103151-SM	P_2O_5		0.303	0.380	-0.077	
New-IL-103151-SM	SiO_2		40.593	41.840	-1.247	-3.0%
New-IL-103151-SM	SnO_2		2.285	2.500	-0.215	
New-IL-103151-SM	SO_3		1.480	1.170	0.310	
New-IL-103151-SM	V_2O_5		2.821	3.000	-0.179	
New-IL-103151-SM	ZnO		4.127	4.000	0.127	
New-IL-103151-SM	ZrO_2		1.479	1.500	-0.021	
New-IL-103151-SM	Sum		96.105	100.010	-3.905	-3.9%
New-IL-151542-SM	Al_2O_3		5.787	6.250	-0.463	-7.4%

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
New-IL-151542-SM	B_2O_3		8.798	9.740	-0.942	-9.7%
New-IL-151542-SM	CaO		9.231	9.000	0.231	2.6%
New-IL-151542-SM	Cl		0.079	0.310	-0.231	
New-IL-151542-SM	Cr_2O_3		0.164	0.210	-0.046	
New-IL-151542-SM	F		0.315	0.470	-0.155	
New-IL-151542-SM	Fe_2O_3		1.095	1.250	-0.155	
New-IL-151542-SM	K_2O		0.183	0.200	-0.017	
New-IL-151542-SM	Li_2O		0.638	1.000	-0.362	
New-IL-151542-SM	MgO		2.305	2.500	-0.195	
New-IL-151542-SM	Na_2O		17.996	17.370	0.626	3.6%
New-IL-151542-SM	P_2O_5		0.673	1.010	-0.337	
New-IL-151542-SM	SiO_2		37.652	39.390	-1.738	-4.4%
New-IL-151542-SM	SnO_2		3.168	3.500	-0.332	
New-IL-151542-SM	SO_3		1.664	1.300	0.364	
New-IL-151542-SM	V_2O_5		2.919	3.000	-0.081	
New-IL-151542-SM	ZnO		2.029	2.000	0.029	
New-IL-151542-SM	ZrO_2		1.117	1.500	-0.383	
New-IL-151542-SM	Sum		95.813	100.000	-4.187	-4.2%
New-IL-166697-PSM	Al_2O_3		11.346	11.250	0.096	0.9%
New-IL-166697-PSM	B_2O_3		10.110	10.220	-0.110	-1.1%
New-IL-166697-PSM	CaO		2.711	2.750	-0.039	
New-IL-166697-PSM	Cl		0.079	0.310	-0.231	
New-IL-166697-PSM	Cr_2O_3		0.153	0.210	-0.057	
New-IL-166697-PSM	F		0.291	0.470	-0.179	
New-IL-166697-PSM	Fe_2O_3		1.207	1.250	-0.043	
New-IL-166697-PSM	K_2O		0.840	1.000	-0.160	
New-IL-166697-PSM	Li_2O		3.170	3.500	-0.330	
New-IL-166697-PSM	MgO		0.468	0.500	-0.032	
New-IL-166697-PSM	Na_2O		17.423	17.490	-0.067	-0.4%
New-IL-166697-PSM	P_2O_5	<	0.229	1.010	-0.781	
New-IL-166697-PSM	SiO_2		38.026	36.750	1.276	3.5%
New-IL-166697-PSM	SnO_2		3.472	3.500	-0.028	
New-IL-166697-PSM	SO_3		1.474	1.290	0.184	
New-IL-166697-PSM	V_2O_5		2.709	3.000	-0.291	
New-IL-166697-PSM	ZnO		3.794	4.000	-0.206	
New-IL-166697-PSM	ZrO_2		0.521	1.500	-0.979	
New-IL-166697-PSM	Sum		98.024	100.000	-1.976	-2.0%
New-IL-166731-PSM	Al_2O_3		11.625	11.500	0.125	1.1%
New-IL-166731-PSM	B_2O_3		9.322	9.310	0.012	0.1%
New-IL-166731-PSM	CaO		2.777	2.750	0.027	
New-IL-166731-PSM	Cl		0.069	0.310	-0.241	
New-IL-166731-PSM	Cr_2O_3		0.149	0.210	-0.061	
New-IL-166731-PSM	F		0.314	0.470	-0.156	
New-IL-166731-PSM	Fe_2O_3		0.437	0.500	-0.063	
New-IL-166731-PSM	K_2O		0.179	0.200	-0.021	
New-IL-166731-PSM	Li_2O		3.181	3.500	-0.319	
New-IL-166731-PSM	MgO		2.226	2.500	-0.274	
New-IL-166731-PSM	Na_2O		18.030	18.020	0.010	0.1%
New-IL-166731-PSM	P_2O_5		0.246	1.010	-0.764	
New-IL-166731-PSM	SiO_2		38.400	36.750	1.650	4.5%
New-IL-166731-PSM	SnO_2		3.190	3.200	-0.010	
New-IL-166731-PSM	SO_3		1.462	1.270	0.192	
New-IL-166731-PSM	V_2O_5		2.718	3.000	-0.282	
New-IL-166731-PSM	ZnO		3.825	4.000	-0.175	
New-IL-166731-PSM	ZrO_2		0.571	1.500	-0.929	
New-IL-166731-PSM	Sum		98.721	100.000	-1.279	-1.3%
New-IL-1721-PSM	Al_2O_3		6.150	6.250	-0.100	-1.6%
New-IL-1721-PSM	B_2O_3		11.382	11.750	-0.368	-3.1%

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
New-IL-1721-PSM	CaO		2.634	2.750	-0.116	
New-IL-1721-PSM	Cl		0.090	0.310	-0.220	
New-IL-1721-PSM	Cr_2O_3		0.177	0.210	-0.033	
New-IL-1721-PSM	F		0.280	0.470	-0.190	
New-IL-1721-PSM	Fe_2O_3		1.173	1.250	-0.077	
New-IL-1721-PSM	K_2O		0.854	1.000	-0.146	
New-IL-1721-PSM	Li_2O		3.089	3.500	-0.411	
New-IL-1721-PSM	MgO		0.440	0.500	-0.060	
New-IL-1721-PSM	Na_2O		16.311	16.450	-0.139	-0.8%
New-IL-1721-PSM	P_2O_5		0.453	1.010	-0.557	
New-IL-1721-PSM	SiO_2		43.321	43.250	0.071	0.2%
New-IL-1721-PSM	SnO_2		3.383	3.500	-0.117	
New-IL-1721-PSM	SO_3		1.716	1.300	0.416	
New-IL-1721-PSM	V_2O_5		2.673	3.000	-0.327	
New-IL-1721-PSM	ZnO		1.839	2.000	-0.161	
New-IL-1721-PSM	ZrO_2		0.850	1.500	-0.650	
New-IL-1721-PSM	Sum		96.816	100.000	-3.184	-3.2%
New-IL-1721-SM	Al_2O_3		6.046	6.250	-0.204	-3.3%
New-IL-1721-SM	B_2O_3		11.125	11.750	-0.625	-5.3%
New-IL-1721-SM	CaO		2.718	2.750	-0.032	
New-IL-1721-SM	Cl		0.082	0.310	-0.228	
New-IL-1721-SM	Cr_2O_3		0.178	0.210	-0.032	
New-IL-1721-SM	F		0.294	0.470	-0.176	
New-IL-1721-SM	Fe_2O_3		1.246	1.250	-0.004	
New-IL-1721-SM	K_2O		0.922	1.000	-0.078	
New-IL-1721-SM	Li_2O		2.998	3.500	-0.502	
New-IL-1721-SM	MgO		0.466	0.500	-0.034	
New-IL-1721-SM	Na_2O		16.277	16.450	-0.173	-1.1%
New-IL-1721-SM	P_2O_5		0.777	1.010	-0.233	
New-IL-1721-SM	SiO_2		42.091	43.250	-1.159	-2.7%
New-IL-1721-SM	SnO_2		3.387	3.500	-0.113	
New-IL-1721-SM	SO_3		1.647	1.300	0.347	
New-IL-1721-SM	V_2O_5		2.780	3.000	-0.220	
New-IL-1721-SM	ZnO		1.948	2.000	-0.052	
New-IL-1721-SM	ZrO_2		1.373	1.500	-0.127	
New-IL-1721-SM	Sum		96.355	100.000	-3.645	-3.6%
New-IL-42295-SM	Al_2O_3		5.640	6.250	-0.610	-9.8%
New-IL-42295-SM	B_2O_3		10.255	11.750	-1.495	-12.7%
New-IL-42295-SM	CaO		2.749	2.750	-0.001	
New-IL-42295-SM	Cl	<	0.050	0.120	-0.070	
New-IL-42295-SM	Cr_2O_3		0.070	0.080	-0.010	
New-IL-42295-SM	F		0.119	0.180	-0.061	
New-IL-42295-SM	Fe_2O_3		1.082	1.250	-0.168	
New-IL-42295-SM	K_2O		0.196	0.200	-0.004	
New-IL-42295-SM	Li_2O		2.740	3.500	-0.760	
New-IL-42295-SM	MgO		2.206	2.500	-0.294	
New-IL-42295-SM	Na_2O		17.895	17.480	0.415	2.4%
New-IL-42295-SM	P_2O_5		0.299	0.380	-0.081	
New-IL-42295-SM	SiO_2		39.417	42.420	-3.003	-7.1%
New-IL-42295-SM	SnO_2		0.788	1.000	-0.212	
New-IL-42295-SM	SO_3		1.639	0.400	1.239	
New-IL-42295-SM	V_2O_5		2.780	3.000	-0.220	
New-IL-42295-SM	ZnO		1.929	2.000	-0.071	
New-IL-42295-SM	ZrO_2		4.498	4.750	-0.252	
New-IL-42295-SM	Sum		94.352	100.010	-5.658	-5.7%
New-IL-456-SM	Al_2O_3		5.994	6.250	-0.256	-4.1%
New-IL-456-SM	B_2O_3		7.696	8.000	-0.304	-3.8%
New-IL-456-SM	CaO		8.329	9.000	-0.671	-7.5%

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
New-IL-456-SM	Cl	<	0.050	0.120	-0.070	
New-IL-456-SM	Cr_2O_3		0.071	0.080	-0.009	
New-IL-456-SM	F		0.117	0.180	-0.063	
New-IL-456-SM	Fe_2O_3		1.256	1.250	0.006	
New-IL-456-SM	K_2O		0.189	0.200	-0.011	
New-IL-456-SM	Li_2O		3.025	3.500	-0.475	
New-IL-456-SM	MgO		2.139	2.500	-0.361	
New-IL-456-SM	Na_2O		15.030	15.000	0.030	0.2%
New-IL-456-SM	P_2O_5		0.313	0.380	-0.067	
New-IL-456-SM	SiO_2		41.770	43.150	-1.380	-3.2%
New-IL-456-SM	SnO_2		3.295	3.500	-0.205	
New-IL-456-SM	SO_3		1.949	0.400	1.549	
New-IL-456-SM	V_2O_5		2.727	3.000	-0.273	
New-IL-456-SM	ZnO		1.880	2.000	-0.120	
New-IL-456-SM	ZrO_2		1.271	1.500	-0.229	
New-IL-456-SM	Sum		97.100	100.010	-2.910	-2.9%
New-IL-5253-SM	Al_2O_3		6.061	6.250	-0.189	-3.0%
New-IL-5253-SM	B_2O_3		11.109	11.750	-0.641	-5.5%
New-IL-5253-SM	CaO		2.718	2.750	-0.032	
New-IL-5253-SM	Cl	<	0.050	0.120	-0.070	
New-IL-5253-SM	Cr_2O_3		0.072	0.080	-0.008	
New-IL-5253-SM	F		0.115	0.180	-0.065	
New-IL-5253-SM	Fe_2O_3		1.247	1.250	-0.003	
New-IL-5253-SM	K_2O		0.186	0.200	-0.014	
New-IL-5253-SM	Li_2O		2.982	3.500	-0.518	
New-IL-5253-SM	MgO		2.247	2.500	-0.253	
New-IL-5253-SM	Na_2O		15.131	15.000	0.131	0.9%
New-IL-5253-SM	P_2O_5		0.334	0.380	-0.046	
New-IL-5253-SM	SiO_2		38.882	39.750	-0.868	-2.2%
New-IL-5253-SM	SnO_2		3.339	3.500	-0.161	
New-IL-5253-SM	SO_3		1.459	1.300	0.159	
New-IL-5253-SM	V_2O_5		2.816	3.000	-0.184	
New-IL-5253-SM	ZnO		3.921	4.000	-0.079	
New-IL-5253-SM	ZrO_2		4.363	4.500	-0.137	
New-IL-5253-SM	Sum		97.031	100.010	-2.979	-3.0%
New-IL-5255-SM	Al_2O_3		6.075	6.250	-0.175	-2.8%
New-IL-5255-SM	B_2O_3		11.068	11.750	-0.682	-5.8%
New-IL-5255-SM	CaO		2.770	2.750	0.020	
New-IL-5255-SM	Cl	<	0.050	0.120	-0.070	
New-IL-5255-SM	Cr_2O_3		0.065	0.080	-0.015	
New-IL-5255-SM	F		0.118	0.180	-0.062	
New-IL-5255-SM	Fe_2O_3		1.279	1.250	0.029	
New-IL-5255-SM	K_2O		0.182	0.200	-0.018	
New-IL-5255-SM	Li_2O		3.036	3.500	-0.464	
New-IL-5255-SM	MgO		2.247	2.500	-0.253	
New-IL-5255-SM	Na_2O		17.389	18.000	-0.611	-3.4%
New-IL-5255-SM	P_2O_5		0.264	0.380	-0.116	
New-IL-5255-SM	SiO_2		36.047	36.750	-0.703	-1.9%
New-IL-5255-SM	SnO_2		3.374	3.500	-0.126	
New-IL-5255-SM	SO_3		1.584	1.300	0.284	
New-IL-5255-SM	V_2O_5		2.767	3.000	-0.233	
New-IL-5255-SM	ZnO		3.940	4.000	-0.060	
New-IL-5255-SM	ZrO_2		3.735	4.500	-0.765	
New-IL-5255-SM	Sum		95.990	100.010	-4.020	-4.0%
New-IL-70316-SM	Al_2O_3		5.763	6.250	-0.487	-7.8%
New-IL-70316-SM	B_2O_3		7.076	8.000	-0.924	-11.6%
New-IL-70316-SM	CaO		8.930	9.000	-0.070	-0.8%
New-IL-70316-SM	Cl	<	0.050	0.120	-0.070	

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
New-IL-70316-SM	Cr_2O_3		0.058	0.080	-0.022	
New-IL-70316-SM	F		0.121	0.180	-0.059	
New-IL-70316-SM	Fe_2O_3		1.083	1.250	-0.167	
New-IL-70316-SM	K_2O		0.828	1.000	-0.172	
New-IL-70316-SM	Li_2O		0.635	1.000	-0.365	
New-IL-70316-SM	MgO		2.264	2.500	-0.236	
New-IL-70316-SM	Na_2O		19.681	20.230	-0.549	-2.7%
New-IL-70316-SM	P_2O_5		0.306	0.380	-0.074	
New-IL-70316-SM	SiO_2		36.796	38.720	-1.924	-5.0%
New-IL-70316-SM	SnO_2		3.171	3.500	-0.329	
New-IL-70316-SM	SO_3		1.602	1.300	0.302	
New-IL-70316-SM	V_2O_5		2.794	3.000	-0.206	
New-IL-70316-SM	ZnO		1.982	2.000	-0.018	
New-IL-70316-SM	ZrO_2		1.439	1.500	-0.061	
New-IL-70316-SM	Sum		94.579	100.010	-5.431	-5.4%
New-IL-87749-SM	Al_2O_3		10.369	11.500	-1.131	-9.8%
New-IL-87749-SM	B_2O_3		6.995	8.000	-1.005	-12.6%
New-IL-87749-SM	CaO		8.944	9.000	-0.056	-0.6%
New-IL-87749-SM	Cl	<	0.050	0.120	-0.070	
New-IL-87749-SM	Cr_2O_3		0.058	0.080	-0.022	
New-IL-87749-SM	F		0.123	0.180	-0.057	
New-IL-87749-SM	Fe_2O_3		1.058	1.250	-0.192	
New-IL-87749-SM	K_2O		0.846	1.000	-0.154	
New-IL-87749-SM	Li_2O		2.772	3.500	-0.728	
New-IL-87749-SM	MgO		0.437	0.500	-0.063	
New-IL-87749-SM	Na_2O		18.131	17.490	0.641	3.7%
New-IL-87749-SM	P_2O_5		0.314	0.380	-0.066	
New-IL-87749-SM	SiO_2		34.924	37.410	-2.486	-6.6%
New-IL-87749-SM	SnO_2		2.352	2.700	-0.348	
New-IL-87749-SM	SO_3		1.633	0.400	1.233	
New-IL-87749-SM	V_2O_5		2.763	3.000	-0.237	
New-IL-87749-SM	ZnO		1.957	2.000	-0.043	
New-IL-87749-SM	ZrO_2		1.386	1.500	-0.114	
New-IL-87749-SM	Sum		95.112	100.010	-4.898	-4.9%
New-IL-93907-SM	Al_2O_3		10.884	11.500	-0.616	-5.4%
New-IL-93907-SM	B_2O_3		10.859	11.750	-0.891	-7.6%
New-IL-93907-SM	CaO		2.805	2.750	0.055	
New-IL-93907-SM	Cl	<	0.050	0.120	-0.070	
New-IL-93907-SM	Cr_2O_3		0.070	0.080	-0.010	
New-IL-93907-SM	F		0.113	0.180	-0.067	
New-IL-93907-SM	Fe_2O_3		1.140	1.250	-0.110	
New-IL-93907-SM	K_2O		0.903	1.000	-0.097	
New-IL-93907-SM	Li_2O		2.820	3.500	-0.680	
New-IL-93907-SM	MgO		0.457	0.500	-0.043	
New-IL-93907-SM	Na_2O		15.637	15.120	0.517	3.4%
New-IL-93907-SM	P_2O_5		0.312	0.380	-0.068	
New-IL-93907-SM	SiO_2		42.198	43.250	-1.052	-2.4%
New-IL-93907-SM	SnO_2		3.212	3.500	-0.288	
New-IL-93907-SM	SO_3		1.134	1.130	0.004	
New-IL-93907-SM	V_2O_5		0.465	0.500	-0.035	
New-IL-93907-SM	ZnO		1.995	2.000	-0.005	
New-IL-93907-SM	ZrO_2		1.452	1.500	-0.048	
New-IL-93907-SM	Sum		96.506	100.010	-3.504	-3.5%
New-IL-94020-PSM	Al_2O_3		11.564	11.500	0.064	0.6%
New-IL-94020-PSM	B_2O_3		8.042	8.000	0.042	0.5%
New-IL-94020-PSM	CaO		3.474	3.530	-0.056	
New-IL-94020-PSM	Cl	<	0.050	0.120	-0.070	
New-IL-94020-PSM	Cr_2O_3		0.073	0.080	-0.007	

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
New-IL-94020-PSM	F		0.100	0.180	-0.080	
New-IL-94020-PSM	Fe_2O_3		1.217	1.250	-0.033	
New-IL-94020-PSM	K_2O		0.179	0.200	-0.021	
New-IL-94020-PSM	Li_2O		3.111	3.500	-0.389	
New-IL-94020-PSM	MgO		2.259	2.500	-0.241	
New-IL-94020-PSM	Na_2O		15.232	15.000	0.232	1.5%
New-IL-94020-PSM	P_2O_5		0.293	0.380	-0.087	
New-IL-94020-PSM	SiO_2		44.604	43.250	1.354	3.1%
New-IL-94020-PSM	SnO_2		3.450	3.500	-0.050	
New-IL-94020-PSM	SO_3		1.081	1.020	0.061	
New-IL-94020-PSM	V_2O_5		0.440	0.500	-0.060	
New-IL-94020-PSM	ZnO		3.753	4.000	-0.247	
New-IL-94020-PSM	ZrO_2		1.223	1.500	-0.277	
New-IL-94020-PSM	Sum		100.146	100.010	0.136	0.1%
New-OL-100210-SM	Al_2O_3		3.458	3.500	-0.042	
New-OL-100210-SM	B_2O_3		5.739	6.000	-0.261	-4.4%
New-OL-100210-SM	CaO		1.875	1.890	-0.015	
New-OL-100210-SM	Cl		0.164	0.470	-0.306	
New-OL-100210-SM	Cr_2O_3		0.255	0.310	-0.055	
New-OL-100210-SM	F		0.515	0.710	-0.195	
New-OL-100210-SM	Fe_2O_3	<	0.143	0.000	0.143	
New-OL-100210-SM	K_2O	<	0.120	0.000	0.120	
New-OL-100210-SM	Li_2O	<	0.215	0.000	0.215	
New-OL-100210-SM	MgO		3.122	3.500	-0.378	
New-OL-100210-SM	Na_2O		22.849	26.000	-3.151	-12.1%
New-OL-100210-SM	P_2O_5		1.215	1.510	-0.295	
New-OL-100210-SM	SiO_2		45.460	47.000	-1.540	-3.3%
New-OL-100210-SM	SnO_2		3.098	3.200	-0.102	
New-OL-100210-SM	SO_3		1.478	0.910	0.568	
New-OL-100210-SM	V_2O_5	<	0.179	0.000	0.179	
New-OL-100210-SM	ZnO		4.936	5.000	-0.064	-1.3%
New-OL-100210-SM	ZrO_2	<	0.135	0.000	0.135	
New-OL-100210-SM	Sum		94.955	100.000	-5.045	-5.0%
New-OL-108249Mod-PSM	Al_2O_3		11.677	12.030	-0.353	-2.9%
New-OL-108249Mod-PSM	B_2O_3		5.715	6.040	-0.325	-5.4%
New-OL-108249Mod-PSM	CaO		9.567	10.070	-0.503	-5.0%
New-OL-108249Mod-PSM	Cl		0.094	0.470	-0.376	
New-OL-108249Mod-PSM	Cr_2O_3		0.163	0.310	-0.147	
New-OL-108249Mod-PSM	F		0.474	0.710	-0.236	
New-OL-108249Mod-PSM	Fe_2O_3		1.422	1.510	-0.088	
New-OL-108249Mod-PSM	K_2O		1.027	1.510	-0.483	
New-OL-108249Mod-PSM	Li_2O		4.494	5.030	-0.536	-10.7%
New-OL-108249Mod-PSM	MgO	<	0.166	0.000	0.166	
New-OL-108249Mod-PSM	Na_2O		15.603	15.610	-0.007	0.0%
New-OL-108249Mod-PSM	P_2O_5		1.340	1.520	-0.180	
New-OL-108249Mod-PSM	SiO_2		34.068	34.230	-0.162	-0.5%
New-OL-108249Mod-PSM	SnO_2		5.935	5.030	0.905	18.0%
New-OL-108249Mod-PSM	SO_3		1.267	0.890	0.377	
New-OL-108249Mod-PSM	V_2O_5	<	0.135	0.000	0.135	
New-OL-108249Mod-PSM	ZnO		4.715	5.030	-0.315	-6.3%
New-OL-108249Mod-PSM	ZrO_2	<	0.135	0.000	0.135	
New-OL-108249Mod-PSM	Sum		97.998	99.990	-1.992	-2.0%
New-OL-108249Mod-SM	Al_2O_3		11.838	12.030	-0.192	-1.6%
New-OL-108249Mod-SM	B_2O_3		6.061	6.040	0.021	0.3%
New-OL-108249Mod-SM	CaO		9.780	10.070	-0.290	-2.9%
New-OL-108249Mod-SM	Cl		0.098	0.470	-0.372	
New-OL-108249Mod-SM	Cr_2O_3		0.152	0.310	-0.158	
New-OL-108249Mod-SM	F		0.532	0.710	-0.178	

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
New-OL-108249Mod-SM	Fe_2O_3		1.562	1.510	0.052	
New-OL-108249Mod-SM	K_2O		1.101	1.510	-0.409	
New-OL-108249Mod-SM	Li_2O		4.516	5.030	-0.514	-10.2%
New-OL-108249Mod-SM	MgO	<	0.166	0.000	0.166	
New-OL-108249Mod-SM	Na_2O		15.502	15.610	-0.108	-0.7%
New-OL-108249Mod-SM	P_2O_5		1.290	1.520	-0.230	
New-OL-108249Mod-SM	SiO_2		34.710	34.230	0.480	1.4%
New-OL-108249Mod-SM	SnO_2		4.659	5.030	-0.371	-7.4%
New-OL-108249Mod-SM	SO_3		1.295	0.890	0.405	
New-OL-108249Mod-SM	V_2O_5	<	0.179	0.000	0.179	
New-OL-108249Mod-SM	ZnO		5.013	5.030	-0.017	-0.3%
New-OL-108249Mod-SM	ZrO_2	<	0.135	0.000	0.135	
New-OL-108249Mod-SM	Sum		98.590	99.990	-1.400	-1.4%
New-OL-116208Mod-PSM	Al_2O_3		3.609	3.530	0.079	
New-OL-116208Mod-PSM	B_2O_3		6.102	6.050	0.052	0.9%
New-OL-116208Mod-PSM	CaO		11.939	12.350	-0.411	-3.3%
New-OL-116208Mod-PSM	Cl		0.095	0.470	-0.375	
New-OL-116208Mod-PSM	Cr_2O_3		0.156	0.310	-0.154	
New-OL-116208Mod-PSM	F		0.504	0.720	-0.216	
New-OL-116208Mod-PSM	Fe_2O_3		1.508	1.510	-0.002	
New-OL-116208Mod-PSM	K_2O	<	0.120	0.000	0.120	
New-OL-116208Mod-PSM	Li_2O		4.666	5.050	-0.384	-7.6%
New-OL-116208Mod-PSM	MgO		3.466	3.530	-0.064	
New-OL-116208Mod-PSM	Na_2O		16.075	16.340	-0.265	-1.6%
New-OL-116208Mod-PSM	P_2O_5		1.166	1.520	-0.354	
New-OL-116208Mod-PSM	SiO_2		35.405	34.310	1.095	3.2%
New-OL-116208Mod-PSM	SnO_2		4.437	4.540	-0.103	
New-OL-116208Mod-PSM	SO_3		1.464	0.930	0.534	
New-OL-116208Mod-PSM	V_2O_5		1.110	1.260	-0.150	
New-OL-116208Mod-PSM	ZnO		0.936	1.010	-0.074	
New-OL-116208Mod-PSM	ZrO_2		5.883	6.560	-0.677	-10.3%
New-OL-116208Mod-PSM	Sum		98.642	99.990	-1.348	-1.3%
New-OL-116208Mod-SM	Al_2O_3		3.533	3.530	0.003	
New-OL-116208Mod-SM	B_2O_3		5.812	6.050	-0.238	-3.9%
New-OL-116208Mod-SM	CaO		11.771	12.350	-0.579	-4.7%
New-OL-116208Mod-SM	Cl		0.091	0.470	-0.379	
New-OL-116208Mod-SM	Cr_2O_3		0.140	0.310	-0.170	
New-OL-116208Mod-SM	F		0.581	0.720	-0.139	
New-OL-116208Mod-SM	Fe_2O_3		1.510	1.510	0.000	
New-OL-116208Mod-SM	K_2O	<	0.120	0.000	0.120	
New-OL-116208Mod-SM	Li_2O		4.467	5.050	-0.583	-11.5%
New-OL-116208Mod-SM	MgO		3.453	3.530	-0.077	
New-OL-116208Mod-SM	Na_2O		15.300	16.340	-1.040	-6.4%
New-OL-116208Mod-SM	P_2O_5		1.216	1.520	-0.304	
New-OL-116208Mod-SM	SiO_2		33.640	34.310	-0.670	-2.0%
New-OL-116208Mod-SM	SnO_2		4.285	4.540	-0.255	
New-OL-116208Mod-SM	SO_3		1.271	0.930	0.341	
New-OL-116208Mod-SM	V_2O_5		1.114	1.260	-0.146	
New-OL-116208Mod-SM	ZnO		0.965	1.010	-0.045	
New-OL-116208Mod-SM	ZrO_2		5.923	6.560	-0.637	-9.7%
New-OL-116208Mod-SM	Sum		95.194	99.990	-4.796	-4.8%
New-OL-122817-SM	Al_2O_3		3.514	3.500	0.014	
New-OL-122817-SM	B_2O_3		5.876	6.000	-0.124	-2.1%
New-OL-122817-SM	CaO		11.585	12.240	-0.655	-5.4%
New-OL-122817-SM	Cl		0.118	0.470	-0.352	
New-OL-122817-SM	Cr_2O_3		0.243	0.310	-0.067	
New-OL-122817-SM	F		0.470	0.710	-0.240	
New-OL-122817-SM	Fe_2O_3		1.514	1.500	0.014	

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
New-OL-122817-SM	K_2O		1.223	1.500	-0.277	
New-OL-122817-SM	Li_2O	<	0.215	0.000	0.215	
New-OL-122817-SM	MgO	<	0.166	0.000	0.166	
New-OL-122817-SM	Na_2O		17.558	18.600	-1.042	-5.6%
New-OL-122817-SM	P_2O_5		1.352	1.510	-0.158	
New-OL-122817-SM	SiO_2		43.588	44.170	-0.582	-1.3%
New-OL-122817-SM	SnO_2		2.955	3.000	-0.045	
New-OL-122817-SM	SO_3		1.977	1.490	0.487	
New-OL-122817-SM	V_2O_5		3.637	4.000	-0.363	
New-OL-122817-SM	ZnO		0.959	1.000	-0.041	
New-OL-122817-SM	ZrO_2	<	0.135	0.000	0.135	
New-OL-122817-SM	Sum		97.087	100.000	-2.913	-2.9%
New-OL-127708Mod-SM	Al_2O_3		10.477	10.940	-0.463	-4.2%
New-OL-127708Mod-SM	B_2O_3		13.210	13.750	-0.540	-3.9%
New-OL-127708Mod-SM	CaO		0.300	0.300	0.000	
New-OL-127708Mod-SM	Cl	<	0.050	0.060	-0.010	
New-OL-127708Mod-SM	Cr_2O_3		0.048	0.040	0.008	
New-OL-127708Mod-SM	F		0.050	0.090	-0.040	
New-OL-127708Mod-SM	Fe_2O_3		1.489	1.500	-0.011	
New-OL-127708Mod-SM	K_2O		1.280	1.500	-0.220	
New-OL-127708Mod-SM	Li_2O		2.123	2.010	0.113	
New-OL-127708Mod-SM	MgO		3.084	3.500	-0.416	
New-OL-127708Mod-SM	Na_2O		13.429	12.500	0.929	7.4%
New-OL-127708Mod-SM	P_2O_5	<	0.229	0.200	0.029	
New-OL-127708Mod-SM	SiO_2		45.674	47.000	-1.326	-2.8%
New-OL-127708Mod-SM	SnO_2		4.212	5.000	-0.788	-15.8%
New-OL-127708Mod-SM	SO_3		0.850	0.610	0.240	
New-OL-127708Mod-SM	V_2O_5	<	0.179	0.000	0.179	
New-OL-127708Mod-SM	ZnO		0.945	1.000	-0.055	
New-OL-127708Mod-SM	ZrO_2	<	0.135	0.000	0.135	
New-OL-127708Mod-SM	Sum		97.765	100.000	-2.235	-2.2%
New-OL-14844-SM	Al_2O_3		3.807	3.500	0.307	
New-OL-14844-SM	B_2O_3		6.367	6.150	0.217	3.5%
New-OL-14844-SM	CaO		11.914	12.240	-0.326	-2.7%
New-OL-14844-SM	Cl		0.072	0.470	-0.398	
New-OL-14844-SM	Cr_2O_3		0.145	0.310	-0.165	
New-OL-14844-SM	F		0.546	0.710	-0.164	
New-OL-14844-SM	Fe_2O_3	<	0.143	0.000	0.143	
New-OL-14844-SM	K_2O		1.034	1.500	-0.466	
New-OL-14844-SM	Li_2O		4.860	5.000	-0.140	-2.8%
New-OL-14844-SM	MgO		3.122	3.500	-0.378	
New-OL-14844-SM	Na_2O		15.603	15.510	0.093	0.6%
New-OL-14844-SM	P_2O_5		1.190	1.510	-0.320	
New-OL-14844-SM	SiO_2		37.170	34.000	3.170	9.3%
New-OL-14844-SM	SnO_2	<	0.127	0.000	0.127	
New-OL-14844-SM	SO_3		1.403	0.100	1.303	
New-OL-14844-SM	V_2O_5		3.602	4.000	-0.398	
New-OL-14844-SM	ZnO		4.880	5.000	-0.120	-2.4%
New-OL-14844-SM	ZrO_2		5.646	6.500	-0.854	-13.1%
New-OL-14844-SM	Sum		101.632	100.000	1.632	1.6%
New-OL-15493-SM	Al_2O_3		3.543	3.500	0.043	
New-OL-15493-SM	B_2O_3		5.667	6.000	-0.333	-5.6%
New-OL-15493-SM	CaO		11.519	12.240	-0.721	-5.9%
New-OL-15493-SM	Cl	<	0.050	0.060	-0.010	
New-OL-15493-SM	Cr_2O_3		0.031	0.040	-0.009	
New-OL-15493-SM	F		0.057	0.090	-0.033	
New-OL-15493-SM	Fe_2O_3	<	0.143	0.000	0.143	
New-OL-15493-SM	K_2O		1.222	1.500	-0.278	

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
New-OL-15493-SM	Li_2O	<	0.215	0.000	0.215	
New-OL-15493-SM	MgO		3.035	3.500	-0.465	
New-OL-15493-SM	Na_2O		23.657	25.510	-1.853	-7.3%
New-OL-15493-SM	P_2O_5	<	0.229	0.200	0.029	
New-OL-15493-SM	SiO_2		39.684	39.250	0.434	1.1%
New-OL-15493-SM	SnO_2		2.958	3.000	-0.042	
New-OL-15493-SM	SO_3		2.138	0.100	2.038	
New-OL-15493-SM	V_2O_5		3.432	4.000	-0.568	
New-OL-15493-SM	ZnO		0.935	1.000	-0.065	
New-OL-15493-SM	ZrO_2	<	0.135	0.000	0.135	
New-OL-15493-SM	Sum		98.650	99.990	-1.340	-1.3%
New-OL-17130-SM	Al_2O_3		3.524	3.500	0.024	
New-OL-17130-SM	B_2O_3		13.194	13.750	-0.556	-4.0%
New-OL-17130-SM	CaO		1.648	1.650	-0.002	
New-OL-17130-SM	Cl		0.204	0.470	-0.266	
New-OL-17130-SM	Cr_2O_3		0.285	0.310	-0.025	
New-OL-17130-SM	F		0.438	0.710	-0.272	
New-OL-17130-SM	Fe_2O_3		1.424	1.500	-0.076	
New-OL-17130-SM	K_2O	<	0.120	0.000	0.120	
New-OL-17130-SM	Li_2O		4.462	5.000	-0.538	-10.8%
New-OL-17130-SM	MgO	<	0.166	0.000	0.166	
New-OL-17130-SM	Na_2O		17.760	16.500	1.260	7.6%
New-OL-17130-SM	P_2O_5		1.240	1.510	-0.270	
New-OL-17130-SM	SiO_2		47.118	47.000	0.118	0.3%
New-OL-17130-SM	SnO_2		2.945	3.000	-0.055	
New-OL-17130-SM	SO_3		2.379	0.100	2.279	
New-OL-17130-SM	V_2O_5		3.673	4.000	-0.327	
New-OL-17130-SM	ZnO		0.967	1.000	-0.033	
New-OL-17130-SM	ZrO_2	<	0.135	0.000	0.135	
New-OL-17130-SM	Sum		101.683	100.000	1.683	1.7%
New-OL-45748-SM	Al_2O_3		14.653	13.850	0.803	5.8%
New-OL-45748-SM	B_2O_3		6.327	6.000	0.327	5.5%
New-OL-45748-SM	CaO		12.135	12.240	-0.105	-0.9%
New-OL-45748-SM	Cl		0.096	0.470	-0.374	
New-OL-45748-SM	Cr_2O_3		0.216	0.310	-0.094	
New-OL-45748-SM	F		0.476	0.710	-0.234	
New-OL-45748-SM	Fe_2O_3		1.523	1.500	0.023	
New-OL-45748-SM	K_2O	<	0.120	0.000	0.120	
New-OL-45748-SM	Li_2O		4.855	5.000	-0.145	-2.9%
New-OL-45748-SM	MgO	<	0.166	0.000	0.166	
New-OL-45748-SM	Na_2O		12.449	11.400	1.049	9.2%
New-OL-45748-SM	P_2O_5		1.444	1.510	-0.066	
New-OL-45748-SM	SiO_2		37.331	34.000	3.331	9.8%
New-OL-45748-SM	SnO_2		4.834	5.000	-0.166	-3.3%
New-OL-45748-SM	SO_3		1.637	0.100	1.537	
New-OL-45748-SM	V_2O_5		2.758	2.910	-0.152	
New-OL-45748-SM	ZnO		4.886	5.000	-0.114	-2.3%
New-OL-45748-SM	ZrO_2	<	0.135	0.000	0.135	
New-OL-45748-SM	Sum		106.039	100.000	6.039	6.0%
New-OL-54017-SM	Al_2O_3		3.661	3.500	0.161	
New-OL-54017-SM	B_2O_3		6.094	6.000	0.094	1.6%
New-OL-54017-SM	CaO		10.641	11.170	-0.529	-4.7%
New-OL-54017-SM	Cl	<	0.050	0.060	-0.010	
New-OL-54017-SM	Cr_2O_3		0.048	0.040	0.008	
New-OL-54017-SM	F		0.054	0.090	-0.036	
New-OL-54017-SM	Fe_2O_3		1.490	1.500	-0.010	
New-OL-54017-SM	K_2O	<	0.120	0.000	0.120	
New-OL-54017-SM	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
New-OL-54017-SM	MgO		3.176	3.500	-0.324	
New-OL-54017-SM	Na_2O		15.839	15.000	0.839	5.6%
New-OL-54017-SM	P_2O_5	<	0.229	0.200	0.029	
New-OL-54017-SM	SiO_2		49.632	47.000	2.632	5.6%
New-OL-54017-SM	SnO_2		4.964	5.000	-0.036	-0.7%
New-OL-54017-SM	SO_3		1.331	0.100	1.231	
New-OL-54017-SM	V_2O_5		1.751	1.850	-0.099	
New-OL-54017-SM	ZnO		4.889	5.000	-0.111	-2.2%
New-OL-54017-SM	ZrO_2	<	0.135	0.000	0.135	
New-OL-54017-SM	Sum		104.320	100.010	4.310	4.3%
New-OL-57284-SM	Al_2O_3		3.699	3.500	0.199	
New-OL-57284-SM	B_2O_3		14.143	13.750	0.393	2.9%
New-OL-57284-SM	CaO		2.896	2.980	-0.084	
New-OL-57284-SM	Cl		0.150	0.470	-0.320	
New-OL-57284-SM	Cr_2O_3		0.287	0.310	-0.023	
New-OL-57284-SM	F		0.454	0.710	-0.256	
New-OL-57284-SM	Fe_2O_3	<	0.143	0.000	0.143	
New-OL-57284-SM	K_2O		1.382	1.500	-0.118	
New-OL-57284-SM	Li_2O	<	0.215	0.000	0.215	
New-OL-57284-SM	MgO	<	0.166	0.000	0.166	
New-OL-57284-SM	Na_2O		14.491	14.010	0.481	3.4%
New-OL-57284-SM	P_2O_5		1.256	1.510	-0.254	
New-OL-57284-SM	SiO_2		48.509	47.000	1.509	3.2%
New-OL-57284-SM	SnO_2	<	0.127	0.000	0.127	
New-OL-57284-SM	SO_3		0.916	0.100	0.816	
New-OL-57284-SM	V_2O_5		3.713	4.000	-0.287	
New-OL-57284-SM	ZnO		4.855	5.000	-0.145	-2.9%
New-OL-57284-SM	ZrO_2		4.768	5.160	-0.392	-7.6%
New-OL-57284-SM	Sum		102.170	100.000	2.170	2.2%
New-OL-62380-SM	Al_2O_3		3.656	3.500	0.156	
New-OL-62380-SM	B_2O_3		13.813	13.750	0.063	0.5%
New-OL-62380-SM	CaO		11.596	12.240	-0.644	-5.3%
New-OL-62380-SM	Cl	<	0.050	0.110	-0.060	
New-OL-62380-SM	Cr_2O_3		0.073	0.080	-0.007	
New-OL-62380-SM	F		0.092	0.710	-0.618	
New-OL-62380-SM	Fe_2O_3		1.481	1.500	-0.019	
New-OL-62380-SM	K_2O		1.187	1.500	-0.313	
New-OL-62380-SM	Li_2O	<	0.215	0.000	0.215	
New-OL-62380-SM	MgO	<	0.166	0.000	0.166	
New-OL-62380-SM	Na_2O		14.660	14.010	0.650	4.6%
New-OL-62380-SM	P_2O_5		0.316	0.370	-0.054	
New-OL-62380-SM	SiO_2		35.887	34.000	1.887	5.6%
New-OL-62380-SM	SnO_2		4.678	4.500	0.178	
New-OL-62380-SM	SO_3		1.532	0.100	1.432	
New-OL-62380-SM	V_2O_5		2.468	2.660	-0.192	
New-OL-62380-SM	ZnO		4.811	5.000	-0.189	-3.8%
New-OL-62380-SM	ZrO_2		6.156	6.500	-0.344	-5.3%
New-OL-62380-SM	Sum		102.839	100.530	2.309	2.3%
New-OL-62909Mod-PSM	Al_2O_3		12.197	12.350	-0.153	-1.2%
New-OL-62909Mod-PSM	B_2O_3		8.895	8.900	-0.005	-0.1%
New-OL-62909Mod-PSM	CaO		11.788	12.240	-0.452	-3.7%
New-OL-62909Mod-PSM	Cl		0.086	0.470	-0.384	
New-OL-62909Mod-PSM	Cr_2O_3		0.276	0.310	-0.034	
New-OL-62909Mod-PSM	F		0.470	0.710	-0.240	
New-OL-62909Mod-PSM	Fe_2O_3	<	0.143	0.000	0.143	
New-OL-62909Mod-PSM	K_2O	<	0.120	0.000	0.120	
New-OL-62909Mod-PSM	Li_2O		2.230	2.500	-0.270	
New-OL-62909Mod-PSM	MgO		3.188	3.500	-0.312	

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
New-OL-62909Mod-PSM	Na_2O		13.493	13.000	0.493	3.8%
New-OL-62909Mod-PSM	P_2O_5		0.603	1.510	-0.907	
New-OL-62909Mod-PSM	SiO_2		34.282	33.500	0.782	2.3%
New-OL-62909Mod-PSM	SnO_2		4.126	4.410	-0.284	
New-OL-62909Mod-PSM	SO_3		1.265	0.100	1.165	
New-OL-62909Mod-PSM	V_2O_5	<	0.179	0.000	0.179	
New-OL-62909Mod-PSM	ZnO		0.933	1.000	-0.067	
New-OL-62909Mod-PSM	ZrO_2		4.599	5.500	-0.901	-16.4%
New-OL-62909Mod-PSM	Sum		98.874	100.000	-1.126	-1.1%
New-OL-65959Mod-PSM	Al_2O_3		13.326	13.850	-0.524	-3.8%
New-OL-65959Mod-PSM	B_2O_3		12.646	13.050	-0.404	-3.1%
New-OL-65959Mod-PSM	CaO	<	0.140	0.000	0.140	
New-OL-65959Mod-PSM	Cl	<	0.050	0.060	-0.010	
New-OL-65959Mod-PSM	Cr_2O_3		0.049	0.040	0.009	
New-OL-65959Mod-PSM	F		0.051	0.090	-0.039	
New-OL-65959Mod-PSM	Fe_2O_3	<	0.143	0.000	0.143	
New-OL-65959Mod-PSM	K_2O	<	0.120	0.000	0.120	
New-OL-65959Mod-PSM	Li_2O		4.483	5.000	-0.517	-10.3%
New-OL-65959Mod-PSM	MgO		3.093	3.500	-0.407	
New-OL-65959Mod-PSM	Na_2O		17.591	16.500	1.091	6.6%
New-OL-65959Mod-PSM	P_2O_5	<	0.229	0.200	0.029	
New-OL-65959Mod-PSM	SiO_2		34.443	34.500	-0.057	-0.2%
New-OL-65959Mod-PSM	SnO_2		4.031	4.500	-0.469	
New-OL-65959Mod-PSM	SO_3		1.680	0.100	1.580	
New-OL-65959Mod-PSM	V_2O_5		3.303	3.600	-0.297	
New-OL-65959Mod-PSM	ZnO		4.680	5.000	-0.320	-6.4%
New-OL-65959Mod-PSM	ZrO_2	<	0.135	0.000	0.135	
New-OL-65959Mod-PSM	Sum		100.194	99.990	0.204	0.2%
New-OL-80309-SM	Al_2O_3		3.850	3.500	0.350	
New-OL-80309-SM	B_2O_3		14.602	13.750	0.852	6.2%
New-OL-80309-SM	CaO	<	0.140	0.000	0.140	
New-OL-80309-SM	Cl	<	0.050	0.060	-0.010	
New-OL-80309-SM	Cr_2O_3		0.035	0.040	-0.005	
New-OL-80309-SM	F		0.060	0.090	-0.030	
New-OL-80309-SM	Fe_2O_3		1.541	1.500	0.041	
New-OL-80309-SM	K_2O		1.241	1.500	-0.259	
New-OL-80309-SM	Li_2O		4.812	5.000	-0.188	-3.8%
New-OL-80309-SM	MgO		3.221	3.500	-0.279	
New-OL-80309-SM	Na_2O		15.704	15.100	0.604	4.0%
New-OL-80309-SM	P_2O_5	<	0.229	0.200	0.029	
New-OL-80309-SM	SiO_2		37.598	34.000	3.598	10.6%
New-OL-80309-SM	SnO_2		4.545	4.500	0.045	
New-OL-80309-SM	SO_3		1.657	1.750	-0.093	
New-OL-80309-SM	V_2O_5		3.780	4.000	-0.220	
New-OL-80309-SM	ZnO		5.029	5.000	0.029	0.6%
New-OL-80309-SM	ZrO_2		6.528	6.500	0.028	0.4%
New-OL-80309-SM	Sum		104.623	99.990	4.633	4.6%
New-OL-8445-SM	Al_2O_3		13.170	12.410	0.760	6.1%
New-OL-8445-SM	B_2O_3		14.562	13.750	0.812	5.9%
New-OL-8445-SM	CaO		11.858	12.240	-0.382	-3.1%
New-OL-8445-SM	Cl		0.124	0.470	-0.346	
New-OL-8445-SM	Cr_2O_3		0.264	0.310	-0.046	
New-OL-8445-SM	F		0.488	0.710	-0.222	
New-OL-8445-SM	Fe_2O_3	<	0.143	0.000	0.143	
New-OL-8445-SM	K_2O		1.240	1.500	-0.260	
New-OL-8445-SM	Li_2O		1.778	2.010	-0.232	
New-OL-8445-SM	MgO		3.072	3.500	-0.428	
New-OL-8445-SM	Na_2O		11.485	10.000	1.485	14.9%

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
New-OL-8445-SM	P_2O_5		1.273	1.510	-0.237	
New-OL-8445-SM	SiO_2		37.063	34.000	3.063	9.0%
New-OL-8445-SM	SnO_2	<	0.127	0.000	0.127	
New-OL-8445-SM	SO_3		1.459	0.100	1.359	
New-OL-8445-SM	V_2O_5	<	0.179	0.000	0.179	
New-OL-8445-SM	ZnO		0.944	1.000	-0.056	
New-OL-8445-SM	ZrO_2		6.106	6.500	-0.394	-6.1%
New-OL-8445-SM	Sum		105.334	100.010	5.324	5.3%
New-OL-8788Mod-SM	Al_2O_3		13.293	12.350	0.943	7.6%
New-OL-8788Mod-SM	B_2O_3		6.271	6.000	0.271	4.5%
New-OL-8788Mod-SM	CaO	<	0.140	0.050	0.090	
New-OL-8788Mod-SM	Cl		0.119	0.470	-0.351	
New-OL-8788Mod-SM	Cr_2O_3		0.274	0.310	-0.036	
New-OL-8788Mod-SM	F		0.481	0.710	-0.229	
New-OL-8788Mod-SM	Fe_2O_3		1.530	1.500	0.030	
New-OL-8788Mod-SM	K_2O		1.325	1.500	-0.175	
New-OL-8788Mod-SM	Li_2O		2.223	2.500	-0.277	
New-OL-8788Mod-SM	MgO		3.225	3.500	-0.275	
New-OL-8788Mod-SM	Na_2O		13.986	13.000	0.986	7.6%
New-OL-8788Mod-SM	P_2O_5		1.275	1.510	-0.235	
New-OL-8788Mod-SM	SiO_2		50.808	46.000	4.808	10.5%
New-OL-8788Mod-SM	SnO_2	<	0.127	0.000	0.127	
New-OL-8788Mod-SM	SO_3		0.602	0.100	0.502	
New-OL-8788Mod-SM	V_2O_5	<	0.179	0.000	0.179	
New-OL-8788Mod-SM	ZnO		5.082	5.000	0.082	1.6%
New-OL-8788Mod-SM	ZrO_2		5.413	5.500	-0.087	-1.6%
New-OL-8788Mod-SM	Sum		106.352	100.000	6.352	6.4%
New-OL-90780-SM	Al_2O_3		13.449	13.850	-0.401	-2.9%
New-OL-90780-SM	B_2O_3		13.210	13.750	-0.540	-3.9%
New-OL-90780-SM	CaO	<	0.140	0.000	0.140	
New-OL-90780-SM	Cl		0.111	0.470	-0.359	
New-OL-90780-SM	Cr_2O_3		0.216	0.310	-0.094	
New-OL-90780-SM	F		0.492	0.710	-0.218	
New-OL-90780-SM	Fe_2O_3	<	0.143	0.000	0.143	
New-OL-90780-SM	K_2O		1.271	1.500	-0.229	
New-OL-90780-SM	Li_2O		4.241	5.000	-0.759	-15.2%
New-OL-90780-SM	MgO		3.192	3.500	-0.308	
New-OL-90780-SM	Na_2O		15.502	15.510	-0.008	-0.1%
New-OL-90780-SM	P_2O_5		1.228	1.510	-0.282	
New-OL-90780-SM	SiO_2		34.336	34.250	0.086	0.3%
New-OL-90780-SM	SnO_2		2.933	3.000	-0.067	
New-OL-90780-SM	SO_3		1.506	1.640	-0.134	
New-OL-90780-SM	V_2O_5		3.597	4.000	-0.403	
New-OL-90780-SM	ZnO		0.971	1.000	-0.029	
New-OL-90780-SM	ZrO_2	<	0.135	0.000	0.135	
New-OL-90780-SM	Sum		96.672	100.000	-3.328	-3.3%

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

Analyte=Al2O3 (wt%), Analytical Method=PF, Analytical Group=A
Variability Chart for Measured (wt%)

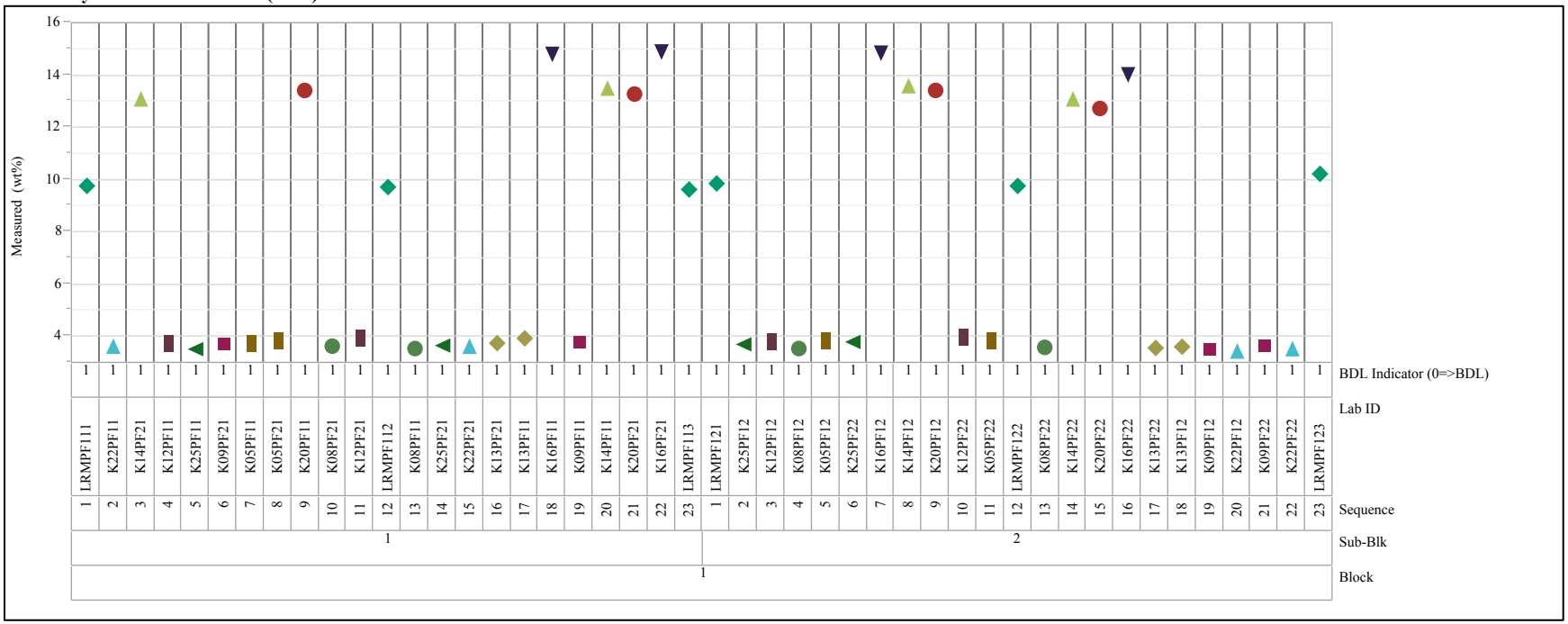


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Al2O3 (wt%), Analytical Method=PF, Analytical Group=B
Variability Chart for Measured (wt%)

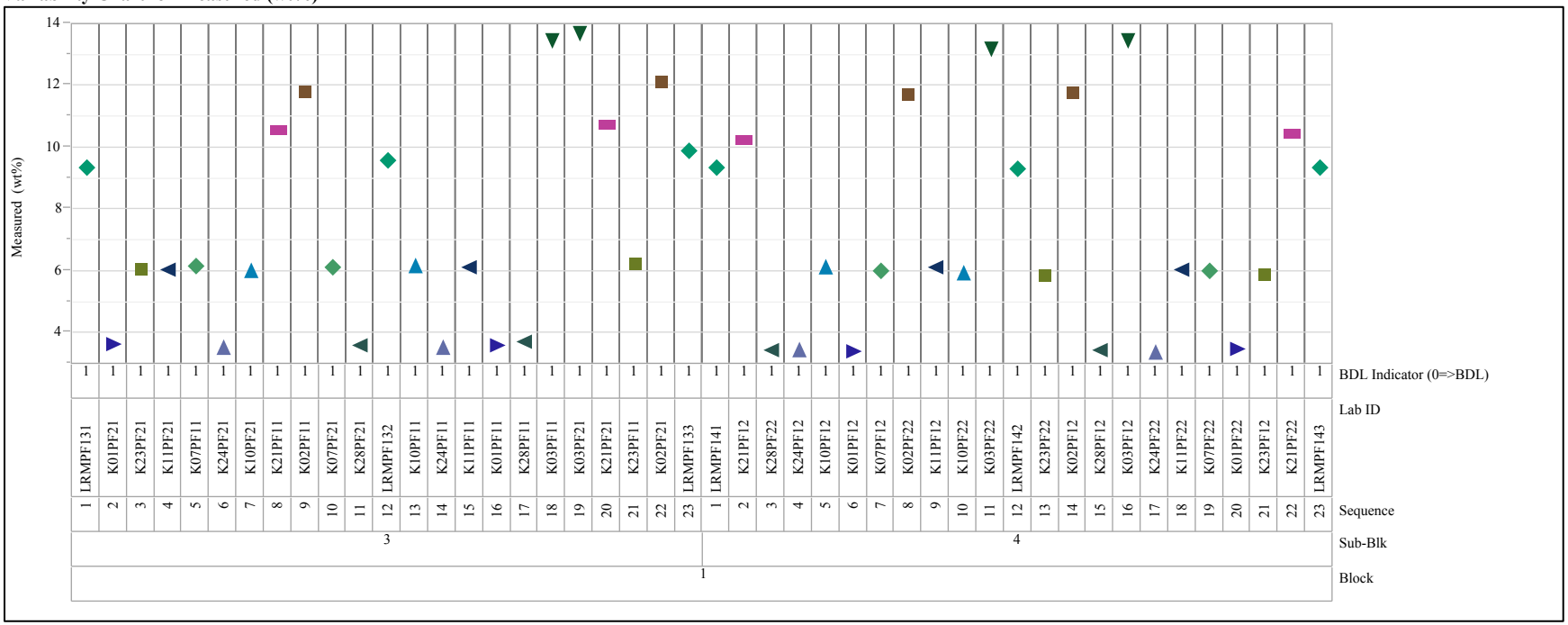


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Al2O3 (wt%), Analytical Method=PF, Analytical Group=C
Variability Chart for Measured (wt%)

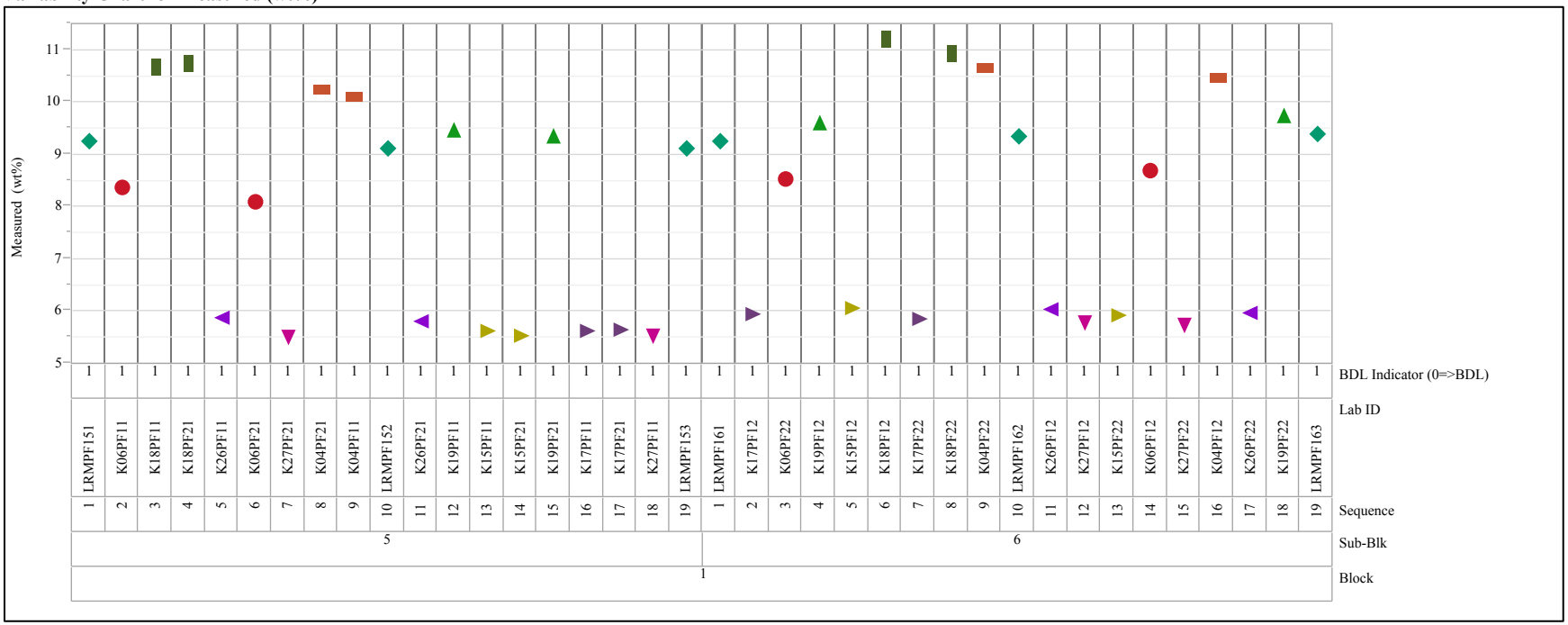


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Al2O3 (wt%), Analytical Method=PF, Analytical Group=D
Variability Chart for Measured (wt%)

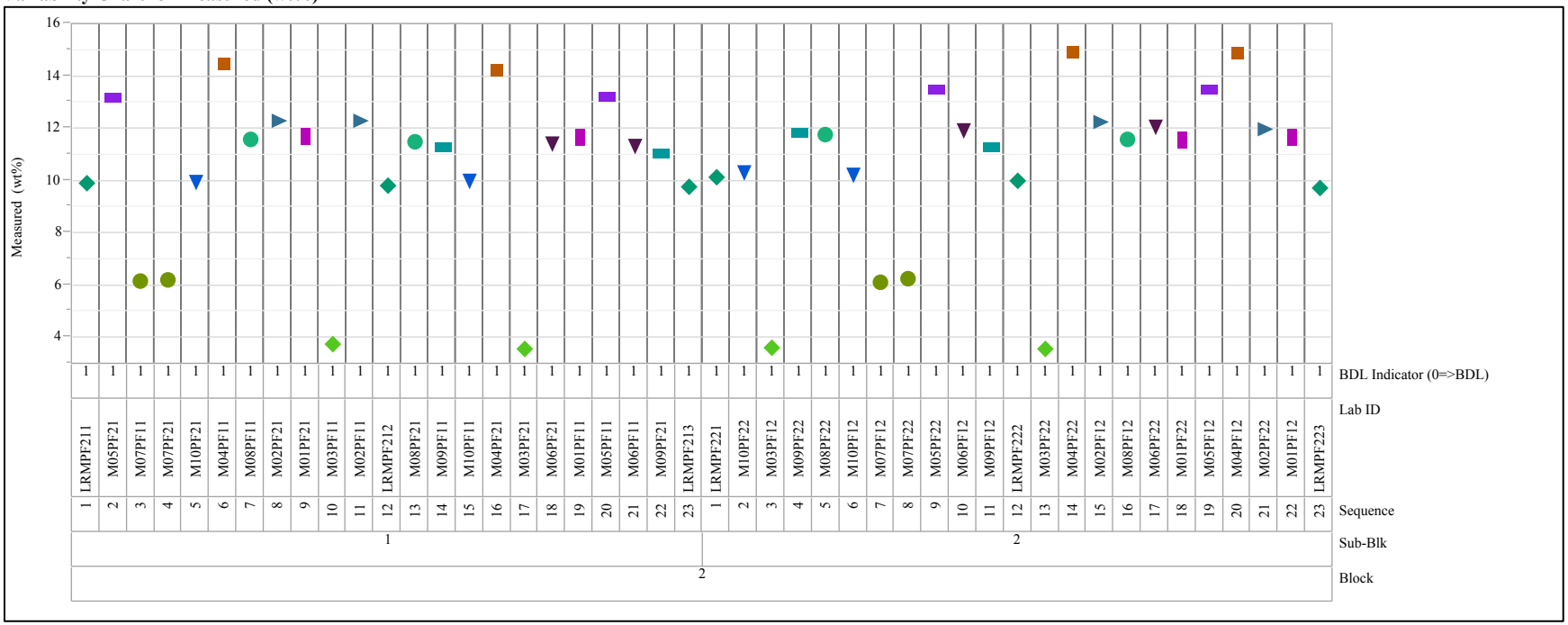


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=B2O3 (wt%), Analytical Method=PF, Analytical Group=A
Variability Chart for Measured (wt%)

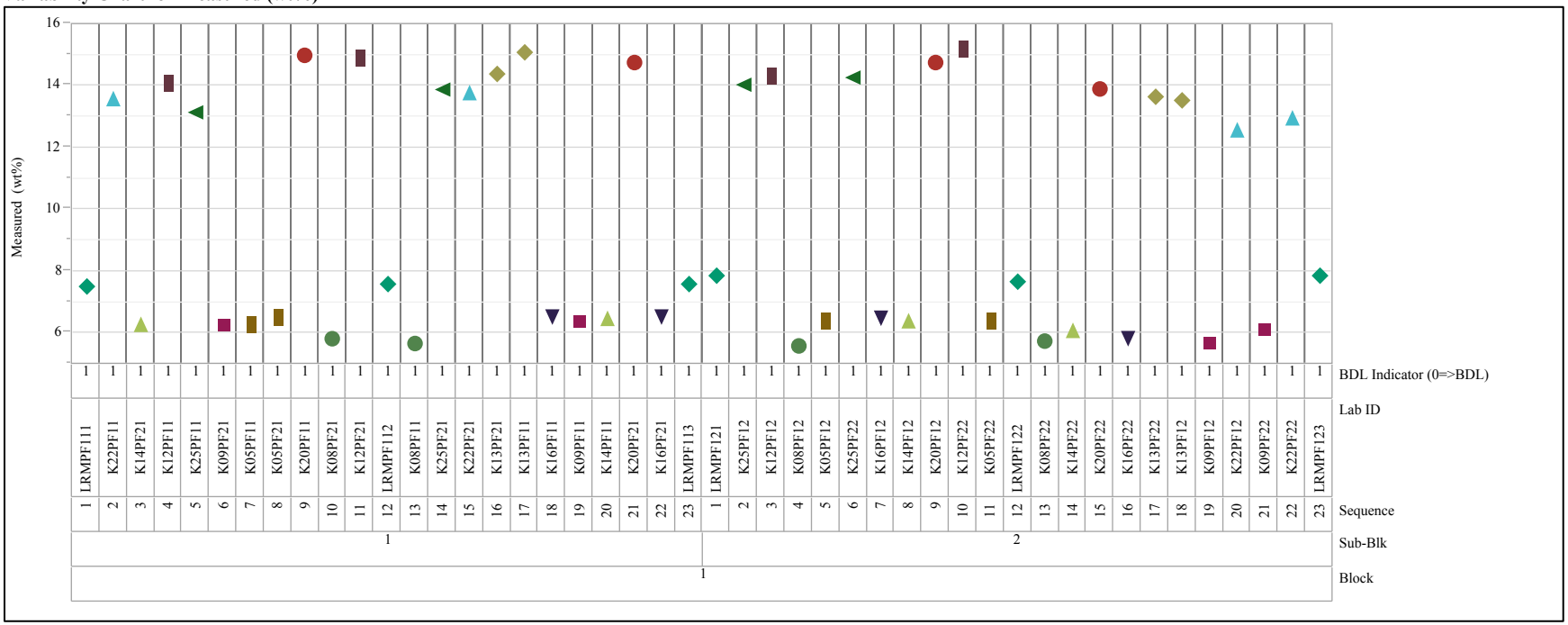


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=B2O3 (wt%), Analytical Method=PF, Analytical Group=B
Variability Chart for Measured (wt%)

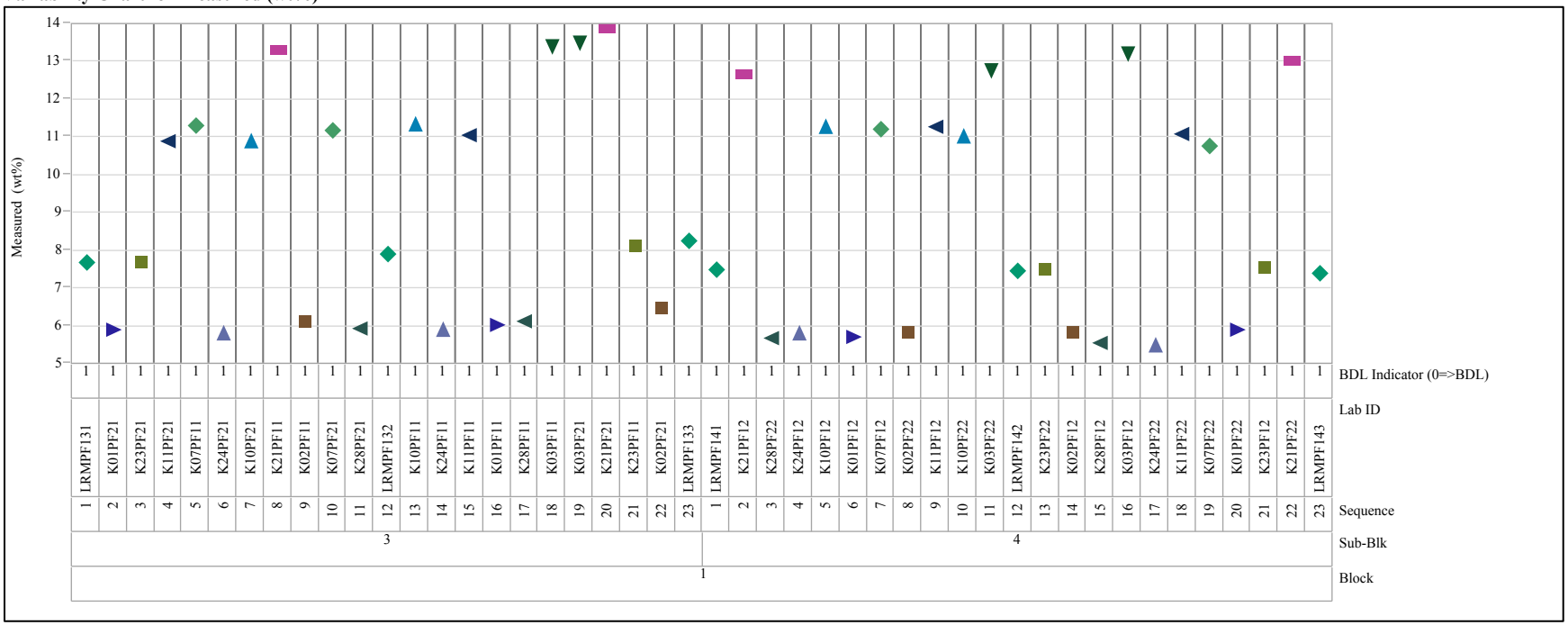


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=B2O3 (wt%), Analytical Method=PF, Analytical Group=C
Variability Chart for Measured (wt%)

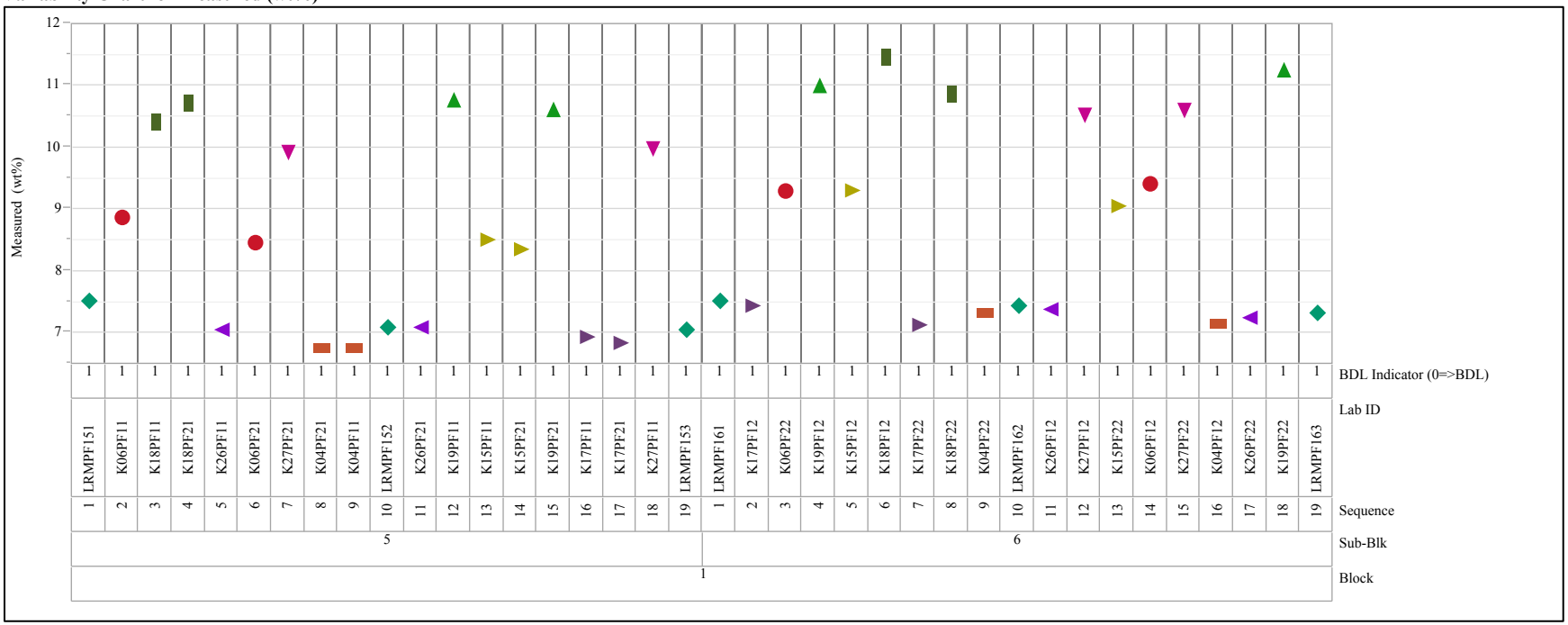


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=B2O3 (wt%), Analytical Method=PF, Analytical Group=D
Variability Chart for Measured (wt%)

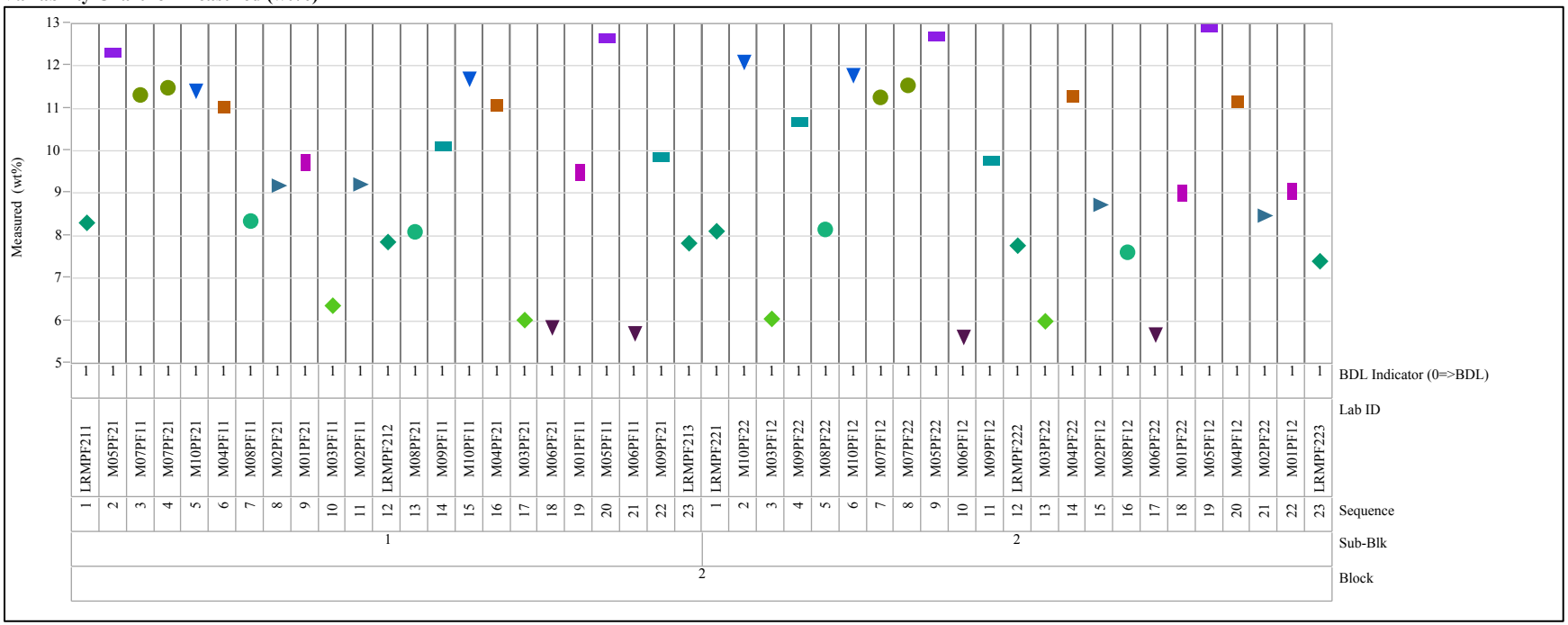


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=CaO (wt%), Analytical Method=LM, Analytical Group=A
Variability Chart for Measured (wt%)

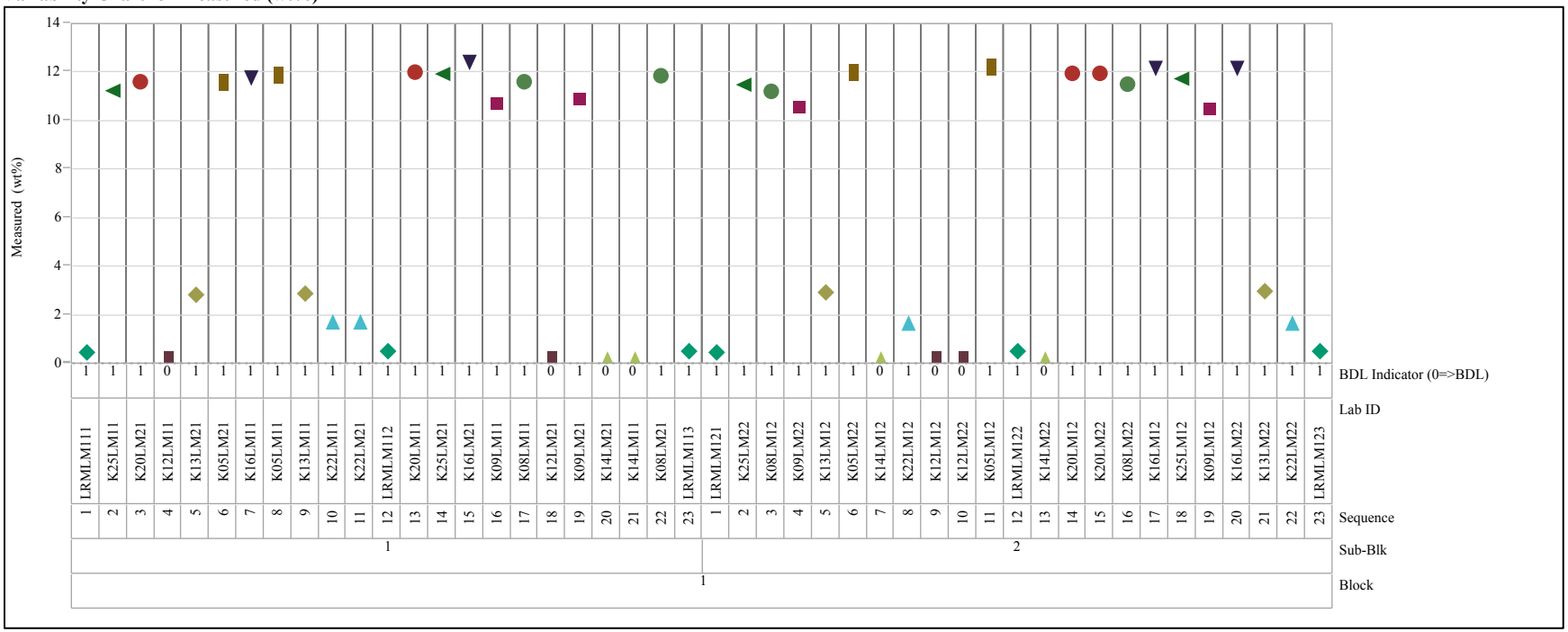


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=CaO (wt%), Analytical Method=LM, Analytical Group=B
Variability Chart for Measured (wt%)

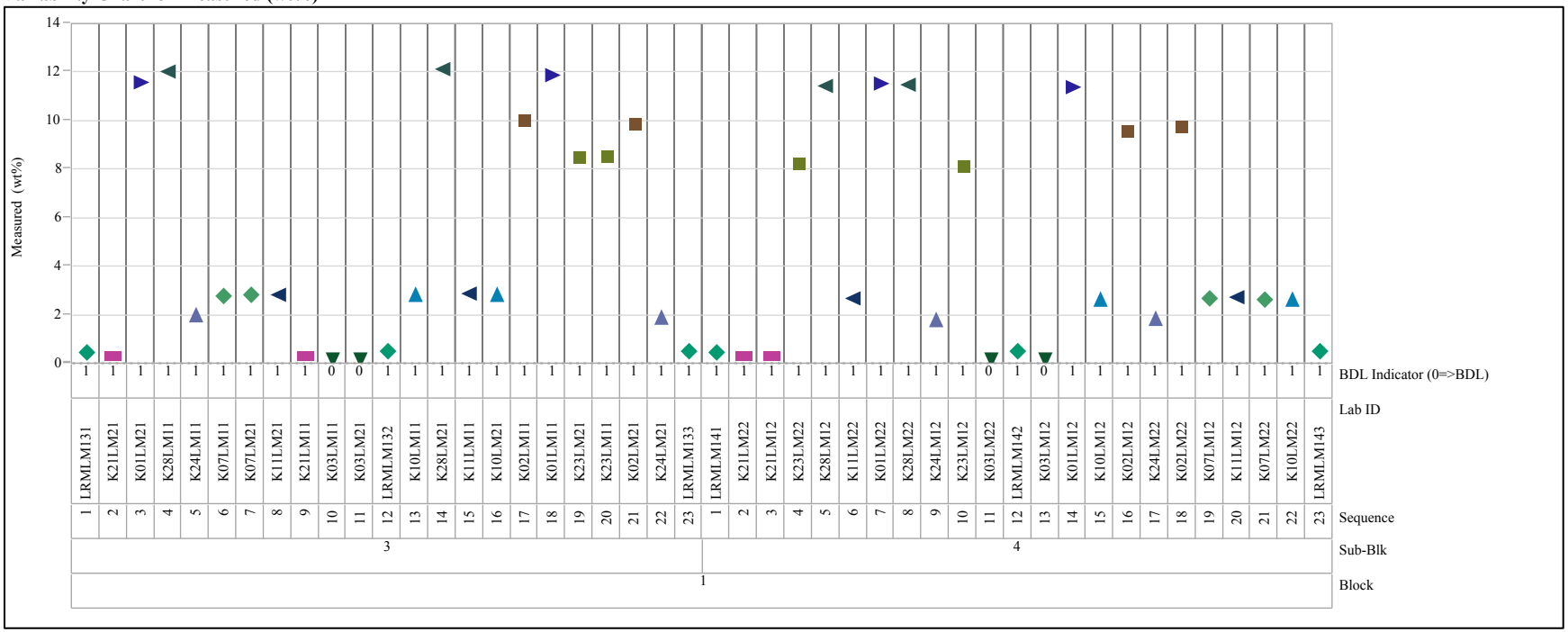


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=CaO (wt%), Analytical Method=LM, Analytical Group=C
Variability Chart for Measured (wt%)

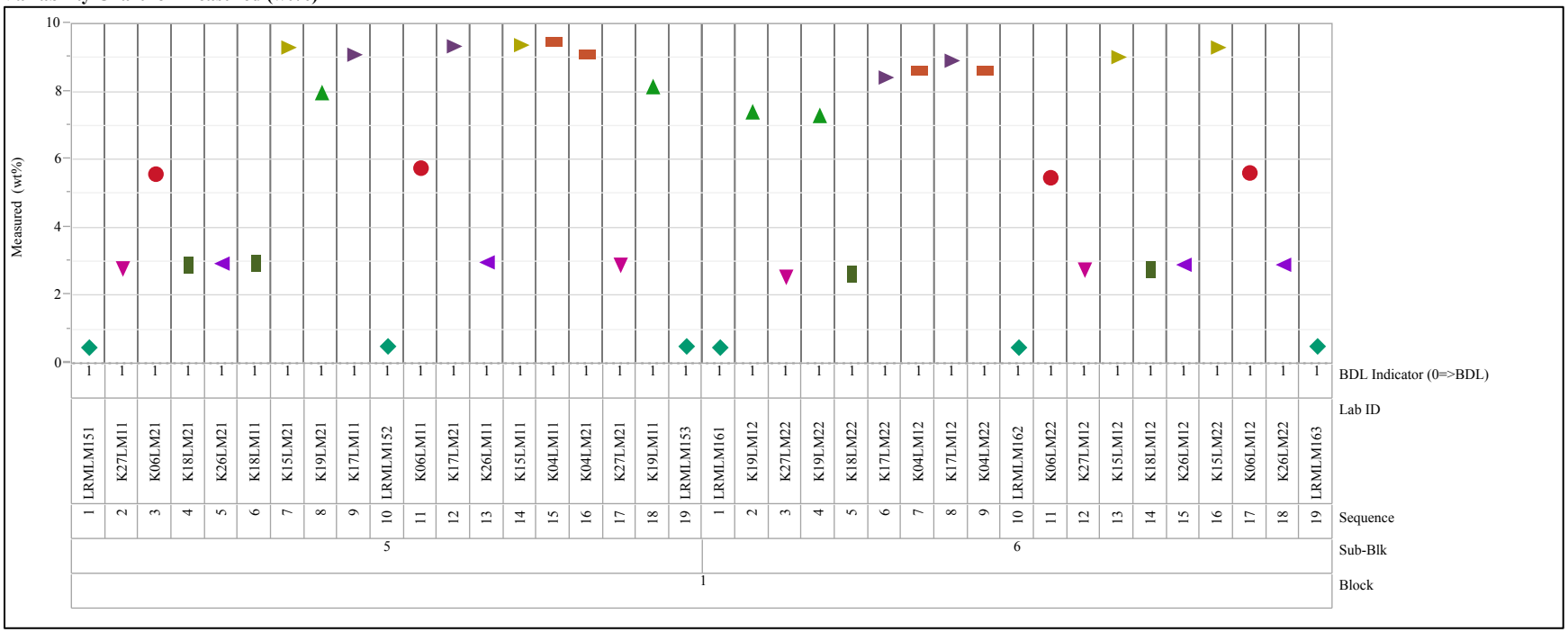


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=CaO (wt%), Analytical Method=LM, Analytical Group=D
Variability Chart for Measured (wt%)

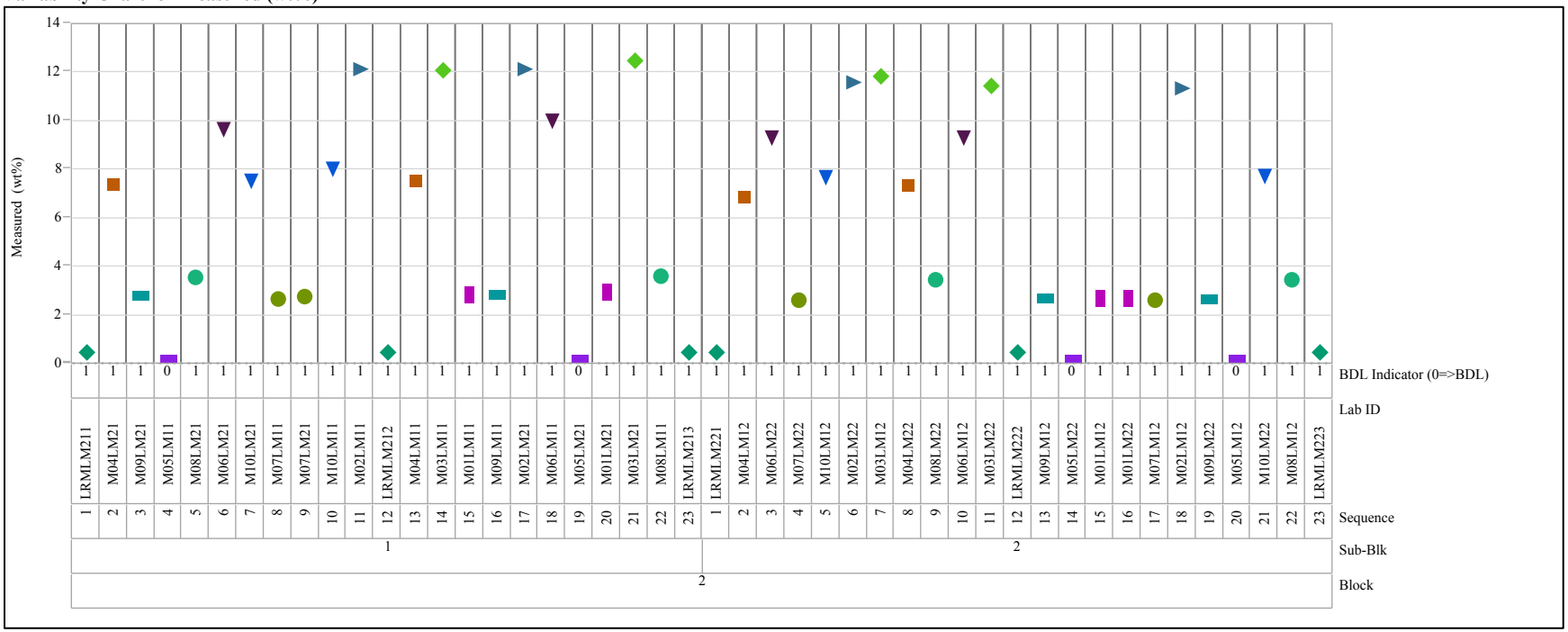


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Cl (wt%), Analytical Method=KH, Analytical Group=A
Variability Chart for Measured (wt%)

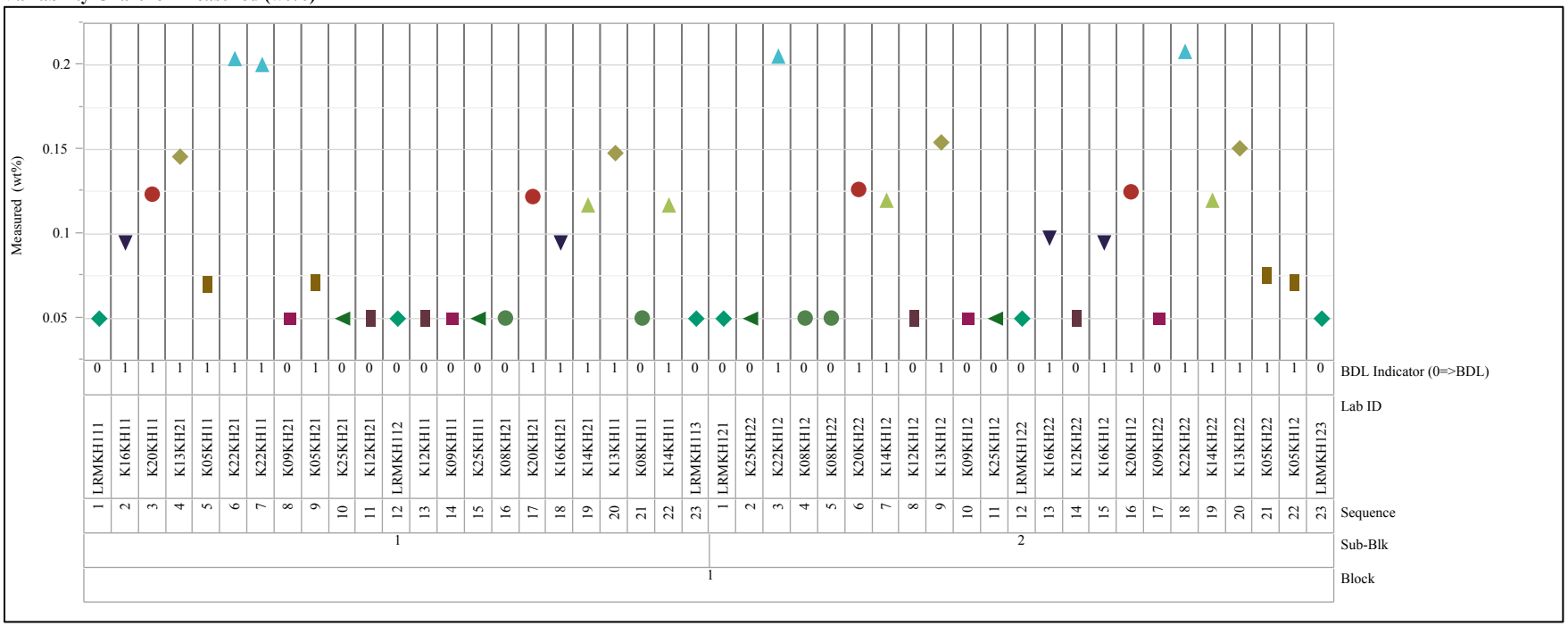


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Cl (wt%), Analytical Method=KH, Analytical Group=B
Variability Chart for Measured (wt%)

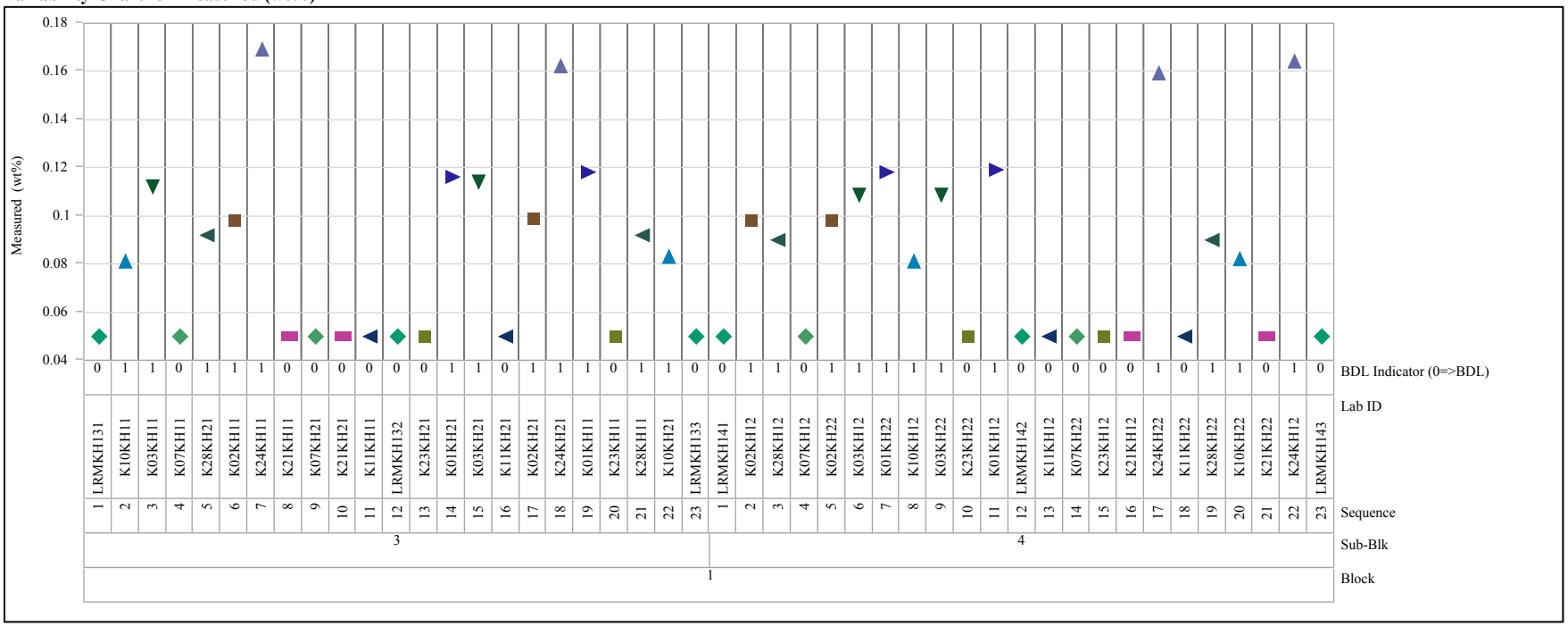


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Cl (wt%), Analytical Method=KH, Analytical Group=C
Variability Chart for Measured (wt%)

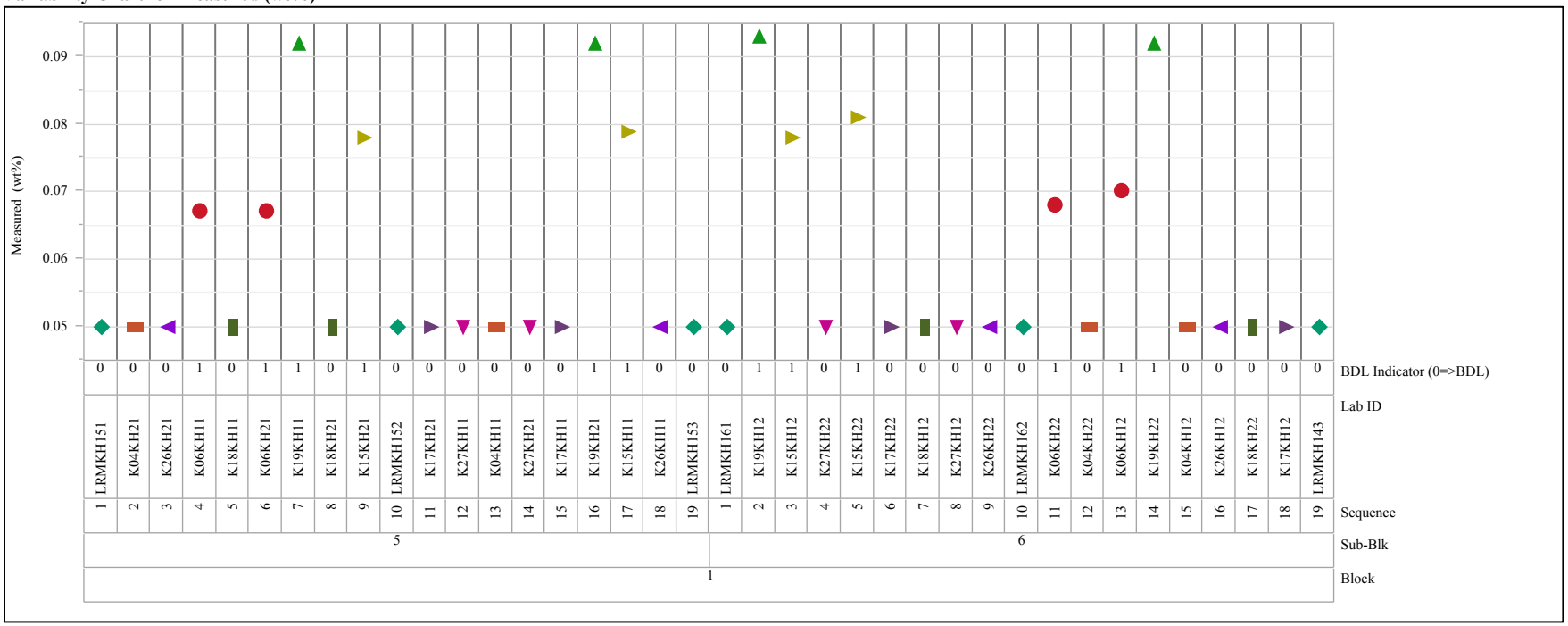


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Cl (wt%), Analytical Method=KH, Analytical Group=D
Variability Chart for Measured (wt%)

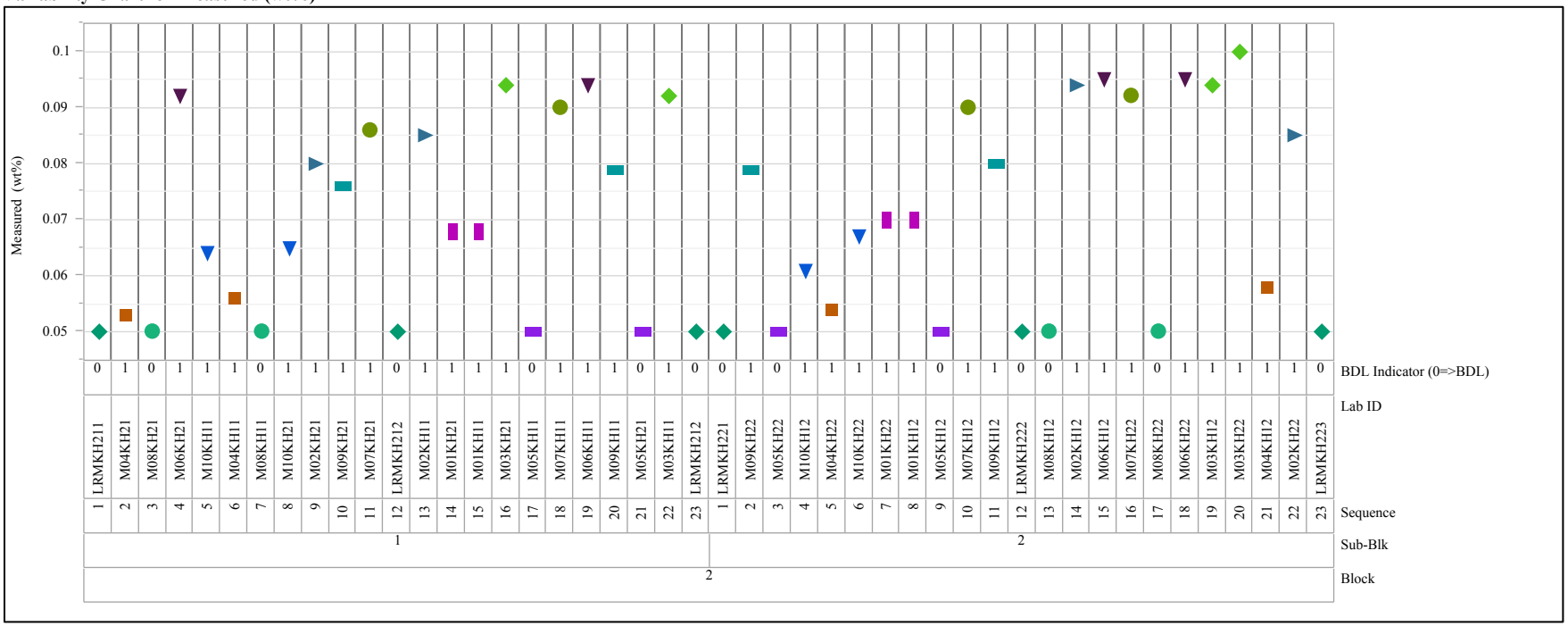


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Cr2O3 (wt%), Analytical Method=LM, Analytical Group=A
Variability Chart for Measured (wt%)

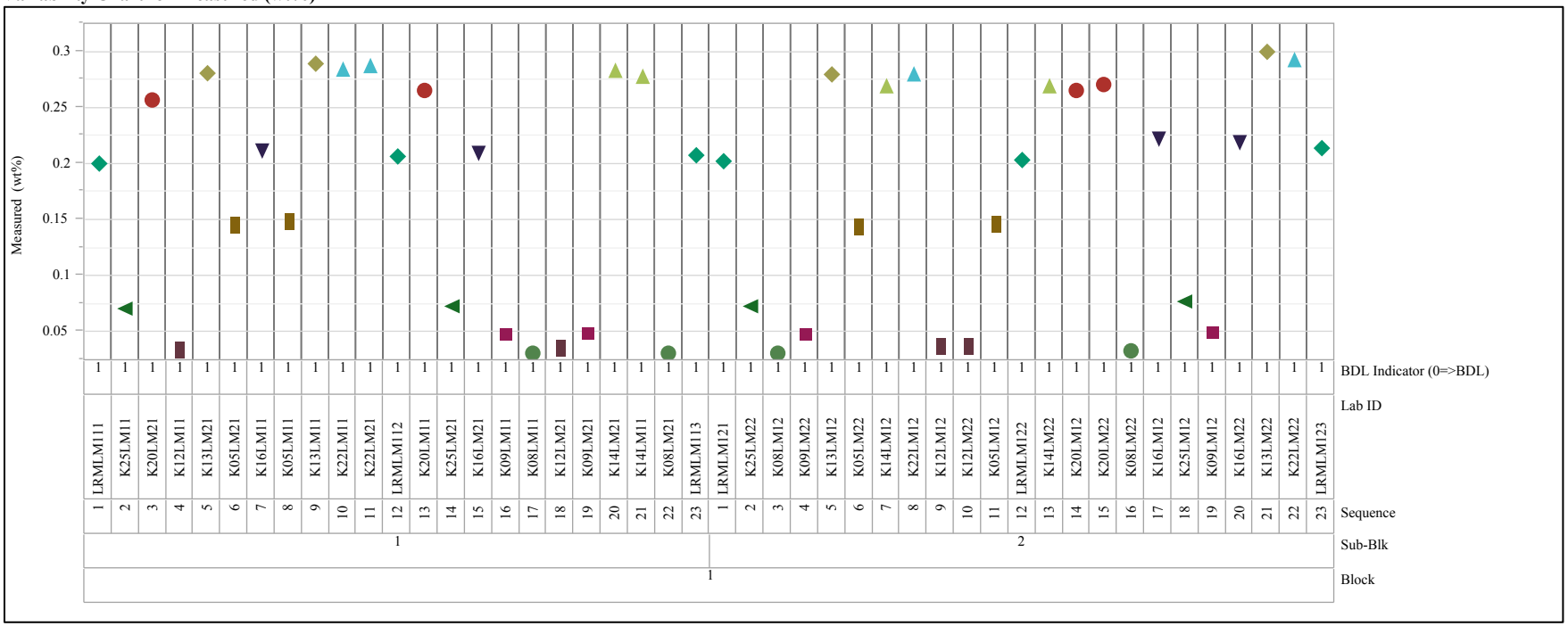


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Cr2O3 (wt%), Analytical Method=LM, Analytical Group=B
Variability Chart for Measured (wt%)

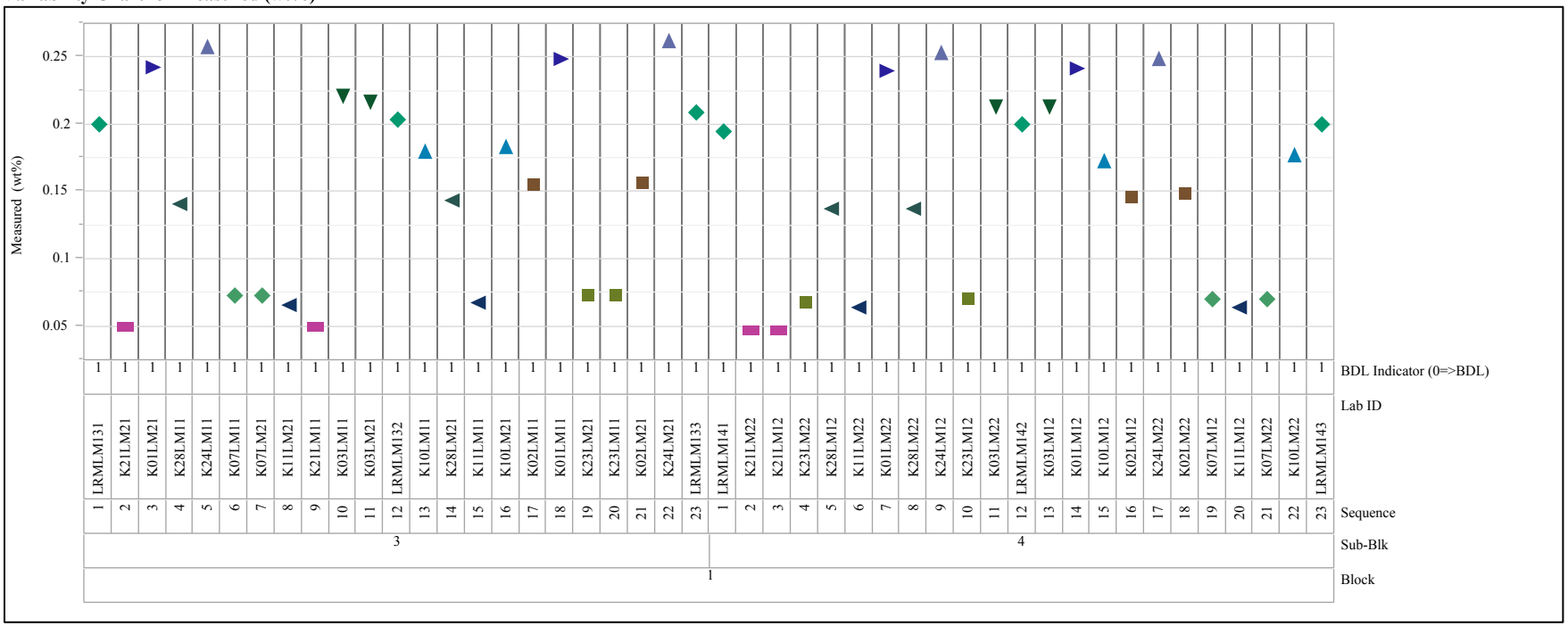


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Cr2O3 (wt%), Analytical Method=LM, Analytical Group=C
Variability Chart for Measured (wt%)

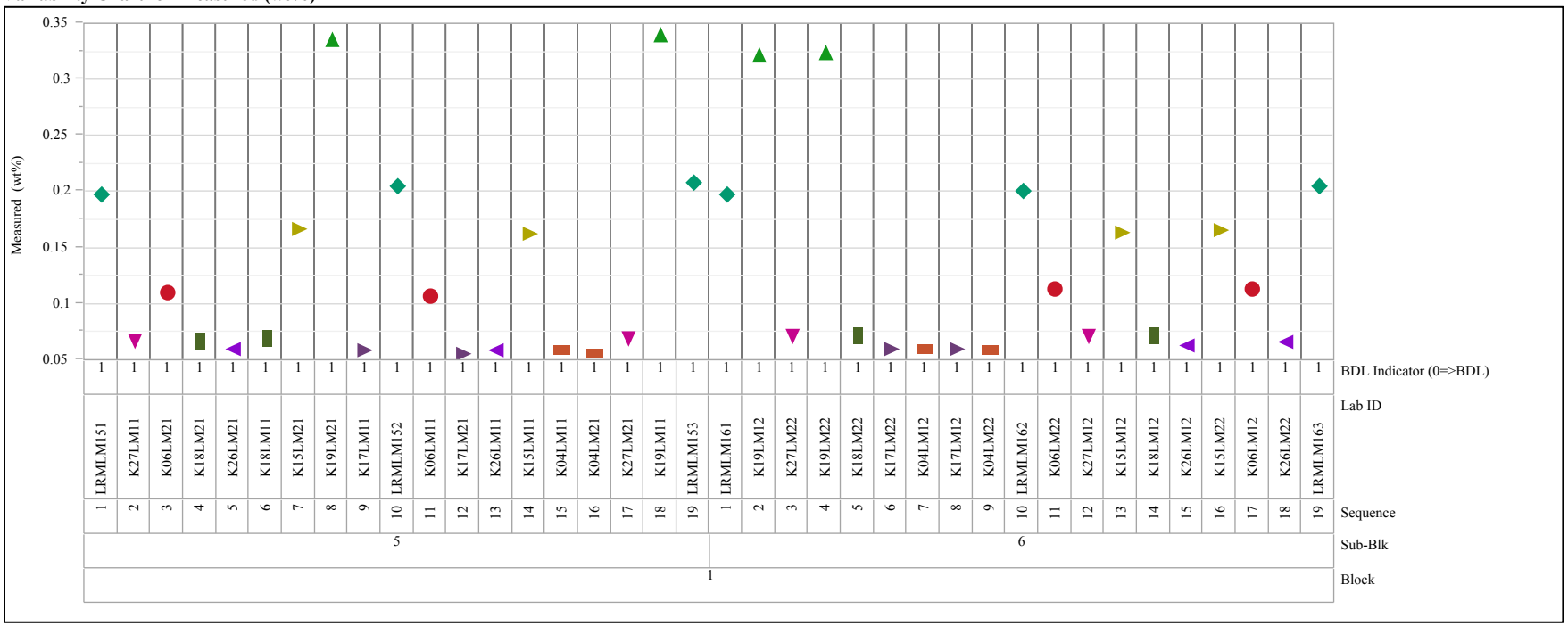


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Cr2O3 (wt%), Analytical Method=LM, Analytical Group=D
Variability Chart for Measured (wt%)

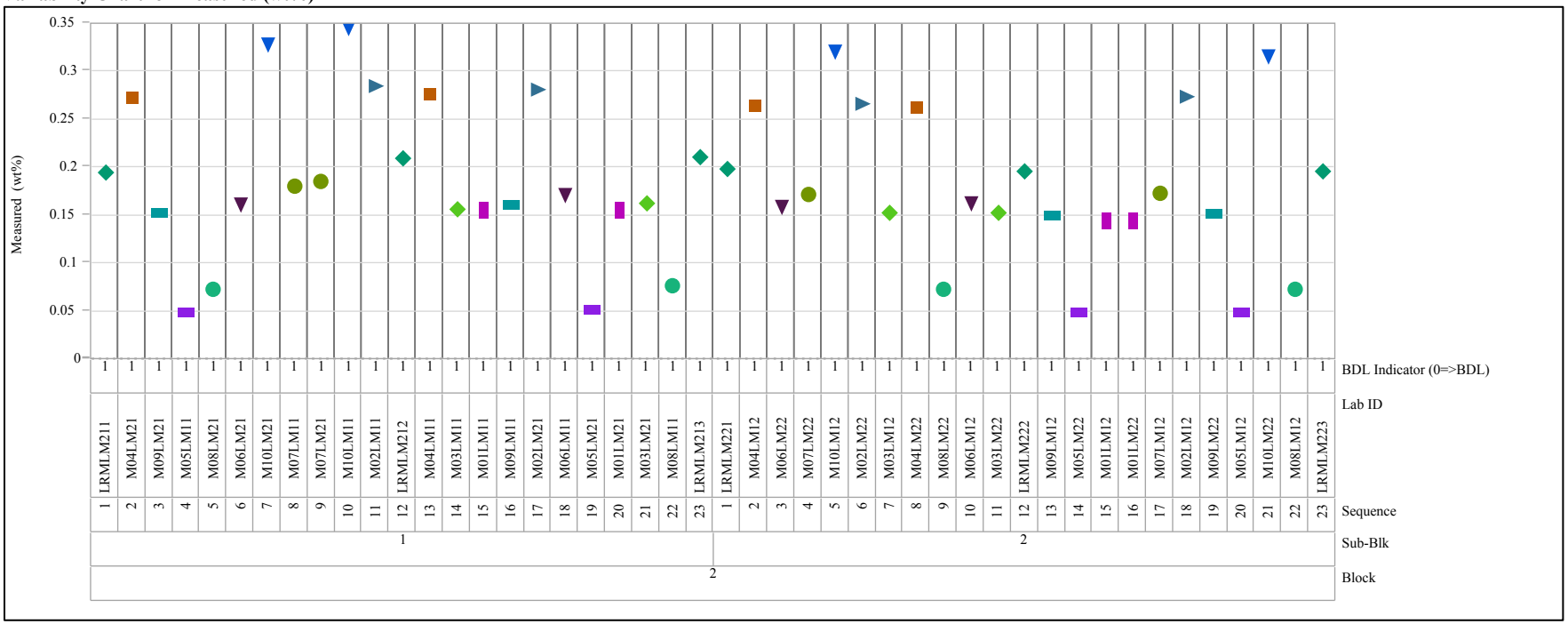


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=F (wt%), Analytical Method=KH, Analytical Group=A
Variability Chart for Measured (wt%)

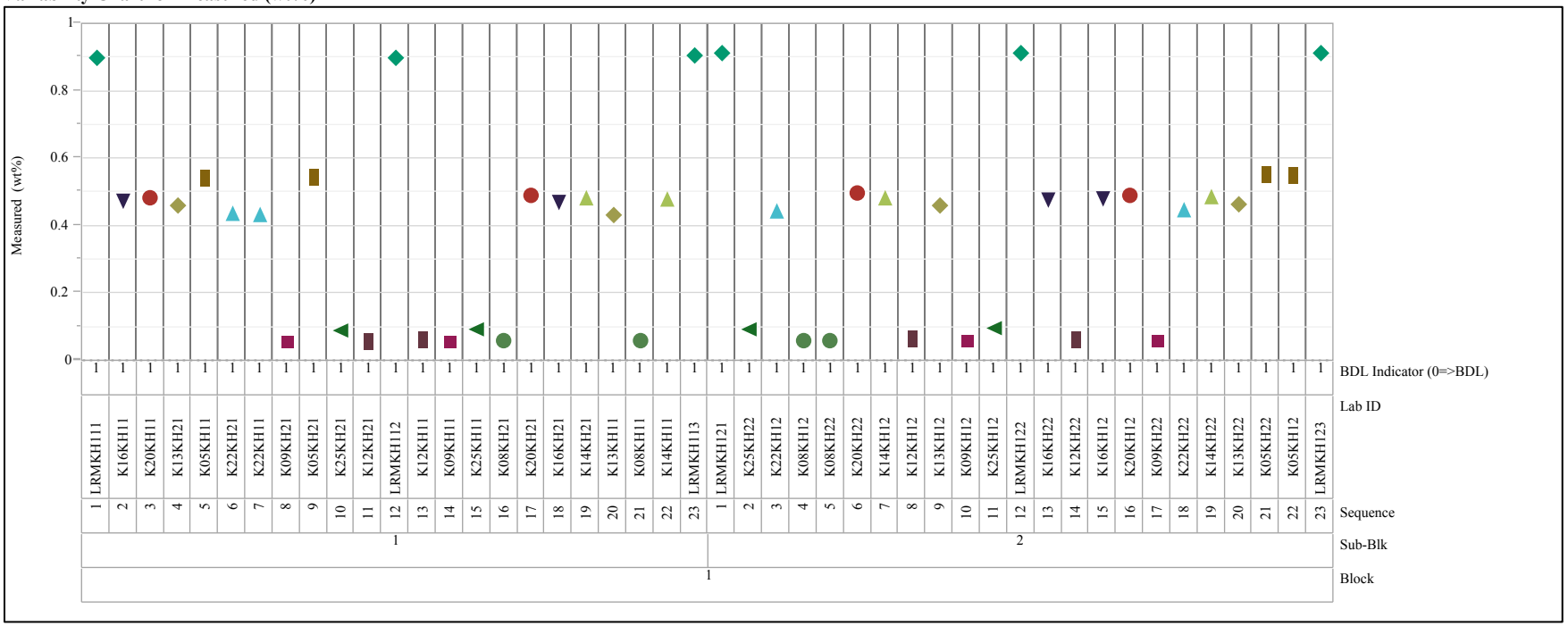


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=F (wt%), Analytical Method=KH, Analytical Group=B
Variability Chart for Measured (wt%)

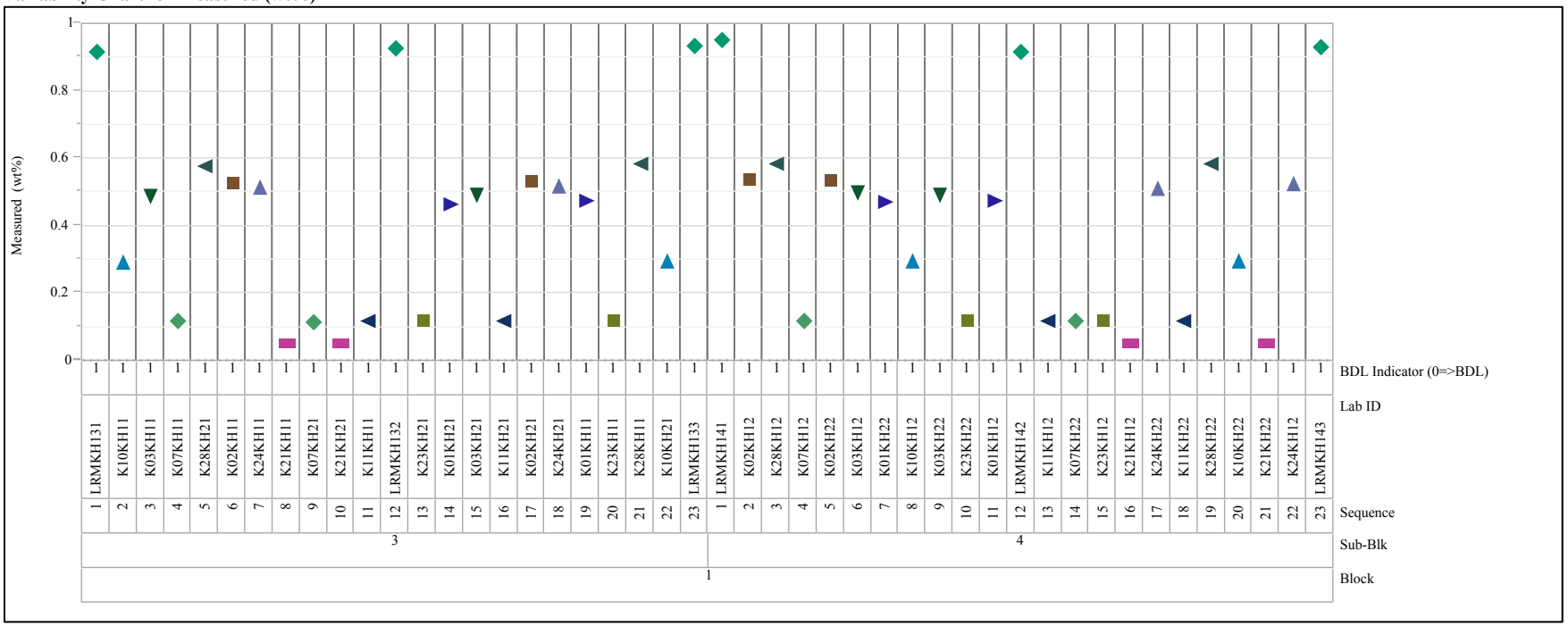


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=F (wt%), Analytical Method=KH, Analytical Group=C
Variability Chart for Measured (wt%)

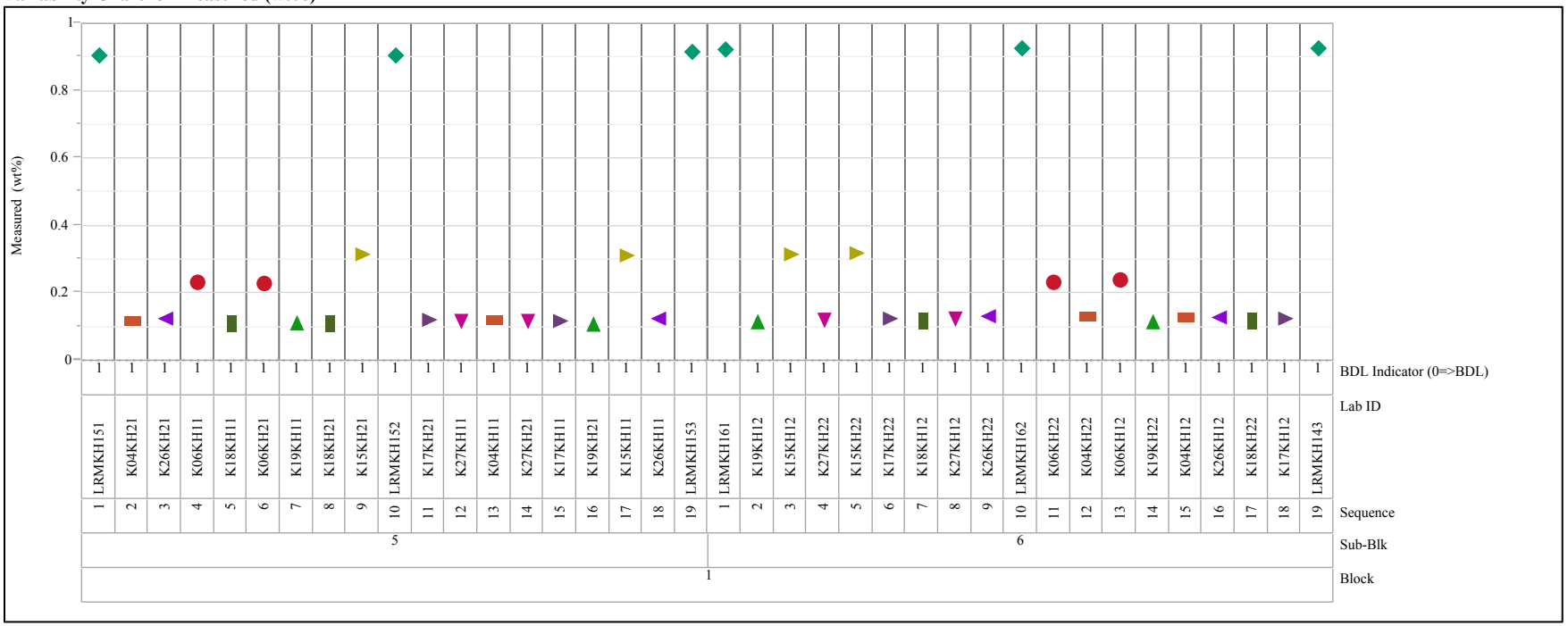


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=F (wt%), Analytical Method=KH, Analytical Group=D
Variability Chart for Measured (wt%)

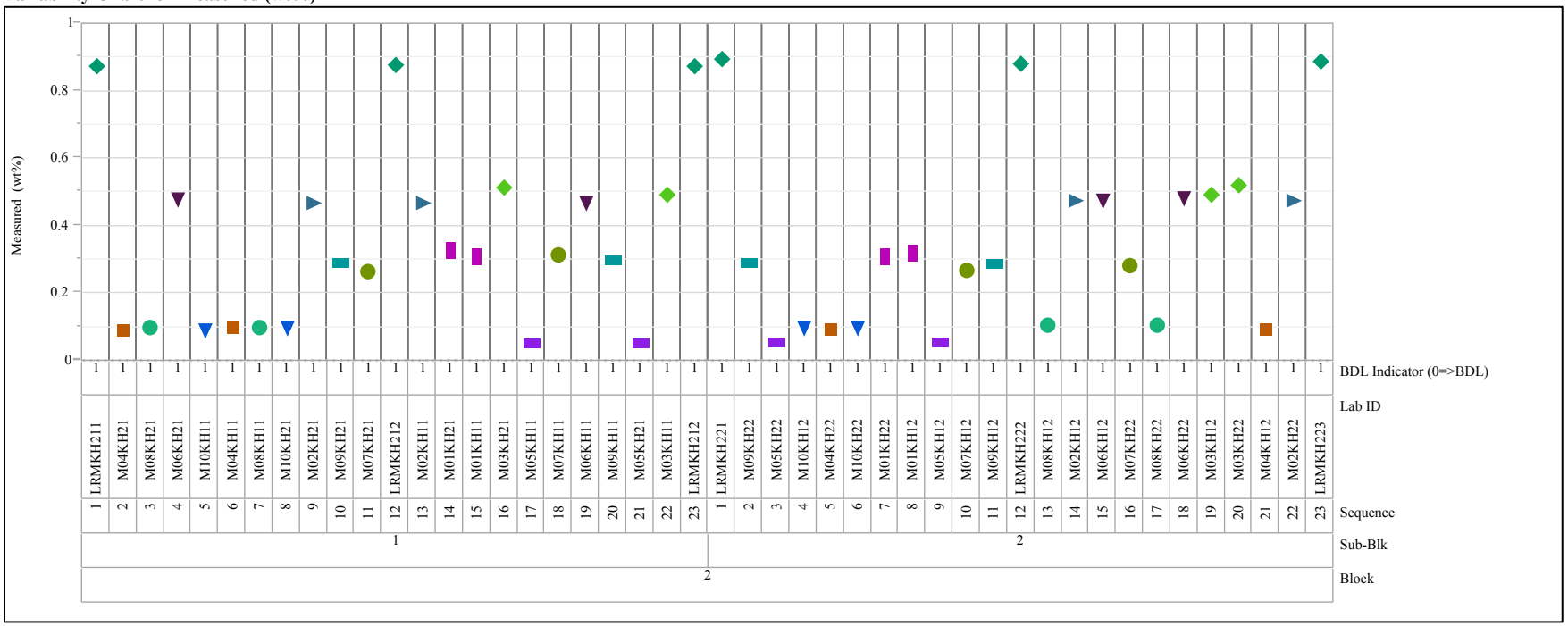


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Fe2O3 (wt%), Analytical Method=PF, Analytical Group=A
Variability Chart for Measured (wt%)

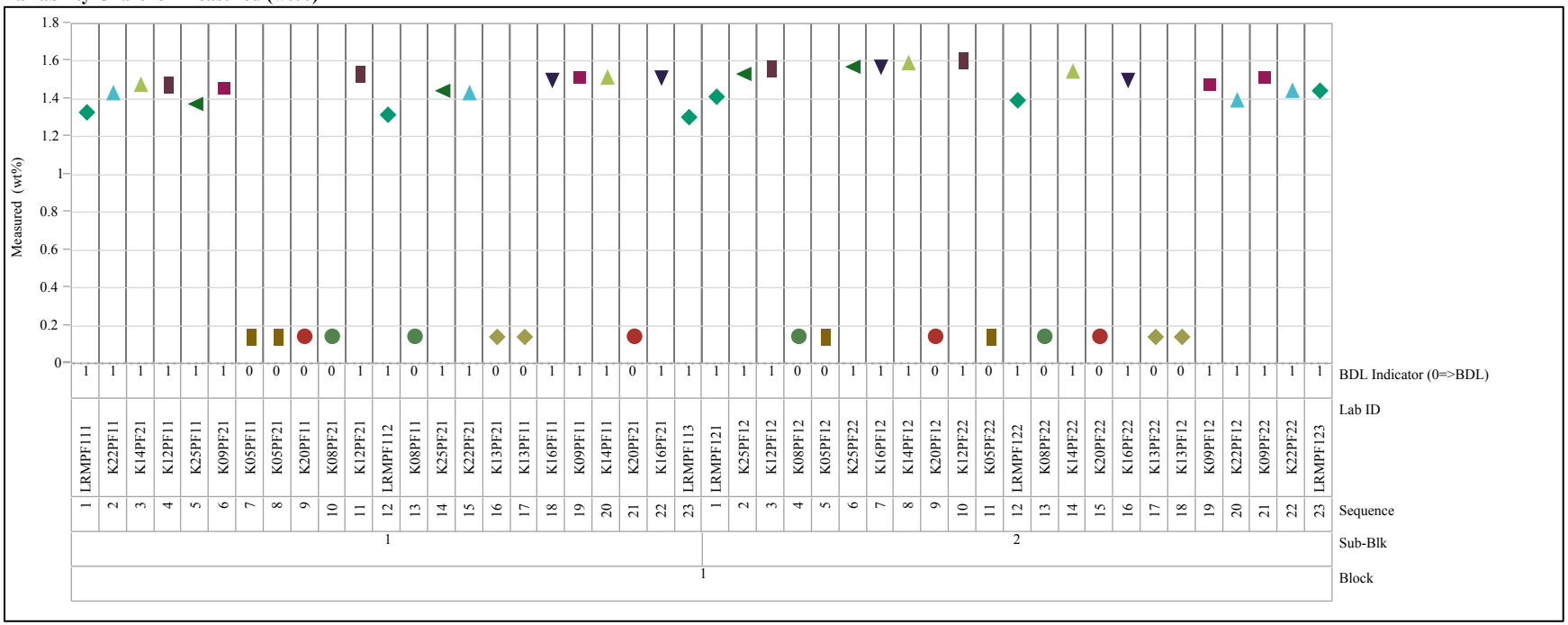


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Fe2O3 (wt%), Analytical Method=PF, Analytical Group=B
Variability Chart for Measured (wt%)

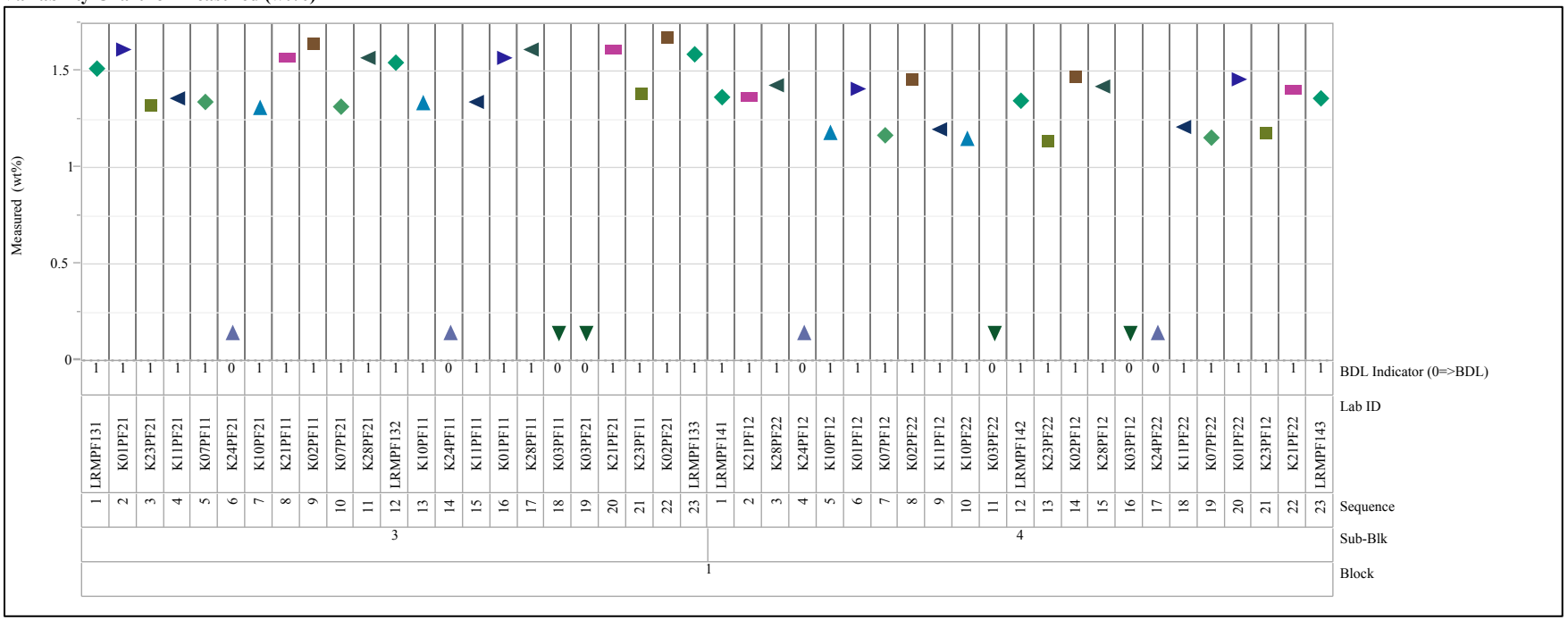


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Fe2O3 (wt%), Analytical Method=PF, Analytical Group=C
Variability Chart for Measured (wt%)

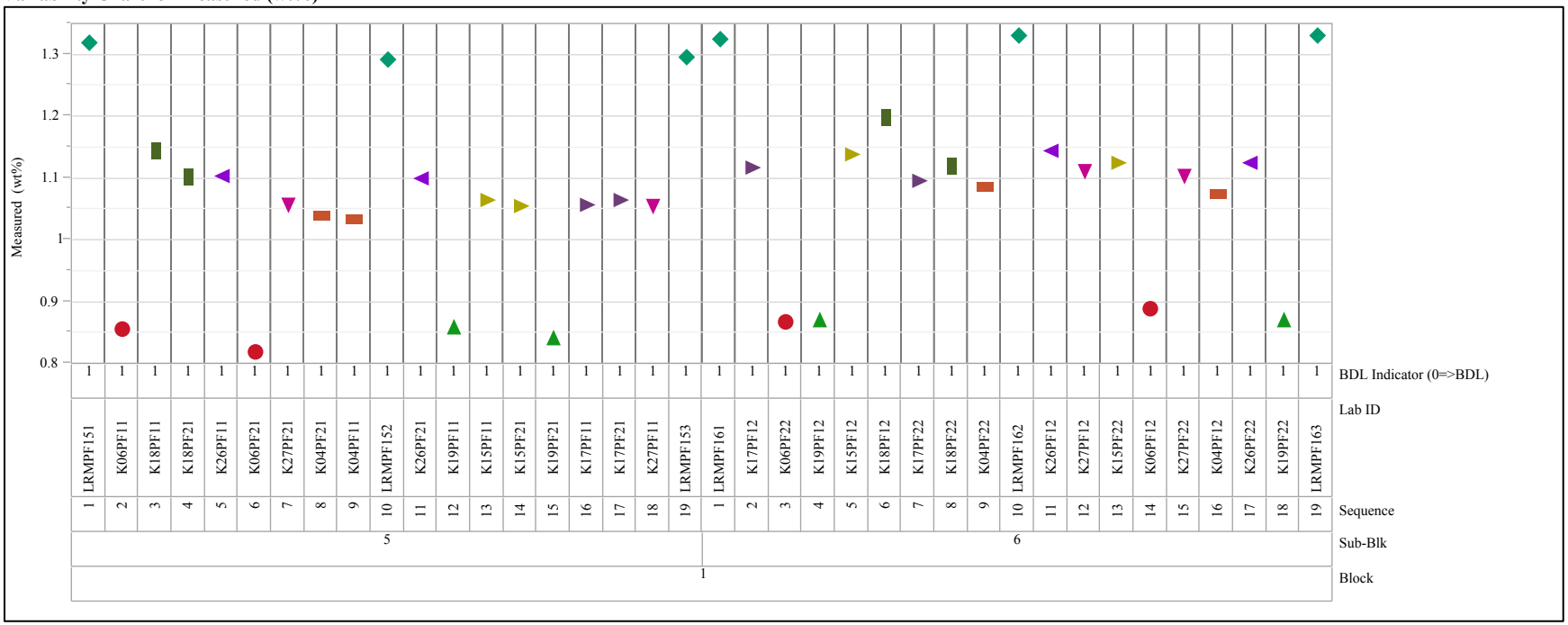


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Fe2O3 (wt%), Analytical Method=PF, Analytical Group=D
Variability Chart for Measured (wt%)

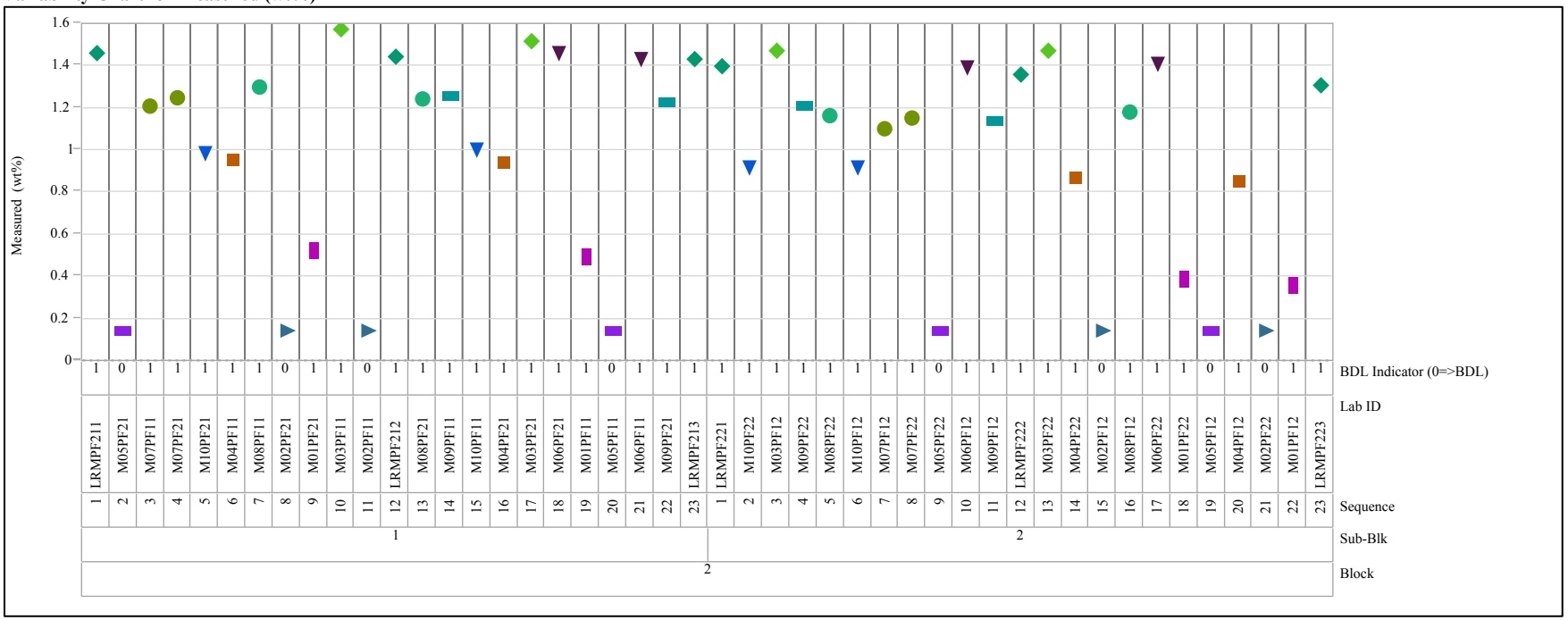


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=K2O (wt%), Analytical Method=LM, Analytical Group=A
Variability Chart for Measured (wt%)

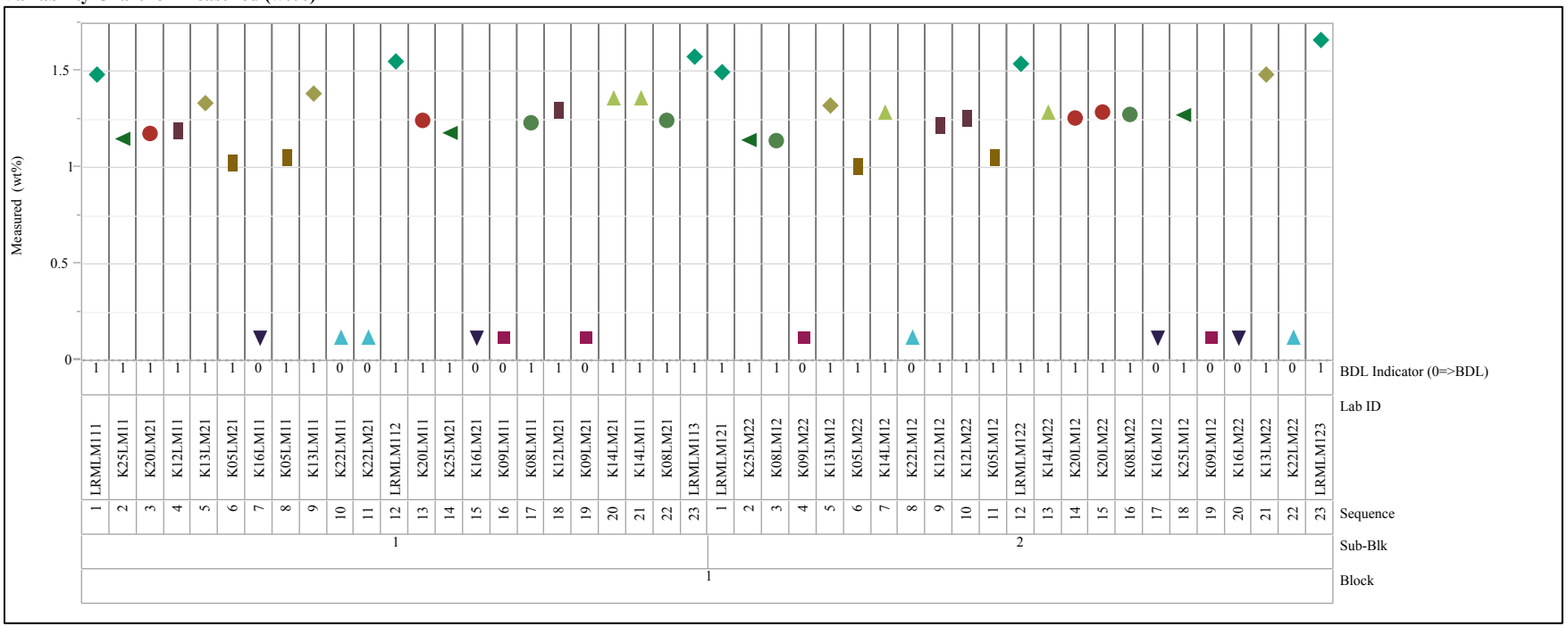


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=K2O (wt%), Analytical Method=LM, Analytical Group=B
Variability Chart for Measured (wt%)

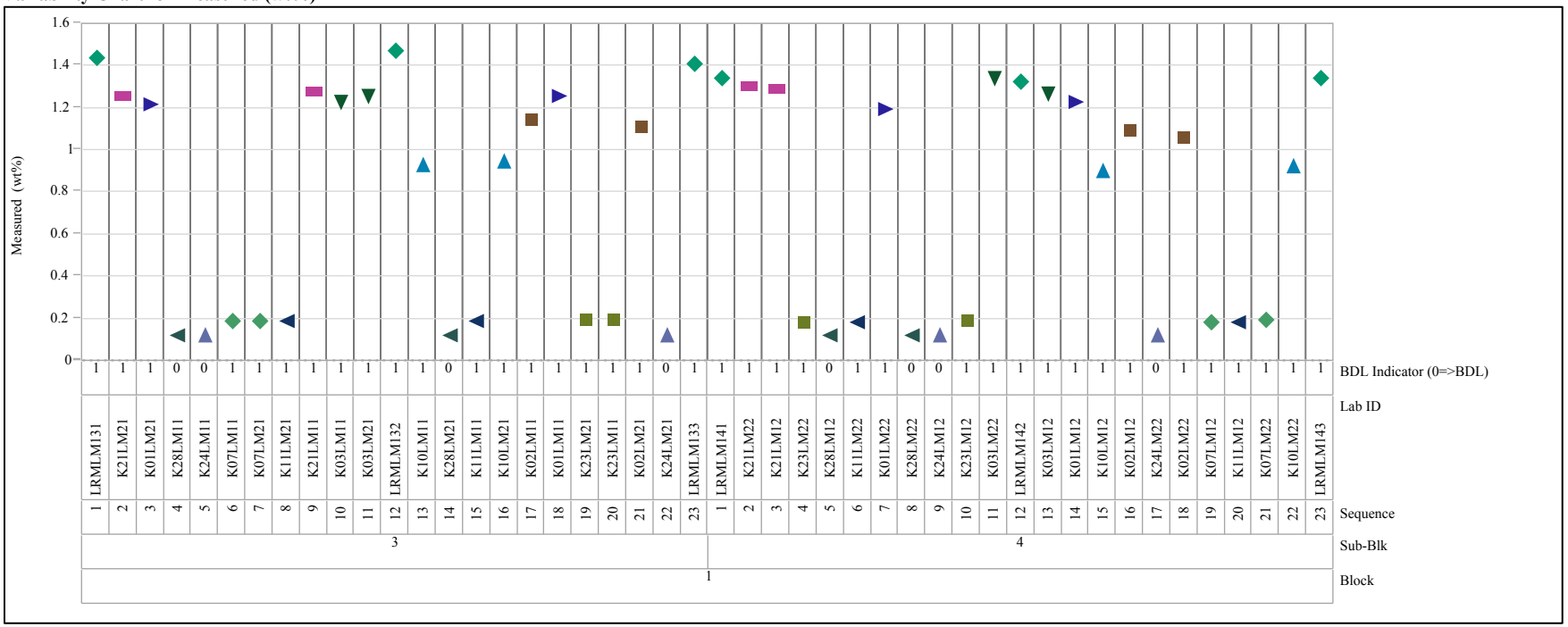


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=K2O (wt%), Analytical Method=LM, Analytical Group=C
Variability Chart for Measured (wt%)

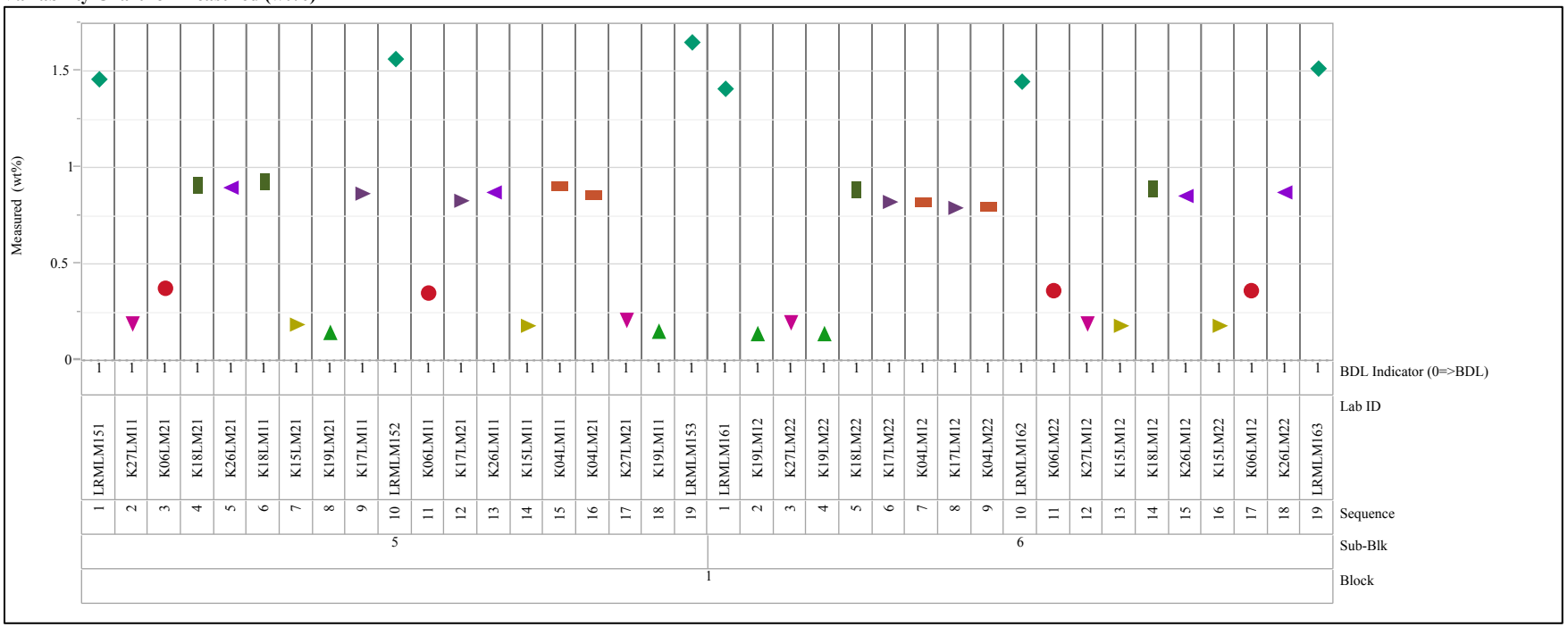


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=K2O (wt%), Analytical Method=LM, Analytical Group=D
Variability Chart for Measured (wt%)

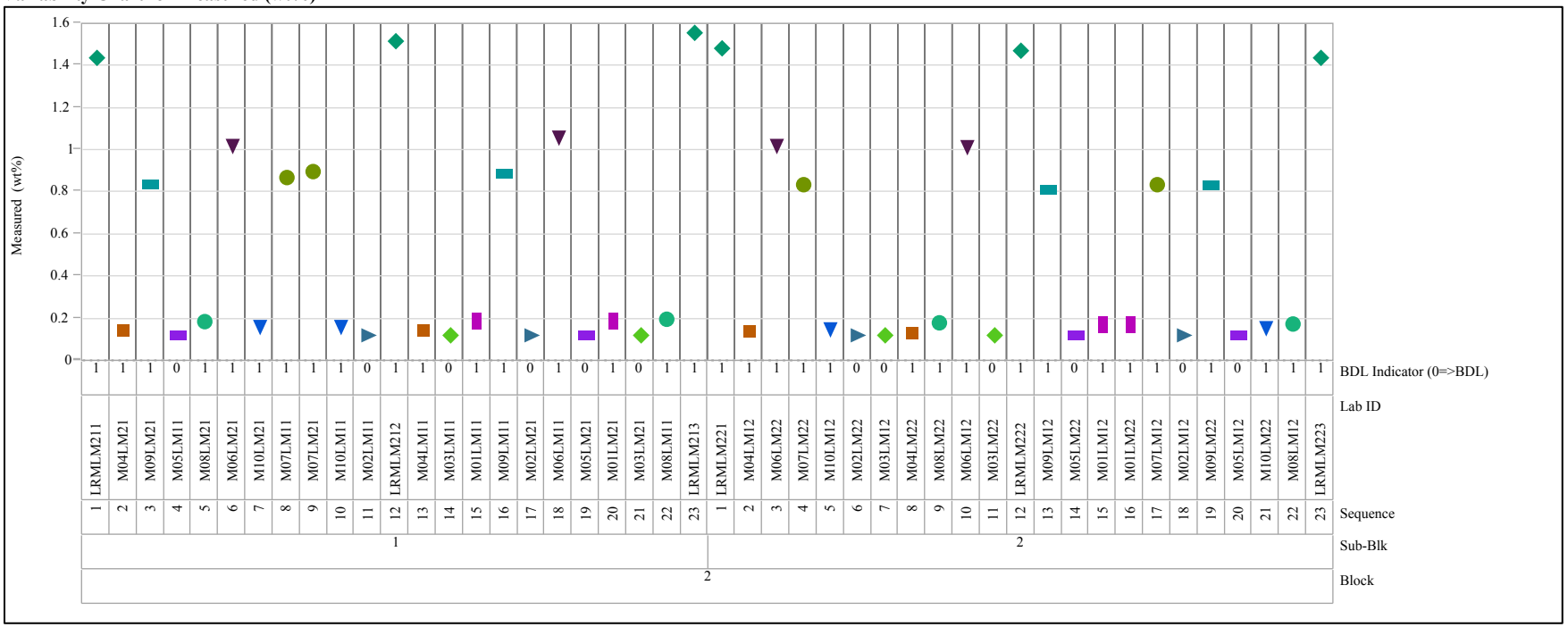


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Li2O (wt%), Analytical Method=PF, Analytical Group=A
Variability Chart for Measured (wt%)

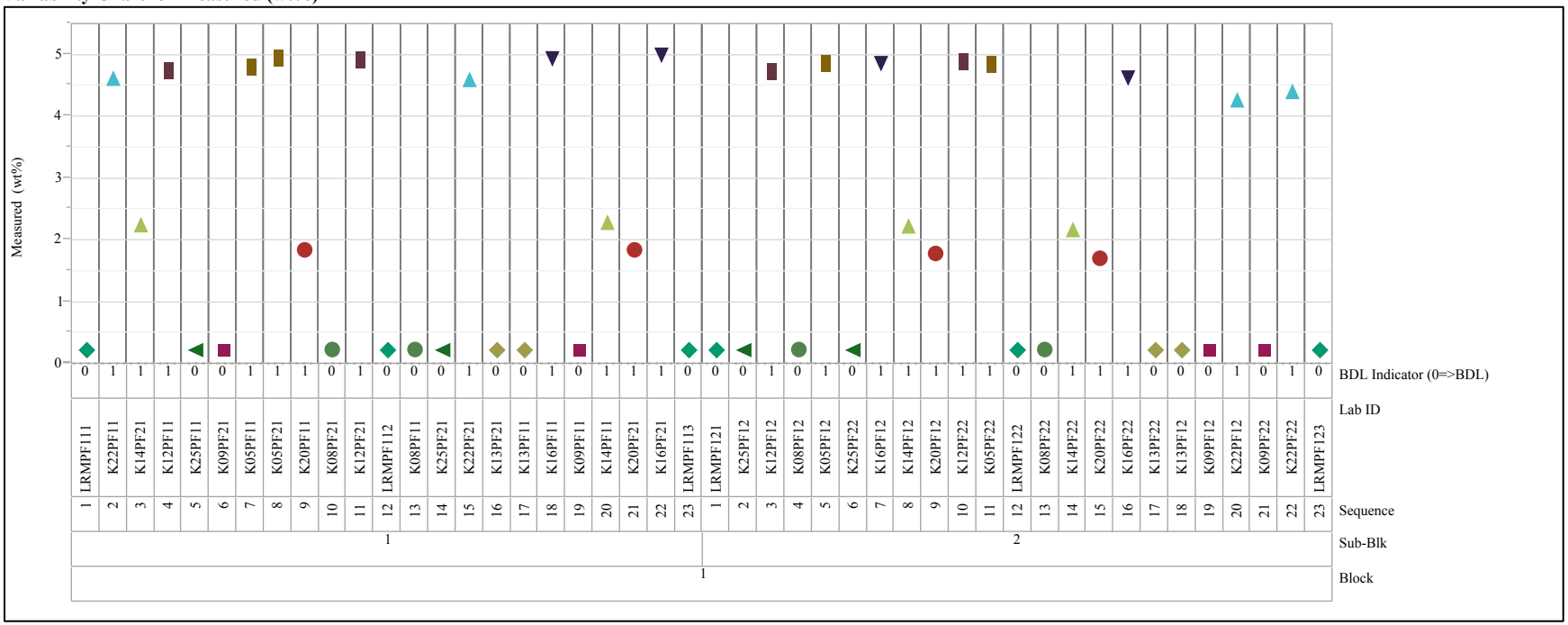


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Li2O (wt%), Analytical Method=PF, Analytical Group=B
Variability Chart for Measured (wt%)

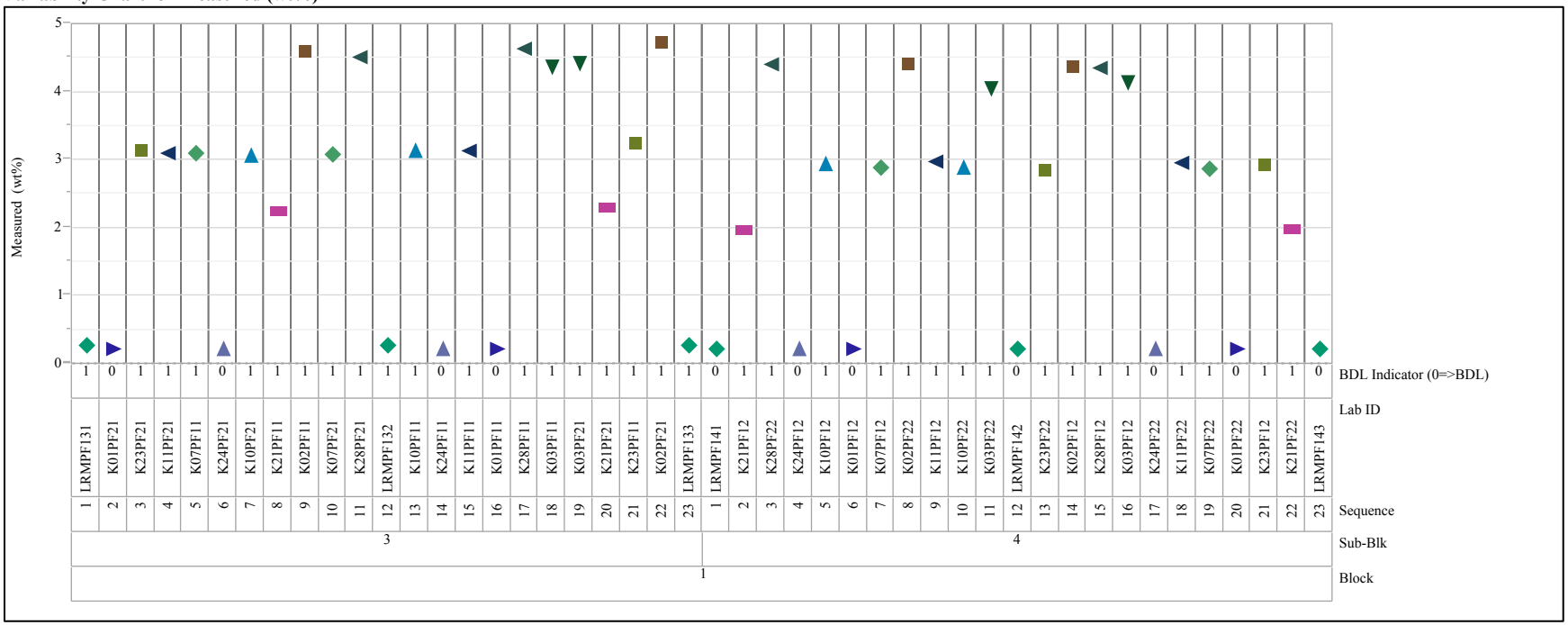


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Li2O (wt%), Analytical Method=PF, Analytical Group=C
Variability Chart for Measured (wt%)

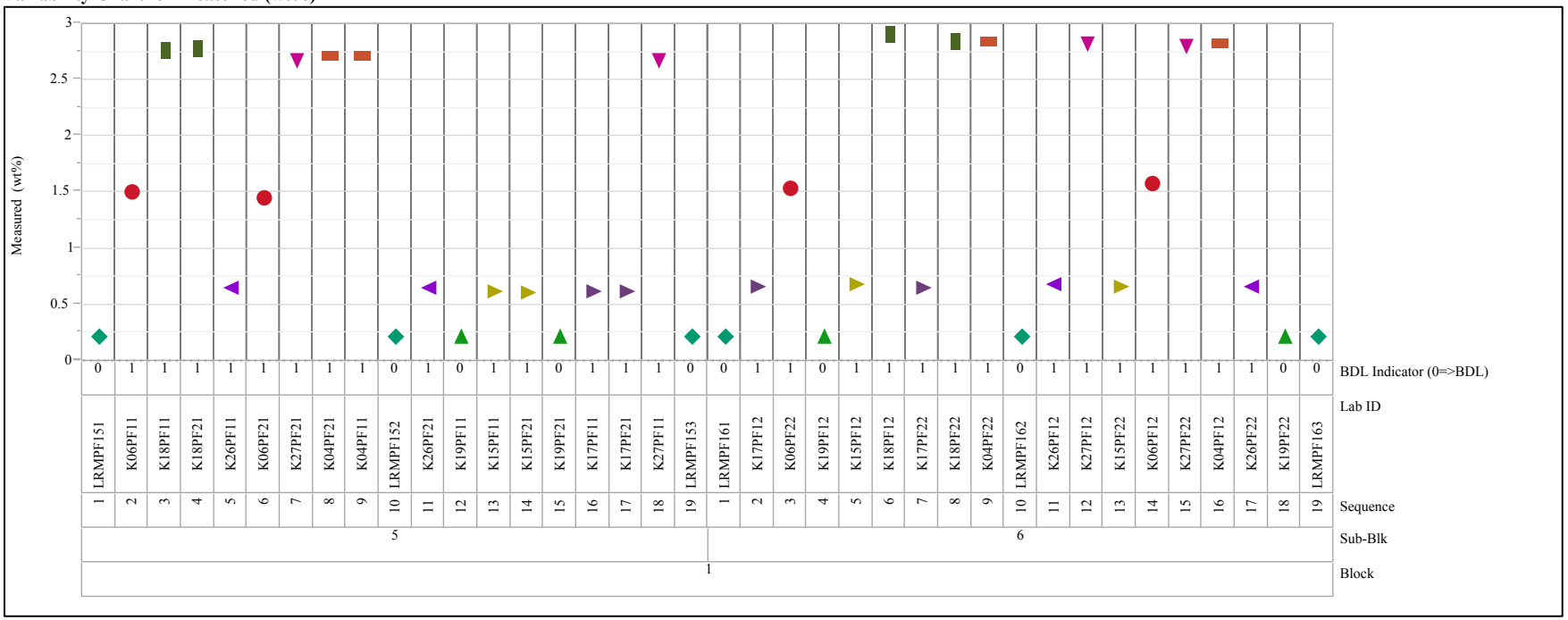


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Li2O (wt%), Analytical Method=PF, Analytical Group=D
Variability Chart for Measured (wt%)

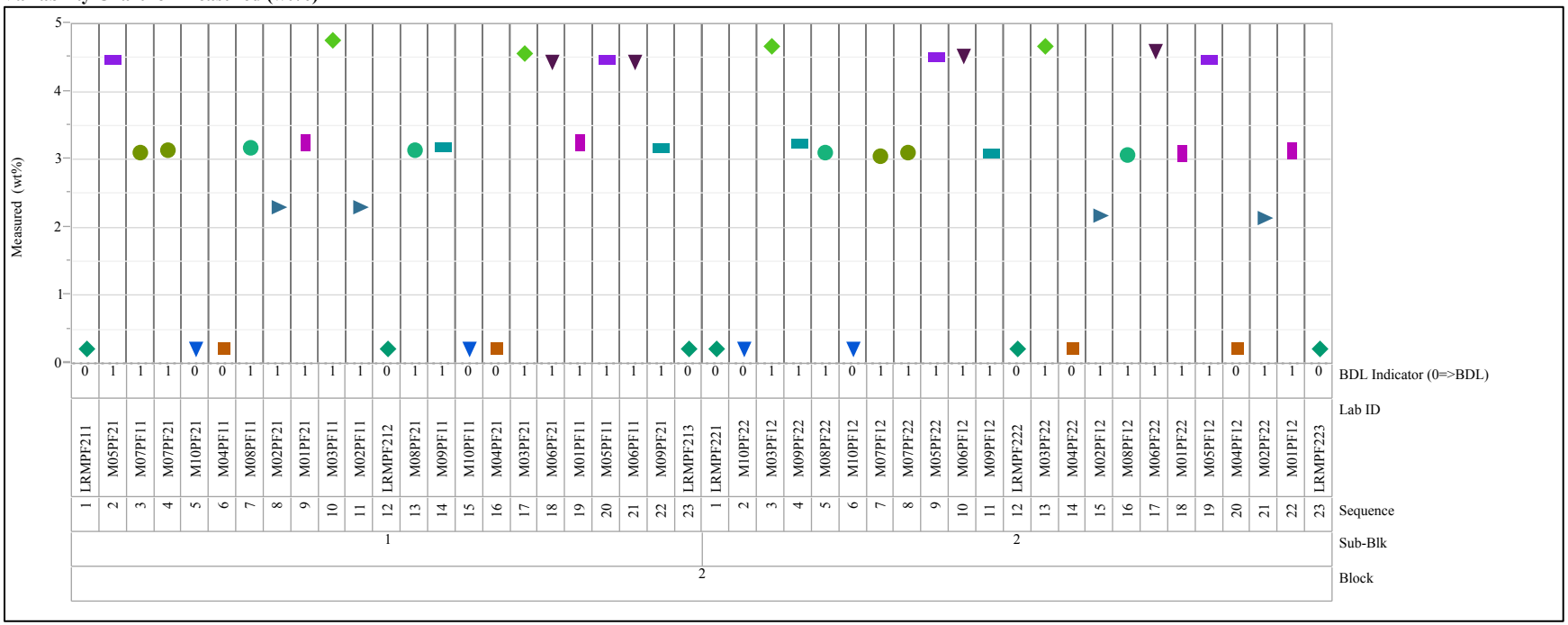


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=MgO (wt%), Analytical Method=LM, Analytical Group=A
Variability Chart for Measured (wt%)

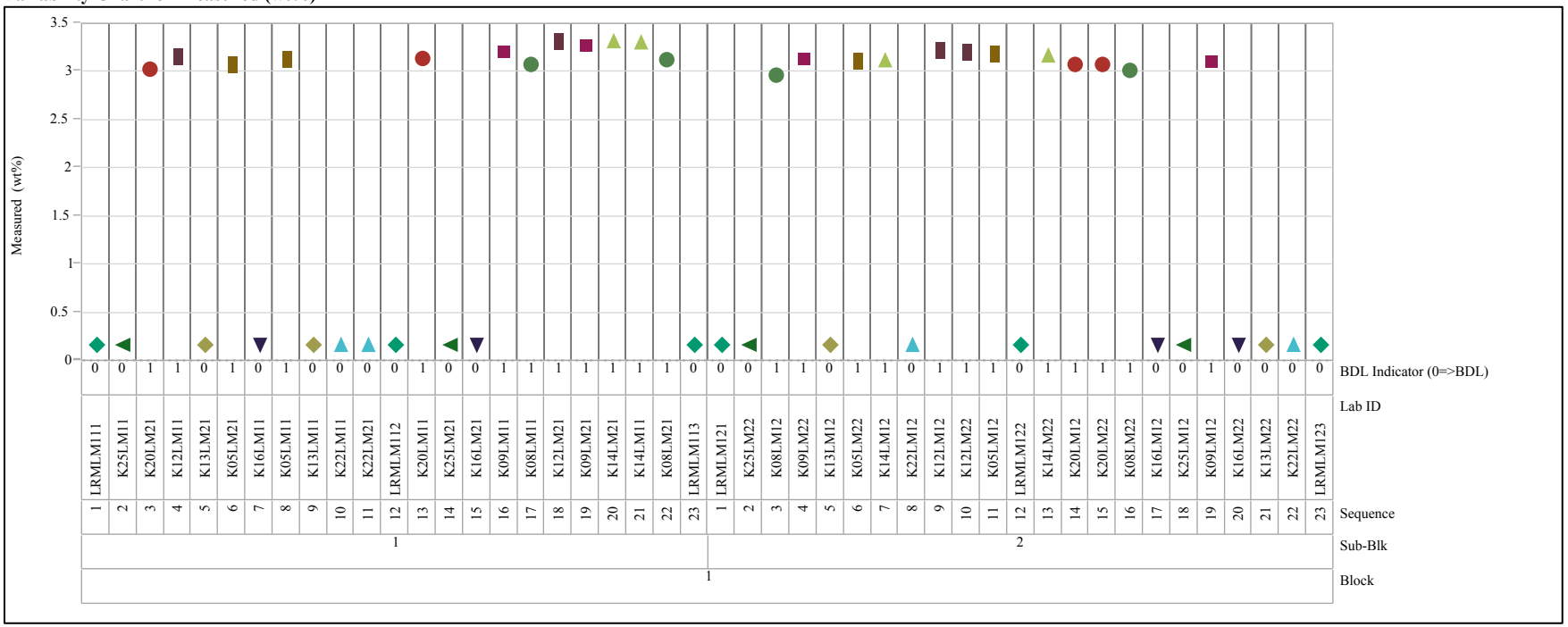


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=MgO (wt%), Analytical Method=LM, Analytical Group=B
Variability Chart for Measured (wt%)

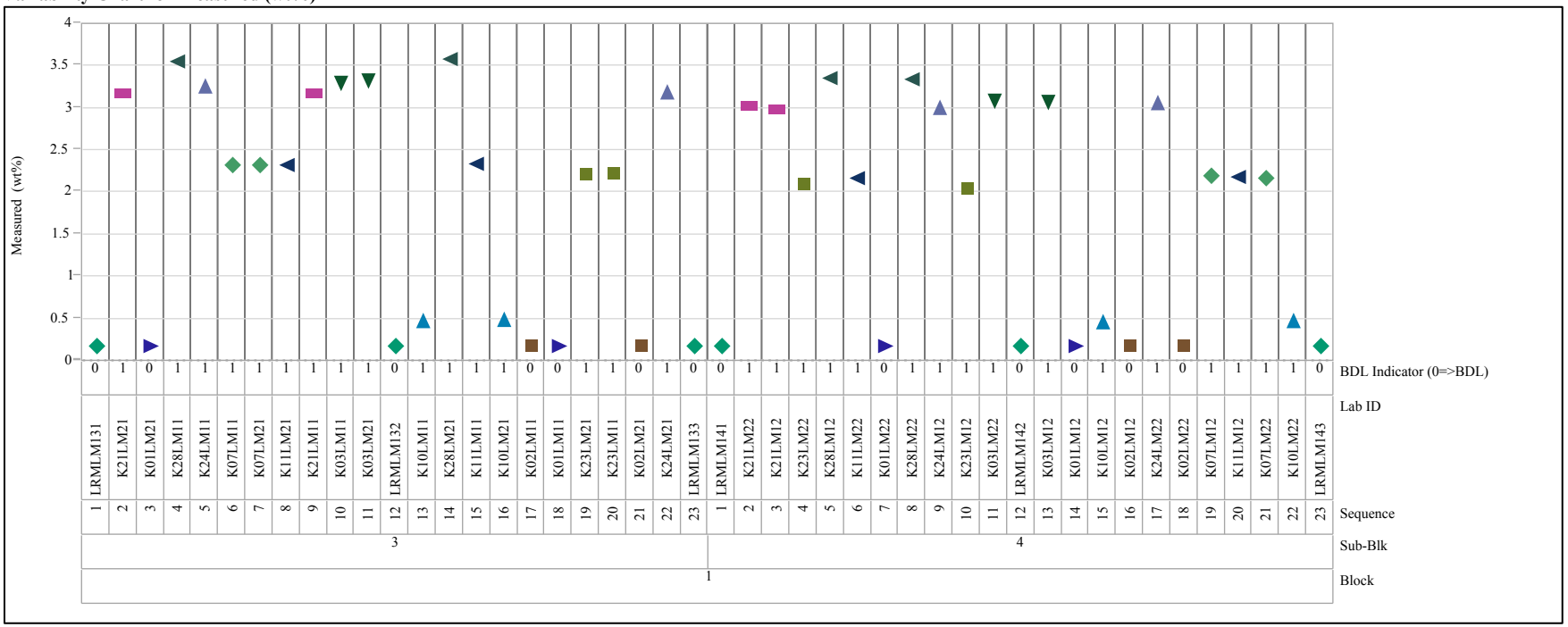


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=MgO (wt%), Analytical Method=LM, Analytical Group=C
Variability Chart for Measured (wt%)

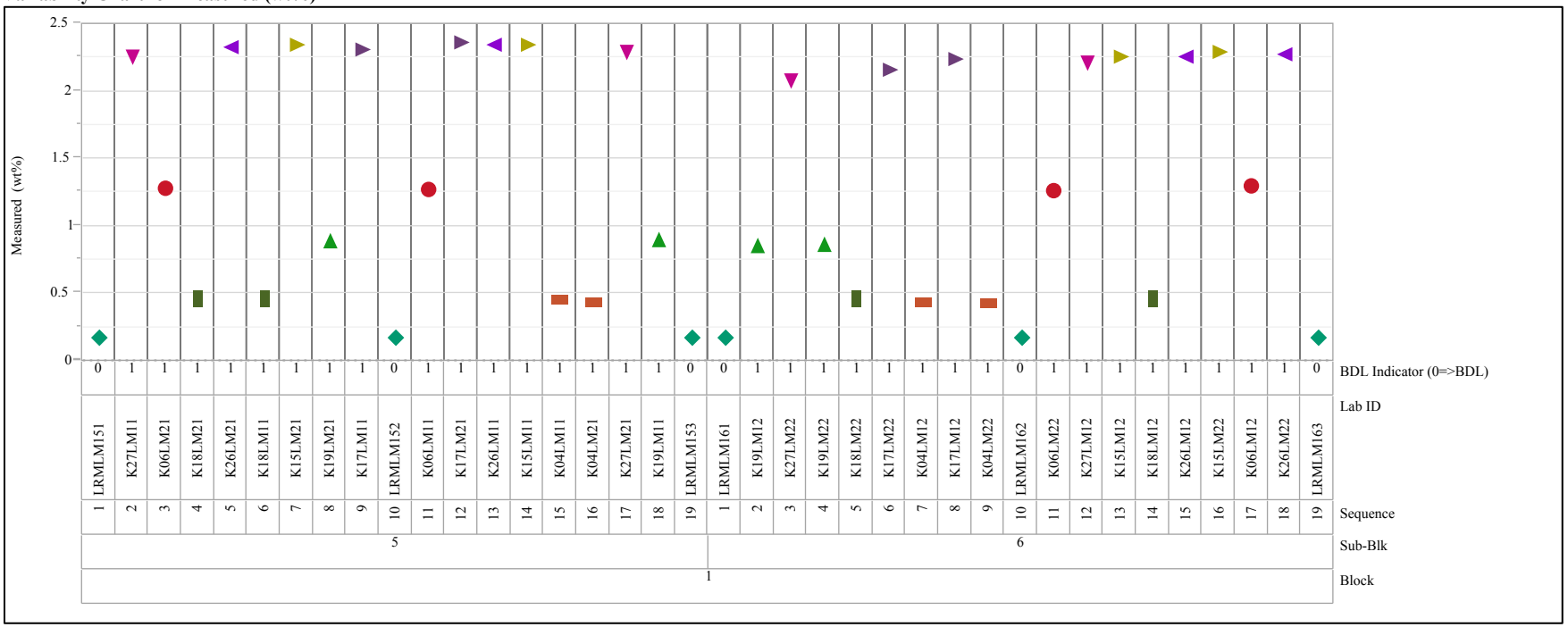


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=MgO (wt%), Analytical Method=LM, Analytical Group=D
Variability Chart for Measured (wt%)

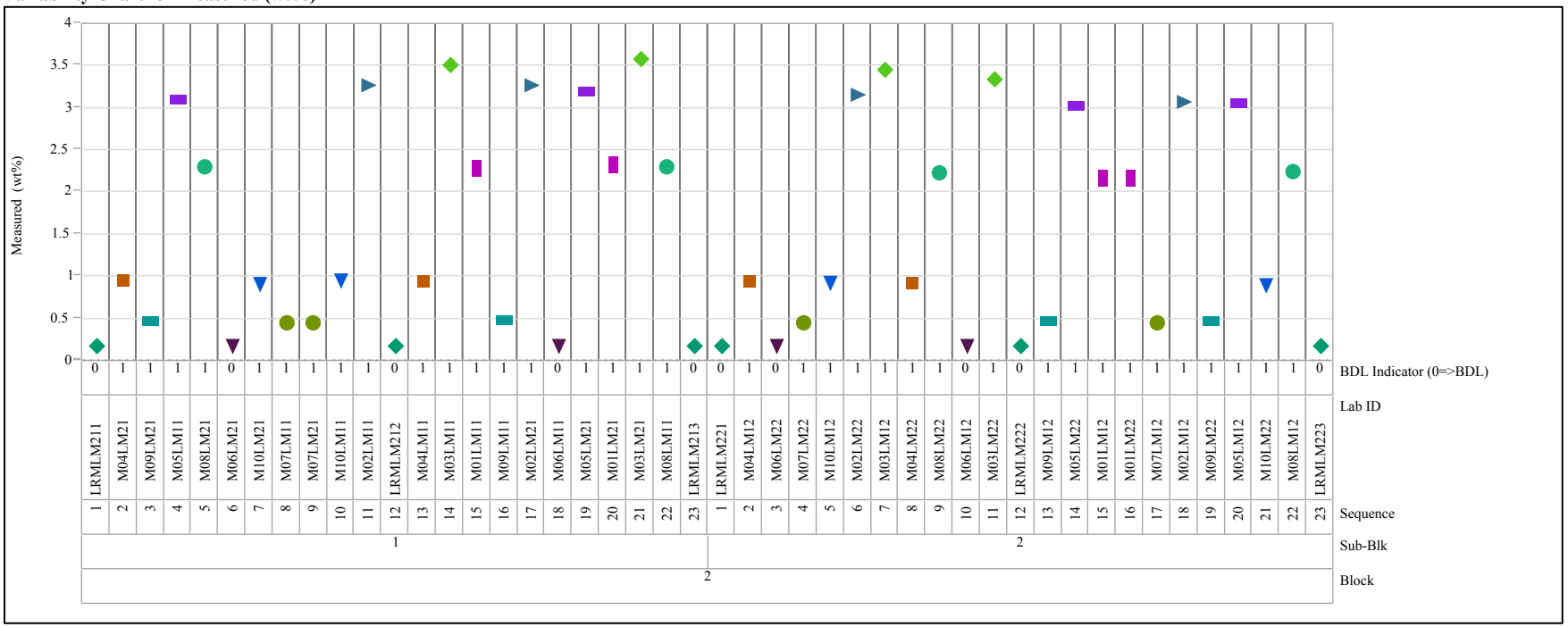


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Na2O (wt%), Analytical Method=LM, Analytical Group=A
Variability Chart for Measured (wt%)

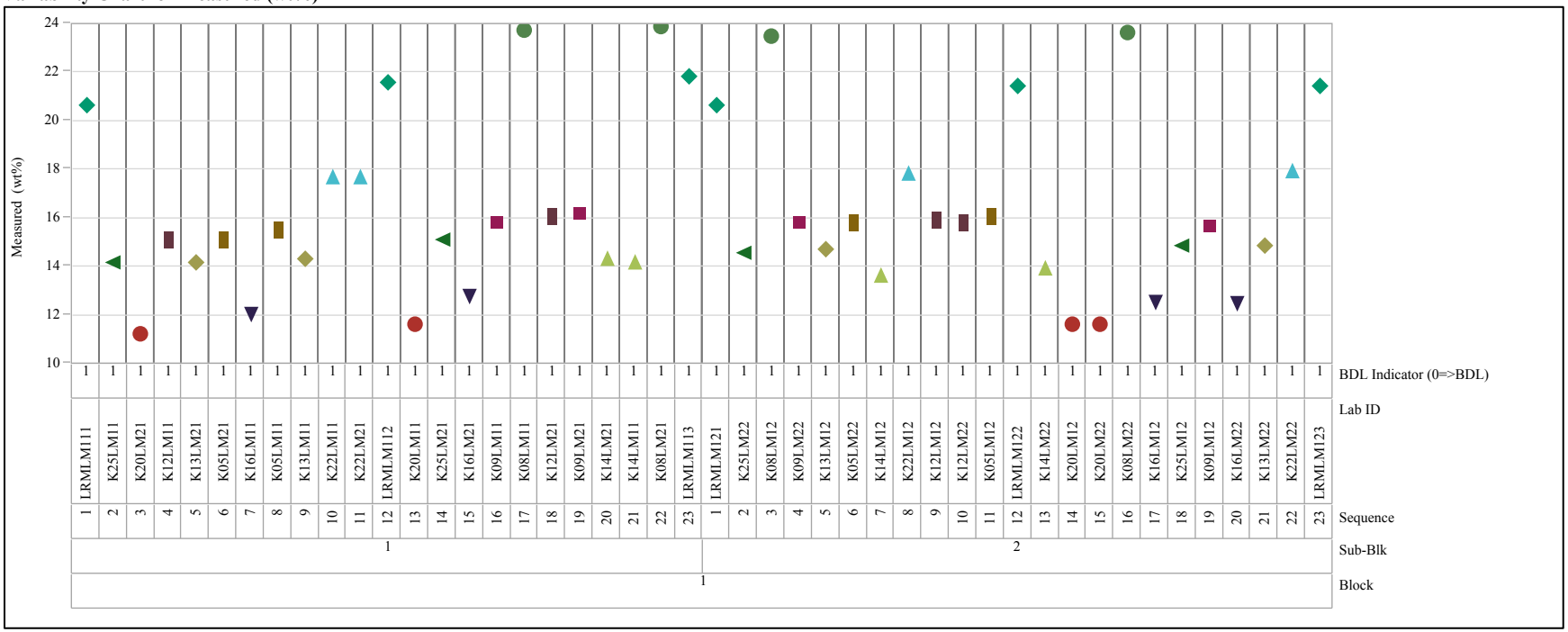


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Na2O (wt%), Analytical Method=LM, Analytical Group=B
Variability Chart for Measured (wt%)

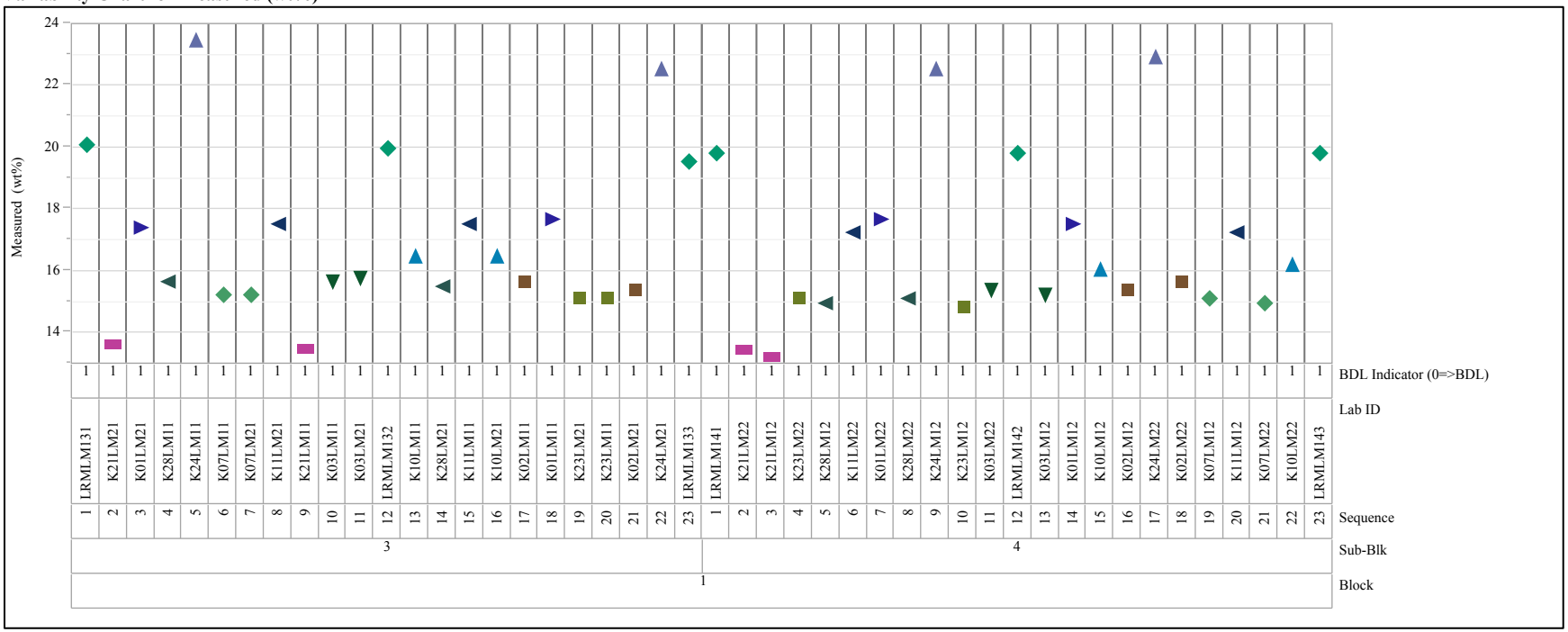


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Na2O (wt%), Analytical Method=LM, Analytical Group=C
Variability Chart for Measured (wt%)

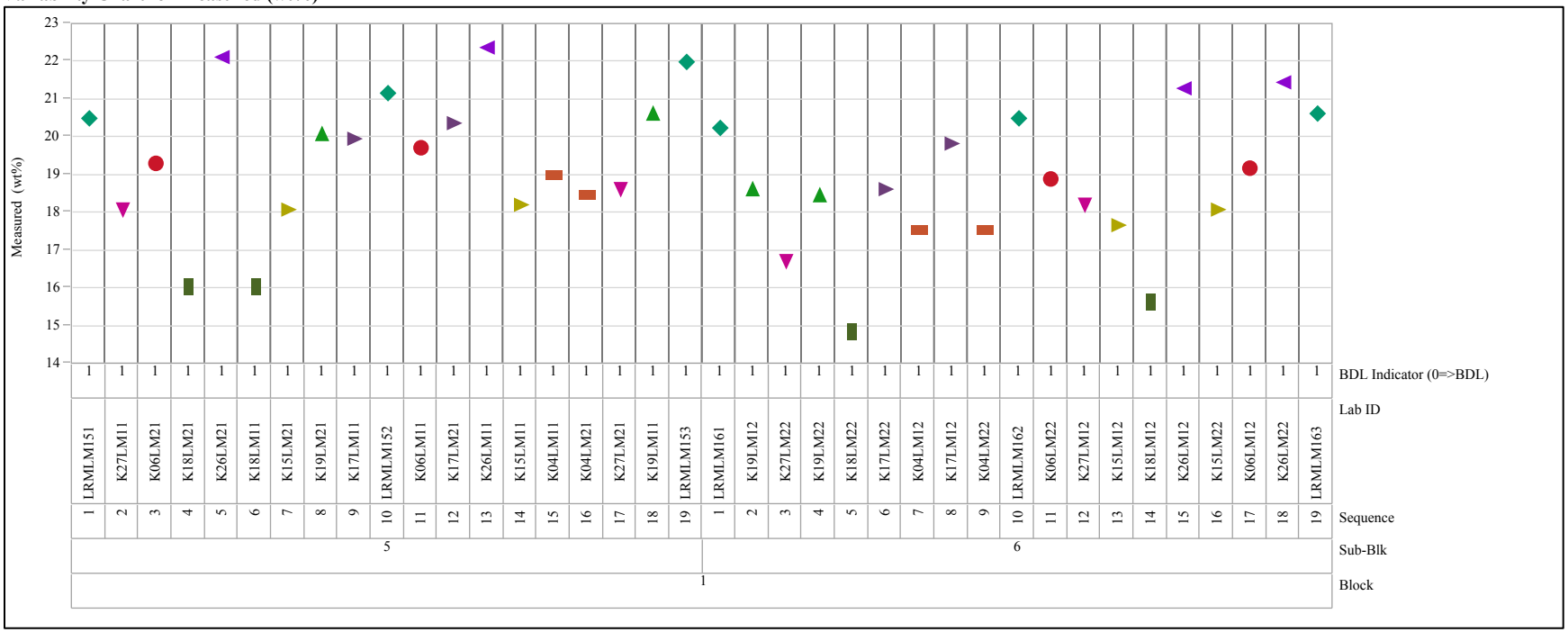


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=Na2O (wt%), Analytical Method=LM, Analytical Group=D
Variability Chart for Measured (wt%)

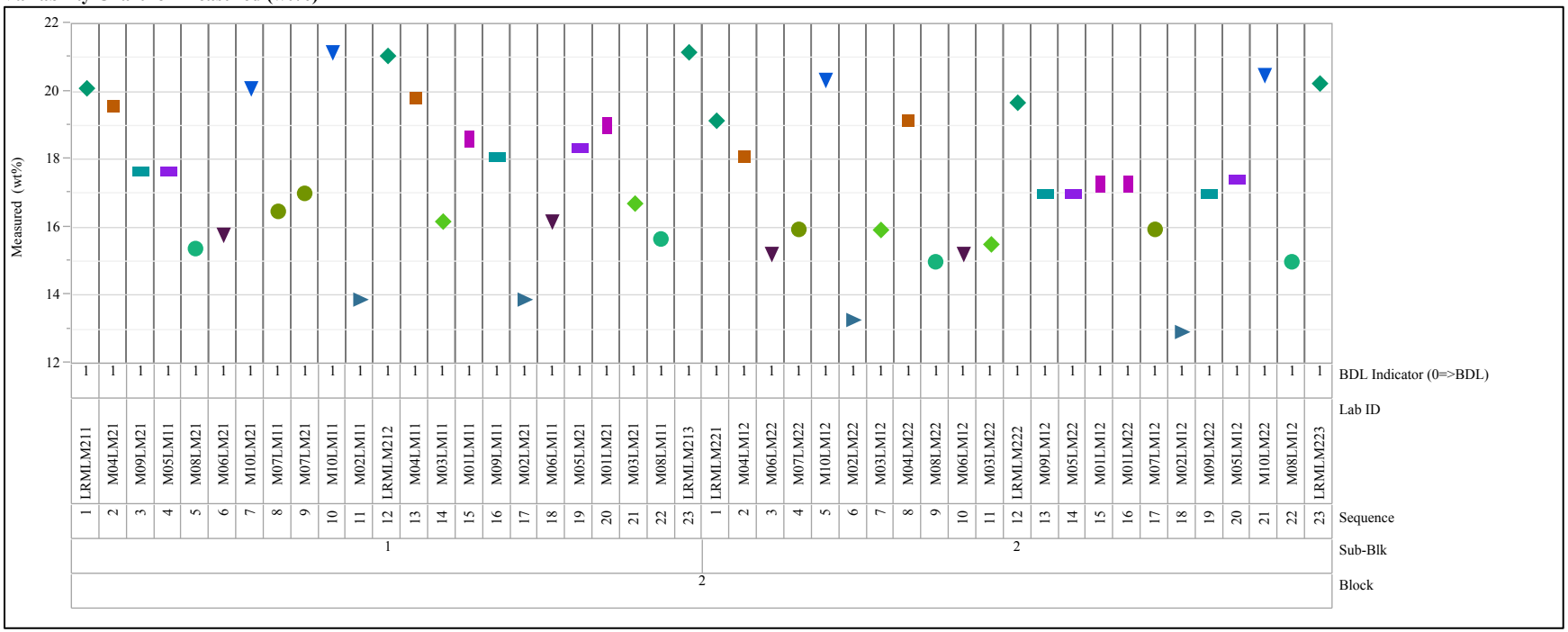


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=P2O5 (wt%), Analytical Method=LM, Analytical Group=A
Variability Chart for Measured (wt%)

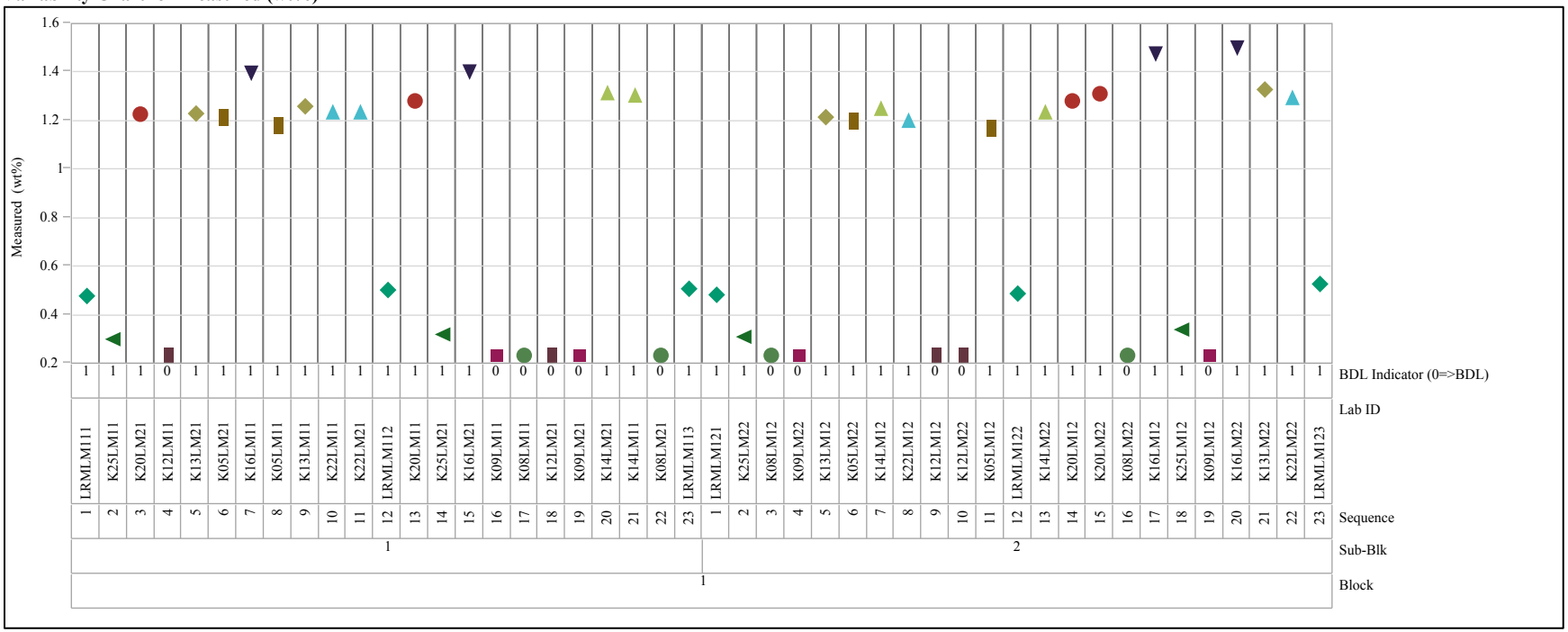


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=P2O5 (wt%), Analytical Method=LM, Analytical Group=B
Variability Chart for Measured (wt%)

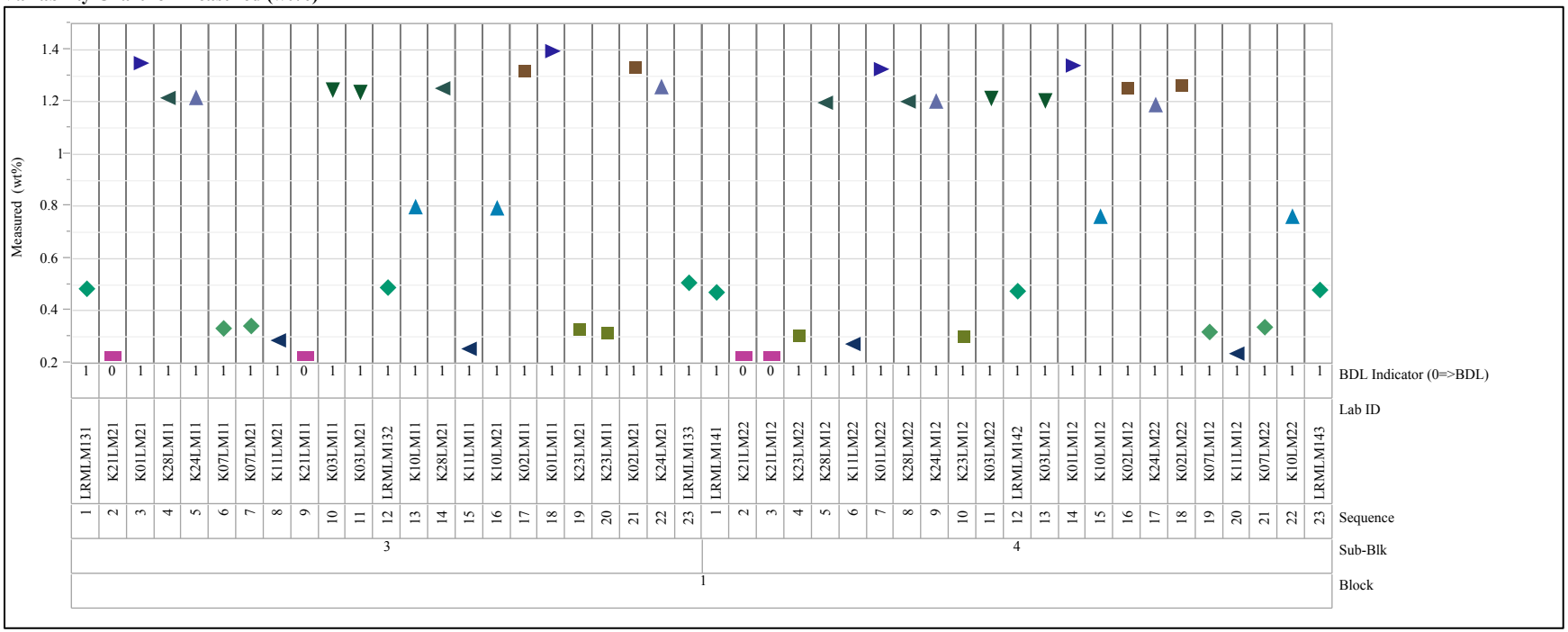


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=P2O5 (wt%), Analytical Method=LM, Analytical Group=C
Variability Chart for Measured (wt%)

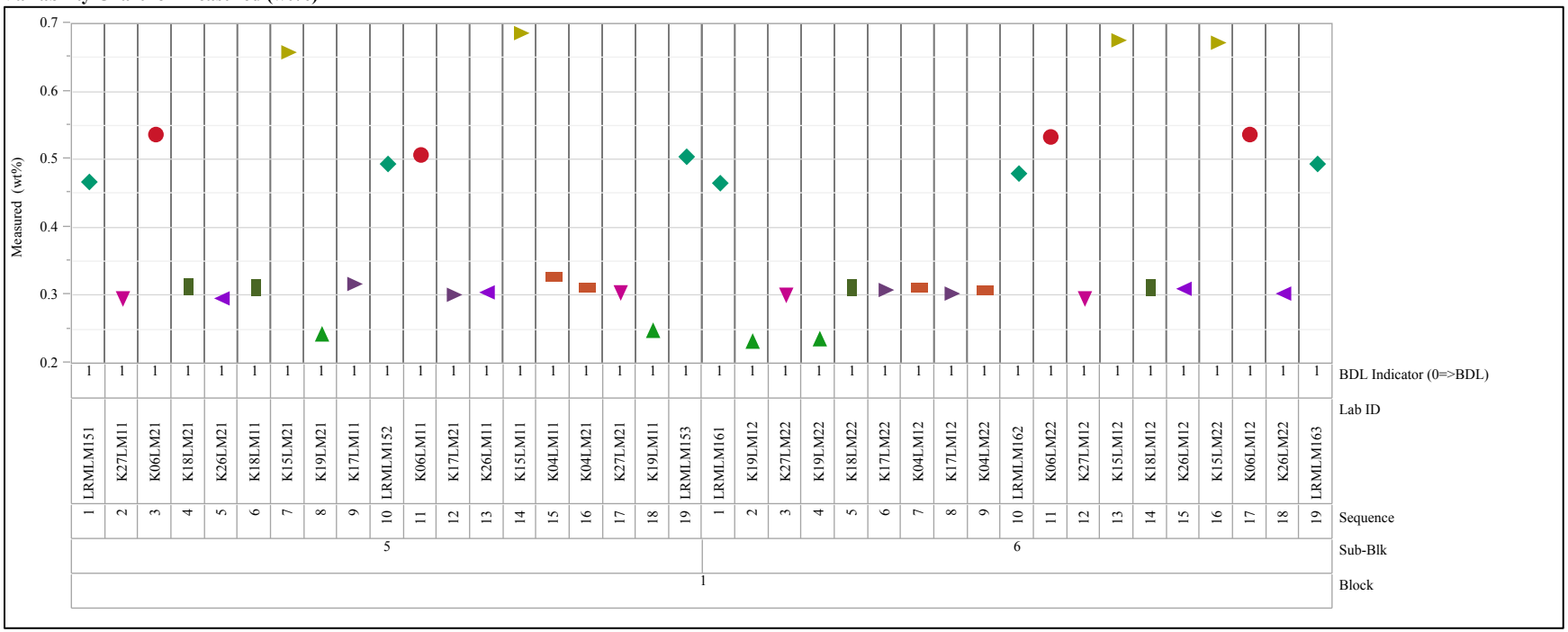


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=P2O5 (wt%), Analytical Method=LM, Analytical Group=D
Variability Chart for Measured (wt%)

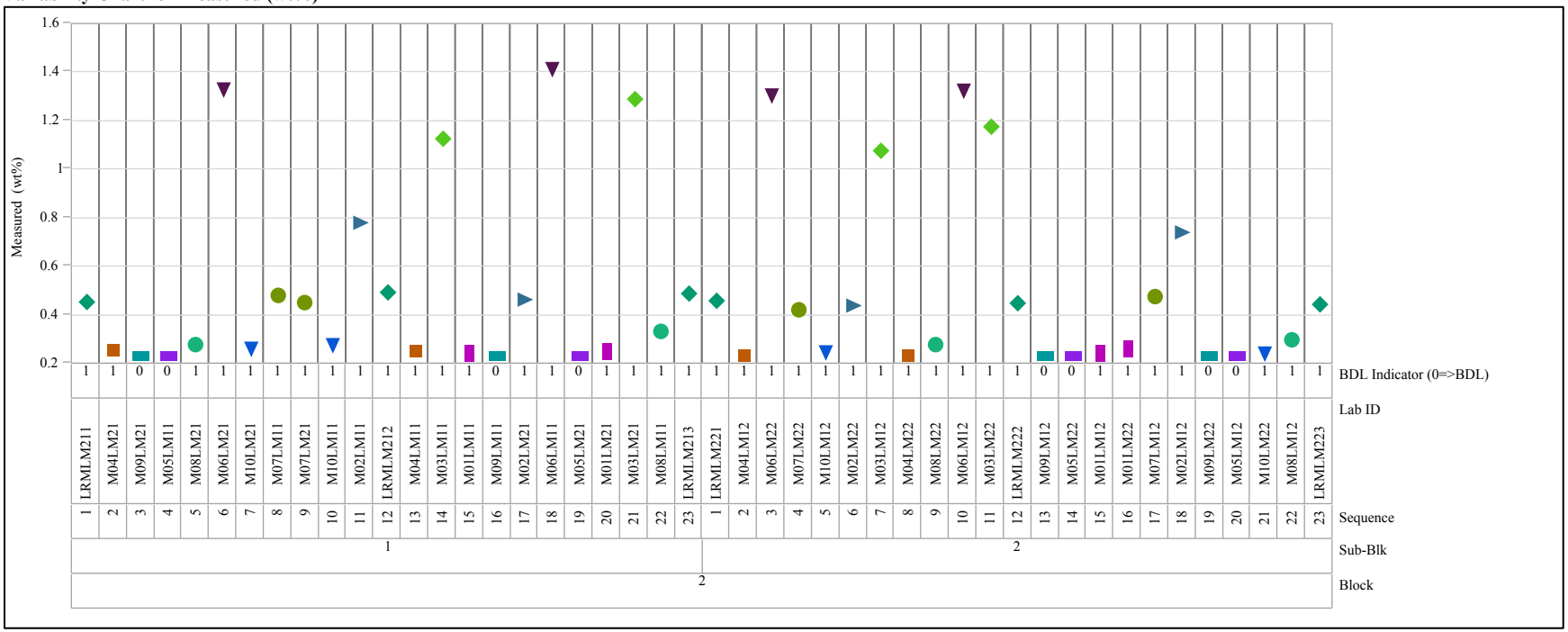


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=SiO2 (wt%), Analytical Method=PF, Analytical Group=A
Variability Chart for Measured (wt%)

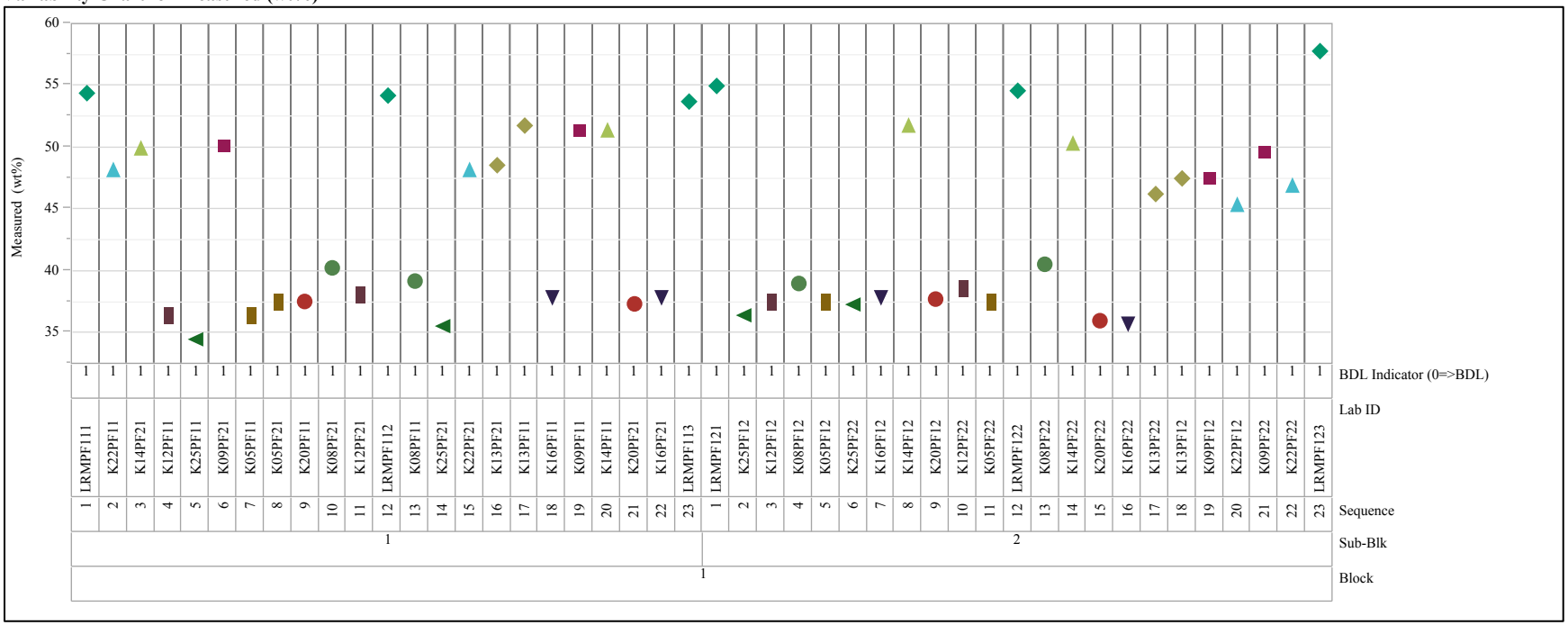


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=SiO2 (wt%), Analytical Method=PF, Analytical Group=B
Variability Chart for Measured (wt%)

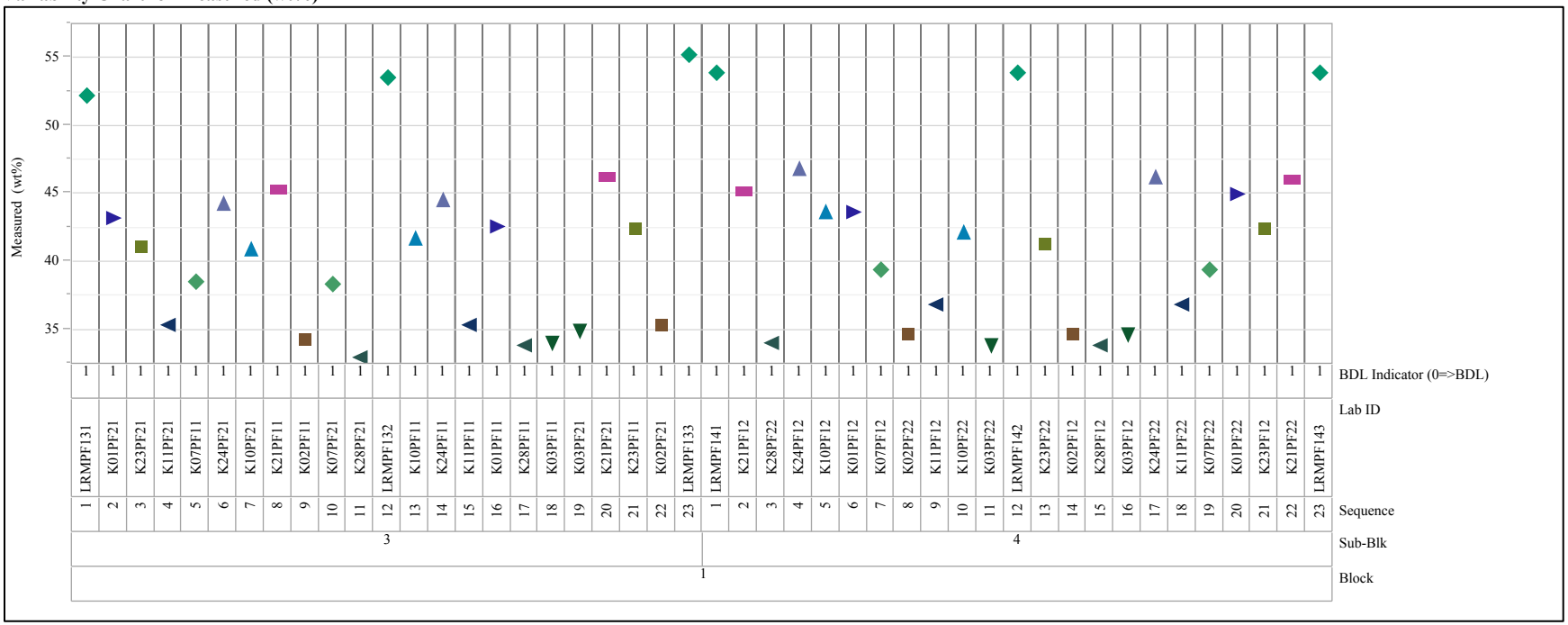


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=SiO2 (wt%), Analytical Method=PF, Analytical Group=C
Variability Chart for Measured (wt%)

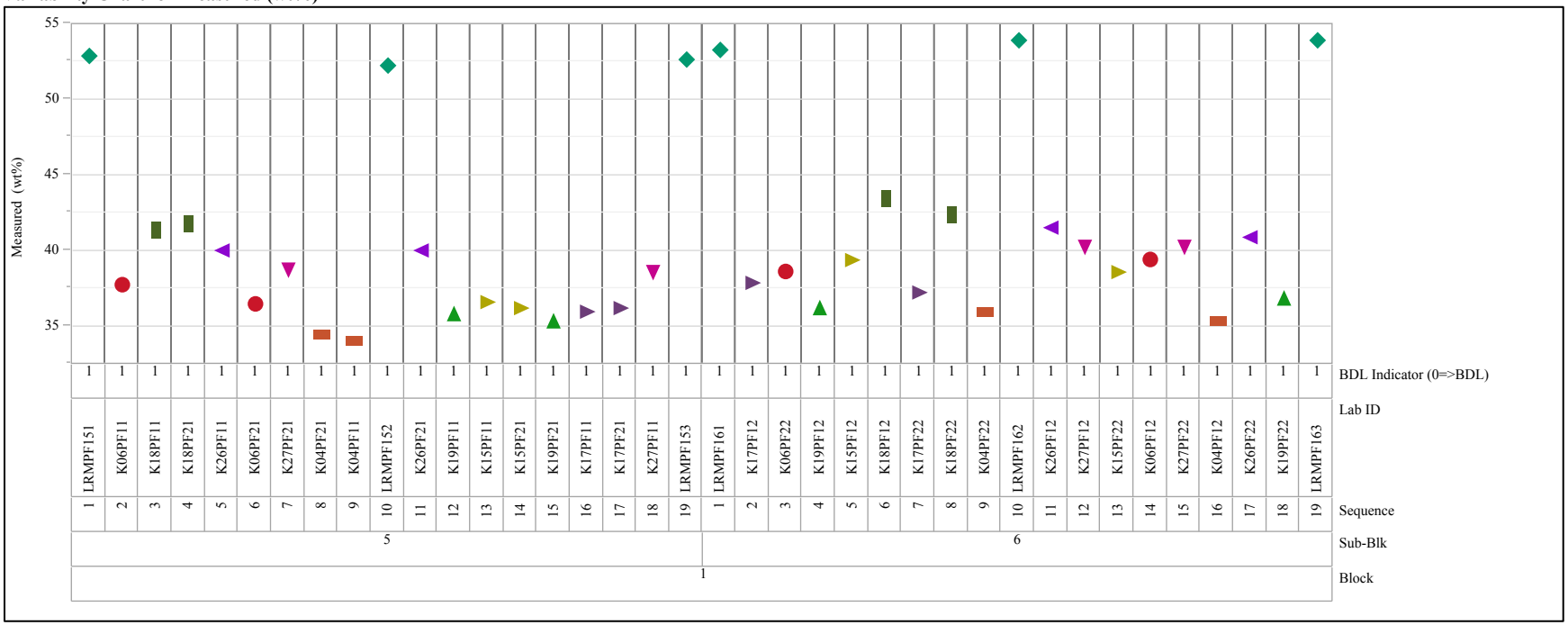


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=SiO2 (wt%), Analytical Method=PF, Analytical Group=D
Variability Chart for Measured (wt%)

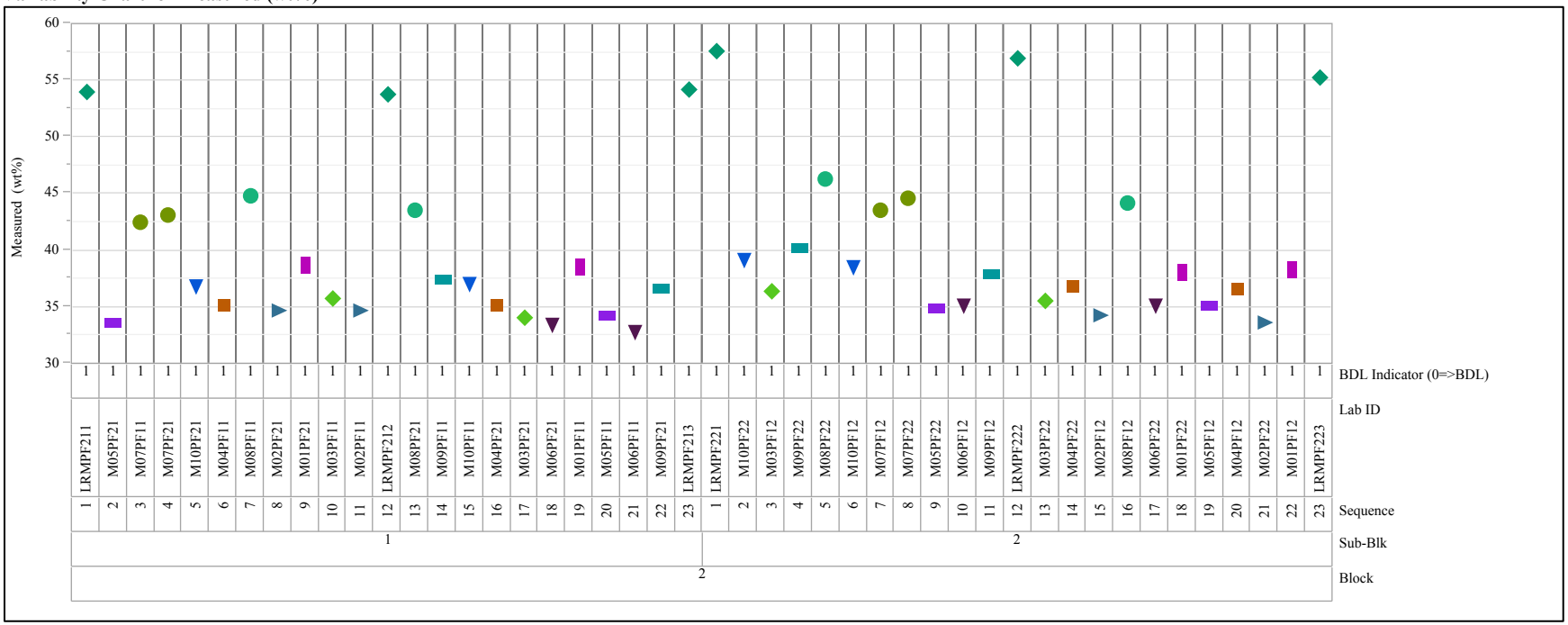


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=SnO2 (wt%), Analytical Method=PF, Analytical Group=A
Variability Chart for Measured (wt%)

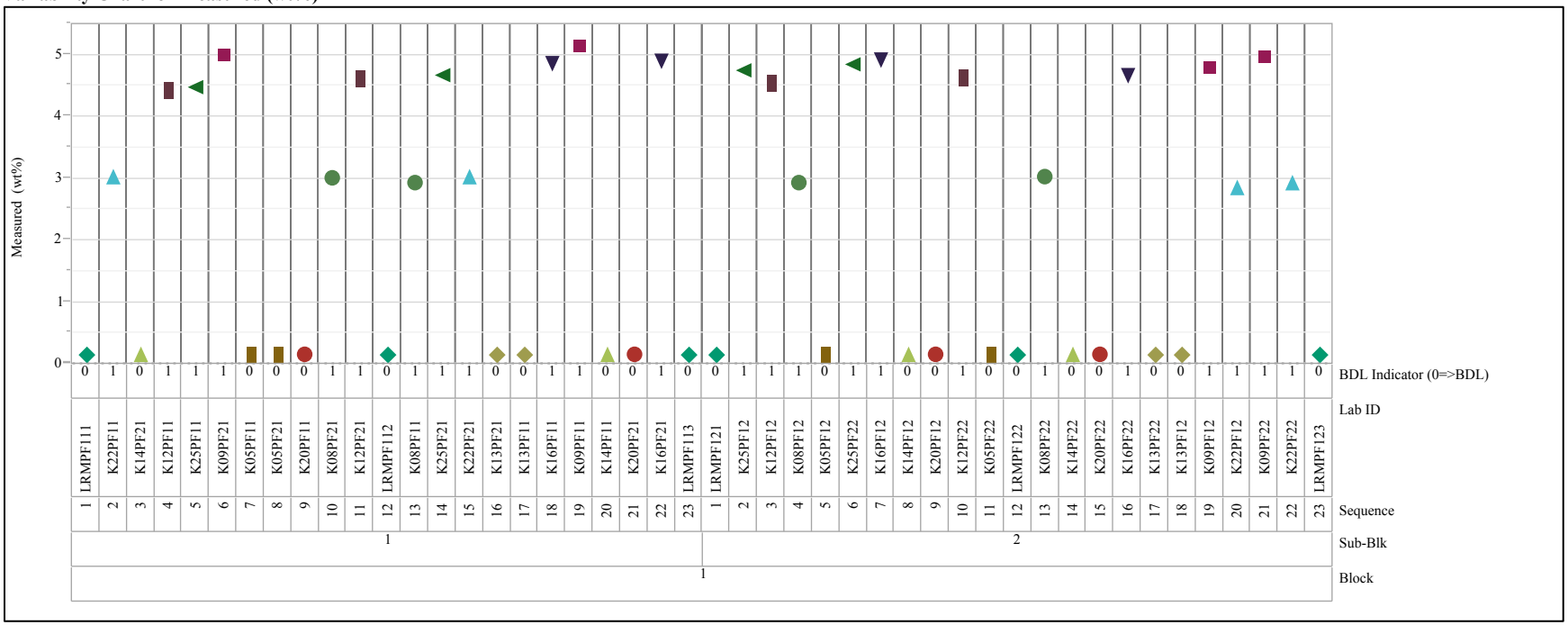


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=SnO2 (wt%), Analytical Method=PF, Analytical Group=B
Variability Chart for Measured (wt%)

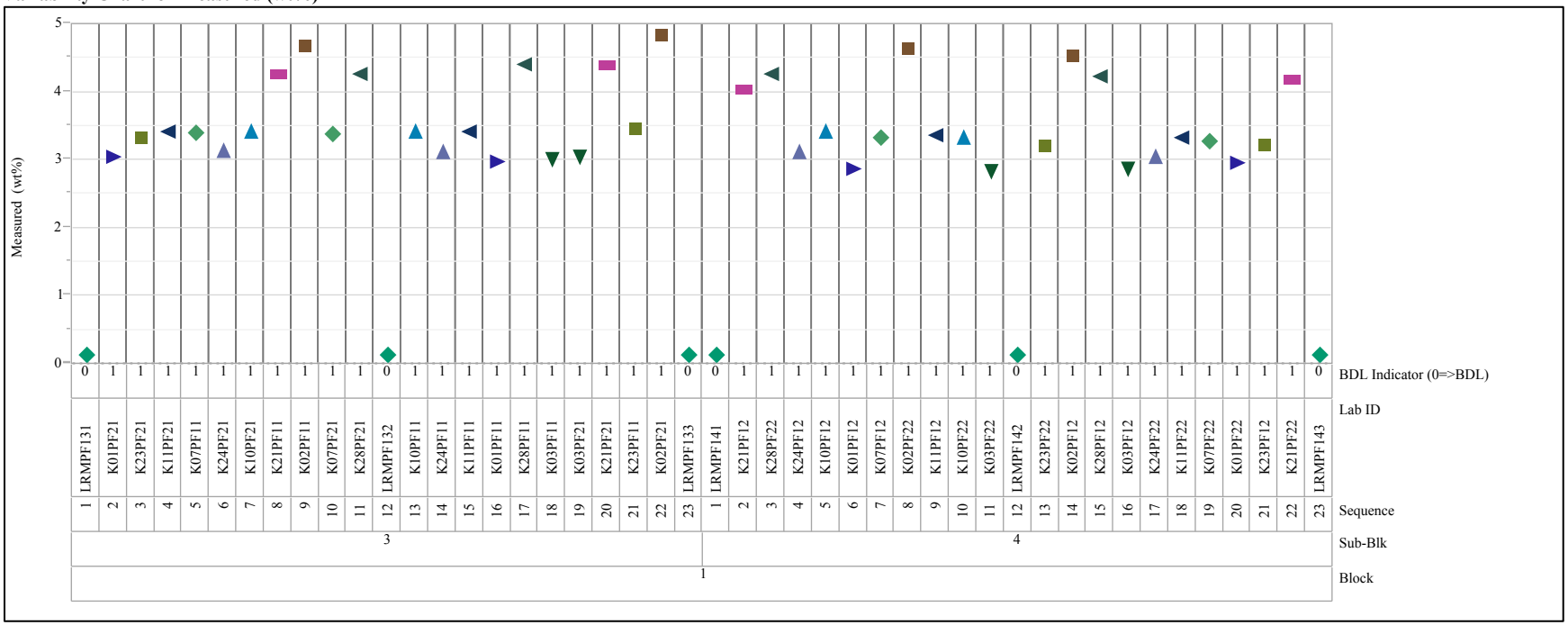


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=SnO2 (wt%), Analytical Method=PF, Analytical Group=C
Variability Chart for Measured (wt%)

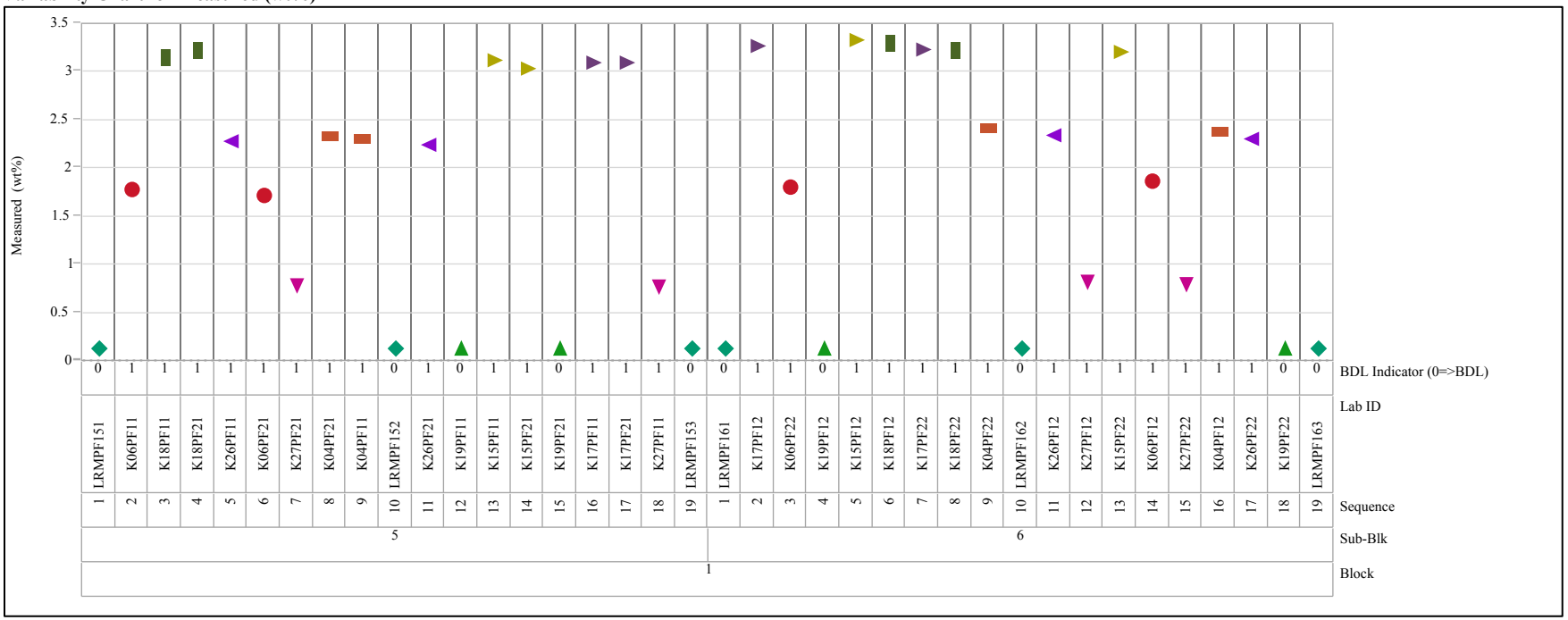


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=SnO2 (wt%), Analytical Method=PF, Analytical Group=D
Variability Chart for Measured (wt%)

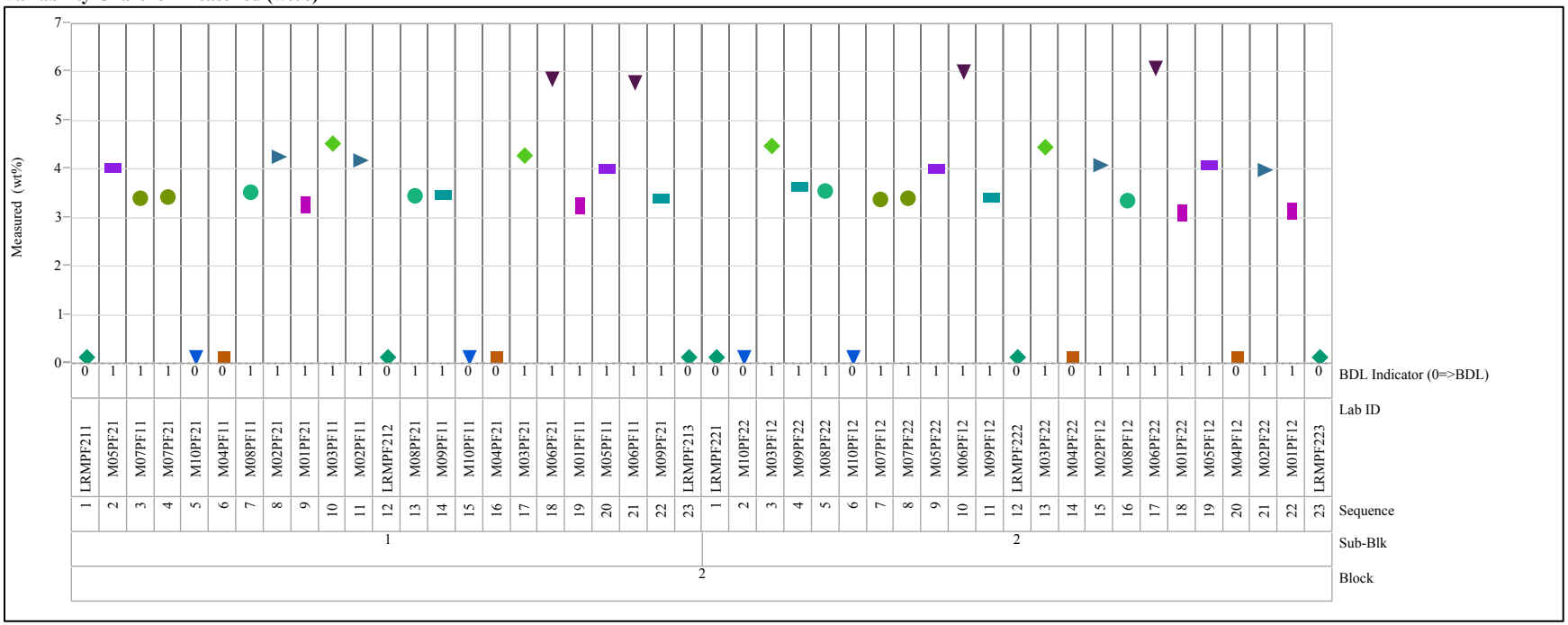


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=SO3 (wt%), Analytical Method=LM, Analytical Group=A
Variability Chart for Measured (wt%)

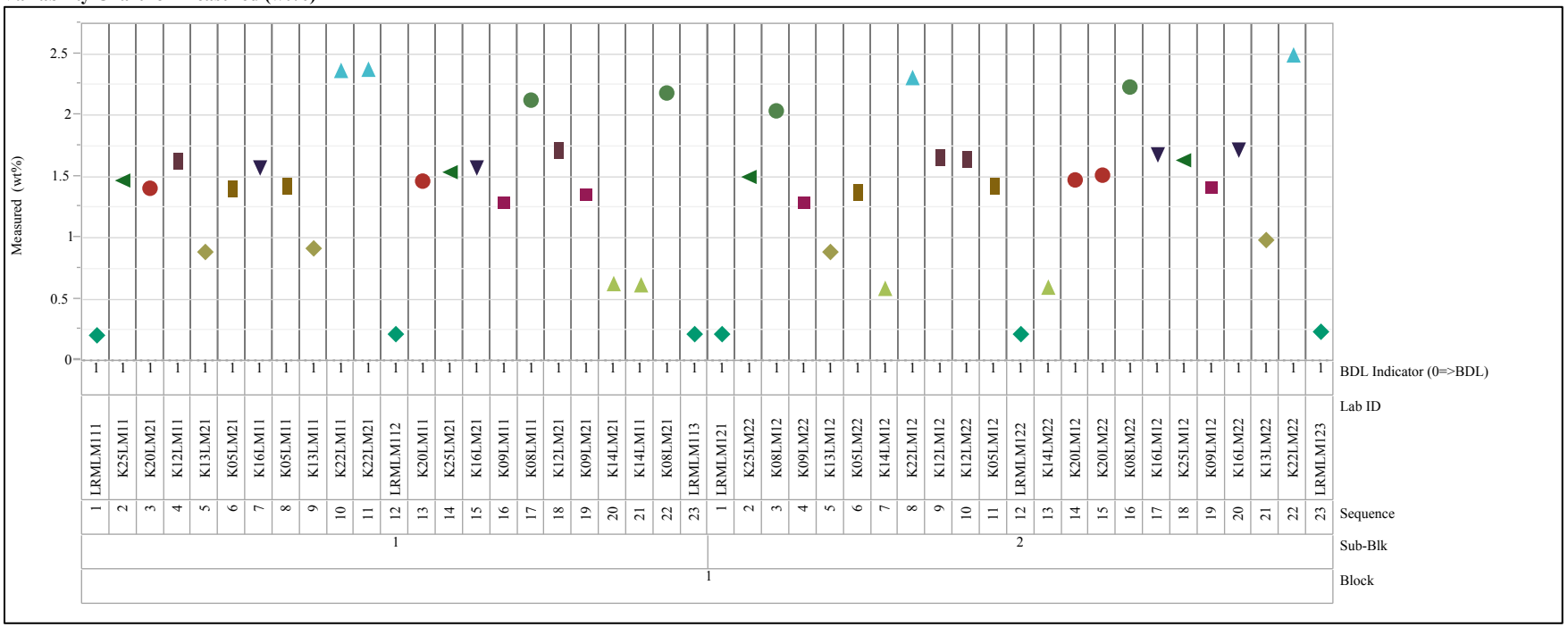


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=SO3 (wt%), Analytical Method=LM, Analytical Group=B
Variability Chart for Measured (wt%)

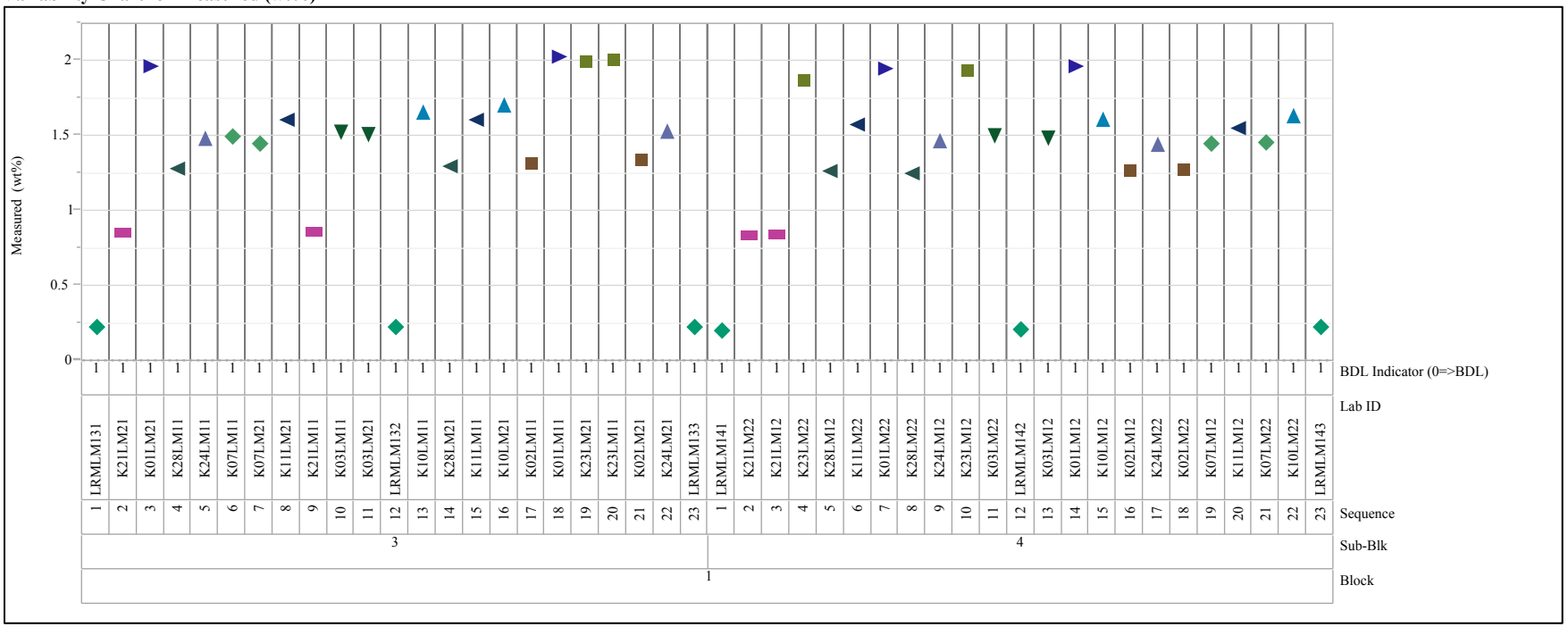


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=SO3 (wt%), Analytical Method=LM, Analytical Group=C
Variability Chart for Measured (wt%)

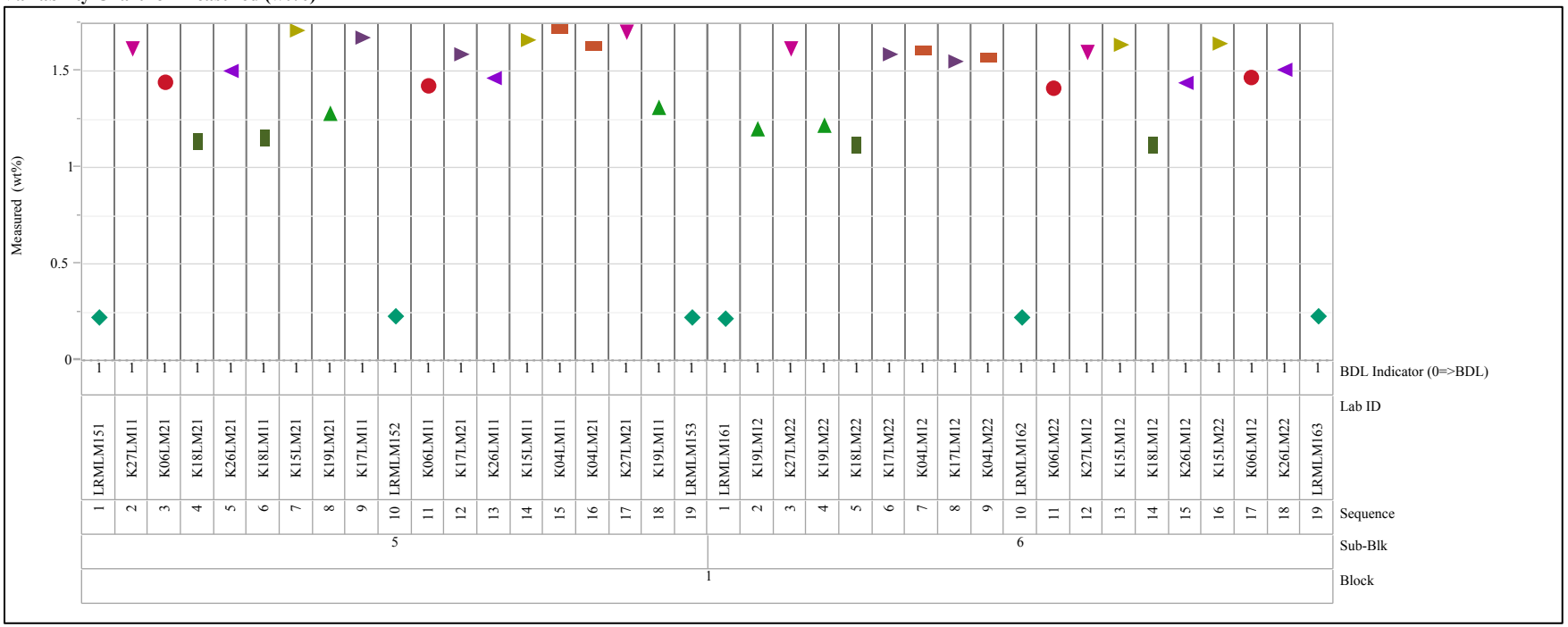


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=SO3 (wt%), Analytical Method=LM, Analytical Group=D
Variability Chart for Measured (wt%)

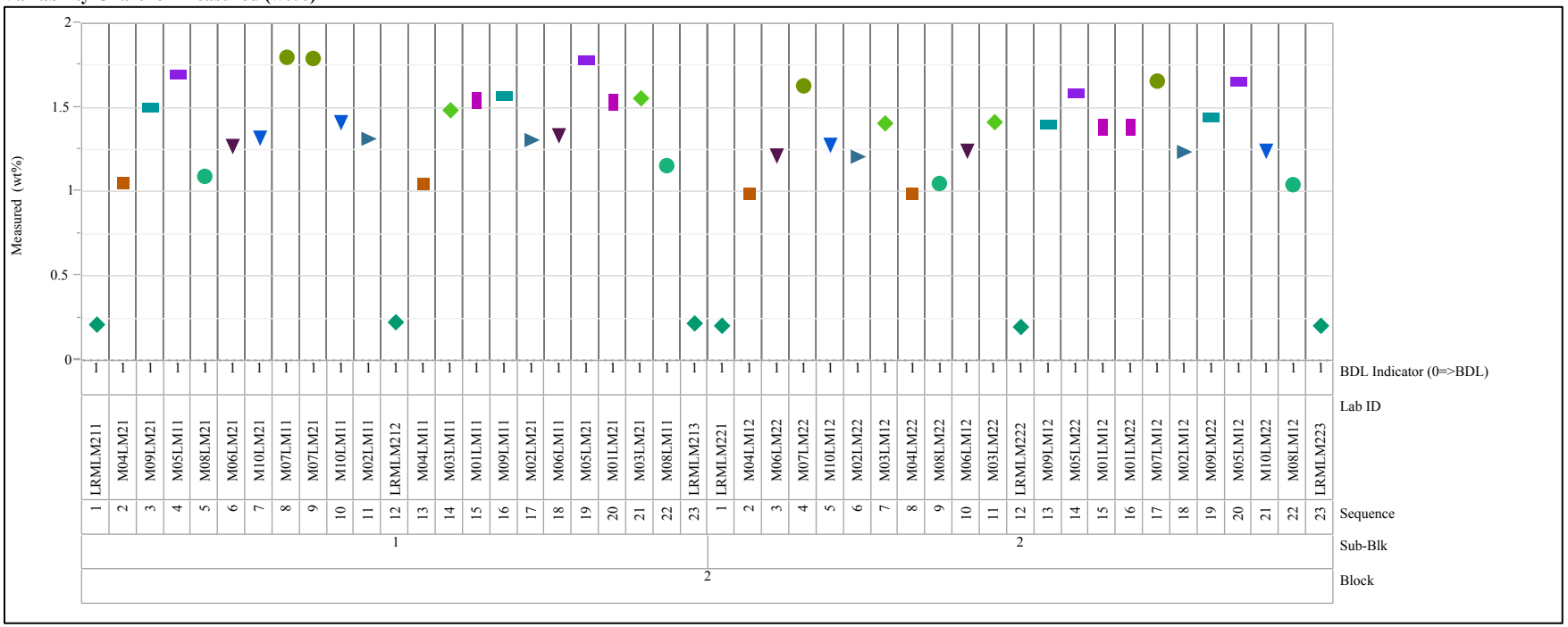


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=V2O5 (wt%), Analytical Method=LM, Analytical Group=A
Variability Chart for Measured (wt%)

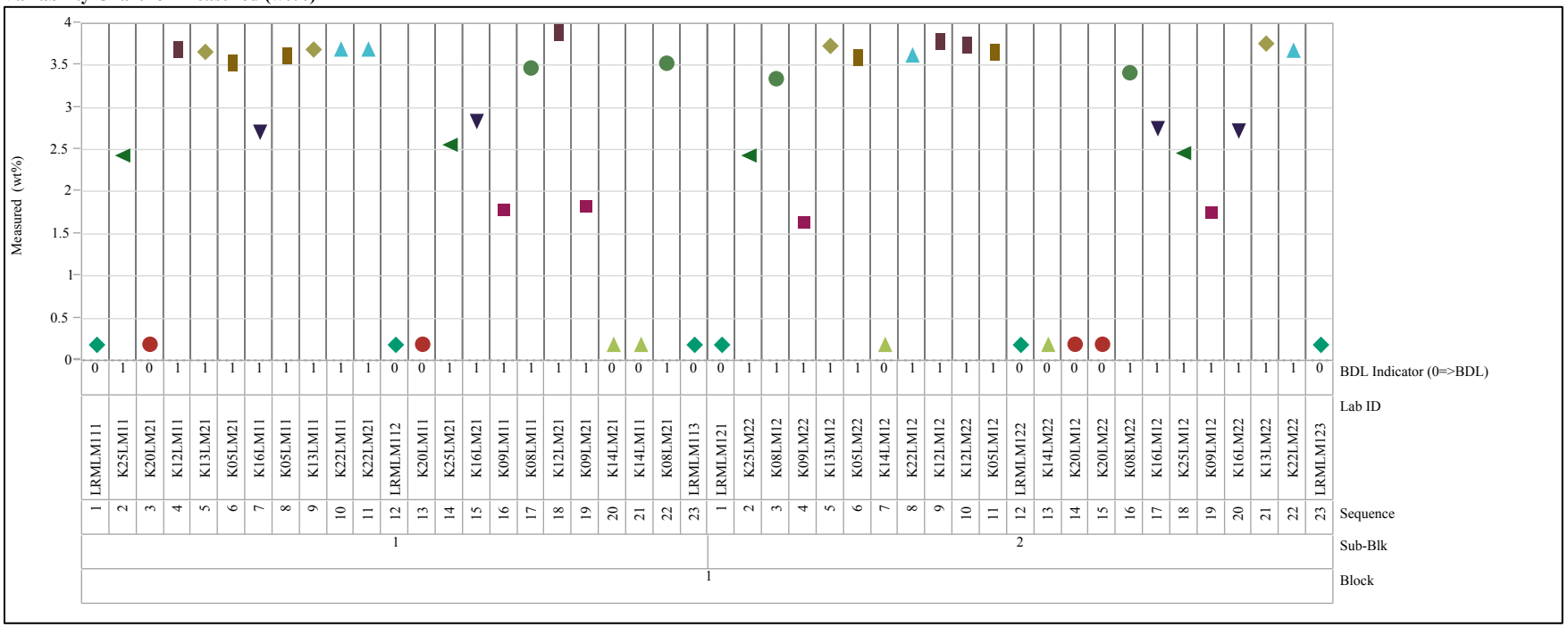


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=V2O5 (wt%), Analytical Method=LM, Analytical Group=B
Variability Chart for Measured (wt%)

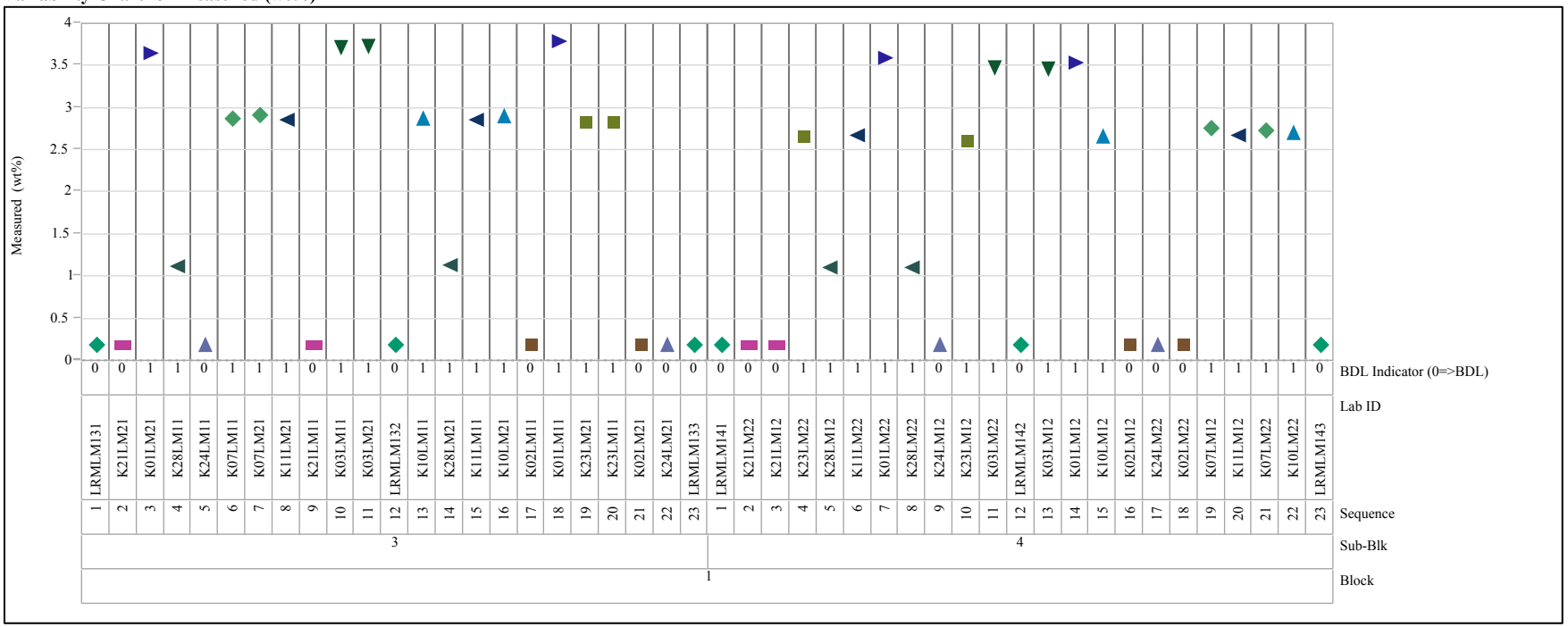


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=V2O5 (wt%), Analytical Method=LM, Analytical Group=C
Variability Chart for Measured (wt%)

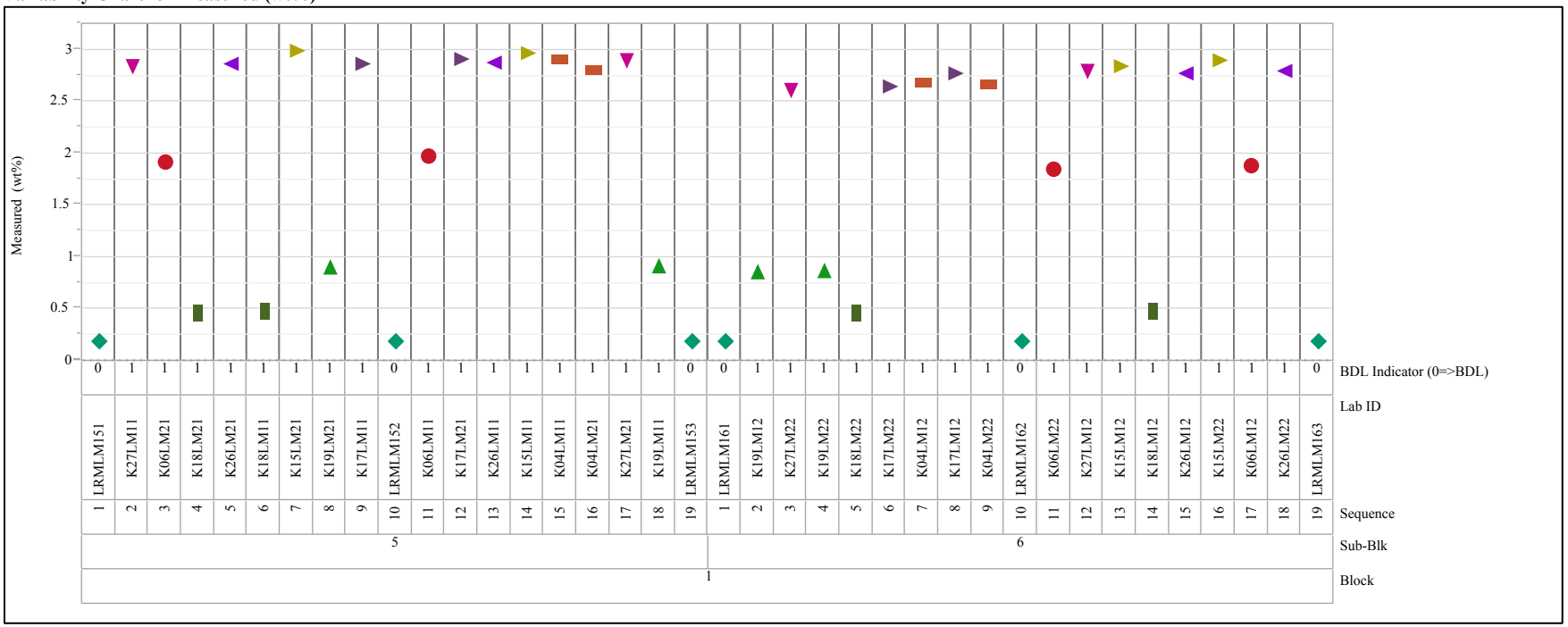


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=V2O5 (wt%), Analytical Method=LM, Analytical Group=D
Variability Chart for Measured (wt%)

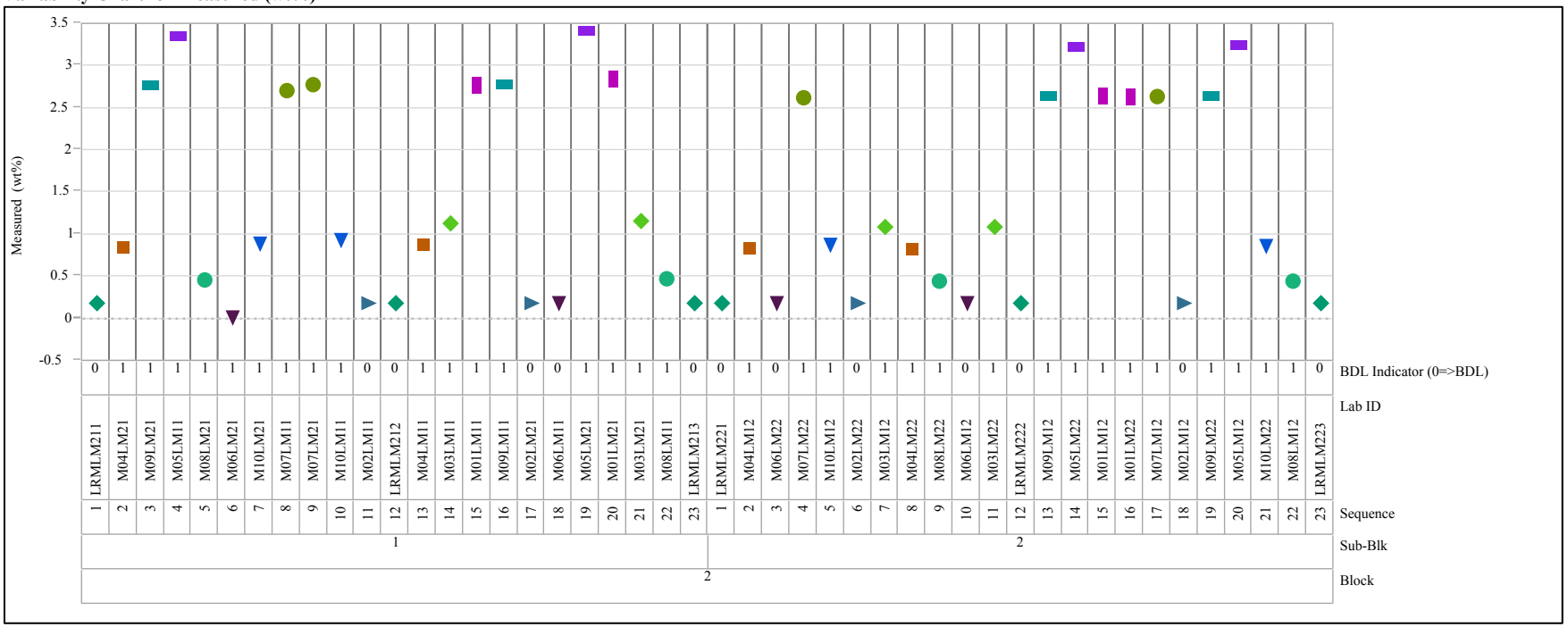


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=ZnO (wt%), Analytical Method=LM, Analytical Group=A
Variability Chart for Measured (wt%)

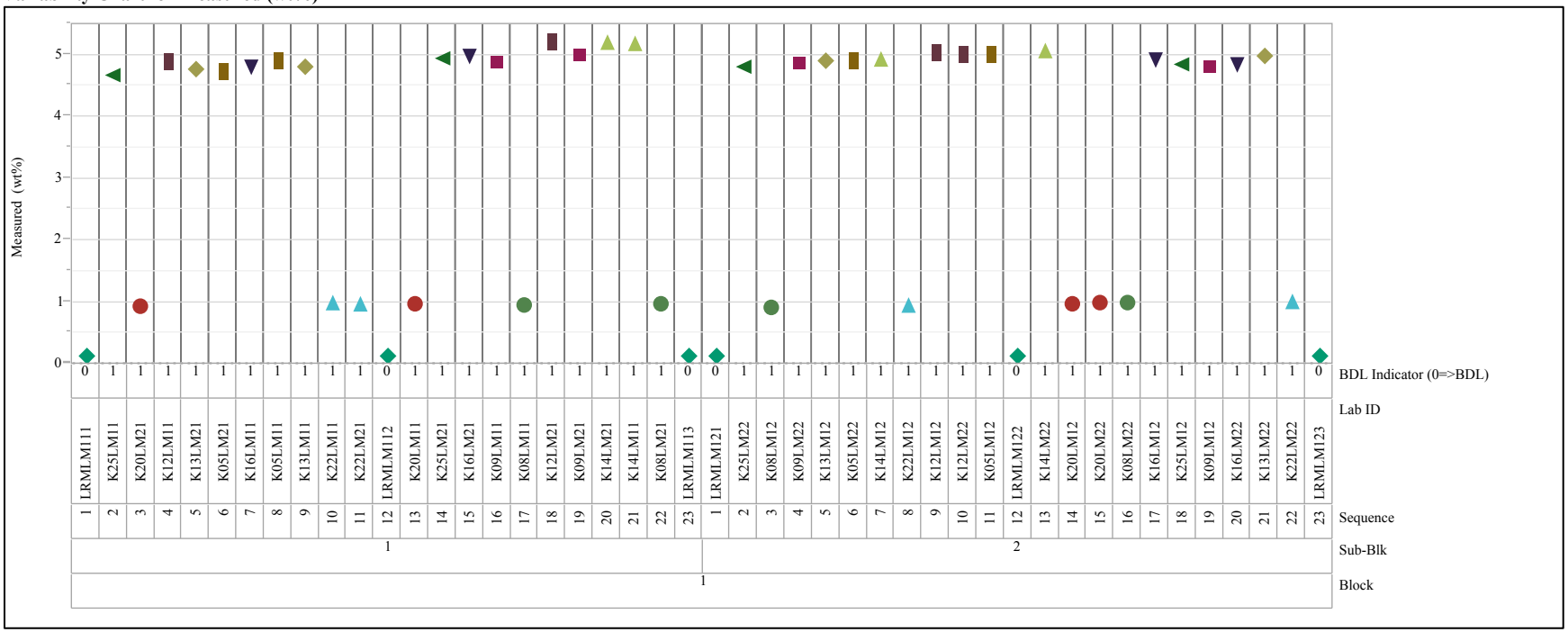


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=ZnO (wt%), Analytical Method=LM, Analytical Group=B
Variability Chart for Measured (wt%)

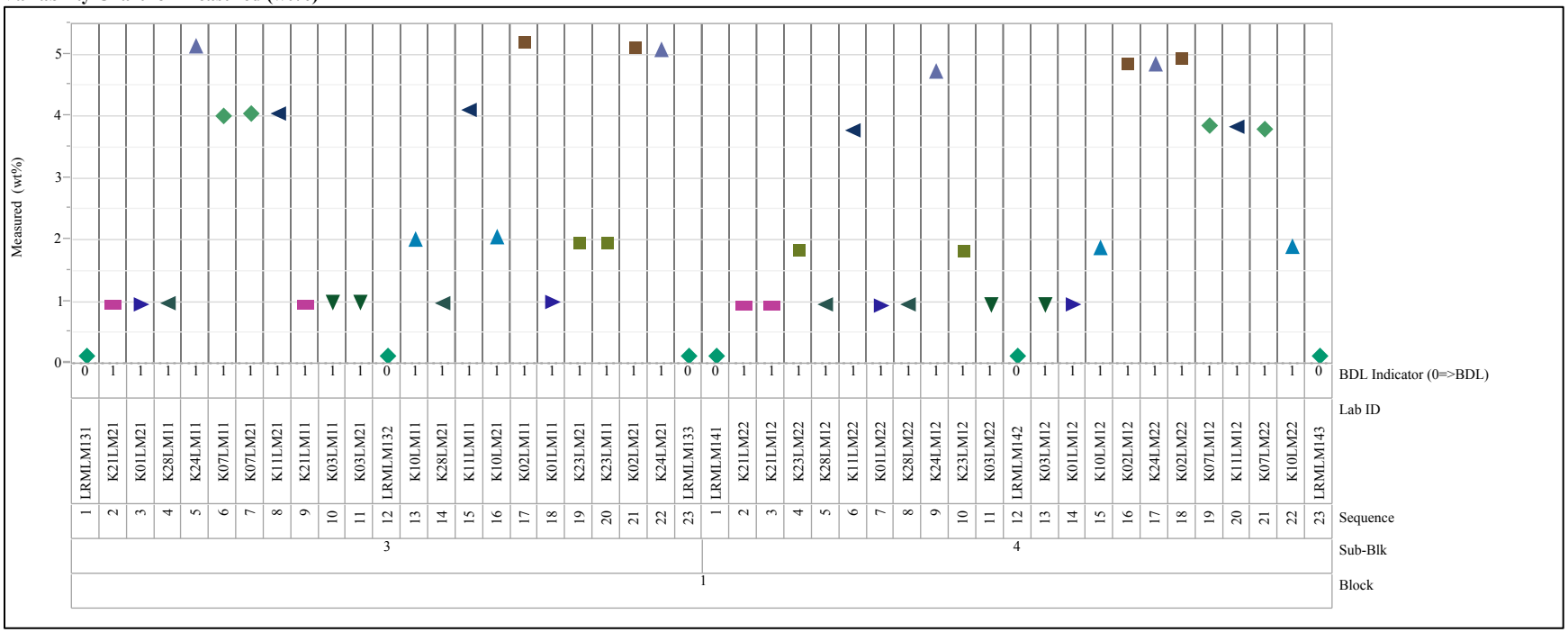


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=ZnO (wt%), Analytical Method=LM, Analytical Group=C
Variability Chart for Measured (wt%)

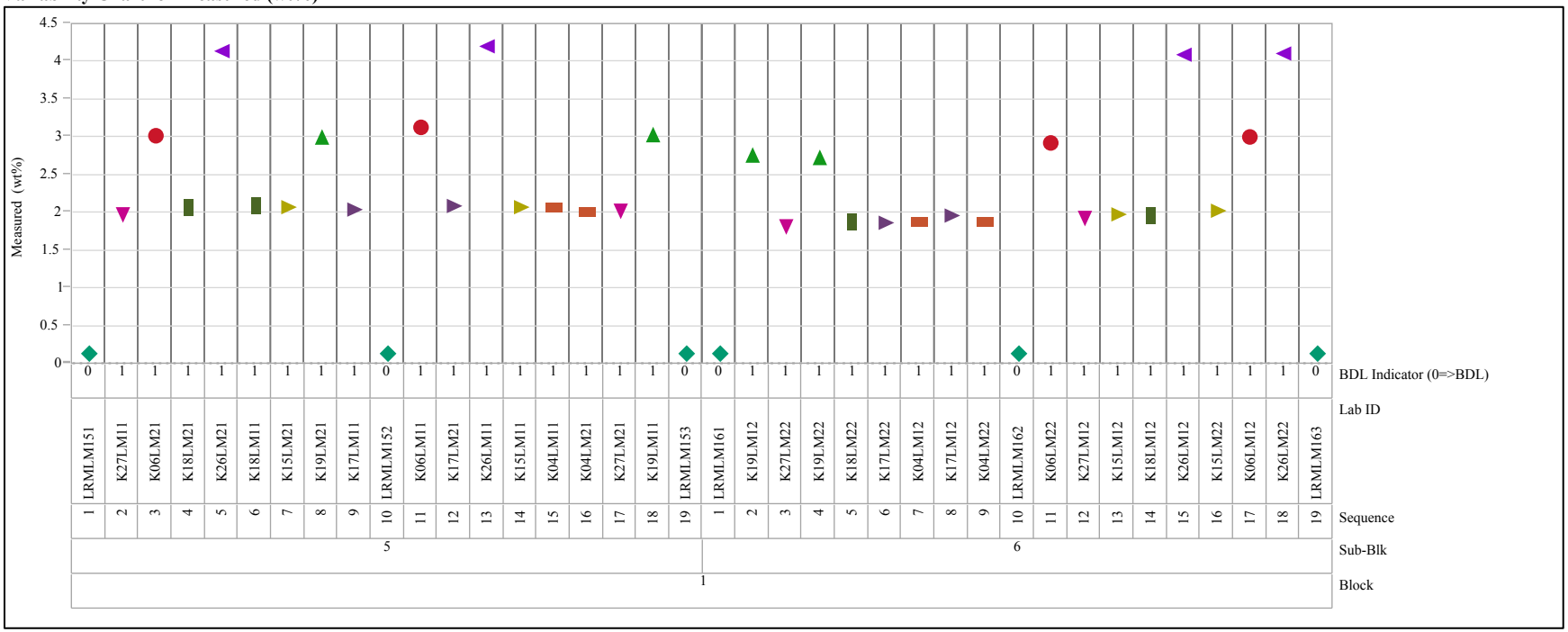


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=ZnO (wt%), Analytical Method=LM, Analytical Group=D
Variability Chart for Measured (wt%)

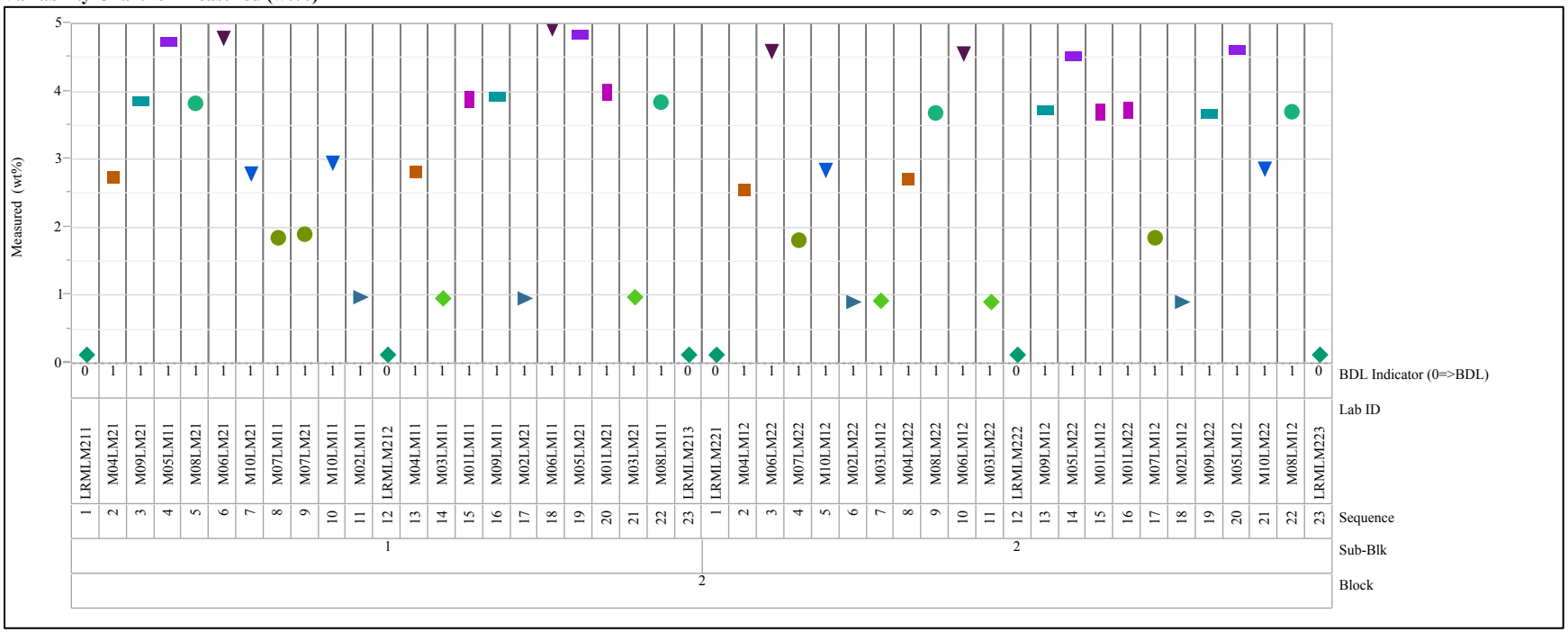


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=ZrO2 (wt%), Analytical Method=LM, Analytical Group=A
Variability Chart for Measured (wt%)

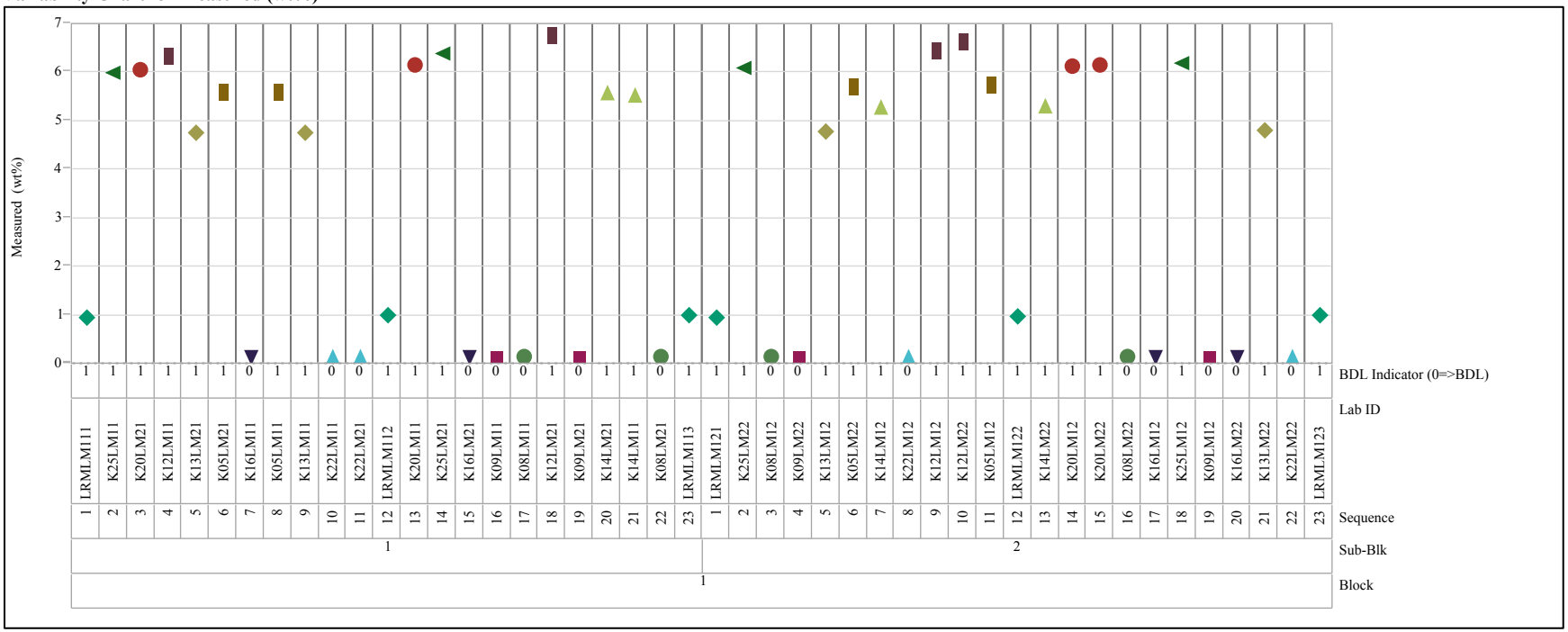


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=ZrO2 (wt%), Analytical Method=LM, Analytical Group=B
Variability Chart for Measured (wt%)

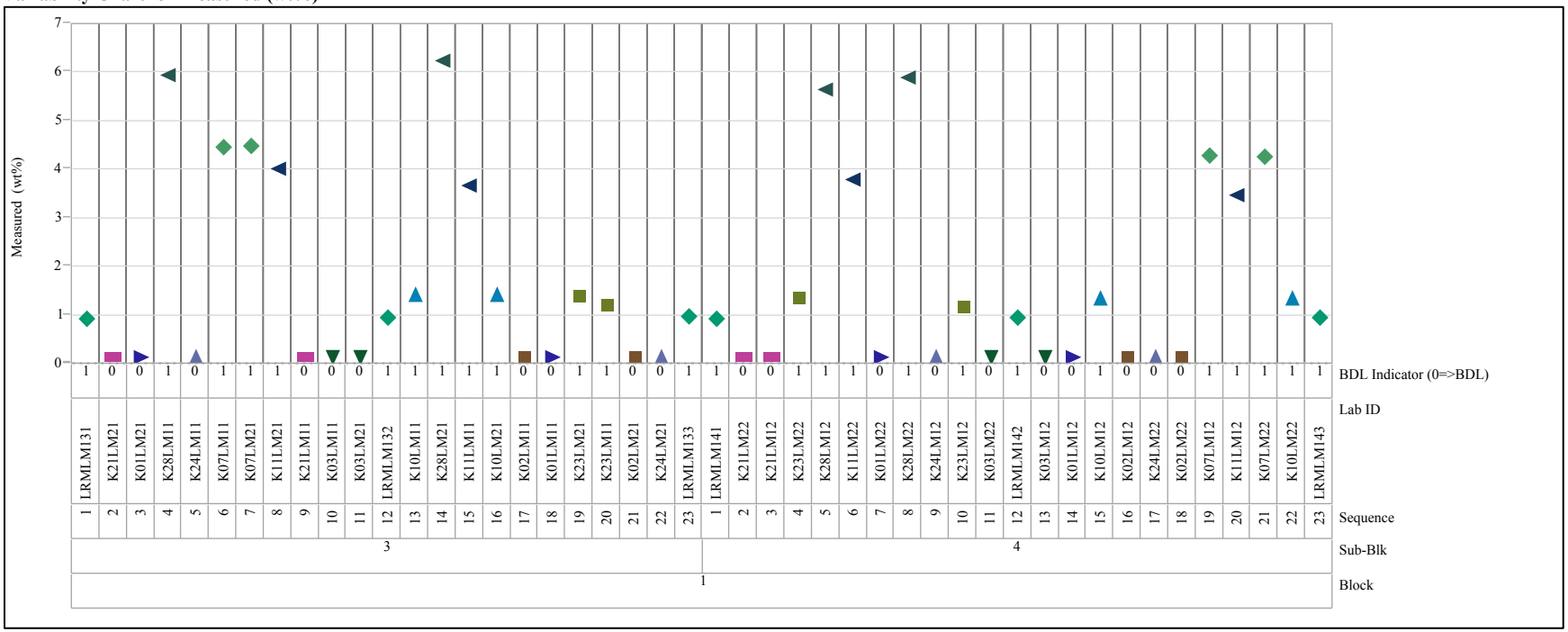


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=ZrO2 (wt%), Analytical Method=LM, Analytical Group=C
Variability Chart for Measured (wt%)

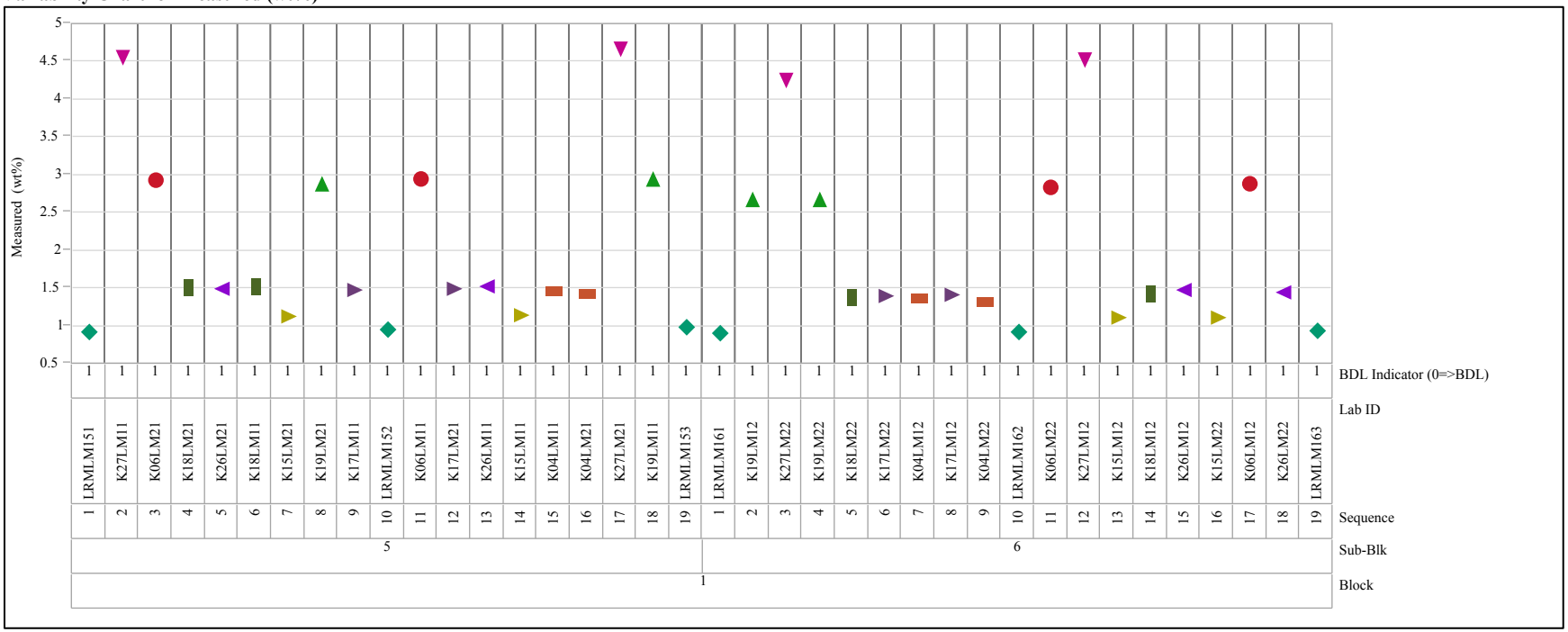


Exhibit C-1. Plots of Oxide Measurements in Analytical Sequence (continued)

Analyte=ZrO2 (wt%), Analytical Method=LM, Analytical Group=D
Variability Chart for Measured (wt%)

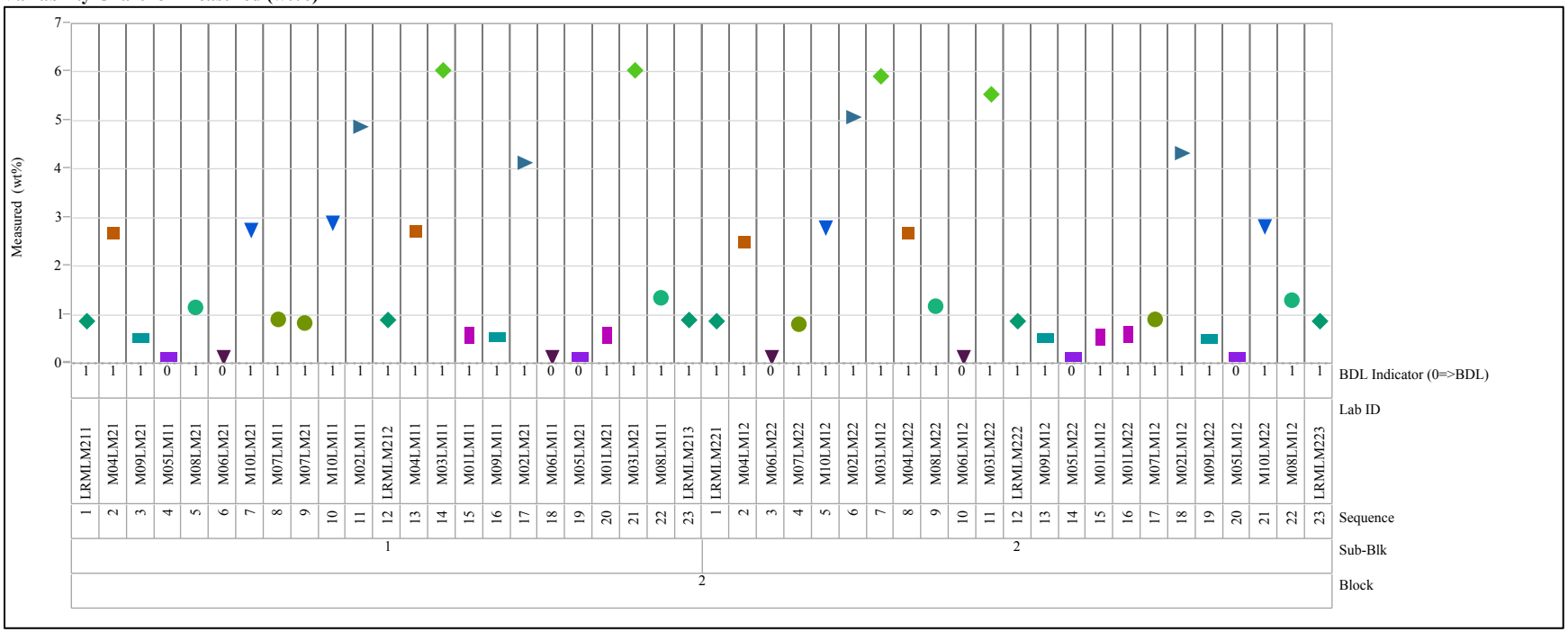


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration

Analyte=Al2O3 (wt%), Analytical Method=PF, Analytical Group=A
Variability Chart for Measured (wt%)

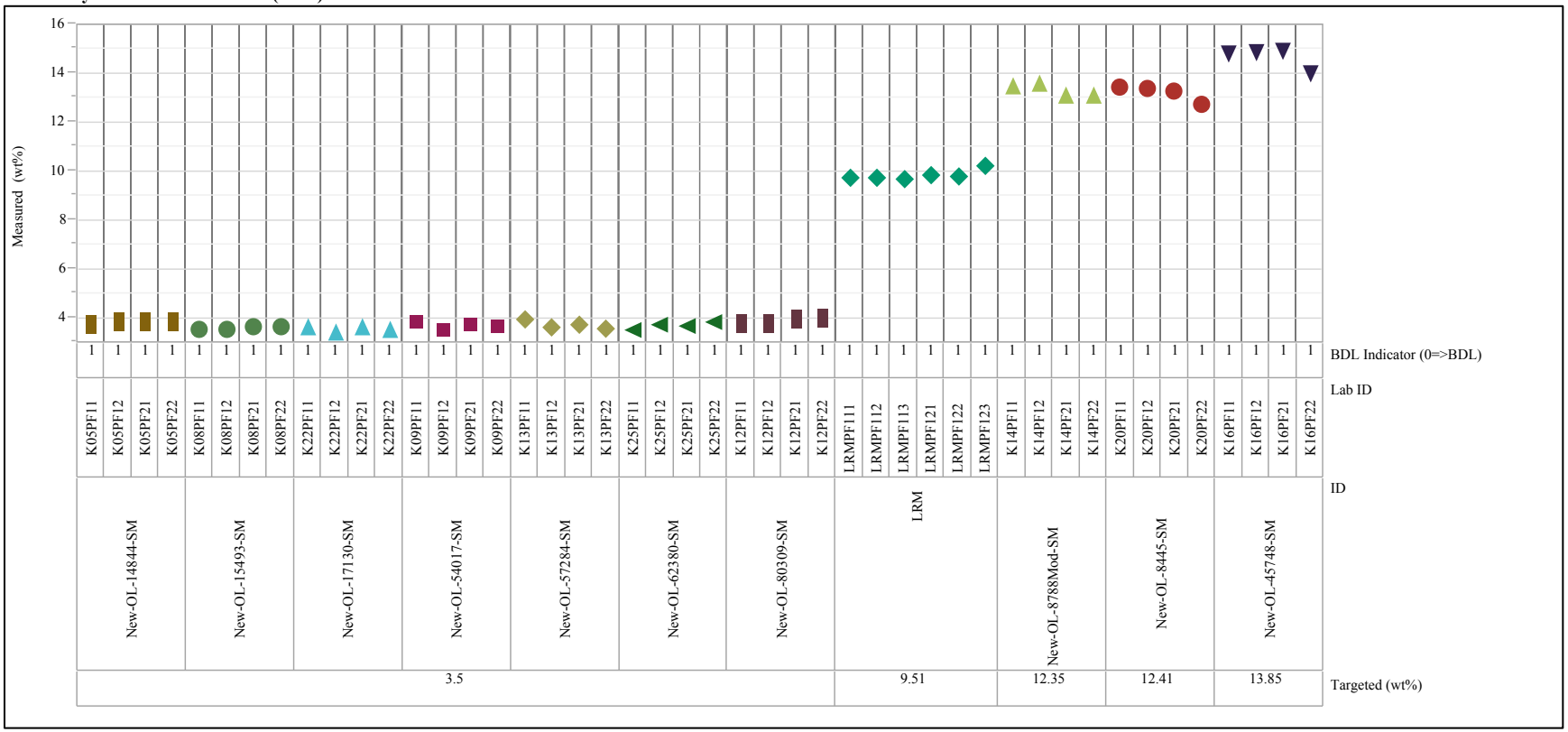


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=Al2O3 (wt%), Analytical Method=PF, Analytical Group=B
Variability Chart for Measured (wt%)

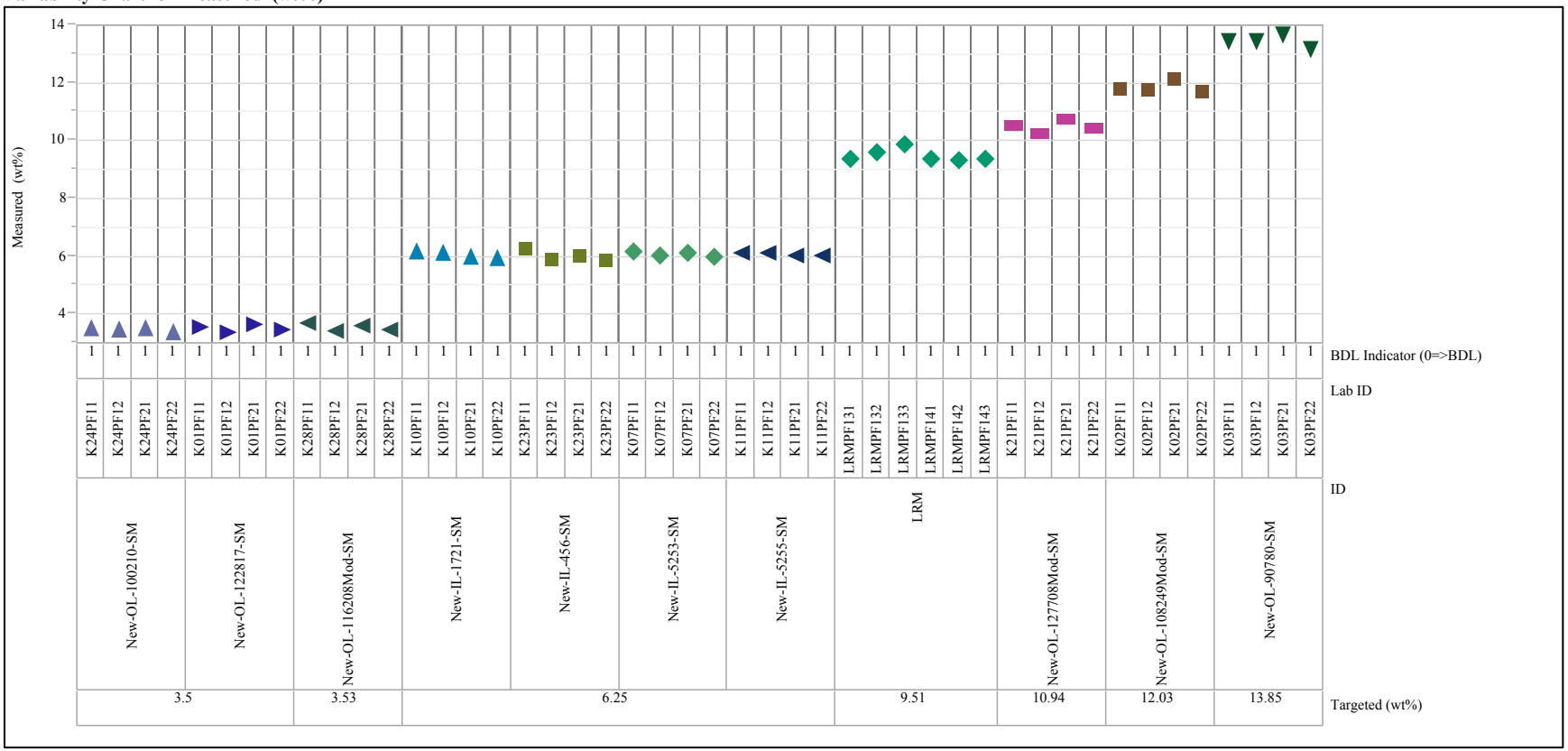


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=Al2O3 (wt%), Analytical Method=PF, Analytical Group=C
Variability Chart for Measured (wt%)

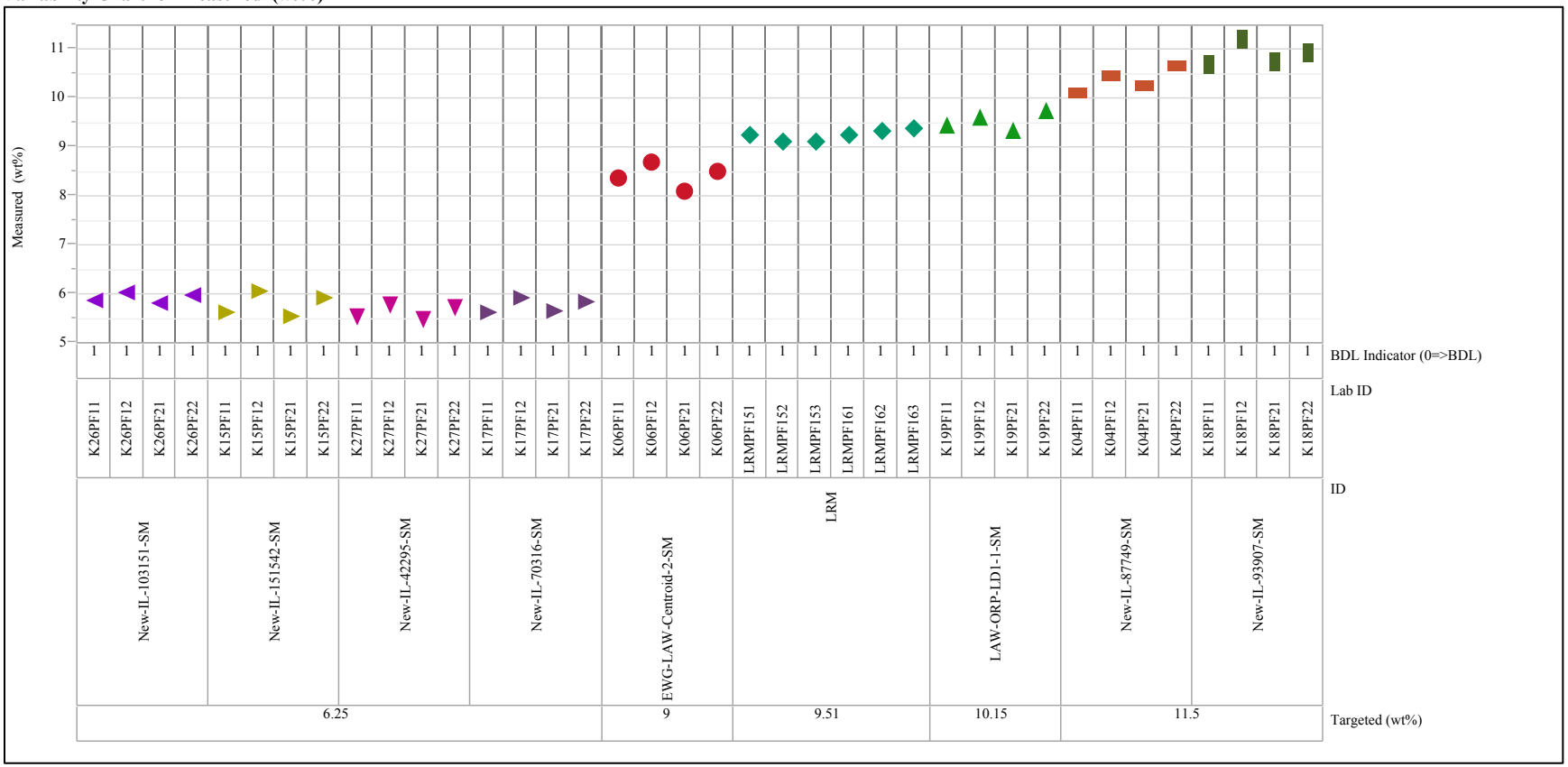


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=Al2O3 (wt%), Analytical Method=PF, Analytical Group=D
Variability Chart for Measured (wt%)

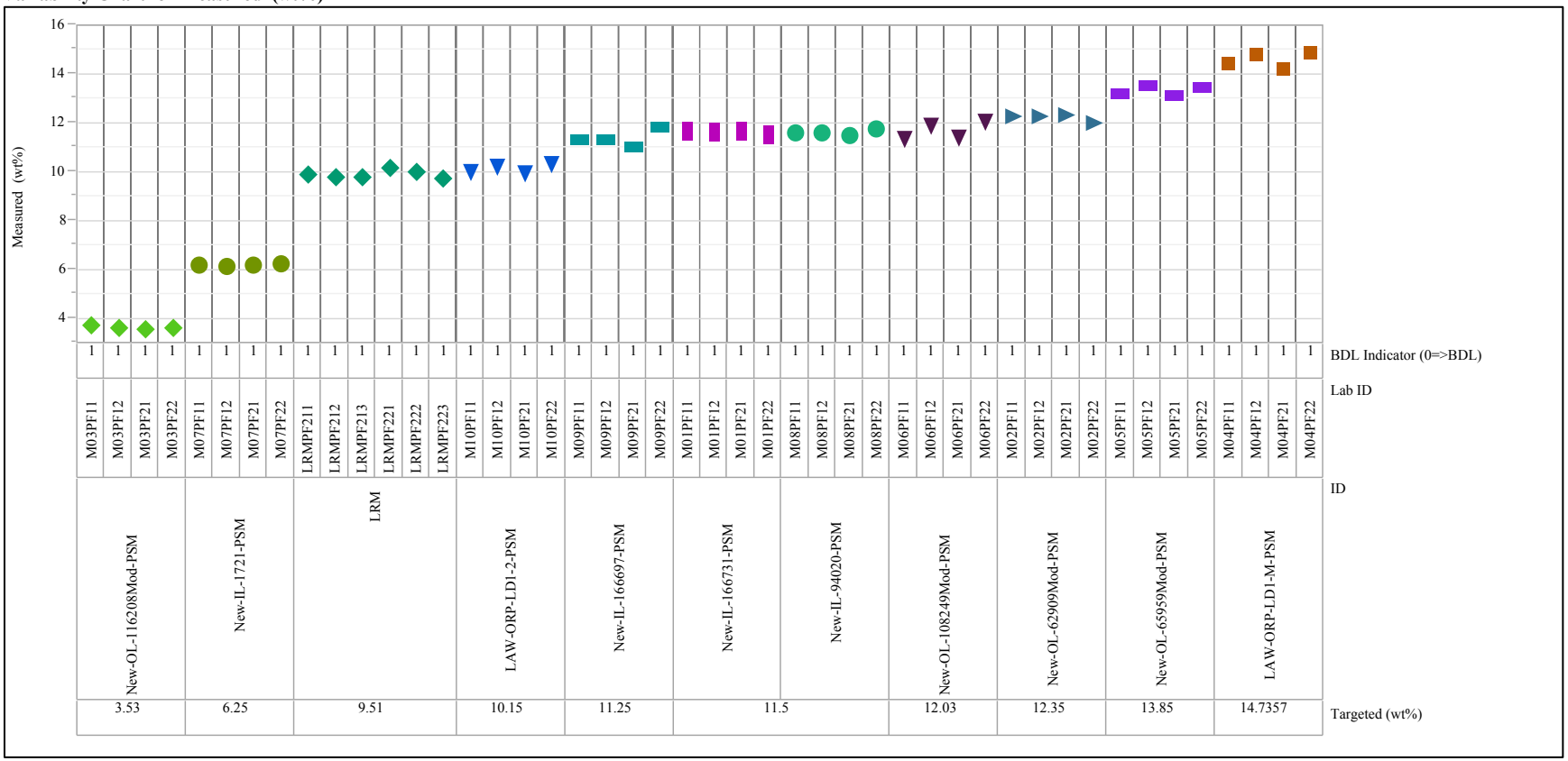


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=B2O3 (wt%), Analytical Method=PF, Analytical Group=A
Variability Chart for Measured (wt%)

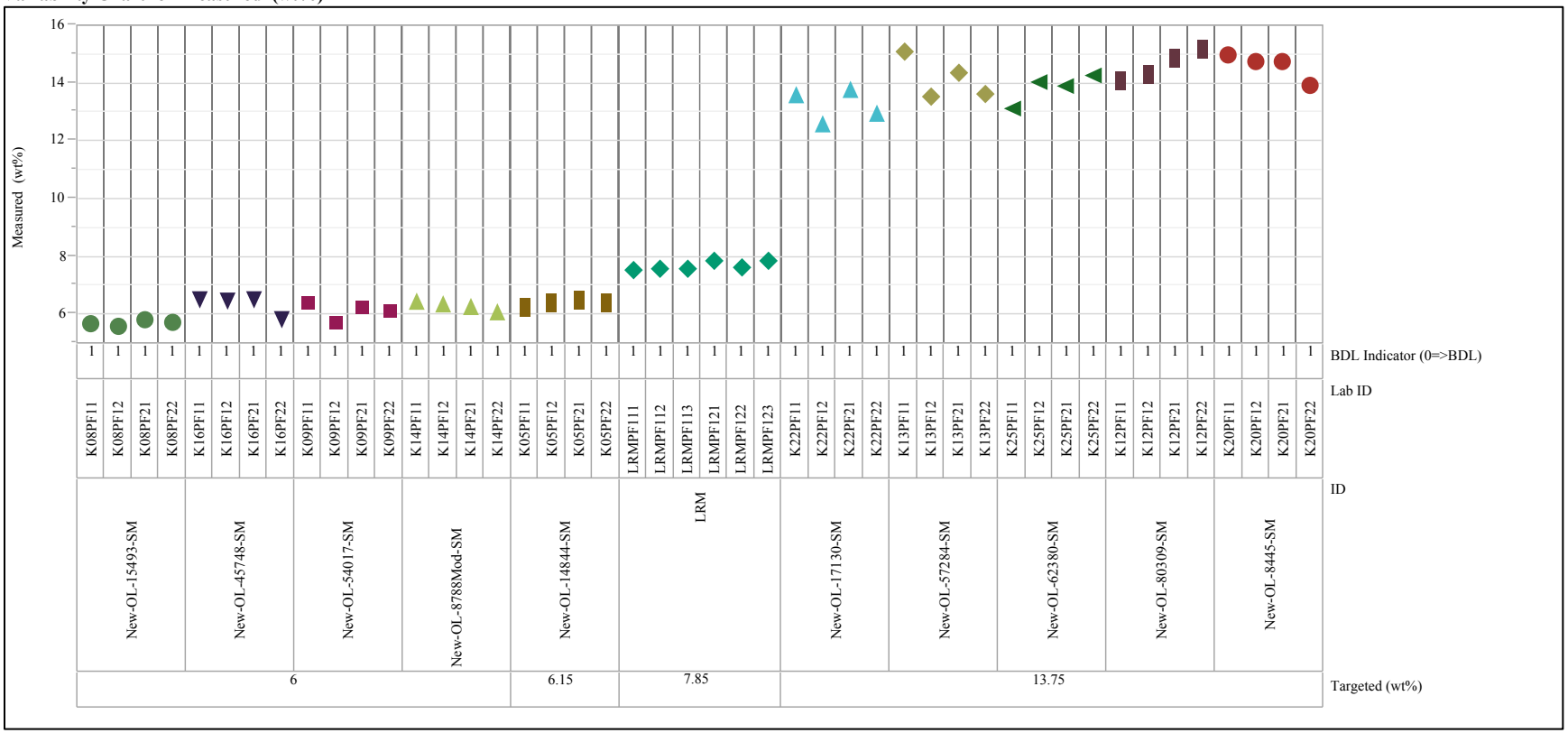


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=B2O3 (wt%), Analytical Method=PF, Analytical Group=B
Variability Chart for Measured (wt%)

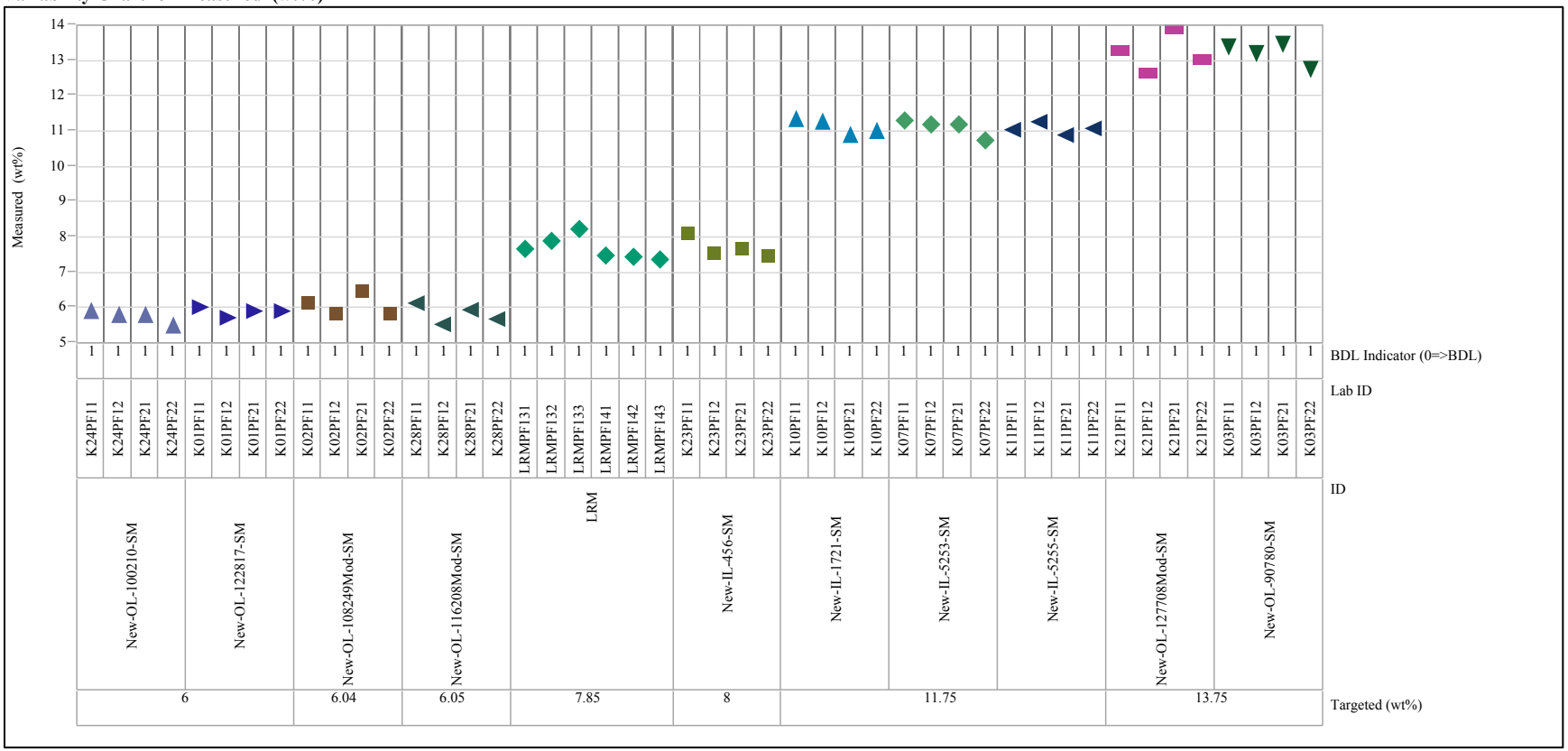


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=B2O3 (wt%), Analytical Method=PF, Analytical Group=C
Variability Chart for Measured (wt%)

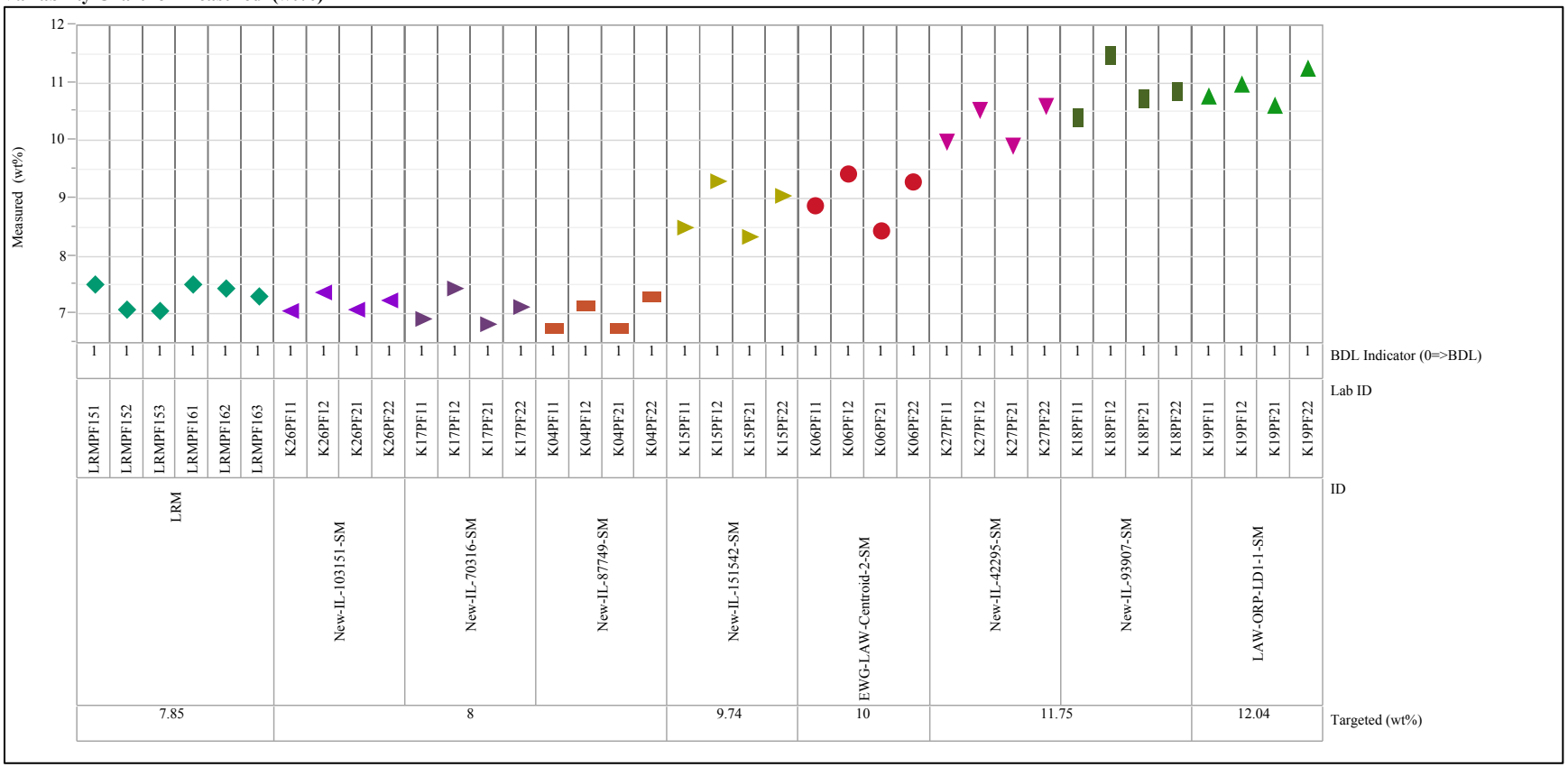


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=B2O3 (wt%), Analytical Method=PF, Analytical Group=D
Variability Chart for Measured (wt%)

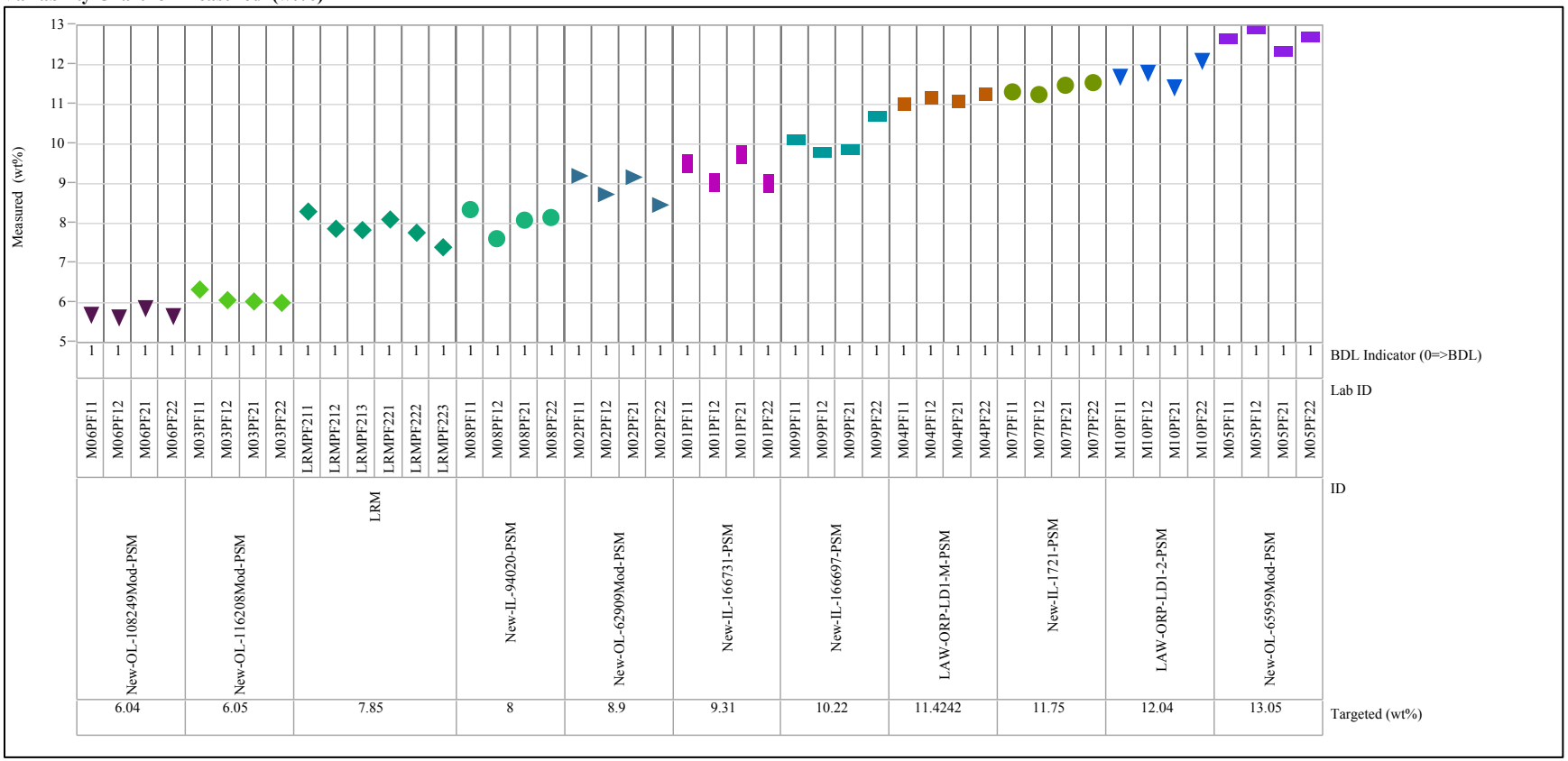


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=CaO (wt%), Analytical Method=LM, Analytical Group=A
Variability Chart for Measured (wt%)

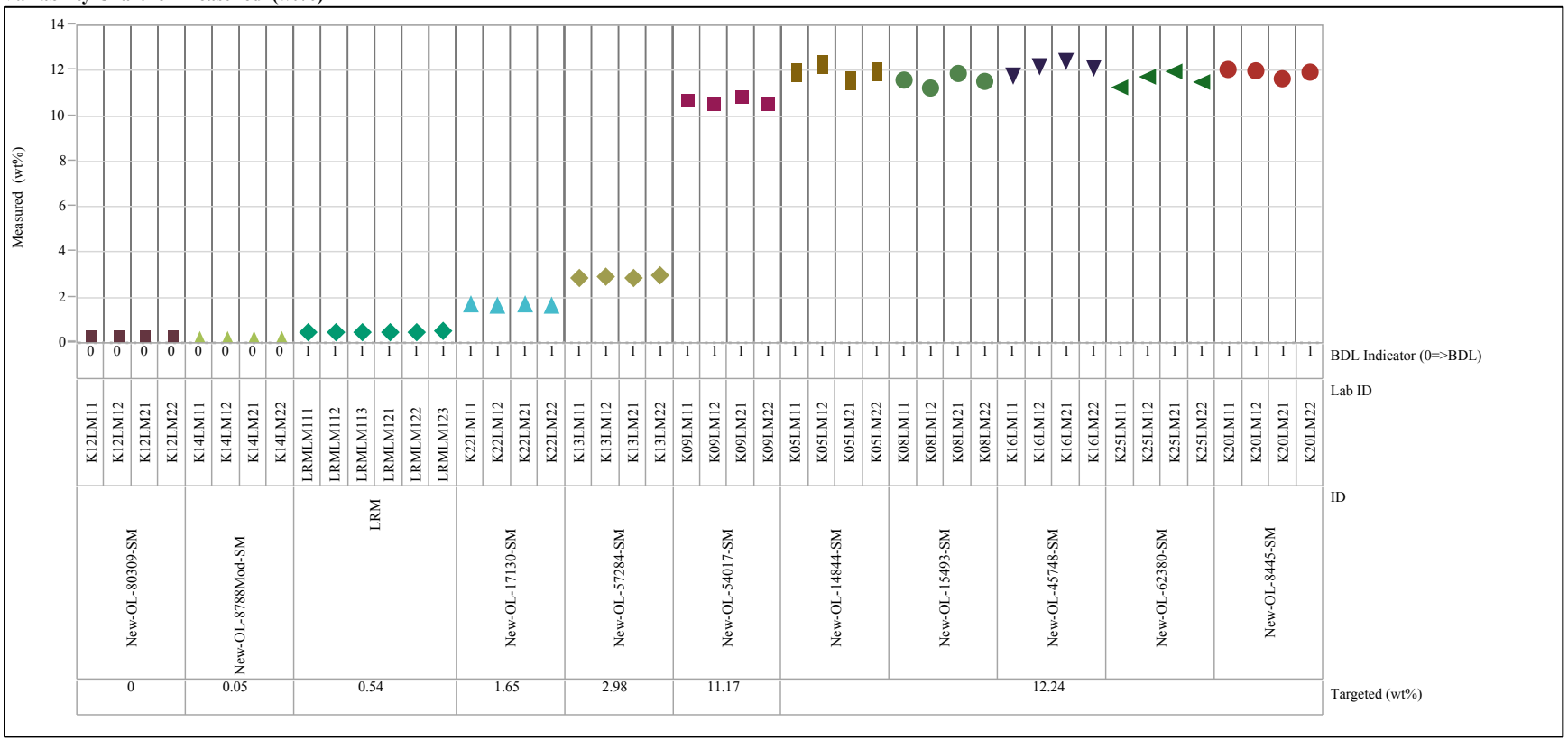


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=CaO (wt%), Analytical Method=LM, Analytical Group=B
Variability Chart for Measured (wt%)

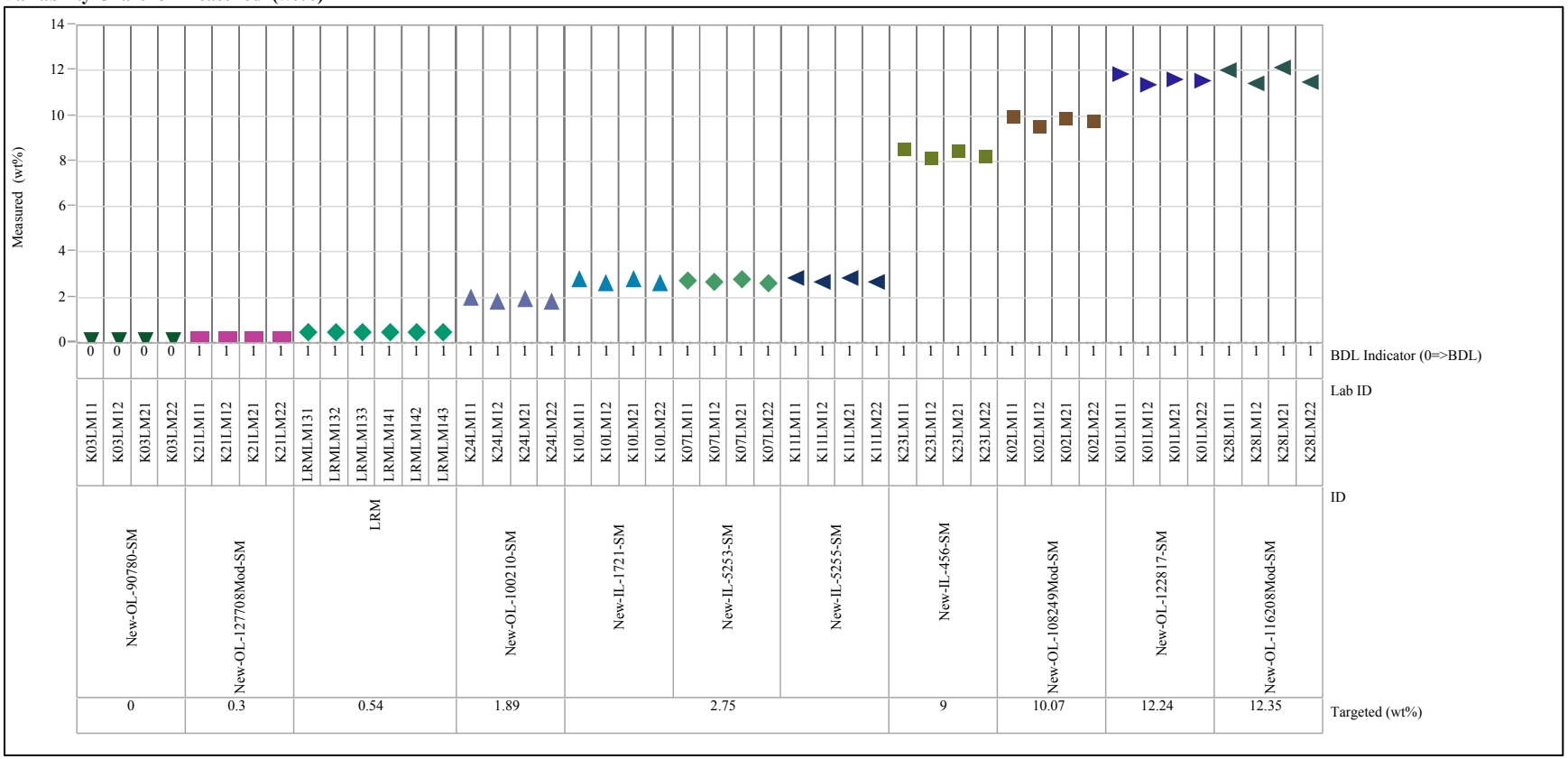


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=CaO (wt%), Analytical Method=LM, Analytical Group=C
Variability Chart for Measured (wt%)

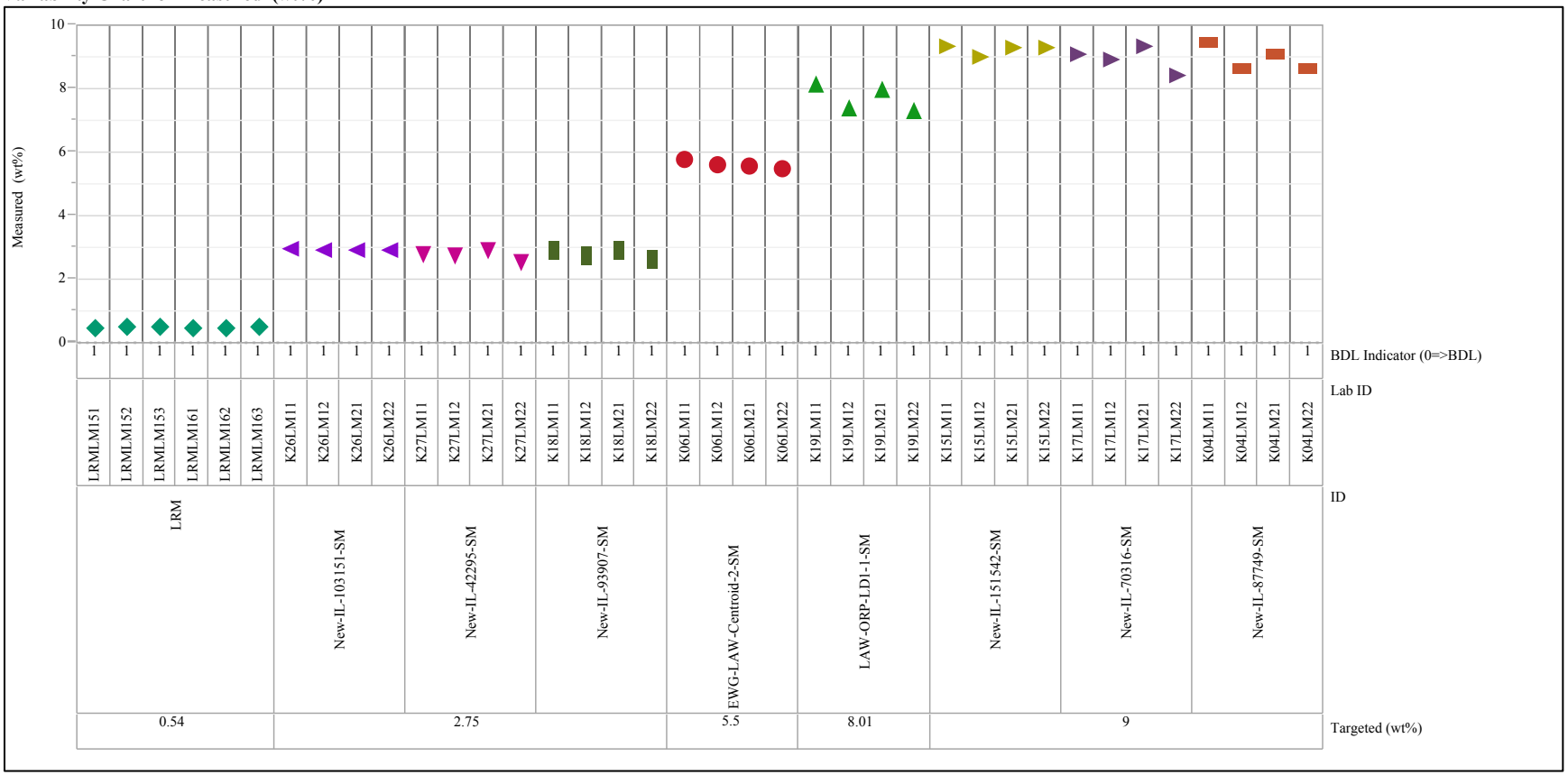


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=CaO (wt%), Analytical Method=LM, Analytical Group=D
Variability Chart for Measured (wt%)

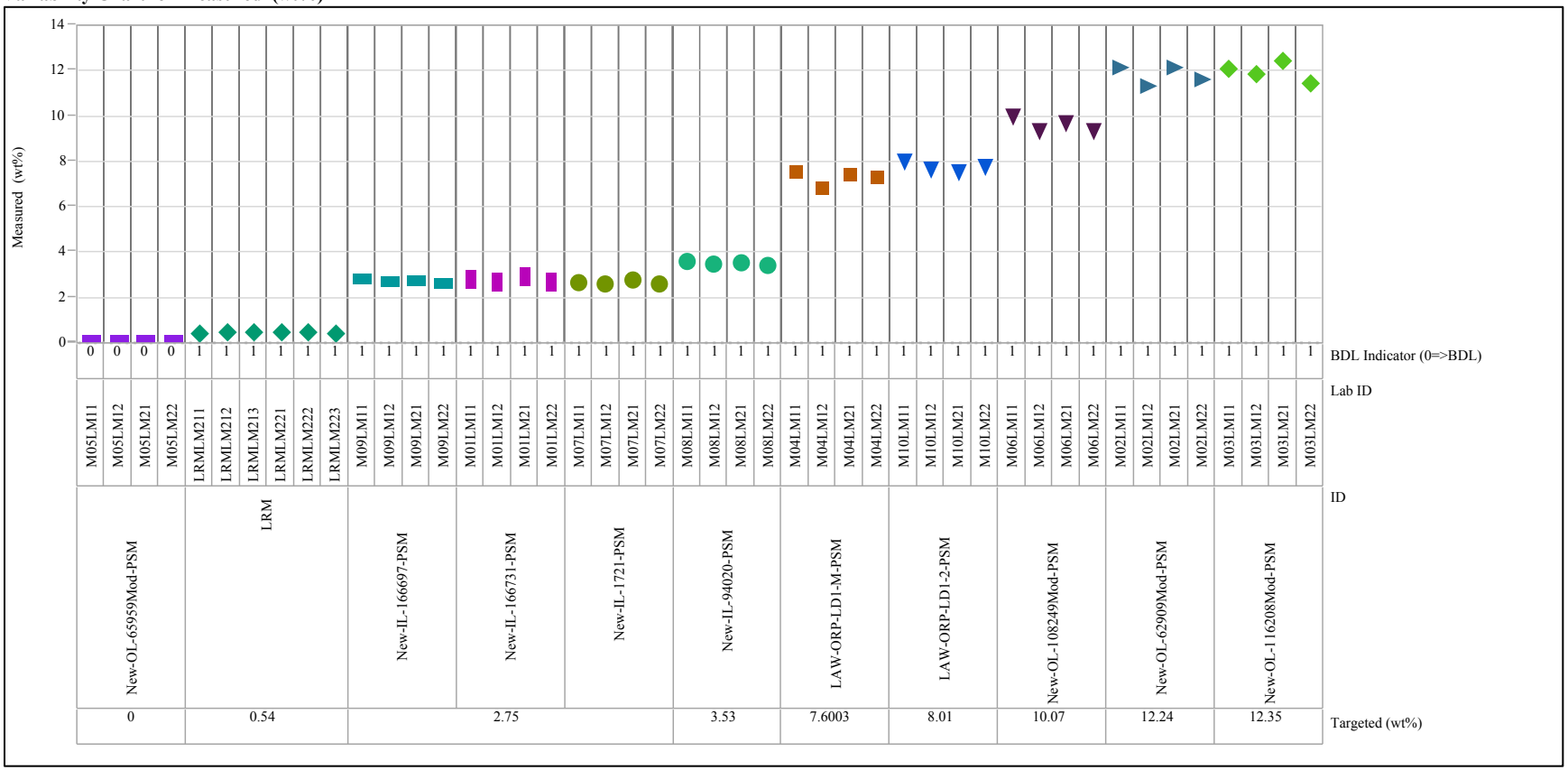


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=Cl (wt%), Analytical Method=KH, Analytical Group=A
Variability Chart for Measured (wt%)

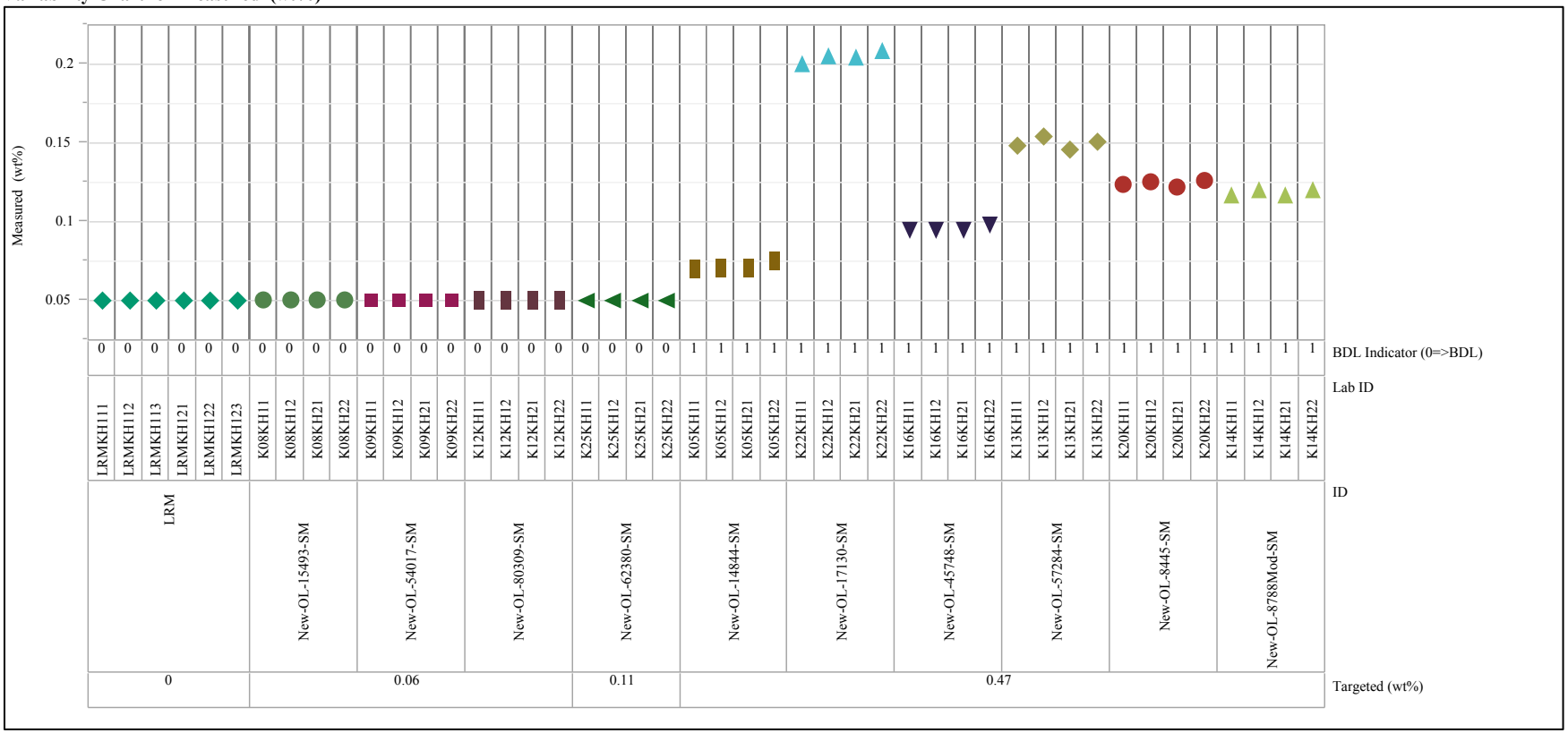


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=Cl (wt%), Analytical Method=KH, Analytical Group=B
Variability Chart for Measured (wt%)

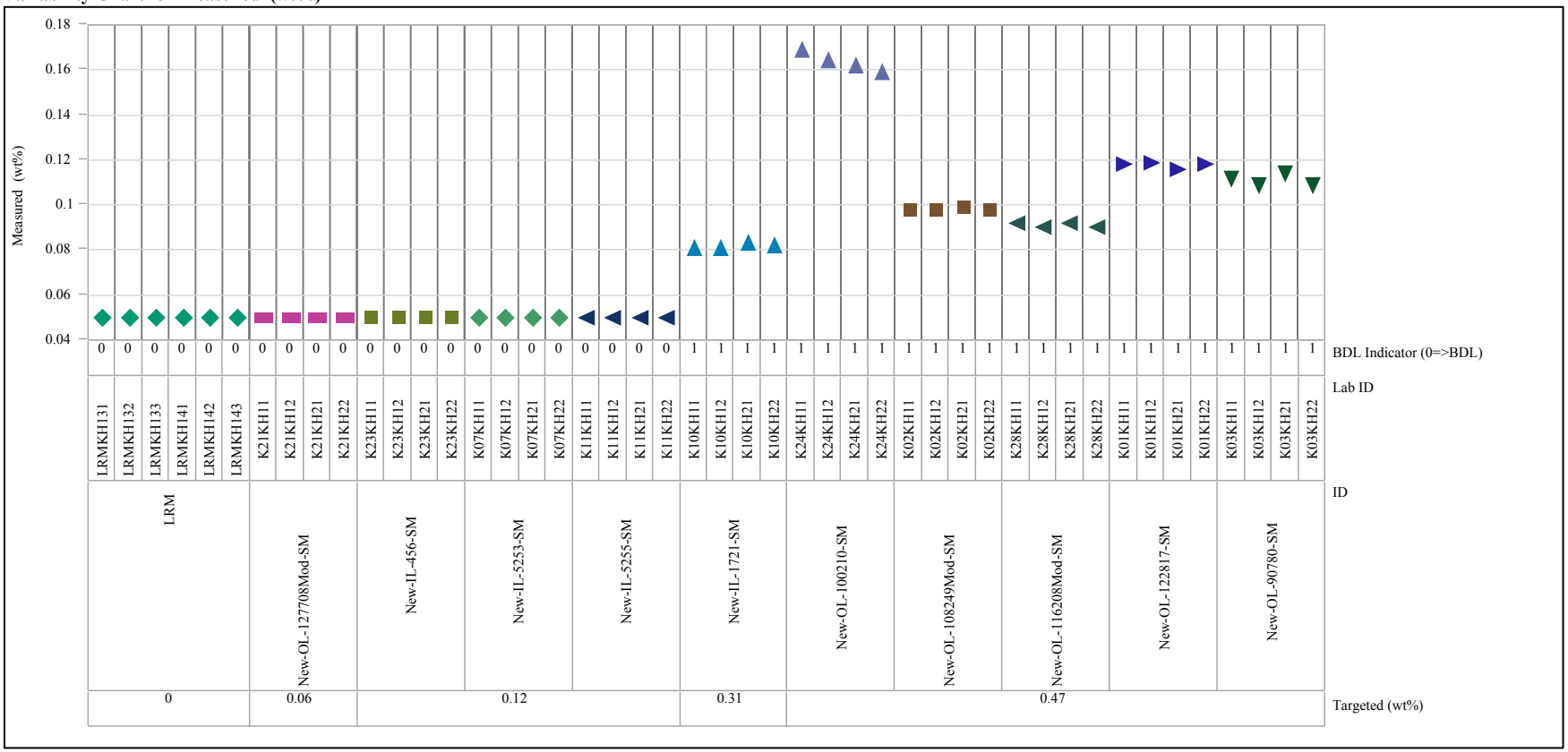


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=Cl (wt%), Analytical Method=KH, Analytical Group=C
Variability Chart for Measured (wt%)

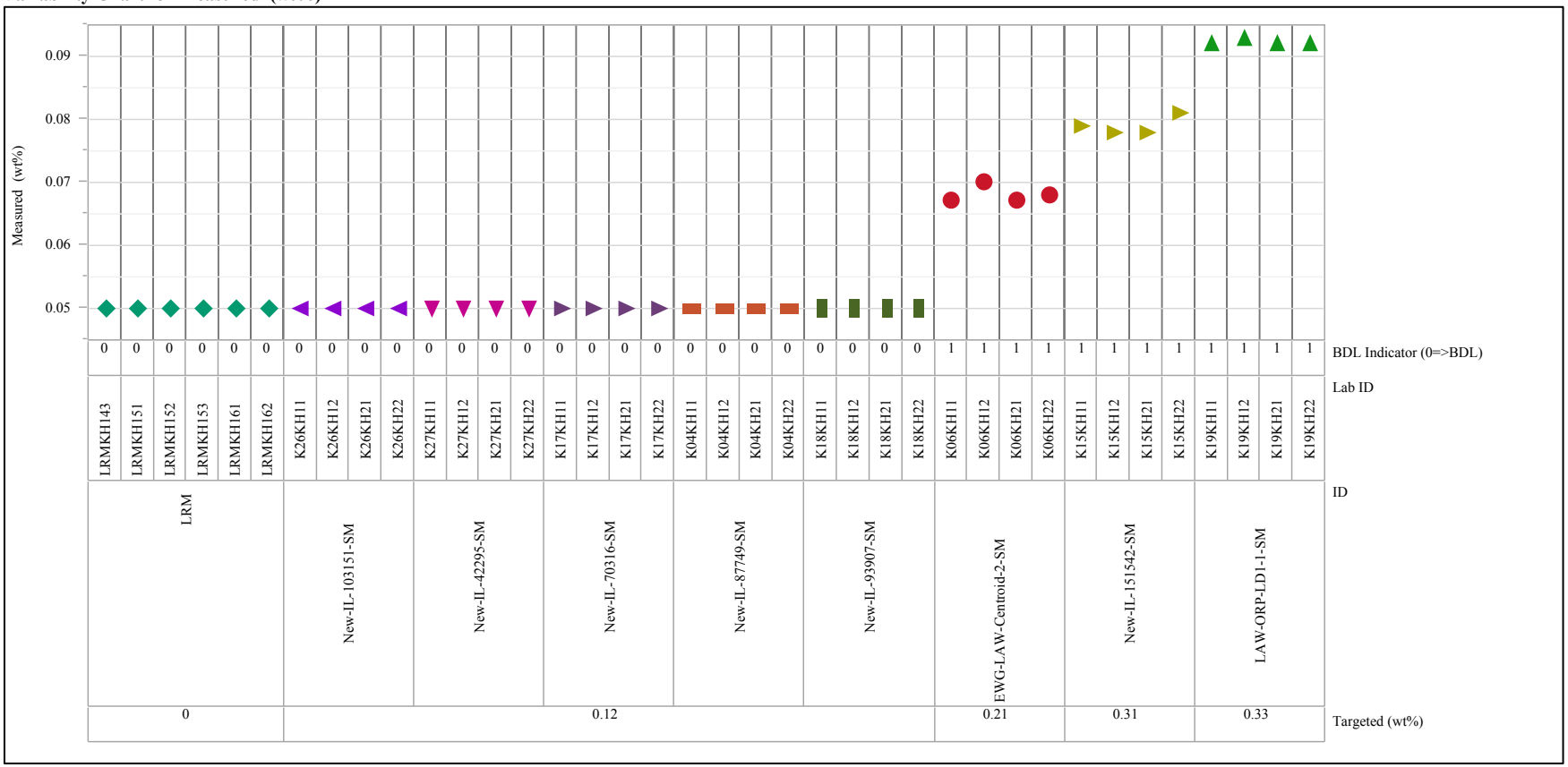


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=Cl (wt%), Analytical Method=KH, Analytical Group=D
Variability Chart for Measured (wt%)

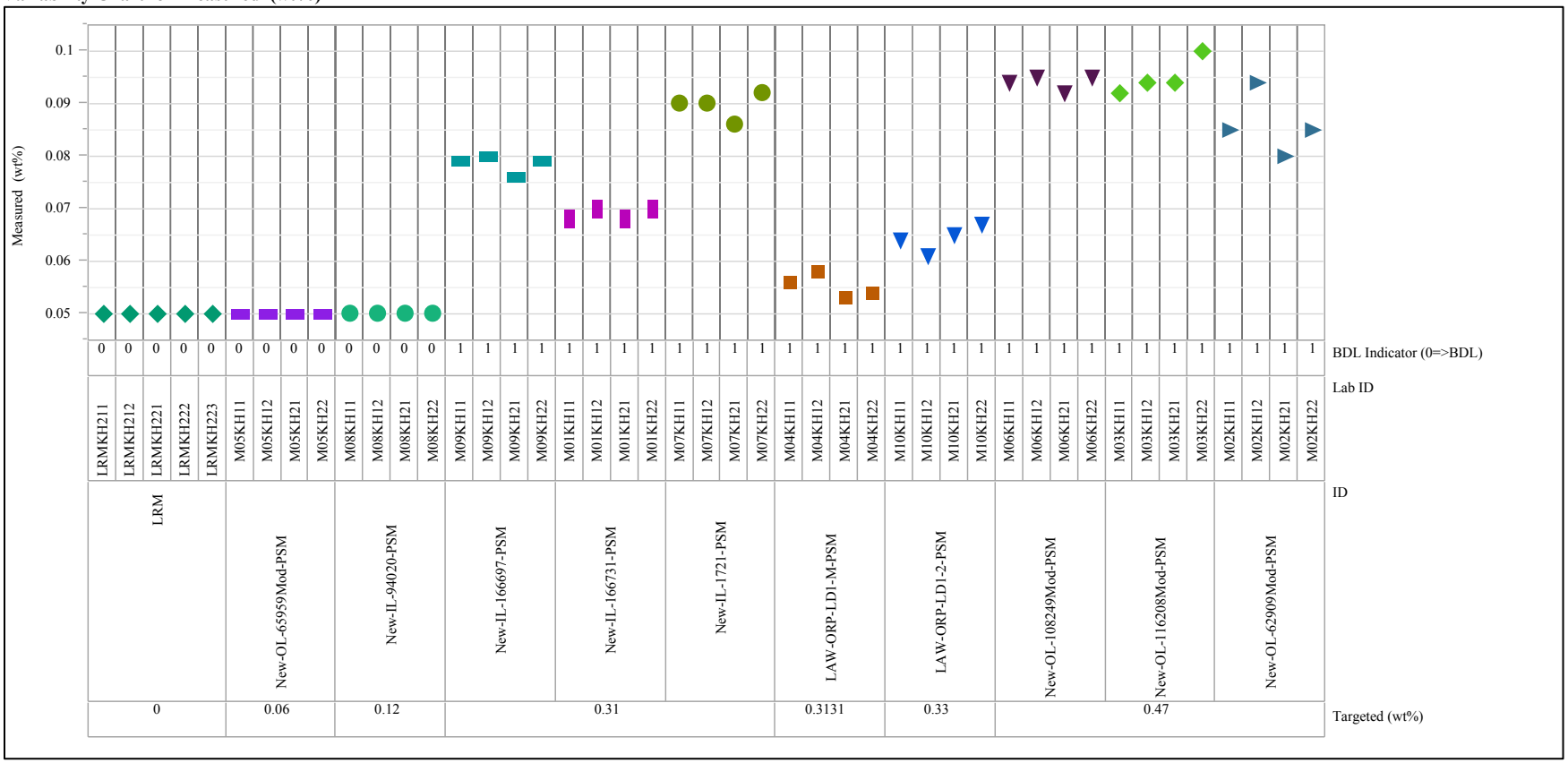


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=Cr2O3 (wt%), Analytical Method=LM, Analytical Group=A
Variability Chart for Measured (wt%)

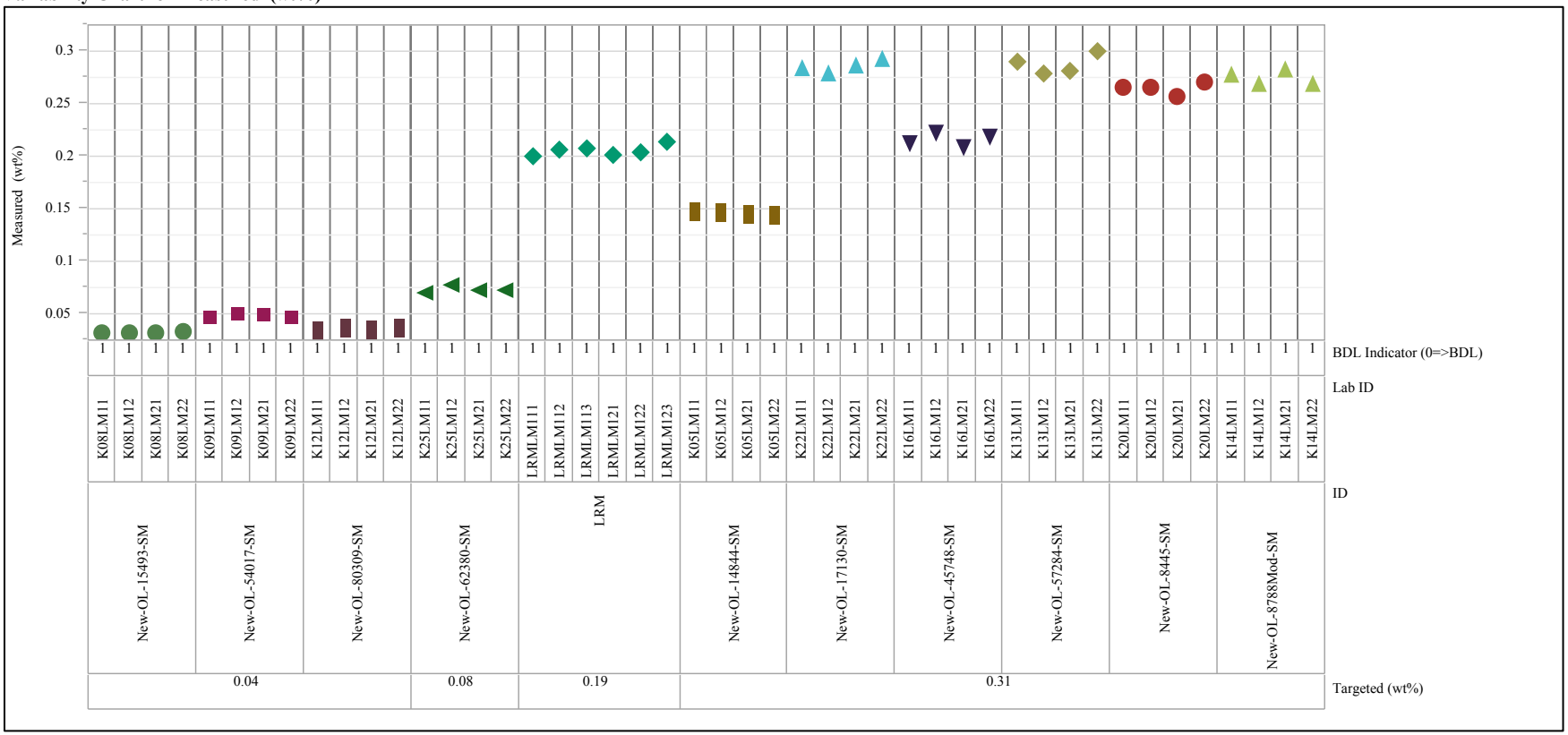


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=Cr2O3 (wt%), Analytical Method=LM, Analytical Group=B
Variability Chart for Measured (wt%)

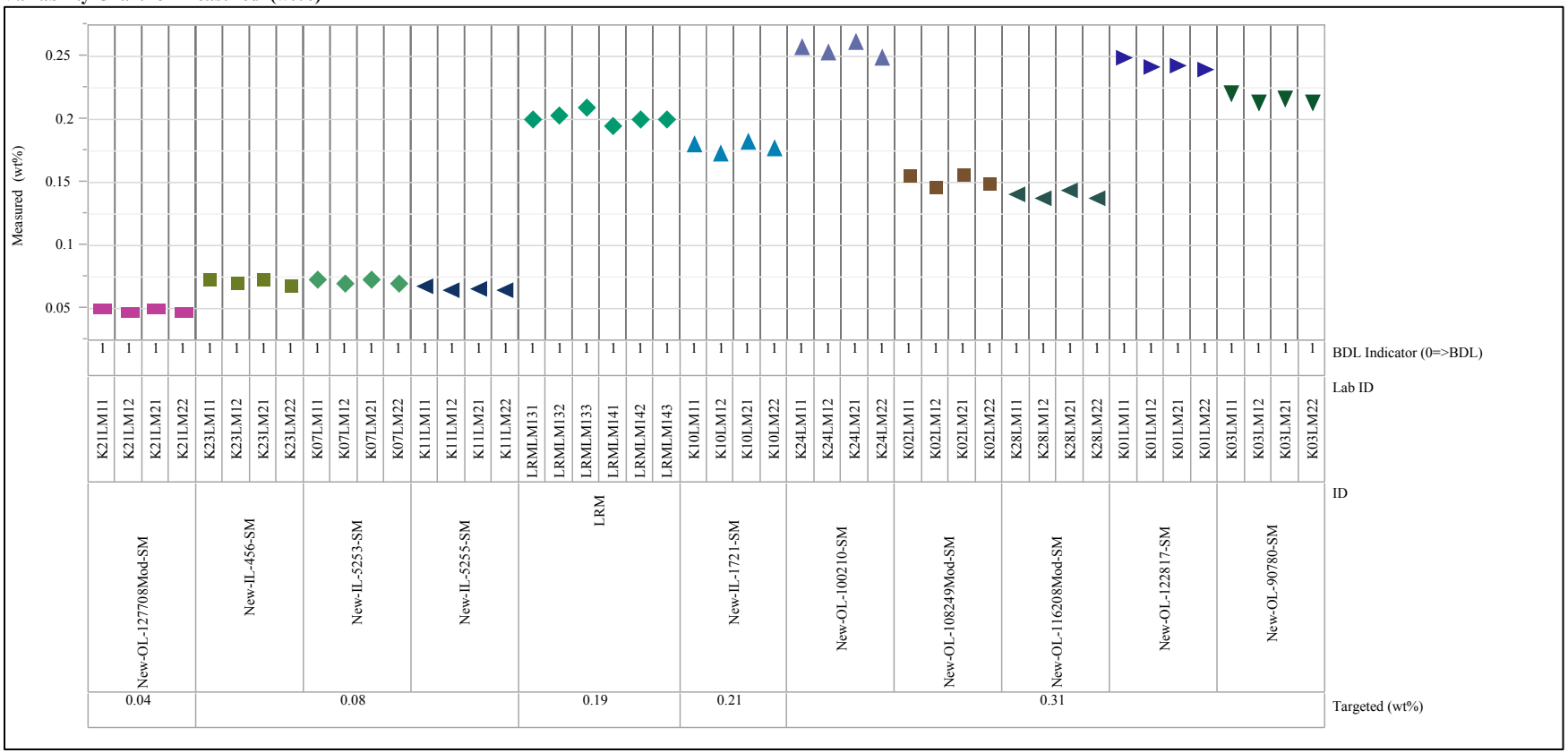


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=Cr2O3 (wt%), Analytical Method=LM, Analytical Group=C
Variability Chart for Measured (wt%)

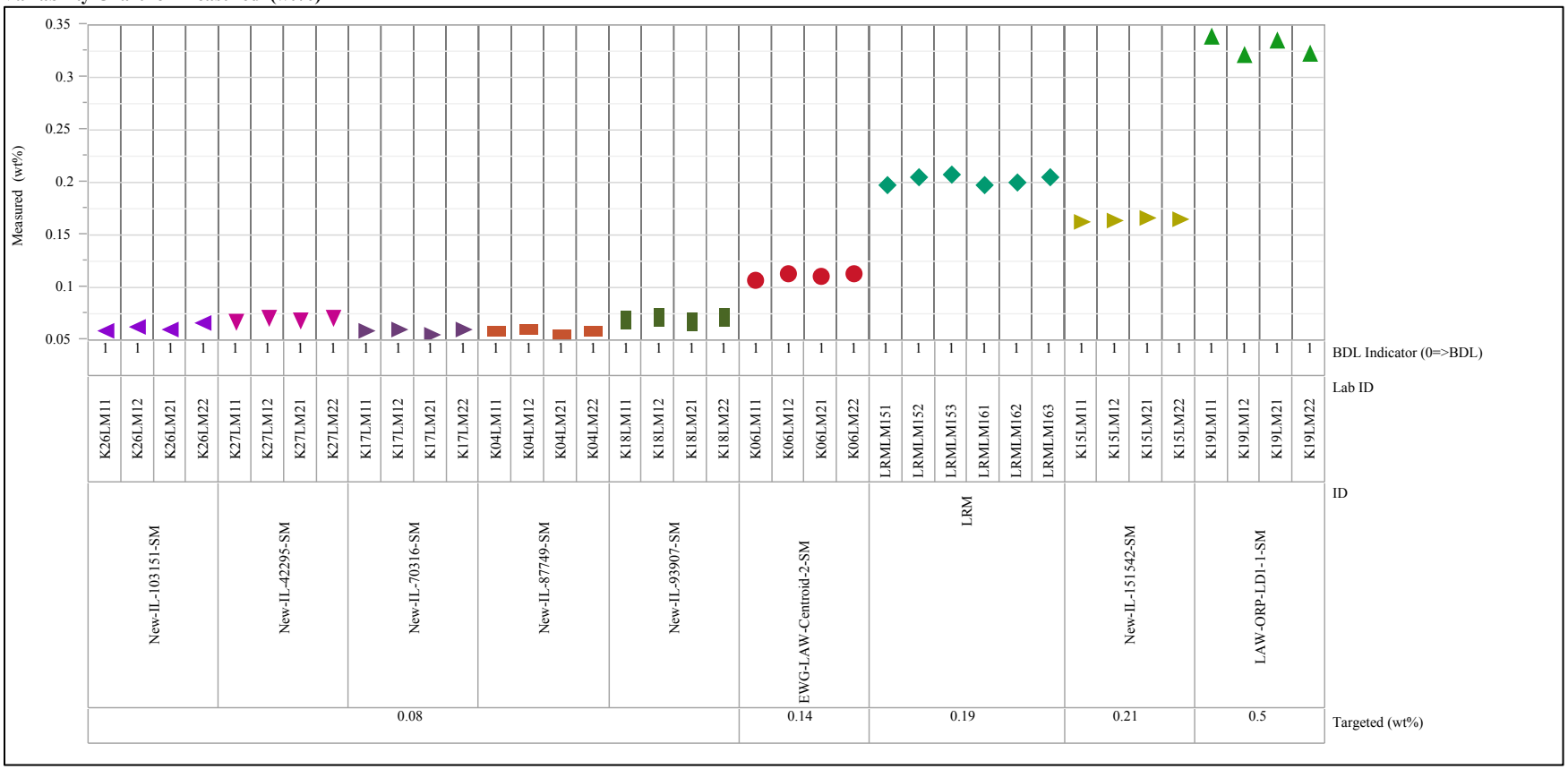


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=Cr2O3 (wt%), Analytical Method=LM, Analytical Group=D
Variability Chart for Measured (wt%)

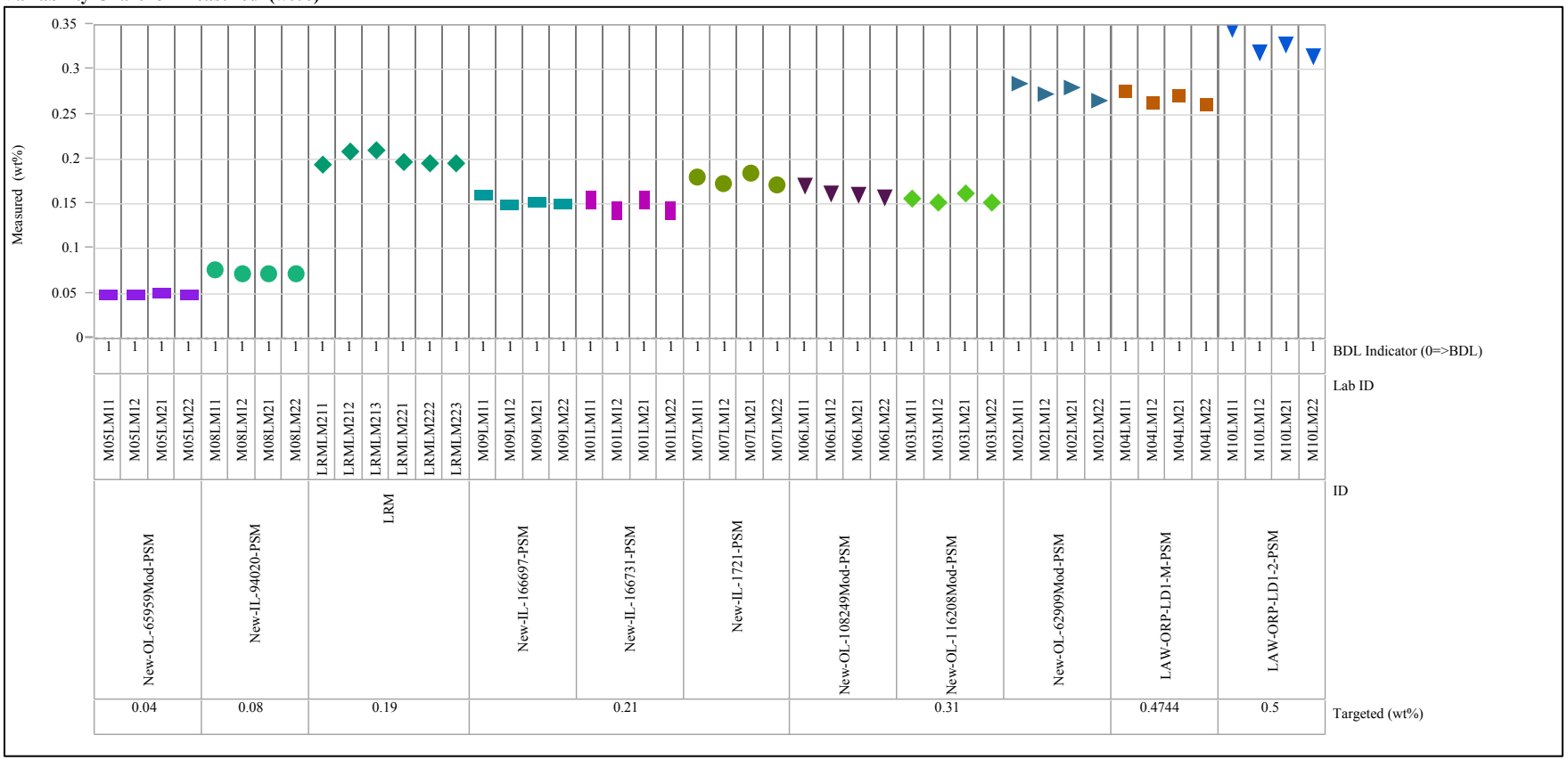


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=F (wt%), Analytical Method=KH, Analytical Group=A
Variability Chart for Measured (wt%)

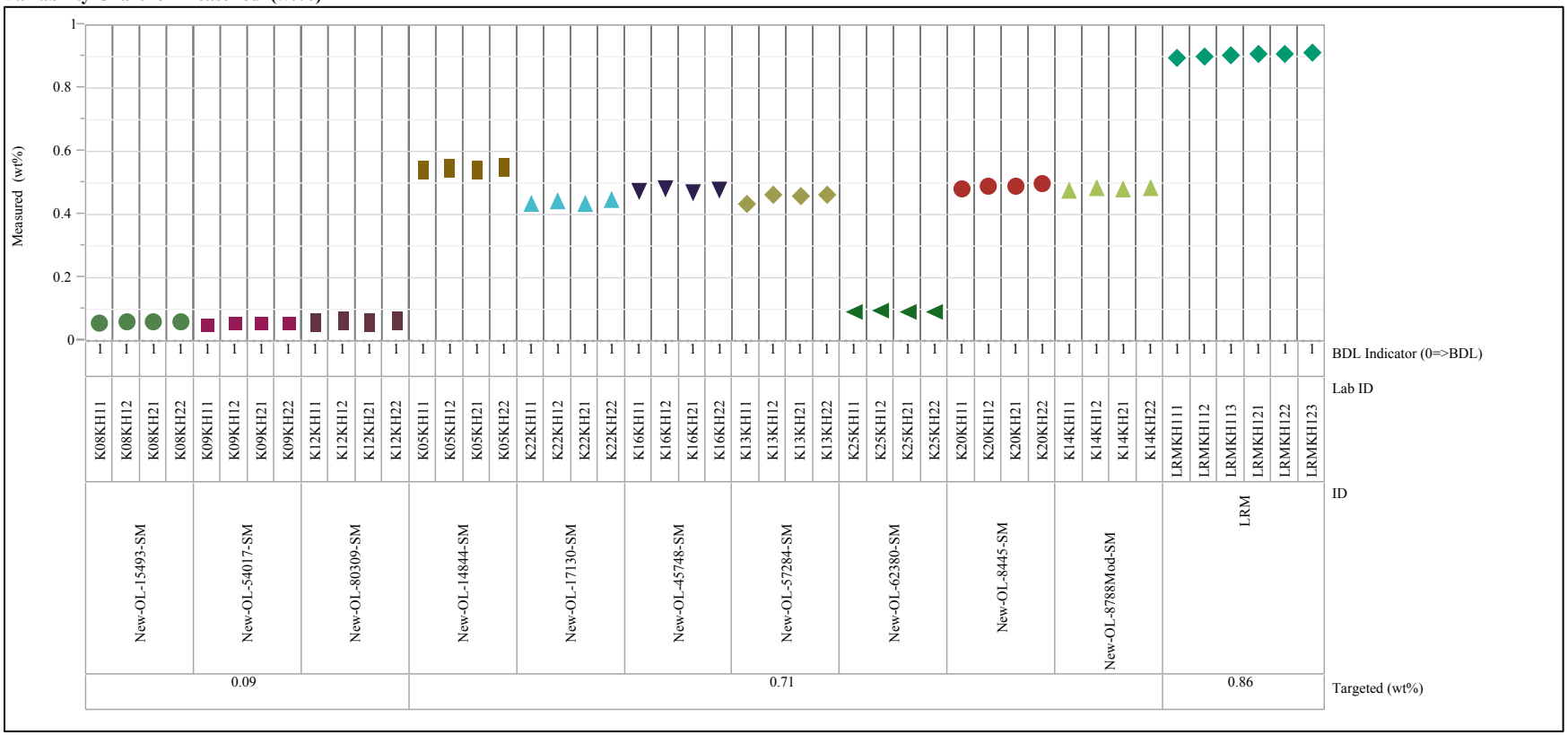


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=F (wt%), Analytical Method=KH, Analytical Group=B
Variability Chart for Measured (wt%)

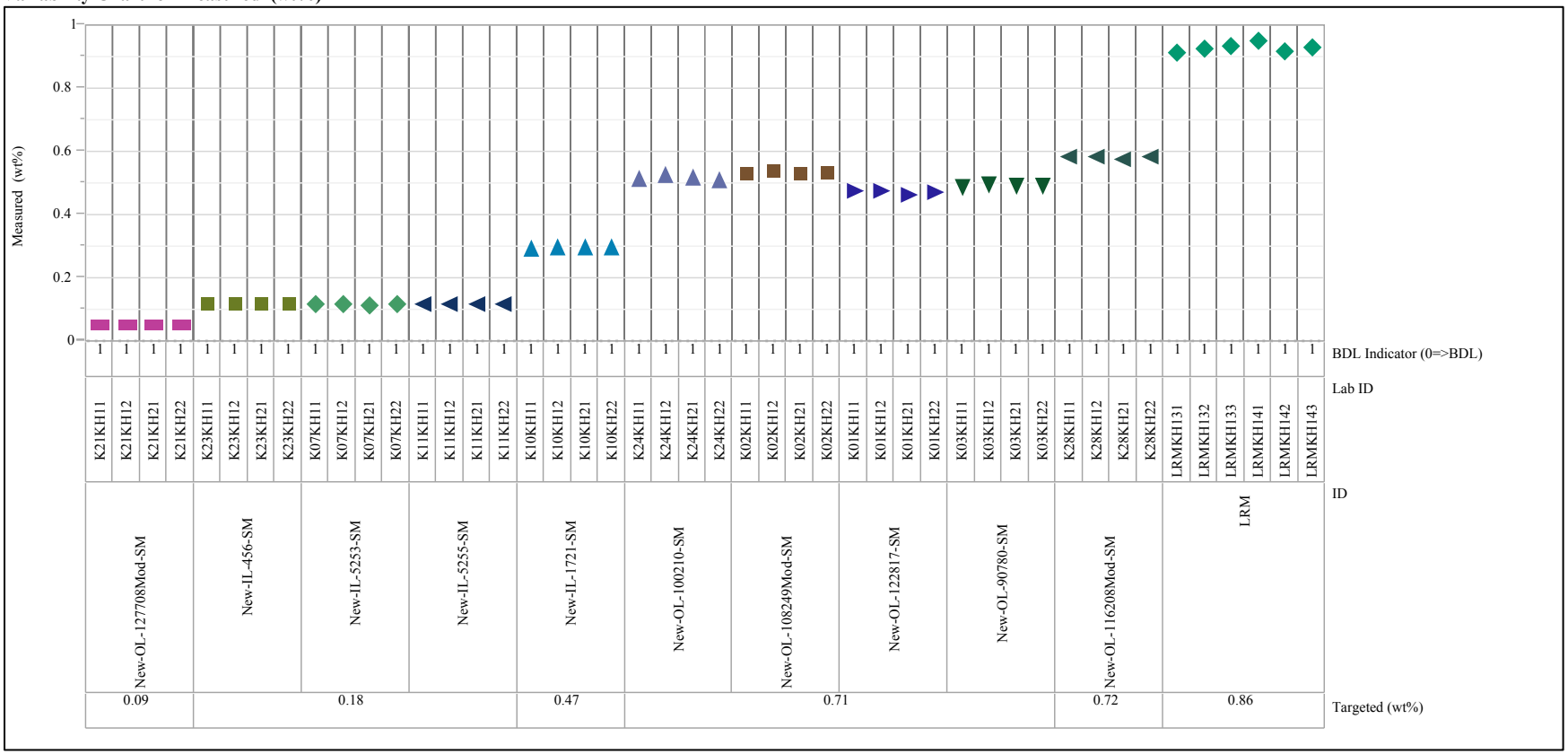


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=F (wt%), Analytical Method=KH, Analytical Group=C
Variability Chart for Measured (wt%)

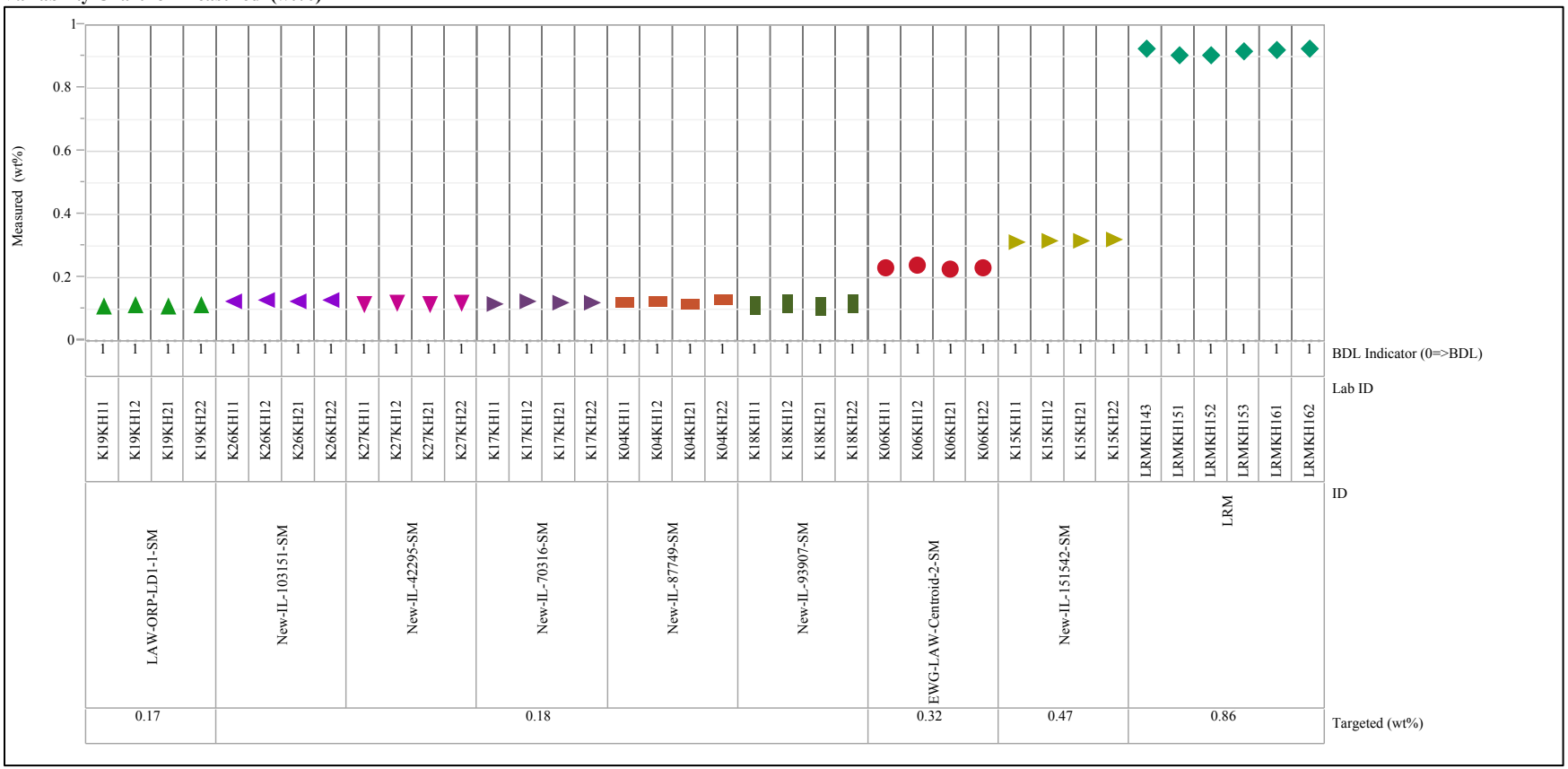


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=F (wt%), Analytical Method=KH, Analytical Group=D
Variability Chart for Measured (wt%)

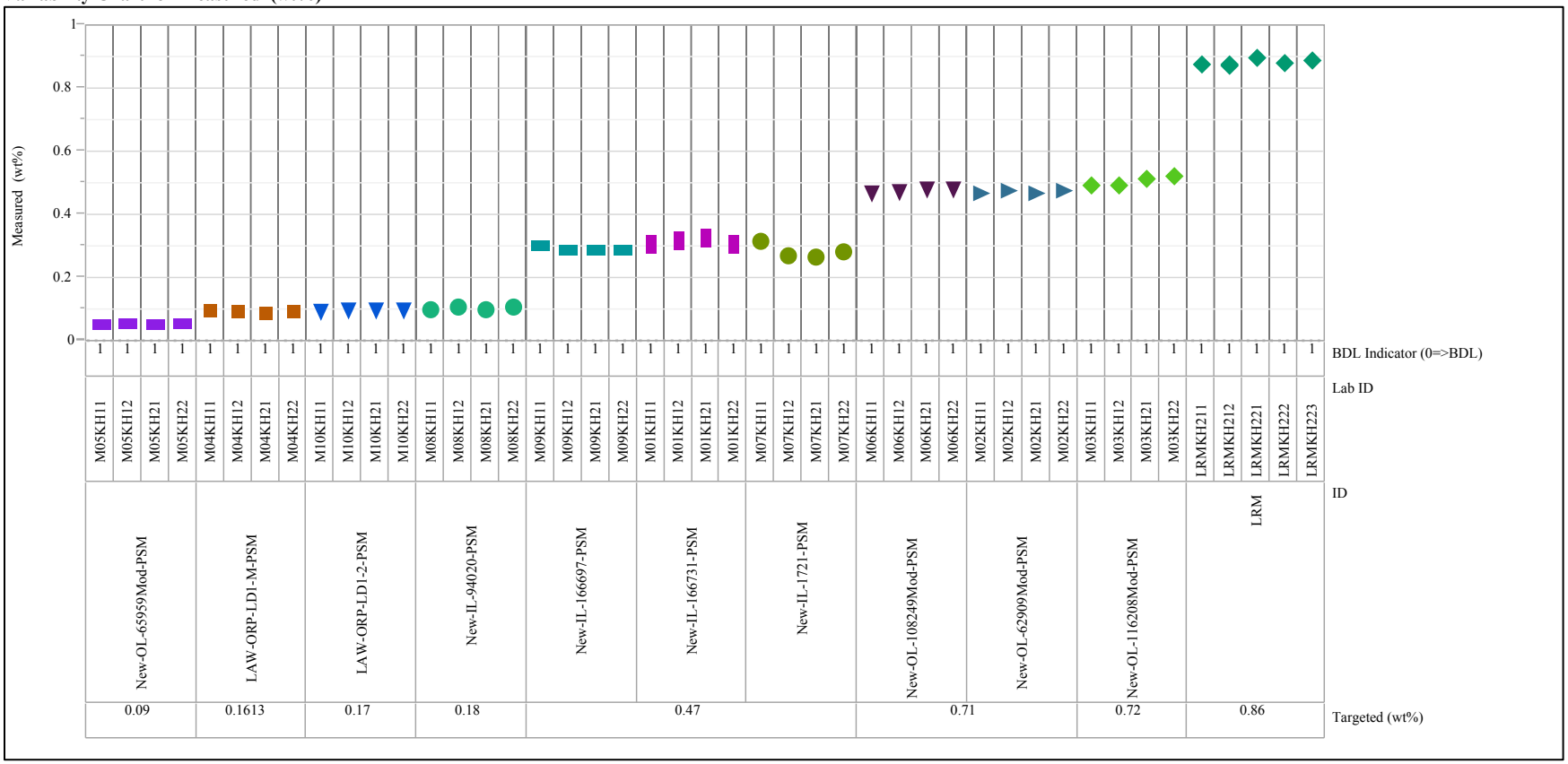


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=Fe2O3 (wt%), Analytical Method=PF, Analytical Group=A
Variability Chart for Measured (wt%)

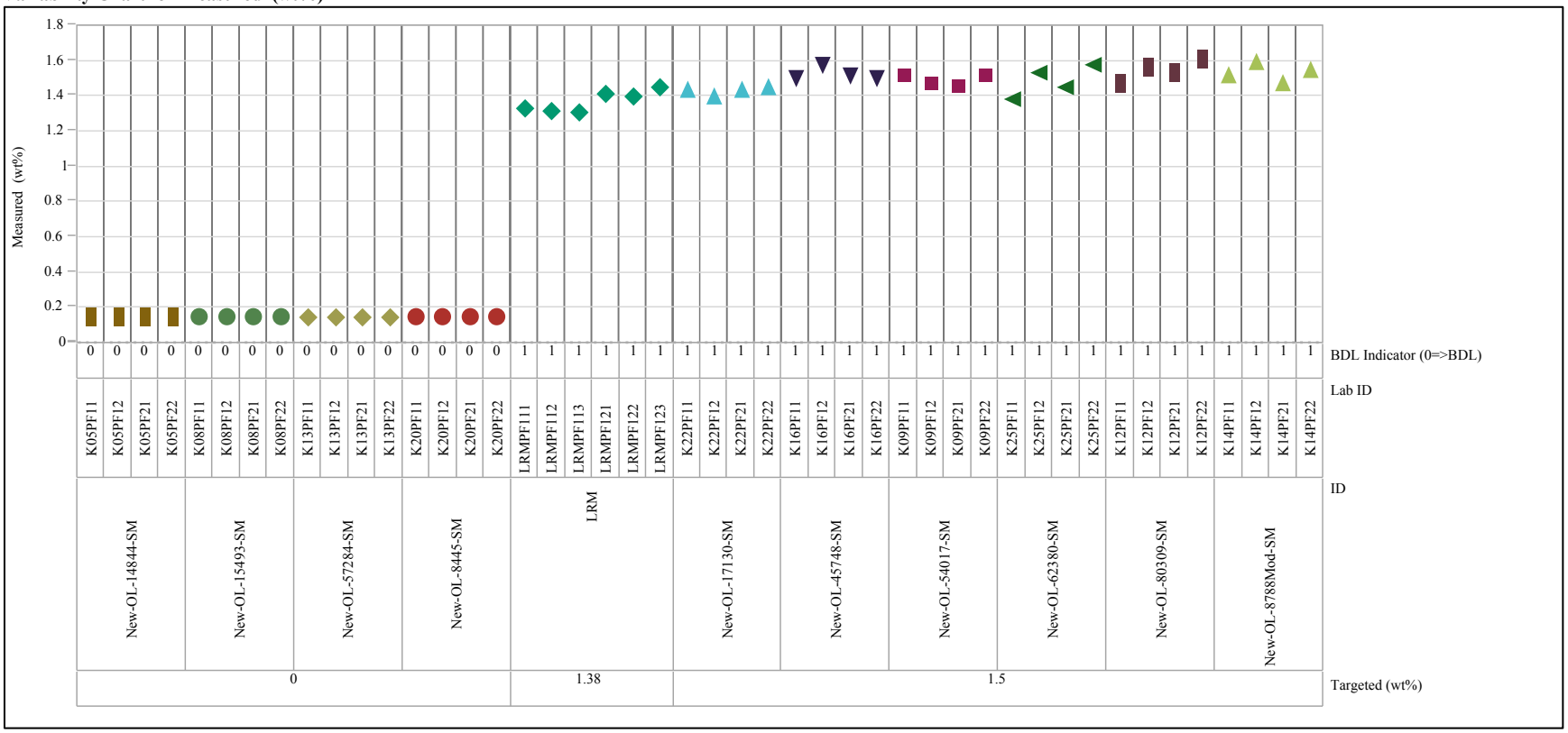


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=Fe2O3 (wt%), Analytical Method=PF, Analytical Group=B
Variability Chart for Measured (wt%)

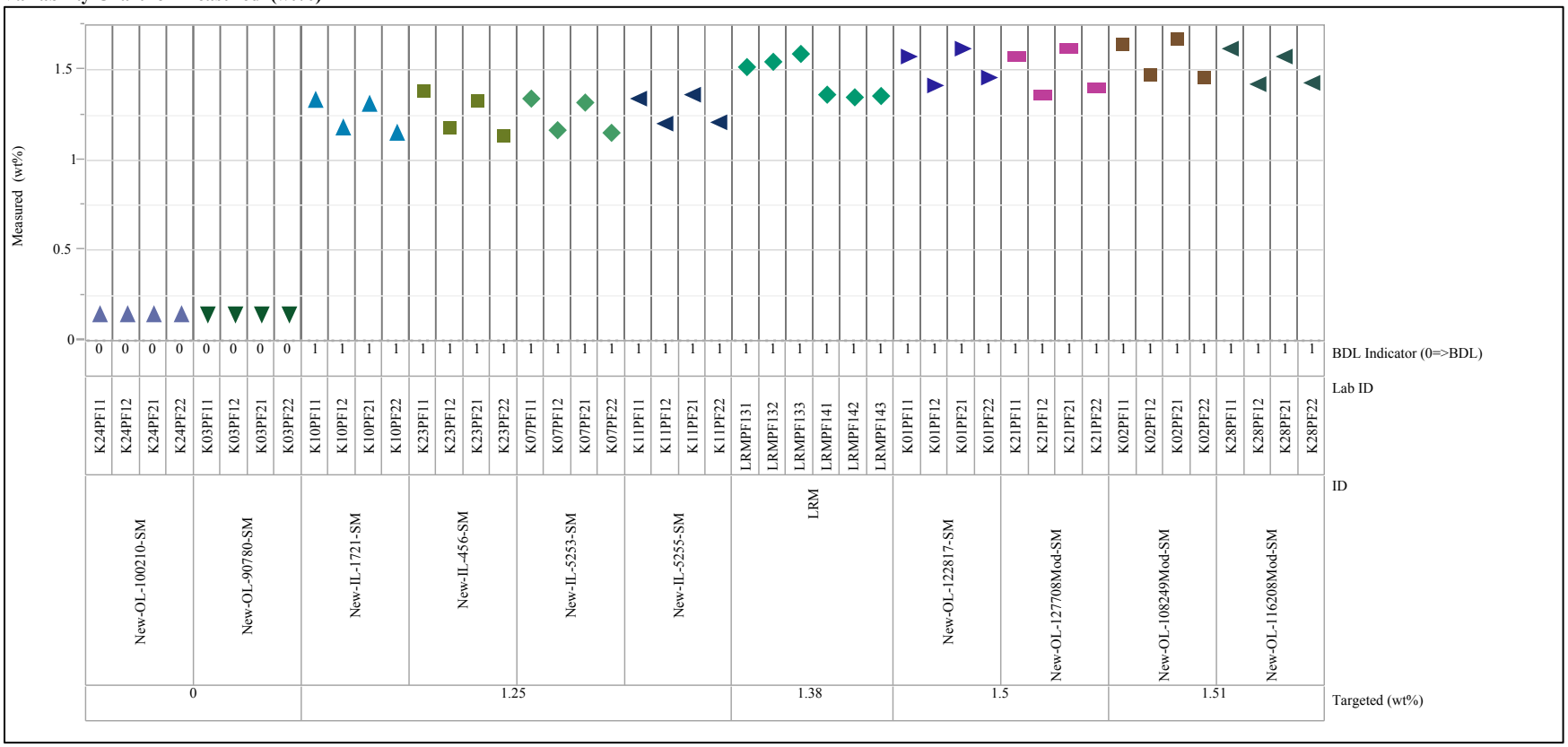


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=Fe2O3 (wt%), Analytical Method=PF, Analytical Group=C
Variability Chart for Measured (wt%)

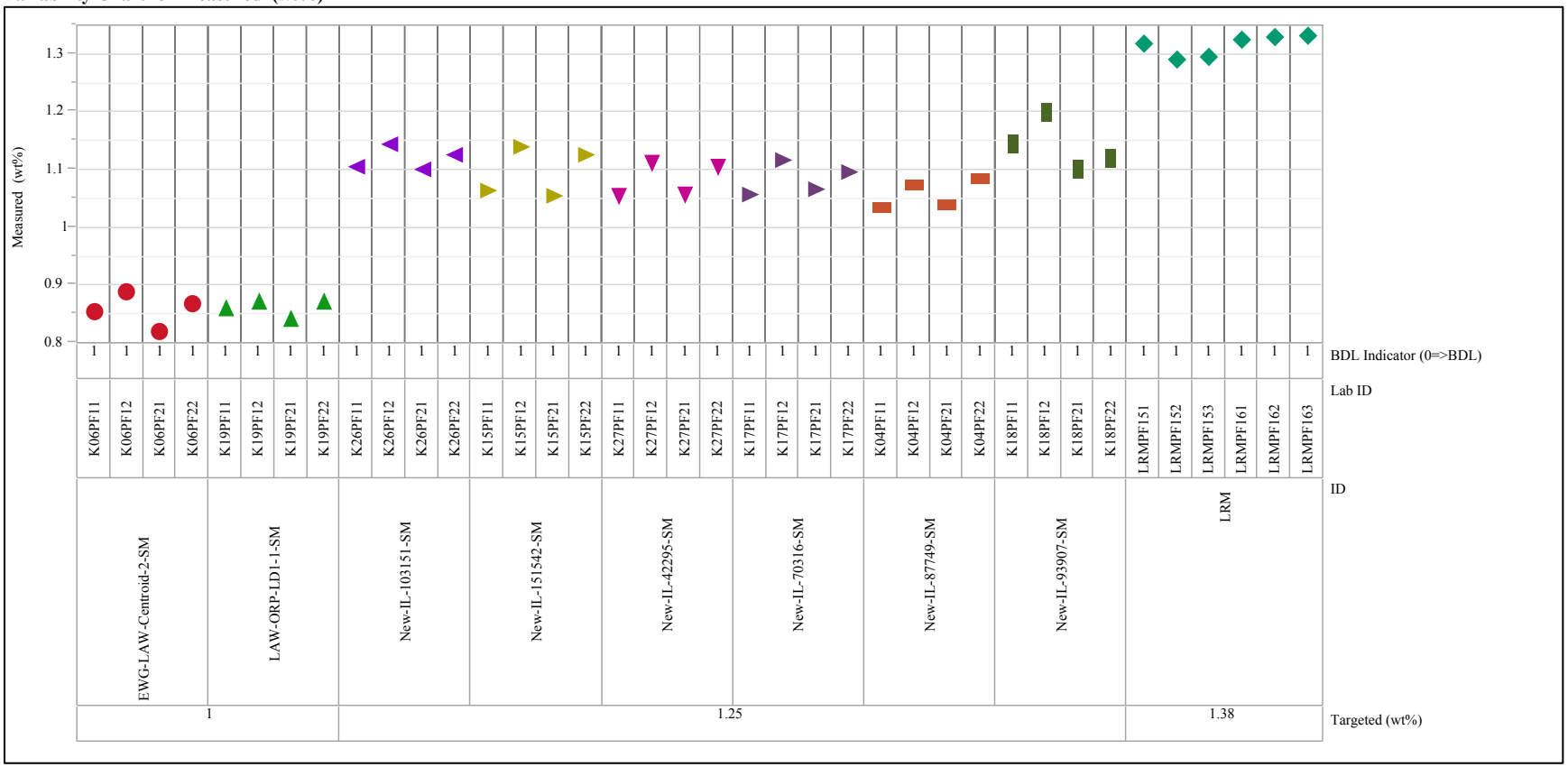


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=Fe2O3 (wt%), Analytical Method=PF, Analytical Group=D
Variability Chart for Measured (wt%)

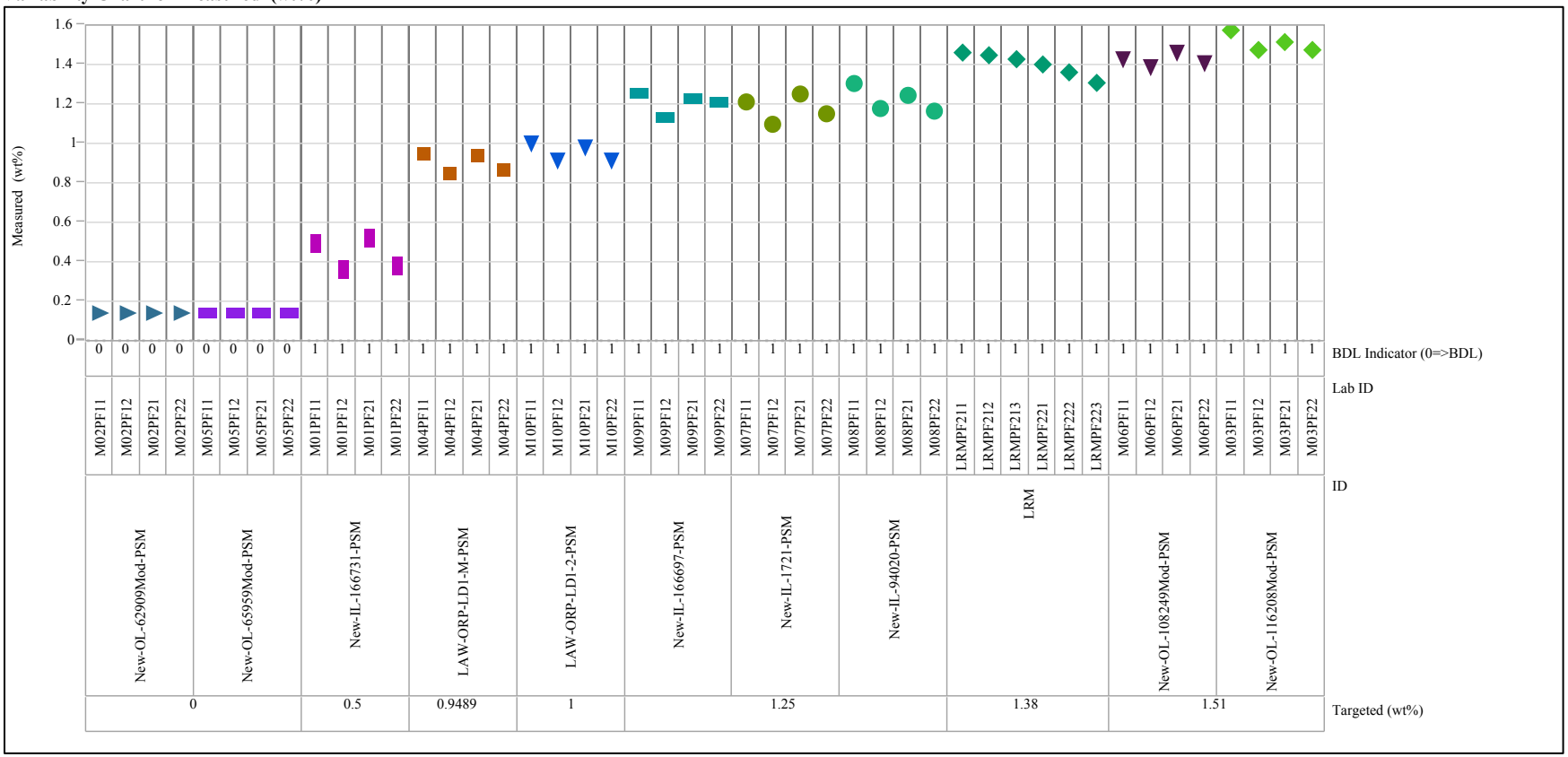


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=K2O (wt%), Analytical Method=LM, Analytical Group=A
Variability Chart for Measured (wt%)

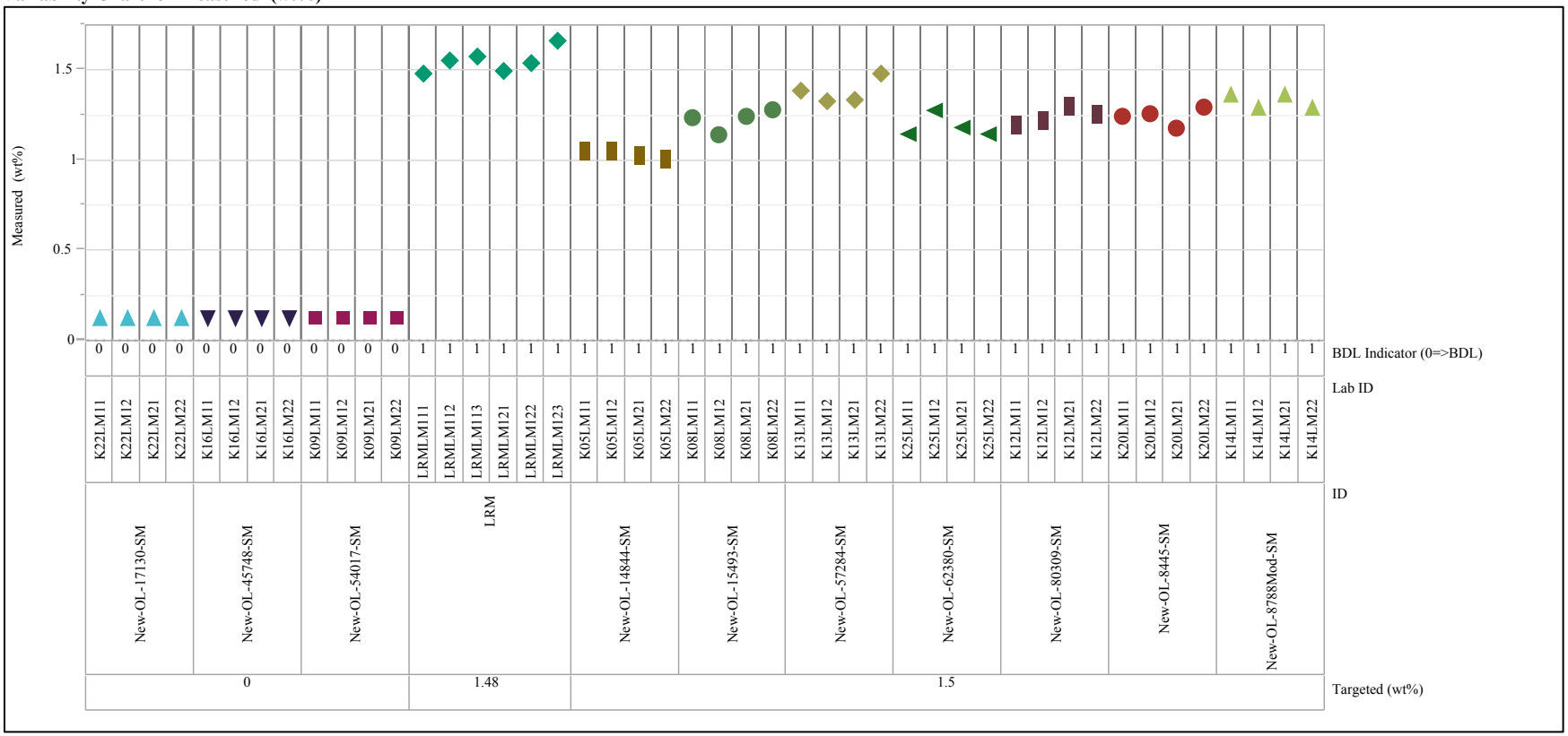


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=K2O (wt%), Analytical Method=LM, Analytical Group=B
Variability Chart for Measured (wt%)

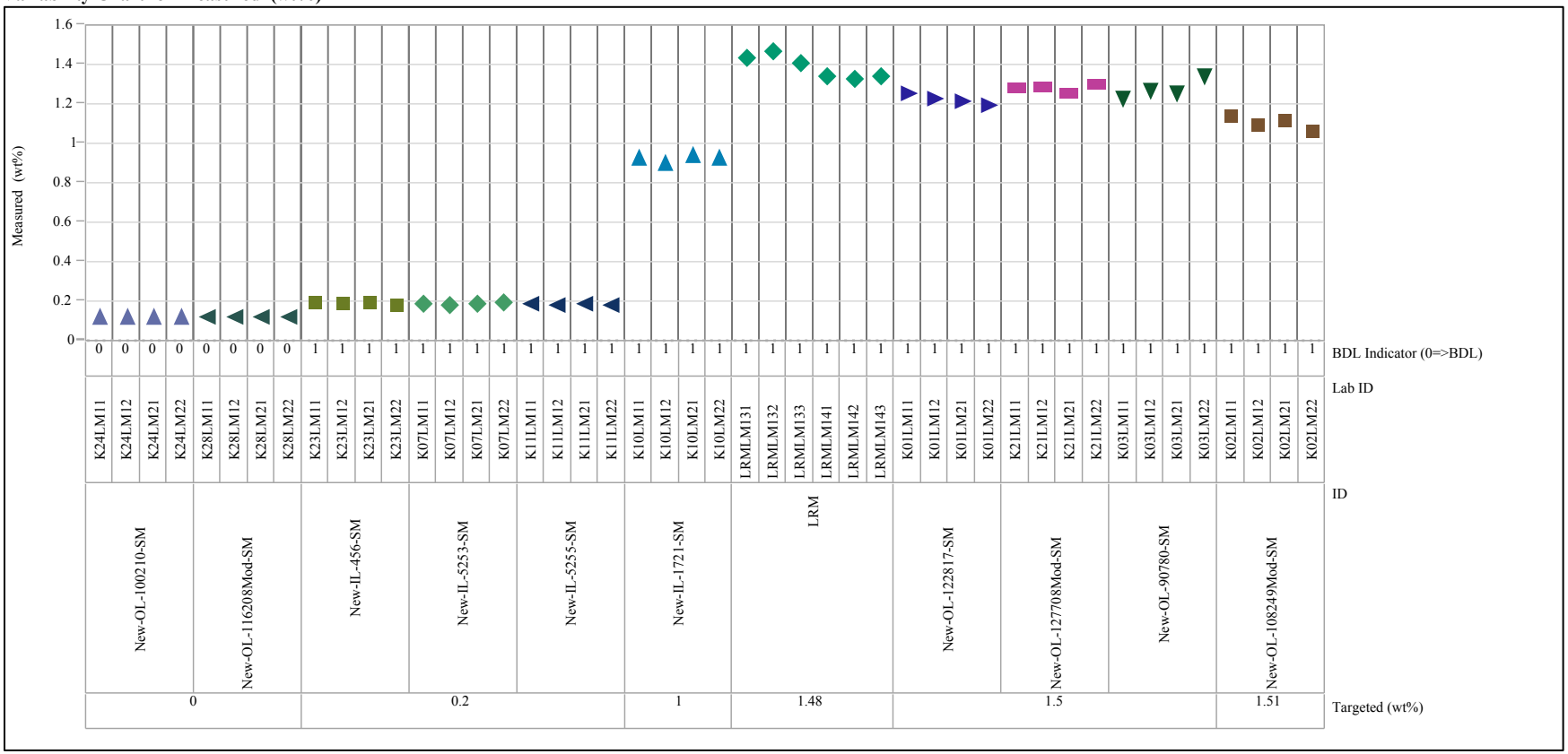


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=K2O (wt%), Analytical Method=LM, Analytical Group=C
Variability Chart for Measured (wt%)

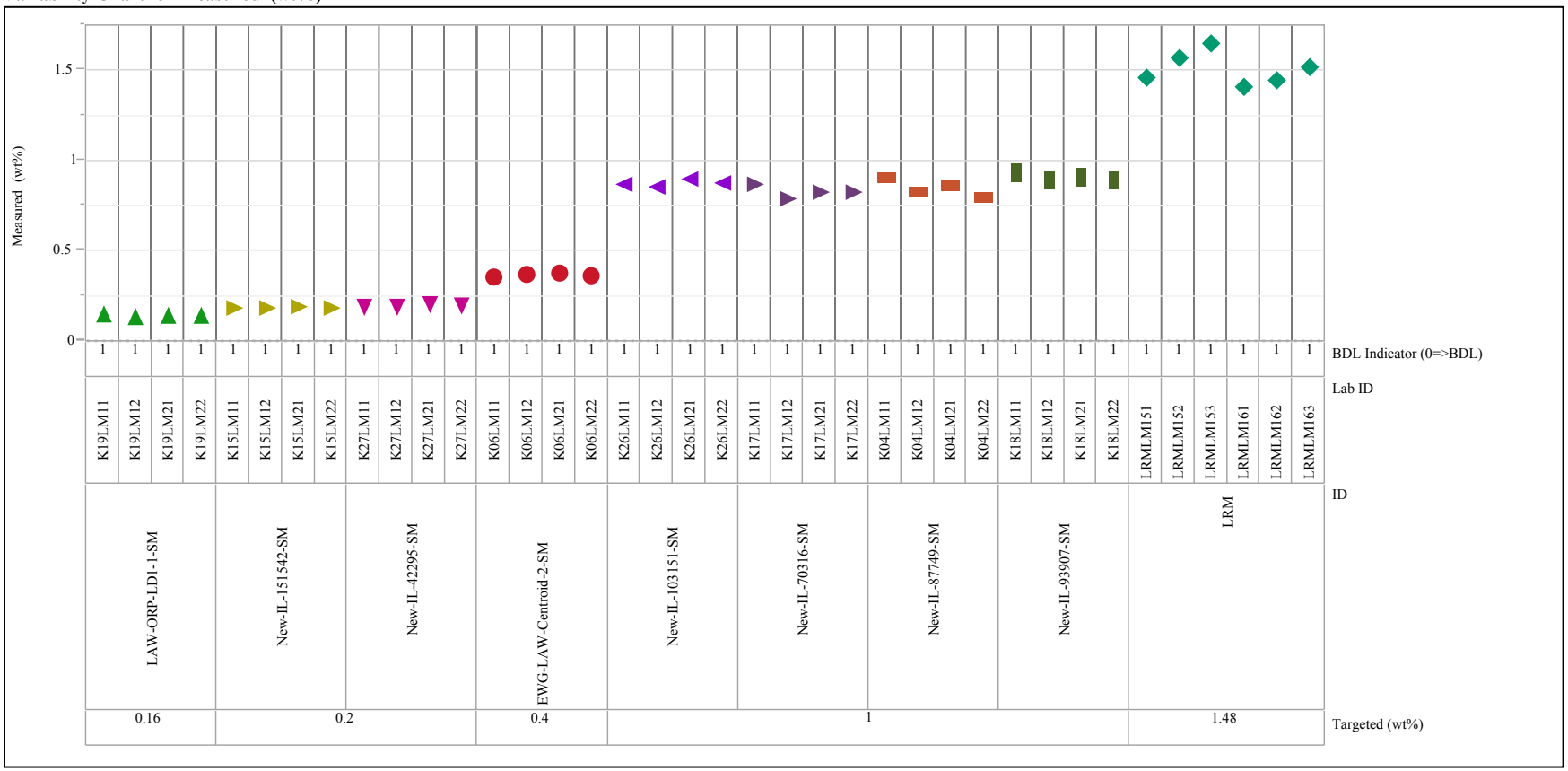


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=K2O (wt%), Analytical Method=LM, Analytical Group=D
Variability Chart for Measured (wt%)

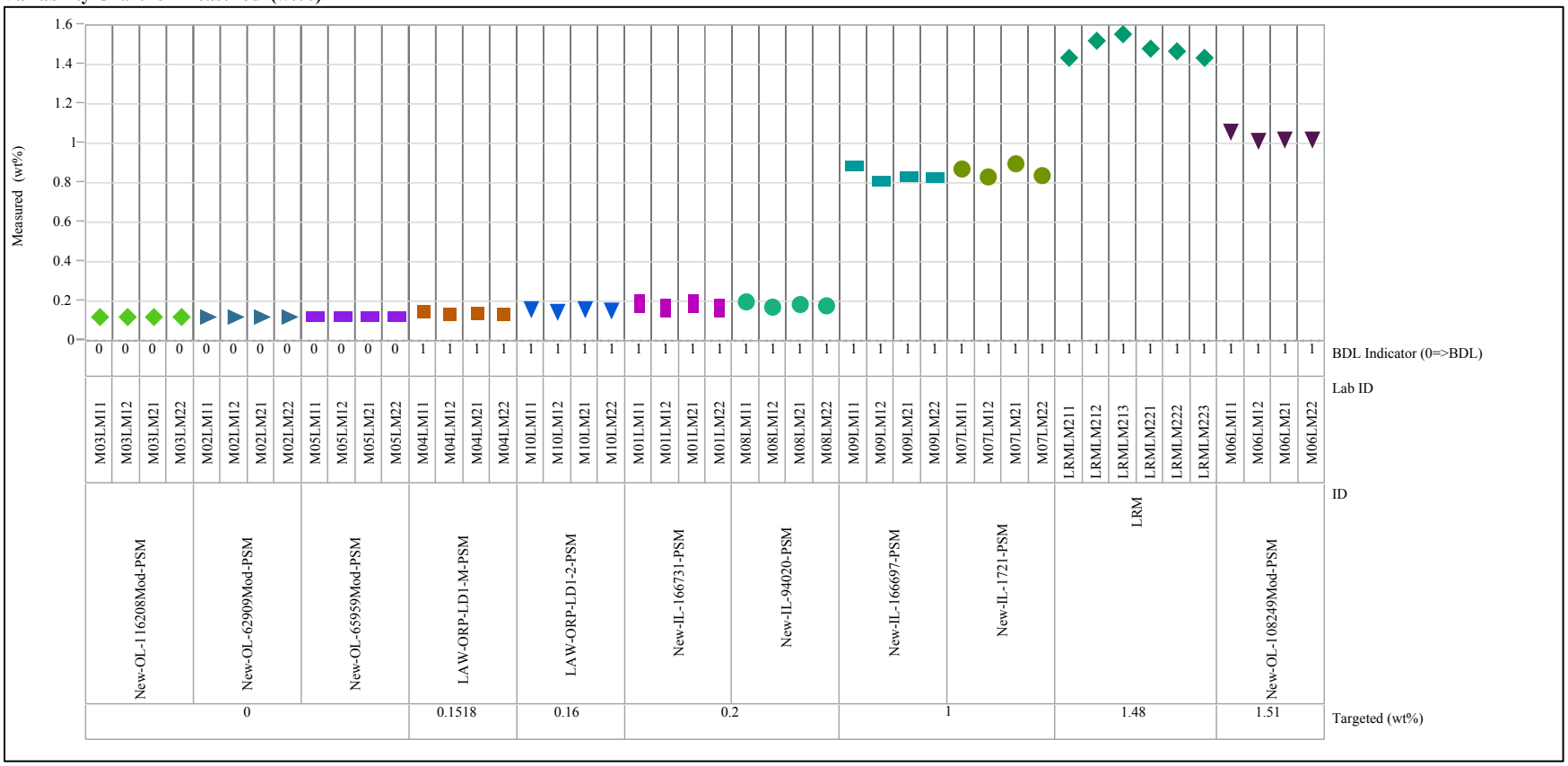


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=Li2O (wt%), Analytical Method=PF, Analytical Group=A
Variability Chart for Measured (wt%)

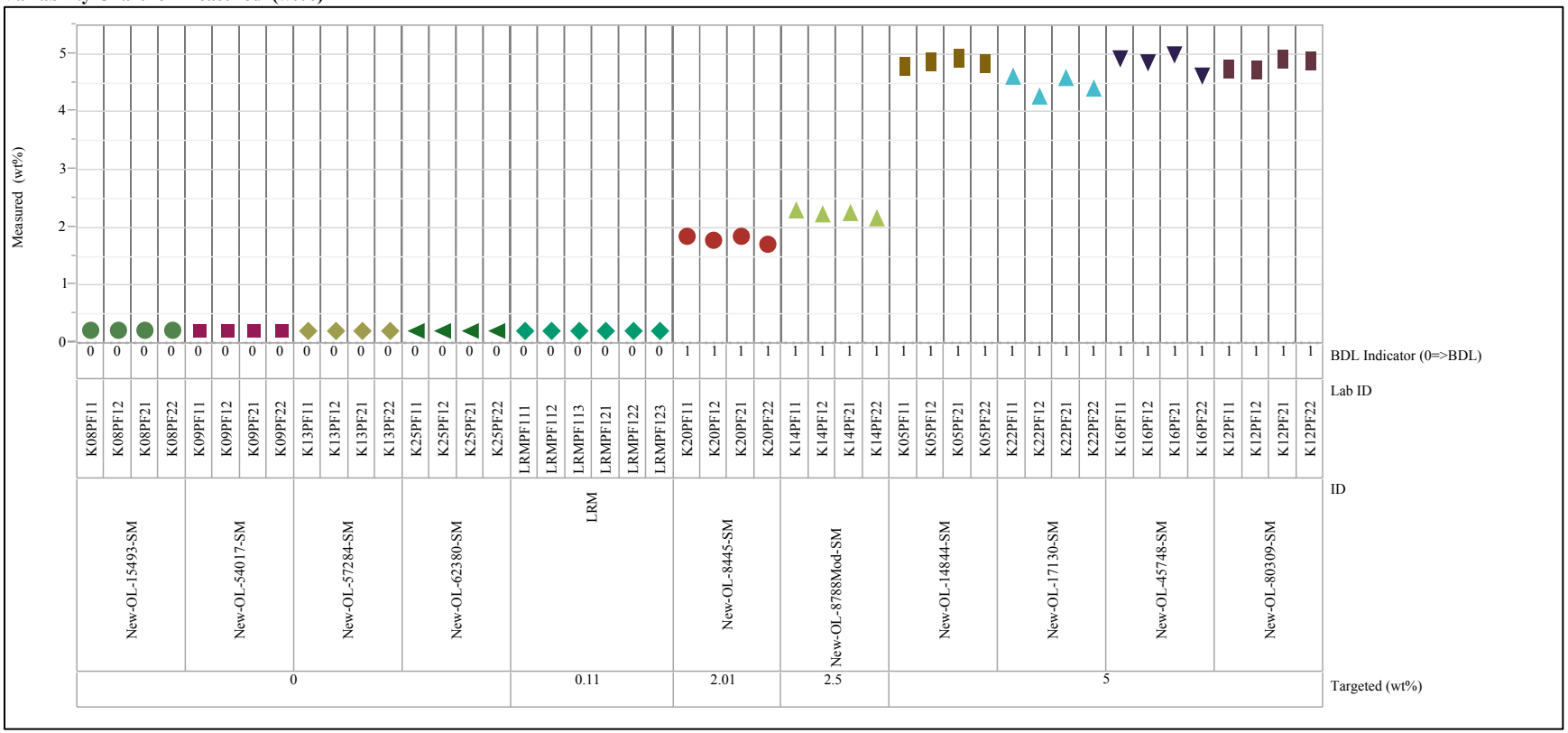


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=Li2O (wt%), Analytical Method=PF, Analytical Group=B
Variability Chart for Measured (wt%)

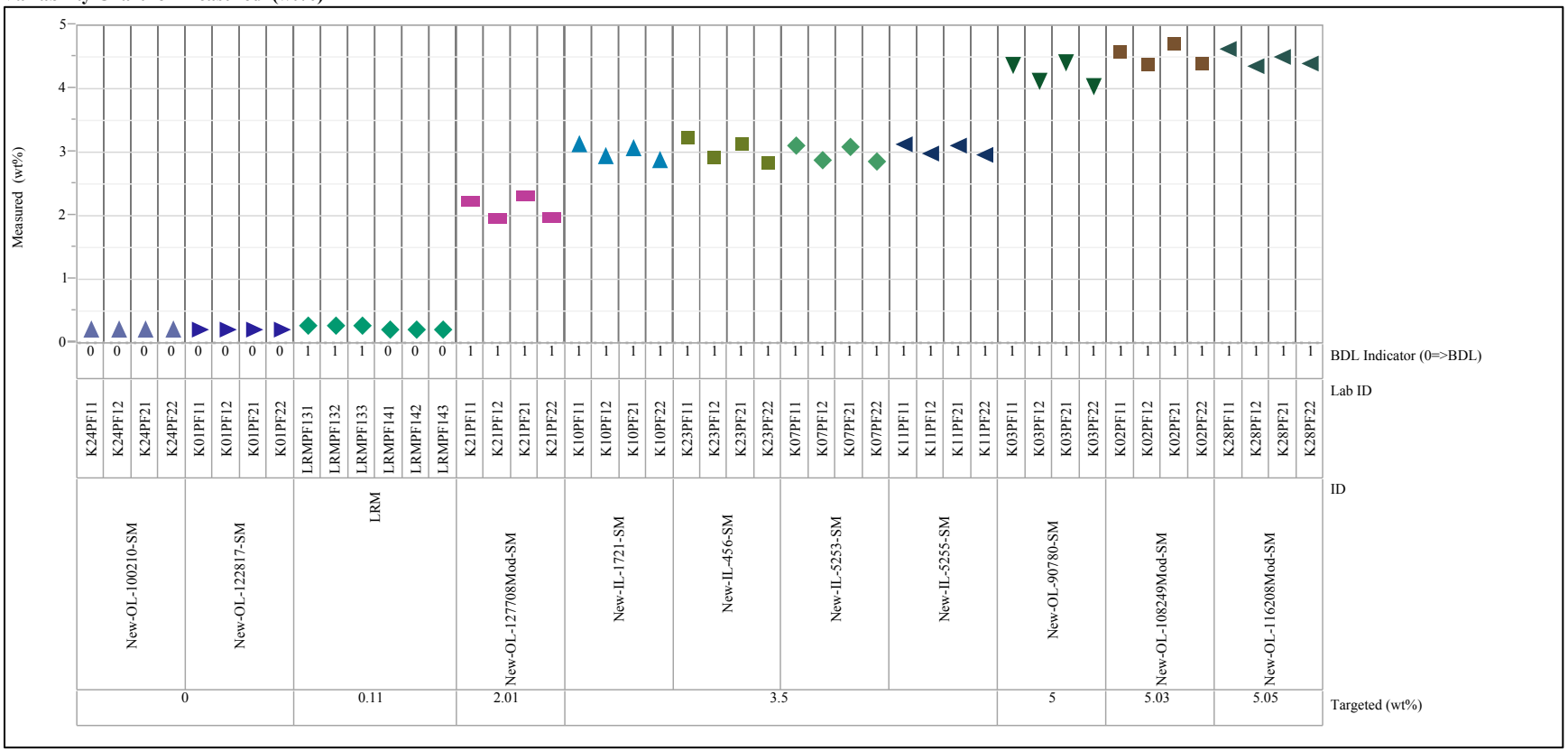


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=Li2O (wt%), Analytical Method=PF, Analytical Group=C
Variability Chart for Measured (wt%)

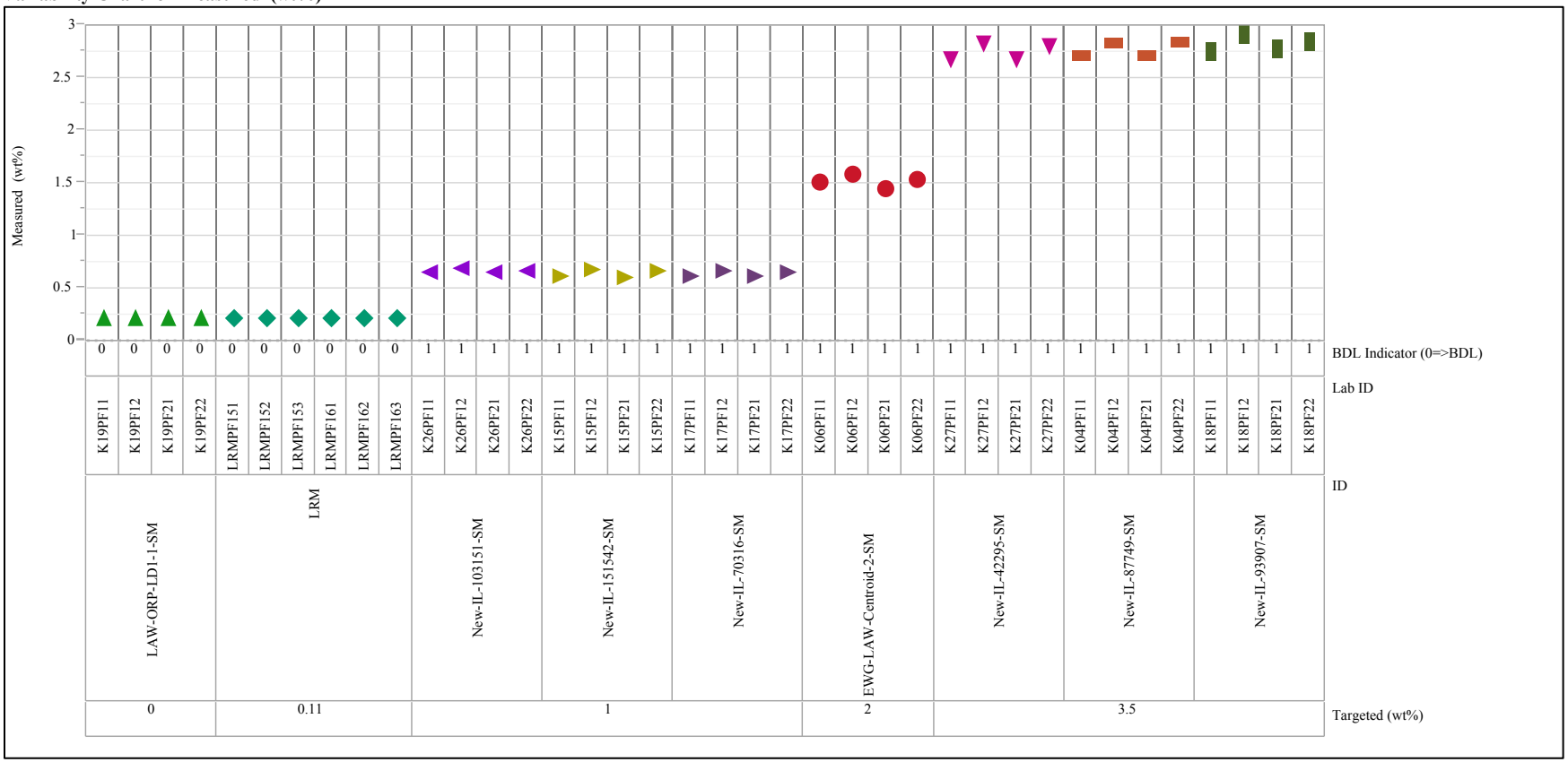


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=Li2O (wt%), Analytical Method=PF, Analytical Group=D
Variability Chart for Measured (wt%)

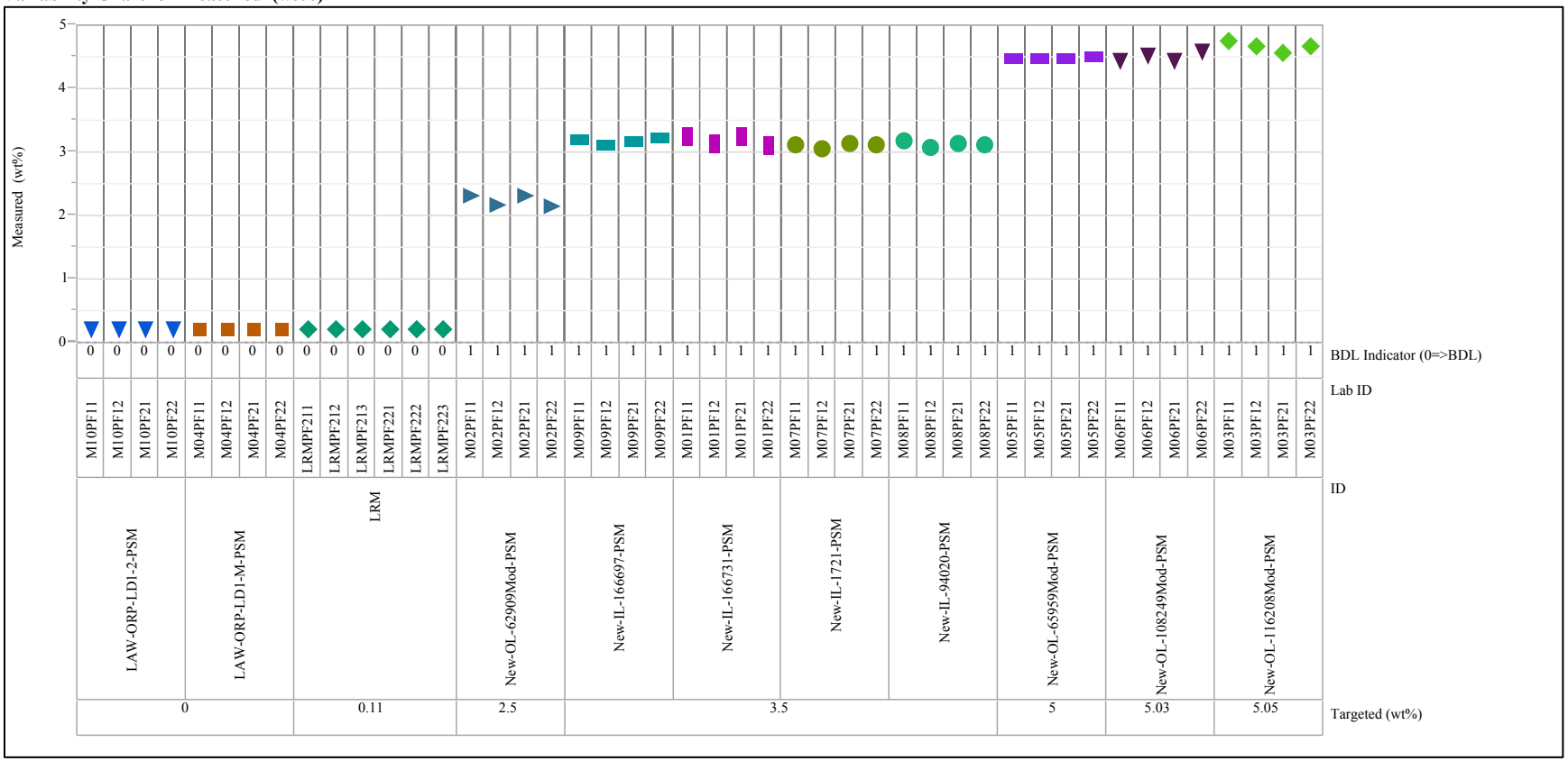


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=MgO (wt%), Analytical Method=LM, Analytical Group=A
Variability Chart for Measured (wt%)

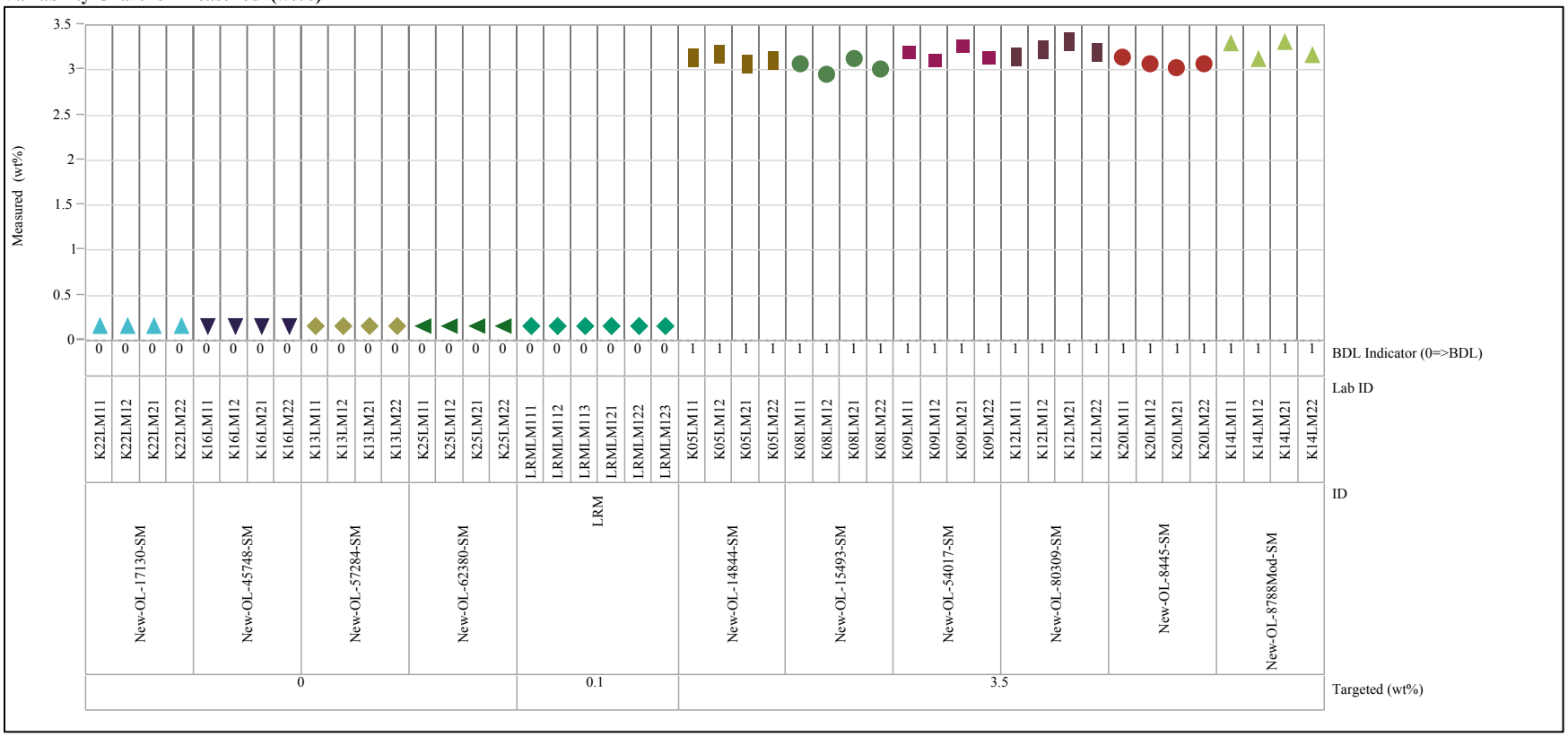


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=MgO (wt%), Analytical Method=LM, Analytical Group=B
Variability Chart for Measured (wt%)

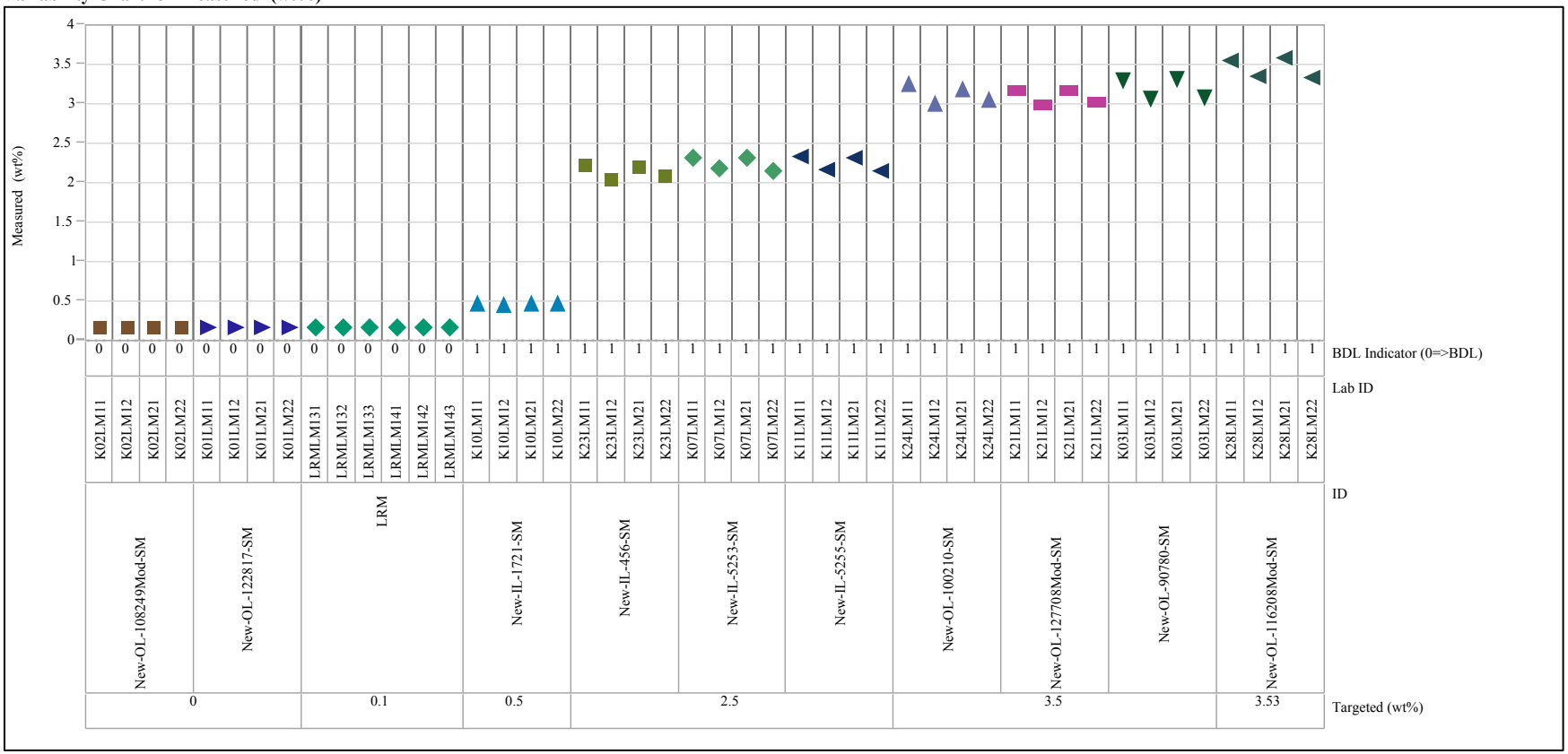


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=MgO (wt%), Analytical Method=LM, Analytical Group=C
Variability Chart for Measured (wt%)

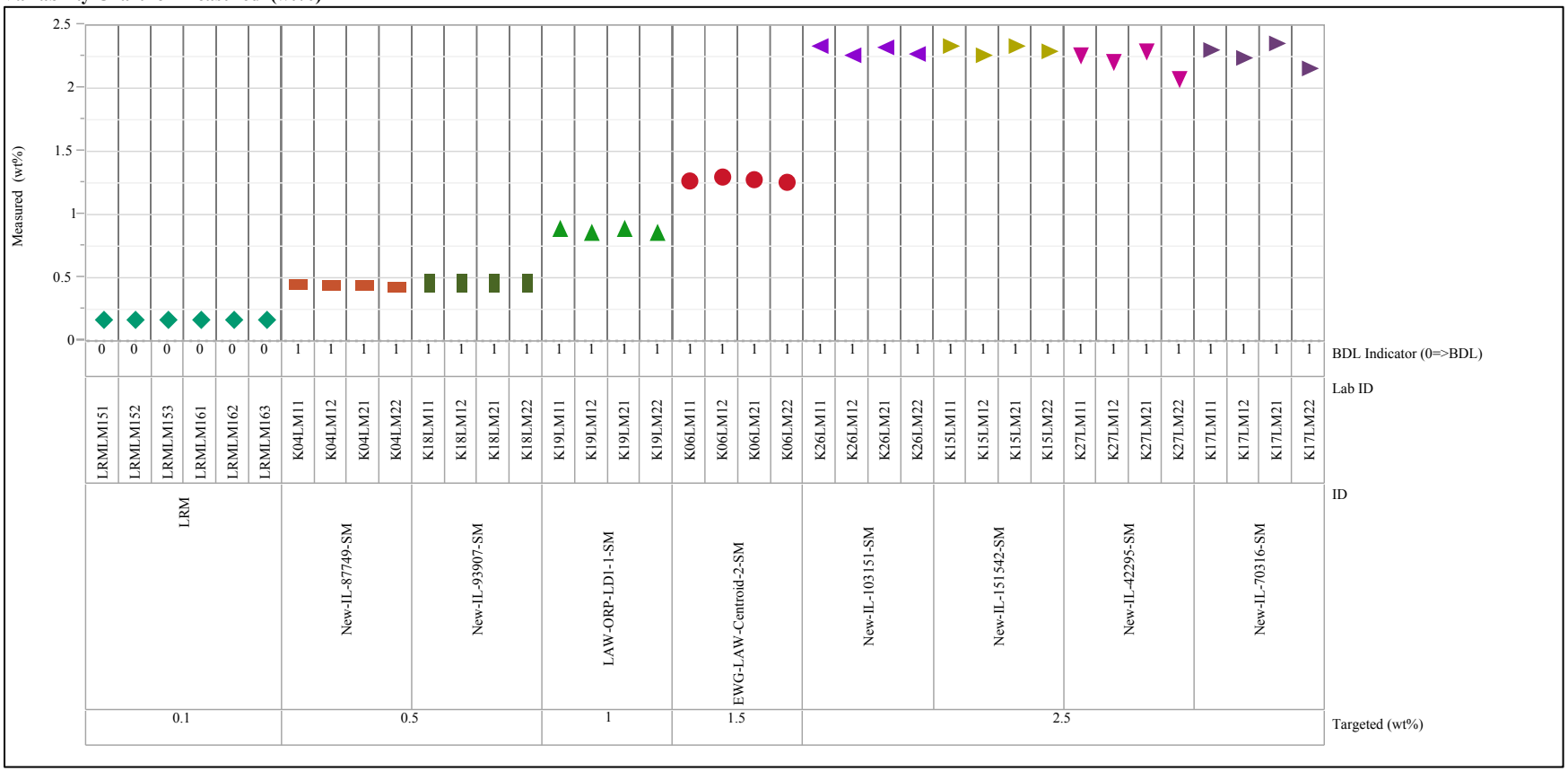


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=MgO (wt%), Analytical Method=LM, Analytical Group=D
Variability Chart for Measured (wt%)

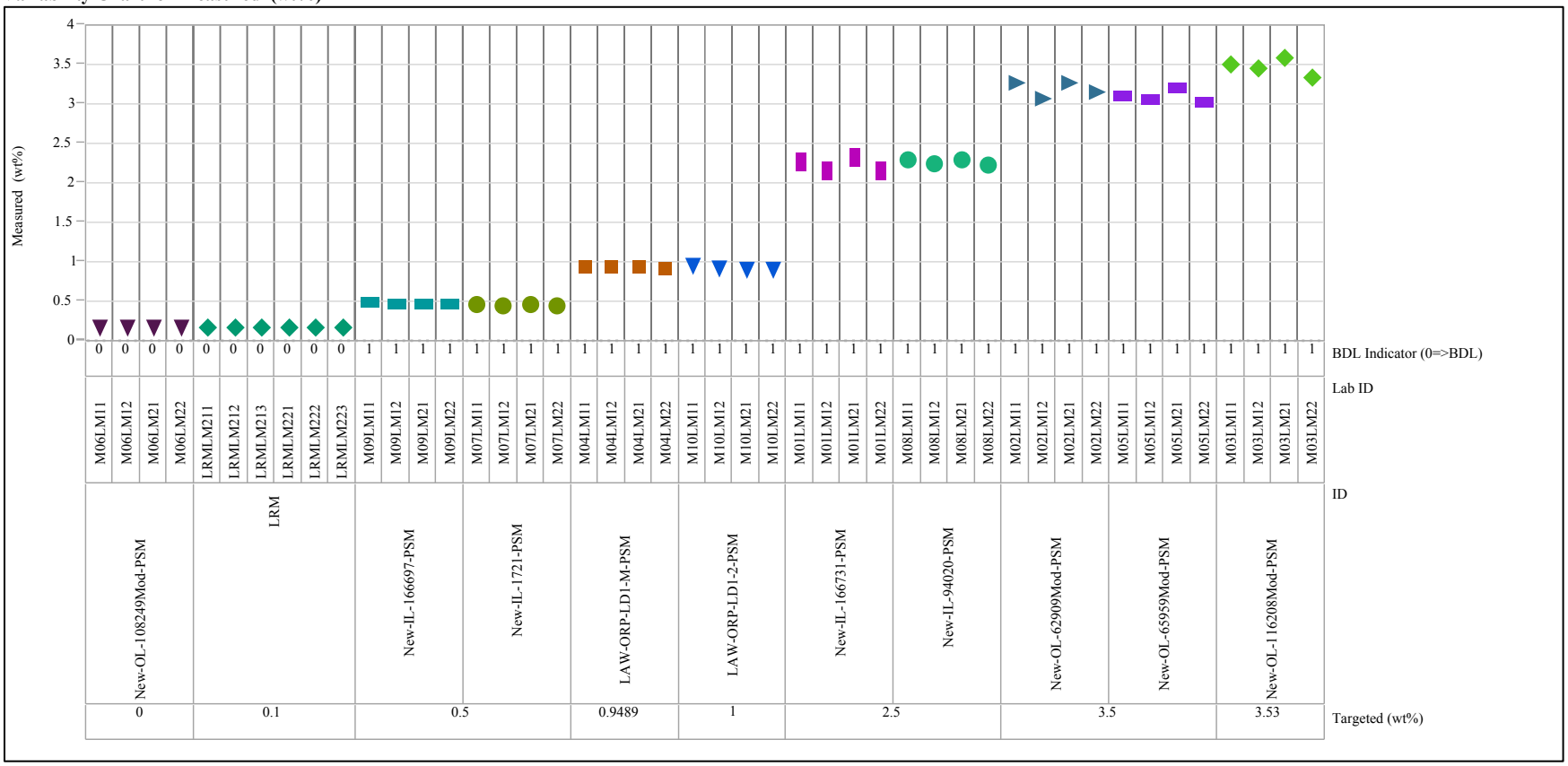


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=Na2O (wt%), Analytical Method=LM, Analytical Group=A
Variability Chart for Measured (wt%)

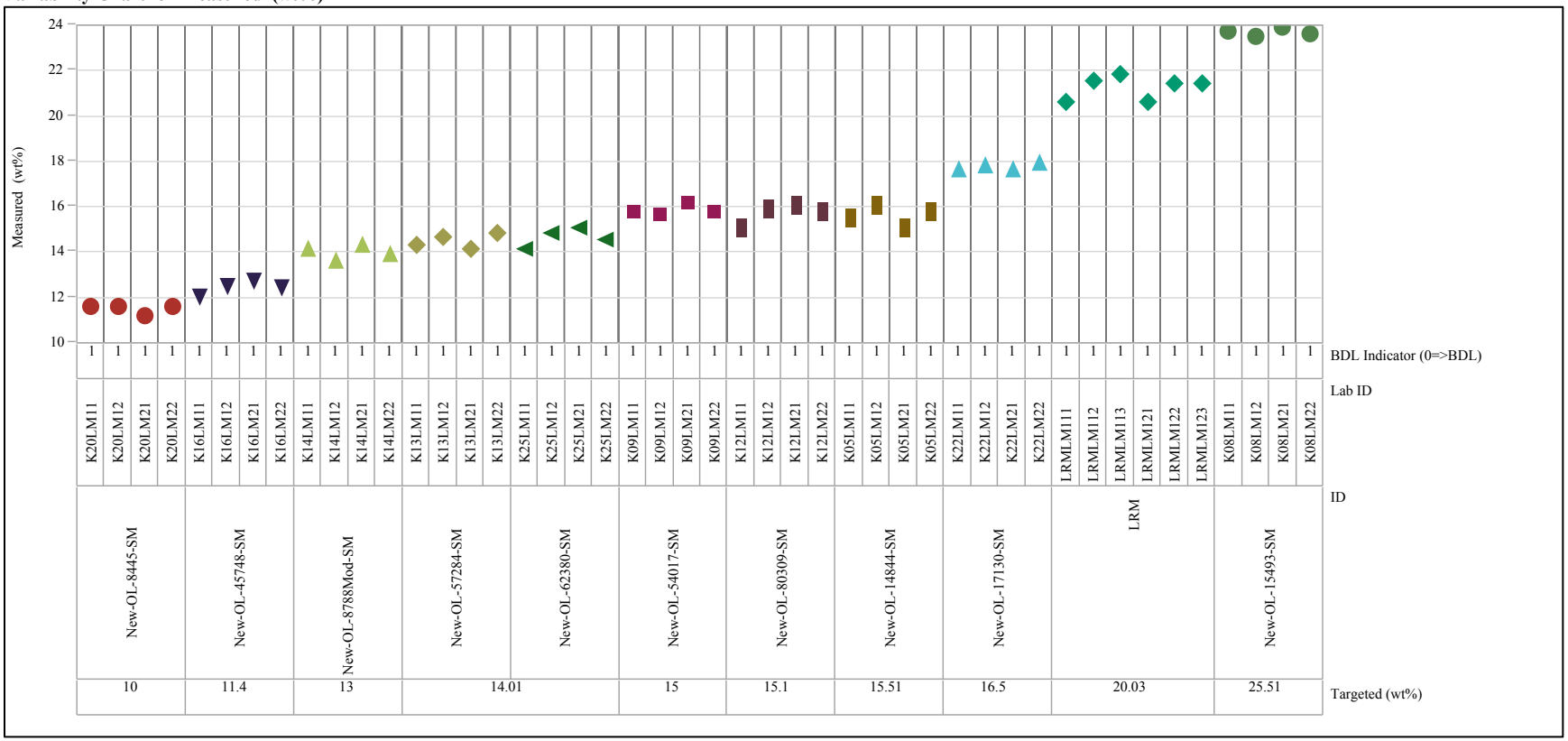


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=Na2O (wt%), Analytical Method=LM, Analytical Group=B
Variability Chart for Measured (wt%)

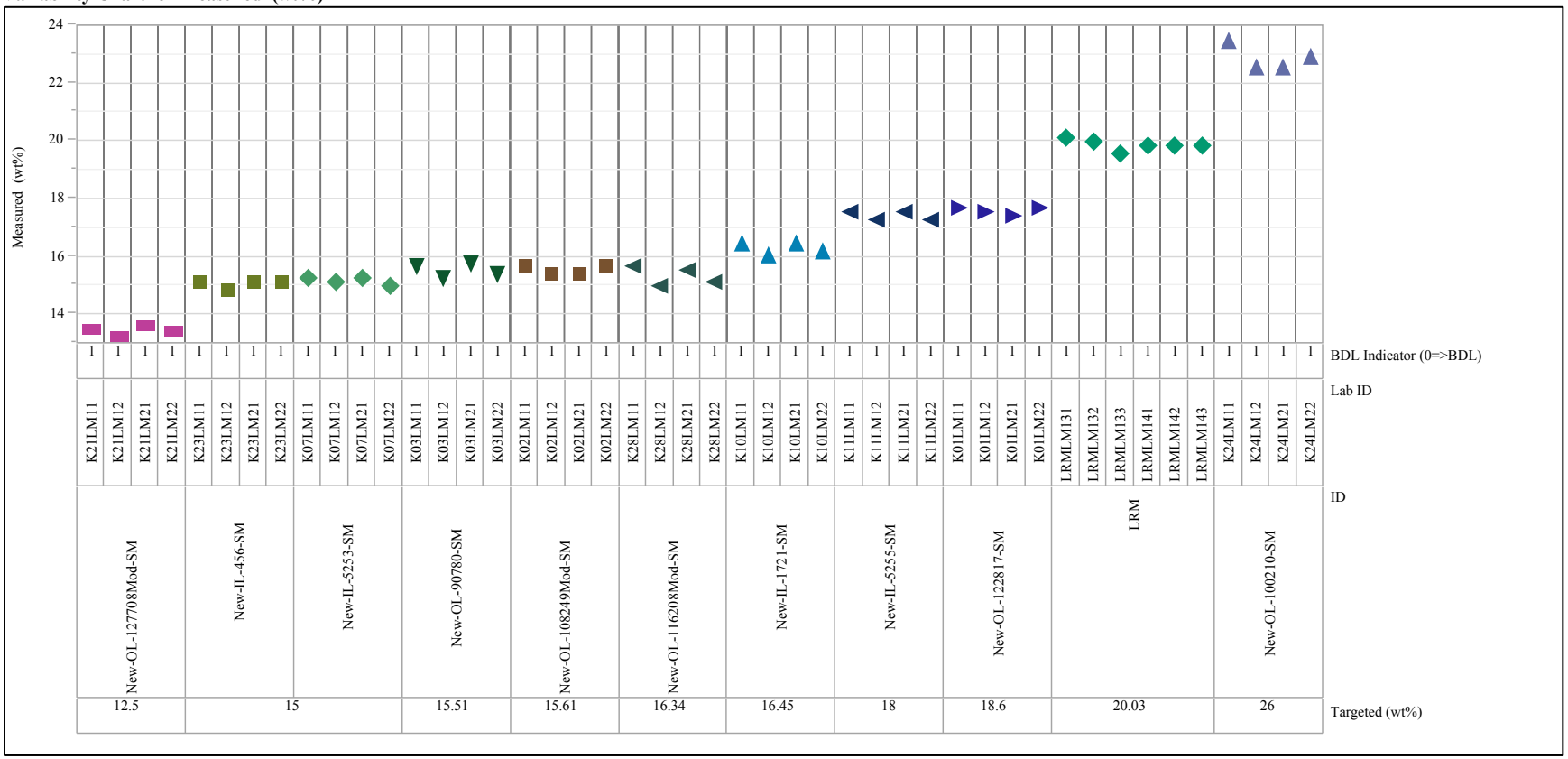


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=Na2O (wt%), Analytical Method=LM, Analytical Group=C
Variability Chart for Measured (wt%)

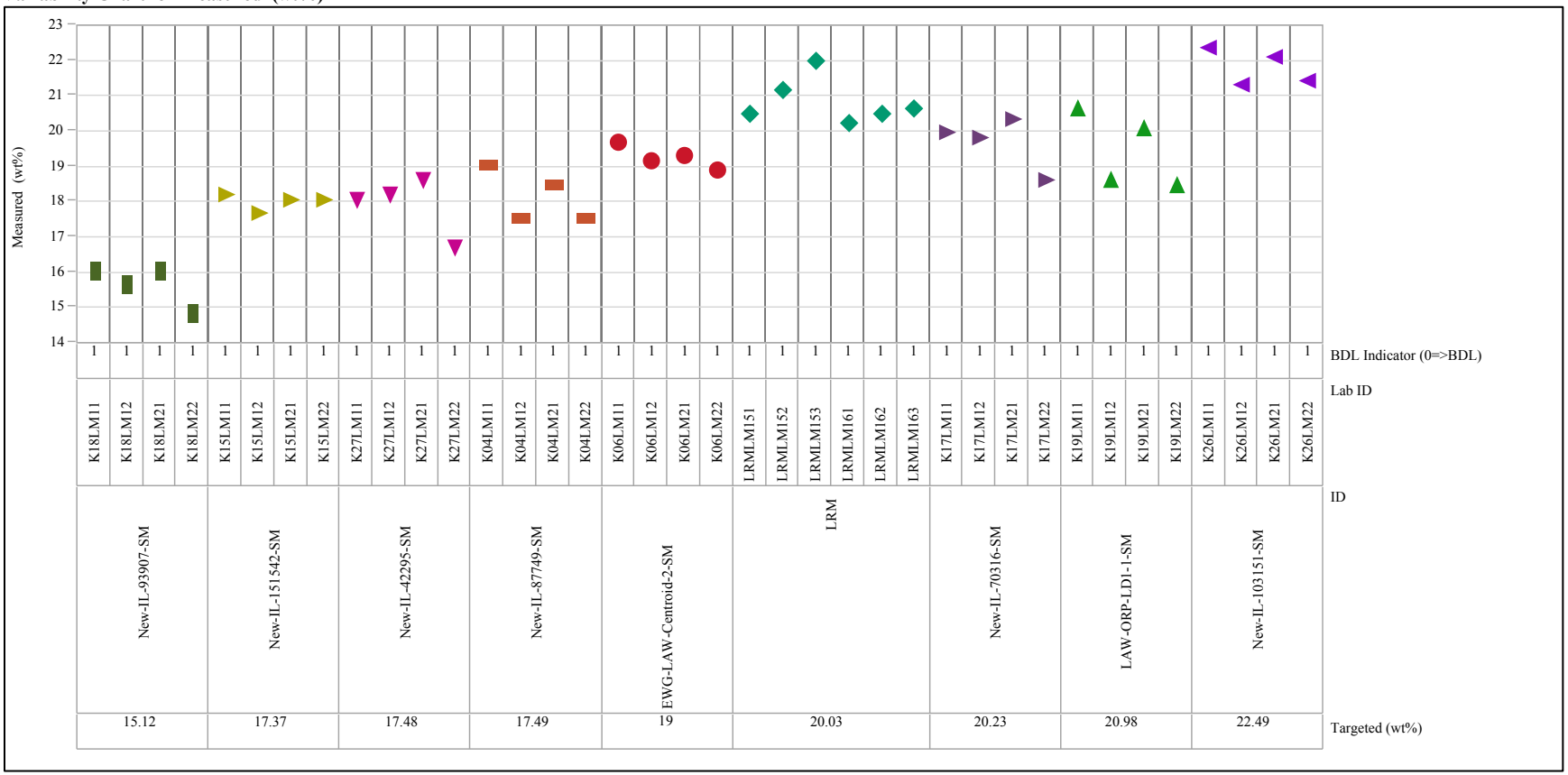


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=Na2O (wt%), Analytical Method=LM, Analytical Group=D
Variability Chart for Measured (wt%)

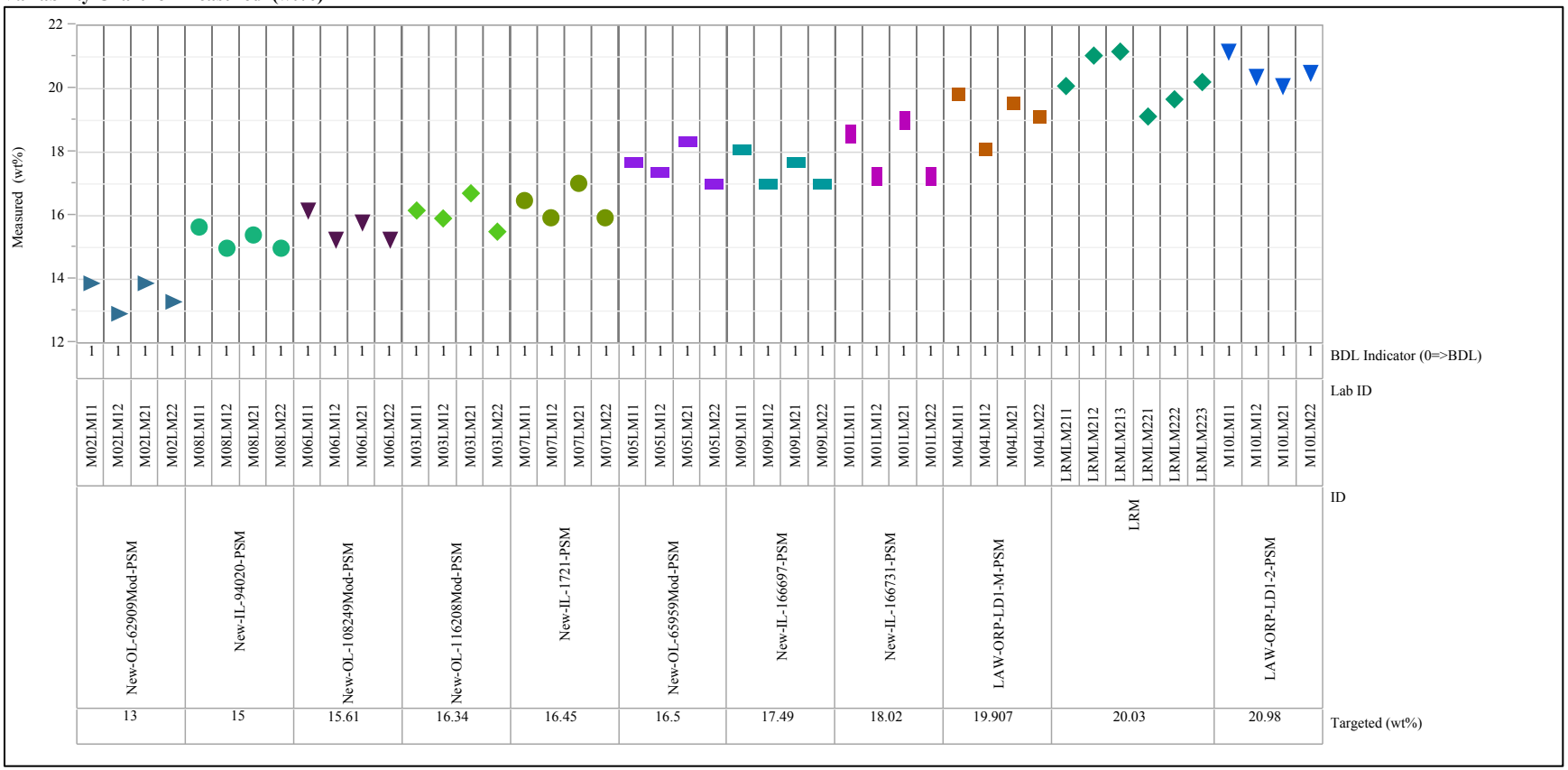


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=P2O5 (wt%), Analytical Method=LM, Analytical Group=A
Variability Chart for Measured (wt%)

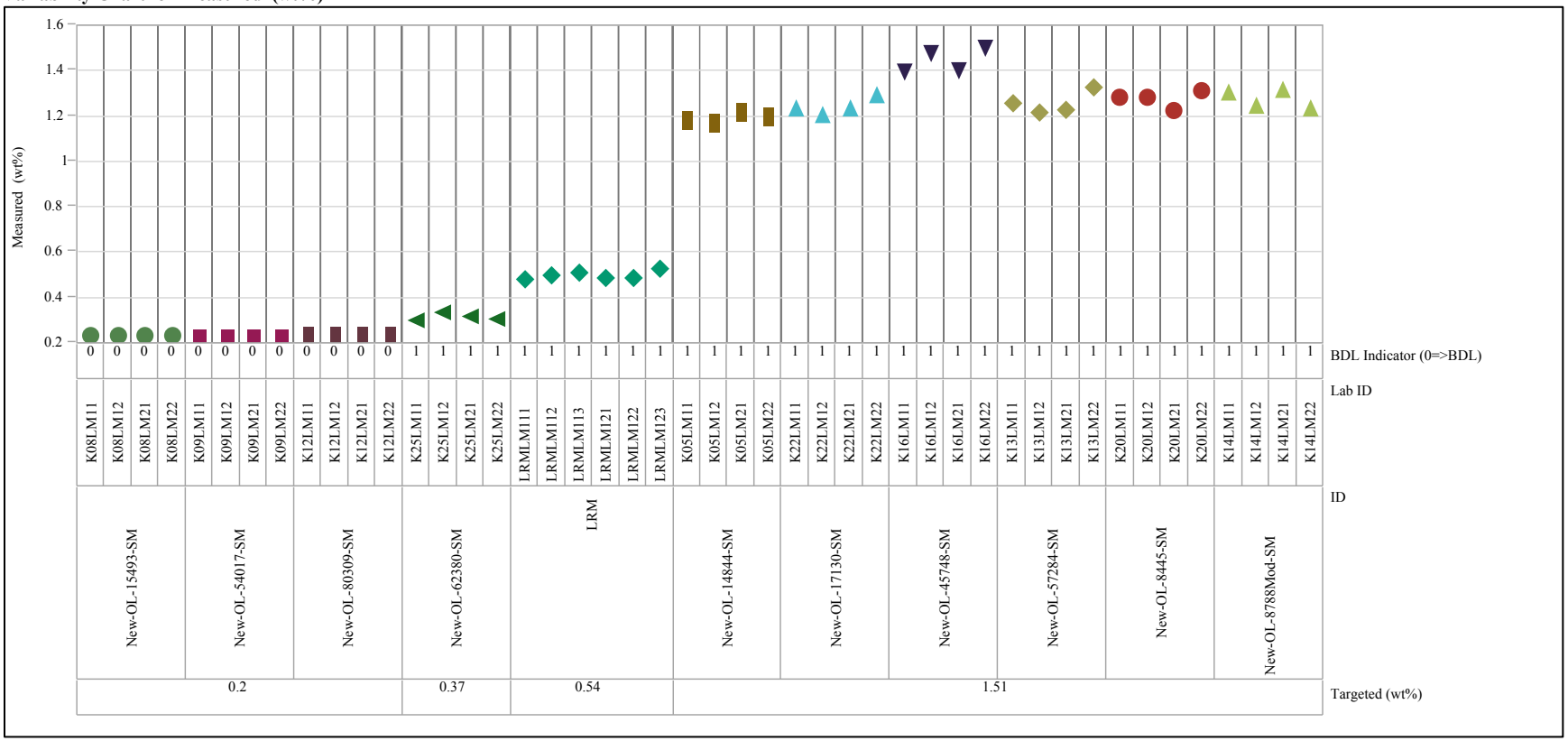


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=P2O5 (wt%), Analytical Method=LM, Analytical Group=B
Variability Chart for Measured (wt%)

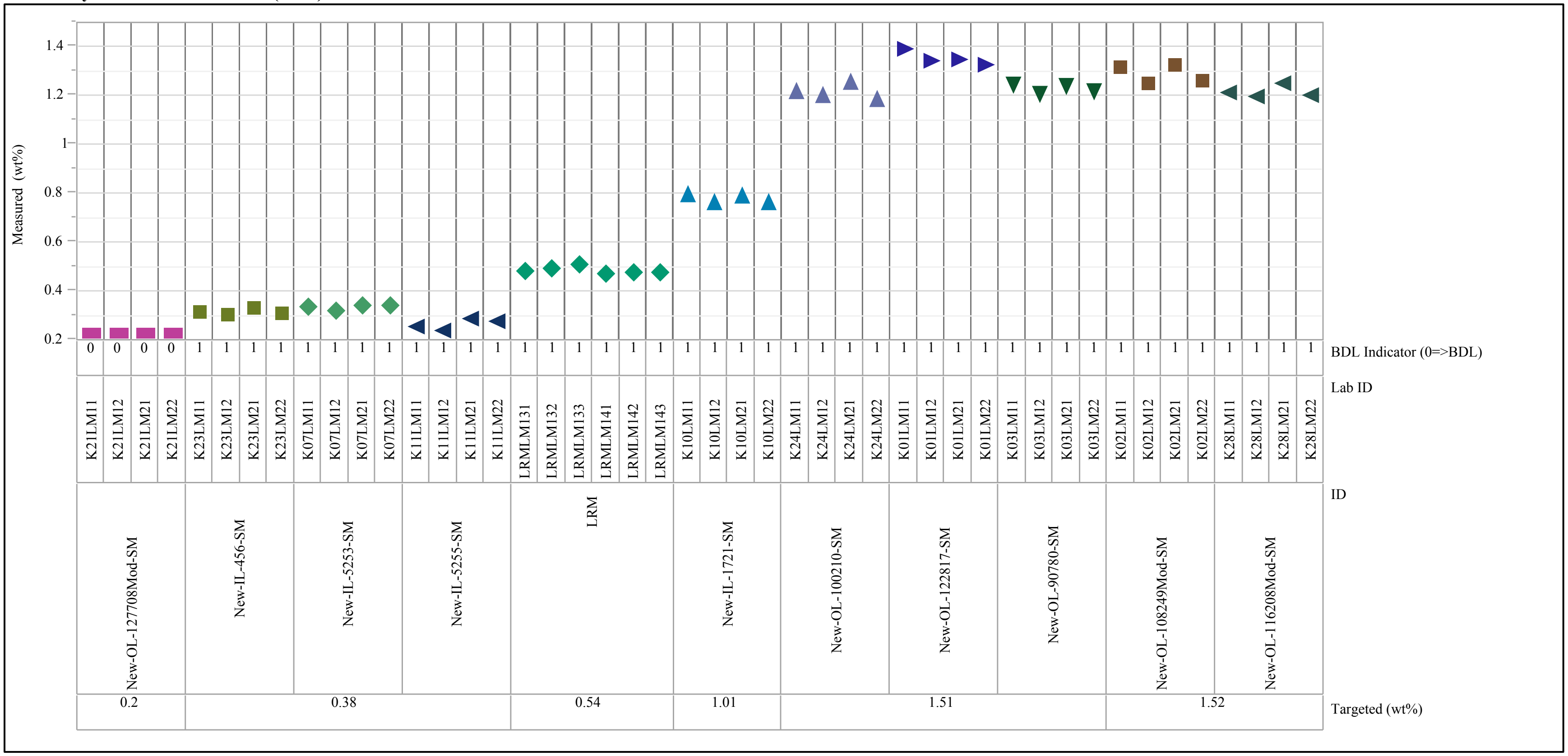


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=P2O5 (wt%), Analytical Method=LM, Analytical Group=C
Variability Chart for Measured (wt%)

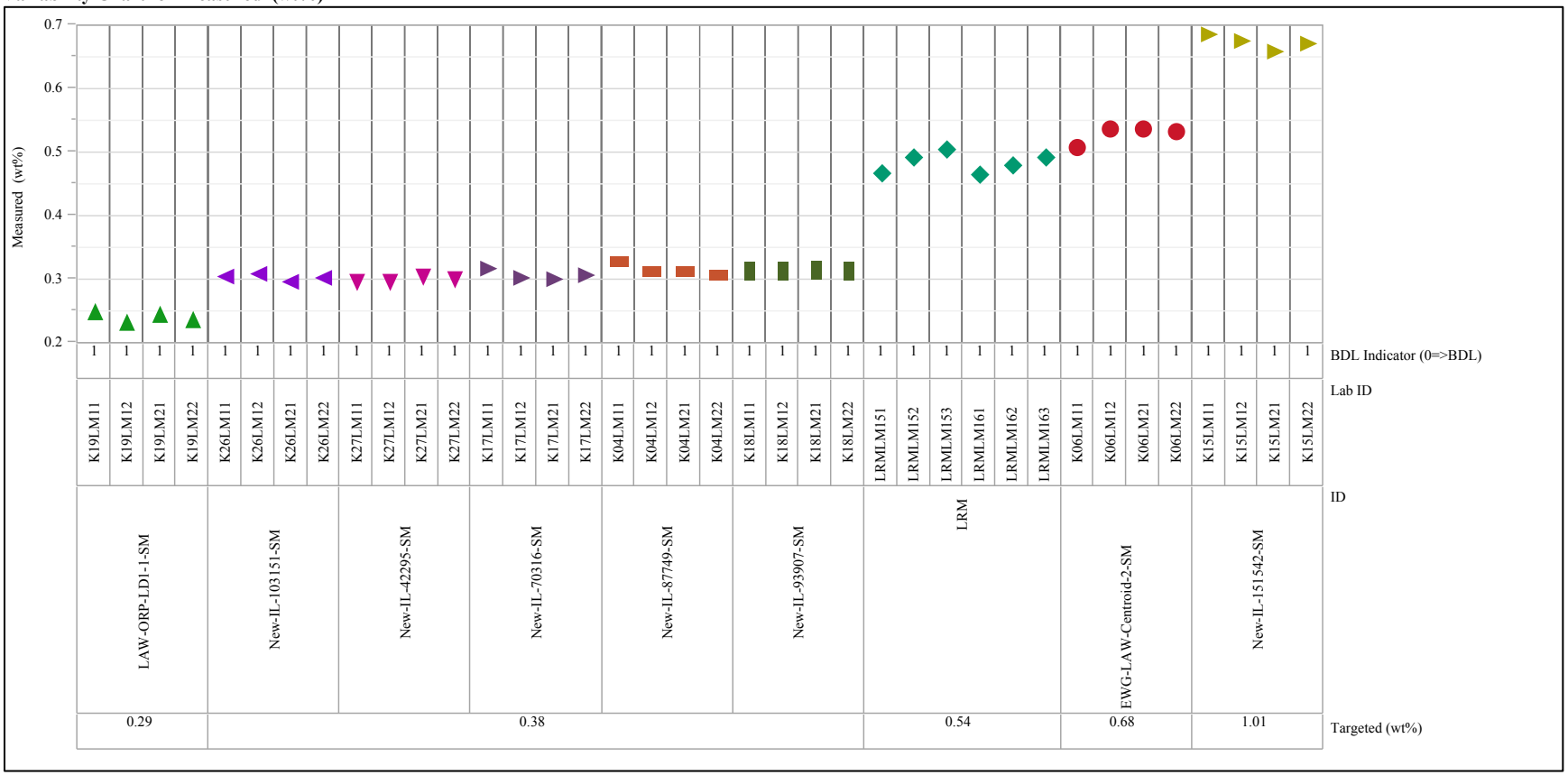


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=P2O5 (wt%), Analytical Method=LM, Analytical Group=D
Variability Chart for Measured (wt%)

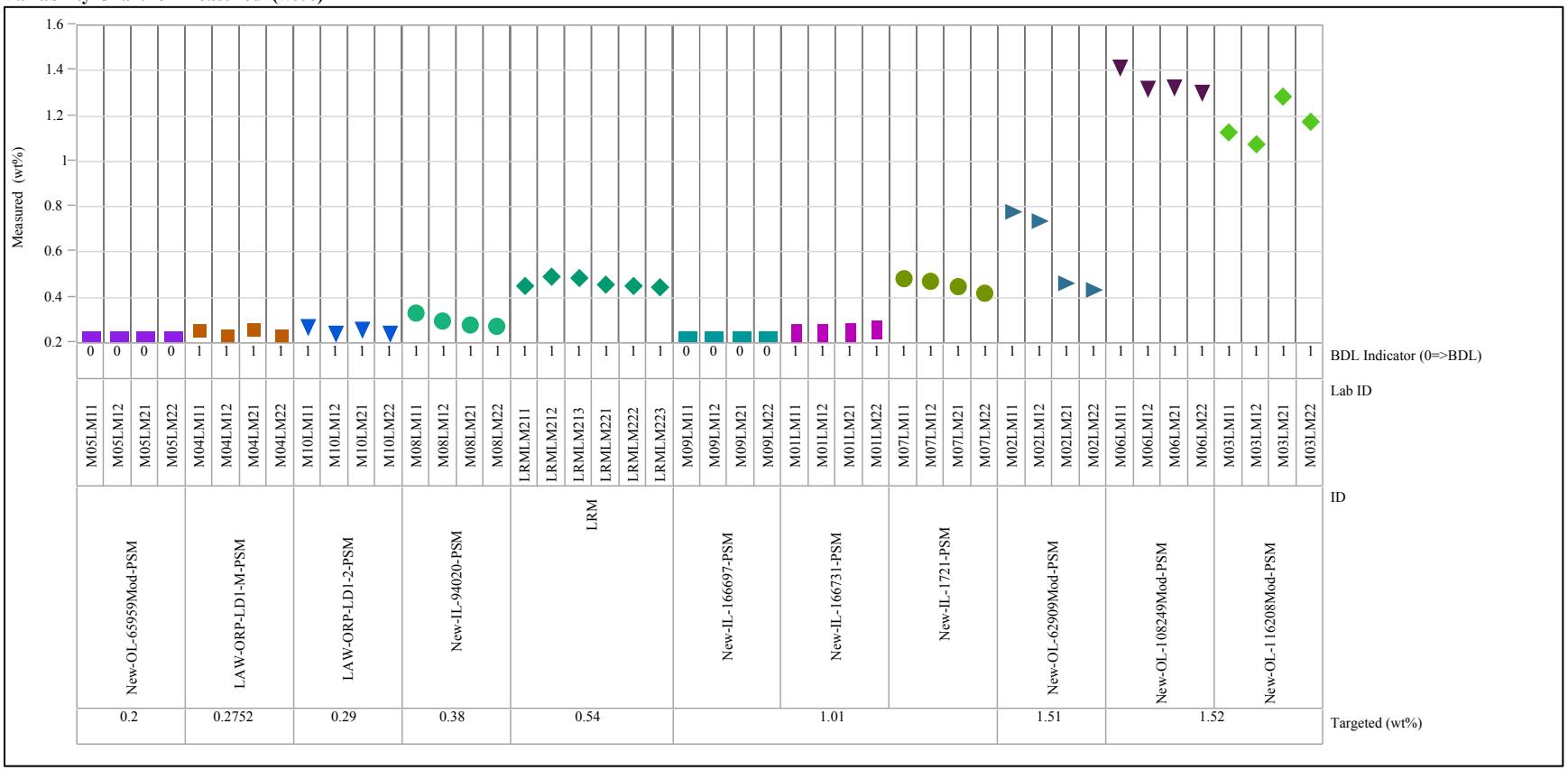


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=SiO2 (wt%), Analytical Method=PF, Analytical Group=A
Variability Chart for Measured (wt%)

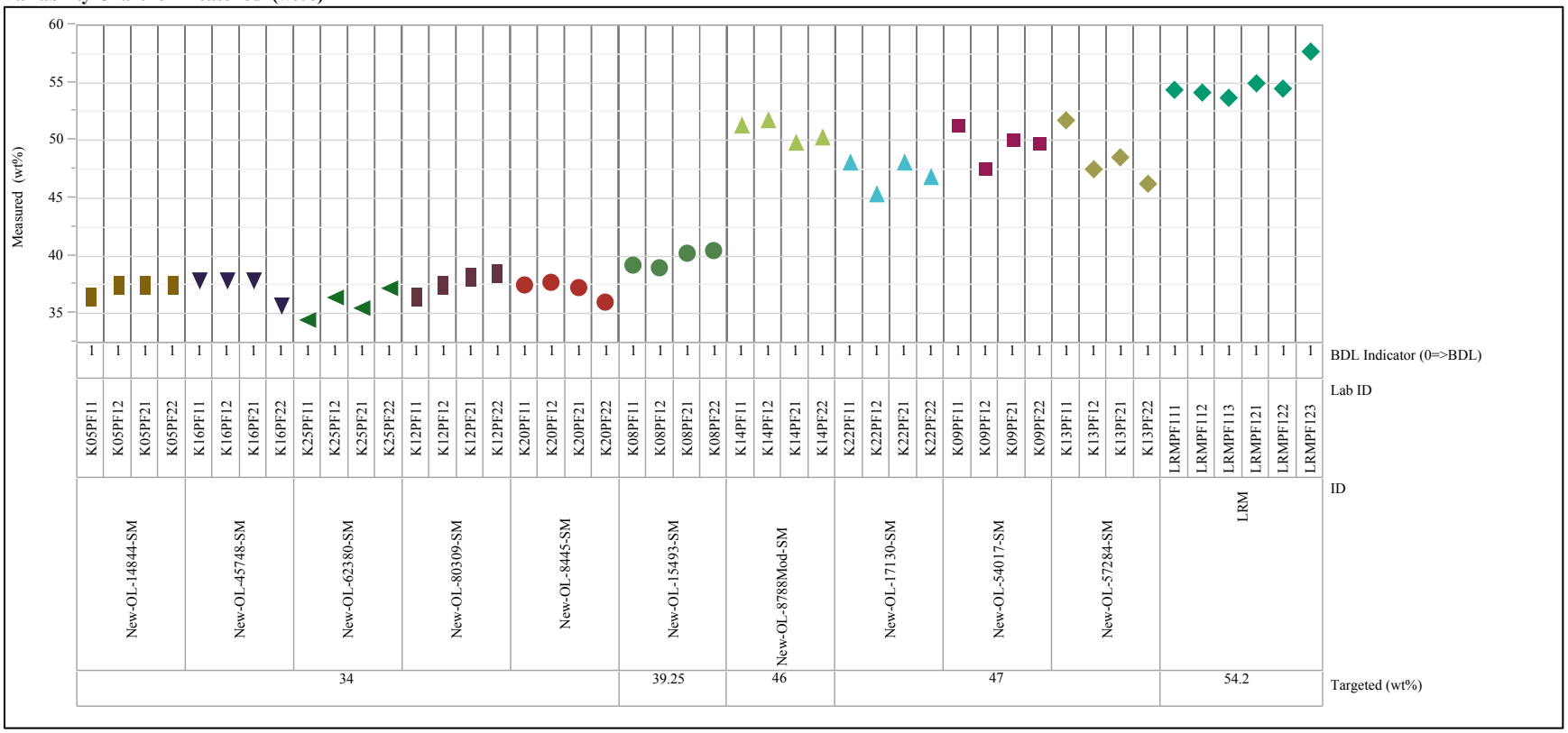


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=SiO2 (wt%), Analytical Method=PF, Analytical Group=B
Variability Chart for Measured (wt%)

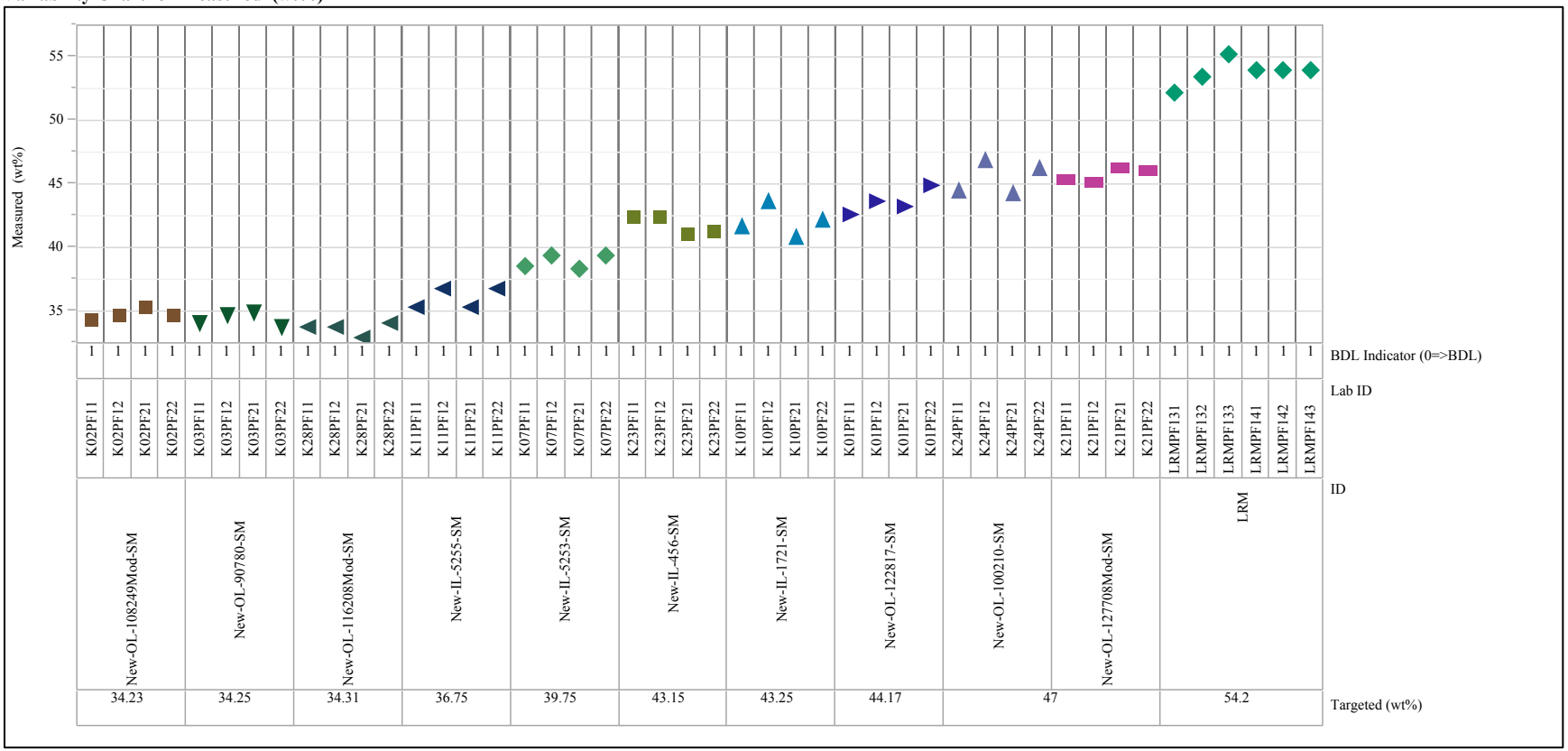


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=SiO2 (wt%), Analytical Method=PF, Analytical Group=C
Variability Chart for Measured (wt%)

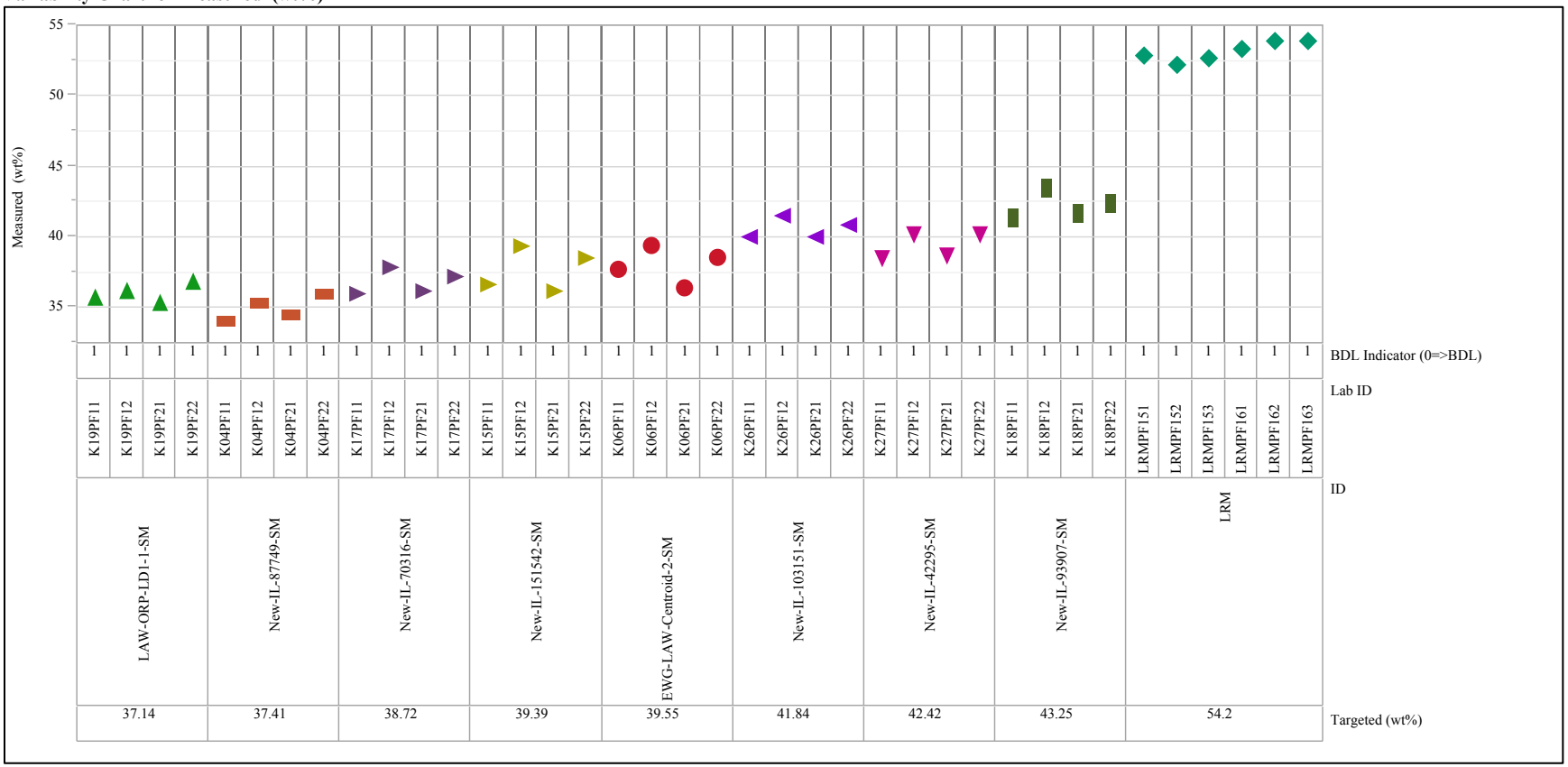


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=SiO2 (wt%), Analytical Method=PF, Analytical Group=D
Variability Chart for Measured (wt%)

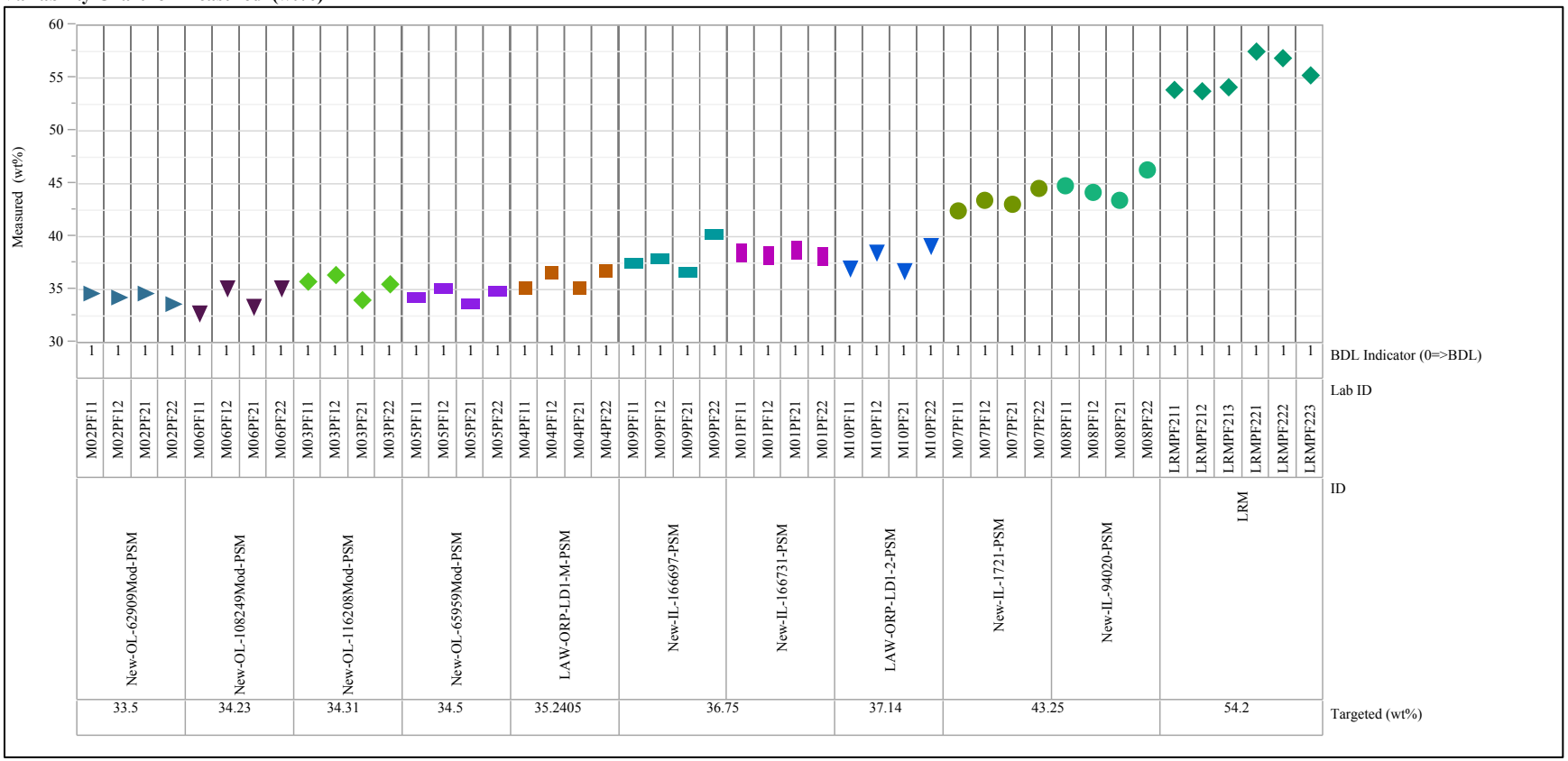


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=SnO2 (wt%), Analytical Method=PF, Analytical Group=A
Variability Chart for Measured (wt%)

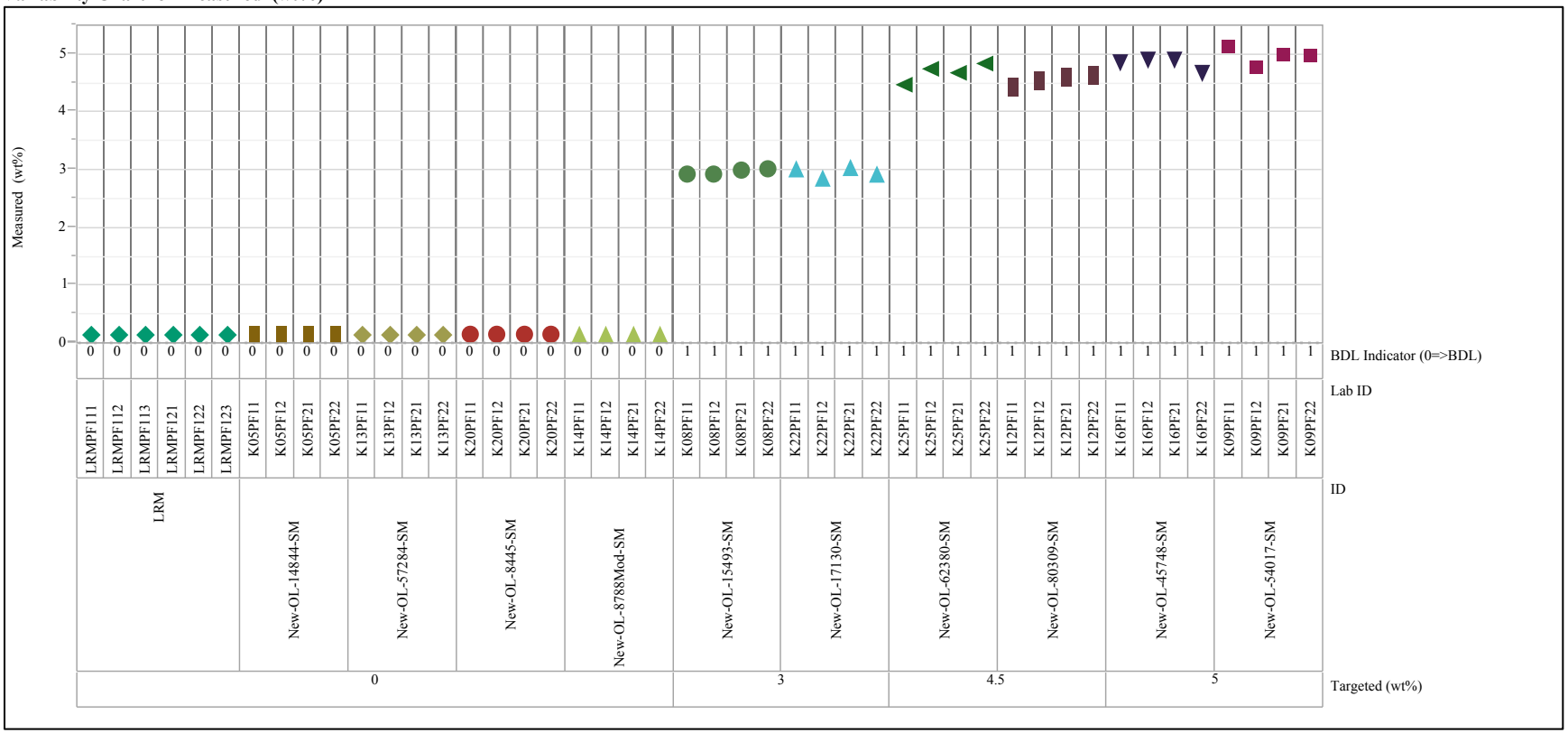


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=SnO2 (wt%), Analytical Method=PF, Analytical Group=B
Variability Chart for Measured (wt%)

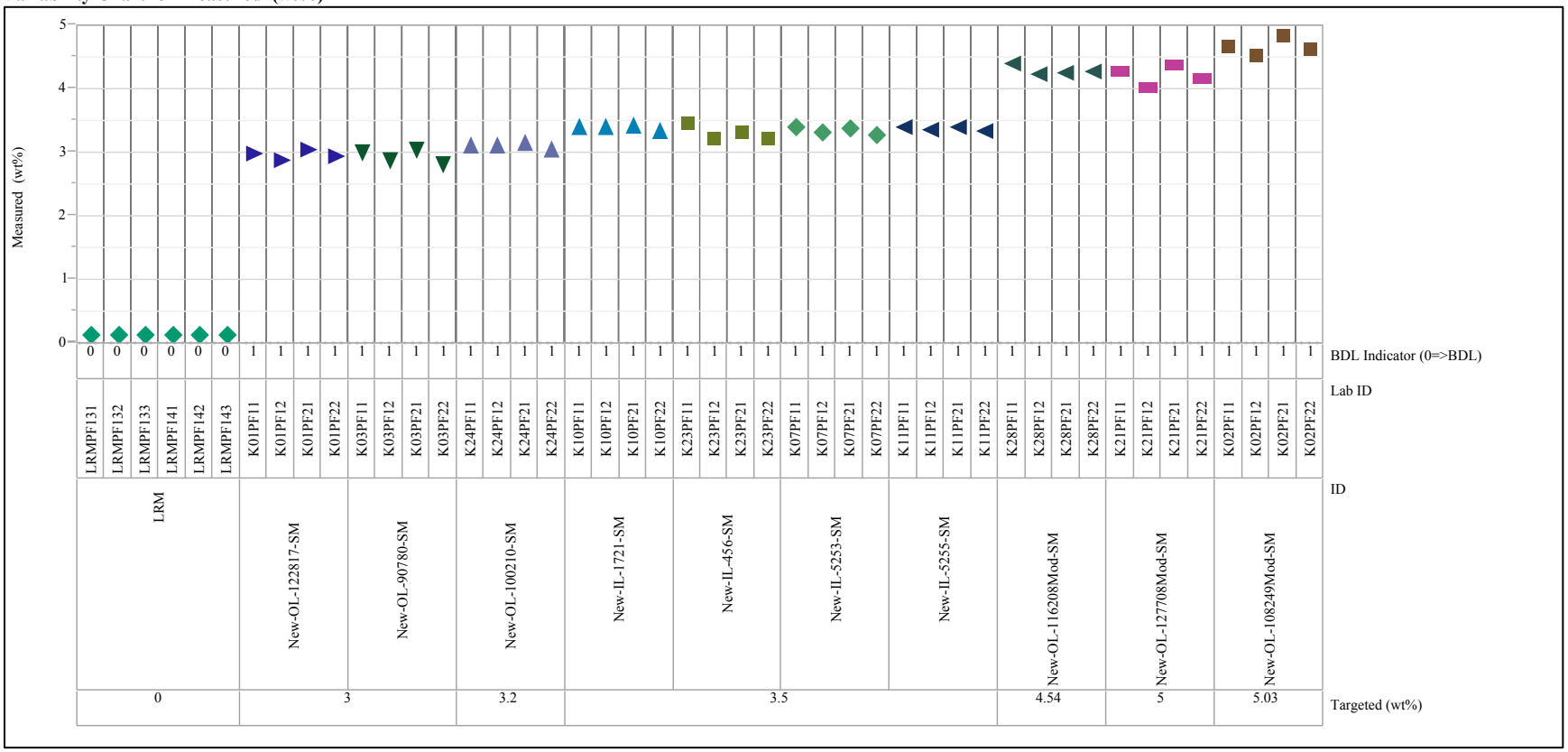


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=SnO2 (wt%), Analytical Method=PF, Analytical Group=C
Variability Chart for Measured (wt%)

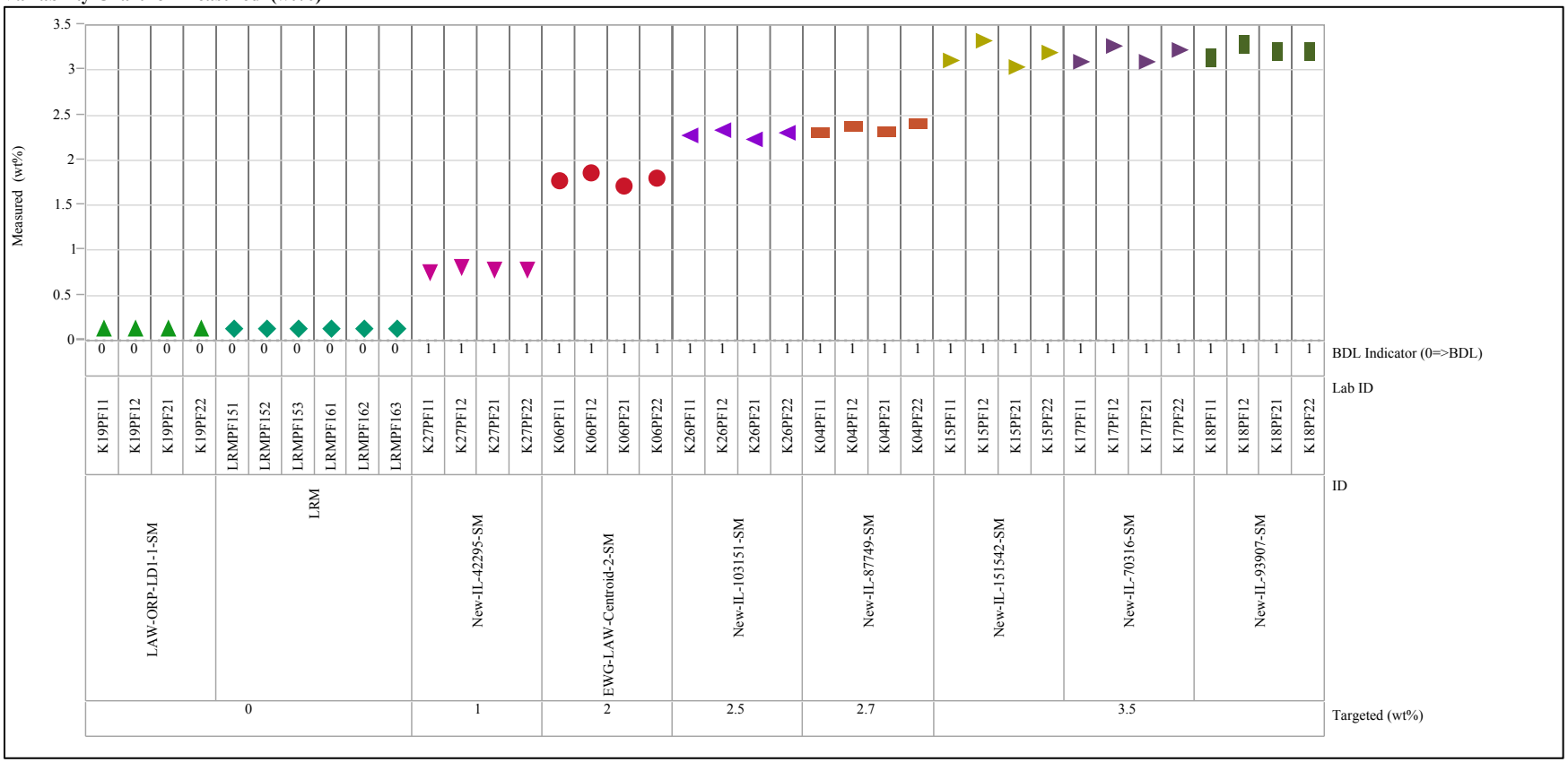


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=SnO2 (wt%), Analytical Method=PF, Analytical Group=D
Variability Chart for Measured (wt%)

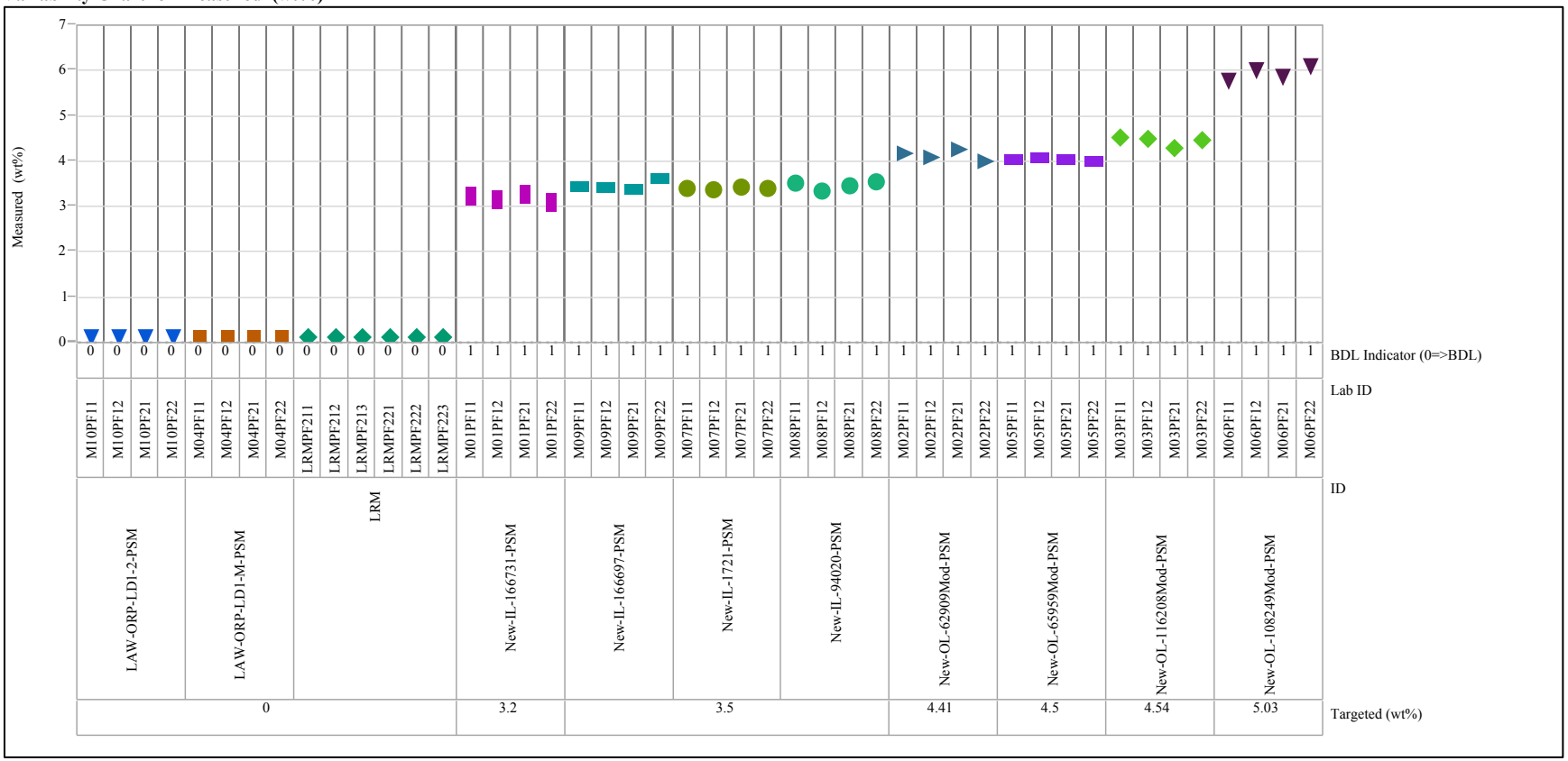


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=SO3 (wt%), Analytical Method=LM, Analytical Group=A
Variability Chart for Measured (wt%)

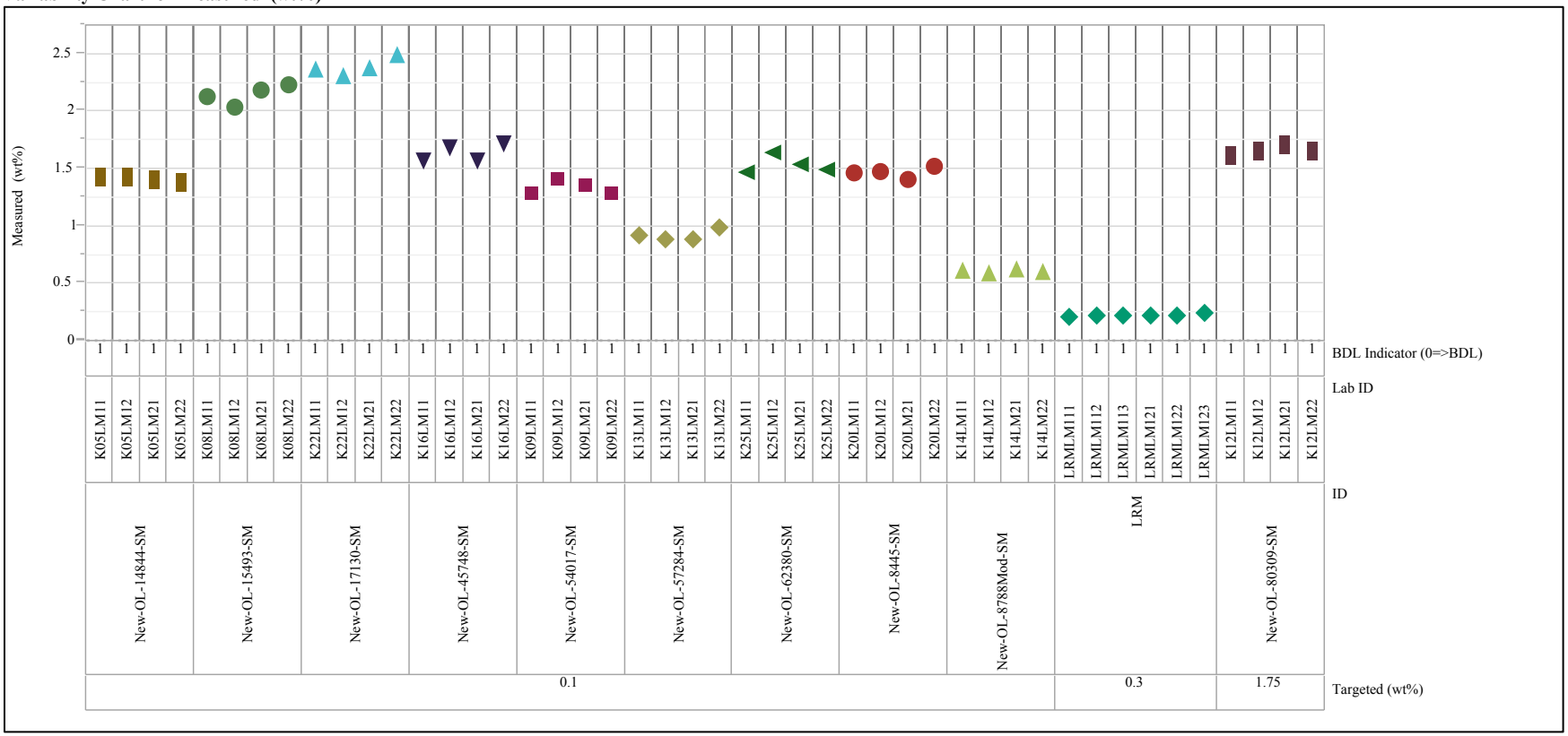


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=SO3 (wt%), Analytical Method=LM, Analytical Group=B
Variability Chart for Measured (wt%)

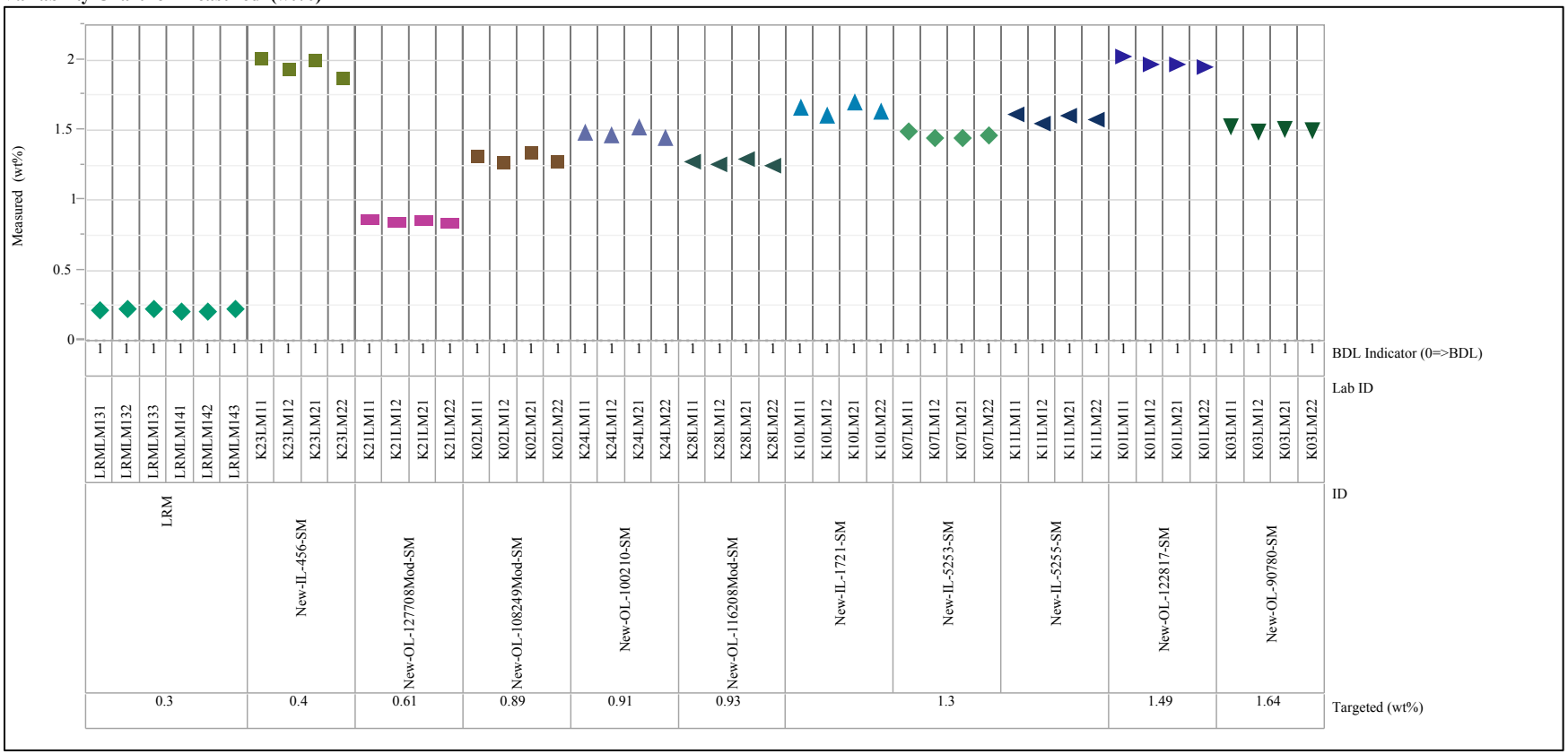


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=SO3 (wt%), Analytical Method=LM, Analytical Group=C
Variability Chart for Measured (wt%)

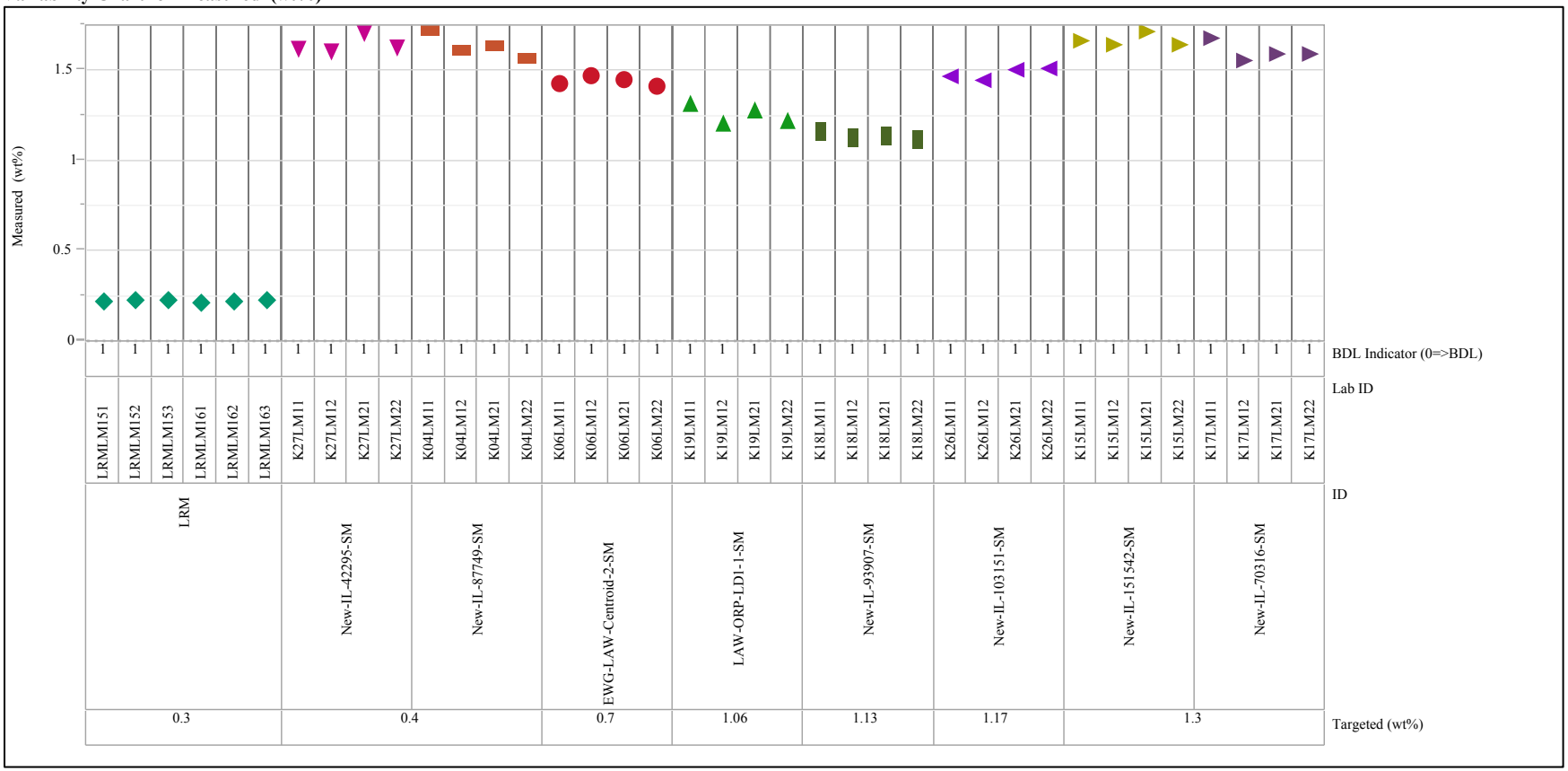


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=SO3 (wt%), Analytical Method=LM, Analytical Group=D
Variability Chart for Measured (wt%)

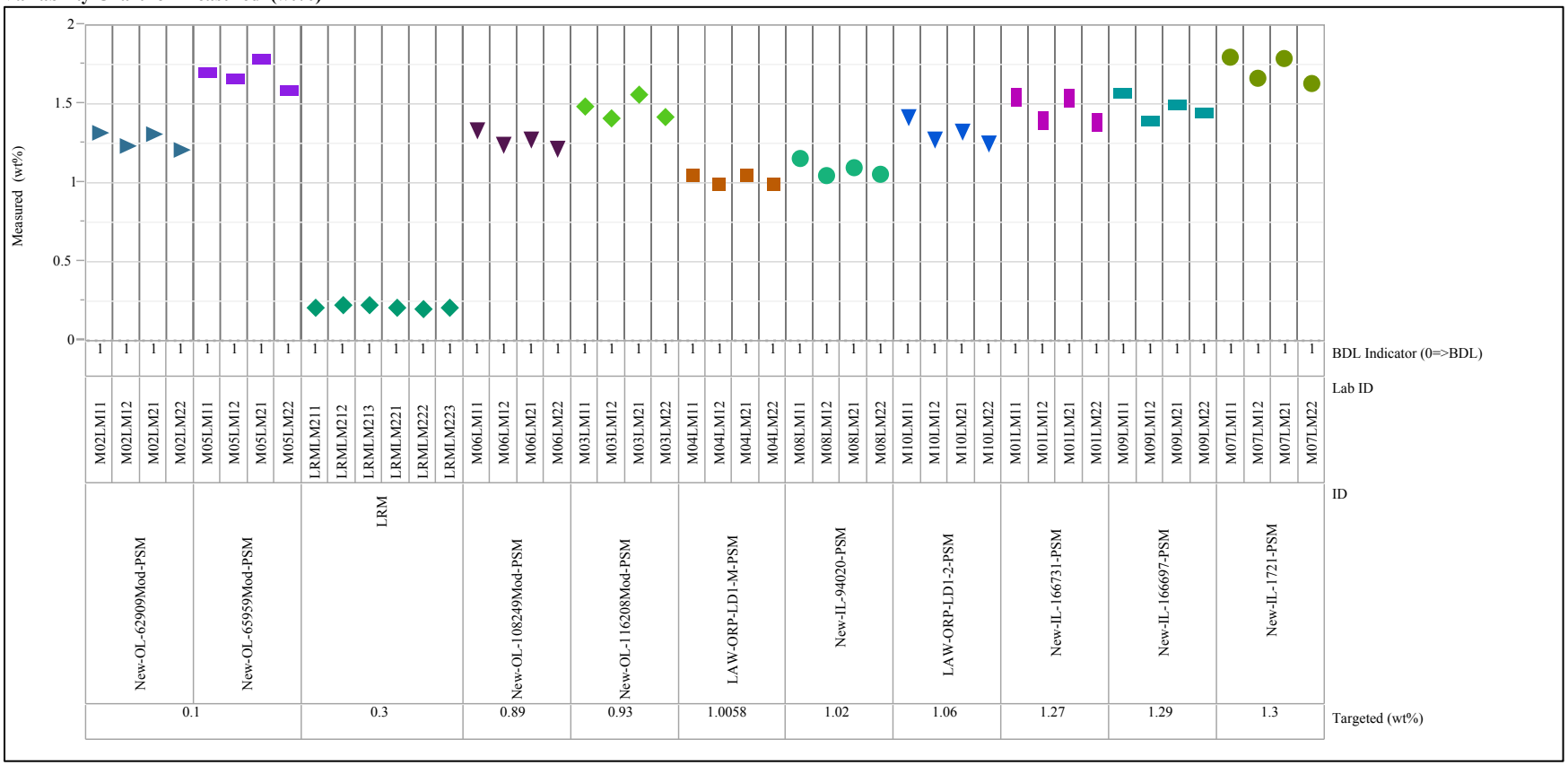


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=V2O5 (wt%), Analytical Method=LM, Analytical Group=A
Variability Chart for Measured (wt%)

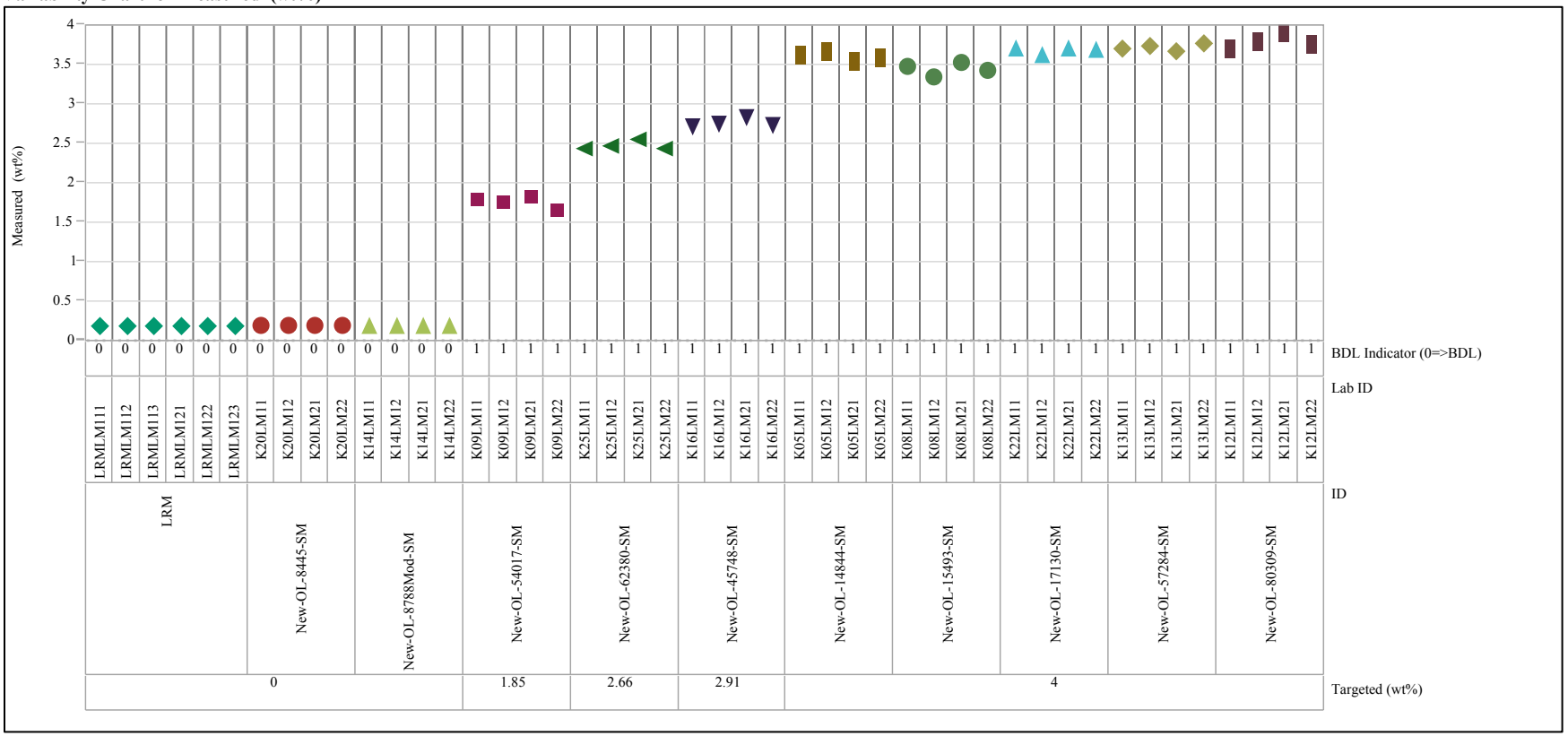


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=V2O5 (wt%), Analytical Method=LM, Analytical Group=B
Variability Chart for Measured (wt%)

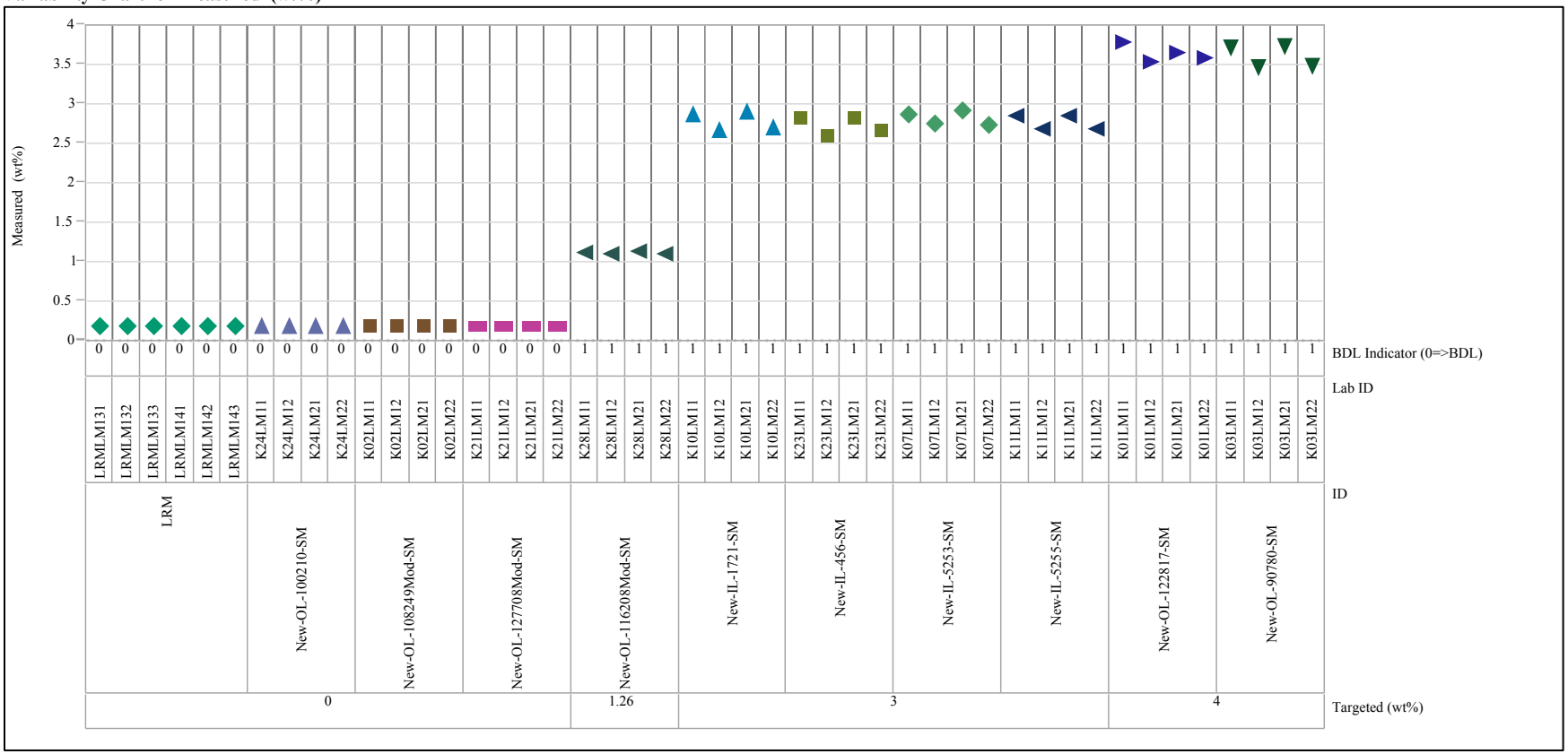


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=V2O5 (wt%), Analytical Method=LM, Analytical Group=C
Variability Chart for Measured (wt%)

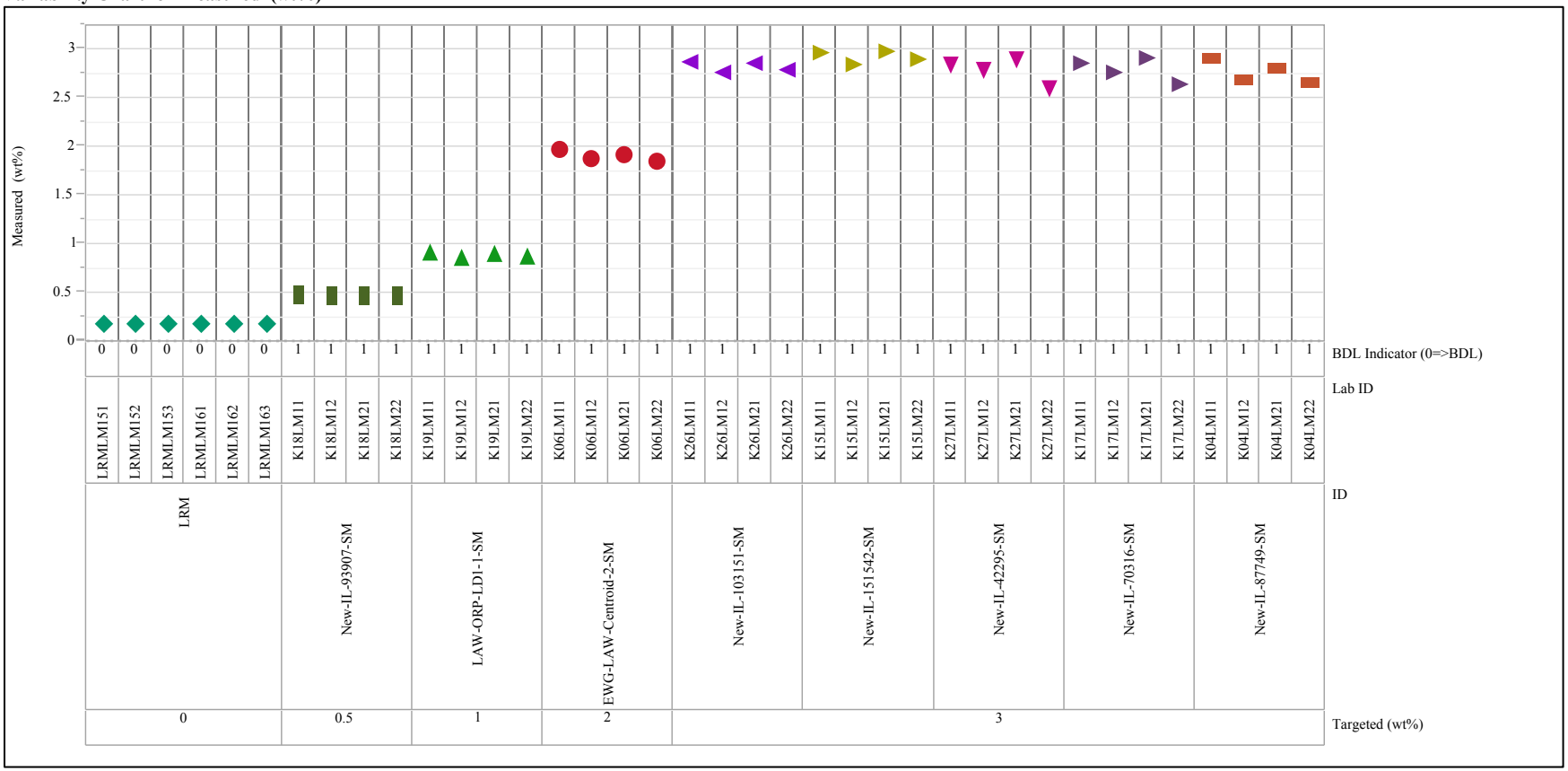


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=V2O5 (wt%), Analytical Method=LM, Analytical Group=D
Variability Chart for Measured (wt%)

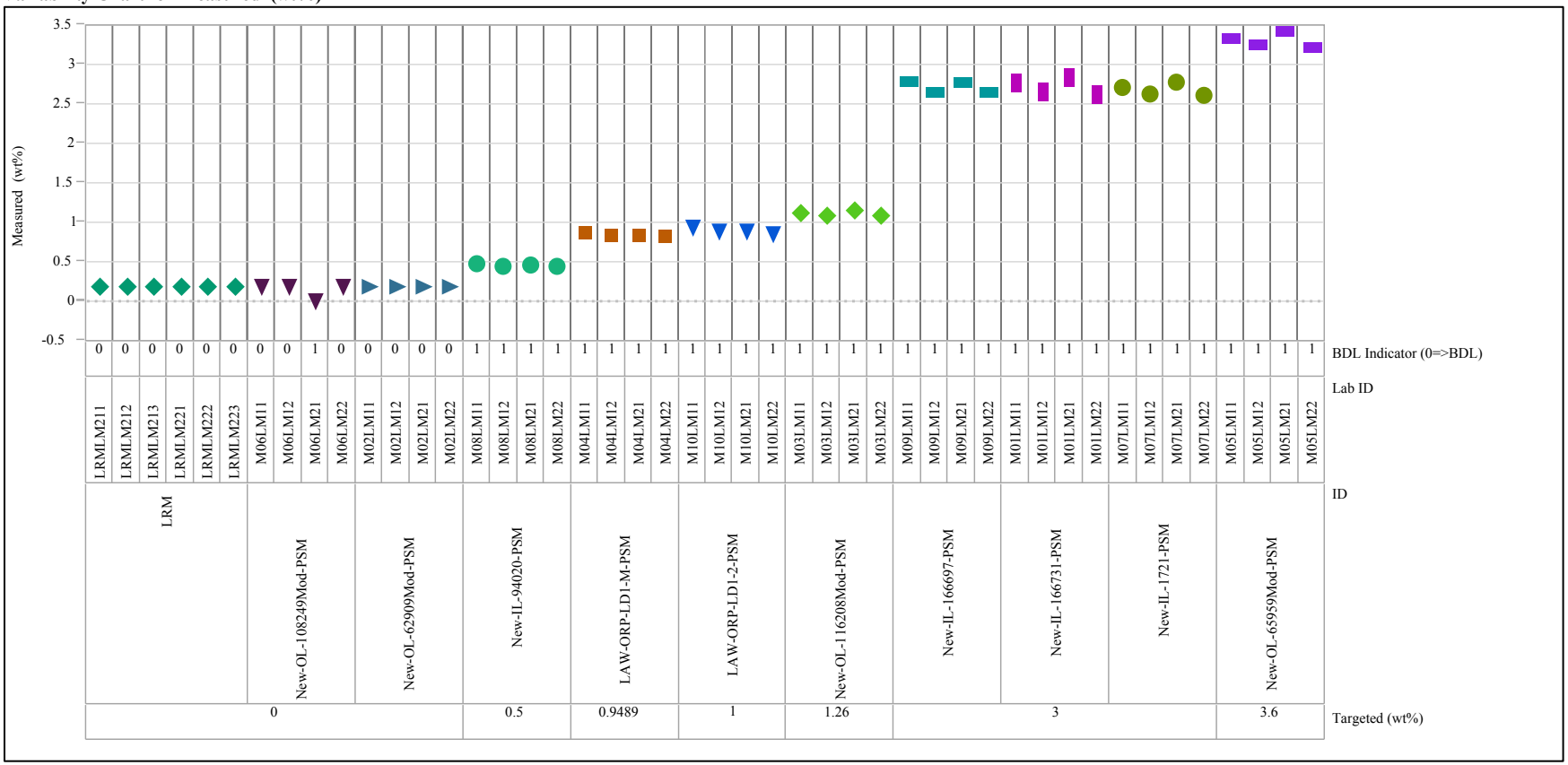


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=ZnO (wt%), Analytical Method=LM, Analytical Group=A
Variability Chart for Measured (wt%)

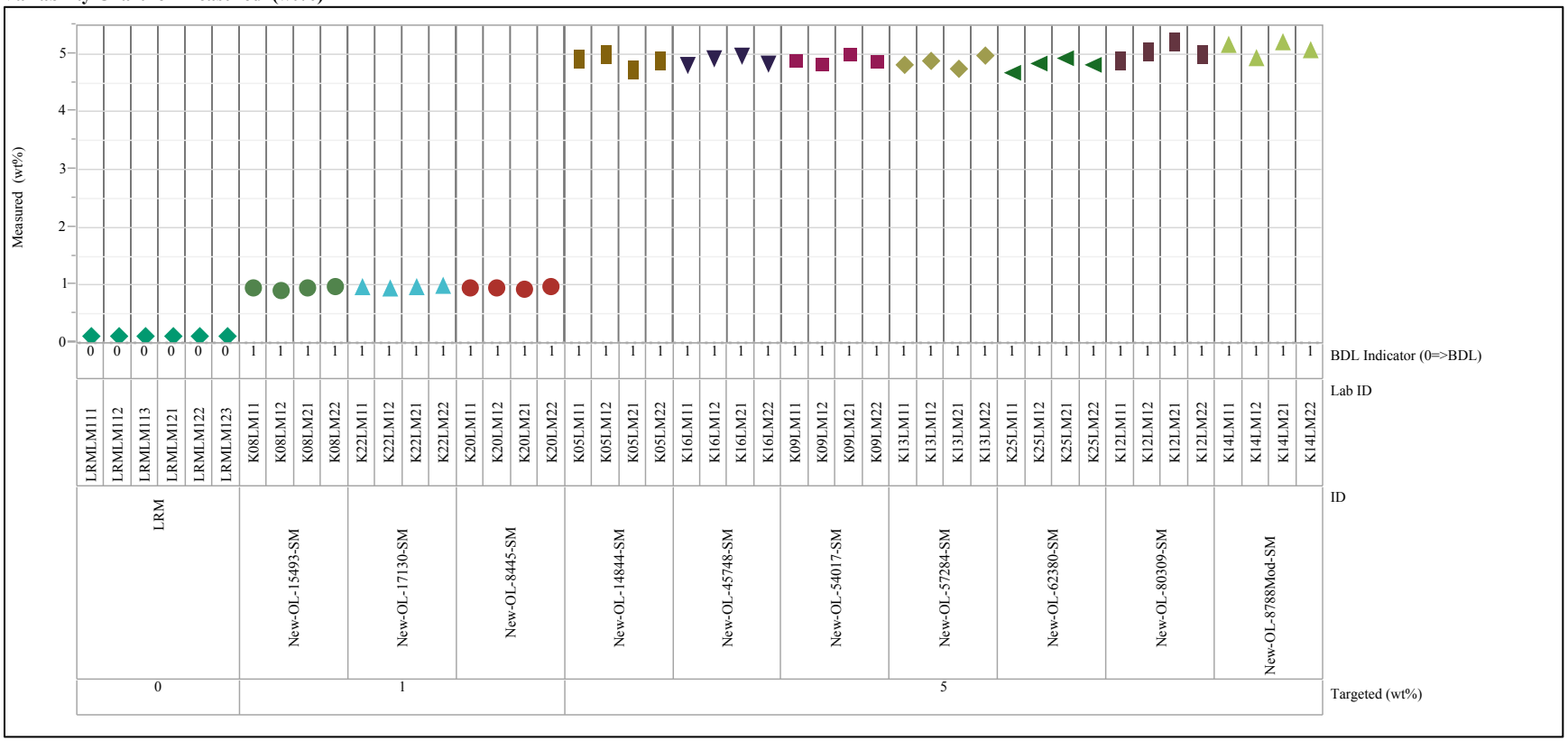


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=ZnO (wt%), Analytical Method=LM, Analytical Group=B
Variability Chart for Measured (wt%)

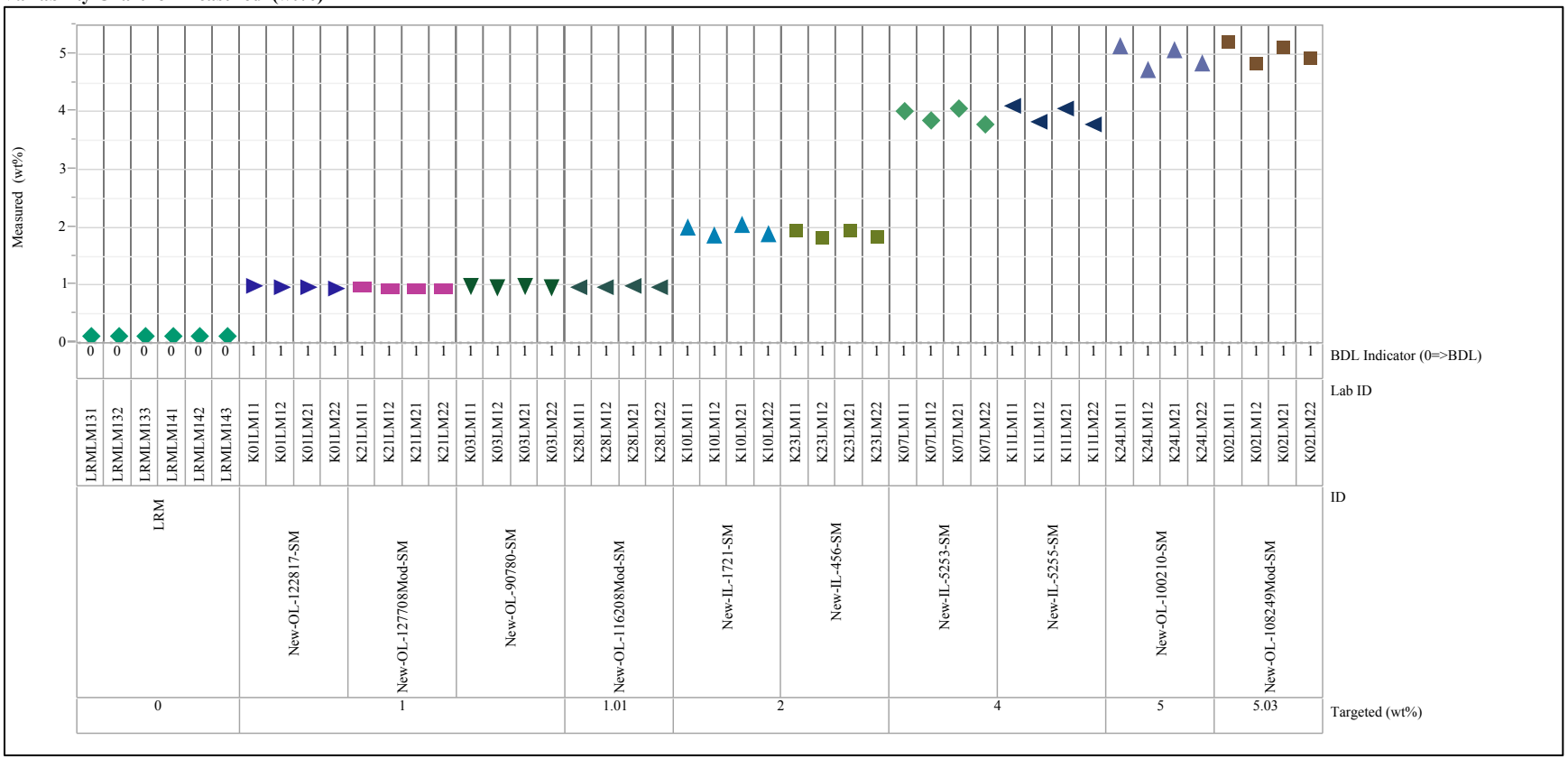


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=ZnO (wt%), Analytical Method=LM, Analytical Group=C
Variability Chart for Measured (wt%)

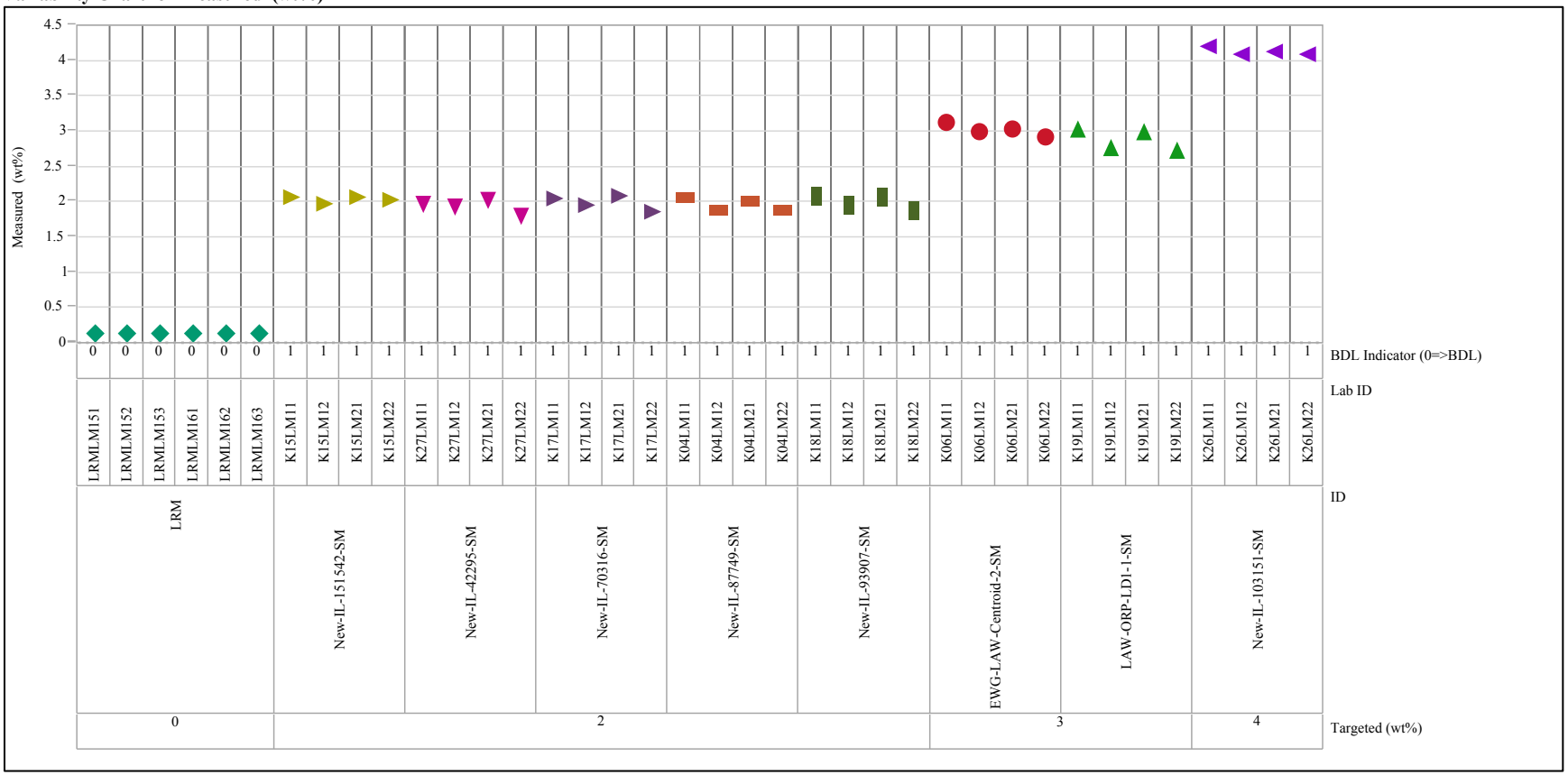


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=ZnO (wt%), Analytical Method=LM, Analytical Group=D
Variability Chart for Measured (wt%)

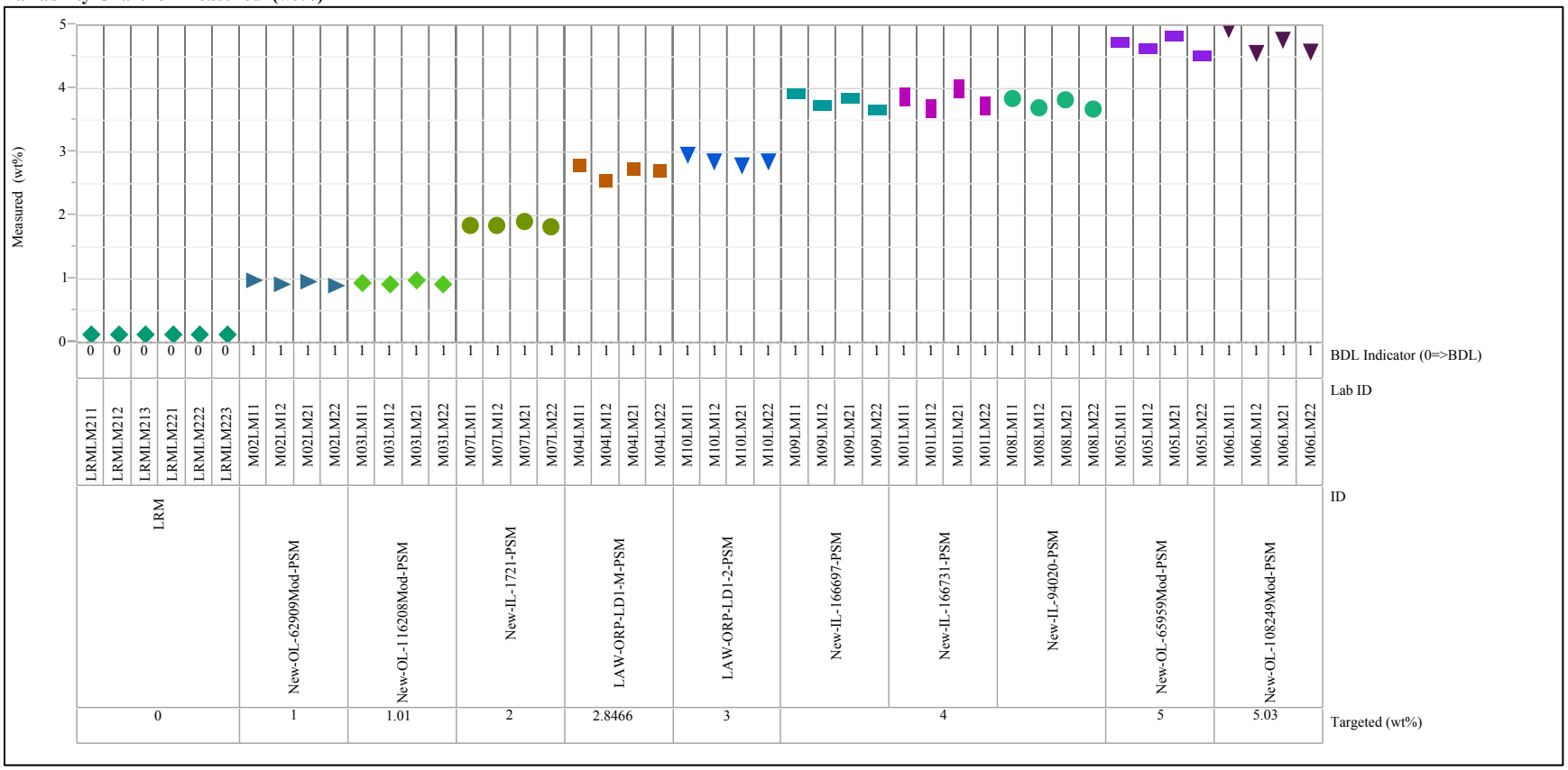


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=ZrO2 (wt%), Analytical Method=LM, Analytical Group=A
Variability Chart for Measured (wt%)

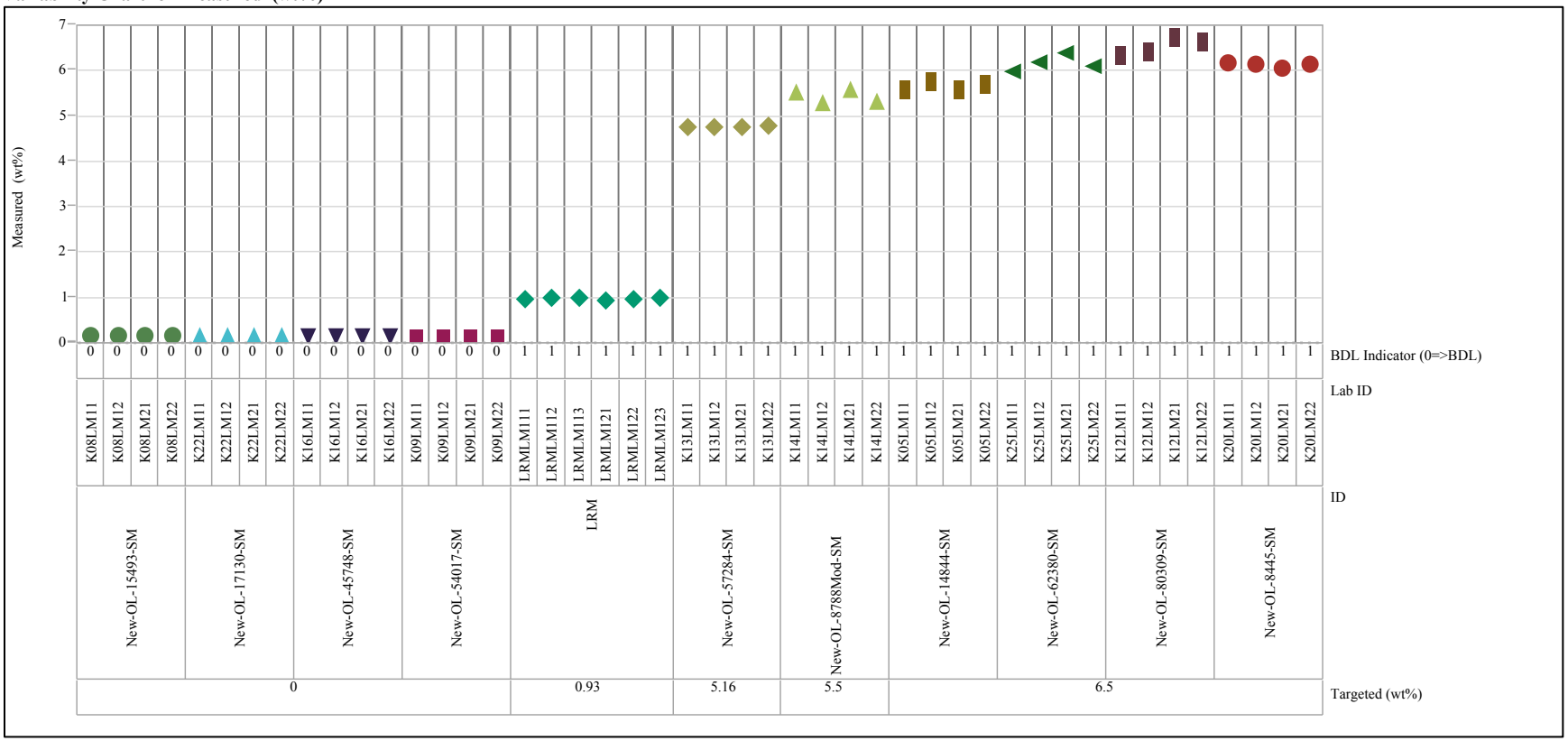


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=ZrO2 (wt%), Analytical Method=LM, Analytical Group=B
Variability Chart for Measured (wt%)

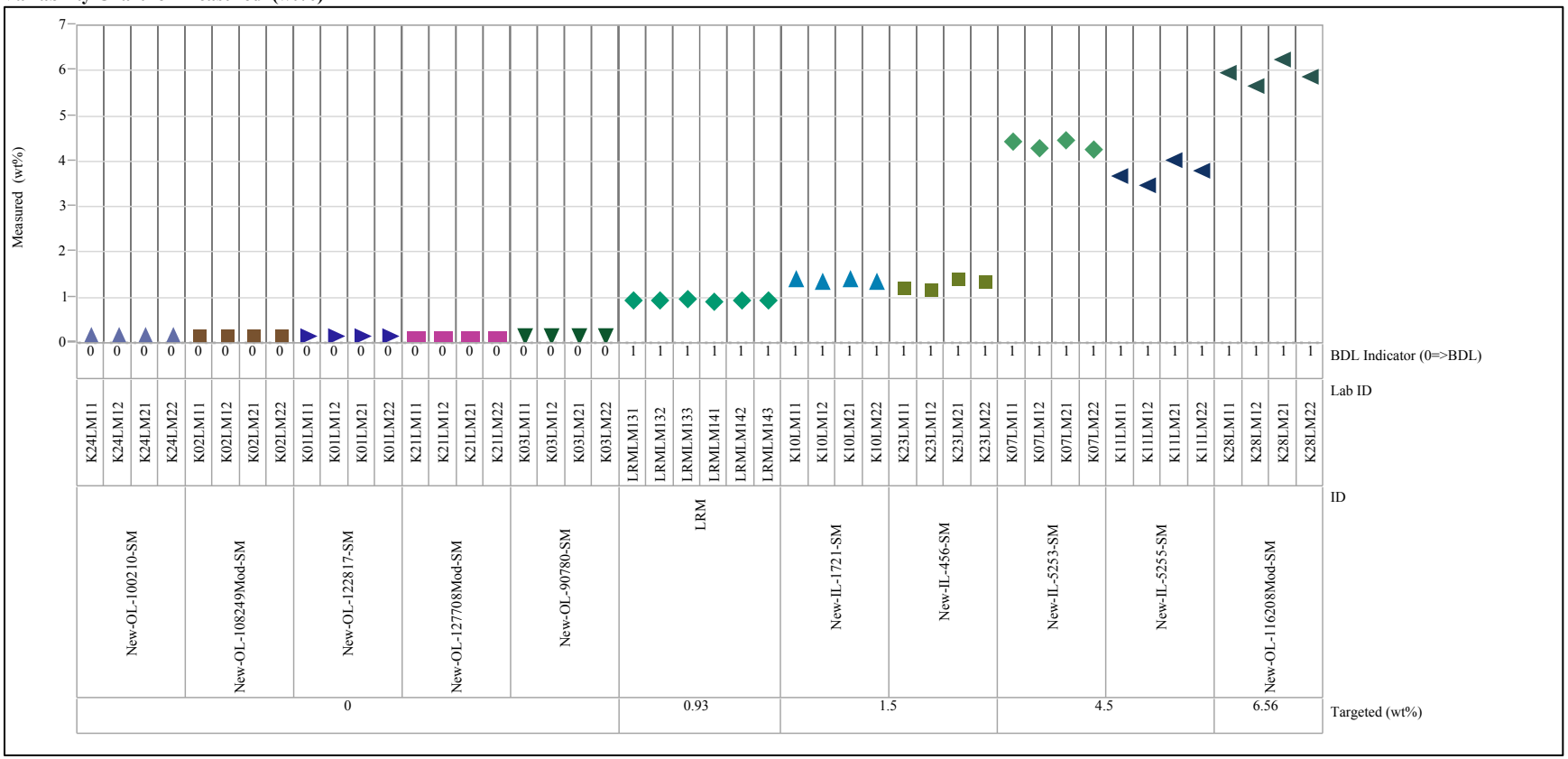


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=ZrO2 (wt%), Analytical Method=LM, Analytical Group=C
Variability Chart for Measured (wt%)

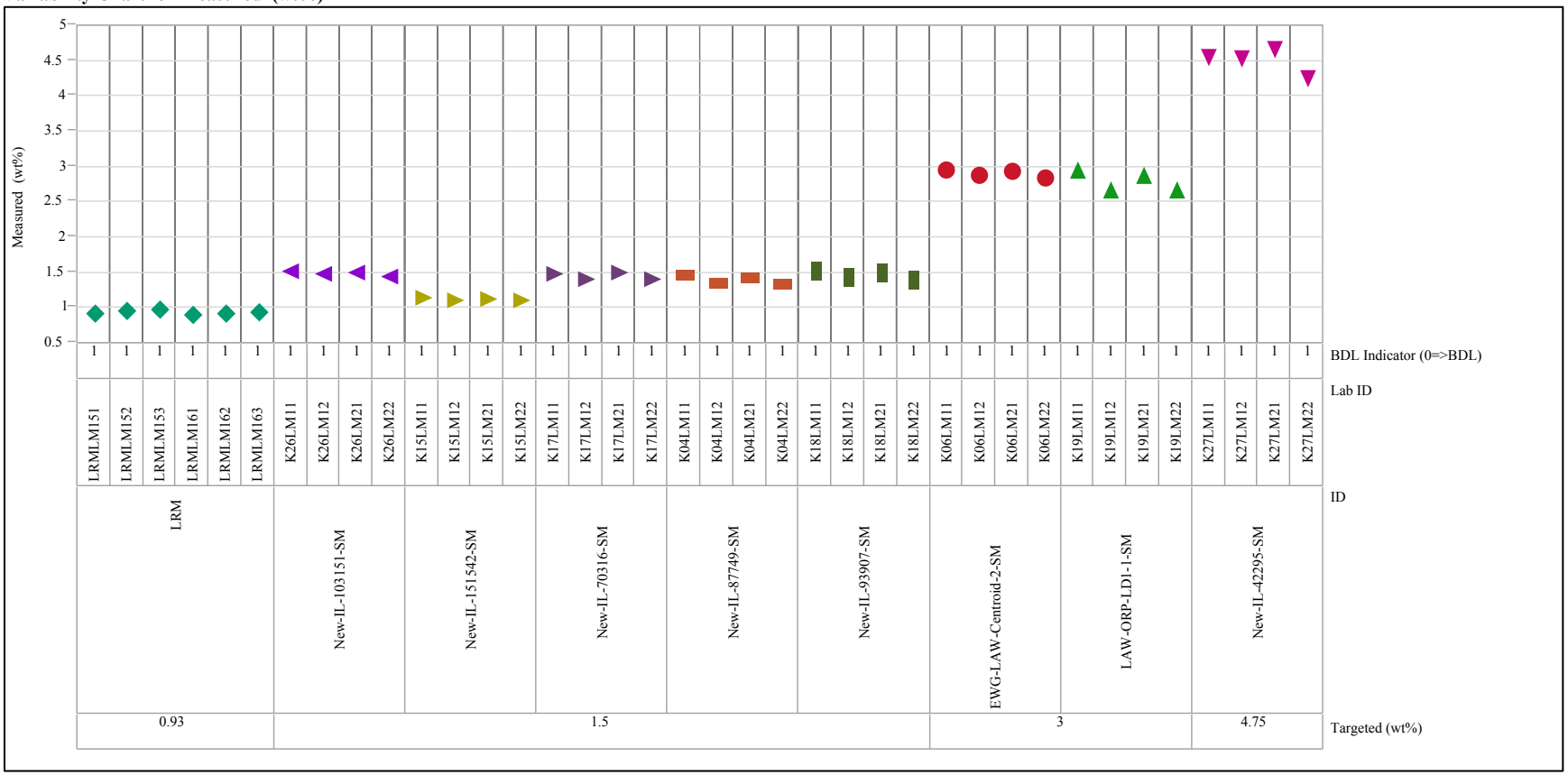


Exhibit C-2. Plots of Oxide Measurements by Glass Identifier Grouped by Targeted Concentration (continued)

Analyte=ZrO2 (wt%), Analytical Method=LM, Analytical Group=D
Variability Chart for Measured (wt%)

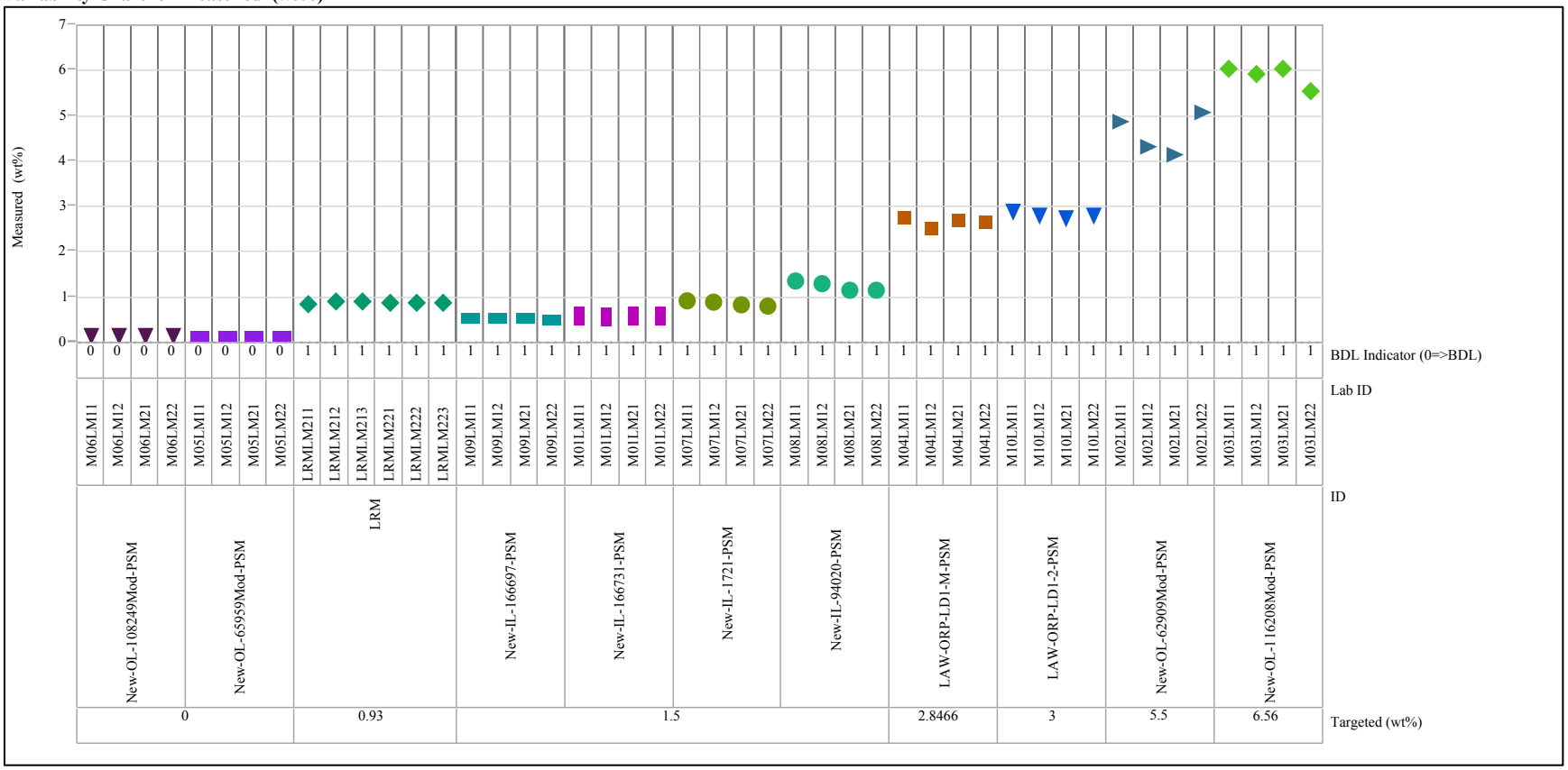
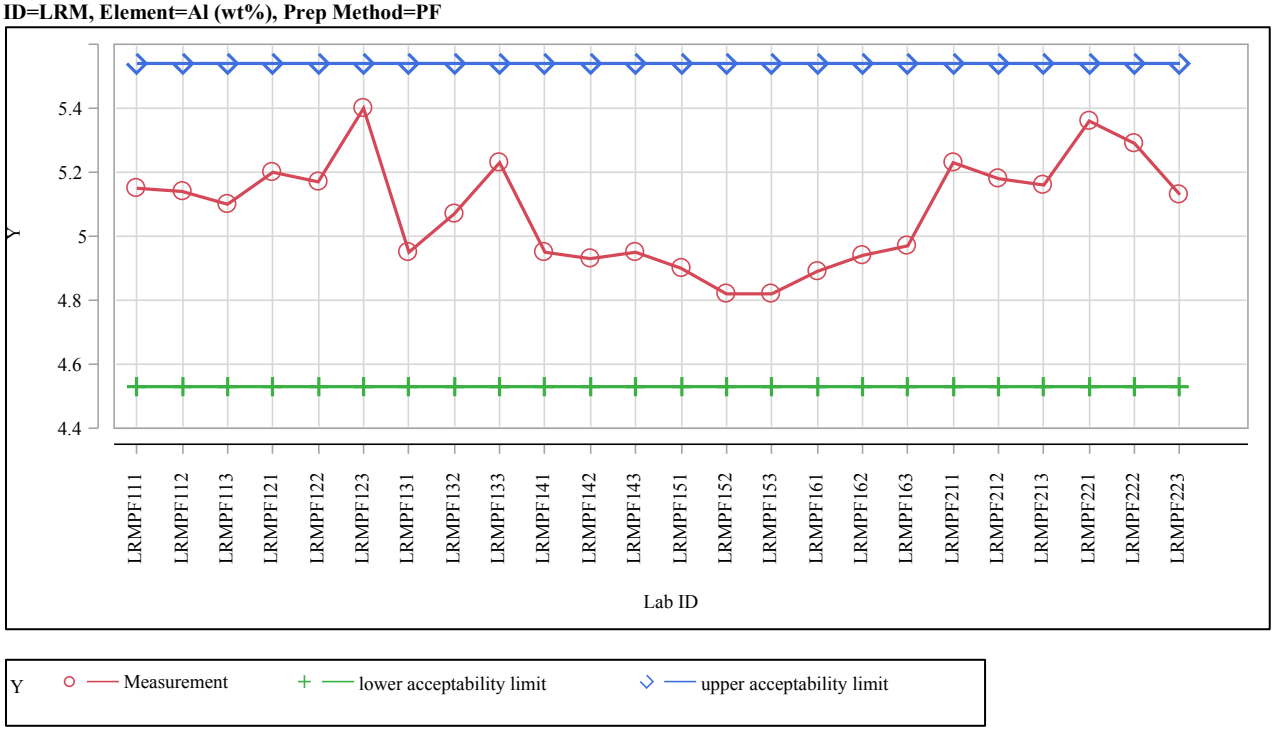
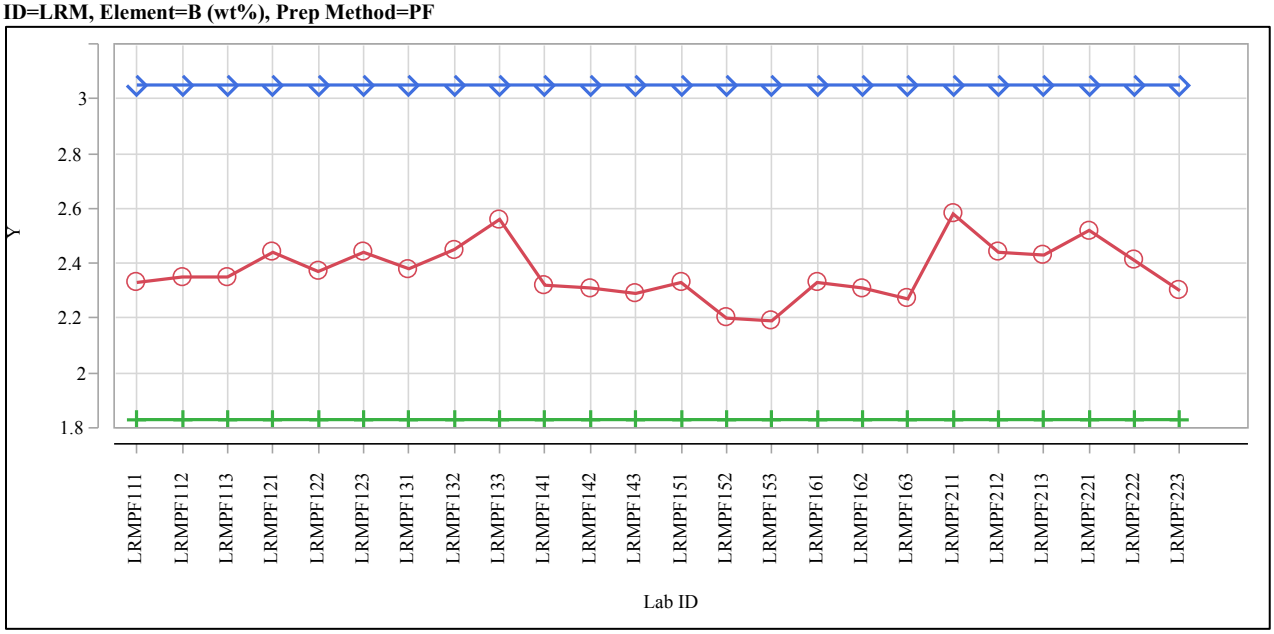


Exhibit C-3. Acceptability Evaluation for Measurements of the LRM Standard Glass

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



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



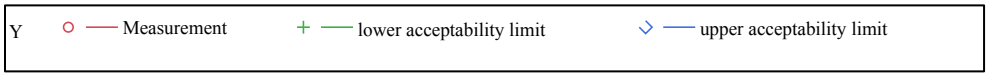
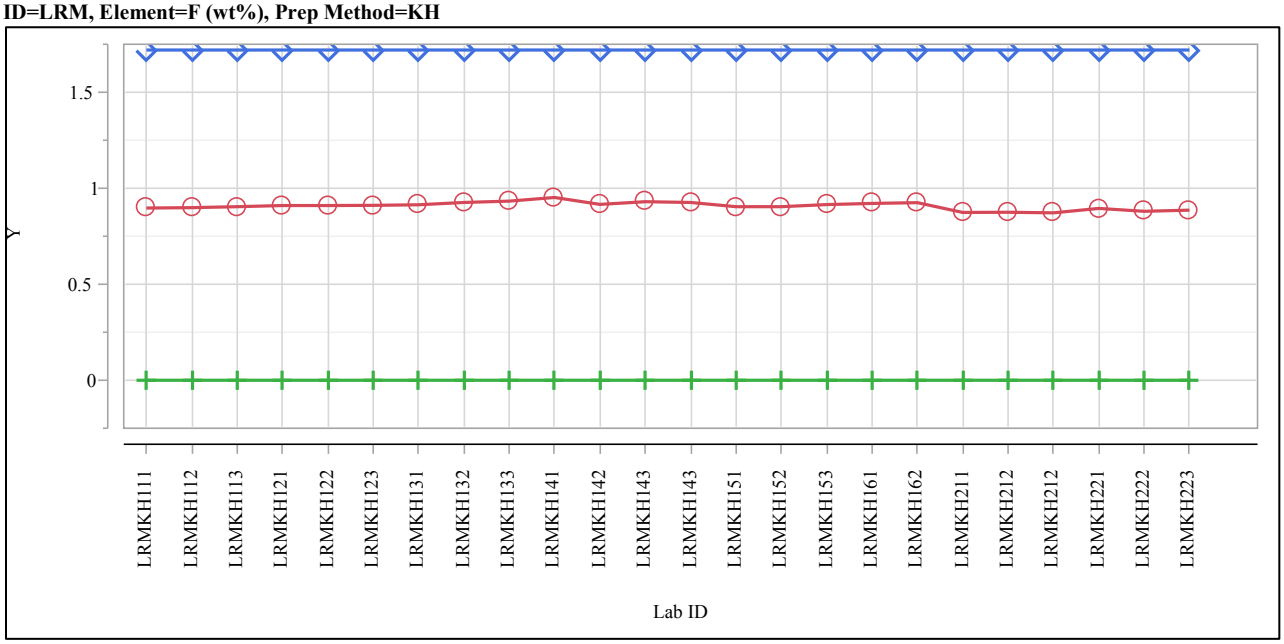
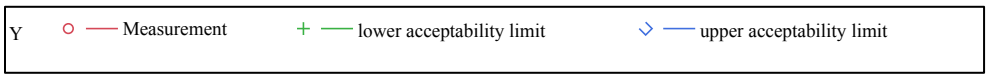


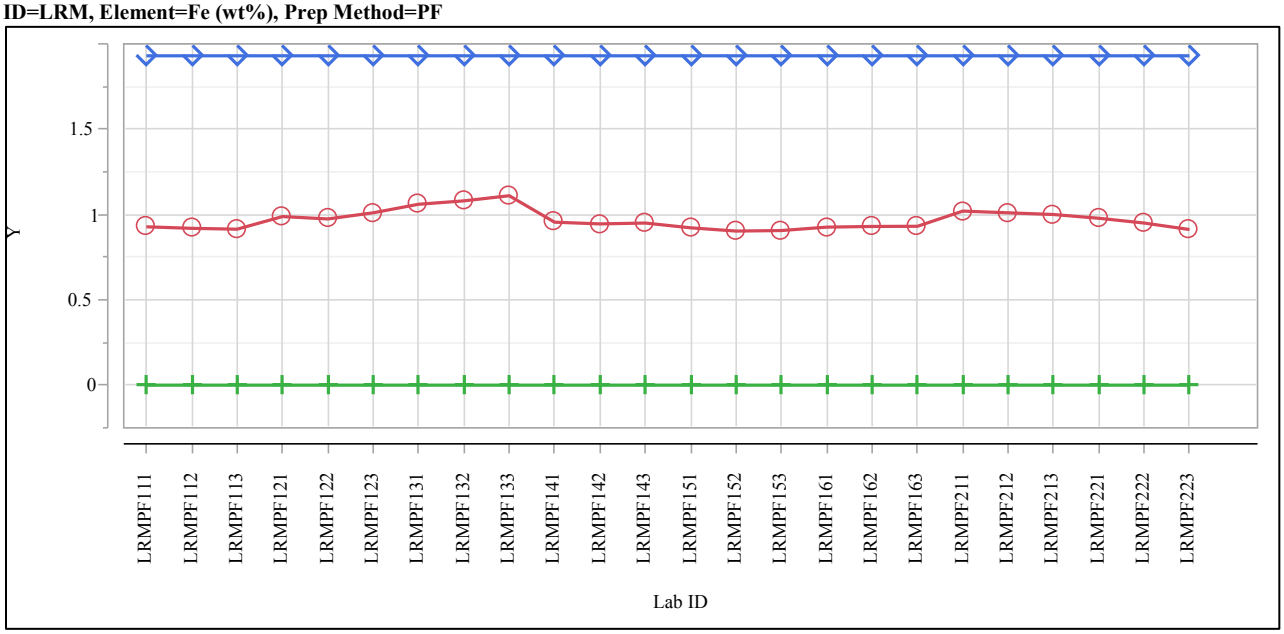
Exhibit C-3. Acceptability Evaluation for Measurements of the LRM Standard Glass (continued)

ID=LRM, Element=F (wt%), Prep Method=KH





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



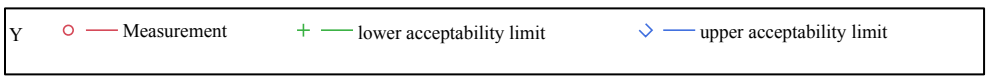
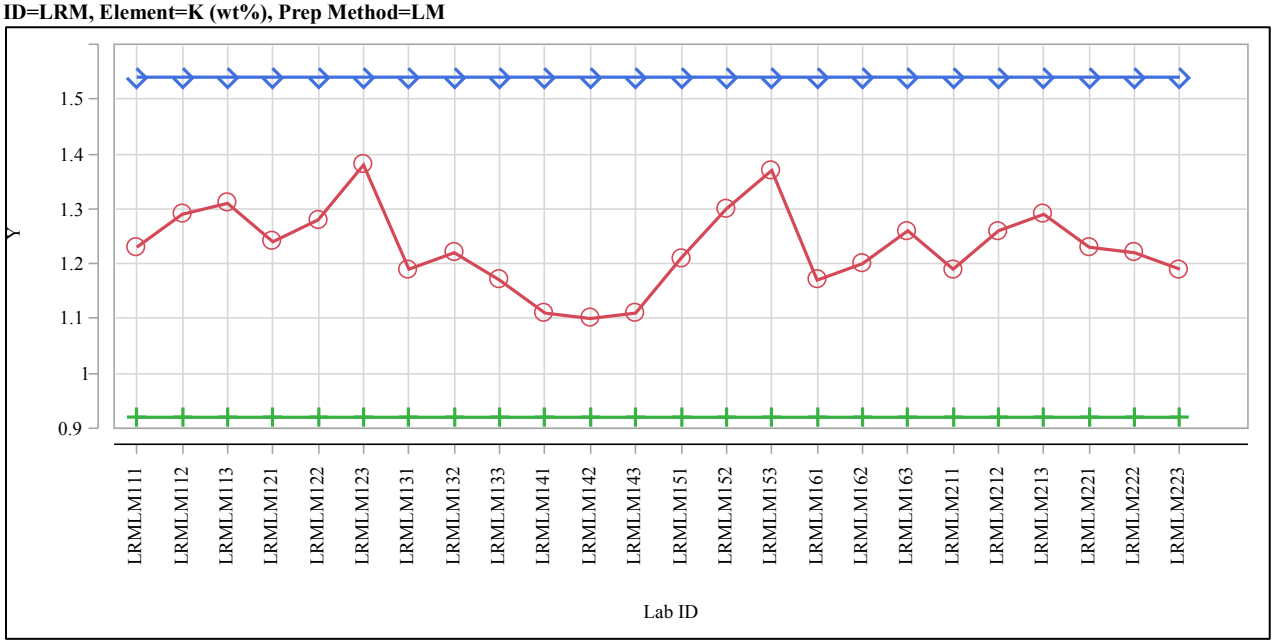
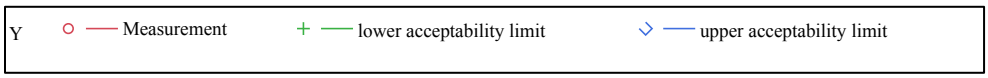


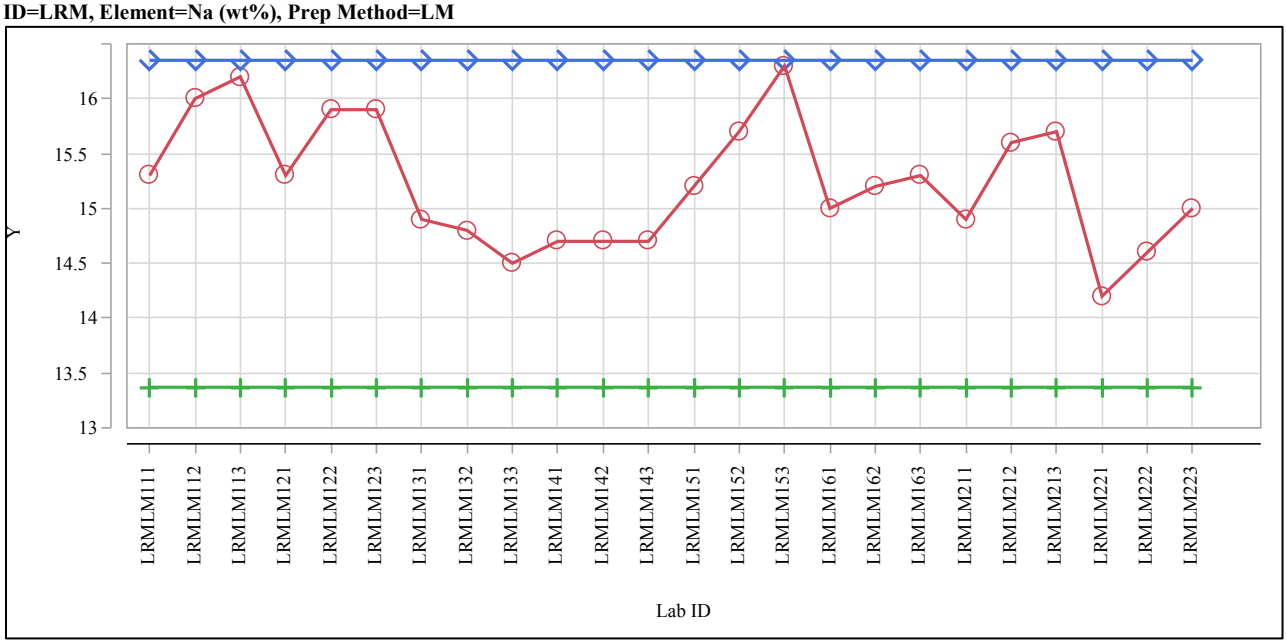
Exhibit C-3. Acceptability Evaluation for Measurements of the LRM Standard Glass (continued)

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





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



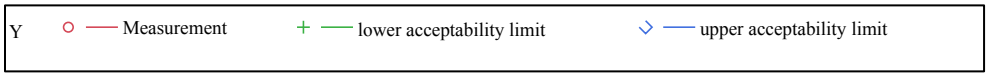
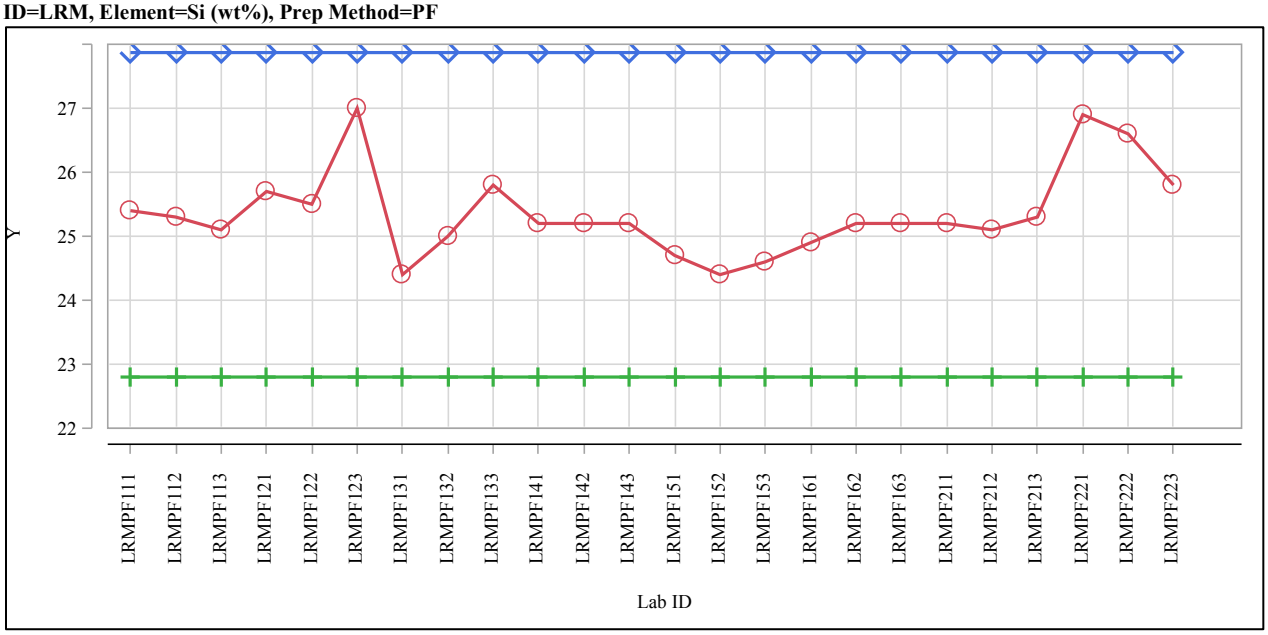
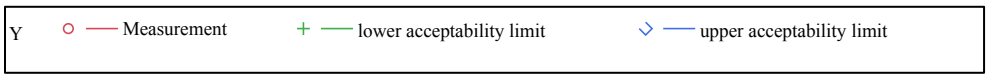


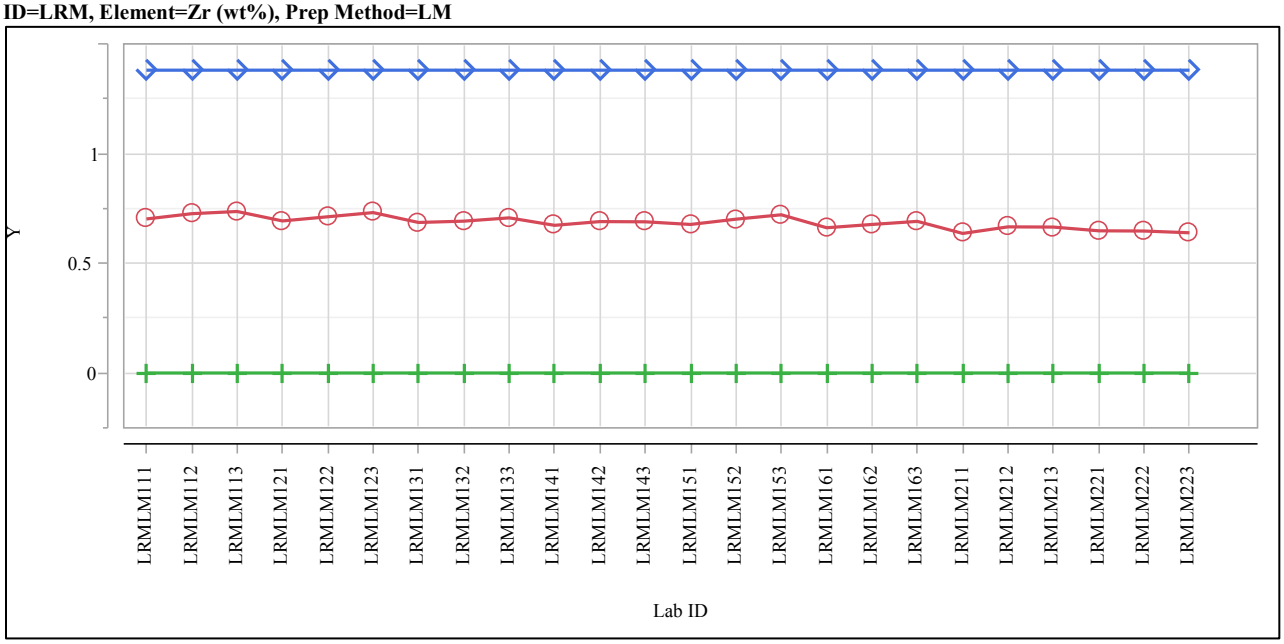
Exhibit C-3. Acceptability Evaluation for Measurements of the LRM Standard Glass (continued)

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





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



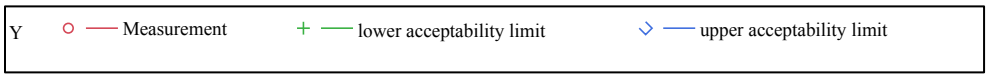


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide

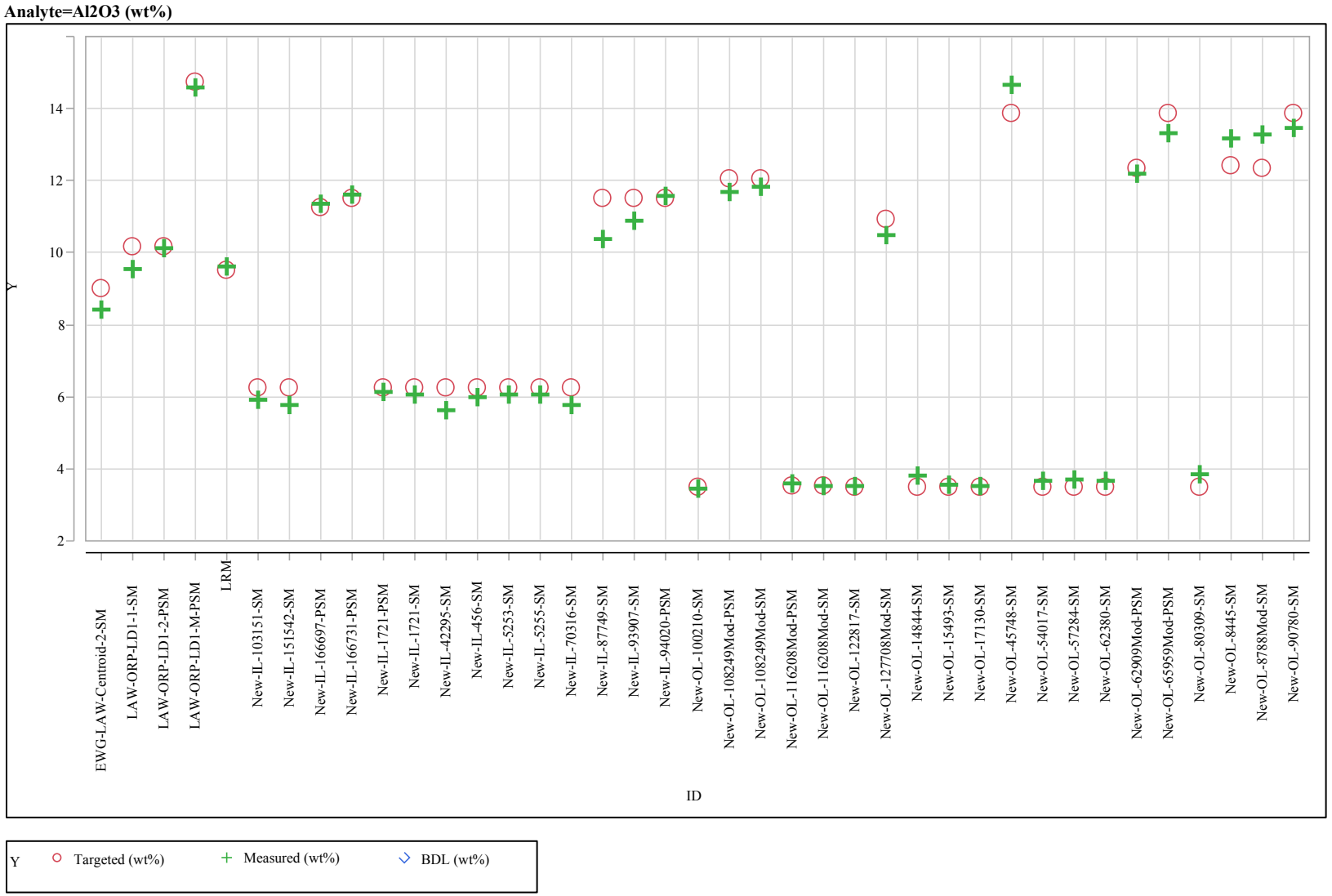


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

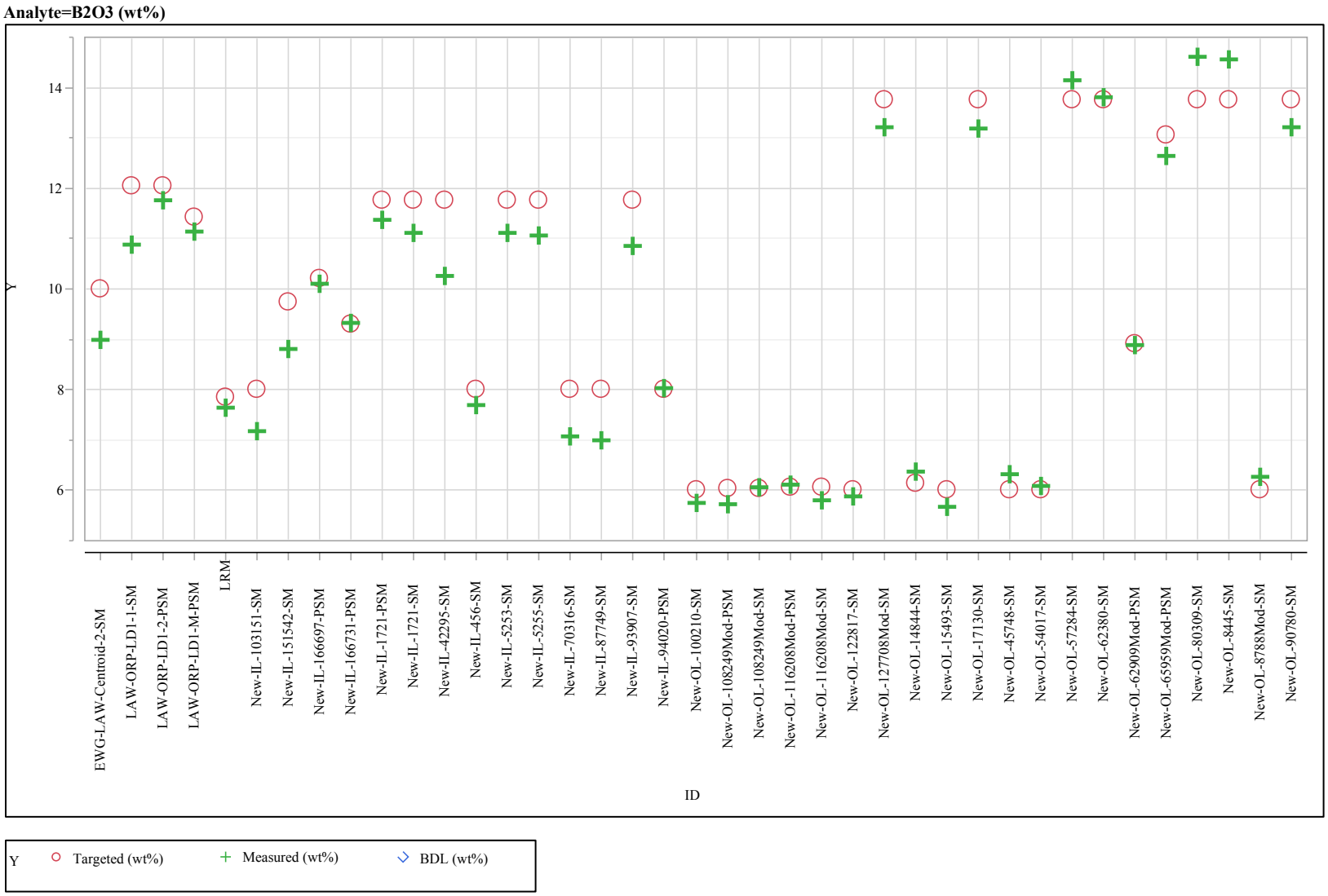


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

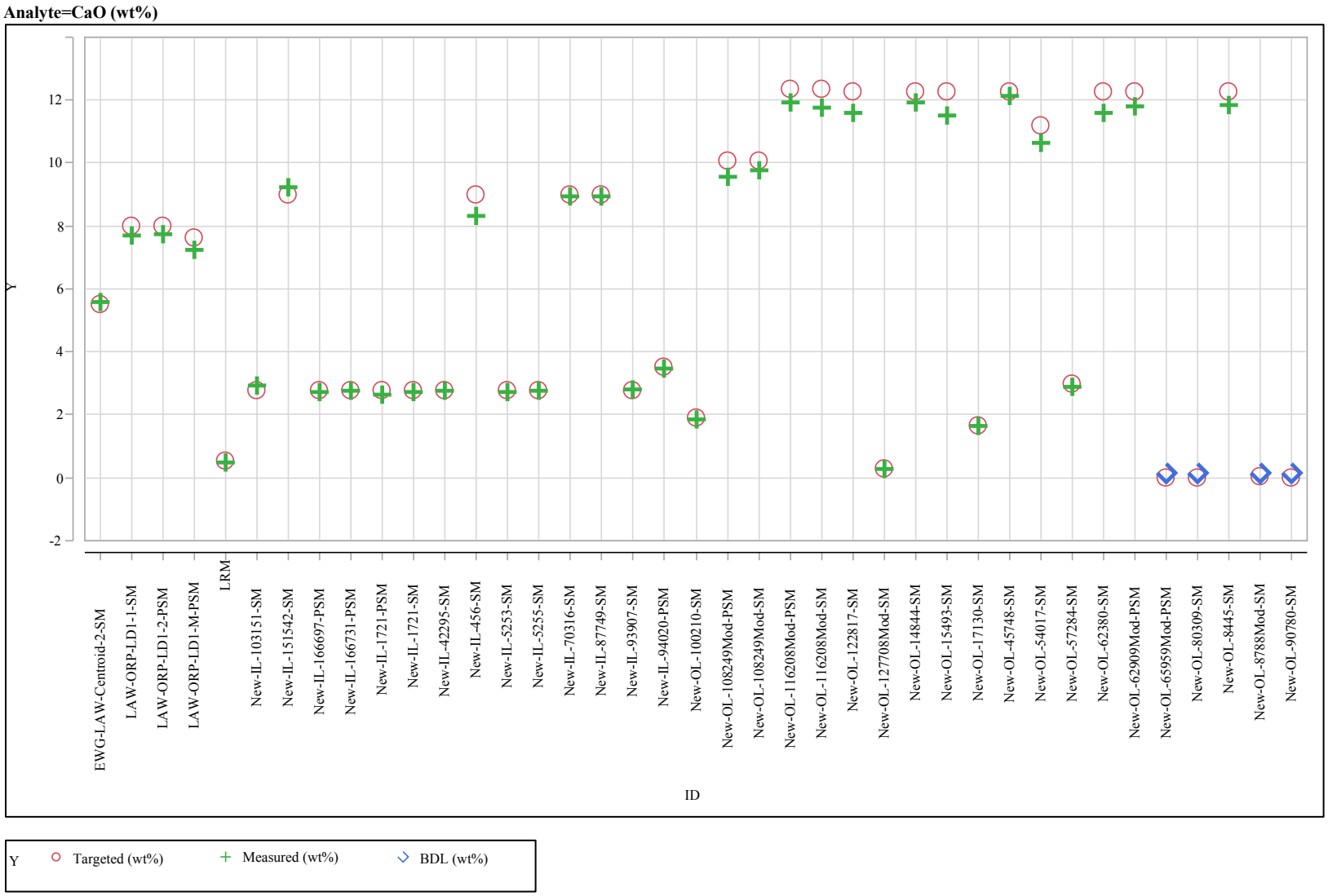


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

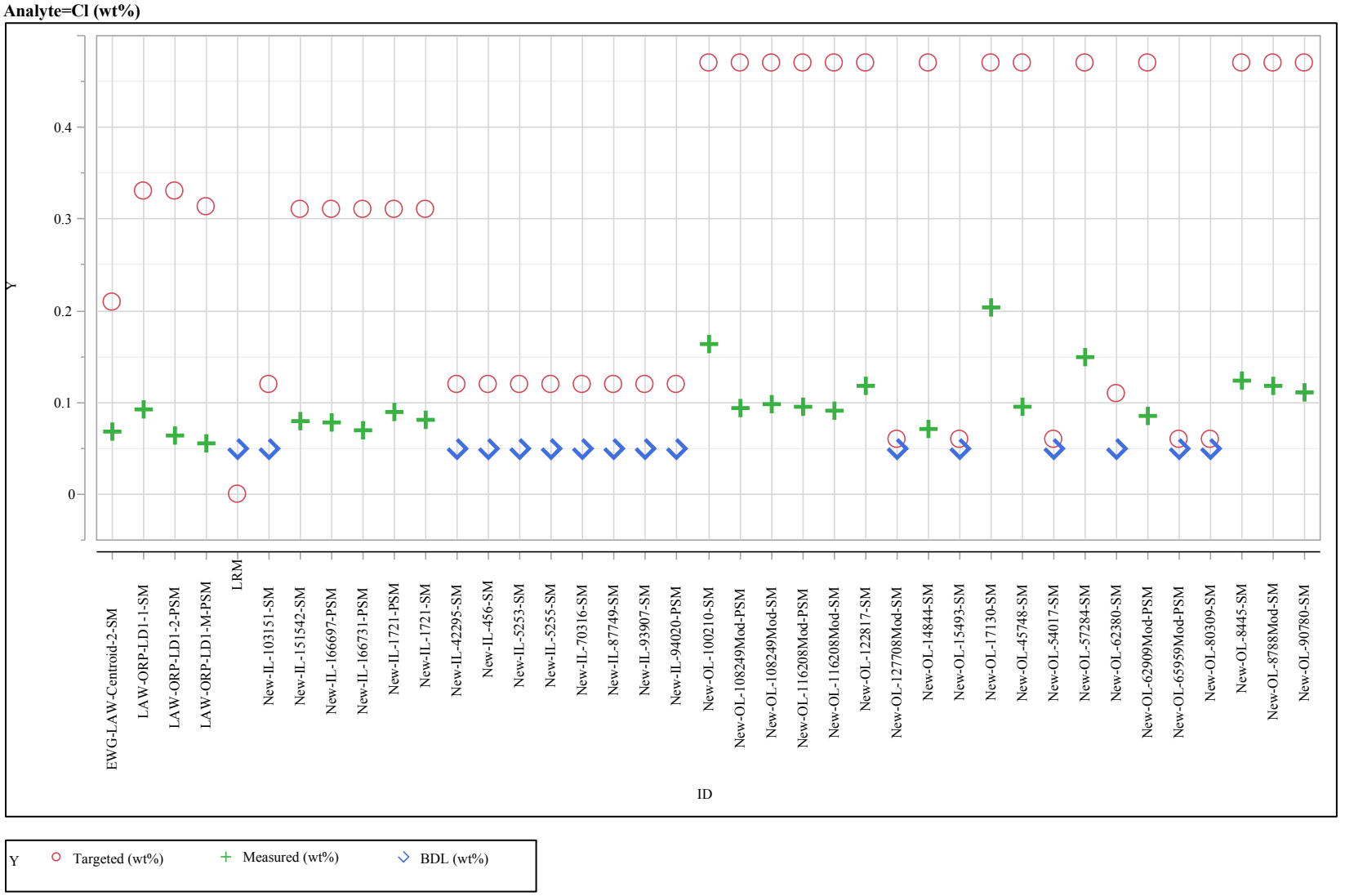


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

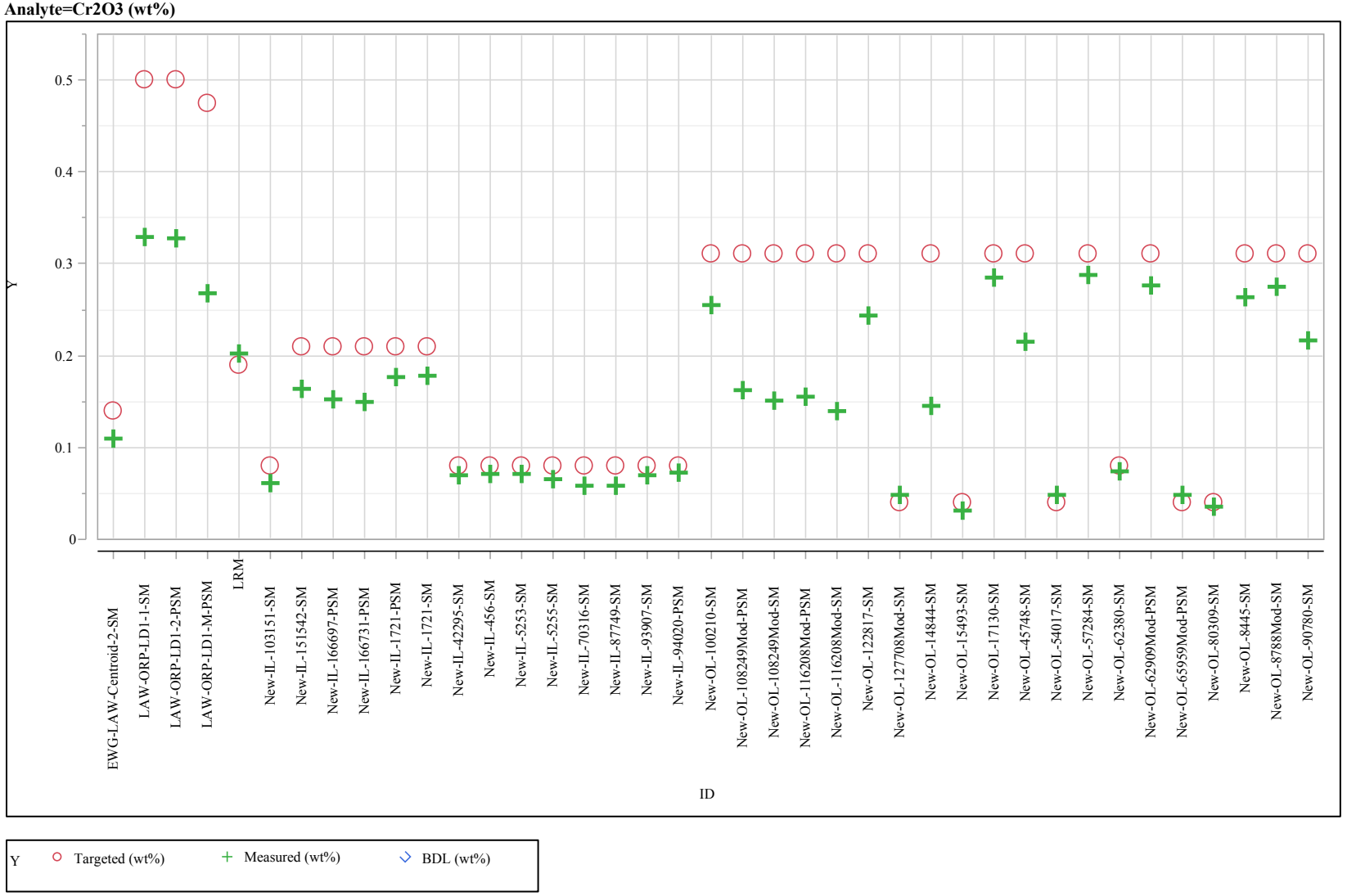


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

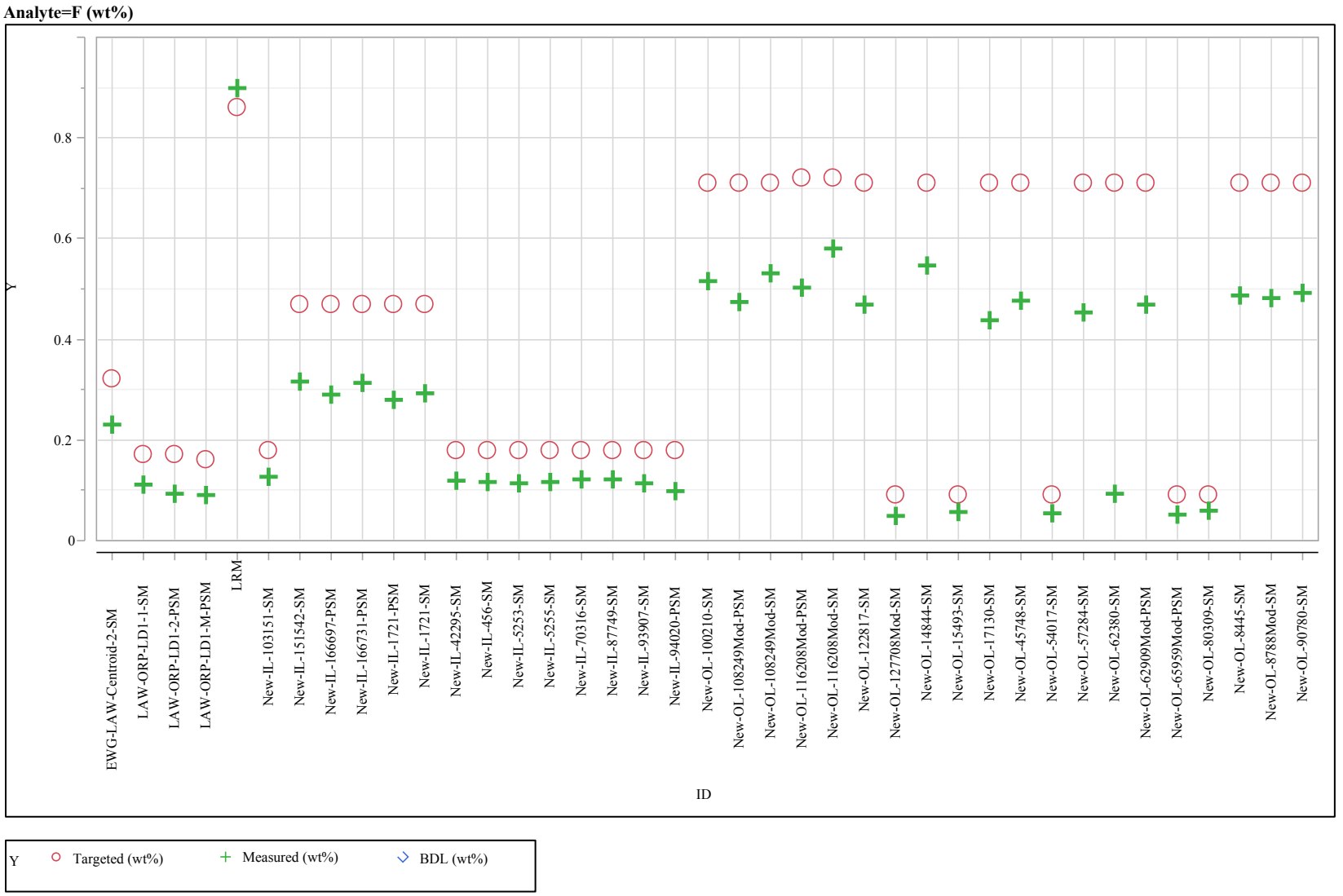


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

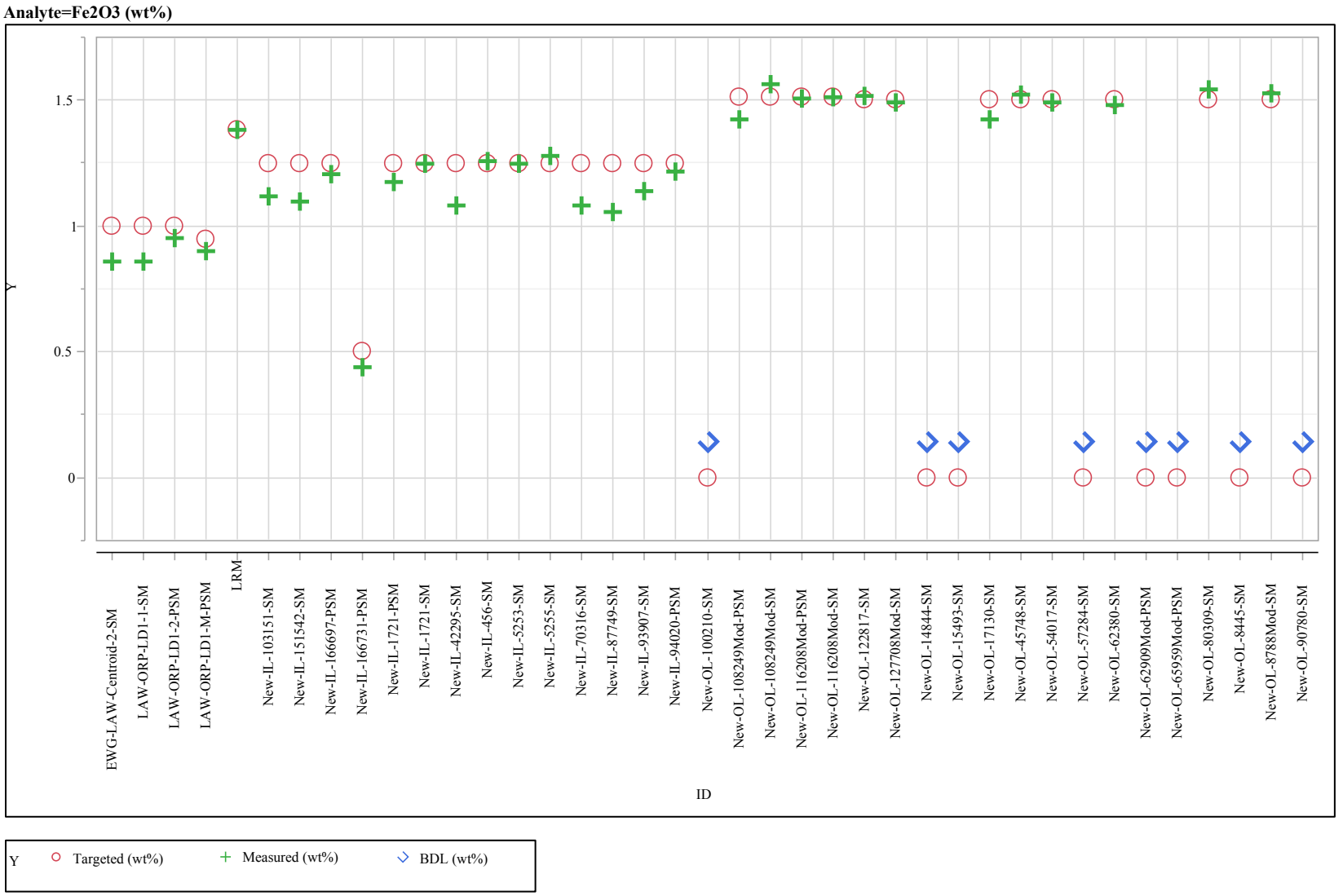


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

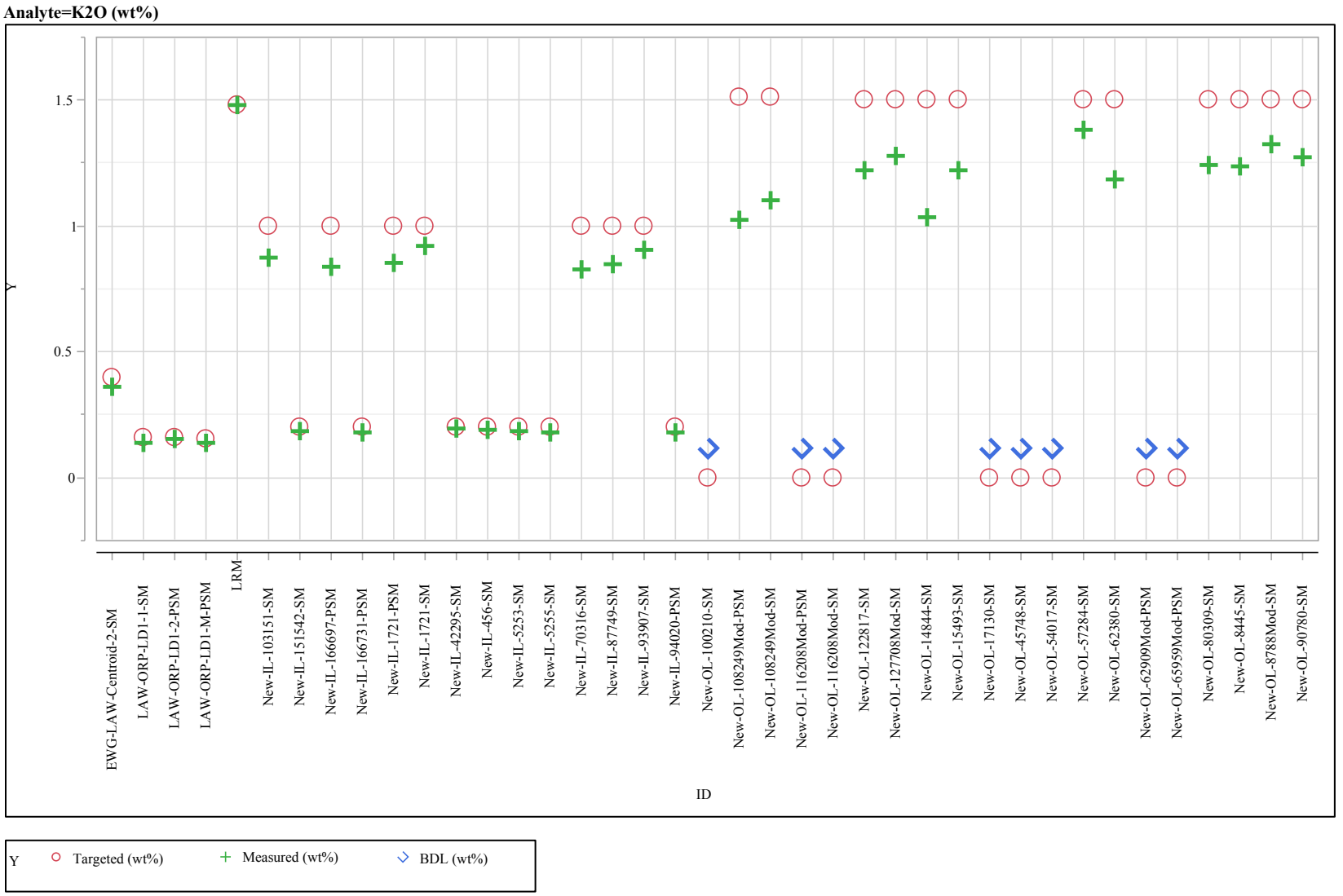


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

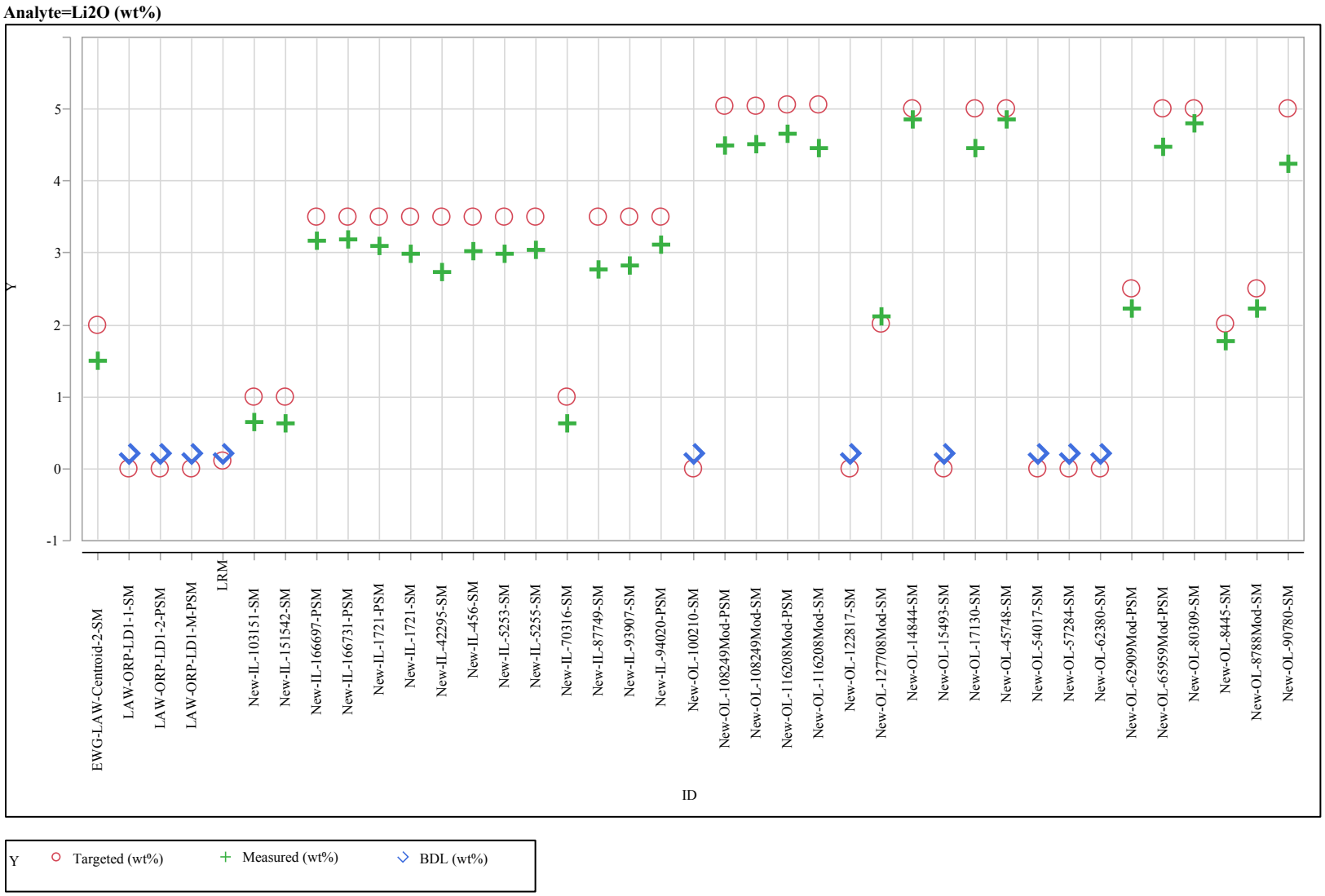


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

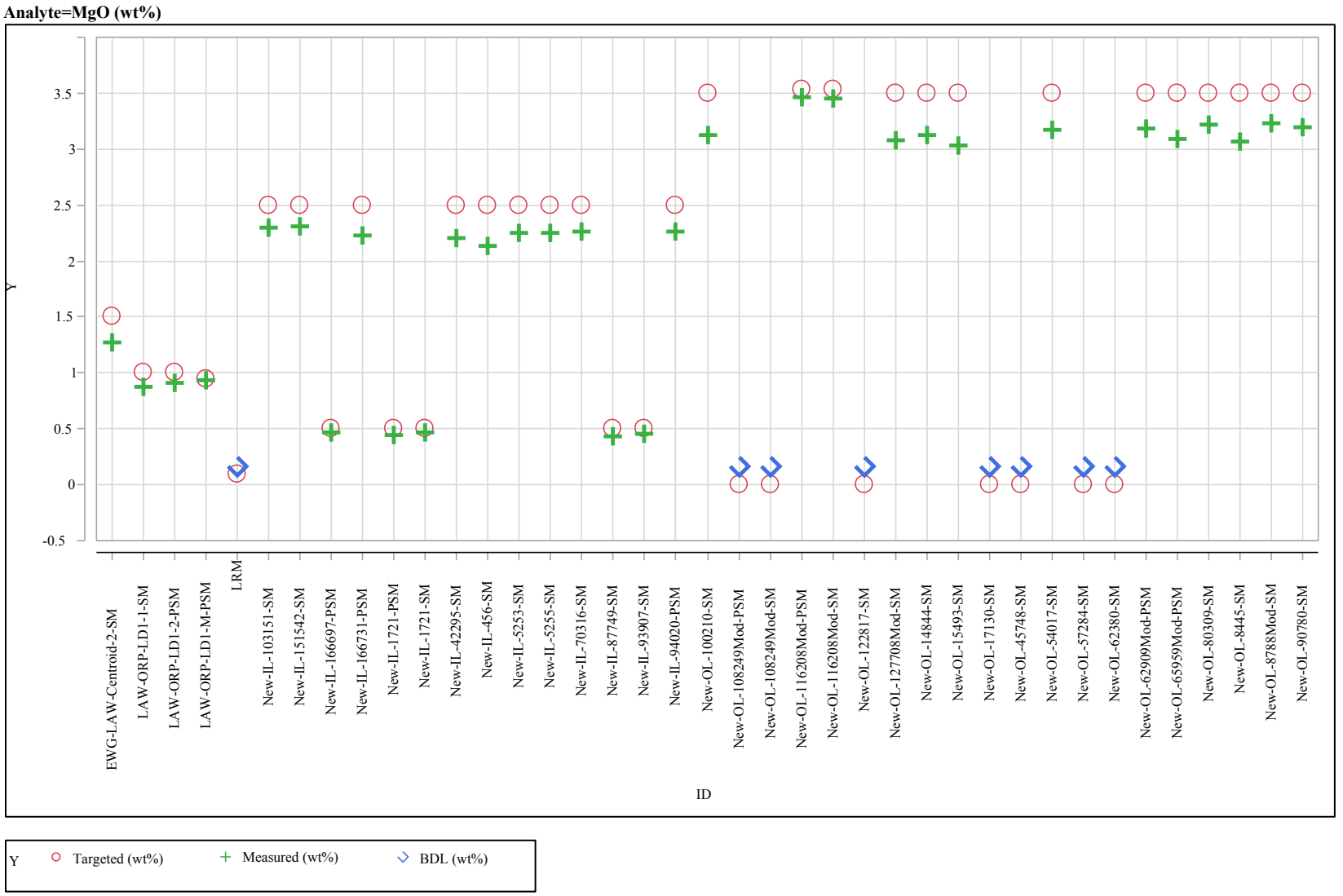


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

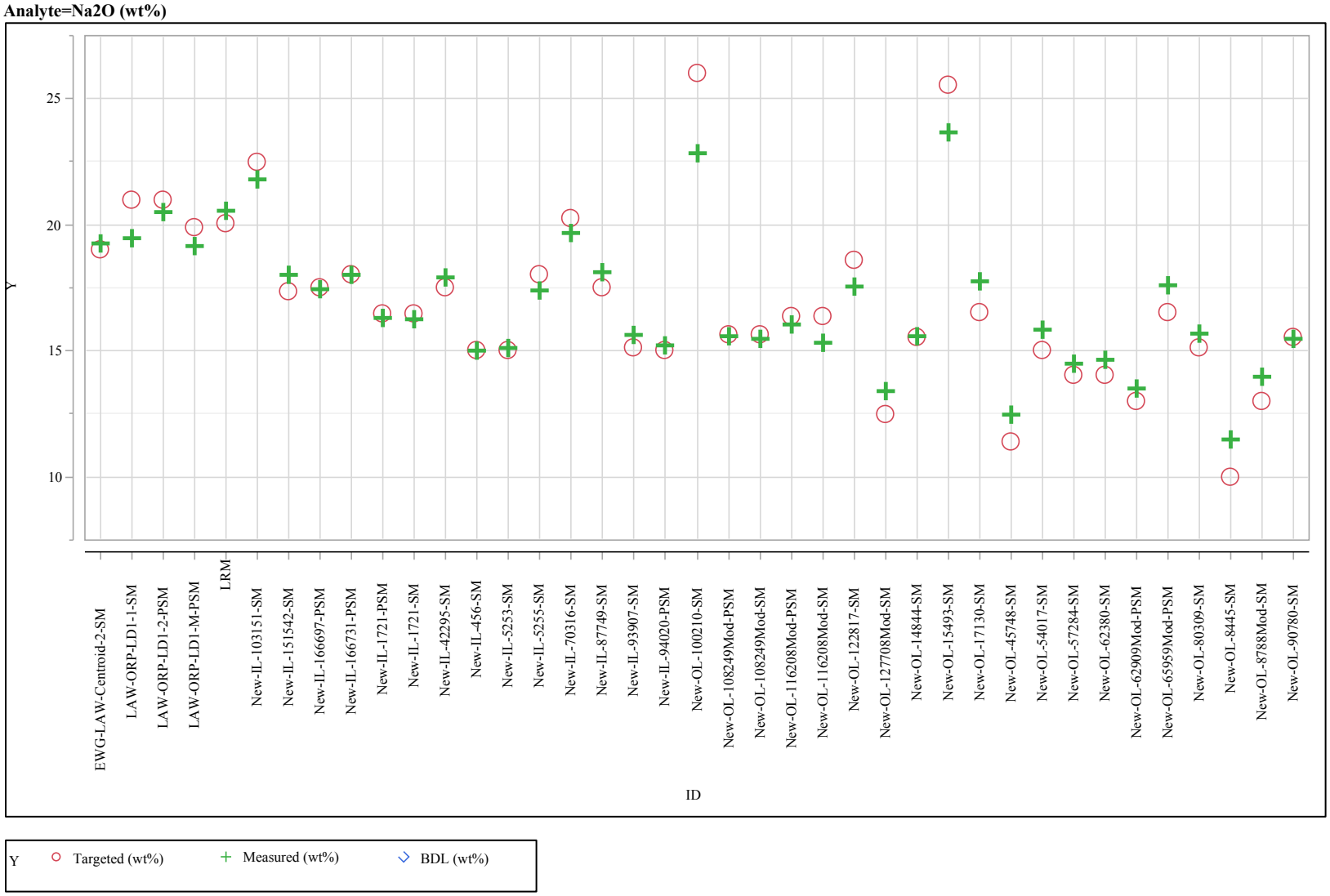


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

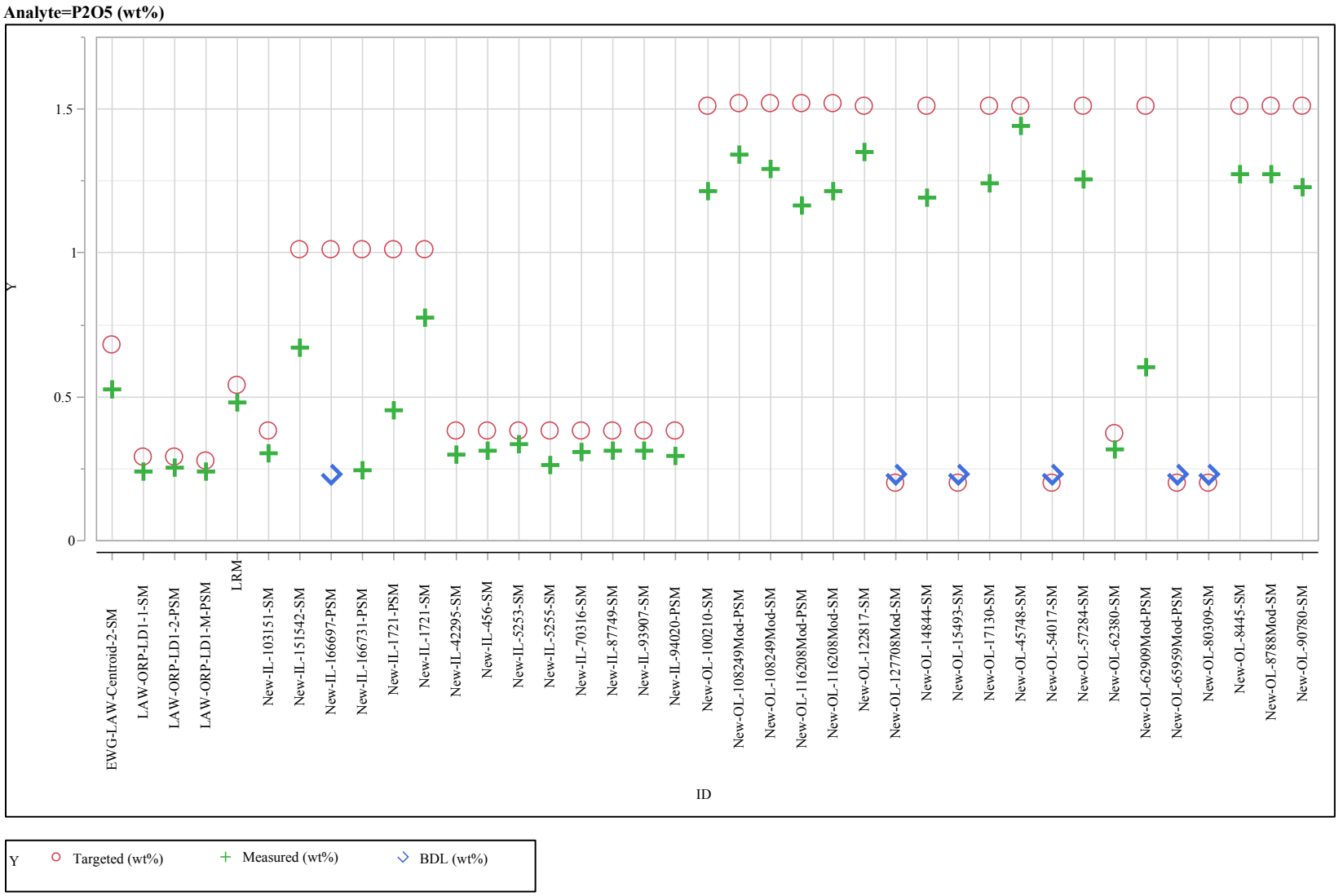


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

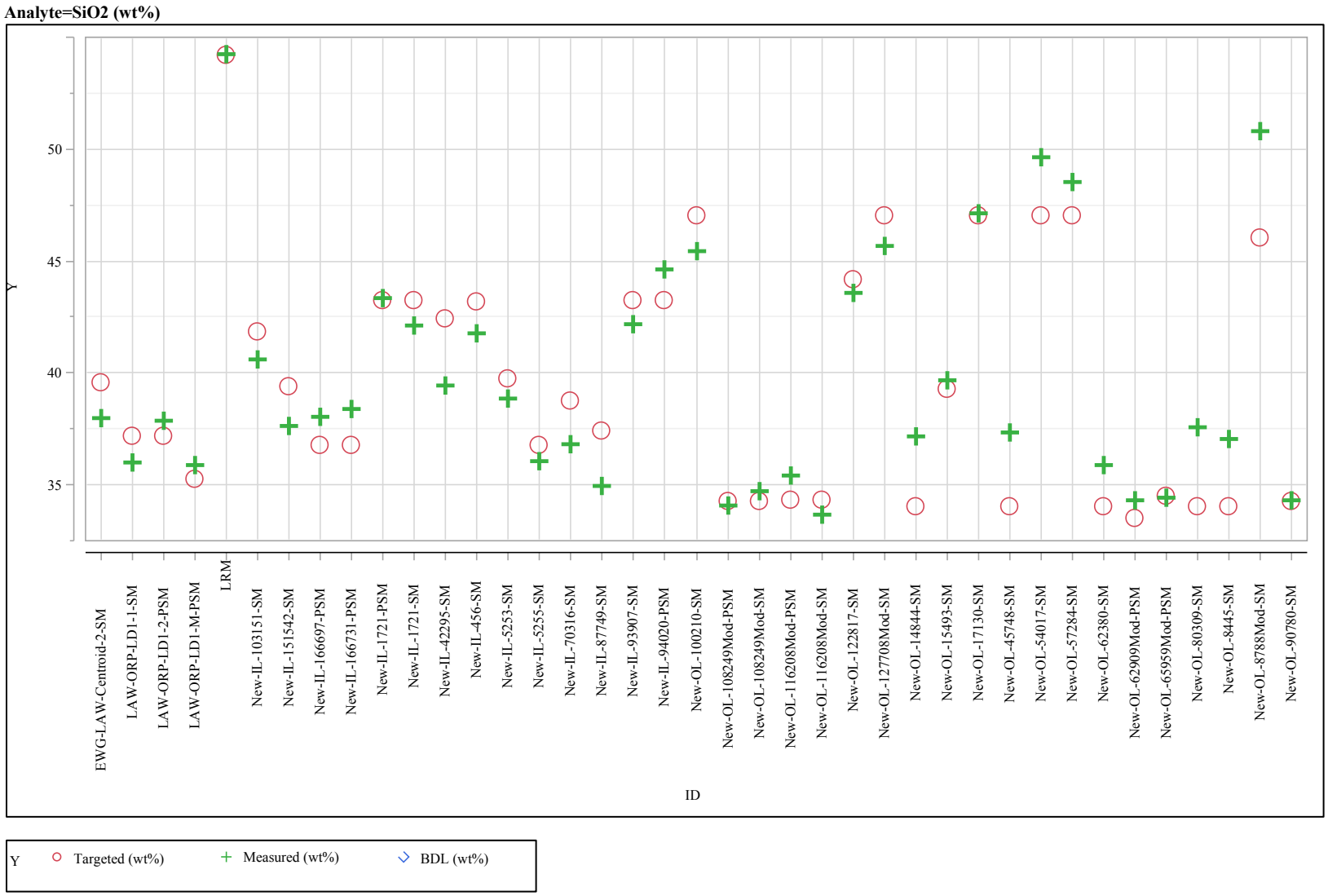


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

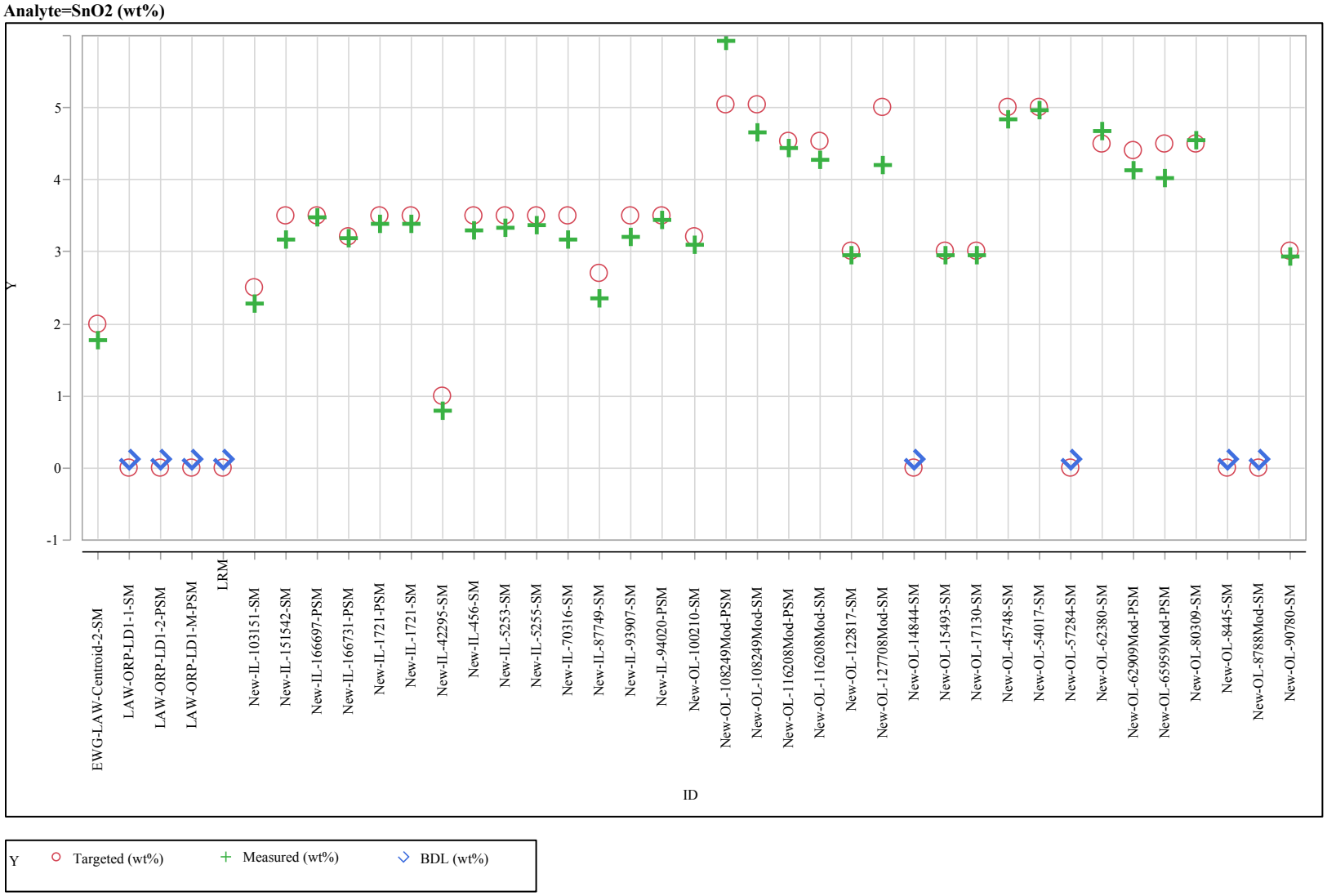


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

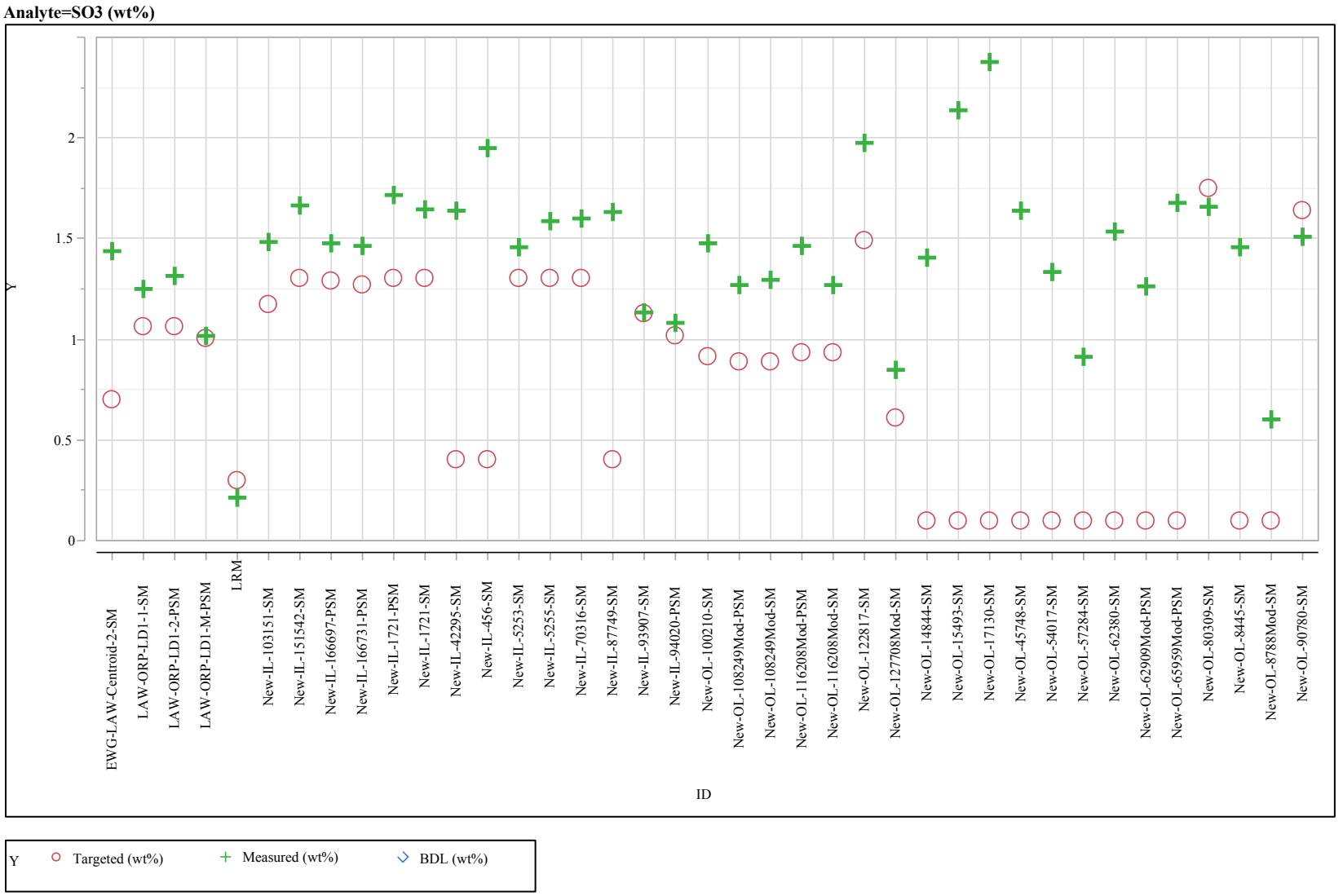


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

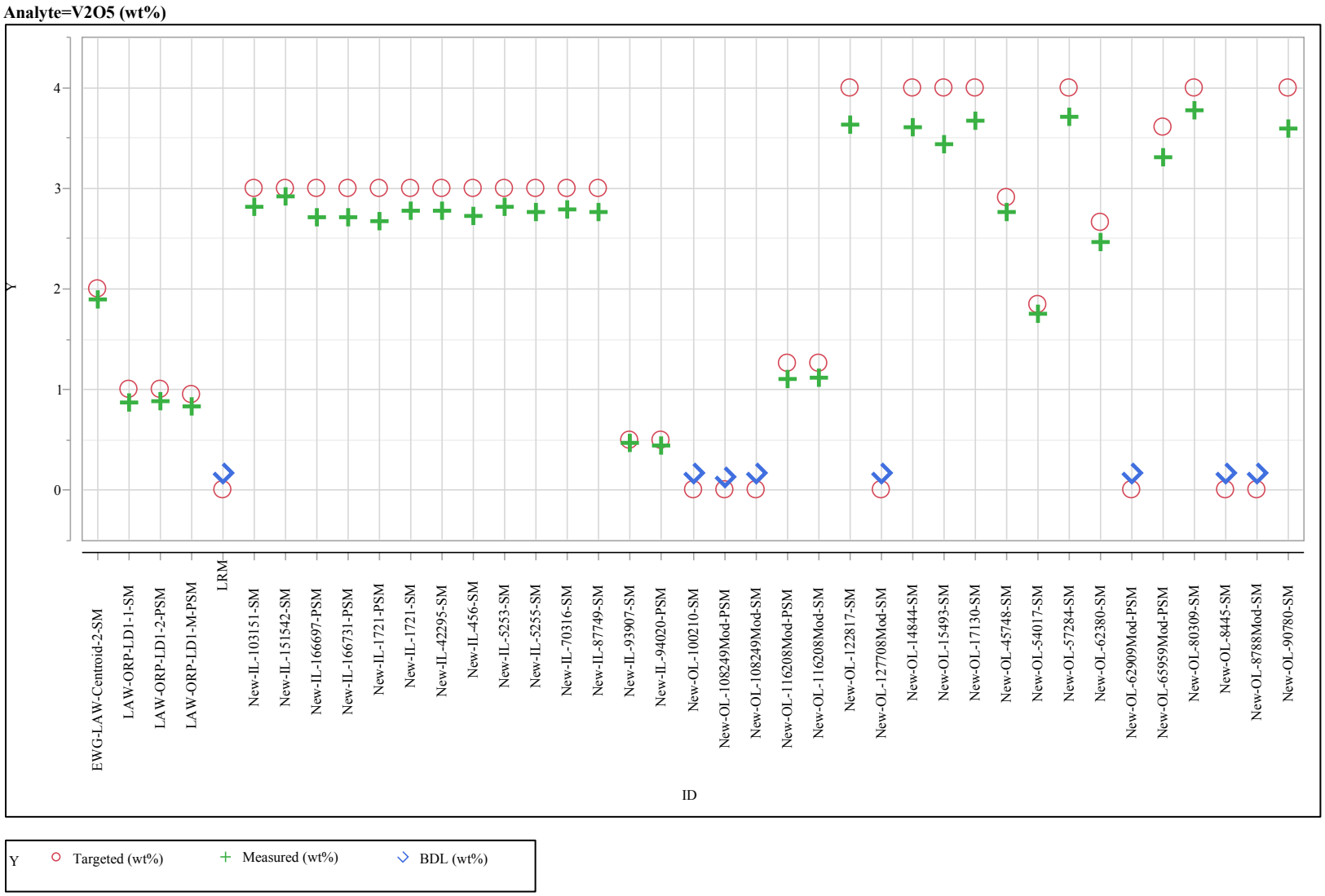


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

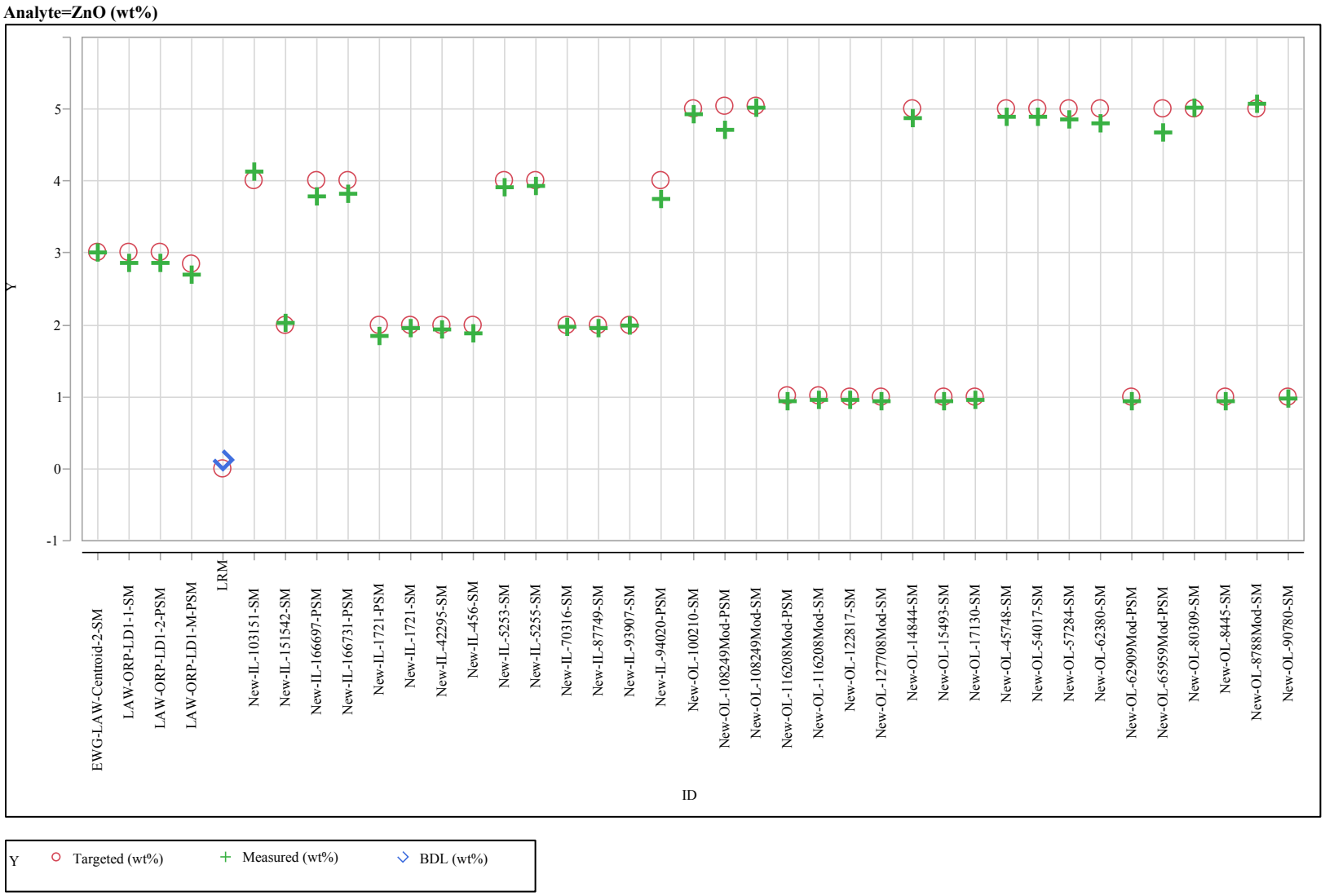


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

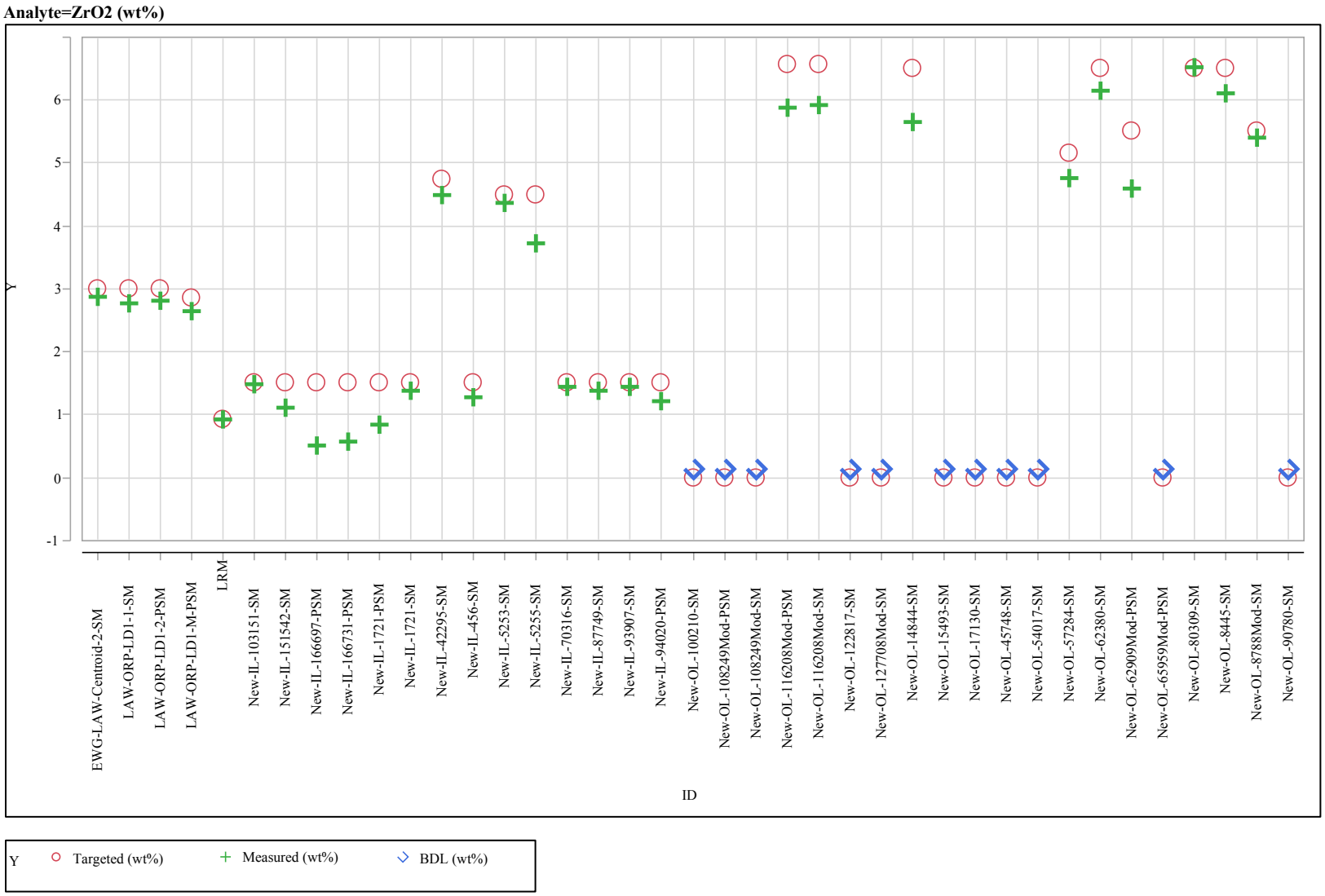


Exhibit C-4. Measured versus Targeted Concentrations by Glass ID by Oxide (continued)

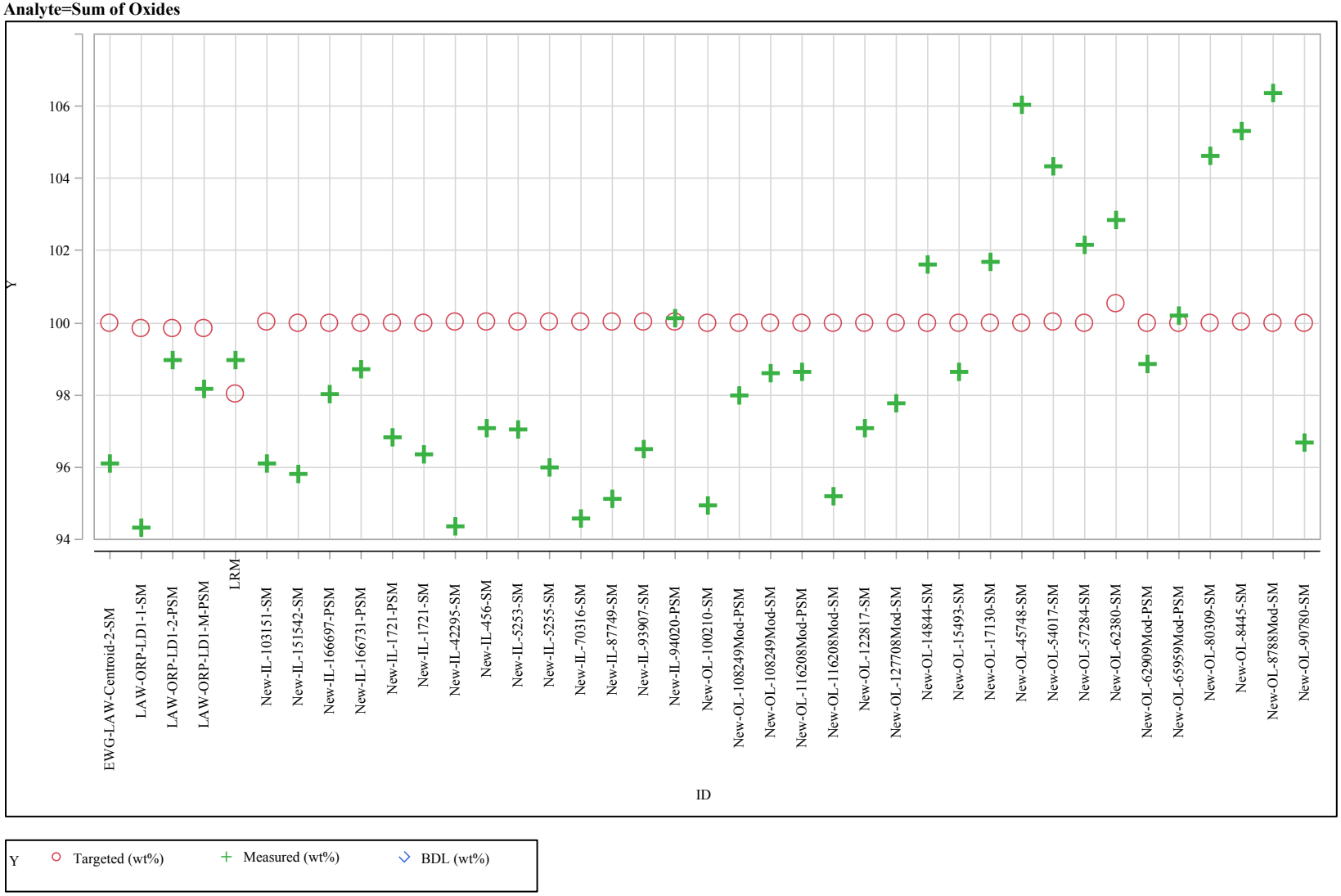
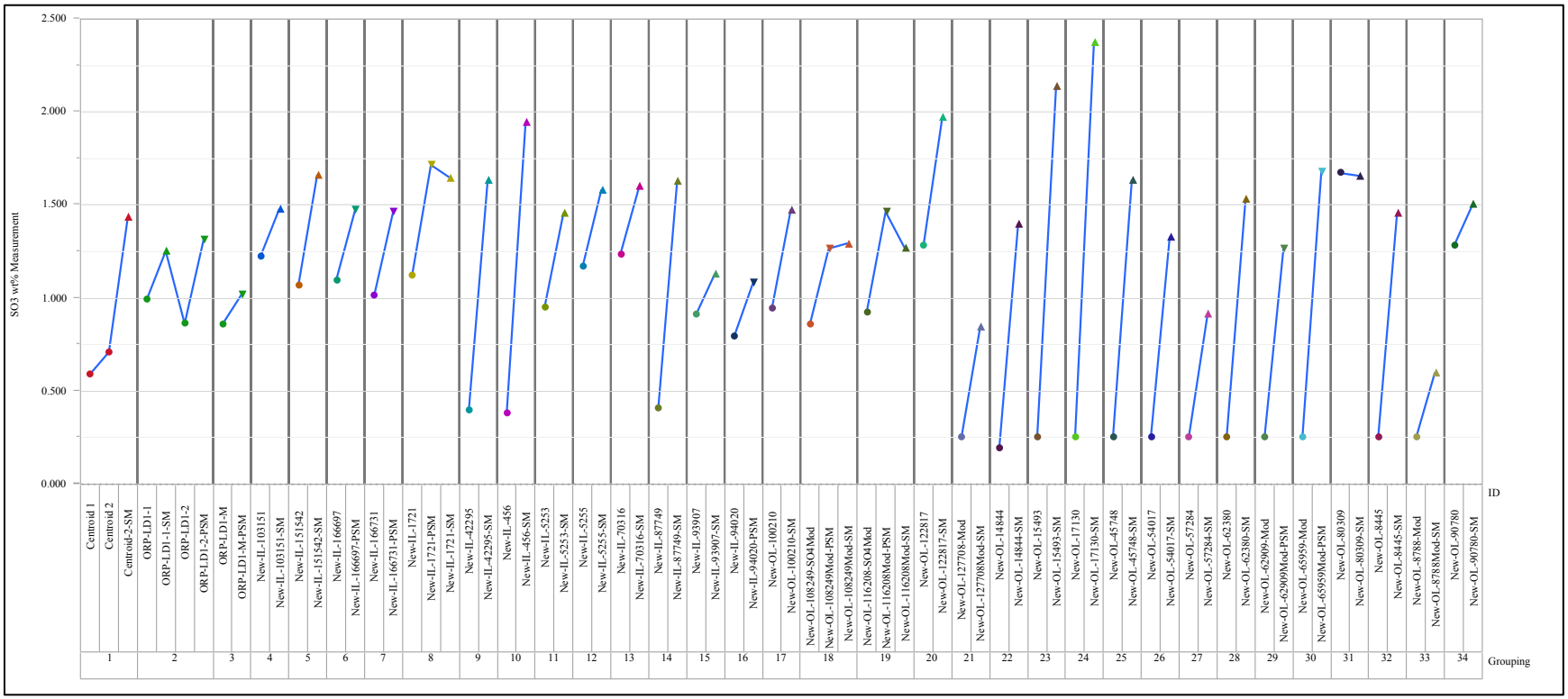


Exhibit C-5. Comparisons of Measured Sulfate Concentrations for Original and Sulfur Saturated Glasses



Appendix D Tables and Exhibits Supporting the Chemical Analysis of the Wash Solutions

Table D-1. Measured Compositions (mg/L) of Wash Solutions by ICP-AES, Part 1

Solution Identifier	Block	Sequence	Lab ID	Al	B	Ca	Cr	Fe	K	Li	Mg
Soln Std	1	1	Soln std1-1	3.72	19.7	<1.00	<0.100	3.69	9.08	9.27	<1.00
New-IL-42295-WS	1	2	A03-1	1.01	29.3	1.74	2.85	<1.00	7.28	28.0	<1.00
New-IL-151542-WS	1	3	A06-1	<1.00	26.4	21.3	14.5	<1.00	15.5	13.3	<1.00
New-IL-456-WS	1	4	A13-1	<1.00	13.7	13.3	3.68	<1.00	10.4	26.0	<1.00
New-OL-8788Mod-WS	1	5	A08-1	<1.00	5.35	<1.00	4.14	<1.00	34.7	24.8	<1.00
Sodium sulfate standard for set 1	1	6	sustd1-11	<10.0	<10.0	<10.0	<1.00	<10.0	<10.0	<10.0	<10.0
New-IL-5253-WS	1	7	A17-1	<1.00	28.9	6.01	5.07	<1.00	16.2	63.5	<1.00
New-IL-1721-WS	1	8	A23-1	<1.00	27.7	2.19	7.31	<1.00	32.2	30.6	<1.00
EWG-LAW-Centroid-2-WS	1	9	A09-1	1.57	20.6	2.24	4.63	<1.00	11.1	11.3	<1.00
First blank for set 1	1	10	blank11-1	<1.00	<1.00	<1.00	<0.100	<1.00	<1.00	<1.00	<1.00
New-OL-80309-WS	1	11	A25-1	<1.00	39.3	<1.00	1.40	<1.00	54.4	45.6	<1.00
New-IL-70316-WS	1	12	A14-1	<1.00	16.9	4.29	3.10	<1.00	30.0	5.08	<1.00
New-IL-103151-WS	1	13	A10-1	1.01	36.8	<1.00	4.55	<1.00	38.5	8.41	<1.00
New-OL-15493-WS	1	14	A24-1	<1.00	31.0	14.2	2.47	<1.00	56.4	<1.00	<1.00
New-OL-90780-WS	1	15	A20-1	5.14	30.4	<1.00	7.91	<1.00	16.0	33.9	<1.00
Soln Std	1	16	Soln std1-2	3.83	19.8	<1.00	<0.100	3.77	9.43	9.54	<1.00
New-OL-116208Mod-WS	1	17	A19-1	<1.00	19.6	1.84	44.0	<1.00	2.10	44.6	<1.00
New-OL-100210-WS	1	18	A05-1	<1.00	16.8	<1.00	8.56	<1.00	<1.00	0.22	<1.00
New-IL-87749-WS	1	19	A18-1	3.17	20.0	3.55	7.24	<1.00	64.7	29.8	<1.00
New-IL-5255-WS	1	20	A04-1	1.54	39.5	3.49	7.21	<1.00	16.6	50.1	<1.00
Second blank for set 1	1	21	blank12-1	<1.00	<1.00	<1.00	<0.100	<1.00	<1.00	<1.00	<1.00
New-OL-54017-WS	1	22	A01-1	<1.00	8.18	32.3	<0.100	<1.00	<1.00	<1.00	<1.00
New-OL-14844-WS	1	23	A26-1	<1.00	17.9	5.03	31.1	<1.00	86.8	35.8	<1.00
New-OL-127708Mod-WS	1	24	A07-1	<1.00	13.2	<1.00	<0.100	<1.00	23.1	16.2	<1.00
New-OL-17130-WS	1	25	A02-1	<1.00	76.1	<1.00	5.43	<1.00	<1.00	68.3	<1.00
Sodium sulfate standard for set 1	1	26	sustd1-12	<10.0	<10.0	<10.0	<1.00	<10.0	<10.0	<10.0	<10.0
New-OL-122817-WS	1	27	A28-1	<1.00	15.5	8.65	13.8	<1.00	64.6	<1.00	<1.00
New-OL-8445-WS	1	28	A11-1	1.55	13.0	23.4	4.17	<1.00	37.3	11.7	<1.00
New-OL-108249Mod-WS	1	29	A21-1	5.69	9.83	<1.00	10.9	<1.00	34.6	20.2	<1.00
New-IL-93907-WS	1	30	A22-1	1.62	19.7	4.26	3.05	<1.00	38.4	34.3	<1.00
New-OL-57284-WS	1	31	A15-1	<1.00	25.8	13.6	5.43	<1.00	48.9	<1.00	<1.00
Sodium sulfate standard for set 1	1	32	sustd1-13	<10.0	<10.0	<10.0	<1.00	<10.0	<10.0	<10.0	<10.0
New-OL-62380-WS	1	33	A27-1	<1.00	22.0	15.8	0.526	<1.00	25.2	<1.00	<1.00
New-OL-45748-WS	1	34	A16-1	4.58	10.8	8.48	25.7	<1.00	1.00	49.1	<1.00
LAW-ORP-LD1-1-WS	1	35	A12-1	1.46	43.0	16.6	46.5	<1.00	13.2	<1.00	<1.00
Soln Std	1	36	Soln std 1-3	3.72	19.7	<1.00	<0.100	3.71	9.13	9.37	<1.00
Soln Std	2	1	Soln std 2-1	4.24	19.1	<1.00	<0.100	4.22	9.51	9.43	<1.00
New-IL-151542-WS	2	2	A06-2	<1.00	27.2	21.4	15.1	<1.00	15.8	13.5	<1.00
New-IL-456-WS	2	3	A13-2	<1.00	13.2	12.8	3.74	<1.00	10.4	25.2	<1.00
New-IL-1721-WS	2	4	A23-2	<1.00	28.6	2.30	7.73	<1.00	32.8	30.9	<1.00
New-OL-80309-WS	2	5	A25-2	0.99	36.2	<1.00	1.57	<1.00	50.9	43.0	<1.00
Sodium sulfate standard for set 1	2	6	sustd1-21	<10.0	<10.0	<10.0	<1.00	<10.0	<10.0	<10.0	<10.0
New-IL-93907-WS	2	7	A22-2	1.98	22.0	4.79	4.12	<1.00	39.2	37.5	<1.00
New-OL-122817-WS	2	8	A28-2	<1.00	17.7	8.94	17.2	<1.00	65.5	<1.00	<1.00
New-OL-54017-WS	2	9	A01-2	<1.00	8.93	30.5	0.220	<1.00	1.20	<1.00	1.49
First blank for set 1	2	10	blank11-2	<1.00	<1.00	<1.00	<0.100	<1.00	<1.00	<1.00	<1.00
New-IL-87749-WS	2	11	A18-2	3.86	27.6	4.16	9.45	<1.00	76.7	34.2	<1.00
New-OL-90780-WS	2	12	A20-2	5.35	33.3	<1.00	8.56	<1.00	16.4	34.0	<1.00
New-IL-70316-WS	2	13	A14-2	1.18	19.4	4.62	3.52	<1.00	31.8	5.44	<1.00
New-IL-42295-WS	2	14	A03-2	1.14	30.8	1.78	3.11	<1.00	7.39	27.2	<1.00
New-OL-100210-WS	2	15	A05-2	1.04	17.2	<1.00	8.69	<1.00	<1.00	<1.00	<1.00
Soln Std	2	16	Soln std 2-2	3.99	20.3	<1.00	<0.100	4.40	9.47	9.57	<1.00
New-IL-5255-WS	2	17	A04-2	2.01	47.7	4.13	8.46	<1.00	19.0	54.8	<1.00
New-OL-14844-WS	2	18	A26-2	1.20	19.9	5.34	34.0	<1.00	89.5	37.2	<1.00
New-OL-116208Mod-WS	2	19	A19-2	1.06	18.7	1.90	44.1	<1.00	2.38	42.4	<1.00
New-OL-127708Mod-WS	2	20	A07-2	<1.00	13.3	<1.00	0.146	<1.00	21.4	15.5	<1.00
Second blank for set 1	2	21	blank12-2	<1.00	<1.00	<1.00	<0.100	<1.00	<1.00	<1.00	<1.00
EWG-LAW-Centroid-2-WS	2	22	A09-2	1.80	20.8	2.30	4.87	<1.00	11.1	11.3	<1.00
LAW-ORP-LD1-1-WS	2	23	A12-2	1.60	41.5	15.7	46.1	<1.00	12.4	<1.00	<1.00

Table D-1. Measured Compositions (mg/L) of Wash Solutions by ICP-AES, Part 1 (continued)

Solution Identifier	Block	Sequence	Lab ID	Al	B	Ca	Cr	Fe	K	Li	Mg
New-OL-8445-WS	2	24	A11-2	1.75	13.6	22.4	4.48	<1.00	35.8	11.6	1.11
New-OL-62380-WS	2	25	A27-2	<1.00	21.6	15.3	0.759	<1.00	24.2	<1.00	<1.00
Sodium sulfate standard for set 1	2	26	sustd1-22	<10.0	<10.0	<10.0	<1.00	<10.0	<10.0	<10.0	<10.0
New-IL-5253-WS	2	27	A17-2	<1.00	29.0	5.21	5.52	<1.00	15.2	61.4	<1.00
New-OL-45748-WS	2	28	A16-2	4.32	10.4	7.53	25.1	<1.00	1.29	44.9	<1.00
New-OL-8788Mod-WS	2	29	A08-2	<1.00	5.32	<1.00	4.13	<1.00	29.6	22.4	<1.00
New-IL-103151-WS	2	30	A10-2	1.18	35.2	1.00	4.64	<1.00	34.8	8.09	<1.00
New-OL-108249Mod-WS	2	31	A21-2	6.00	11.1	1.22	11.8	<1.00	34.7	20.6	<1.00
Sodium sulfate standard for set 1	2	32	sustd1-23	<10.0	<10.0	<10.0	<1.00	<10.0	<10.0	<10.0	<10.0
New-OL-17130-WS	2	33	A02-2	<1.00	78.1	<1.00	5.81	<1.00	<1.00	68.2	<1.00
New-OL-57284-WS	2	34	A15-2	<1.00	25.1	12.8	5.54	<1.00	45.4	<1.00	<1.00
New-OL-15493-WS	2	35	A24-2	1.04	28.1	12.9	2.60	<1.00	50.4	<1.00	<1.00
Soln Std	2	36	Soln std 2-3	3.94	20.1	<1.00	<0.100	4.32	9.39	9.41	<1.00
Soln Std	3	1	Soln std 3-1	3.94	21.2	<1.00	<0.100	3.76	10.0	9.89	<1.00
New-IL-93907-WS	3	2	A22-3	1.64	20.2	4.81	3.17	<1.00	40.8	36.1	<1.00
New-OL-122817-WS	3	3	A28-3	<1.00	16.4	9.53	14.2	<1.00	69.7	<1.00	<1.00
New-OL-57284-WS	3	4	A15-3	<1.00	24.9	14.3	5.47	<1.00	49.6	<1.00	<1.00
New-IL-151542-WS	3	5	A06-3	<1.00	27.3	22.7	15.0	<1.00	16.3	13.7	<1.00
Sodium sulfate standard for set 1	3	6	sustd1-31	<10.0	<10.0	<10.0	<1.00	<10.0	<10.0	<10.0	<10.0
New-IL-1721-WS	3	7	A23-3	<1.00	29.0	2.23	7.51	<1.00	35.1	32.3	<1.00
New-OL-108249Mod-WS	3	8	A21-3	5.69	9.75	1.19	10.9	<1.00	34.9	20.3	<1.00
New-IL-103151-WS	3	9	A10-3	<1.00	35.2	1.07	4.35	<1.00	37.7	8.14	<1.00
First blank for set 1	3	10	blank11-3	<1.00	<1.00	<1.00	<0.100	<1.00	<1.00	<1.00	<1.00
New-IL-70316-WS	3	11	A14-3	<1.00	18.8	5.17	3.28	<1.00	34.8	5.46	<1.00
New-OL-62380-WS	3	12	A27-3	<1.00	23.5	17.3	0.505	<1.00	27.0	<1.00	<1.00
New-OL-116208Mod-WS	3	13	A19-3	<1.00	18.4	1.91	43.2	<1.00	2.13	43.5	<1.00
New-OL-80309-WS	3	14	A25-3	<1.00	36.5	<1.00	1.30	<1.00	53.5	44.5	<1.00
LAW-ORP-LD1-1-WS	3	15	A12-3	1.24	39.3	16.0	44.1	<1.00	12.3	<1.00	<1.00
Soln Std	3	16	Soln std 3-2	4.02	19.9	<1.00	<0.100	3.76	9.83	9.82	<1.00
New-IL-456-WS	3	17	A13-3	<1.00	13.0	13.1	3.47	<1.00	10.0	25.3	<1.00
New-OL-100210-WS	3	18	A05-3	<1.00	15.3	<1.00	8.15	<1.00	<1.00	<1.00	<1.00
New-OL-17130-WS	3	19	A02-3	<1.00	74.1	<1.00	5.47	<1.00	<1.00	68.1	<1.00
New-OL-8445-WS	3	20	A11-3	1.49	13.6	23.8	4.21	<1.00	38.0	11.7	<1.00
Second blank for set 1	3	21	blank12-3	<1.00	<1.00	<1.00	<0.100	<1.00	<1.00	<1.00	<1.00
New-OL-14844-WS	3	22	A26-3	<1.00	18.4	5.42	32.6	<1.00	90.4	36.6	<1.00
New-OL-90780-WS	3	23	A20-3	5.32	31.0	<1.00	8.27	<1.00	16.8	34.8	<1.00
New-IL-5255-WS	3	24	A04-3	1.59	43.6	3.93	7.98	<1.00	18.1	53.4	<1.00
New-OL-54017-WS	3	25	A01-3	<1.00	7.18	30.6	<0.100	<1.00	<1.00	<1.00	<1.00
Sodium sulfate standard for set 1	3	26	sustd1-32	<10.0	<10.0	<10.0	<1.00	<10.0	<10.0	<10.0	<10.0
New-IL-87749-WS	3	27	A18-3	3.34	21.3	4.19	7.84	<1.00	70.8	31.7	<1.00
New-IL-5253-WS	3	28	A17-3	<1.00	29.1	5.99	5.33	<1.00	16.4	64.4	<1.00
New-OL-127708Mod-WS	3	29	A07-3	<1.00	13.6	<1.00	<0.100	<1.00	24.0	16.4	<1.00
New-OL-8788Mod-WS	3	30	A08-3	<1.00	4.86	<1.00	4.06	<1.00	32.9	24.0	<1.00
EWG-LAW-Centroid-2-WS	3	31	A09-3	1.54	20.1	2.49	4.78	<1.00	11.6	11.6	<1.00
Sodium sulfate standard for set 1	3	32	sustd1-33	<10.0	<10.0	<10.0	<1.00	<10.0	<10.0	<10.0	<10.0
New-OL-15493-WS	3	33	A24-3	<1.00	27.4	13.7	2.37	<1.00	52.6	<1.00	<1.00
New-IL-42295-WS	3	34	A03-3	<1.00	26.9	1.80	2.73	<1.00	6.97	26.8	<1.00
New-OL-45748-WS	3	35	A16-3	4.73	11.1	9.08	27.0	<1.00	1.15	50.6	<1.00
Soln Std	3	36	Soln std 3-3	4.00	19.8	<1.00	<0.100	3.74	9.74	9.75	<1.00
Soln Std	4	1	soln std4-1	3.88	20.9	<1.00	<0.100	3.77	9.97	9.58	<1.00
New-OL-62909Mod-PWS	4	2	B07-1	1.16	4.14	15.2	4.69	<1.00	1.38	10.5	<1.00
Sodium sulfate standard for set 2	4	3	sustd2-41	<10.0	<10.0	<10.0	<1.00	<10.0	<10.0	<10.0	<10.0
New-IL-166731-PWS	4	4	B03-1	<1.00	14.0	6.99	16.4	<1.00	11.3	29.9	<1.00
First blank for set 2	4	5	blank21-4	<1.00	<1.00	<1.00	<0.100	<1.00	<1.00	<1.00	<1.00
LAW-ORP-LD1-2-PWS	4	6	B08-1	<1.00	20.9	18.2	41.1	<1.00	10.3	<1.00	<1.00
Soln Std	4	7	soln std4-2	3.88	20.1	<1.00	<0.100	3.73	9.76	9.62	<1.00
New-IL-1721-PWS	4	8	B06-1	<1.00	17.3	7.28	8.91	<1.00	39.4	29.7	<1.00
Second blank for set 2	4	9	blank22-4	<1.00	<1.00	<1.00	<0.100	<1.00	<1.00	<1.00	<1.00
New-IL-94020-PWS	4	10	B09-1	<1.00	7.32	11.1	5.27	<1.00	11.1	34.6	<1.00
New-IL-166697-PWS	4	11	B04-1	<1.00	16.7	7.05	15.2	<1.00	48.5	31.1	<1.00

Table D-1. Measured Compositions (mg/L) of Wash Solutions by ICP-AES, Part 1 (continued)

Sodium sulfate standard for set 2	4	12	sustd2-42	<10.0	<10.0	<10.0	<1.00	<10.0	<10.0	<10.0	<10.0
New-OL-65959Mod-PWS	4	13	B10-1	2.30	12.4	<1.00	0.192	<1.00	<1.00	28.4	<1.00
New-OL-108249Mod-PWS	4	14	B01-1	1.50	8.22	10.3	40.1	<1.00	125	28.3	<1.00
Sodium sulfate standard for set 2	4	15	sustd2-43	<10.0	<10.0	<10.0	<1.00	<10.0	<10.0	<10.0	<10.0
LAW-ORP-LD1-M-PWS	4	16	B02-1	1.28	16.4	25.4	52.5	<1.00	10.0	<1.00	<1.00
New-OL-116208Mod-PWS	4	17	B05-1	<1.00	9.05	7.32	39.1	<1.00	2.19	25.7	<1.00
Soln Std	4	18	soln std4-3	3.88	20.2	<1.00	<0.100	3.76	9.76	9.70	<1.00
Soln Std	5	1	soln std5-1	3.83	20.7	<1.00	<0.100	3.67	9.74	9.60	<1.00
New-IL-166731-PWS	5	2	B03-2	<1.00	14.2	6.84	16.2	<1.00	11.1	29.9	<1.00
Sodium sulfate standard for set 2	5	3	sustd2-51	<10.0	<10.0	<10.0	<1.00	<10.0	<10.0	<10.0	<10.0
New-OL-65959Mod-PWS	5	4	B10-2	2.22	12.3	<1.00	<0.100	<1.00	<1.00	28.2	<1.00
First blank for set 2	5	5	blank21-5	<1.00	<1.00	<1.00	<0.100	<1.00	<1.00	<1.00	<1.00
New-OL-62909Mod-PWS	5	6	B07-2	1.13	4.35	15.4	4.65	<1.00	1.26	10.6	<1.00
Soln Std	5	7	soln std5-2	3.76	19.6	<1.00	<0.100	3.59	9.52	9.48	<1.00
New-OL-116208Mod-PWS	5	8	B05-2	<1.00	8.91	7.02	37.9	<1.00	2.04	25.1	<1.00
Second blank for set 2	5	9	blank22-5	<1.00	<1.00	<1.00	<0.100	<1.00	<1.00	<1.00	<1.00
New-IL-1721-PWS	5	10	B06-2	<1.00	17.2	7.11	8.70	<1.00	38.9	29.6	<1.00
New-OL-108249Mod-PWS	5	11	B01-2	1.40	8.08	9.99	39.2	<1.00	123	27.8	<1.00
Sodium sulfate standard for set 2	5	12	sustd2-52	<10.0	<10.0	<10.0	<1.00	<10.0	<10.0	<10.0	<10.0
LAW-ORP-LD1-2-PWS	5	13	B08-2	<1.00	20.9	18.2	40.8	<1.00	10.3	<1.00	<1.00
New-IL-166697-PWS	5	14	B04-2	<1.00	17.2	6.97	15.1	<1.00	49.0	31.3	<1.00
Sodium sulfate standard for set 2	5	15	sustd2-53	<10.0	<10.0	<10.0	<1.00	<10.0	<10.0	<10.0	<10.0
New-IL-94020-PWS	5	16	B09-2	<1.00	7.80	11.3	5.27	<1.00	11.4	35.4	<1.00
LAW-ORP-LD1-M-PWS	5	17	B02-2	1.22	16.4	25.2	51.8	<1.00	10.0	<1.00	<1.00
Soln Std	5	18	soln std5-3	3.81	20.4	<1.00	<0.100	3.64	9.83	9.52	<1.00
Soln Std	6	1	soln std6-1	3.98	20.4	0.10	<0.100	3.83	9.85	9.60	<1.00
LAW-ORP-LD1-M-PWS	6	2	B02-3	1.36	15.7	24.2	50.2	<1.00	9.75	<1.00	<1.00
Sodium sulfate standard for set 2	6	3	sustd2-61	<10.0	<10.0	<10.0	<1.00	<10.0	<10.0	<10.0	<10.0
New-OL-108249Mod-PWS	6	4	B01-3	1.59	8.11	10.1	39.2	<1.00	122	27.7	<1.00
First blank for set 2	6	5	blank21-6	<1.00	<1.00	<1.00	<0.100	<1.00	<1.00	<1.00	<1.00
New-IL-166697-PWS	6	6	B04-3	<1.00	16.8	7.03	15.0	<1.00	47.8	30.7	<1.00
Soln Std	6	7	soln std6-2	4.01	21.1	<1.00	<0.100	3.88	9.93	9.70	<1.00
New-IL-166731-PWS	6	8	B03-3	1.15	14.5	7.04	16.4	<1.00	11.4	29.8	<1.00
Second blank for set 2	6	9	blank22-6	<1.00	<1.00	<1.00	<0.100	<1.00	<1.00	<1.00	<1.00
New-OL-65959Mod-PWS	6	10	B10-3	2.41	12.3	<1.00	0.279	<1.00	<1.00	28.2	<1.00
New-IL-94020-PWS	6	11	B09-3	<1.00	7.58	11.2	5.37	<1.00	11.3	34.8	<1.00
Sodium sulfate standard for set 2	6	12	sustd2-62	<10.0	<10.0	<10.0	<1.00	<10.0	<10.0	<10.0	<10.0
New-OL-62909Mod-PWS	6	13	B07-3	1.34	4.69	15.8	4.90	<1.00	1.50	10.8	<1.00
New-IL-1721-PWS	6	14	B06-3	<1.00	17.1	7.21	8.80	<1.00	38.2	29.2	<1.00
Sodium sulfate standard for set 2	6	15	sustd2-63	<10.0	<10.0	<10.0	<1.00	<10.0	<10.0	<10.0	<10.0
New-OL-116208Mod-PWS	6	16	B05-3	<1.00	8.82	7.19	37.8	<1.00	2.22	25.0	<1.00
LAW-ORP-LD1-2-PWS	6	17	B08-3	<1.00	21.0	18.3	41.0	<1.00	10.5	<1.00	<1.00
Soln Std	6	18	soln std6-3	3.99	20.5	<1.00	<0.100	3.83	9.88	9.65	<1.00

Table D-2. Measured Compositions (mg/L) of Wash Solutions by ICP-AES, Part 2

Solution Identifier	Block	Sequence	Lab ID	Na	P	S	Si	Sn	V	Zn	Zr
Soln Std	1	1	Soln std1-1	77.4	<1.00	<1.00	47.0	<1.00	<1.00	<1.00	<1.00
New-IL-42295-WS	1	2	A03-1	684	4.65	424	30.4	<1.00	24.6	<1.00	<1.00
New-IL-151542-WS	1	3	A06-1	1130	<1.00	689	21.8	<1.00	32.6	<1.00	<1.00
New-IL-456-WS	1	4	A13-1	675	<1.00	478	21.0	<1.00	19.9	<1.00	<1.00
New-OL-8788Mod-WS	1	5	A08-1	538	5.40	384	3.81	<1.00	<1.00	<1.00	<1.00
Sodium sulfate standard for set 1	1	6	sustd1-11	646	<10.0	450	<10.0	<10.0	<10.0	<10.0	<10.0
New-IL-5253-WS	1	7	A17-1	1120	4.07	812	15.2	<1.00	32.4	<1.00	<1.00
New-IL-1721-WS	1	8	A23-1	812	12.6	519	29.5	<1.00	30.4	<1.00	<1.00
EWG-LAW-Centroid-2-WS	1	9	A09-1	571	5.61	331	20.5	<1.00	14.0	<1.00	<1.00
First blank for set 1	1	10	blank11-1	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
New-OL-80309-WS	1	11	A25-1	634	2.16	443	23.3	1.80	36.2	<1.00	<1.00
New-IL-70316-WS	1	12	A14-1	590	<1.00	326	27.7	<1.00	22.7	<1.00	<1.00
New-IL-103151-WS	1	13	A10-1	932	6.64	461	58.9	1.01	42.4	<1.00	<1.00
New-OL-15493-WS	1	14	A24-1	831	<1.00	243	109	<1.00	62.8	<1.00	<1.00
New-OL-90780-WS	1	15	A20-1	355	12.4	196	13.8	1.25	36.1	<1.00	<1.00
Soln Std	1	16	Soln std1-2	80.0	<1.00	<1.00	48.4	<1.00	<1.00	<1.00	<1.00
New-OL-116208Mod-WS	1	17	A19-1	1070	<1.00	627	32.3	<1.00	14.1	<1.00	<1.00
New-OL-100210-WS	1	18	A05-1	725	19.4	324	58.9	1.58	<1.00	<1.00	<1.00
New-IL-87749-WS	1	19	A18-1	917	<1.00	597	20.5	<1.00	39.4	<1.00	<1.00
New-IL-5255-WS	1	20	A04-1	1370	7.62	883	25.1	<1.00	42.8	<1.00	<1.00
Second blank for set 1	1	21	blank12-1	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
New-OL-54017-WS	1	22	A01-1	537	<1.00	354	20.3	<1.00	6.88	<1.00	<1.00
New-OL-14844-WS	1	23	A26-1	712	<1.00	391	36.6	<1.00	46.1	<1.00	<1.00
New-OL-127708Mod-WS	1	24	A07-1	410	<1.00	308	8.69	<1.00	<1.00	<1.00	<1.00
New-OL-17130-WS	1	25	A02-1	667	30.3	323	130	<1.00	62.4	<1.00	<1.00
Sodium sulfate standard for set 1	1	26	sustd1-12	630	<10.0	445	<10.0	<10.0	<10.0	<10.0	<10.0
New-OL-122817-WS	1	27	A28-1	889	<1.00	514	46.2	<1.00	40.1	<1.00	<1.00
New-OL-8445-WS	1	28	A11-1	288	<1.00	223	5.48	<1.00	<1.00	<1.00	<1.00
New-OL-108249Mod-WS	1	29	A21-1	333	2.95	171	18.3	1.05	<1.00	<1.00	<1.00
New-IL-93907-WS	1	30	A22-1	679	4.80	503	12.3	<1.00	3.07	<1.00	<1.00
New-OL-57284-WS	1	31	A15-1	880	10.23	547	19.6	<1.00	40.2	<1.00	<1.00
Sodium sulfate standard for set 1	1	32	sustd1-13	624	<10.0	436	<10.0	<10.0	<10.0	<10.0	<10.0
New-OL-62380-WS	1	33	A27-1	262	<1.00	140	15.4	<1.00	9.62	<1.00	<1.00
New-OL-45748-WS	1	34	A16-1	675	<1.00	471	13.8	<1.00	24.2	<1.00	<1.00
LAW-ORP-LD1-1-WS	1	35	A12-1	1250	<1.00	711	19.1	<1.00	11.2	<1.00	<1.00
Soln Std	1	36	Soln std 1-3	77.9	<1.00	<1.00	47.4	<1.00	<1.00	<1.00	<1.00
Soln Std	2	1	Soln std 2-1	77.1	<1.00	<1.00	47.0	<1.00	<1.00	<1.00	<1.00
New-IL-151542-WS	2	2	A06-2	1140	<1.00	726	22.5	<1.00	34.0	<1.00	<1.00
New-IL-456-WS	2	3	A13-2	632	<1.00	449	20.5	<1.00	19.7	<1.00	<1.00
New-IL-1721-WS	2	4	A23-2	679	13.4	429	30.4	<1.00	31.7	<1.00	<1.00
New-OL-80309-WS	2	5	A25-2	633	2.37	451	22.7	1.92	35.6	<1.00	<1.00
Sodium sulfate standard for set 1	2	6	sustd1-21	638	<10.0	452	<10.0	<10.0	<10.0	<10.0	<10.0
New-IL-93907-WS	2	7	A22-2	714	7.10	547	14.8	<1.00	3.87	<1.00	<1.00
New-OL-122817-WS	2	8	A28-2	851	<1.00	493	51.9	<1.00	46.7	<1.00	<1.00
New-OL-54017-WS	2	9	A01-2	545	<1.00	370	22.3	<1.00	8.02	<1.00	<1.00
First blank for set 1	2	10	blank11-2	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
New-IL-87749-WS	2	11	A18-2	946	<1.00	635	25.6	<1.00	48.2	<1.00	<1.00
New-OL-90780-WS	2	12	A20-2	339	13.8	191	14.5	1.81	37.5	<1.00	<1.00
New-IL-70316-WS	2	13	A14-2	556	<1.00	311	29.2	<1.00	23.9	<1.00	<1.00
New-IL-42295-WS	2	14	A03-2	685	5.25	433	30.0	<1.00	24.8	<1.00	<1.00
New-OL-100210-WS	2	15	A05-2	689	20.2	312	57.0	1.82	<1.00	<1.00	<1.00
Soln Std	2	16	Soln std 2-2	76.7	<1.00	<1.00	48.8	<1.00	<1.00	<1.00	<1.00
New-IL-5255-WS	2	17	A04-2	1320	9.59	899	29.2	1.28	48.4	<1.00	<1.00
New-OL-14844-WS	2	18	A26-2	655	<1.00	371	39.4	<1.00	49.5	<1.00	<1.00
New-OL-116208Mod-WS	2	19	A19-2	1060	<1.00	624	31.3	<1.00	13.9	<1.00	<1.00
New-OL-127708Mod-WS	2	20	A07-2	391	1.20	299	8.90	<1.00	<1.00	<1.00	<1.00
Second blank for set 1	2	21	blank12-2	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
EWG-LAW-Centroid-2-WS	2	22	A09-2	567	6.18	340	20.8	<1.00	14.2	<1.00	<1.00
LAW-ORP-LD1-1-WS	2	23	A12-2	1280	1.23	759	18.6	<1.00	11.1	<1.00	<1.00

Table D-2. Measured Compositions (mg/L) of Wash Solutions by ICP-AES, Part 2 (continued)

Solution Identifier	Block	Sequence	Lab ID	Na	P	S	Si	Sn	V	Zn	Zr
New-OL-8445-WS	2	24	A11-2	261	<1.00	211	5.88	<1.00	<1.00	<1.00	<1.00
New-OL-62380-WS	2	25	A27-2	272	<1.00	151	15.7	<1.00	9.72	<1.00	<1.00
Sodium sulfate standard for set 1	2	26	sustd1-22	615	<10.0	440	<10.0	<10.0	<10.0	<10.0	<10.0
New-IL-5253-WS	2	27	A17-2	1220	4.30	920	15.6	<1.00	32.7	<1.00	<1.00
New-OL-45748-WS	2	28	A16-2	685	<1.00	492	13.4	<1.00	23.2	<1.00	<1.00
New-OL-8788Mod-WS	2	29	A08-2	535	5.45	396	3.49	<1.00	<1.00	<1.00	<1.00
New-IL-103151-WS	2	30	A10-2	817	6.89	418	56.8	1.17	40.6	<1.00	<1.00
New-OL-108249Mod-WS	2	31	A21-2	321	3.67	173	19.9	1.42	<1.00	<1.00	<1.00
Sodium sulfate standard for set 1	2	32	sustd1-23	626	<10.0	447	<10.0	<10.0	<10.0	<10.0	<10.0
New-OL-17130-WS	2	33	A02-2	634	31.9	317	133	<1.00	63.8	<1.00	<1.00
New-OL-57284-WS	2	34	A15-2	829	10.4	524	19.3	<1.00	39.4	<1.00	<1.00
New-OL-15493-WS	2	35	A24-2	813	<1.00	243	99.8	<1.00	59.3	<1.00	<1.00
Soln Std	2	36	Soln std 2-3	74.3	<1.00	<1.00	48.2	<1.00	<1.00	<1.00	<1.00
Soln Std	3	1	Soln std 3-1	84.7	<1.00	<1.00	51.4	<1.00	<1.00	<1.00	<1.00
New-IL-93907-WS	3	2	A22-3	693	5.21	516	13.5	<1.00	3.23	<1.00	<1.00
New-OL-122817-WS	3	3	A28-3	886	<1.00	507	48.7	<1.00	42.2	<1.00	<1.00
New-OL-57284-WS	3	4	A15-3	853	10.7	544	20.6	<1.00	41.6	<1.00	<1.00
New-IL-151542-WS	3	5	A06-3	1180	<1.00	752	23.2	<1.00	34.5	<1.00	<1.00
Sodium sulfate standard for set 1	3	6	sustd1-31	678	<10.0	492	<10.0	<10.0	<10.0	<10.0	<10.0
New-IL-1721-WS	3	7	A23-3	732	13.2	472	31.7	<1.00	32.4	<1.00	<1.00
New-OL-108249Mod-WS	3	8	A21-3	312	2.99	160	19.1	<1.00	<1.00	<1.00	<1.00
New-IL-103151-WS	3	9	A10-3	880	6.39	442	57.7	<1.00	41.7	<1.00	<1.00
First blank for set 1	3	10	blank11-3	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
New-IL-70316-WS	3	11	A14-3	542	<1.00	299	31.0	<1.00	24.7	<1.00	<1.00
New-OL-62380-WS	3	12	A27-3	291	<1.00	160	16.9	<1.00	10.3	<1.00	<1.00
New-OL-116208Mod-WS	3	13	A19-3	1020	<1.00	594	31.5	<1.00	13.9	<1.00	<1.00
New-OL-80309-WS	3	14	A25-3	577	1.99	410	23.2	1.59	36.1	<1.00	<1.00
LAW-ORP-LD1-1-WS	3	15	A12-3	1300	<1.00	767	17.8	<1.00	10.7	<1.00	<1.00
Soln Std	3	16	Soln std 3-2	82.5	<1.00	<1.00	50.9	<1.00	<1.00	<1.00	<1.00
New-IL-456-WS	3	17	A13-3	618	<1.00	431	20.6	<1.00	19.7	<1.00	<1.00
New-OL-100210-WS	3	18	A05-3	660	18.8	293	56.5	1.38	<1.00	<1.00	<1.00
New-OL-17130-WS	3	19	A02-3	628	31.0	313	132	<1.00	63.7	<1.00	<1.00
New-OL-8445-WS	3	20	A11-3	255	<1.00	201	5.84	<1.00	<1.00	<1.00	<1.00
Second blank for set 1	3	21	blank12-3	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
New-OL-14844-WS	3	22	A26-3	655	<1.00	368	38.4	<1.00	48.9	<1.00	<1.00
New-OL-90780-WS	3	23	A20-3	336	13.1	188	14.7	1.14	38.2	<1.00	<1.00
New-IL-5255-WS	3	24	A04-3	1350	8.49	897	27.8	<1.00	47.7	<1.00	<1.00
New-OL-54017-WS	3	25	A01-3	488	<1.00	325	18.9	<1.00	6.44	<1.00	<1.00
Sodium sulfate standard for set 1	3	26	sustd1-32	637	<10.0	455	<10.0	<10.0	<10.0	<10.0	<10.0
New-IL-87749-WS	3	27	A18-3	899	<1.00	598	22.9	<1.00	43.4	<1.00	<1.00
New-IL-5253-WS	3	28	A17-3	1190	3.98	890	16.0	<1.00	33.9	<1.00	<1.00
New-OL-127708Mod-WS	3	29	A07-3	387	<1.00	295	9.33	<1.00	<1.00	<1.00	<1.00
New-OL-8788Mod-WS	3	30	A08-3	504	5.11	364	3.66	<1.00	<1.00	<1.00	<1.00
EWG-LAW-Centroid-2-WS	3	31	A09-3	540	5.86	316	21.9	<1.00	14.8	<1.00	<1.00
Sodium sulfate standard for set 1	3	32	sustd1-33	619	<10.0	441	<10.0	<10.0	<10.0	<10.0	<10.0
New-OL-15493-WS	3	33	A24-3	797	<1.00	238	103	<1.00	61.6	<1.00	<1.00
New-IL-42295-WS	3	34	A03-3	662	4.59	424	30.1	<1.00	24.7	<1.00	<1.00
New-OL-45748-WS	3	35	A16-3	685	<1.00	488	14.9	<1.00	25.7	<1.00	<1.00
Soln Std	3	36	Soln std 3-3	82.4	<1.00	<1.00	51.0	<1.00	<1.00	<1.00	<1.00
Soln Std	4	1	soln std4-1	83.2	<1.00	<1.00	51.1	<1.00	<1.00	<1.00	<1.00
New-OL-62909Mod-PWS	4	2	B07-1	622	1.24	439	3.42	<1.00	<1.00	<1.00	<1.00
Sodium sulfate standard for set 2	4	3	sustd2-41	648	<10.0	459	<10.0	<10.0	<10.0	<10.0	<10.0
New-IL-166731-PWS	4	4	B03-1	777	8.30	536	6.56	<1.00	33.2	<1.00	<1.00
First blank for set 2	4	5	blank21-4	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
LAW-ORP-LD1-2-PWS	4	6	B08-1	893	2.12	549	5.89	<1.00	7.03	<1.00	<1.00
Soln Std	4	7	soln std4-2	82.2	<1.00	<1.00	50.0	<1.00	<1.00	<1.00	<1.00
New-IL-1721-PWS	4	8	B06-1	678	9.35	489	10.8	<1.00	25.2	<1.00	<1.00
Second blank for set 2	4	9	blank22-4	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
New-IL-94020-PWS	4	10	B09-1	689	3.33	554	4.29	<1.00	2.44	<1.00	<1.00
New-IL-166697-PWS	4	11	B04-1	785	10.0	554	6.73	<1.00	35.8	<1.00	<1.00

Table D-2. Measured Compositions (mg/L) of Wash Solutions by ICP-AES, Part 2 (continued)

Sodium sulfate standard for set 2	4	12	sustd2-42	651	<10.0	460	<10.0	<10.0	<10.0	<10.0	<10.0
New-OL-65959Mod-PWS	4	13	B10-1	450	1.61	338	6.12	<1.00	22.7	<1.00	<1.00
New-OL-108249Mod-PWS	4	14	B01-1	756	2.33	554	5.52	<1.00	<1.00	<1.00	<1.00
Sodium sulfate standard for set 2	4	15	sustd2-43	641	<10.0	459	<10.0	<10.0	<10.0	<10.0	<10.0
LAW-ORP-LD1-M-PWS	4	16	B02-1	934	1.78	601	3.51	<1.00	7.45	<1.00	<1.00
New-OL-116208Mod-PWS	4	17	B05-1	809	1.99	526	10.8	<1.00	9.92	<1.00	<1.00
Soln Std	4	18	soln std4-3	80.6	<1.00	<1.00	50.8	<1.00	<1.00	<1.00	<1.00
Soln Std	5	1	soln std5-1	81.1	<1.00	<1.00	50.0	<1.00	<1.00	<1.00	<1.00
New-IL-166731-PWS	5	2	B03-2	774	8.01	535	6.29	<1.00	33.2	<1.00	<1.00
Sodium sulfate standard for set 2	5	3	sustd2-51	635	<10.0	456	<10.0	<10.0	<10.0	<10.0	<10.0
New-OL-65959Mod-PWS	5	4	B10-2	442	1.54	335	5.86	<1.00	22.6	<1.00	<1.00
First blank for set 2	5	5	blank21-5	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
New-OL-62909Mod-PWS	5	6	B07-2	621	1.19	435	3.24	<1.00	<1.00	<1.00	<1.00
Soln Std	5	7	soln std5-2	81.9	<1.00	<1.00	49.8	<1.00	<1.00	<1.00	<1.00
New-OL-116208Mod-PWS	5	8	B05-2	826	1.83	530	10.4	<1.00	9.73	<1.00	<1.00
Second blank for set 2	5	9	blank22-5	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
New-IL-1721-PWS	5	10	B06-2	669	9.12	482	10.3	<1.00	25.2	<1.00	<1.00
New-OL-108249Mod-PWS	5	11	B01-2	771	2.08	569	5.21	<1.00	<1.00	<1.00	<1.00
Sodium sulfate standard for set 2	5	12	sustd2-52	646	<10.0	462	<10.0	<10.0	<10.0	<10.0	<10.0
LAW-ORP-LD1-2-PWS	5	13	B08-2	885	1.95	552	5.68	<1.00	6.93	<1.00	<1.00
New-IL-166697-PWS	5	14	B04-2	807	9.86	574	6.48	<1.00	36.4	<1.00	<1.00
Sodium sulfate standard for set 2	5	15	sustd2-53	652	<10.0	460	<10.0	<10.0	<10.0	<10.0	<10.0
New-IL-94020-PWS	5	16	B09-2	686	3.36	538	4.23	<1.00	2.39	<1.00	<1.00
LAW-ORP-LD1-M-PWS	5	17	B02-2	968	1.55	612	3.26	<1.00	7.36	<1.00	<1.00
Soln Std	5	18	soln std5-3	82.5	<1.00	<1.00	50.0	<1.00	<1.00	<1.00	<1.00
Soln Std	6	1	soln std6-1	80.9	<1.00	<1.00	50.1	<1.00	<1.00	<1.00	<1.00
LAW-ORP-LD1-M-PWS	6	2	B02-3	923	1.90	583	3.38	<1.00	7.26	<1.00	<1.00
Sodium sulfate standard for set 2	6	3	sustd2-61	634	<10.0	447	<10.0	<10.0	<10.0	<10.0	<10.0
New-OL-108249Mod-PWS	6	4	B01-3	743	2.46	545	5.27	<1.00	<1.00	<1.00	<1.00
First blank for set 2	6	5	blank21-6	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
New-IL-166697-PWS	6	6	B04-3	794	10.1	555	6.51	<1.00	35.5	<1.00	<1.00
Soln Std	6	7	soln std6-2	80.9	<1.00	<1.00	50.9	<1.00	<1.00	<1.00	<1.00
New-IL-166731-PWS	6	8	B03-3	772	8.44	533	6.61	<1.00	33.0	<1.00	<1.00
Second blank for set 2	6	9	blank22-6	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
New-OL-65959Mod-PWS	6	10	B10-3	444	2.02	331	5.99	<1.00	22.6	<1.00	<1.00
New-IL-94020-PWS	6	11	B09-3	679	3.67	543	4.31	<1.00	2.54	<1.00	<1.00
Sodium sulfate standard for set 2	6	12	sustd2-62	636	<10.0	451	<10.0	<10.0	<10.0	<10.0	<10.0
New-OL-62909Mod-PWS	6	13	B07-3	608	1.77	432	3.53	<1.00	<1.00	<1.00	<1.00
New-IL-1721-PWS	6	14	B06-3	680	9.52	485	10.4	<1.00	24.8	<1.00	<1.00
Sodium sulfate standard for set 2	6	15	sustd2-63	621	<10.0	434	<10.0	<10.0	<10.0	<10.0	<10.0
New-OL-116208Mod-PWS	6	16	B05-3	835	2.09	532	10.4	<1.00	9.77	<1.00	<1.00
LAW-ORP-LD1-2-PWS	6	17	B08-3	909	2.38	557	5.91	<1.00	7.09	<1.00	<1.00
Soln Std	6	18	soln std6-3	81.6	<1.00	<1.00	49.9	<1.00	<1.00	<1.00	<1.00

Table D-3. Measured Compositions of Wash Solutions by IC

Solution Identifier	Block	Sequence	Lab ID	Cl (mg/L)	F (mg/L)	PO4 (mg/L)	SO4 (mg/L)
Soln Std (IC)	1	1	SOLN STD 1-1	4.90	4.95	4.81	5.31
New-IL-42295-WS	1	2	A03-1	<10.0	<10.0	12.2	1290
New-IL-151542-WS	1	3	A06-1	29.5	13.5	<10.0	2340
New-IL-456-WS	1	4	A13-1	<10.0	<10.0	<10.0	1320
New-OL-8788Mod-WS	1	5	A08-1	38.8	13.9	14.5	1240
Sodium sulfate standard for set 1	1	6	SUSTD 1-11	<10.0	<10.0	<10.0	1390
New-IL-5253-WS	1	7	A17-1	11.3	<10.0	<10.0	2640
New-IL-1721-WS	1	8	A23-1	17.3	11.7	35.3	1460
EWG-LAW-Centroid-2-WS	1	9	A09-1	<10.0	<10.0	12.4	981
First blank for set 1	1	10	BLANK 11-1	<10.0	<10.0	<10.0	<10.0
New-OL-80309-WS	1	11	A25-1	<10.0	<10.0	<10.0	1310
New-IL-70316-WS	1	12	A14-1	<10.0	<10.0	<10.0	956
New-IL-103151-WS	1	13	A10-1	<10.0	<10.0	16.8	1360
New-OL-15493-WS	1	14	A24-1	<10.0	<10.0	<10.0	733
New-OL-90780-WS	1	15	A20-1	11.9	11.4	36.6	569
Soln Std (IC)	1	16	SOLN STD 1-2	4.86	5.14	4.8	4.90
New-OL-116208Mod-WS	1	17	A19-1	49.0	25.8	<10.0	1920
New-OL-100210-WS	1	18	A05-1	23.9	18.9	58.0	946
New-IL-87749-WS	1	19	A18-1	10.0	<10.0	<10.0	1820
New-IL-5255-WS	1	20	A04-1	11.0	<10.0	18.1	2680
Second blank for set 1	1	21	BLANK 12-1	<10.0	<10.0	<10.0	<10.0
New-OL-54017-WS	1	22	A01-1	<10.0	<10.0	<10.0	1080
New-OL-14844-WS	1	23	A26-1	18.2	14.0	<10.0	1090
New-OL-127708Mod-WS	1	24	A07-1	<10.0	<10.0	<10.0	917
New-OL-17130-WS	1	25	A02-1	28.6	24.6	92.8	993
Sodium sulfate standard for set 1	1	26	SUSTD 1-12	<10.0	<10.0	<10.0	1390
New-OL-122817-WS	1	27	A28-1	27.8	15.1	<10.0	1480
New-OL-8445-WS	1	28	A11-1	13.4	<10.0	<10.0	623
New-OL-108249Mod-WS	1	29	A21-1	12.2	10.5	<10.0	492
New-IL-93907-WS	1	30	A22-1	<10.0	<10.0	13.5	1600
New-OL-57284-WS	1	31	A15-1	47.1	<10.0	29.6	1640
Sodium sulfate standard for set 1	1	32	SUSTD 1-13	<10.0	<10.0	<10.0	1390
New-OL-62380-WS	1	33	A27-1	<10.0	<10.0	<10.0	418
New-OL-45748-WS	1	34	A16-1	23.8	19.1	<10.0	1470
LAW-ORP-LD1-1-WS	1	35	A12-1	25.7	<10.0	<10.0	2310
Soln Std (IC)	1	36	SOLN STD 1-3	4.85	5.50	4.85	4.90
Soln Std (IC)	2	1	SOLN STD 2-1	4.90	5.16	4.86	4.92
New-IL-151542-WS	2	2	A06-2	29.7	13.5	<10.0	2330
New-IL-456-WS	2	3	A13-2	<10.0	<10.0	<10.0	1320
New-IL-1721-WS	2	4	A23-2	17.4	11.7	35.7	1460
New-OL-80309-WS	2	5	A25-2	<10.0	<10.0	<10.0	1310
Sodium sulfate standard for set 1	2	6	SUSTD 1-21	<10.0	<10.0	<10.0	1390
New-IL-93907-WS	2	7	A22-2	8.09	<10.0	13.6	1590
New-OL-122817-WS	2	8	A28-2	27.8	15.2	<10.0	1480
New-OL-54017-WS	2	9	A01-2	<10.0	<10.0	<10.0	1080
First blank for set 1	2	10	BLANK 11-2	<10.0	<10.0	<10.0	<10.0
New-IL-87749-WS	2	11	A18-2	10.1	<10.0	<10.0	1810
New-OL-90780-WS	2	12	A20-2	12.0	11.4	36.9	568
New-IL-70316-WS	2	13	A14-2	<10.0	<10.0	<10.0	952
New-IL-42295-WS	2	14	A03-2	<10.0	<10.0	12.6	1280
New-OL-100210-WS	2	15	A05-2	24.1	18.9	58.5	946
Soln Std (IC)	2	16	SOLN STD 2-2	4.90	5.17	4.89	4.89
New-IL-5255-WS	2	17	A04-2	11.1	<10.0	18.4	2680
New-OL-14844-WS	2	18	A26-2	18.3	14.1	<10.0	1080
New-OL-116208Mod-WS	2	19	A19-2	49.4	26.0	<10.0	1920
New-OL-127708Mod-WS	2	20	A07-2	<10.0	<10.0	<10.0	915
Second blank for set 1	2	21	BLANK 12-2	<10.0	<10.0	<10.0	<10.0
EWG-LAW-Centroid-2-WS	2	22	A09-2	<10.0	<10.0	12.7	978

Table D-3. Measured Compositions of Wash Solutions by IC (continued)

Solution Identifier	Block	Sequence	Lab ID	Cl (mg/L)	F (mg/L)	PO4 (mg/L)	SO4 (mg/L)
LAW-ORP-LD1-1-WS	2	23	A12-2	25.9	<10.0	<10.0	2300
New-OL-8445-WS	2	24	A11-2	13.5	<10.0	<10.0	618
New-OL-62380-WS	2	25	A27-2	<10.0	<10.0	<10.0	414
Sodium sulfate standard for set 1	2	26	SUSTD 1-22	<10.0	<10.0	<10.0	1380
New-IL-5253-WS	2	27	A17-2	11.5	<10.0	<10.0	2660
New-OL-45748-WS	2	28	A16-2	23.9	19.2	<10.0	1470
New-OL-8788Mod-WS	2	29	A08-2	39.3	14.0	15.0	1240
New-IL-103151-WS	2	30	A10-2	<10.0	<10.0	17.2	1360
New-OL-108249Mod-WS	2	31	A21-2	12.4	10.6	<10.0	489
Sodium sulfate standard for set 1	2	32	SUSTD 1-23	<10.0	<10.0	<10.0	1380
New-OL-17130-WS	2	33	A02-2	29.0	24.7	93.7	991
New-OL-57284-WS	2	34	A15-2	47.4	<10.0	29.9	1630
New-OL-15493-WS	2	35	A24-2	<10.0	<10.0	<10.0	736
Soln Std (IC)	2	36	SOLN STD 2-3	4.89	5.12	4.91	4.90
Soln Std (IC)	3	1	SOLN STD 3-1	4.94	5.18	4.90	5.03
New-IL-93907-WS	3	2	A22-3	<10.0	<10.0	13.7	1600
New-OL-122817-WS	3	3	A28-3	28.1	15.2	<10.0	1490
New-OL-57284-WS	3	4	A15-3	47.5	<10.0	30.0	1630
New-IL-151542-WS	3	5	A06-3	30.0	13.6	<10.0	2340
Sodium sulfate standard for set 1	3	6	SUSTD 1-31	<10.0	<10.0	<10.0	1410
New-IL-1721-WS	3	7	A23-3	17.7	11.8	36.1	1470
New-OL-108249Mod-WS	3	8	A21-3	12.5	10.6	<10.0	513
New-IL-103151-WS	3	9	A10-3	<10.0	<10.0	17.4	1370
First blank for set 1	3	10	BLANK 11-3	<10.0	<10.0	<10.0	<10.0
New-IL-70316-WS	3	11	A14-3	<10.0	<10.0	<10.0	976
New-OL-62380-WS	3	12	A27-3	<10.0	<10.0	<10.0	437
New-OL-116208Mod-WS	3	13	A19-3	49.8	26.1	<10.0	1920
New-OL-80309-WS	3	14	A25-3	<10.0	<10.0	<10.0	1330
LAW-ORP-LD1-1-WS	3	15	A12-3	26.1	<10.0	<10.0	2300
Soln Std (IC)	3	16	SOLN STD 3-2	4.93	5.21	4.95	5.03
New-IL-456-WS	3	17	A13-3	<10.0	<10.0	<10.0	1330
New-OL-100210-WS	3	18	A05-3	24.2	19.0	59.1	967
New-OL-17130-WS	3	19	A02-3	29.3	24.9	94.5	1010
New-OL-8445-WS	3	20	A11-3	13.7	<10.0	<10.0	643
Second blank for set 1	3	21	BLANK 12-3	<10.0	<10.0	<10.0	<10.0
New-OL-14844-WS	3	22	A26-3	18.5	14.2	<10.0	1100
New-OL-90780-WS	3	23	A20-3	12.1	11.5	37.5	593
New-IL-5255-WS	3	24	A04-3	11.2	<10.0	18.7	2680
New-OL-54017-WS	3	25	A01-3	<10.0	<10.0	<10.0	1100
Sodium sulfate standard for set 1	3	26	SUSTD 1-32	<10.0	<10.0	<10.0	1400
New-IL-87749-WS	3	27	A18-3	10.2	<10.0	<10.0	1820
New-IL-5253-WS	3	28	A17-3	11.6	<10.0	<10.0	2670
New-OL-127708Mod-WS	3	29	A07-3	<10.0	<10.0	<10.0	936
New-OL-8788Mod-WS	3	30	A08-3	39.6	14.0	15.3	1260
EWG-LAW-Centroid-2-WS	3	31	A09-3	10.1	<10.0	13.0	1000
Sodium sulfate standard for set 1	3	32	SUSTD 1-33	<10.0	<10.0	<10.0	1400
New-OL-15493-WS	3	33	A24-3	<10.0	<10.0	<10.0	758
New-IL-42295-WS	3	34	A03-3	<10.0	<10.0	12.9	1290
New-OL-45748-WS	3	35	A16-3	24.0	19.2	<10.0	1490
Soln Std (IC)	3	36	SOLN STD 3-3	4.89	5.14	4.93	5.00
Soln Std (IC)	4	1	soln std4-1	5.05	4.92	4.87	4.62
New-OL-62909Mod-PWS	4	2	B07-1	23.2	<10.0	<100	1210
Sodium sulfate standard for set 2	4	3	sustd2-41	<10.0	<10.0	<100	1280
New-IL-166731-PWS	4	4	B03-1	14.0	12.1	<100	1510
First blank for set 2	4	5	blank21-4	<10.0	<10.0	<100	<100
LAW-ORP-LD1-2-PWS	4	6	B08-1	14.8	<10.0	<100	1540
Soln Std (IC)	4	7	soln std4-2	5.01	4.93	4.60	4.60
New-IL-1721-PWS	4	8	B06-1	15.7	11.3	<100	1360
Second blank for set 2	4	9	blank22-4	<10.0	<10.0	<100	<100

Table D-3. Measured Compositions of Wash Solutions by IC (continued)

Solution Identifier	Block	Sequence	Lab ID	Cl (mg/L)	F (mg/L)	PO4 (mg/L)	SO4 (mg/L)
New-IL-94020-PWS	4	10	B09-1	<10.0	<10.0	<100	1510
New-IL-166697-PWS	4	11	B04-1	16.6	13.0	<100	1570
Sodium sulfate standard for set 2	4	12	sustd2-42	<10.0	<10.0	<100	1270
New-OL-65959Mod-PWS	4	13	B10-1	<10.0	<10.0	<100	936
New-OL-108249Mod-PWS	4	14	B01-1	30.9	24.6	<100	1600
Sodium sulfate standard for set 2	4	15	sustd2-43	<10.0	<10.0	<100	1280
LAW-ORP-LD1-M-PWS	4	16	B02-1	15.2	<10.0	<100	1660
New-OL-116208Mod-PWS	4	17	B05-1	32.4	19.4	<100	1490
Soln Std (IC)	4	18	soln std4-3	4.99	4.87	4.56	4.62
Soln Std (IC)	5	1	soln std5-1	4.97	4.89	4.78	4.58
New-IL-166731-PWS	5	2	B03-2	14.3	12.8	<100	1490
Sodium sulfate standard for set 2	5	3	sustd2-51	<10.0	<10.0	<100	1270
New-OL-65959Mod-PWS	5	4	B10-2	<10.0	<10.0	<100	930
First blank for set 2	5	5	blank21-5	<10.0	<10.0	<100	<100
New-OL-62909Mod-PWS	5	6	B07-2	21.9	<10.0	<100	1190
Soln Std (IC)	5	7	soln std5-2	4.98	4.88	4.55	4.66
New-OL-116208Mod-PWS	5	8	B05-2	32.9	20.0	<100	1550
Second blank for set 2	5	9	blank22-5	<10.0	<10.0	<100	<100
New-IL-1721-PWS	5	10	B06-2	15.1	10.8	<100	1360
New-OL-108249Mod-PWS	5	11	B01-2	30.9	24.7	<100	1550
Sodium sulfate standard for set 2	5	12	sustd2-52	<10.0	<10.0	<100	1280
LAW-ORP-LD1-2-PWS	5	13	B08-2	14.8	<10.0	<100	1520
New-IL-166697-PWS	5	14	B04-2	16.6	13.1	<100	1560
Sodium sulfate standard for set 2	5	15	sustd2-53	<10.0	<10.0	<100	1270
New-IL-94020-PWS	5	16	B09-2	<10.0	<10.0	<100	1510
LAW-ORP-LD1-M-PWS	5	17	B02-2	15.3	<10.0	<100	1650
Soln Std (IC)	5	18	soln std5-3	4.97	4.84	4.60	4.58
Soln Std (IC)	6	1	soln std6-1	5.01	4.89	4.90	4.61
LAW-ORP-LD1-M-PWS	6	2	B02-3	16.2	<10.0	<100	1720
Sodium sulfate standard for set 2	6	3	sustd2-61	<10.0	<10.0	<100	1280
New-OL-108249Mod-PWS	6	4	B01-3	31.4	25.0	<100	1570
First blank for set 2	6	5	blank21-6	<10.0	<10.0	<100	<100
New-IL-166697-PWS	6	6	B04-3	17.0	13.5	<100	1560
Soln Std (IC)	6	7	soln std6-2	5.02	4.88	4.64	4.73
New-IL-166731-PWS	6	8	B03-3	14.4	12.8	<100	1490
Second blank for set 2	6	9	blank22-6	<10.0	<10.0	<100	<100
New-OL-65959Mod-PWS	6	10	B10-3	<10.0	<10.0	<100	1010
New-IL-94020-PWS	6	11	B09-3	<10.0	<10.0	<100	1520
Sodium sulfate standard for set 2	6	12	sustd2-62	<10.0	<10.0	<100	1270
New-OL-62909Mod-PWS	6	13	B07-3	22.2	<10.0	<100	1200
New-IL-1721-PWS	6	14	B06-3	15.2	10.9	<100	1370
Sodium sulfate standard for set 2	6	15	sustd2-63	<10.0	<10.0	<100	1280
New-OL-116208Mod-PWS	6	16	B05-3	33.7	19.7	<100	1530
LAW-ORP-LD1-2-PWS	6	17	B08-3	15.0	<10.0	<100	1530
Soln Std (IC)	6	18	soln std6-3	5.00	4.89	4.58	4.64

Table D-4. Average Compositions of the Solution Standards

Solution Identifier	Analyte	Analysis	Reference Value (mg/L)	Number of Measurements	Mean (Measurement (mg/L))	Indicator (0=>BDL)
Soln Std (IC)	Cl (mg/L)	IC	5	18	4.9	1
Soln Std (IC)	F (mg/L)	IC	5	18	5.0	1
Soln Std (IC)	PO4 (mg/L)	IC	5	18	4.8	1
Soln Std (IC)	SO4 (mg/L)	IC	5	18	4.8	1
Soln Std (ICP)	Al (mg/L)	ICP	4	18	3.9	1
Soln Std (ICP)	B (mg/L)	ICP	20	18	20.2	1
Soln Std (ICP)	Ca (mg/L)	ICP	-	18	1.0	0
Soln Std (ICP)	Cr (mg/L)	ICP	-	18	0.1	0
Soln Std (ICP)	Fe (mg/L)	ICP	4	18	3.8	1
Soln Std (ICP)	K (mg/L)	ICP	10	18	9.7	1
Soln Std (ICP)	Li (mg/L)	ICP	10	18	9.6	1
Soln Std (ICP)	Mg (mg/L)	ICP	-	18	1.0	0
Soln Std (ICP)	Na (mg/L)	ICP	81	18	80.4	1
Soln Std (ICP)	P (mg/L)	ICP	-	18	1.0	0
Soln Std (ICP)	PO4 (mg/L)	ICP	-	18	3.1	0
Soln Std (ICP)	S (mg/L)	ICP	-	18	1.0	0
Soln Std (ICP)	Si (mg/L)	ICP	50	18	49.6	1
Soln Std (ICP)	Sn (mg/L)	ICP	-	18	1.0	0
Soln Std (ICP)	SO4 (mg/L)	ICP	-	18	3.0	0
Soln Std (ICP)	V (mg/L)	ICP	-	18	1.0	0
Soln Std (ICP)	Zn (mg/L)	ICP	-	18	1.0	0
Soln Std (ICP)	Zr (mg/L)	ICP	-	18	1.0	0

Table D-5. Average Composition (mg/L) of Wash Solutions by Solution Identifier, Part 1

Solution Identifier	Al [ICP]	B [ICP]	Ca [ICP]	Cl [IC]	Cr [ICP]	F [IC]	Fe [ICP]	K [ICP]	Li [ICP]	Mg [ICP]	Na [ICP]
EWG-LAW-Centroid-2-WS	1.6	20.5	2.3	<10.00	4.8	<10.00	<1.00	11.3	11.4	<1.00	559.3
First blank for set 1	<1.00	<1.00	<1.00	<10.00	<0.10	<10.00	<1.00	<1.00	<1.00	<1.00	<1.00
First blank for set 2	<1.00	<1.00	<1.00	<10.00	<0.10	<10.00	<1.00	<1.00	<1.00	<1.00	<1.00
LAW-ORP-LD1-1-WS	1.4	41.3	16.1	25.9	45.6	<10.00	<1.00	12.6	<1.00	<1.00	1,276.7
LAW-ORP-LD1-2-PWS	<1.00	20.9	18.2	14.9	41.0	<10.00	<1.00	10.4	<1.00	<1.00	895.7
LAW-ORP-LD1-M-PWS	1.3	16.2	24.9	15.6	51.5	<10.00	<1.00	9.9	<1.00	<1.00	941.7
New-IL-103151-WS	<1.10	35.7	<1.00	<10.00	4.5	<10.00	<1.00	37.0	8.2	<1.00	876.3
New-IL-151542-WS	<1.00	27.0	21.8	29.7	14.9	13.5	<1.00	15.9	13.5	<1.00	1,150.0
New-IL-166697-PWS	<1.00	16.9	7.0	16.7	15.1	13.2	<1.00	48.4	31.0	<1.00	795.3
New-IL-166731-PWS	<1.10	14.2	7.0	14.2	16.3	12.6	<1.00	11.3	29.9	<1.00	774.3
New-IL-1721-PWS	<1.00	17.2	7.2	15.3	8.8	11.0	<1.00	38.8	29.5	<1.00	675.7
New-IL-1721-WS	<1.00	28.4	2.2	17.5	7.5	11.7	<1.00	33.4	31.3	<1.00	741.0
New-IL-42295-WS	<1.10	29.0	1.8	<10.00	2.9	<10.00	<1.00	7.2	27.3	<1.00	677.0
New-IL-456-WS	<1.00	13.3	13.1	<10.00	3.6	<10.00	<1.00	10.3	25.5	<1.00	641.7
New-IL-5253-WS	<1.00	29.0	5.7	11.5	5.3	<10.00	<1.00	15.9	63.1	<1.00	1,176.7
New-IL-5255-WS	1.7	43.6	3.9	11.1	7.9	<10.00	<1.00	17.9	52.8	<1.00	1,346.7
New-IL-70316-WS	<1.10	18.4	4.7	<10.00	3.3	<10.00	<1.00	32.2	5.3	<1.00	562.7
New-IL-87749-WS	3.5	23.0	4.0	10.1	8.2	<10.00	<1.00	70.7	31.9	<1.00	920.7
New-IL-93907-WS	1.7	20.6	4.6	<9.40	3.4	<10.00	<1.00	39.5	36.0	<1.00	695.3
New-IL-94020-PWS	<1.00	7.6	11.2	<10.00	5.3	<10.00	<1.00	11.3	34.9	<1.00	684.7
New-OL-100210-WS	<1.00	16.4	<1.00	24.1	8.5	18.9	<1.00	<1.00	<0.70	<1.00	691.3
New-OL-108249Mod-PWS	1.5	8.1	10.1	31.1	39.5	24.8	<1.00	123.3	27.9	<1.00	756.7
New-OL-108249Mod-WS	5.8	10.2	<1.10	12.4	11.2	10.6	<1.00	34.7	20.4	<1.00	322.0
New-OL-116208Mod-PWS	<1.00	8.9	7.2	33.0	38.3	19.7	<1.00	2.2	25.3	<1.00	823.3
New-OL-116208Mod-WS	<1.00	18.9	1.9	49.4	43.8	26.0	<1.00	2.2	43.5	<1.00	1,050.0
New-OL-122817-WS	<1.00	16.5	9.0	27.9	15.1	15.2	<1.00	66.6	<1.00	<1.00	875.3
New-OL-127708Mod-WS	<1.00	13.4	<1.00	<10.00	<0.10	<10.00	<1.00	22.8	16.0	<1.00	396.0
New-OL-14844-WS	<1.10	18.7	5.3	18.3	32.6	14.1	<1.00	88.9	36.5	<1.00	674.0
New-OL-15493-WS	<1.00	28.8	13.6	<10.00	2.5	<10.00	<1.00	53.1	<1.00	<1.00	813.7
New-OL-17130-WS	<1.00	76.1	<1.00	29.0	5.6	24.7	<1.00	<1.00	68.2	<1.00	643.0
New-OL-45748-WS	4.5	10.8	8.4	23.9	25.9	19.2	<1.00	1.1	48.2	<1.00	681.7
New-OL-54017-WS	<1.00	8.1	31.1	<10.00	<0.10	<10.00	<1.00	<1.10	<1.00	<1.20	523.3
New-OL-57284-WS	<1.00	25.3	13.6	47.3	5.5	<10.00	<1.00	48.0	<1.00	<1.00	854.0
New-OL-62380-WS	<1.00	22.4	16.1	<10.00	0.6	<10.00	<1.00	25.5	<1.00	<1.00	275.0
New-OL-62909Mod-PWS	1.2	4.4	15.5	22.4	4.7	<10.00	<1.00	1.4	10.6	<1.00	617.0
New-OL-65959Mod-PWS	2.3	12.3	<1.00	<10.00	<0.20	<10.00	<1.00	<1.00	28.3	<1.00	445.3
New-OL-80309-WS	<1.00	37.3	<1.00	<10.00	1.4	<10.00	<1.00	52.9	44.4	<1.00	614.7
New-OL-8445-WS	1.6	13.4	23.2	13.5	4.3	<10.00	<1.00	37.0	11.7	<1.00	268.0
New-OL-8788Mod-WS	<1.00	5.2	<1.00	39.2	4.1	14.0	<1.00	32.4	23.7	<1.00	525.7
New-OL-90780-WS	5.3	31.6	<1.00	12.0	8.2	11.4	<1.00	16.4	34.2	<1.00	343.3

Table D-5. Average Composition (mg/L) of Wash Solutions by Solution Identifier, Part 1 (continued)

Solution Identifier	Al [ICP]	B [ICP]	Ca [ICP]	Cl [IC]	Cr [ICP]	F [IC]	Fe [ICP]	K [ICP]	Li [ICP]	Mg [ICP]	Na [ICP]
Second blank for set 1	<1.00	<1.00	<1.00	<10.00	<0.10	<10.00	<1.00	<1.00	<1.00	<1.00	<1.00
Second blank for set 2	<1.00	<1.00	<1.00	<10.00	<0.10	<10.00	<1.00	<1.00	<1.00	<1.00	<1.00
Sodium sulfate standard for set 1	<10.00	<10.00	<10.00	<10.00	<1.00	<10.00	<10.00	<10.00	<10.00	<10.00	634.8
Sodium sulfate standard for set 2	<10.00	<10.00	<10.00	<10.00	<1.00	<10.00	<10.00	<10.00	<10.00	<10.00	640.4

Table D-6. Average Composition (mg/L) of Wash Solutions by Solution Identifier, Part 2

Solution Identifier	P [ICP]	PO4 [IC]	PO4 [ICP]	S [ICP]	Si [ICP]	Sn [ICP]	SO4 [IC]	SO4 [ICP]	V [ICP]	Zn [ICP]	Zr [ICP]
EWG-LAW-Centroid-2-WS	5.9	12.7	18.0	329.0	21.1	<1.00	986.3	985.7	14.3	<1.00	<1.00
First blank for set 1	<1.00	<10.00	<3.10	<1.00	<1.00	<1.00	<10.00	<3.00	<1.00	<1.00	<1.00
First blank for set 2	<1.00	<100.00	<3.10	<1.00	<1.00	<1.00	<100.00	<3.00	<1.00	<1.00	<1.00
LAW-ORP-LD1-1-WS	<1.10	<10.00	<3.30	745.7	18.5	<1.00	2,303.3	2,233.9	11.0	<1.00	<1.00
LAW-ORP-LD1-2-PWS	2.2	<100.00	6.6	552.7	5.8	<1.00	1,530.0	1,655.7	7.0	<1.00	<1.00
LAW-ORP-LD1-M-PWS	1.7	<100.00	5.3	598.7	3.4	<1.00	1,676.7	1,793.5	7.4	<1.00	<1.00
New-IL-103151-WS	6.6	17.1	20.4	440.3	57.8	<1.10	1,363.3	1,319.2	41.6	<1.00	<1.00
New-IL-151542-WS	<1.00	<10.00	<3.10	722.3	22.5	<1.00	2,336.7	2,164.0	33.7	<1.00	<1.00
New-IL-166697-PWS	10.0	<100.00	30.6	561.0	6.6	<1.00	1,563.3	1,680.7	35.9	<1.00	<1.00
New-IL-166731-PWS	8.3	<100.00	25.3	534.7	6.5	<1.00	1,496.7	1,601.8	33.1	<1.00	<1.00
New-IL-1721-PWS	9.3	<100.00	28.6	485.3	10.5	<1.00	1,363.3	1,454.0	25.1	<1.00	<1.00
New-IL-1721-WS	13.1	35.7	40.1	473.3	30.5	<1.00	1,463.3	1,418.1	31.5	<1.00	<1.00
New-IL-42295-WS	4.8	12.6	14.8	427.0	30.2	<1.00	1,286.7	1,279.2	24.7	<1.00	<1.00
New-IL-456-WS	<1.00	<10.00	<3.10	452.7	20.7	<1.00	1,323.3	1,356.1	19.8	<1.00	<1.00
New-IL-5253-WS	4.1	<10.00	12.6	874.0	15.6	<1.00	2,656.7	2,618.4	33.0	<1.00	<1.00
New-IL-5255-WS	8.6	18.4	26.3	893.0	27.4	<1.10	2,680.0	2,675.3	46.3	<1.00	<1.00
New-IL-70316-WS	<1.00	<10.00	<3.10	312.0	29.3	<1.00	961.3	934.7	23.8	<1.00	<1.00
New-IL-87749-WS	<1.00	<10.00	<3.10	610.0	23.0	<1.00	1,816.7	1,827.5	43.7	<1.00	<1.00
New-IL-93907-WS	5.7	13.6	17.5	522.0	13.5	<1.00	1,596.7	1,563.9	3.4	<1.00	<1.00
New-IL-94020-PWS	3.5	<100.00	10.6	545.0	4.3	<1.00	1,513.3	1,632.8	2.5	<1.00	<1.00
New-OL-100210-WS	19.5	58.5	59.7	309.7	57.5	1.6	953.0	927.7	<1.00	<1.00	<1.00
New-OL-108249Mod-PWS	2.3	<100.00	7.0	556.0	5.3	<1.00	1,573.3	1,665.7	<1.00	<1.00	<1.00
New-OL-108249Mod-WS	3.2	<10.00	9.8	168.0	19.1	<1.20	498.0	503.3	<1.00	<1.00	<1.00
New-OL-116208Mod-PWS	2.0	<100.00	6.0	529.3	10.5	<1.00	1,523.3	1,585.8	9.8	<1.00	<1.00
New-OL-116208Mod-WS	<1.00	<10.00	<3.10	615.0	31.7	<1.00	1,920.0	1,842.5	14.0	<1.00	<1.00
New-OL-122817-WS	<1.00	<10.00	<3.10	504.7	48.9	<1.00	1,483.3	1,511.9	43.0	<1.00	<1.00
New-OL-127708Mod-WS	<1.10	<10.00	<3.30	300.7	9.0	<1.00	922.7	900.8	<1.00	<1.00	<1.00
New-OL-14844-WS	<1.00	<10.00	<3.10	376.7	38.1	<1.00	1,090.0	1,128.5	48.2	<1.00	<1.00
New-OL-15493-WS	<1.00	<10.00	<3.10	241.3	103.9	<1.00	742.3	723.0	61.2	<1.00	<1.00
New-OL-17130-WS	31.1	93.7	95.3	317.7	131.7	<1.00	998.0	951.7	63.3	<1.00	<1.00
New-OL-45748-WS	<1.00	<10.00	<3.10	483.7	14.0	<1.00	1,476.7	1,449.0	24.4	<1.00	<1.00
New-OL-54017-WS	<1.00	<10.00	<3.10	349.7	20.5	<1.00	1,086.7	1,047.6	7.1	<1.00	<1.00
New-OL-57284-WS	10.4	29.8	32.0	538.3	19.8	<1.00	1,633.3	1,612.8	40.4	<1.00	<1.00
New-OL-62380-WS	<1.00	<10.00	<3.10	150.3	16.0	<1.00	423.0	450.4	9.9	<1.00	<1.00
New-OL-62909Mod-PWS	1.4	<100.00	4.3	435.3	3.4	<1.00	1,200.0	1,304.2	<1.00	<1.00	<1.00
New-OL-65959Mod-PWS	1.7	<100.00	5.3	334.7	6.0	<1.00	958.7	1,002.6	22.6	<1.00	<1.00
New-OL-80309-WS	2.2	<10.00	6.7	434.7	23.1	1.8	1,316.7	1,302.2	36.0	<1.00	<1.00
New-OL-8445-WS	<1.00	<10.00	<3.10	211.7	5.7	<1.00	628.0	634.1	<1.00	<1.00	<1.00
New-OL-8788Mod-WS	5.3	14.9	16.3	381.3	3.7	<1.00	1,246.7	1,142.4	<1.00	<1.00	<1.00
New-OL-90780-WS	13.1	37.0	40.2	191.7	14.3	1.4	576.7	574.2	37.3	<1.00	<1.00

Table D-6. Average Composition (mg/L) of Wash Solutions by Solution Identifier, Part 2 (continued)

Solution Identifier	P [ICP]	PO4 [IC]	PO4 [ICP]	S [ICP]	Si [ICP]	Sn [ICP]	SO4 [IC]	SO4 [ICP]	V [ICP]	Zn [ICP]	Zr [ICP]
Second blank for set 1	<1.00	<10.00	<3.10	<1.00	<1.00	<1.00	<10.00	<3.00	<1.00	<1.00	<1.00
Second blank for set 2	<1.00	<100.00	<3.10	<1.00	<1.00	<1.00	<100.00	<3.00	<1.00	<1.00	<1.00
Sodium sulfate standard for set 1	<10.00	<10.00	<30.70	450.9	<10.00	<10.00	1,392.2	1,350.8	<10.00	<10.00	<10.00
Sodium sulfate standard for set 2	<10.00	<100.00	<30.70	454.2	<10.00	<10.00	1,275.6	1,360.8	<10.00	<10.00	<10.00

Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block

Analyte=Al (mg/L), Analysis=ICP, Blk=1
Variability Chart for Measurement (mg/L)

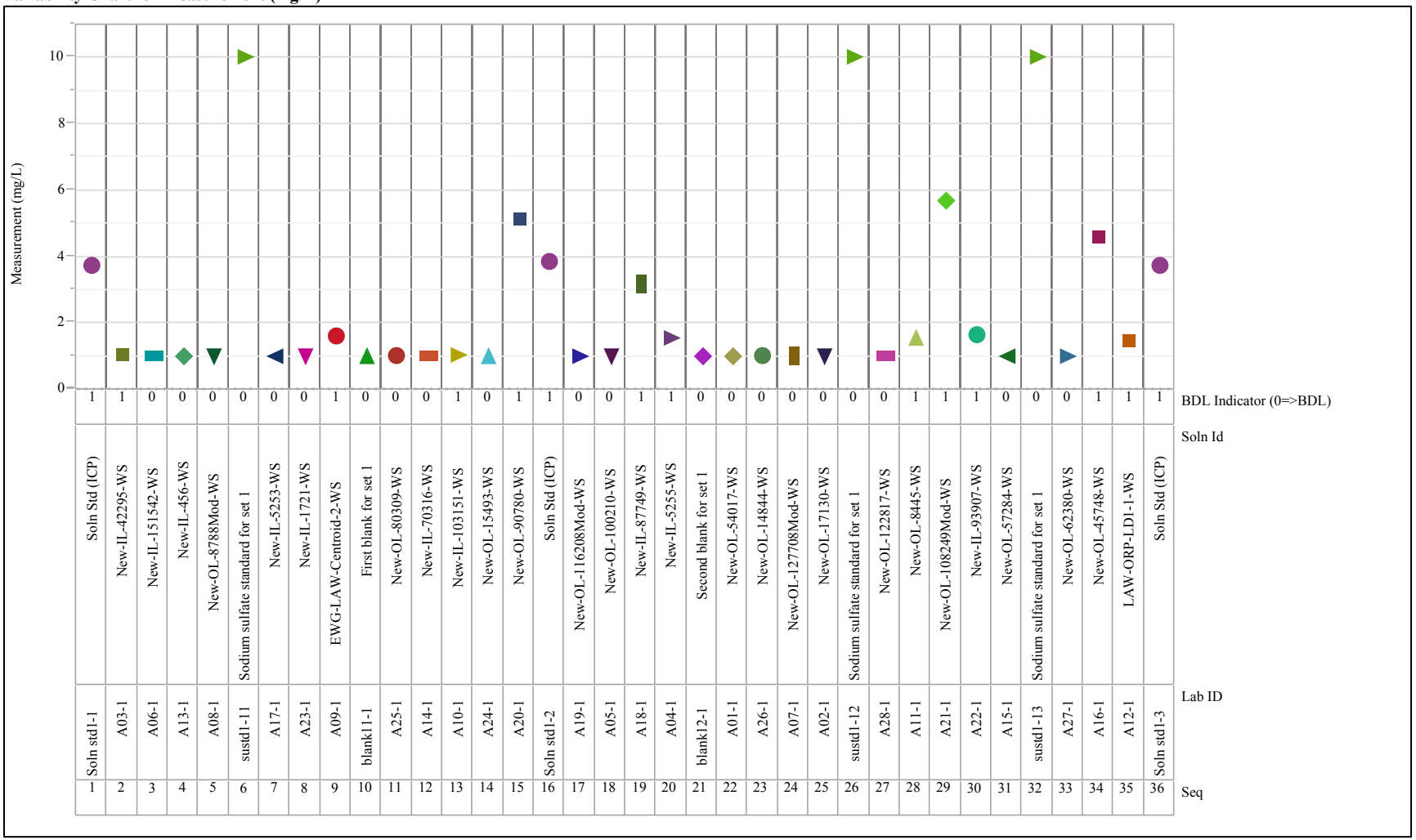


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Al (mg/L), Analysis=ICP, Blk=2
Variability Chart for Measurement (mg/L)

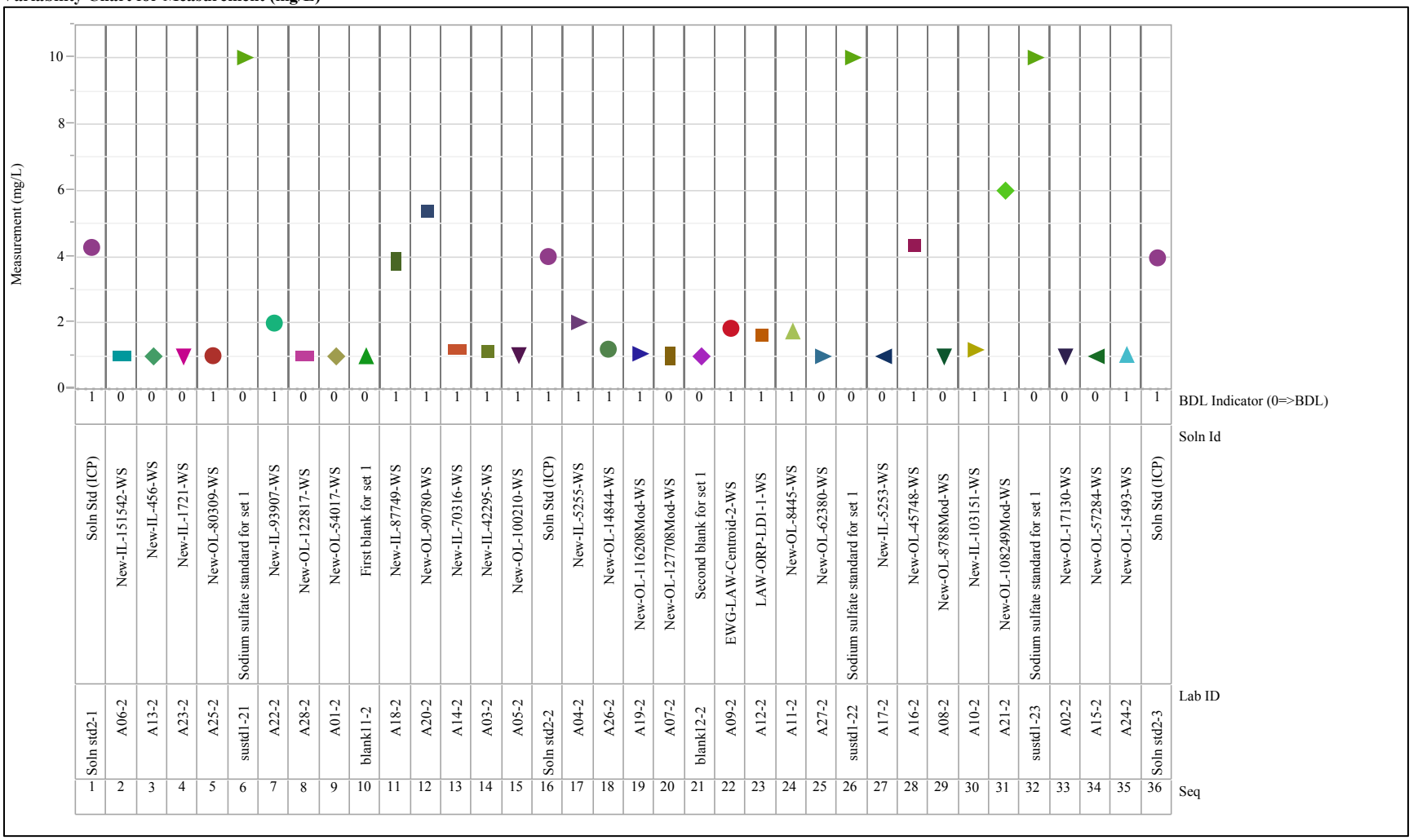


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Al (mg/L), Analysis=ICP, Blk=3
Variability Chart for Measurement (mg/L)

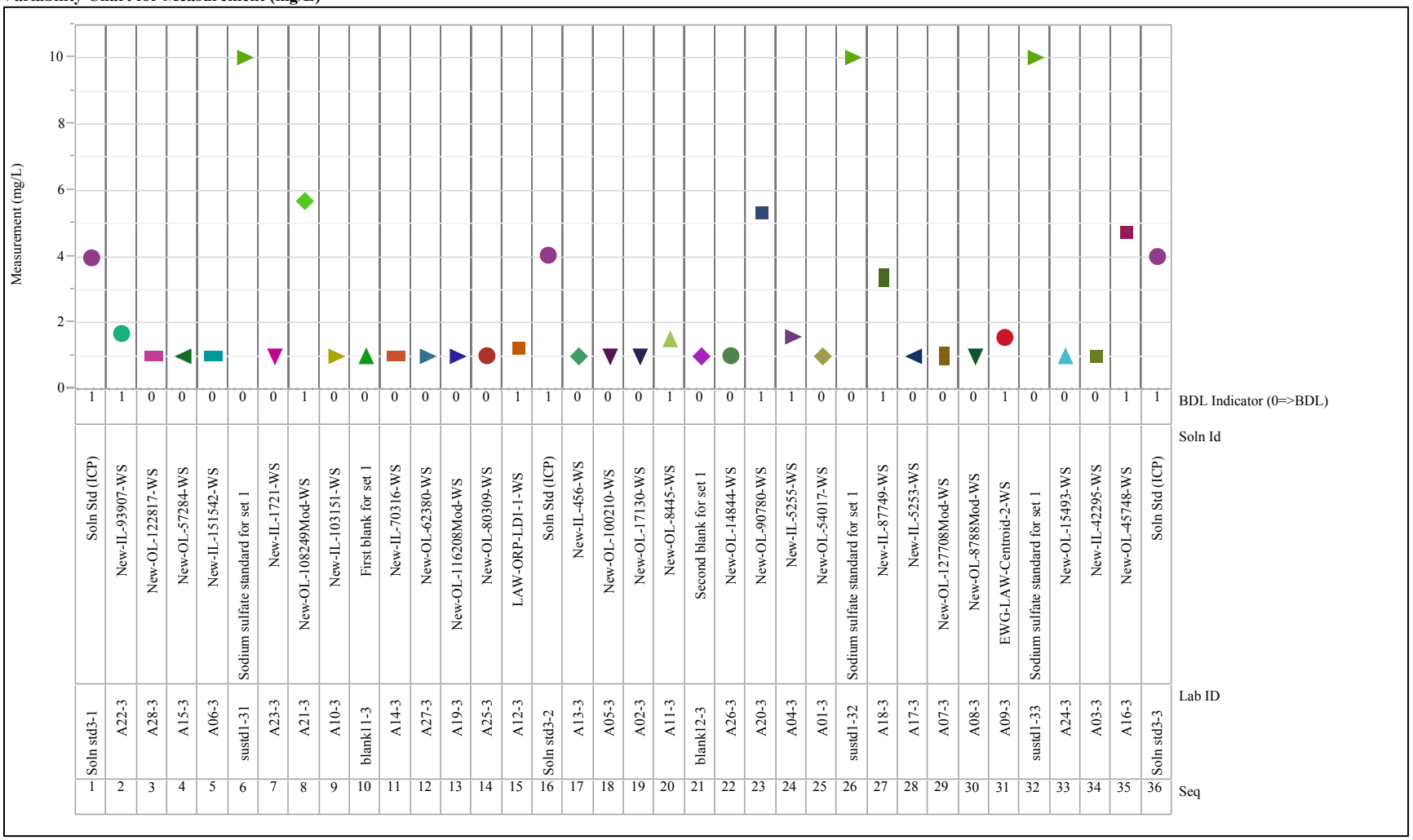


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Al (mg/L), Analysis=ICP, Blk=4
Variability Chart for Measurement (mg/L)

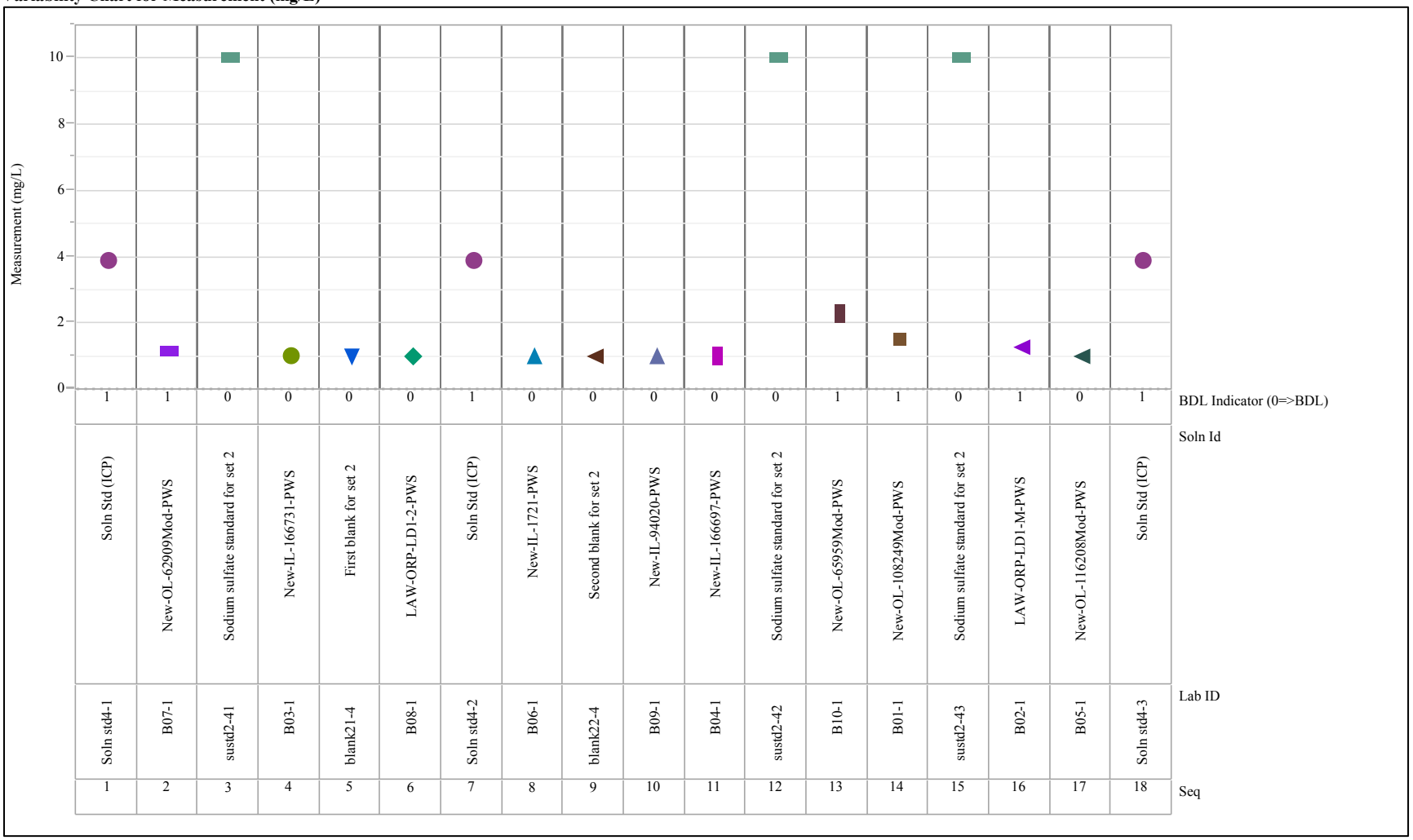


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Al (mg/L), Analysis=ICP, Blk=5
Variability Chart for Measurement (mg/L)

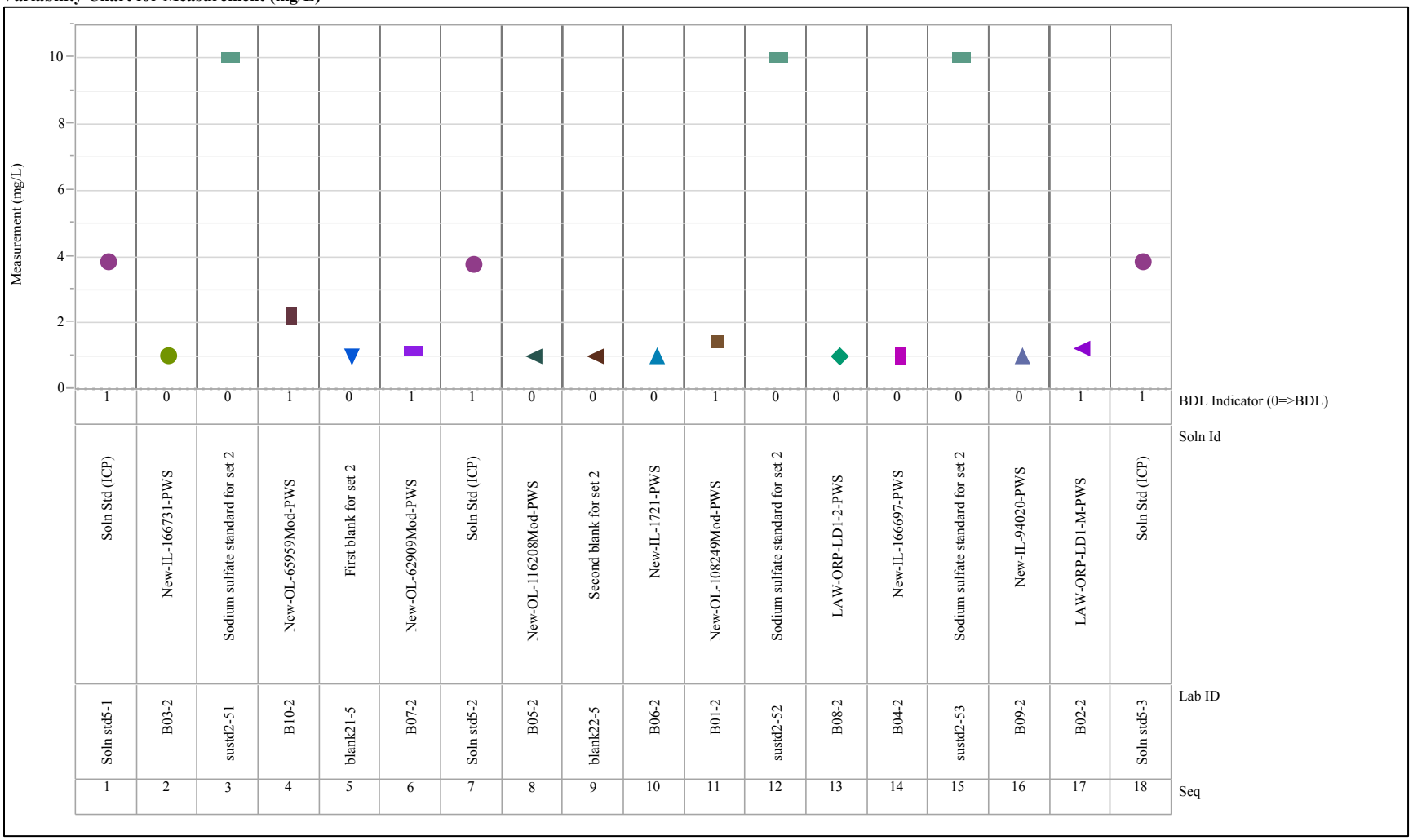


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Al (mg/L), Analysis=ICP, Blk=6
Variability Chart for Measurement (mg/L)

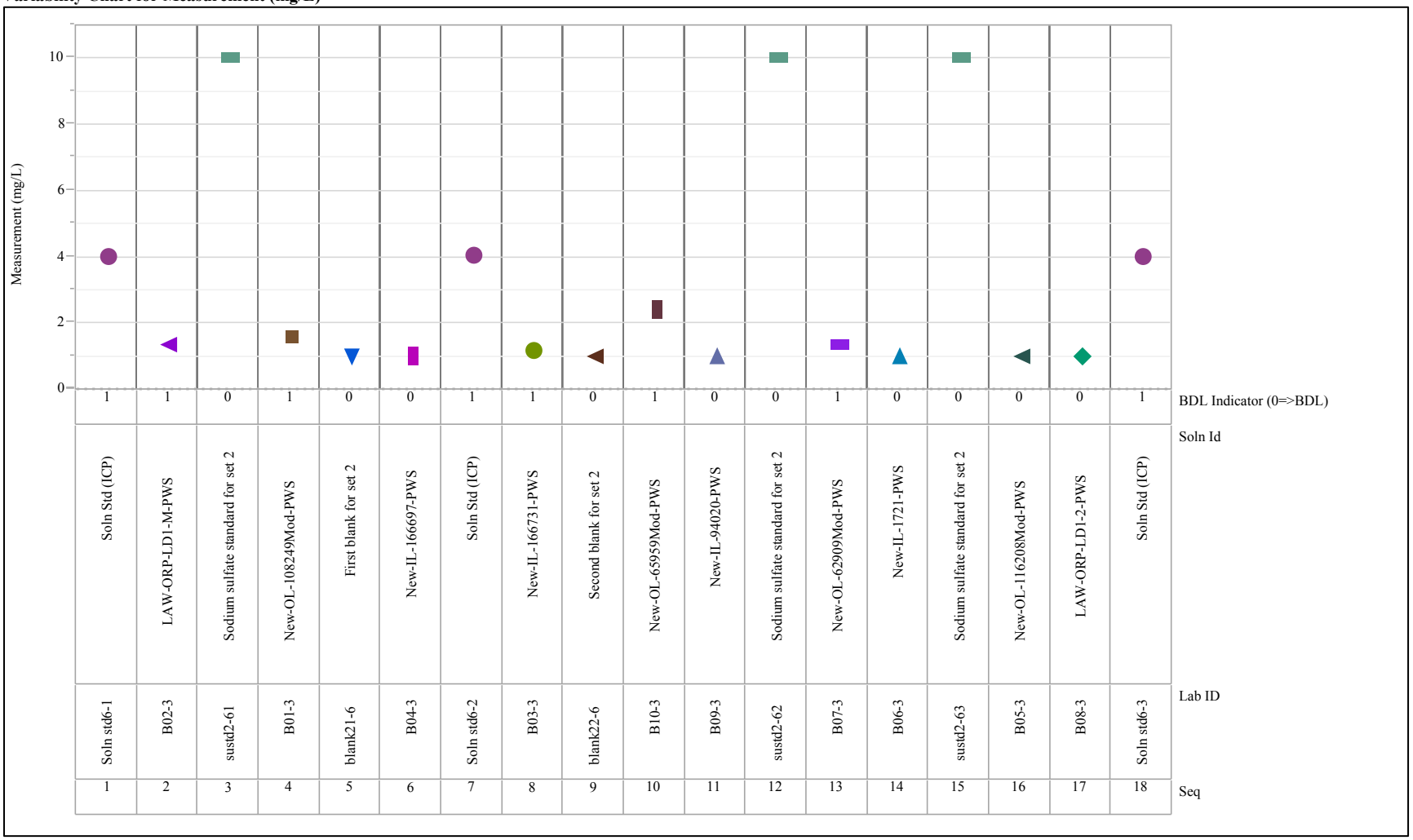


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=B (mg/L), Analysis=ICP, Blk=1
Variability Chart for Measurement (mg/L)

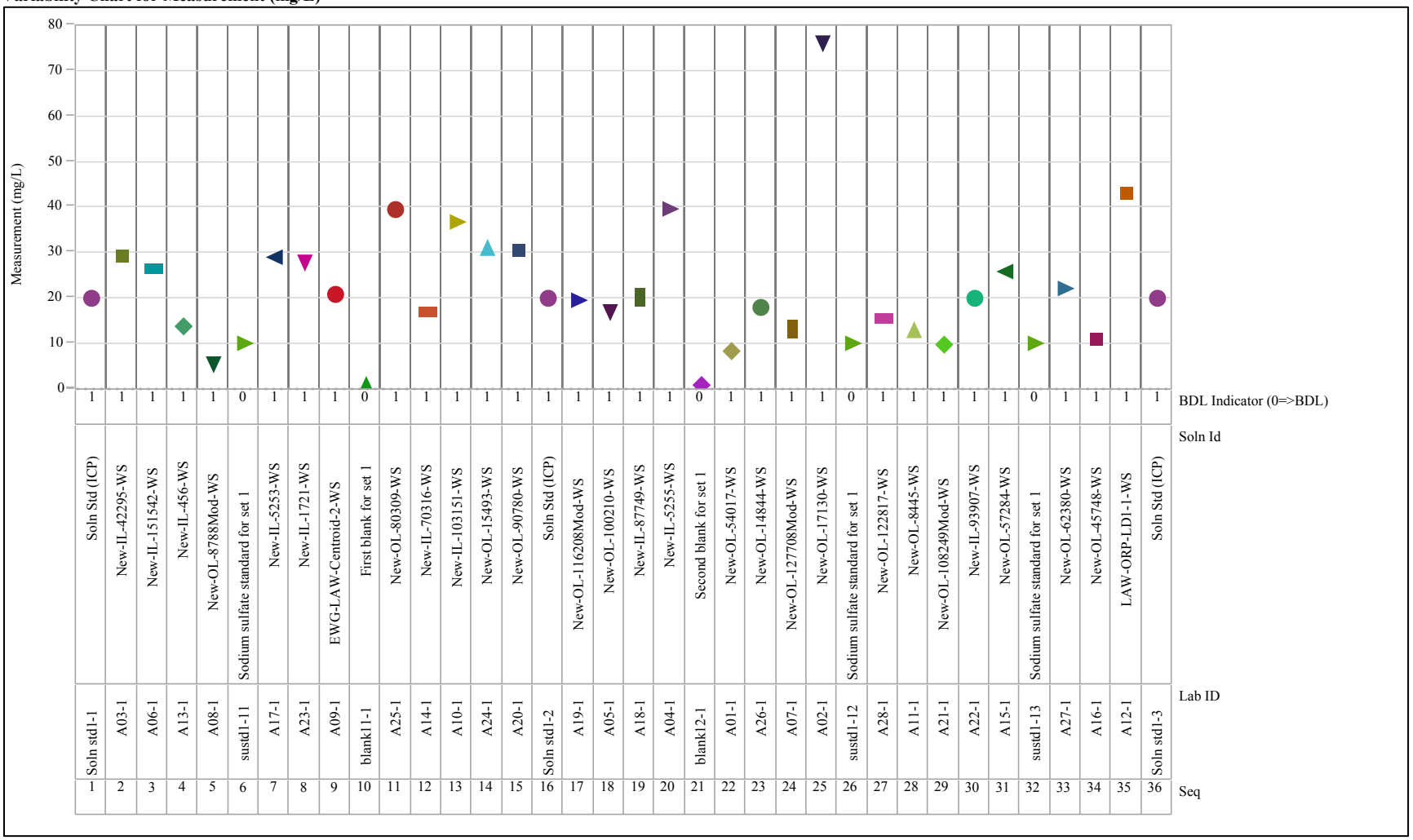


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=B (mg/L), Analysis=ICP, Blk=2
Variability Chart for Measurement (mg/L)

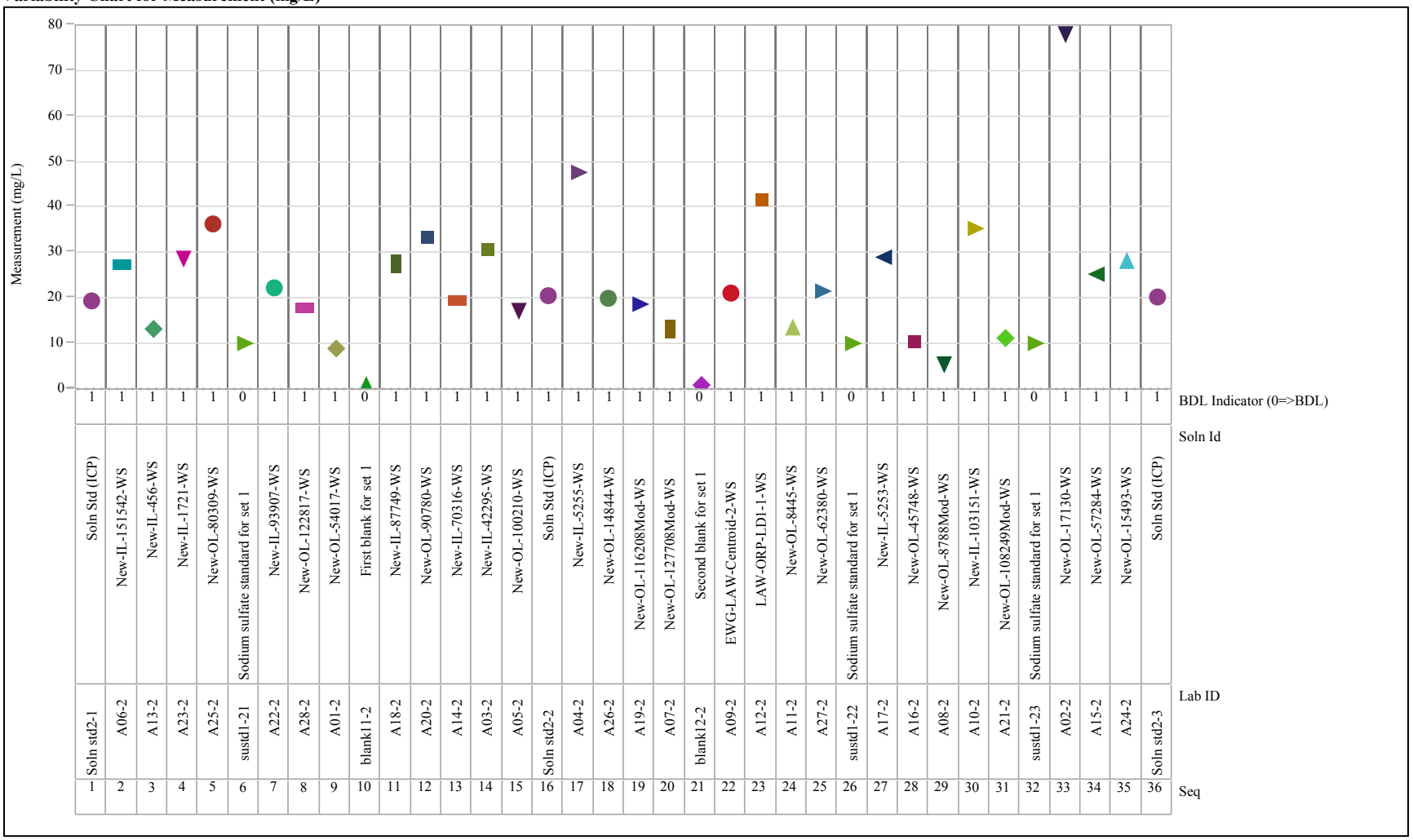


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=B (mg/L), Analysis=ICP, Blk=3
Variability Chart for Measurement (mg/L)

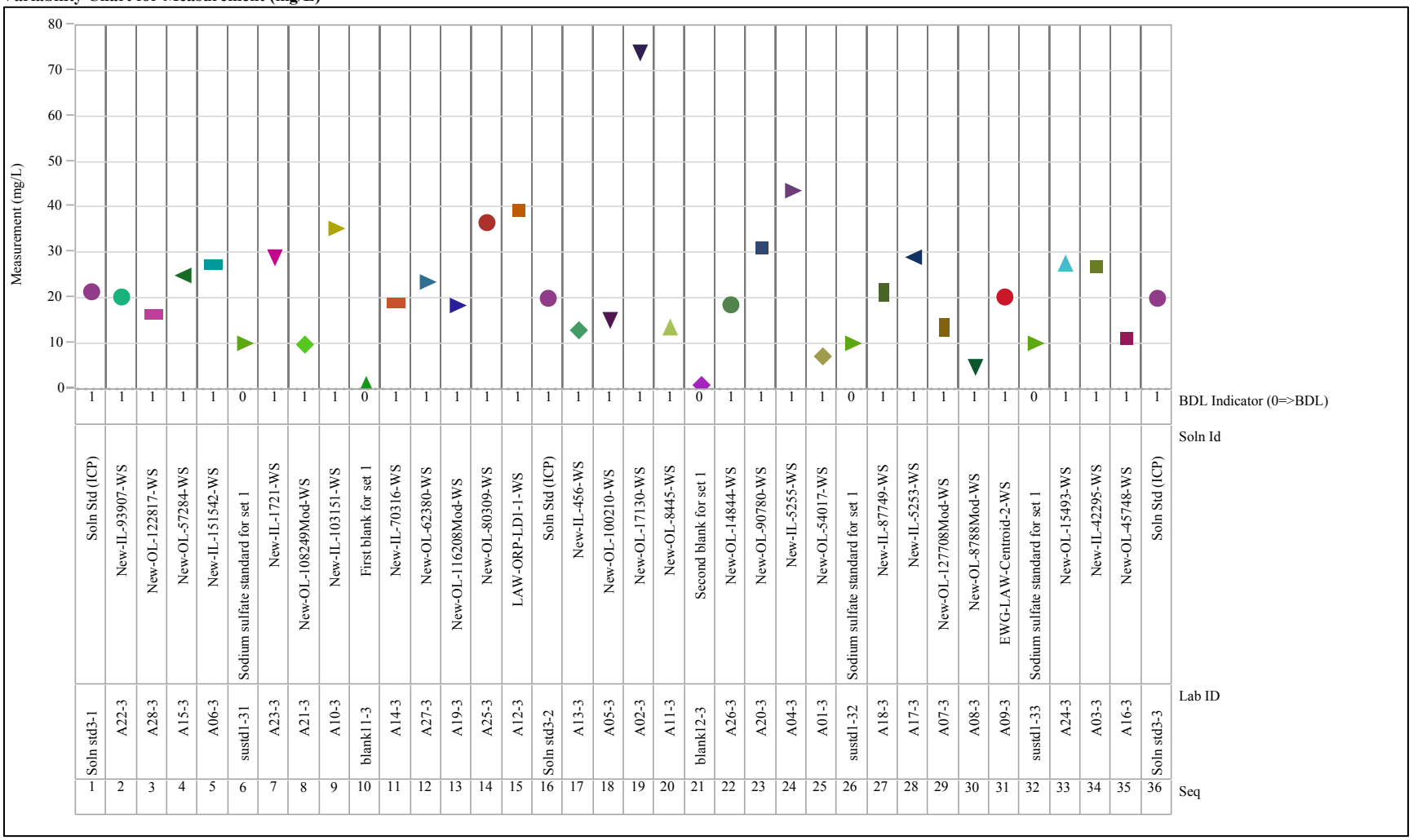


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=B (mg/L), Analysis=ICP, Blk=4
Variability Chart for Measurement (mg/L)

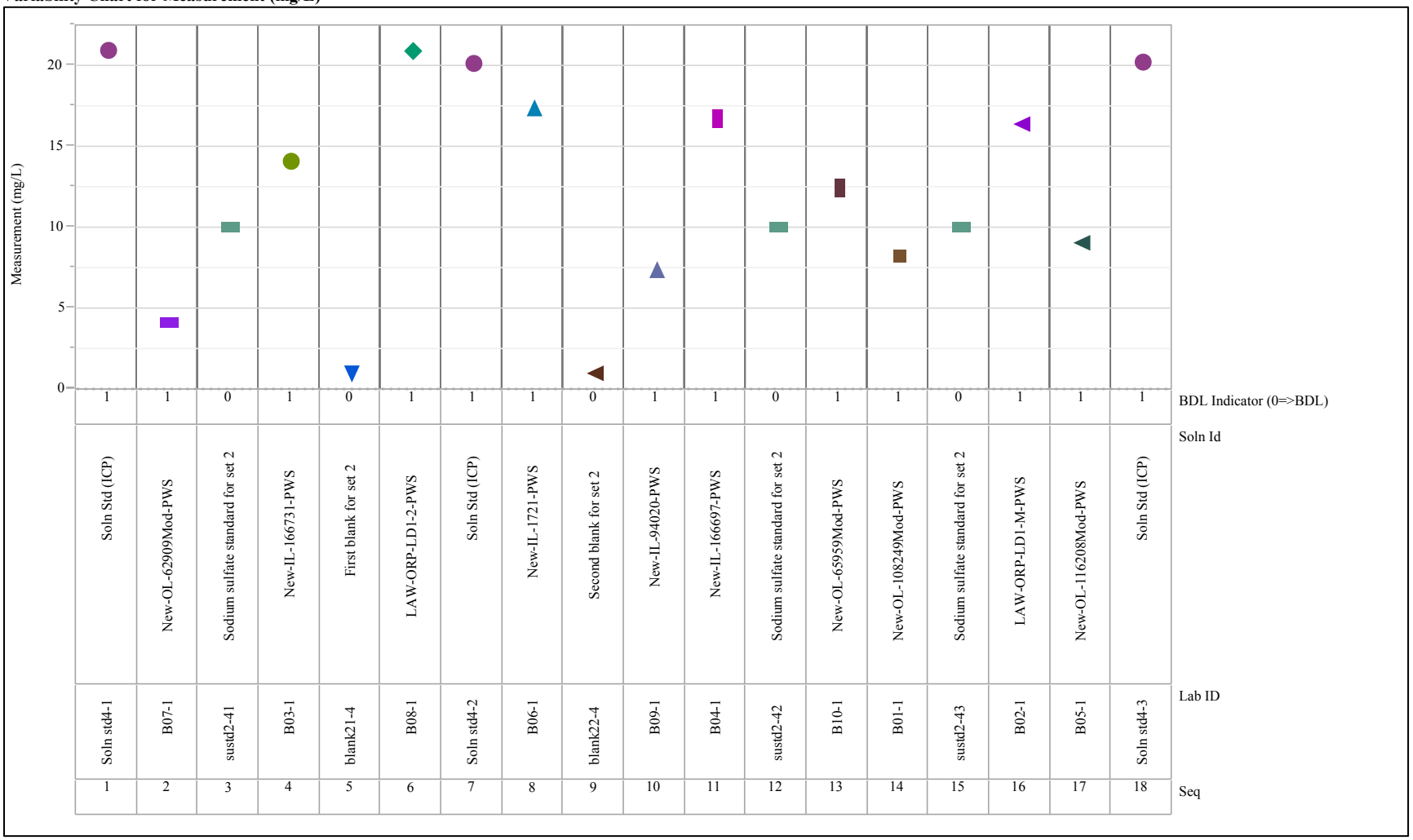


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=B (mg/L), Analysis=ICP, Blk=5
Variability Chart for Measurement (mg/L)

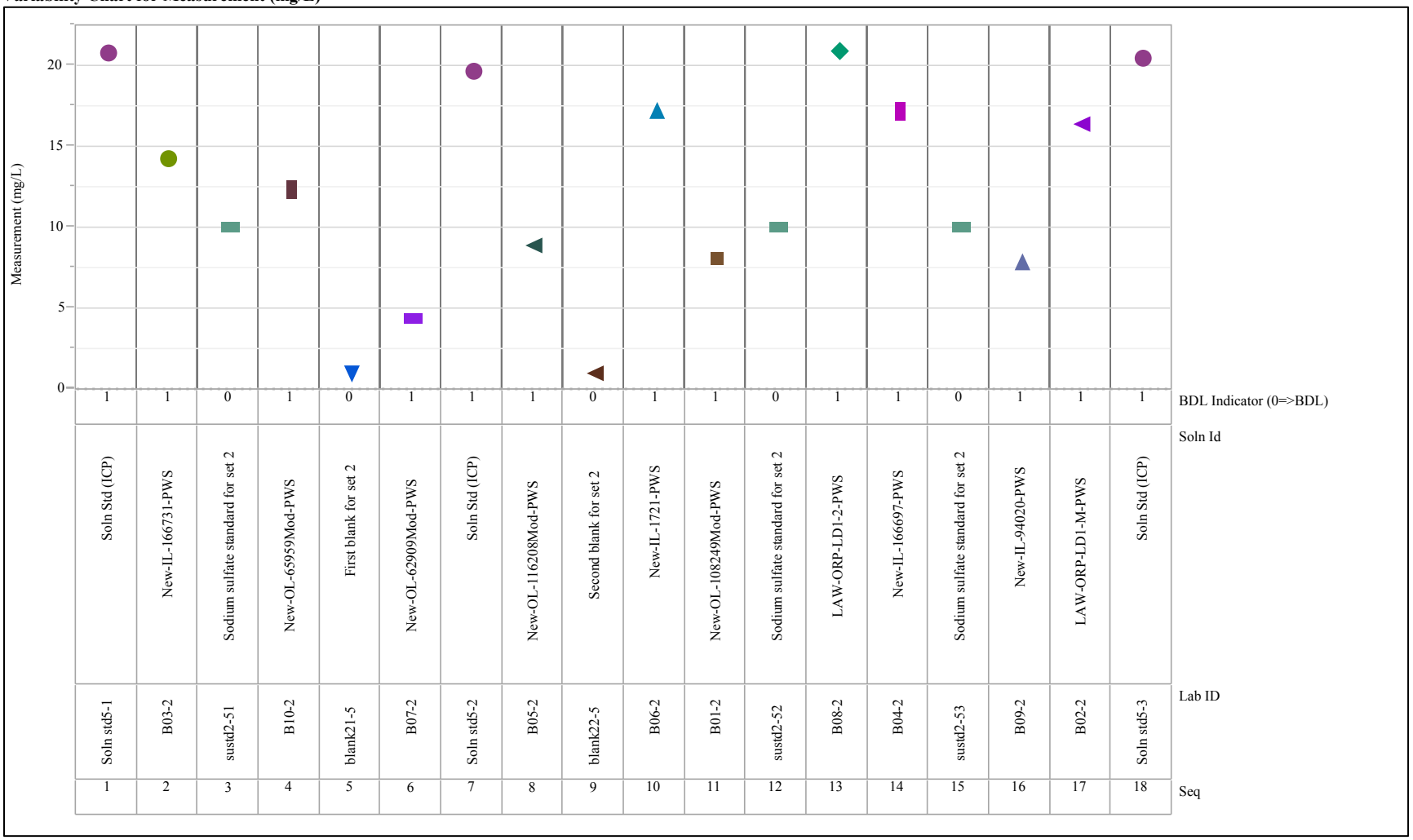


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=B (mg/L), Analysis=ICP, Blk=6
Variability Chart for Measurement (mg/L)

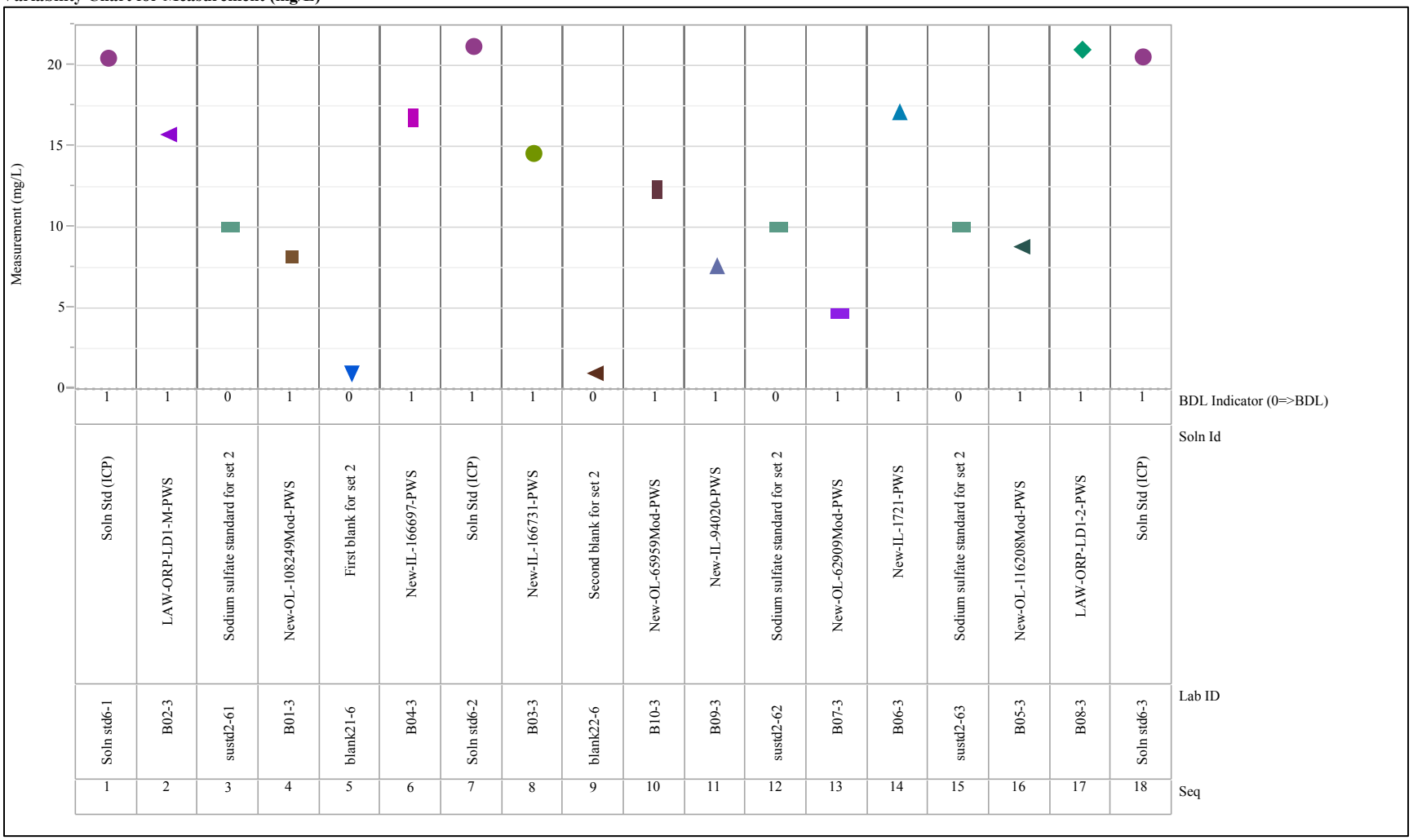


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Ca (mg/L), Analysis=ICP, Blk=1
Variability Chart for Measurement (mg/L)

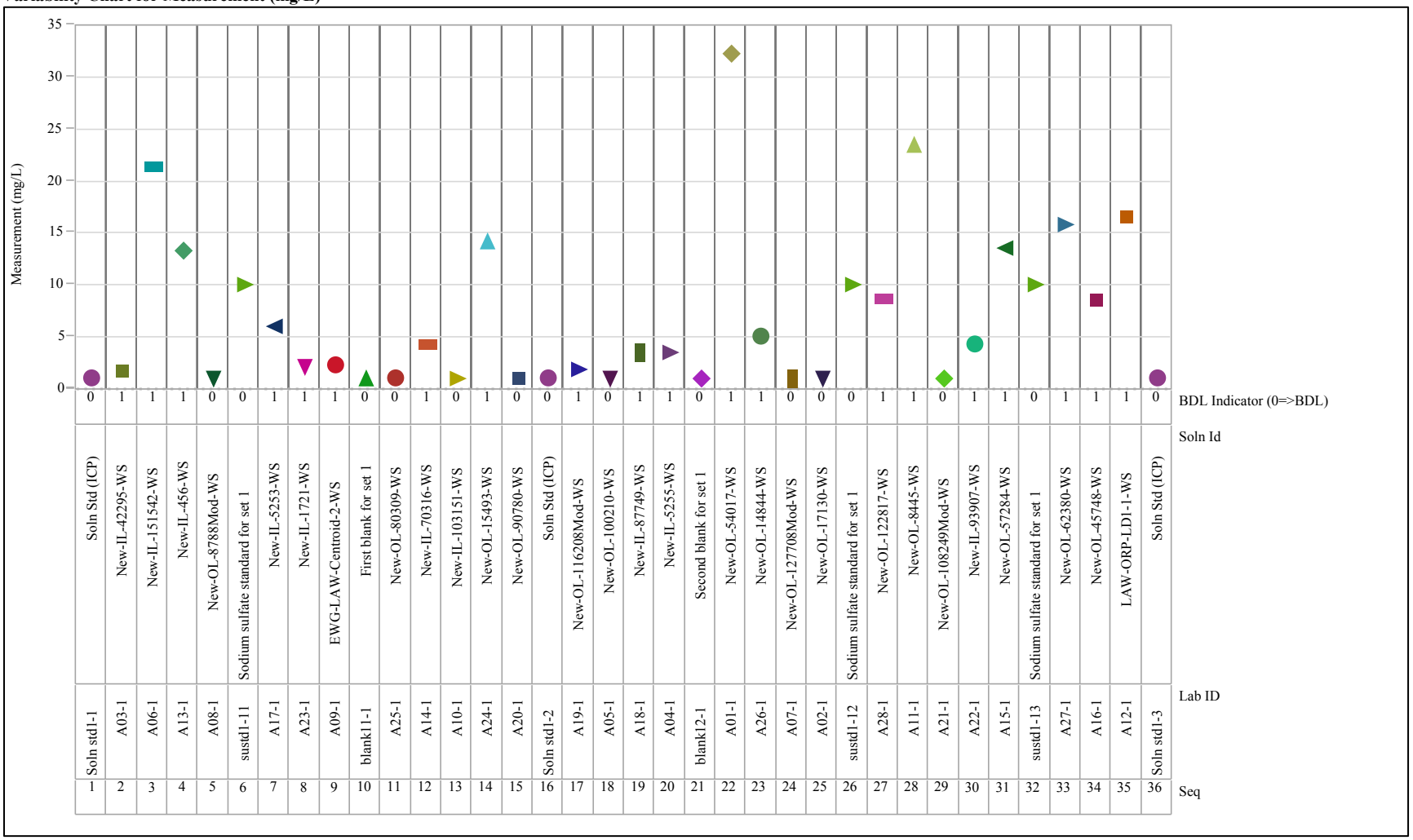


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Ca (mg/L), Analysis=ICP, Blk=2
Variability Chart for Measurement (mg/L)

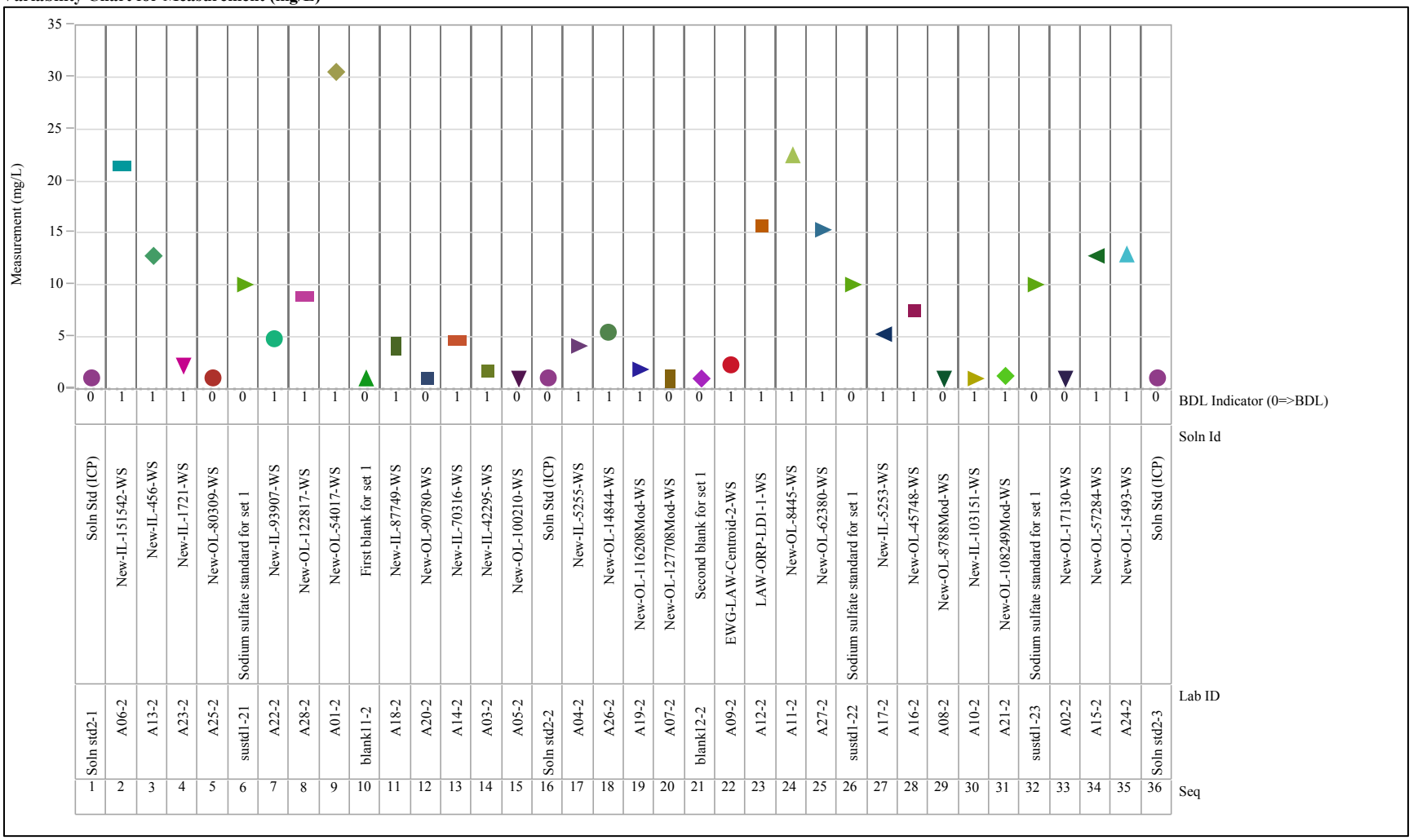


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Ca (mg/L), Analysis=ICP, Blk=3
Variability Chart for Measurement (mg/L)

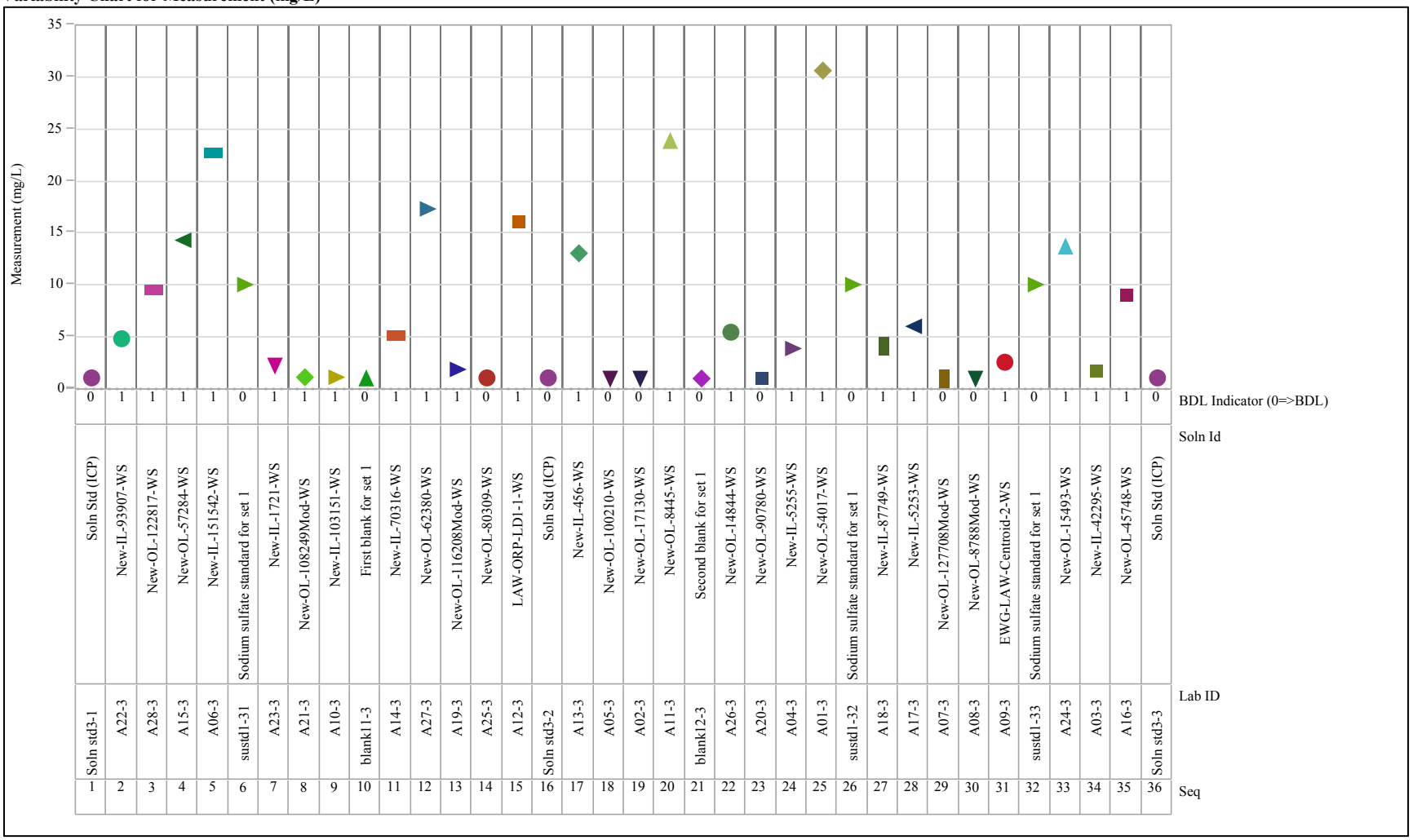


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Ca (mg/L), Analysis=ICP, Blk=4
Variability Chart for Measurement (mg/L)

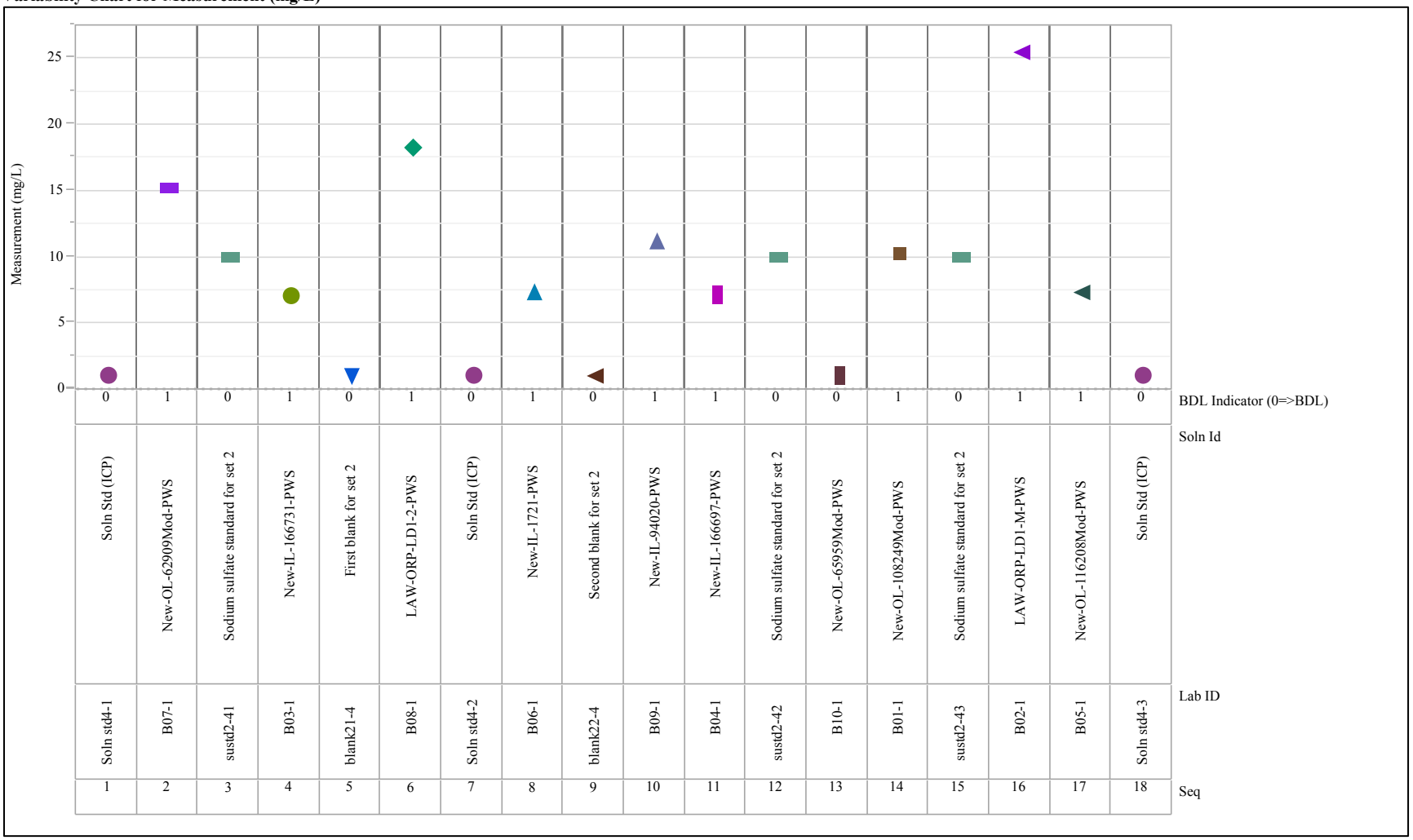


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Ca (mg/L), Analysis=ICP, Blk=5
Variability Chart for Measurement (mg/L)

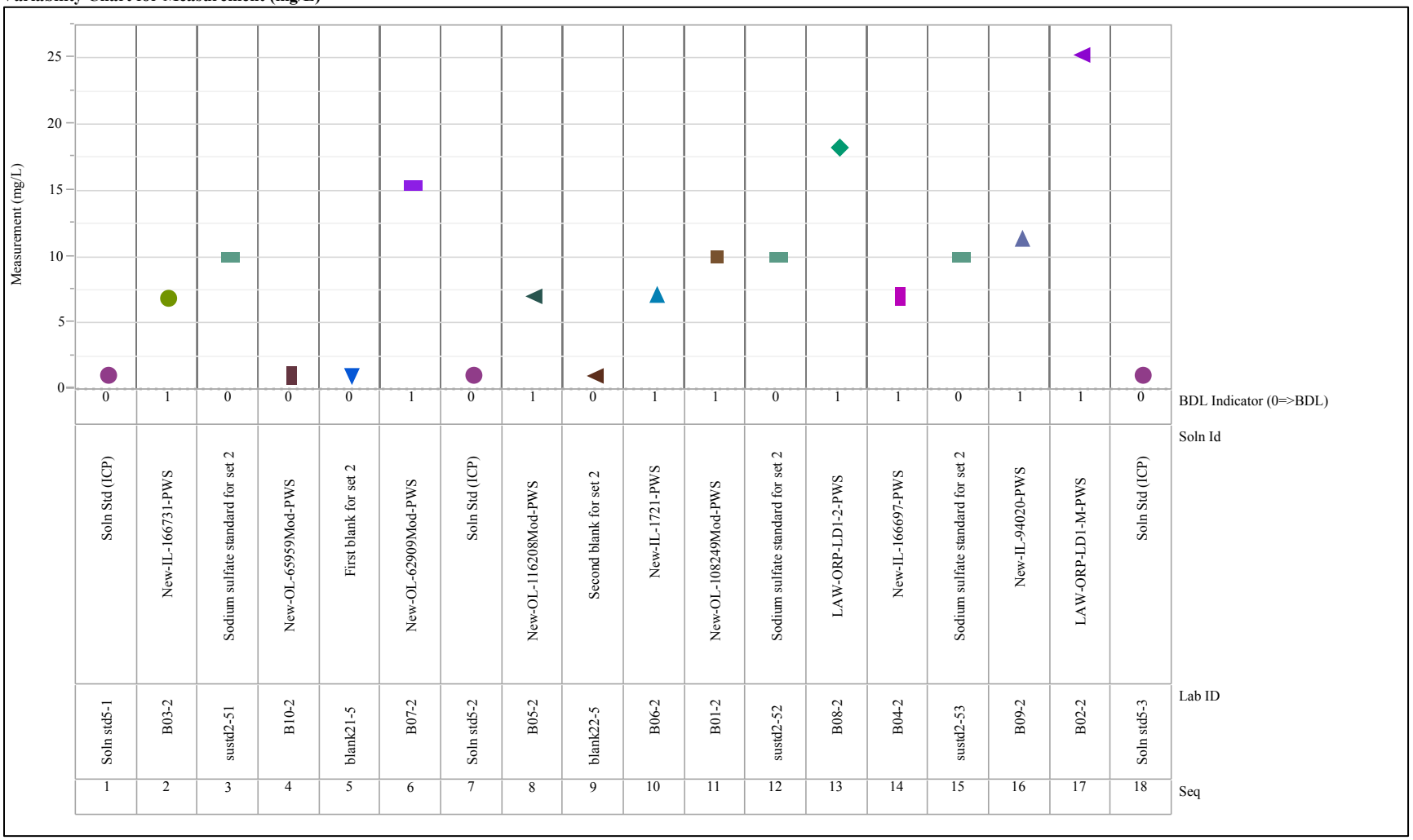


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Ca (mg/L), Analysis=ICP, Blk=6
Variability Chart for Measurement (mg/L)

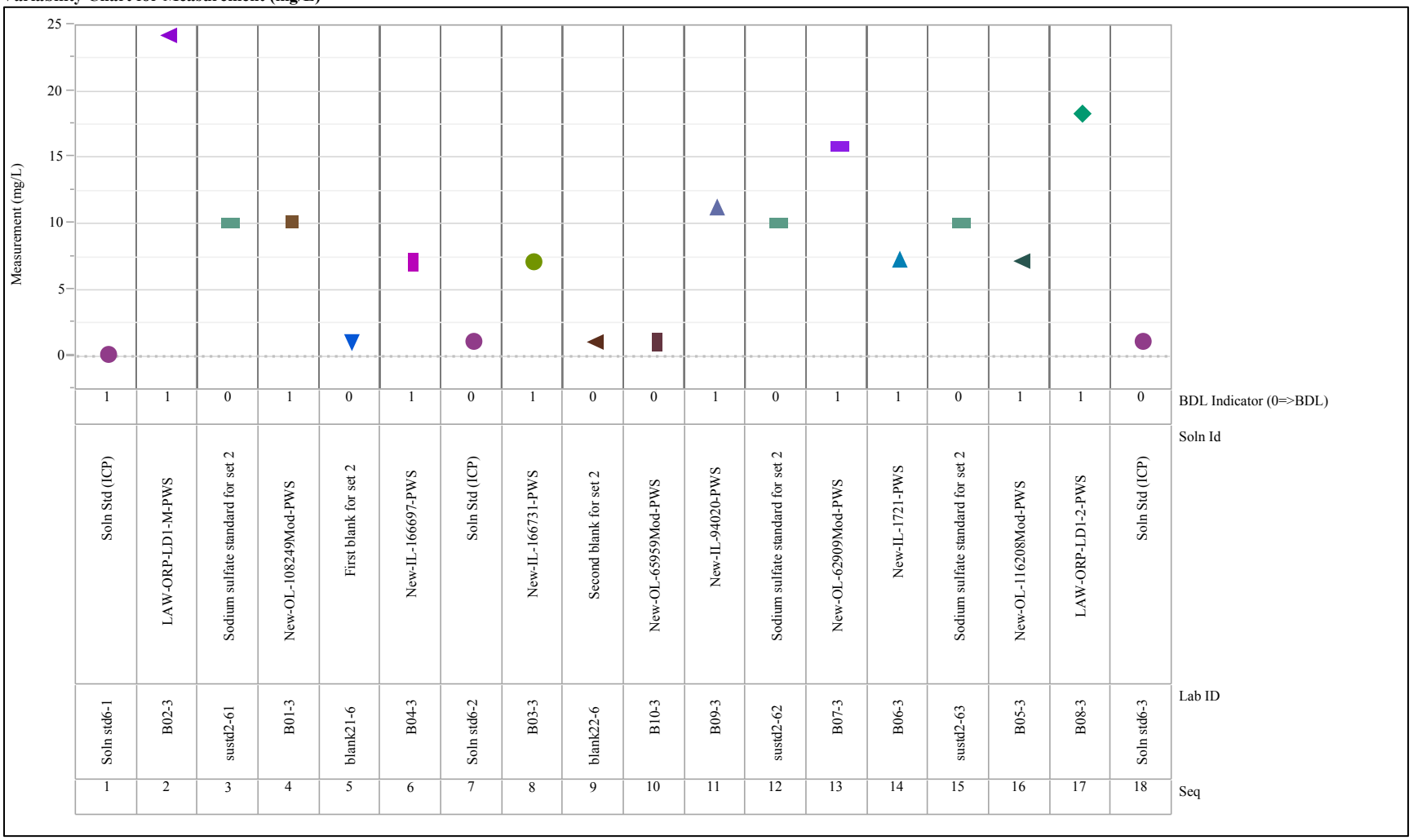


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Cl (mg/L), Analysis=IC, Blk=1
Variability Chart for Measurement (mg/L)

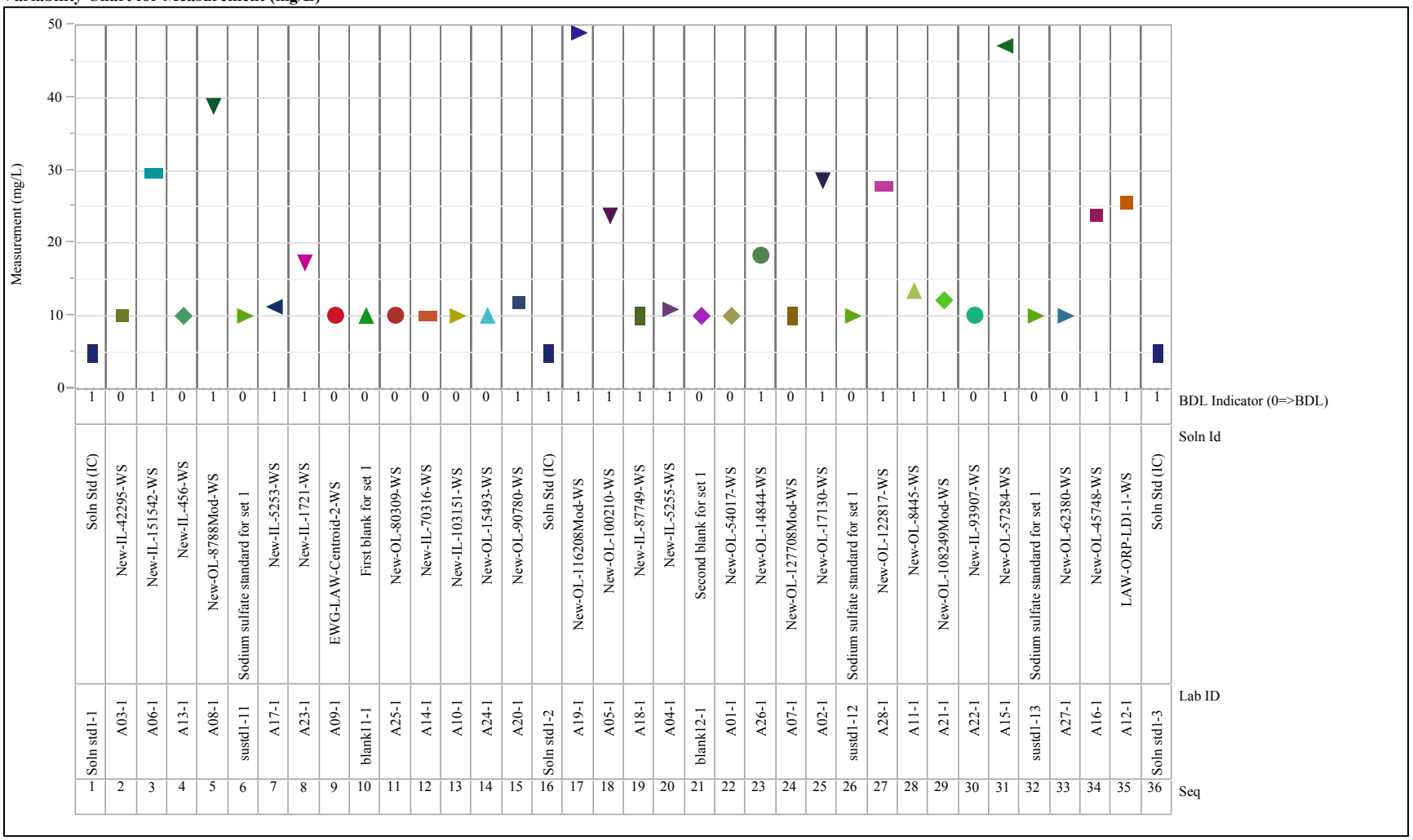


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Cl (mg/L), Analysis=IC, Blk=2
Variability Chart for Measurement (mg/L)

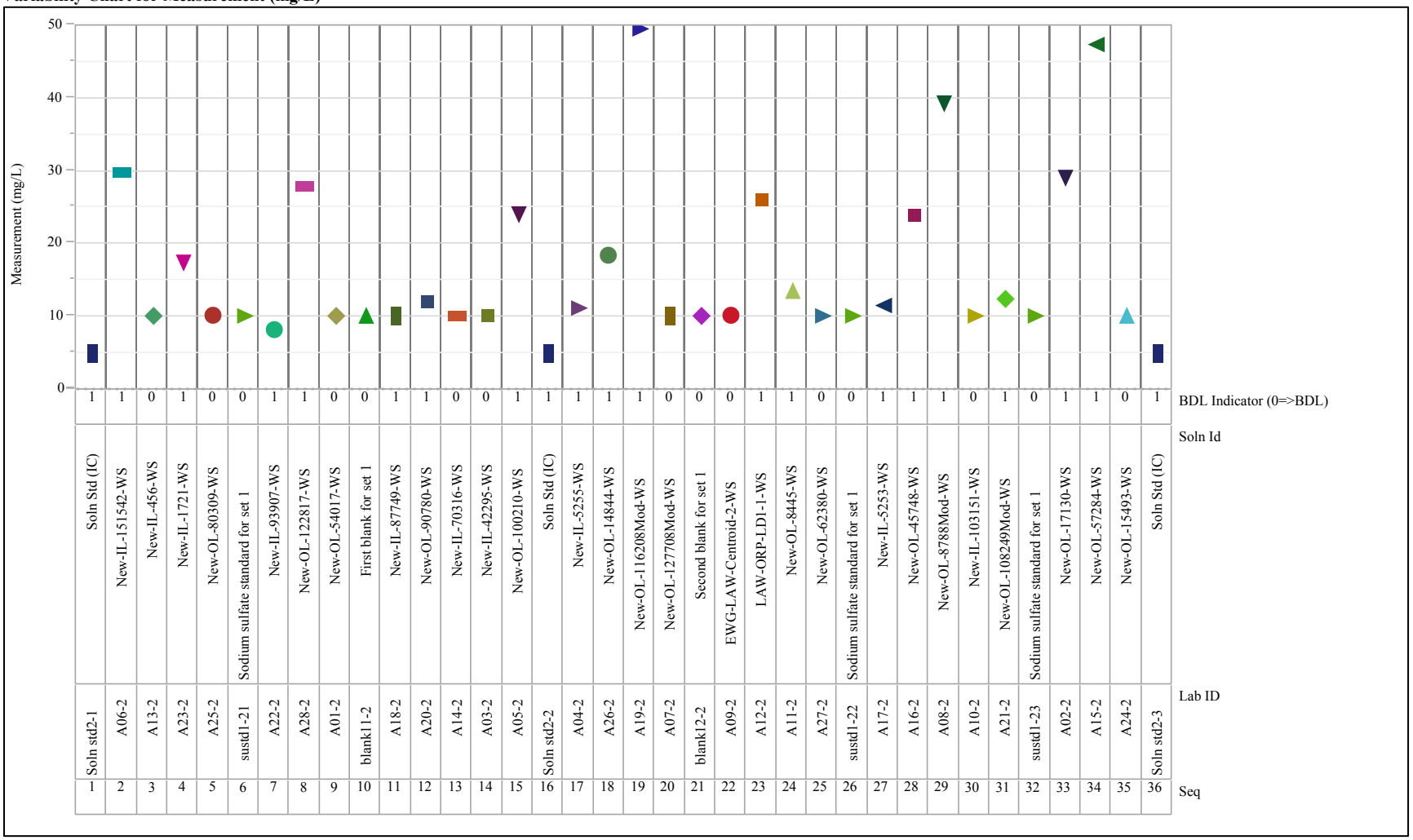


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Cl (mg/L), Analysis=IC, Blk=3
Variability Chart for Measurement (mg/L)

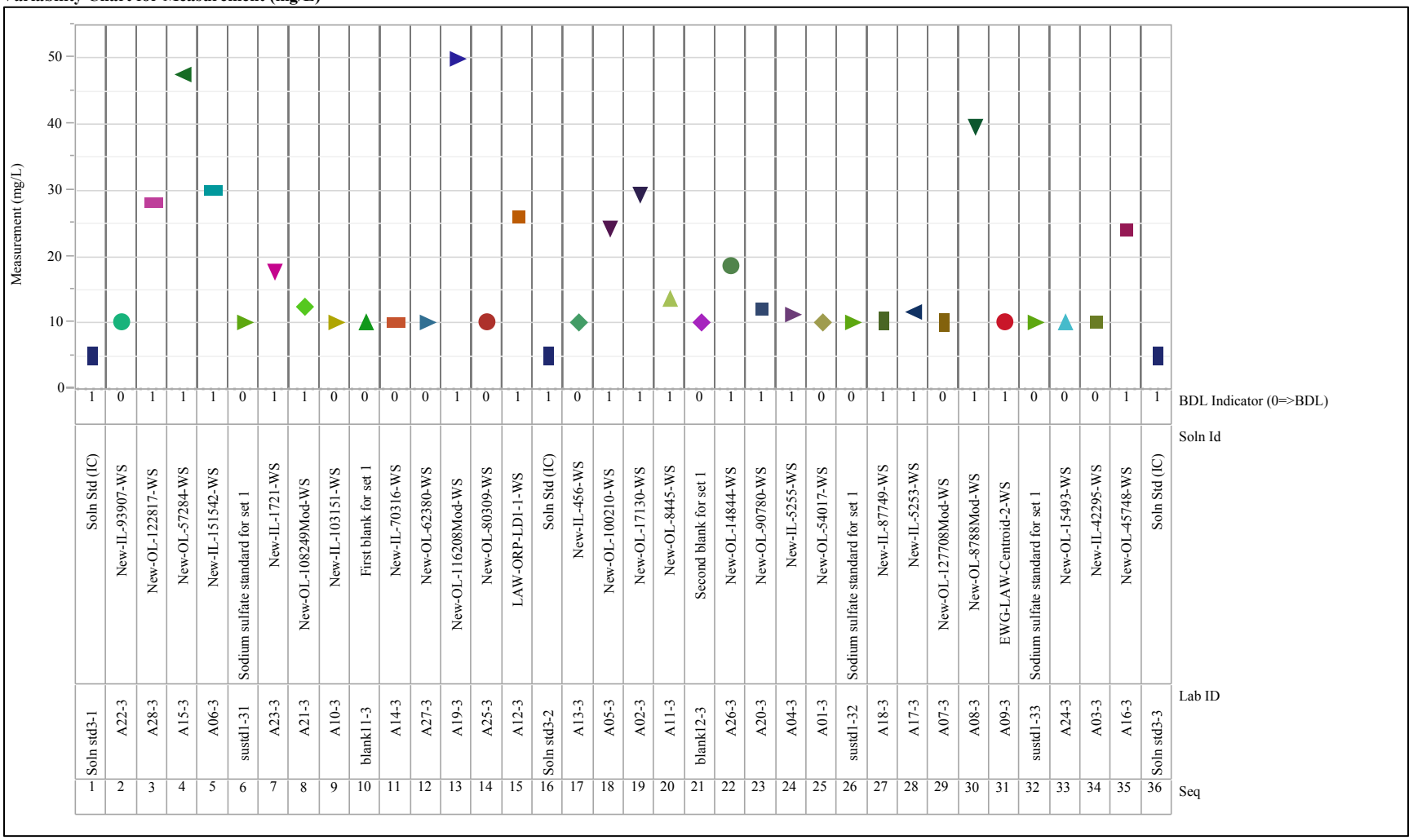


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Cl (mg/L), Analysis=IC, Blk=4
Variability Chart for Measurement (mg/L)

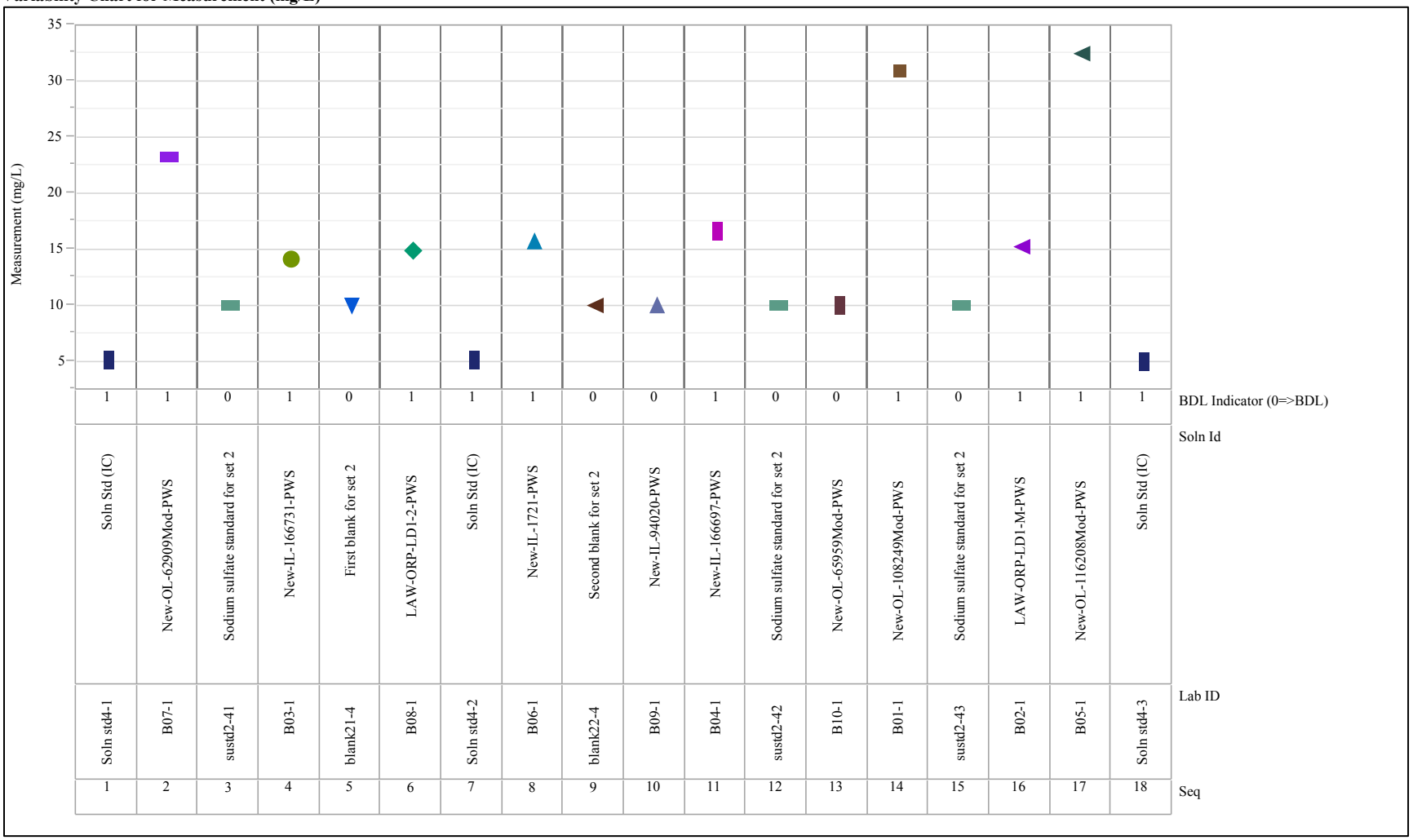


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Cl (mg/L), Analysis=IC, Blk=5
Variability Chart for Measurement (mg/L)

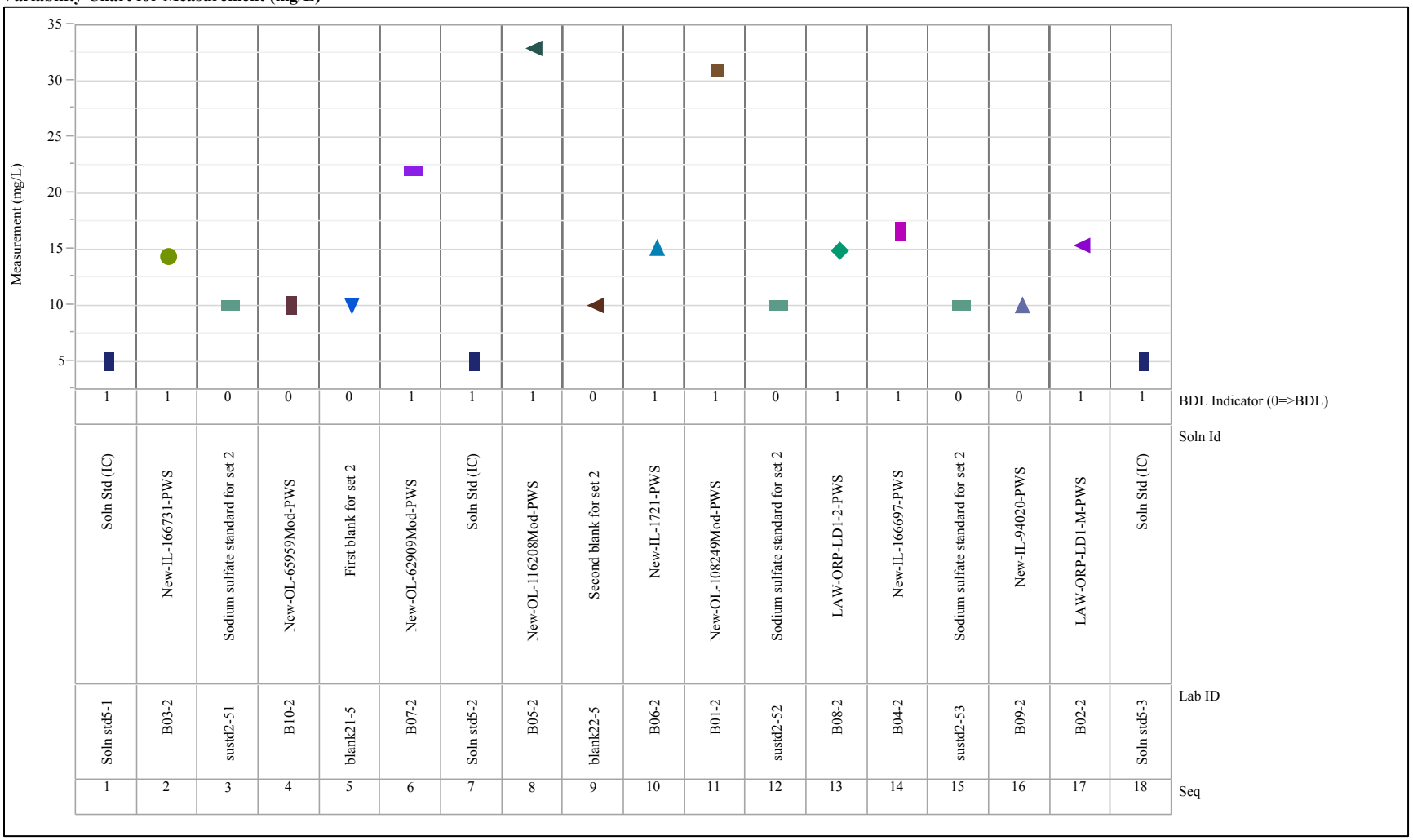


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Cl (mg/L), Analysis=IC, Blk=6
Variability Chart for Measurement (mg/L)

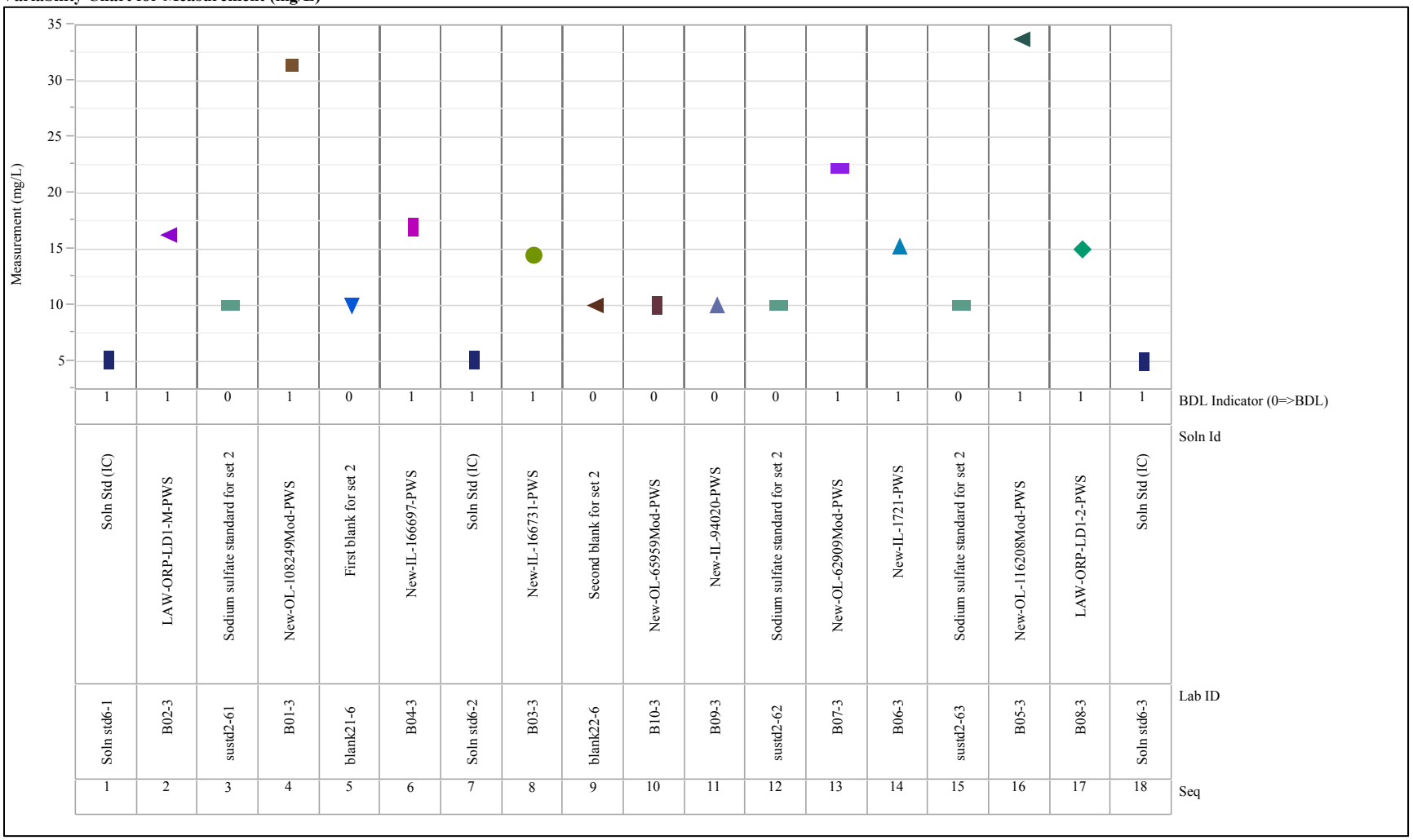


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Cr (mg/L), Analysis=ICP, Blk=1
Variability Chart for Measurement (mg/L)

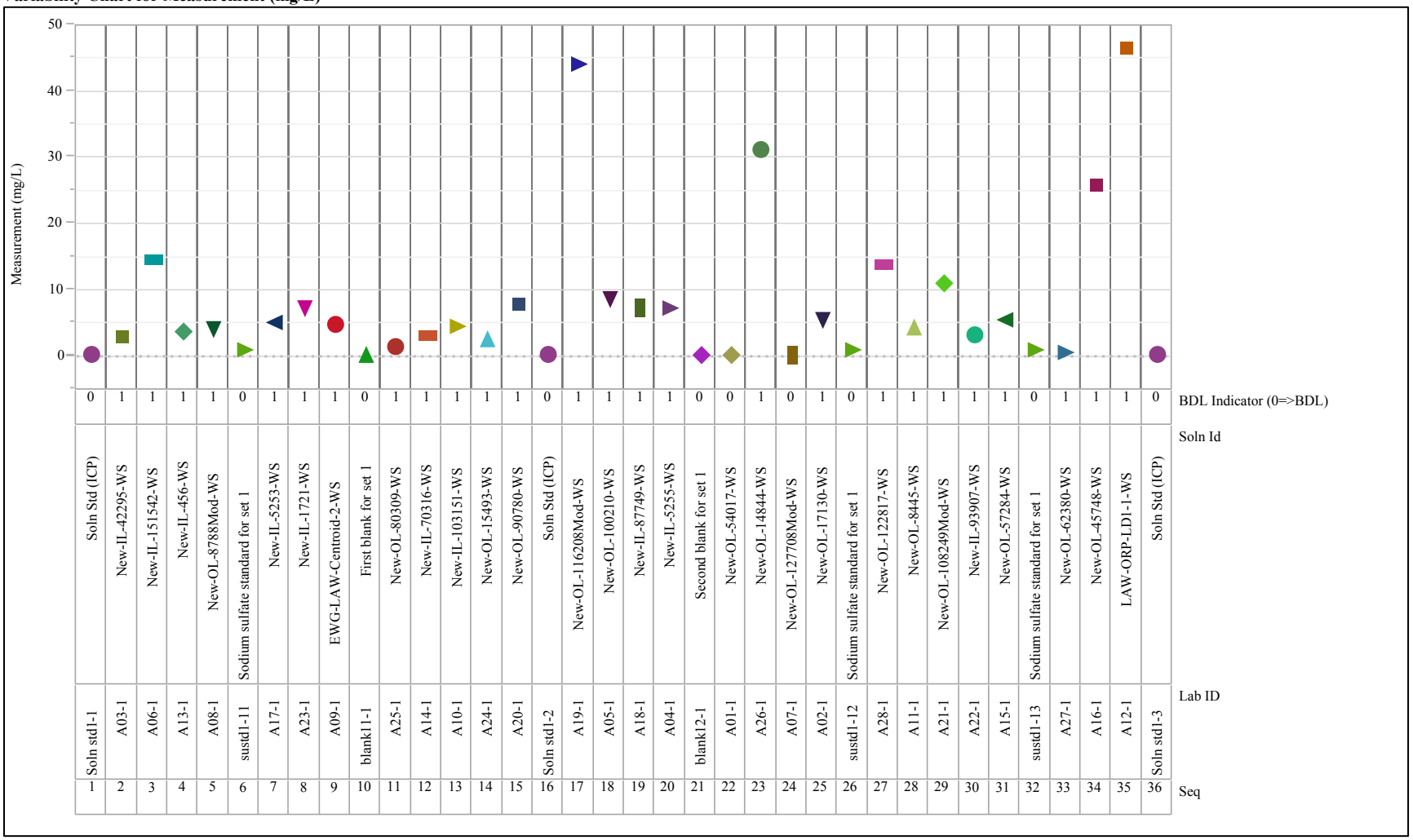


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Cr (mg/L), Analysis=ICP, Blk=2
Variability Chart for Measurement (mg/L)

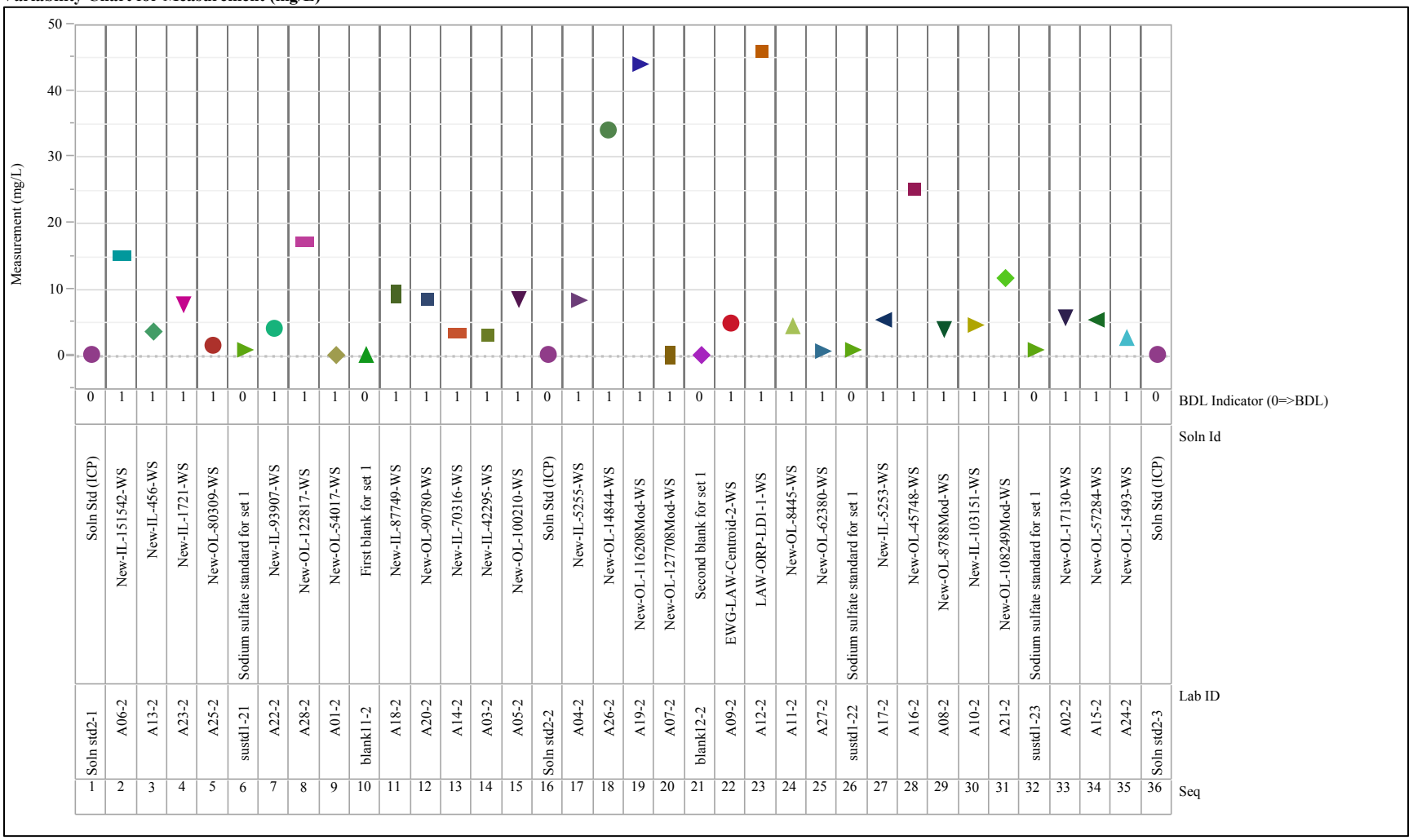


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Cr (mg/L), Analysis=ICP, Blk=3
Variability Chart for Measurement (mg/L)

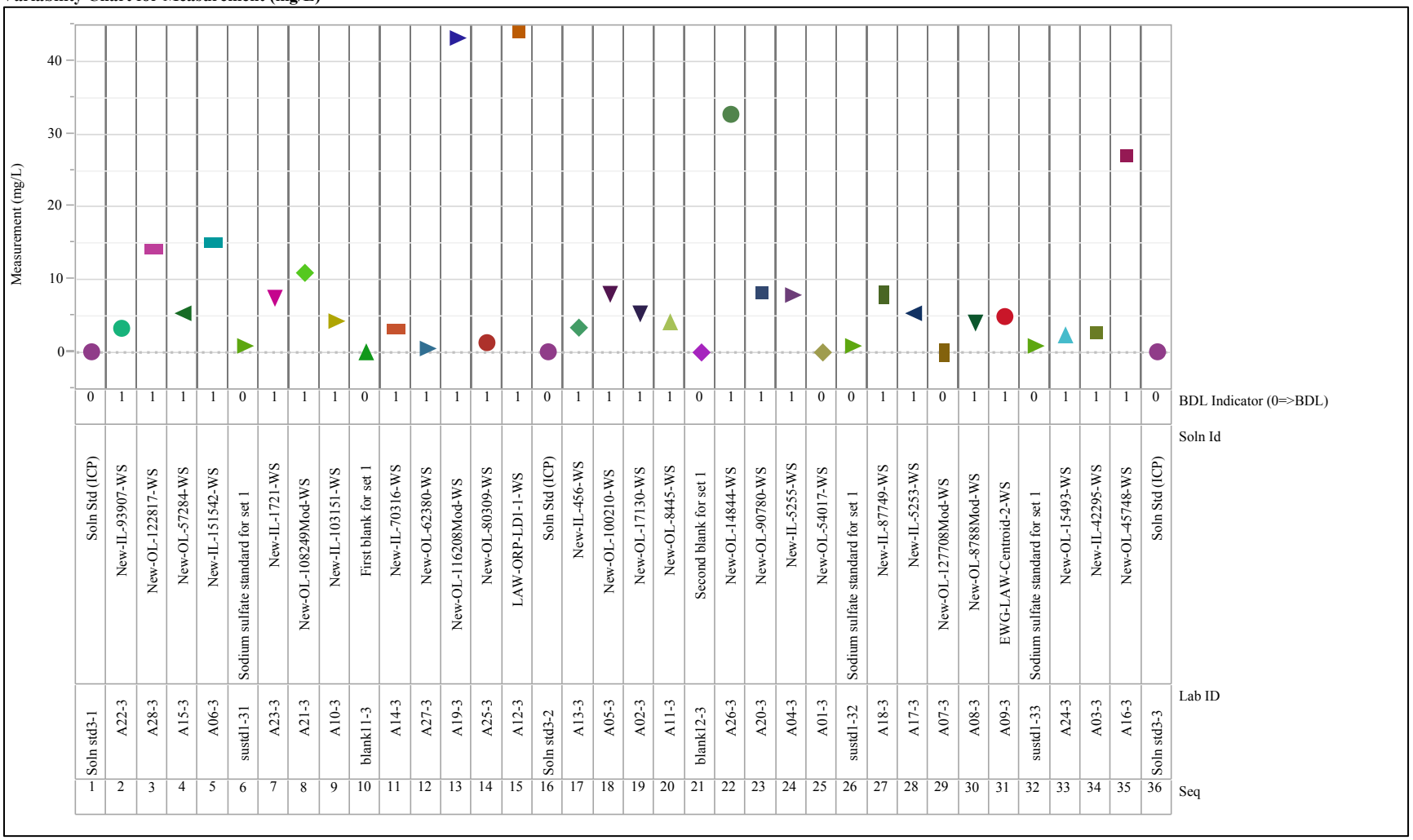


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Cr (mg/L), Analysis=ICP, Blk=4
Variability Chart for Measurement (mg/L)

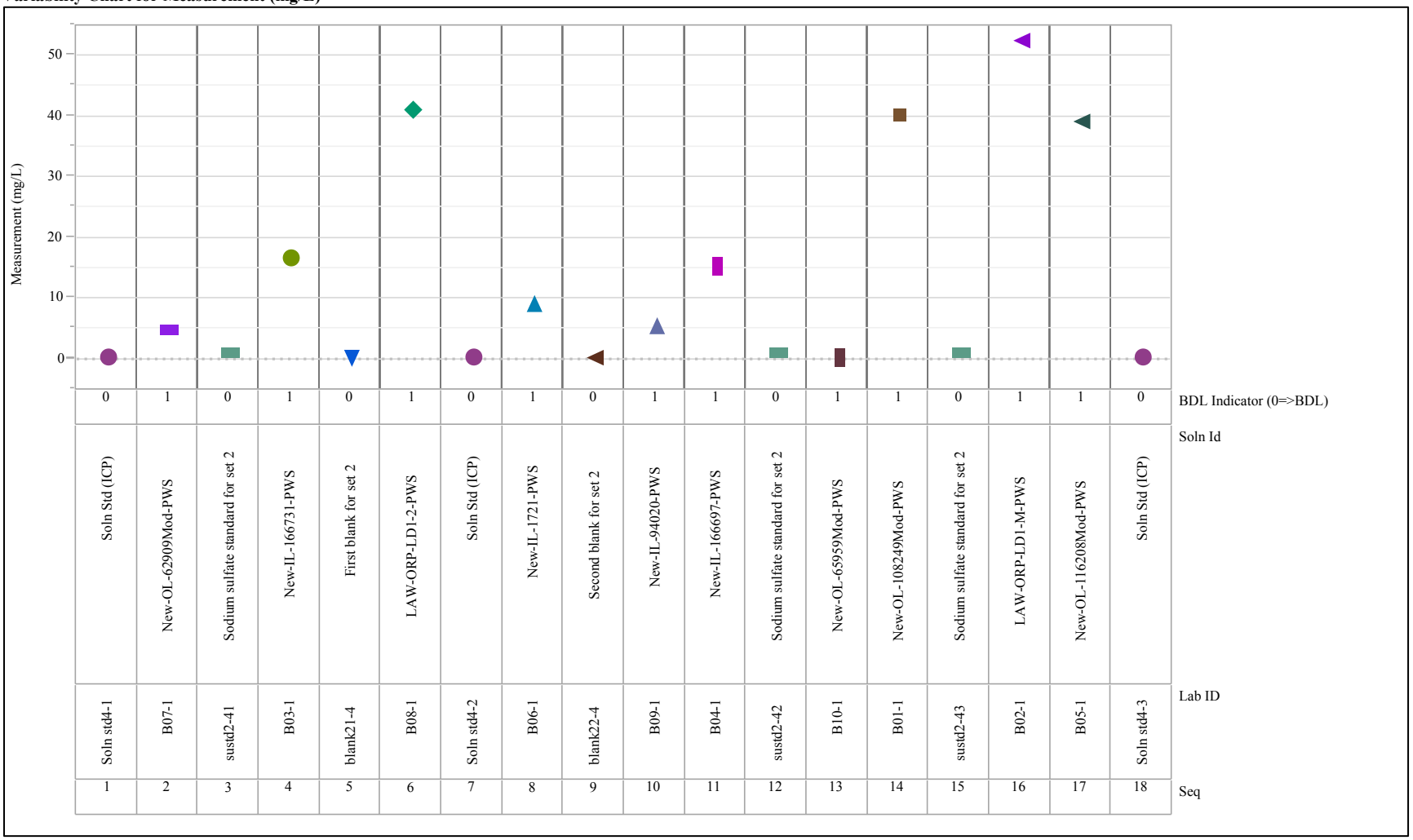


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Cr (mg/L), Analysis=ICP, Blk=5
Variability Chart for Measurement (mg/L)

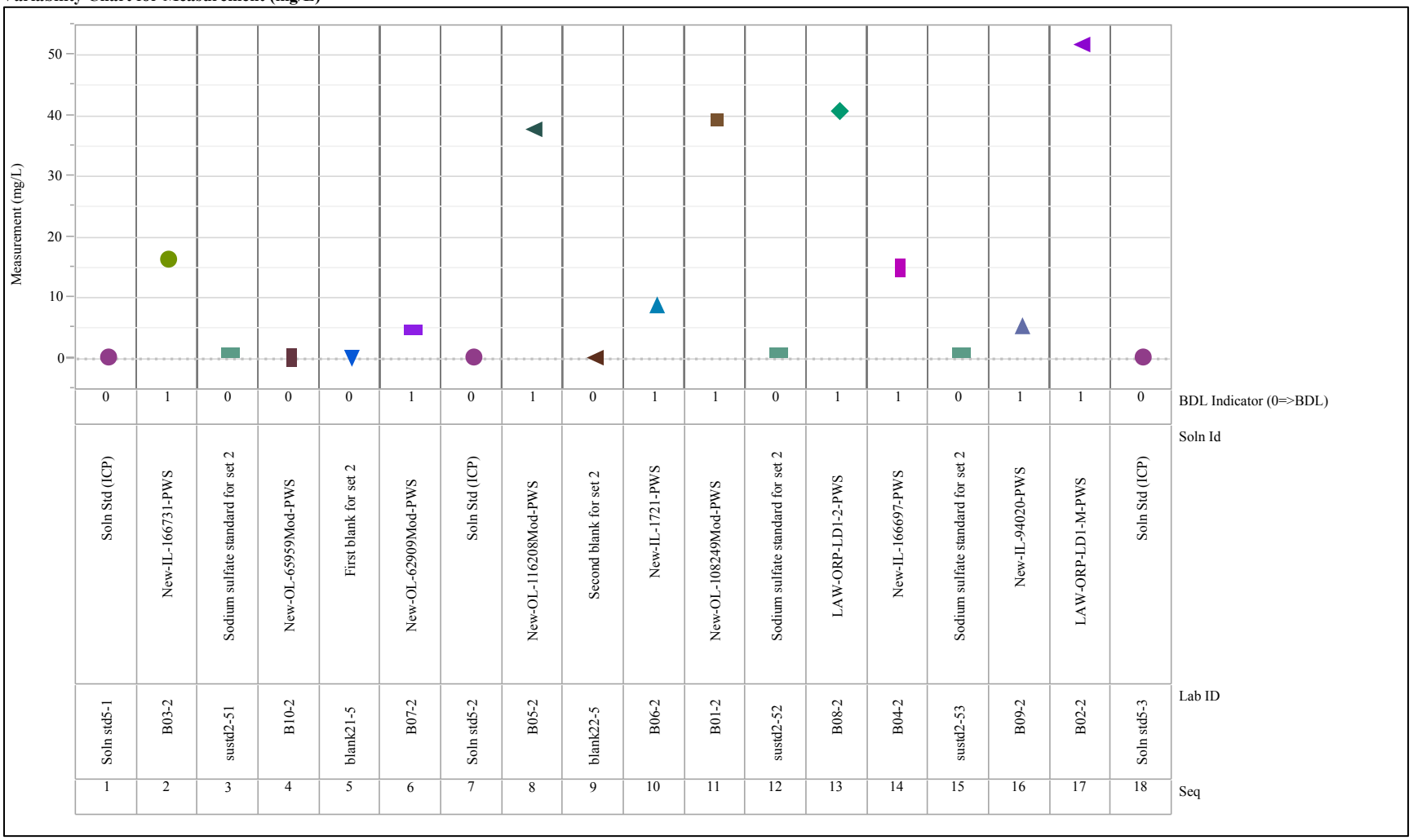


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Cr (mg/L), Analysis=ICP, Blk=6
Variability Chart for Measurement (mg/L)

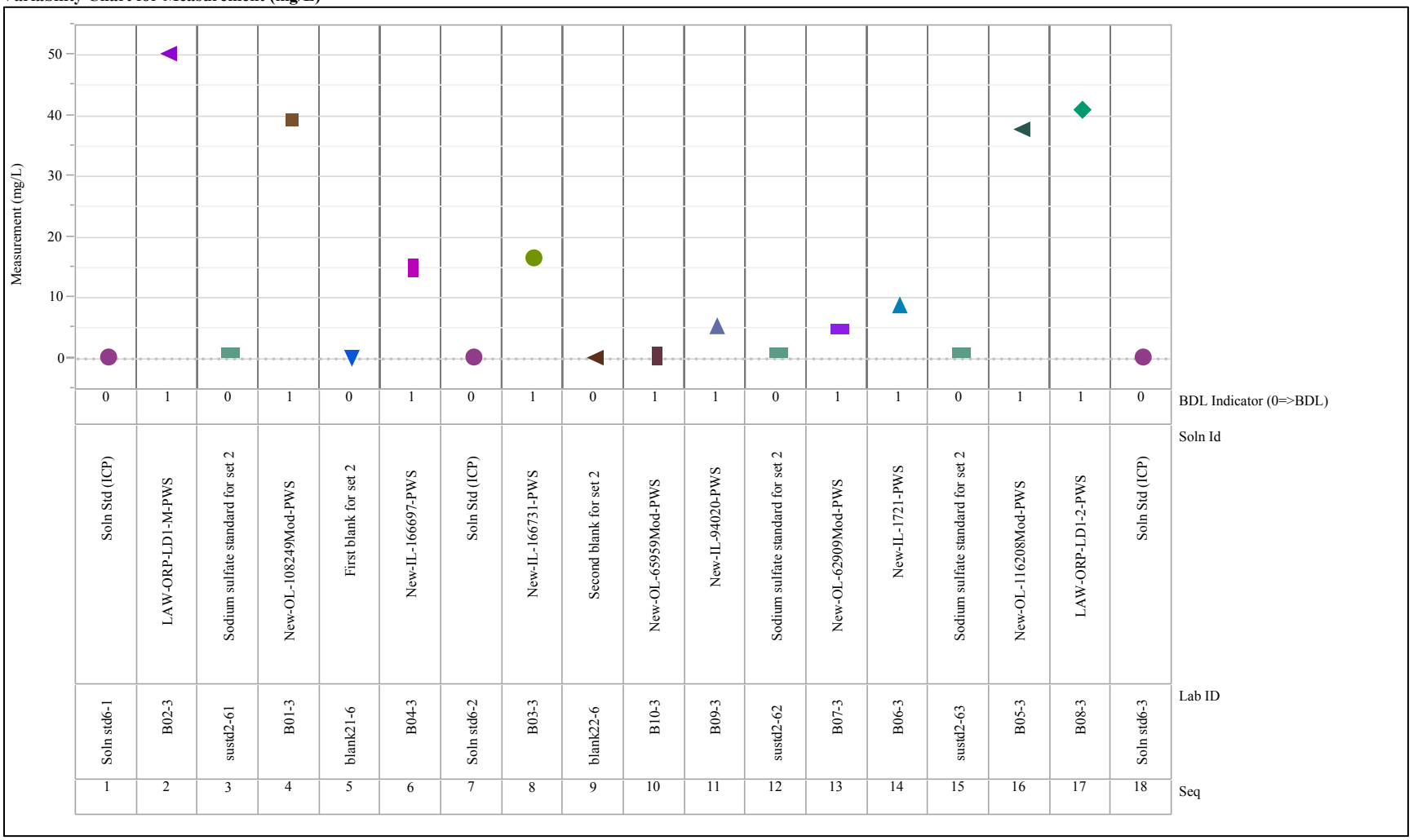


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=F (mg/L), Analysis=IC, Blk=1
Variability Chart for Measurement (mg/L)

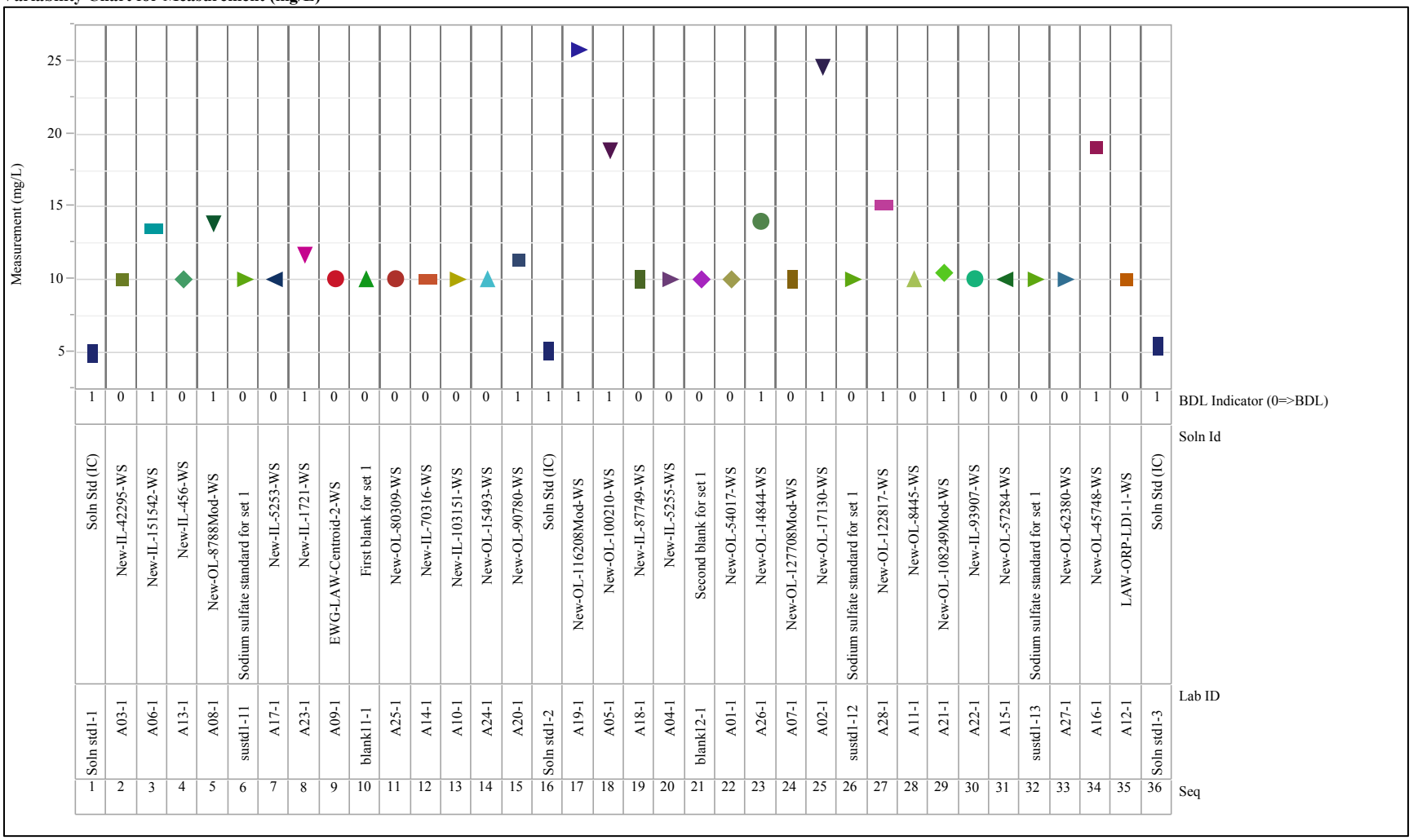


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=F (mg/L), Analysis=IC, Blk=2
Variability Chart for Measurement (mg/L)

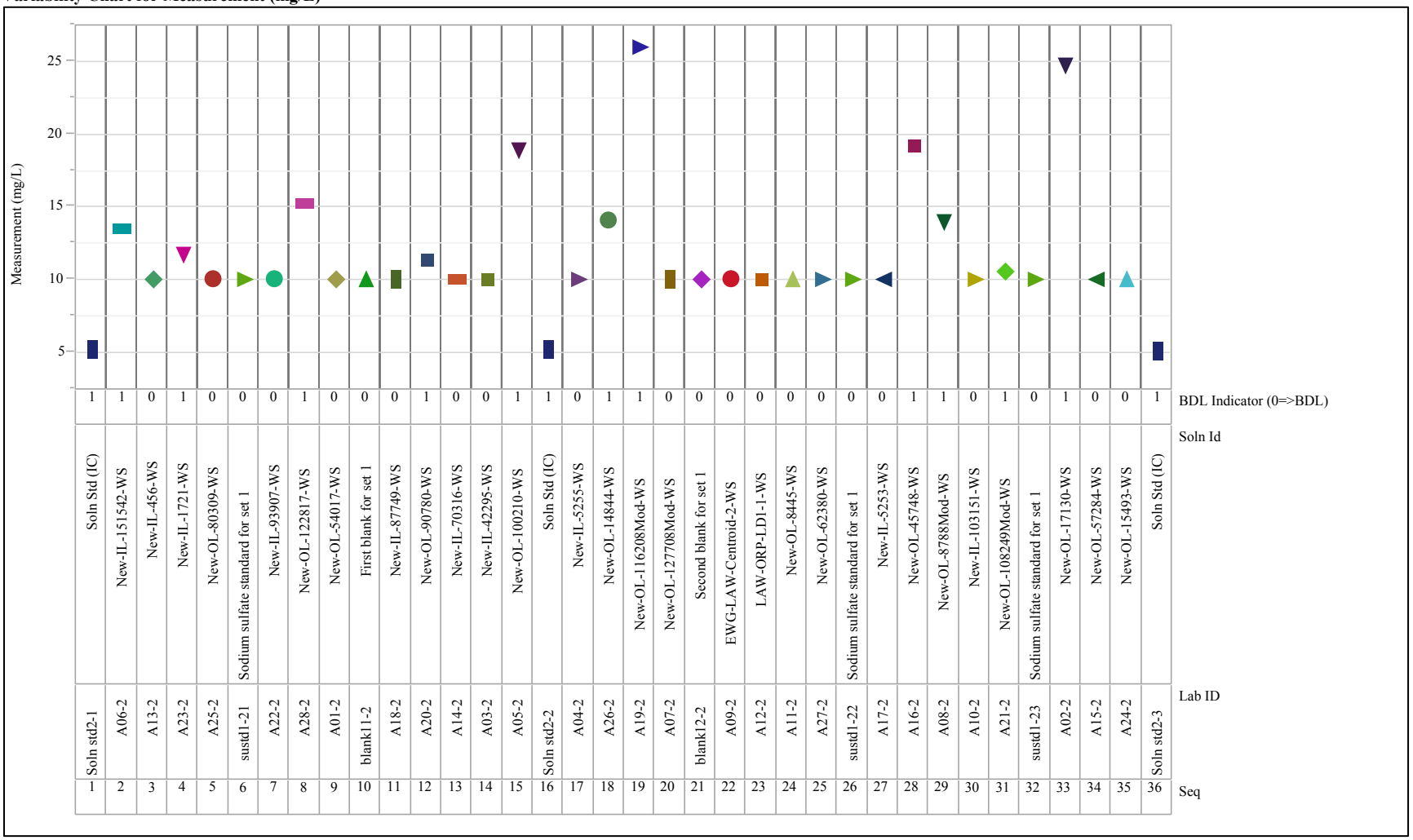


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=F (mg/L), Analysis=IC, Blk=3
Variability Chart for Measurement (mg/L)

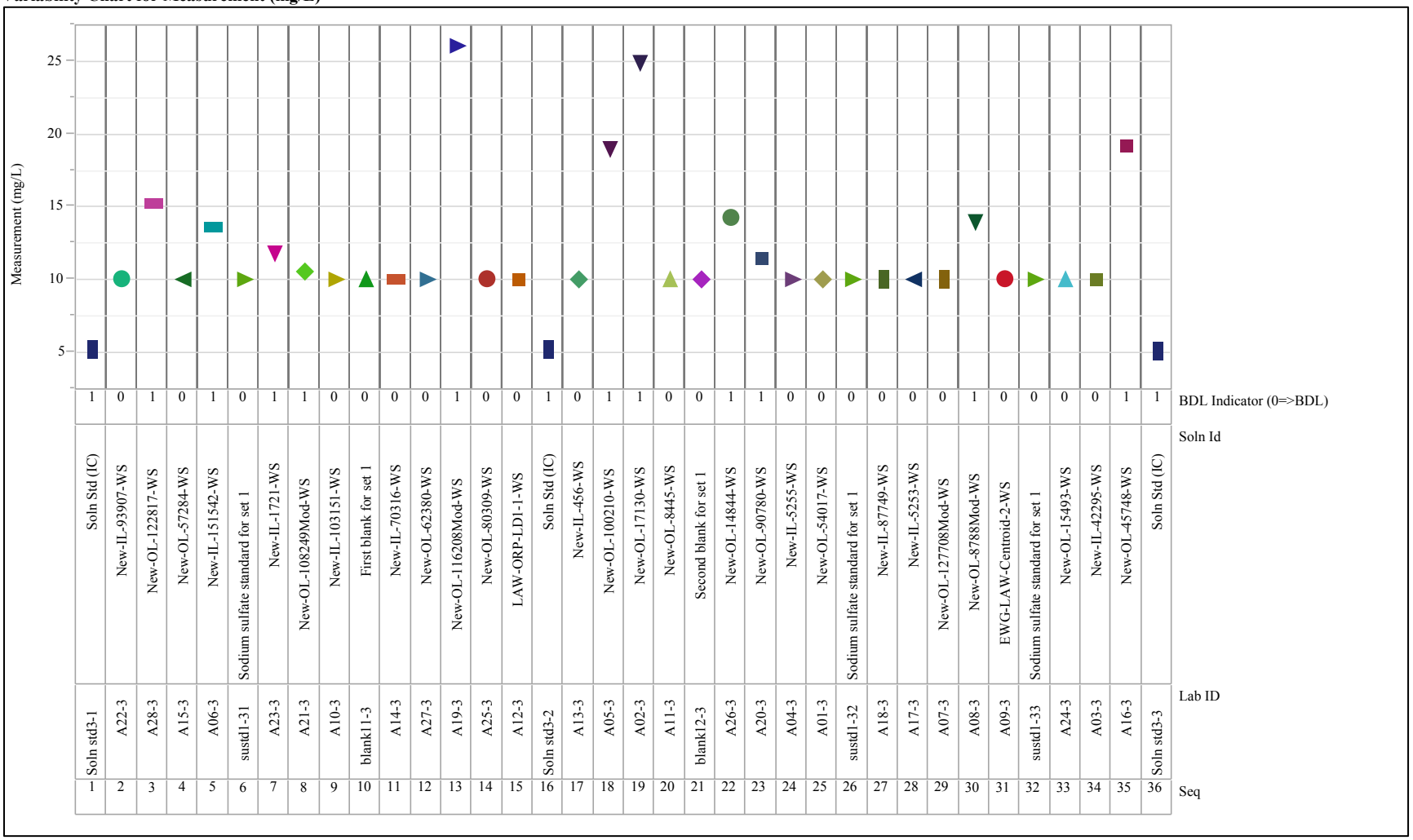


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=F (mg/L), Analysis=IC, Blk=4
Variability Chart for Measurement (mg/L)

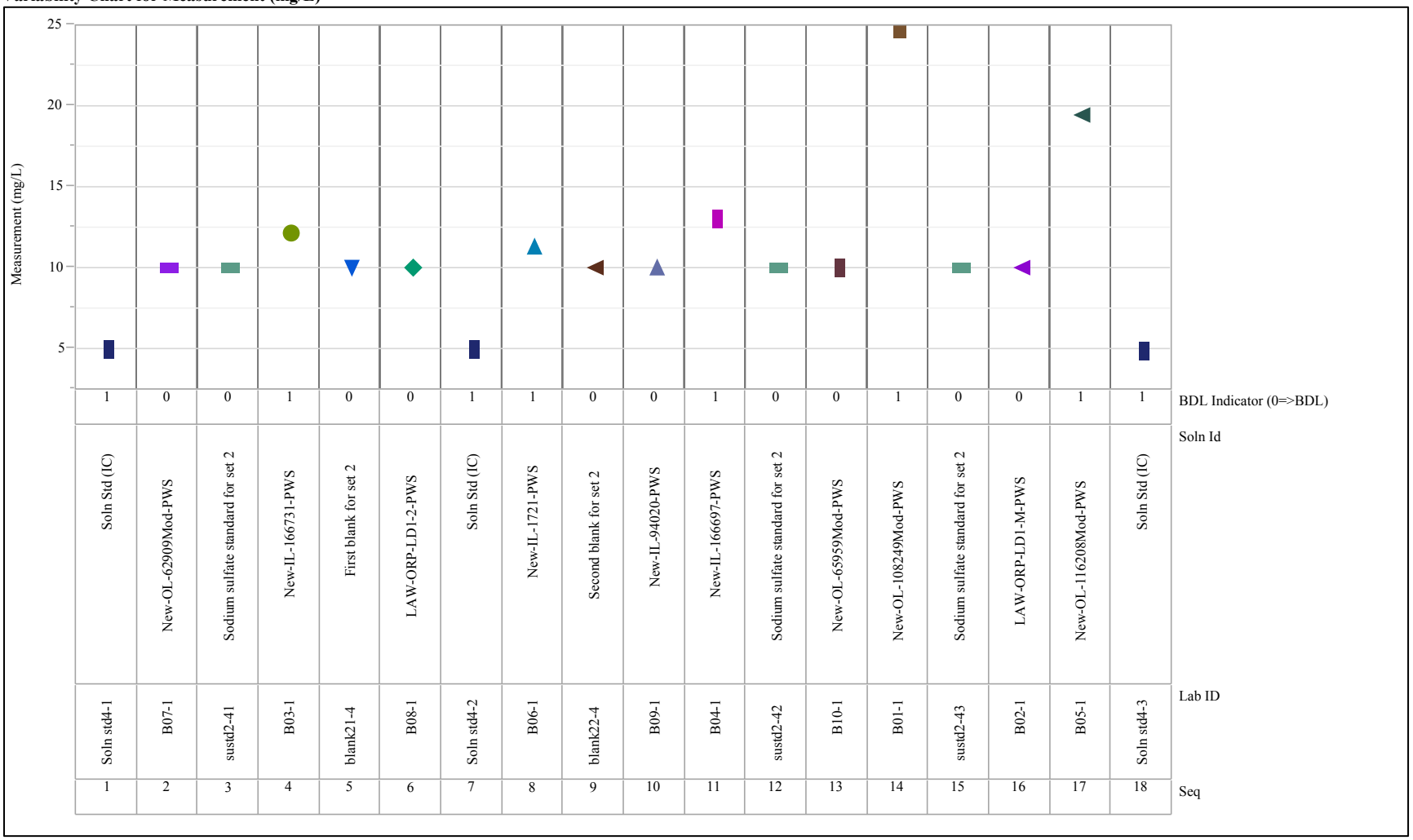


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=F (mg/L), Analysis=IC, Blk=5
Variability Chart for Measurement (mg/L)

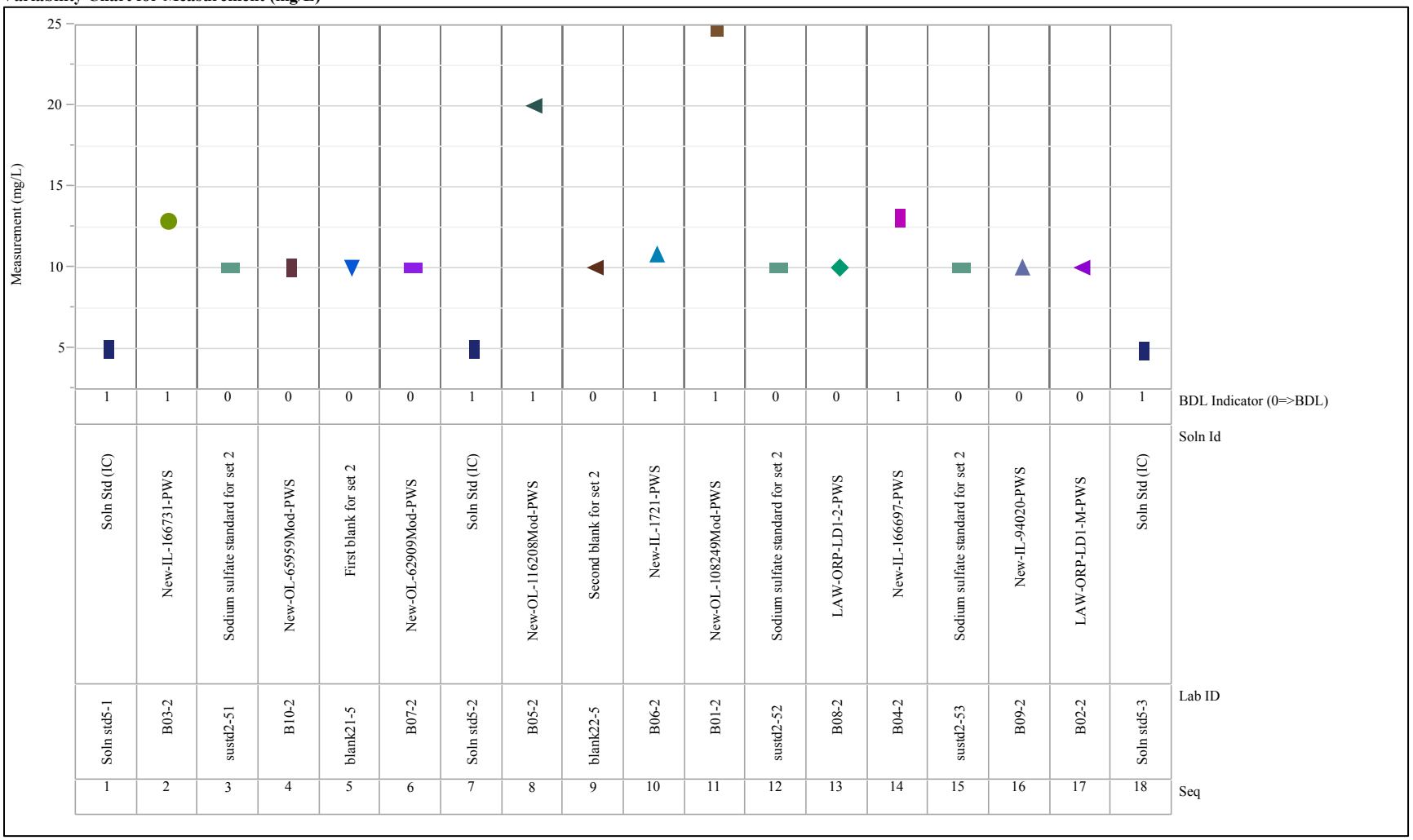


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=F (mg/L), Analysis=IC, Blk=6
Variability Chart for Measurement (mg/L)

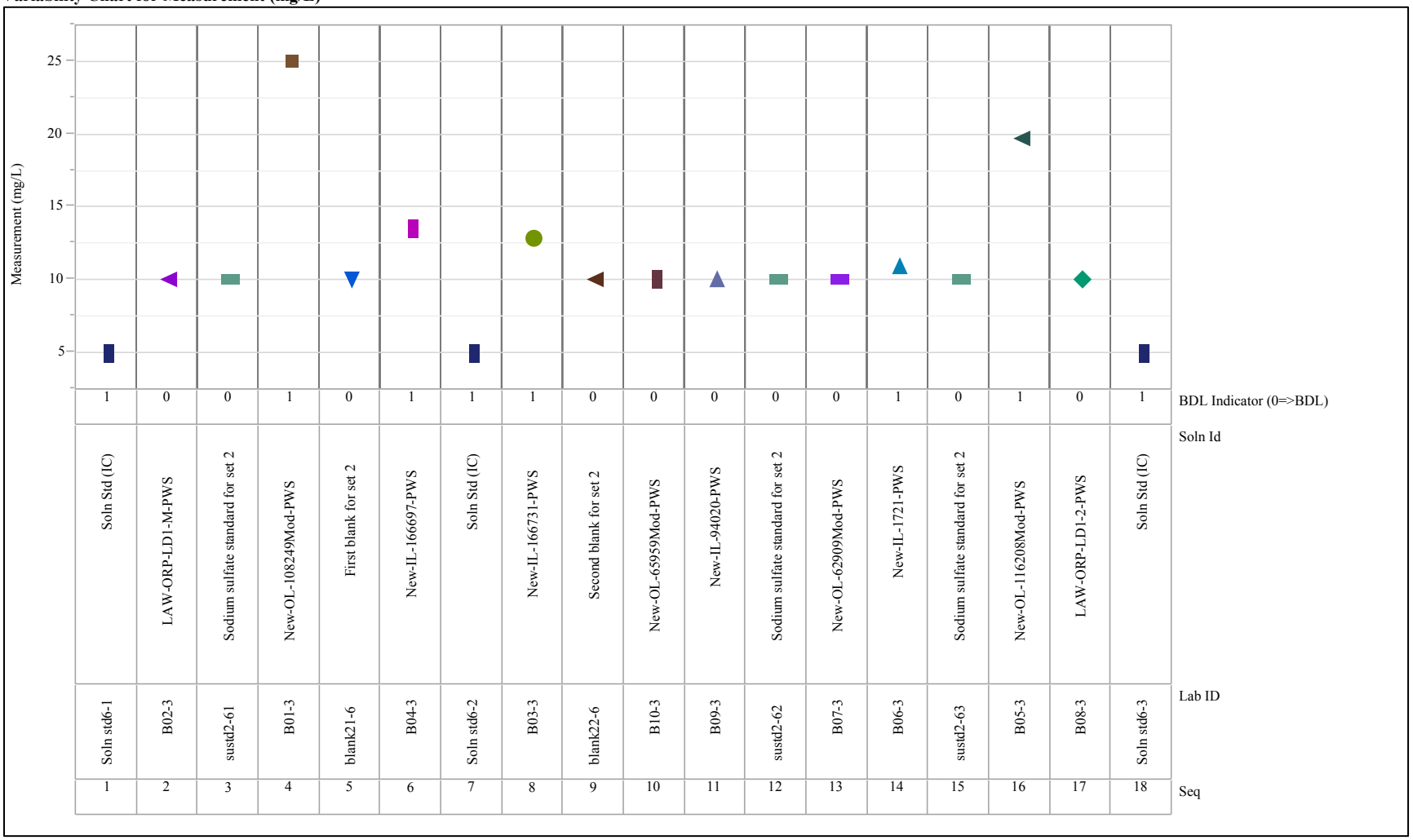


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Fe (mg/L), Analysis=ICP, Blk=1
Variability Chart for Measurement (mg/L)

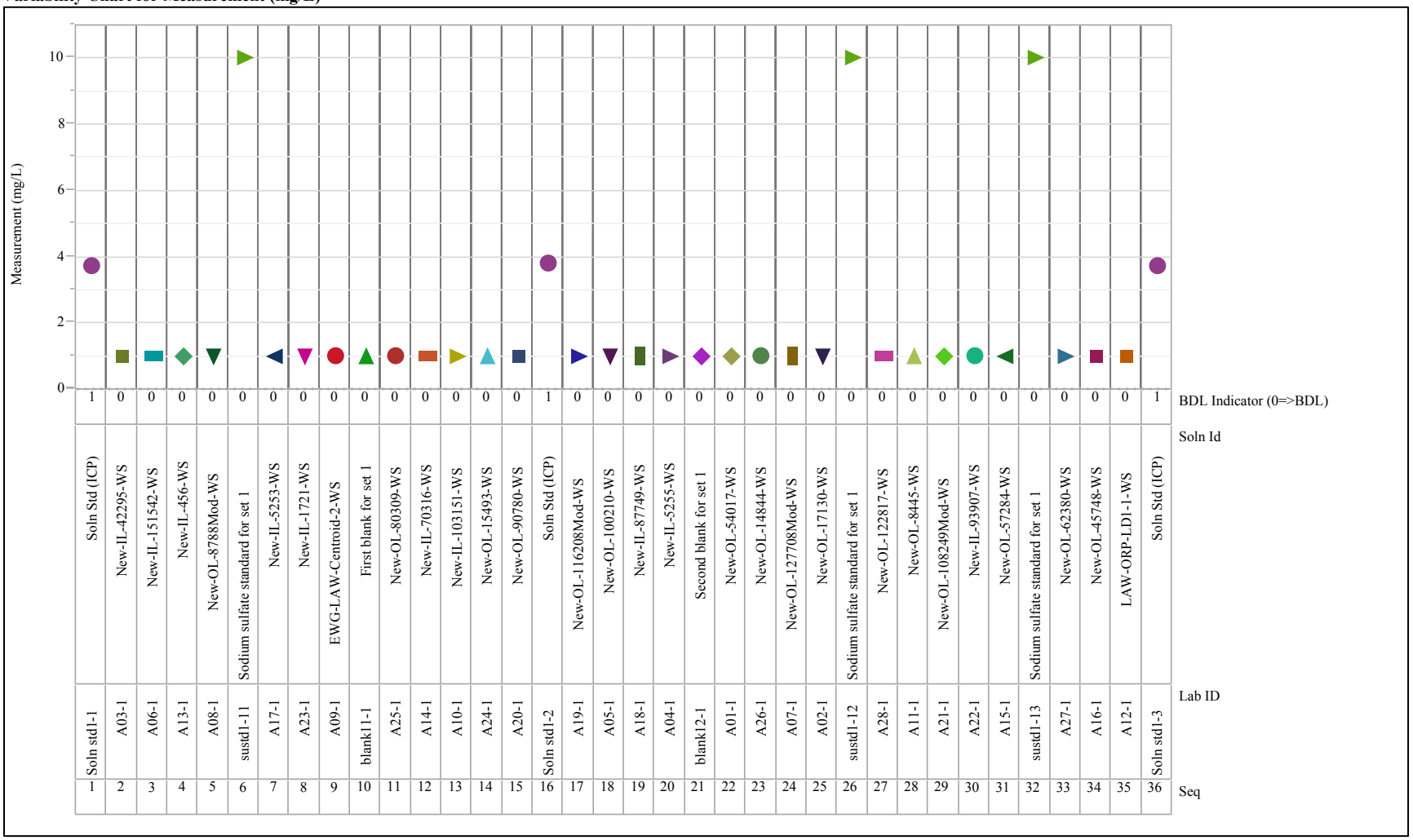


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Fe (mg/L), Analysis=ICP, Blk=2
Variability Chart for Measurement (mg/L)

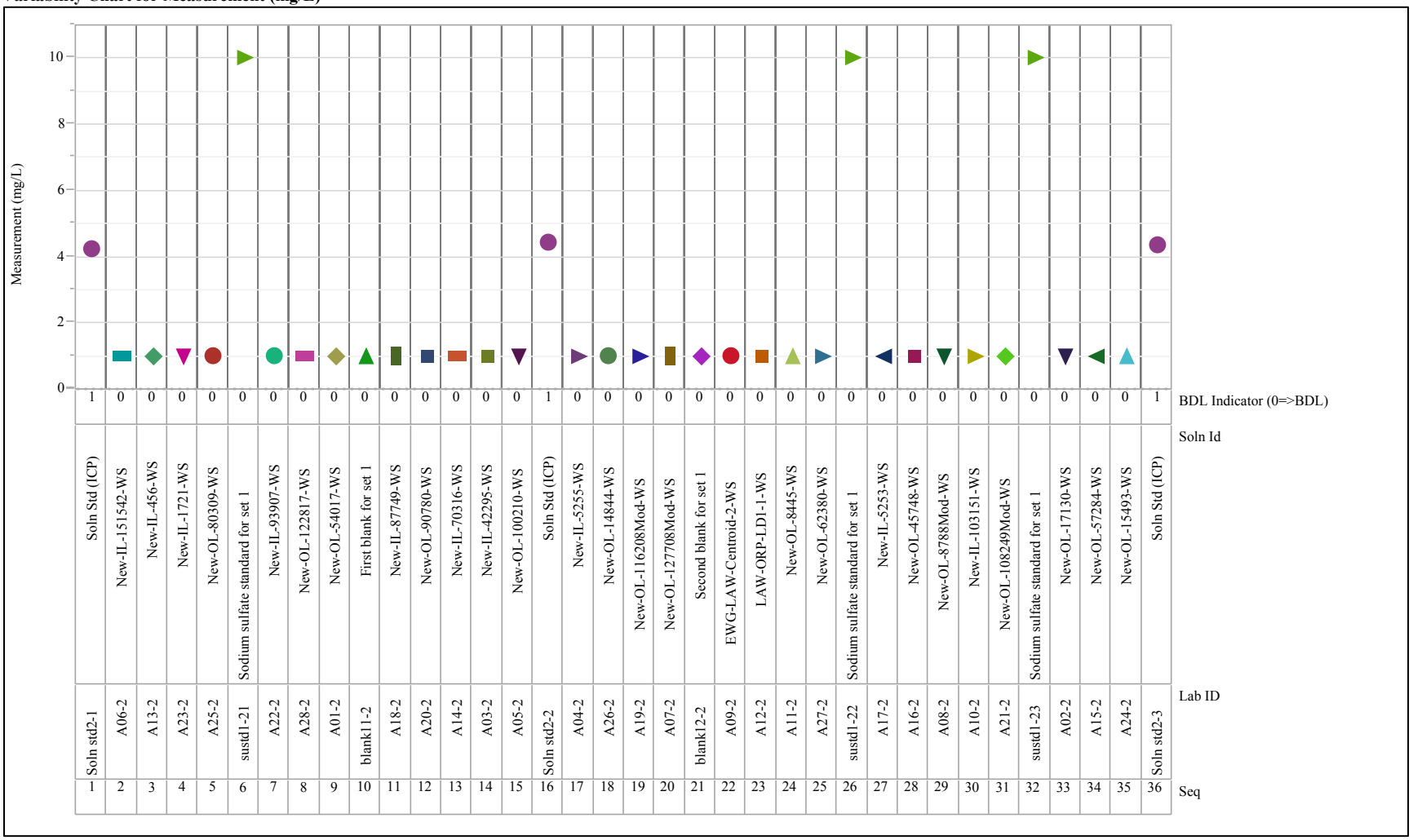


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Fe (mg/L), Analysis=ICP, Blk=3
Variability Chart for Measurement (mg/L)

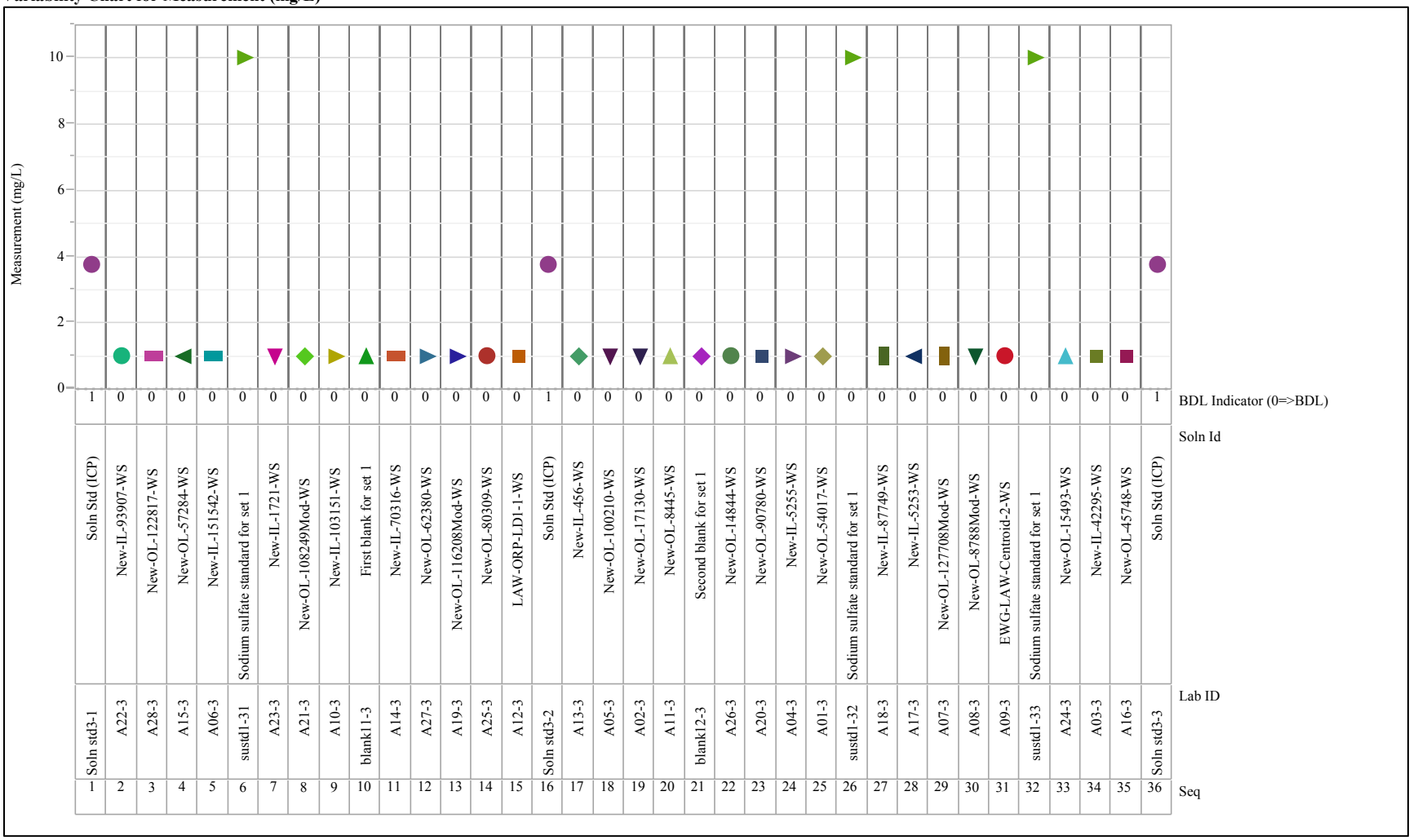


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Fe (mg/L), Analysis=ICP, Blk=4
Variability Chart for Measurement (mg/L)

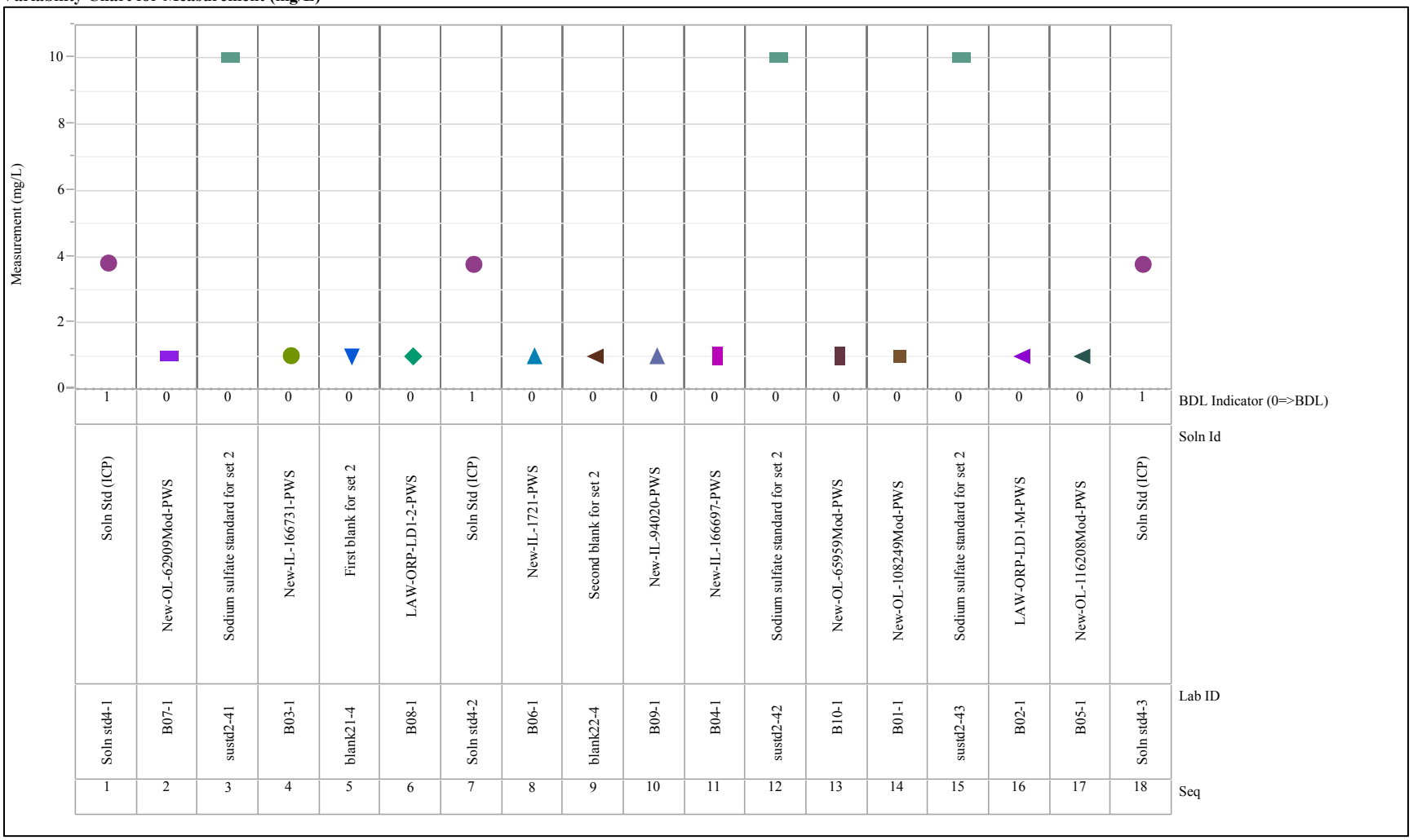


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Fe (mg/L), Analysis=ICP, Blk=5
Variability Chart for Measurement (mg/L)

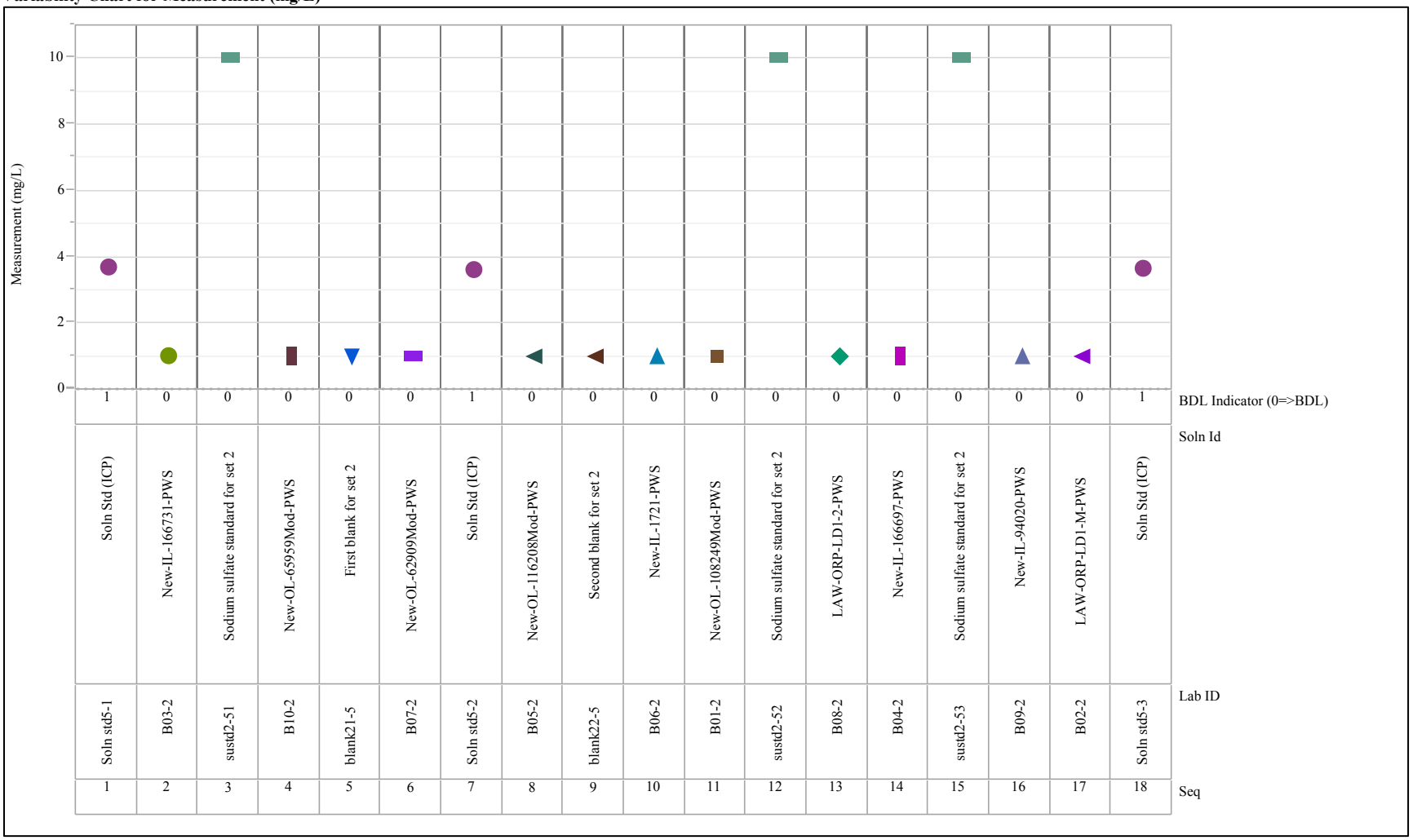


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Fe (mg/L), Analysis=ICP, Blk=6
Variability Chart for Measurement (mg/L)

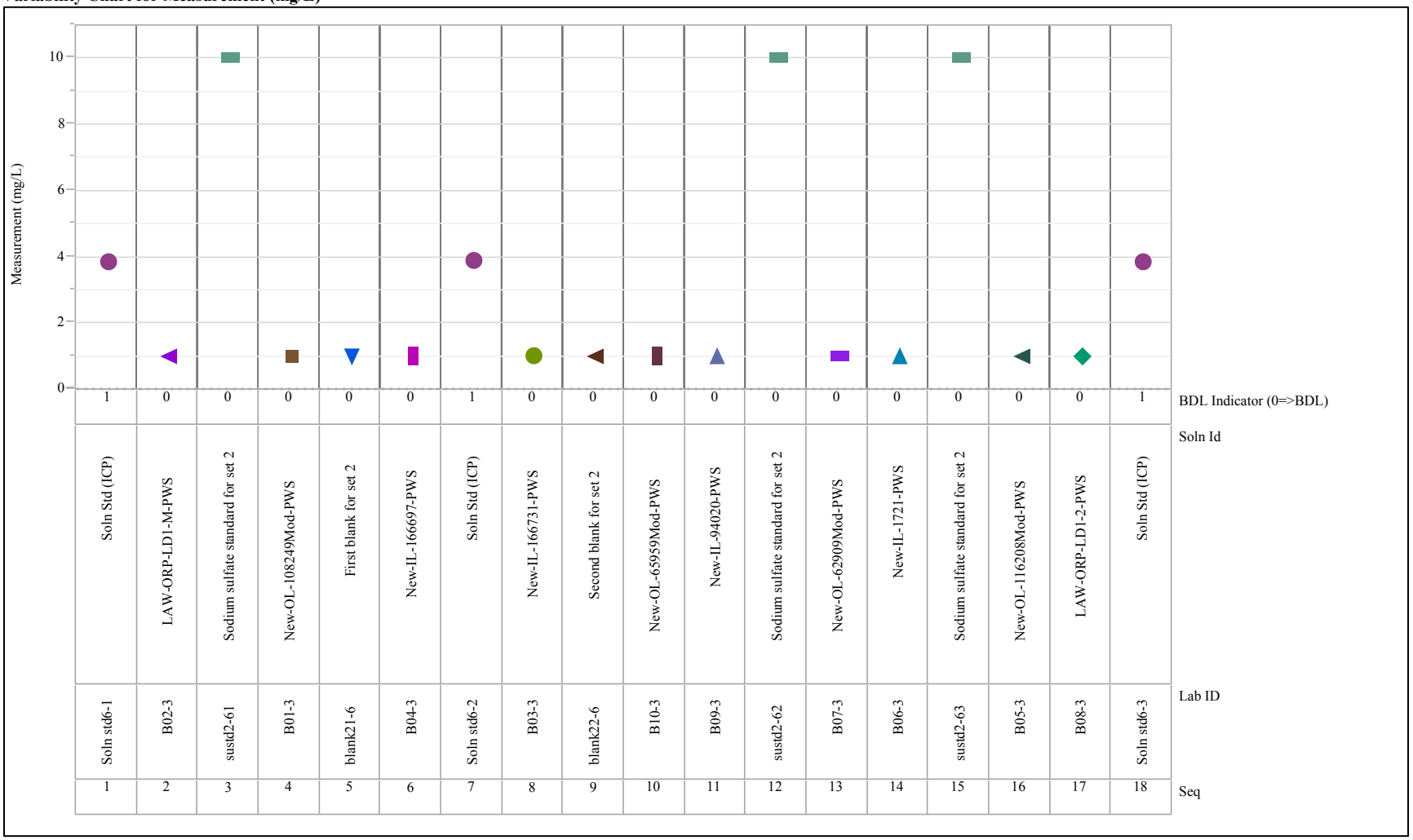


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=K (mg/L), Analysis=ICP, Blk=1
Variability Chart for Measurement (mg/L)

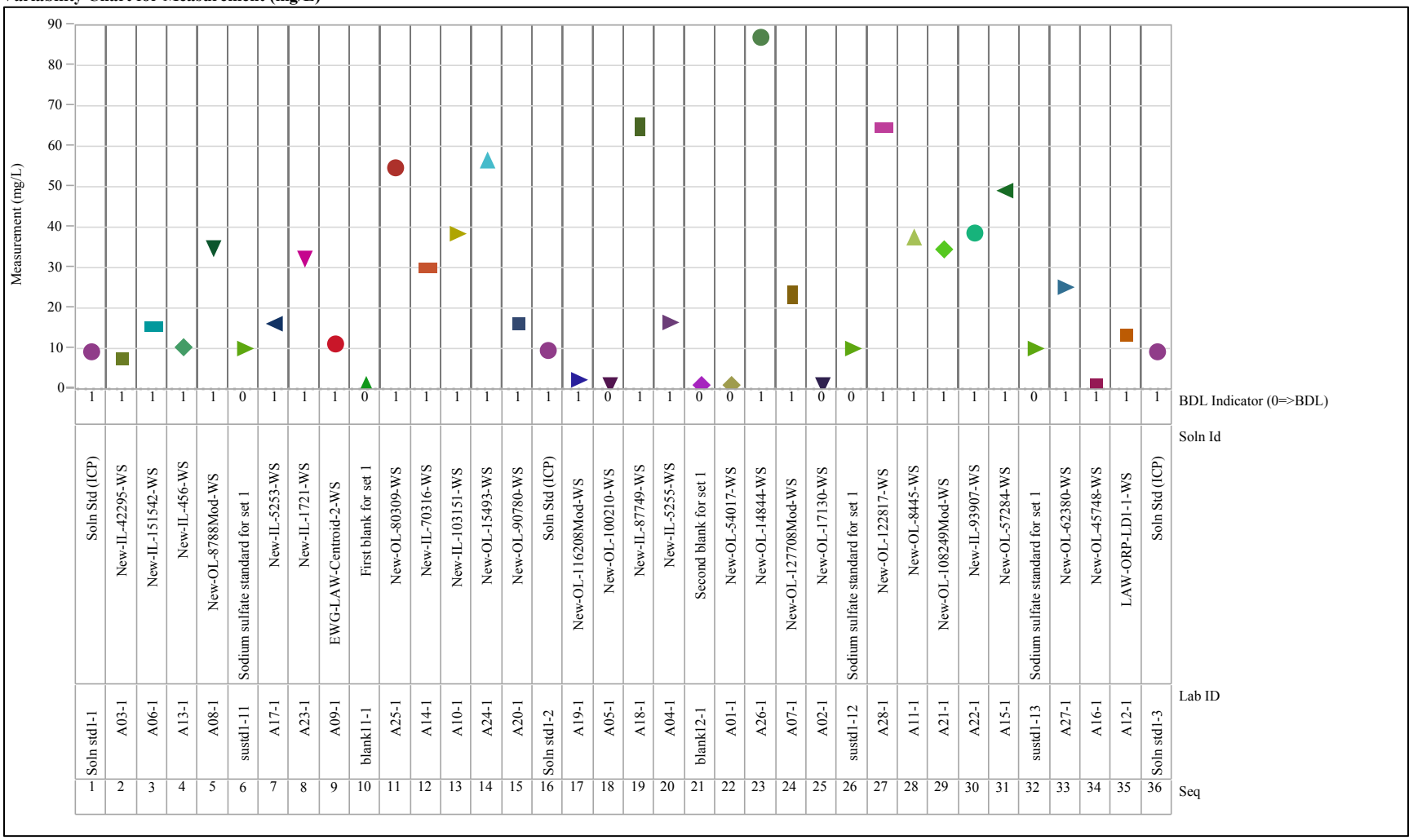


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=K (mg/L), Analysis=ICP, Blk=2
Variability Chart for Measurement (mg/L)

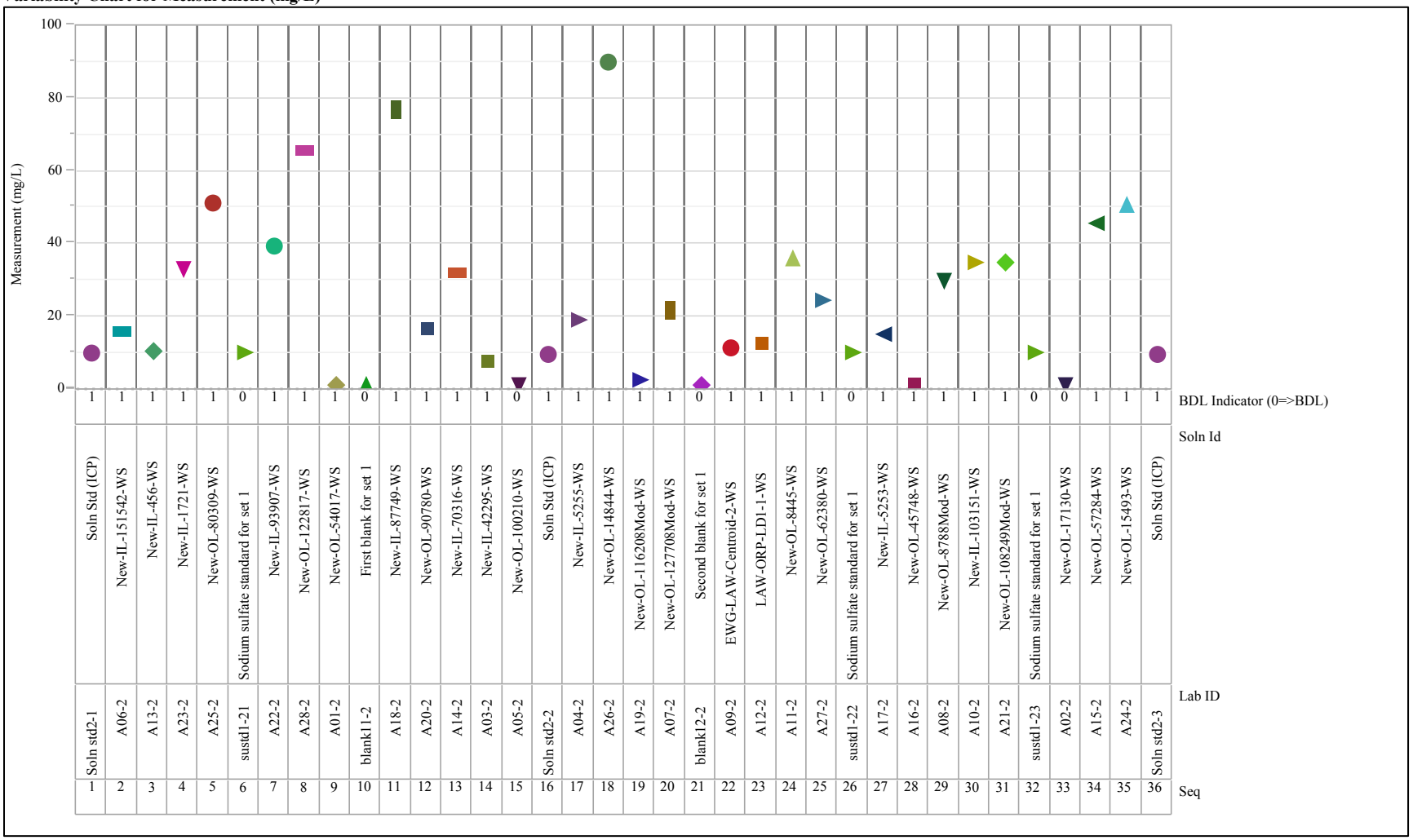


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=K (mg/L), Analysis=ICP, Blk=3
Variability Chart for Measurement (mg/L)

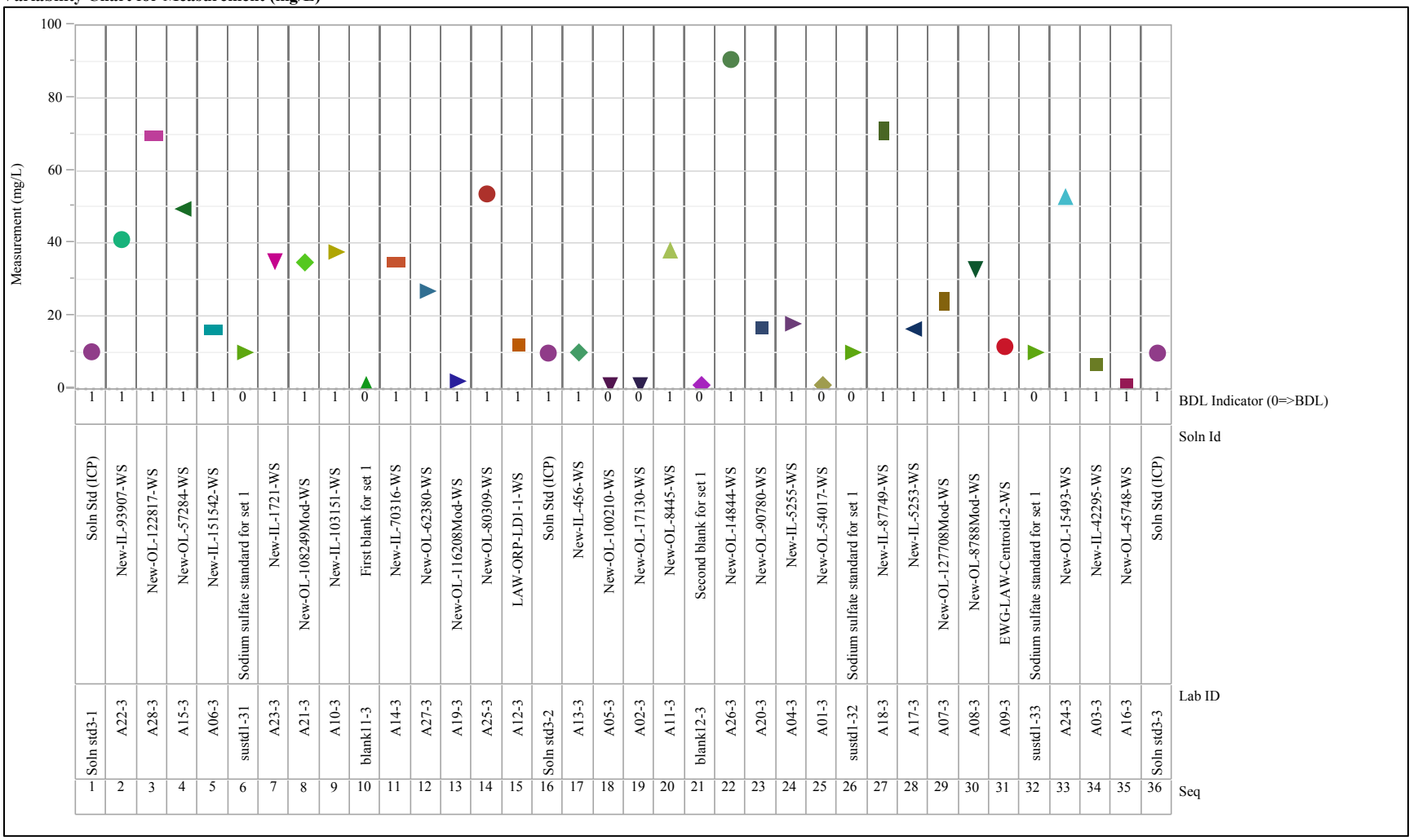


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=K (mg/L), Analysis=ICP, Blk=4
Variability Chart for Measurement (mg/L)

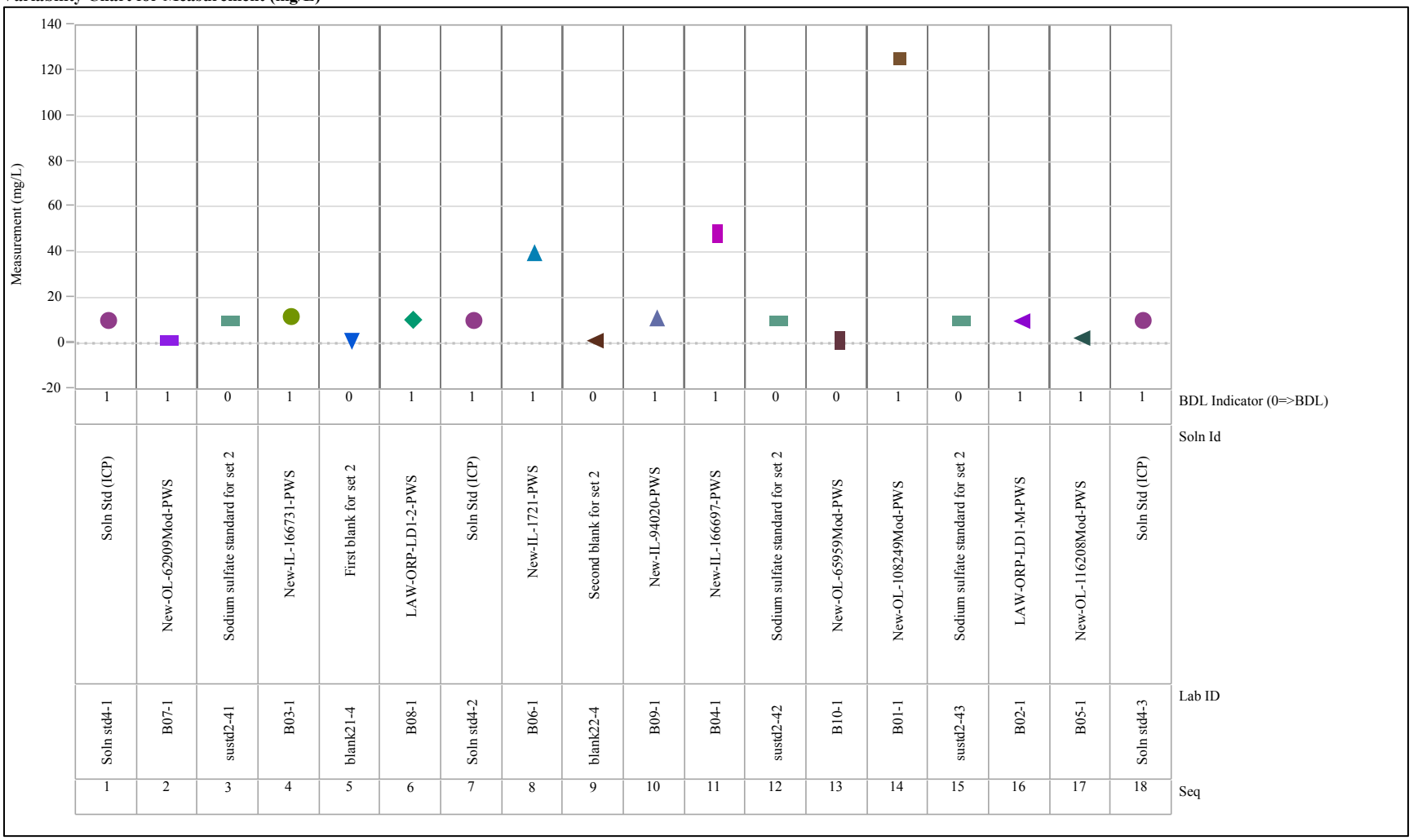


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=K (mg/L), Analysis=ICP, Blk=5
Variability Chart for Measurement (mg/L)

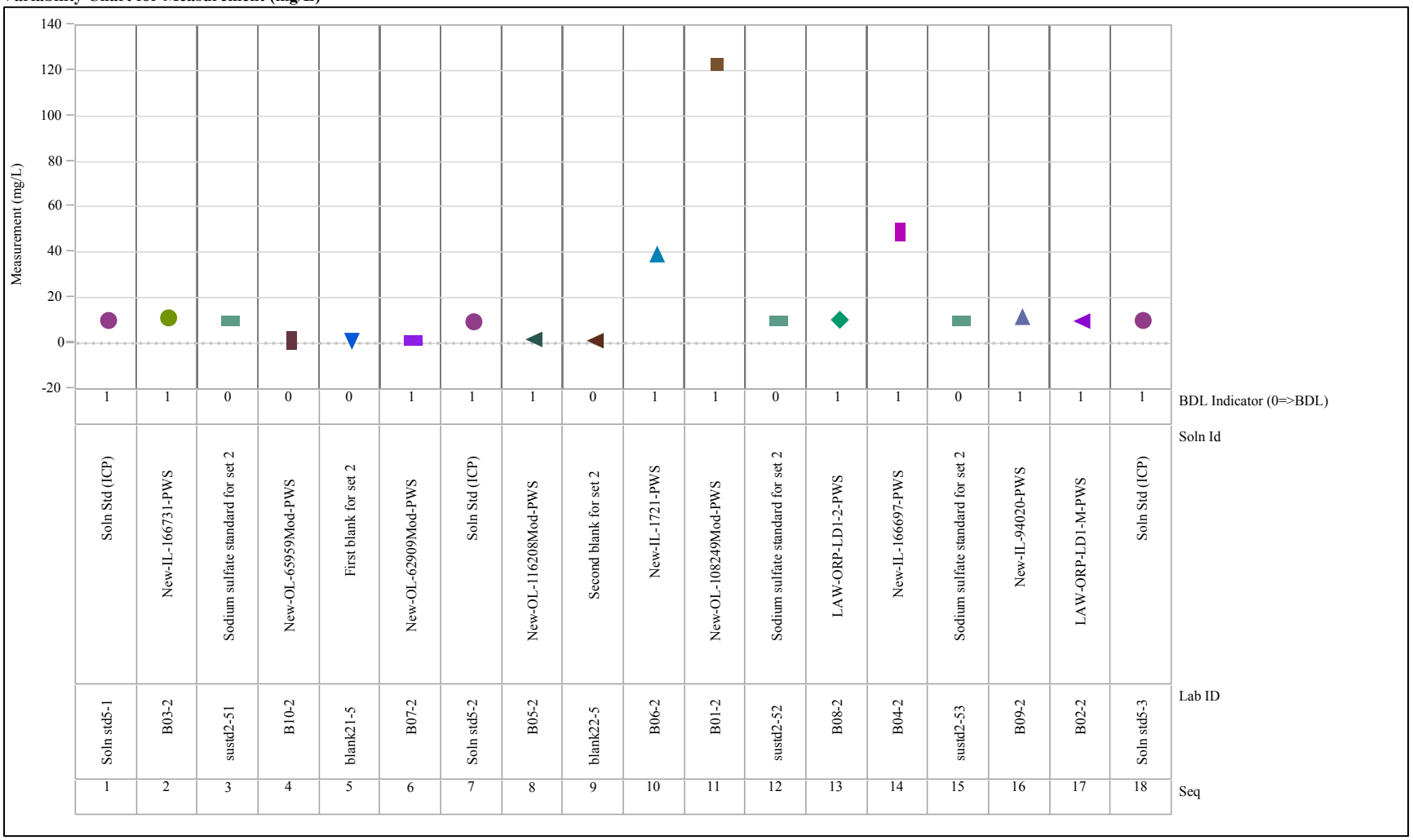


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=K (mg/L), Analysis=ICP, Blk=6
Variability Chart for Measurement (mg/L)

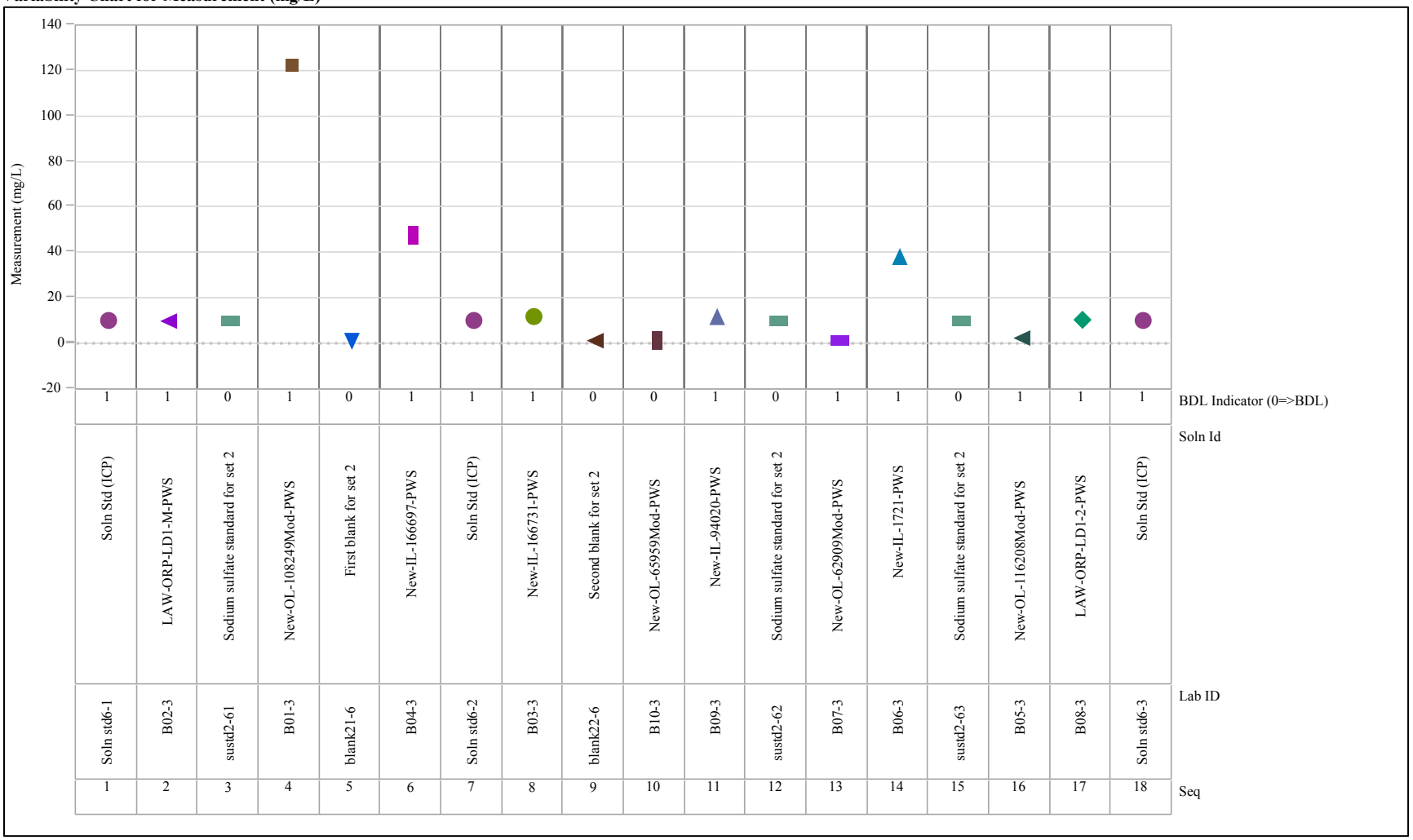


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Li (mg/L), Analysis=ICP, Blk=1
Variability Chart for Measurement (mg/L)

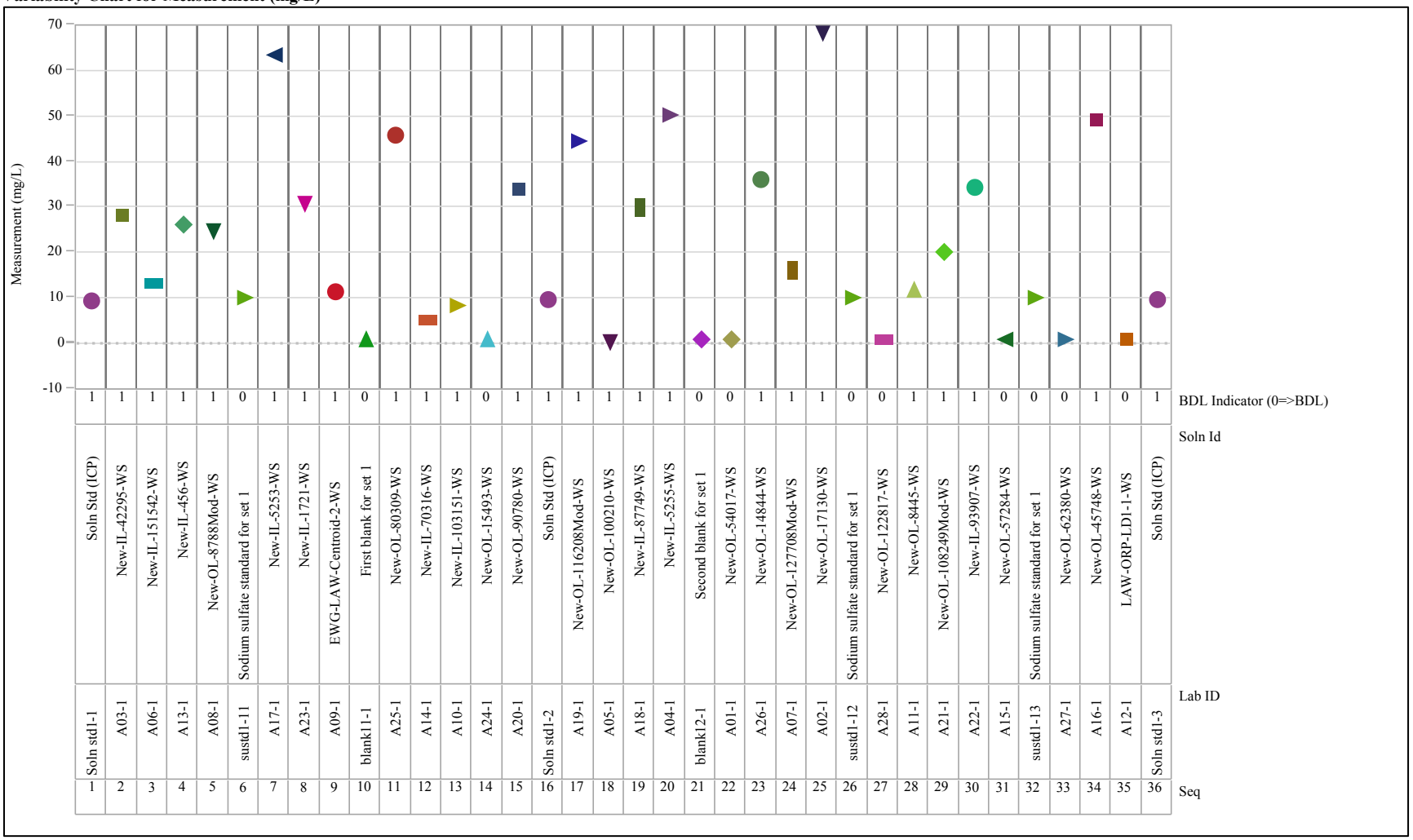


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Li (mg/L), Analysis=ICP, Blk=2
Variability Chart for Measurement (mg/L)

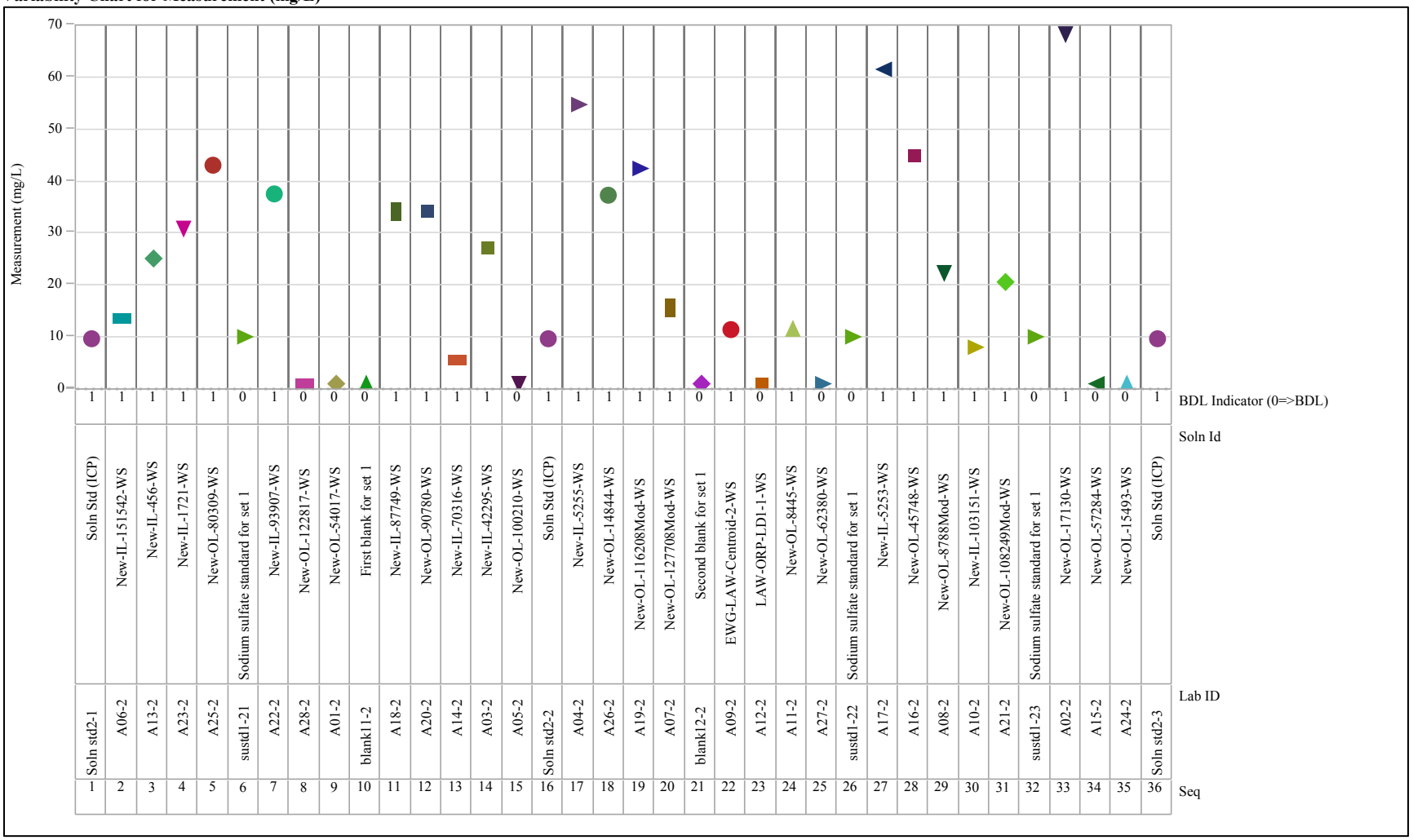


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Li (mg/L), Analysis=ICP, Blk=3
Variability Chart for Measurement (mg/L)

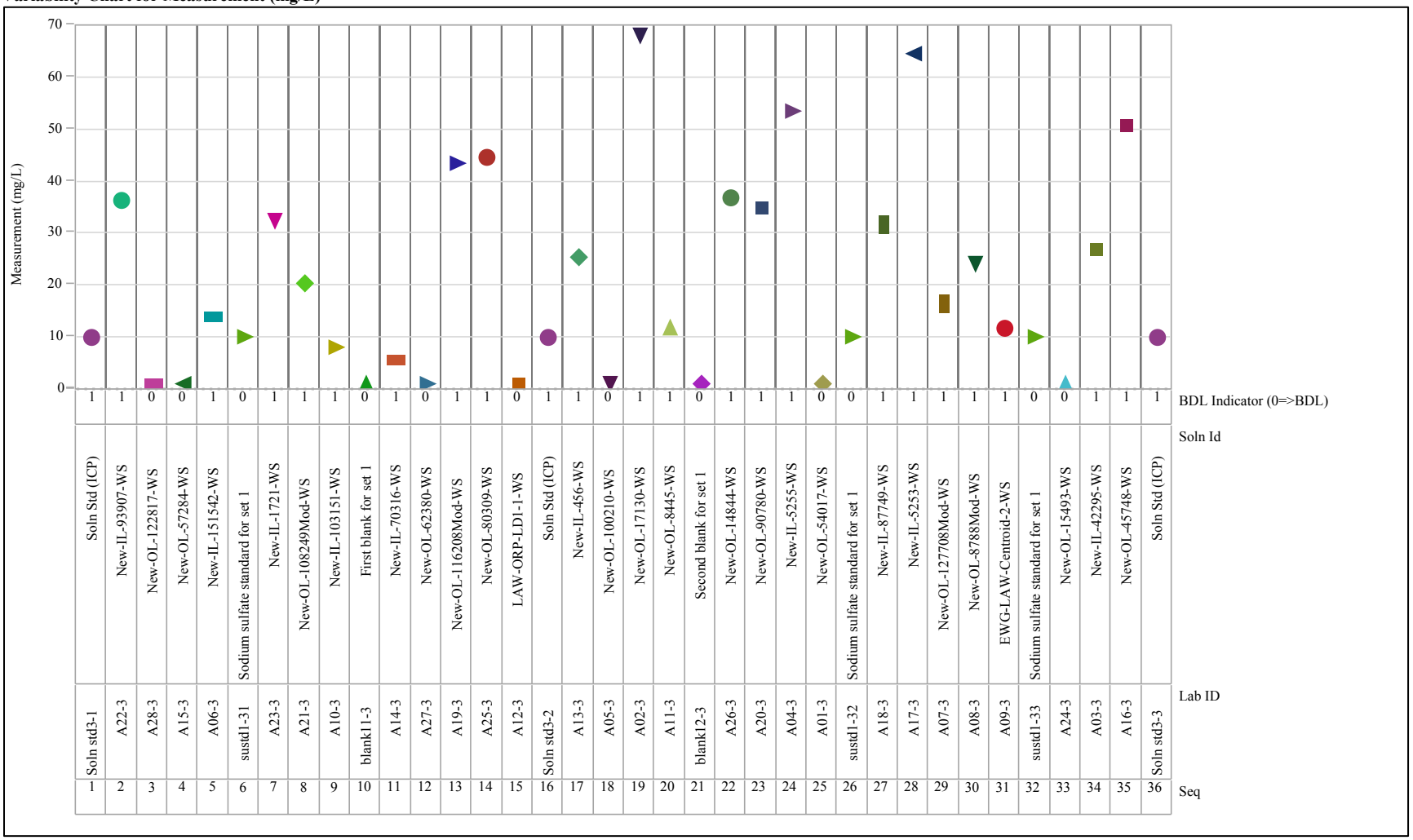


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Li (mg/L), Analysis=ICP, Blk=4
Variability Chart for Measurement (mg/L)

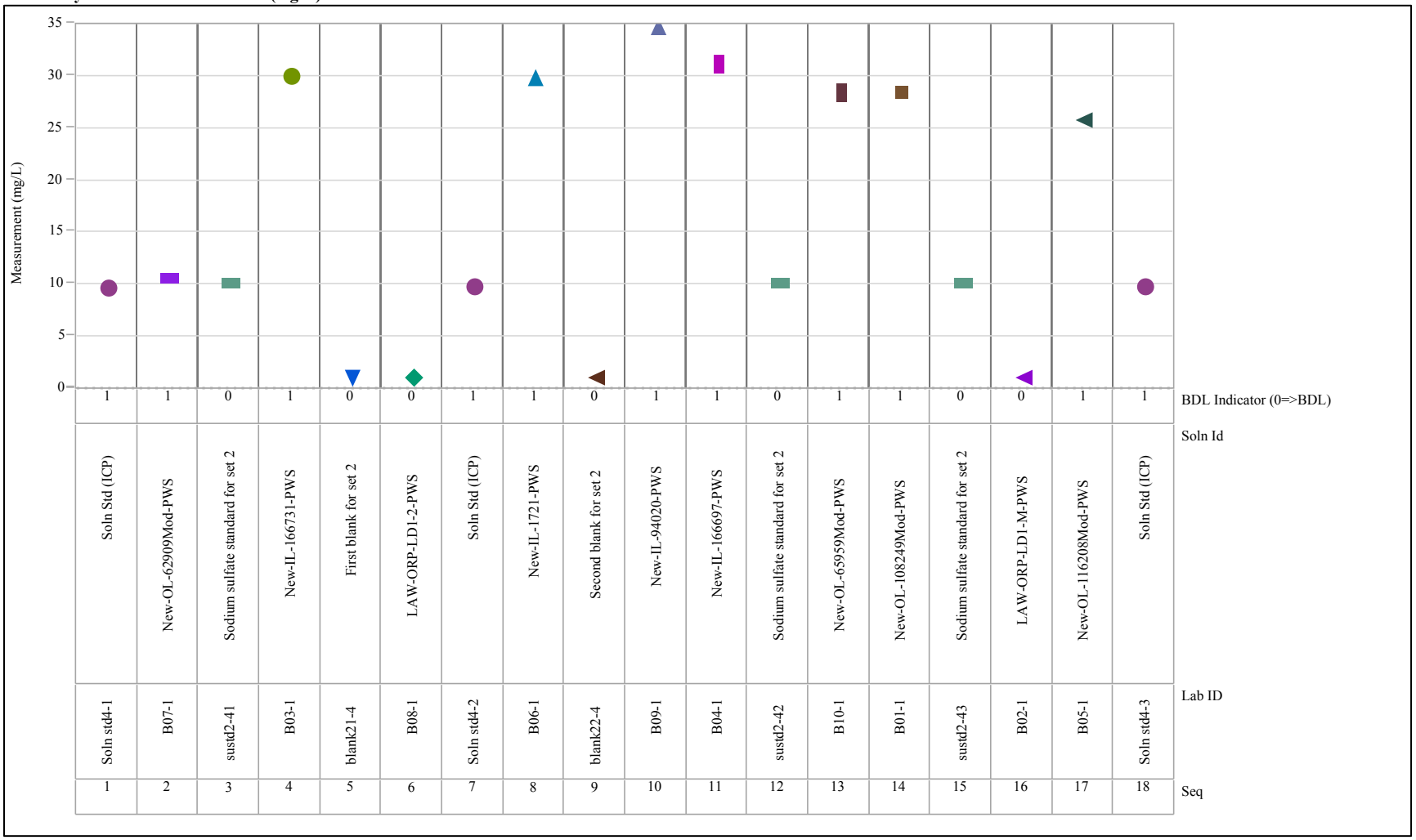


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Li (mg/L), Analysis=ICP, Blk=5
Variability Chart for Measurement (mg/L)

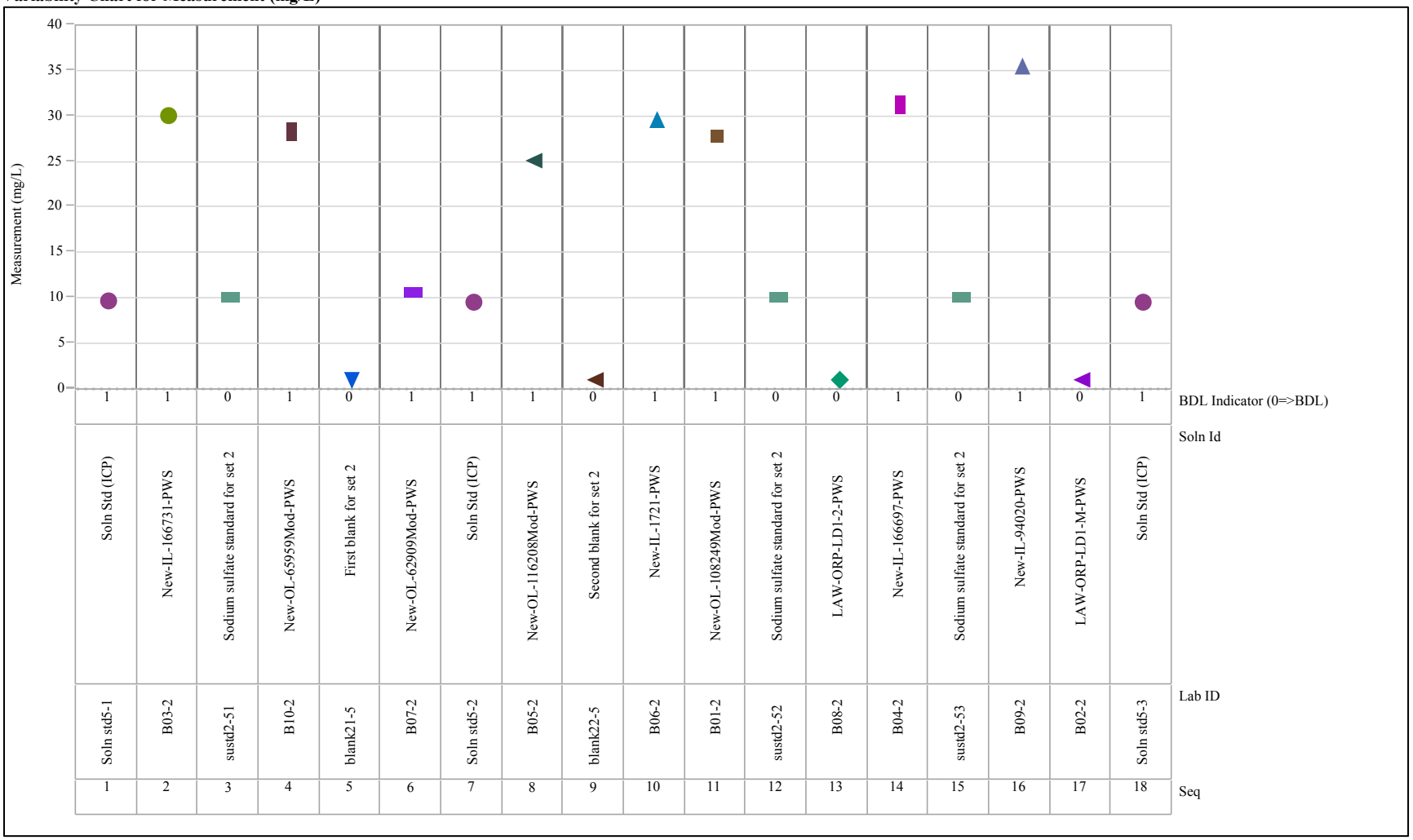


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Li (mg/L), Analysis=ICP, Blk=6
Variability Chart for Measurement (mg/L)

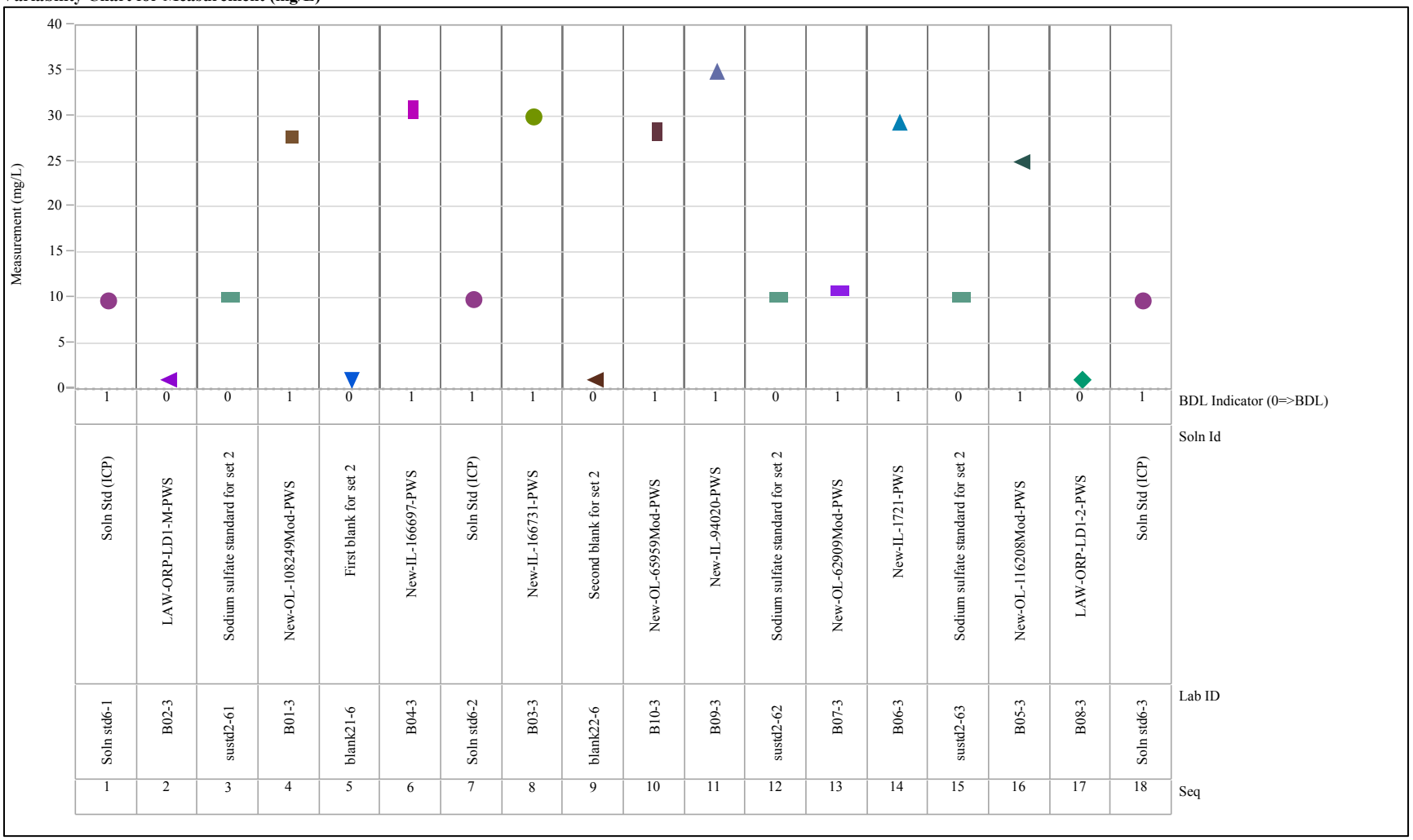


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Mg (mg/L), Analysis=ICP, Blk=1
Variability Chart for Measurement (mg/L)

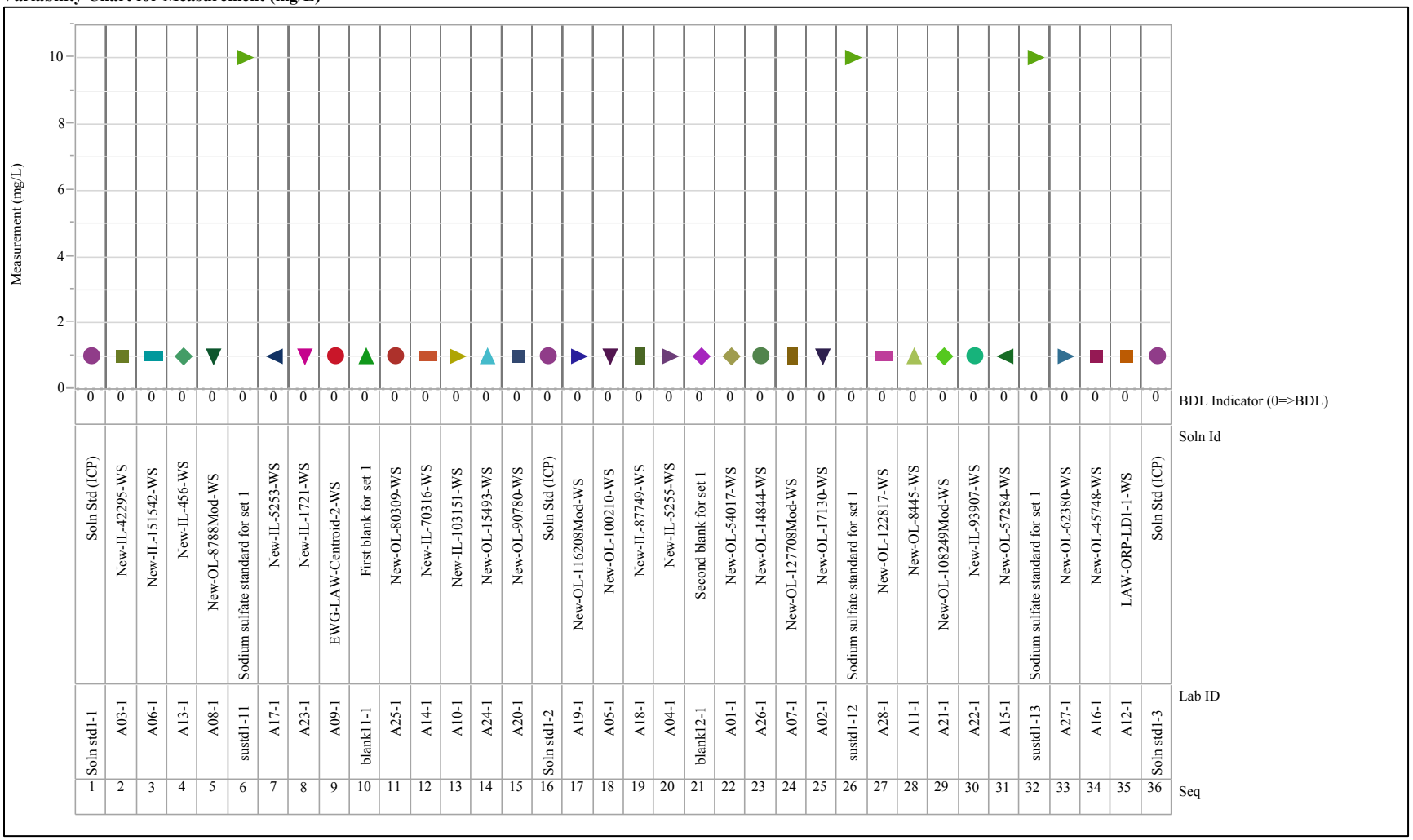


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Mg (mg/L), Analysis=ICP, Blk=2
Variability Chart for Measurement (mg/L)

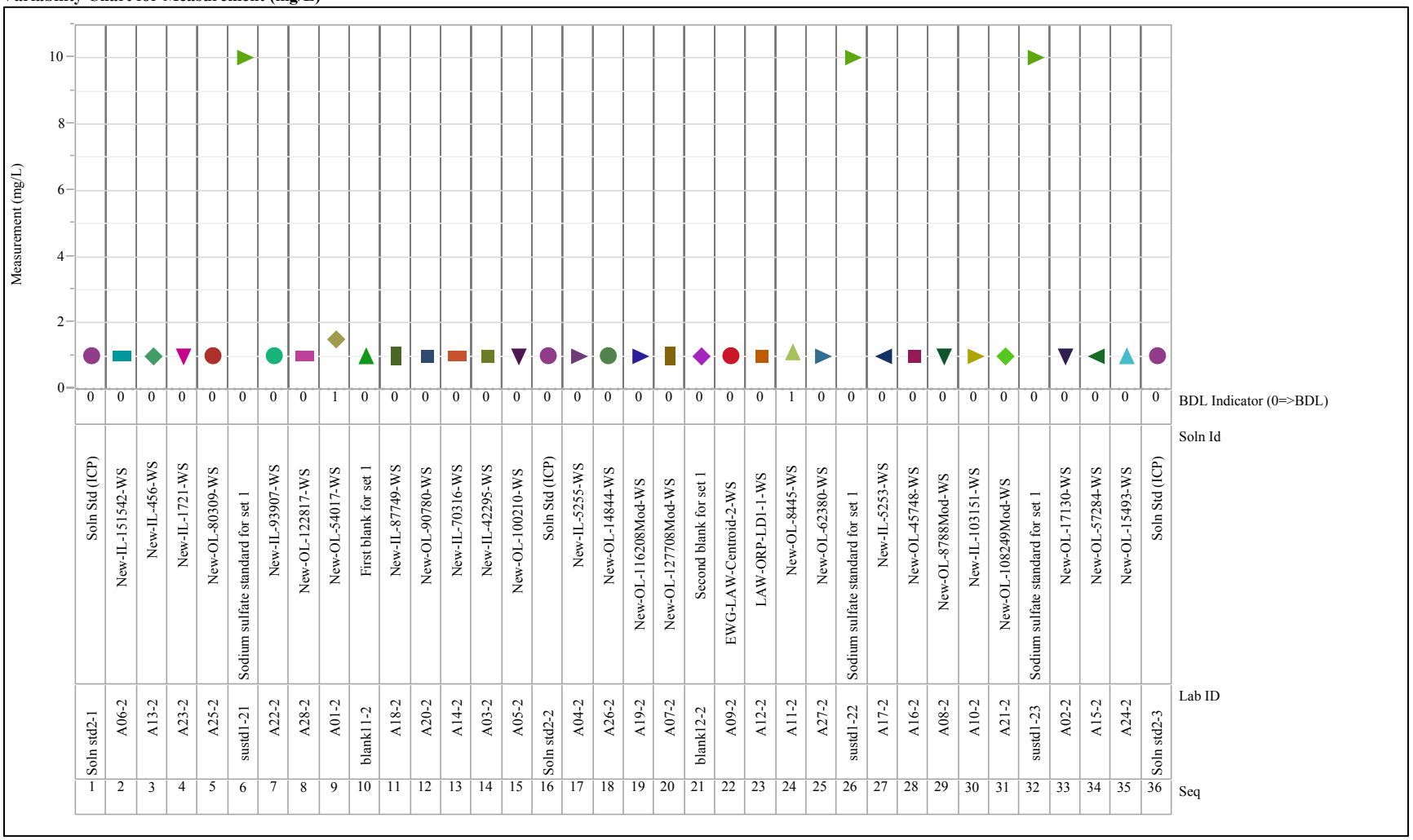


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Mg (mg/L), Analysis=ICP, Blk=3
Variability Chart for Measurement (mg/L)

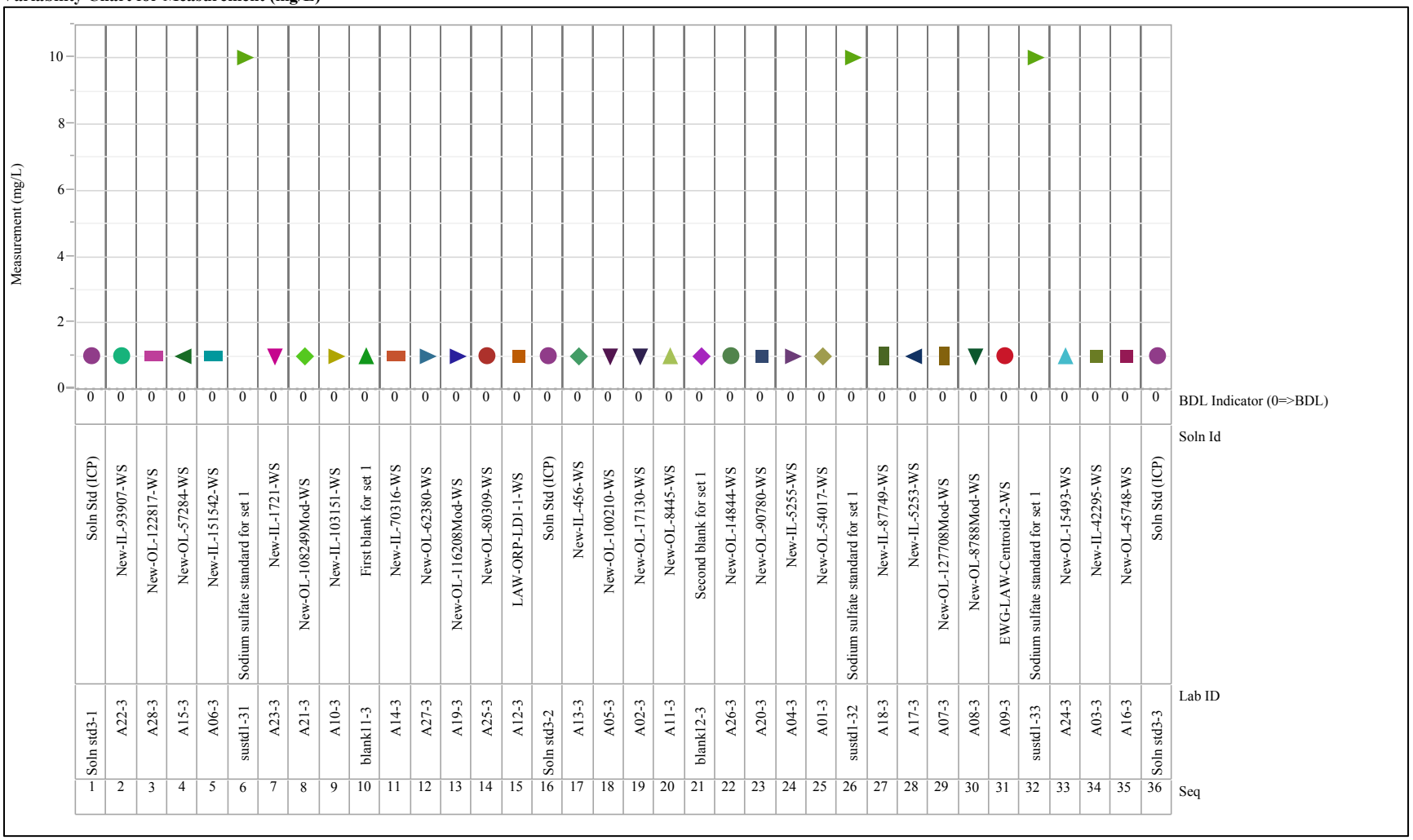


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Mg (mg/L), Analysis=ICP, Blk=4
Variability Chart for Measurement (mg/L)

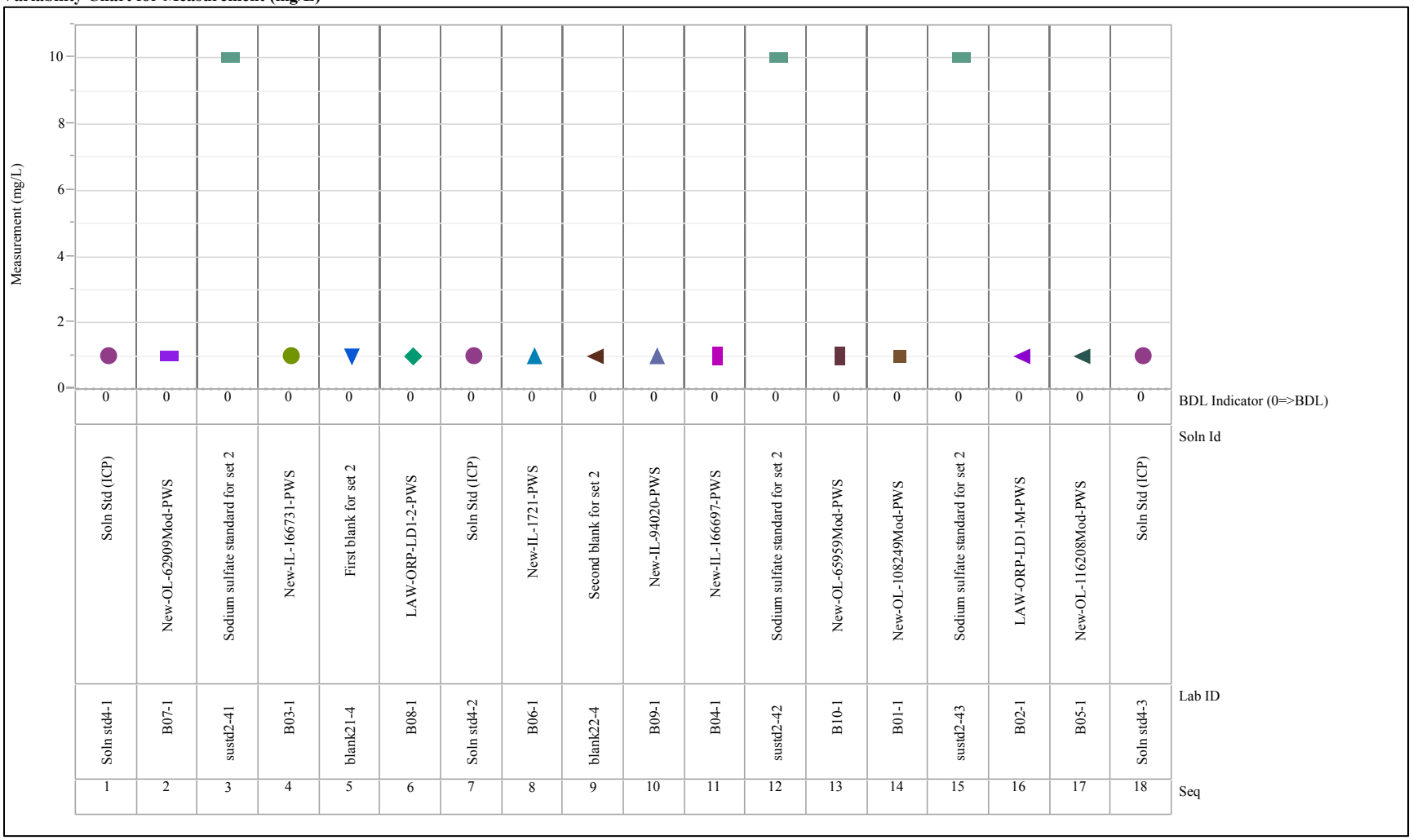


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Mg (mg/L), Analysis=ICP, Blk=5
Variability Chart for Measurement (mg/L)

Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Mg (mg/L), Analysis=ICP, Blk=6
Variability Chart for Measurement (mg/L)

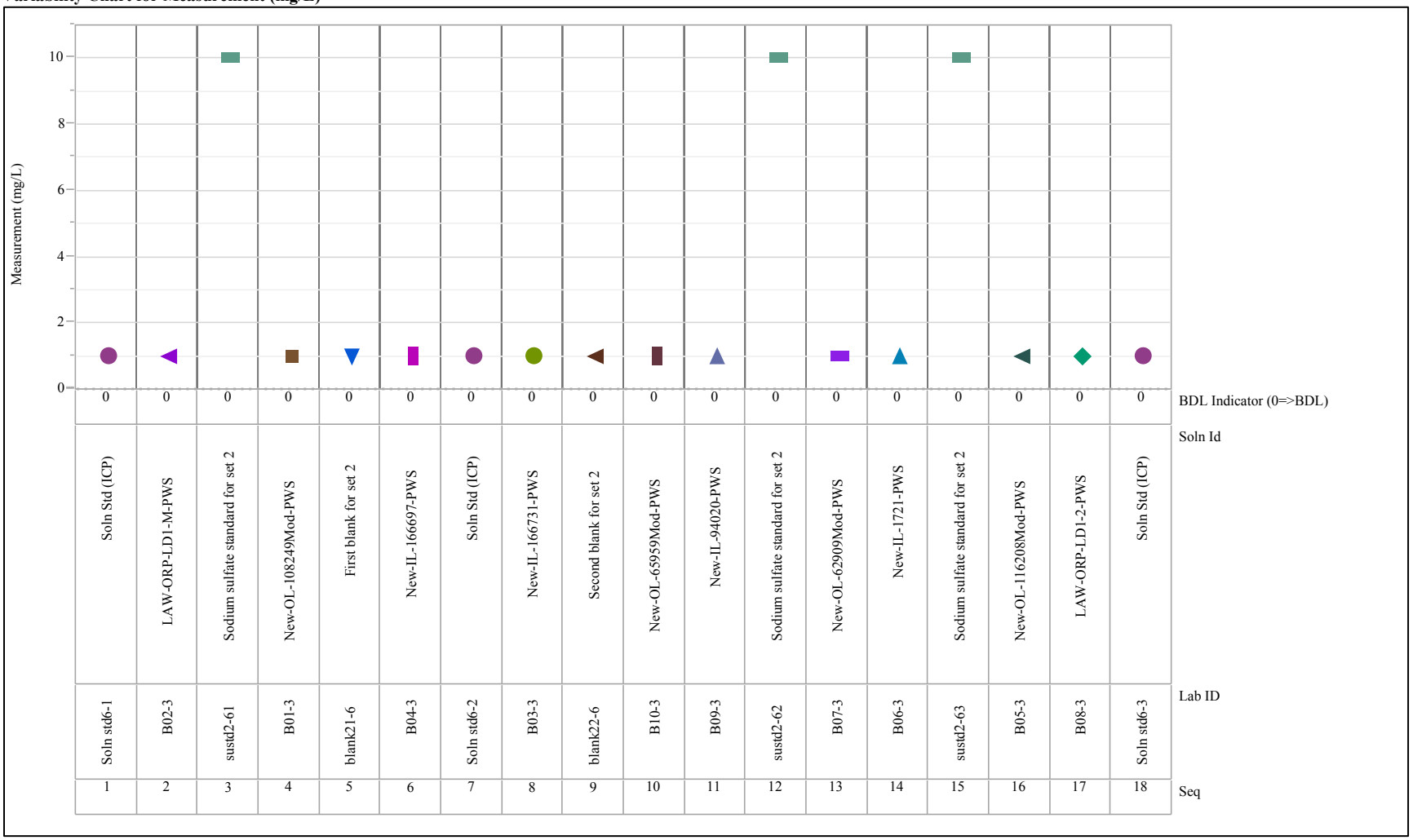


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Na (mg/L), Analysis=ICP, Blk=1
Variability Chart for Measurement (mg/L)

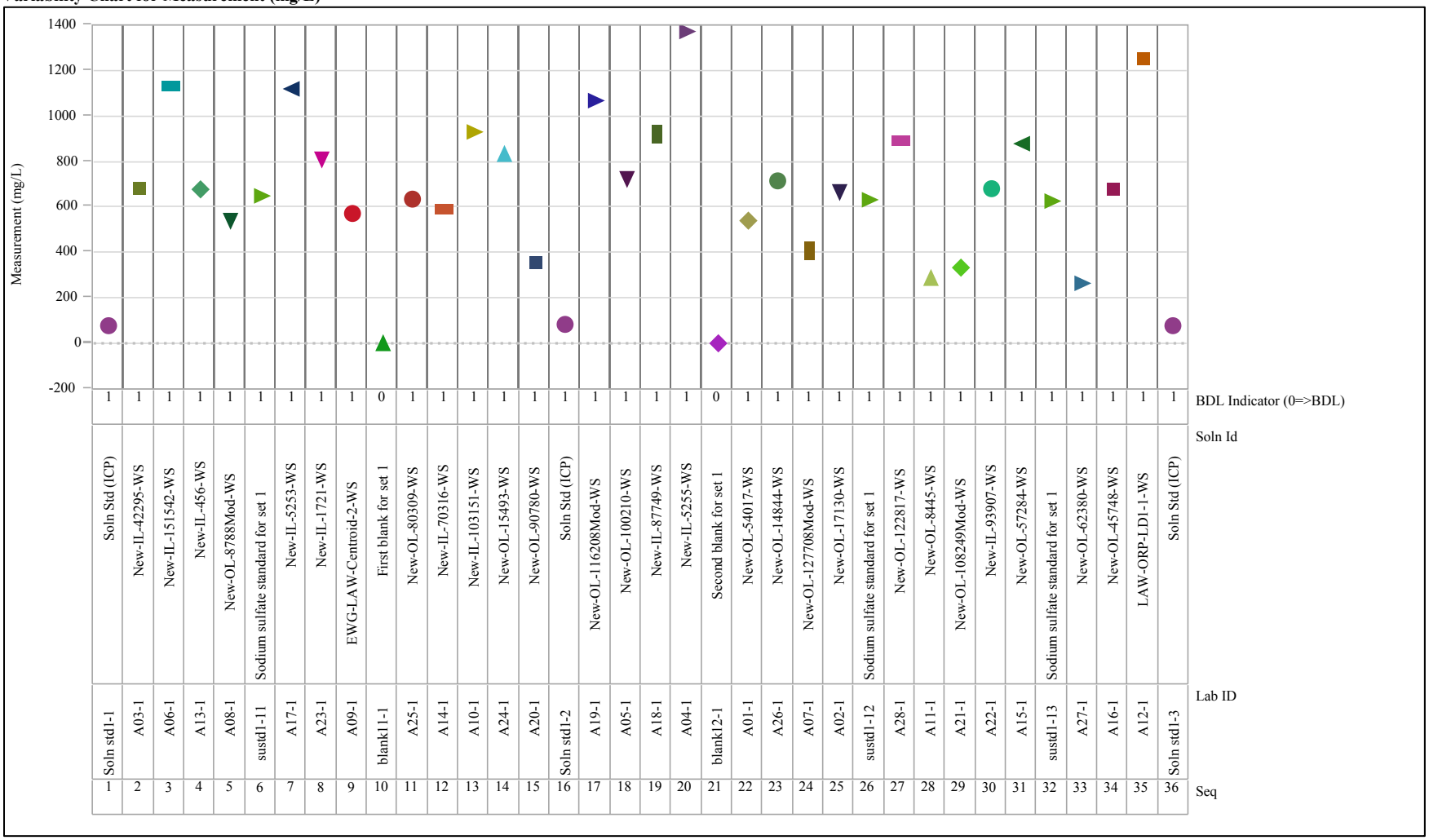


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Na (mg/L), Analysis=ICP, Blk=2
Variability Chart for Measurement (mg/L)

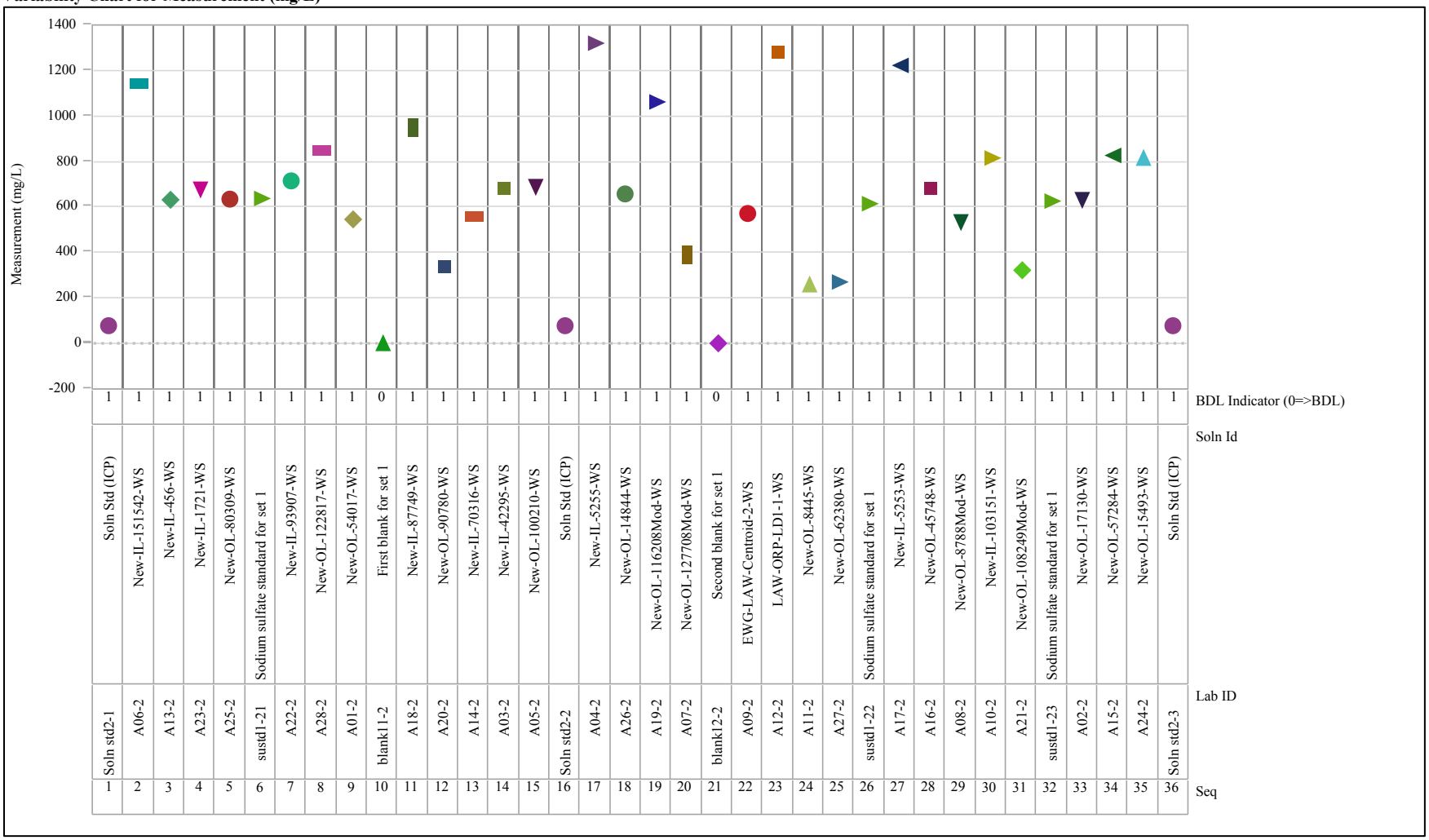


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Na (mg/L), Analysis=ICP, Blk=3
Variability Chart for Measurement (mg/L)

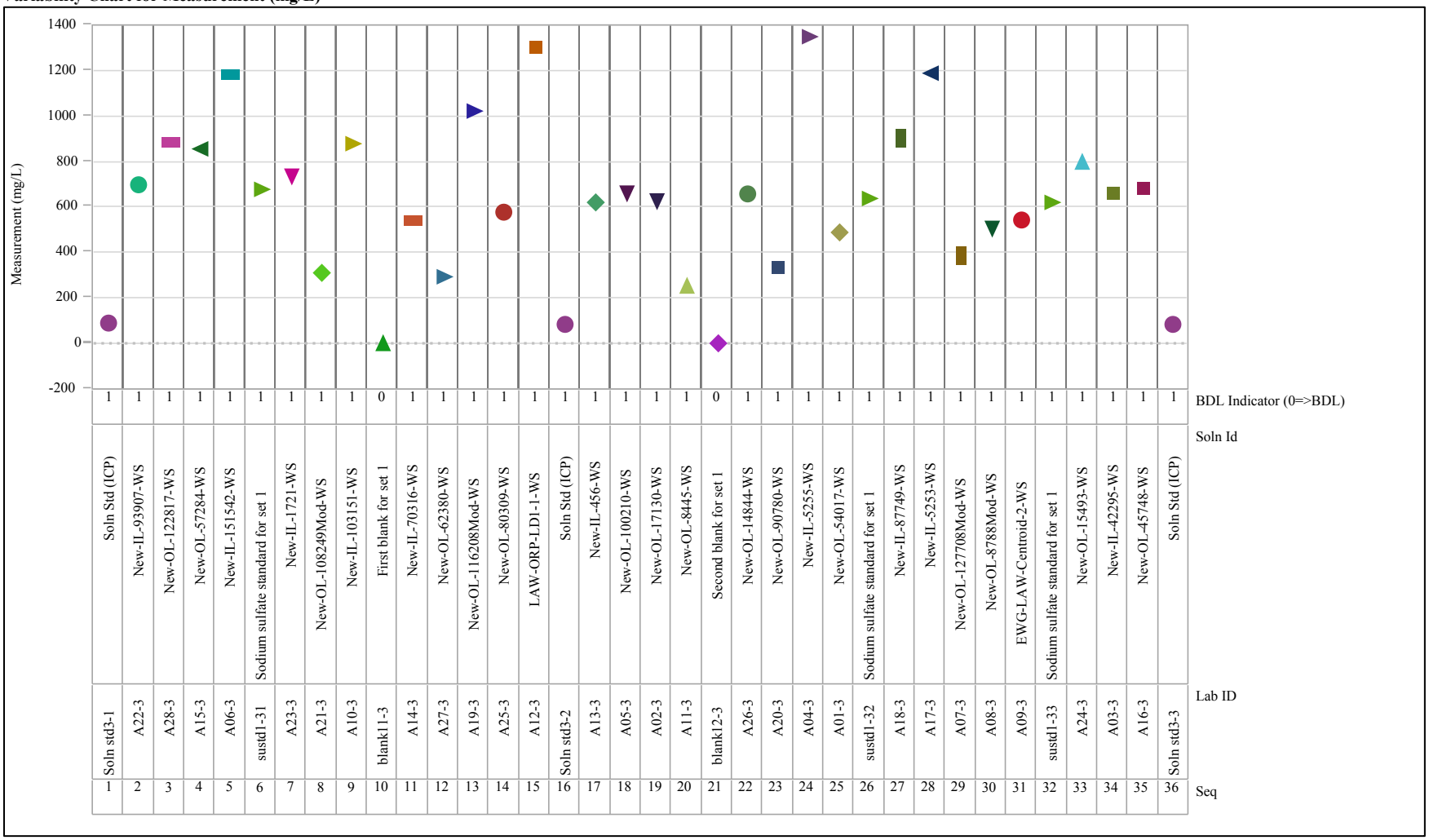


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Na (mg/L), Analysis=ICP, Blk=4
Variability Chart for Measurement (mg/L)

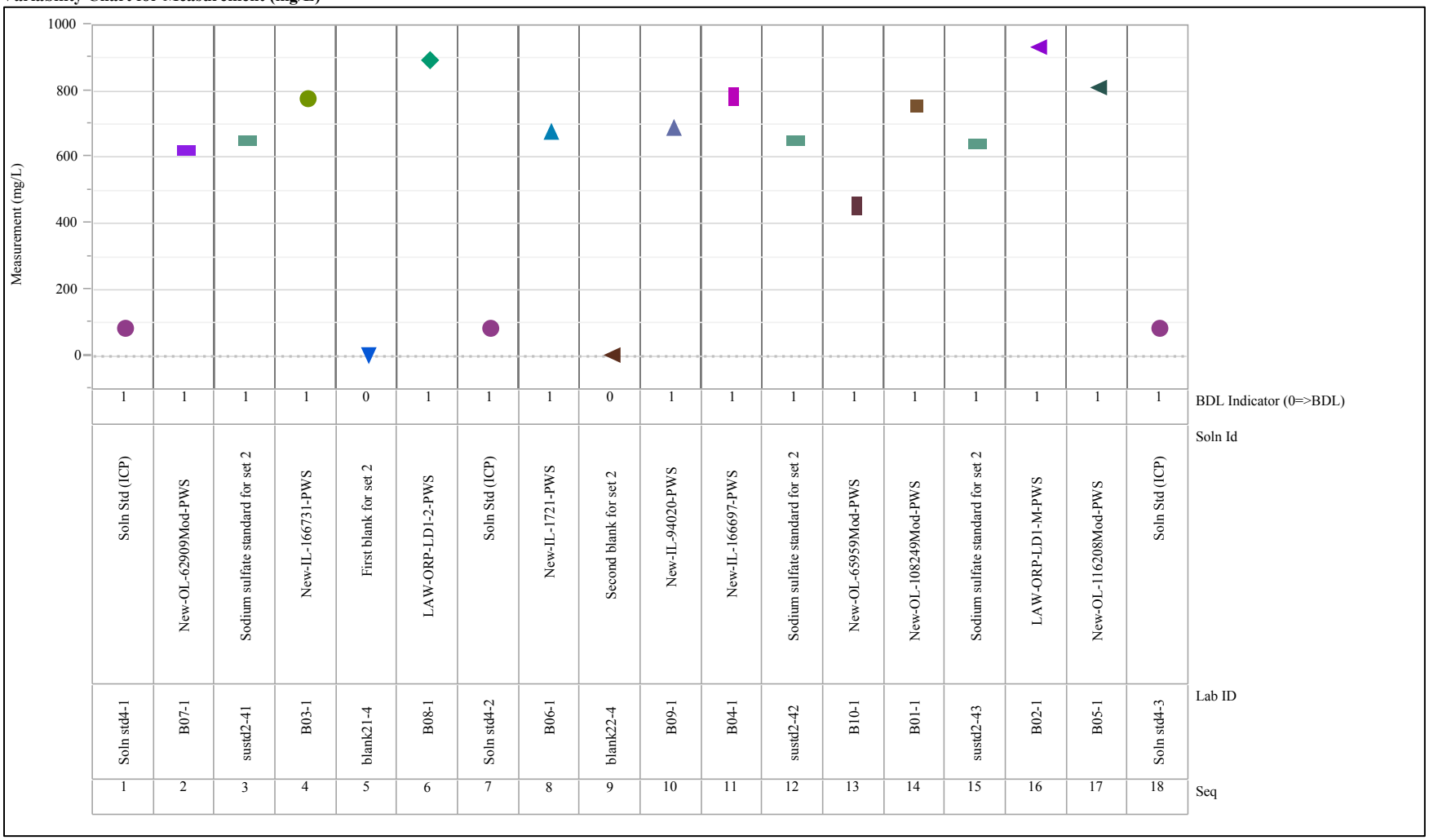


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Na (mg/L), Analysis=ICP, Blk=5
Variability Chart for Measurement (mg/L)

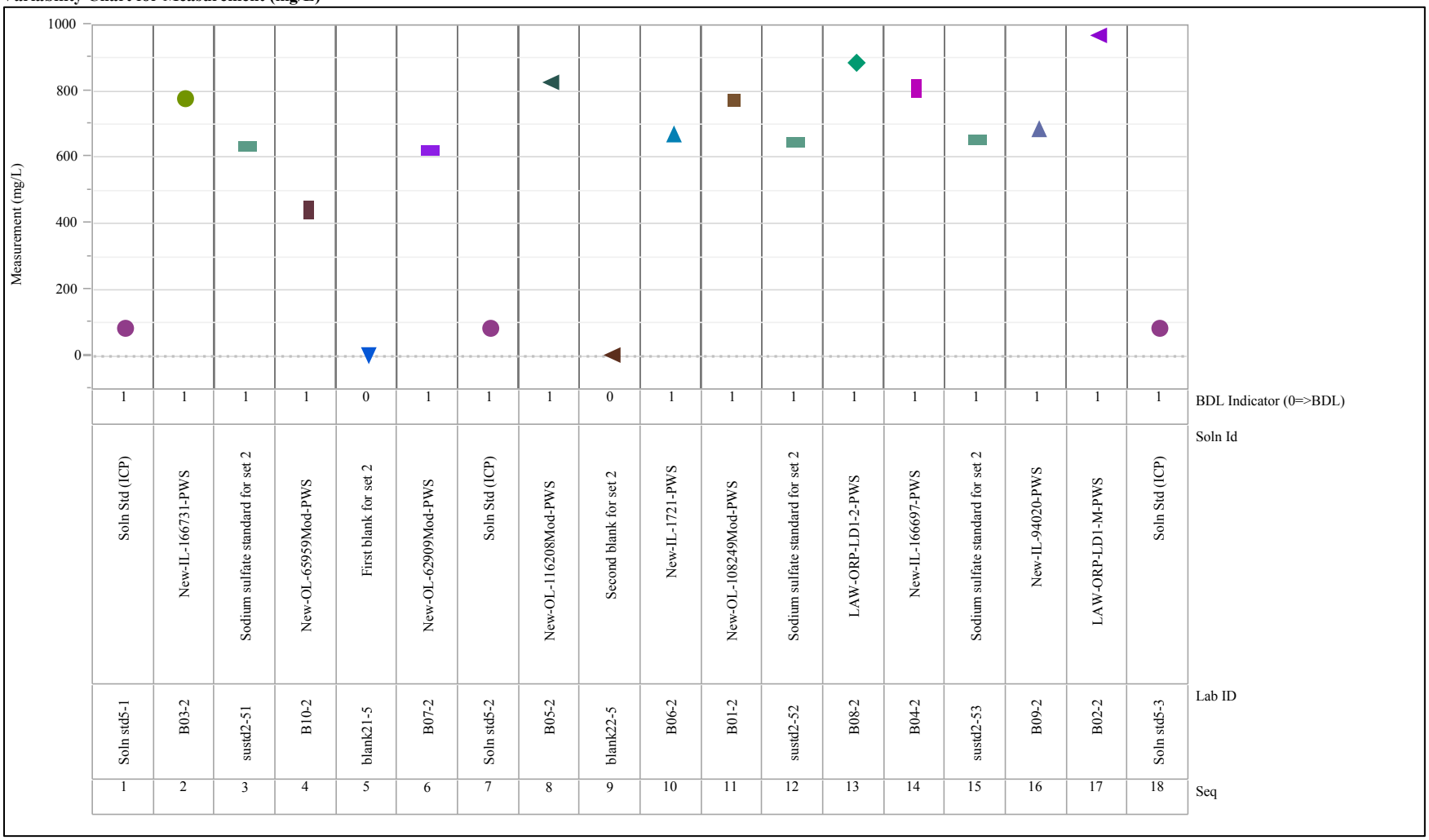


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Na (mg/L), Analysis=ICP, Blk=6
Variability Chart for Measurement (mg/L)

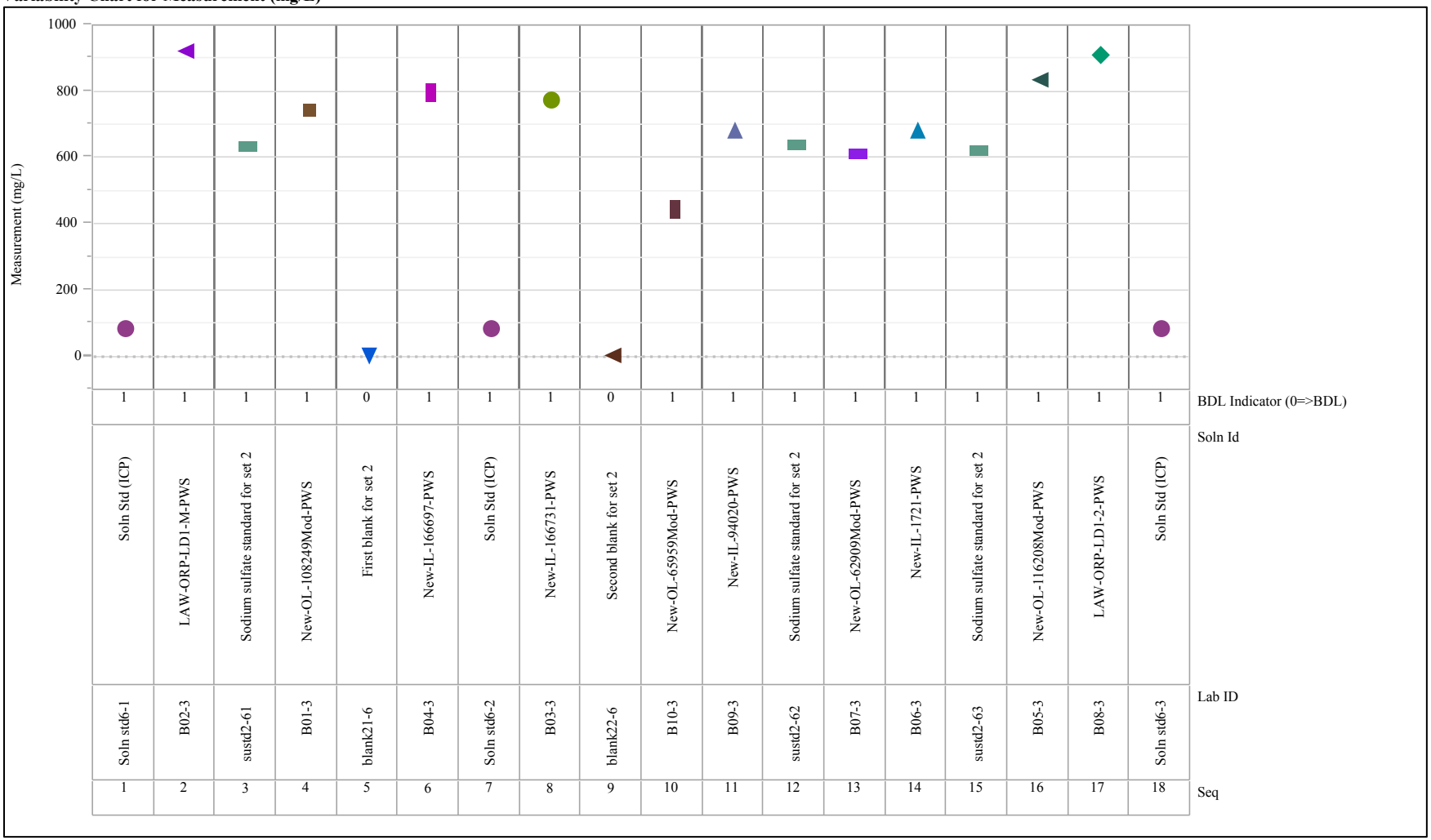


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=P (mg/L), Analysis=ICP, Blk=1
Variability Chart for Measurement (mg/L)

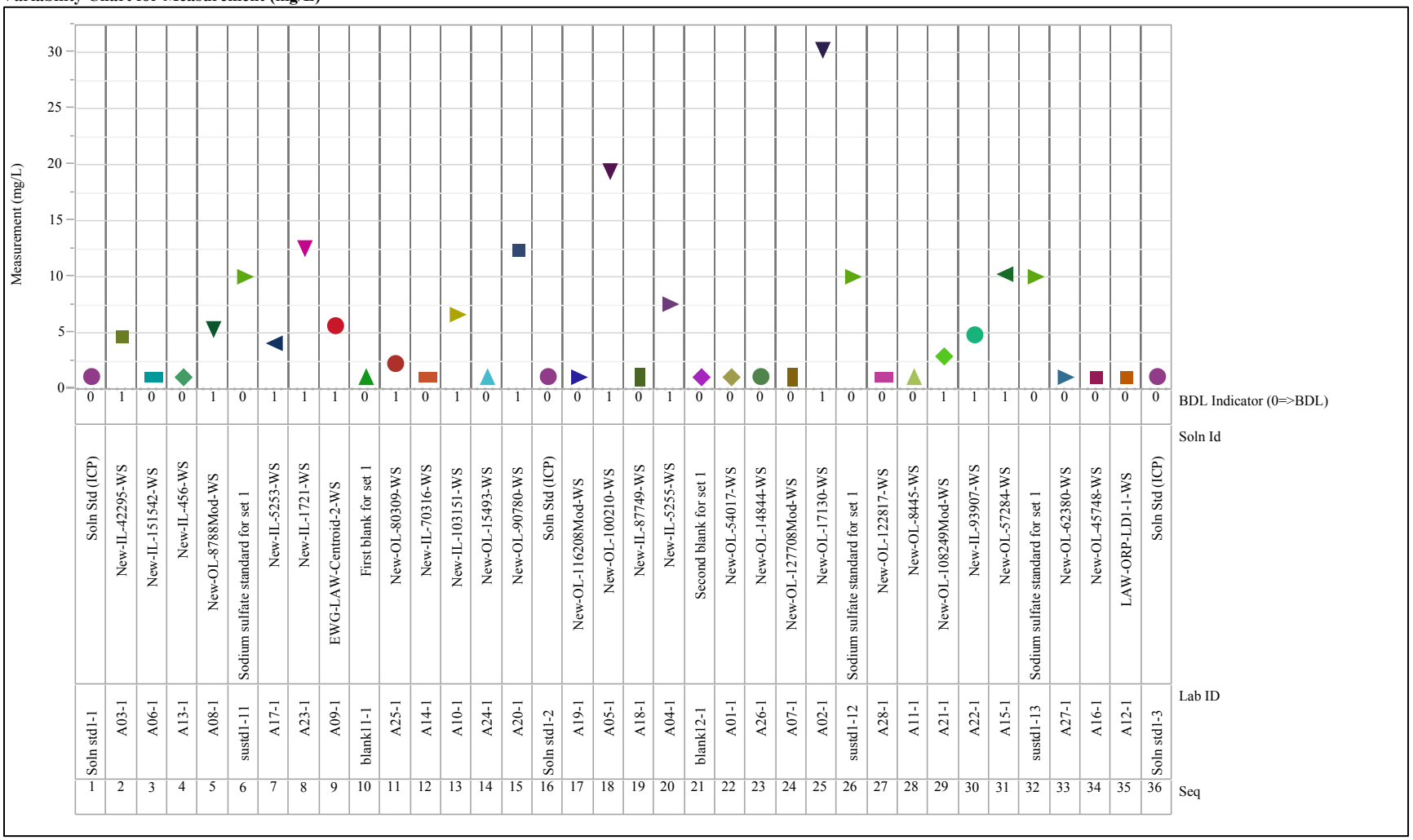


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=P (mg/L), Analysis=ICP, Blk=2
Variability Chart for Measurement (mg/L)

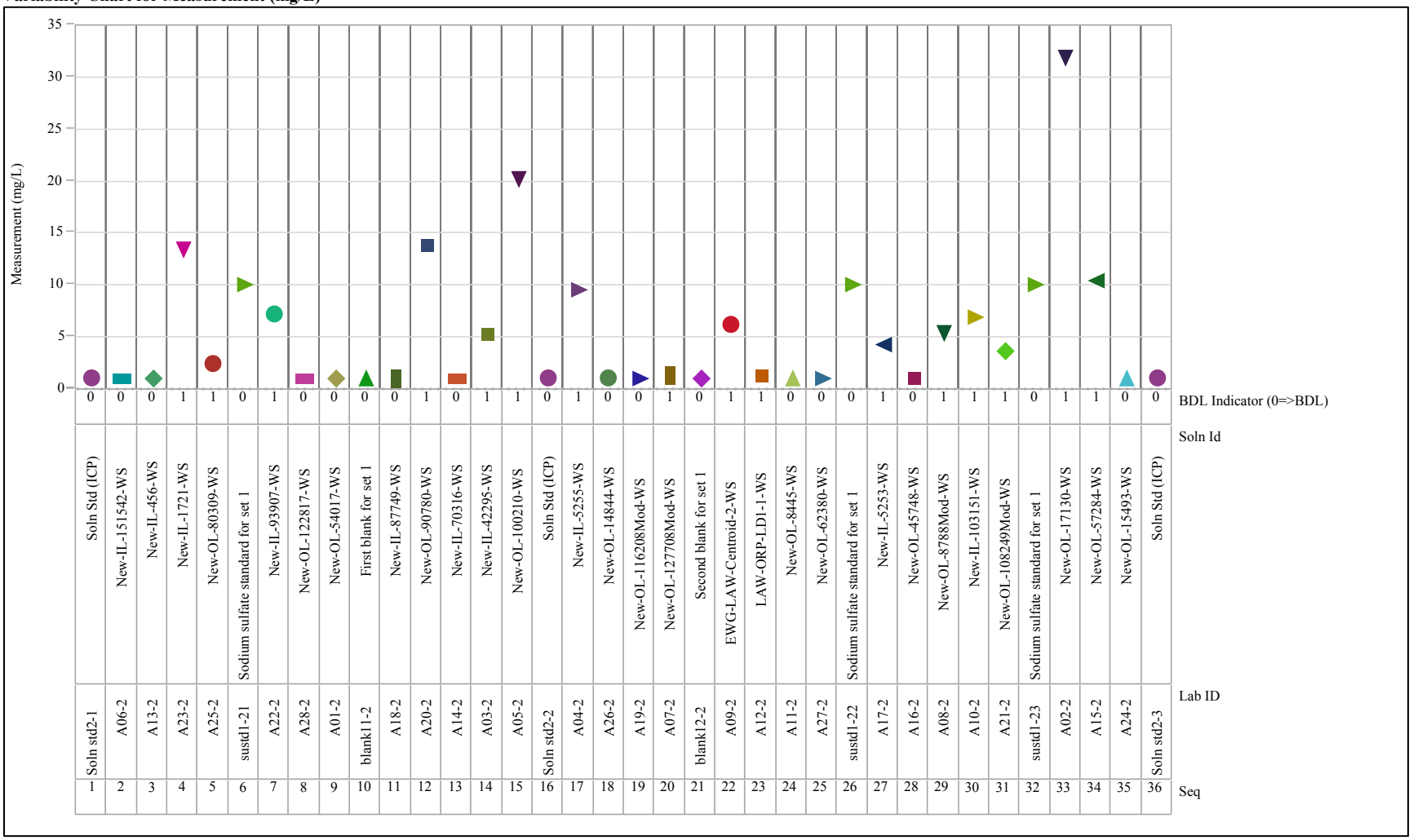


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=P (mg/L), Analysis=ICP, Blk=3
Variability Chart for Measurement (mg/L)

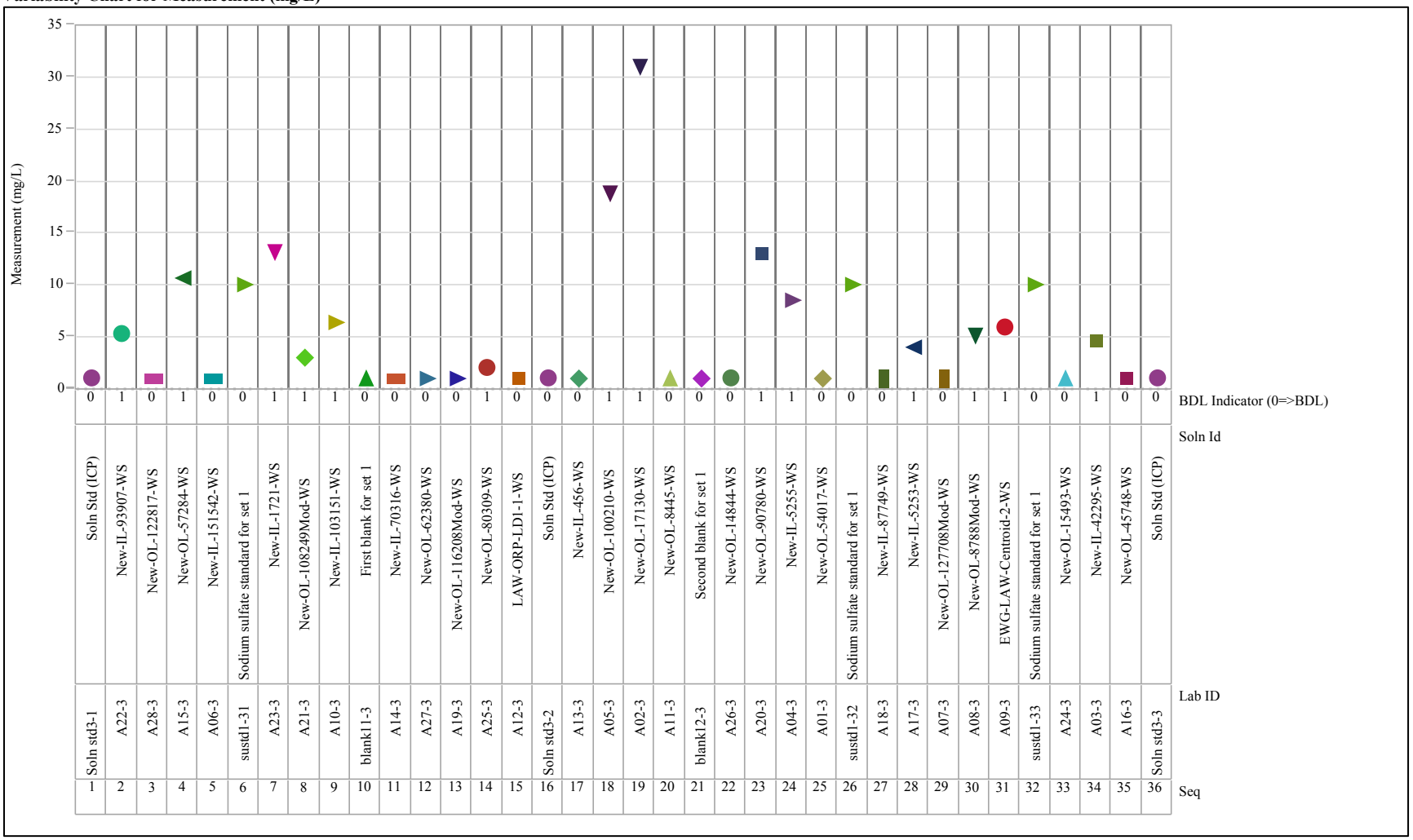


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=P (mg/L), Analysis=ICP, Blk=4
Variability Chart for Measurement (mg/L)

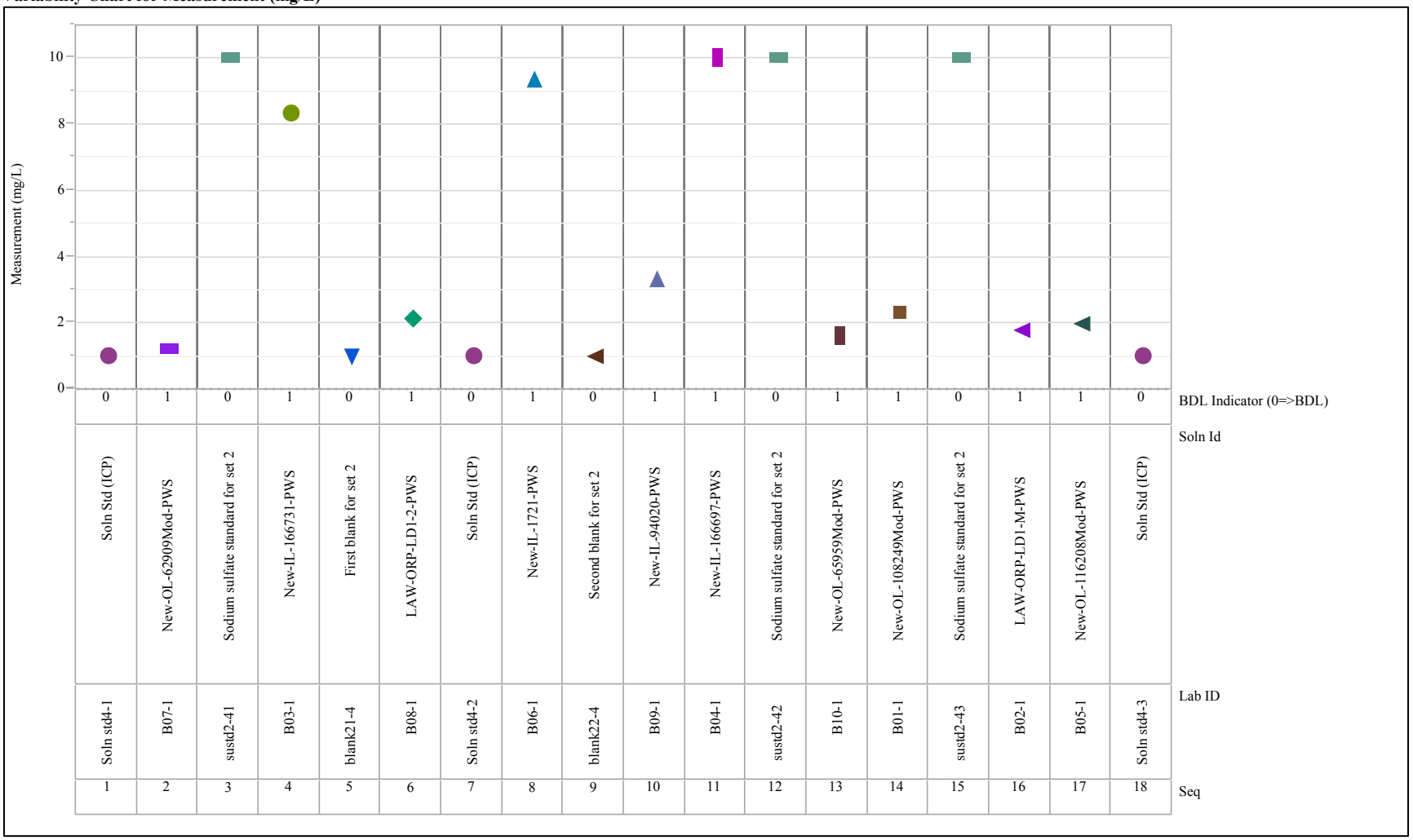


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=P (mg/L), Analysis=ICP, Blk=5
Variability Chart for Measurement (mg/L)

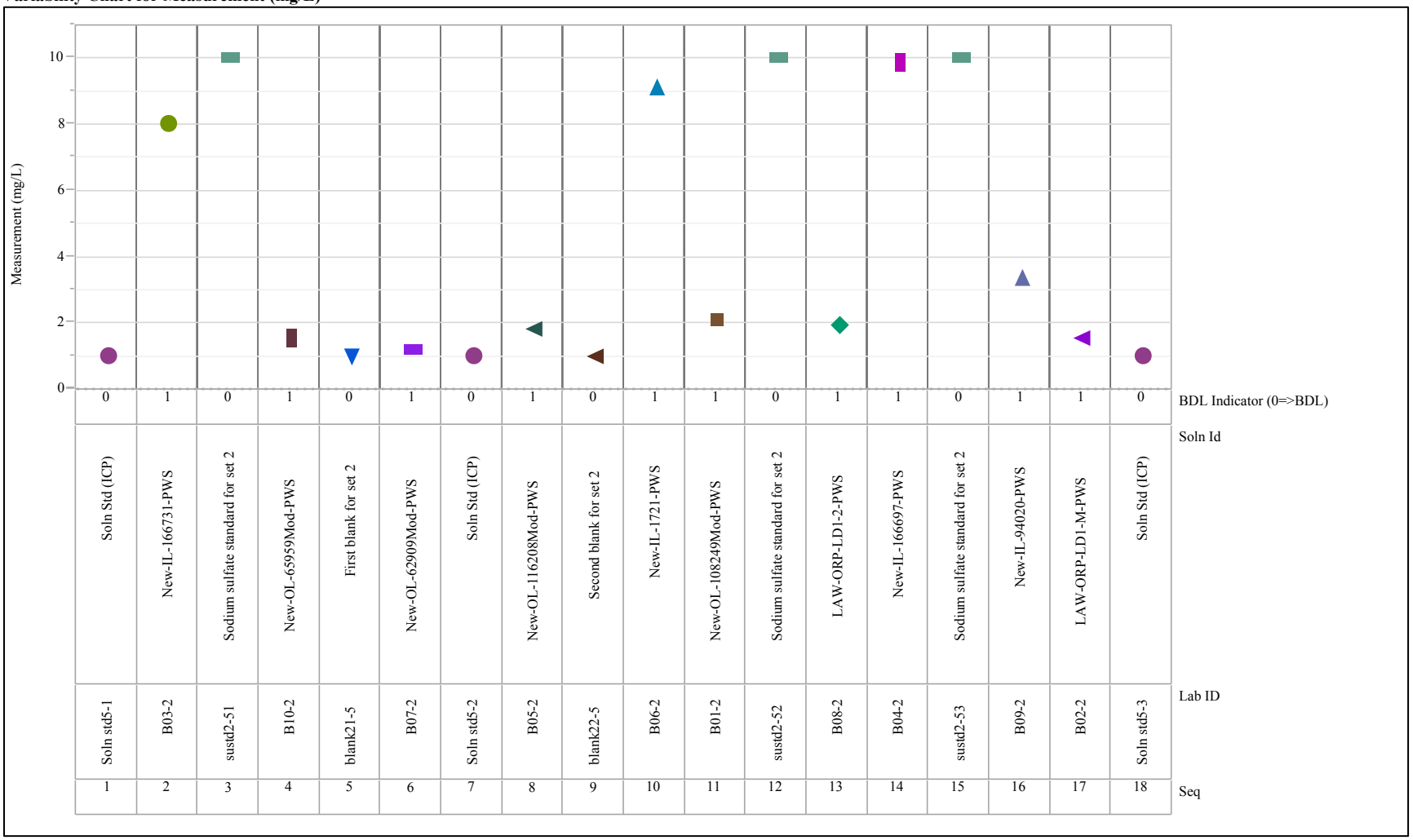


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=P (mg/L), Analysis=ICP, Blk=6
Variability Chart for Measurement (mg/L)

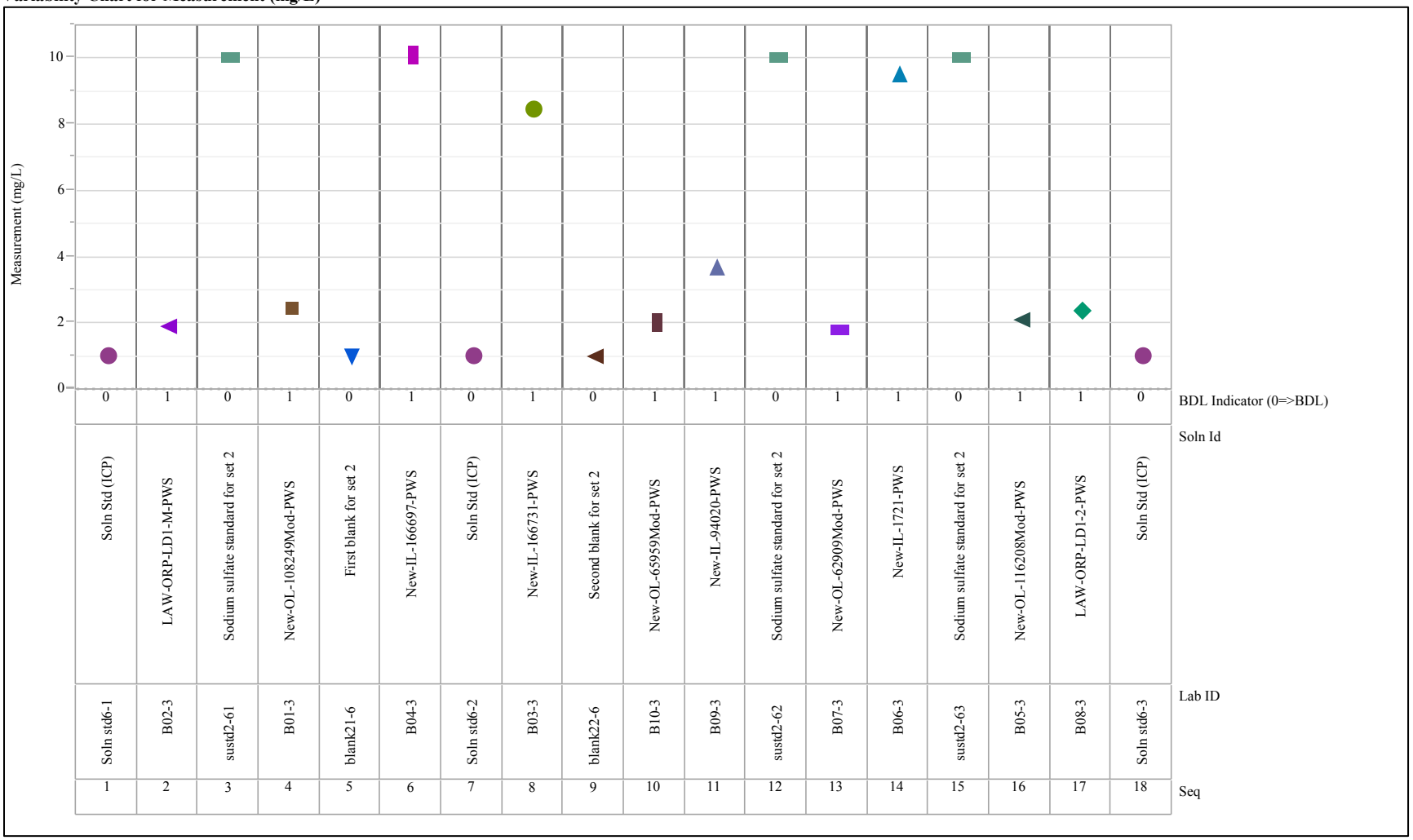


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=PO4 (mg/L), Analysis=IC, Blk=1
Variability Chart for Measurement (mg/L)

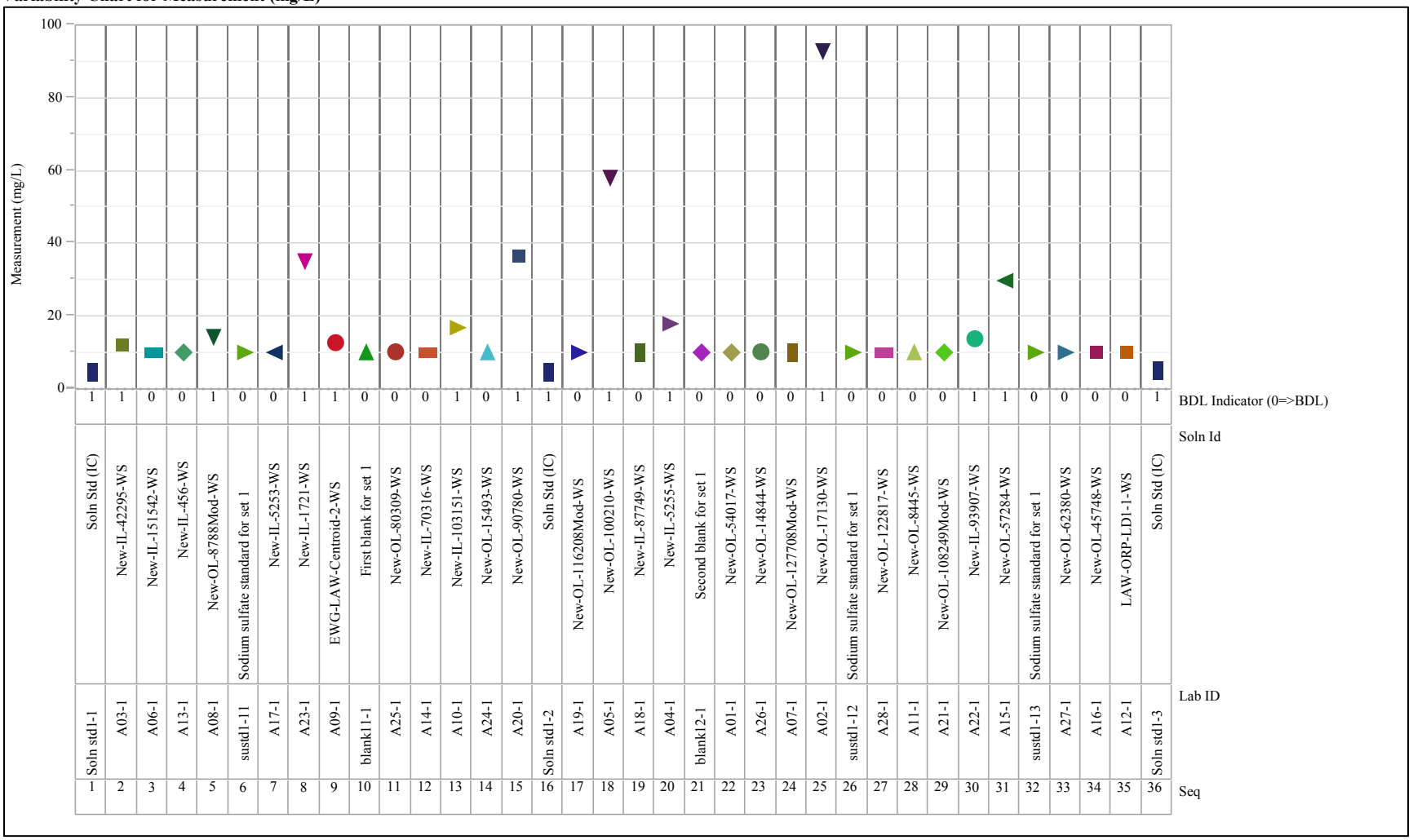


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=PO4 (mg/L), Analysis=IC, Blk=2
Variability Chart for Measurement (mg/L)

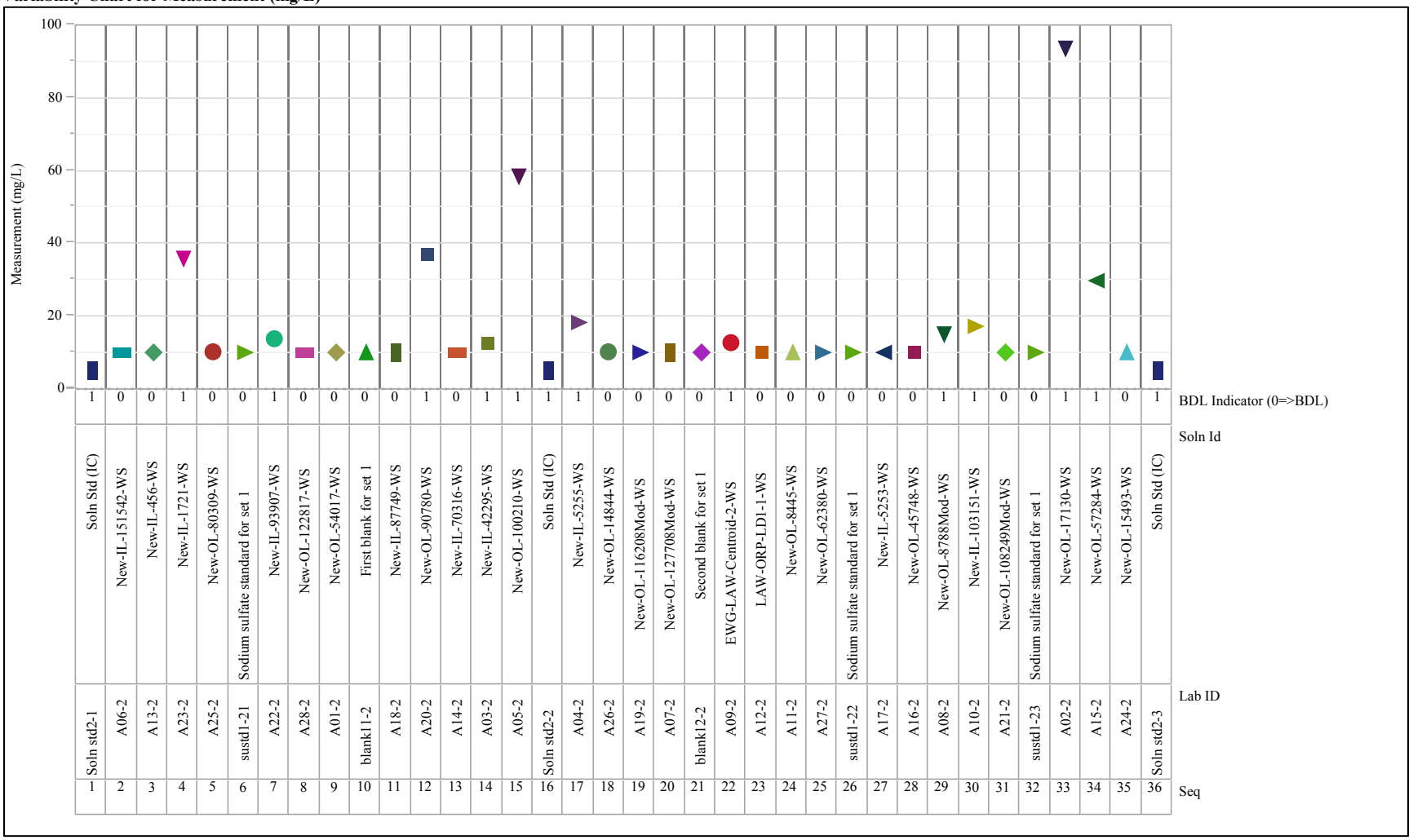


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=PO4 (mg/L), Analysis=IC, Blk=3
Variability Chart for Measurement (mg/L)

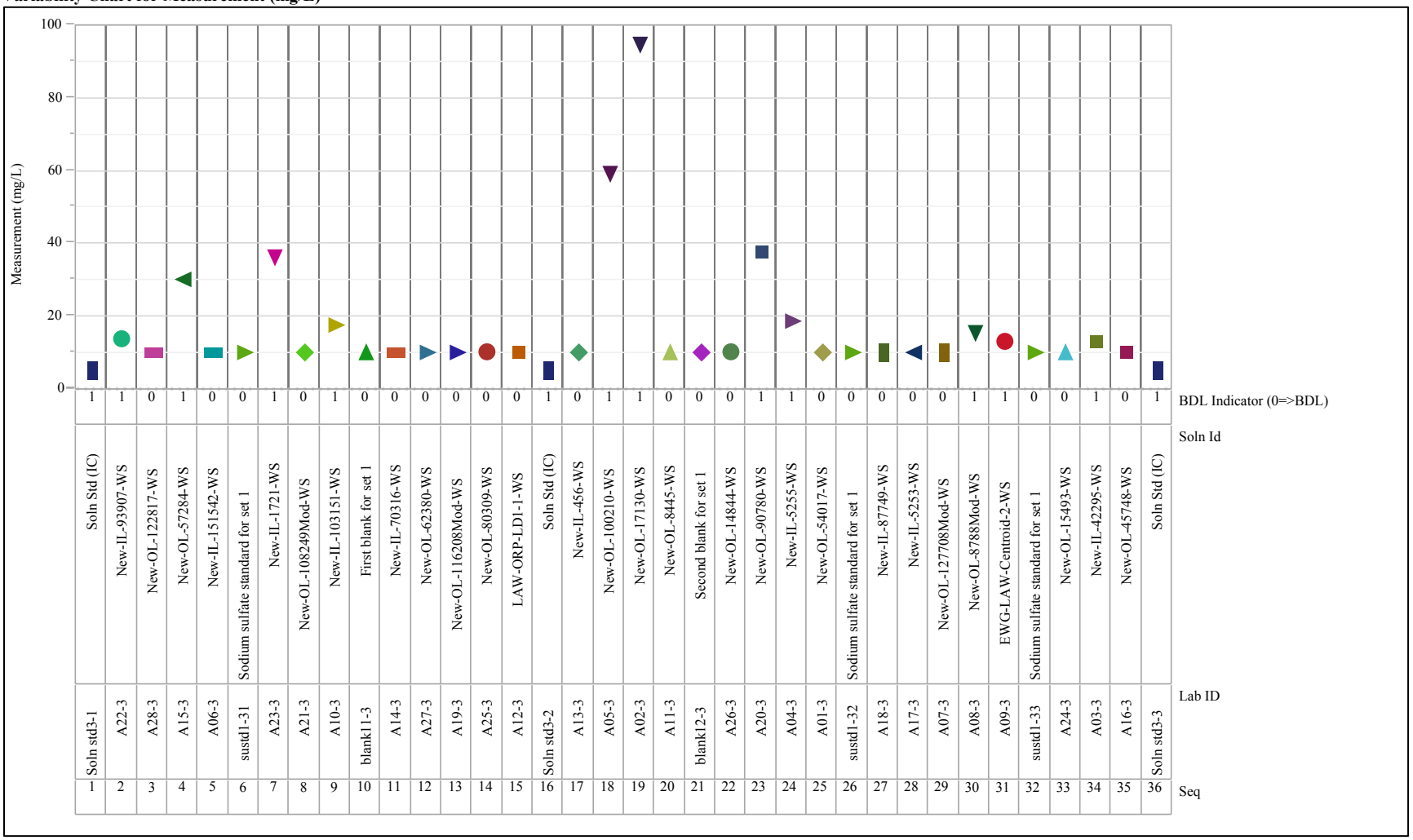


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=PO4 (mg/L), Analysis=IC, Blk=4
Variability Chart for Measurement (mg/L)

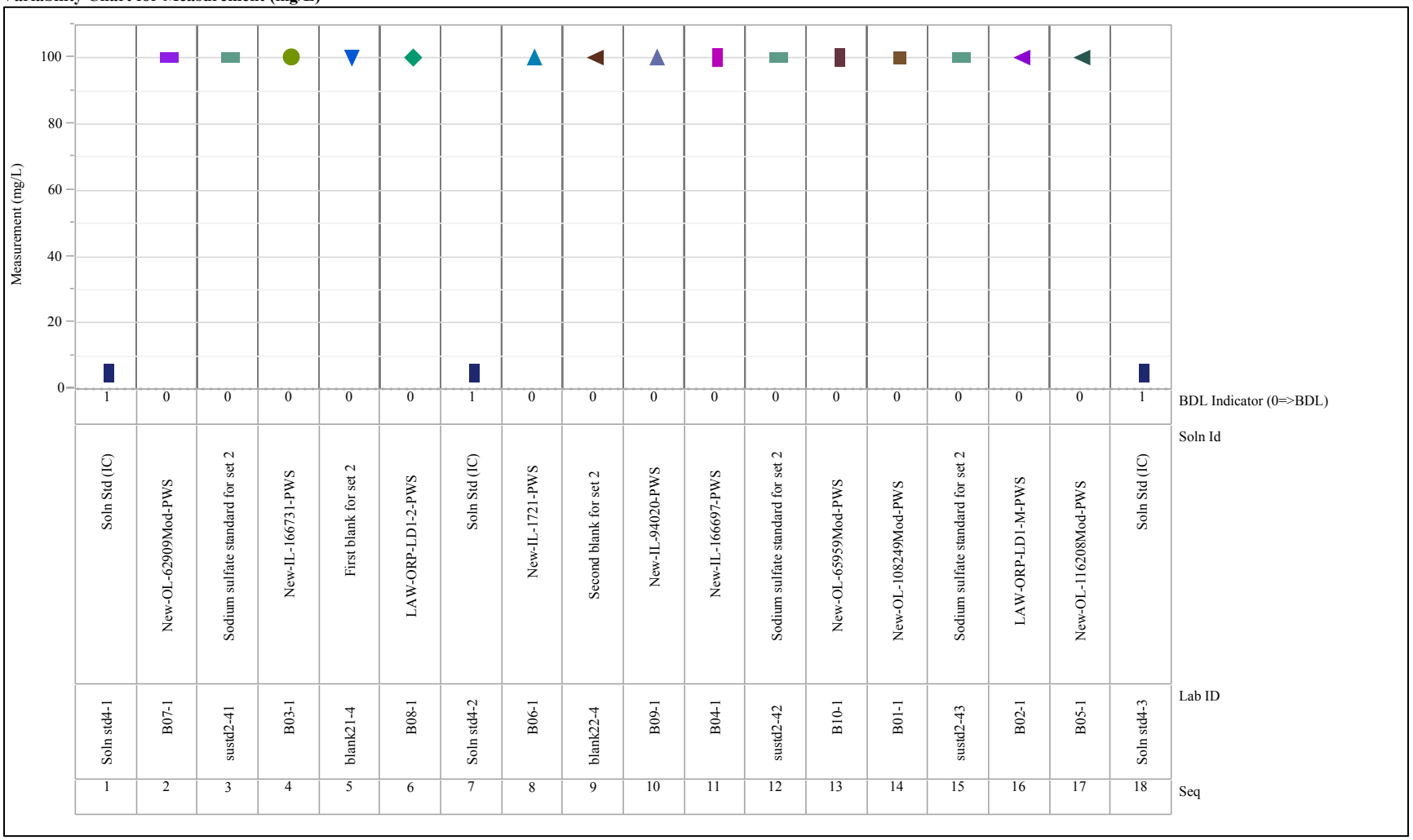


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=PO4 (mg/L), Analysis=IC, Blk=5
Variability Chart for Measurement (mg/L)

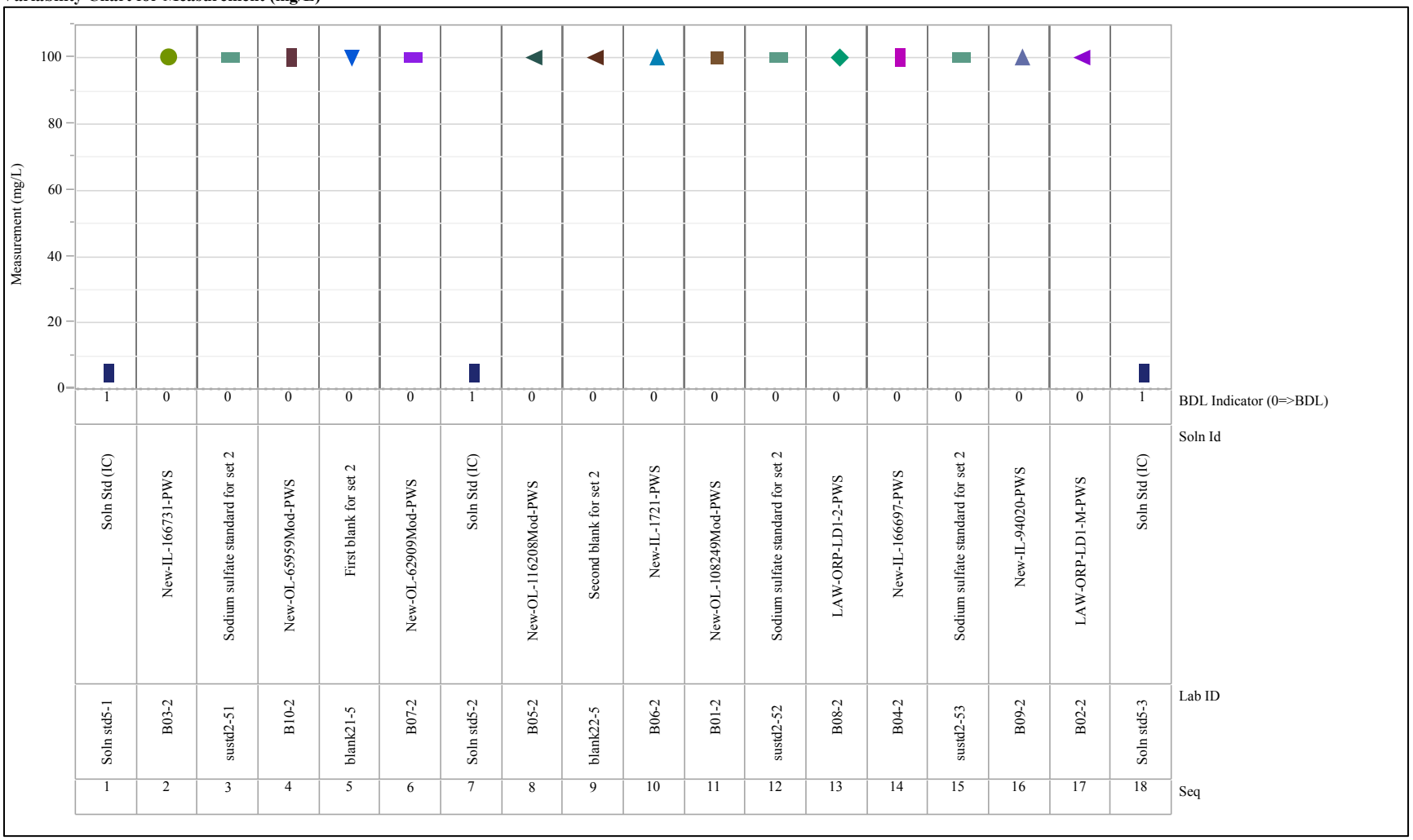


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=PO4 (mg/L), Analysis=IC, Blk=6
Variability Chart for Measurement (mg/L)

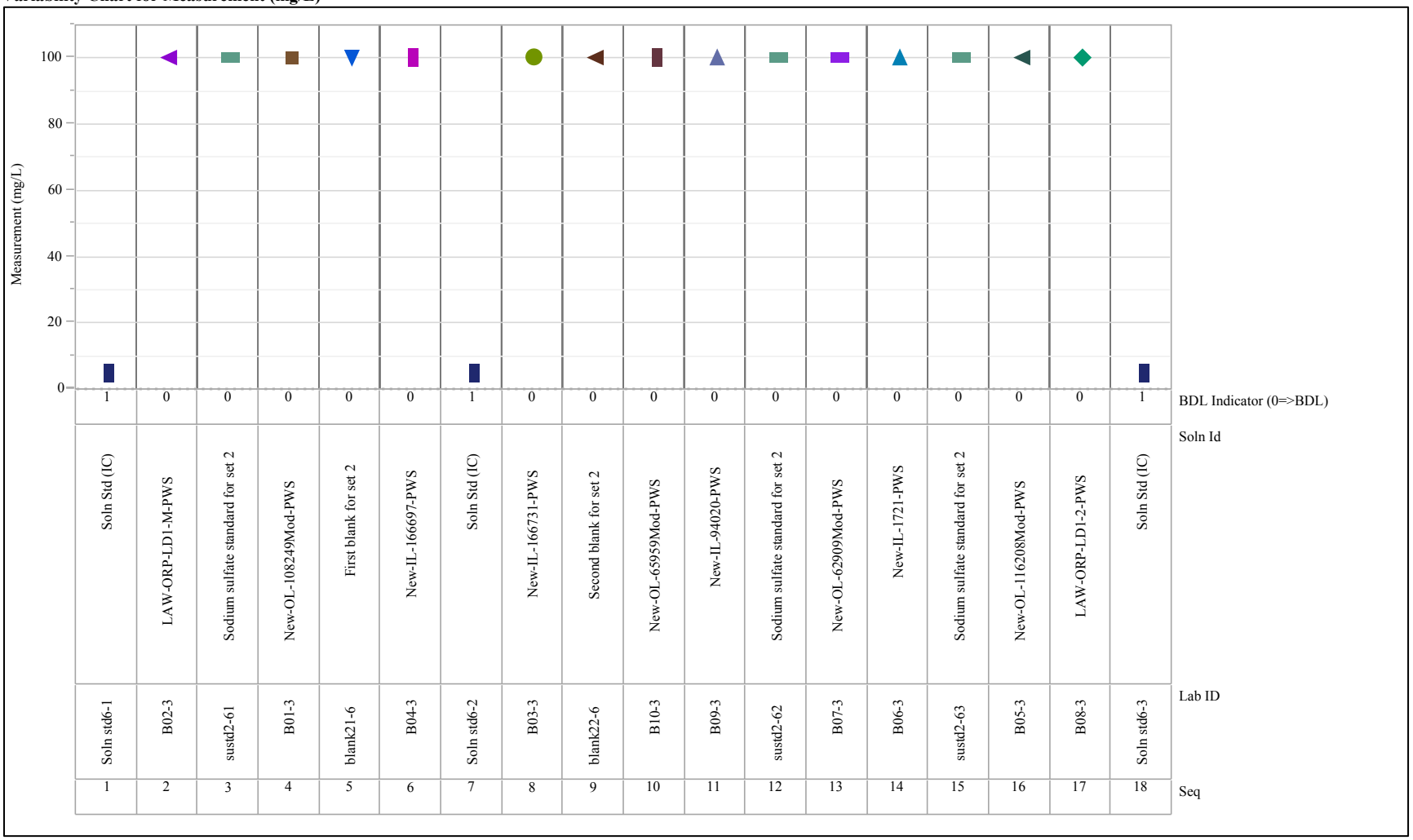


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=PO4 (mg/L), Analysis=ICP, Blk=1
Variability Chart for Measurement (mg/L)

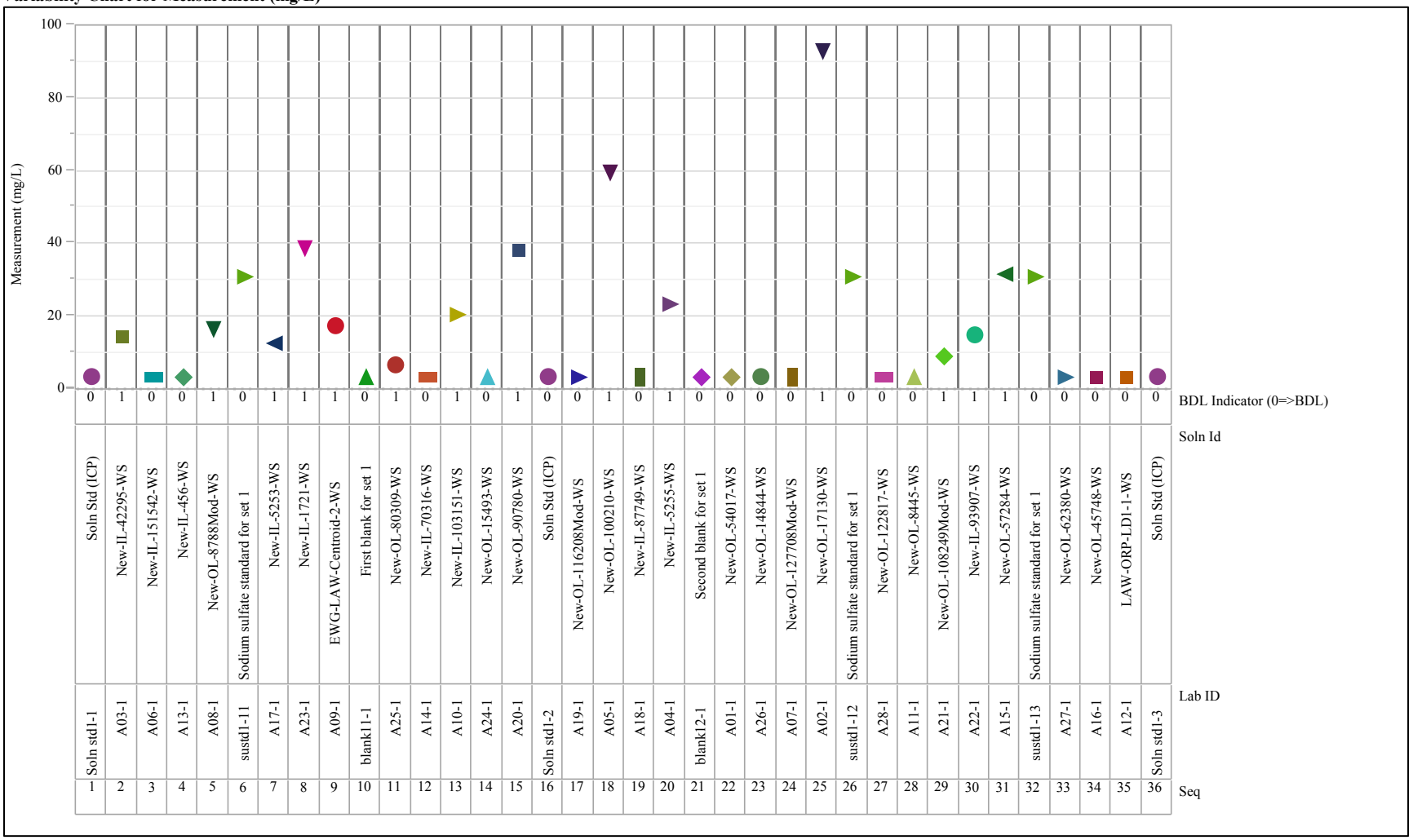


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=PO4 (mg/L), Analysis=ICP, Blk=2
Variability Chart for Measurement (mg/L)

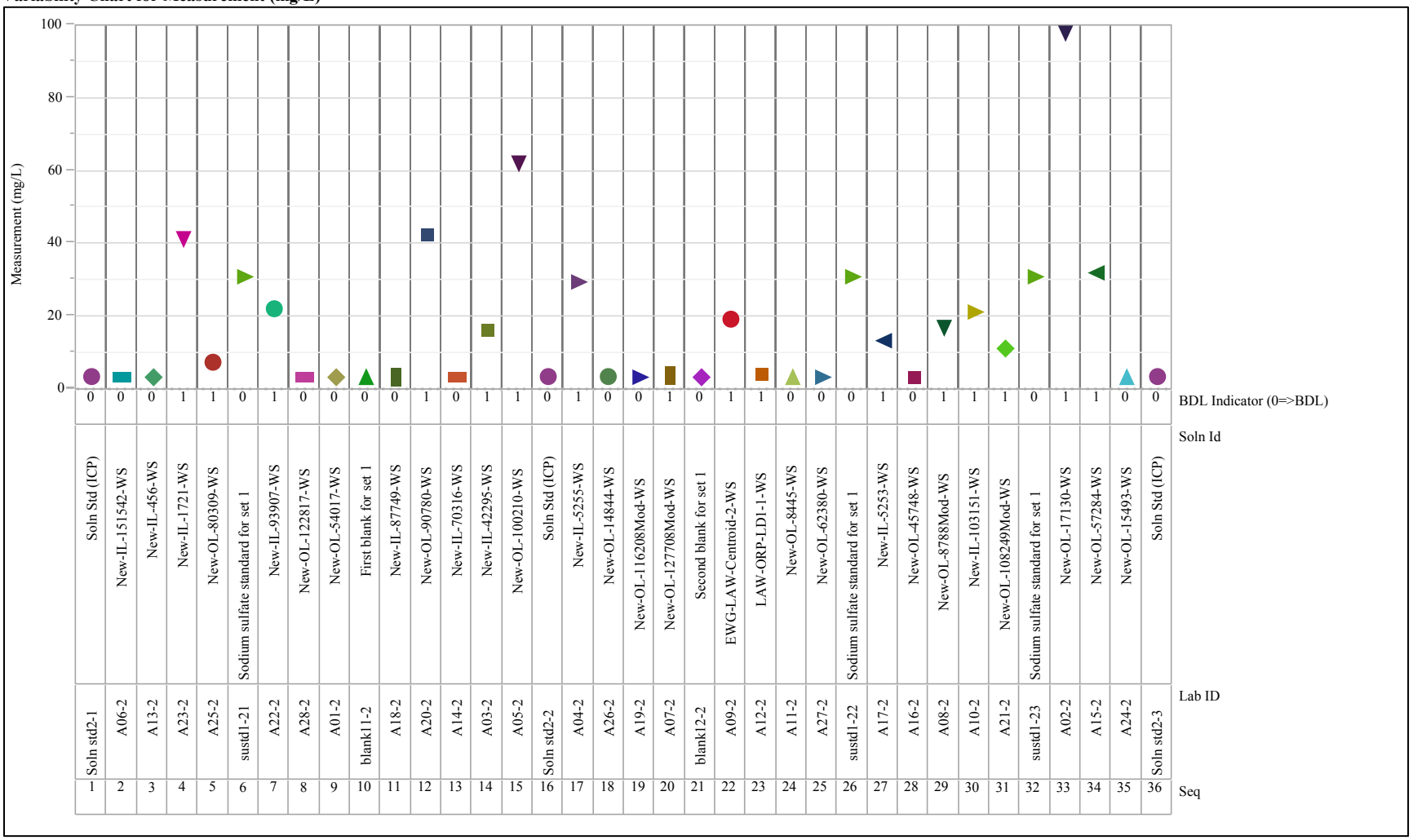


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=PO4 (mg/L), Analysis=ICP, Blk=3
Variability Chart for Measurement (mg/L)

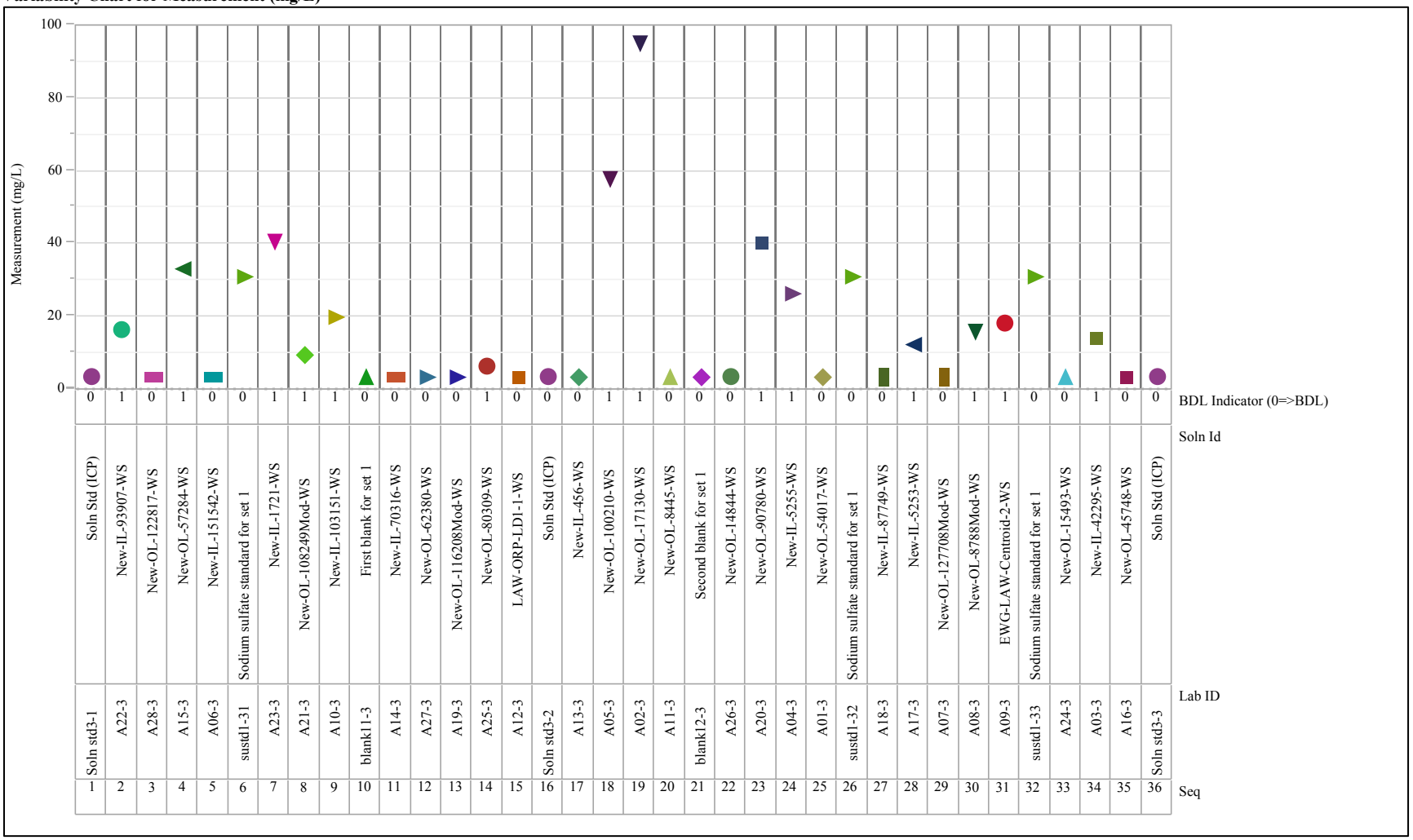


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=PO4 (mg/L), Analysis=ICP, Blk=4
Variability Chart for Measurement (mg/L)

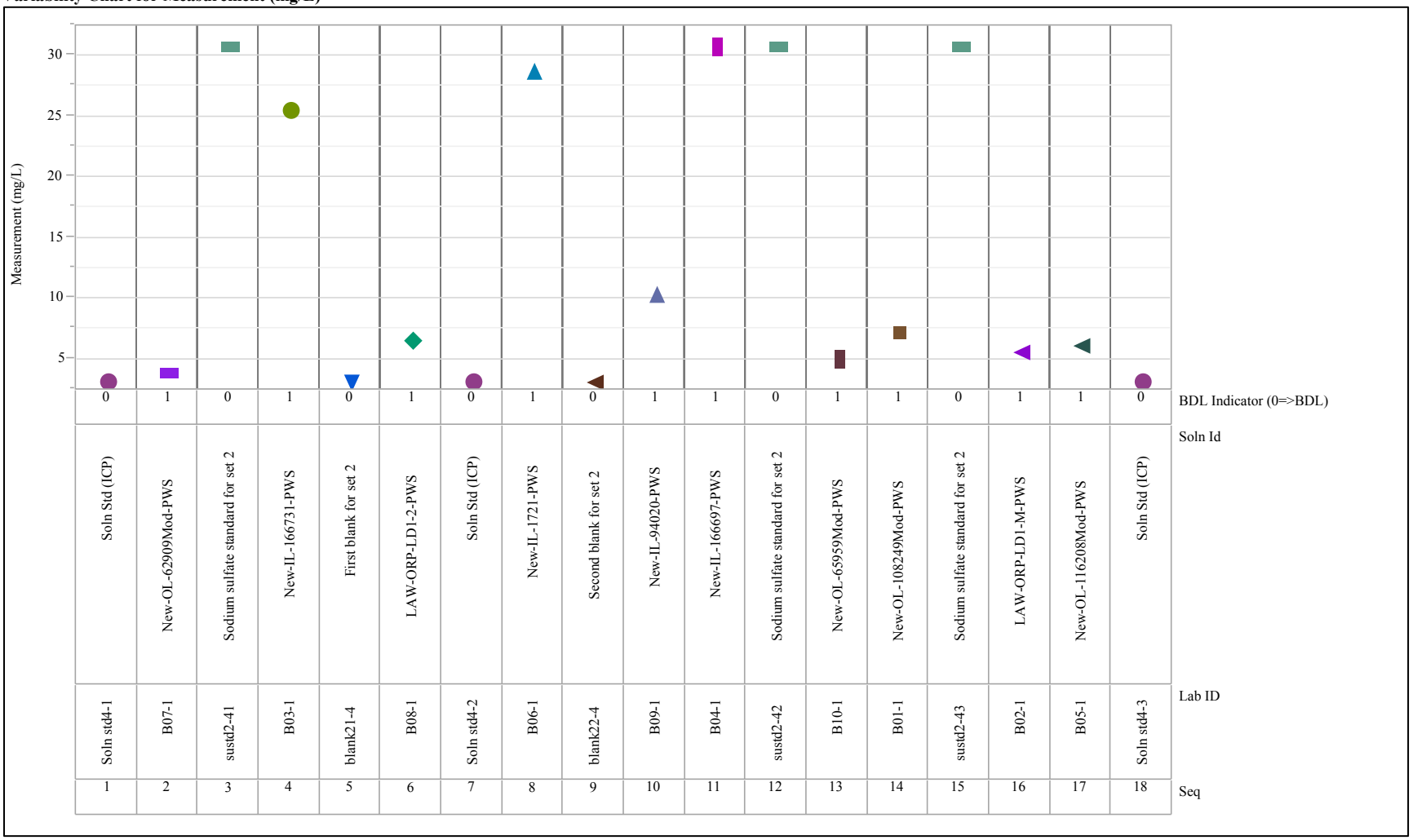


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=PO4 (mg/L), Analysis=ICP, Blk=5
Variability Chart for Measurement (mg/L)

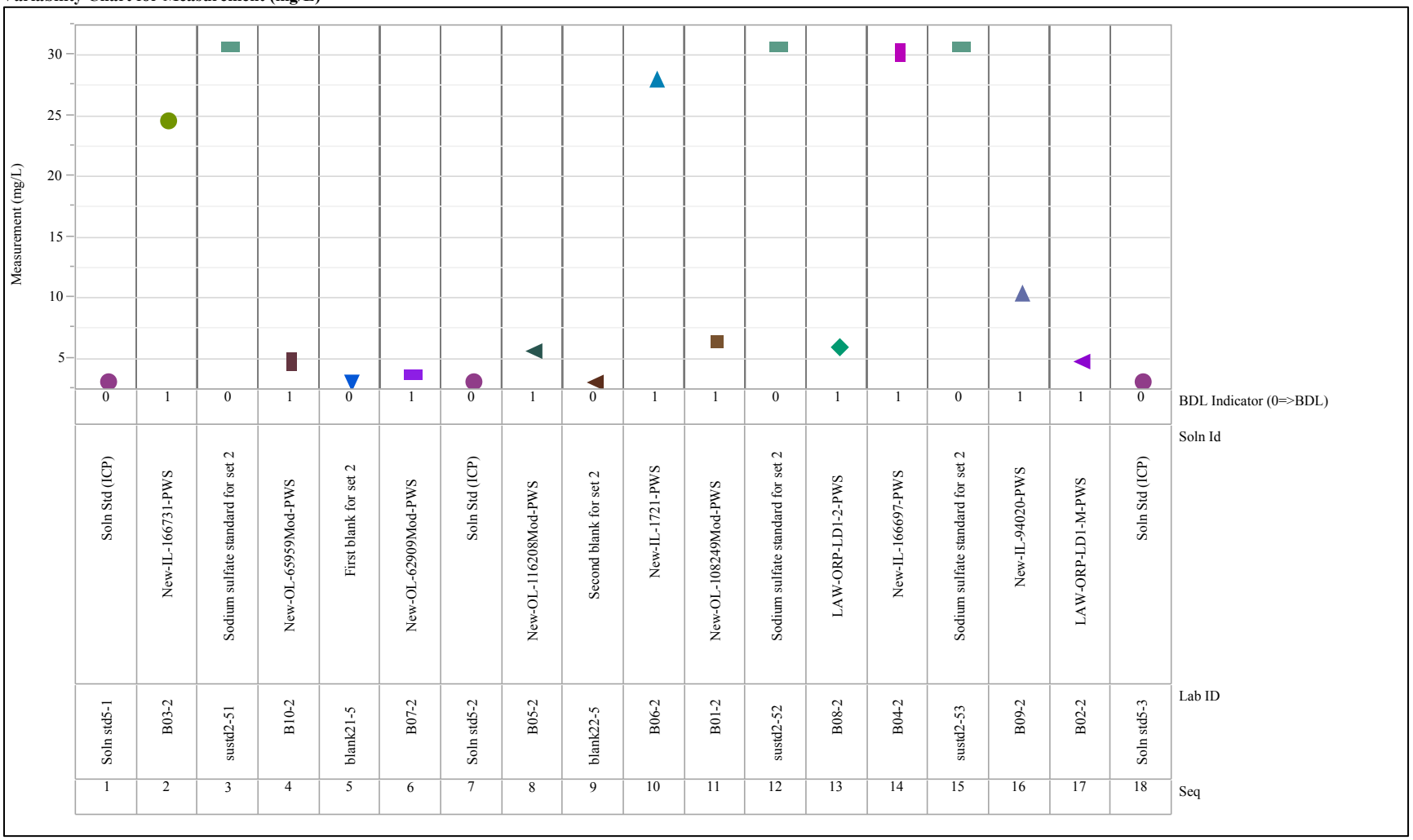


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=PO4 (mg/L), Analysis=ICP, Blk=6
Variability Chart for Measurement (mg/L)

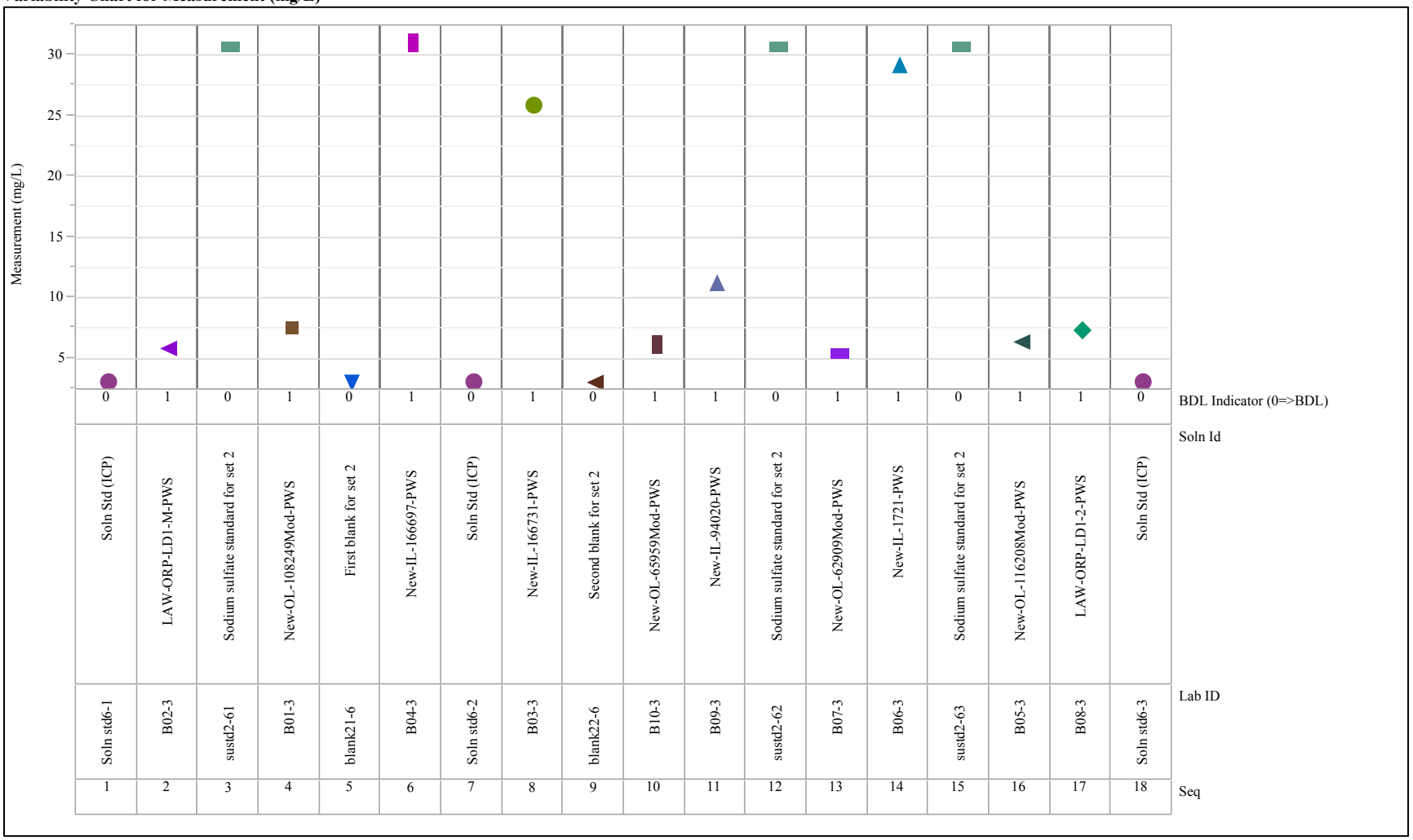


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=S (mg/L), Analysis=ICP, Blk=1
Variability Chart for Measurement (mg/L)

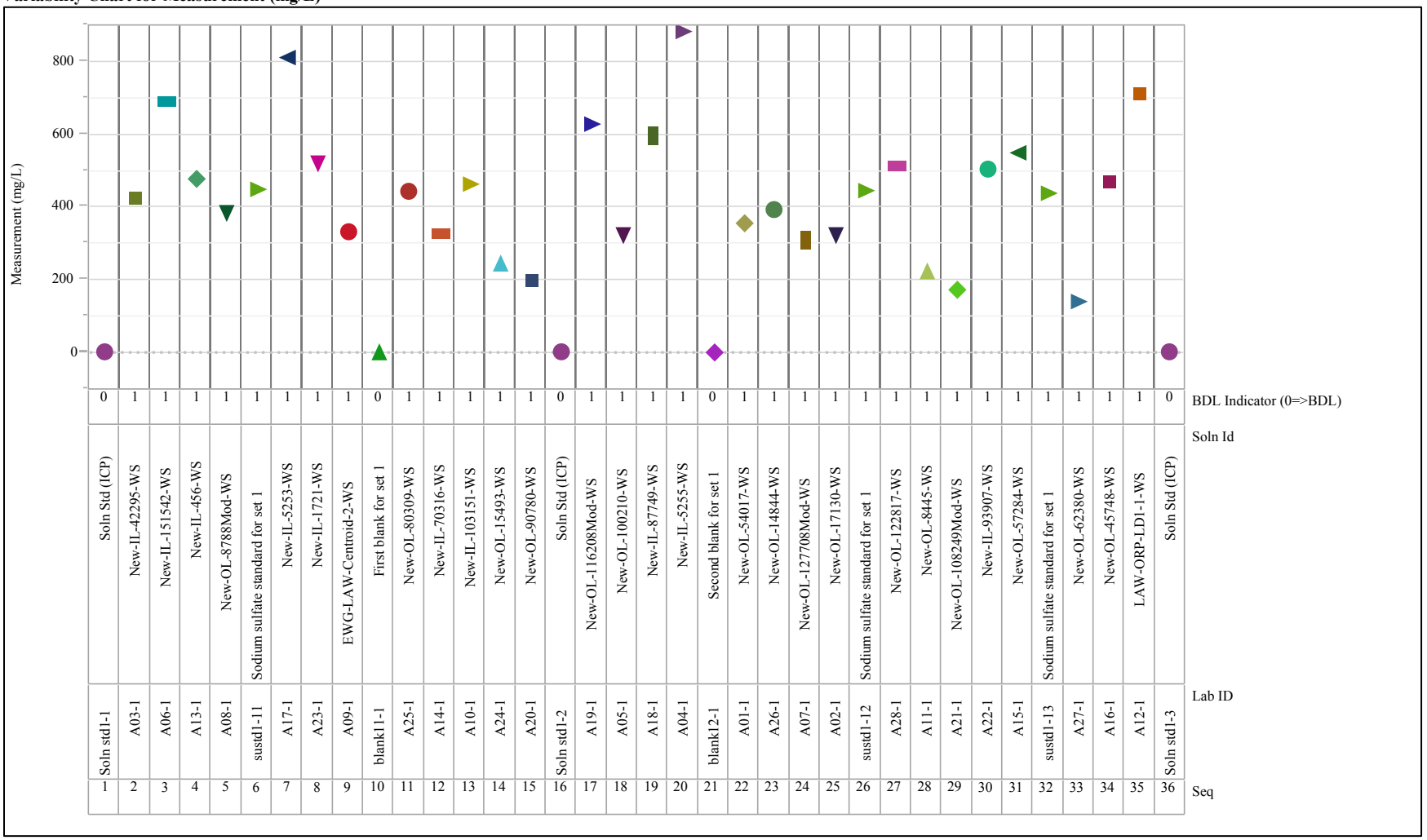


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=S (mg/L), Analysis=ICP, Blk=2
Variability Chart for Measurement (mg/L)

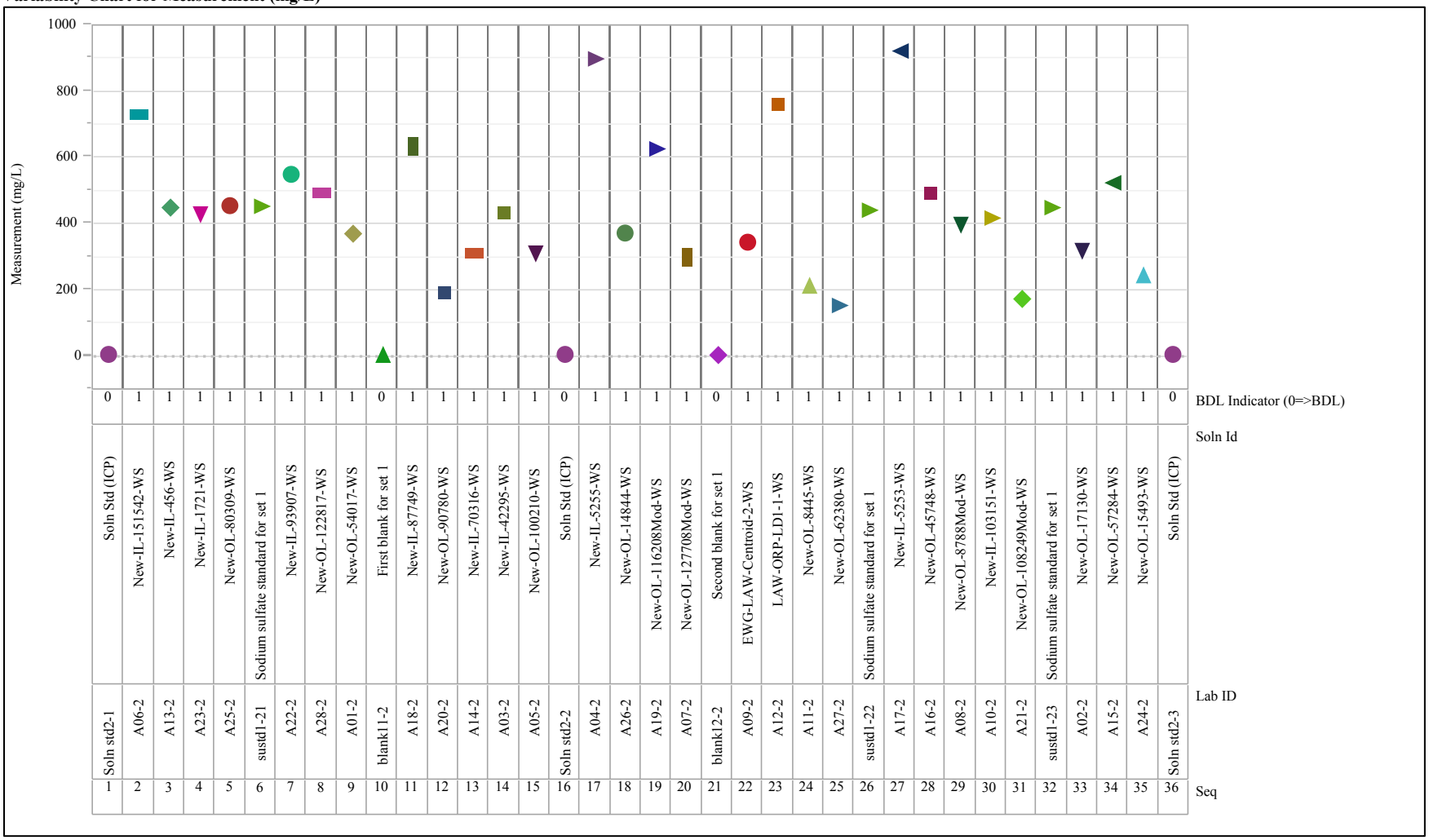


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=S (mg/L), Analysis=ICP, Blk=3
Variability Chart for Measurement (mg/L)

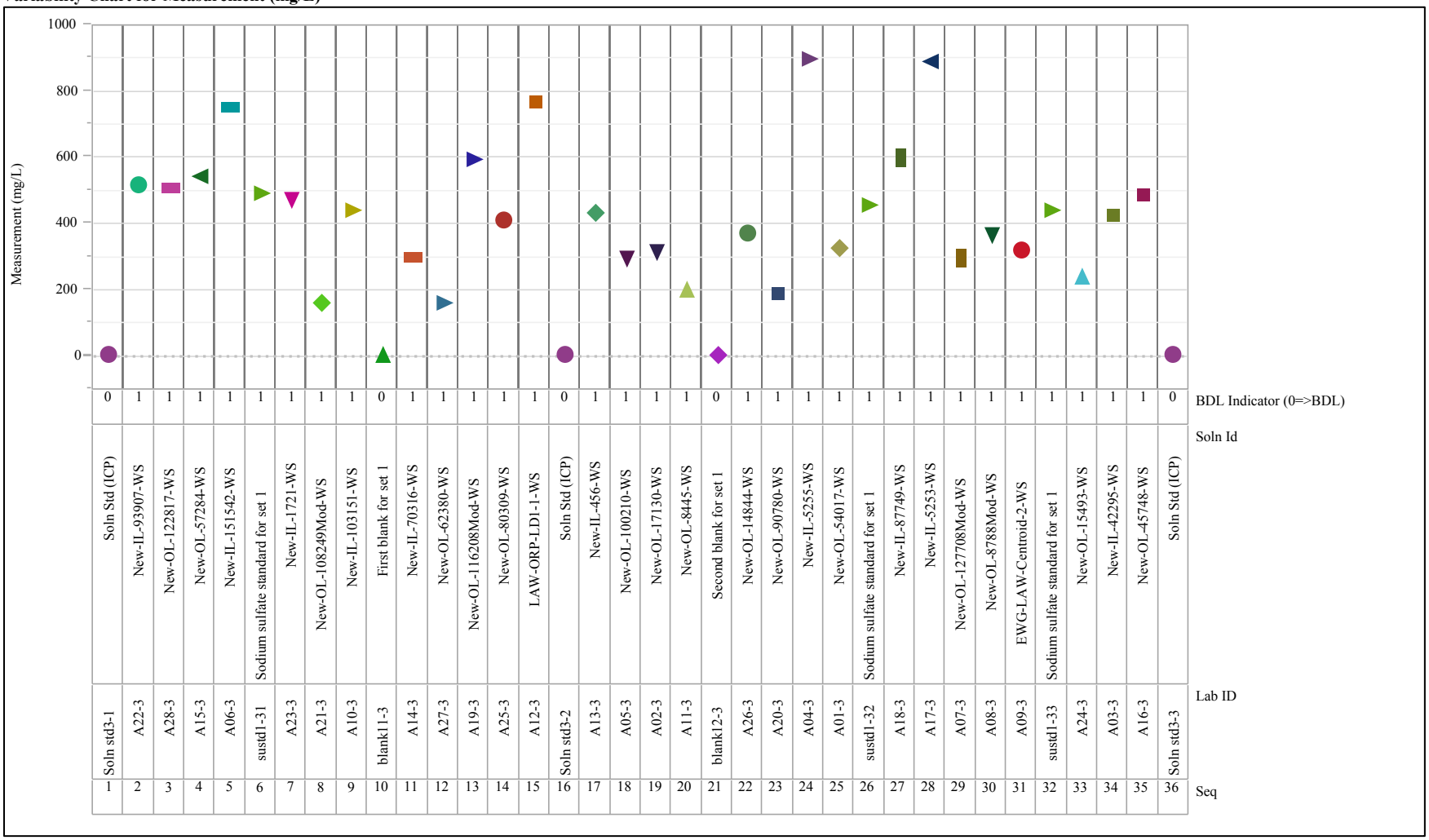


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=S (mg/L), Analysis=ICP, Blk=4
Variability Chart for Measurement (mg/L)

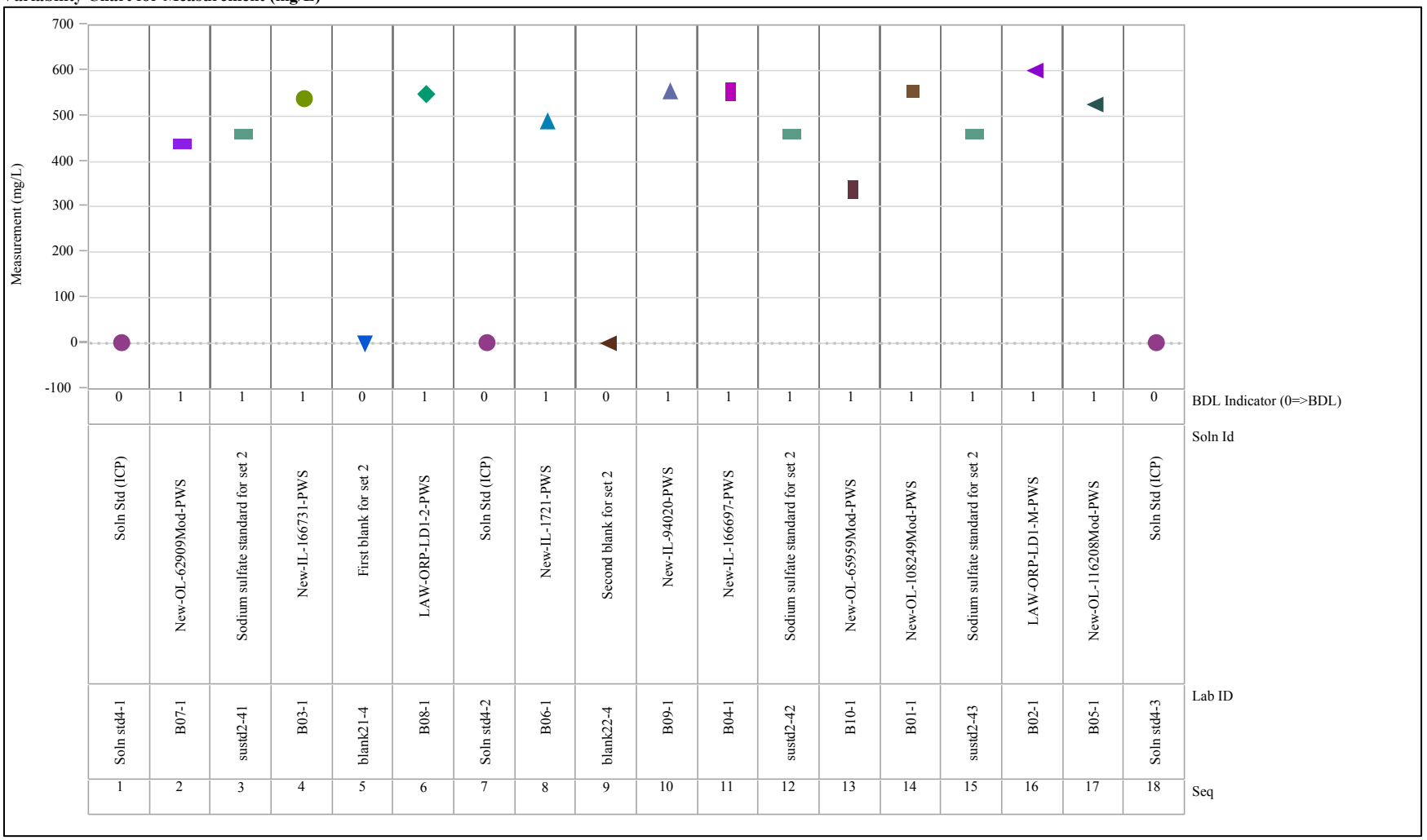


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=S (mg/L), Analysis=ICP, Blk=5
Variability Chart for Measurement (mg/L)

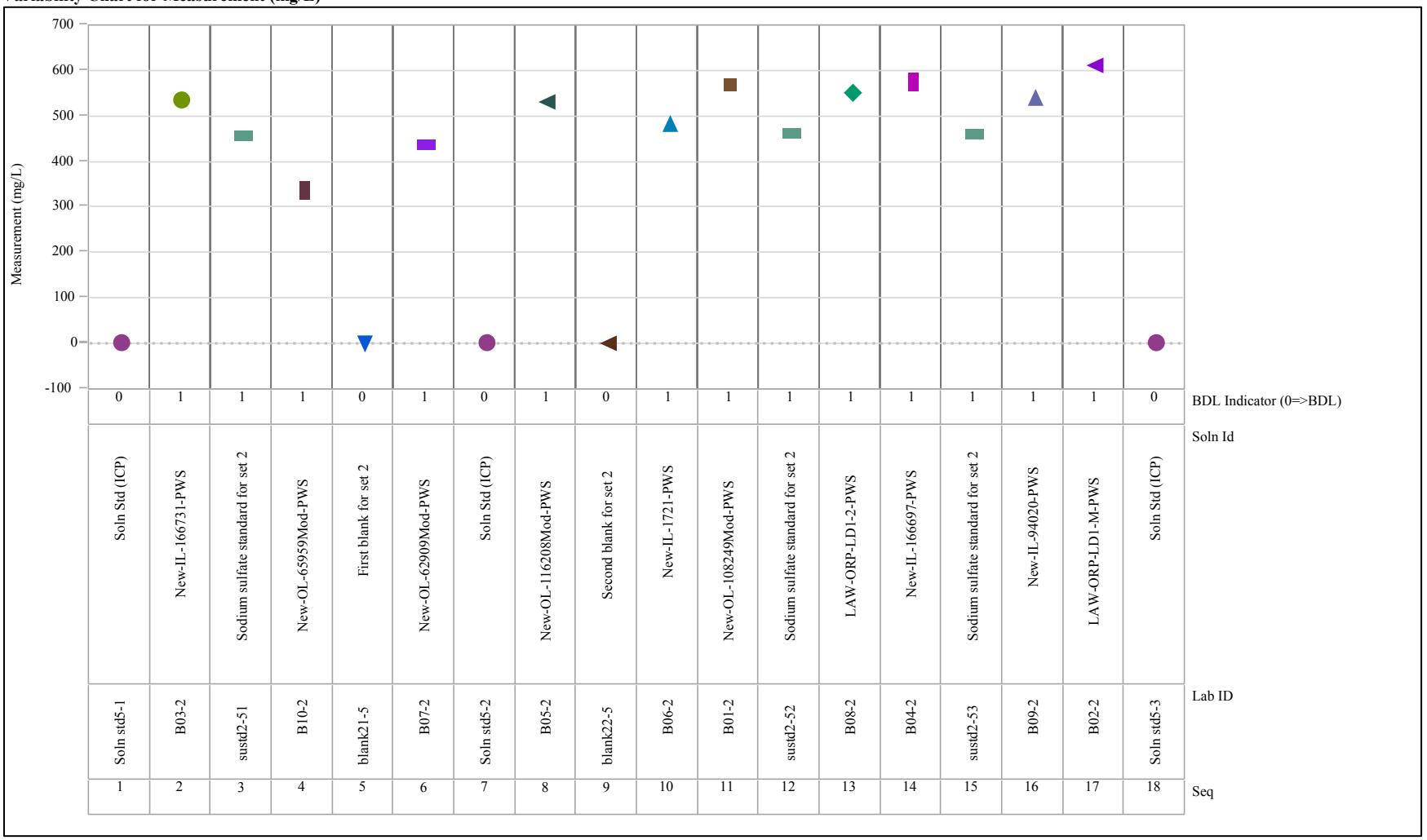


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=S (mg/L), Analysis=ICP, Blk=6
Variability Chart for Measurement (mg/L)

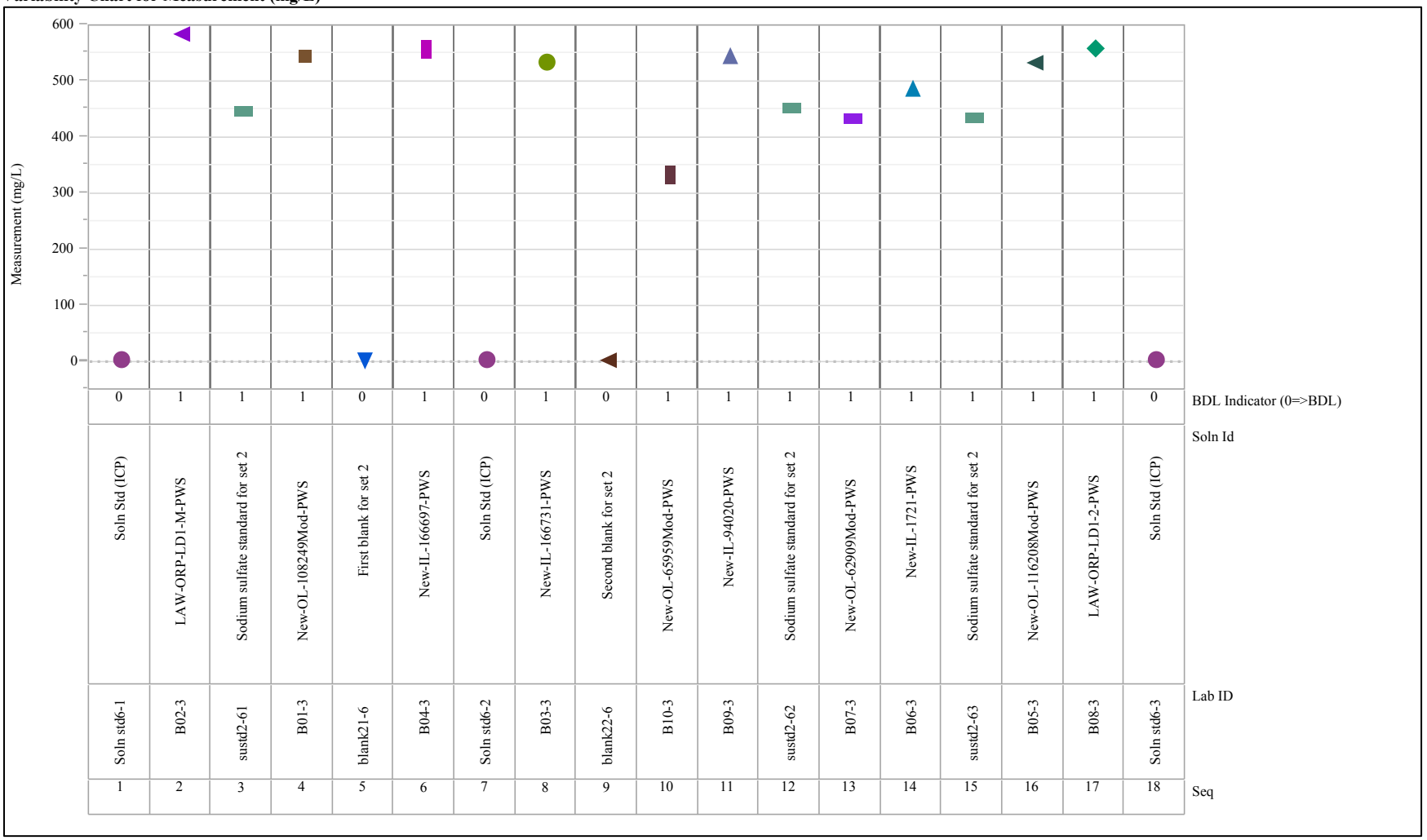


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Si (mg/L), Analysis=ICP, Blk=1
Variability Chart for Measurement (mg/L)

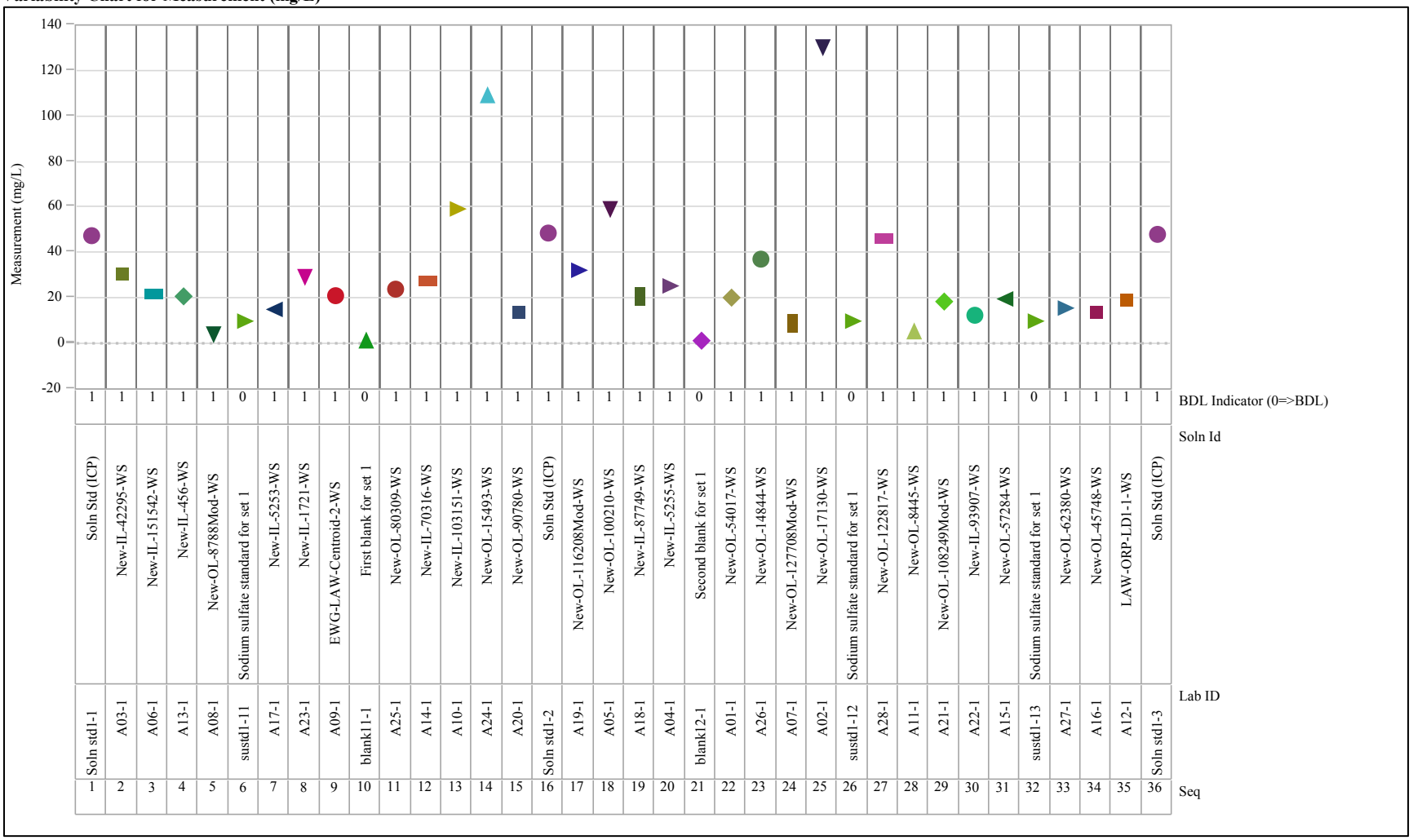


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Si (mg/L), Analysis=ICP, Blk=2
Variability Chart for Measurement (mg/L)

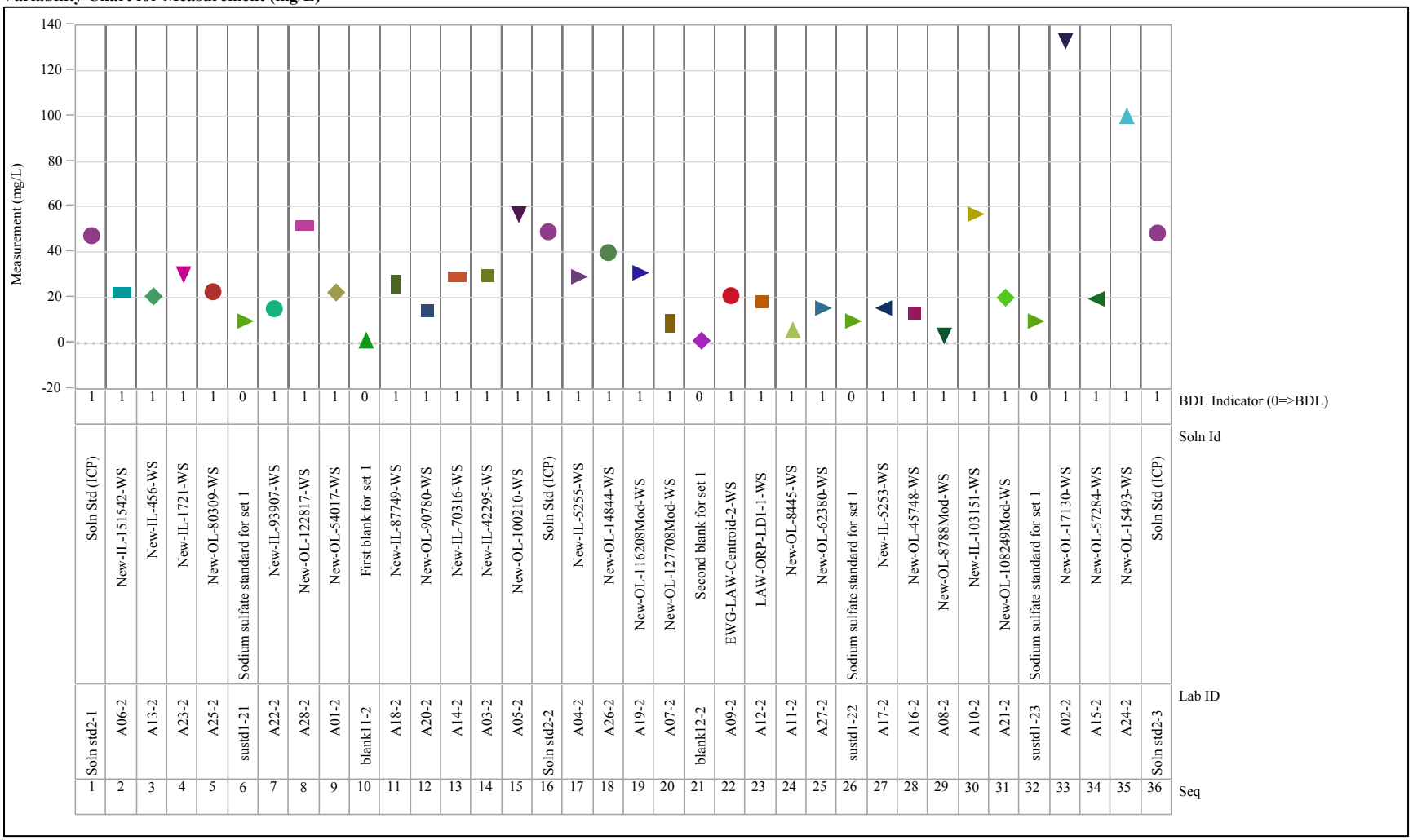


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Si (mg/L), Analysis=ICP, Blk=3
Variability Chart for Measurement (mg/L)

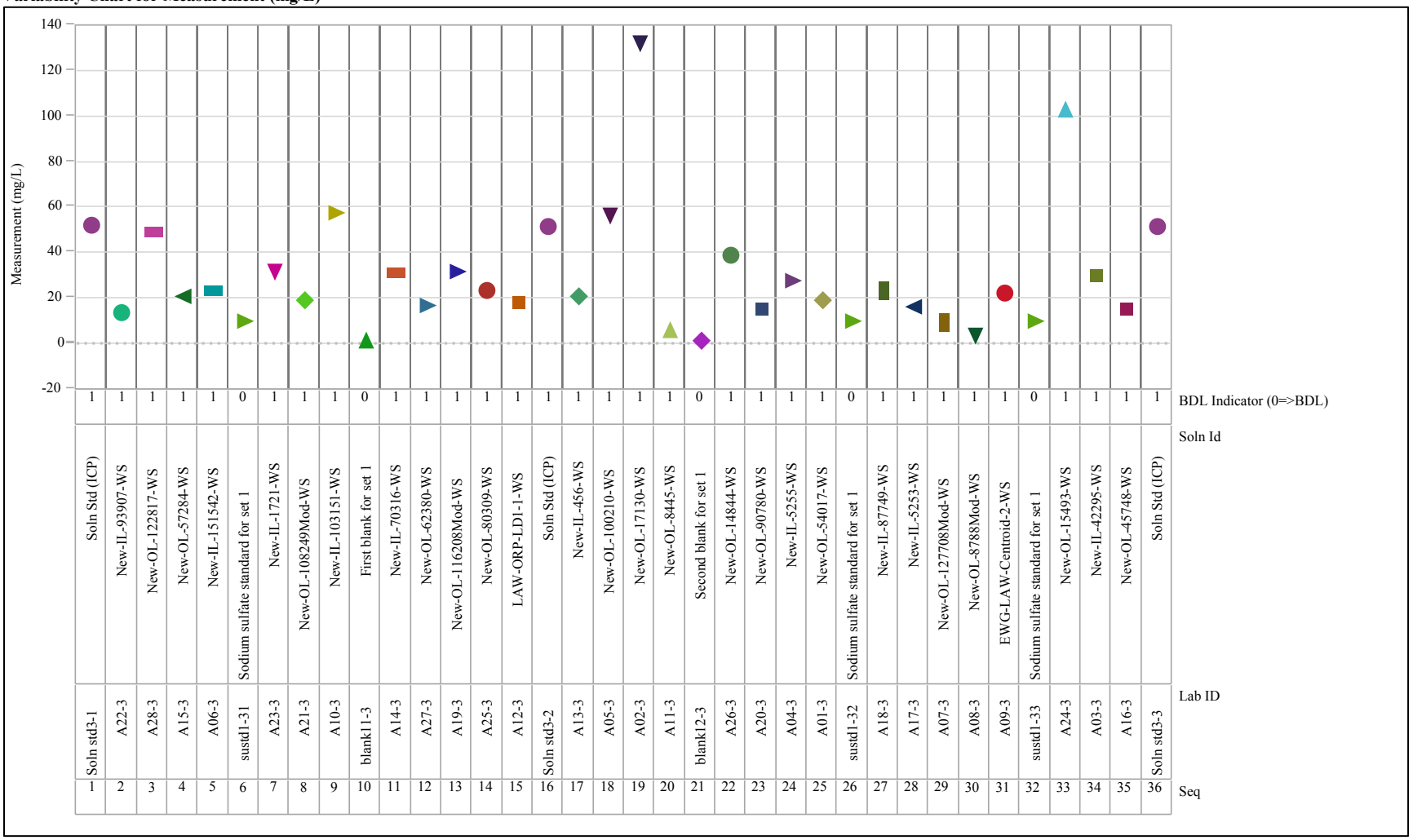


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Si (mg/L), Analysis=ICP, Blk=4
Variability Chart for Measurement (mg/L)

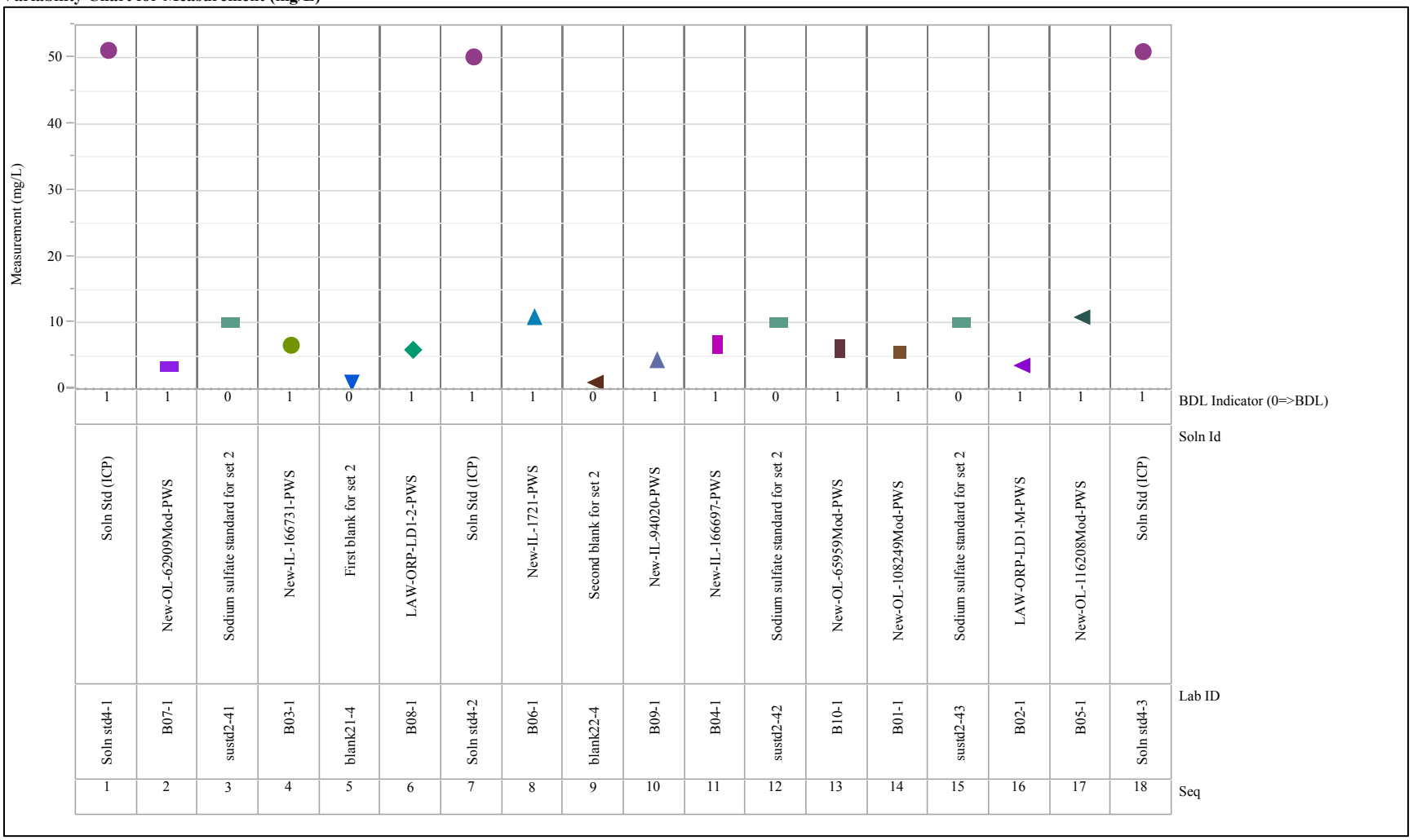


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Si (mg/L), Analysis=ICP, Blk=5
Variability Chart for Measurement (mg/L)

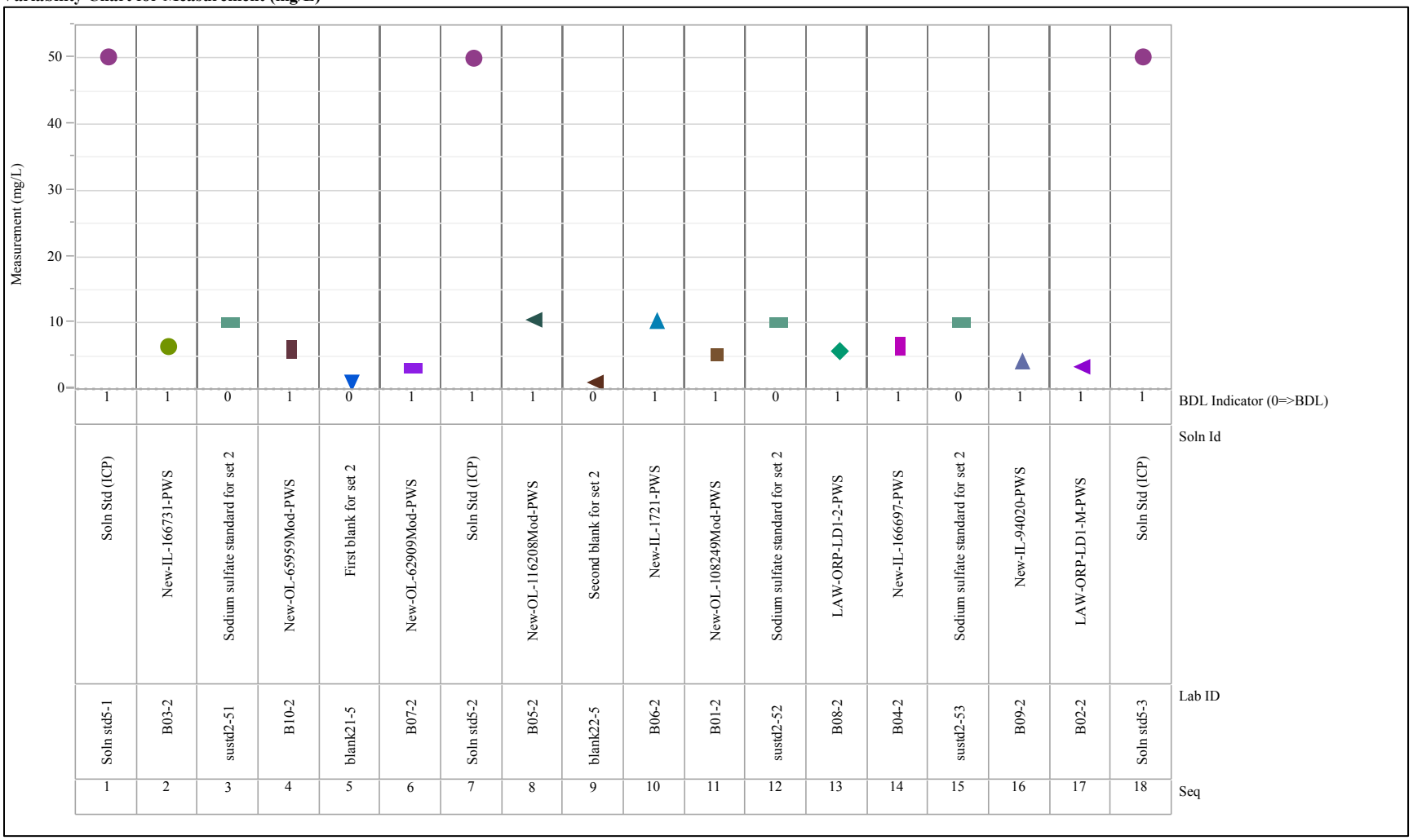


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Si (mg/L), Analysis=ICP, Blk=6
Variability Chart for Measurement (mg/L)

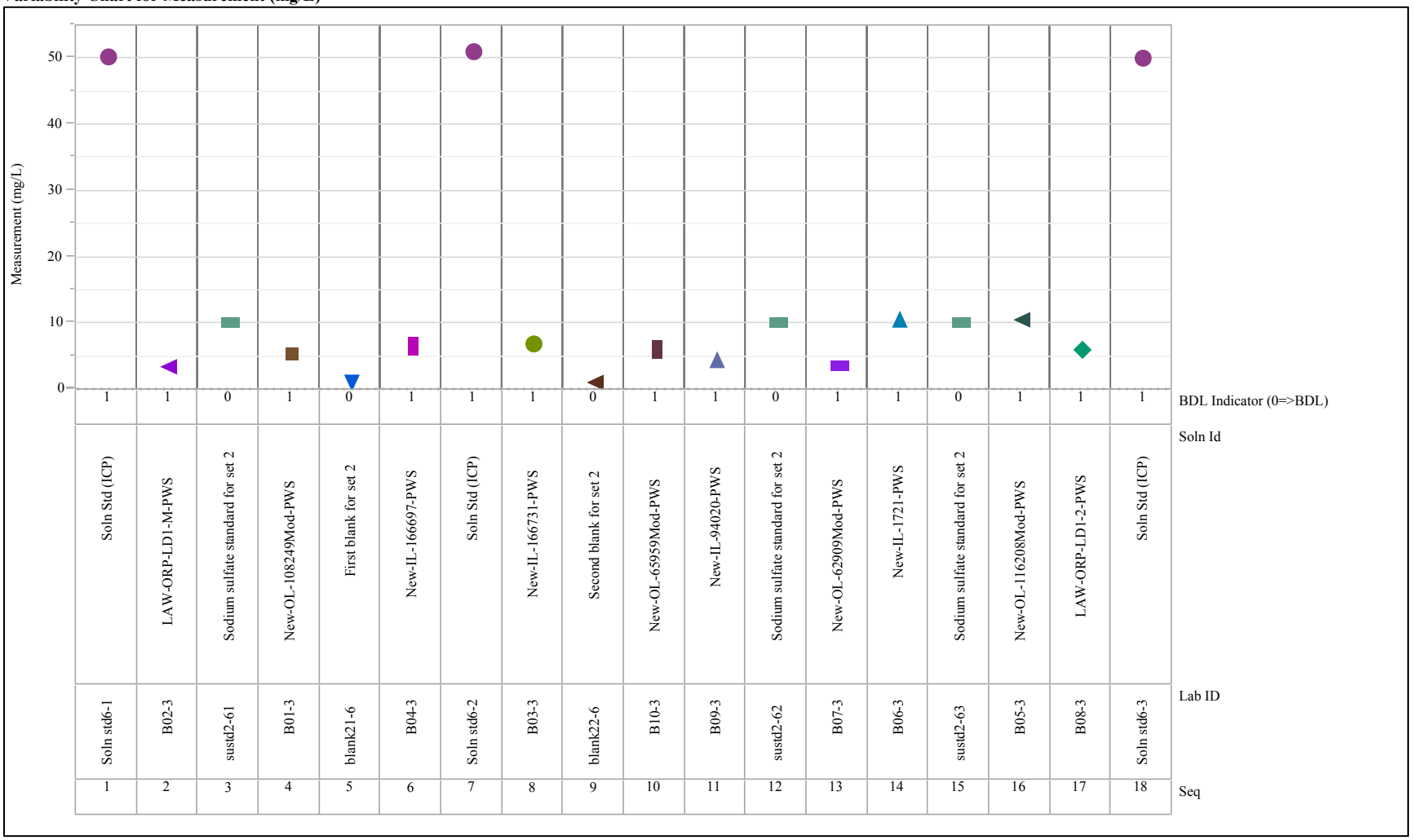


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Sn (mg/L), Analysis=ICP, Blk=1
Variability Chart for Measurement (mg/L)

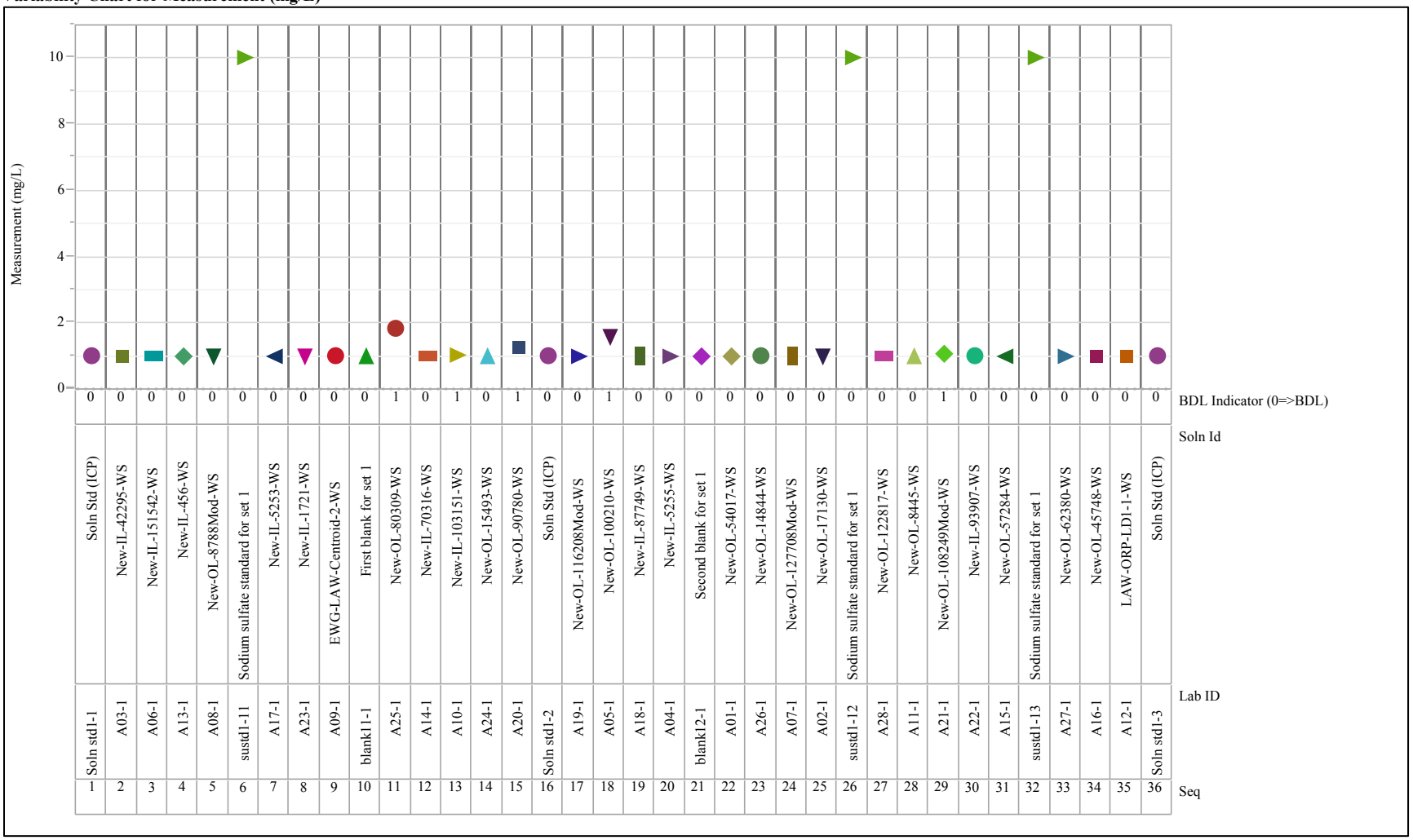


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Sn (mg/L), Analysis=ICP, Blk=2
Variability Chart for Measurement (mg/L)

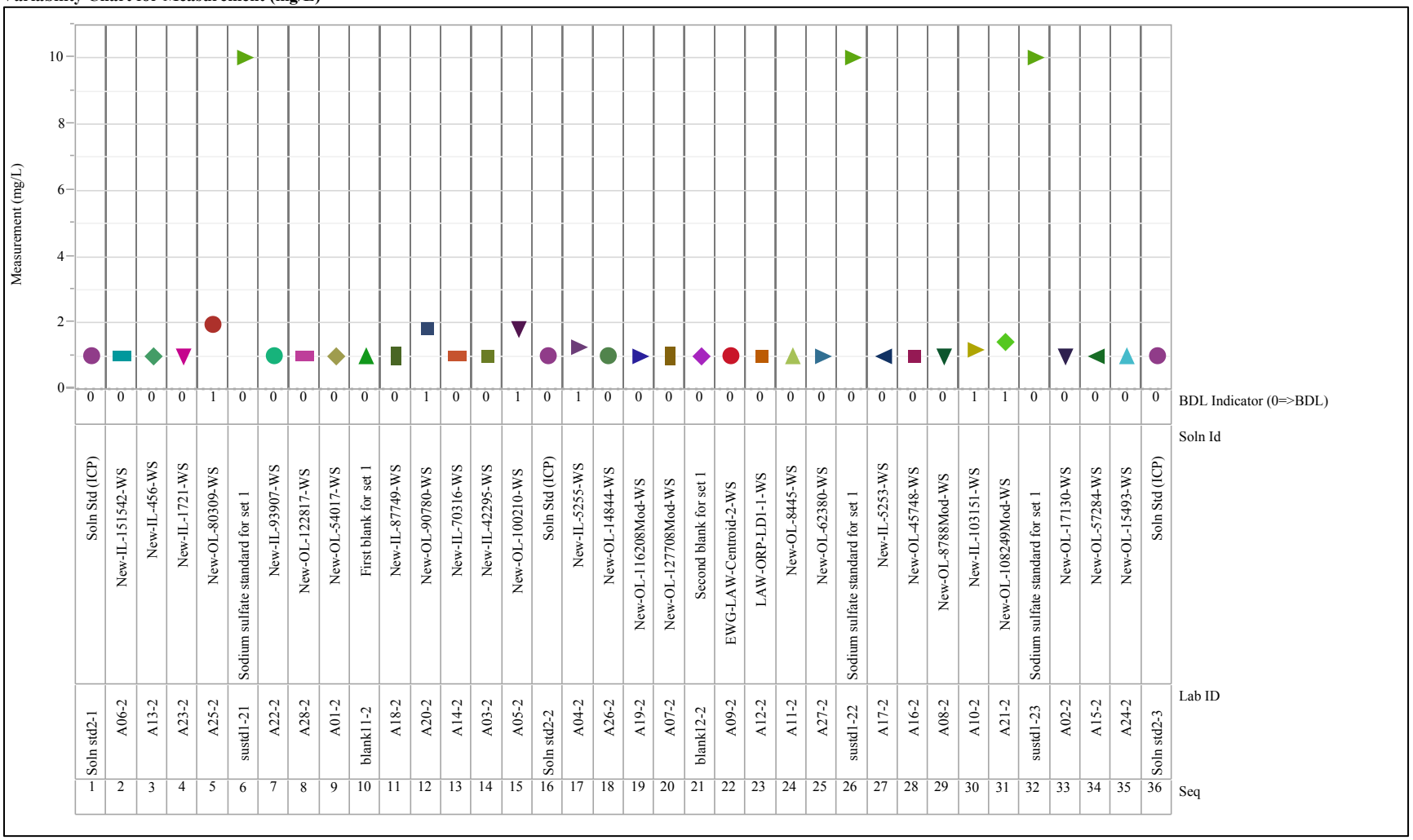


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Sn (mg/L), Analysis=ICP, Blk=3
Variability Chart for Measurement (mg/L)

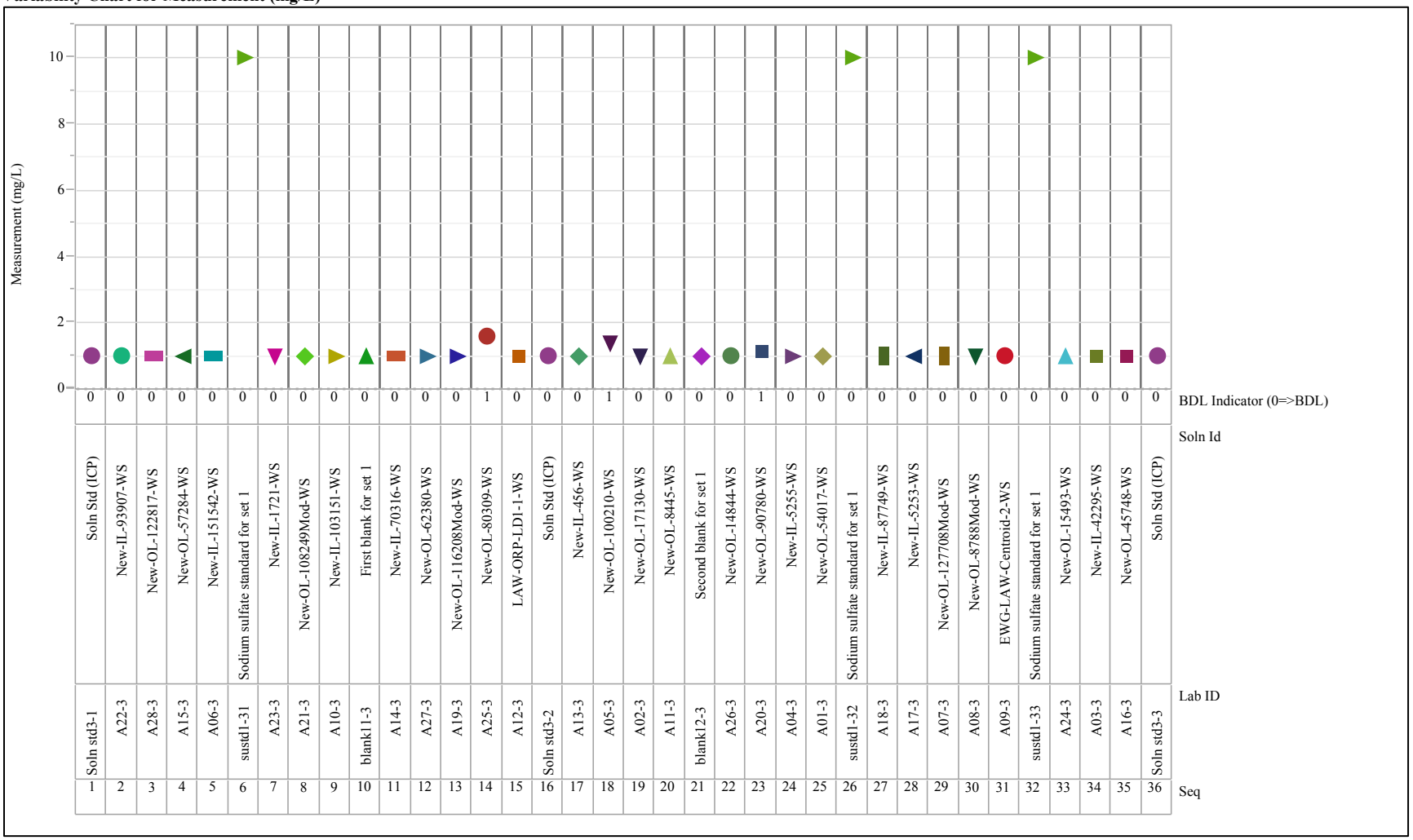


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Sn (mg/L), Analysis=ICP, Blk=4
Variability Chart for Measurement (mg/L)

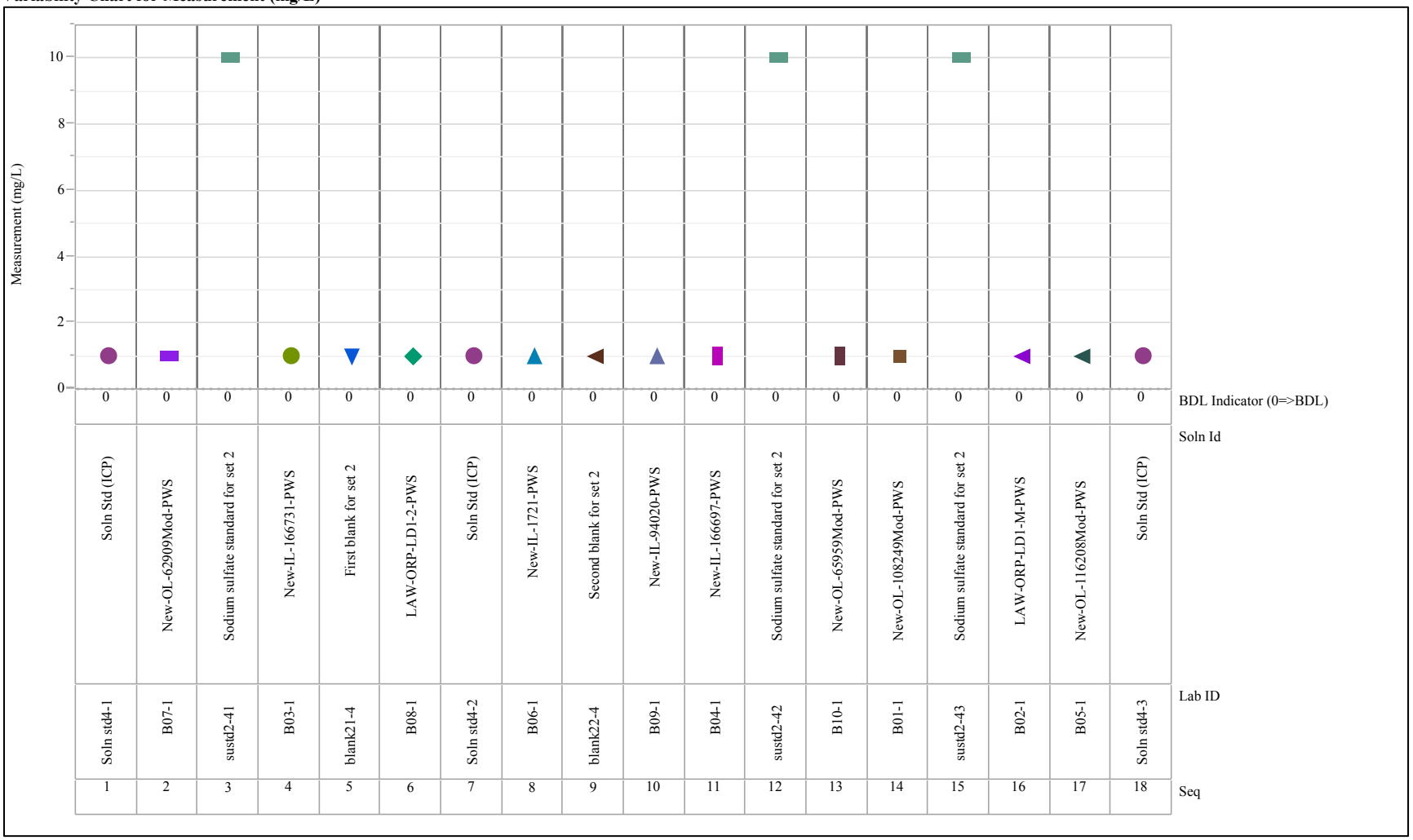


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Sn (mg/L), Analysis=ICP, Blk=5
Variability Chart for Measurement (mg/L)

Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Sn (mg/L), Analysis=ICP, Blk=6
Variability Chart for Measurement (mg/L)

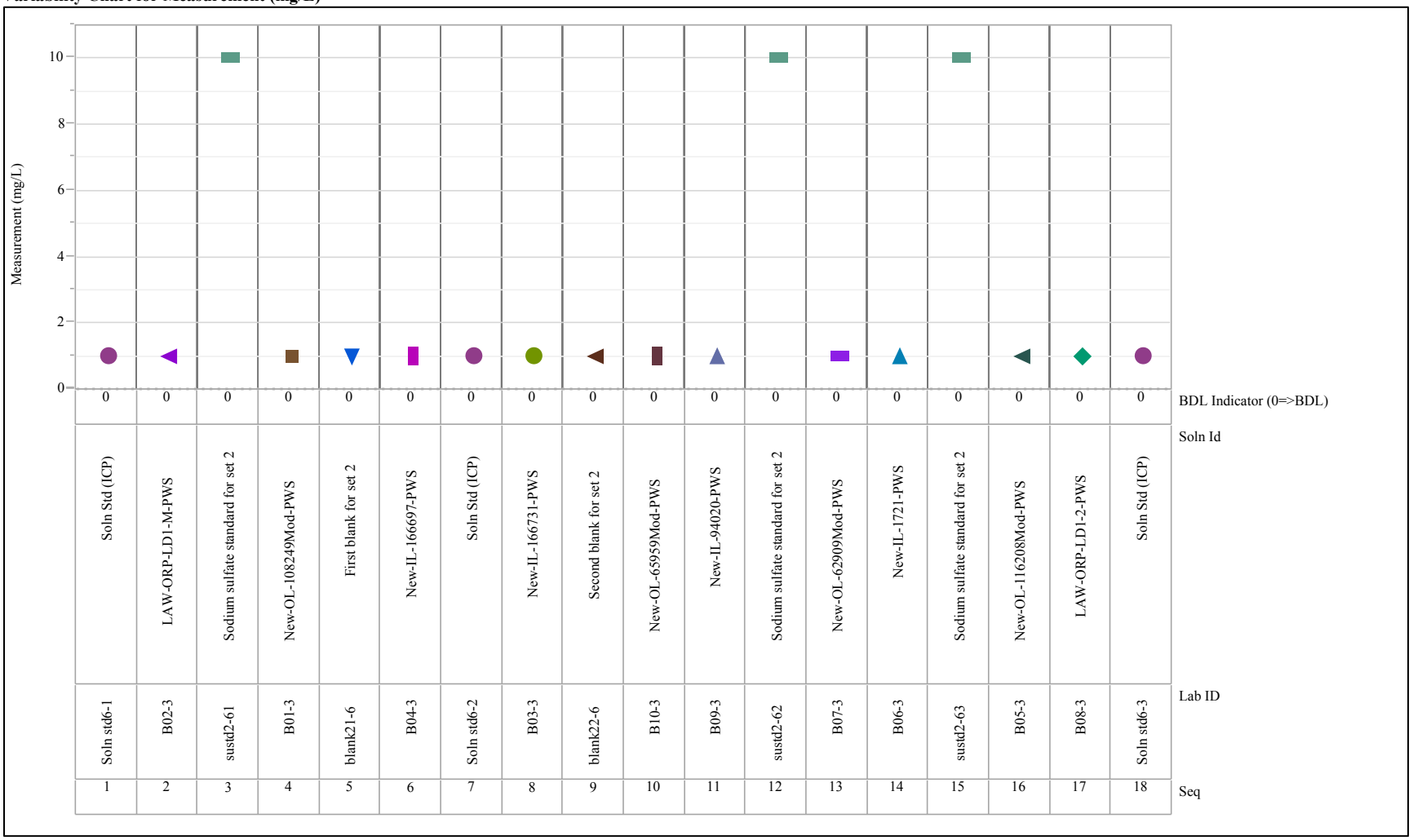


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=SO4 (mg/L), Analysis=IC, Blk=1
Variability Chart for Measurement (mg/L)

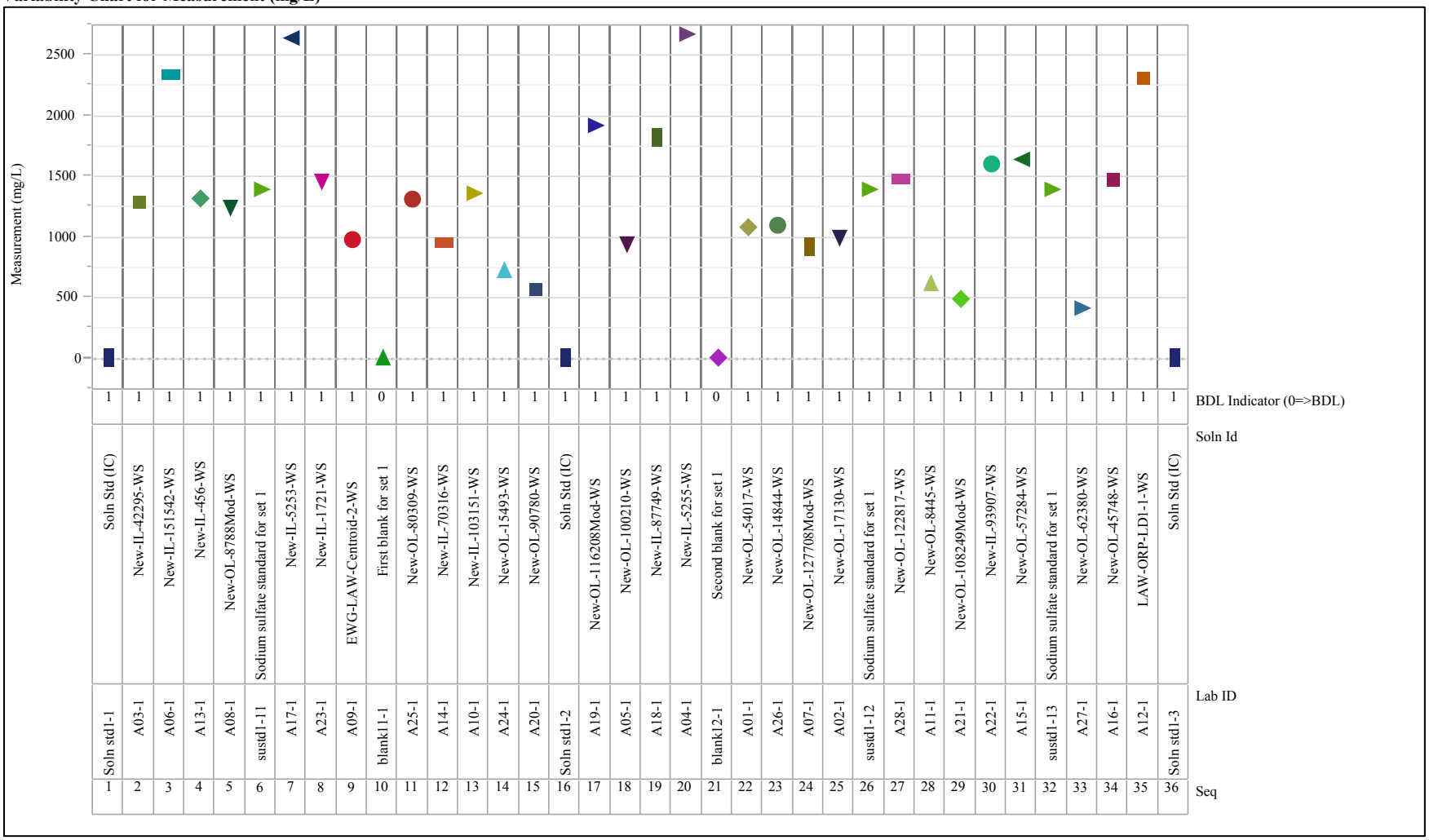


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=SO4 (mg/L), Analysis=IC, Blk=2
Variability Chart for Measurement (mg/L)

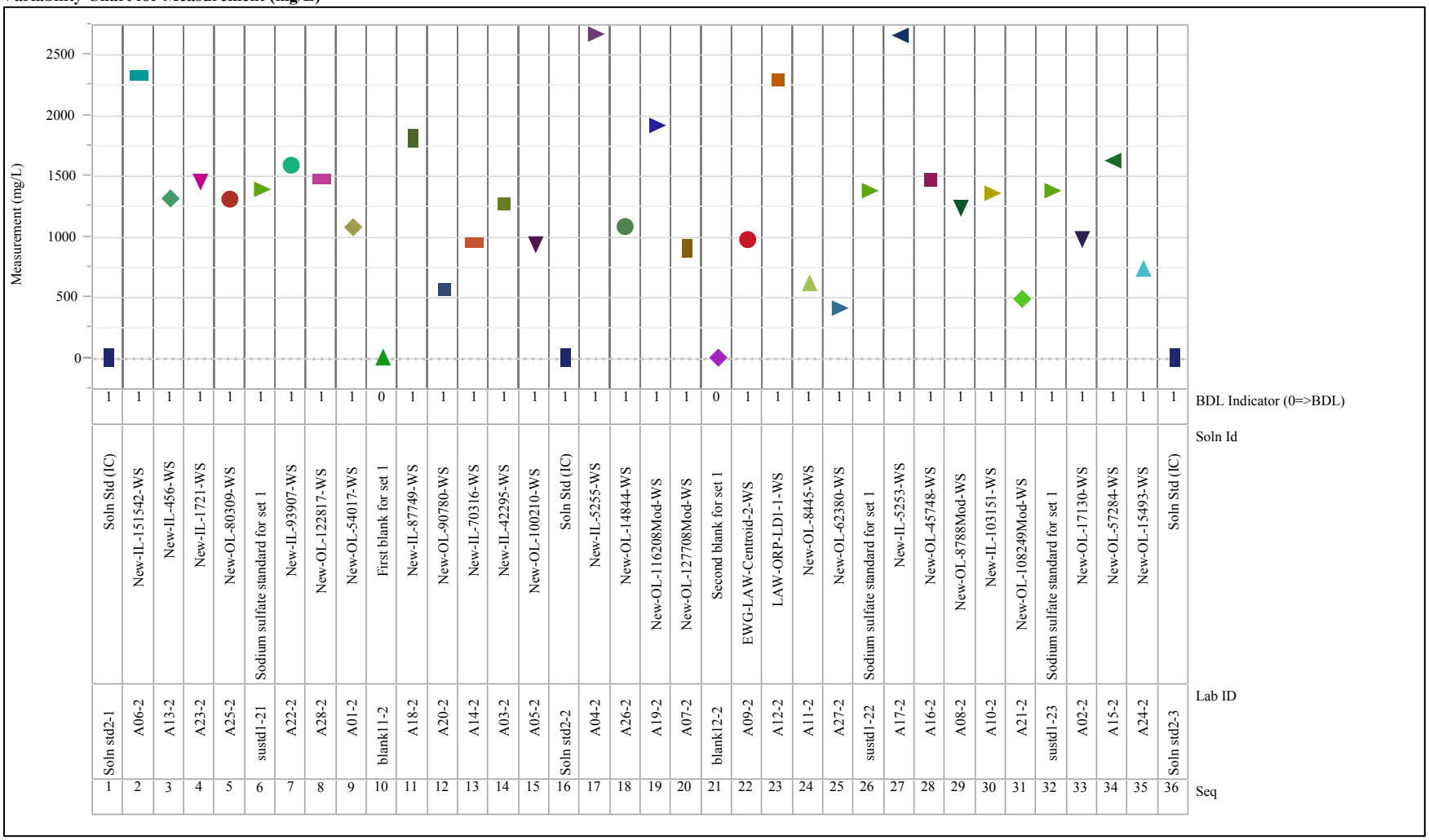


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=SO4 (mg/L), Analysis=IC, Blk=3
Variability Chart for Measurement (mg/L)

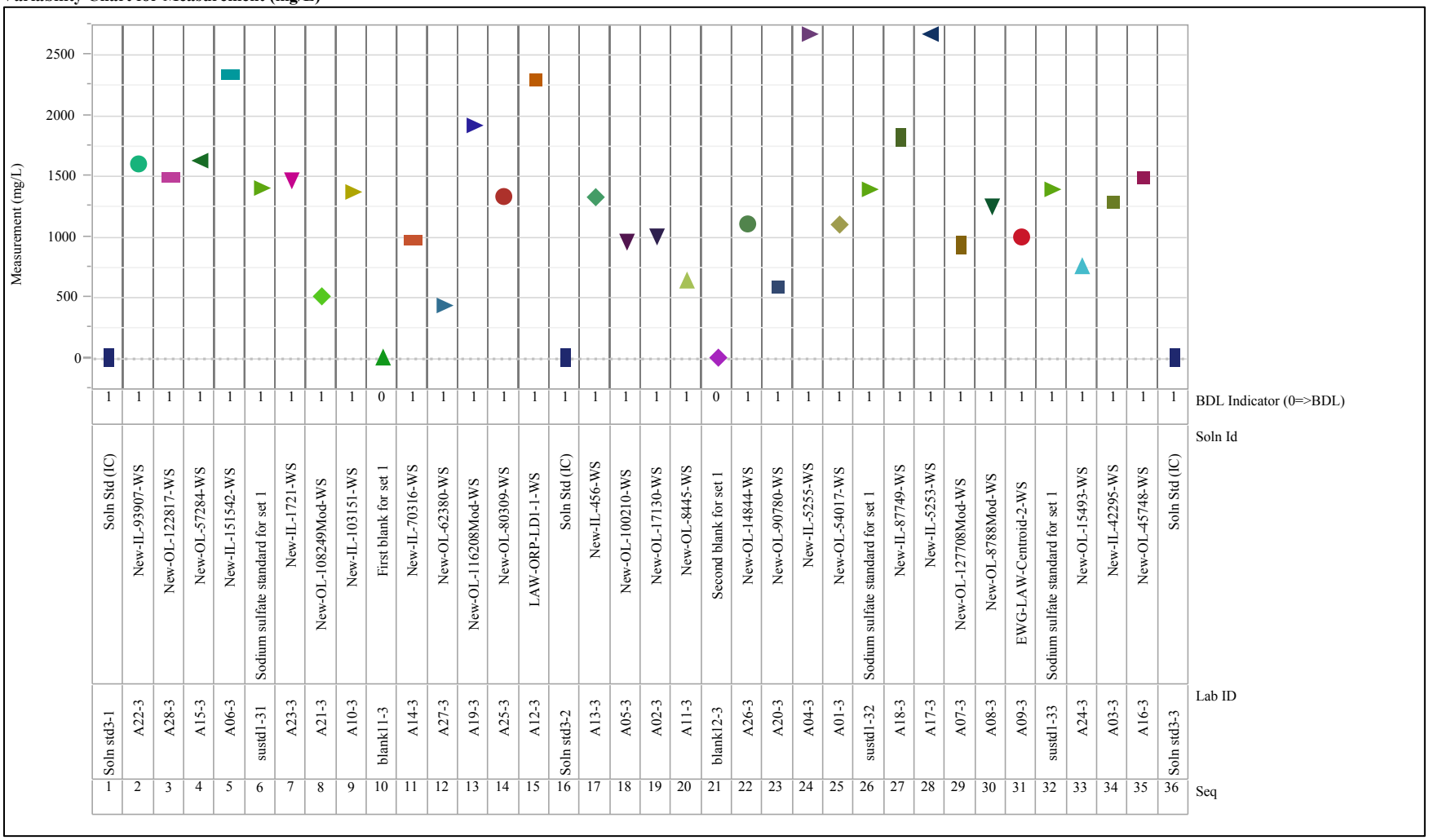


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=SO4 (mg/L), Analysis=IC, Blk=4
Variability Chart for Measurement (mg/L)

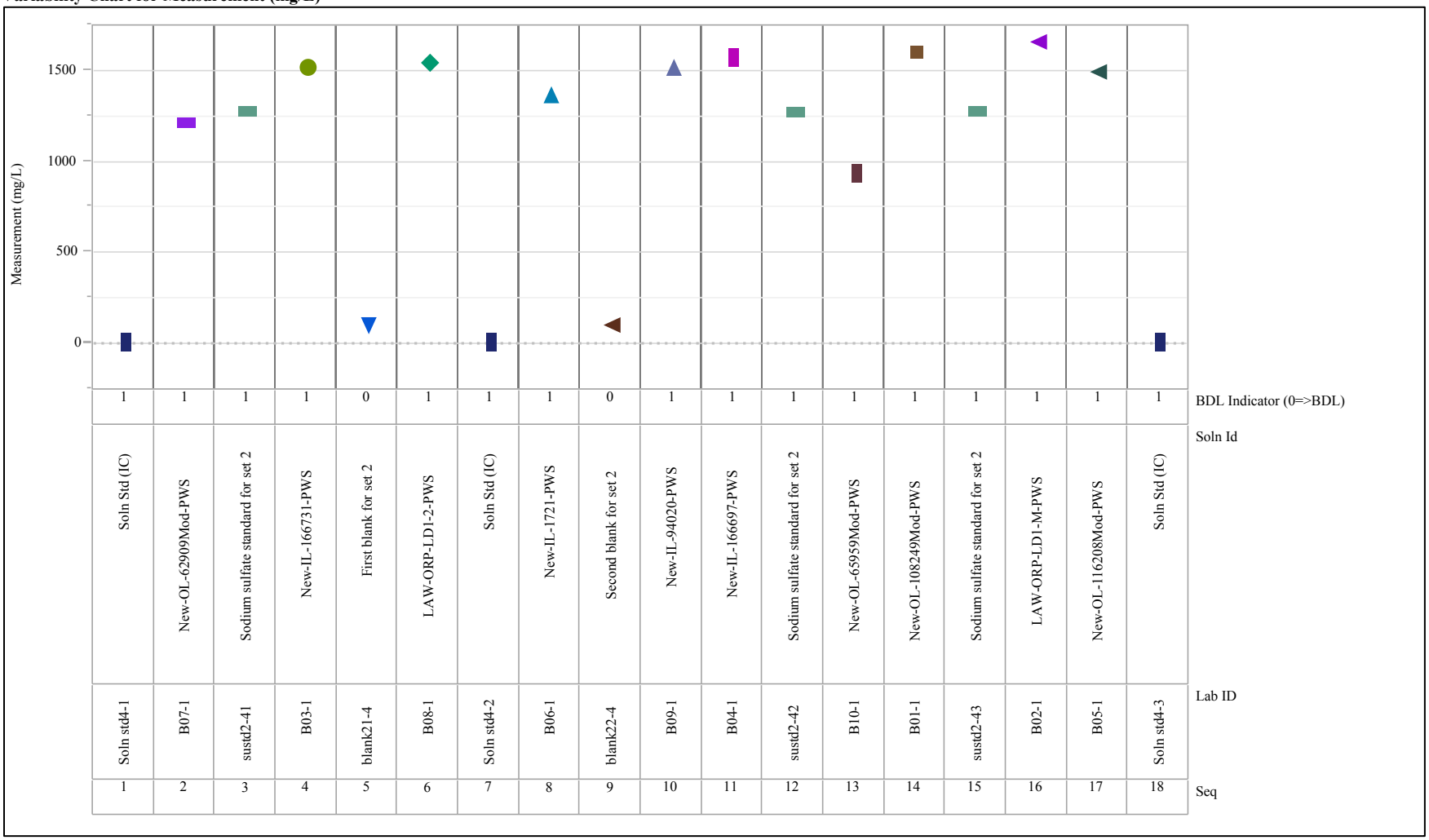


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=SO4 (mg/L), Analysis=IC, Blk=5
Variability Chart for Measurement (mg/L)

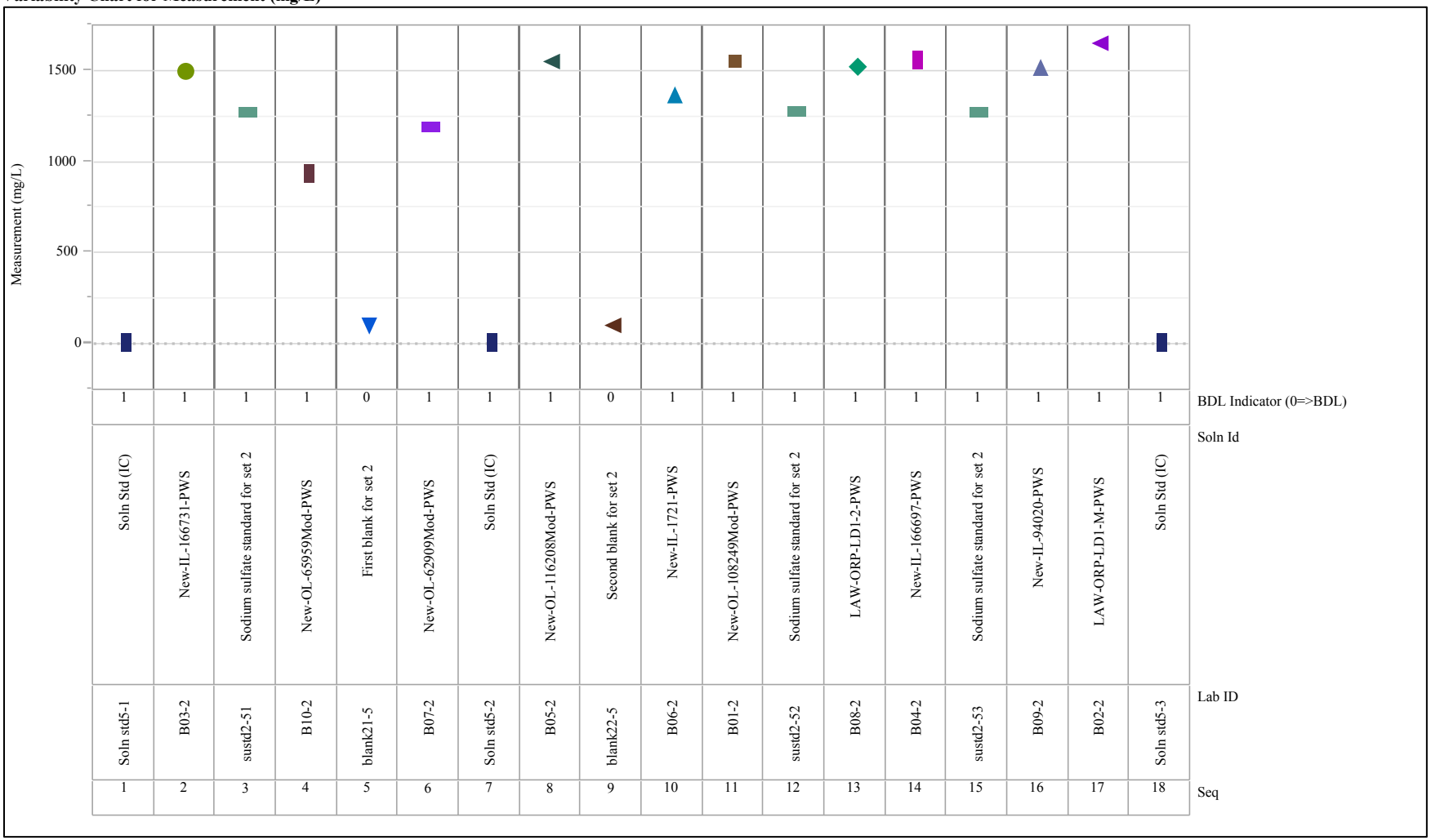


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=SO4 (mg/L), Analysis=IC, Blk=6
Variability Chart for Measurement (mg/L)

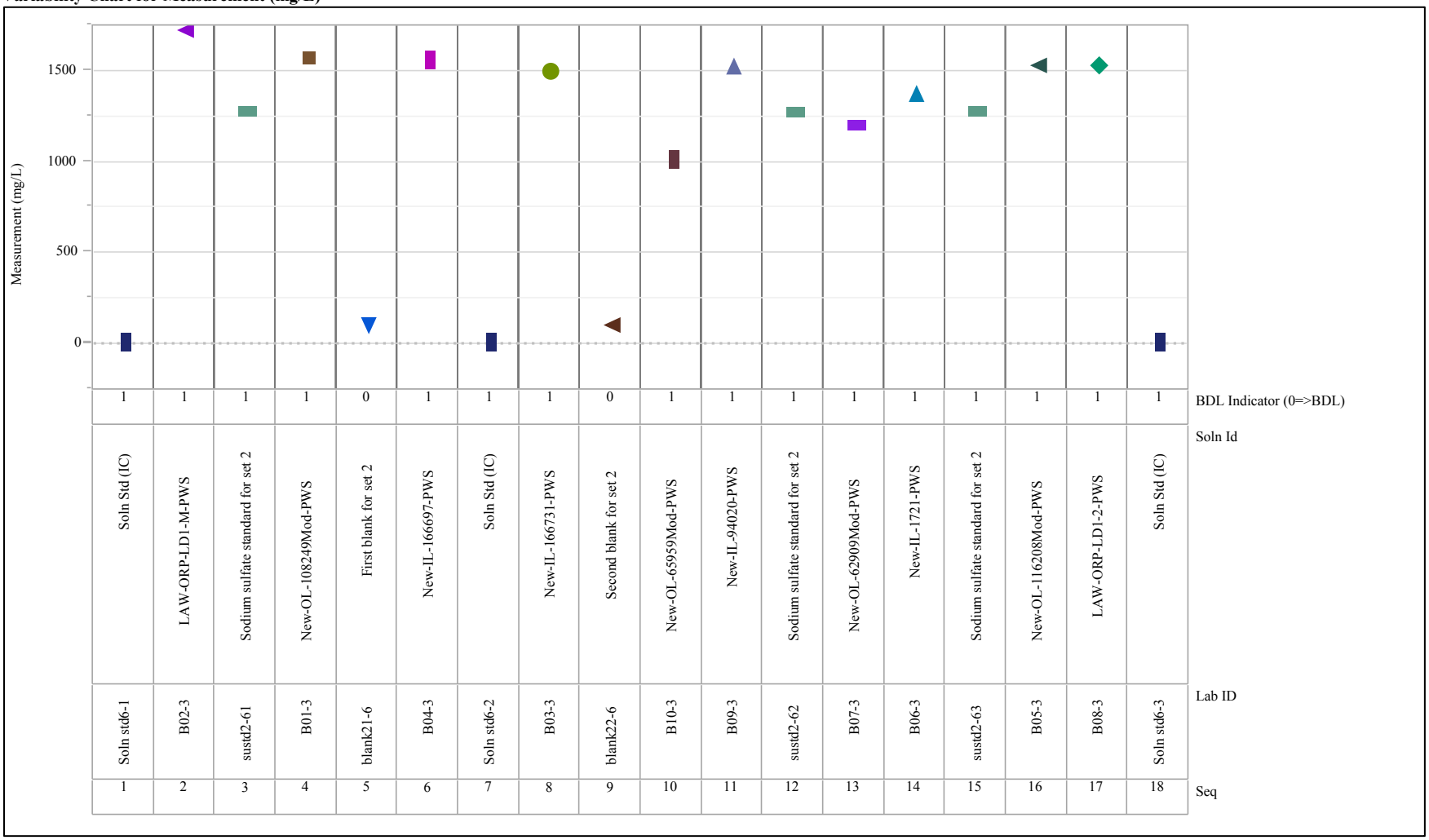


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=SO4 (mg/L), Analysis=ICP, Blk=1
Variability Chart for Measurement (mg/L)

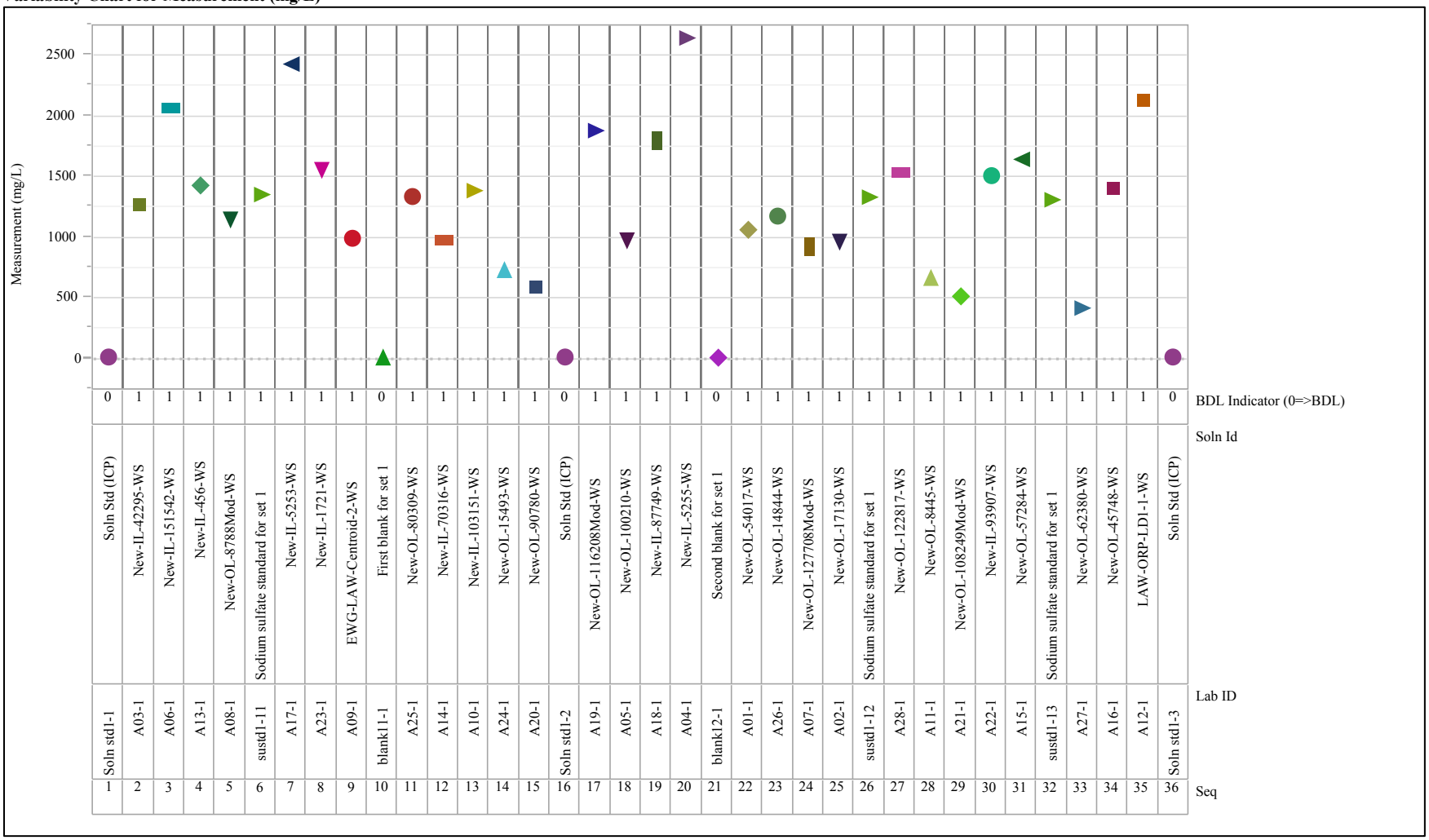


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=SO4 (mg/L), Analysis=ICP, Blk=2
Variability Chart for Measurement (mg/L)

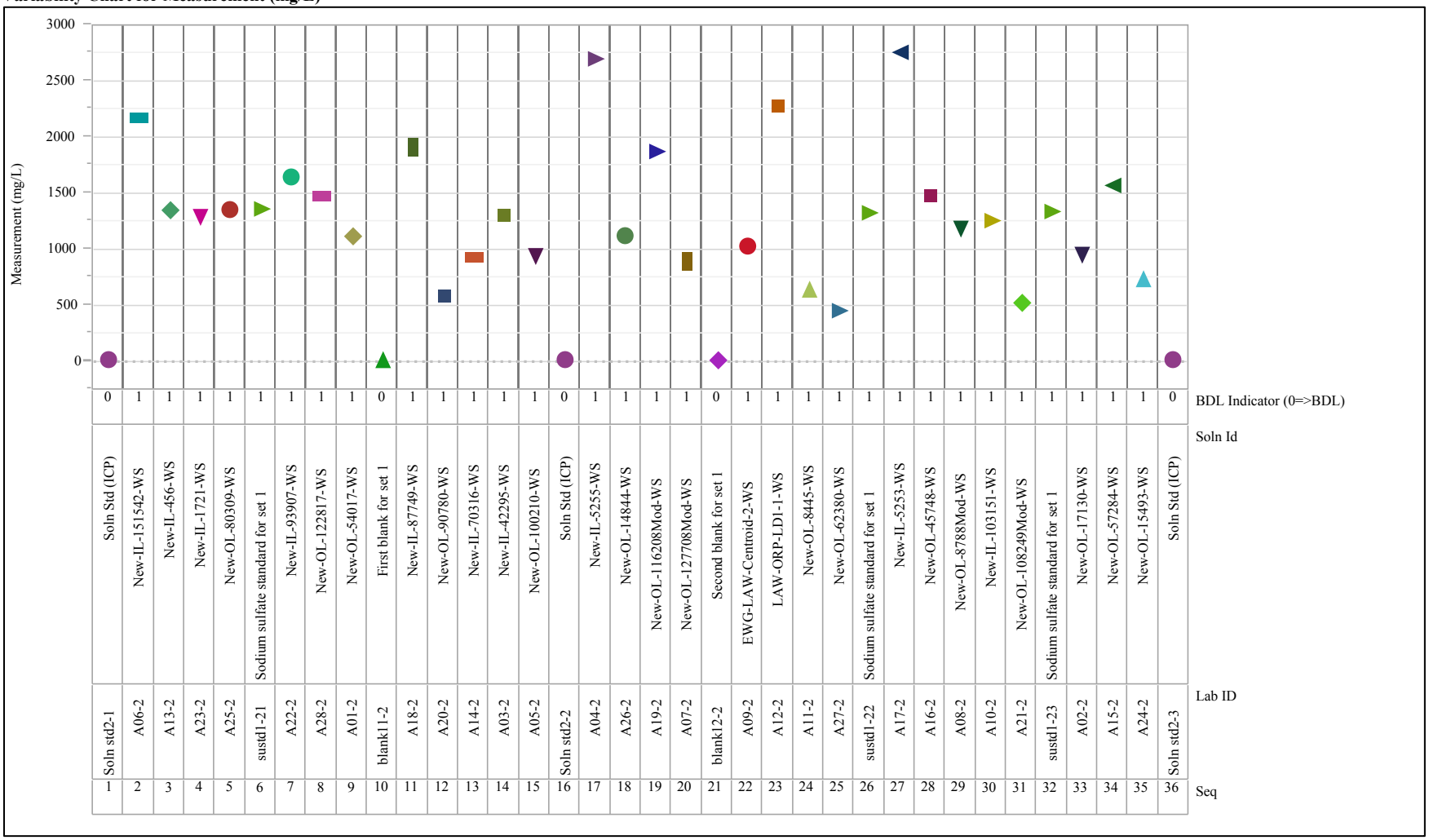


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=SO4 (mg/L), Analysis=ICP, Blk=3
Variability Chart for Measurement (mg/L)

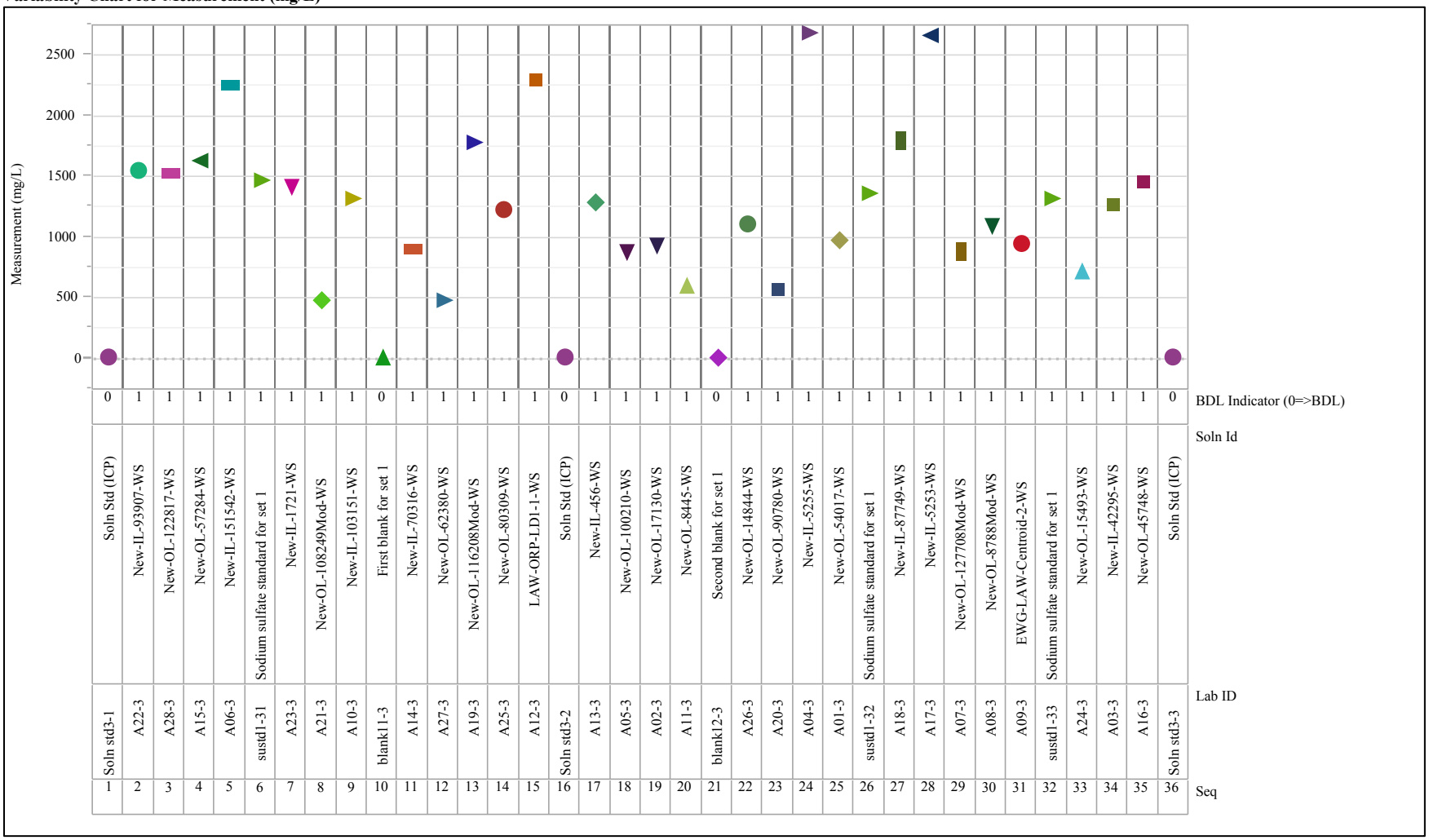


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=SO4 (mg/L), Analysis=ICP, Blk=4
Variability Chart for Measurement (mg/L)

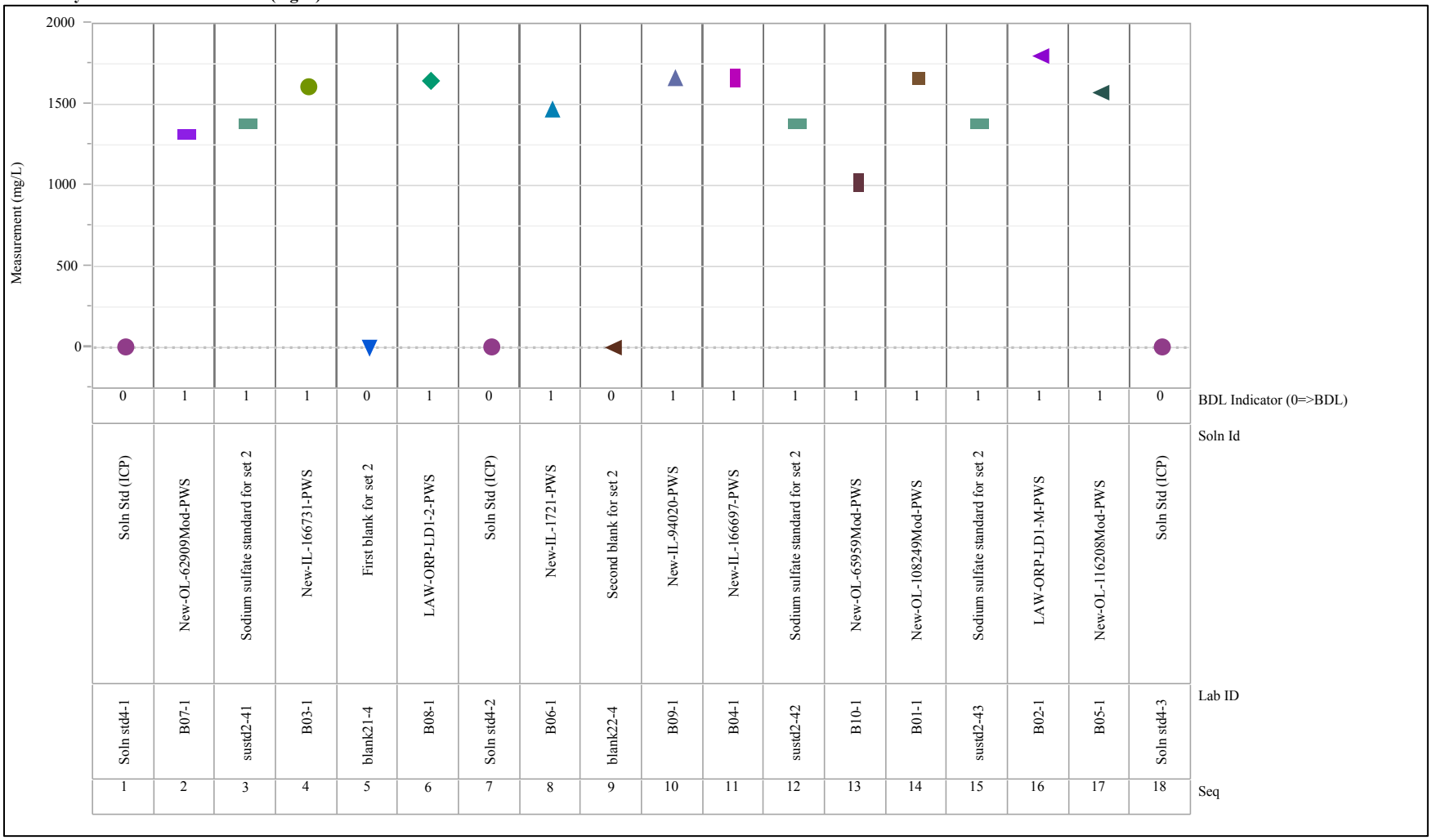


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=SO4 (mg/L), Analysis=ICP, Blk=5
Variability Chart for Measurement (mg/L)

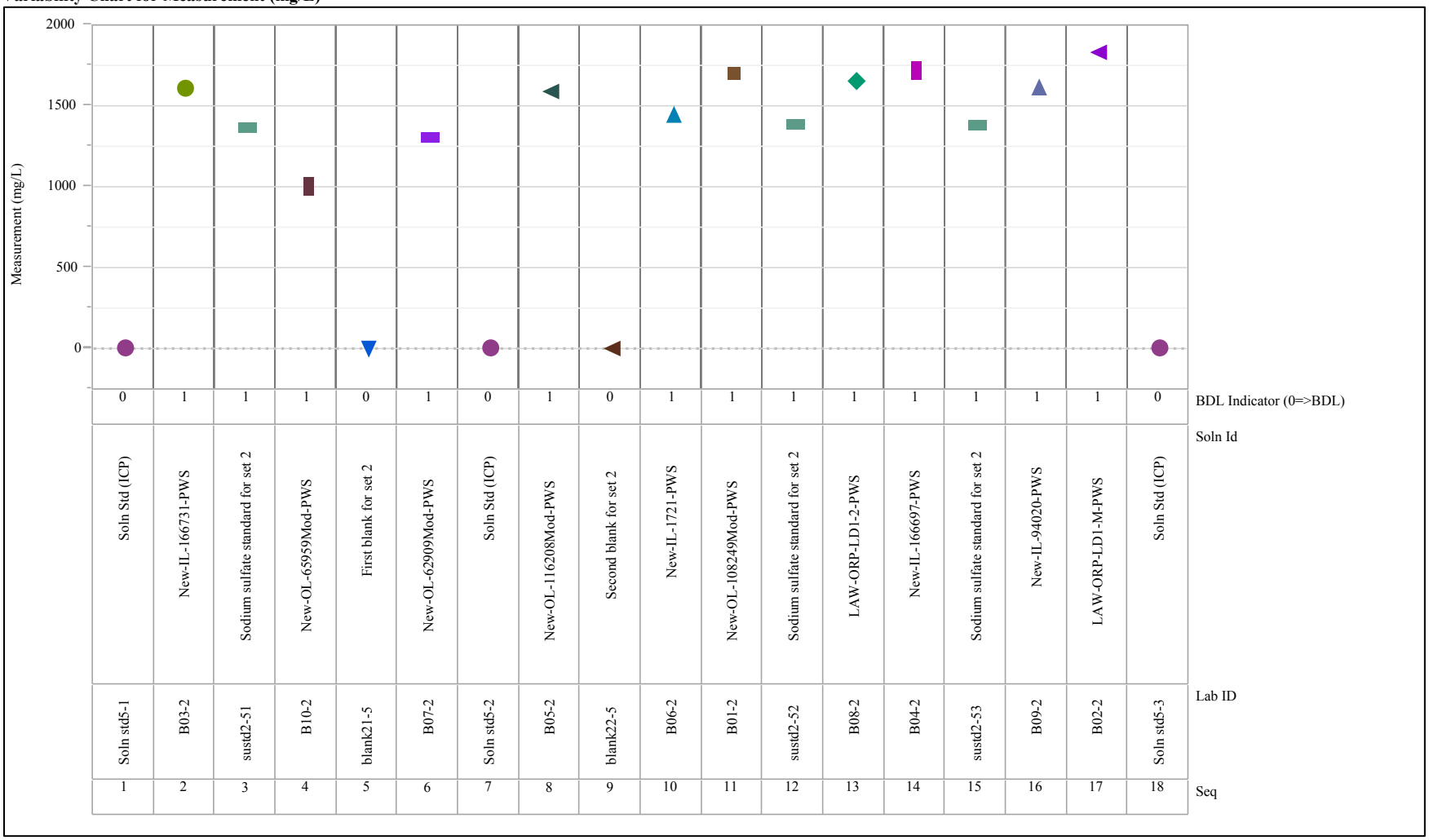


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=SO4 (mg/L), Analysis=ICP, Blk=6
Variability Chart for Measurement (mg/L)

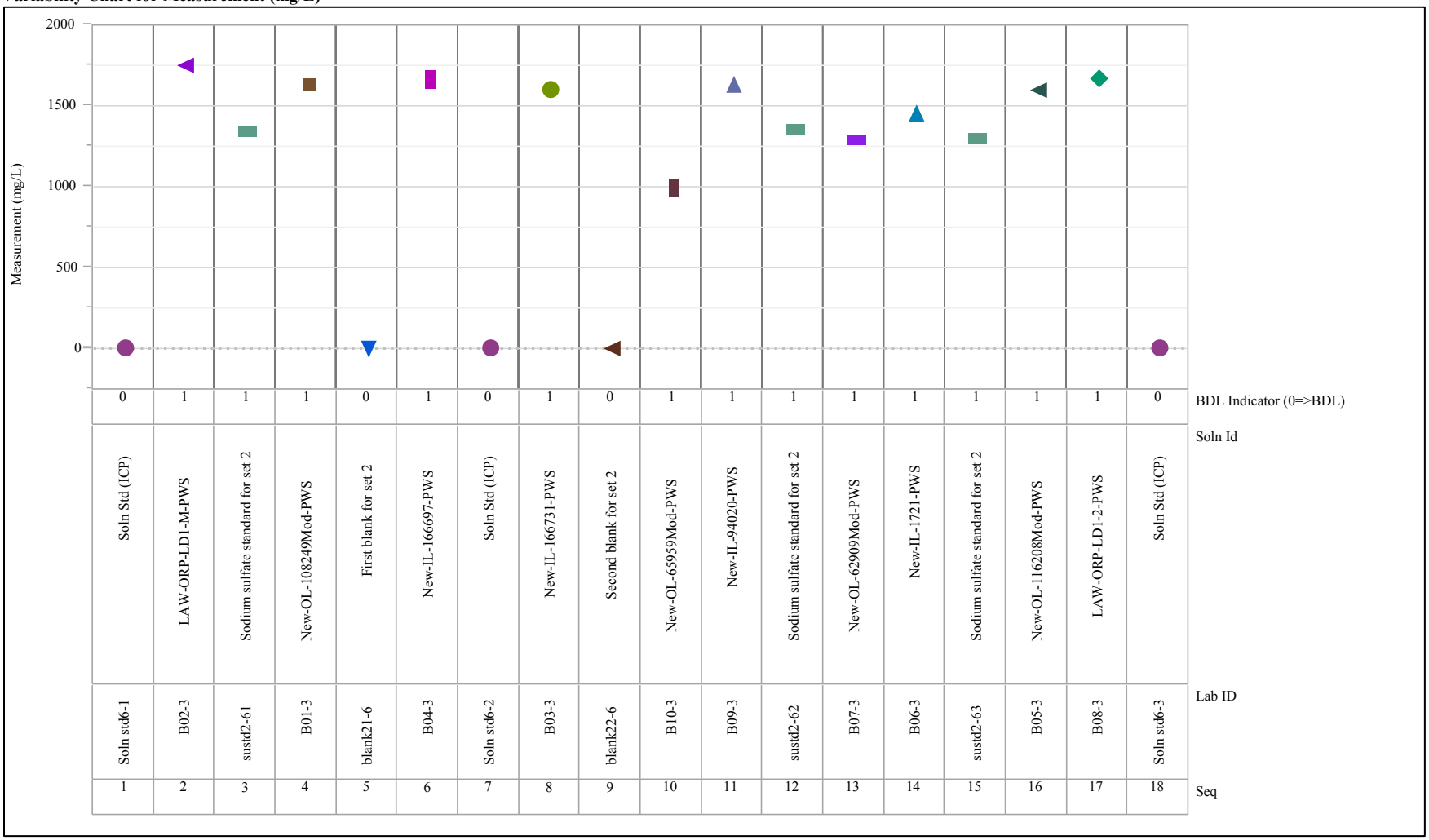


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=V (mg/L), Analysis=ICP, Blk=1
Variability Chart for Measurement (mg/L)

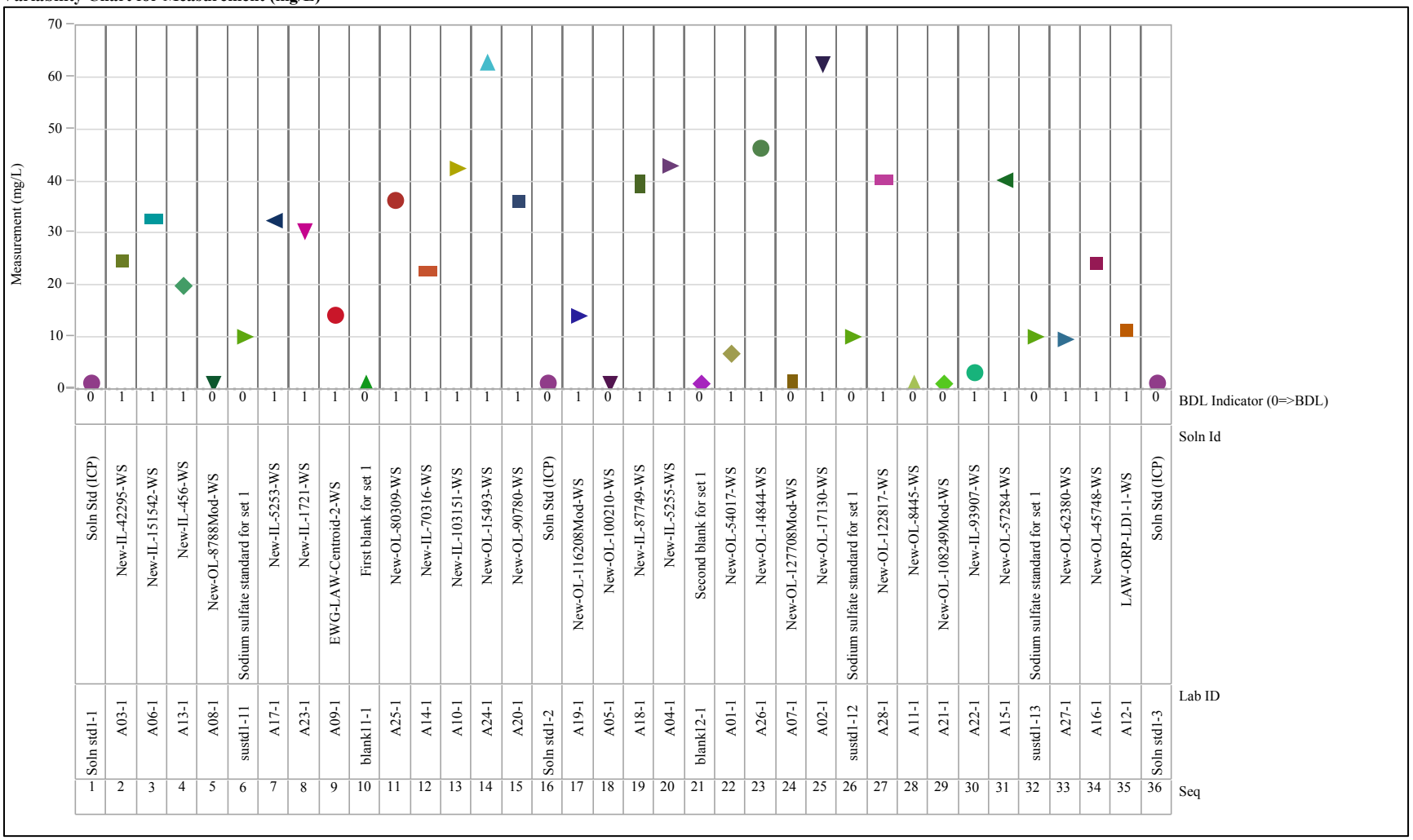


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=V (mg/L), Analysis=ICP, Blk=2
Variability Chart for Measurement (mg/L)

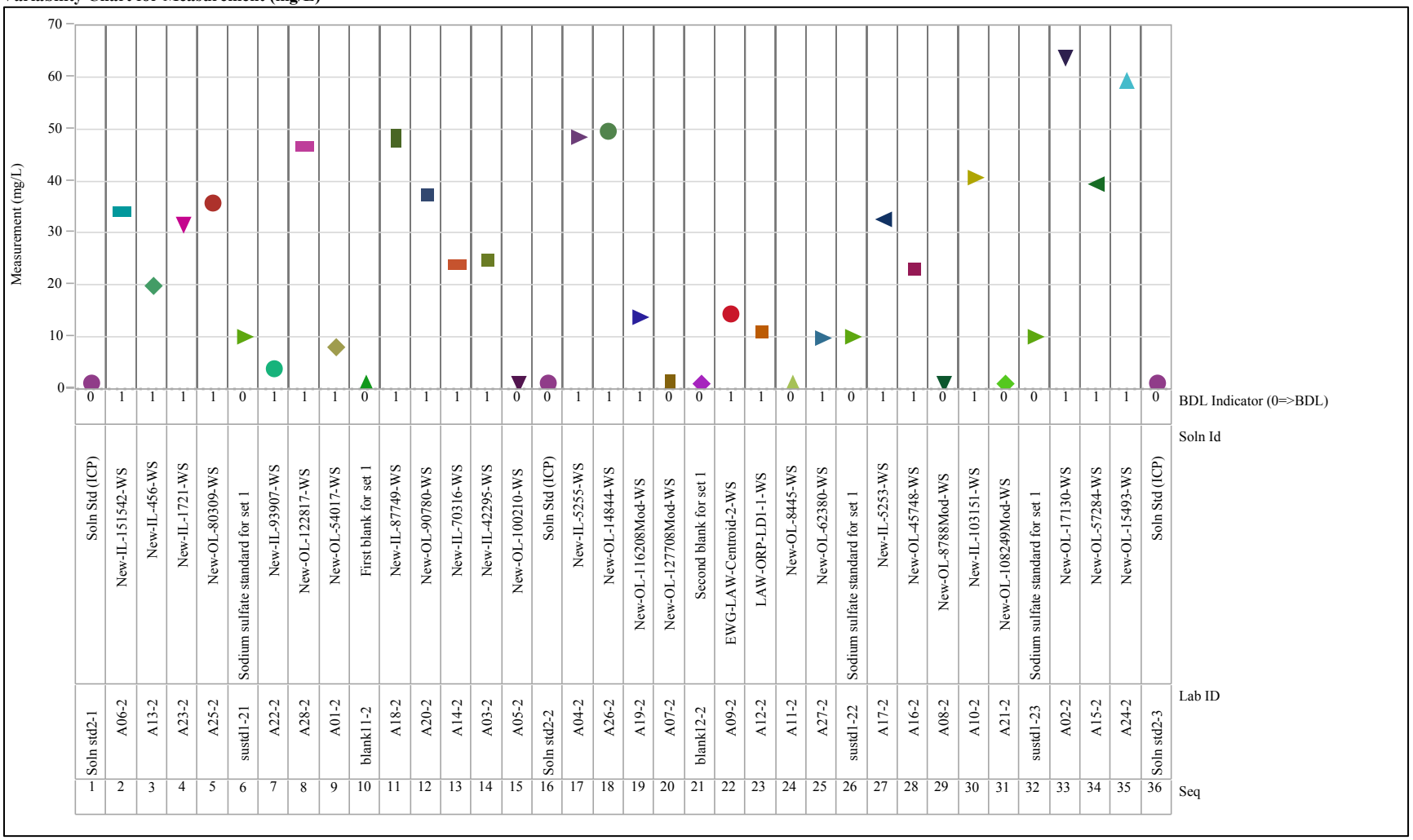


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=V (mg/L), Analysis=ICP, Blk=3
Variability Chart for Measurement (mg/L)

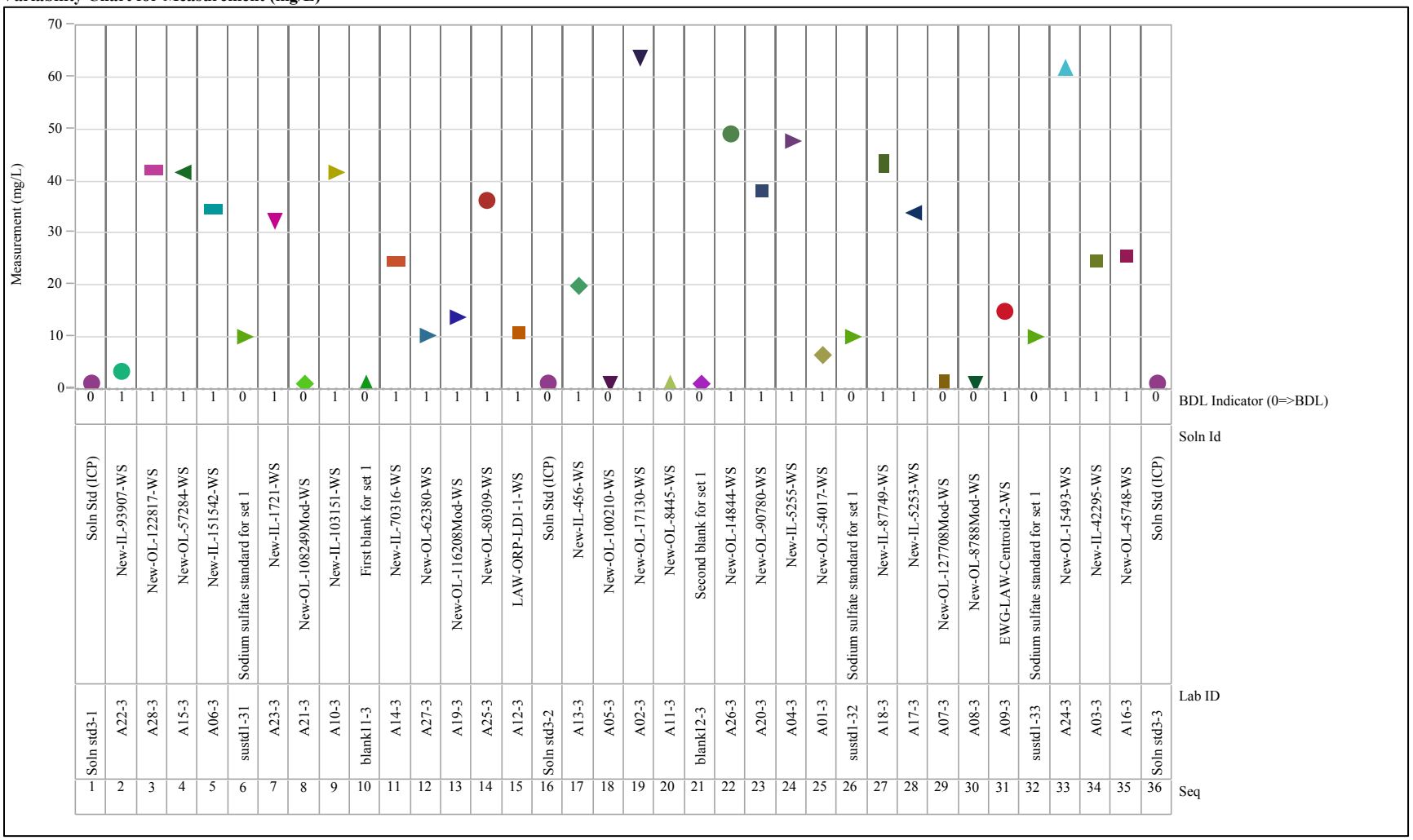


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=V (mg/L), Analysis=ICP, Blk=4
Variability Chart for Measurement (mg/L)

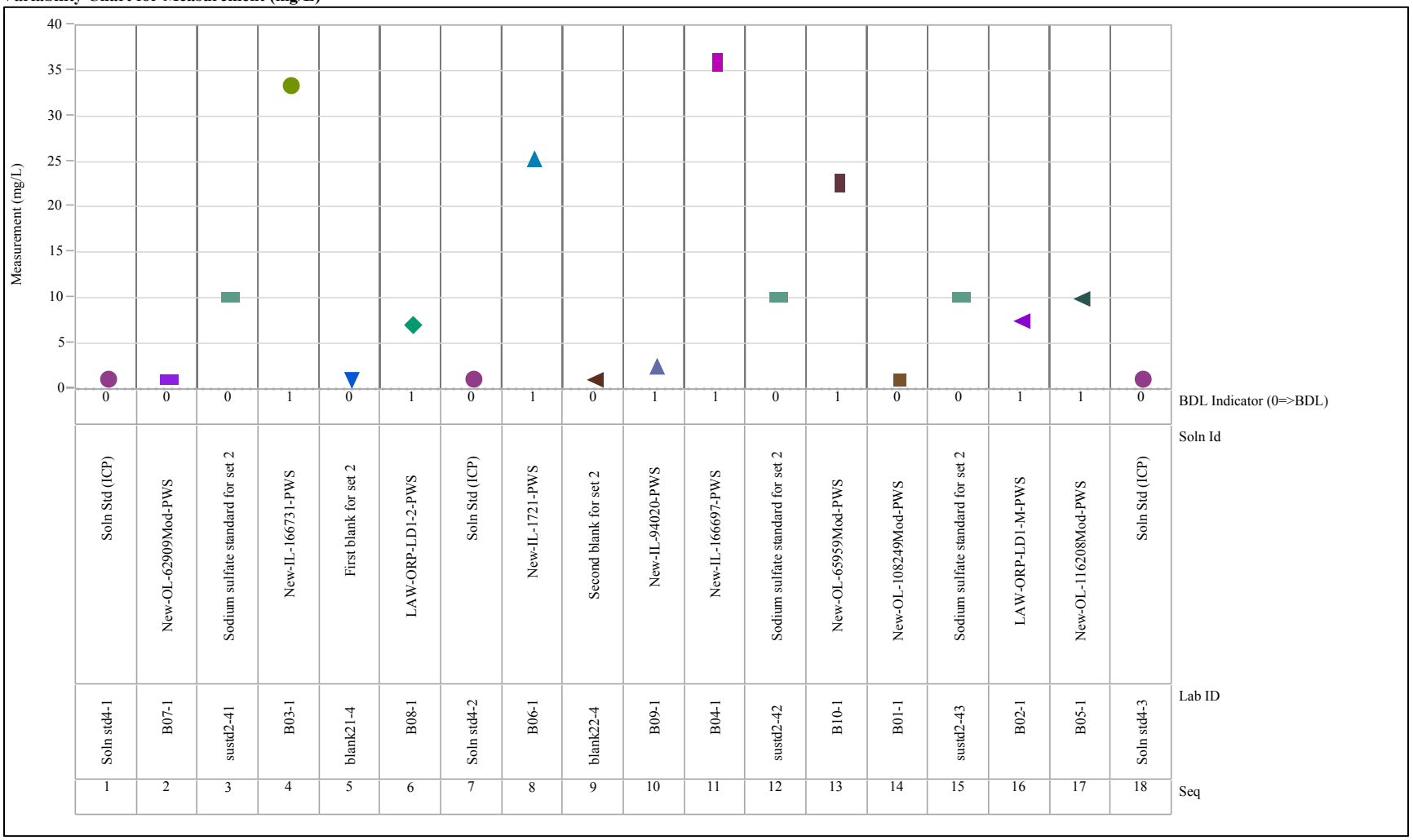


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=V (mg/L), Analysis=ICP, Blk=5
Variability Chart for Measurement (mg/L)

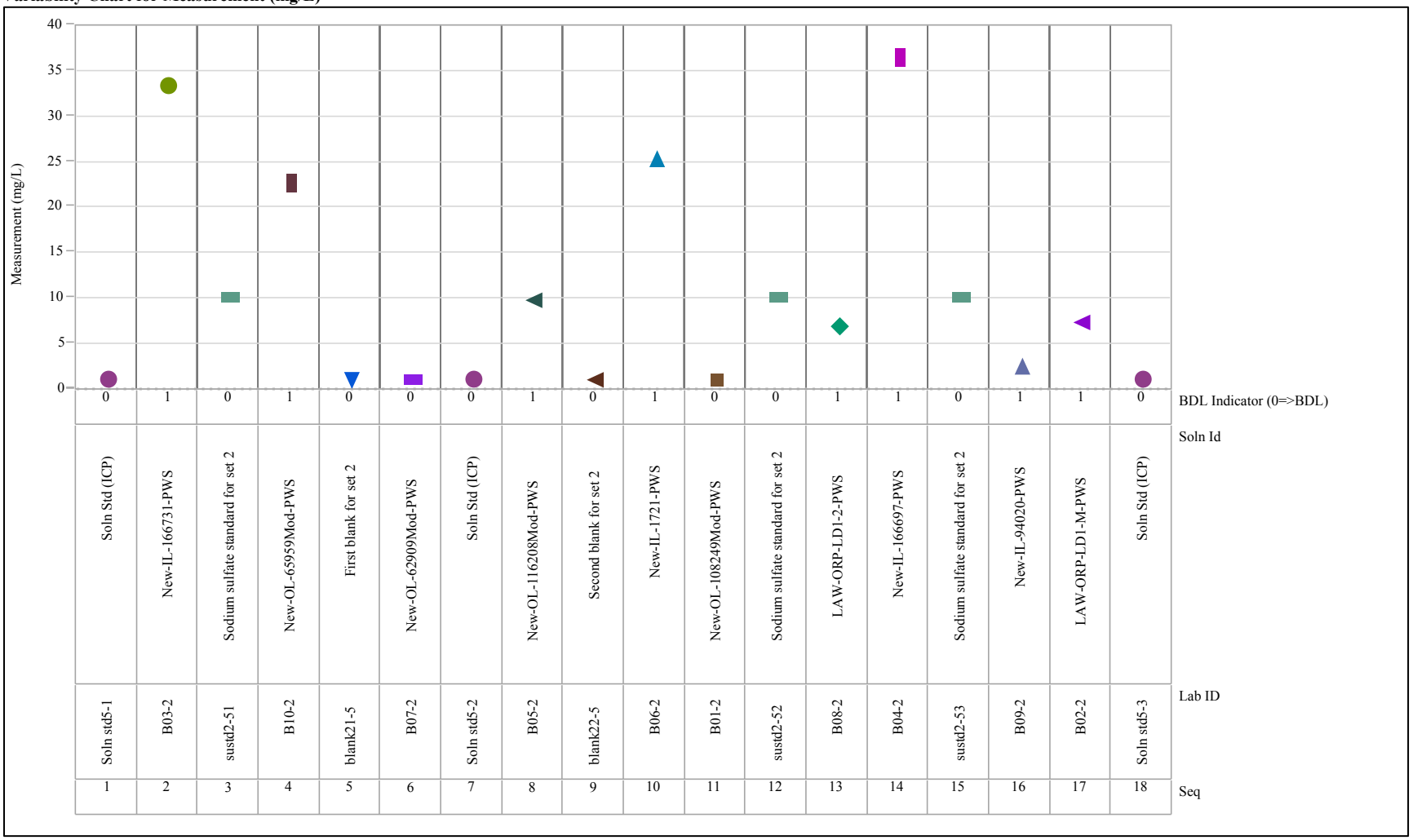


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=V (mg/L), Analysis=ICP, Blk=6
Variability Chart for Measurement (mg/L)

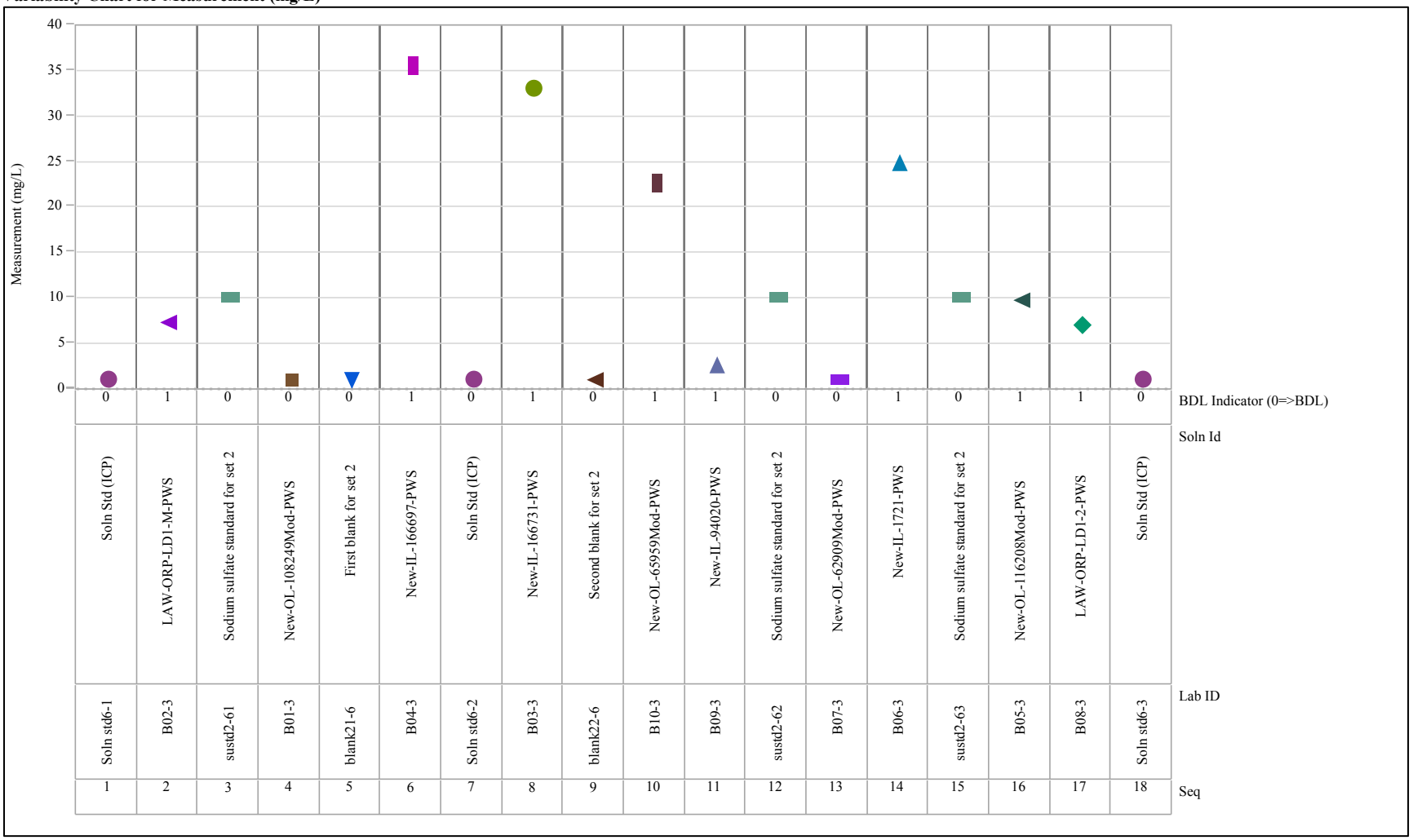


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Zn (mg/L), Analysis=ICP, Blk=1
Variability Chart for Measurement (mg/L)

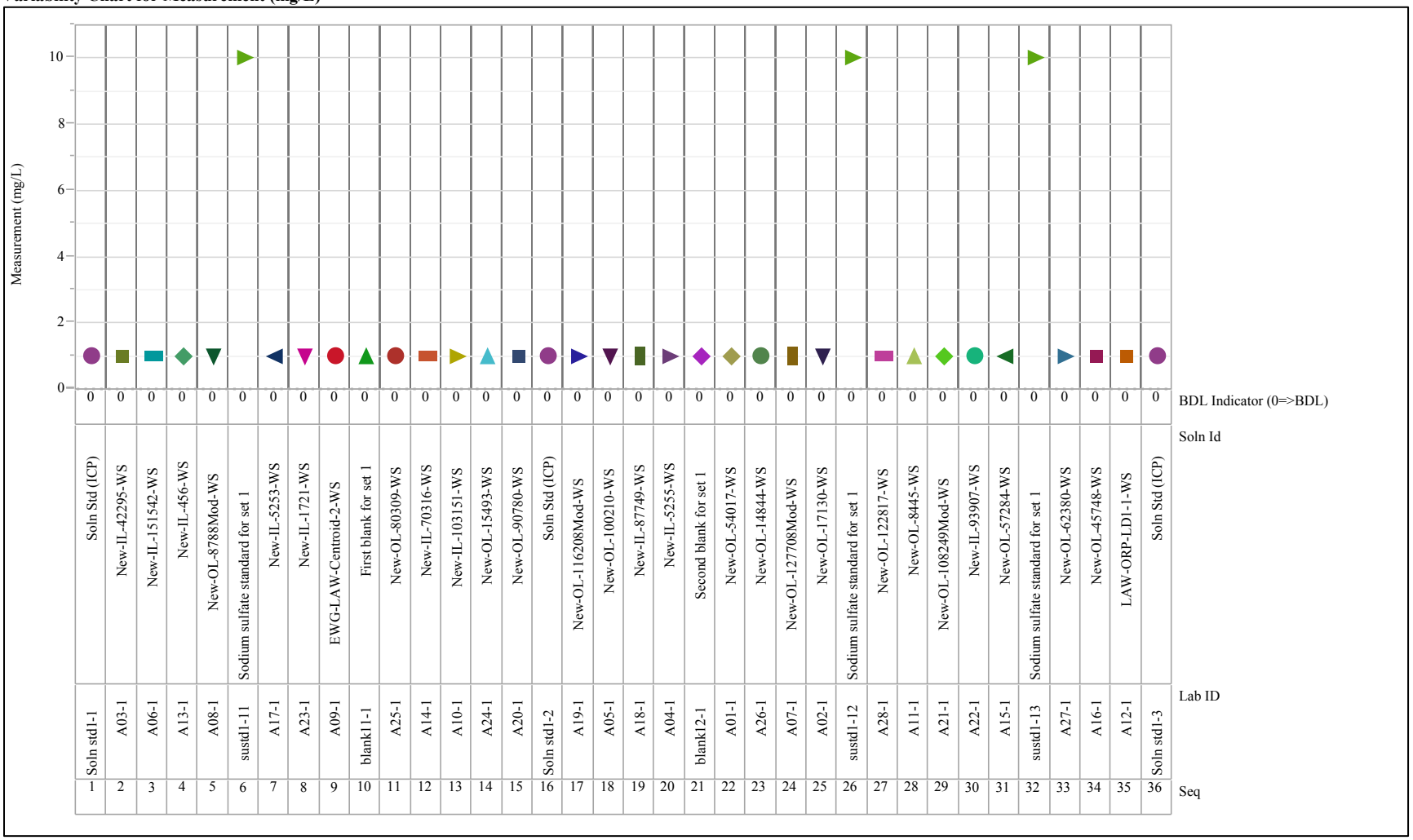


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Zn (mg/L), Analysis=ICP, Blk=2
Variability Chart for Measurement (mg/L)

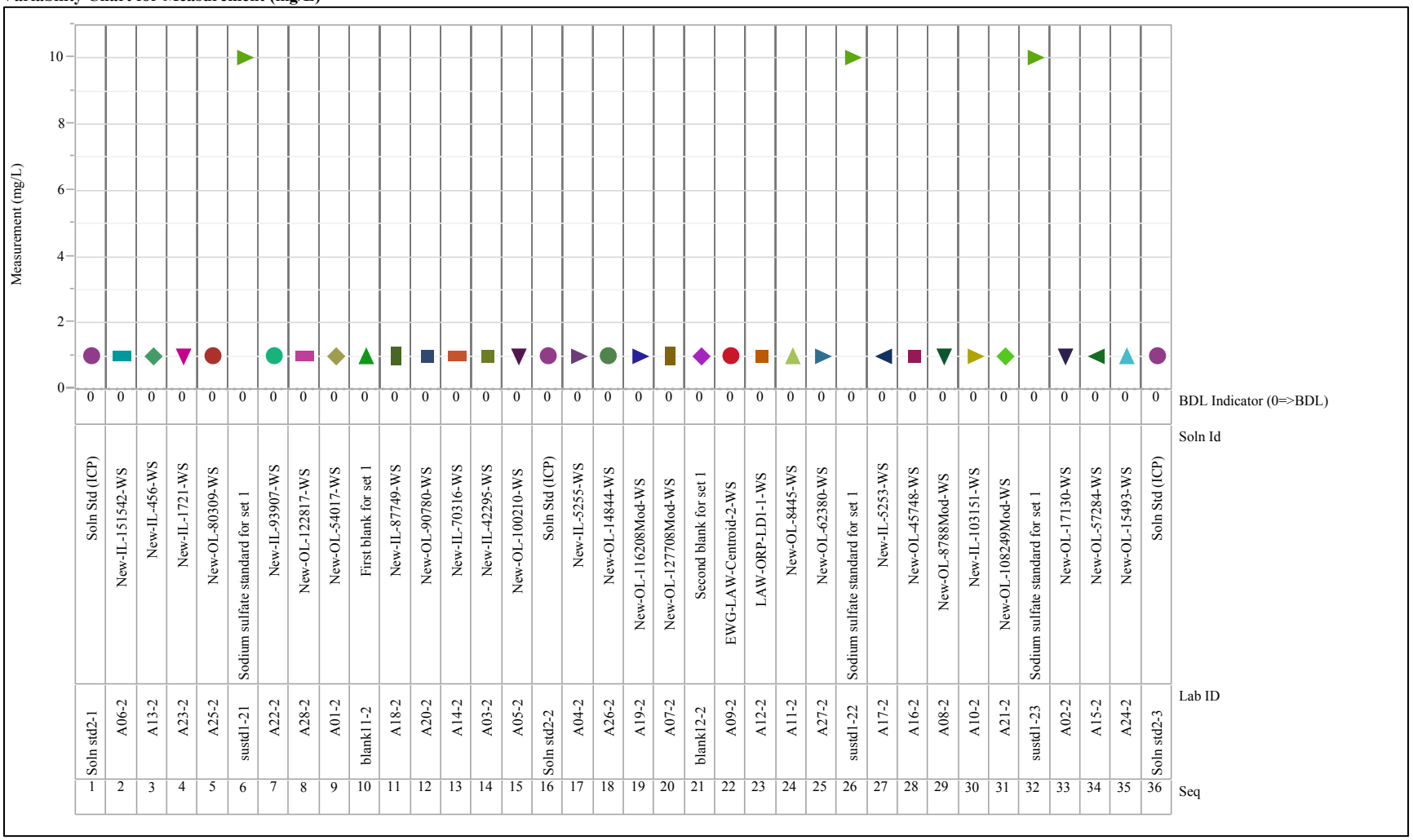


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Zn (mg/L), Analysis=ICP, Blk=3
Variability Chart for Measurement (mg/L)

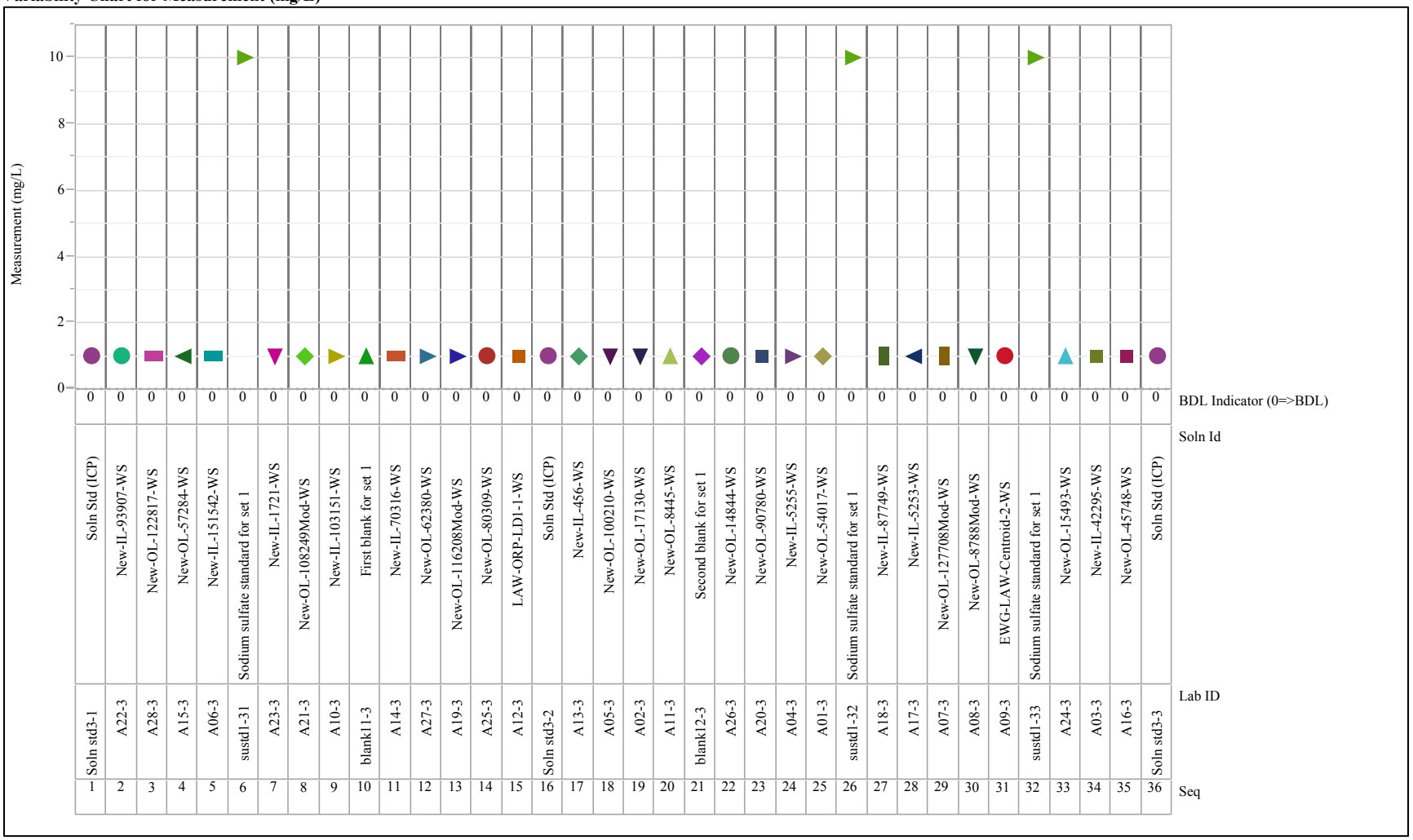


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Zn (mg/L), Analysis=ICP, Blk=4
Variability Chart for Measurement (mg/L)

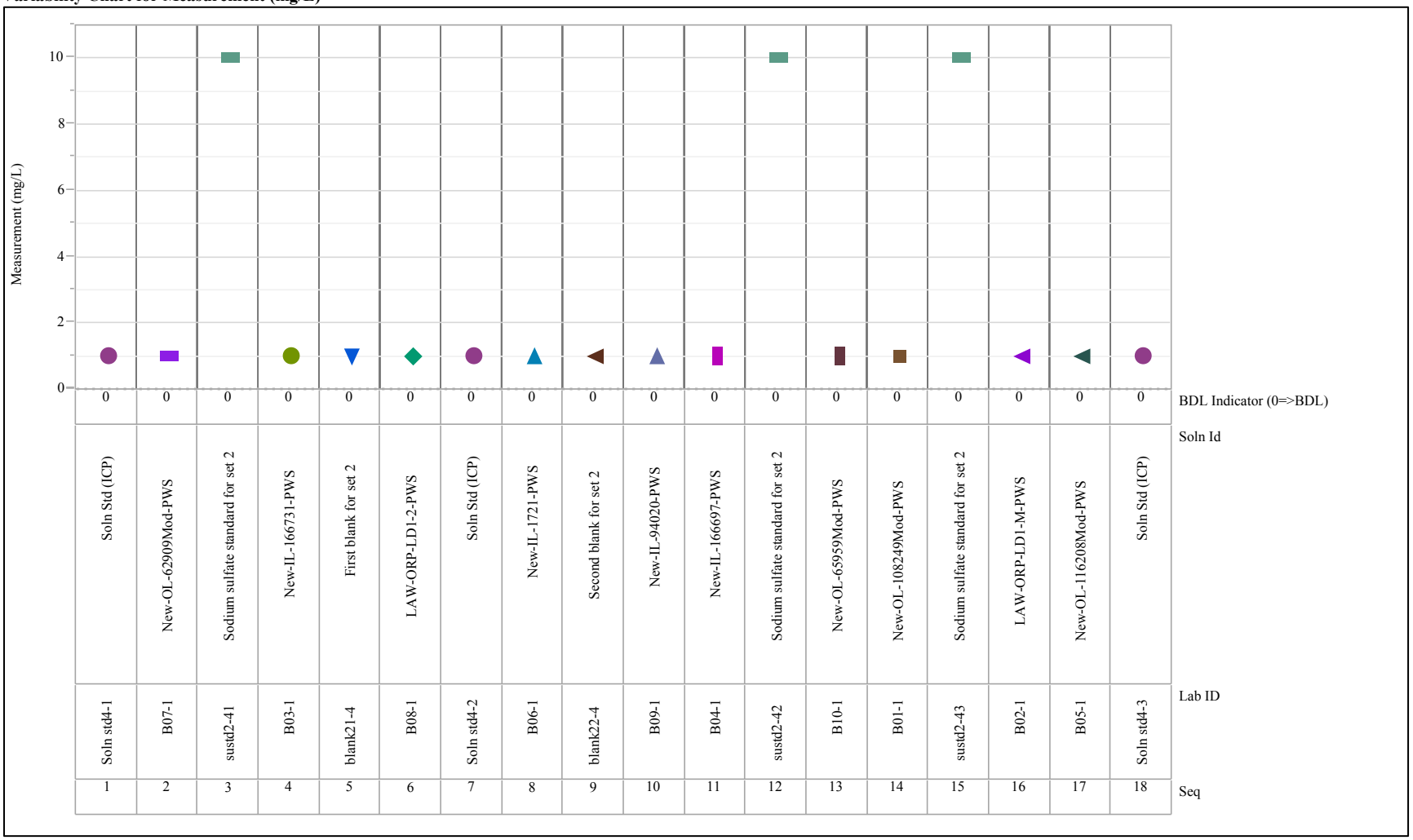


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Zn (mg/L), Analysis=ICP, Blk=5
Variability Chart for Measurement (mg/L)

Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Zn (mg/L), Analysis=ICP, Blk=6
Variability Chart for Measurement (mg/L)

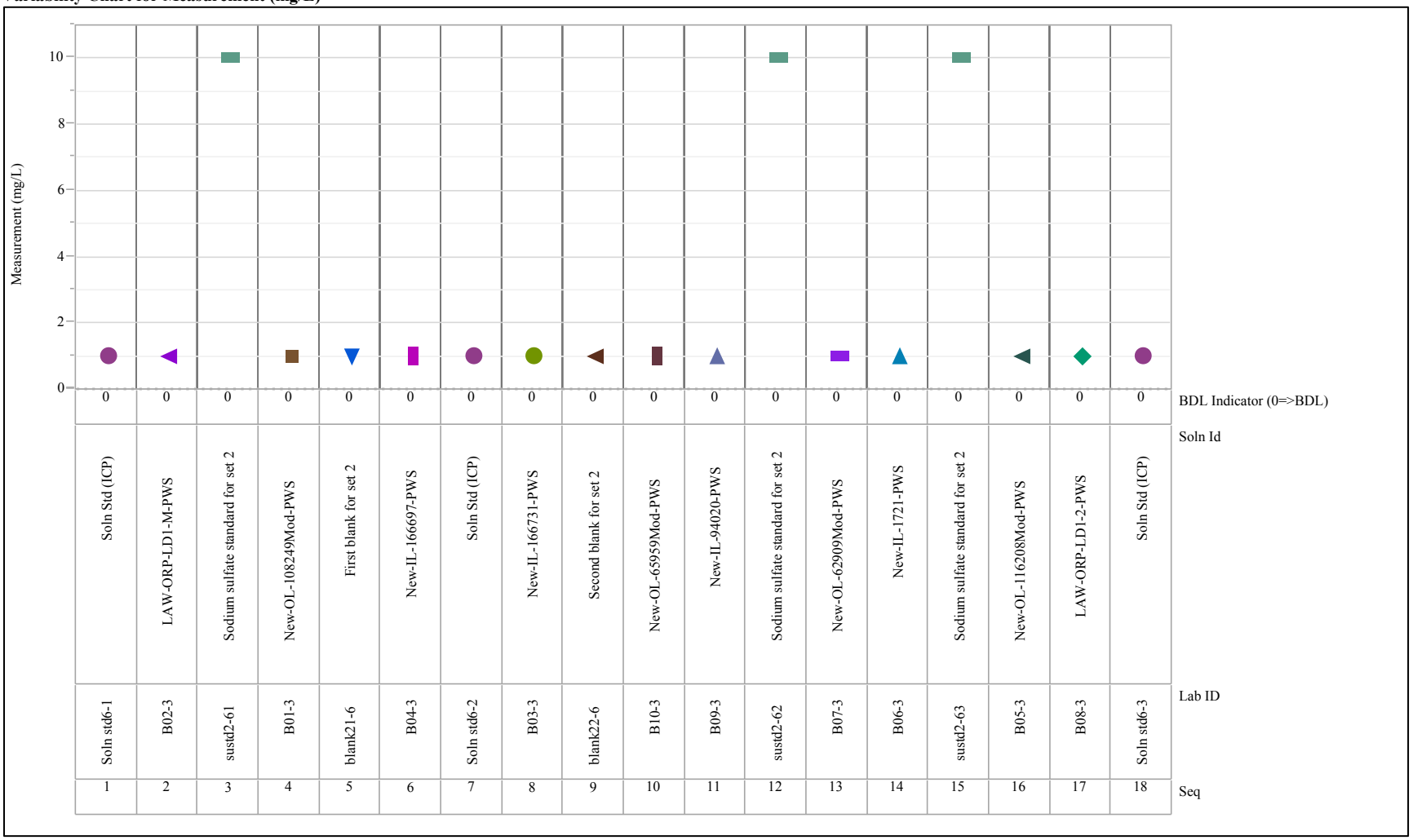


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Zr (mg/L), Analysis=ICP, Blk=1
Variability Chart for Measurement (mg/L)

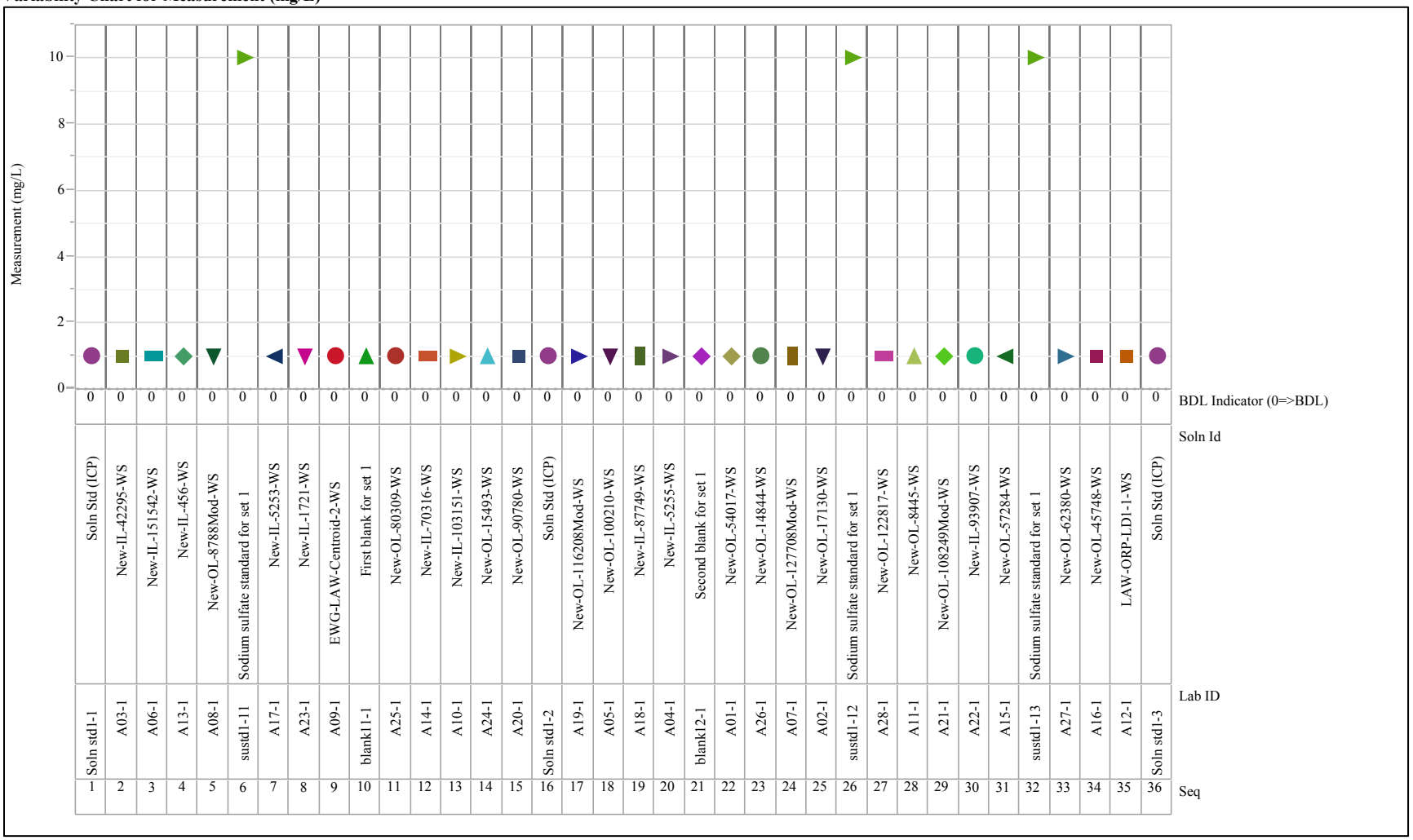


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Zr (mg/L), Analysis=ICP, Blk=2
Variability Chart for Measurement (mg/L)

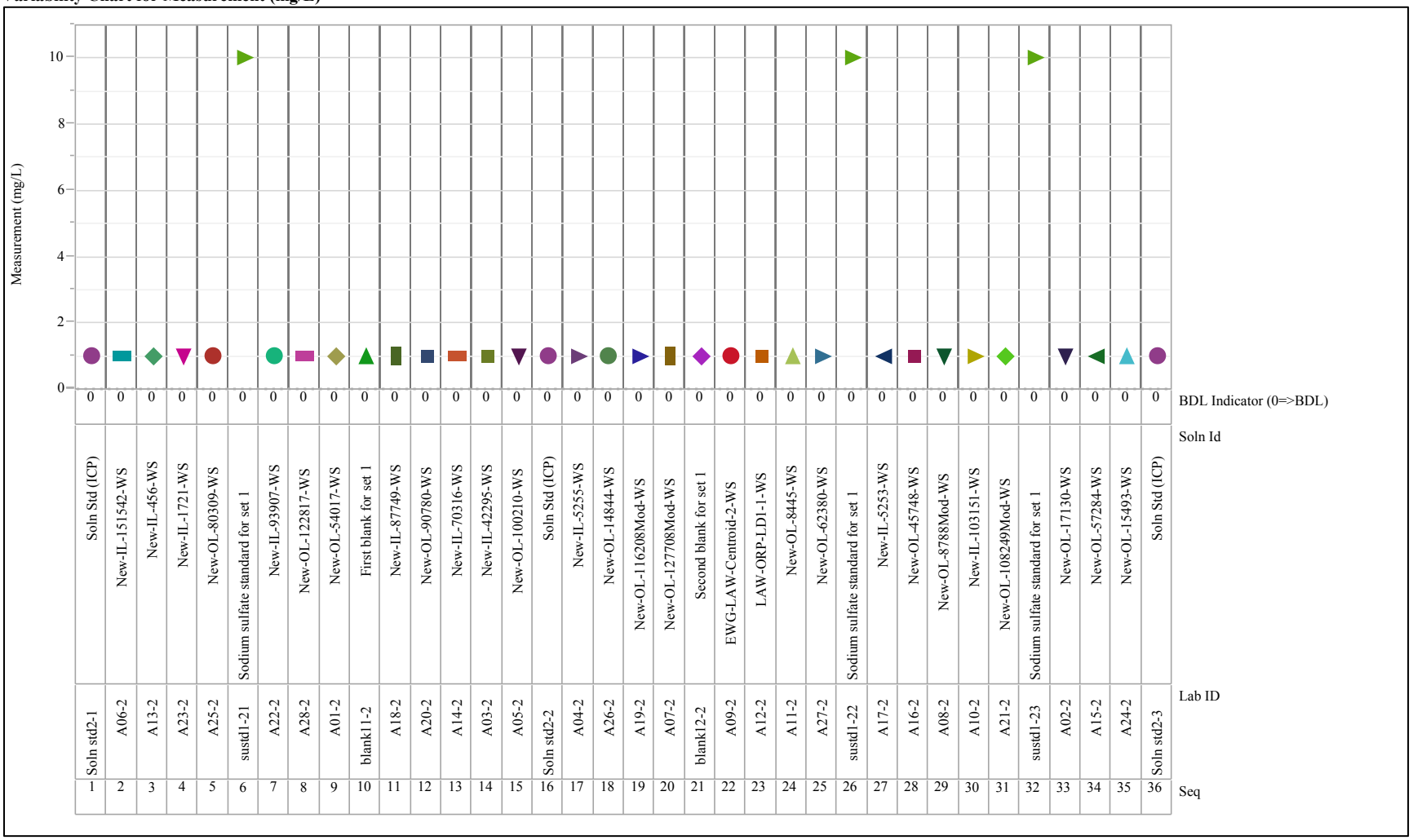


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Zr (mg/L), Analysis=ICP, Blk=3
Variability Chart for Measurement (mg/L)

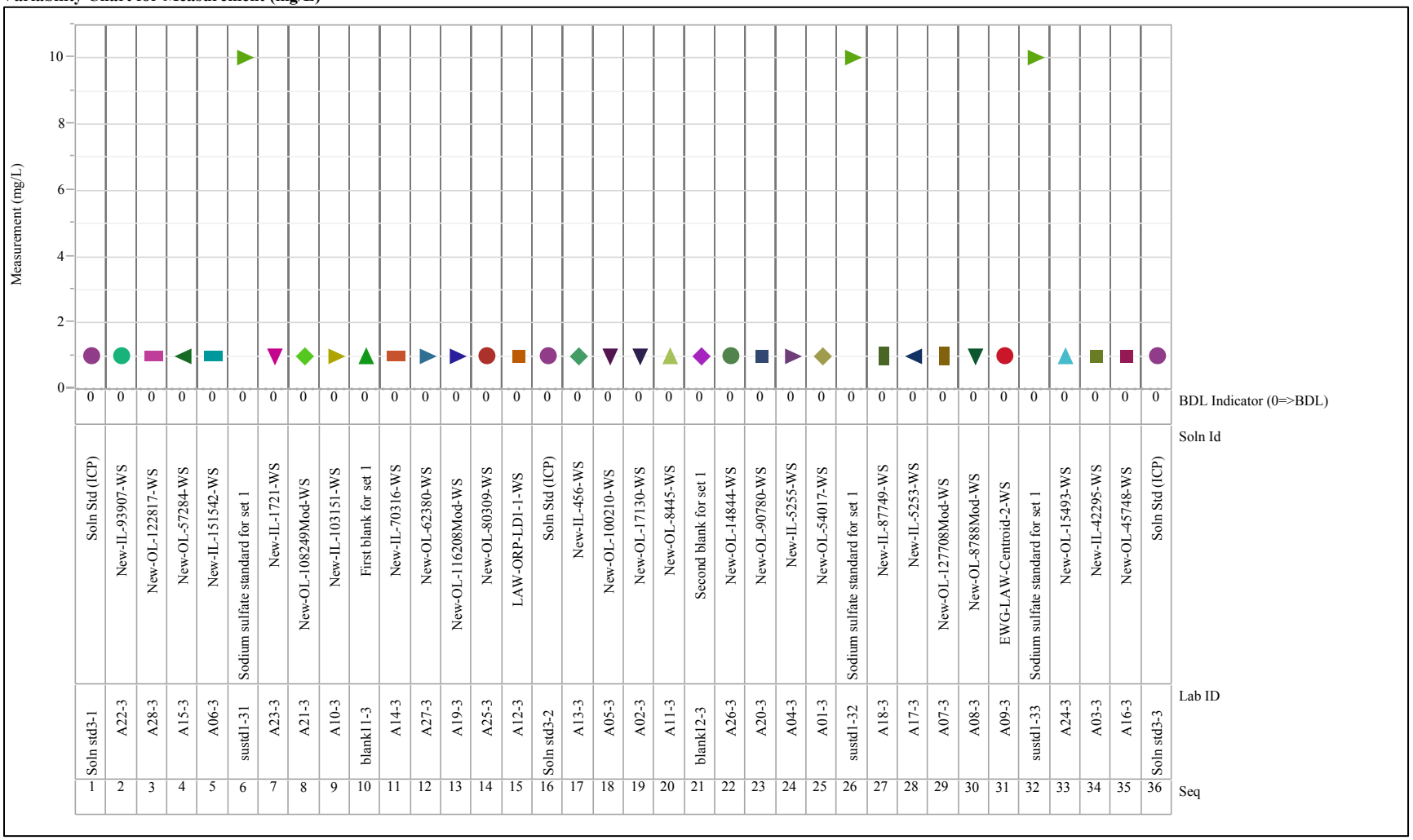


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Zr (mg/L), Analysis=ICP, Blk=4
Variability Chart for Measurement (mg/L)

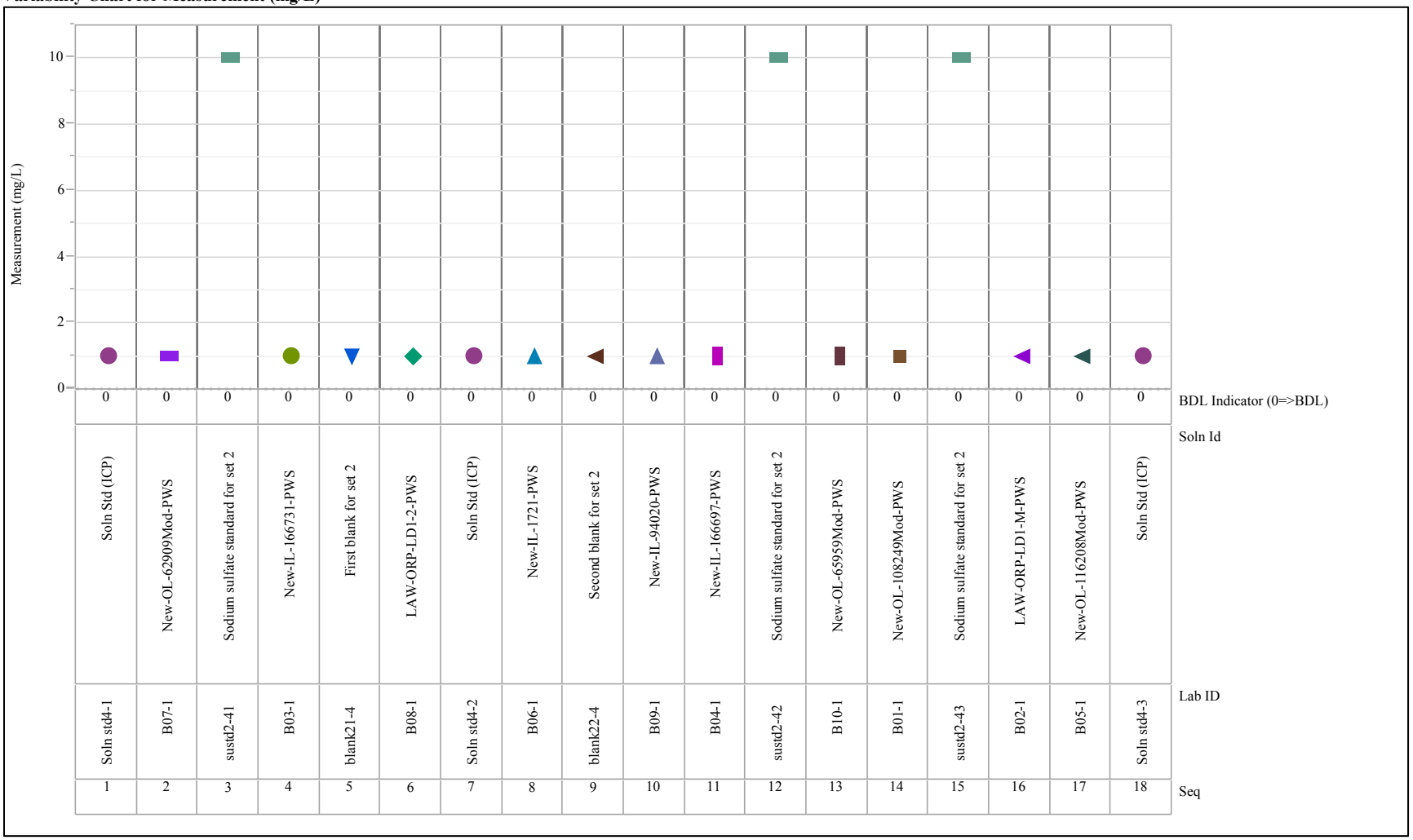


Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Zr (mg/L), Analysis=ICP, Blk=5
Variability Chart for Measurement (mg/L)

Exhibit D-1. Analysis of Wash Solutions in Analytical Sequence by Block (continued)

Analyte=Zr (mg/L), Analysis=ICP, Blk=6
Variability Chart for Measurement (mg/L)

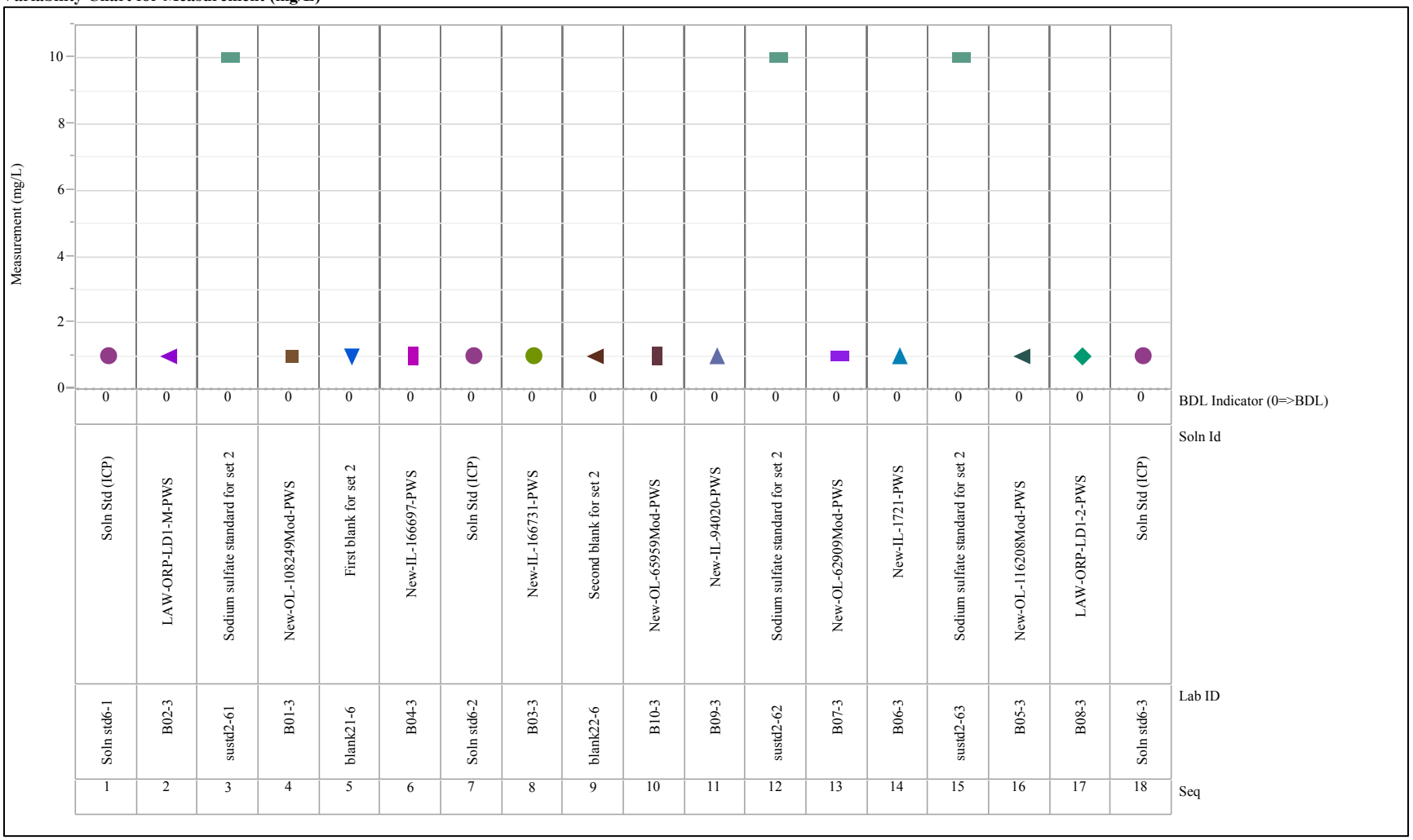


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier

Analyte=Al (mg/L), Groupings=A: a
Variability Chart for Measurement (mg/L)

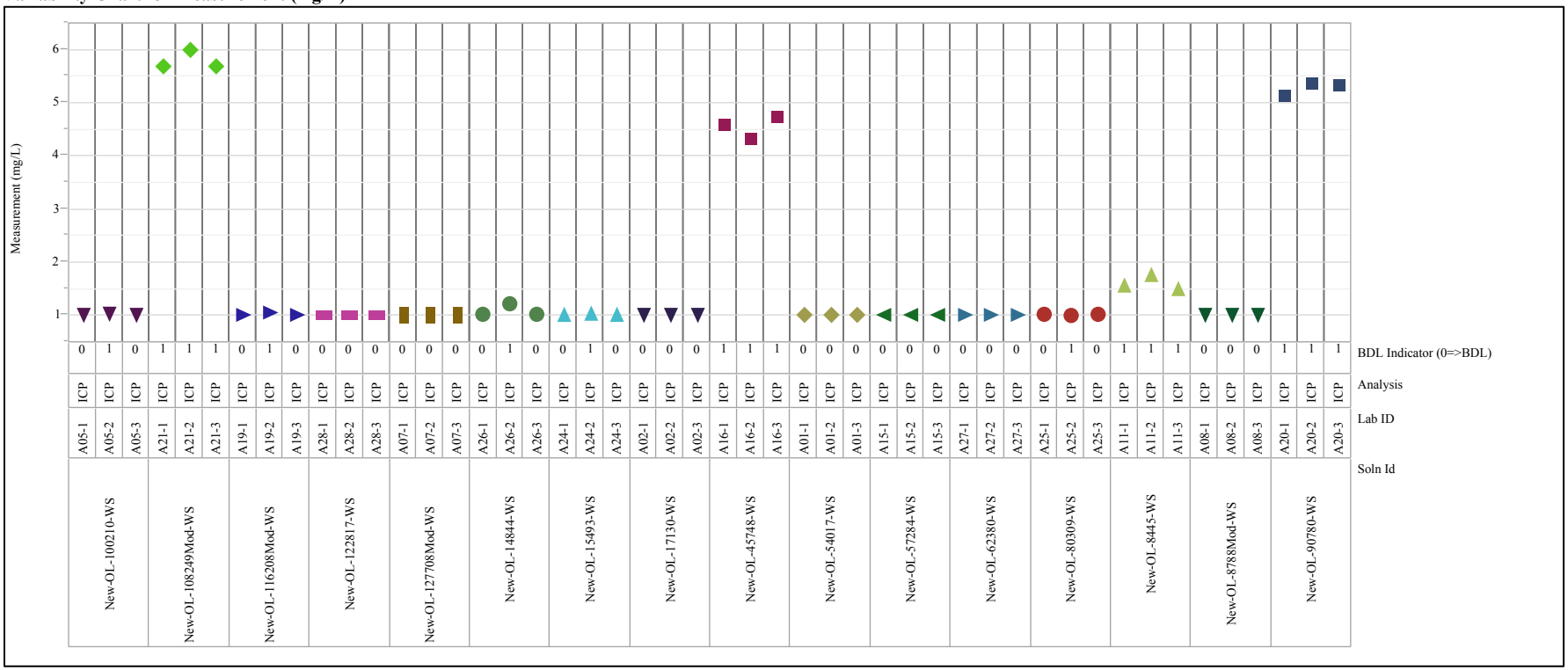


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Al (mg/L), Groupings=A: b
Variability Chart for Measurement (mg/L)

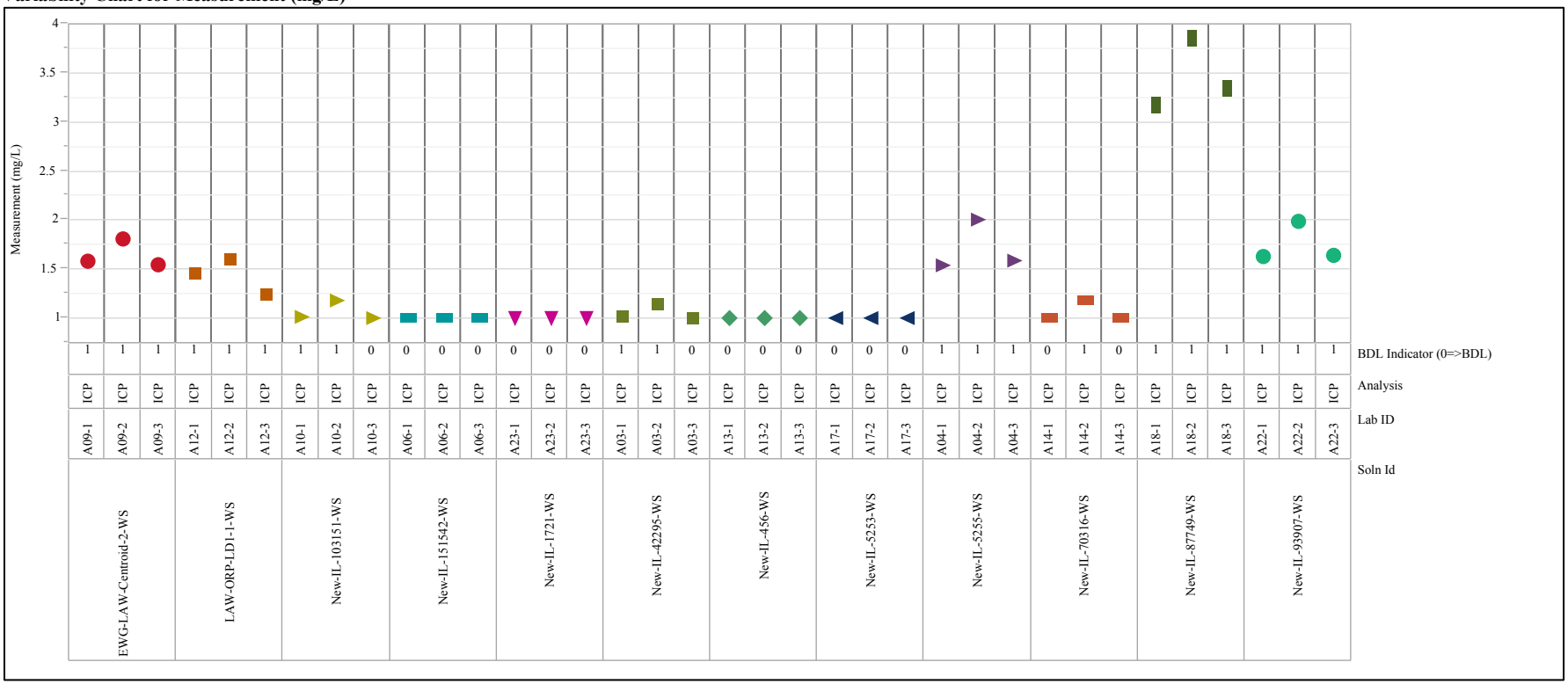


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Al (mg/L), Groupings=B: a
Variability Chart for Measurement (mg/L)

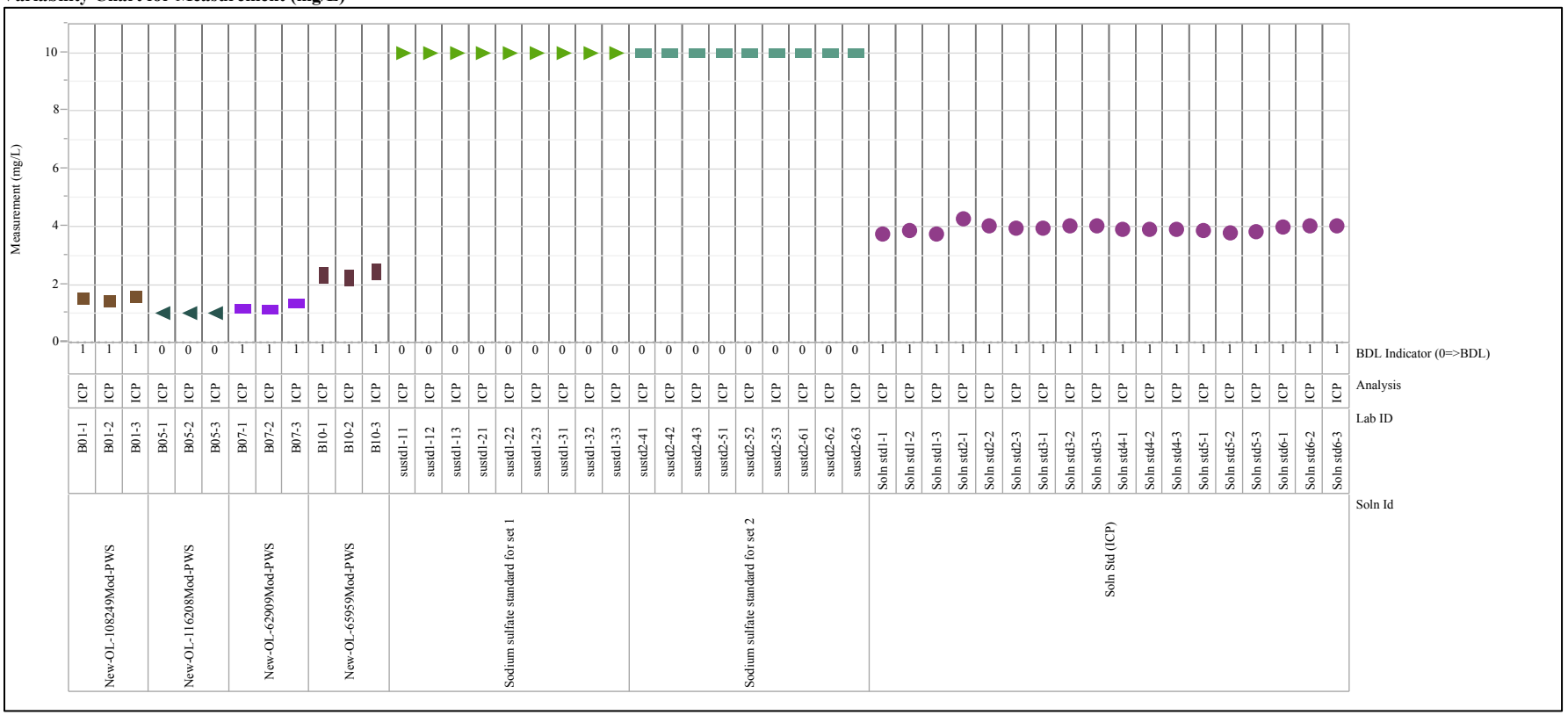


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Al (mg/L), Groupings=B: b
Variability Chart for Measurement (mg/L)

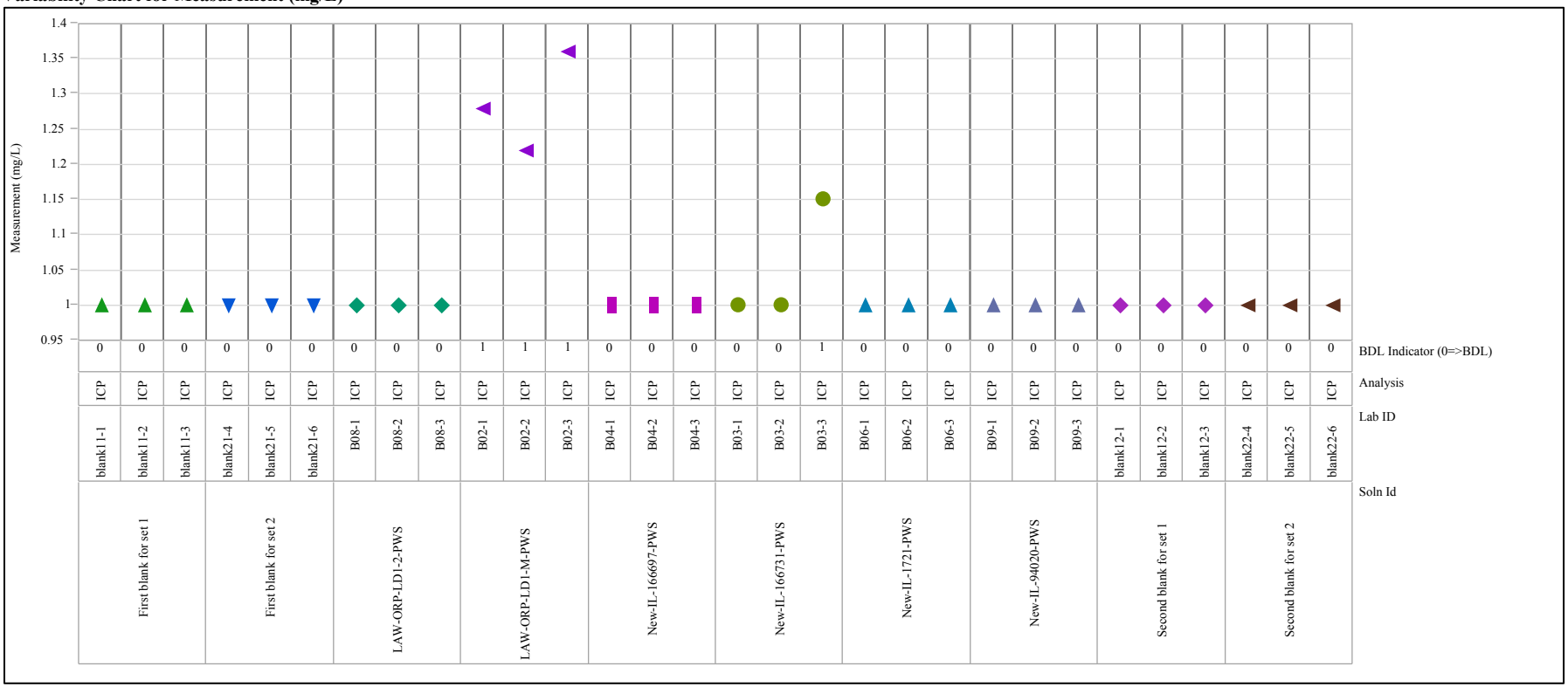


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=B (mg/L), Groupings=A: a
Variability Chart for Measurement (mg/L)

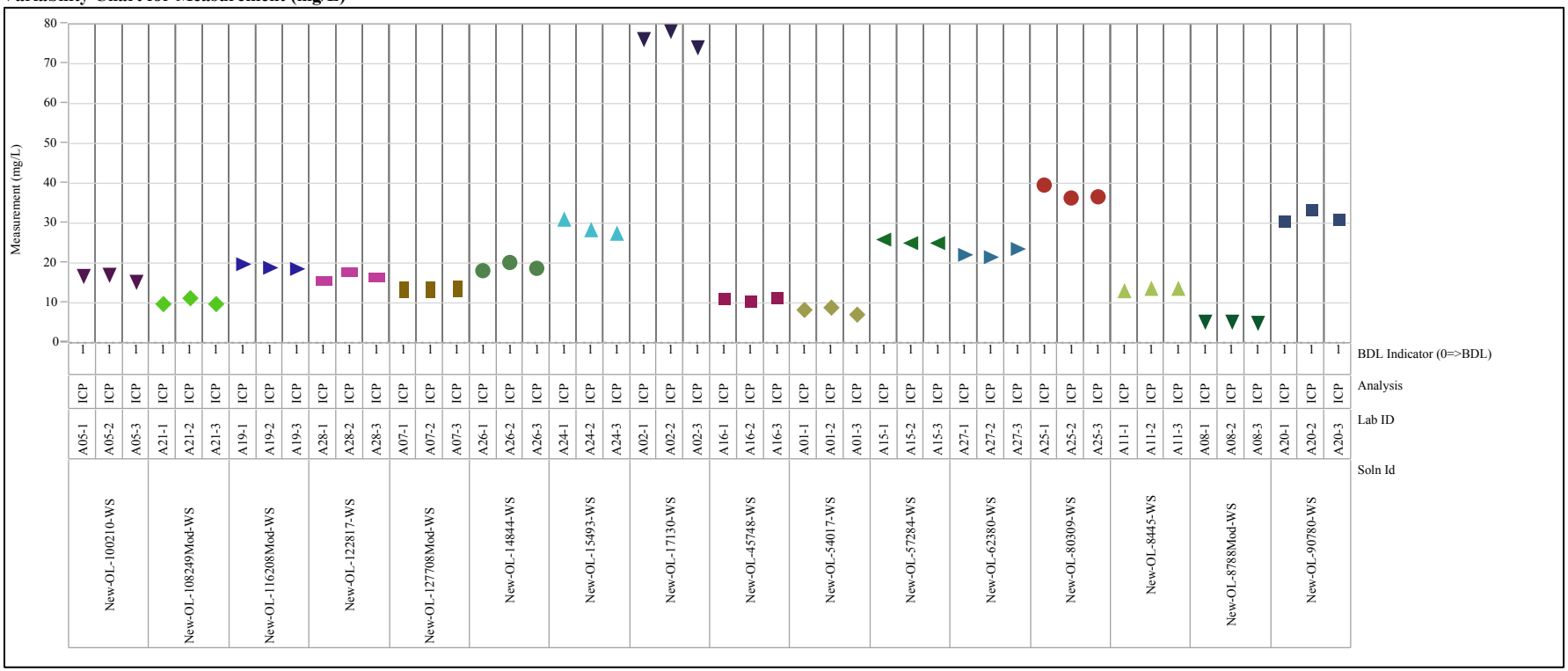


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=B (mg/L), Groupings=A: b
Variability Chart for Measurement (mg/L)

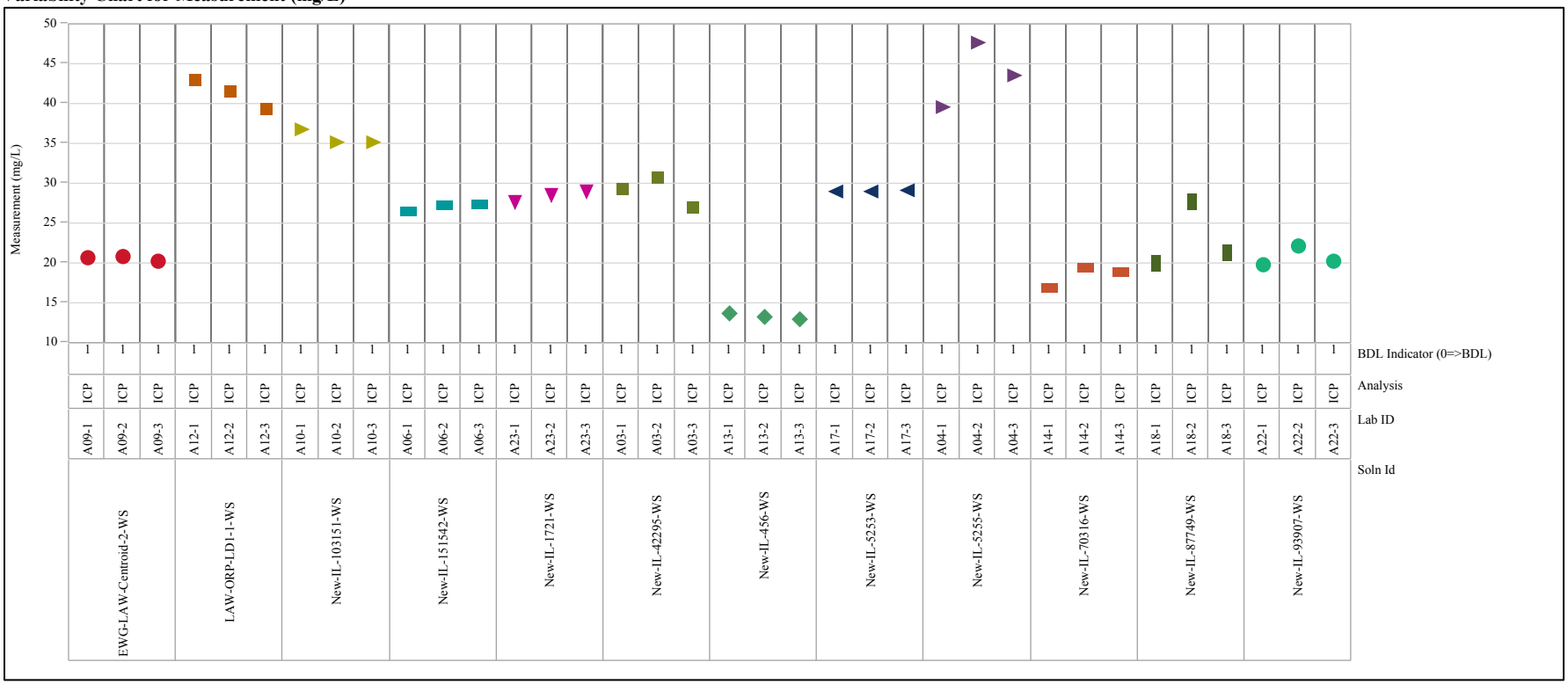


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=B (mg/L), Groupings=B: a
Variability Chart for Measurement (mg/L)

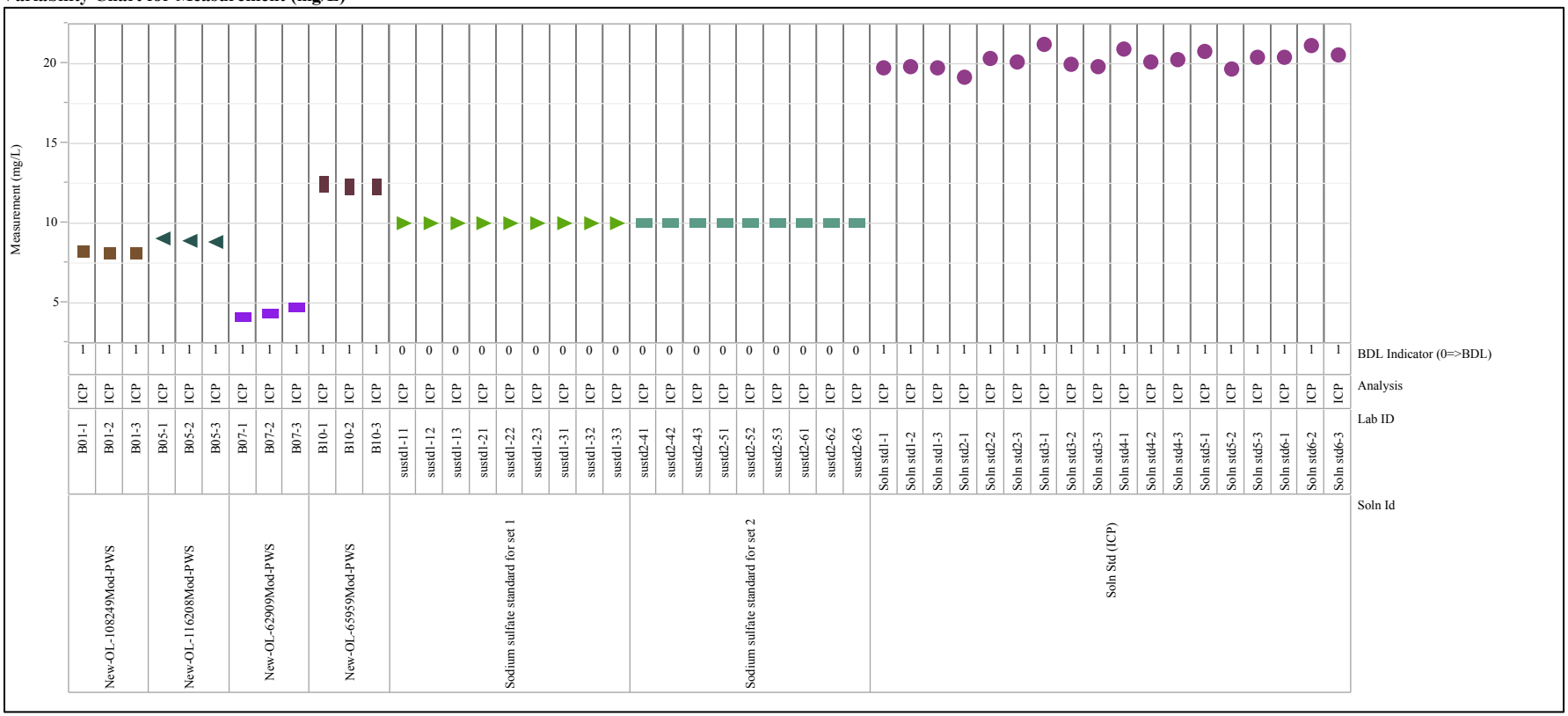


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=B (mg/L), Groupings=B: b
Variability Chart for Measurement (mg/L)

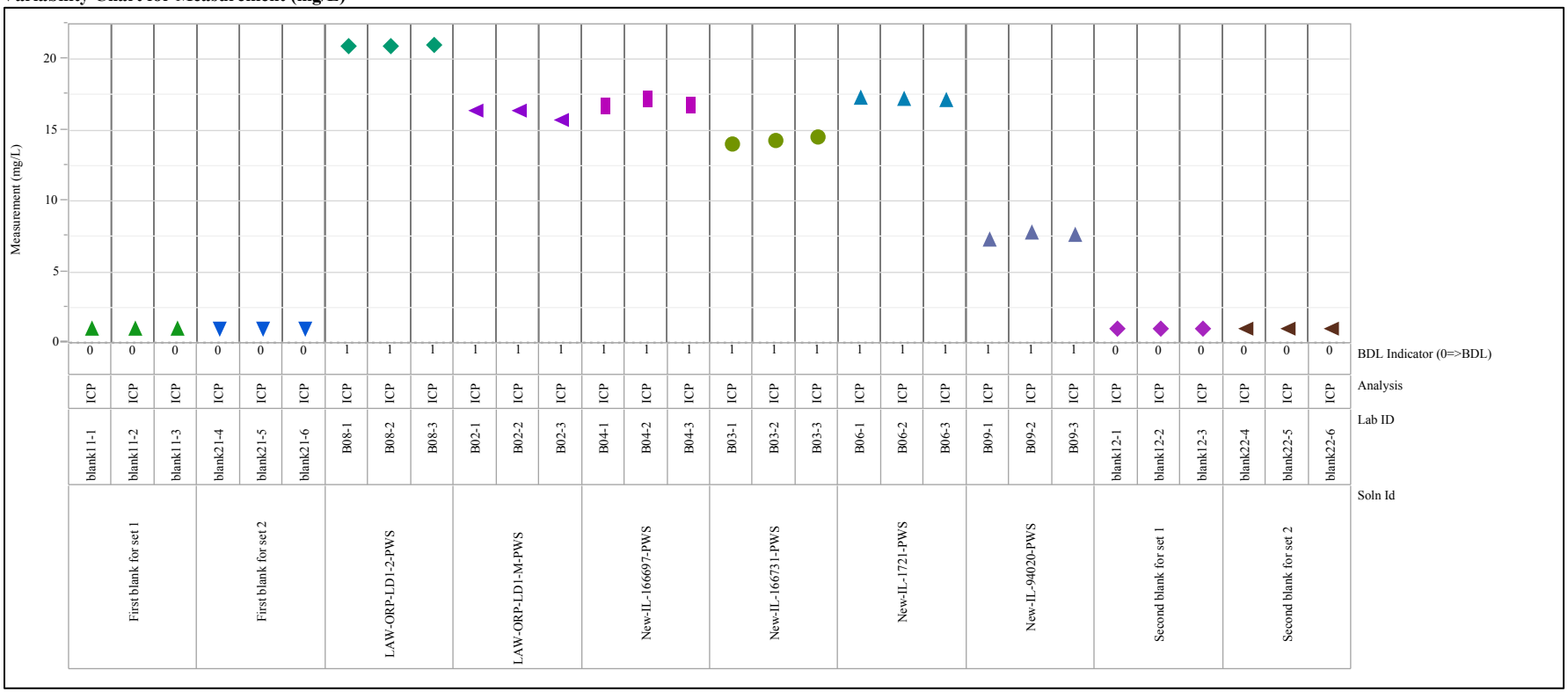


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Ca (mg/L), Groupings=A: a
Variability Chart for Measurement (mg/L)

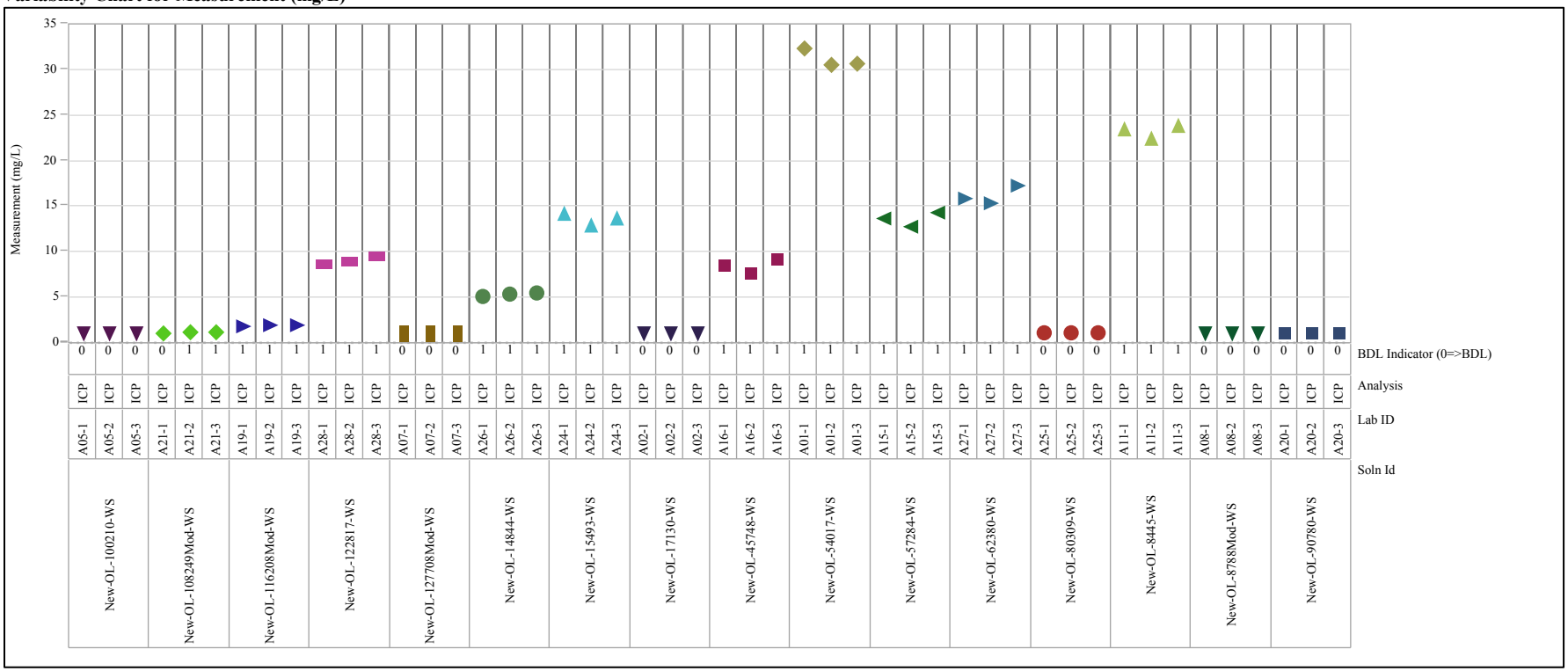


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Ca (mg/L), Groupings=A: b
Variability Chart for Measurement (mg/L)

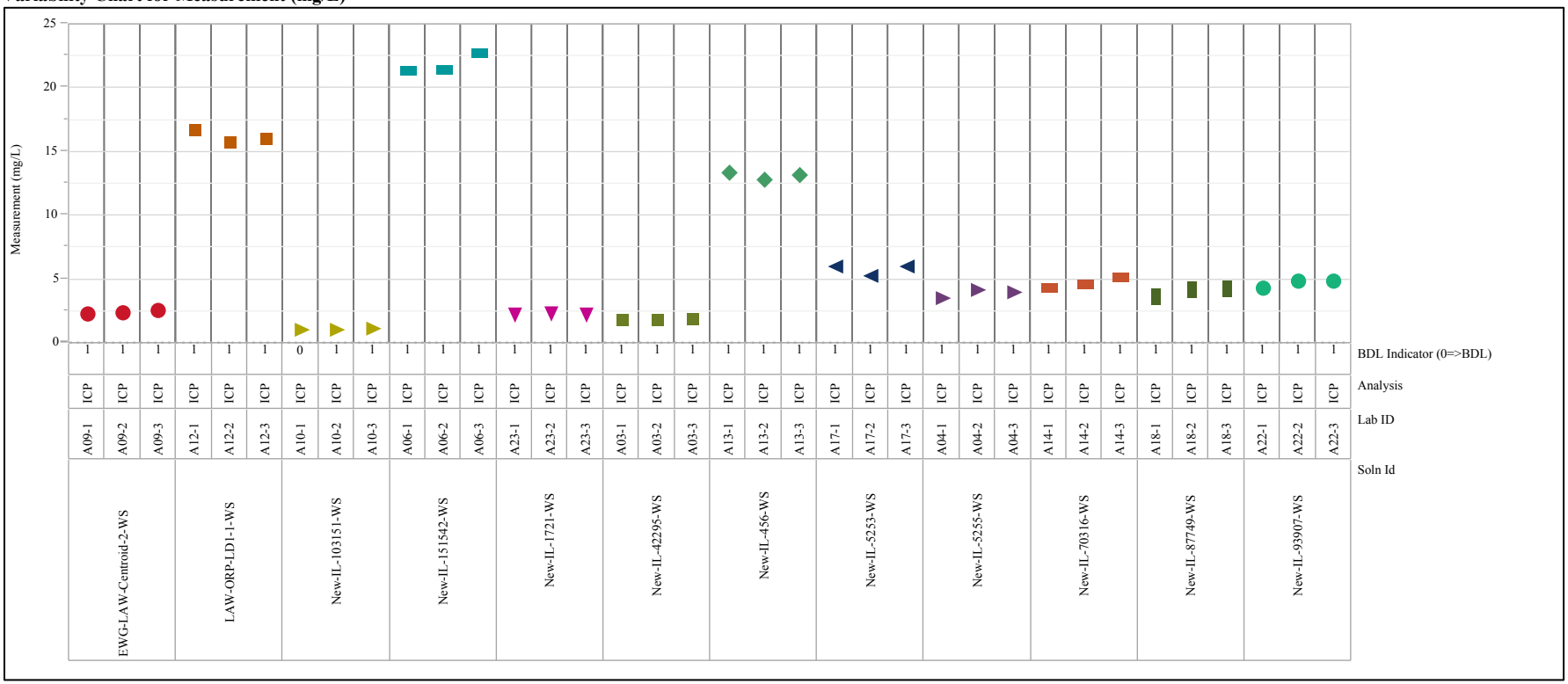


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Ca (mg/L), Groupings=B: a
Variability Chart for Measurement (mg/L)

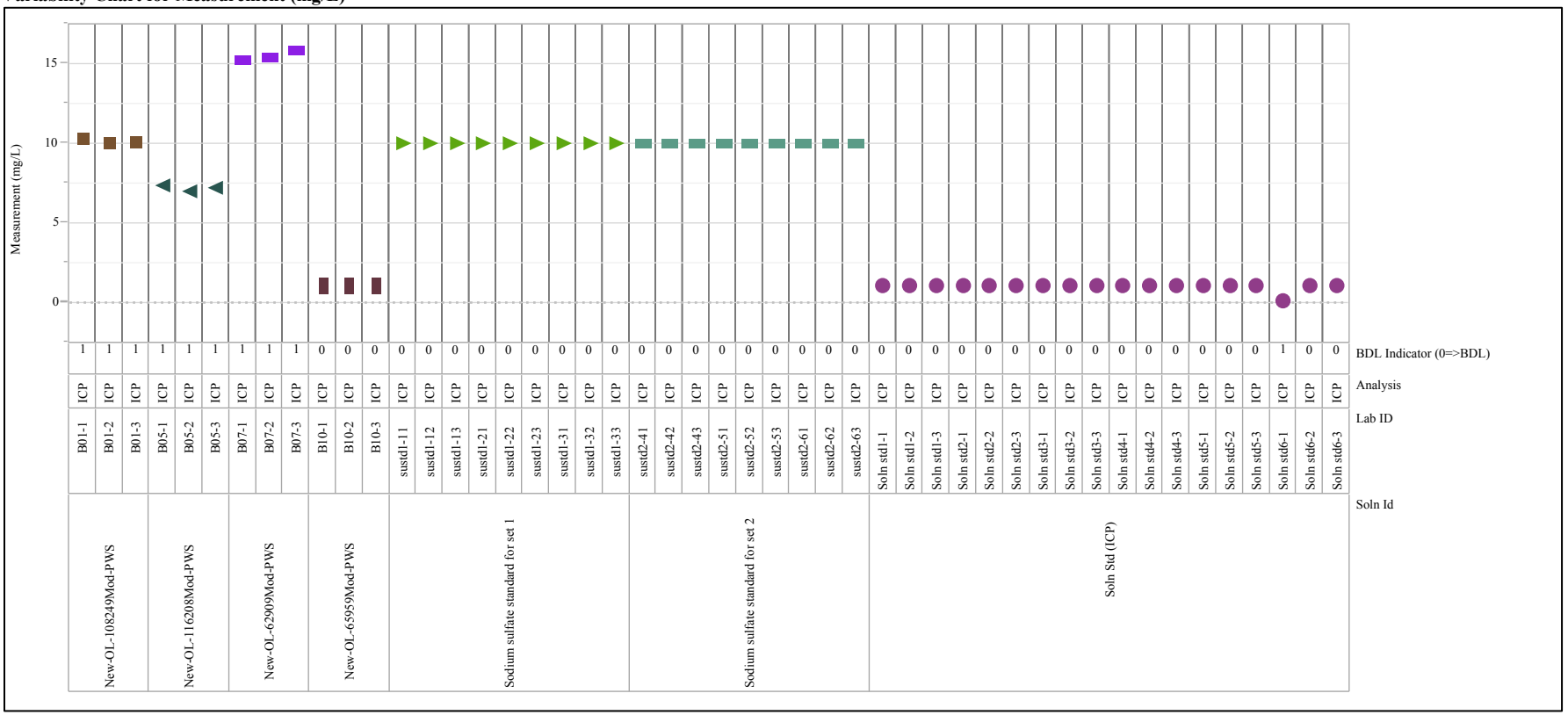


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Ca (mg/L), Groupings=B: b
Variability Chart for Measurement (mg/L)

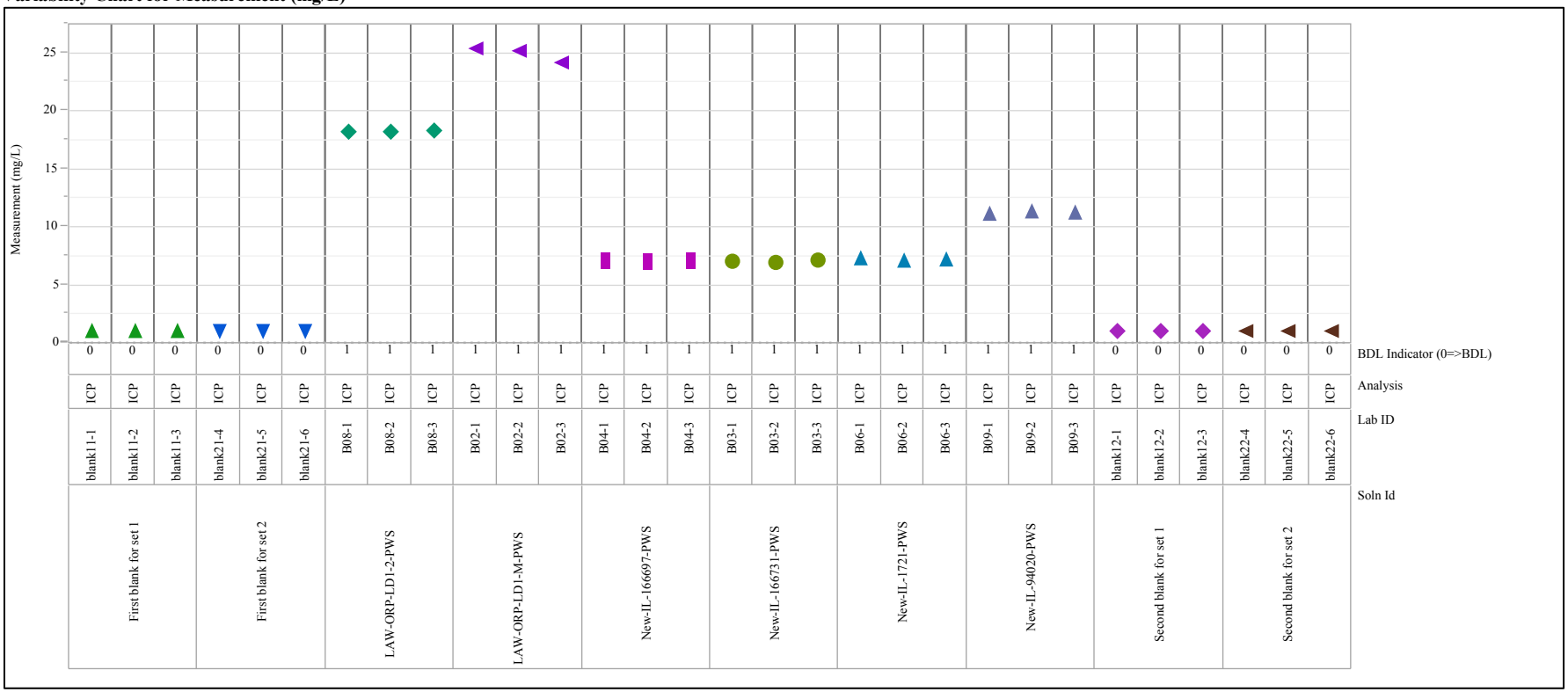


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Cl (mg/L), Groupings=A: a
Variability Chart for Measurement (mg/L)

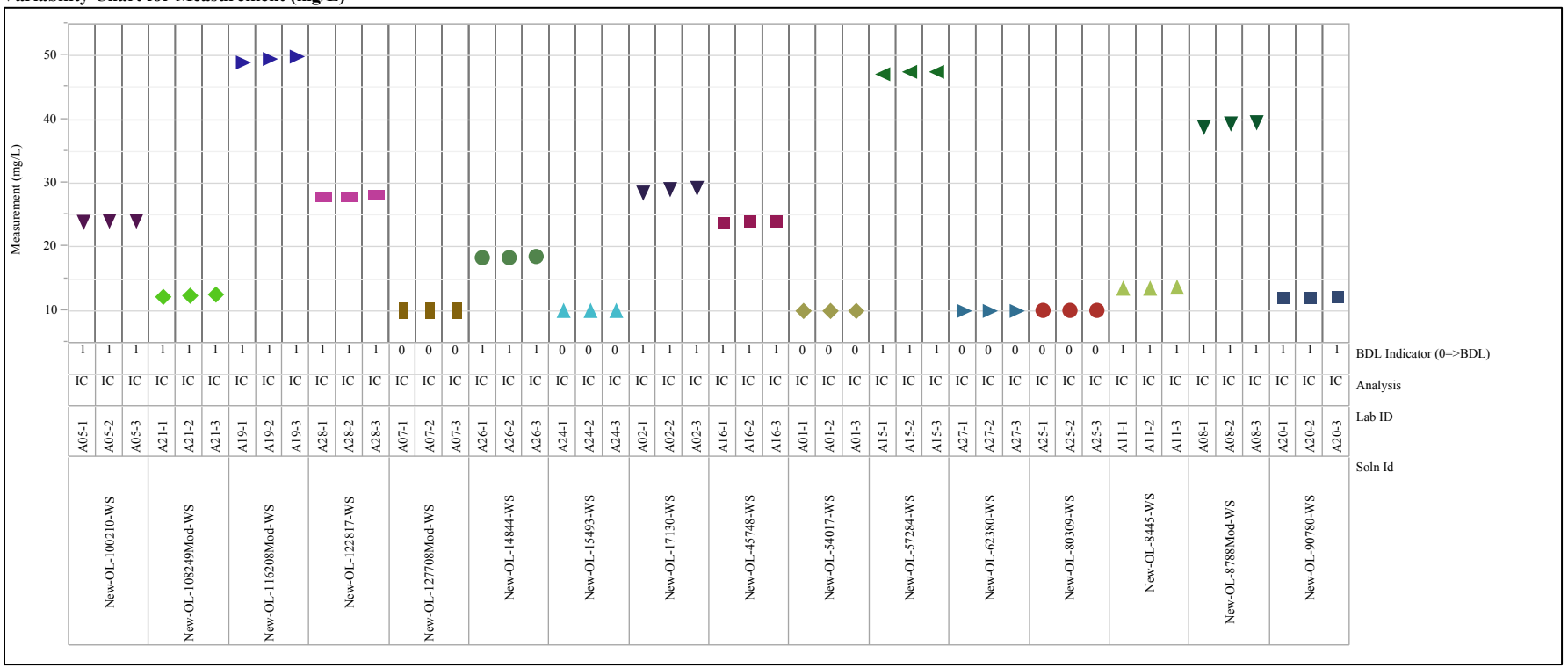


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Cl (mg/L), Groupings=A: b
Variability Chart for Measurement (mg/L)

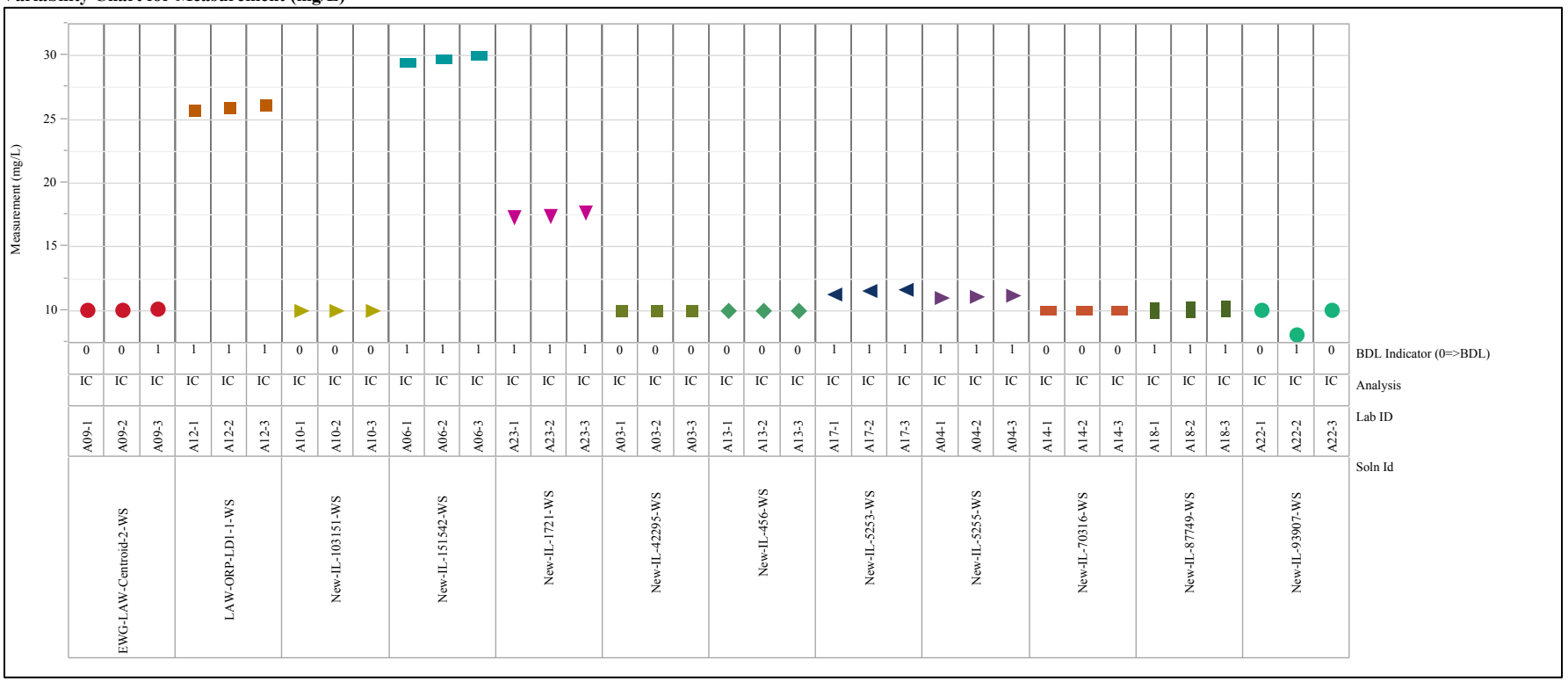


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Cl (mg/L), Groupings=B: a
Variability Chart for Measurement (mg/L)

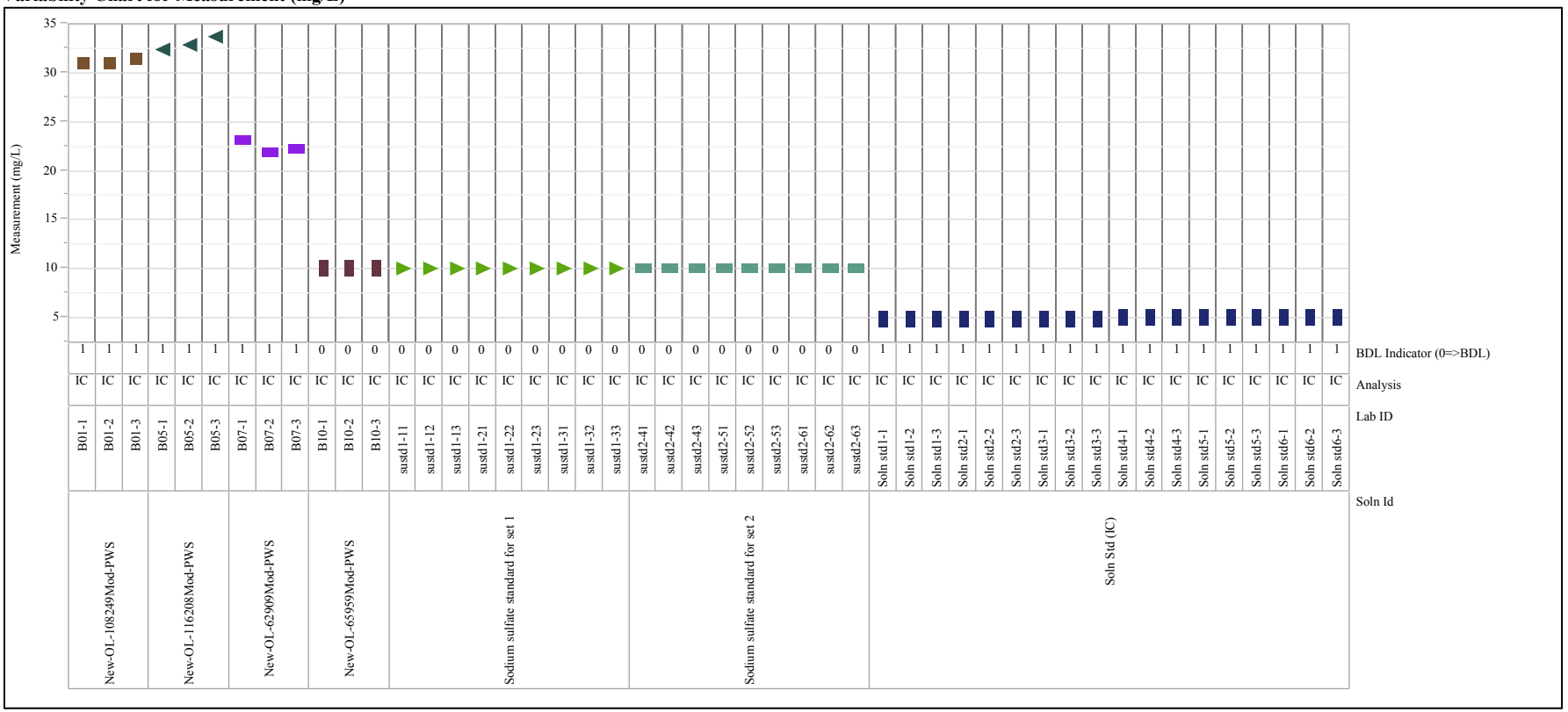


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Cl (mg/L), Groupings=B: b
Variability Chart for Measurement (mg/L)

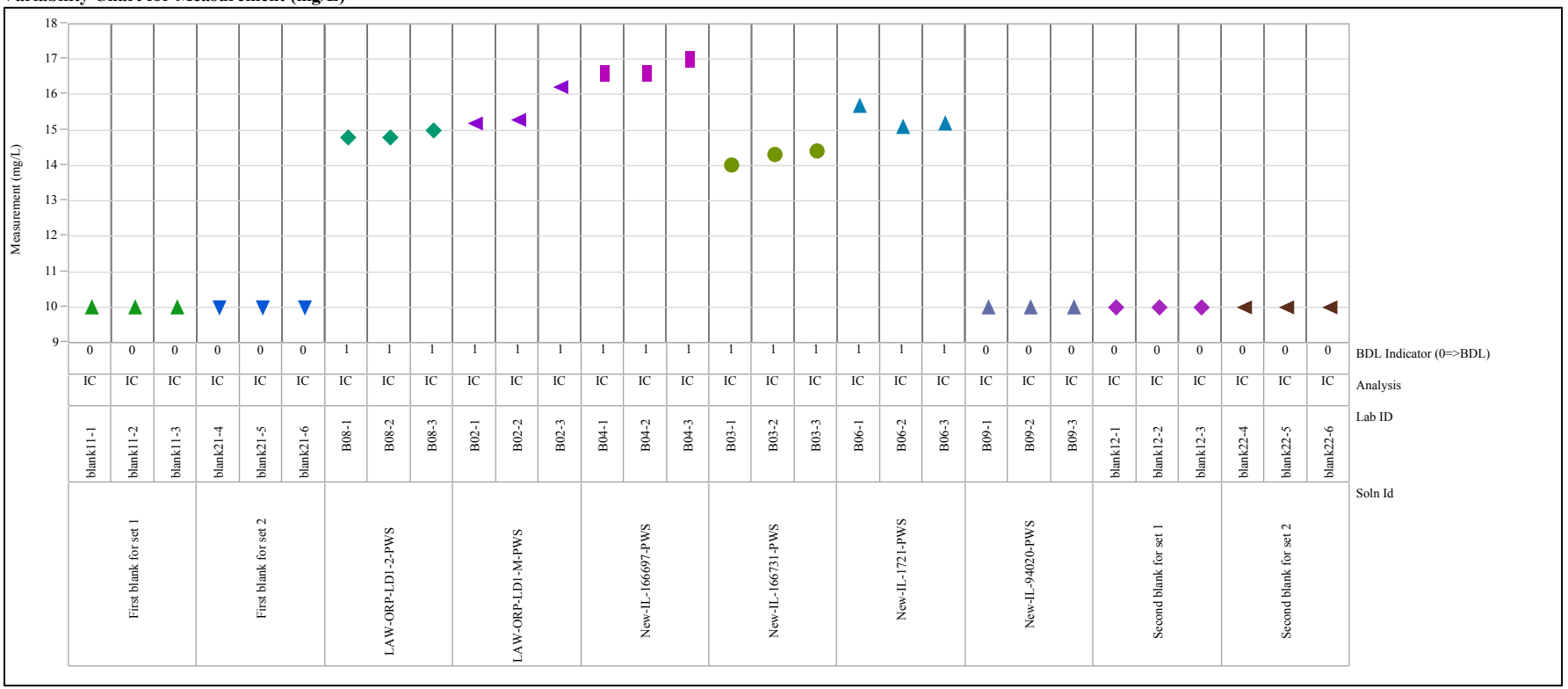


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Cr (mg/L), Groupings=A: a
Variability Chart for Measurement (mg/L)

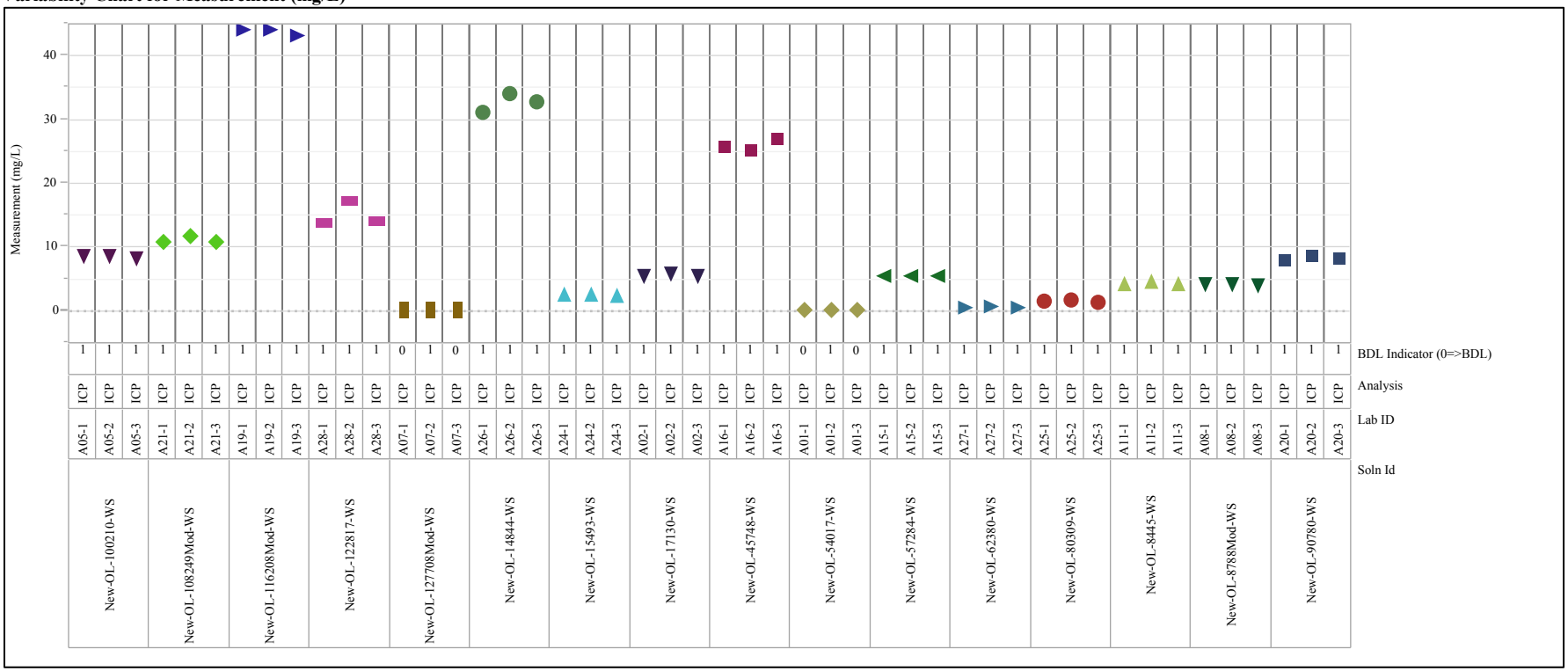


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Cr (mg/L), Groupings=A: b
Variability Chart for Measurement (mg/L)

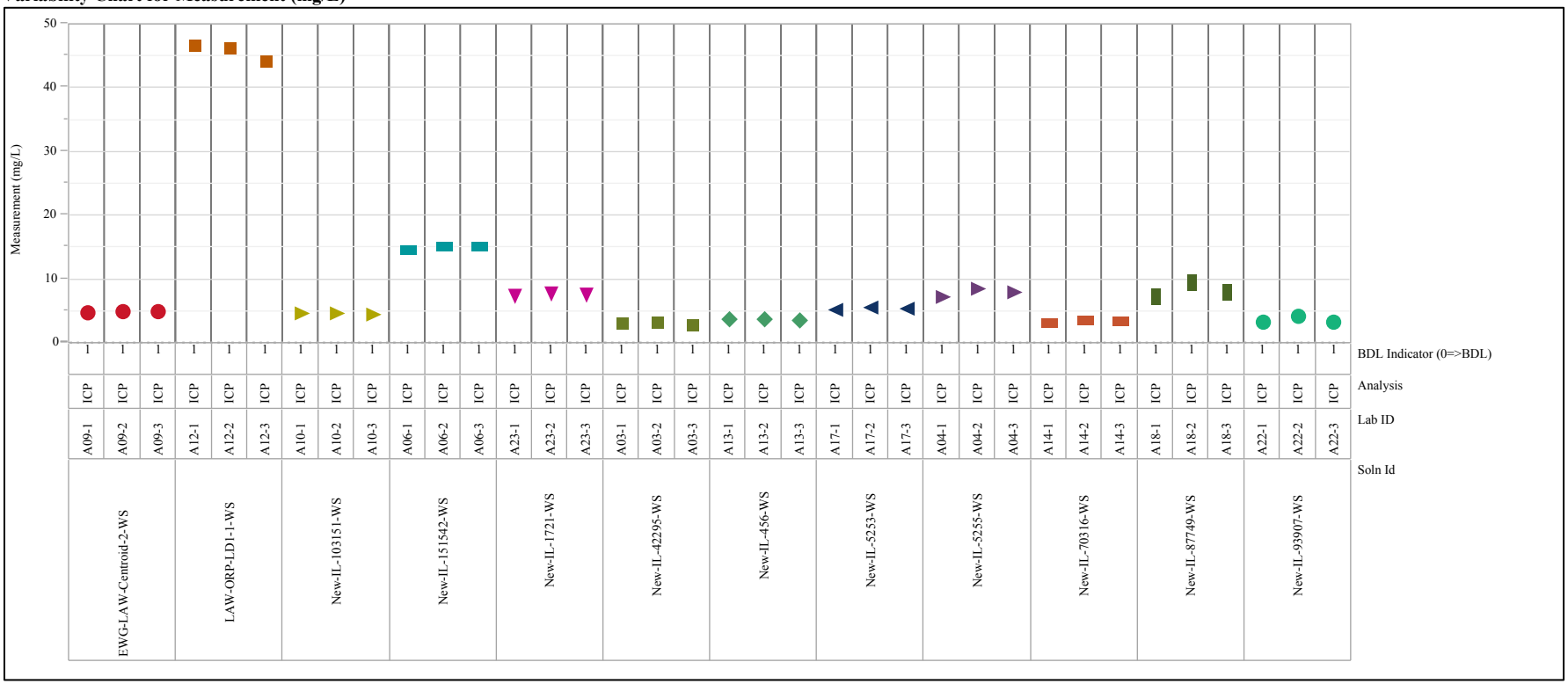


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Cr (mg/L), Groupings=B: a
Variability Chart for Measurement (mg/L)

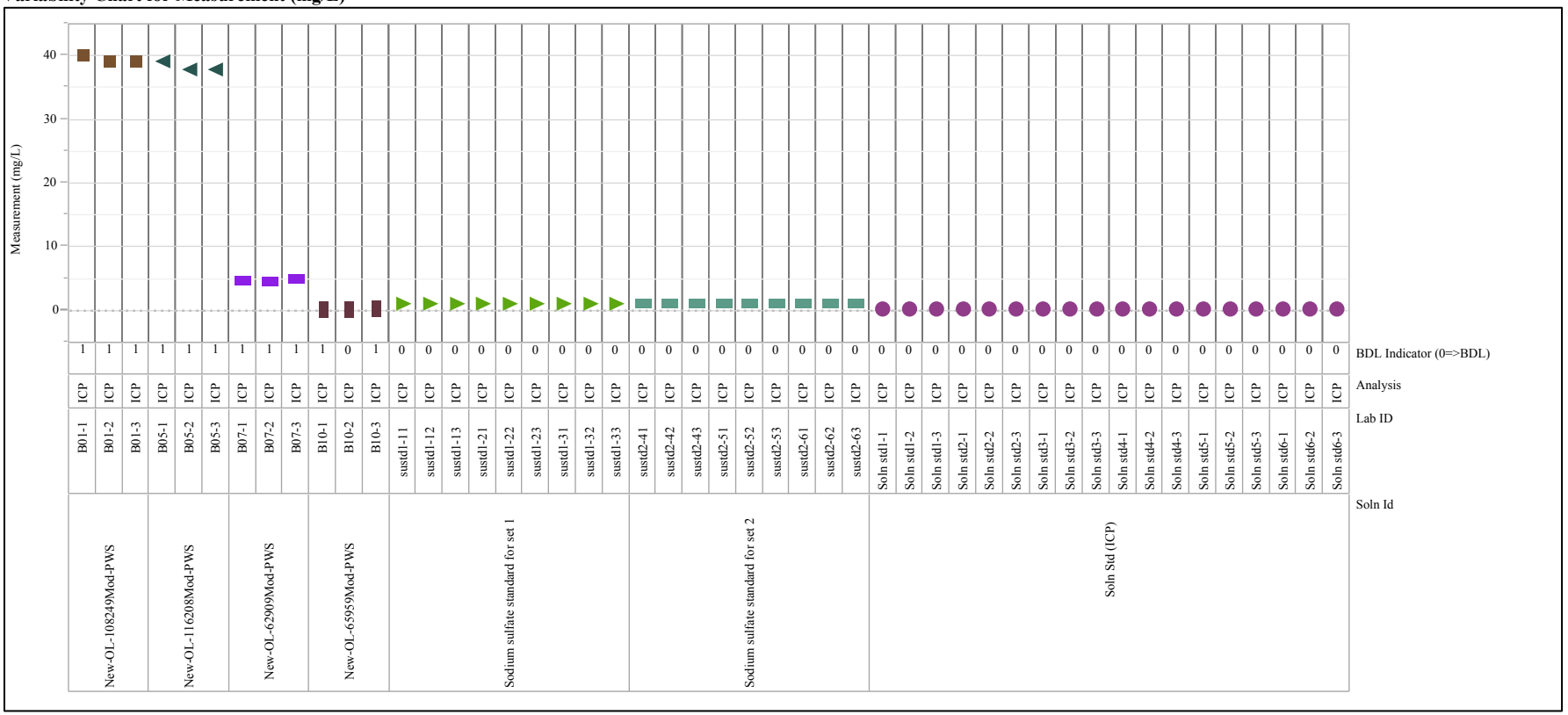


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Cr (mg/L), Groupings=B: b
Variability Chart for Measurement (mg/L)

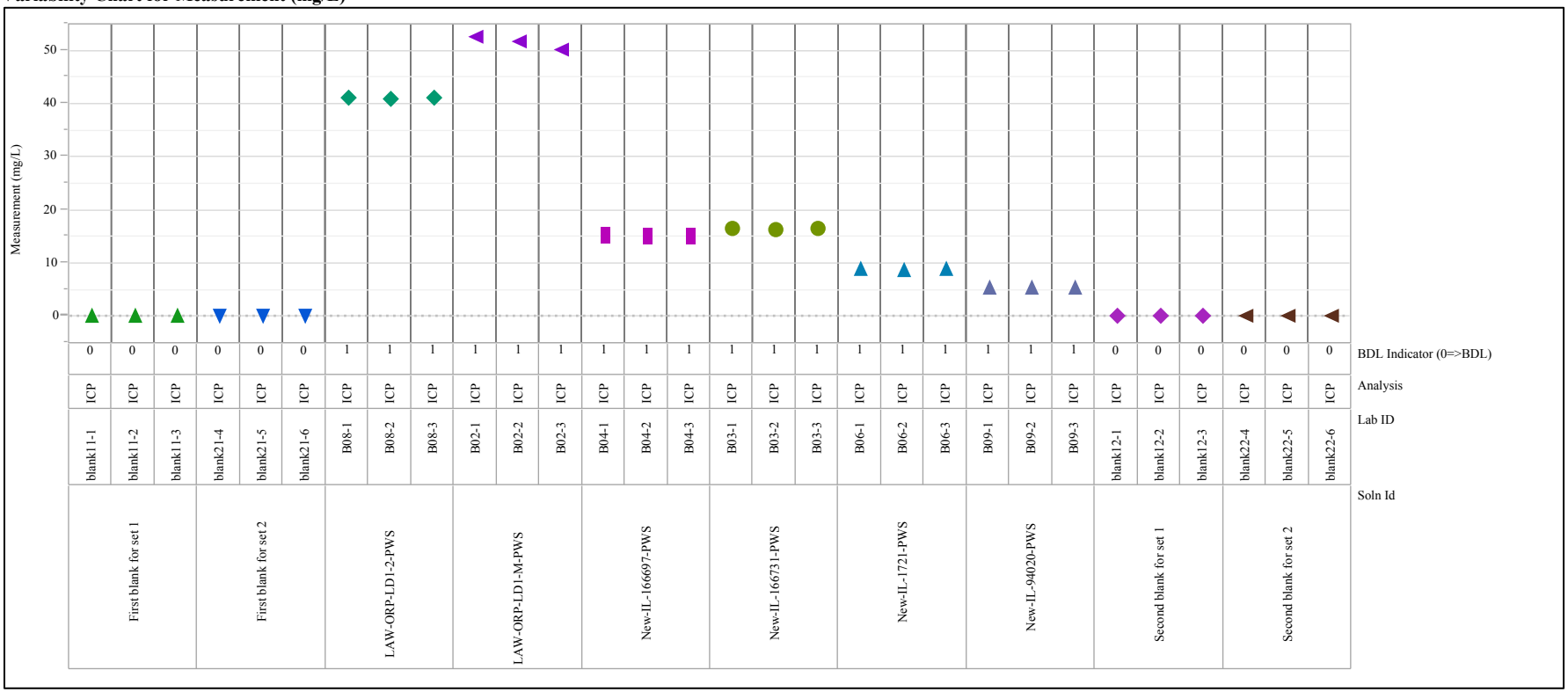


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=F (mg/L), Groupings=A: a
Variability Chart for Measurement (mg/L)

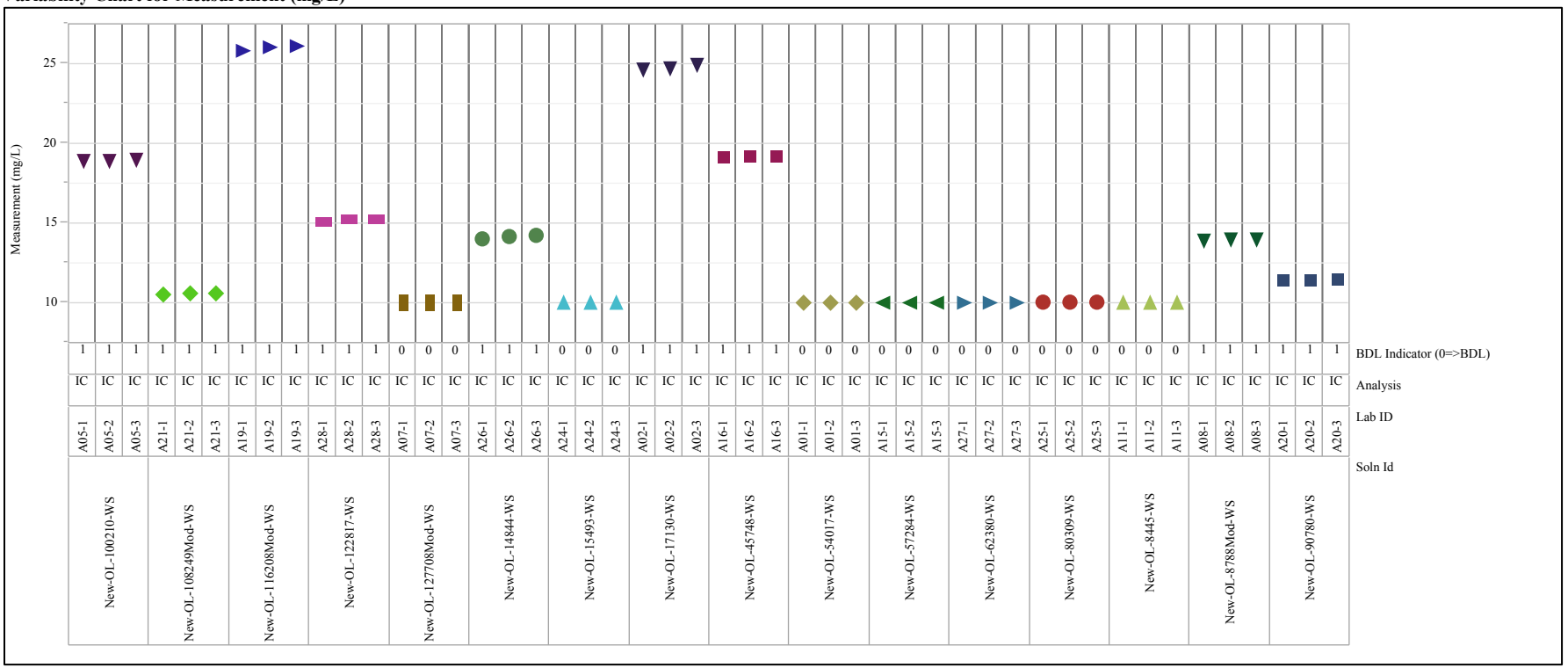


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=F (mg/L), Groupings=A: b
Variability Chart for Measurement (mg/L)

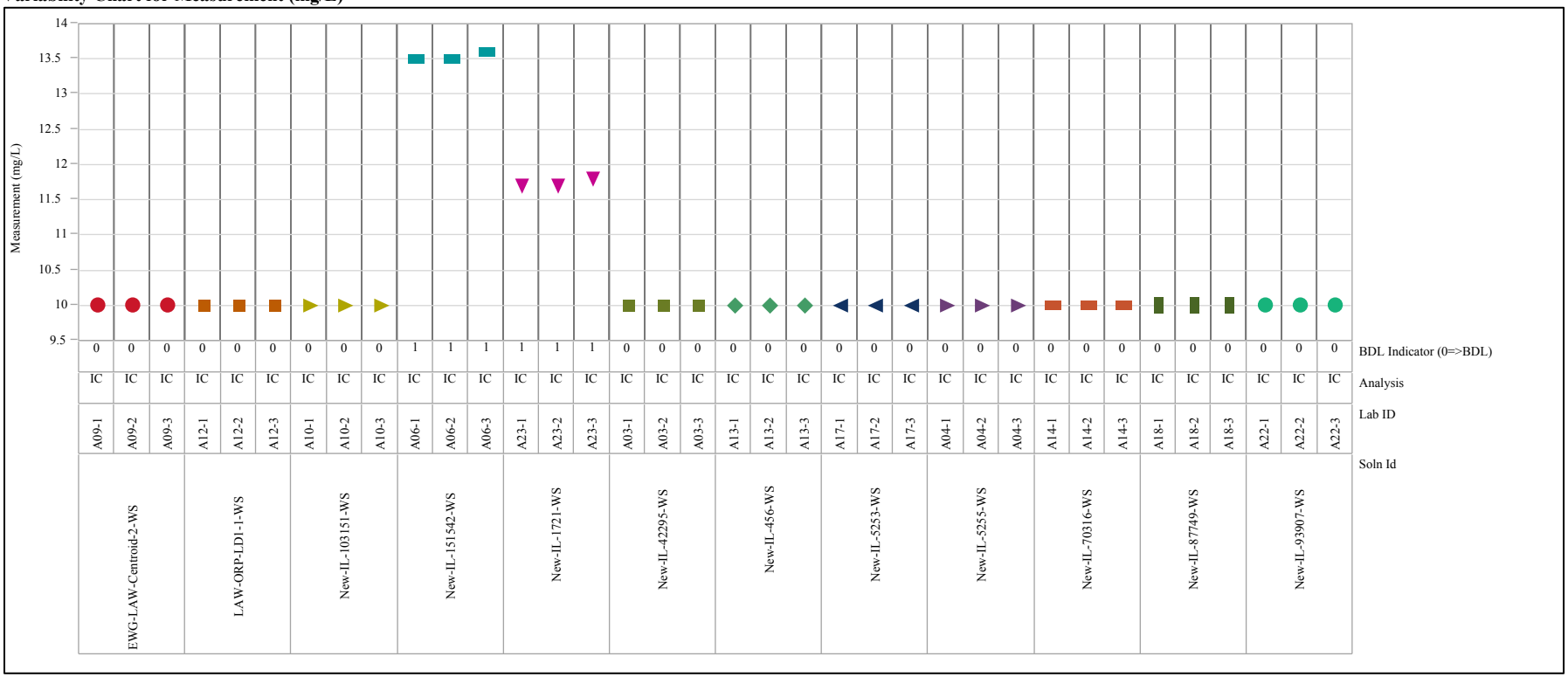


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=F (mg/L), Groupings=B: a
Variability Chart for Measurement (mg/L)

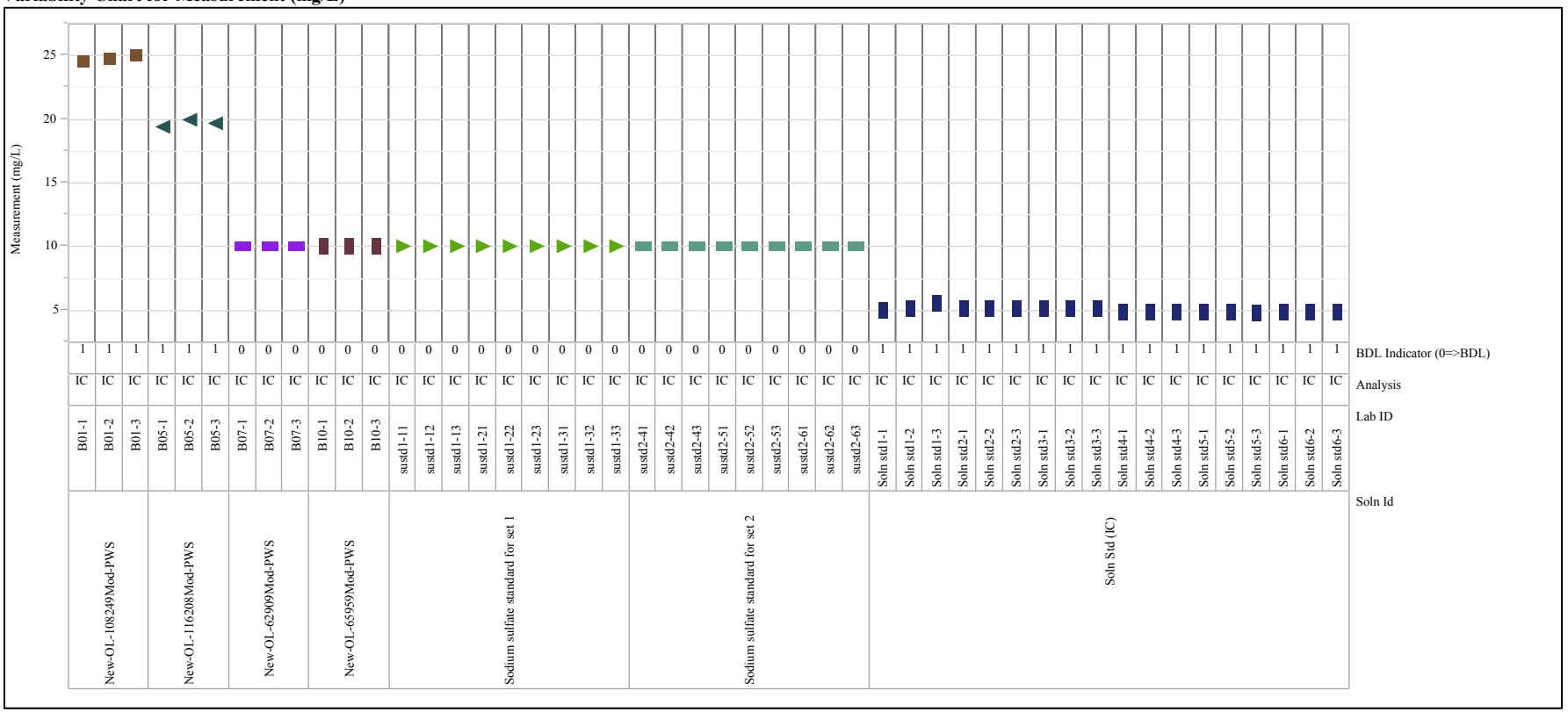


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=F (mg/L), Groupings=B: b
Variability Chart for Measurement (mg/L)

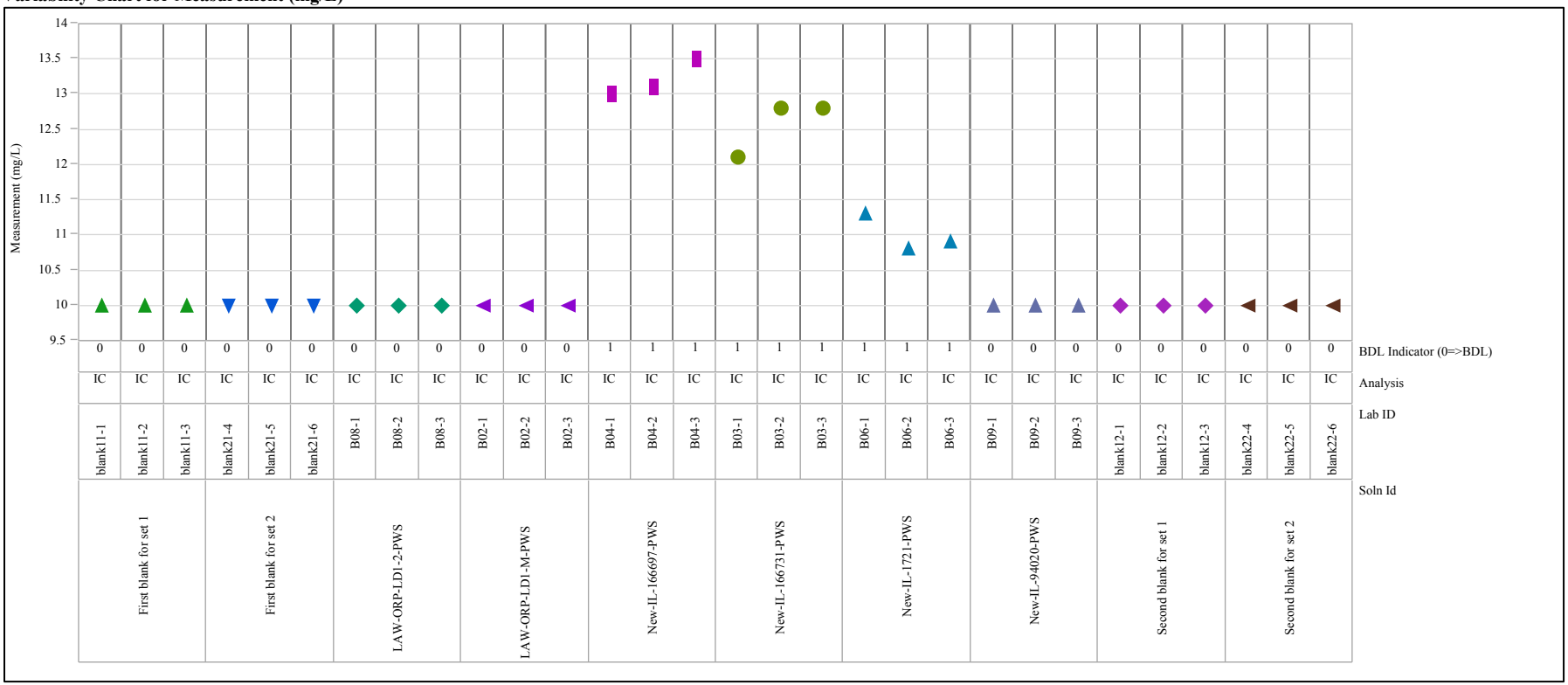


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Fe (mg/L), Groupings=A: a
Variability Chart for Measurement (mg/L)

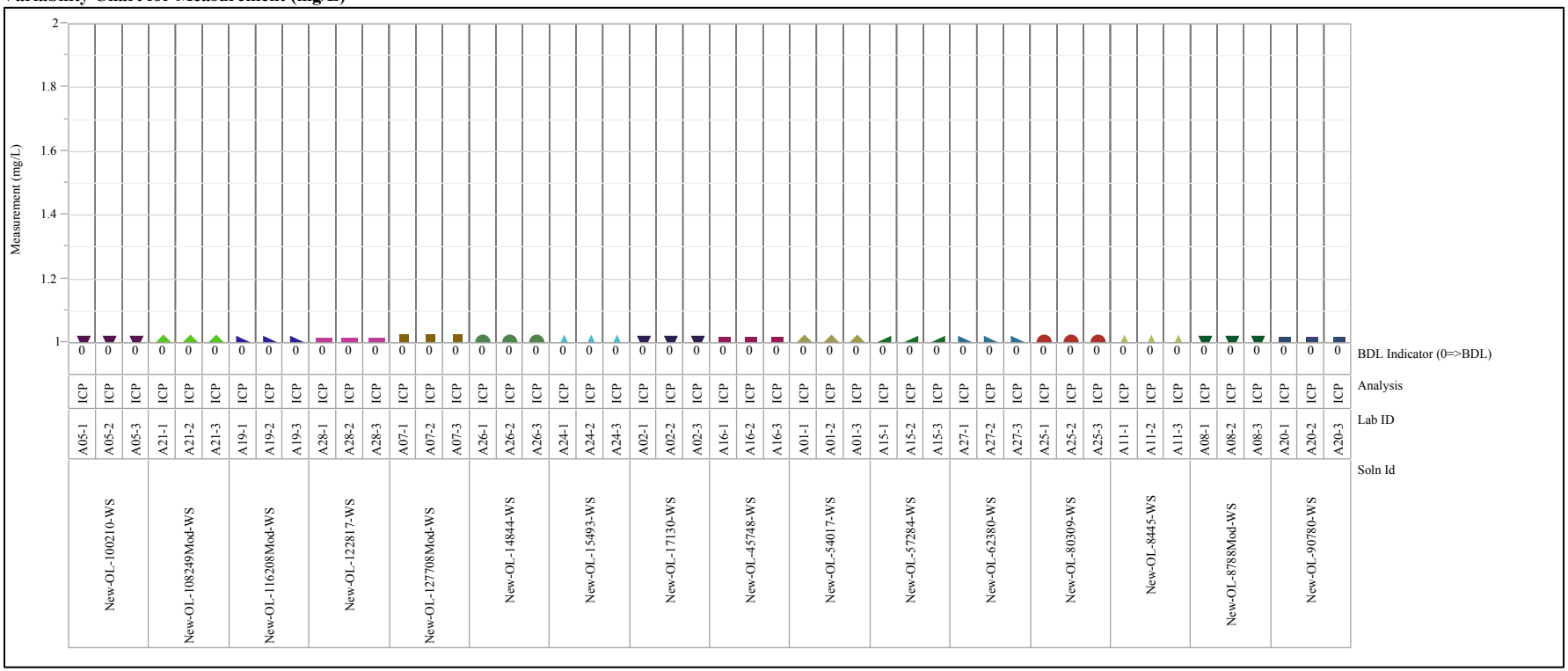


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Fe (mg/L), Groupings=A: b
Variability Chart for Measurement (mg/L)

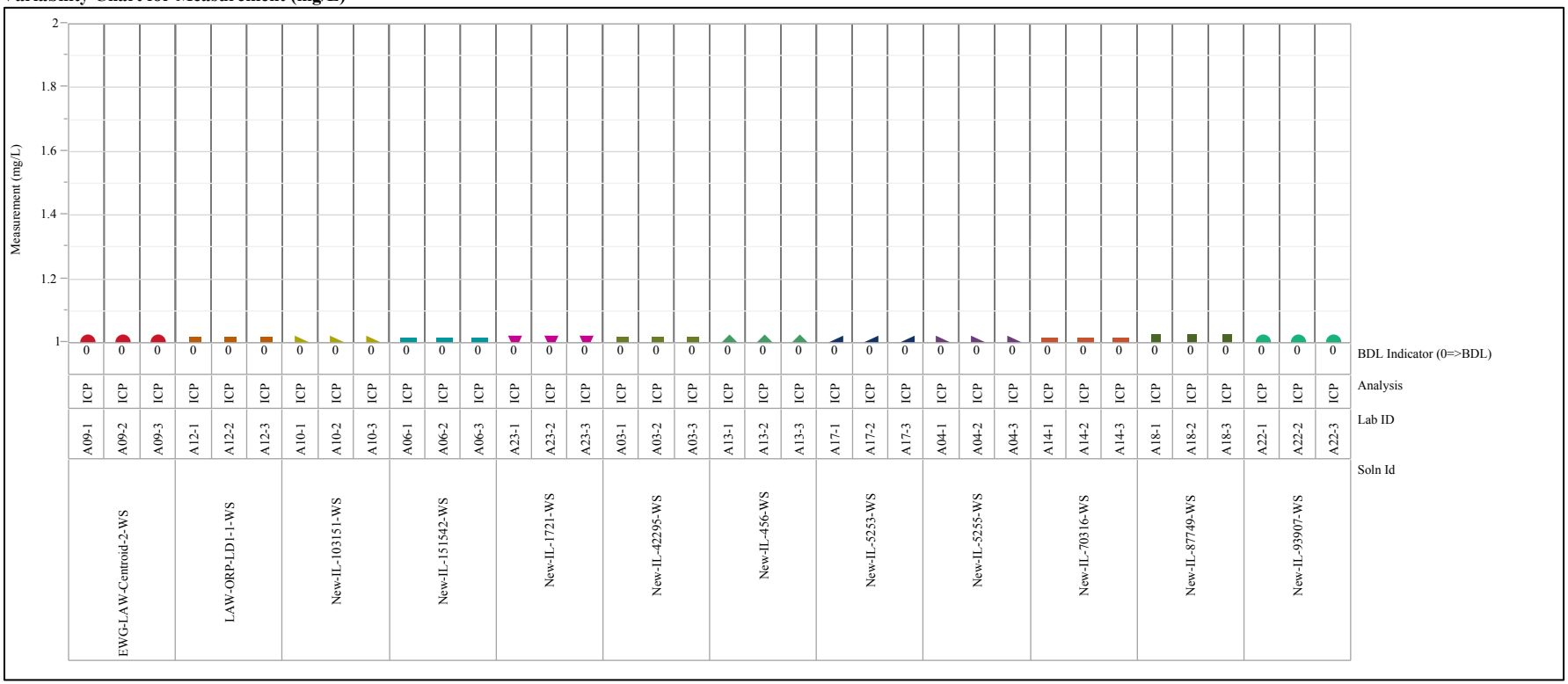


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Fe (mg/L), Groupings=B: a
Variability Chart for Measurement (mg/L)

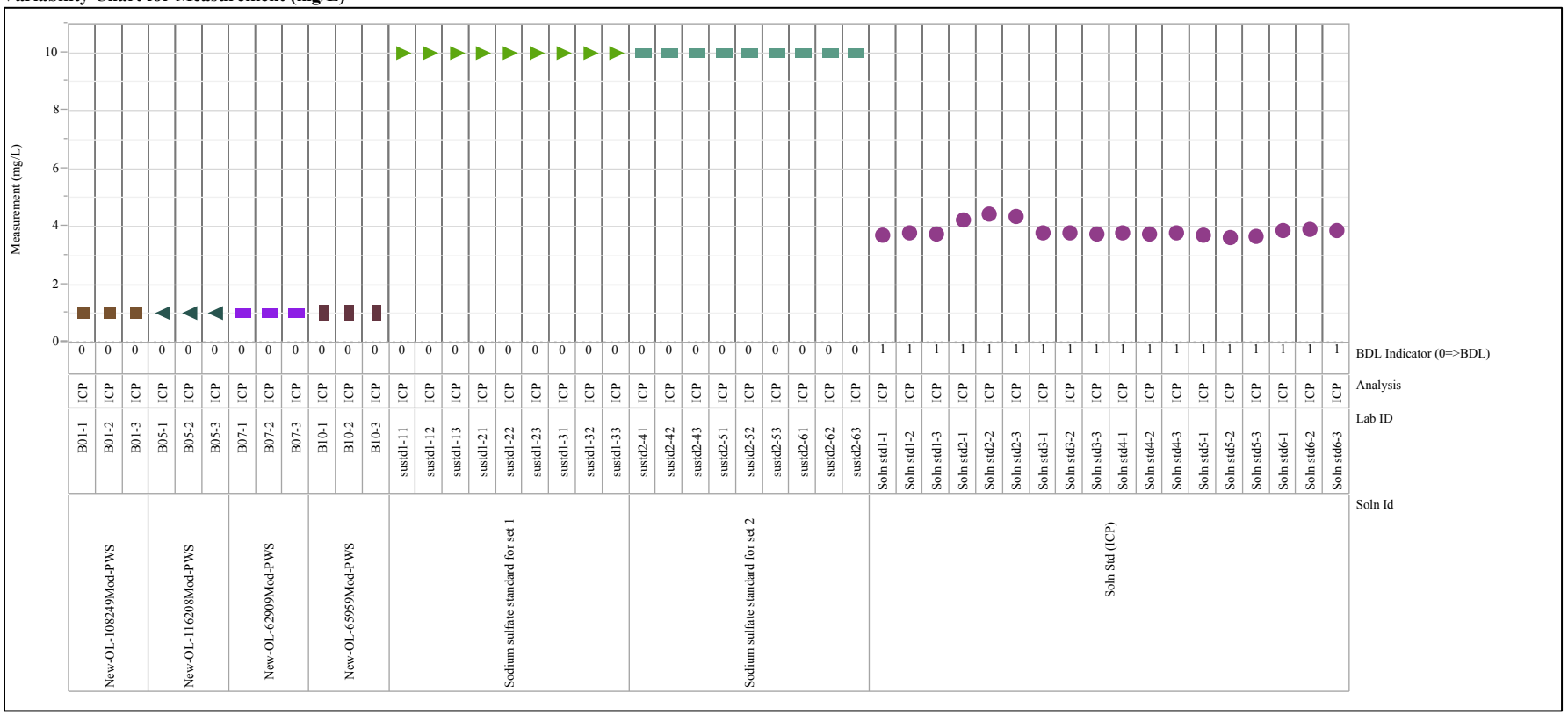


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Fe (mg/L), Groupings=B: b
Variability Chart for Measurement (mg/L)

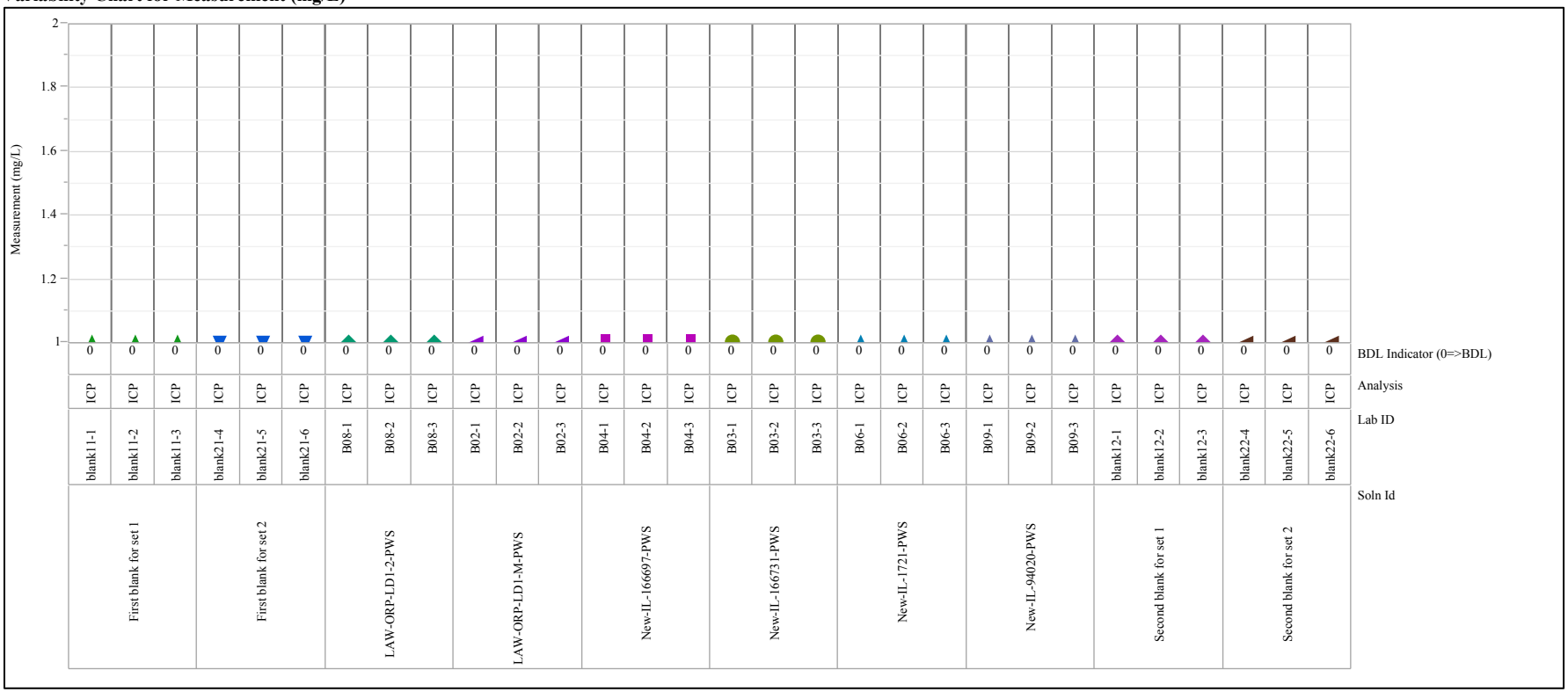


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=K (mg/L), Groupings=A: a
Variability Chart for Measurement (mg/L)

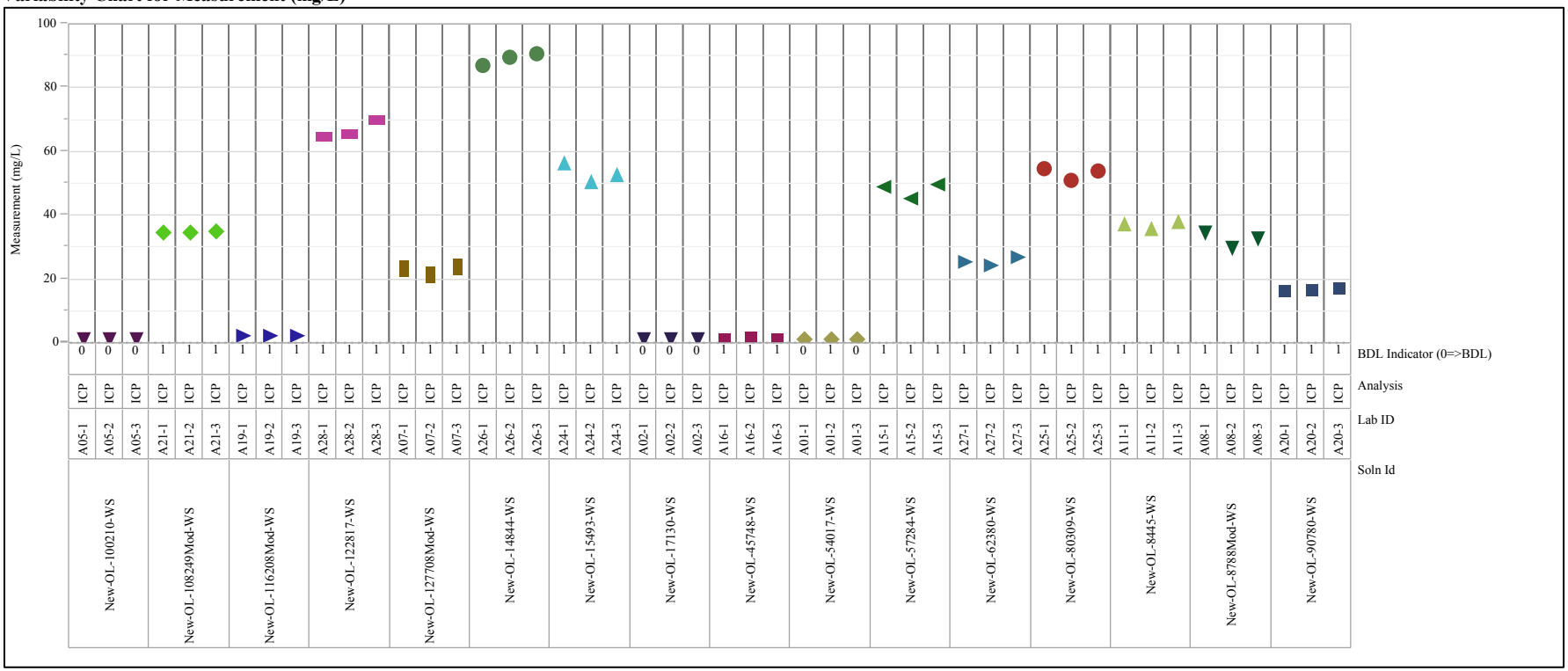


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=K (mg/L), Groupings=A: b
Variability Chart for Measurement (mg/L)

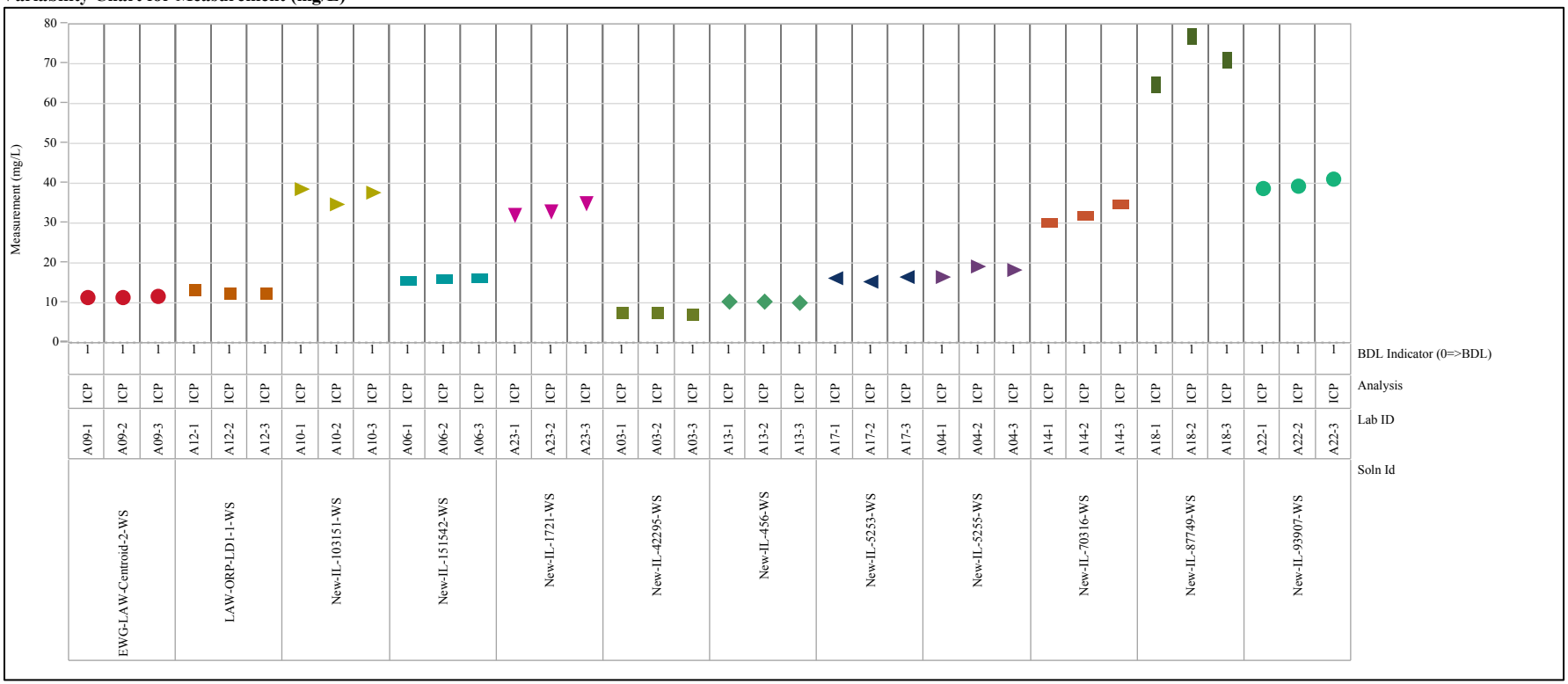


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=K (mg/L), Groupings=B: a
Variability Chart for Measurement (mg/L)

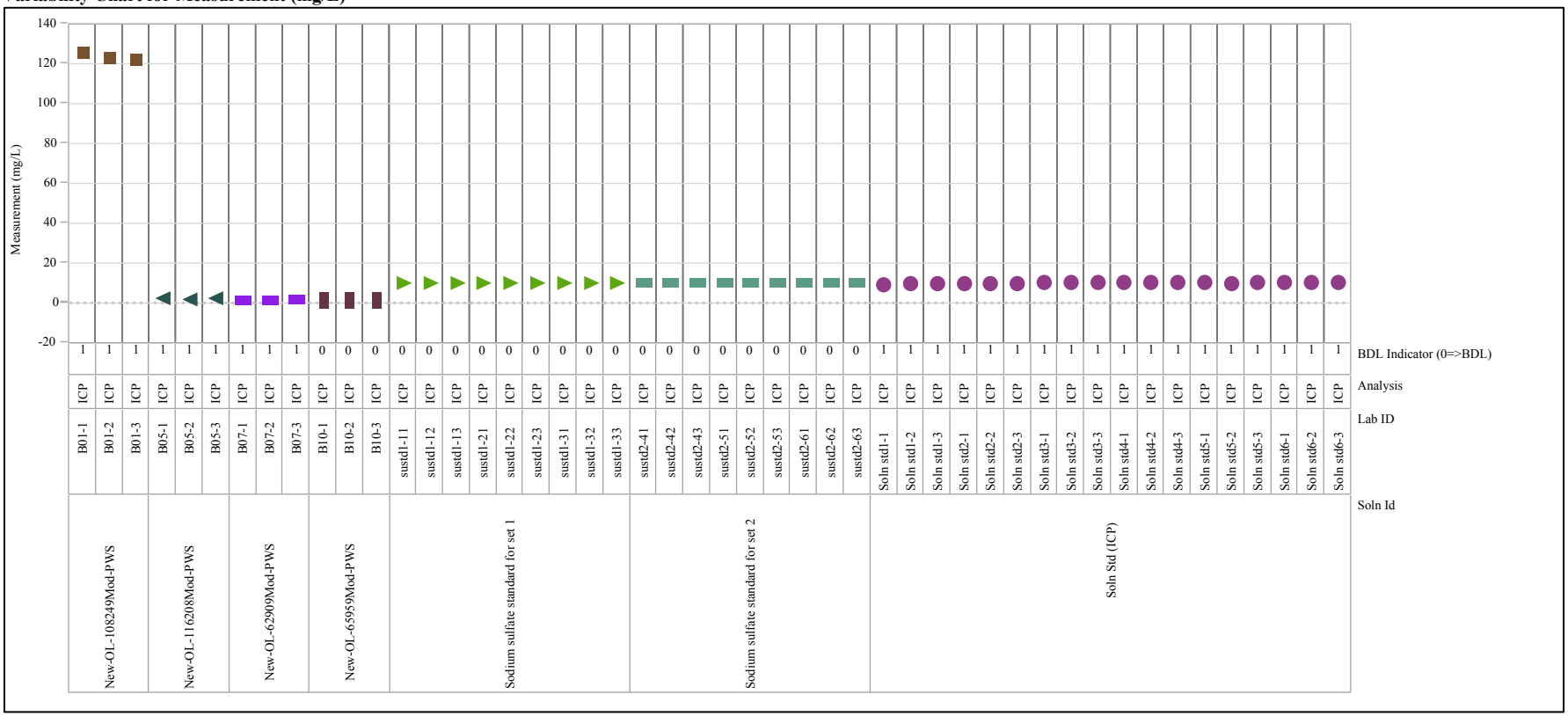


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=K (mg/L), Groupings=B: b
Variability Chart for Measurement (mg/L)

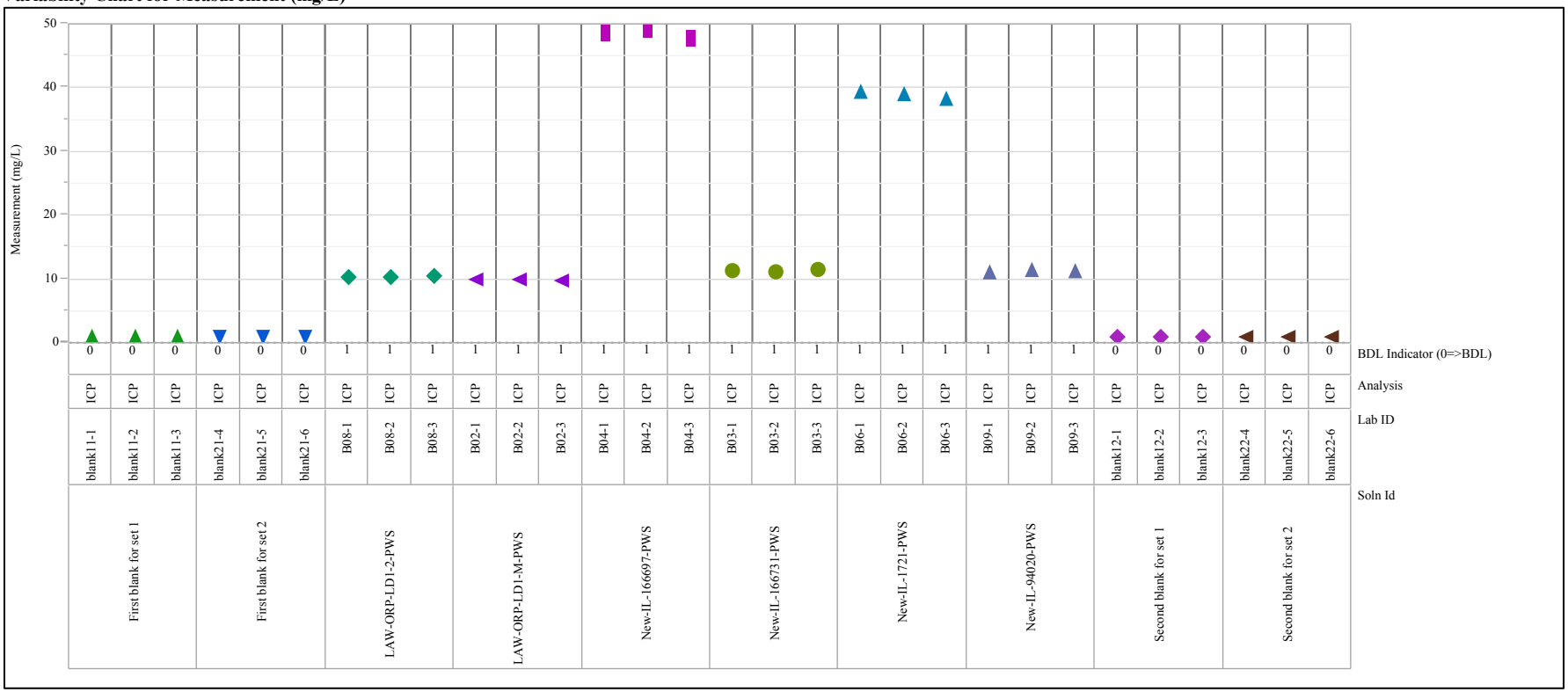


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Li (mg/L), Groupings=A: a
Variability Chart for Measurement (mg/L)

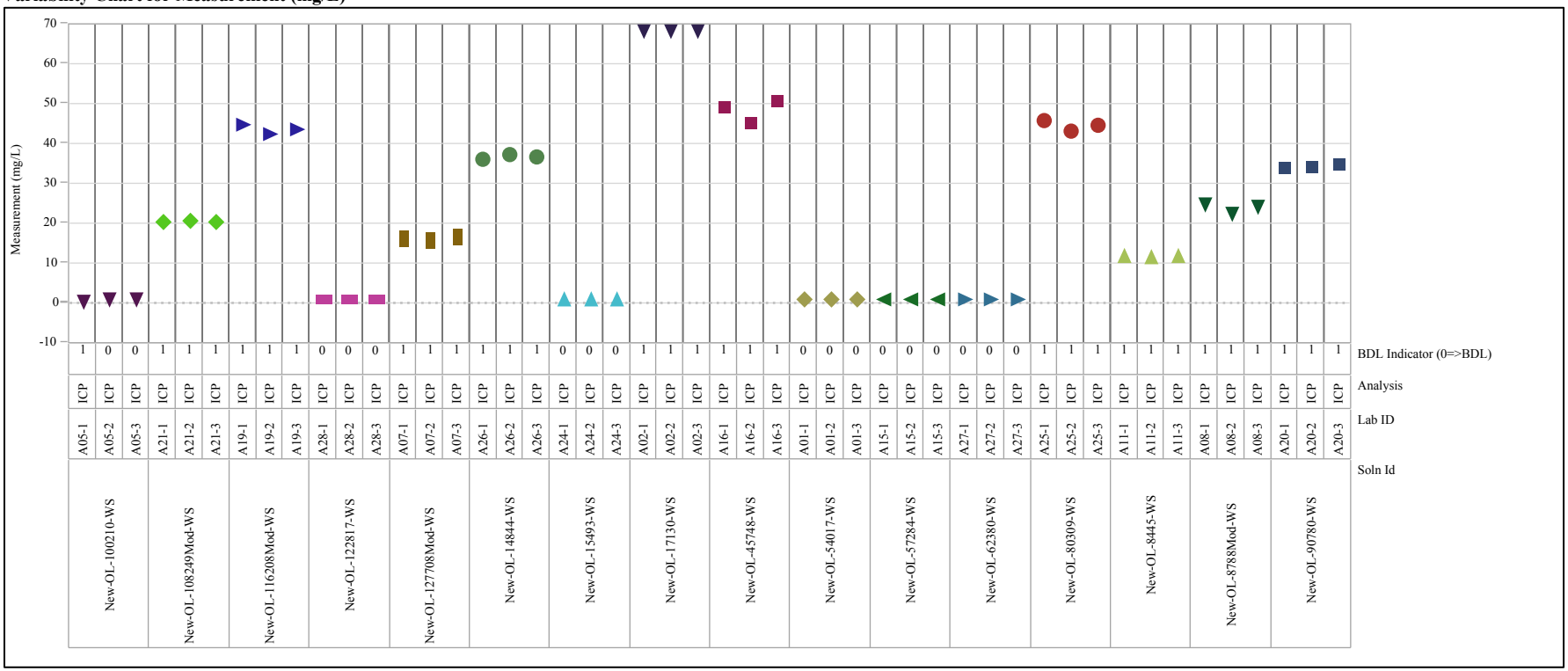


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Li (mg/L), Groupings=A: b
Variability Chart for Measurement (mg/L)

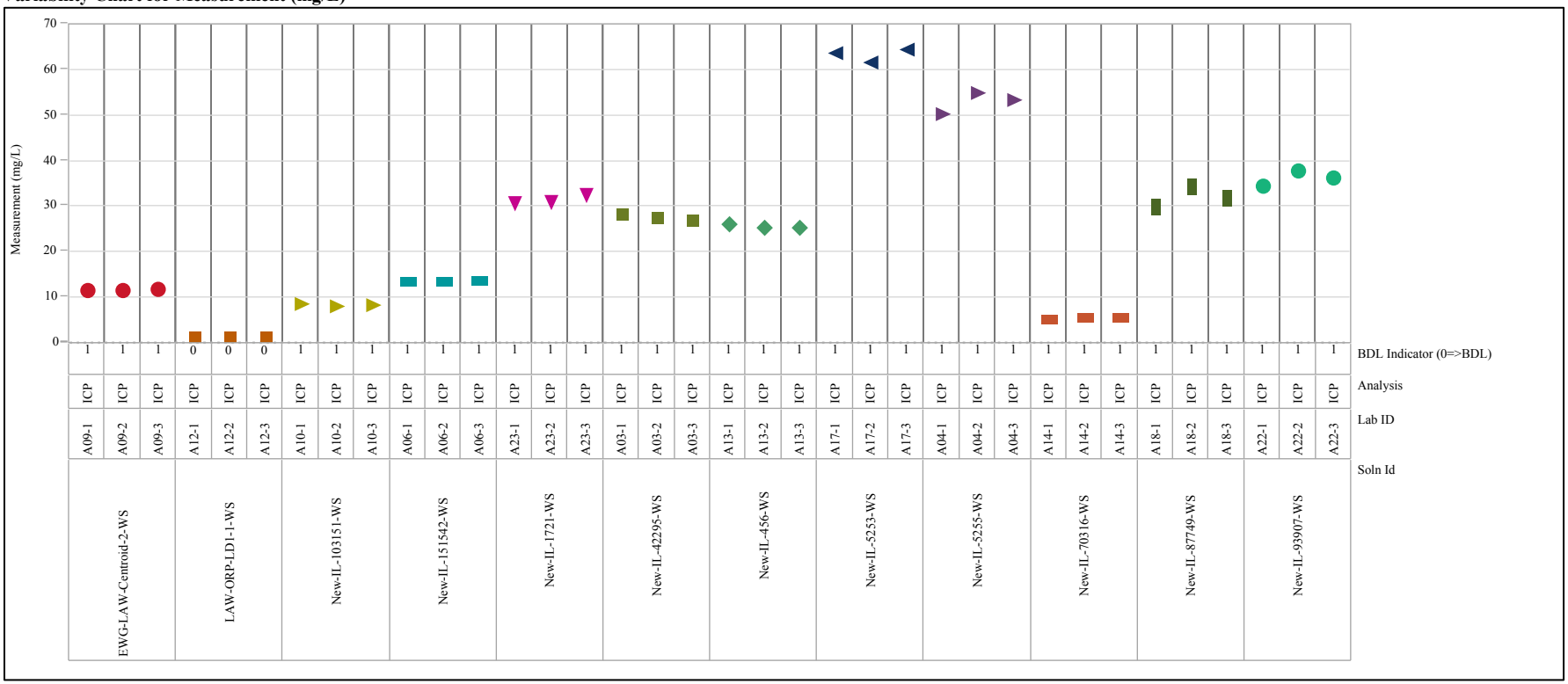


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Li (mg/L), Groupings=B: a
Variability Chart for Measurement (mg/L)

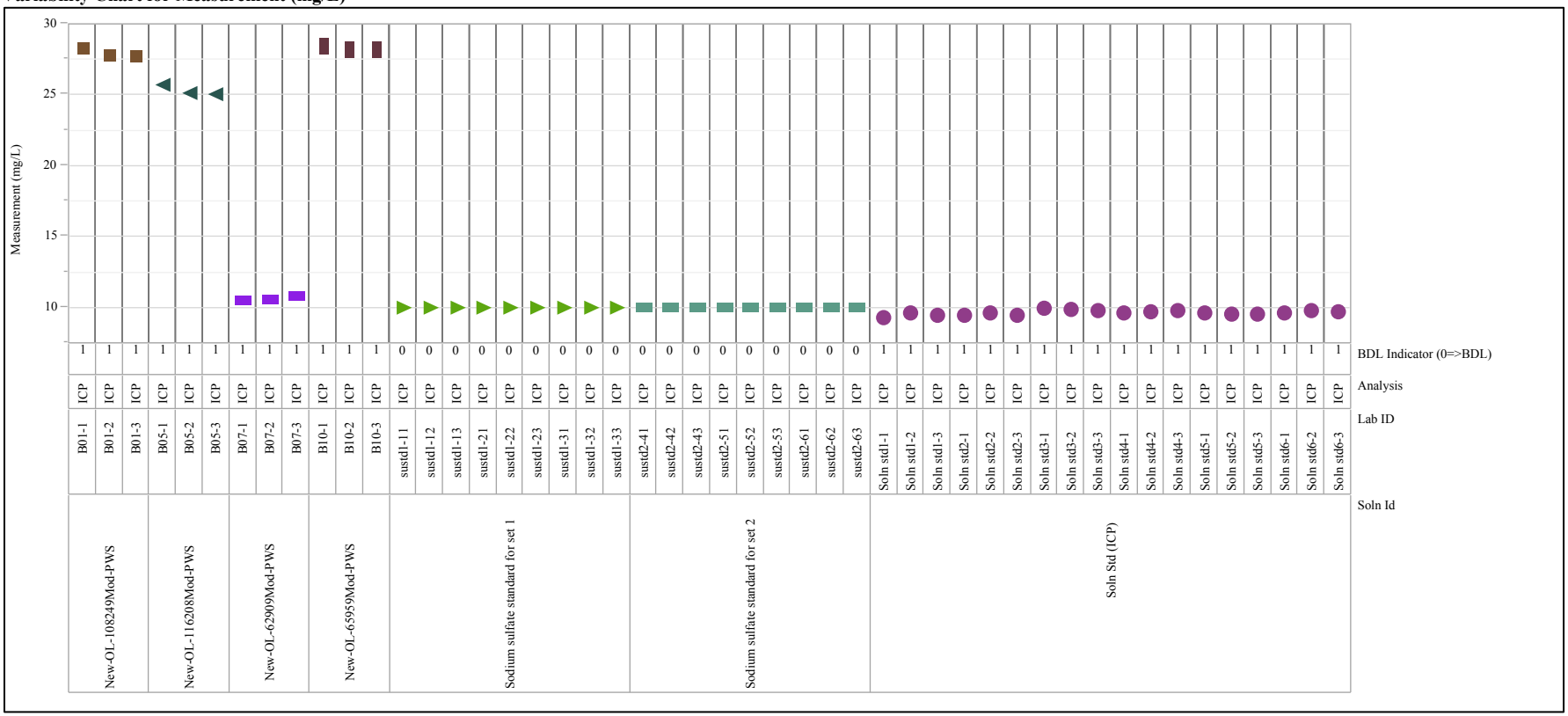


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Li (mg/L), Groupings=B: b
Variability Chart for Measurement (mg/L)

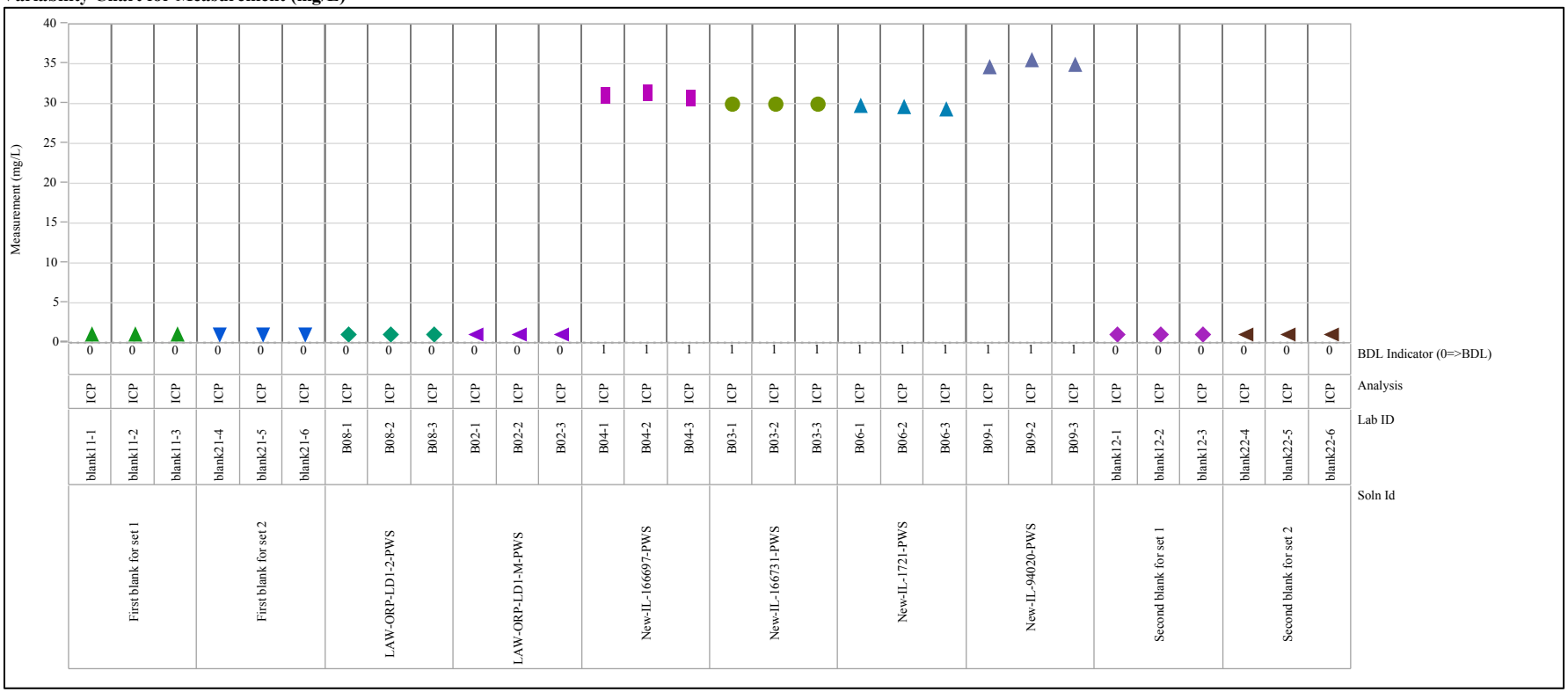


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Mg (mg/L), Groupings=A: a
Variability Chart for Measurement (mg/L)

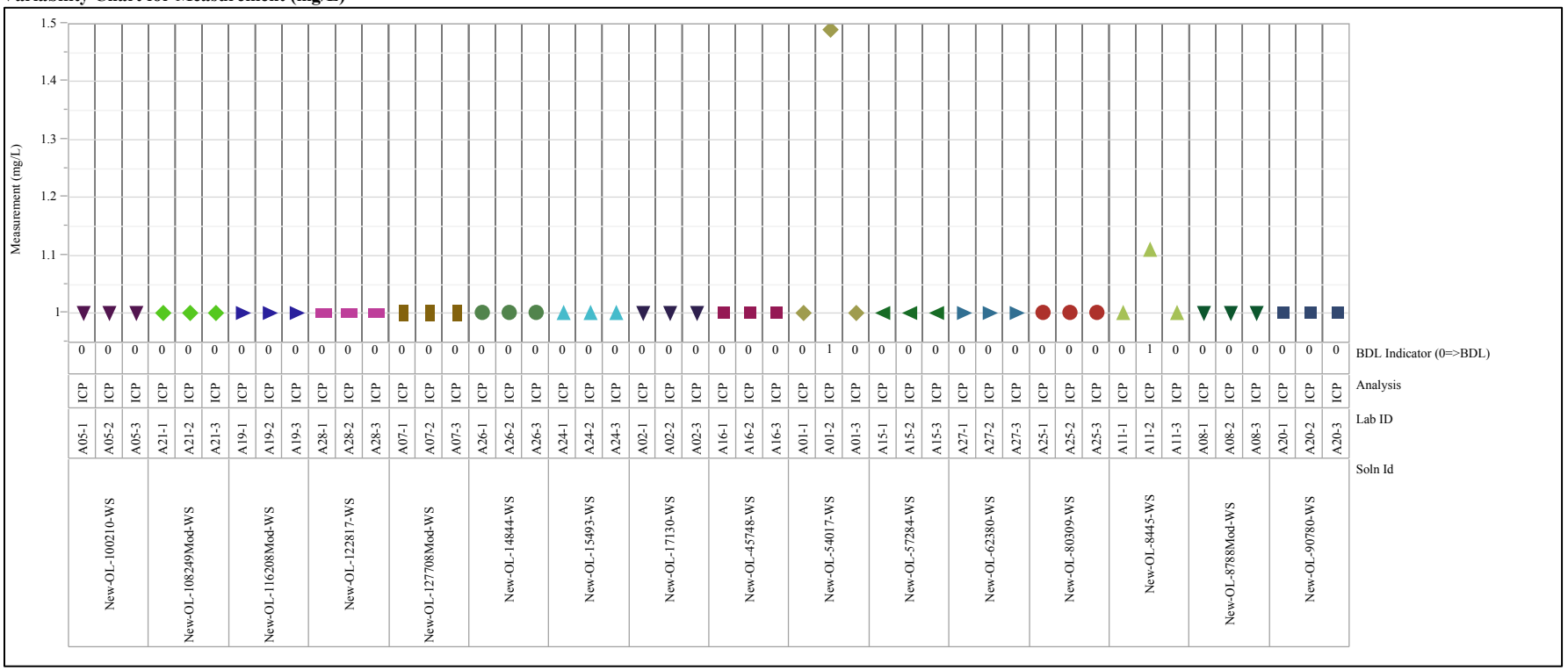


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Mg (mg/L), Groupings=A: b
Variability Chart for Measurement (mg/L)

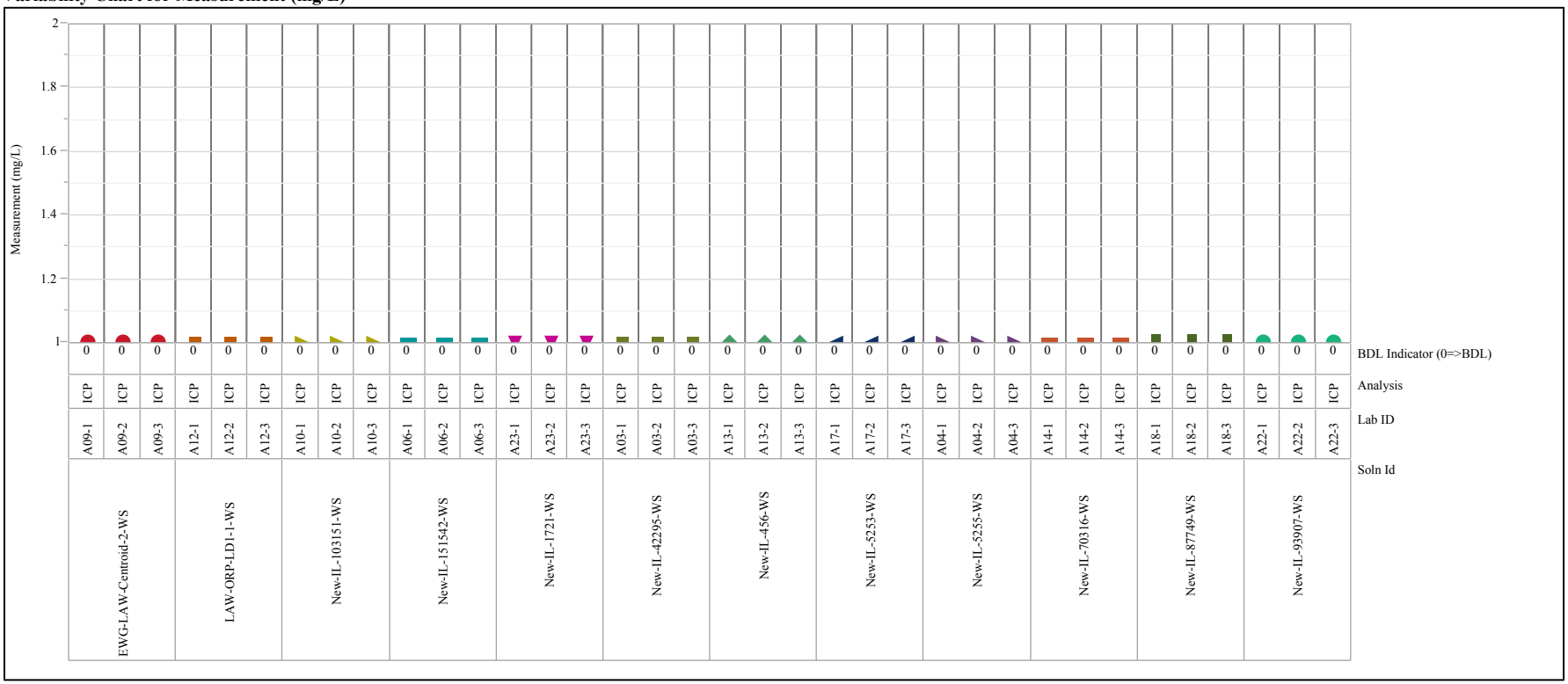


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Mg (mg/L), Groupings=B: a
Variability Chart for Measurement (mg/L)

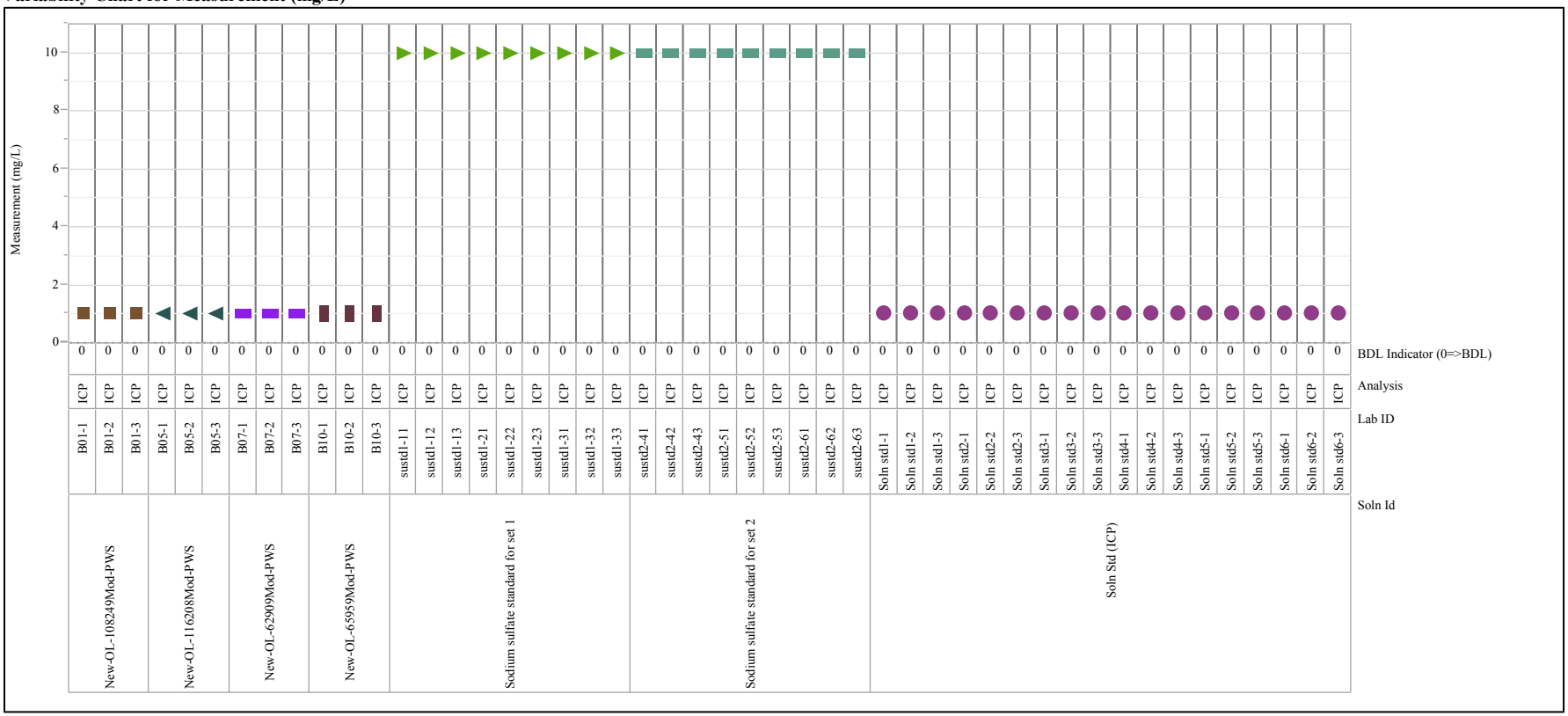


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Mg (mg/L), Groupings=B: b
Variability Chart for Measurement (mg/L)

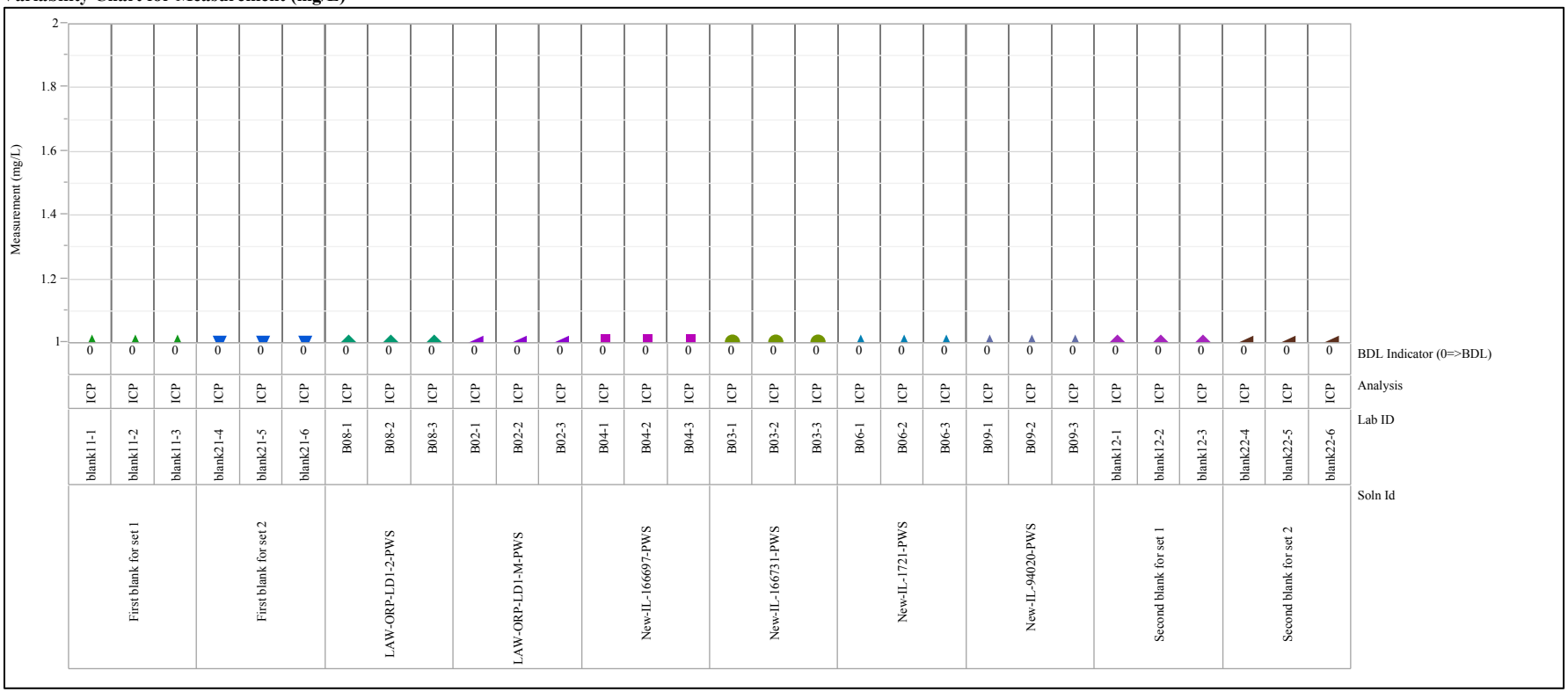


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Na (mg/L), Groupings=A: a
Variability Chart for Measurement (mg/L)

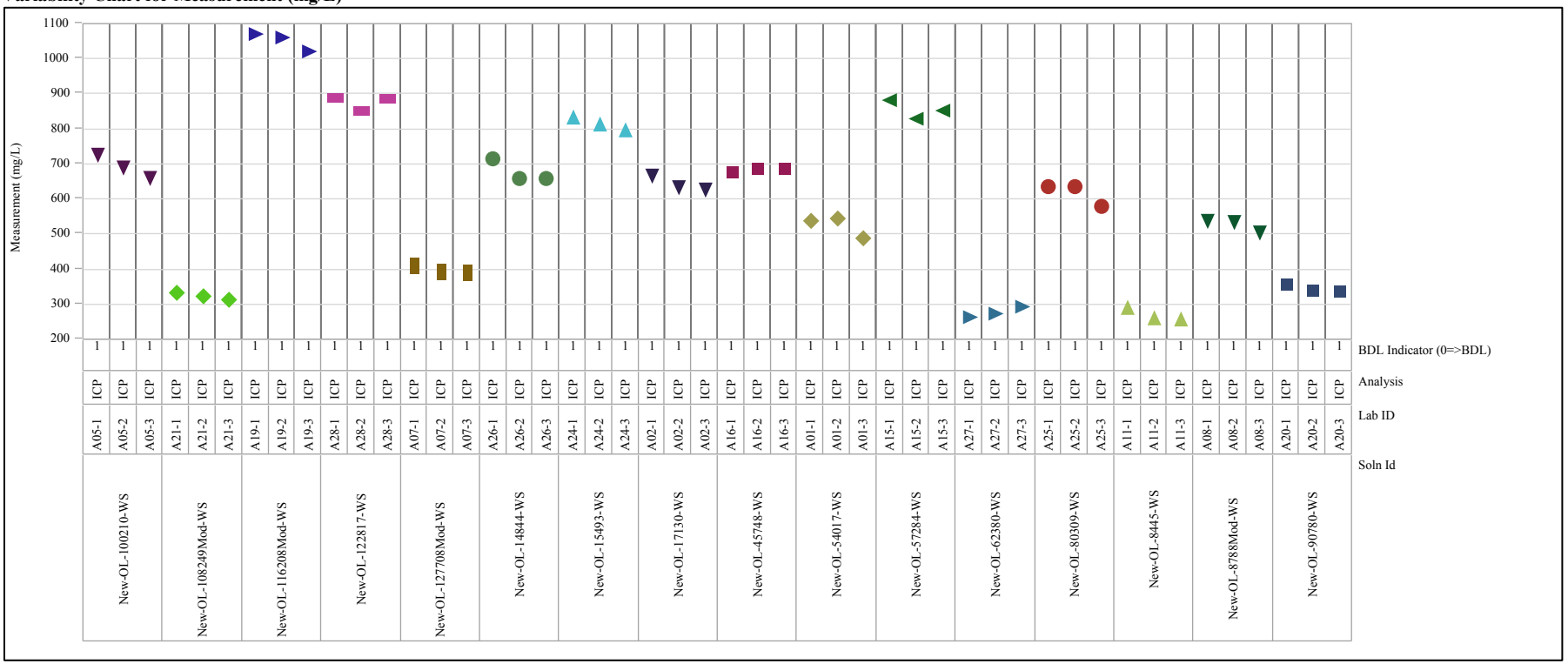


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Na (mg/L), Groupings=A: b
Variability Chart for Measurement (mg/L)

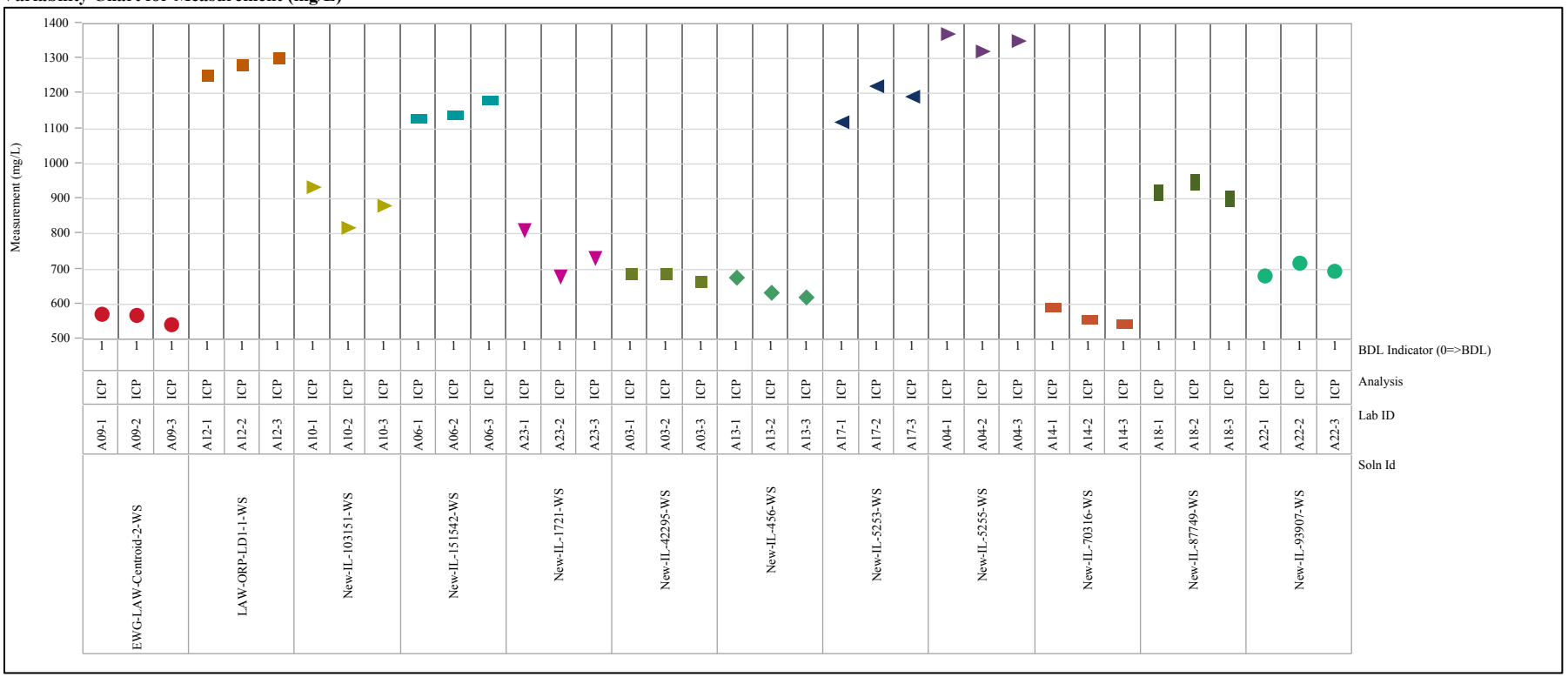


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Na (mg/L), Groupings=B: a
Variability Chart for Measurement (mg/L)

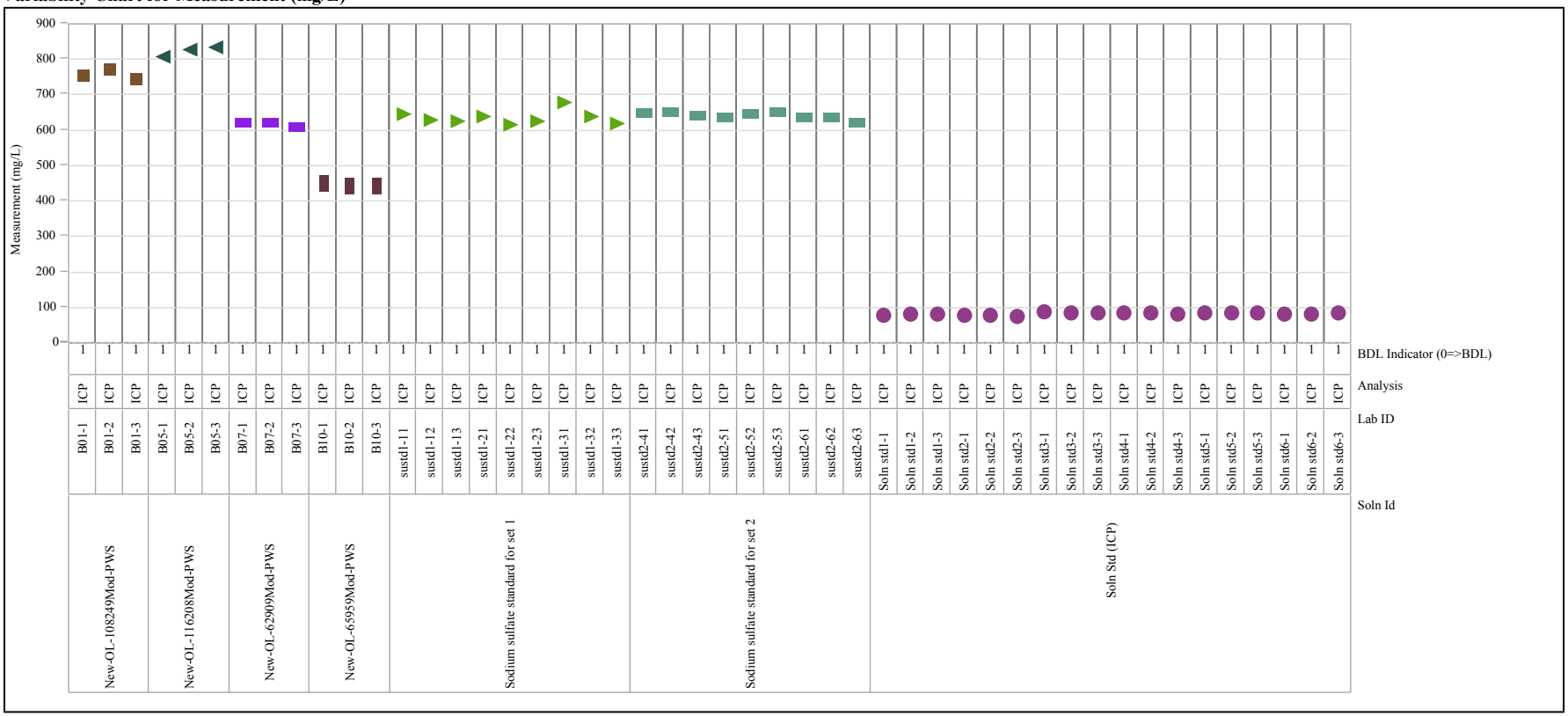


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Na (mg/L), Groupings=B: b
Variability Chart for Measurement (mg/L)

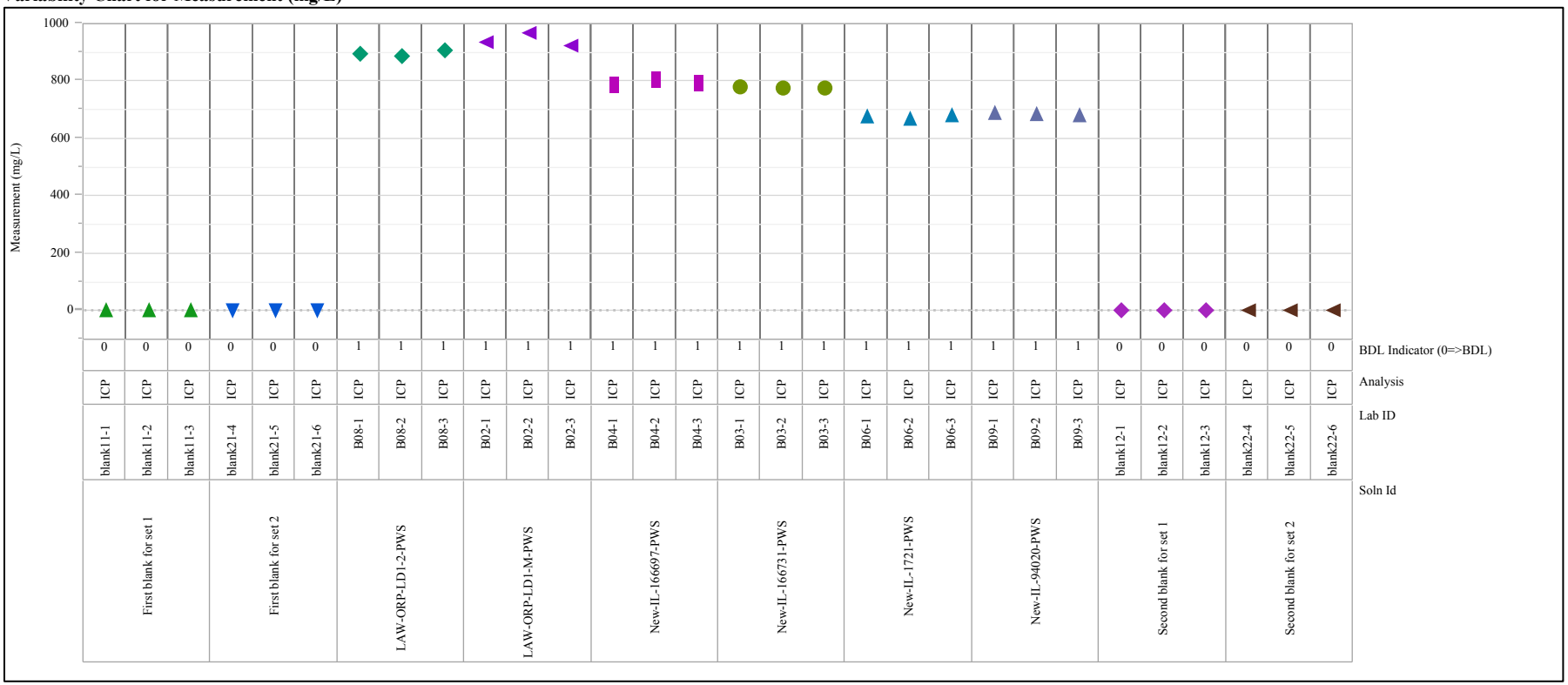


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=P (mg/L), Groupings=A: a
Variability Chart for Measurement (mg/L)

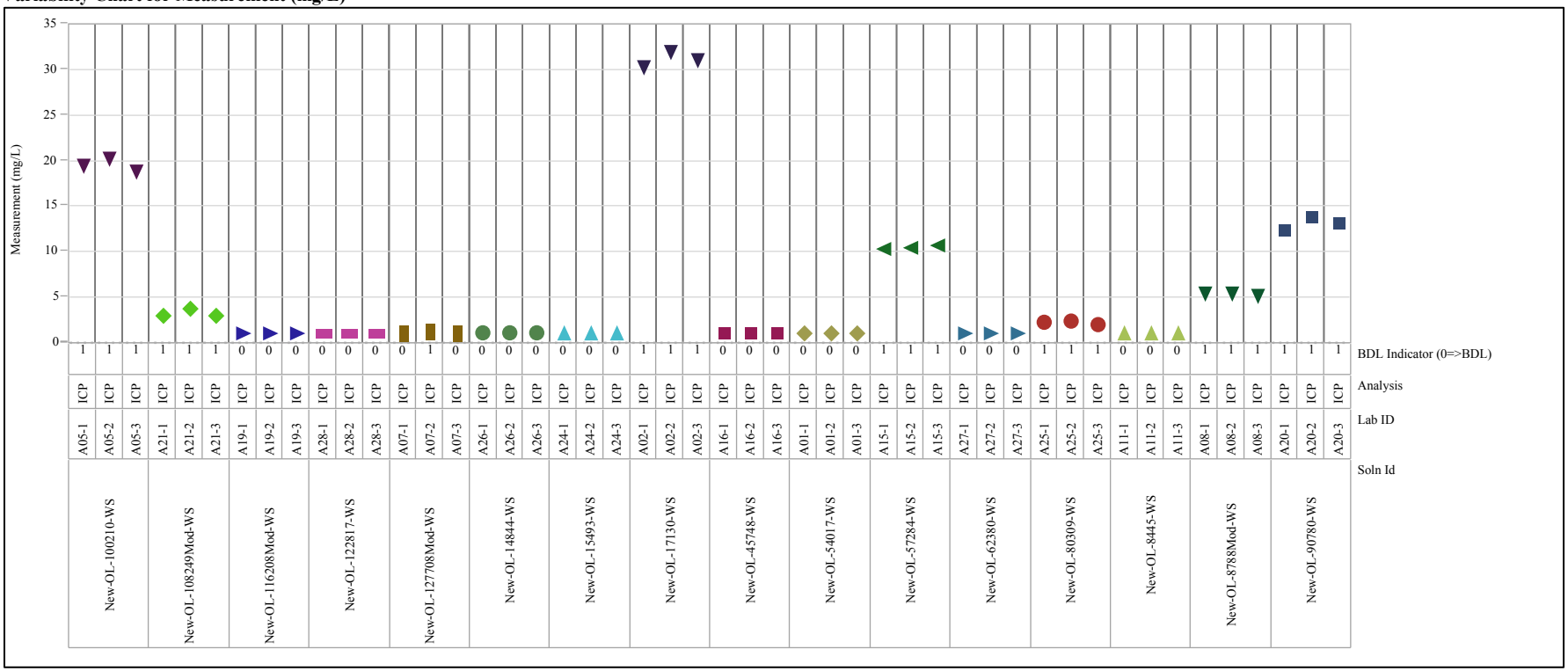


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=P (mg/L), Groupings=A: b
Variability Chart for Measurement (mg/L)

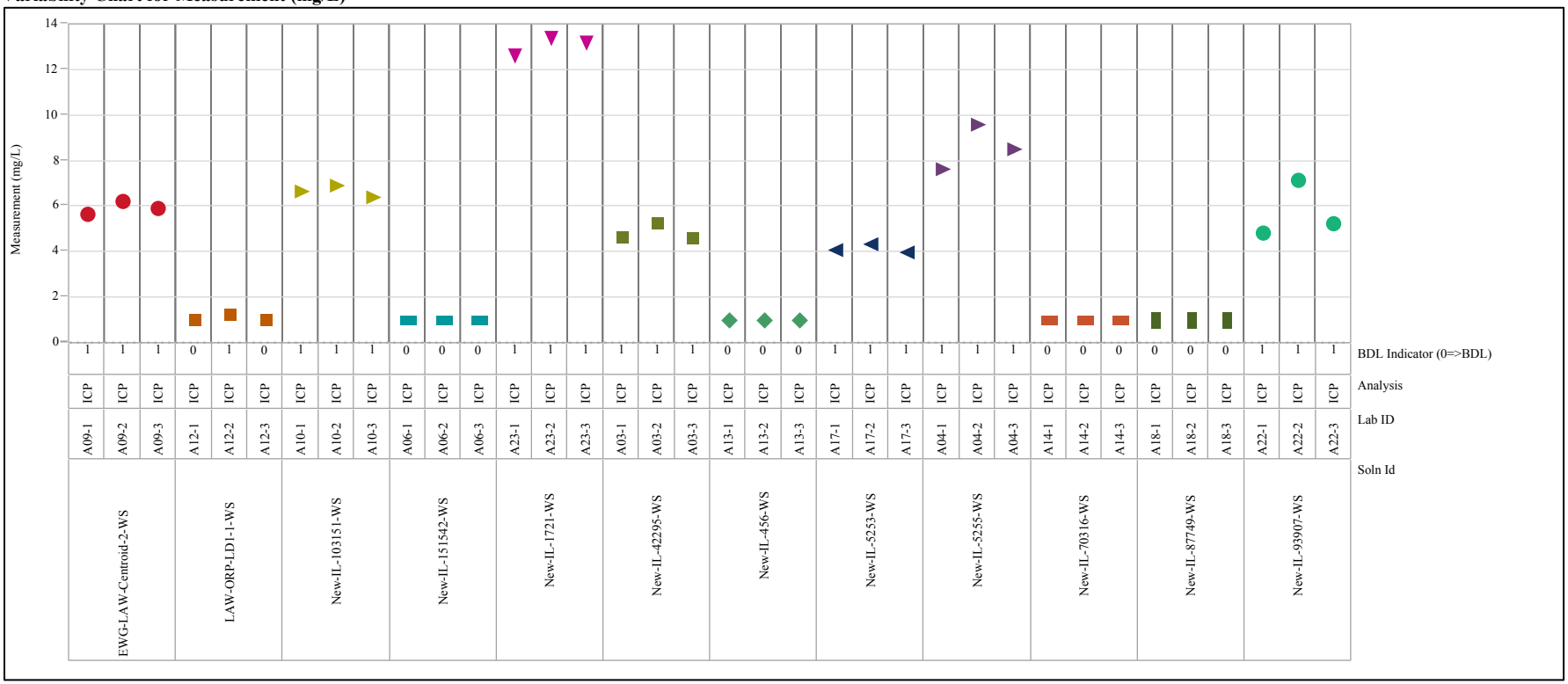


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=P (mg/L), Groupings=B: a
Variability Chart for Measurement (mg/L)

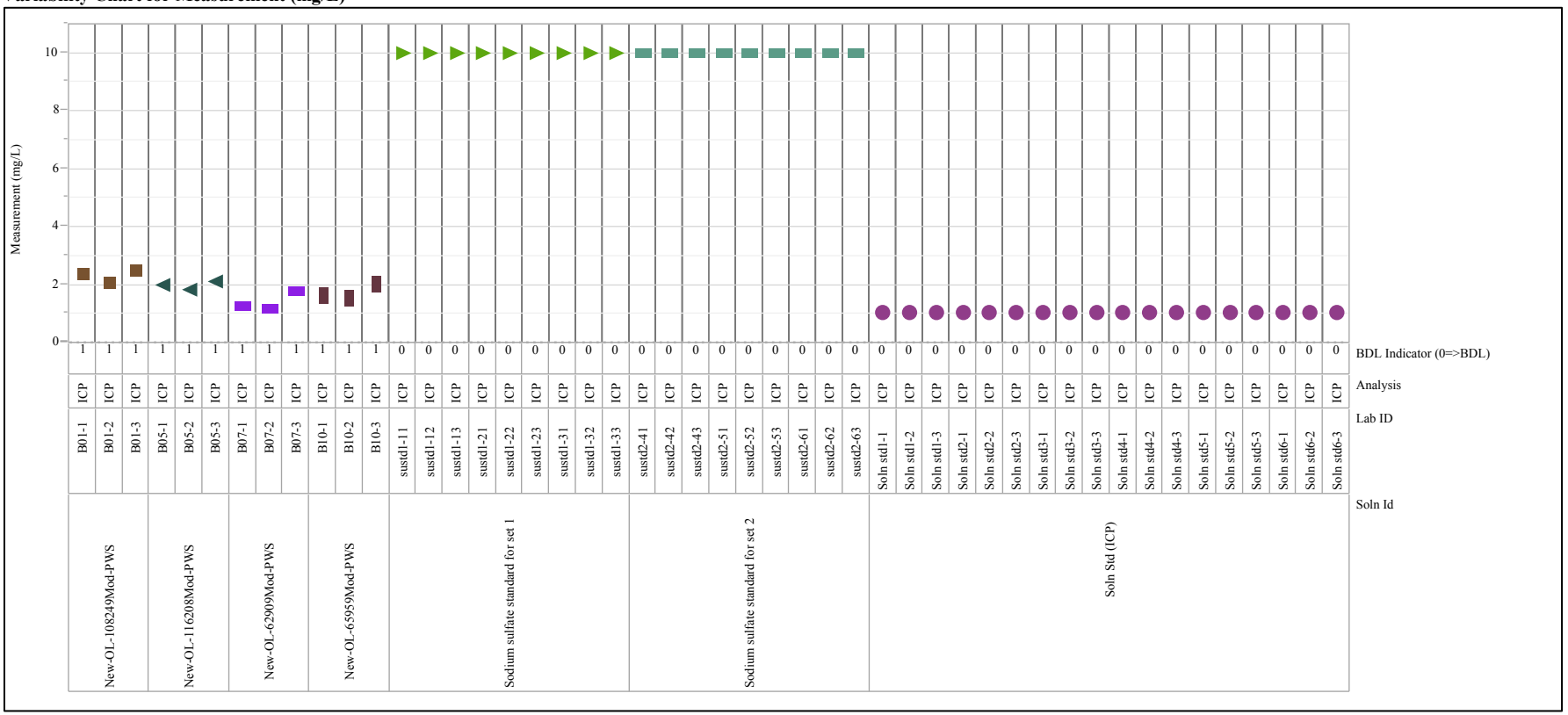


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=P (mg/L), Groupings=B: b
Variability Chart for Measurement (mg/L)

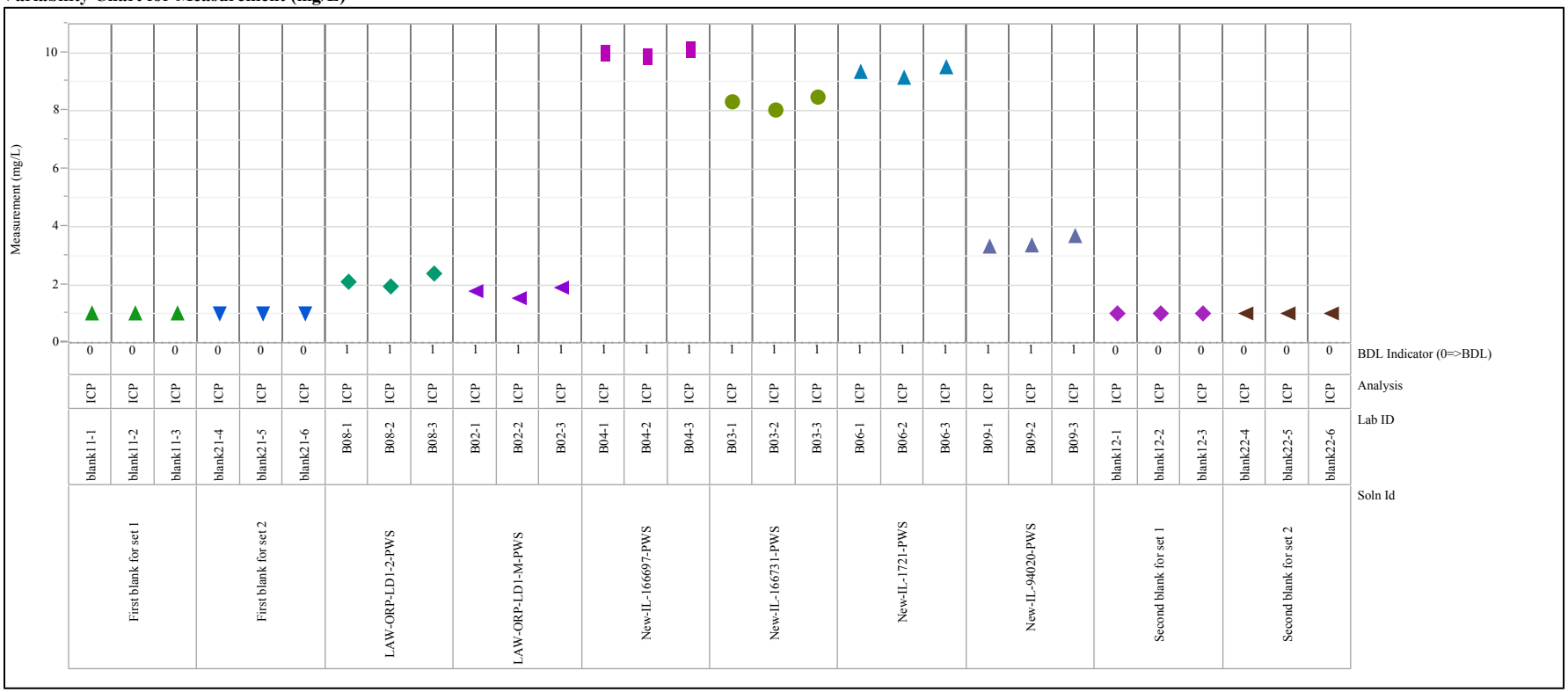


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=PO4 (mg/L), Groupings=A: a
Variability Chart for Measurement (mg/L)

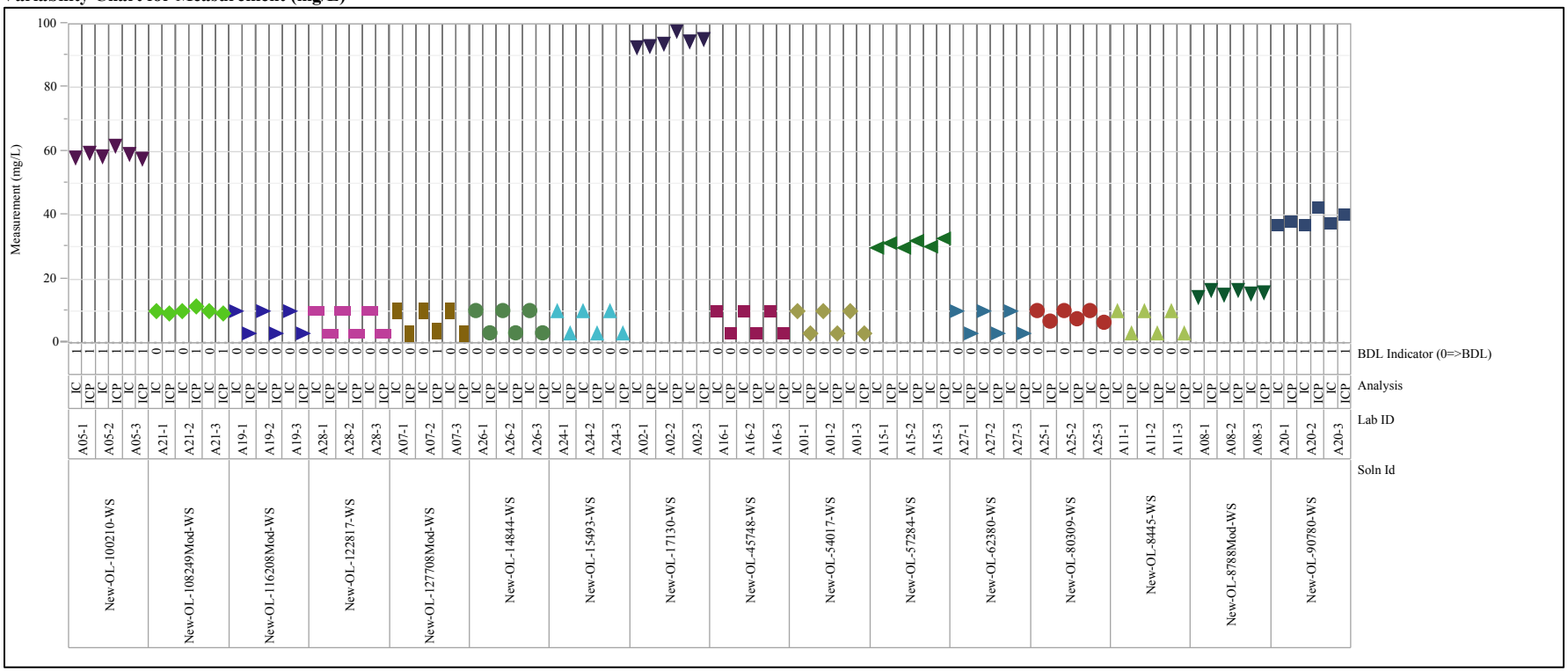


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=PO4 (mg/L), Groupings=A: b
Variability Chart for Measurement (mg/L)

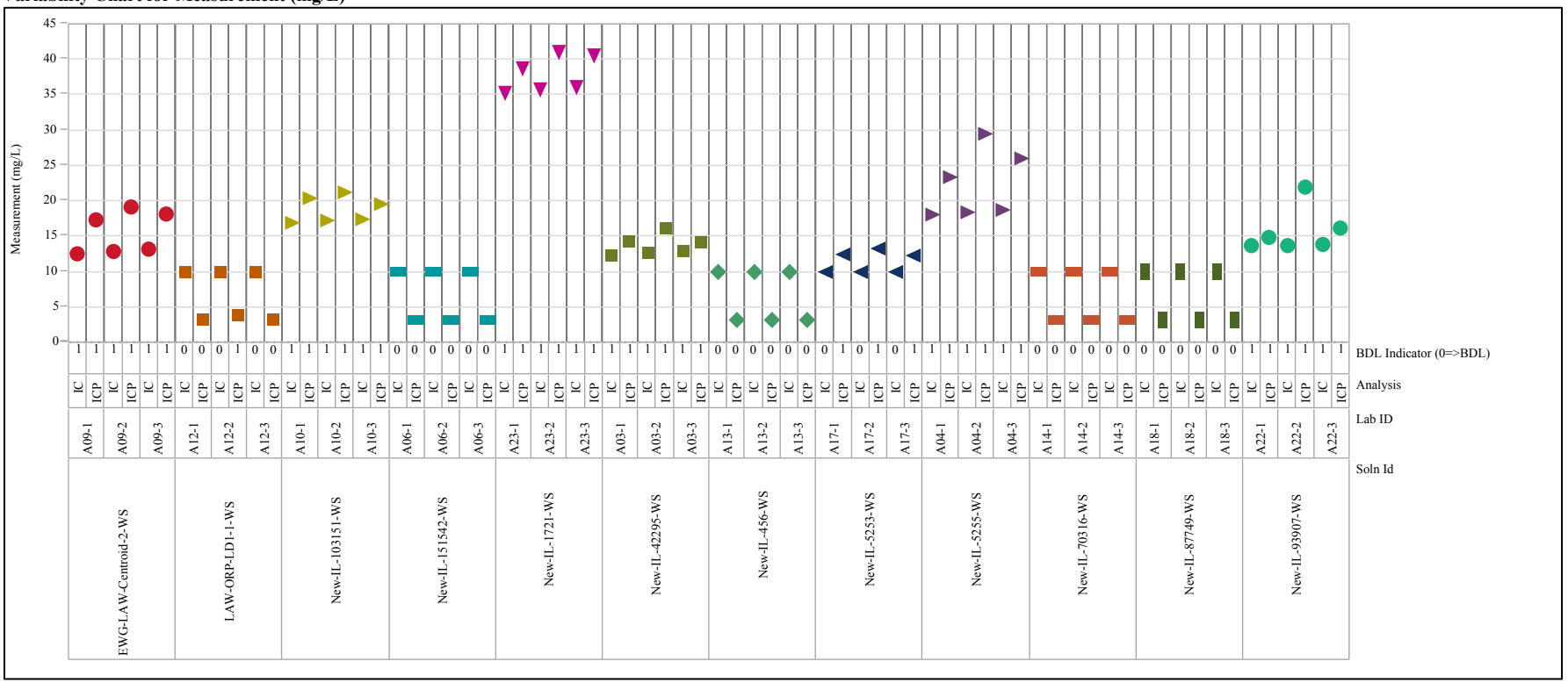


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=PO4 (mg/L), Groupings=B: a
Variability Chart for Measurement (mg/L)

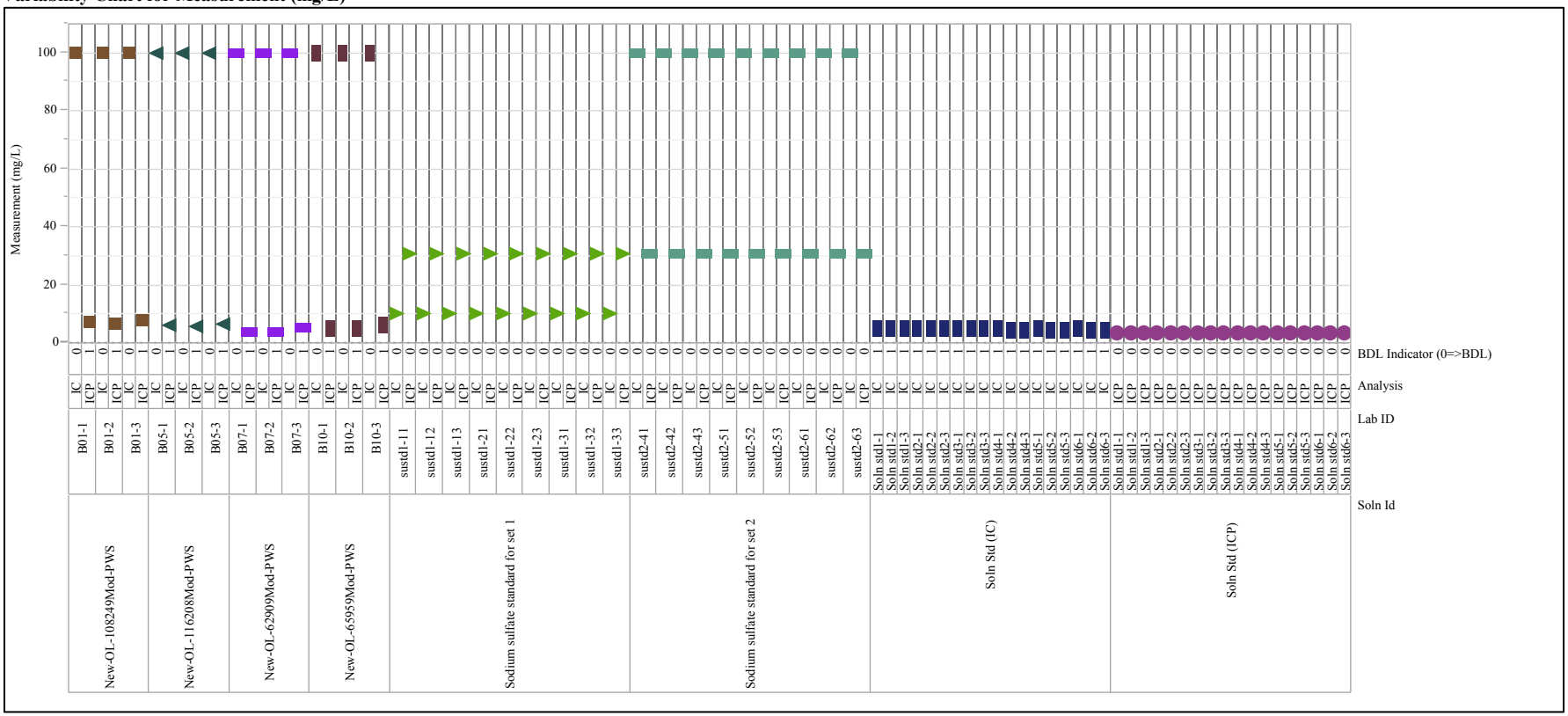


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=PO4 (mg/L), Groupings=B: b
Variability Chart for Measurement (mg/L)

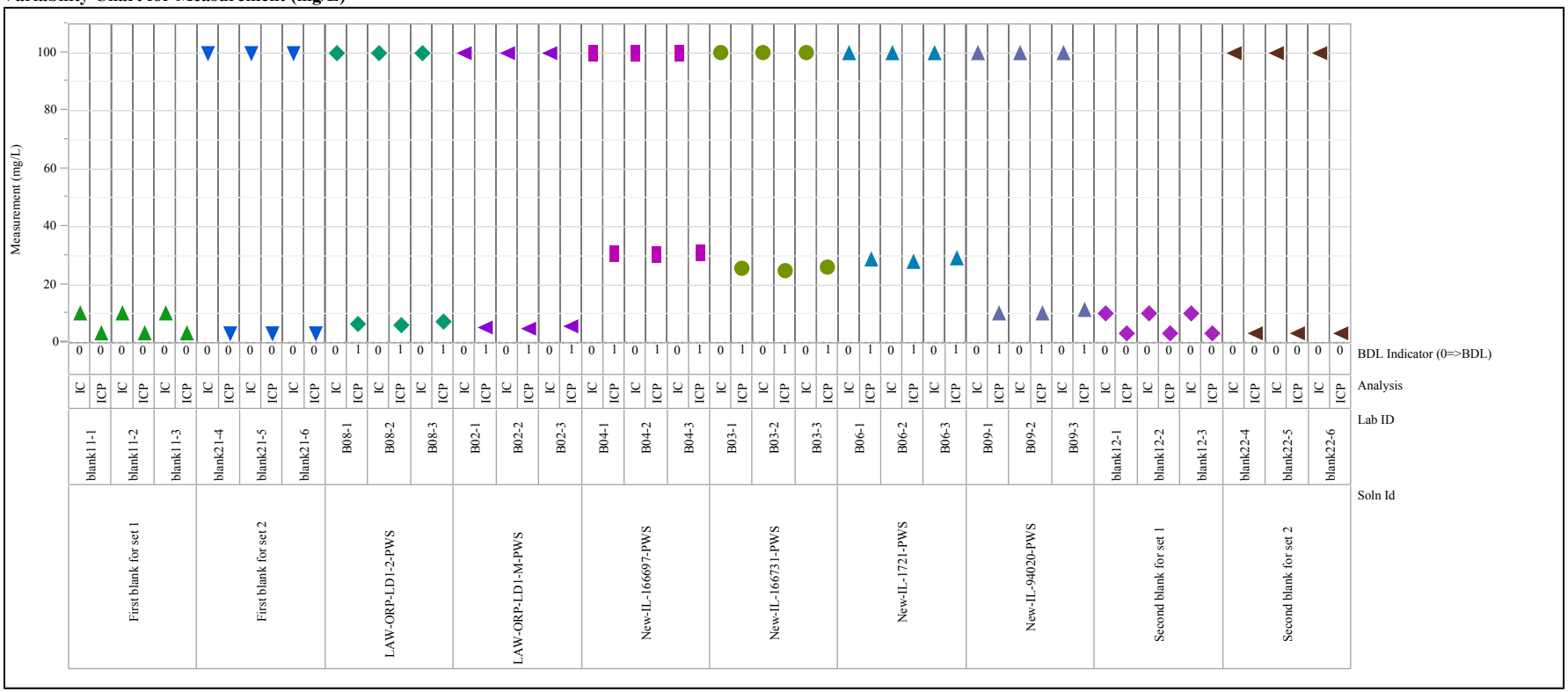


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=S (mg/L), Groupings=A: a
Variability Chart for Measurement (mg/L)

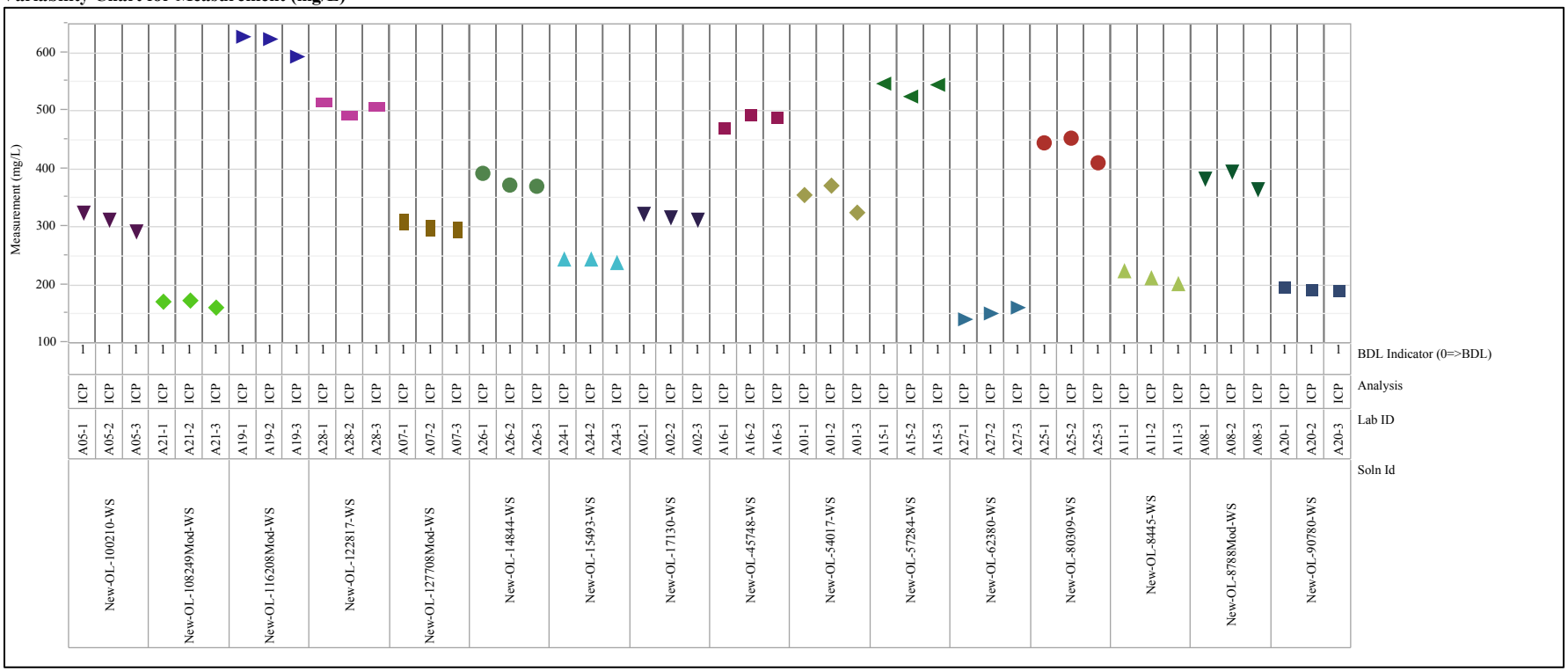


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=S (mg/L), Groupings=A: b
Variability Chart for Measurement (mg/L)

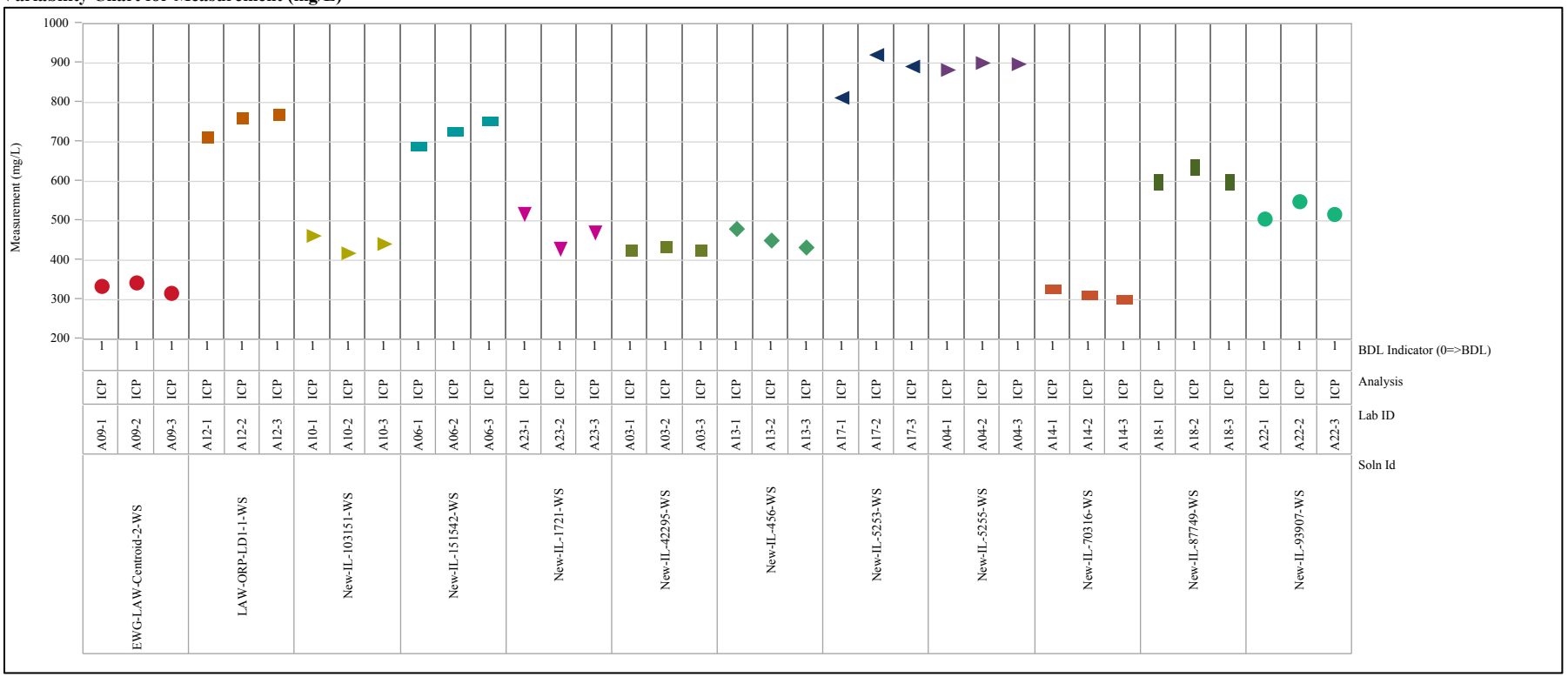


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=S (mg/L), Groupings=B: a
Variability Chart for Measurement (mg/L)

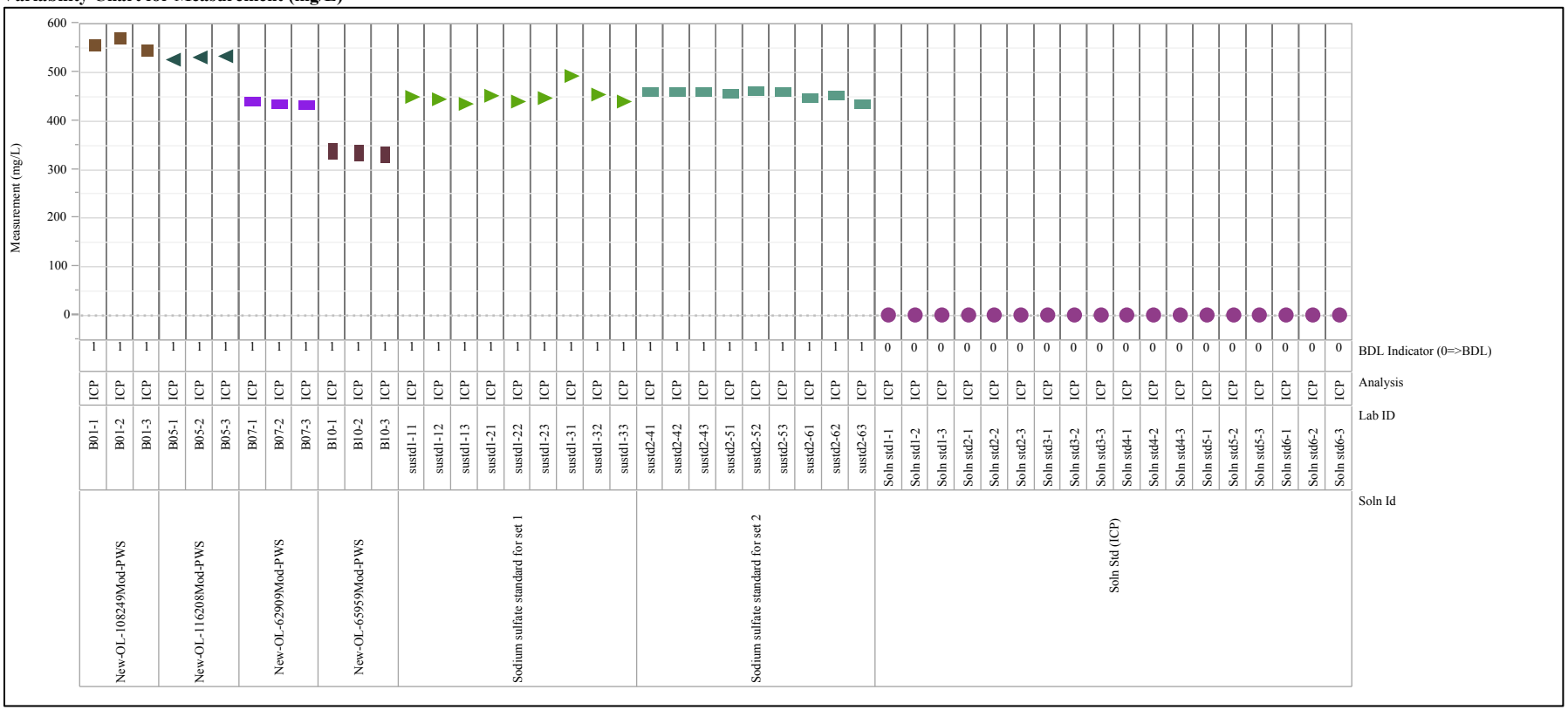


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=S (mg/L), Groupings=B: b
Variability Chart for Measurement (mg/L)

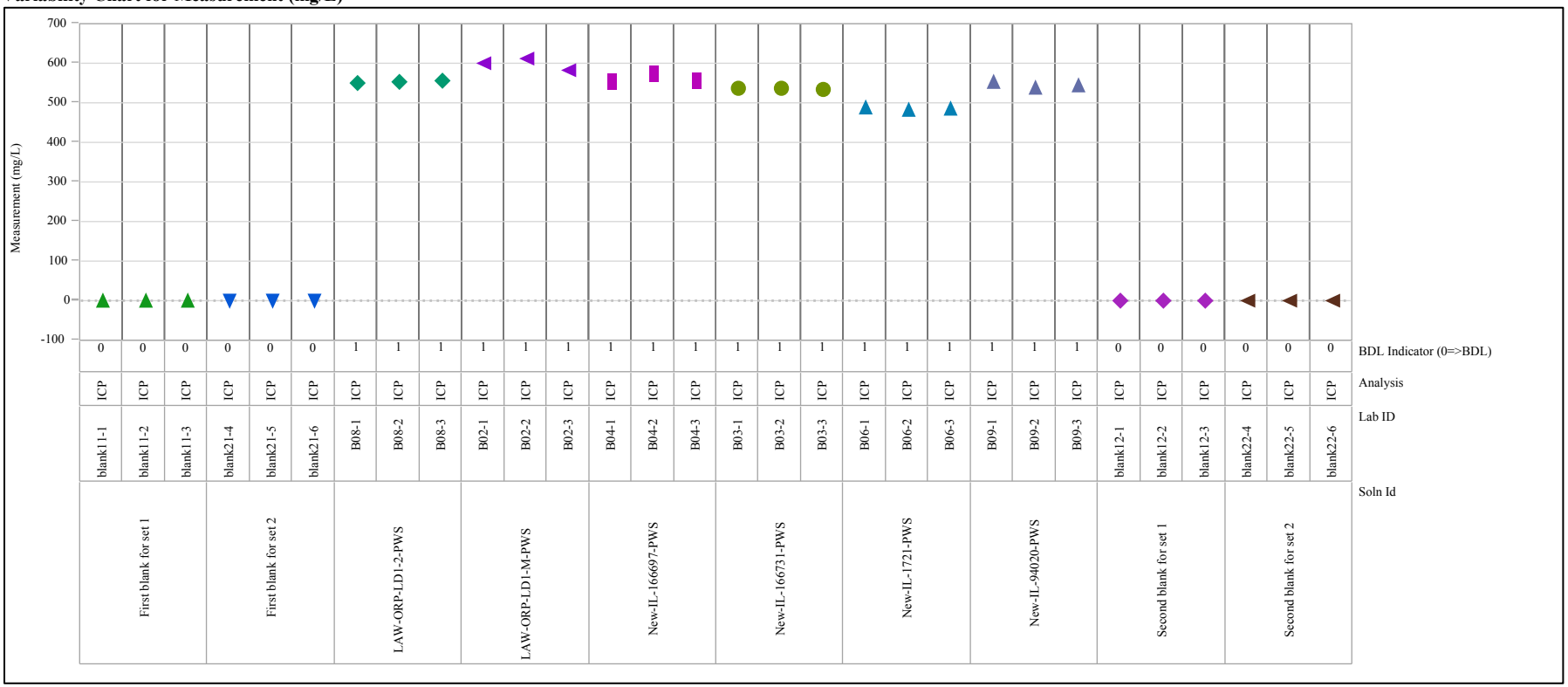


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Si (mg/L), Groupings=A: a
Variability Chart for Measurement (mg/L)

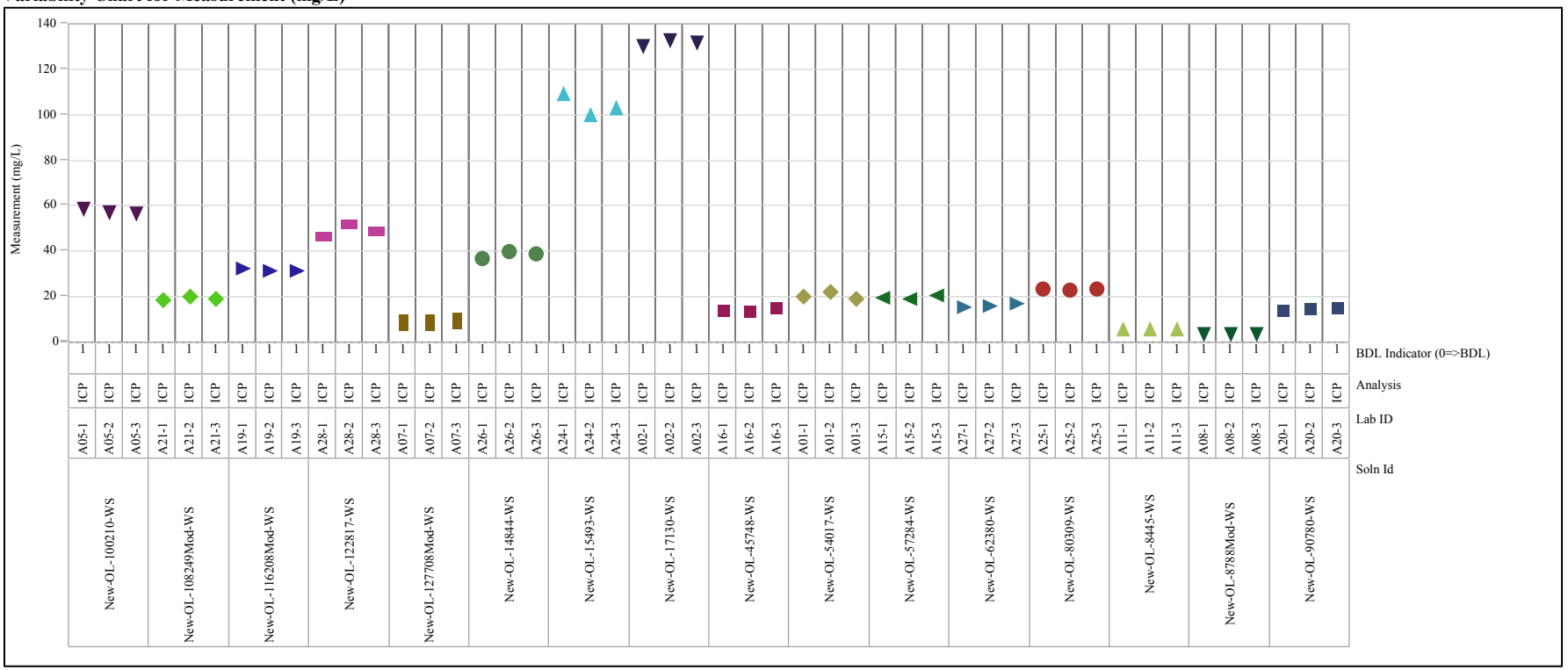


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Si (mg/L), Groupings=A: b
Variability Chart for Measurement (mg/L)

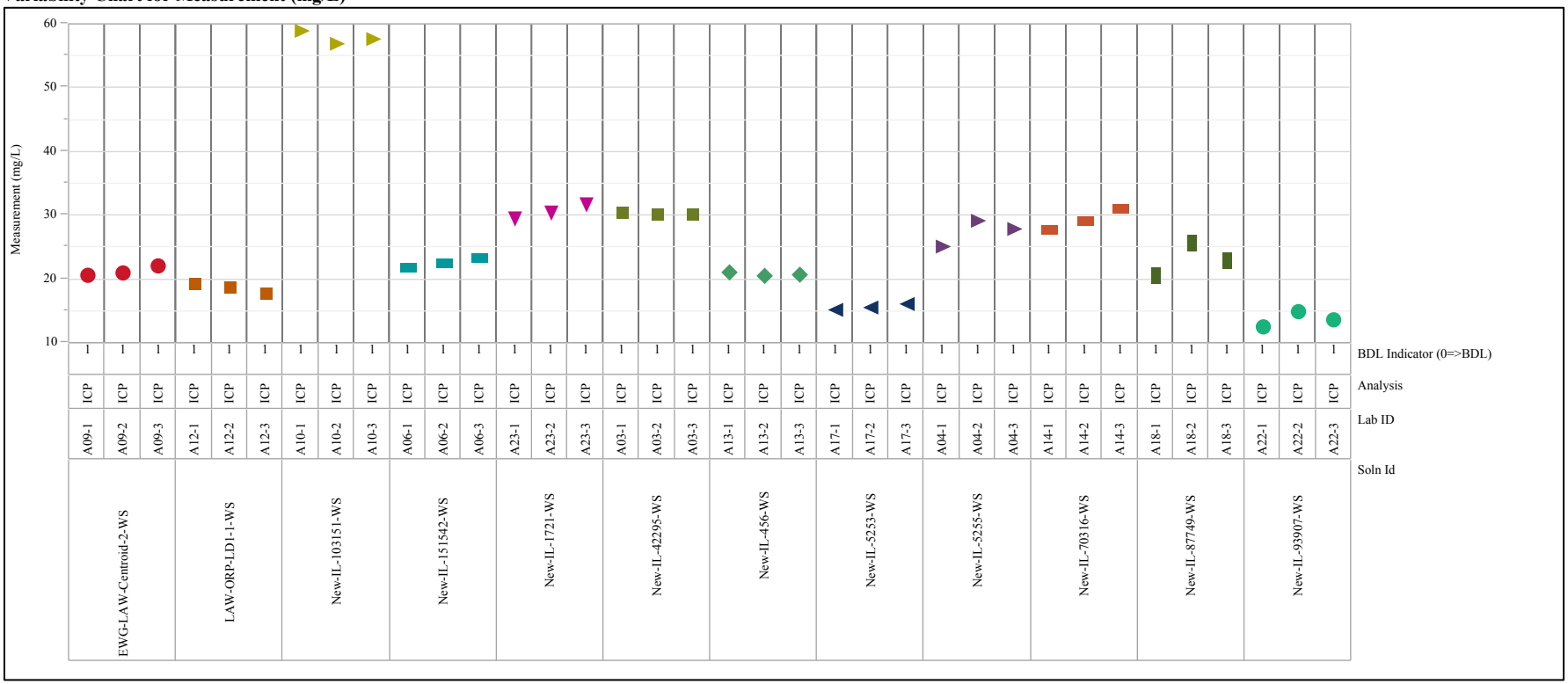


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Si (mg/L), Groupings=B: a
Variability Chart for Measurement (mg/L)

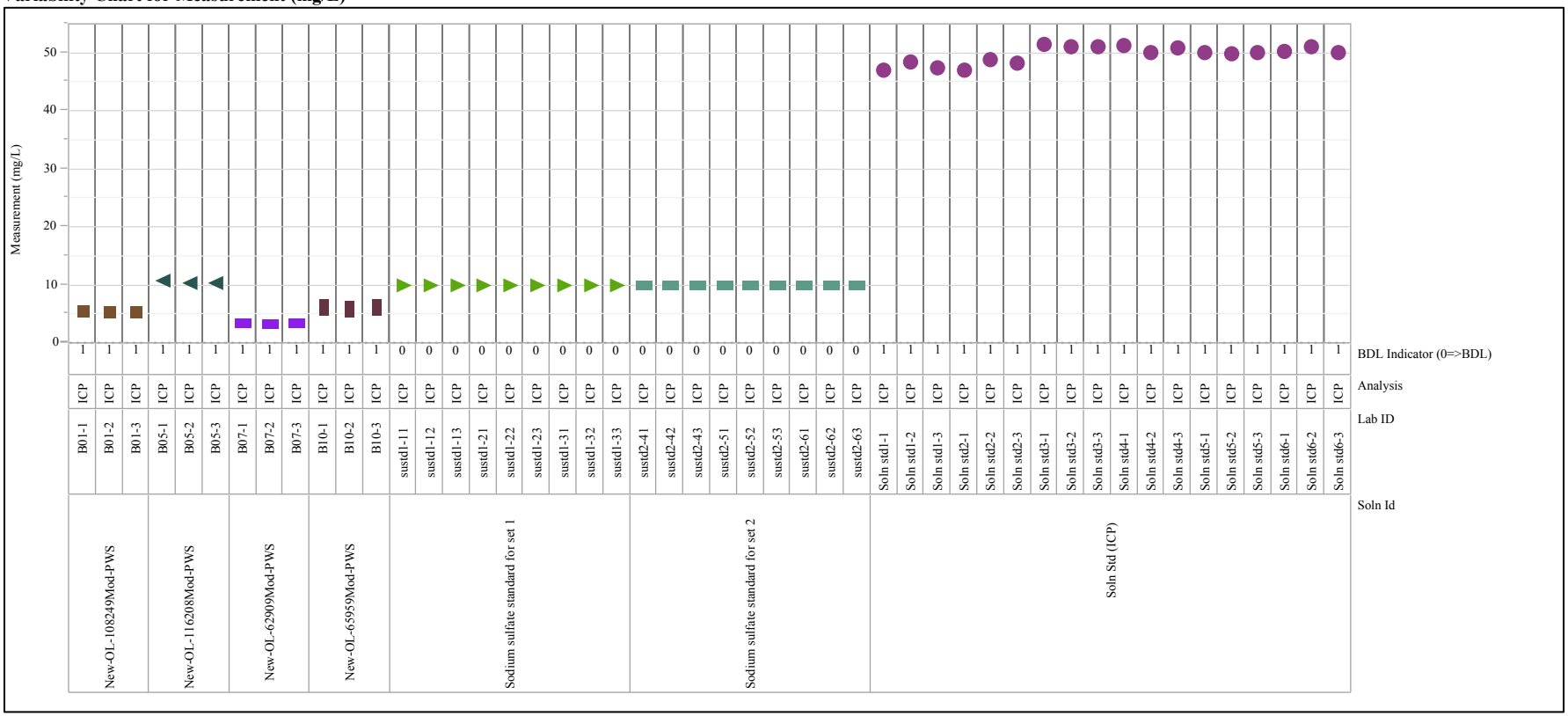


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Si (mg/L), Groupings=B: b
Variability Chart for Measurement (mg/L)

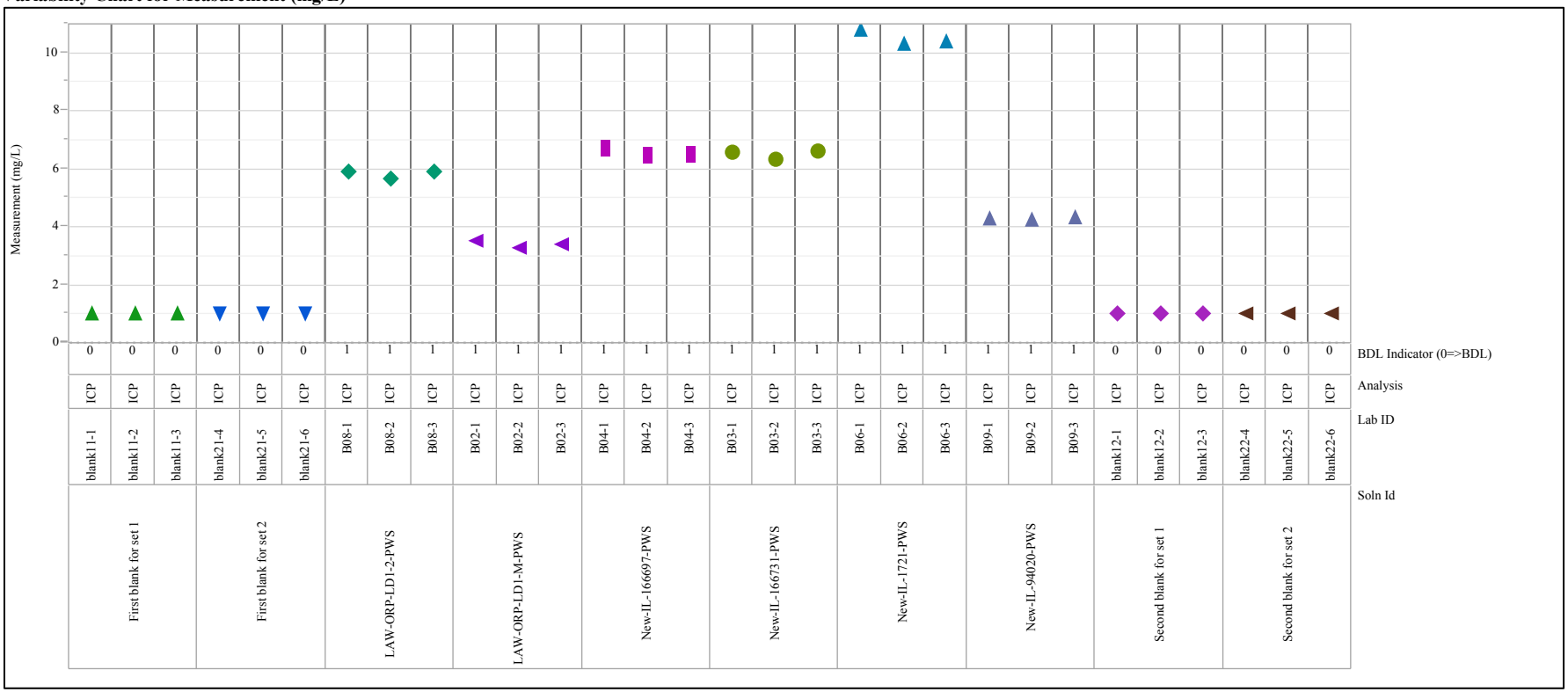


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Sn (mg/L), Groupings=A: a
Variability Chart for Measurement (mg/L)

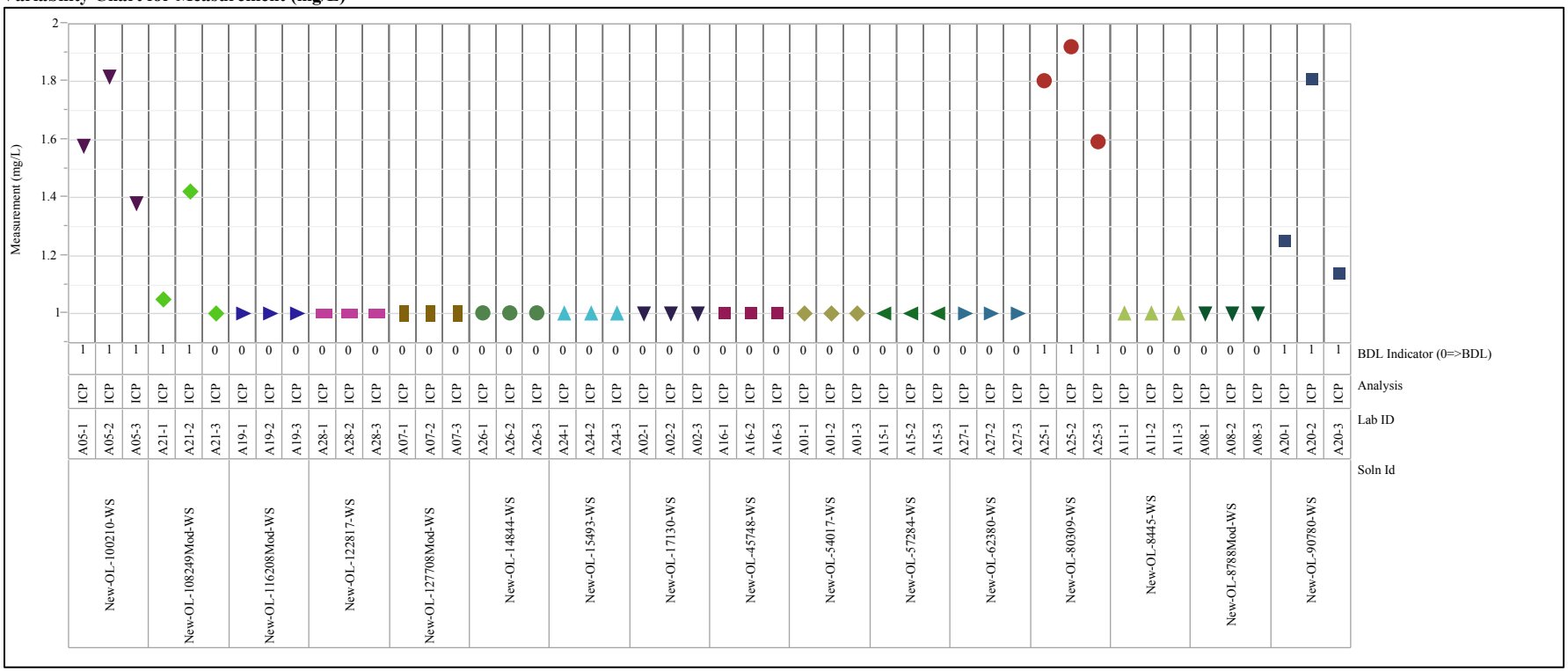


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Sn (mg/L), Groupings=A: b
Variability Chart for Measurement (mg/L)

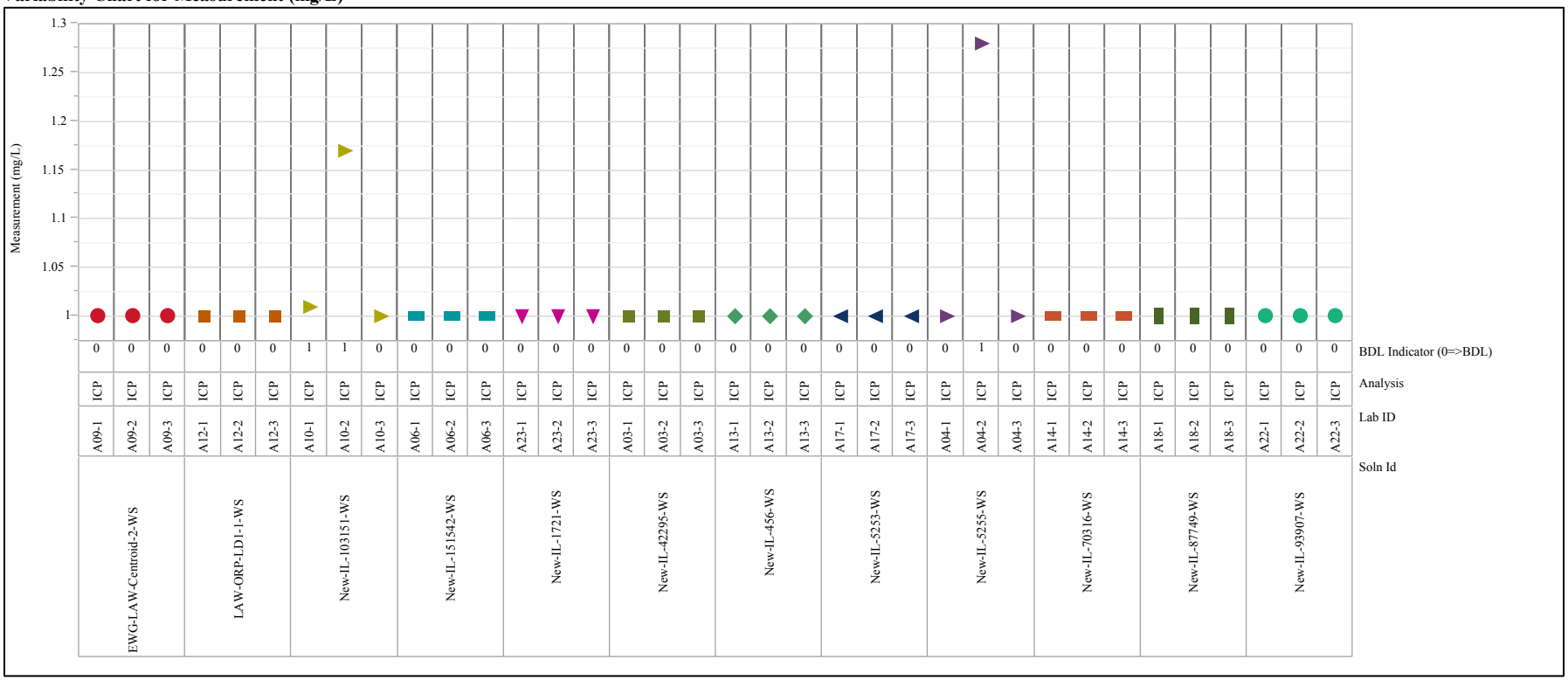


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Sn (mg/L), Groupings=B: a
Variability Chart for Measurement (mg/L)

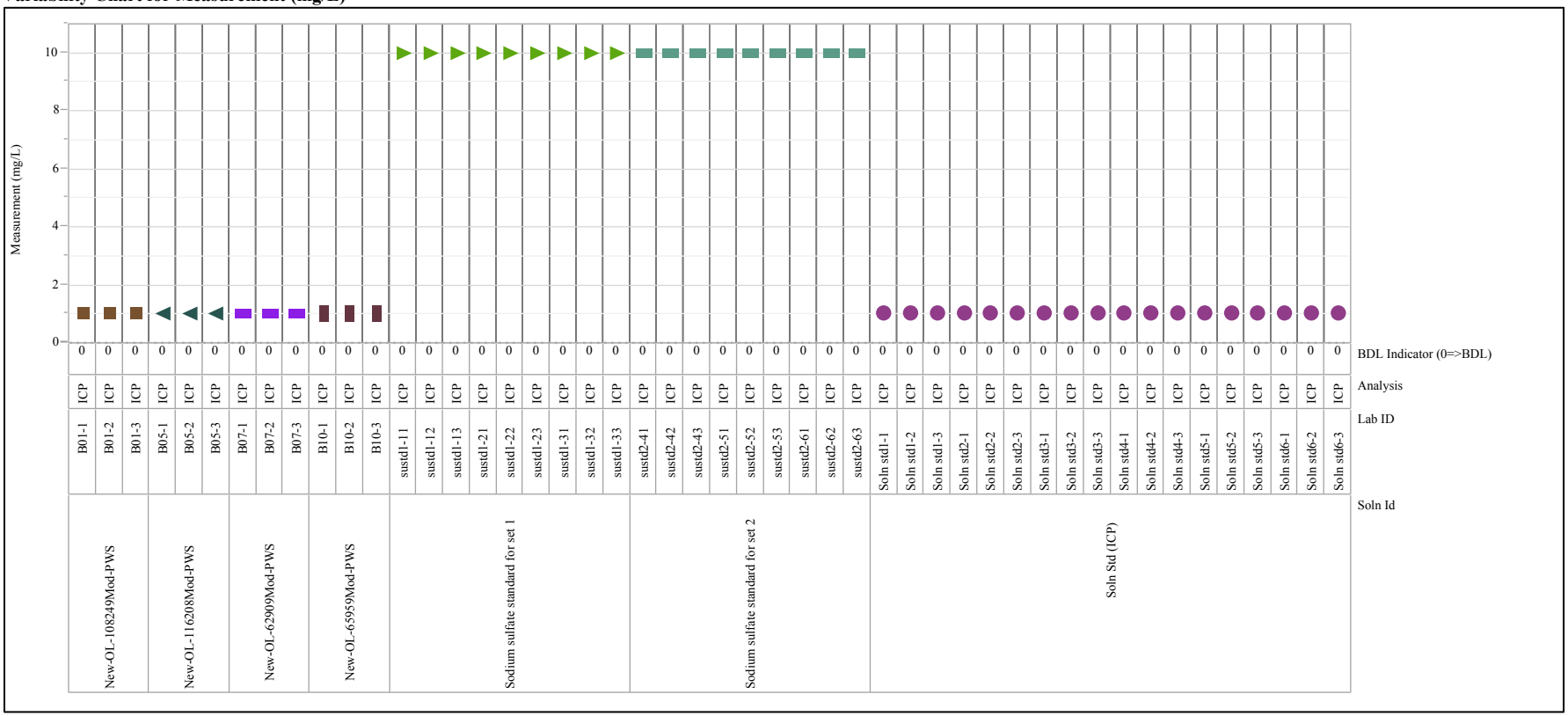


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Sn (mg/L), Groupings=B: b
Variability Chart for Measurement (mg/L)

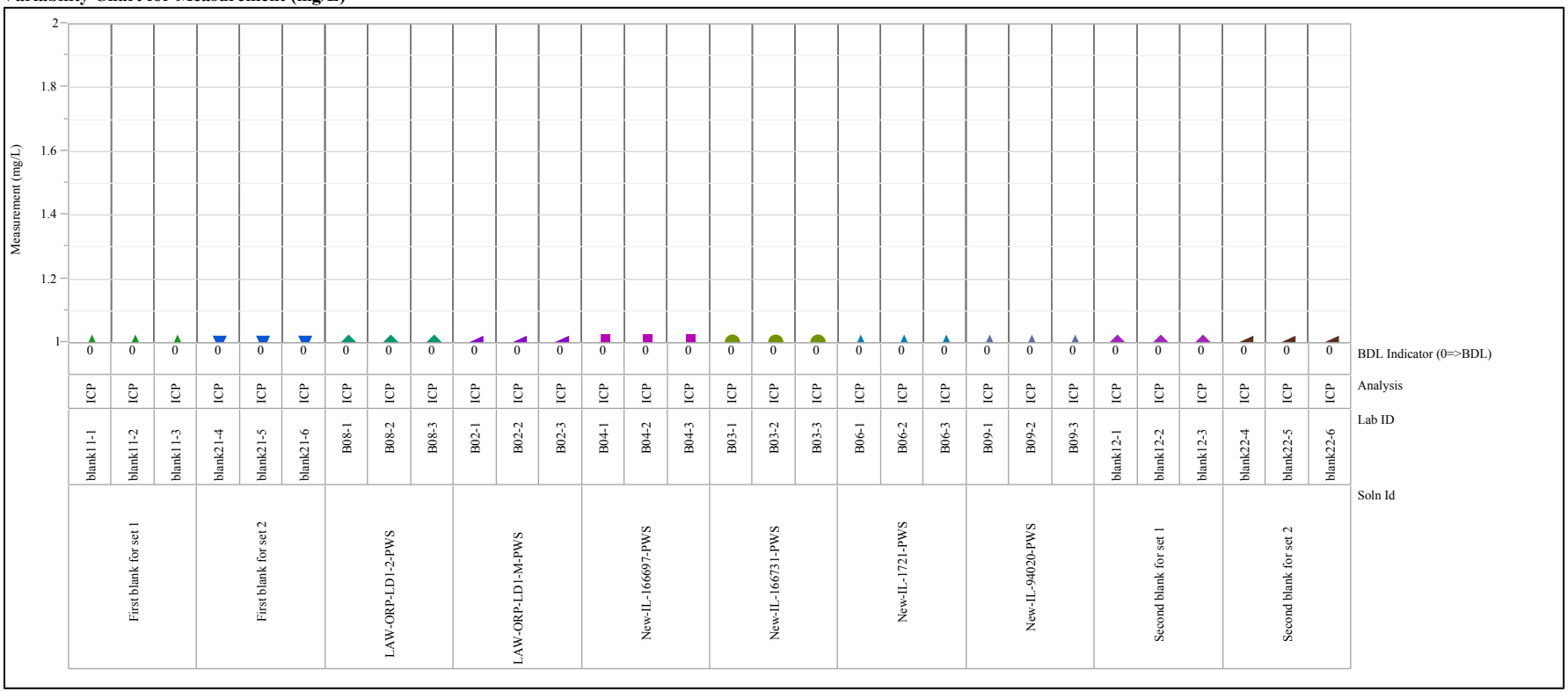


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=SO4 (mg/L), Groupings=A: a
Variability Chart for Measurement (mg/L)

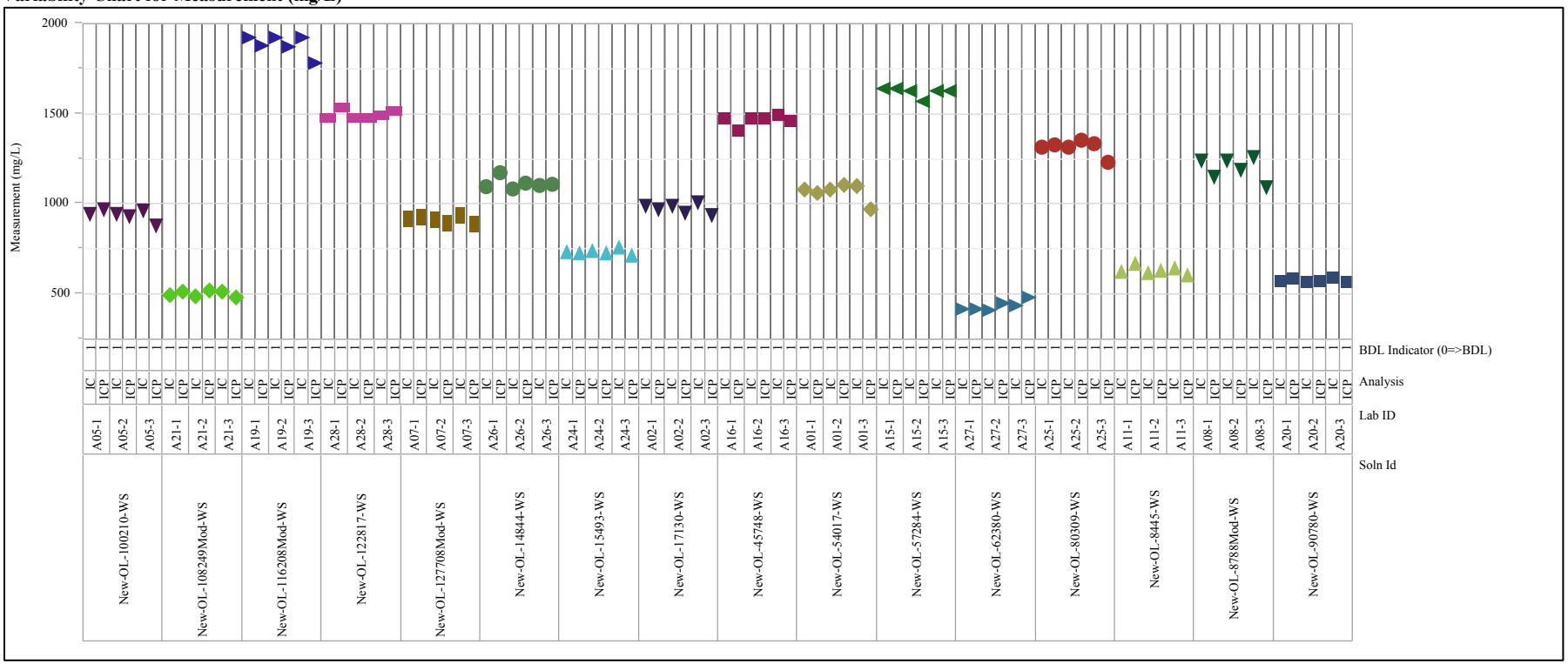


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=SO4 (mg/L), Groupings=A: b
Variability Chart for Measurement (mg/L)

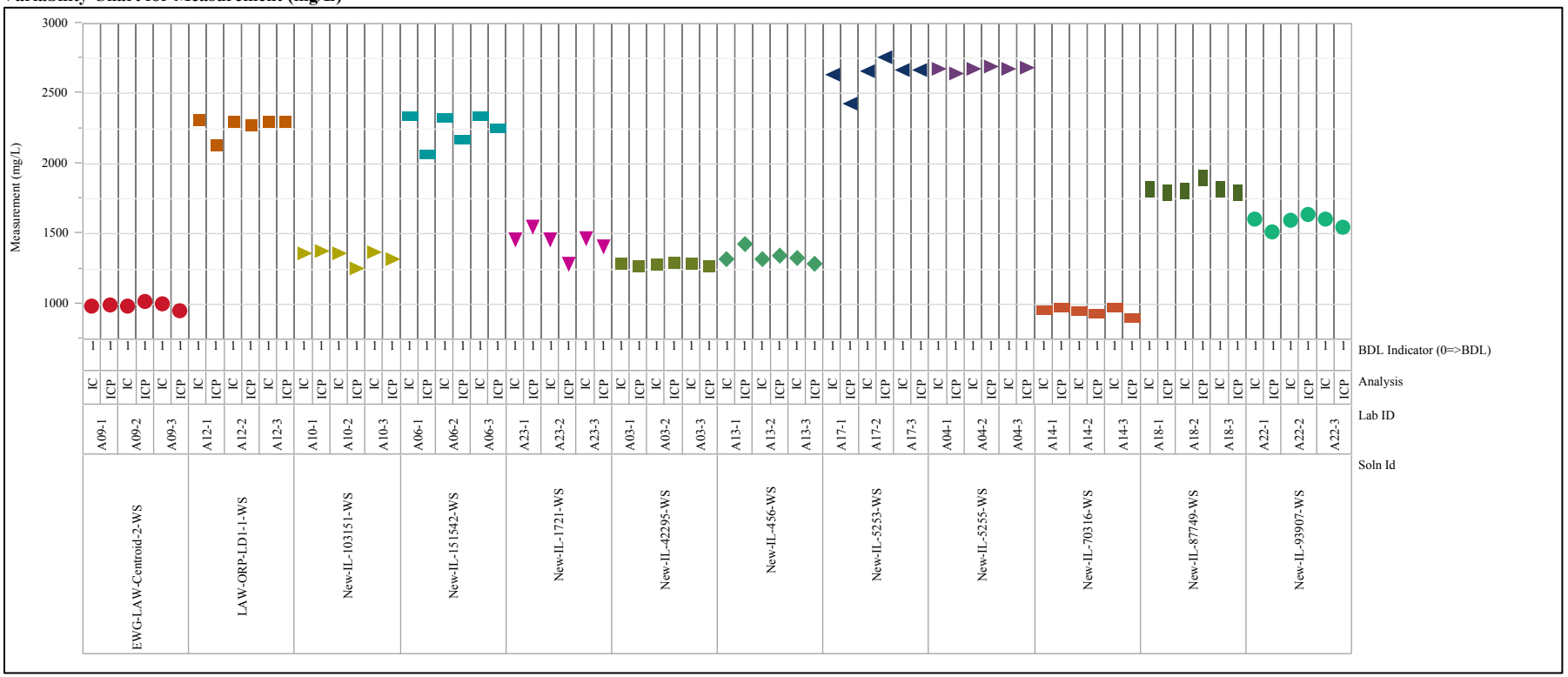


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=SO4 (mg/L), Groupings=B: a
Variability Chart for Measurement (mg/L)

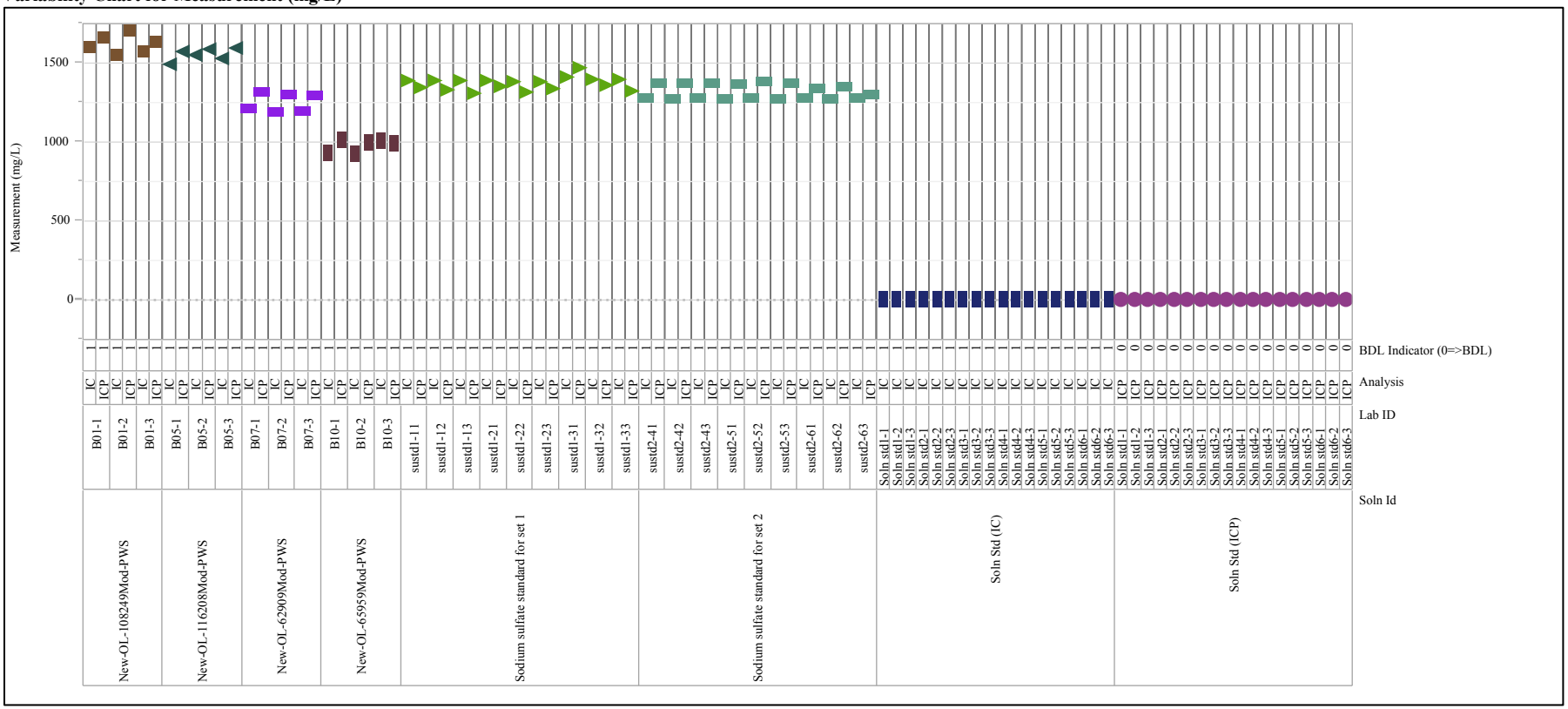


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=SO4 (mg/L), Groupings=B: b
Variability Chart for Measurement (mg/L)

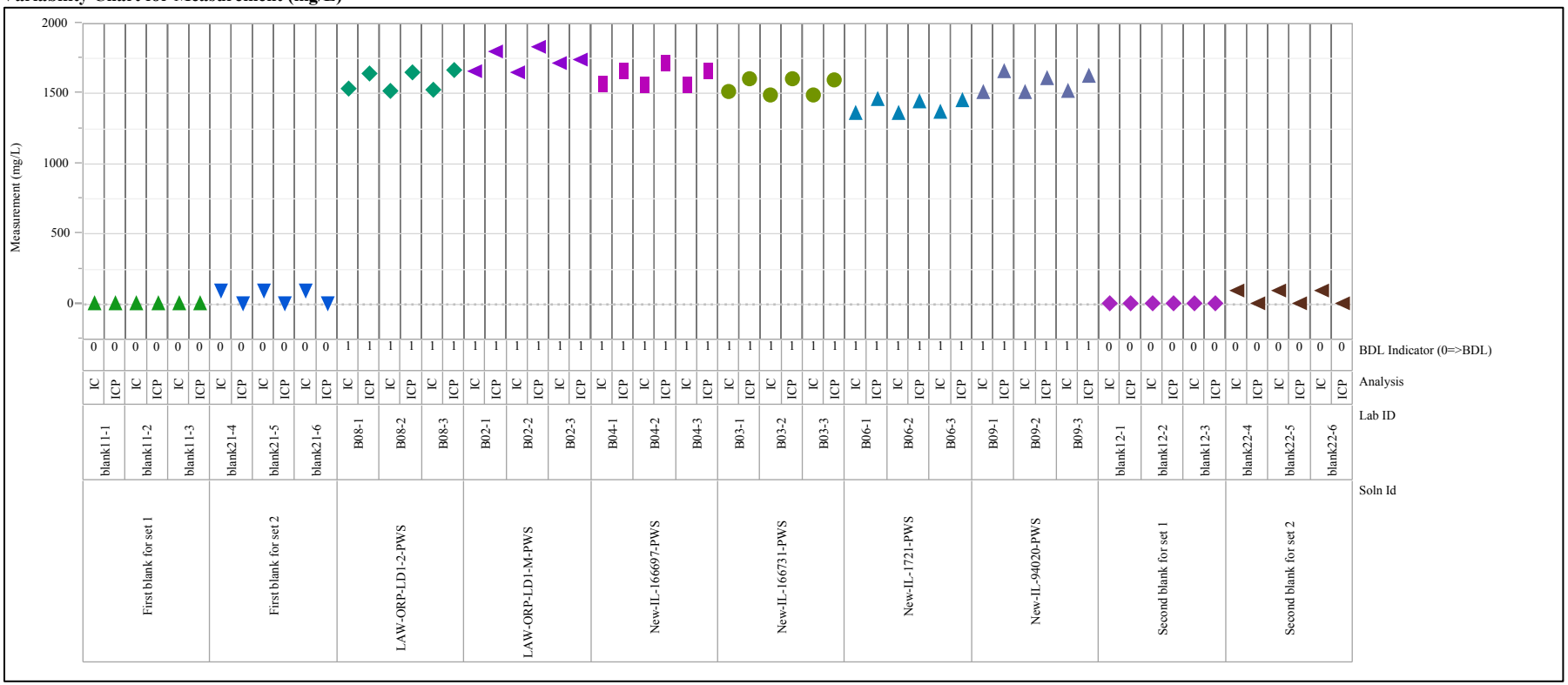


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=V (mg/L), Groupings=A: a
Variability Chart for Measurement (mg/L)

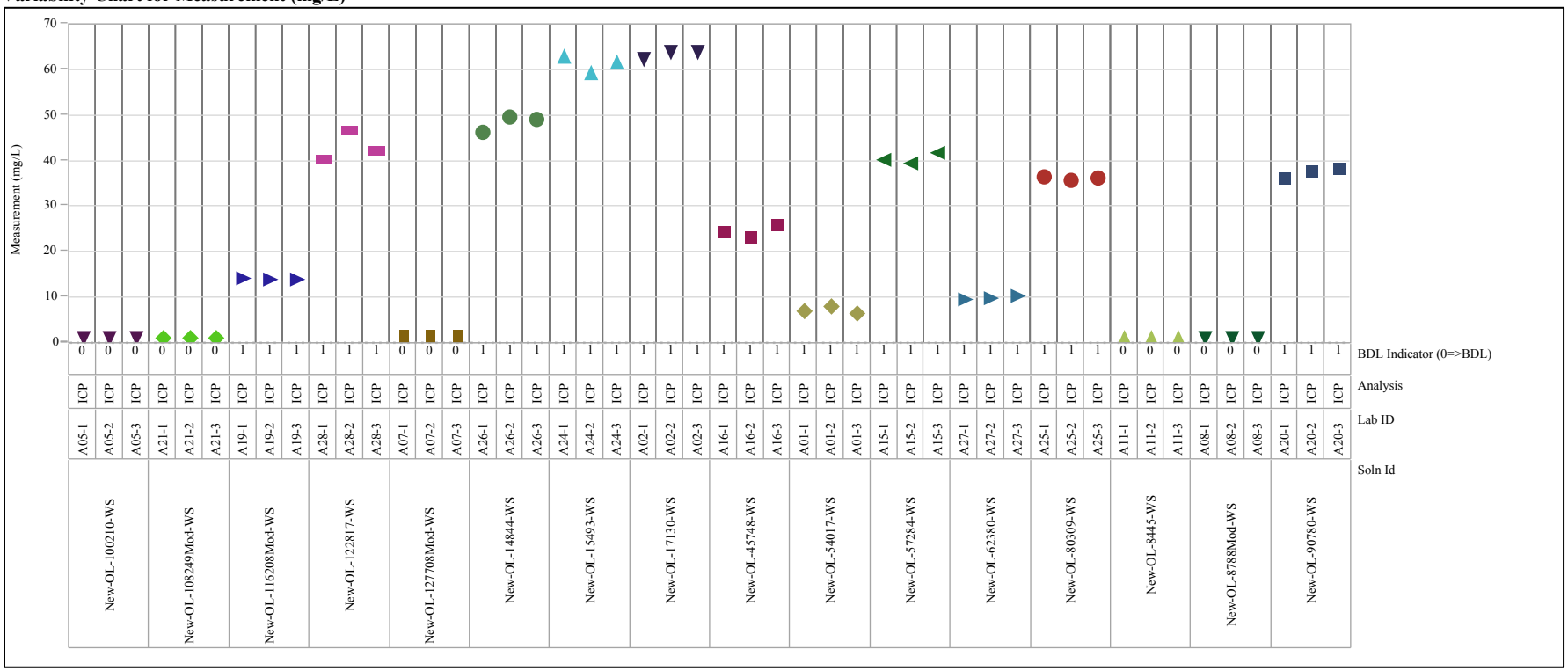


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=V (mg/L), Groupings=A: b
Variability Chart for Measurement (mg/L)

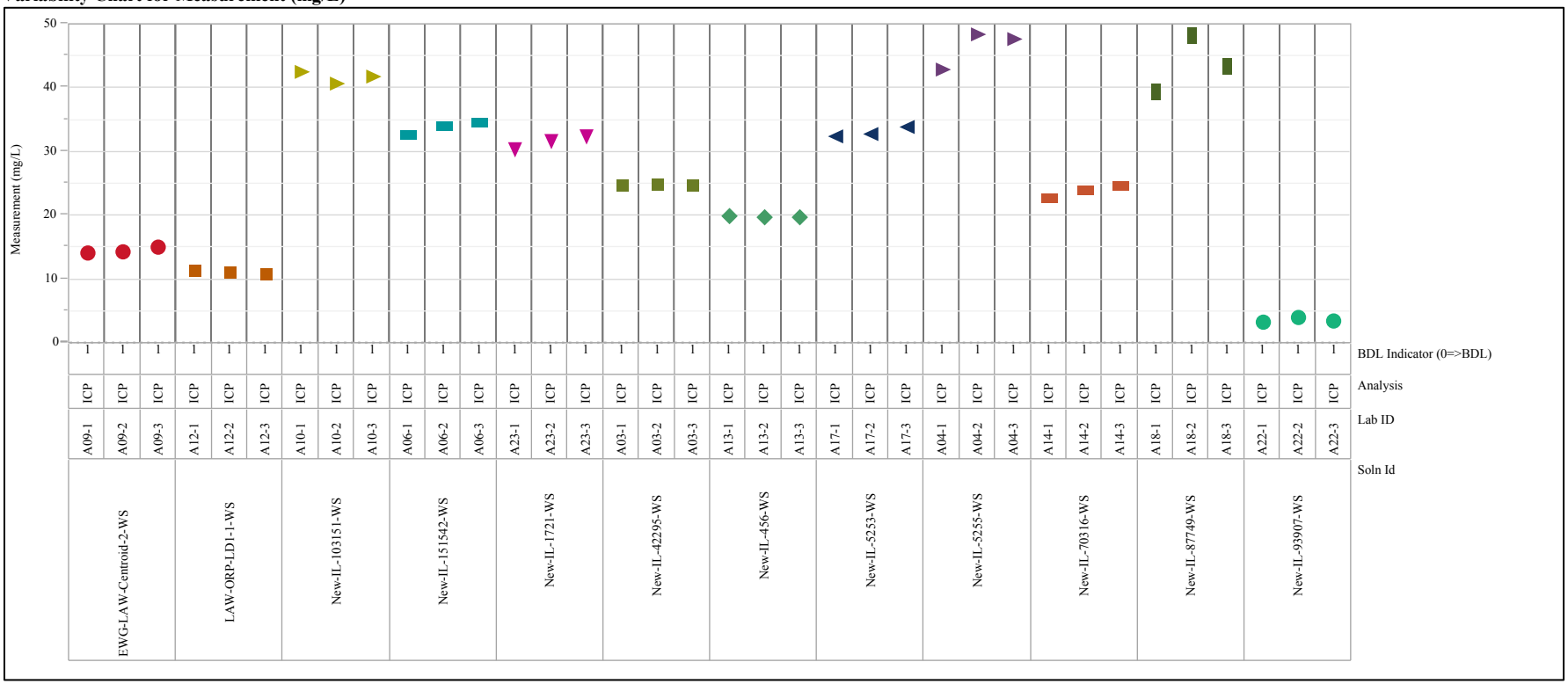


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=V (mg/L), Groupings=B: a
Variability Chart for Measurement (mg/L)

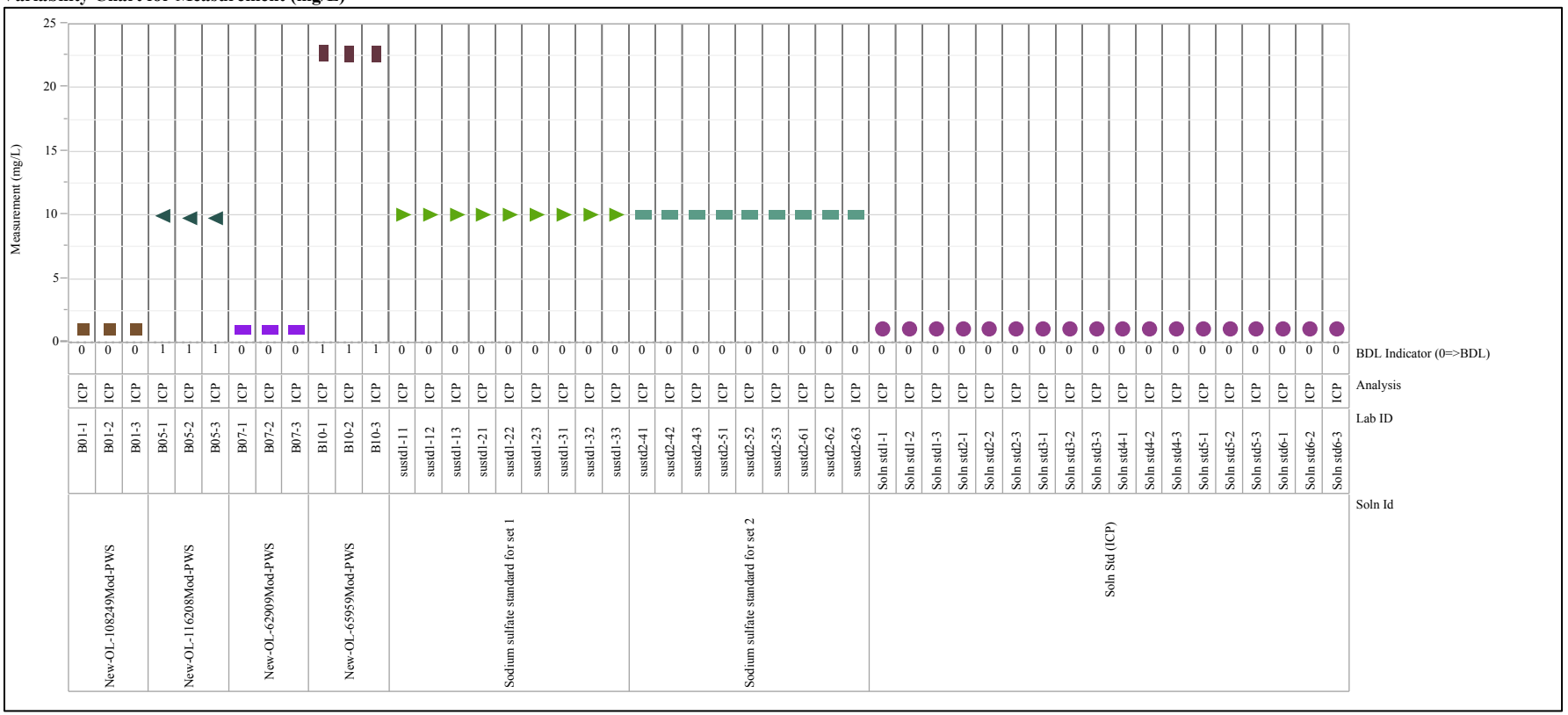


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=V (mg/L), Groupings=B: b
Variability Chart for Measurement (mg/L)

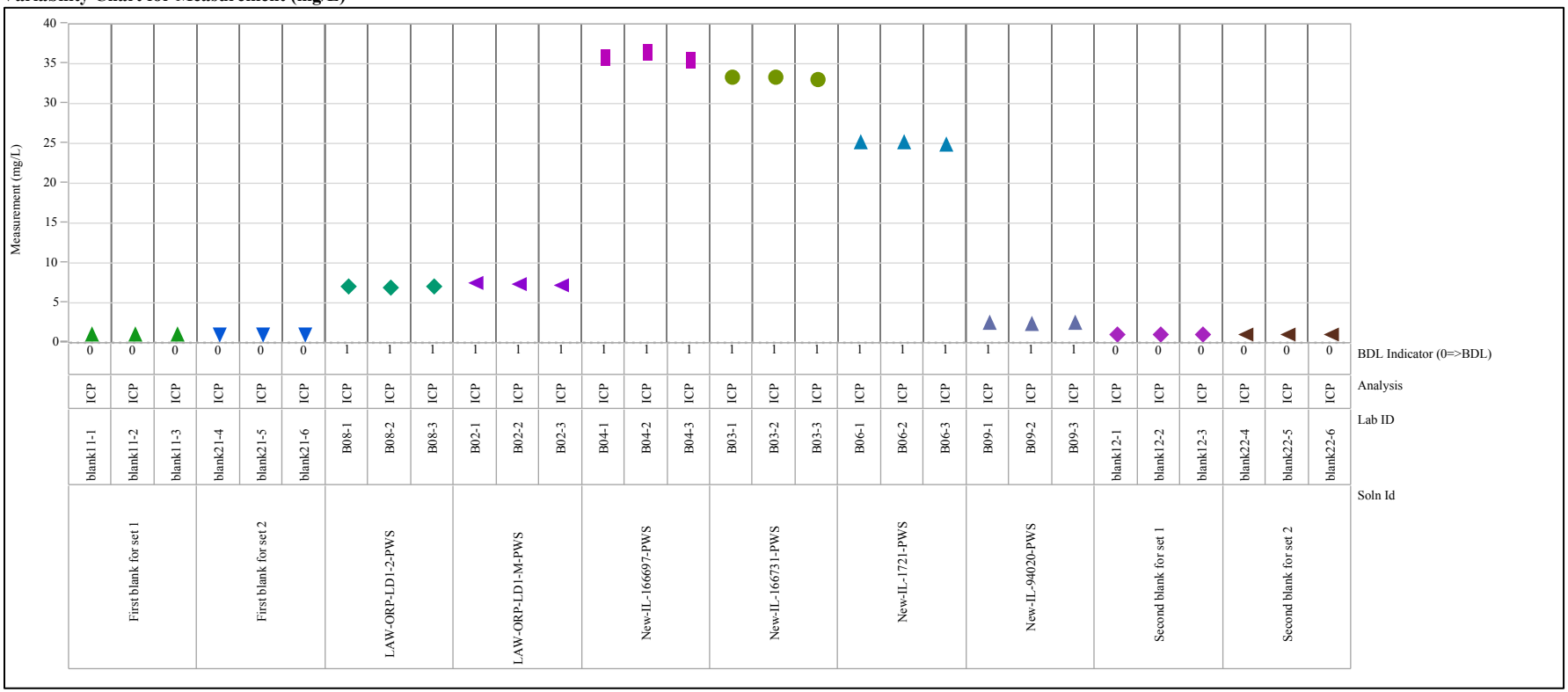


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Zn (mg/L), Groupings=A: a
Variability Chart for Measurement (mg/L)

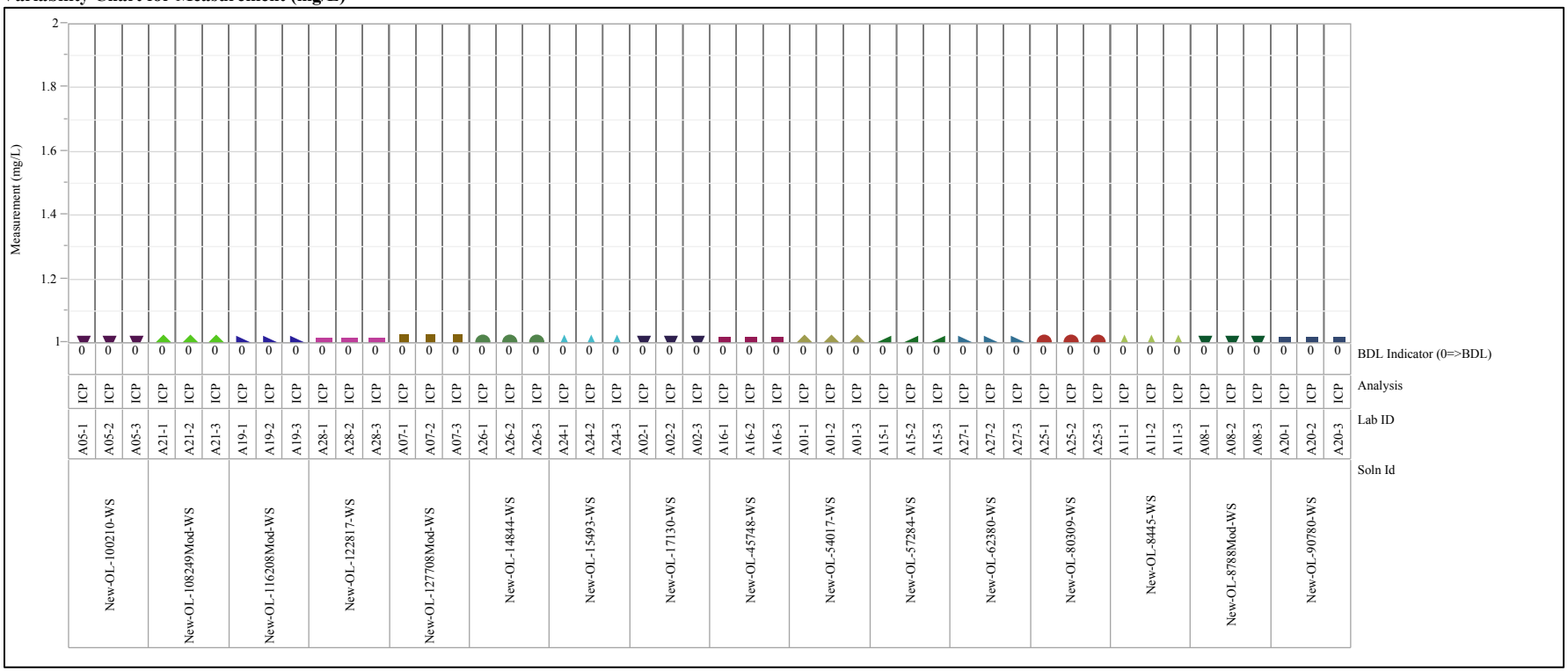


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Zn (mg/L), Groupings=A: b
Variability Chart for Measurement (mg/L)

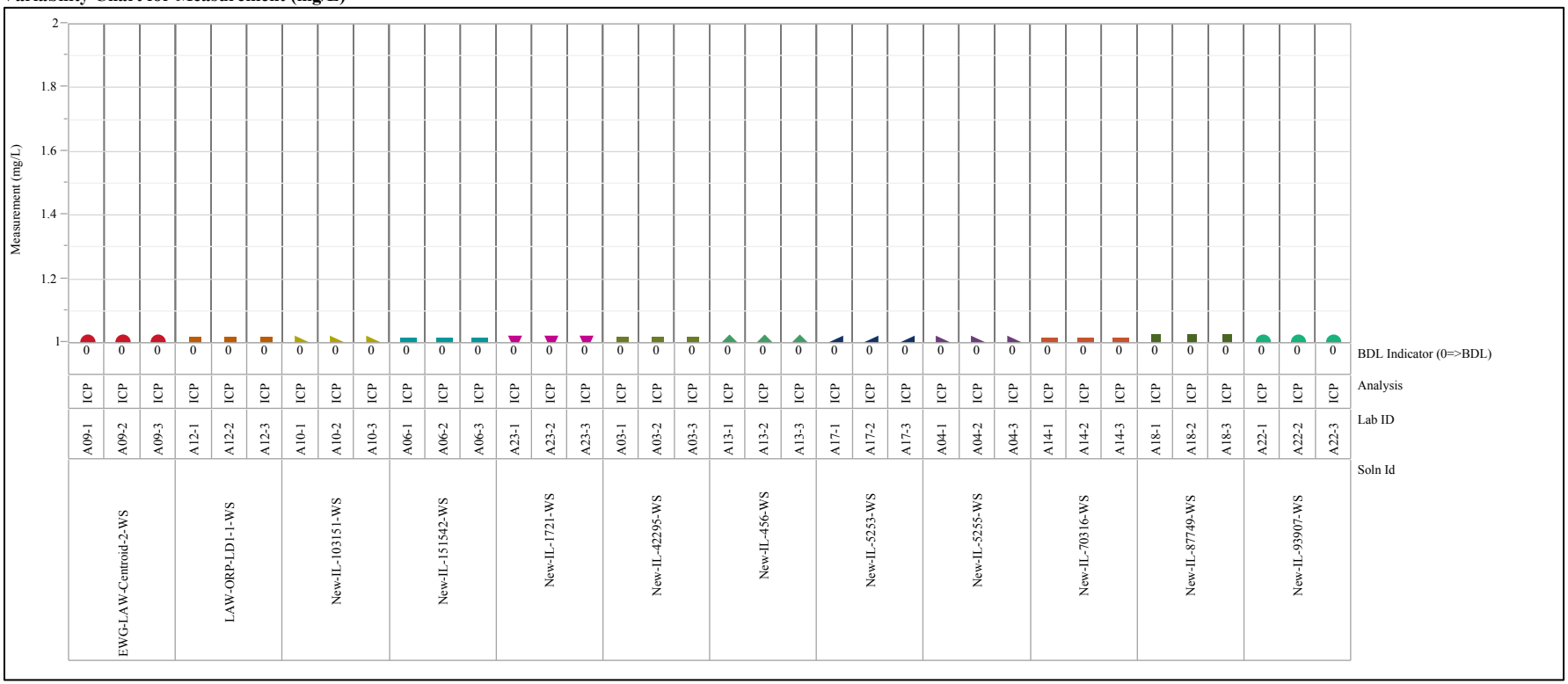


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Zn (mg/L), Groupings=B: a
Variability Chart for Measurement (mg/L)

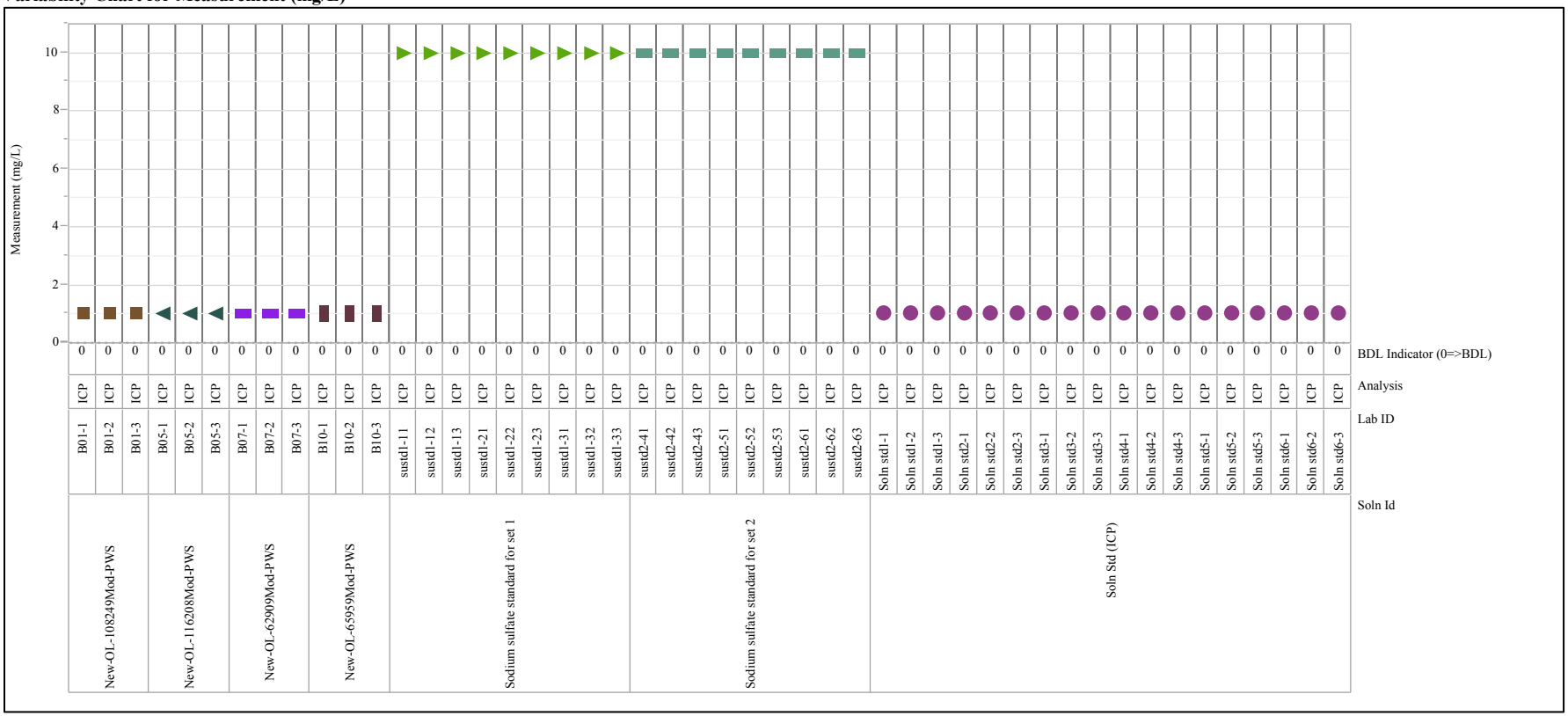


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Zn (mg/L), Groupings=B: b
Variability Chart for Measurement (mg/L)

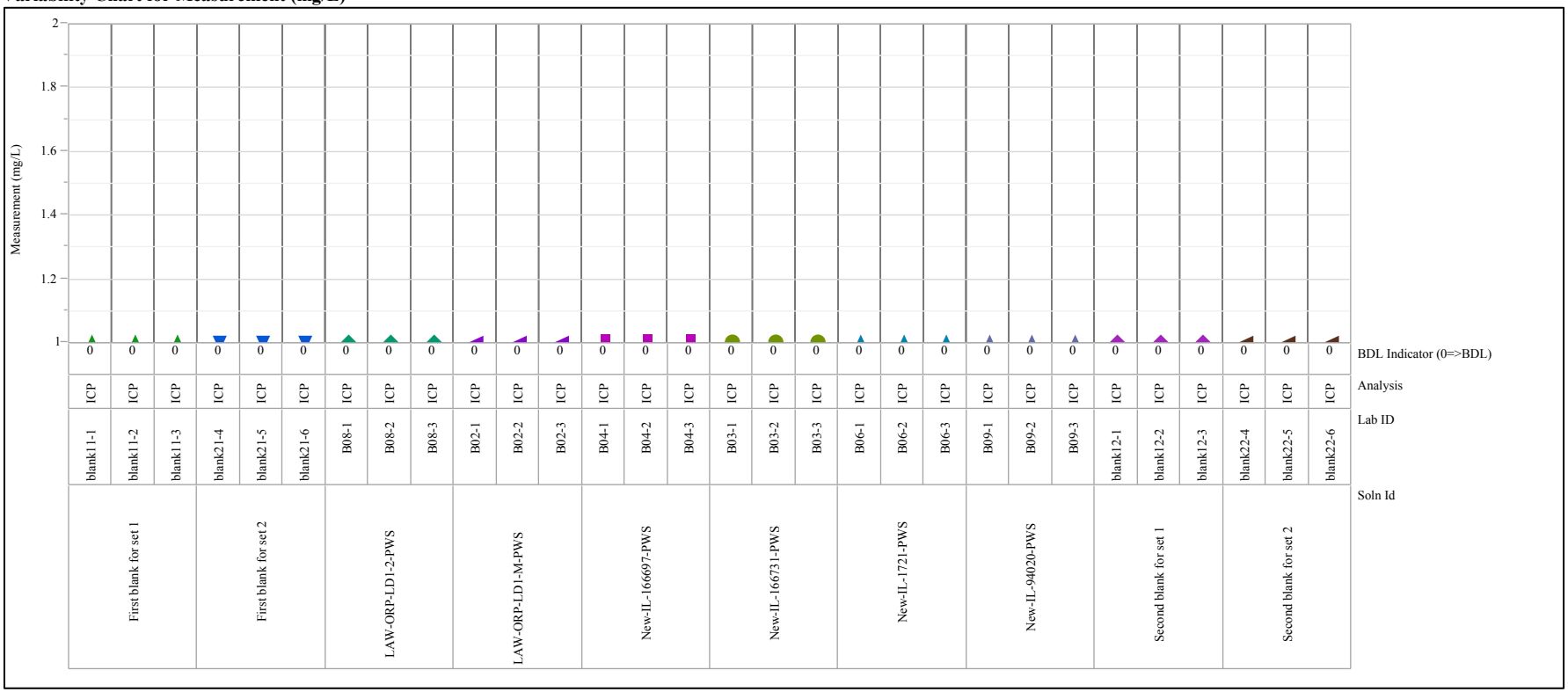


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Zr (mg/L), Groupings=A: a
Variability Chart for Measurement (mg/L)

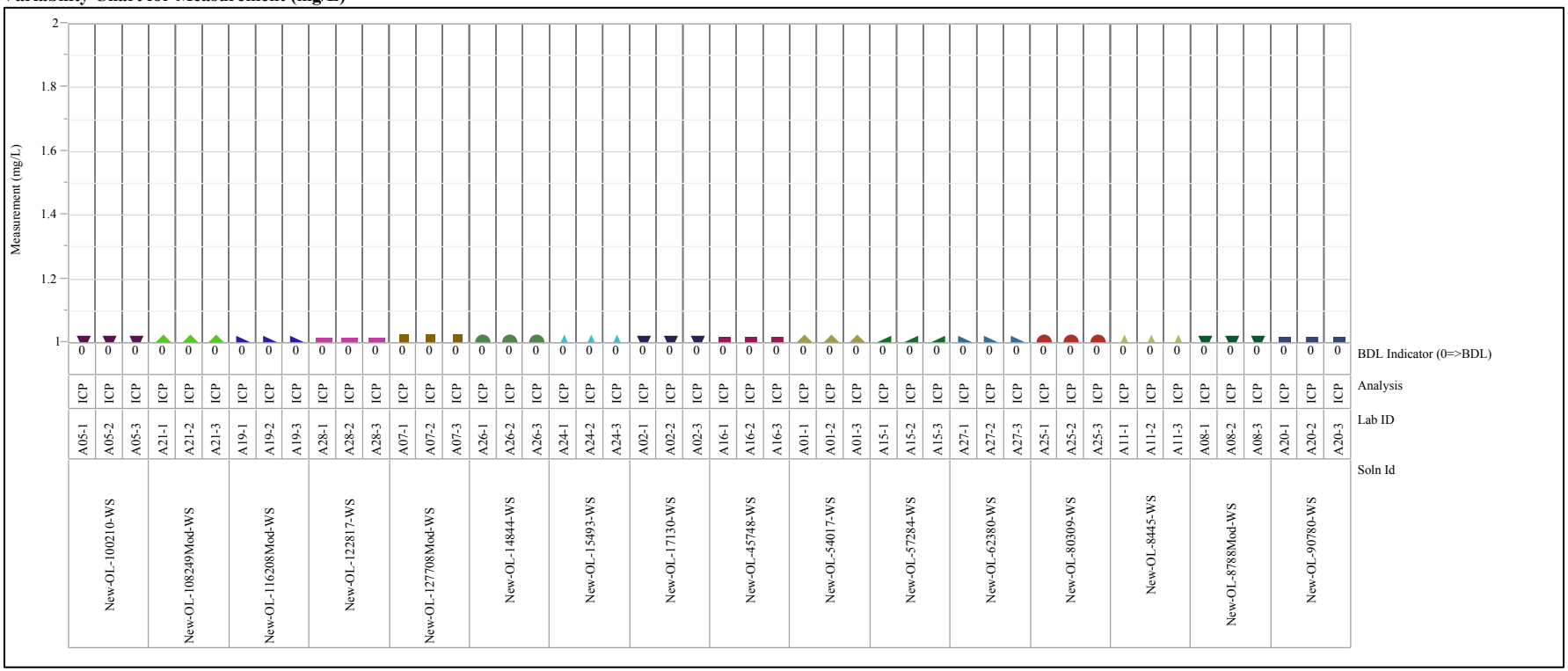


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Zr (mg/L), Groupings=A: b
Variability Chart for Measurement (mg/L)

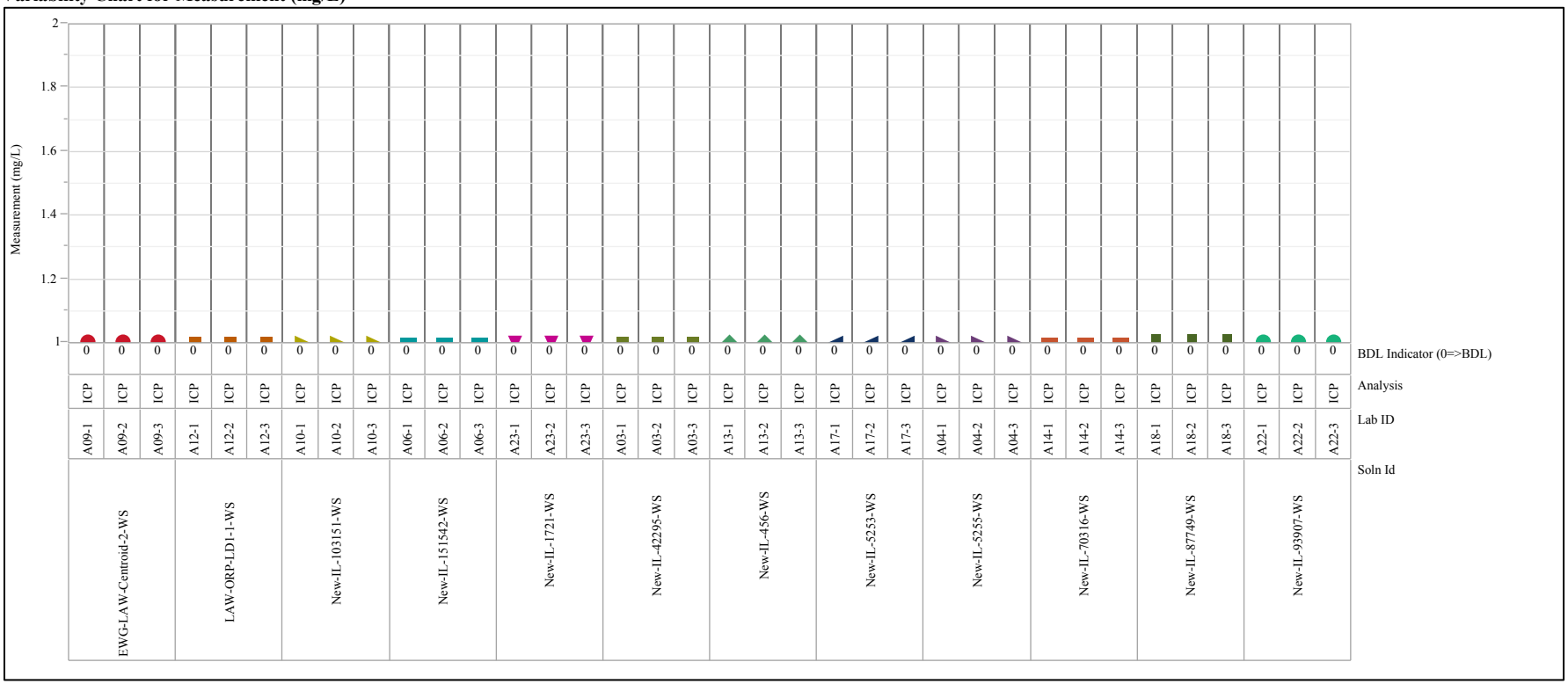


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Zr (mg/L), Groupings=B: a
Variability Chart for Measurement (mg/L)

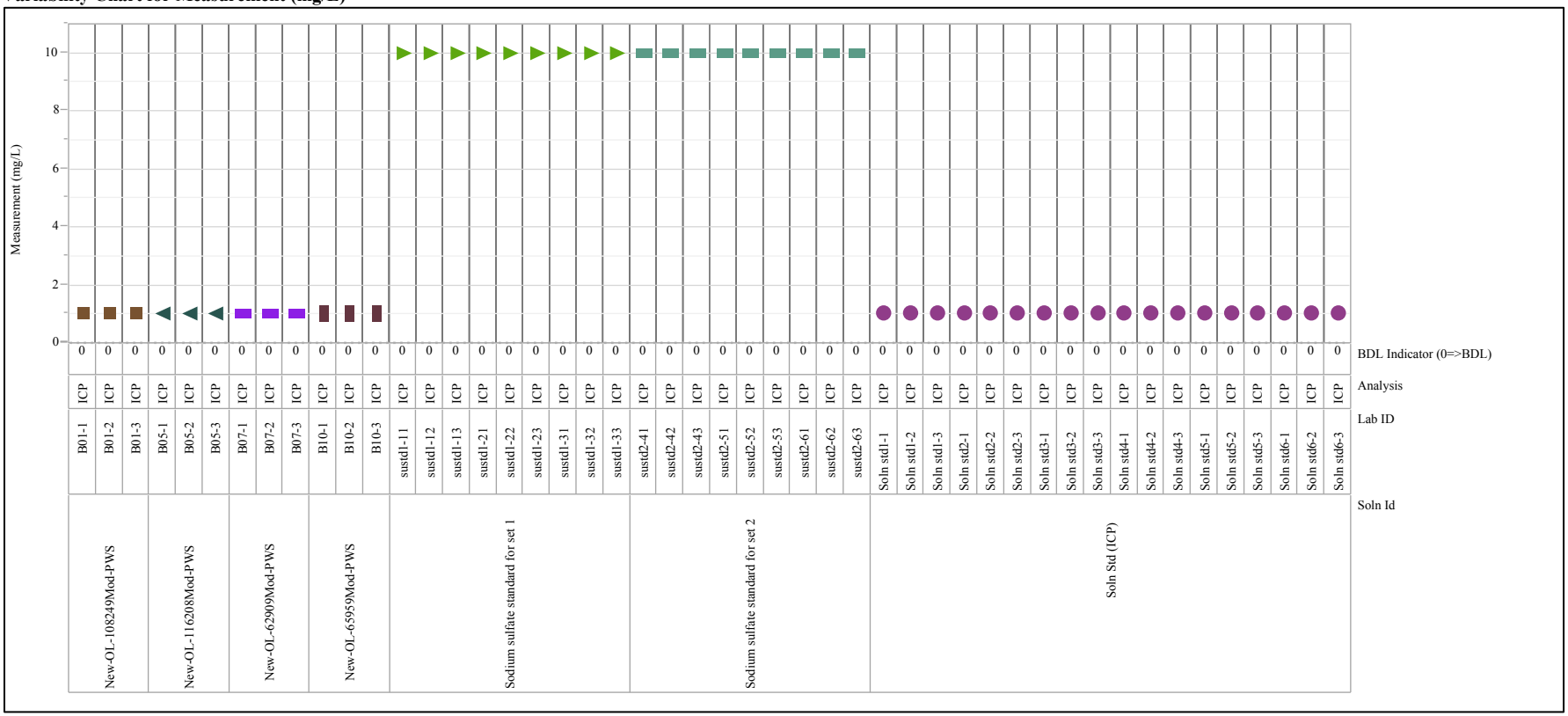
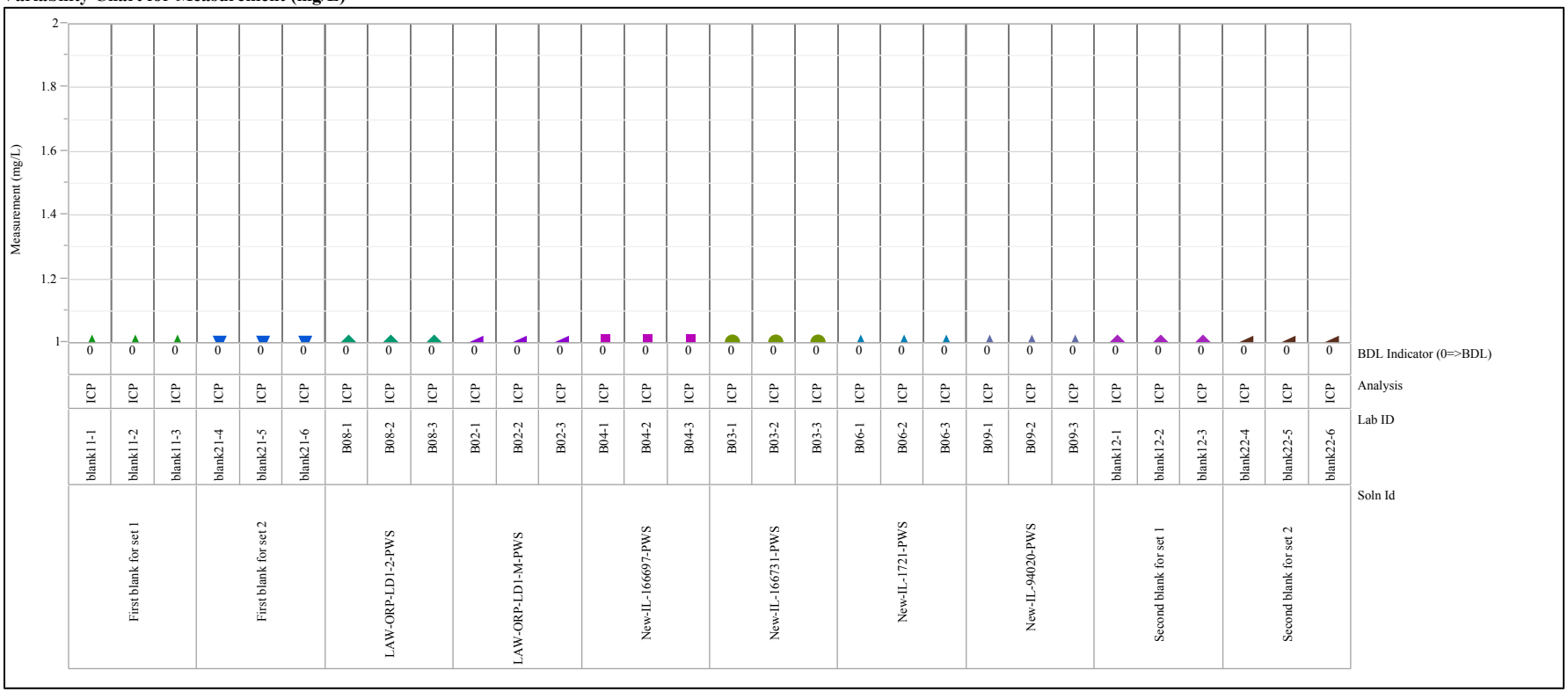


Exhibit D-2. Analysis of Wash Solutions by Solution Identifier (continued)

Analyte=Zr (mg/L), Groupings=B: b
Variability Chart for Measurement (mg/L)



Distribution:

J. W. Amoroso, 999-W
T. B. Brown, 773-A
H. H. Burns, 773-41A
M. E. Caldwell, 999-W
A. D. Cozzi, 999-W
C. L. Crawford, 773-42A
T. B. Edwards, 999-W
S. D. Fink, 773-A
K. M. Fox, 999-W
C. C. Herman, 773-A
E. N. Hoffman, 999-W
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
C. S. Lewis, 999-W
J. Matyáš, PNNL
D. J. McCabe, 773-42A
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
C. L. Trivelpiece, 999-W
J. D. Vienna, PNNL
B. J. Wiedenman, 773-42A
W. R. Wilmarth, 773-A
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