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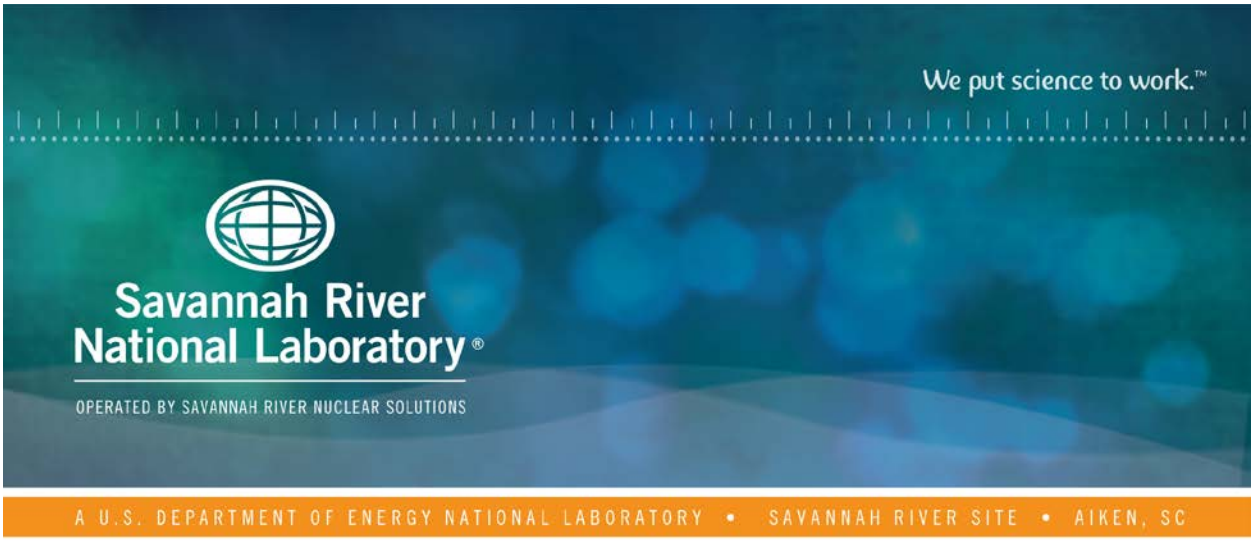


# Product Consistency Test Results for the High-Chromium Matrix Glasses

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**T. B. Edwards**

April 2020

SRNL-STI-2020-00136, Revision 0

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# EXECUTIVE SUMMARY

This report provides chemical analysis of a series of Product Consistency Test (PCT) leachates from simulated nuclear waste glasses. The resulting data will be used in the development of improved property/composition models.

For some of the glass leachates, minor scatter among the triplicate values of some analytes was observed. For other leachates, there were more significant differences among the triplicate values. A review of the PCT data noted that there was little difference between the normalized values on the basis of targeted or measured glass composition. Several of the study glasses, both quenched and canister centerline cooled, have $NC_i$ values that are greater than the Hanford Tank Waste Treatment and Immobilization Plant immobilized low-activity waste constraint of 4 g/L for B, Na, and Si. For many of the study glasses, heat treatment had only a marginal impact on the $NC_i$ values. The samples of the Environmental Assessment (EA) reference glass included with each PCT set had inconsistent $NC_i$ values, although some degree of variation in $NC_i$ values for the EA glass is typical. The release rates for boron and sodium were highly correlated for the study glasses, while for the other analytes, less correlation was observed.

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# LIST OF ABBREVIATIONS

| | |
|---|---|
| BDL | Below Detection Limit |
| CCC | Canister Centerline Cooled |
| DOE | U.S. Department of Energy |
| EA | Environmental Assessment |
| ICP-OES | Inductively Coupled Plasma – Optical Emission Spectroscopy |
| HLW | High-Level Waste |
| LAW | Low-Activity Waste |
| $NC_i$ | Normalized Concentration of element "*i*" |
| ORP | Office of River Protection |
| PCT | Product Consistency Test |
| PNNL | Pacific Northwest National Laboratory |
| %RSD | Percent Relative Standard Deviation |
| SRNL | Savannah River National Laboratory |
| 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] Two of these areas are enhancing waste glass property/composition models and broadening the compositional regions over which those models are applicable.

In this report, SRNL provides chemical analysis of a series of Product Consistency Test leachates from simulated nuclear waste glasses fabricated at the Pacific Northwest National Laboratory (PNNL). The glasses were selected as part of a broader study of the influence of glass composition on chemical durability, sulfur retention, and other properties.[2,3] The glasses were designated the DHW19M-series glasses. The resulting data will be used in the development of improved property/composition models for nuclear waste glasses.

## 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, experiments C3489-00079-29 and C3489-00079-32. The glasses provided by PNNL were fabricated following a Task Plan.[4]

### 2.2 Glasses Selected for Study

The baseline (quenched) glass compositions in this study were selected and fabricated by PNNL. PNNL performed canister centerline cooled (CCC) heat treatments on a subsample of each of the glasses. The ASTM Product Consistency Test (PCT) Method A was performed on quenched and CCC versions of each of the study glasses, and the resulting leachates were sent to SRNL for chemical analysis. The leachates were received and subsequently analyzed in several groups. Identifiers and PNNL groupings for the glass leachates received at SRNL in 2019 are listed in Table 2-1, and those received at SRNL in 2020 are listed in Table 2-2.

In the sections that follow, the methods used for measuring the chemical compositions of the PCT leachates are described, the concentrations of the leachate constituents are normalized to the targeted and measured glass compositions, and reviews of the resulting data are provided. Detailed data from these analyses are included in the appendices.

**Table 2-1. Identifiers for the PCT Leachates Received in 2019**

| PNNL Group | PNNL Solution ID | PNNL Group | PNNL Solution ID |
|---|---|---|---|
| 1 | DHW19M-1-2-Q-PCT-A | 3 | DHW19M-11-Q-PCT-A |
| 1 | DHW19M-1-2-Q-PCT-B | 3 | DHW19M-11-Q-PCT-B |
| 1 | DHW19M-1-2-Q-PCT-C | 3 | DHW19M-11-Q-PCT-C |
| 1 | DHW19M-2-3-Q-PCT-A | 3 | DHW19M-12-Q-PCT-A |
| 1 | DHW19M-2-3-Q-PCT-B | 3 | DHW19M-12-Q-PCT-B |
| 1 | DHW19M-2-3-Q-PCT-C | 3 | DHW19M-12-Q-PCT-C |
| 1 | DHW19M-3-1-Q-PCT-A | 3 | DHW19M-13-Q-PCT-A |
| 1 | DHW19M-3-1-Q-PCT-B | 3 | DHW19M-13-Q-PCT-B |
| 1 | DHW19M-3-1-Q-PCT-C | 3 | DHW19M-13-Q-PCT-C |
| 1 | DHW19M-4-Q-PCT-A | 3 | DHW19M-14-Q-PCT-A |
| 1 | DHW19M-4-Q-PCT-B | 3 | DHW19M-14-Q-PCT-B |
| 1 | DHW19M-4-Q-PCT-C | 3 | DHW19M-14-Q-PCT-C |
| 1 | DHW19M-5-Q-PCT-A | 3 | DHW19M-15-Q-PCT-A |
| 1 | DHW19M-5-Q-PCT-B | 3 | DHW19M-15-Q-PCT-B |
| 1 | DHW19M-5-Q-PCT-C | 3 | DHW19M-15-Q-PCT-C |
| 1 | DWPF-EA-PCT-9919-A | 3 | DWPF-EA-PCT-91919-A |
| 1 | DWPF-EA-PCT-9919-B | 3 | DWPF-EA-PCT-91919-B |
| 1 | DWPF-EA-PCT-9919-C | 3 | DWPF-EA-PCT-91919-C |
| 1 | DI-Water-BLANK-1-9919 | 3 | DI-Water-BLANK-1-91919 |
| 1 | DI-Water-BLANK-2-9919 | 3 | DI-Water-BLANK-2-91919 |
| 2 | DHW19M-6-1-Q-PCT-A | 4 | DHW19M-16-Q-PCT-A |
| 2 | DHW19M-6-1-Q-PCT-B | 4 | DHW19M-16-Q-PCT-B |
| 2 | DHW19M-6-1-Q-PCT-C | 4 | DHW19M-16-Q-PCT-C |
| 2 | DHW19M-7-1-Q-PCT-A | 4 | DHW19M-17-1-Q-PCT-A |
| 2 | DHW19M-7-1-Q-PCT-B | 4 | DHW19M-17-1-Q-PCT-B |
| 2 | DHW19M-7-1-Q-PCT-C | 4 | DHW19M-17-1-Q-PCT-C |
| 2 | DHW19M-8-Q-PCT-A | 4 | DHW19M-18-Q-PCT-A |
| 2 | DHW19M-8-Q-PCT-B | 4 | DHW19M-18-Q-PCT-B |
| 2 | DHW19M-8-Q-PCT-C | 4 | DHW19M-18-Q-PCT-C |
| 2 | DHW19M-9-Q-PCT-A | 4 | DHW19M-19-Q-PCT-A |
| 2 | DHW19M-9-Q-PCT-B | 4 | DHW19M-19-Q-PCT-B |
| 2 | DHW19M-9-Q-PCT-C | 4 | DHW19M-19-Q-PCT-C |
| 2 | DHW19M-10-Q-PCT-A | 4 | DHW19M-20-Q-PCT-A |
| 2 | DHW19M-10-Q-PCT-B | 4 | DHW19M-20-Q-PCT-B |
| 2 | DHW19M-10-Q-PCT-C | 4 | DHW19M-20-Q-PCT-C |
| 2 | DWPF-EA-PCT-91119-A | 4 | DWPF-EA-PCT-92319-A |
| 2 | DWPF-EA-PCT-91119-B | 4 | DWPF-EA-PCT-92319-B |
| 2 | DWPF-EA-PCT-91119-C | 4 | DWPF-EA-PCT-92319-C |
| 2 | DI-Water-BLANK-1-91119 | 4 | DI-Water-BLANK-1-92319 |
| 2 | DI-Water-BLANK-2-91119 | 4 | DI-Water-BLANK-2-92319 |

**Table 2-2. Identifiers for the PCT Leachates Received in 2020**

| PNNL Group | PNNL Solution ID |
|---|---|
| 1 | DHW19M-24-Q-PCT-A |
| 1 | DHW19M-24-Q-PCT-B |
| 1 | DHW19M-24-Q-PCT-C |
| 1 | DHW19M-25-Q-PCT-A |
| 1 | DHW19M-25-Q-PCT-B |
| 1 | DHW19M-25-Q-PCT-C |
| 1 | DHW19M-26-Q-PCT-A |
| 1 | DHW19M-26-Q-PCT-B |
| 1 | DHW19M-26-Q-PCT-C |
| 1 | DWPF-EA-PCT-100719-A |
| 1 | DWPF-EA-PCT-100719-B |
| 1 | DWPF-EA-PCT-100719-C |
| 1 | DI-WaterBLANK-1-100719-A |
| 1 | DI-WaterBLANK-1-100719-B |
| 2 | DHW19M-22-1-Q-PCT-A |
| 2 | DHW19M-22-1-Q-PCT-B |
| 2 | DHW19M-22-1-Q-PCT-C |
| 2 | DHW19M-27-Q-PCT-A |
| 2 | DHW19M-27-Q-PCT-B |
| 2 | DHW19M-27-Q-PCT-C |
| 2 | DHW19M-28-Q-PCT-A |
| 2 | DHW19M-28-Q-PCT-B |
| 2 | DHW19M-28-Q-PCT-C |
| 2 | DHW19M-29-Q-PCT-A |
| 2 | DHW19M-29-Q-PCT-B |
| 2 | DHW19M-29-Q-PCT-C |
| 2 | DHW19M-30-Q-PCT-A |
| 2 | DHW19M-30-Q-PCT-B |
| 2 | DHW19M-30-Q-PCT-C |
| 2 | DWPF-EA-PCT-100919-A+B |
| 2 | DWPF-EA-PCT-100919-C |
| 2 | DI-WaterBLANK-1-100919-A |
| 2 | DI-WaterBLANK-1-100919-B |
| 3 | DHW19M-31-Q-PCT-A |
| 3 | DHW19M-31-Q-PCT-B |
| 3 | DHW19M-31-Q-PCT-C |
| 3 | DHW19M-32-Q-PCT-A |
| 3 | DHW19M-32-Q-PCT-B |
| 3 | DHW19M-32-Q-PCT-C |
| 3 | DHW19M-33-Q-PCT-A |
| 3 | DHW19M-33-Q-PCT-B |
| 3 | DHW19M-33-Q-PCT-C |
| 3 | DHW19M-1-3-Q-PCT-A |
| 3 | DHW19M-1-3-Q-PCT-B |
| 3 | DHW19M-1-3-Q-PCT-C |
| 3 | DHW19M-1-3-CCC-PCT-A |
| 3 | DHW19M-1-3-CCC-PCT-B |
| 3 | DHW19M-1-3-CCC-PCT-C |
| 3 | DWPF-EA-PCT-102319-A |
| 3 | DWPF-EA-PCT-102319-B |
| 3 | DWPF-EA-PCT-102319-C |
| 3 | DI-WaterBLANK-1-102319 |
| 3 | DI-WaterBLANK-2-102319 |
| 4 | DHW19M-2-3-CCC-PCT-A |
| 4 | DHW19M-2-3-CCC-PCT-B |
| 4 | DHW19M-2-3-CCC-PCT-C |
| 4 | DHW19M-3-1-CCC-PCT-A |
| 4 | DHW19M-3-1-CCC-PCT-B |
| 4 | DHW19M-3-1-CCC-PCT-C |
| 4 | DHW19M-4-CCC-PCT-A |
| 4 | DHW19M-4-CCC-PCT-B |
| 4 | DHW19M-4-CCC-PCT-C |
| 4 | DHW19M-5-CCC-PCT-A |
| 4 | DHW19M-5-CCC-PCT-B |
| 4 | DHW19M-5-CCC-PCT-C |
| 4 | DHW19M-6-1-CCC-PCT-A |
| 4 | DHW19M-6-1-CCC-PCT-B |
| 4 | DHW19M-6-1-CCC-PCT-C |
| 4 | DWPF-EA-PCT-102419-A |
| 4 | DWPF-EA-PCT-102419-B |
| 4 | DWPF-EA-PCT-102419-C |
| 4 | DI-WaterBLANK-1-102419 |
| 4 | DI-WaterBLANK-2-102419 |
| 5 | DHW19M-7-1-CCC-PCT-A |
| 5 | DHW19M-7-1-CCC-PCT-B |
| 5 | DHW19M-7-1-CCC-PCT-C |
| 5 | DHW19M-8-CCC-PCT-A |
| 5 | DHW19M-8-CCC-PCT-B |
| 5 | DHW19M-8-CCC-PCT-C |
| 5 | DHW19M-9-CCC-PCT-A |
| 5 | DHW19M-9-CCC-PCT-B |
| 5 | DHW19M-9-CCC-PCT-C |
| 5 | DHW19M-10-CCC-PCT-A |
| 5 | DHW19M-10-CCC-PCT-B |
| 5 | DHW19M-10-CCC-PCT-C |
| 5 | DHW19M-12-CCC-PCT-A |
| 5 | DHW19M-12-CCC-PCT-B |
| 5 | DHW19M-12-CCC-PCT-C |
| 5 | DWPF-EA-PCT-110519-A |
| 5 | DWPF-EA-PCT-110519-B |
| 5 | DWPF-EA-PCT-110519-C |
| 5 | DI-WaterBLANK-1-110519 |
| 5 | DI-WaterBLANK-2-110519 |

**Table 2-2. Identifiers for the PCT Leachates Received in 2020 (continued)**

| PNNL Group | PNNL Solution ID | PNNL Group | PNNL Solution ID |
|---|---|---|---|
| 6 | DHW19M-13-CCC-PCT-A | 9 | DHW19M-27-CCC-PCT-A |
| 6 | DHW19M-13-CCC-PCT-B | 9 | DHW19M-27-CCC-PCT-B |
| 6 | DHW19M-13-CCC-PCT-C | 9 | DHW19M-27-CCC-PCT-C |
| 6 | DHW19M-14-CCC-PCT-A | 9 | DHW19M-28-CCC-PCT-A |
| 6 | DHW19M-14-CCC-PCT-B | 9 | DHW19M-28-CCC-PCT-B |
| 6 | DHW19M-14-CCC-PCT-C | 9 | DHW19M-28-CCC-PCT-C |
| 6 | DHW19M-15-CCC-PCT-A | 9 | DHW19M-29-CCC-PCT-A |
| 6 | DHW19M-15-CCC-PCT-B | 9 | DHW19M-29-CCC-PCT-B |
| 6 | DHW19M-15-CCC-PCT-C | 9 | DHW19M-29-CCC-PCT-C |
| 6 | DHW19M-16-CCC-PCT-A | 9 | DHW19M-30-CCC-PCT-A |
| 6 | DHW19M-16-CCC-PCT-B | 9 | DHW19M-30-CCC-PCT-B |
| 6 | DHW19M-16-CCC-PCT-C | 9 | DHW19M-30-CCC-PCT-C |
| 6 | DWPF-EA-PCT-110619-A | 9 | DHW19M-31-CCC-PCT-A |
| 6 | DWPF-EA-PCT-110619-B | 9 | DHW19M-31-CCC-PCT-B |
| 6 | DWPF-EA-PCT-110619-C | 9 | DHW19M-31-CCC-PCT-C |
| 6 | DI-WaterBLANK-1-110619 | 9 | DWPF-EA-PCT-121219-A |
| 6 | DI-WaterBLANK-2-110619 | 9 | DWPF-EA-PCT-121219-B |
| 7 | DHW19M-21-Q-PCT-A | 9 | DWPF-EA-PCT-121219-C |
| 7 | DHW19M-21-Q-PCT-B | 9 | DI-WaterBLANK-1-121219 |
| 7 | DHW19M-21-Q-PCT-C | 9 | DI-WaterBLANK-2-121219 |
| 7 | DHW19M-23-Q-PCT-A | 10 | DHW19M-32-CCC-PCT-A |
| 7 | DHW19M-23-Q-PCT-B | 10 | DHW19M-32-CCC-PCT-B |
| 7 | DHW19M-23-Q-PCT-C | 10 | DHW19M-32-CCC-PCT-C |
| 7 | DWPF-EA-PCT-011520-A | 10 | DHW19M-33-CCC-PCT-A |
| 7 | DWPF-EA-PCT-011520-B | 10 | DHW19M-33-CCC-PCT-B |
| 7 | DWPF-EA-PCT-011520-C | 10 | DHW19M-33-CCC-PCT-C |
| 7 | DI-WaterBLANK-1-011520 | 10 | DWPF-EA-PCT-010820-A |
| 7 | DI-WaterBLANK-2-011520 | 10 | DWPF-EA-PCT-010820-B |
| 8 | DHW19M-22-1-CCC-PCT-A | 10 | DWPF-EA-PCT-010820-C |
| 8 | DHW19M-22-1-CCC-PCT-B | 10 | DI-WaterBLANK-1-011520 |
| 8 | DHW19M-22-1-CCC-PCT-C | 10 | DI-WaterBLANK-2-011521 |
| 8 | DHW19M-23-CCC-PCT-A | | |
| 8 | DHW19M-23-CCC-PCT-B | | |
| 8 | DHW19M-23-CCC-PCT-C | | |
| 8 | DHW19M-24-CCC-PCT-A | | |
| 8 | DHW19M-24-CCC-PCT-B | | |
| 8 | DHW19M-24-CCC-PCT-C | | |
| 8 | DHW19M-25-CCC-PCT-A | | |
| 8 | DHW19M-25-CCC-PCT-B | | |
| 8 | DHW19M-25-CCC-PCT-C | | |
| 8 | DWPF-EA-PCT-112719-A | | |
| 8 | DWPF-EA-PCT-112719-B | | |
| 8 | DWPF-EA-PCT-112719-C | | |
| 8 | DI-WaterBLANK-1-112719 | | |
| 8 | DI-WaterBLANK-2-112719 | | |

**Table 2-2. Identifiers for the PCT Leachates Received in 2020 (continued)**

| PNNL Group | PNNL Solution ID | | PNNL Group | PNNL Solution ID |
|---|---|---|---|---|
| 11 | DHW19M-11-CCC-PCT-A | | 11 | DHW19M-20-CCC-PCT-C |
| 11 | DHW19M-11-CCC-PCT-B | | 11 | DHW19M-21-CCC-PCT-A |
| 11 | DHW19M-11-CCC-PCT-C | | 11 | DHW19M-21-CCC-PCT-B |
| 11 | DHW19M-17-1-CCC-PCT-A | | 11 | DHW19M-21-CCC-PCT-C |
| 11 | DHW19M-17-1-CCC-PCT-B | | 11 | DHW19M-26-CCC-PCT-A |
| 11 | DHW19M-17-1-CCC-PCT-C | | 11 | DHW19M-26-CCC-PCT-B |
| 11 | DHW19M-18-CCC-PCT-A | | 11 | DHW19M-26-CCC-PCT-C |
| 11 | DHW19M-18-CCC-PCT-B | | 11 | DWPF-EA-PCT-013020-A |
| 11 | DHW19M-18-CCC-PCT-C | | 11 | DWPF-EA-PCT-013020-B |
| 11 | DHW19M-19-CCC-PCT-A | | 11 | DWPF-EA-PCT-013020-C |
| 11 | DHW19M-19-CCC-PCT-B | | 11 | DI-WaterBLANK-1-013020 |
| 11 | DHW19M-19-CCC-PCT-C | | 11 | DI-WaterBLANK-2-013020 |
| 11 | DHW19M-20-CCC-PCT-A | | 11 | DI-WaterBLANK-1-013020-NA |
| 11 | DHW19M-20-CCC-PCT-B | | 11 | DI-WaterBLANK-2-013020-NA |

## 2.3 PCT Leachate Analyses

The PCT leachate samples were analyzed by Inductively Coupled Plasma – Optical Emission Spectroscopy (ICP-OES) under the auspices of two analytical study plans.[5,6] Samples of a multi-element standard solution[a] were also included in the analytical plans as a check on the accuracy of the ICP-OES instrument used for these measurements. PNNL provided the dilution factors used in preparing the PCT leachates for analyses. The leachates received at SRNL in 2019 were diluted by a factor of 1.11. The leachates received at SRNL in 2020 had varying dilution factors; these values are shown in Table B-1 of Appendix A. The dilution factors were used in adjusting the leachate measurements as described further below. Normalized release values were calculated for each glass based on the targeted and measured[7] compositions.

During performance of the ICP-OES analyses, it was noted that some of the PCT leachate samples were gel-like. Additional dilutions with acid were made for these samples, listed in Table 2-3, to allow for analysis. Specifically, HCl and $HNO_3$ in a 3:1 ratio were added until all the gel inside the sample vials had visibly dissolved. Acid additions were made in increments of 900 µl of HCl and 300 µl of $HNO_3$. Four to six incremental acid additions were needed to dissolve the gels. Additional dilution factors were calculated using the change in sample mass after the acid additions. The analytical laboratory made adjustments for these additional dilutions prior to reporting the measurement data; thus, the additional dilution factors are not reported here.

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

**Table 2-3. Leachates that Appeared Gel-like and Required Additional Dilution with Acids**

| PNNL Group (rec'd 2020) | PNNL Solution ID | SRNL Solution ID |
|---|---|---|
| 2 | DHW19M-28-Q-PCT-A | S-10565 |
| 2 | DHW19M-28-Q-PCT-B | S-10566 |
| 2 | DHW19M-28-Q-PCT-C | S-10567 |
| 2 | DHW19M-29-Q-PCT-A | S-10568 |
| 2 | DHW19M-29-Q-PCT-B | S-10569 |
| 2 | DHW19M-29-Q-PCT-C | S-10570 |
| 6 | DHW19M-14-CCC-PCT-A | S-10641 |
| 6 | DHW19M-14-CCC-PCT-B | S-10642 |
| 6 | DHW19M-14-CCC-PCT-C | S-10643 |
| 9 | DHW19M-29-CCC-PCT-A | S-10689 |
| 9 | DHW19M-29-CCC-PCT-B | S-10690 |
| 9 | DHW19M-29-CCC-PCT-C | S-10691 |

## 3.0 Results and Discussion

Data for the PCT leachates received at SRNL in 2019 are shown in Appendix A, and data for the PCT leachates received at SRNL in 2020 are shown in Appendix B. These data are generally reviewed and discussed as one large set in the sections that follow. The normalized PCT results are presented in Appendix C. JMP Pro Version 11.2.1 (SAS Institute, Inc.)[8] was used to support these analyses.

### 3.1 Measured Compositions of PCT Leachates

Table A-1 in Appendix A and Table B-2 in Appendix B provide the elemental leachate concentration measurements for the PCT leachates and standard solutions. Values are shown both as-received from the analytical laboratory and after correction for the dilutions performed at PNNL. Note that the measured concentrations of the analytes in the blank samples were generally below detection limits, with a few blanks having measurable concentrations of silicon of about 2 mg/L.

Table A-2 in Appendix A and Table B-3 in Appendix B provide a review of the measurements of the solution standard samples that were included in the analytical blocks for the PCT leachate analyses. For each analytical block, the mean, standard deviation, and percent relative standard deviation (%RSD) are determined for each element present in the standard. Following the guidance in ASTM C 1285,[9] there were two primary evaluations conducted for these summary statistics: the mean value for each analytical block was found to be less than 10% from the reference value (i.e., a percent relative bias less than 10%) for the element in question, and the %RSD was less than 10% for the element in question. The results in Table A-2 and Table B-3 satisfy these criteria, and thus, the results for the solution standard suggest no significant issues with the analytical outcomes for the measurements of the PCT leachates.

Exhibit A-1 in Appendix A and Exhibit B-1 in Appendix B provide plots of the leachate concentrations (mg/L) in analytical sequence by analytical block. Both linear and logarithmic plots are provided for each analyte. Plotting the data in this format provides an opportunity to identify gross trends in performance of the analytical instrument within and among calibration blocks. No issues were observed in a review of these plots.

Exhibit A-2 in Appendix A and Exhibit B-2 in Appendix B provide plots of the triplicate leachate concentrations by the groupings provided by PNNL. Both linear and logarithmic plots are provided for each analyte. Plotting the data in this format allows for the assessment of the repeatability of the measurements for each glass. For some of the glasses, minor scatter among the triplicate values of some

analytes is observed. For other glasses, there are more significant differences among the triplicate values. Note for example:

- The boron, lithium, and sodium measurements for several of the "DWPF-EA" reference glass samples.
- The silicon measurements for glasses DHW19M-25-Q, DHW19M-26-Q, DHW19M-32-Q, DHW19M-28-CCC, and DHW19M-32-CCC.

### 3.2 Normalization of PCT Data

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

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

where $NC_i$ is the normalized concentration in units of $g_{waste\ form}/L_{leachant}$, $c_i$ is the concentration of element "*i*" in the leachate in units of $g_i/L$ (corrected for the dilutions performed at PNNL), and $f_i$ is the mass fraction of element "*i*" in the unleached glass in units of $g_i/g_{glass}$.[a]

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

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

where $NC_i$ remains in units of $g_{waste\ form}/L_{leachant}$, $\overline{\log_{10} c_i}$ is the average of the common logarithms of the measured concentrations of element "*i*" in the triplicate leachates in units of mg/L (corrected for the dilutions performed at PNNL as discussed in Section 2.3), and $\log_{10} f_i$ is either the common logarithm of the targeted concentration of element "*i*" in the glass in units of wt %, or the common logarithm of the average measured concentration of element "*i*" in the glass in units of wt % (reported earlier[7]).

Table C-1 in Appendix C provides a listing of the normalized PCT responses in units of g/L. Exhibit C-1 in Appendix C provides plots of the normalized PCT responses for the two heat treatments for each of the study glasses as well as the responses for the Environmental Assessment (EA) reference glass[10] (labeled "DWPF EA" in the PNNL experiments). The results are grouped by compositional view. Note that an indicator is provided as part of these plots to show results involving below detection limit (BDL) values. The plots of Exhibit C-1 provide a graphical comparison between the PCT responses for the two heat treatments of each study glass.

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

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

- Little difference is seen when evaluating the normalized values on the basis of targeted or measured glass composition.
- Several of the study glasses, both quenched and CCC, have $NC_i$ values that are greater than the WTP immobilized LAW constraint[a] of 4 g/L for B, Na, and Si.
- For many of the study glasses, heat treatment had only a marginal impact on the $NC_i$ values.
    - In two cases (i.e., glasses DHW19M-7-1 and -25), the CCC heat treatment led to higher $NC_i$ values.
    - In two other cases (i.e., glasses DHW19M-8, -26) the Q version of the glass had higher $NC_i$ values than the CCC version.
- High $NC_{Li}$ values were noted for the CCC version of glass DHW19M-6-1.
    - The reason for the high $NC_{Li}$ value for the CCC version of this glass is unclear, but could be contamination of the leachate.
    - The greater-than values for $NC_{Li}$ for this glass are a result of the measured $Li_2O$ concentration in the glass being below the detection limit (the targeted $Li_2O$ concentration is 0.06 wt %).
- Greater-than values for $NC_{Li}$ for glasses DHW19M-23 and DHW19M-25 are also due to the measured $Li_2O$ concentration in the glass being below the detection limit (the targeted $Li_2O$ concentrations for these glasses are 0.05 wt % and 0.41 wt %, respectively).
- The samples of the EA reference glass (labeled "DWPF-EA" in the study) included with each PCT set have inconsistent $NC_i$ values.
    - $NC_B$ values in this study vary over a range of about 8 to 20 g/L.
    - The reference $NC_B$ value for the EA glass is 16.695 g/L.[10]
    - Note that some degree of variation in $NC_i$ values for the EA glass is typical.[11]

Exhibit C-2 provides the results of an evaluation of congruent leaching among the analytes for the EA reference glass and the study glasses. The release rates for the analytes of the EA glass are highly correlated. The release rates for boron and sodium are highly correlated for the study glasses. For the other analytes, less correlation is seen among the release rates for the study glasses. For lithium, this may be driven by the low targeted concentrations of lithium in some of the study glasses. Lack of correlation for the silicon release rates relative to those of the other analytes has been reported previously for some WTP study glasses.[12-14]

## 4.0 Summary

In this report, SRNL provides chemical analysis of a series of PCT leachates from simulated nuclear waste glasses fabricated at PNNL. The resulting data will be used in the development of improved property/composition models for nuclear waste glasses. The measured concentrations of the analytes in the blank samples were generally below detection limits. The results for the solution standard suggest no significant issues with the analytical methods used. For some of the glasses, minor scatter among the triplicate values of some analytes was observed. For other glasses, there were more significant differences among the triplicate values. A review of the PCT data noted that there was little difference between the normalized values on the basis of targeted or measured glass composition. Several of the study glasses, both quenched and CCC, have $NC_i$ values that are greater than the WTP immobilized LAW constraint of 4 g/L for B, Na, and Si. For many of the study glasses, heat treatment had only a marginal impact on the $NC_i$ values. The samples of the EA reference glass included with each PCT set had inconsistent $NC_i$ values, although some degree of variation in $NC_i$ values for the EA glass is typical. The release rates for boron and sodium were highly correlated for the study glasses, while for the other analytes, less correlation was observed.

[a] Contract DE-AC27-01RV14136, as amended, U.S. Department of Energy, Richland, WA (2000)

## 5.0 References

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# Appendix A Tables and Exhibits Supporting Analysis of the PCT Leachates Received in 2019

## Table A-1. PCT Leachate Measurements in Analytical Sequence

| PNNL Grouping | PNNL Solution ID | Lab ID | Block | Seq | B (ar) | Cr (ar) | Li (ar) | Na (ar) | Si (ar) | Dil. Fac. | B (mg/L) | Cr (mg/L) | Li (mg/L) | Na (mg /L) | Si (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| na | soln std | std-11 | 1 | 1 | 19.2 | <1.00 | 9.27 | 78.8 | 48.0 | 1.0 | 19.2 | <1.00 | 9.27 | 78.8 | 48.0 |
| 4 | DWPF-EA-PCT-92319-A | S-10156 | 1 | 2 | 280 | <1.00 | 104 | 849 | 502 | 1.11 | 310 | <1.11 | 116 | 943 | 557 |
| 2 | DHW19M-8-Q-PCT-A | S-10107 | 1 | 3 | 1340 | 172 | 169 | 4200 | 1820 | 1.11 | 1490 | 191 | 188 | 4660 | 2020 |
| 1 | DHW19M-5-Q-PCT-A | S-10093 | 1 | 4 | 576 | 17.7 | 119 | 1150 | 333 | 1.11 | 639 | 19.6 | 132 | 1280 | 370 |
| 2 | DHW19M-10-Q-PCT-A | S-10113 | 1 | 5 | 826 | 78.7 | 61.0 | 2040 | 447 | 1.11 | 917 | 87.4 | 67.7 | 2260 | 496 |
| 2 | DWPF-EA-PCT-91119-A | S-10116 | 1 | 6 | 531 | <1.00 | 156 | 1530 | 769 | 1.11 | 589 | <1.11 | 173 | 1700 | 853 |
| 1 | DI-Water-BLANK-1-9919 | S-10099 | 1 | 7 | <1.00 | <1.00 | <1.00 | <1.00 | 2.02 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 2.02 |
| 4 | DHW19M-17-1-Q-PCT-A | S-10144 | 1 | 8 | 515 | 53.2 | 17.0 | 1250 | 576 | 1.11 | 572 | 59.0 | 18.8 | 1390 | 640 |
| 1 | DHW19M-1-2-Q-PCT-A | S-10081 | 1 | 9 | 265 | 35.3 | 92.4 | 853 | 448 | 1.11 | 294 | 39.1 | 103 | 947 | 497 |
| 3 | DHW19M-13-Q-PCT-A | S-10127 | 1 | 10 | 378 | 17.9 | 94.4 | 1030 | 425 | 1.11 | 419 | 19.8 | 105 | 1140 | 471 |
| 2 | DI-Water-BLANK-1-91119 | S-10119 | 1 | 11 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| 1 | DHW19M-2-3-Q-PCT-A | S-10084 | 1 | 12 | 182 | 11.4 | 13.4 | 723 | 344 | 1.11 | 202 | 12.7 | 14.8 | 802 | 382 |
| 3 | DWPF-EA-PCT-91919-A | S-10136 | 1 | 13 | 274 | <1.00 | 106 | 825 | 504 | 1.11 | 304 | <1.11 | 117 | 916 | 559 |
| 2 | DHW19M-6-1-Q-PCT-A | S-10101 | 1 | 14 | 370 | 31.6 | 2.62 | 1550 | 978 | 1.11 | 411 | 35.1 | 2.91 | 1720 | 1090 |
| 2 | DHW19M-9-Q-PCT-A | S-10110 | 1 | 15 | 445 | 12.8 | 14.3 | 1060 | 130 | 1.11 | 494 | 14.2 | 15.9 | 1180 | 145 |
| na | soln std | std-12 | 1 | 16 | 19.4 | <1.00 | 9.25 | 78.5 | 47.5 | 1.00 | 19.4 | <1.00 | 9.25 | 78.5 | 47.5 |
| 3 | DHW19M-15-Q-PCT-A | S-10133 | 1 | 17 | 845 | 40.5 | 260 | 1640 | 873 | 1.11 | 938 | 45.0 | 289 | 1820 | 969 |
| 3 | DHW19M-14-Q-PCT-A | S-10130 | 1 | 18 | 1680 | 87.4 | 485 | 6350 | 4980 | 1.11 | 1860 | 97.0 | 538 | 7050 | 5530 |
| 3 | DHW19M-11-Q-PCT-A | S-10121 | 1 | 19 | 1020 | 33.5 | 254 | 1680 | 583 | 1.11 | 1130 | 37.1 | 282 | 1860 | 647 |
| 1 | DHW19M-4-Q-PCT-A | S-10090 | 1 | 20 | 167 | 16.1 | 16.9 | 761 | 342 | 1.11 | 185 | 17.8 | 18.7 | 845 | 380 |
| 2 | DHW19M-7-1-Q-PCT-A | S-10104 | 1 | 21 | 425 | 14.5 | 148 | 1000 | 450 | 1.11 | 472 | 16.1 | 165 | 1110 | 499 |
| 4 | DHW19M-18-Q-PCT-A | S-10147 | 1 | 22 | 499 | 20.4 | 53.5 | 1500 | 738 | 1.11 | 553 | 22.7 | 59.4 | 1670 | 819 |
| 1 | DHW19M-3-1-Q-PCT-A | S-10087 | 1 | 23 | 379 | 30.2 | 22.6 | 1350 | 850 | 1.11 | 421 | 33.5 | 25.1 | 1500 | 944 |
| 4 | DHW19M-19-Q-PCT-A | S-10150 | 1 | 24 | 605 | 18.4 | 62.0 | 1160 | 287 | 1.11 | 671 | 20.4 | 68.9 | 1290 | 318 |
| 4 | DHW19M-16-Q-PCT-A | S-10141 | 1 | 25 | 178 | 11.8 | 67.3 | 556 | 275 | 1.11 | 198 | 13.1 | 74.7 | 617 | 305 |
| 1 | DWPF-EA-PCT-9919-A | S-10096 | 1 | 26 | 527 | <1.00 | 158 | 1510 | 753 | 1.11 | 585 | <1.11 | 175 | 1680 | 836 |
| 4 | DHW19M-20-Q-PCT-A | S-10153 | 1 | 27 | 1210 | 192 | 160 | 3770 | 1650 | 1.11 | 1340 | 213 | 177 | 4180 | 1830 |
| 3 | DHW19M-12-Q-PCT-A | S-10124 | 1 | 28 | 102 | 3.99 | 19.3 | 344 | 267 | 1.11 | 113 | 4.43 | 21.4 | 382 | 296 |
| 4 | DI-Water-BLANK-1-92319 | S-10159 | 1 | 29 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| na | soln std | std-13 | 1 | 30 | 18.9 | <1.00 | 9.45 | 79.3 | 46.9 | 1.00 | 18.9 | <1.00 | 9.45 | 79.3 | 46.9 |
| na | soln std | std-21 | 2 | 1 | 19.1 | <1.00 | 9.65 | 77.2 | 48.1 | 1.00 | 19.1 | <1.00 | 9.65 | 77.2 | 48.1 |
| 2 | DHW19M-6-1-Q-PCT-B | S-10102 | 2 | 2 | 381 | 30.9 | 2.77 | 1620 | 1030 | 1.11 | 423 | 34.3 | 3.08 | 1800 | 1140 |
| 2 | DHW19M-7-1-Q-PCT-B | S-10105 | 2 | 3 | 426 | 14.1 | 155 | 988 | 462 | 1.11 | 473 | 15.6 | 172 | 1100 | 512 |
| 1 | DI-Water-BLANK-2-9919 | S-10100 | 2 | 4 | <1.00 | <1.00 | <1.00 | <1.00 | 1.69 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.69 |
| 3 | DHW19M-15-Q-PCT-B | S-10134 | 2 | 5 | 846 | 38.4 | 268 | 1620 | 902 | 1.11 | 939 | 42.6 | 297 | 1800 | 1000 |
| 4 | DHW19M-20-Q-PCT-B | S-10154 | 2 | 6 | 1240 | 197 | 167 | 3820 | 1680 | 1.11 | 1380 | 219 | 185 | 4240 | 1860 |
| 1 | DWPF-EA-PCT-9919-B | S-10097 | 2 | 7 | 526 | <1.00 | 165 | 1510 | 776 | 1.11 | 584 | <1.11 | 183 | 1680 | 861 |
| 2 | DHW19M-10-Q-PCT-B | S-10114 | 2 | 8 | 829 | 73.9 | 62.2 | 2080 | 460 | 1.11 | 920 | 82.0 | 69.0 | 2310 | 511 |
| 4 | DI-Water-BLANK-1-91919 | S-10139 | 2 | 9 | <1.00 | <1.00 | <1.00 | <1.00 | 1.34 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.34 |
| 4 | DHW19M-16-Q-PCT-B | S-10142 | 2 | 10 | 185 | 11.7 | 70.4 | 547 | 295 | 1.11 | 205 | 13.0 | 78.2 | 607 | 327 |

ar = as-received measurements prior to correction for dilution factor (Dil. Fac.)

**Table A-1. PCT Leachate Measurements in Analytical Sequence (continued)**

| PNNL Grouping | PNNL Solution ID | Lab ID | Block | Seq | B (ar) | Cr (ar) | Li (ar) | Na (ar) | Si (ar) | Dil. Fac. | B (mg/L) | Cr (mg/L) | Li (mg/L) | Na (mg /L) | Si (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | DHW19M-13-Q-PCT-B | S-10128 | 2 | 11 | 379 | 17.3 | 94.5 | 993 | 433 | 1.11 | 421 | 19.2 | 105 | 1100 | 480 |
| 4 | DHW19M-18-Q-PCT-B | S-10148 | 2 | 12 | 522 | 19.7 | 54.6 | 1560 | 786 | 1.11 | 579 | 21.9 | 60.6 | 1730 | 873 |
| 2 | DHW19M-8-Q-PCT-B | S-10108 | 2 | 13 | 1410 | 180 | 184 | 4350 | 1880 | 1.11 | 1570 | 199 | 204 | 4830 | 2090 |
| 1 | DHW19M-1-2-Q-PCT-B | S-10082 | 2 | 14 | 259 | 32.1 | 91.7 | 826 | 444 | 1.11 | 287 | 35.6 | 102 | 917 | 493 |
| 1 | DHW19M-2-3-Q-PCT-B | S-10085 | 2 | 15 | 184 | 10.6 | 13.4 | 709 | 351 | 1.11 | 204 | 11.8 | 14.8 | 787 | 390 |
| na | soln std | std-22 | 2 | 16 | 19.3 | <1.00 | 9.70 | 77.3 | 48.8 | 1.00 | 19.3 | <1.00 | 9.70 | 77.3 | 48.8 |
| 3 | DHW19M-14-Q-PCT-B | S-10131 | 2 | 17 | 1680 | 84.8 | 515 | 6460 | 4920 | 1.11 | 1860 | 94.1 | 572 | 7170 | 5460 |
| 3 | DHW19M-11-Q-PCT-B | S-10122 | 2 | 18 | 1050 | 31.1 | 269 | 1690 | 603 | 1.11 | 1170 | 34.5 | 299 | 1880 | 669 |
| 4 | DWPF-EA-PCT-92319-B | S-10157 | 2 | 19 | 270 | <1.00 | 102 | 799 | 504 | 1.11 | 299 | <1.11 | 113 | 886 | 559 |
| 4 | DHW19M-17-1-Q-PCT-B | S-10145 | 2 | 20 | 489 | 46.9 | 16.1 | 1180 | 561 | 1.11 | 543 | 52.1 | 17.9 | 1310 | 623 |
| 1 | DHW19M-4-Q-PCT-B | S-10091 | 2 | 21 | 165 | 14.5 | 16.7 | 736 | 334 | 1.11 | 183 | 16.1 | 18.5 | 817 | 371 |
| 2 | DWPF-EA-PCT-91119-B | S-10117 | 2 | 22 | 555 | <1.00 | 173 | 1570 | 808 | 1.11 | 616 | <1.11 | 191 | 1740 | 897 |
| 3 | DHW19M-12-Q-PCT-B | S-10125 | 2 | 23 | 106 | 3.65 | 18.9 | 334 | 277 | 1.11 | 117 | 4.05 | 20.9 | 371 | 308 |
| 2 | DHW19M-9-Q-PCT-B | S-10111 | 2 | 24 | 442 | 11.6 | 14.5 | 1050 | 132 | 1.11 | 490 | 12.9 | 16.0 | 1170 | 146 |
| 4 | DHW19M-19-Q-PCT-B | S-10151 | 2 | 25 | 618 | 18.1 | 64.5 | 1170 | 295 | 1.11 | 685 | 20.0 | 71.6 | 1300 | 327 |
| 1 | DHW19M-3-1-Q-PCT-B | S-10088 | 2 | 26 | 378 | 29.1 | 23.2 | 1370 | 872 | 1.11 | 419 | 32.3 | 25.7 | 1520 | 968 |
| 3 | DWPF-EA-PCT-91919-B | S-10137 | 2 | 27 | 275 | <1.00 | 108 | 817 | 521 | 1.11 | 306 | <1.11 | 120 | 907 | 579 |
| 1 | DHW19M-5-Q-PCT-B | S-10094 | 2 | 28 | 582 | 17.1 | 127 | 1190 | 352 | 1.11 | 646 | 18.9 | 141 | 1320 | 391 |
| na | soln std | std-23 | 2 | 29 | 19.4 | <1.00 | 9.73 | 77.9 | 48.9 | 1.00 | 19.4 | <1.00 | 9.73 | 77.9 | 48.9 |
| na | soln std | std-31 | 3 | 1 | 19.1 | <1.00 | 9.77 | 79.1 | 49.5 | 1.00 | 19.1 | <1.00 | 9.77 | 79.1 | 49.5 |
| 2 | DWPF-EA-PCT-91119-C | S-10118 | 3 | 2 | 539 | <1.00 | 168 | 1510 | 735 | 1.11 | 598 | <1.11 | 186 | 1680 | 816 |
| 4 | DHW19M-20-Q-PCT-C | S-10155 | 3 | 3 | 1280 | 195 | 170 | 3830 | 1740 | 1.11 | 1420 | 217 | 188 | 4250 | 1930 |
| 4 | DHW19M-18-Q-PCT-C | S-10149 | 3 | 4 | 505 | 16.1 | 55.1 | 1510 | 742 | 1.11 | 560 | 17.9 | 61.2 | 1680 | 823 |
| 3 | DHW19M-13-Q-PCT-C | S-10129 | 3 | 5 | 369 | 17.6 | 95.0 | 1010 | 421 | 1.11 | 409 | 19.5 | 105 | 1120 | 467 |
| 1 | DHW19M-5-Q-PCT-C | S-10095 | 3 | 6 | 607 | 18.2 | 133 | 1210 | 358 | 1.11 | 674 | 20.2 | 147 | 1340 | 397 |
| 1 | DHW19M-1-2-Q-PCT-C | S-10083 | 3 | 7 | 266 | 34.1 | 93.4 | 857 | 463 | 1.11 | 295 | 37.8 | 104 | 951 | 514 |
| 3 | DHW19M-14-Q-PCT-C | S-10132 | 3 | 8 | 1720 | 86.3 | 530 | 6390 | 5160 | 1.11 | 1910 | 95.7 | 588 | 7090 | 5730 |
| 3 | DHW19M-11-Q-PCT-C | S-10123 | 3 | 9 | 1090 | 32.2 | 279 | 1700 | 610 | 1.11 | 1210 | 35.8 | 309 | 1890 | 677 |
| 3 | DWPF-EA-PCT-91919-C | S-10138 | 3 | 10 | 287 | <1.00 | 108 | 847 | 538 | 1.11 | 318 | <1.11 | 120 | 940 | 598 |
| 2 | DI-Water-BLANK-2-91119 | S-10120 | 3 | 11 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| 2 | DHW19M-9-Q-PCT-C | S-10112 | 3 | 12 | 442 | 10.9 | 14.6 | 1070 | 130 | 1.11 | 491 | 12.1 | 16.2 | 1190 | 144 |
| 2 | DHW19M-10-Q-PCT-C | S-10115 | 3 | 13 | 859 | 78.1 | 64.4 | 2100 | 456 | 1.11 | 953 | 86.7 | 71.5 | 2330 | 507 |
| 4 | DHW19M-16-Q-PCT-C | S-10143 | 3 | 14 | 173 | 11.7 | 69.9 | 552 | 287 | 1.11 | 191 | 13.0 | 77.6 | 612 | 319 |
| 3 | DHW19M-12-Q-PCT-C | S-10126 | 3 | 15 | 106 | 3.66 | 19.2 | 343 | 274 | 1.11 | 117 | 4.07 | 21.3 | 381 | 304 |
| na | soln std | std-32 | 3 | 16 | 19.4 | <1.00 | 9.80 | 80.7 | 49.9 | 1.00 | 19.4 | <1.00 | 9.80 | 80.7 | 49.9 |
| 2 | DHW19M-6-1-Q-PCT-C | S-10103 | 3 | 17 | 420 | 33.8 | 3.05 | 1700 | 1030 | 1.11 | 466 | 37.6 | 3.38 | 1890 | 1140 |
| 2 | DHW19M-8-Q-PCT-C | S-10109 | 3 | 18 | 1440 | 177 | 188 | 4300 | 1990 | 1.11 | 1600 | 197 | 209 | 4770 | 2210 |
| 4 | DHW19M-19-Q-PCT-C | S-10152 | 3 | 19 | 620 | 19.0 | 66.4 | 1150 | 291 | 1.11 | 688 | 21.1 | 73.7 | 1280 | 323 |
| 4 | DHW19M-17-1-Q-PCT-C | S-10146 | 3 | 20 | 510 | 51.7 | 17.2 | 1230 | 581 | 1.11 | 566 | 57.4 | 19.1 | 1370 | 644 |
| 4 | DI-Water-BLANK-2-91919 | S-10140 | 3 | 21 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| 2 | DHW19M-7-1-Q-PCT-C | S-10106 | 3 | 22 | 424 | 14.3 | 156 | 1000 | 464 | 1.11 | 470 | 15.9 | 173 | 1110 | 515 |

Ar = as-received measurements prior to correction for dilution factor (Dil. Fac.)

**Table A-1. PCT Leachate Measurements in Analytical Sequence (continued)**

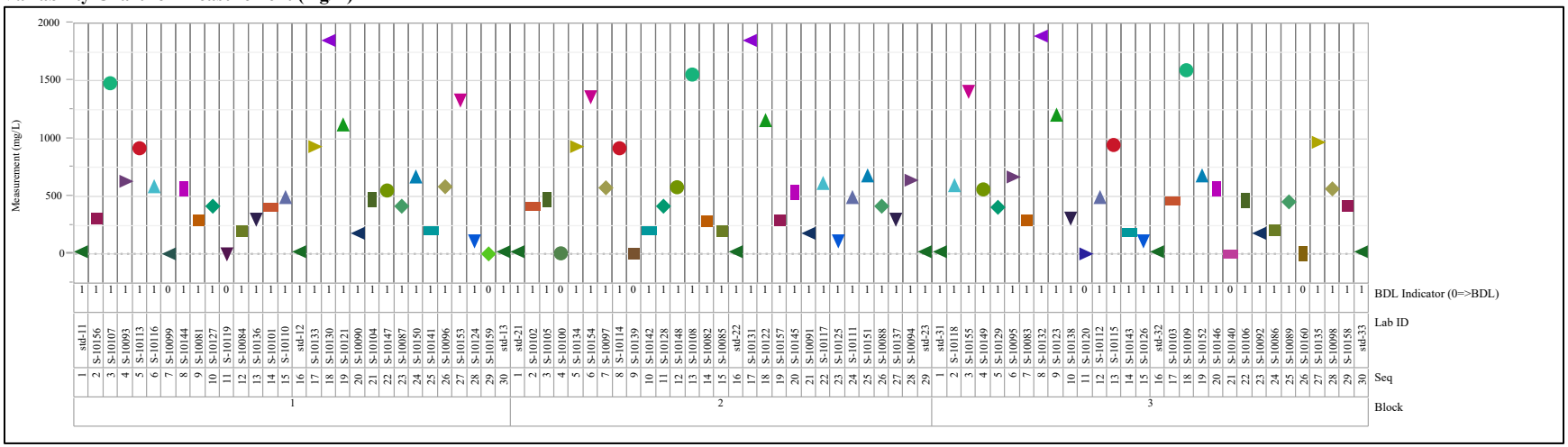
| PNNL Grouping | PNNL Solution ID | Lab ID | Block | Seq | B (ar) | Cr (ar) | Li (ar) | Na (ar) | Si (ar) | Dil. Fac. | B (mg/L) | Cr (mg/L) | Li (mg/L) | Na (mg /L) | Si (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | DHW19M-4-Q-PCT-C | S-10092 | 3 | 23 | 167 | 15.4 | 17.4 | 775 | 352 | 1.11 | 186 | 17.1 | 19.3 | 860 | 391 |
| 1 | DHW19M-2-3-Q-PCT-C | S-10086 | 3 | 24 | 189 | 11.2 | 14.0 | 742 | 361 | 1.11 | 210 | 12.4 | 15.5 | 823 | 401 |
| 1 | DHW19M-3-1-Q-PCT-C | S-10089 | 3 | 25 | 409 | 30.8 | 24.2 | 1390 | 927 | 1.11 | 454 | 34.1 | 26.8 | 1540 | 1030 |
| 4 | DI-Water-BLANK-2-92319 | S-10160 | 3 | 26 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| 3 | DHW19M-15-Q-PCT-C | S-10135 | 3 | 27 | 884 | 40.4 | 279 | 1650 | 924 | 1.11 | 981 | 44.9 | 309 | 1830 | 1030 |
| 1 | DWPF-EA-PCT-9919-C | S-10098 | 3 | 28 | 515 | <1.00 | 163 | 1420 | 764 | 1.11 | 571 | <1.11 | 181 | 1580 | 848 |
| 4 | DWPF-EA-PCT-92319-C | S-10158 | 3 | 29 | 375 | <1.00 | 135 | 1080 | 667 | 1.11 | 416 | <1.11 | 150 | 1200 | 740 |
| na | soln std | std-33 | 3 | 30 | 19.0 | <1.00 | 9.84 | 80.8 | 49.7 | 1.00 | 19.0 | <1.00 | 9.84 | 80.8 | 49.7 |

**Table A-2. Results from Samples of the Multi-Element Solution Standard Included with the PCT Leachates**

| Analytical Block | 1 | 2 | 3 | Reference Values (mg/L) |
|---|---|---|---|---|
| **Mean (B (mg/L))** | 19.17 | 19.27 | 19.17 | 20 |
| **Mean (Li (mg/L))** | 9.32 | 9.69 | 9.80 | 10 |
| **Mean (Na (mg/L))** | 78.87 | 77.47 | 80.20 | 81 |
| **Mean (Si (mg/L))** | 47.47 | 48.60 | 49.70 | 50 |
| | | | | |
| **% relative bias, B** | -4.2% | -3.7% | -4.2% | <10% per ASTM C1285 |
| **% relative bias, Li** | -6.8% | -3.1% | -2.0% | |
| **% relative bias, Na** | -2.6% | -4.4% | -1.0% | |
| **% relative bias, Si** | -5.1% | -2.8% | -0.6% | |
| | | | | |
| **Std Dev (B (mg/L))** | 0.252 | 0.153 | 0.208 | |
| **Std Dev (Li (mg/L))** | 0.110 | 0.040 | 0.035 | |
| **Std Dev (Na (mg/L))** | 0.404 | 0.379 | 0.954 | |
| **Std Dev (Si (mg/L))** | 0.551 | 0.436 | 0.200 | |
| | | | | |
| **%RSD (B (mg/L))** | 1.3% | 0.8% | 1.1% | <10% per ASTM C1285 |
| **%RSD (Li (mg/L))** | 1.2% | 0.4% | 0.4% | |
| **%RSD (Na (mg/L))** | 0.5% | 0.5% | 1.2% | |
| **%RSD (Si (mg/L))** | 1.2% | 0.9% | 0.4% | |

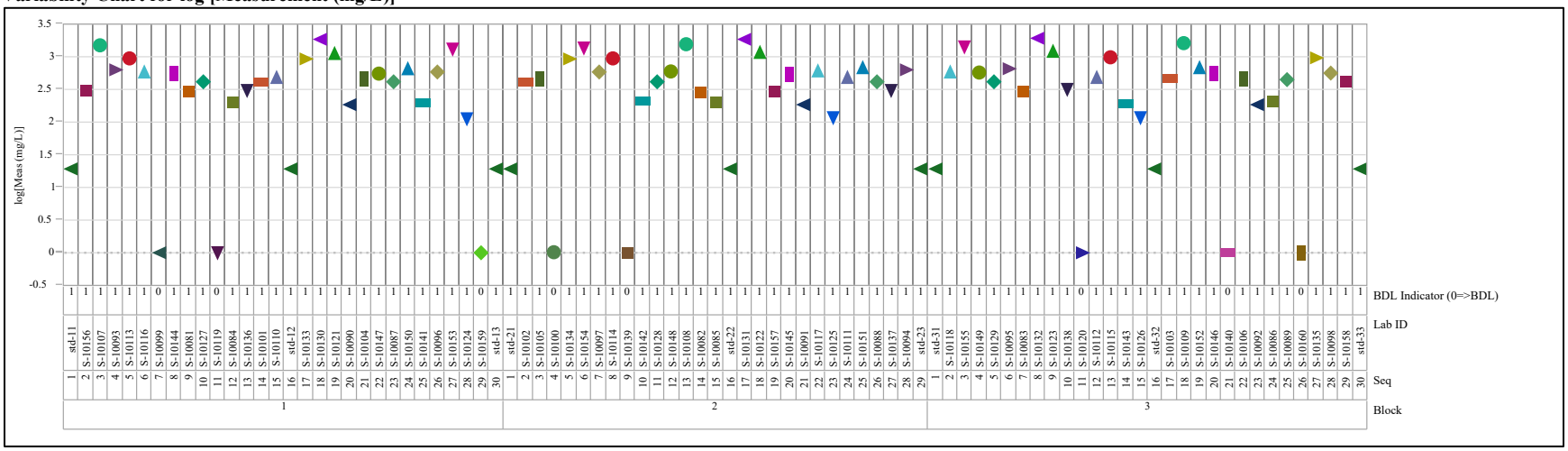
## Exhibit A-1. PCT Leachate Measurements in Analytical Sequence

**Analyte=B (mg/L)**
**Variability Chart for Measurement (mg/L)**



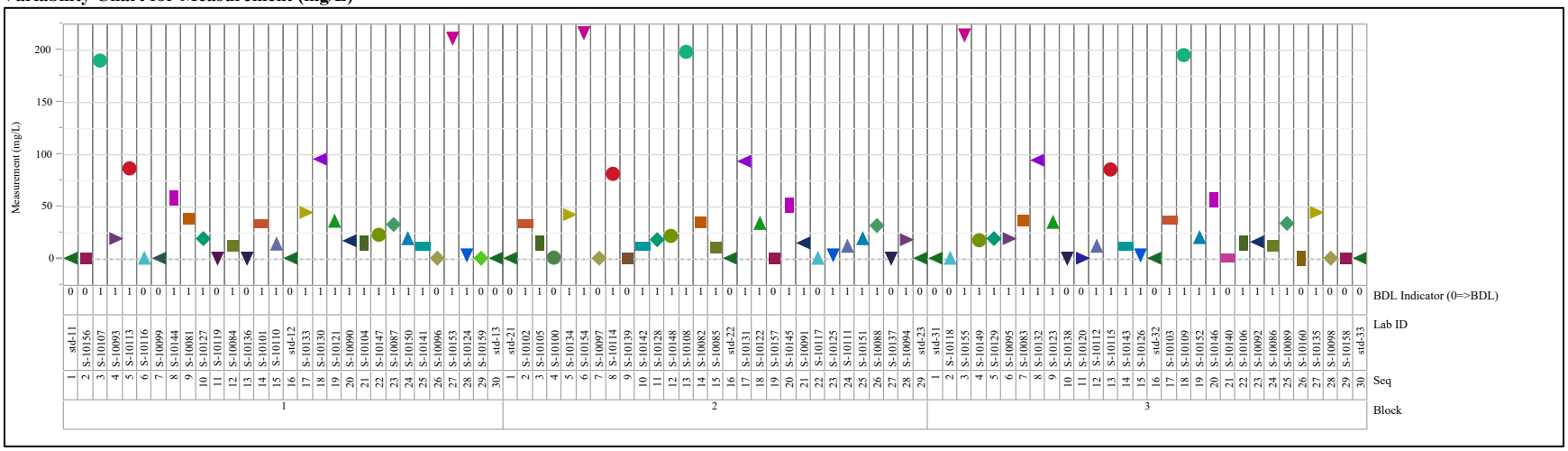
## Exhibit A-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=B (mg/L)**
**Variability Chart for log [Measurement (mg/L)]**



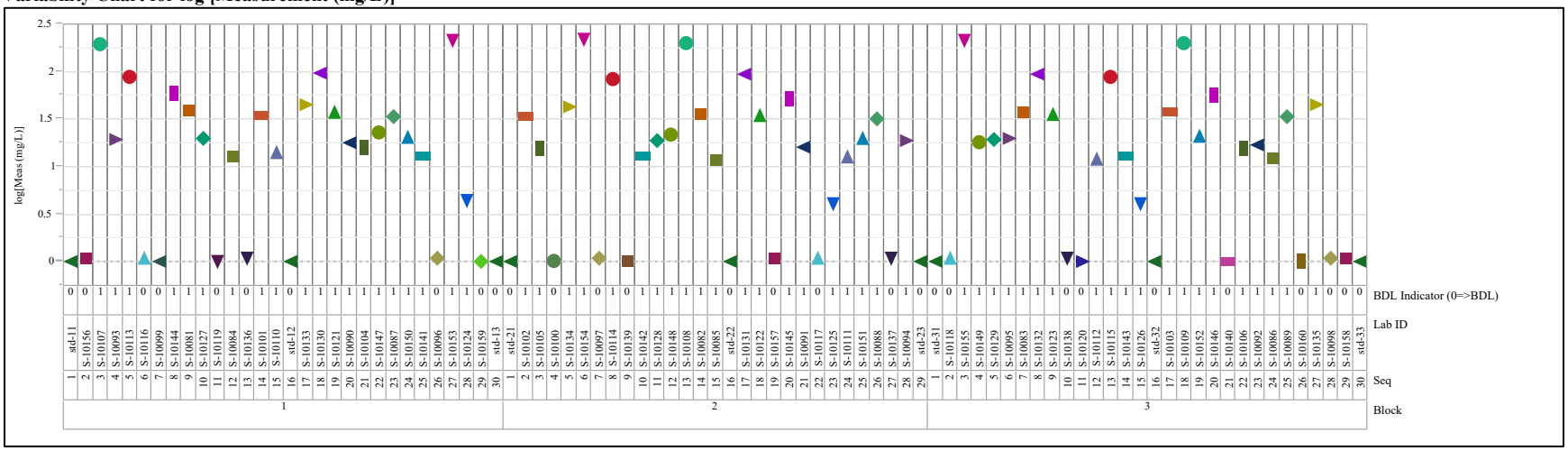
## Exhibit A-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=Cr (mg/L)**
**Variability Chart for Measurement (mg/L)**



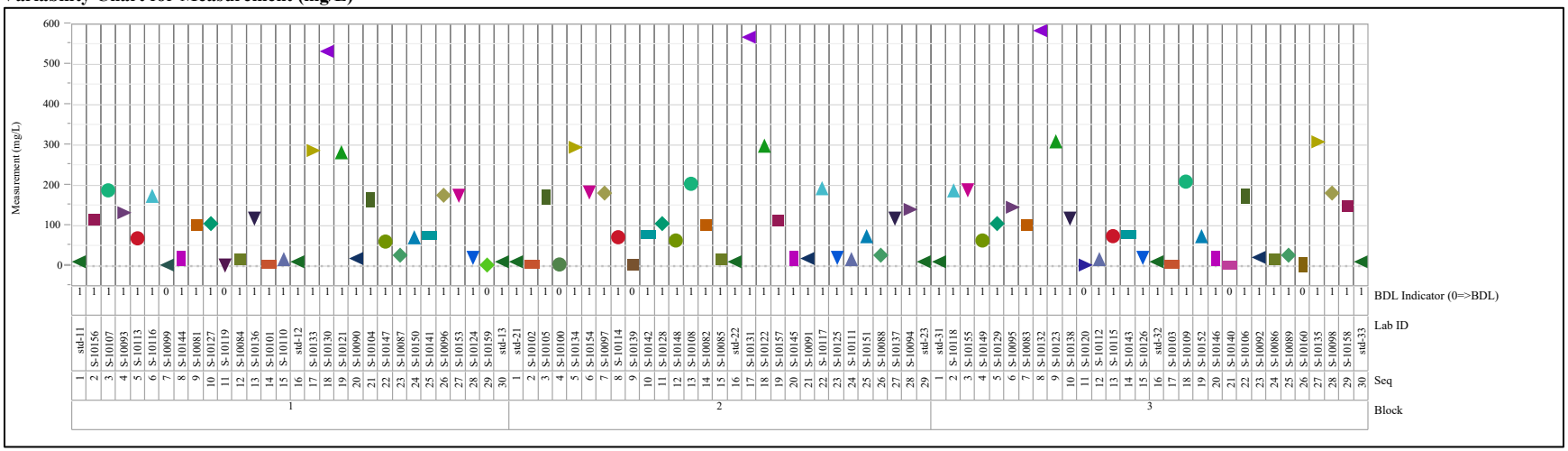
## Exhibit A-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=Cr (mg/L)**
**Variability Chart for log [Measurement (mg/L)]**



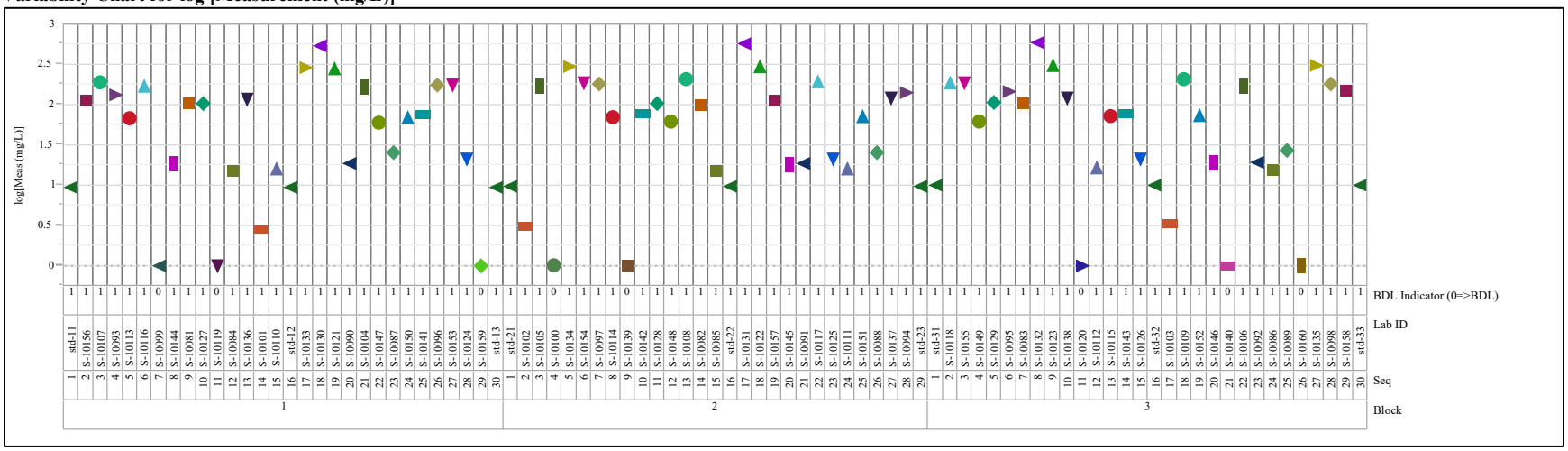
## Exhibit A-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=Li (mg/L)**
**Variability Chart for Measurement (mg/L)**



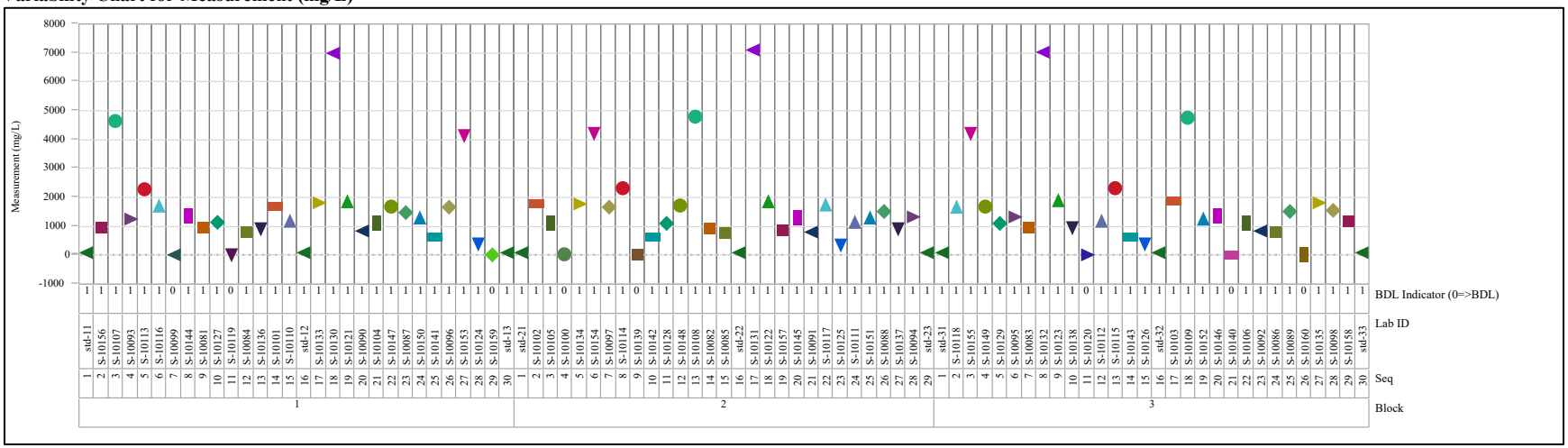
## Exhibit A-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=Li (mg/L)**
**Variability Chart for log [Measurement (mg/L)]**



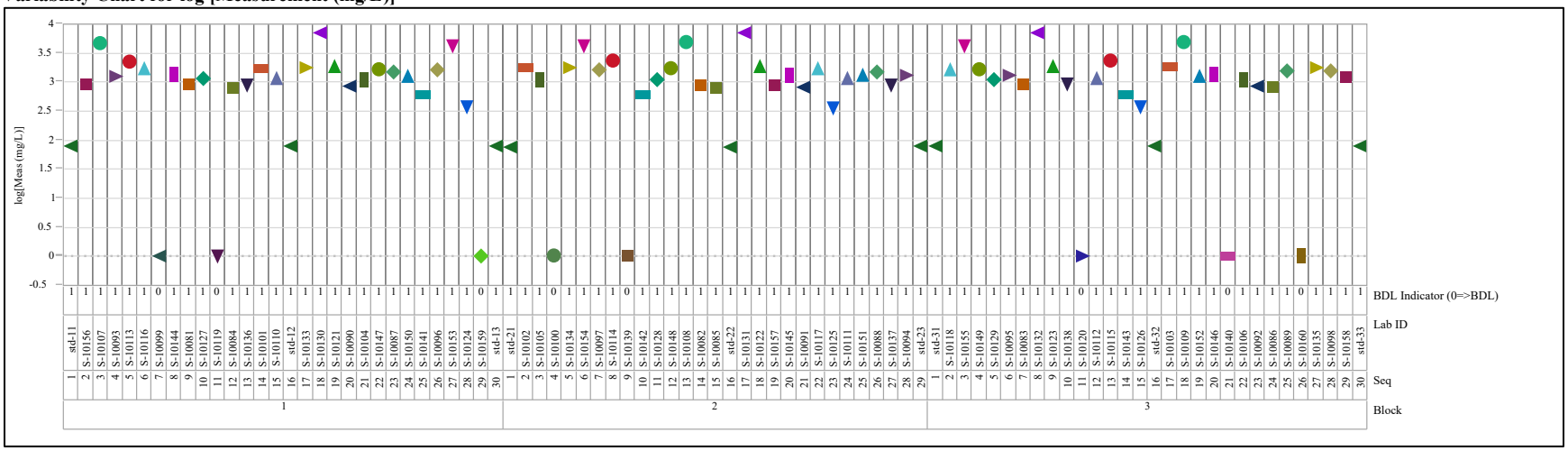
## Exhibit A-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=Na (mg/L)**
**Variability Chart for Measurement (mg/L)**



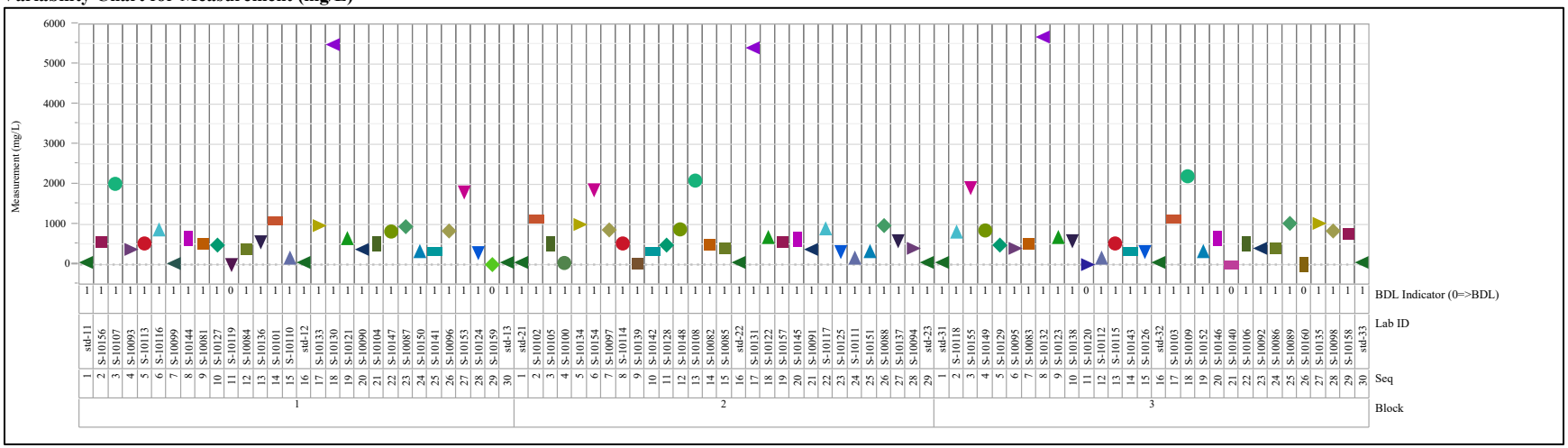
## Exhibit A-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=Na (mg/L)**
**Variability Chart for log [Measurement (mg/L)]**



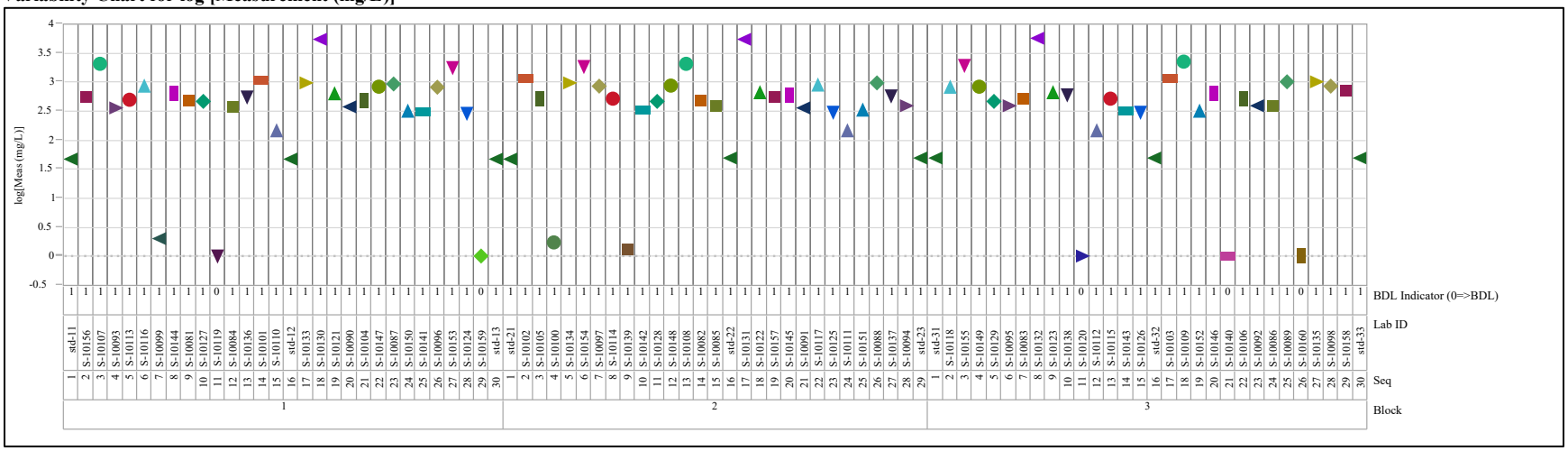
## Exhibit A-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=Si (mg/L)**
**Variability Chart for Measurement (mg/L)**



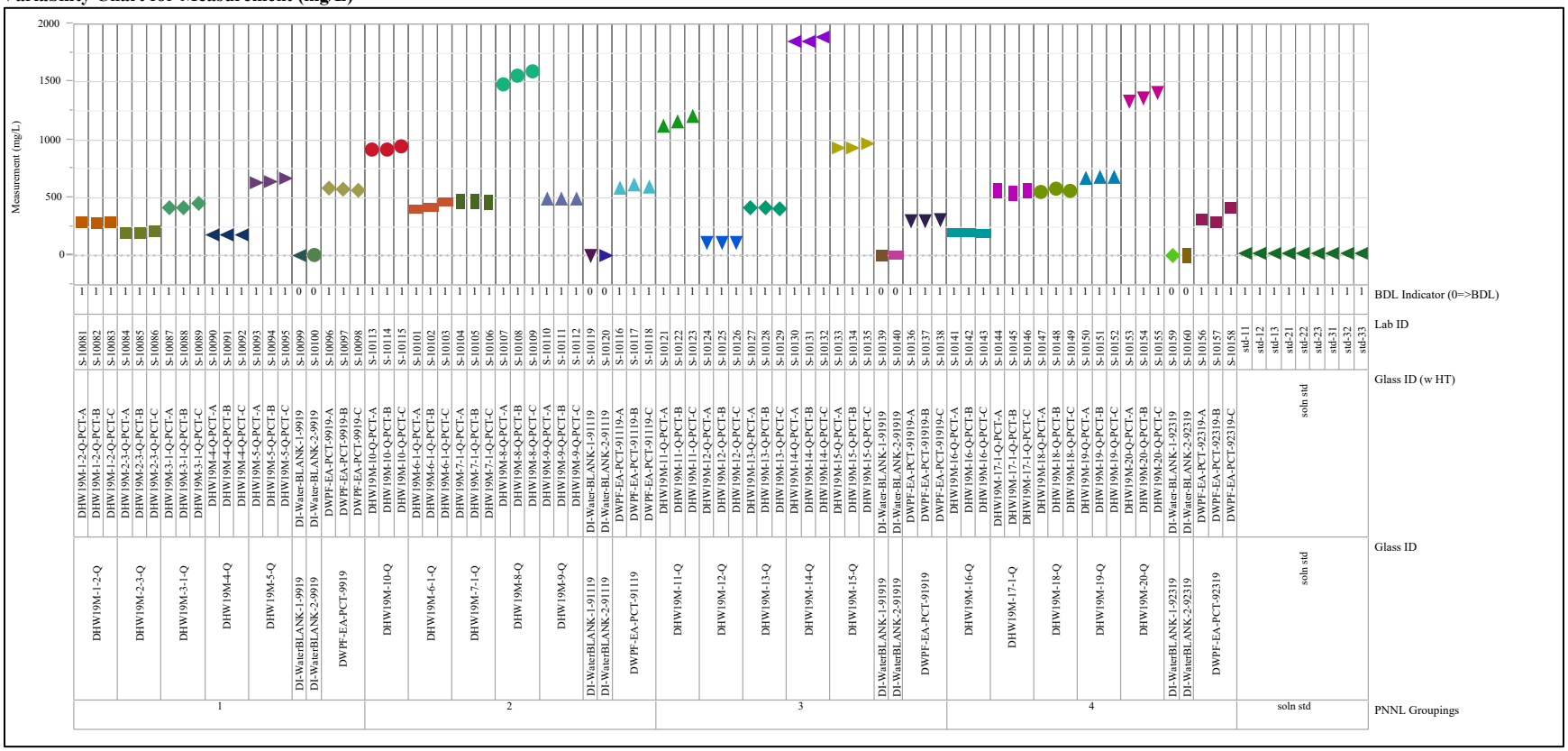
## Exhibit A-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=Si (mg/L)**
**Variability Chart for log [Measurement (mg/L)]**



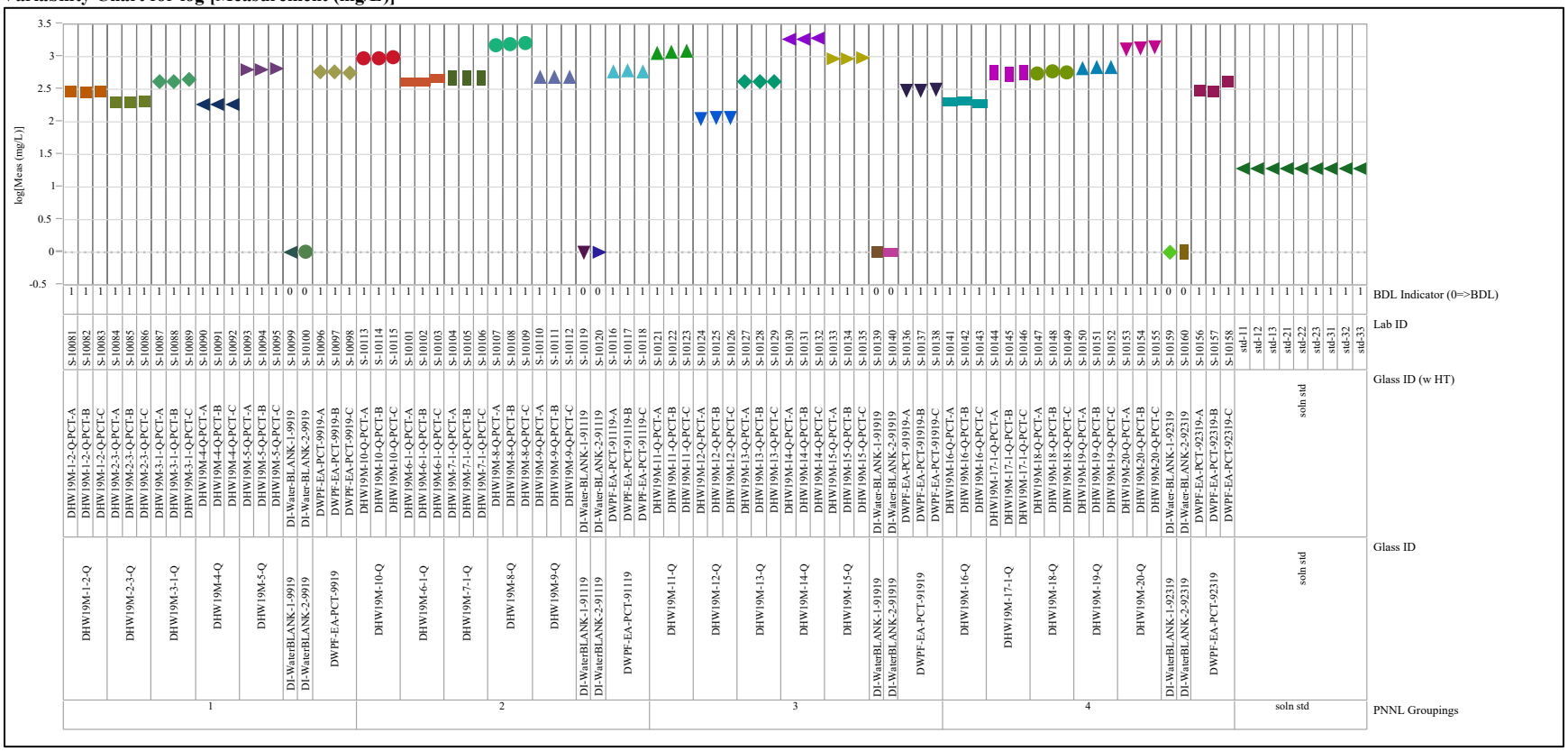
# Exhibit A-2. PCT Leachate Measurements by PNNL Grouping

**Analyte=B (mg/L)**
**Variability Chart for Measurement (mg/L)**



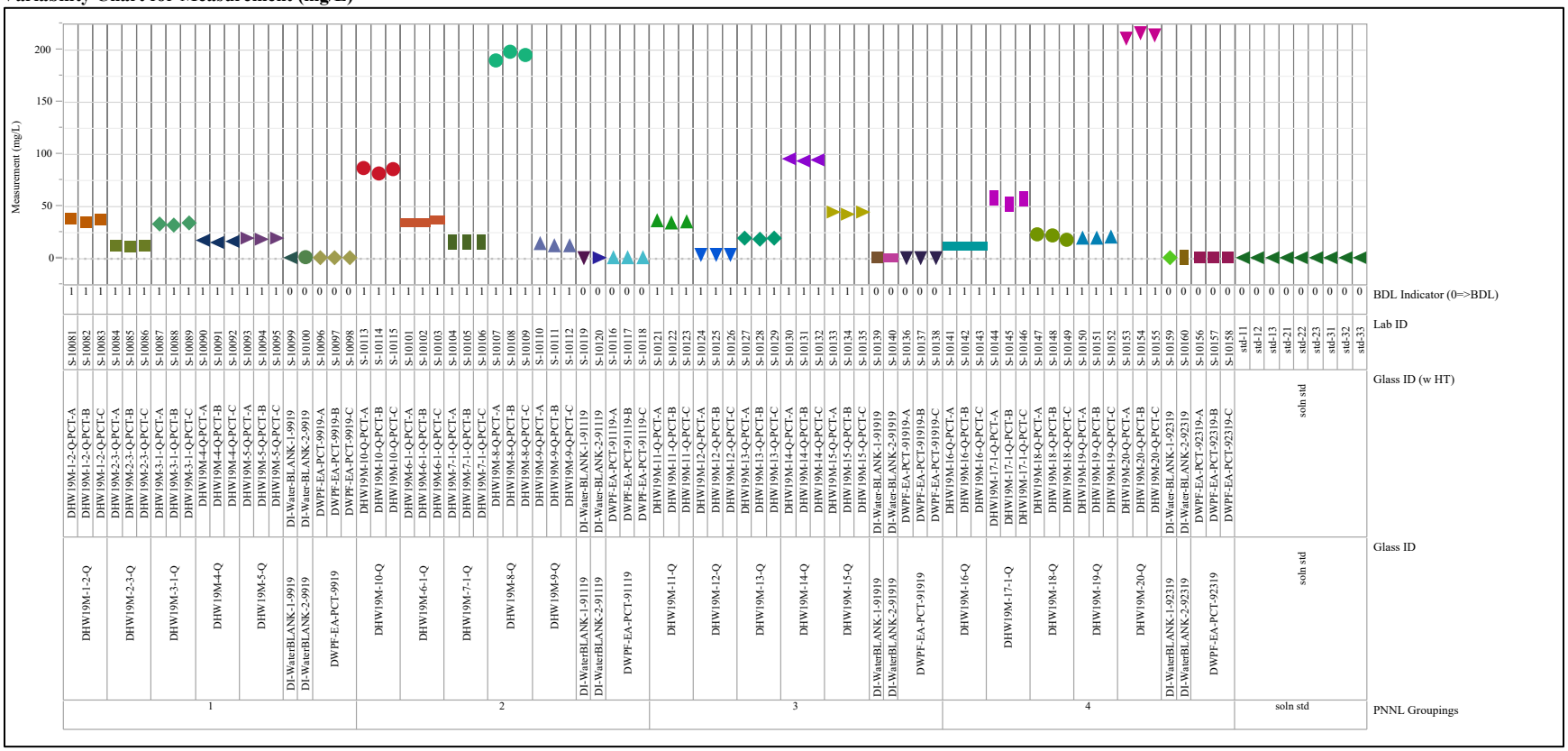
## Exhibit A-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=B (mg/L)**
**Variability Chart for log [Measurement (mg/L)]**



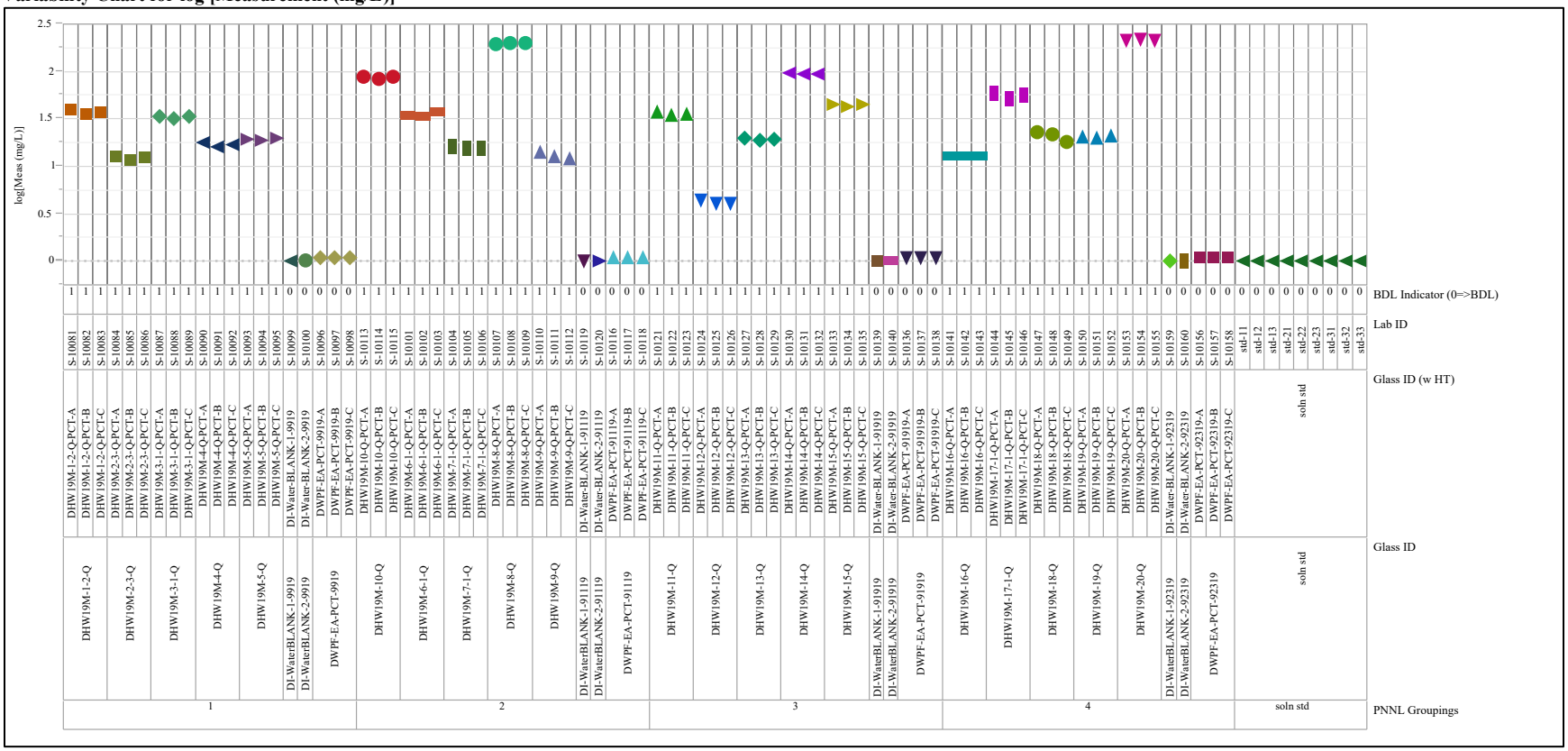
## Exhibit A-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=Cr (mg/L)**
**Variability Chart for Measurement (mg/L)**



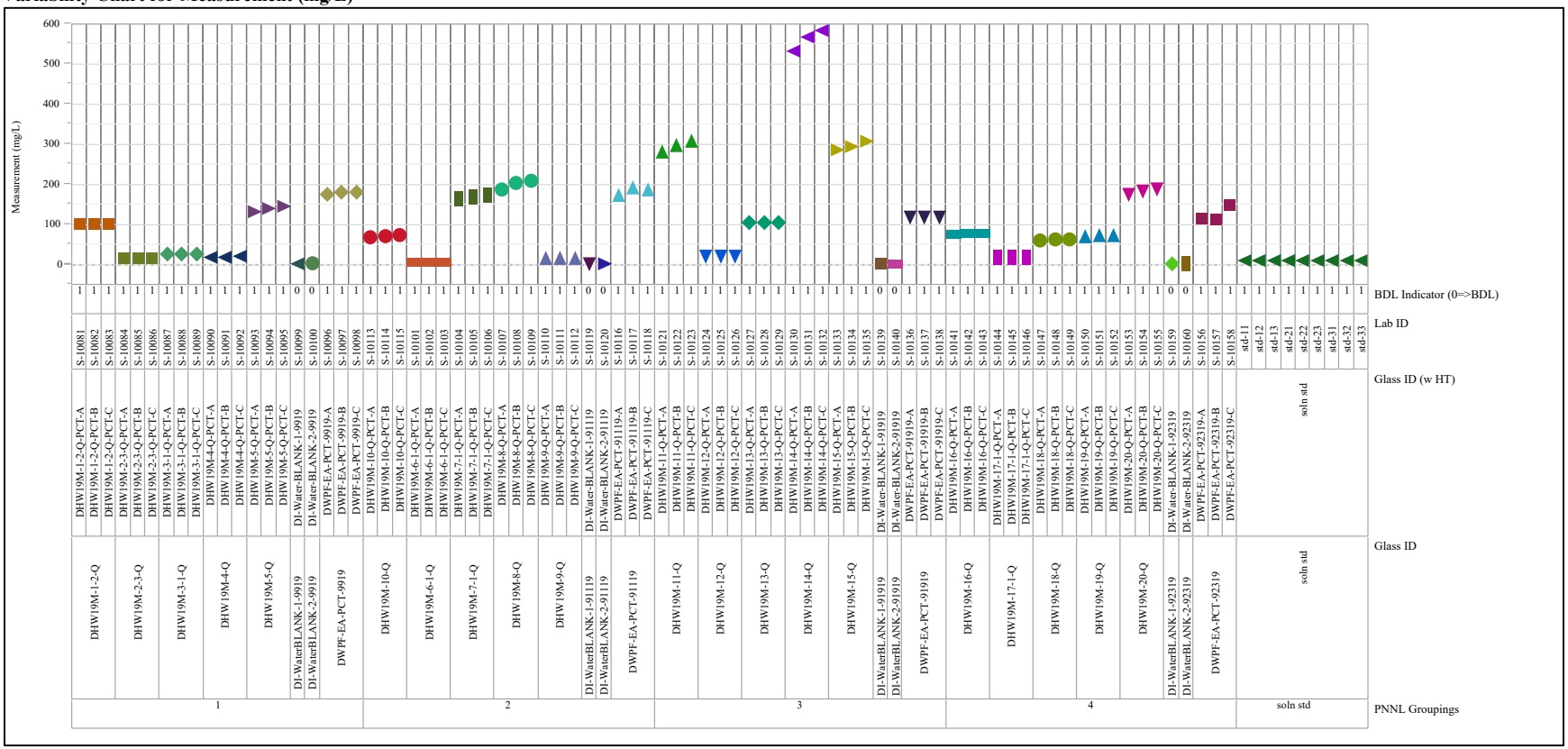
## Exhibit A-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=Cr (mg/L)**
**Variability Chart for log [Measurement (mg/L)]**



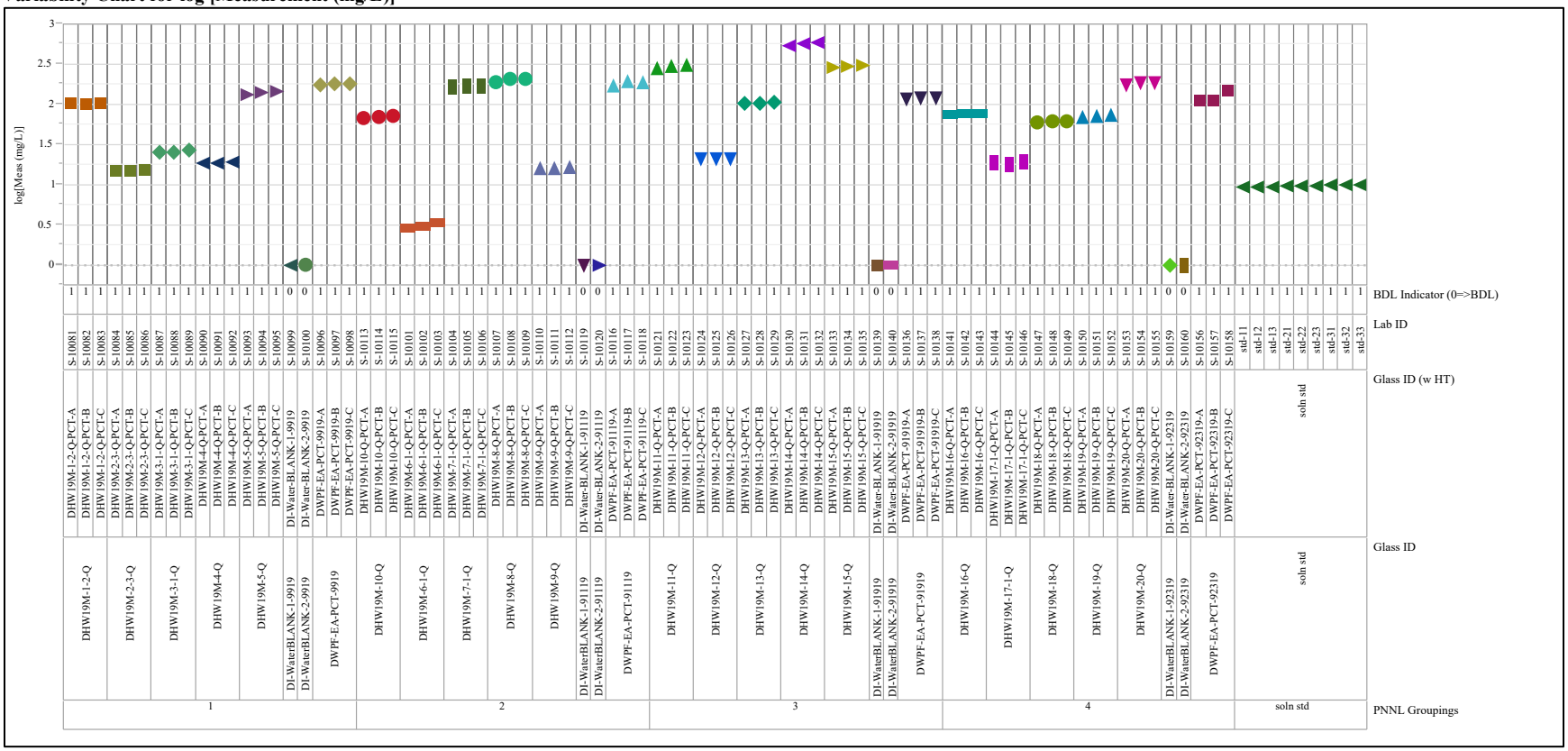
## Exhibit A-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=Li (mg/L)**
**Variability Chart for Measurement (mg/L)**



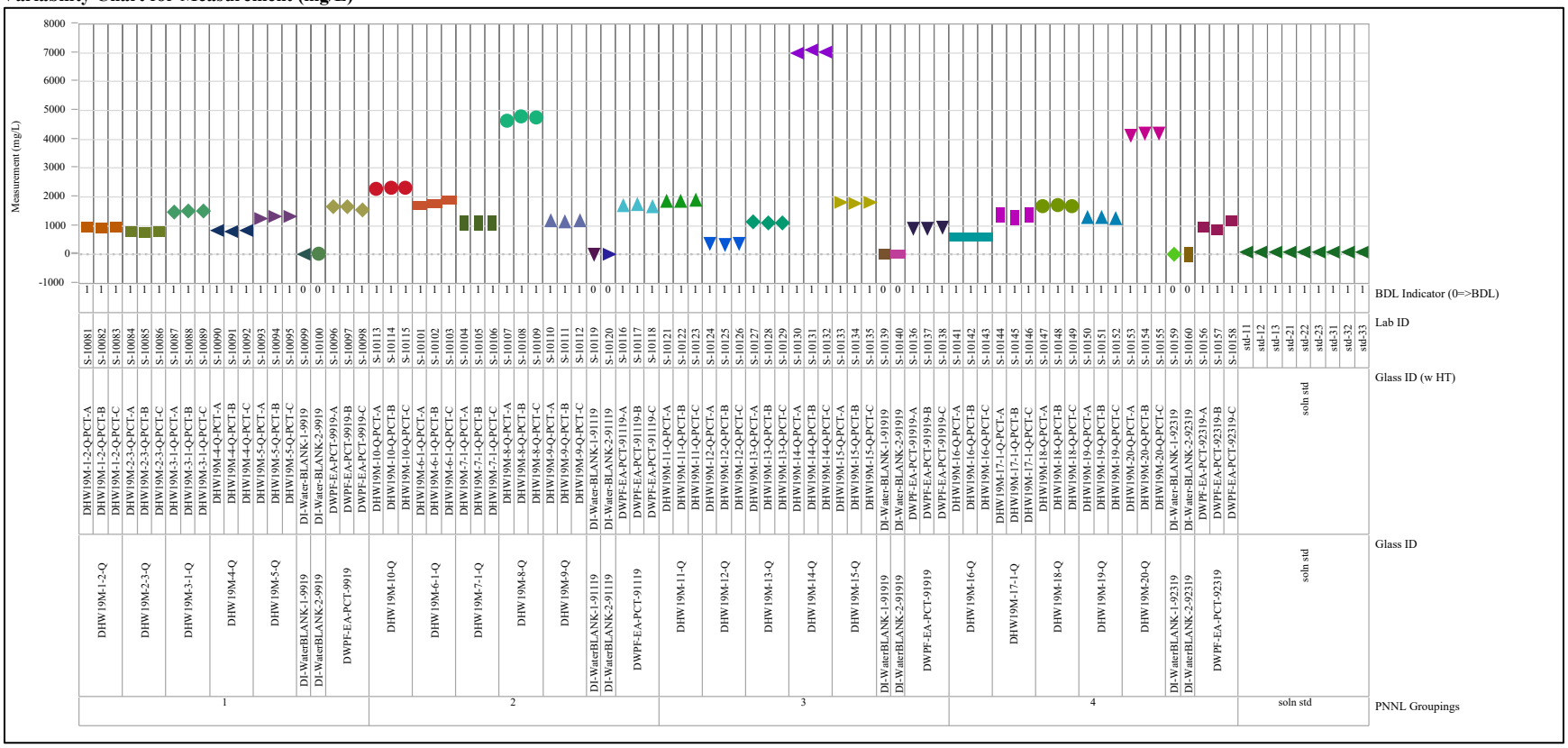
## Exhibit A-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=Li (mg/L)**
**Variability Chart for log [Measurement (mg/L)]**



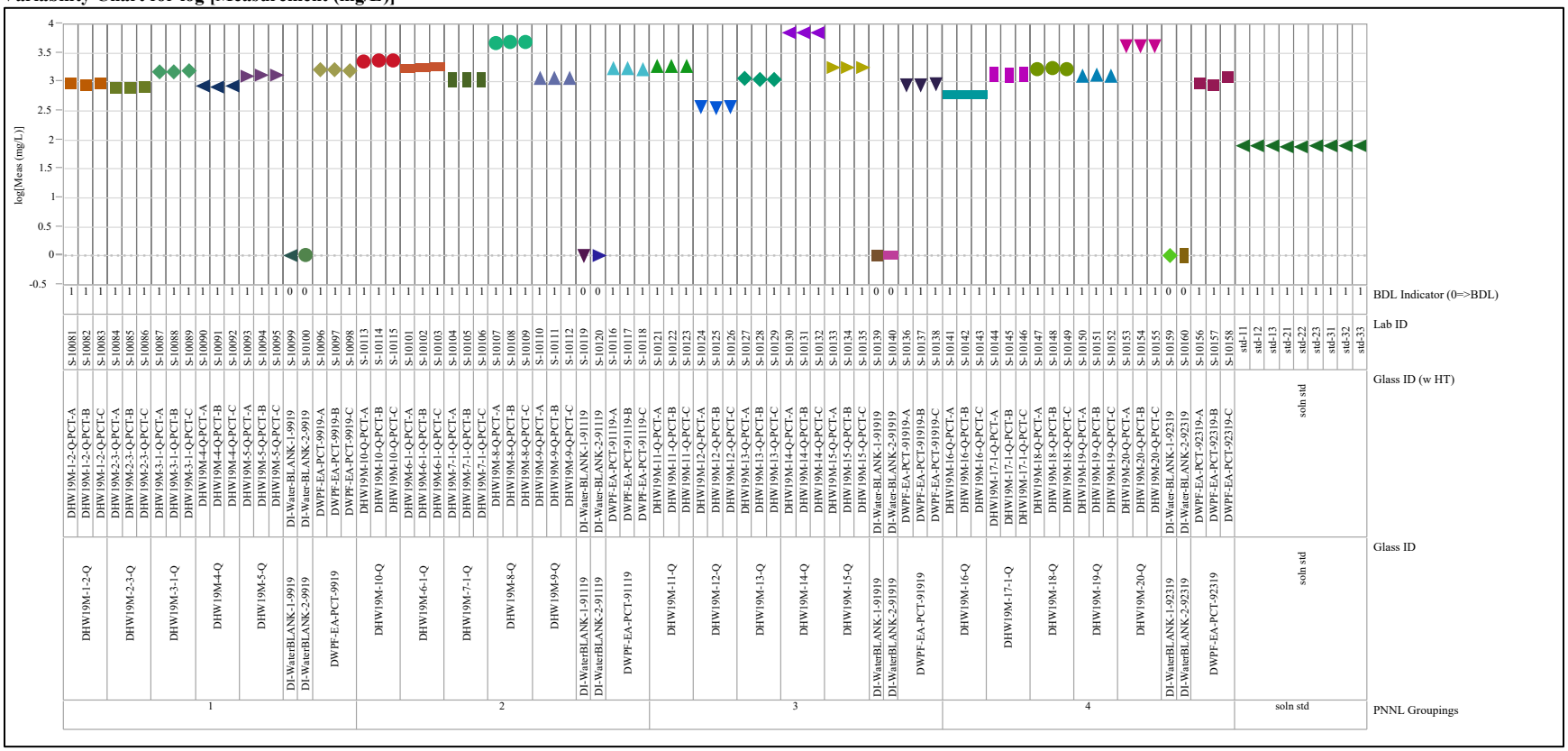
## Exhibit A-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=Na (mg/L)**
**Variability Chart for Measurement (mg/L)**



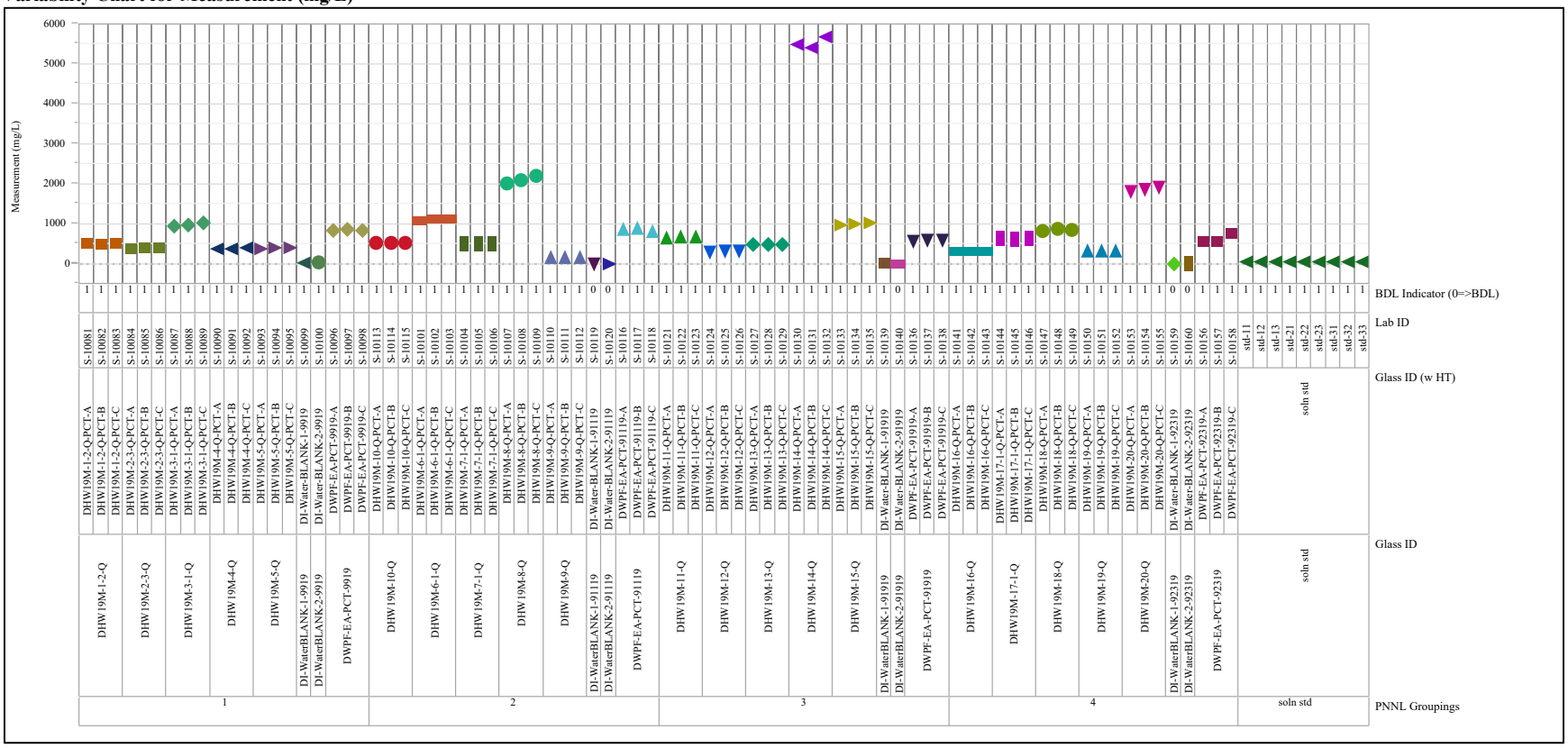
## Exhibit A-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=Na (mg/L)**
**Variability Chart for log [Measurement (mg/L)]**



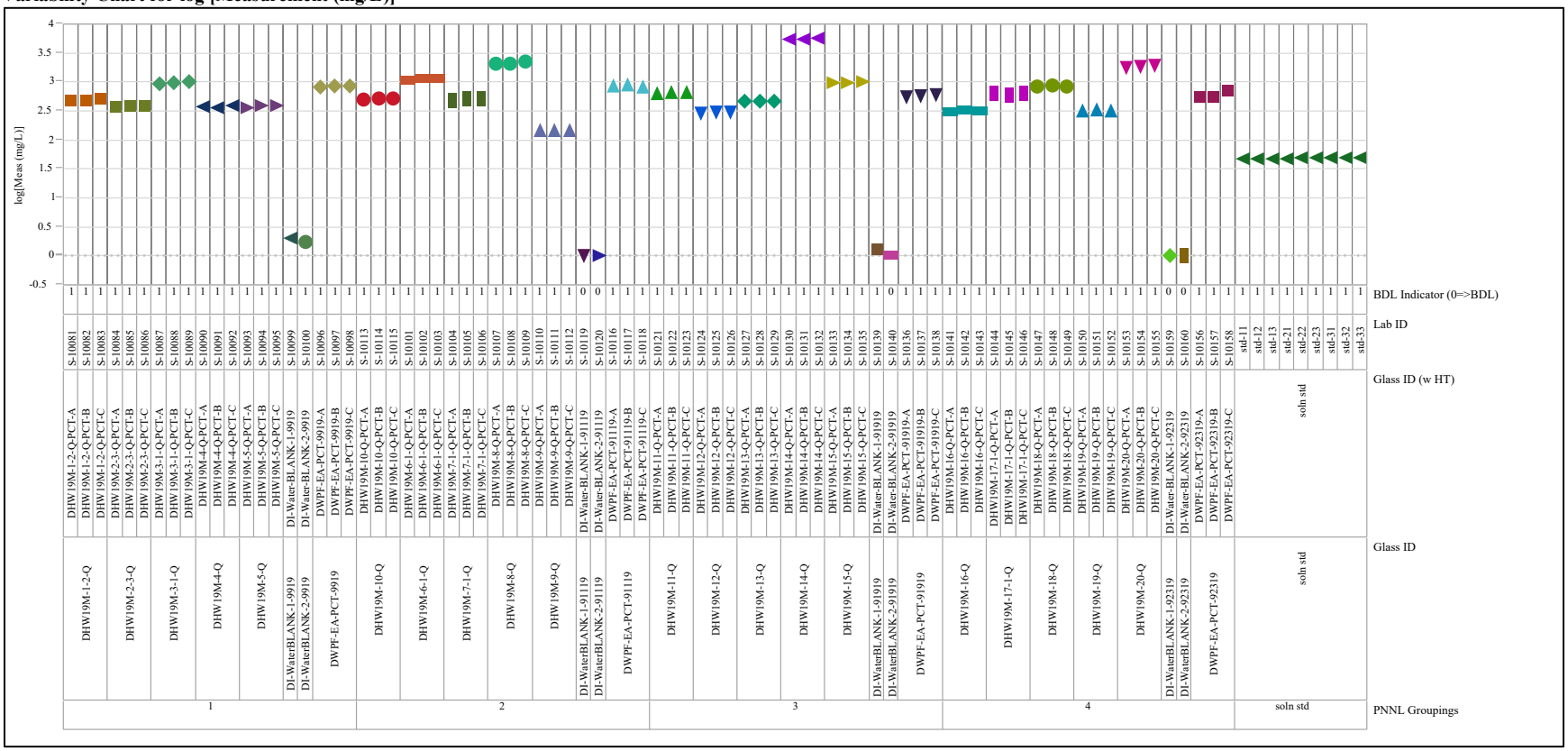
## Exhibit A-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=Si (mg/L)**
**Variability Chart for Measurement (mg/L)**



## Exhibit A-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=Si (mg/L)**
**Variability Chart for log [Measurement (mg/L)]**



# Appendix B Tables and Exhibits Supporting Analysis of the PCT Leachates Received in 2020

**Table B-1. Dilution Factors Used At PNNL in Preparing PCT Leachates**

| PNNL Group | PNNL Solution ID | SRNL Solution ID | Dilution Factor |
|---|---|---|---|
| 1 | DHW19M-24-Q-PCT-A | S-10545 | 1.16 |
| 1 | DHW19M-24-Q-PCT-B | S-10546 | 1.16 |
| 1 | DHW19M-24-Q-PCT-C | S-10547 | 1.16 |
| 1 | DHW19M-25-Q-PCT-A | S-10548 | 1.16 |
| 1 | DHW19M-25-Q-PCT-B | S-10549 | 1.16 |
| 1 | DHW19M-25-Q-PCT-C | S-10550 | 1.16 |
| 1 | DHW19M-26-Q-PCT-A | S-10551 | 1.16 |
| 1 | DHW19M-26-Q-PCT-B | S-10552 | 1.16 |
| 1 | DHW19M-26-Q-PCT-C | S-10553 | 1.16 |
| 1 | DWPF-EA-PCT-100719-A | S-10554 | 1.16 |
| 1 | DWPF-EA-PCT-100719-B | S-10555 | 1.16 |
| 1 | DWPF-EA-PCT-100719-C | S-10556 | 1.16 |
| 1 | DI-WaterBLANK-1-100719-A | S-10557 | 1 |
| 1 | DI-WaterBLANK-1-100719-B | S-10558 | 1 |
| 2 | DHW19M-22-1-Q-PCT-A | S-10559 | 1.16 |
| 2 | DHW19M-22-1-Q-PCT-B | S-10560 | 1.16 |
| 2 | DHW19M-22-1-Q-PCT-C | S-10561 | 1.16 |
| 2 | DHW19M-27-Q-PCT-A | S-10562 | 1.16 |
| 2 | DHW19M-27-Q-PCT-B | S-10563 | 1.16 |
| 2 | DHW19M-27-Q-PCT-C | S-10564 | 1.16 |
| 2 | DHW19M-28-Q-PCT-A | S-10565 | 1.16 |
| 2 | DHW19M-28-Q-PCT-B | S-10566 | 1.16 |
| 2 | DHW19M-28-Q-PCT-C | S-10567 | 1.16 |
| 2 | DHW19M-29-Q-PCT-A | S-10568 | 1.16 |
| 2 | DHW19M-29-Q-PCT-B | S-10569 | 1.16 |
| 2 | DHW19M-29-Q-PCT-C | S-10570 | 1.16 |
| 2 | DHW19M-30-Q-PCT-A | S-10571 | 1.16 |
| 2 | DHW19M-30-Q-PCT-B | S-10572 | 1.16 |
| 2 | DHW19M-30-Q-PCT-C | S-10573 | 1.16 |
| 2 | DWPF-EA-PCT-100919-A+B | S-10574 | 1.16 |
| 2 | DWPF-EA-PCT-100919-C | S-10575 | 1.16 |
| 2 | DI-WaterBLANK-1-100919-A | S-10576 | 1 |
| 2 | DI-WaterBLANK-1-100919-B | S-10577 | 1 |
| 3 | DHW19M-31-Q-PCT-A | S-10578 | 1.16 |
| 3 | DHW19M-31-Q-PCT-B | S-10579 | 1.16 |
| 3 | DHW19M-31-Q-PCT-C | S-10580 | 1.16 |
| 3 | DHW19M-32-Q-PCT-A | S-10581 | 1.16 |
| 3 | DHW19M-32-Q-PCT-B | S-10582 | 1.16 |
| 3 | DHW19M-32-Q-PCT-C | S-10583 | 1.16 |
| 3 | DHW19M-33-Q-PCT-A | S-10584 | 1.16 |
| 3 | DHW19M-33-Q-PCT-B | S-10585 | 1.16 |
| 3 | DHW19M-33-Q-PCT-C | S-10586 | 1.16 |
| 3 | DHW19M-1-3-Q-PCT-A | S-10587 | 1.16 |
| 3 | DHW19M-1-3-Q-PCT-B | S-10588 | 1.16 |
| 3 | DHW19M-1-3-Q-PCT-C | S-10589 | 1.16 |
| 3 | DHW19M-1-3-CCC-PCT-A | S-10590 | 1.16 |
| 3 | DHW19M-1-3-CCC-PCT-B | S-10591 | 1.16 |
| 3 | DHW19M-1-3-CCC-PCT-C | S-10592 | 1.16 |
| 3 | DWPF-EA-PCT-102319-A | S-10593 | 1.16 |
| 3 | DWPF-EA-PCT-102319-B | S-10594 | 1.16 |
| 3 | DWPF-EA-PCT-102319-C | S-10595 | 1.16 |
| 3 | DI-WaterBLANK-1-102319 | S-10596 | 1 |
| 3 | DI-WaterBLANK-2-102319 | S-10597 | 1 |

**Table B-1. Dilution Factors Used At PNNL in Preparing PCT Leachates (continued)**

| PNNL Group | PNNL Solution ID | SRNL Solution ID | Dilution Factor |
|---|---|---|---|
| 4 | DHW19M-2-3-CCC-PCT-A | S-10598 | 1.16 |
| 4 | DHW19M-2-3-CCC-PCT-B | S-10599 | 1.16 |
| 4 | DHW19M-2-3-CCC-PCT-C | S-10600 | 1.16 |
| 4 | DHW19M-3-1-CCC-PCT-A | S-10601 | 1.16 |
| 4 | DHW19M-3-1-CCC-PCT-B | S-10602 | 1.16 |
| 4 | DHW19M-3-1-CCC-PCT-C | S-10603 | 1.16 |
| 4 | DHW19M-4-CCC-PCT-A | S-10604 | 1.16 |
| 4 | DHW19M-4-CCC-PCT-B | S-10605 | 1.16 |
| 4 | DHW19M-4-CCC-PCT-C | S-10606 | 1.16 |
| 4 | DHW19M-5-CCC-PCT-A | S-10607 | 1.16 |
| 4 | DHW19M-5-CCC-PCT-B | S-10608 | 1.16 |
| 4 | DHW19M-5-CCC-PCT-C | S-10609 | 1.16 |
| 4 | DHW19M-6-1-CCC-PCT-A | S-10610 | 1.16 |
| 4 | DHW19M-6-1-CCC-PCT-B | S-10611 | 1.16 |
| 4 | DHW19M-6-1-CCC-PCT-C | S-10612 | 1.16 |
| 4 | DWPF-EA-PCT-102419-A | S-10613 | 1.16 |
| 4 | DWPF-EA-PCT-102419-B | S-10614 | 1.16 |
| 4 | DWPF-EA-PCT-102419-C | S-10615 | 1.16 |
| 4 | DI-WaterBLANK-1-102419 | S-10616 | 1 |
| 4 | DI-WaterBLANK-2-102419 | S-10617 | 1 |
| 5 | DHW19M-7-1-CCC-PCT-A | S-10618 | 1.16 |
| 5 | DHW19M-7-1-CCC-PCT-B | S-10619 | 1.16 |
| 5 | DHW19M-7-1-CCC-PCT-C | S-10620 | 1.16 |
| 5 | DHW19M-8-CCC-PCT-A | S-10621 | 1.16 |
| 5 | DHW19M-8-CCC-PCT-B | S-10622 | 1.16 |
| 5 | DHW19M-8-CCC-PCT-C | S-10623 | 1.16 |
| 5 | DHW19M-9-CCC-PCT-A | S-10624 | 1.16 |
| 5 | DHW19M-9-CCC-PCT-B | S-10625 | 1.16 |
| 5 | DHW19M-9-CCC-PCT-C | S-10626 | 1.16 |
| 5 | DHW19M-10-CCC-PCT-A | S-10627 | 1.16 |
| 5 | DHW19M-10-CCC-PCT-B | S-10628 | 1.16 |
| 5 | DHW19M-10-CCC-PCT-C | S-10629 | 1.16 |
| 5 | DHW19M-12-CCC-PCT-A | S-10630 | 1.16 |
| 5 | DHW19M-12-CCC-PCT-B | S-10631 | 1.16 |
| 5 | DHW19M-12-CCC-PCT-C | S-10632 | 1.16 |
| 5 | DWPF-EA-PCT-110519-A | S-10633 | 1.16 |
| 5 | DWPF-EA-PCT-110519-B | S-10634 | 1.16 |
| 5 | DWPF-EA-PCT-110519-C | S-10635 | 1.16 |
| 5 | DI-WaterBLANK-1-110519 | S-10636 | 1 |
| 5 | DI-WaterBLANK-2-110519 | S-10637 | 1 |

**Table B-1. Dilution Factors Used At PNNL in Preparing PCT Leachates (continued)**

| PNNL Group | PNNL Solution ID | SRNL Solution ID | Dilution Factor |
|---|---|---|---|
| 6 | DHW19M-13-CCC-PCT-A | S-10638 | 1.16 |
| 6 | DHW19M-13-CCC-PCT-B | S-10639 | 1.16 |
| 6 | DHW19M-13-CCC-PCT-C | S-10640 | 1.16 |
| 6 | DHW19M-14-CCC-PCT-A | S-10641 | 1.16 |
| 6 | DHW19M-14-CCC-PCT-B | S-10642 | 1.16 |
| 6 | DHW19M-14-CCC-PCT-C | S-10643 | 1.16 |
| 6 | DHW19M-15-CCC-PCT-A | S-10644 | 1.16 |
| 6 | DHW19M-15-CCC-PCT-B | S-10645 | 1.16 |
| 6 | DHW19M-15-CCC-PCT-C | S-10646 | 1.16 |
| 6 | DHW19M-16-CCC-PCT-A | S-10647 | 1.16 |
| 6 | DHW19M-16-CCC-PCT-B | S-10648 | 1.16 |
| 6 | DHW19M-16-CCC-PCT-C | S-10649 | 1.16 |
| 6 | DWPF-EA-PCT-110619-A | S-10650 | 1.16 |
| 6 | DWPF-EA-PCT-110619-B | S-10651 | 1.16 |
| 6 | DWPF-EA-PCT-110619-C | S-10652 | 1.16 |
| 6 | DI-WaterBLANK-1-110619 | S-10653 | 1 |
| 6 | DI-WaterBLANK-2-110619 | S-10654 | 1 |
| 7 | DHW19M-21-Q-PCT-A | S-10655 | 1.014 |
| 7 | DHW19M-21-Q-PCT-B | S-10656 | 1.014 |
| 7 | DHW19M-21-Q-PCT-C | S-10657 | 1.014 |
| 7 | DHW19M-23-Q-PCT-A | S-10658 | 1.014 |
| 7 | DHW19M-23-Q-PCT-B | S-10659 | 1.014 |
| 7 | DHW19M-23-Q-PCT-C | S-10660 | 1.014 |
| 7 | DWPF-EA-PCT-011520-A | S-10661 | 1.014 |
| 7 | DWPF-EA-PCT-011520-B | S-10662 | 1.014 |
| 7 | DWPF-EA-PCT-011520-C | S-10663 | 1.014 |
| 7 | DI-WaterBLANK-1-011520 | S-10664 | 1 |
| 7 | DI-WaterBLANK-2-011520 | S-10665 | 1 |
| 8 | DHW19M-22-1-CCC-PCT-A | S-10666 | 1.147 |
| 8 | DHW19M-22-1-CCC-PCT-B | S-10667 | 1.147 |
| 8 | DHW19M-22-1-CCC-PCT-C | S-10668 | 1.147 |
| 8 | DHW19M-23-CCC-PCT-A | S-10669 | 1.147 |
| 8 | DHW19M-23-CCC-PCT-B | S-10670 | 1.147 |
| 8 | DHW19M-23-CCC-PCT-C | S-10671 | 1.147 |
| 8 | DHW19M-24-CCC-PCT-A | S-10672 | 1.147 |
| 8 | DHW19M-24-CCC-PCT-B | S-10673 | 1.147 |
| 8 | DHW19M-24-CCC-PCT-C | S-10674 | 1.147 |
| 8 | DHW19M-25-CCC-PCT-A | S-10675 | 1.147 |
| 8 | DHW19M-25-CCC-PCT-B | S-10676 | 1.147 |
| 8 | DHW19M-25-CCC-PCT-C | S-10677 | 1.147 |
| 8 | DWPF-EA-PCT-112719-A | S-10678 | 1.051 |
| 8 | DWPF-EA-PCT-112719-B | S-10679 | 1.051 |
| 8 | DWPF-EA-PCT-112719-C | S-10680 | 1.051 |
| 8 | DI-WaterBLANK-1-112719 | S-10681 | 1 |
| 8 | DI-WaterBLANK-2-112719 | S-10682 | 1 |

**Table B-1. Dilution Factors Used At PNNL in Preparing PCT Leachates (continued)**

| PNNL Group | PNNL Solution ID | SRNL Solution ID | Dilution Factor |
|---|---|---|---|
| 9 | DHW19M-27-CCC-PCT-A | S-10683 | 1.147 |
| 9 | DHW19M-27-CCC-PCT-B | S-10684 | 1.147 |
| 9 | DHW19M-27-CCC-PCT-C | S-10685 | 1.147 |
| 9 | DHW19M-28-CCC-PCT-A | S-10686 | 1.147 |
| 9 | DHW19M-28-CCC-PCT-B | S-10687 | 1.147 |
| 9 | DHW19M-28-CCC-PCT-C | S-10688 | 1.147 |
| 9 | DHW19M-29-CCC-PCT-A | S-10689 | 1.147 |
| 9 | DHW19M-29-CCC-PCT-B | S-10690 | 1.147 |
| 9 | DHW19M-29-CCC-PCT-C | S-10691 | 1.147 |
| 9 | DHW19M-30-CCC-PCT-A | S-10692 | 1.147 |
| 9 | DHW19M-30-CCC-PCT-B | S-10693 | 1.147 |
| 9 | DHW19M-30-CCC-PCT-C | S-10694 | 1.147 |
| 9 | DHW19M-31-CCC-PCT-A | S-10695 | 1.147 |
| 9 | DHW19M-31-CCC-PCT-B | S-10696 | 1.147 |
| 9 | DHW19M-31-CCC-PCT-C | S-10697 | 1.147 |
| 9 | DWPF-EA-PCT-121219-A | S-10698 | 1.051 |
| 9 | DWPF-EA-PCT-121219-B | S-10699 | 1.051 |
| 9 | DWPF-EA-PCT-121219-C | S-10700 | 1.051 |
| 9 | DI-WaterBLANK-1-121219 | S-10701 | 1 |
| 9 | DI-WaterBLANK-2-121219 | S-10702 | 1 |
| 10 | DHW19M-32-CCC-PCT-A | S-10703 | 1.147 |
| 10 | DHW19M-32-CCC-PCT-B | S-10704 | 1.147 |
| 10 | DHW19M-32-CCC-PCT-C | S-10705 | 1.147 |
| 10 | DHW19M-33-CCC-PCT-A | S-10706 | 1.147 |
| 10 | DHW19M-33-CCC-PCT-B | S-10707 | 1.147 |
| 10 | DHW19M-33-CCC-PCT-C | S-10708 | 1.147 |
| 10 | DWPF-EA-PCT-010820-A | S-10709 | 1.051 |
| 10 | DWPF-EA-PCT-010820-B | S-10710 | 1.051 |
| 10 | DWPF-EA-PCT-010820-C | S-10711 | 1.051 |
| 10 | DI-WaterBLANK-1-011520 | S-10712 | 1 |
| 10 | DI-WaterBLANK-2-011521 | S-10713 | 1 |

**Table B-1. Dilution Factors Used At PNNL in Preparing PCT Leachates (continued)**

| PNNL Group | PNNL Solution ID | SRNL Solution ID | Dilution Factor |
|---|---|---|---|
| 11 | DHW19M-11-CCC-PCT-A | S-10714 | 6.0 |
| 11 | DHW19M-11-CCC-PCT-B | S-10715 | 6.0 |
| 11 | DHW19M-11-CCC-PCT-C | S-10716 | 6.0 |
| 11 | DHW19M-17-1-CCC-PCT-A | S-10717 | 6.0 |
| 11 | DHW19M-17-1-CCC-PCT-B | S-10718 | 6.0 |
| 11 | DHW19M-17-1-CCC-PCT-C | S-10719 | 6.0 |
| 11 | DHW19M-18-CCC-PCT-A | S-10720 | 6.0 |
| 11 | DHW19M-18-CCC-PCT-B | S-10721 | 6.0 |
| 11 | DHW19M-18-CCC-PCT-C | S-10722 | 6.0 |
| 11 | DHW19M-19-CCC-PCT-A | S-10723 | 6.0 |
| 11 | DHW19M-19-CCC-PCT-B | S-10724 | 6.0 |
| 11 | DHW19M-19-CCC-PCT-C | S-10725 | 6.0 |
| 11 | DHW19M-20-CCC-PCT-A | S-10726 | 6.0 |
| 11 | DHW19M-20-CCC-PCT-B | S-10727 | 6.0 |
| 11 | DHW19M-20-CCC-PCT-C | S-10728 | 6.0 |
| 11 | DHW19M-21-CCC-PCT-A | S-10729 | 6.0 |
| 11 | DHW19M-21-CCC-PCT-B | S-10730 | 6.0 |
| 11 | DHW19M-21-CCC-PCT-C | S-10731 | 6.0 |
| 11 | DHW19M-26-CCC-PCT-A | S-10732 | 6.0 |
| 11 | DHW19M-26-CCC-PCT-B | S-10733 | 6.0 |
| 11 | DHW19M-26-CCC-PCT-C | S-10734 | 6.0 |
| 11 | DWPF-EA-PCT-013020-A | S-10735 | 6.0 |
| 11 | DWPF-EA-PCT-013020-B | S-10736 | 6.0 |
| 11 | DWPF-EA-PCT-013020-C | S-10737 | 6.0 |
| 11 | DI-WaterBLANK-1-013020 | S-10738 | 6.0 |
| 11 | DI-WaterBLANK-2-013020 | S-10739 | 6.0 |
| 11 | DI-WaterBLANK-1-013020-NA | S-10740 | 1 |
| 11 | DI-WaterBLANK-2-013020-NA | S-10741 | 1 |

## Table B-2. PCT Leachate Measurements in Analytical Sequence

| PNNL Grouping | PNNL Solution ID | Lab ID | Block | Seq | B (ar) | Cr (ar) | Li (ar) | Na (ar) | Si (ar) | Dil. Fac. | B (mg/L) | Cr (mg/L) | Li (mg/L) | Na (mg/L) | Si (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| na | soln std | std-11 | 1 | 1 | 19.6 | <1.00 | 9.10 | 76.1 | 46.7 | 1.00 | 19.6 | <1.00 | 9.10 | 76.1 | 46.7 |
| 3 | DHW19M-1-3-CCC-PCT-A | S-10590 | 1 | 2 | 217 | 44.8 | 75.2 | 692 | 376 | 1.16 | 251 | 52.0 | 87.2 | 802 | 436 |
| 5 | DHW19M-12-CCC-PCT-A | S-10630 | 1 | 3 | 88.4 | 4.74 | 14.3 | 265 | 221 | 1.16 | 103 | 5.50 | 16.5 | 308 | 256 |
| 5 | DI-WaterBLANK-1-110519 | S-10636 | 1 | 4 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| 9 | DHW19M-28-CCC-PCT-A | S-10686 | 1 | 5 | 1940 | 103 | 557 | 4950 | 4040 | 1.15 | 2230 | 119 | 640 | 5680 | 4640 |
| 9 | DHW19M-29-CCC-PCT-A | S-10689 | 1 | 6 | 1510 | 126 | 436 | 6020 | 327 | 1.15 | 1730 | 145 | 500 | 6910 | 375 |
| 9 | DHW19M-27-CCC-PCT-A | S-10683 | 1 | 7 | 77.8 | 8.57 | 49.5 | 650 | 288 | 1.15 | 89.2 | 9.83 | 56.8 | 746 | 330 |
| 9 | DHW19M-31-CCC-PCT-A | S-10695 | 1 | 8 | 461 | 6.07 | 71.4 | 796 | 132 | 1.15 | 529 | 6.97 | 81.9 | 913 | 151 |
| 2 | DI-WaterBLANK-1-100919-A | S-10576 | 1 | 9 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| 3 | DHW19M-1-3-Q-PCT-A | S-10587 | 1 | 10 | 272 | 34.5 | 85.8 | 849 | 449 | 1.16 | 315 | 40.0 | 99.5 | 985 | 520 |
| 3 | DI-WaterBLANK-1-102319 | S-10596 | 1 | 11 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| 3 | DHW19M-33-Q-PCT-A | S-10584 | 1 | 12 | 295 | 26.8 | 10.1 | 873 | 320 | 1.16 | 342 | 31.1 | 11.7 | 1010 | 371 |
| 5 | DHW19M-7-1-CCC-PCT-A | S-10618 | 1 | 13 | 1280 | 164 | 171 | 4090 | 1820 | 1.16 | 1480 | 190 | 198 | 4740 | 2110 |
| 4 | DHW19M-2-3-CCC-PCT-A | S-10598 | 1 | 14 | 170 | 11.1 | 12.6 | 653 | 323 | 1.16 | 197 | 12.9 | 14.6 | 758 | 375 |
| 3 | DWPF-EA-PCT-102319-A | S-10593 | 1 | 15 | 242 | <1.00 | 85.6 | 727 | 443 | 1.16 | 280 | <1.16 | 99.3 | 843 | 514 |
| 9 | DHW19M-30-CCC-PCT-A | S-10692 | 1 | 16 | 301 | 29.3 | 17.2 | 746 | 313 | 1.15 | 346 | 33.6 | 19.8 | 856 | 359 |
| 4 | DI-WaterBLANK-1-102419 | S-10616 | 1 | 17 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| 2 | DHW19M-29-Q-PCT-A | S-10568 | 1 | 18 | 1450 | 67.7 | 411 | 5740 | 68.0 | 1.16 | 1680 | 78.5 | 477 | 6660 | 78.9 |
| na | soln std | std-12 | 1 | 19 | 19.5 | <1.00 | 9.09 | 77.2 | 46.3 | 1.00 | 19.5 | <1.00 | 9.09 | 77.2 | 46.3 |
| 9 | DWPF-EA-PCT-121219-A | S-10698 | 1 | 20 | 435 | <1.00 | 142 | 1310 | 682 | 1.05 | 457 | <1.05 | 149 | 1380 | 717 |
| 4 | DHW19M-5-CCC-PCT-A | S-10607 | 1 | 21 | 494 | 33.3 | 108 | 1000 | 322 | 1.16 | 573 | 38.7 | 126 | 1160 | 373 |
| 5 | DHW19M-9-CCC-PCT-A | S-10624 | 1 | 22 | 417 | 16.7 | 13.7 | 977 | 116 | 1.16 | 483 | 19.4 | 15.9 | 1130 | 135 |
| 2 | DHW19M-30-Q-PCT-A | S-10571 | 1 | 23 | 376 | 31.7 | 21.0 | 910 | 351 | 1.16 | 436 | 36.7 | 24.3 | 1060 | 407 |
| 5 | DWPF-EA-PCT-110519-A | S-10633 | 1 | 24 | 273 | <1.00 | 98.7 | 766 | 499 | 1.16 | 316 | <1.16 | 114 | 888 | 579 |
| 5 | DHW19M-10-CCC-PCT-A | S-10627 | 1 | 25 | 1080 | 149 | 72.9 | 2600 | 554 | 1.16 | 1250 | 173 | 84.6 | 3020 | 643 |
| 2 | DHW19M-27-Q-PCT-A | S-10562 | 1 | 26 | 88.9 | 9.07 | 66.4 | 856 | 382 | 1.16 | 103 | 10.5 | 77.0 | 993 | 443 |
| 4 | DWPF-EA-PCT-102419-A | S-10613 | 1 | 27 | 391 | <1.00 | 115 | 1090 | 672 | 1.16 | 454 | <1.16 | 133 | 1260 | 779 |
| 5 | DHW19M-8-CCC-PCT-A | S-10621 | 1 | 28 | 357 | 36.8 | 2.57 | 1500 | 1050 | 1.16 | 414 | 42.7 | 2.98 | 1740 | 1220 |
| 2 | DHW19M-22-1-Q-PCT-A | S-10559 | 1 | 29 | 734 | 34.8 | 77.8 | 2050 | 1150 | 1.16 | 852 | 40.3 | 90.3 | 2380 | 1330 |
| 4 | DHW19M-4-CCC-PCT-A | S-10604 | 1 | 30 | 161 | 13.2 | 15.8 | 696 | 325 | 1.16 | 186 | 15.3 | 18.4 | 807 | 377 |
| 4 | DHW19M-3-1-CCC-PCT-A | S-10601 | 1 | 31 | 411 | 20.9 | 24.6 | 1530 | 967 | 1.16 | 477 | 24.2 | 28.5 | 1770 | 1120 |
| 4 | DHW19M-6-1-CCC-PCT-A | S-10610 | 1 | 32 | 392 | 12.4 | 137 | 928 | 446 | 1.16 | 454 | 14.4 | 159 | 1080 | 517 |
| 3 | DHW19M-32-Q-PCT-A | S-10581 | 1 | 33 | 1220 | 82.4 | 243 | 2800 | 1170 | 1.16 | 1420 | 95.6 | 281 | 3250 | 1360 |
| 2 | DHW19M-28-Q-PCT-A | S-10565 | 1 | 34 | 1870 | 56.1 | 497 | 4710 | 57.3 | 1.16 | 2170 | 65.1 | 576 | 5460 | 66.5 |
| 3 | DHW19M-31-Q-PCT-A | S-10578 | 1 | 35 | 562 | 6.65 | 96.3 | 993 | 159 | 1.16 | 652 | 7.72 | 112 | 1150 | 184 |
| na | soln std | std-13 | 1 | 36 | 19.2 | <1.00 | 9.05 | 78.2 | 48.2 | 1.00 | 19.2 | <1.00 | 9.05 | 78.2 | 48.2 |
| na | soln std | std-21 | 2 | 1 | 19.9 | <1.00 | 9.43 | 77.1 | 48.1 | 1.00 | 19.9 | <1.00 | 9.43 | 77.1 | 48.1 |
| 9 | DHW19M-28-CCC-PCT-B | S-10687 | 2 | 2 | 1810 | 101 | 529 | 4680 | 3000 | 1.15 | 2080 | 115 | 606 | 5370 | 3440 |
| 5 | DI-WaterBLANK-2-110519 | S-10637 | 2 | 3 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| 3 | DHW19M-33-Q-PCT-B | S-10585 | 2 | 4 | 305 | 29.2 | 10.9 | 884 | 325 | 1.16 | 353 | 33.8 | 12.7 | 1030 | 377 |

ar = as-received measurements prior to correction for dilution factor (Dil. Fac.)

**Table B-2. PCT Leachate Measurements in Analytical Sequence (continued)**

| PNNL Grouping | PNNL Solution ID | Lab ID | Block | Seq | B (ar) | Cr (ar) | Li (ar) | Na (ar) | Si (ar) | Dil. Fac. | B (mg/L) | Cr (mg/L) | Li (mg/L) | Na (mg/L) | Si (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | DWPF-EA-PCT-110519-B | S-10634 | 2 | 5 | 265 | <1.00 | 102 | 758 | 476 | 1.16 | 308 | <1.16 | 119 | 880 | 552 |
| 4 | DHW19M-2-3-CCC-PCT-B | S-10599 | 2 | 6 | 169 | 11.6 | 13.1 | 638 | 320 | 1.16 | 195 | 13.5 | 15.2 | 740 | 371 |
| 2 | DHW19M-28-Q-PCT-B | S-10566 | 2 | 7 | 1820 | 57.9 | 500 | 4590 | 76.0 | 1.16 | 2110 | 67.2 | 580 | 5320 | 88.2 |
| 9 | DHW19M-31-CCC-PCT-B | S-10696 | 2 | 8 | 450 | 6.01 | 73.5 | 760 | 125 | 1.15 | 516 | 6.89 | 84.3 | 872 | 143 |
| 4 | DWPF-EA-PCT-102419-B | S-10614 | 2 | 9 | 335 | <1.00 | 110 | 955 | 552 | 1.16 | 388 | <1.16 | 127 | 1110 | 640 |
| 2 | DHW19M-30-Q-PCT-B | S-10572 | 2 | 10 | 360 | 36.7 | 22.1 | 873 | 334 | 1.16 | 417 | 42.6 | 25.7 | 1010 | 388 |
| 3 | DHW19M-32-Q-PCT-B | S-10582 | 2 | 11 | 1300 | 87.8 | 255 | 2920 | 70.2 | 1.16 | 1510 | 102 | 296 | 3390 | 81.4 |
| 2 | DHW19M-27-Q-PCT-B | S-10563 | 2 | 12 | 83.0 | 9.48 | 66.1 | 827 | 327 | 1.16 | 96.3 | 11.0 | 76.7 | 959 | 379 |
| 9 | DHW19M-29-CCC-PCT-B | S-10690 | 2 | 13 | 1590 | 111 | 448 | 6210 | 158 | 1.15 | 1820 | 127 | 514 | 7120 | 181 |
| 5 | DHW19M-10-CCC-PCT-B | S-10628 | 2 | 14 | 1010 | 132 | 76.5 | 2630 | 506 | 1.16 | 1170 | 154 | 88.8 | 3050 | 587 |
| 3 | DI-WaterBLANK-2-102319 | S-10597 | 2 | 15 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| 9 | DHW19M-27-CCC-PCT-B | S-10684 | 2 | 16 | 71.6 | 8.91 | 51.6 | 613 | 275 | 1.15 | 82.2 | 10.2 | 59.2 | 703 | 315 |
| 5 | DHW19M-12-CCC-PCT-B | S-10631 | 2 | 17 | 84.2 | 5.06 | 15.4 | 259 | 214 | 1.16 | 97.7 | 5.87 | 17.8 | 300 | 248 |
| 3 | DHW19M-1-3-CCC-PCT-B | S-10591 | 2 | 18 | 209 | 37.2 | 77.3 | 660 | 360 | 1.16 | 243 | 43.1 | 89.7 | 766 | 417 |
| na | soln std | std-22 | 2 | 19 | 20.0 | <1.00 | 9.74 | 77.2 | 47.4 | 1.00 | 20.0 | <1.00 | 9.74 | 77.2 | 47.4 |
| 4 | DHW19M-6-1-CCC-PCT-B | S-10611 | 2 | 20 | 384 | 12.8 | 140 | 891 | 417 | 1.16 | 446 | 14.8 | 162 | 1030 | 483 |
| 4 | DHW19M-3-1-CCC-PCT-B | S-10602 | 2 | 21 | 417 | 24.4 | 26.0 | 1560 | 955 | 1.16 | 484 | 28.3 | 30.2 | 1810 | 1110 |
| 4 | DHW19M-5-CCC-PCT-B | S-10608 | 2 | 22 | 484 | 37.0 | 104 | 960 | 305 | 1.16 | 561 | 43.0 | 121 | 1110 | 354 |
| 5 | DHW19M-7-1-CCC-PCT-B | S-10619 | 2 | 23 | 1340 | 162 | 171 | 4180 | 1970 | 1.16 | 1550 | 188 | 198 | 4850 | 2290 |
| 5 | DHW19M-9-CCC-PCT-B | S-10625 | 2 | 24 | 400 | 17.7 | 14.4 | 953 | 108 | 1.16 | 464 | 20.6 | 16.7 | 1110 | 126 |
| 5 | DHW19M-8-CCC-PCT-B | S-10622 | 2 | 25 | 336 | 38.6 | 2.66 | 1500 | 910 | 1.16 | 389 | 44.8 | 3.08 | 1740 | 1060 |
| 2 | DHW19M-29-Q-PCT-B | S-10569 | 2 | 26 | 1420 | 67.2 | 398 | 5540 | 60.8 | 1.16 | 1650 | 78.0 | 462 | 6430 | 70.5 |
| 9 | DWPF-EA-PCT-121219-B | S-10699 | 2 | 27 | 402 | <1.00 | 132 | 1190 | 636 | 1.05 | 422 | <1.05 | 139 | 1250 | 668 |
| 4 | DHW19M-4-CCC-PCT-B | S-10605 | 2 | 28 | 150 | 14.8 | 16.7 | 679 | 287 | 1.16 | 174 | 17.1 | 19.4 | 787 | 332 |
| 9 | DI-WaterBLANK-2-121219 | S-10702 | 2 | 29 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| 2 | DHW19M-22-1-Q-PCT-B | S-10560 | 2 | 30 | 685 | 38.5 | 78.1 | 1750 | 995 | 1.16 | 795 | 44.6 | 90.5 | 2030 | 1150 |
| 9 | DHW19M-30-CCC-PCT-B | S-10693 | 2 | 31 | 289 | 29.6 | 18.0 | 720 | 295 | 1.15 | 331 | 34.0 | 20.6 | 825 | 338 |
| 2 | DI-WaterBLANK-1-100919-B | S-10577 | 2 | 32 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| 3 | DHW19M-1-3-Q-PCT-B | S-10588 | 2 | 33 | 248 | 34.0 | 87.8 | 799 | 411 | 1.16 | 287 | 39.4 | 102 | 927 | 477 |
| 3 | DWPF-EA-PCT-102319-B | S-10594 | 2 | 34 | 239 | <1.00 | 91.9 | 714 | 431 | 1.16 | 277 | <1.16 | 107 | 829 | 500 |
| 3 | DHW19M-31-Q-PCT-B | S-10579 | 2 | 35 | 515 | 3.94 | 84.7 | 866 | 132 | 1.16 | 597 | 4.56 | 98.2 | 1000 | 153 |
| na | soln std | std-23 | 2 | 36 | 19.7 | <1.00 | 9.93 | 77.6 | 47.0 | 1.00 | 19.7 | <1.00 | 9.93 | 77.6 | 47.0 |
| na | soln std | std-31 | 3 | 1 | 19.1 | <1.00 | 9.27 | 76.5 | 46.7 | 1.00 | 19.1 | <1.00 | 9.27 | 76.5 | 46.7 |
| 2 | DHW19M-29-Q-PCT-C | S-10570 | 3 | 2 | 1390 | 67.5 | 384 | 5460 | 162 | 1.16 | 1610 | 78.3 | 446 | 6330 | 188 |
| 3 | DHW19M-31-Q-PCT-C | S-10580 | 3 | 3 | 513 | 3.59 | 85.5 | 882 | 138 | 1.16 | 595 | 4.16 | 99.1 | 1020 | 160 |
| 9 | DWPF-EA-PCT-121219-C | S-10700 | 3 | 4 | 468 | <1.00 | 151 | 1390 | 757 | 1.05 | 492 | <1.05 | 158 | 1460 | 796 |
| 4 | DWPF-EA-PCT-102419-C | S-10615 | 3 | 5 | 299 | <1.00 | 108 | 873 | 515 | 1.16 | 347 | <1.16 | 125 | 1010 | 597 |
| 9 | DHW19M-28-CCC-PCT-C | S-10688 | 3 | 6 | 1790 | 89.3 | 516 | 4590 | 3670 | 1.15 | 2050 | 102 | 592 | 5270 | 4210 |
| 3 | DWPF-EA-PCT-102319-C | S-10595 | 3 | 7 | 250 | <1.00 | 94.3 | 733 | 450 | 1.16 | 290 | <1.16 | 109 | 851 | 522 |
| 9 | DHW19M-30-CCC-PCT-C | S-10694 | 3 | 8 | 291 | 29.1 | 18.0 | 725 | 305 | 1.15 | 334 | 33.4 | 20.6 | 832 | 350 |
| 3 | DHW19M-1-3-CCC-PCT-C | S-10592 | 3 | 9 | 206 | 32.3 | 77.1 | 674 | 370 | 1.16 | 239 | 37.5 | 89.5 | 782 | 429 |

ar = as-received measurements prior to correction for dilution factor (Dil. Fac.)

**Table B-2. PCT Leachate Measurements in Analytical Sequence (continued)**

| PNNL Grouping | PNNL Solution ID | Lab ID | Block | Seq | B (ar) | Cr (ar) | Li (ar) | Na (ar) | Si (ar) | Dil. Fac. | B (mg/L) | Cr (mg/L) | Li (mg/L) | Na (mg/L) | Si (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | DHW19M-2-3-CCC-PCT-C | S-10600 | 3 | 10 | 170 | 11.2 | 13.4 | 663 | 330 | 1.16 | 197 | 12.9 | 15.5 | 769 | 383 |
| 3 | DHW19M-33-Q-PCT-C | S-10586 | 3 | 11 | 295 | 27.6 | 11.1 | 888 | 332 | 1.16 | 342 | 32.0 | 12.8 | 1030 | 385 |
| 9 | DHW19M-31-CCC-PCT-C | S-10697 | 3 | 12 | 441 | 5.90 | 76.6 | 777 | 127 | 1.15 | 506 | 6.77 | 87.9 | 892 | 146 |
| 3 | DHW19M-1-3-Q-PCT-C | S-10589 | 3 | 13 | 246 | 33.0 | 87.1 | 802 | 421 | 1.16 | 286 | 38.3 | 101 | 930 | 489 |
| 2 | DHW19M-30-Q-PCT-C | S-10573 | 3 | 14 | 352 | 32.0 | 21.9 | 879 | 337 | 1.16 | 408 | 37.1 | 25.4 | 1020 | 391 |
| 4 | DHW19M-4-CCC-PCT-C | S-10606 | 3 | 15 | 154 | 13.7 | 16.5 | 685 | 297 | 1.16 | 178 | 15.9 | 19.1 | 795 | 345 |
| 2 | DHW19M-28-Q-PCT-C | S-10567 | 3 | 16 | 1750 | 56.4 | 495 | 4550 | 69.0 | 1.16 | 2030 | 65.5 | 574 | 5280 | 80.0 |
| 9 | DI-WaterBLANK-1-121219 | S-10701 | 3 | 17 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| 4 | DHW19M-3-1-CCC-PCT-C | S-10603 | 3 | 18 | 515 | 21.4 | 25.8 | 1820 | 1170 | 1.16 | 598 | 24.8 | 30.0 | 2110 | 1360 |
| na | soln std | std-32 | 3 | 19 | 19.0 | <1.00 | 9.40 | 76.9 | 46.3 | 1.00 | 19.0 | <1.00 | 9.40 | 76.9 | 46.3 |
| 2 | DHW19M-27-Q-PCT-C | S-10564 | 3 | 20 | 81.6 | 9.19 | 67.1 | 828 | 331 | 1.16 | 94.6 | 10.7 | 77.8 | 960 | 384 |
| 5 | DHW19M-9-CCC-PCT-C | S-10626 | 3 | 21 | 401 | 17.2 | 14.1 | 957 | 112 | 1.16 | 465 | 19.9 | 16.4 | 1110 | 130 |
| 5 | DHW19M-12-CCC-PCT-C | S-10632 | 3 | 22 | 78.6 | 4.42 | 15.1 | 261 | 214 | 1.16 | 91.2 | 5.12 | 17.5 | 303 | 248 |
| 2 | DWPF-EA-PCT-100919-A+B | S-10574 | 3 | 23 | 605 | <1.00 | 183 | 1790 | 870 | 1.16 | 701 | <1.16 | 212 | 2080 | 1010 |
| 9 | DHW19M-29-CCC-PCT-C | S-10691 | 3 | 24 | 1610 | 111 | 441 | 6200 | 127 | 1.15 | 1850 | 127 | 506 | 7110 | 145 |
| 5 | DHW19M-8-CCC-PCT-C | S-10623 | 3 | 25 | 337 | 37.6 | 2.64 | 1500 | 940 | 1.16 | 390 | 43.6 | 3.06 | 1740 | 1090 |
| 3 | DHW19M-32-Q-PCT-C | S-10583 | 3 | 26 | 1260 | 82.6 | 244 | 2820 | 1200 | 1.16 | 1460 | 95.8 | 283 | 3270 | 1390 |
| 2 | DHW19M-22-1-Q-PCT-C | S-10561 | 3 | 27 | 673 | 34.7 | 77.9 | 2130 | 993 | 1.16 | 780 | 40.3 | 90.4 | 2470 | 1150 |
| 5 | DHW19M-10-CCC-PCT-C | S-10629 | 3 | 28 | 996 | 135 | 77.6 | 2610 | 508 | 1.16 | 1150 | 157 | 90.0 | 3030 | 589 |
| 4 | DHW19M-5-CCC-PCT-C | S-10609 | 3 | 29 | 470 | 33.7 | 101 | 947 | 309 | 1.16 | 545 | 39.0 | 117 | 1100 | 358 |
| 2 | DWPF-EA-PCT-100919-C | S-10575 | 3 | 30 | 266 | <1.00 | 99.9 | 798 | 474 | 1.16 | 308 | <1.16 | 116 | 925 | 550 |
| 4 | DHW19M-6-1-CCC-PCT-C | S-10612 | 3 | 31 | 376 | 12.2 | 134 | 895 | 418 | 1.16 | 436 | 14.2 | 156 | 1040 | 485 |
| 4 | DI-WaterBLANK-2-102419 | S-10617 | 3 | 32 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| 9 | DHW19M-27-CCC-PCT-C | S-10685 | 3 | 33 | 70.1 | 8.10 | 52.4 | 632 | 281 | 1.15 | 80.4 | 9.29 | 60.1 | 725 | 322 |
| 5 | DHW19M-7-1-CCC-PCT-C | S-10620 | 3 | 34 | 983 | 130 | 130 | 3240 | 1460 | 1.16 | 1140 | 151 | 151 | 3760 | 1690 |
| 5 | DWPF-EA-PCT-110519-C | S-10635 | 3 | 35 | 552 | <1.00 | 175 | 1650 | 811 | 1.16 | 640 | <1.16 | 203 | 1910 | 940 |
| na | soln std | std-33 | 3 | 36 | 18.6 | <1.00 | 9.53 | 77.3 | 45.9 | 1.00 | 18.6 | <1.00 | 9.53 | 77.3 | 45.9 |
| na | soln std | std-41 | 4 | 1 | 19.3 | <1.00 | 9.29 | 76.6 | 46.7 | 1.00 | 19.3 | <1.00 | 9.29 | 76.6 | 46.7 |
| 6 | DHW19M-14-CCC-PCT-A | S-10641 | 4 | 2 | 1510 | 111 | 416 | 5840 | 130 | 1.16 | 1750 | 129 | 483 | 6770 | 151 |
| 1 | DWPF-EA-PCT-100719-A | S-10554 | 4 | 3 | 597 | <1.00 | 182 | 1790 | 850 | 1.16 | 693 | <1.16 | 211 | 2080 | 986 |
| 11 | DHW19M-20-CCC-PCT-A | S-10726 | 4 | 4 | 215 | 33.5 | 29.7 | 668 | 327 | 6.00 | 1290 | 201 | 178 | 4010 | 1960 |
| 11 | DI-WaterBLANK-1-013020 | S-10738 | 4 | 5 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 6.00 | <6.00 | <6.00 | <6.00 | <6.00 | <6.00 |
| 6 | DHW19M-15-CCC-PCT-A | S-10644 | 4 | 6 | 628 | 35.7 | 194 | 1330 | 722 | 1.16 | 728 | 41.4 | 225 | 1540 | 837 |
| 6 | DI-WaterBLANK-1-110619 | S-10653 | 4 | 7 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| 11 | DHW19M-19-CCC-PCT-A | S-10723 | 4 | 8 | 158 | 7.41 | 15.2 | 297 | 60.4 | 6.00 | 946 | 44.5 | 91.3 | 1780 | 363 |
| 11 | DHW19M-26-CCC-PCT-A | S-10732 | 4 | 9 | 79.7 | 8.06 | 3.63 | 291 | 169 | 6.00 | 478 | 48.3 | 21.8 | 1740 | 1010 |
| 8 | DWPF-EA-PCT-112719-A | S-10678 | 4 | 10 | 605 | <1.00 | 182 | 1820 | 865 | 1.05 | 635 | <1.05 | 191 | 1910 | 909 |
| 10 | DWPF-EA-PCT-010820-A | S-10709 | 4 | 11 | 665 | <1.00 | 211 | 1990 | 971 | 1.05 | 699 | <1.05 | 221 | 2090 | 1020 |
| 8 | DHW19M-22-1-CCC-PCT-A | S-10666 | 4 | 12 | 462 | 39.5 | 50.9 | 1490 | 794 | 1.15 | 530 | 45.4 | 58.4 | 1710 | 911 |
| 8 | DHW19M-24-CCC-PCT-A | S-10672 | 4 | 13 | 234 | 18.9 | 40.9 | 699 | 429 | 1.15 | 268 | 21.6 | 46.9 | 802 | 492 |
| 10 | DI-WaterBLANK-1-011520 | S-10712 | 4 | 14 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |

ar = as-received measurements prior to correction for dilution factor (Dil. Fac.)

**Table B-2. PCT Leachate Measurements in Analytical Sequence (continued)**

| PNNL Grouping | PNNL Solution ID | Lab ID | Block | Seq | B (ar) | Cr (ar) | Li (ar) | Na (ar) | Si (ar) | Dil. Fac. | B (mg/L) | Cr (mg/L) | Li (mg/L) | Na (mg/L) | Si (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | DHW19M-17-1-CCC-PCT-A | S-10717 | 4 | 15 | 85.1 | 9.78 | 2.59 | 218 | 103 | 6.00 | 511 | 58.7 | 15.6 | 1310 | 618 |
| 8 | DHW19M-25-CCC-PCT-A | S-10675 | 4 | 16 | 1270 | 137 | 190 | 4000 | 1550 | 1.15 | 1460 | 158 | 217 | 4590 | 1780 |
| 7 | DHW19M-23-Q-PCT-A | S-10658 | 4 | 17 | 751 | 9.73 | 2.65 | 1700 | 221 | 1.01 | 762 | 9.86 | 2.69 | 1720 | 224 |
| 8 | DI-WaterBLANK-1-112719 | S-10681 | 4 | 18 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| na | soln std | std-42 | 4 | 19 | 19.0 | <1.00 | 9.24 | 76.3 | 46.0 | 1.00 | 19.0 | <1.00 | 9.24 | 76.3 | 46.0 |
| 7 | DI-WaterBLANK-1-011520 | S-10664 | 4 | 20 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| 6 | DWPF-EA-PCT-110619-A | S-10650 | 4 | 21 | 249 | <1.00 | 92.6 | 724 | 453 | 1.16 | 289 | <1.16 | 107 | 840 | 526 |
| 7 | DHW19M-21-Q-PCT-A | S-10655 | 4 | 22 | 56.6 | 7.13 | 57.5 | 730 | 290 | 1.01 | 57.4 | 7.23 | 58.4 | 740 | 294 |
| 7 | DWPF-EA-PCT-011520-A | S-10661 | 4 | 23 | 516 | <1.00 | 163 | 1620 | 788 | 1.01 | 524 | <1.01 | 166 | 1640 | 799 |
| 1 | DHW19M-25-Q-PCT-A | S-10548 | 4 | 24 | 443 | 33.8 | 20.3 | 1730 | 208 | 1.16 | 514 | 39.2 | 23.5 | 2010 | 241 |
| 11 | DHW19M-21-CCC-PCT-A | S-10729 | 4 | 25 | 10.1 | 1.27 | 8.56 | 116 | 45.3 | 6.00 | 60.4 | 7.61 | 51.4 | 695 | 272 |
| 10 | DHW19M-33-CCC-PCT-A | S-10706 | 4 | 26 | 324 | 30.2 | 12.2 | 947 | 369 | 1.15 | 372 | 34.7 | 14.0 | 1090 | 424 |
| 1 | DHW19M-24-Q-PCT-A | S-10545 | 4 | 27 | 356 | 14.8 | 60.1 | 998 | 576 | 1.16 | 413 | 17.1 | 69.7 | 1160 | 668 |
| 6 | DHW19M-13-CCC-PCT-A | S-10638 | 4 | 28 | 212 | 14.5 | 54.7 | 618 | 278 | 1.16 | 246 | 16.8 | 63.5 | 716 | 322 |
| 1 | DHW19M-26-Q-PCT-A | S-10551 | 4 | 29 | 1050 | 112 | 164 | 3510 | 1210 | 1.16 | 1220 | 130 | 191 | 4070 | 1400 |
| 10 | DHW19M-32-CCC-PCT-A | S-10703 | 4 | 30 | 1170 | 127 | 246 | 2830 | 1200 | 1.15 | 1340 | 145 | 282 | 3250 | 1380 |
| 8 | DHW19M-23-CCC-PCT-A | S-10669 | 4 | 31 | 636 | 11.0 | 2.85 | 1490 | 220 | 1.15 | 730 | 12.7 | 3.26 | 1710 | 252 |
| 6 | DHW19M-16-CCC-PCT-A | S-10647 | 4 | 32 | 159 | 11.5 | 61.7 | 467 | 194 | 1.16 | 184 | 13.3 | 71.5 | 541 | 225 |
| 11 | DWPF-EA-PCT-013020-A | S-10735 | 4 | 33 | 62.3 | <1.00 | 21.2 | 187 | 105 | 6.00 | 374 | <6.00 | 127 | 1120 | 631 |
| 11 | DHW19M-18-CCC-PCT-A | S-10720 | 4 | 34 | 81.6 | 6.25 | 8.81 | 252 | 133 | 6.00 | 490 | 37.5 | 52.9 | 1510 | 796 |
| 11 | DHW19M-11-CCC-PCT-A | S-10714 | 4 | 35 | 185 | 9.98 | 47.8 | 313 | 106 | 6.00 | 1110 | 59.9 | 287 | 1880 | 638 |
| na | soln std | std-43 | 4 | 36 | 18.8 | <1.00 | 9.29 | 76.1 | 45.8 | 1.00 | 18.8 | <1.00 | 9.29 | 76.1 | 45.8 |
| na | soln std | std-51 | 5 | 1 | 19.1 | <1.00 | 9.16 | 77.0 | 46.7 | 1.00 | 19.1 | <1.00 | 9.16 | 77.0 | 46.7 |
| 8 | DHW19M-23-CCC-PCT-C | S-10671 | 5 | 2 | 633 | 10.8 | 2.80 | 1470 | 229 | 1.15 | 726 | 12.4 | 3.21 | 1690 | 262 |
| 11 | DHW19M-20-CCC-PCT-C | S-10728 | 5 | 3 | 208 | 31.7 | 27.3 | 648 | 319 | 6.00 | 1250 | 190 | 164 | 3890 | 1910 |
| 8 | DHW19M-22-1-CCC-PCT-C | S-10668 | 5 | 4 | 461 | 39.1 | 48.8 | 1450 | 791 | 1.15 | 529 | 44.9 | 56.0 | 1660 | 907 |
| 6 | DHW19M-13-CCC-PCT-C | S-10640 | 5 | 5 | 214 | 14.5 | 52.8 | 608 | 279 | 1.16 | 248 | 16.8 | 61.2 | 706 | 324 |
| 6 | DHW19M-14-CCC-PCT-C | S-10643 | 5 | 6 | 1430 | 109 | 395 | 5790 | 175 | 1.16 | 1660 | 126 | 458 | 6720 | 203 |
| 8 | DWPF-EA-PCT-112719-C | S-10680 | 5 | 7 | 237 | <1.00 | 82.0 | 699 | 443 | 1.05 | 249 | <1.05 | 86.2 | 735 | 466 |
| 6 | DWPF-EA-PCT-110619-C | S-10652 | 5 | 8 | 253 | <1.00 | 90.8 | 740 | 487 | 1.16 | 293 | <1.16 | 105 | 858 | 565 |
| 11 | DHW19M-18-CCC-PCT-C | S-10722 | 5 | 9 | 81.2 | 6.28 | 8.46 | 255 | 127 | 6.00 | 487 | 37.7 | 50.8 | 1530 | 763 |
| 6 | DI-WaterBLANK-2-110619 | S-10654 | 5 | 10 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| 11 | DWPF-EA-PCT-013020-C | S-10737 | 5 | 11 | 73.3 | <1.00 | 22.7 | 220 | 113 | 6.00 | 440 | <6.00 | 136 | 1320 | 676 |
| 10 | DHW19M-33-CCC-PCT-C | S-10708 | 5 | 12 | 313 | 29.4 | 11.3 | 918 | 367 | 1.15 | 359 | 33.7 | 13.0 | 1050 | 420 |
| 7 | DWPF-EA-PCT-011520-C | S-10663 | 5 | 13 | 394 | <1.00 | 140 | 1080 | 614 | 1.01 | 400 | <1.01 | 142 | 1100 | 623 |
| 7 | DHW19M-21-Q-PCT-C | S-10657 | 5 | 14 | 62.9 | 8.07 | 56.8 | 746 | 306 | 1.01 | 63.8 | 8.19 | 57.6 | 757 | 310 |
| 11 | DHW19M-21-CCC-PCT-C | S-10731 | 5 | 15 | 9.58 | 1.34 | 8.61 | 121 | 46.8 | 6.00 | 57.5 | 8.02 | 51.6 | 727 | 281 |
| 10 | DWPF-EA-PCT-010820-C | S-10711 | 5 | 16 | 701 | <1.00 | 218 | 2090 | 1010 | 1.05 | 737 | <1.05 | 229 | 2200 | 1060 |
| 1 | DI-WaterBLANK-1-100719-A | S-10557 | 5 | 17 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| 6 | DHW19M-15-CCC-PCT-C | S-10646 | 5 | 18 | 588 | 32.6 | 179 | 1290 | 699 | 1.16 | 682 | 37.8 | 207 | 1500 | 811 |
| na | soln std | std-52 | 5 | 19 | 19.1 | <1.00 | 9.07 | 77.0 | 46.8 | 1.00 | 19.1 | <1.00 | 9.07 | 77.0 | 46.8 |

ar = as-received measurements prior to correction for dilution factor (Dil. Fac.)

**Table B-2. PCT Leachate Measurements in Analytical Sequence (continued)**

| PNNL Grouping | PNNL Solution ID | Lab ID | Block | Seq | B (ar) | Cr (ar) | Li (ar) | Na (ar) | Si (ar) | Dil. Fac. | B (mg/L) | Cr (mg/L) | Li (mg/L) | Na (mg/L) | Si (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | DHW19M-17-1-CCC-PCT-C | S-10719 | 5 | 20 | 82.4 | 9.38 | 2.40 | 209 | 98.8 | 6.00 | 494 | 56.3 | 14.4 | 1250 | 593 |
| 8 | DHW19M-25-CCC-PCT-C | S-10677 | 5 | 21 | 1220 | 136 | 183 | 3950 | 1520 | 1.15 | 1400 | 156 | 209 | 4530 | 1740 |
| 10 | DI-WaterBLANK-2-011521 | S-10713 | 5 | 22 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| 1 | DHW19M-26-Q-PCT-C | S-10553 | 5 | 23 | 1030 | 109 | 157 | 3400 | 63.2 | 1.16 | 1190 | 127 | 182 | 3940 | 73.3 |
| 1 | DHW19M-25-Q-PCT-C | S-10550 | 5 | 24 | 458 | 34.3 | 19.8 | 1750 | 974 | 1.16 | 531 | 39.7 | 23.0 | 2030 | 1130 |
| 10 | DHW19M-32-CCC-PCT-C | S-10705 | 5 | 25 | 1390 | 131 | 257 | 2990 | 1470 | 1.15 | 1590 | 150 | 294 | 3430 | 1690 |
| 11 | DHW19M-26-CCC-PCT-C | S-10734 | 5 | 26 | 79.1 | 7.79 | 3.35 | 289 | 169 | 6.00 | 475 | 46.7 | 20.1 | 1730 | 1010 |
| 6 | DHW19M-16-CCC-PCT-C | S-10649 | 5 | 27 | 167 | 11.7 | 60.75 | 496 | 212 | 1.16 | 194 | 13.5 | 70.5 | 575 | 246 |
| 11 | DHW19M-19-CCC-PCT-C | S-10725 | 5 | 28 | 162 | 7.60 | 15.0 | 306 | 61.8 | 6.00 | 973 | 45.6 | 90.2 | 1830 | 371 |
| 8 | DHW19M-24-CCC-PCT-C | S-10674 | 5 | 29 | 232 | 17.8 | 38.2 | 686 | 441 | 1.15 | 266 | 20.5 | 43.8 | 787 | 506 |
| 1 | DHW19M-24-Q-PCT-C | S-10547 | 5 | 30 | 359 | 14.6 | 57.8 | 996 | 584 | 1.16 | 416 | 16.9 | 67.1 | 1160 | 677 |
| 7 | DHW19M-23-Q-PCT-C | S-10660 | 5 | 31 | 765 | 9.73 | 2.53 | 1710 | 229 | 1.01 | 776 | 9.87 | 2.57 | 1730 | 232 |
| 11 | DI-WaterBLANK-1-013020-NA | S-10740 | 5 | 32 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| 1 | DWPF-EA-PCT-100719-C | S-10556 | 5 | 33 | 263 | <1.00 | 89.3 | 786 | 477 | 1.16 | 305 | <1.16 | 104 | 911 | 553 |
| 11 | DHW19M-11-CCC-PCT-C | S-10716 | 5 | 34 | 184 | 9.67 | 44.5 | 311 | 109 | 6.00 | 1100 | 58.0 | 267 | 1860 | 653 |
| na | soln std | std-53 | 5 | 35 | 19.4 | <1.00 | 9.04 | 77.0 | 47.4 | 1.00 | 19.4 | <1.00 | 9.04 | 77.0 | 47.4 |
| na | soln std | std-61 | 6 | 1 | 19.6 | <1.00 | 9.22 | 74.8 | 47.8 | 1.00 | 19.6 | <1.00 | 9.22 | 74.8 | 47.8 |
| 7 | DI-WaterBLANK-2-011520 | S-10665 | 6 | 2 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| 8 | DHW19M-24-CCC-PCT-B | S-10673 | 6 | 3 | 235 | 18.7 | 39.6 | 666 | 434 | 1.15 | 270 | 21.5 | 45.5 | 764 | 498 |
| 11 | DHW19M-17-1-CCC-PCT-B | S-10718 | 6 | 4 | 83.2 | 9.47 | 2.43 | 207 | 100 | 6.00 | 499 | 56.8 | 14.6 | 1240 | 600 |
| 1 | DHW19M-25-Q-PCT-B | S-10549 | 6 | 5 | 451 | 34.1 | 19.7 | 1720 | 961 | 1.16 | 523 | 39.5 | 22.9 | 2000 | 1110 |
| 11 | DI-WaterBLANK-2-013020-NA | S-10741 | 6 | 6 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| 11 | DHW19M-11-CCC-PCT-B | S-10715 | 6 | 7 | 187 | 9.91 | 46.2 | 308 | 111 | 6.00 | 1120 | 59.4 | 277 | 1850 | 667 |
| 11 | DHW19M-18-CCC-PCT-B | S-10721 | 6 | 8 | 81.9 | 6.34 | 8.61 | 252 | 126 | 6.00 | 491 | 38.0 | 51.7 | 1510 | 753 |
| 8 | DI-WaterBLANK-2-112719 | S-10682 | 6 | 9 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 |
| 11 | DWPF-EA-PCT-013020-B | S-10736 | 6 | 10 | 71.8 | <1.00 | 22.8 | 212 | 113 | 6.00 | 431 | <6.00 | 137 | 1270 | 676 |
| 8 | DHW19M-23-CCC-PCT-B | S-10670 | 6 | 11 | 641 | 11.3 | 2.83 | 1460 | 223 | 1.15 | 735 | 12.9 | 3.25 | 1680 | 256 |
| 6 | DHW19M-15-CCC-PCT-B | S-10645 | 6 | 12 | 576 | 32.2 | 180 | 1070 | 702 | 1.16 | 668 | 37.3 | 208 | 1240 | 814 |
| 8 | DWPF-EA-PCT-112719-B | S-10679 | 6 | 13 | 282 | <1.00 | 101 | 800 | 530 | 1.05 | 296 | <1.05 | 106 | 840 | 557 |
| 1 | DI-WaterBLANK-1-100719-B | S-10558 | 6 | 14 | <1.00 | <1.00 | <1.00 | <1.00 | 1.13 | 1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 1.13 |
| 10 | DHW19M-33-CCC-PCT-B | S-10707 | 6 | 15 | 329 | 30.0 | 11.9 | 925 | 376 | 1.15 | 377 | 34.4 | 13.6 | 1060 | 431 |
| 6 | DHW19M-16-CCC-PCT-B | S-10648 | 6 | 16 | 167 | 11.8 | 61.7 | 479 | 237 | 1.16 | 193 | 13.7 | 71.5 | 556 | 275 |
| 6 | DWPF-EA-PCT-110619-B | S-10651 | 6 | 17 | 270 | <1.00 | 100 | 752 | 496 | 1.16 | 313 | <1.16 | 116 | 872 | 575 |
| 10 | DWPF-EA-PCT-010820-B | S-10710 | 6 | 18 | 667 | <1.00 | 217 | 1940 | 972 | 1.05 | 701 | <1.05 | 228 | 2040 | 1020 |
| na | soln std | std-62 | 6 | 19 | 19.7 | <1.00 | 9.22 | 74.9 | 47.8 | 1.00 | 19.7 | <1.00 | 9.22 | 74.9 | 47.8 |
| 1 | DWPF-EA-PCT-100719-B | S-10555 | 6 | 20 | 608 | <1.00 | 183 | 1810 | 864 | 1.16 | 706 | <1.16 | 213 | 2100 | 1000 |
| 7 | DHW19M-23-Q-PCT-B | S-10659 | 6 | 21 | 762 | 9.75 | 2.59 | 1720 | 228 | 1.01 | 773 | 9.89 | 2.63 | 1740 | 232 |
| 1 | DHW19M-24-Q-PCT-B | S-10546 | 6 | 22 | 359 | 14.4 | 59.4 | 973 | 588 | 1.16 | 416 | 16.7 | 68.9 | 1130 | 683 |
| 11 | DI-WaterBLANK-2-013020 | S-10739 | 6 | 23 | <1.00 | <1.00 | <1.00 | <1.00 | <1.00 | 6.00 | <6.00 | <6.00 | <6.00 | <6.00 | <6.00 |
| 11 | DHW19M-19-CCC-PCT-B | S-10724 | 6 | 24 | 162 | 7.42 | 15.1 | 296 | 61.4 | 6.00 | 972 | 44.5 | 90.7 | 1770 | 368 |
| 11 | DHW19M-20-CCC-PCT-B | S-10727 | 6 | 25 | 216 | 31.9 | 27.9 | 643 | 328 | 6.00 | 1300 | 191 | 167 | 3860 | 1970 |

ar = as-received measurements prior to correction for dilution factor (Dil. Fac.)

**Table B-2. PCT Leachate Measurements in Analytical Sequence (continued)**

| PNNL Grouping | PNNL Solution ID | Lab ID | Block | Seq | B (ar) | Cr (ar) | Li (ar) | Na (ar) | Si (ar) | Dil. Fac. | B (mg/L) | Cr (mg/L) | Li (mg/L) | Na (mg/L) | Si (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | DHW19M-21-CCC-PCT-B | S-10730 | 6 | 26 | 9.58 | 1.34 | 8.74 | 121 | 46.4 | 6.00 | 57.5 | 8.01 | 52.4 | 724 | 279 |
| 10 | DHW19M-32-CCC-PCT-B | S-10704 | 6 | 27 | 1200 | 129 | 256 | 2900 | 1280 | 1.15 | 1380 | 148 | 294 | 3330 | 1470 |
| 8 | DHW19M-22-1-CCC-PCT-B | S-10667 | 6 | 28 | 470 | 38.9 | 49.0 | 1491 | 809 | 1.15 | 539 | 44.6 | 56.3 | 1710 | 928 |
| 6 | DHW19M-14-CCC-PCT-B | S-10642 | 6 | 29 | 1520 | 108 | 433 | 6280 | 61.7 | 1.16 | 1760 | 125 | 502 | 7280 | 71.5 |
| 6 | DHW19M-13-CCC-PCT-B | S-10639 | 6 | 30 | 218 | 14.3 | 52.5 | 582 | 280 | 1.16 | 252 | 16.6 | 60.9 | 675 | 324 |
| 1 | DHW19M-26-Q-PCT-B | S-10552 | 6 | 31 | 999 | 107 | 153 | 3271 | 1226 | 1.16 | 1160 | 124 | 178 | 3790 | 1420 |
| 7 | DHW19M-21-Q-PCT-B | S-10656 | 6 | 32 | 61.4 | 7.49 | 57.9 | 733 | 310 | 1.01 | 62.3 | 7.60 | 58.8 | 743 | 315 |
| 8 | DHW19M-25-CCC-PCT-B | S-10676 | 6 | 33 | 1240 | 141 | 194 | 4100 | 1560 | 1.15 | 1420 | 162 | 223 | 4700 | 1790 |
| 7 | DWPF-EA-PCT-011520-B | S-10662 | 6 | 34 | 239 | <1.00 | 93.2 | 686 | 450 | 1.01 | 242 | <1.01 | 94.5 | 696 | 457 |
| 11 | DHW19M-26-CCC-PCT-B | S-10733 | 6 | 35 | 78.9 | 8.04 | 3.50 | 286 | 174 | 6.00 | 473 | 48.3 | 21.0 | 1710 | 1050 |
| na | soln std | std-63 | 6 | 36 | 20.0 | <1.00 | 9.19 | 75.1 | 48.1 | 1.00 | 20.0 | <1.00 | 9.19 | 75.1 | 48.1 |

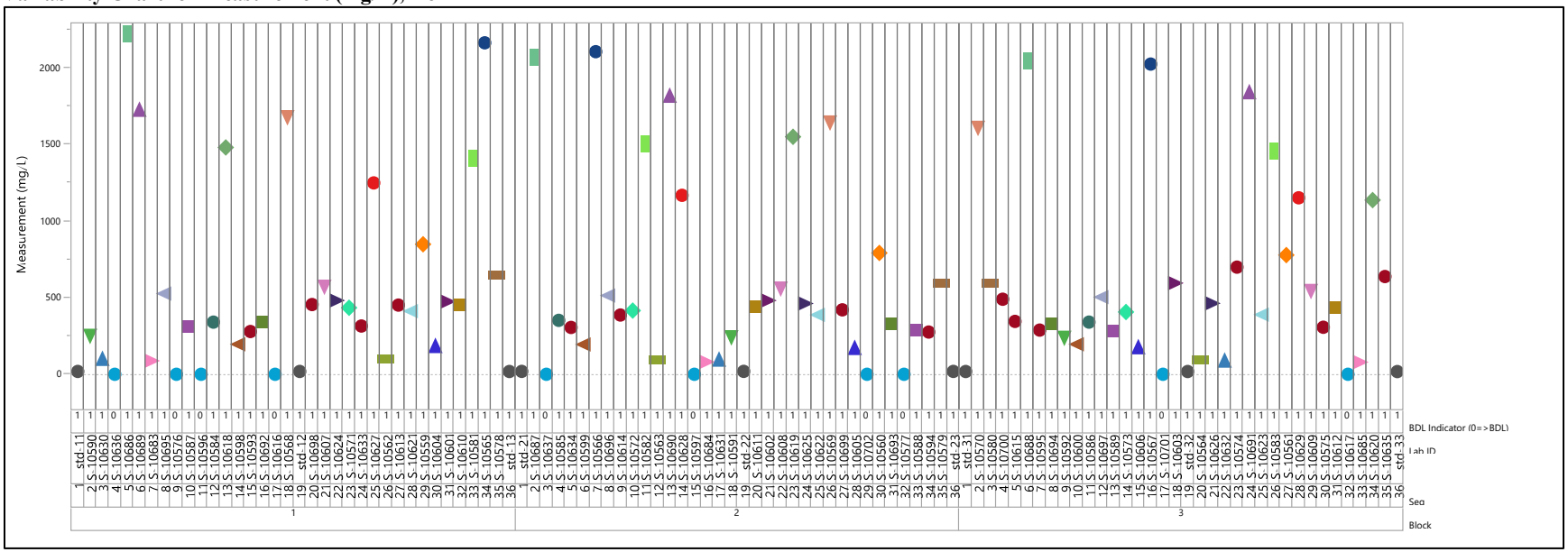
ar = as-received measurements prior to correction for dilution factor (Dil. Fac.)

**Table B-3. Results from Samples of the Multi-Element Solution Standard Included with the PCT Leachates**

| Block | 1 | 2 | 3 | 4 | 5 | 6 | Reference Values (mg/L) |
|---|---|---|---|---|---|---|---|
| **Mean (B (mg/L))** | 19.43 | 19.87 | 18.90 | 19.03 | 19.20 | 19.77 | 20 |
| **Mean (Li (mg/L))** | 9.08 | 9.70 | 9.40 | 9.27 | 9.09 | 9.21 | 10 |
| **Mean (Na (mg/L))** | 77.17 | 77.30 | 76.90 | 76.33 | 77.00 | 74.93 | 81 |
| **Mean (Si mg/L))** | 47.07 | 47.50 | 46.30 | 46.17 | 46.97 | 47.90 | 50 |
| | | | | | | | |
| **% relative bias, B** | -2.8% | -0.7% | -5.5% | -4.8% | -4.0% | -1.2% | <10% per ASTM C1285 |
| **% relative bias, Li** | -9.2% | -3.0% | -6.0% | -7.3% | -9.1% | -7.9% | |
| **% relative bias, Na** | -4.7% | -4.6% | -5.1% | -5.8% | -4.9% | -7.5% | |
| **% relative bias, Si** | -5.9% | -5.0% | -7.4% | -7.7% | -6.1% | -4.2% | |
| | | | | | | | |
| **Std Dev (B (mg/L))** | 0.208 | 0.153 | 0.265 | 0.252 | 0.173 | 0.208 | |
| **Std Dev (Li (mg/L))** | 0.026 | 0.252 | 0.130 | 0.029 | 0.062 | 0.017 | |
| **Std Dev (Na (mg/L))** | 1.050 | 0.265 | 0.400 | 0.252 | 0.000 | 0.153 | |
| **Std Dev (Si (mg/L))** | 1.002 | 0.557 | 0.400 | 0.473 | 0.379 | 0.173 | |
| | | | | | | | |
| **%RSD (B (mg/L))** | 1.1% | 0.8% | 1.4% | 1.3% | 0.9% | 1.1% | <10% per ASTM C1285 |
| **%RSD (Li (mg/L))** | 0.3% | 2.6% | 1.4% | 0.3% | 0.7% | 0.2% | |
| **%RSD (Na (mg/L))** | 1.4% | 0.3% | 0.5% | 0.3% | 0.0% | 0.2% | |
| **%RSD (Si (mg/L))** | 2.1% | 1.2% | 0.9% | 1.0% | 0.8% | 0.4% | |

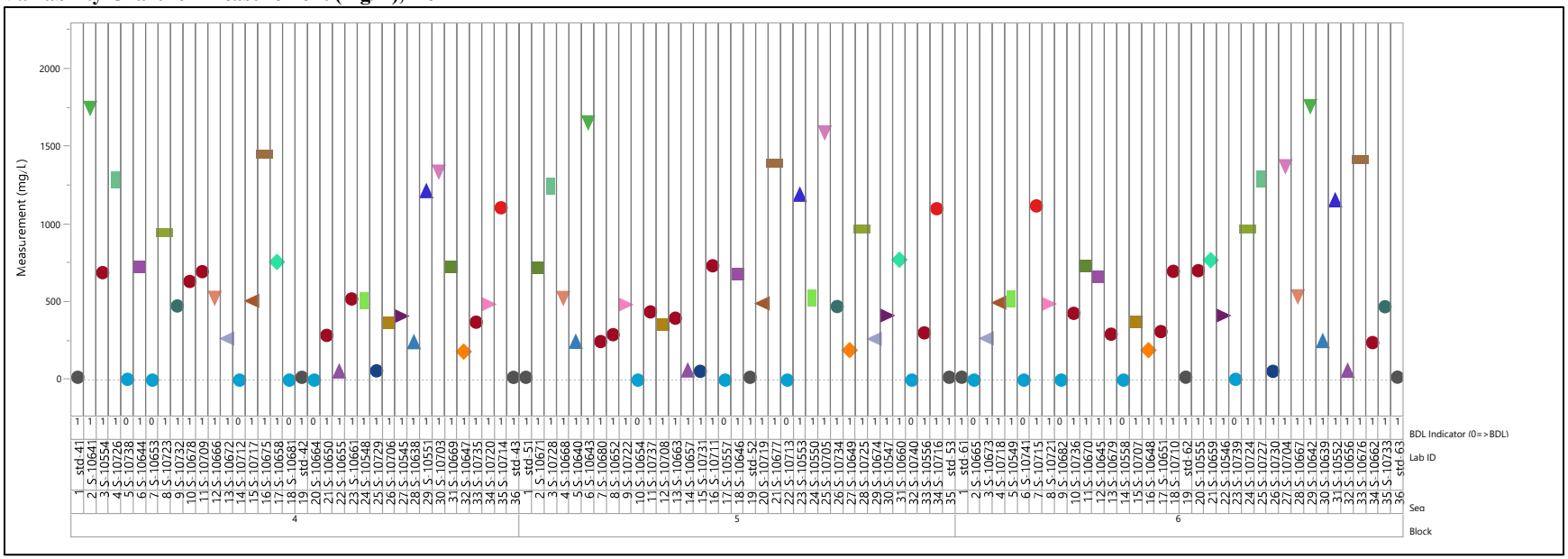
## Exhibit B-1. PCT Leachate Measurements in Analytical Sequence

**Analyte=B**
**Variability Chart for Measurement (mg/L), 1 of 2**



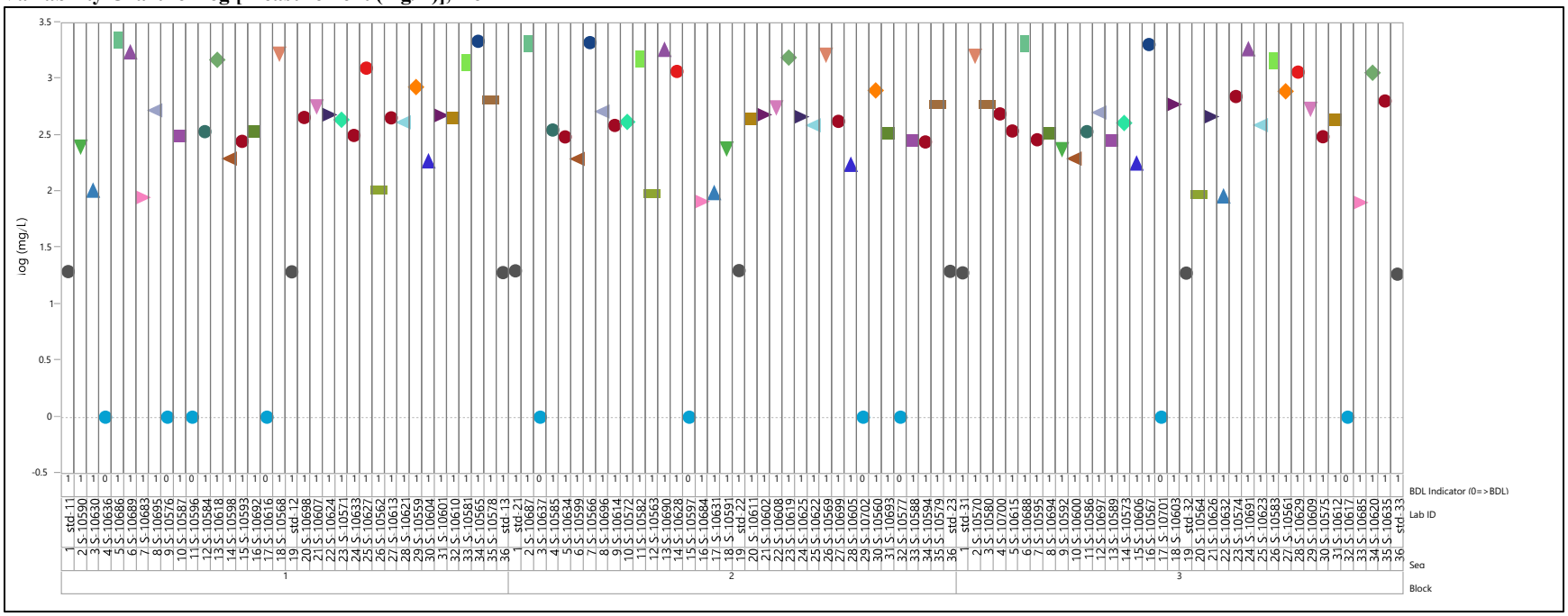
## Exhibit B-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=B**
**Variability Chart for Measurement (mg/L), 2 of 2**



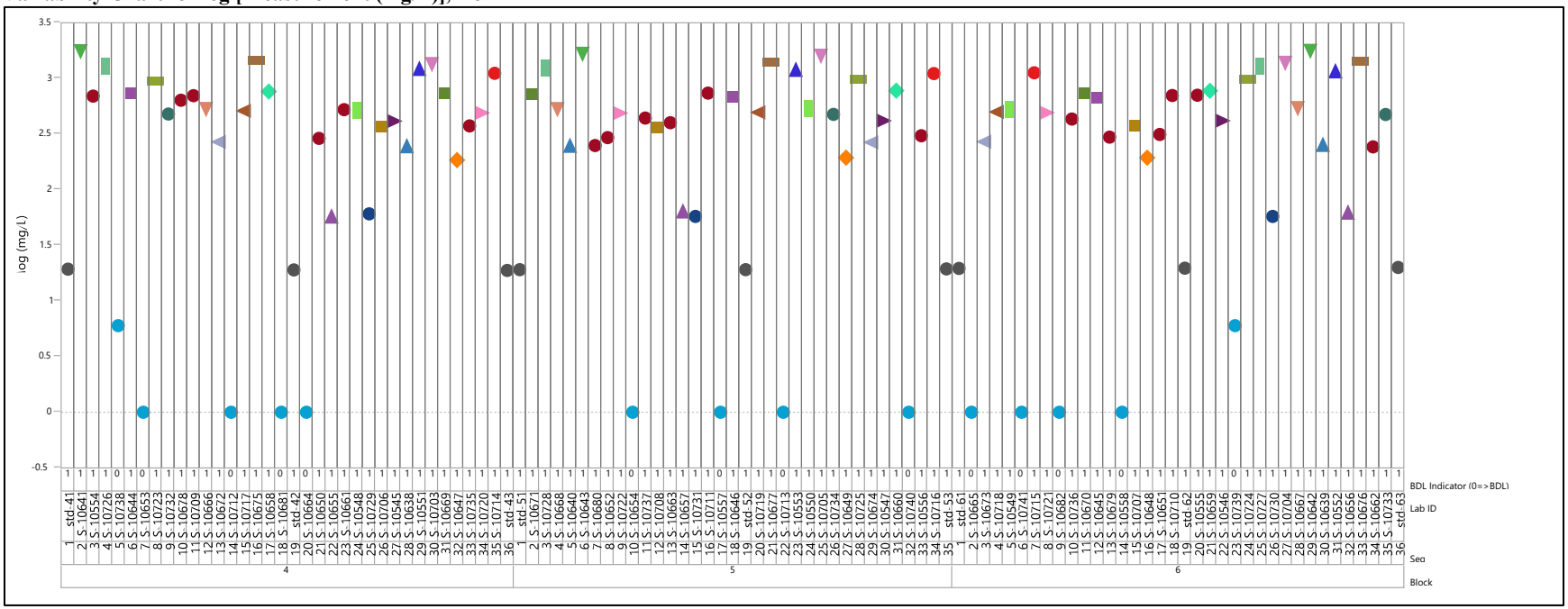
## Exhibit B-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=B**
**Variability Chart for log [Measurement (mg/L)], 1 of 2**



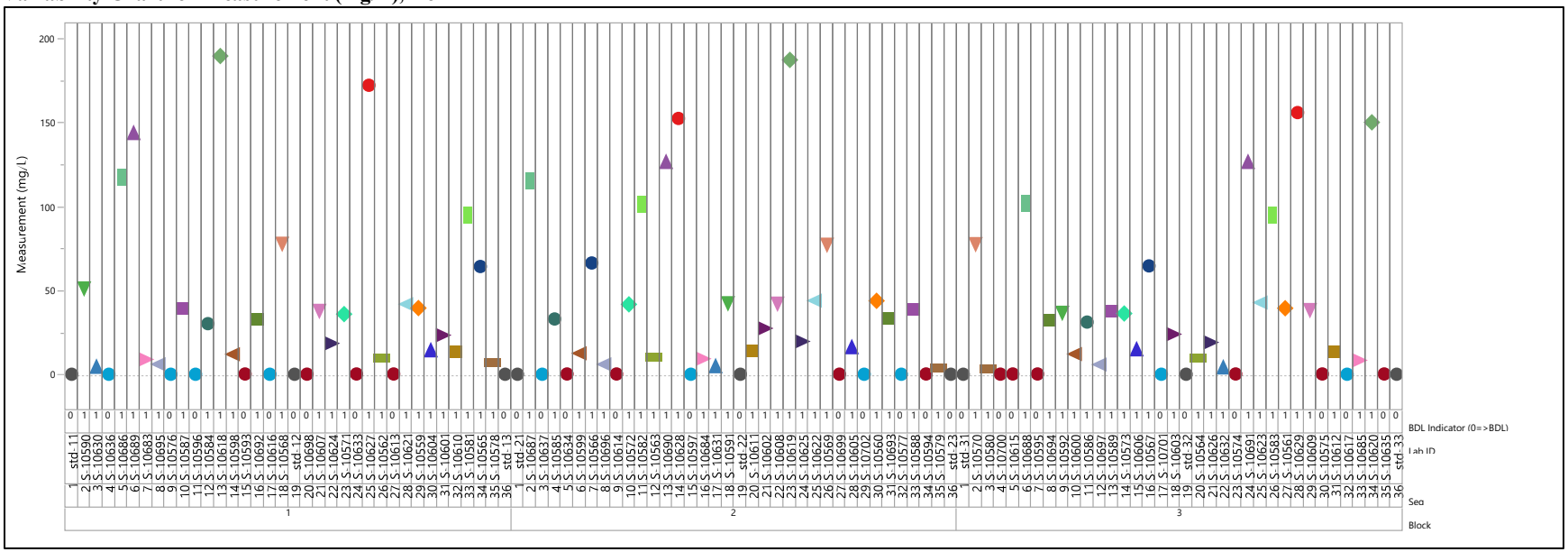
## Exhibit B-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=B**
**Variability Chart for log [Measurement (mg/L)], 2 of 2**



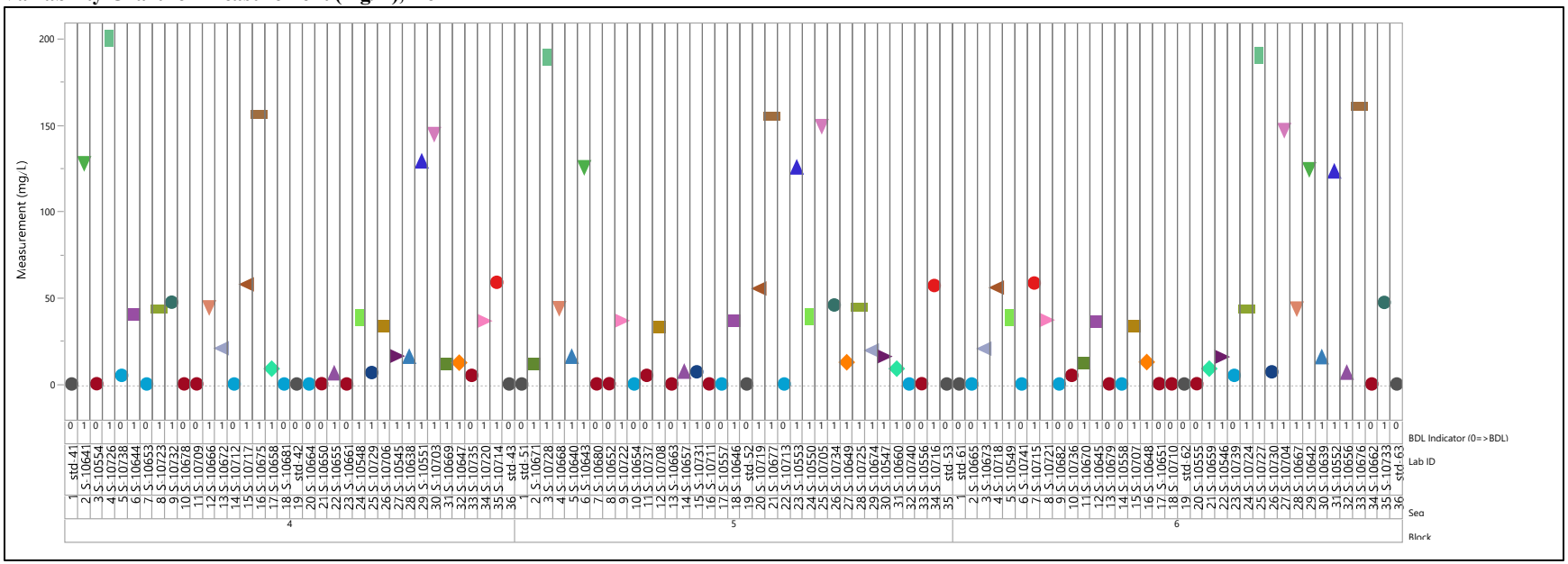
## Exhibit B-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=Cr**
**Variability Chart for Measurement (mg/L), 1 of 2**



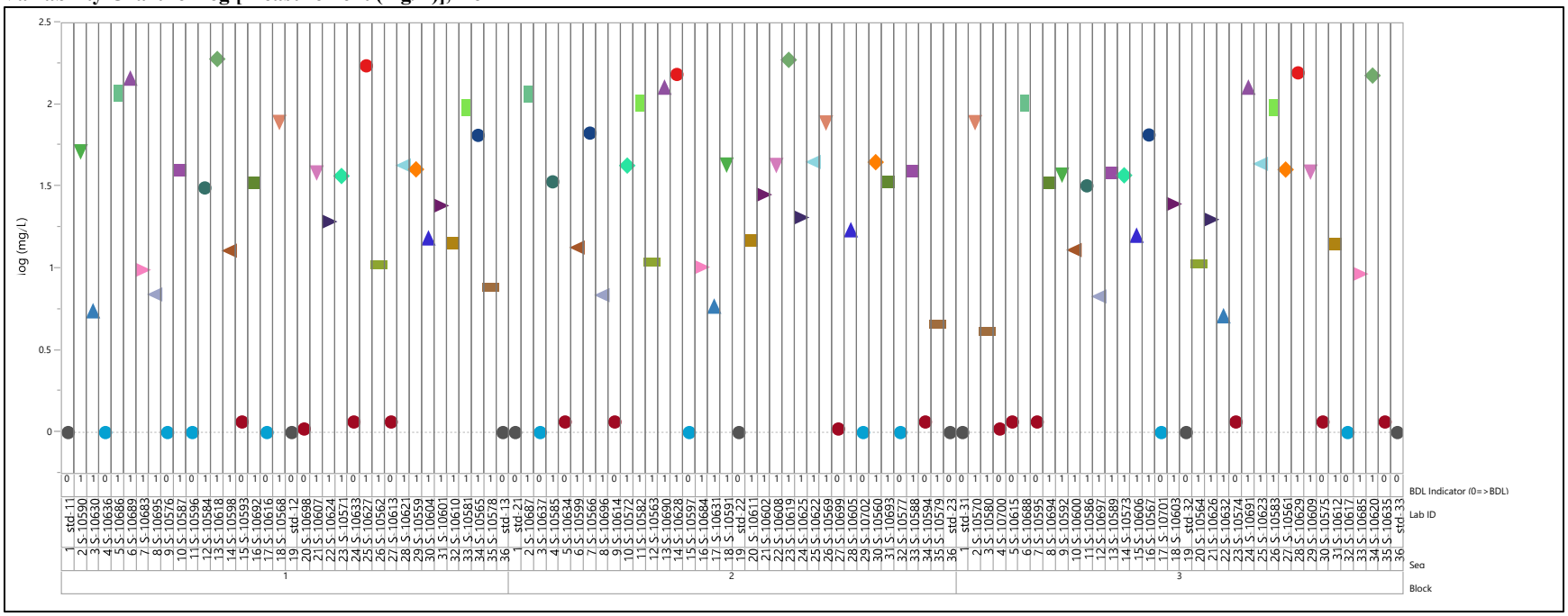
## Exhibit B-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=Cr**
**Variability Chart for Measurement (mg/L), 2 of 2**



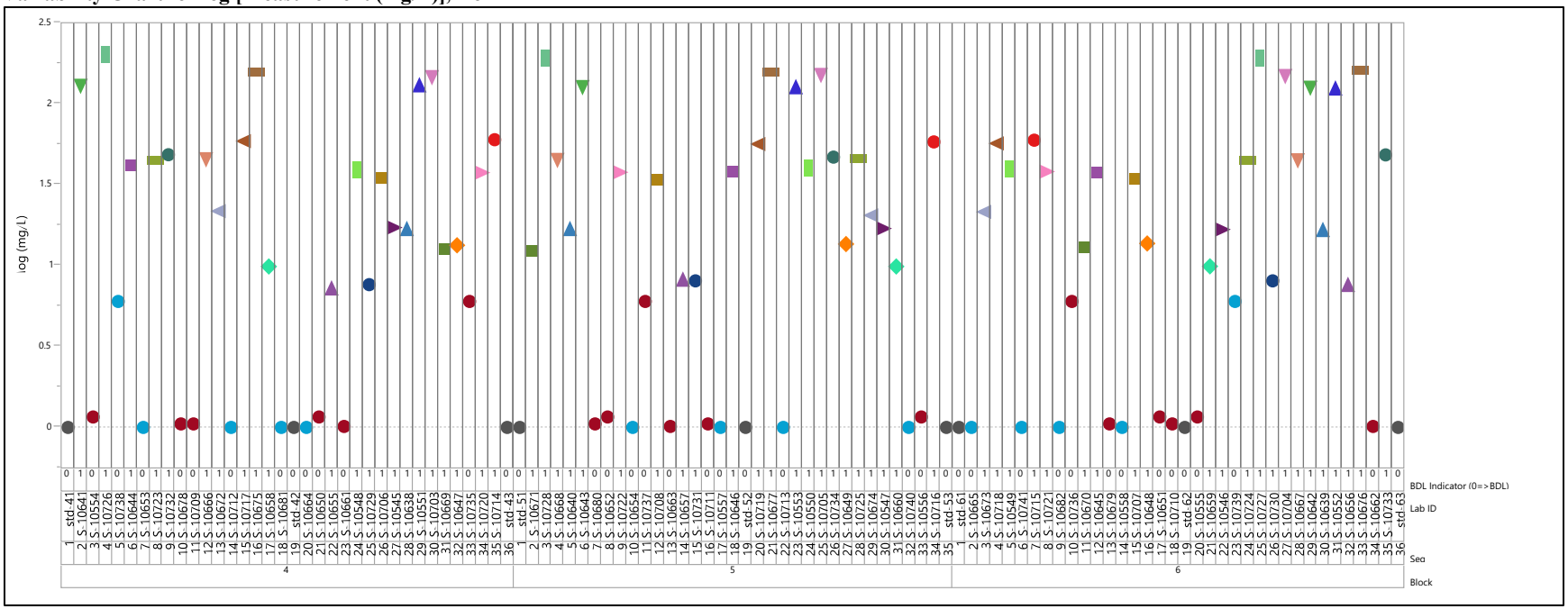
## Exhibit B-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=Cr**
**Variability Chart for log [Measurement (mg/L)], 1 of 2**



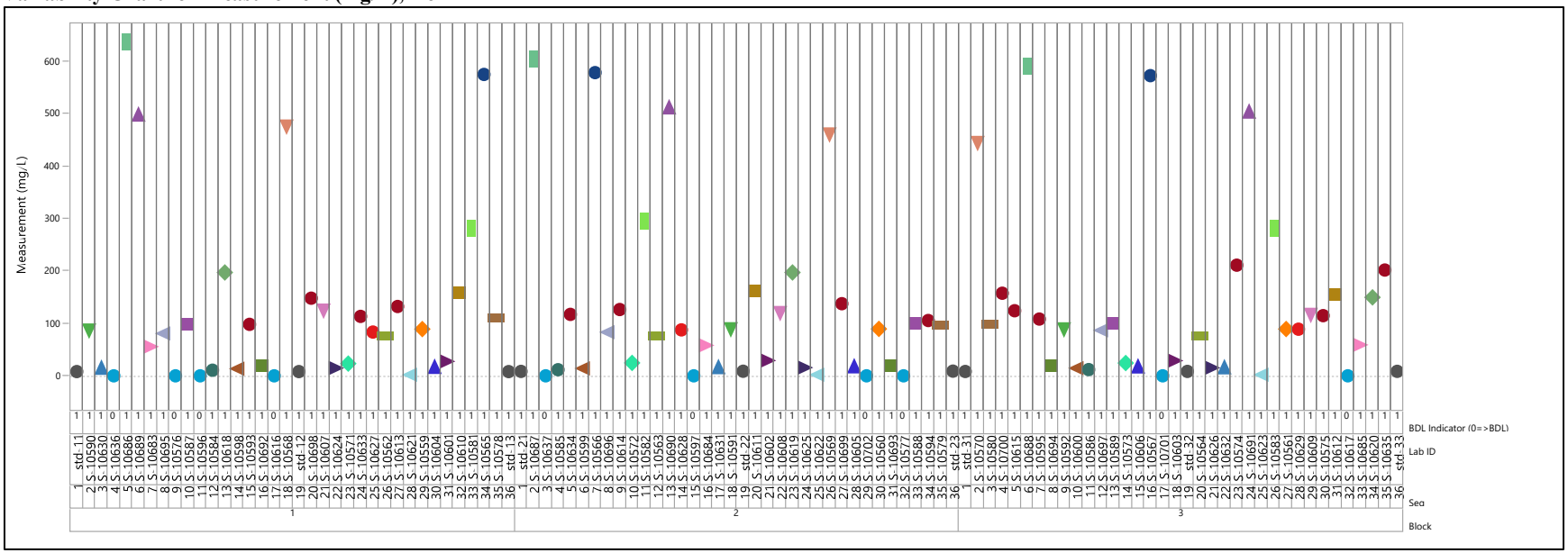
## Exhibit B-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=Cr**
**Variability Chart for log [Measurement (mg/L)], 2 of 2**



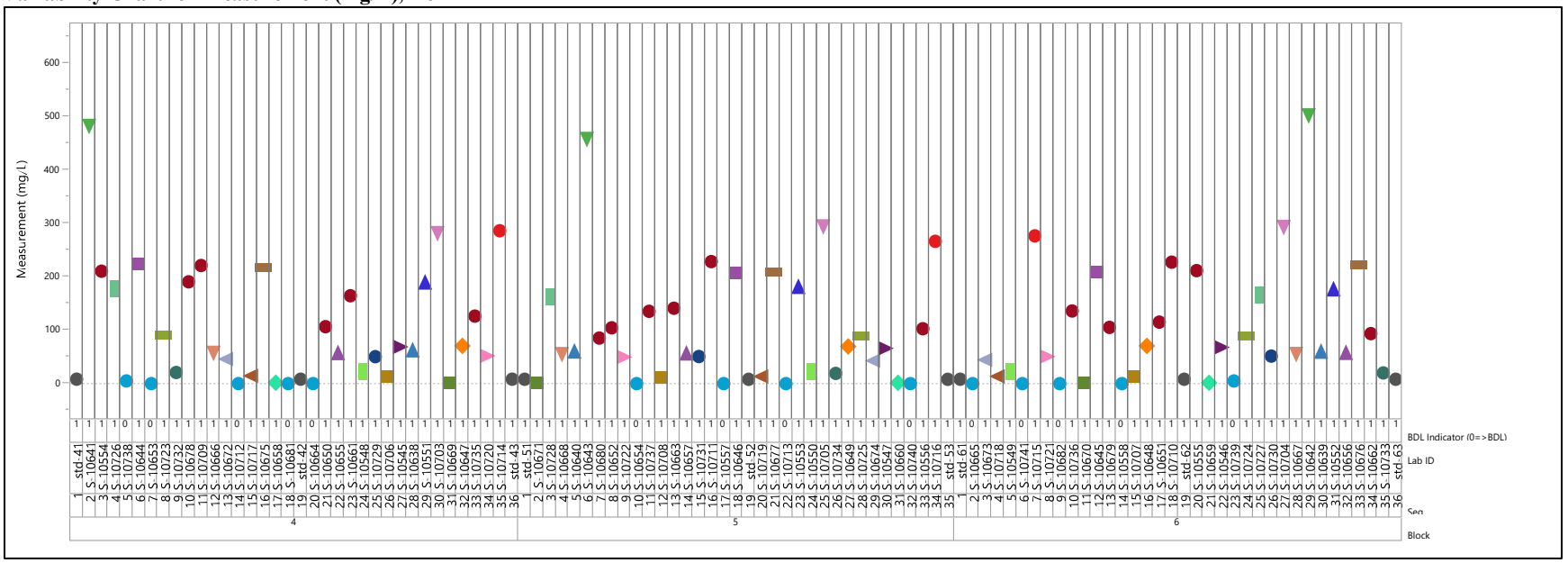
## Exhibit B-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=Li**
**Variability Chart for Measurement (mg/L), 1 of 2**



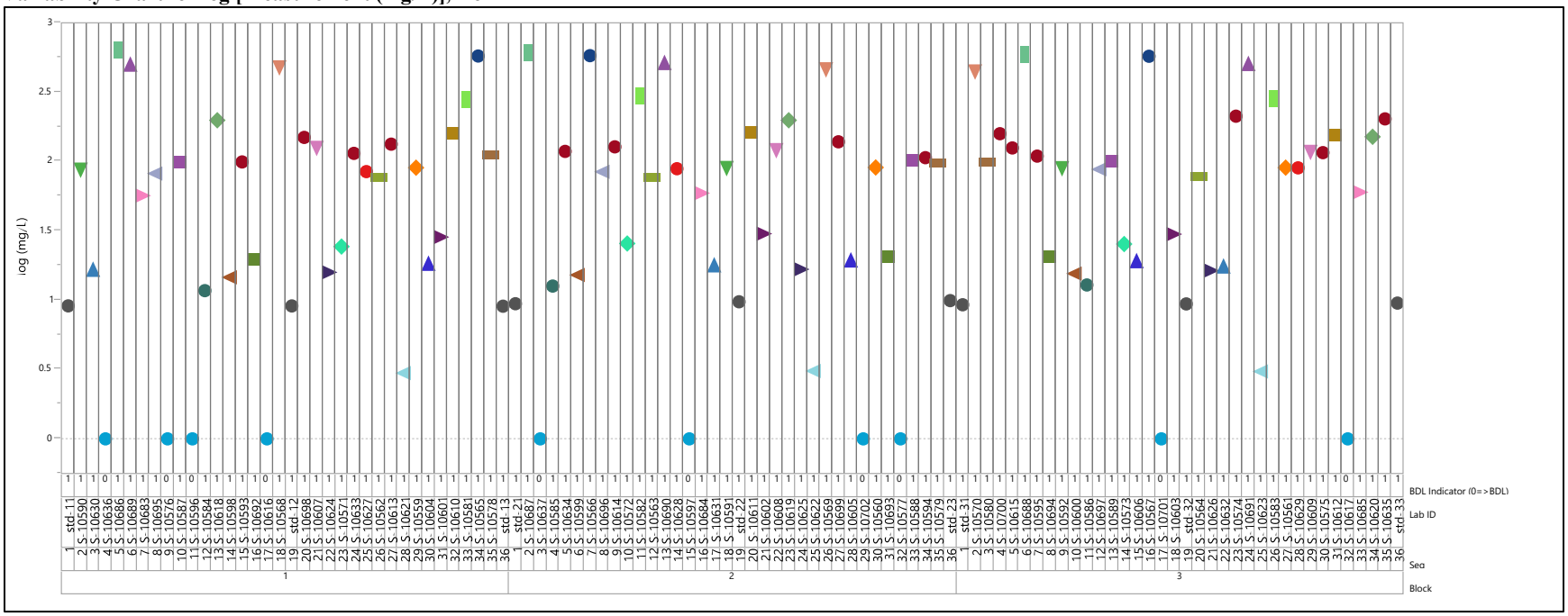
## Exhibit B-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=Li**
**Variability Chart for Measurement (mg/L), 2 of 2**



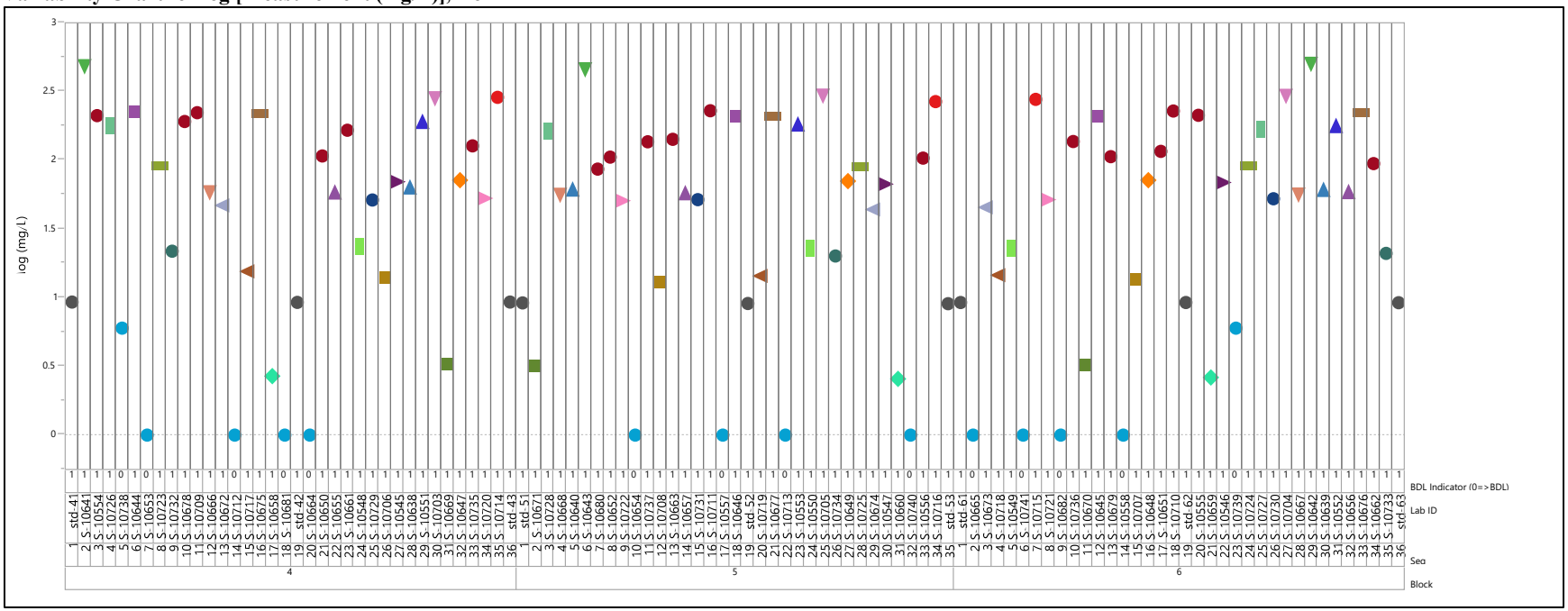
## Exhibit B-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=Li**
**Variability Chart for log [Measurement (mg/L)], 1 of 2**



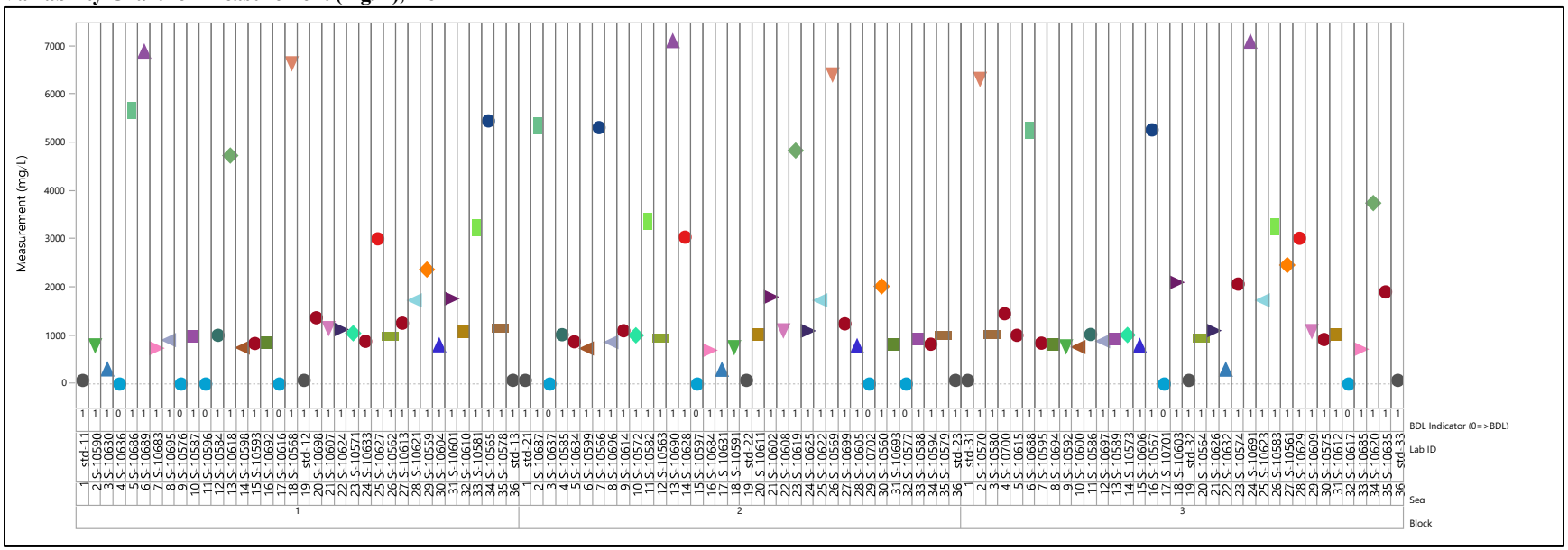
## Exhibit B-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=Li**
**Variability Chart for log [Measurement (mg/L)], 2 of 2**



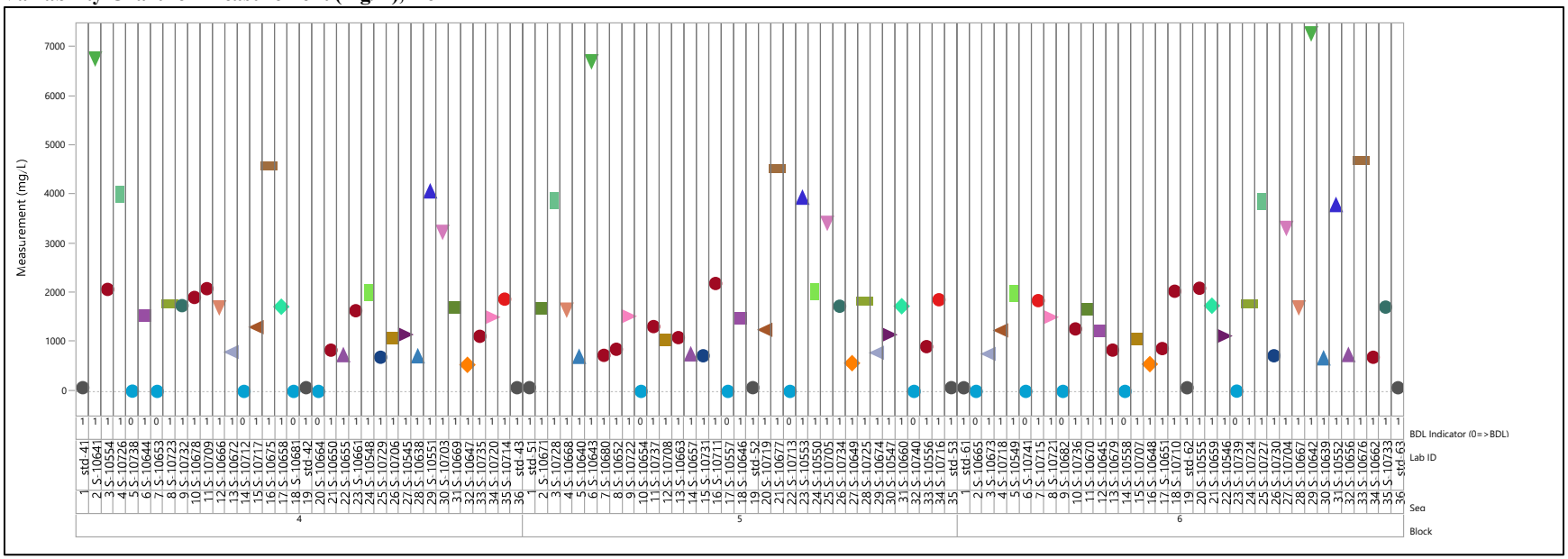
## Exhibit B-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=Na**
**Variability Chart for Measurement (mg/L), 1 of 2**



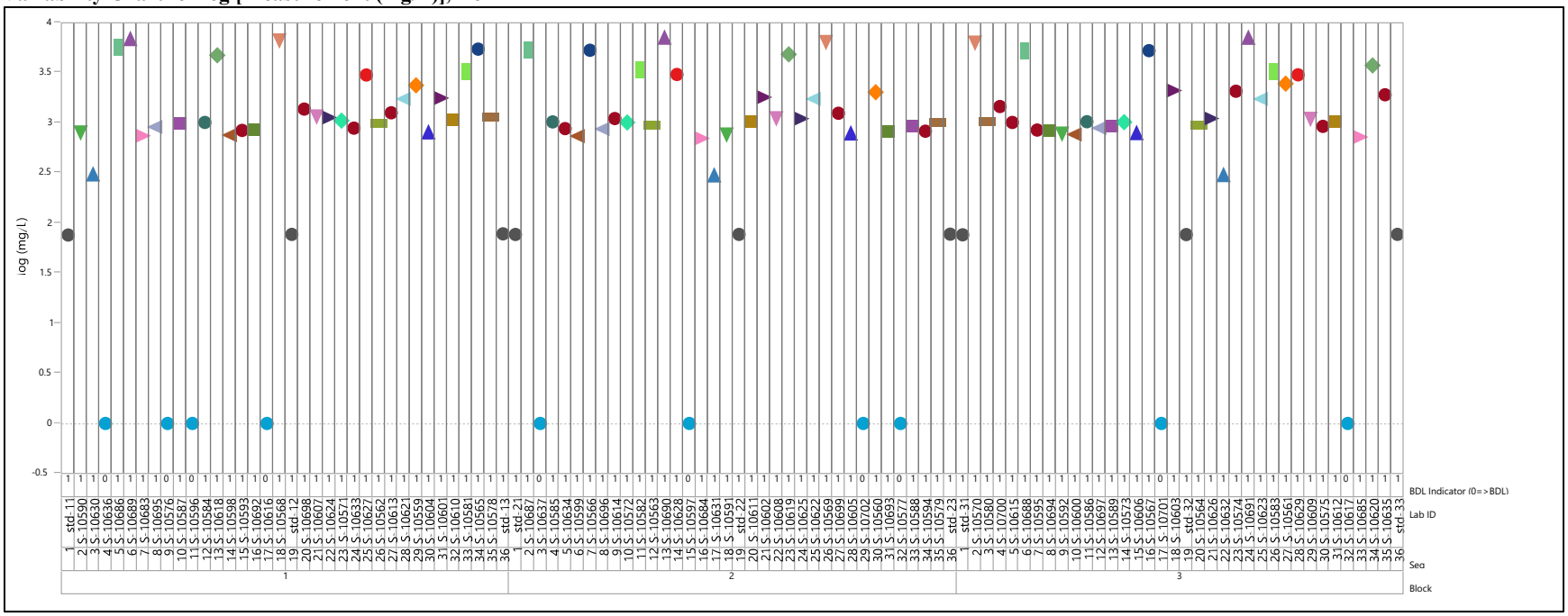
## Exhibit B-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=Na**
**Variability Chart for Measurement (mg/L), 2 of 2**



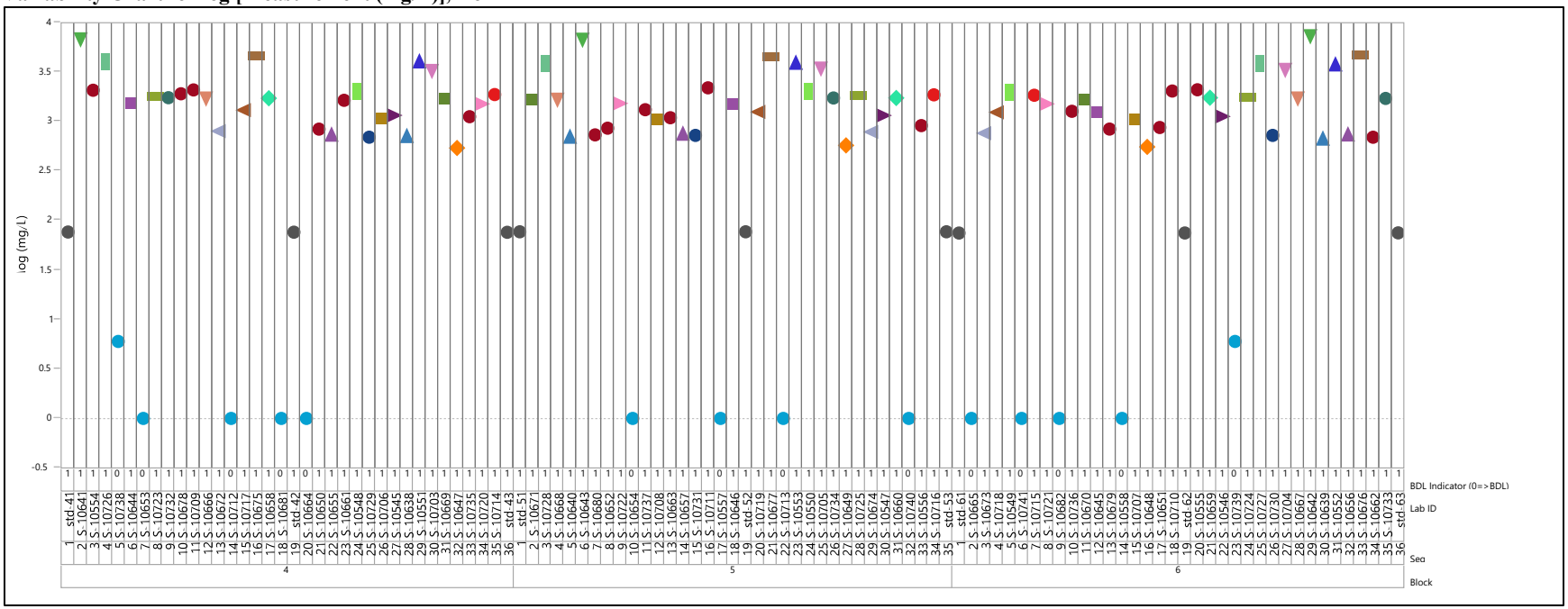
## Exhibit B-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=Na**
**Variability Chart for log [Measurement (mg/L)], 1 of 2**



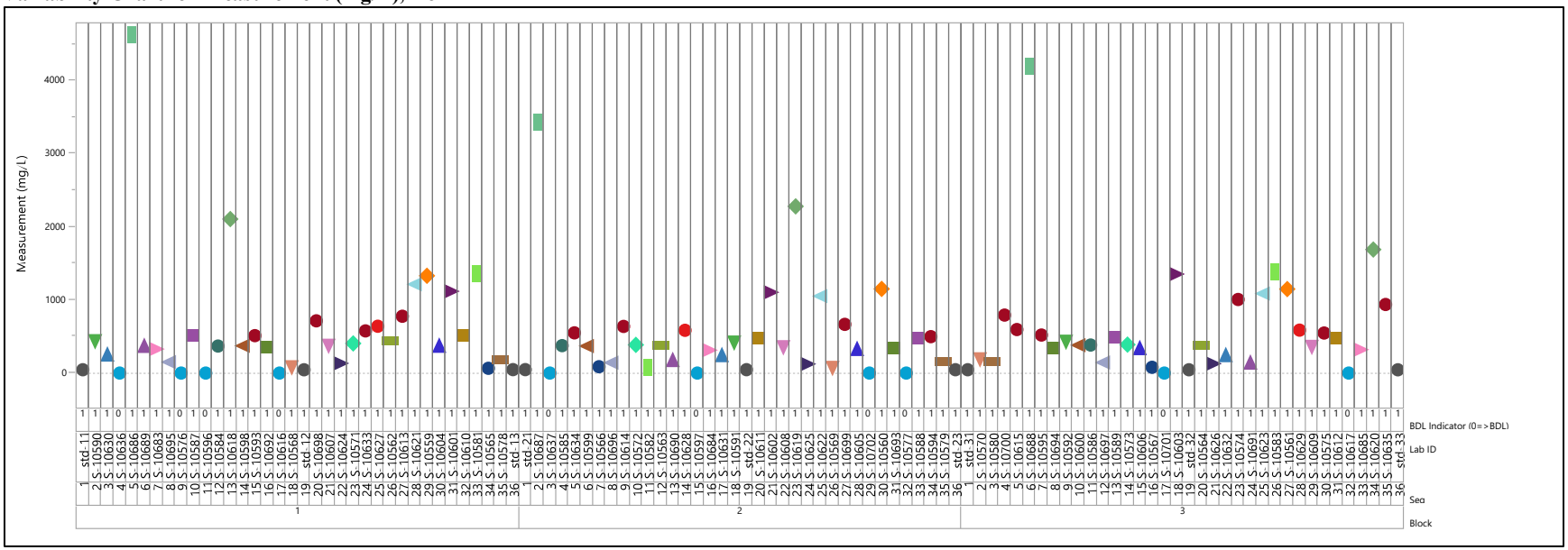
## Exhibit B-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=Na**
**Variability Chart for log [Measurement (mg/L)], 2 of 2**



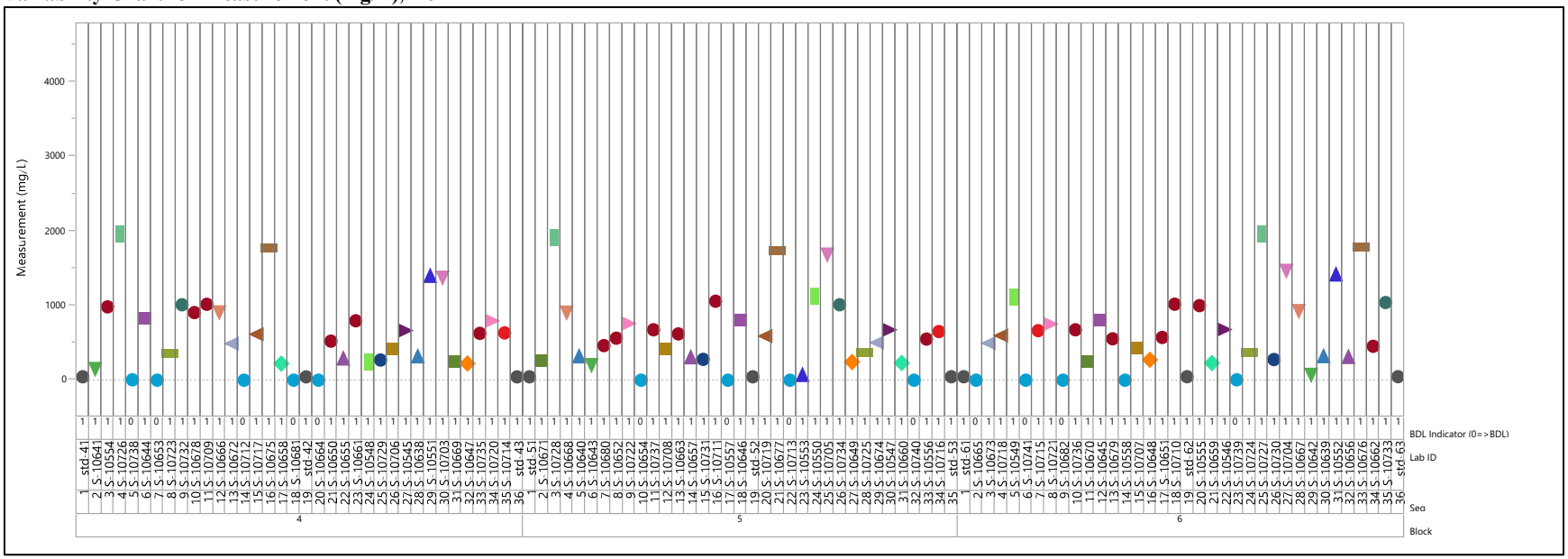
## Exhibit B-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=Si**
**Variability Chart for Measurement (mg/L), 1 of 2**



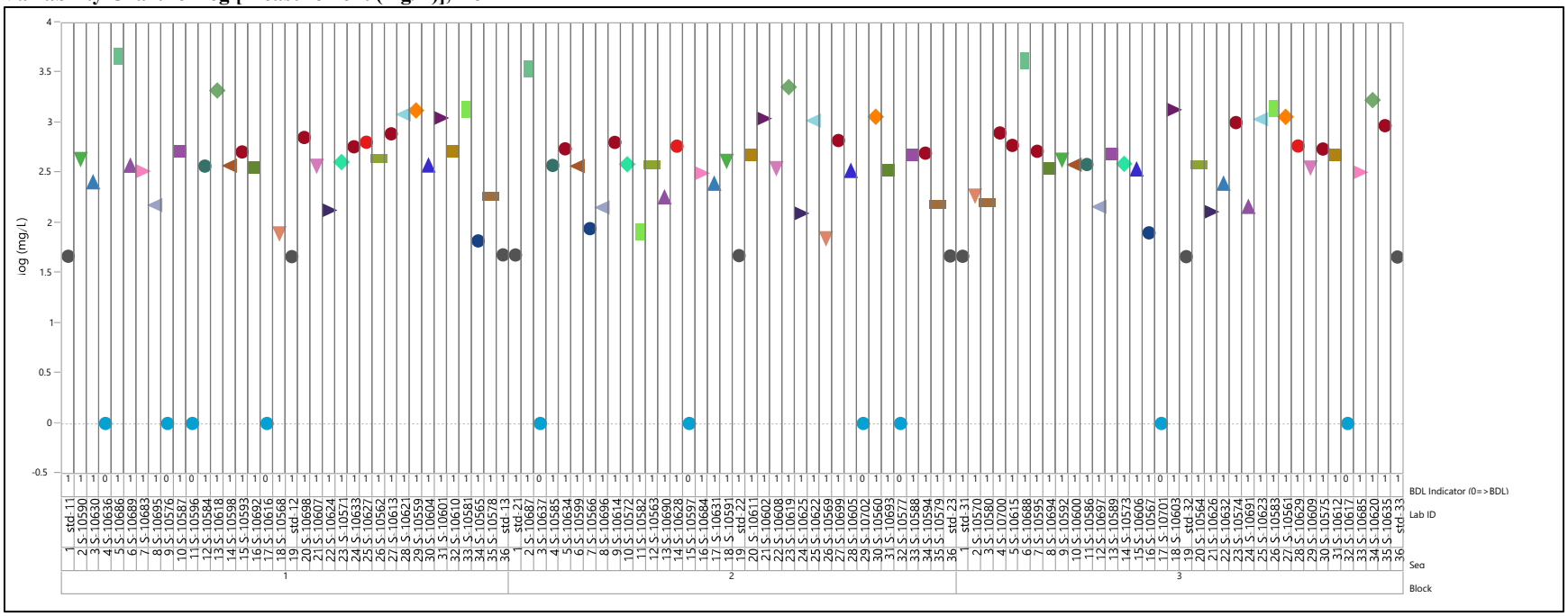
## Exhibit B-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=Si**
**Variability Chart for Measurement (mg/L), 2 of 2**



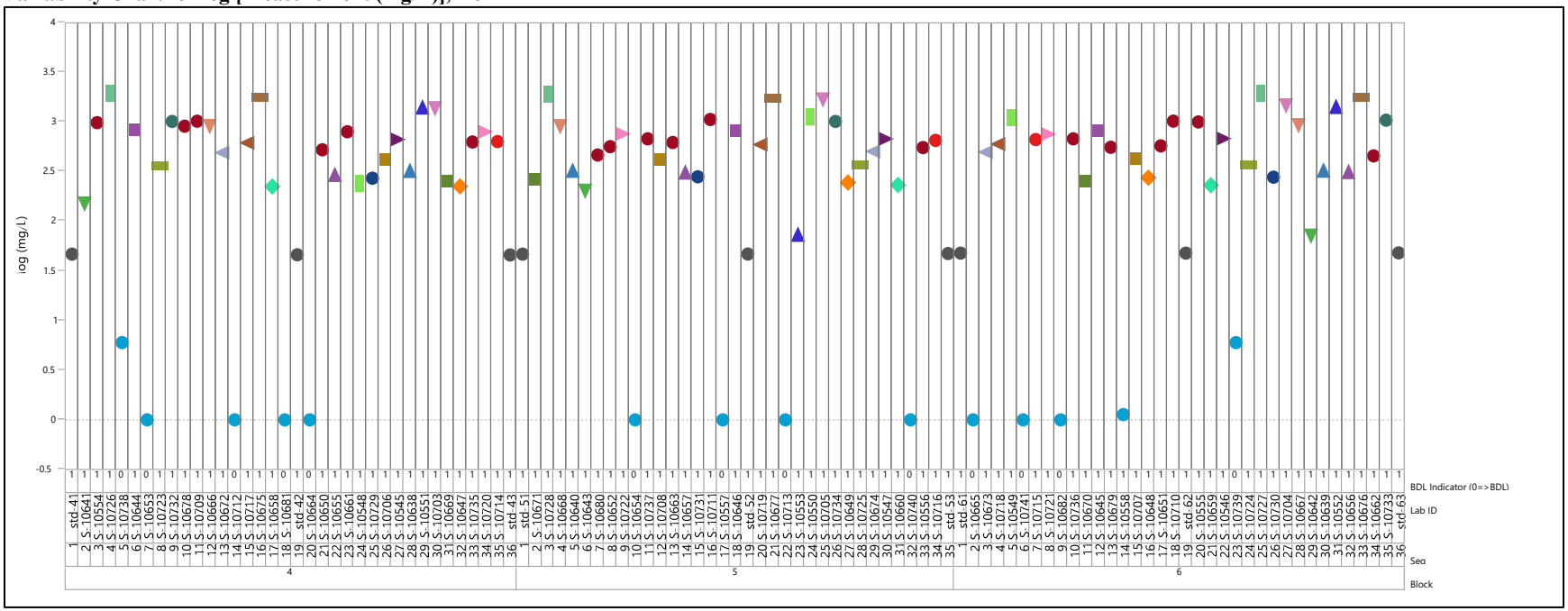
## Exhibit B-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=Si**
**Variability Chart for log [Measurement (mg/L)], 1 of 2**



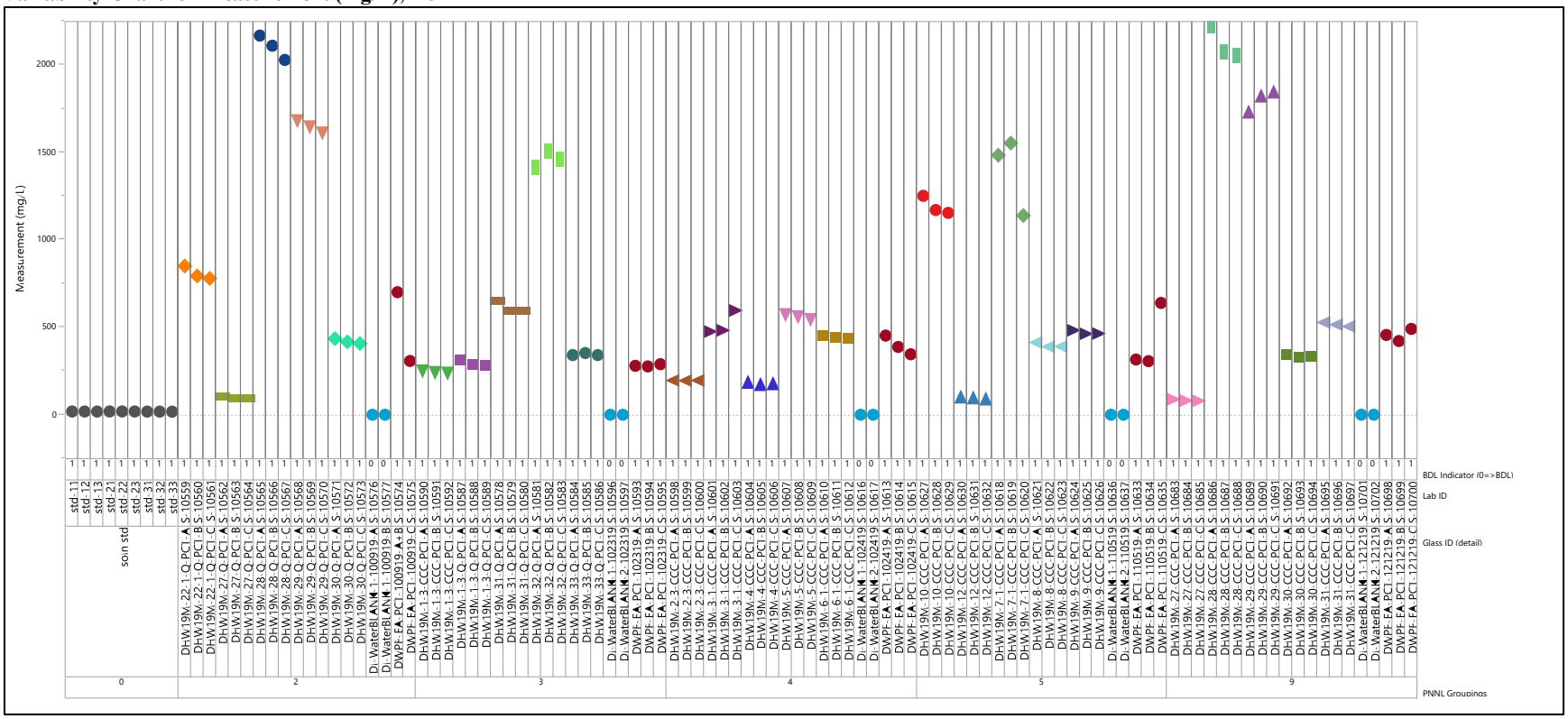
## Exhibit B-1. PCT Leachate Measurements in Analytical Sequence (continued)

**Analyte=Si**
**Variability Chart for log [Measurement (mg/L)], 2 of 2**



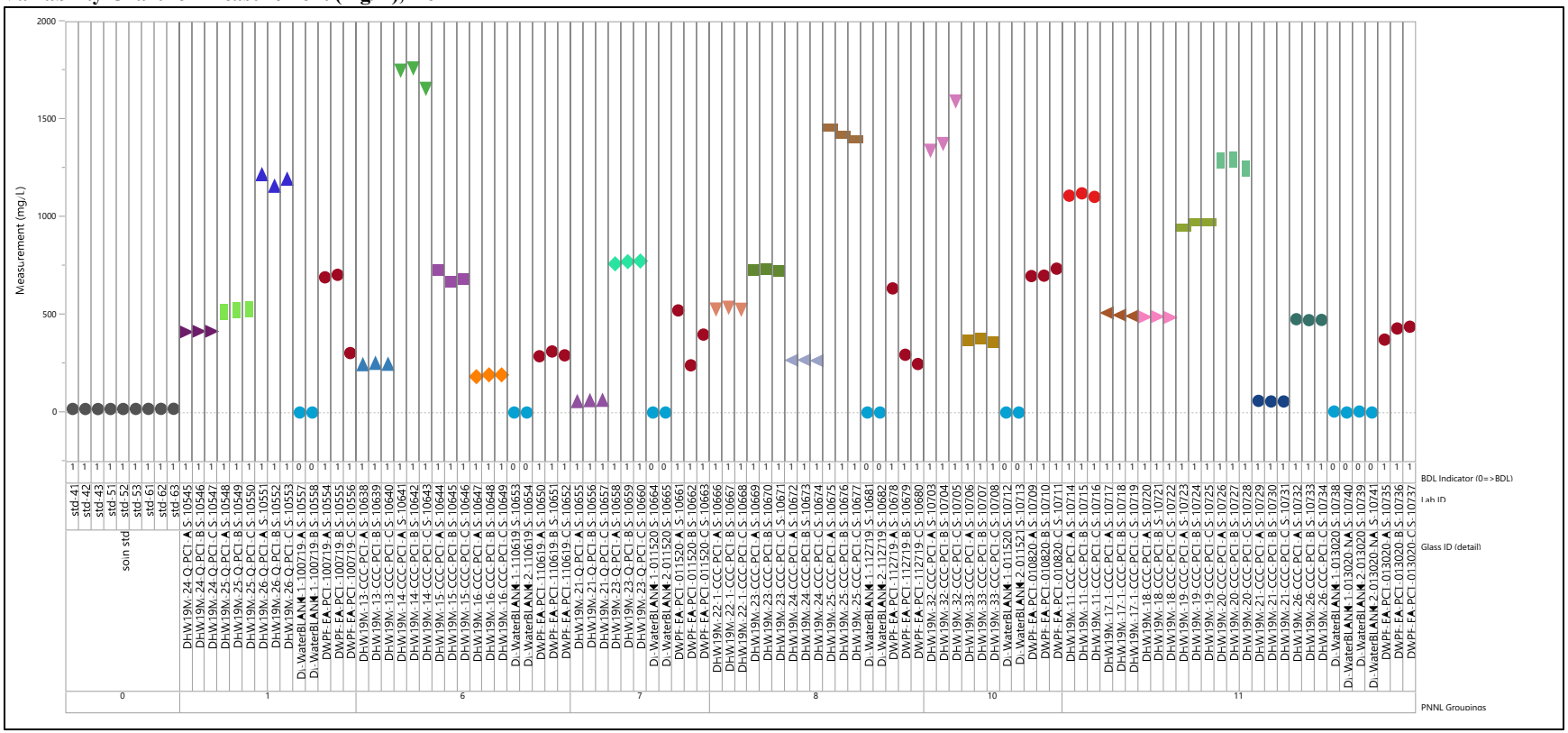
## Exhibit B-2. PCT Leachate Measurements by PNNL Grouping

**Analyte=B**
**Variability Chart for Measurement (mg/L), 1 of 2**



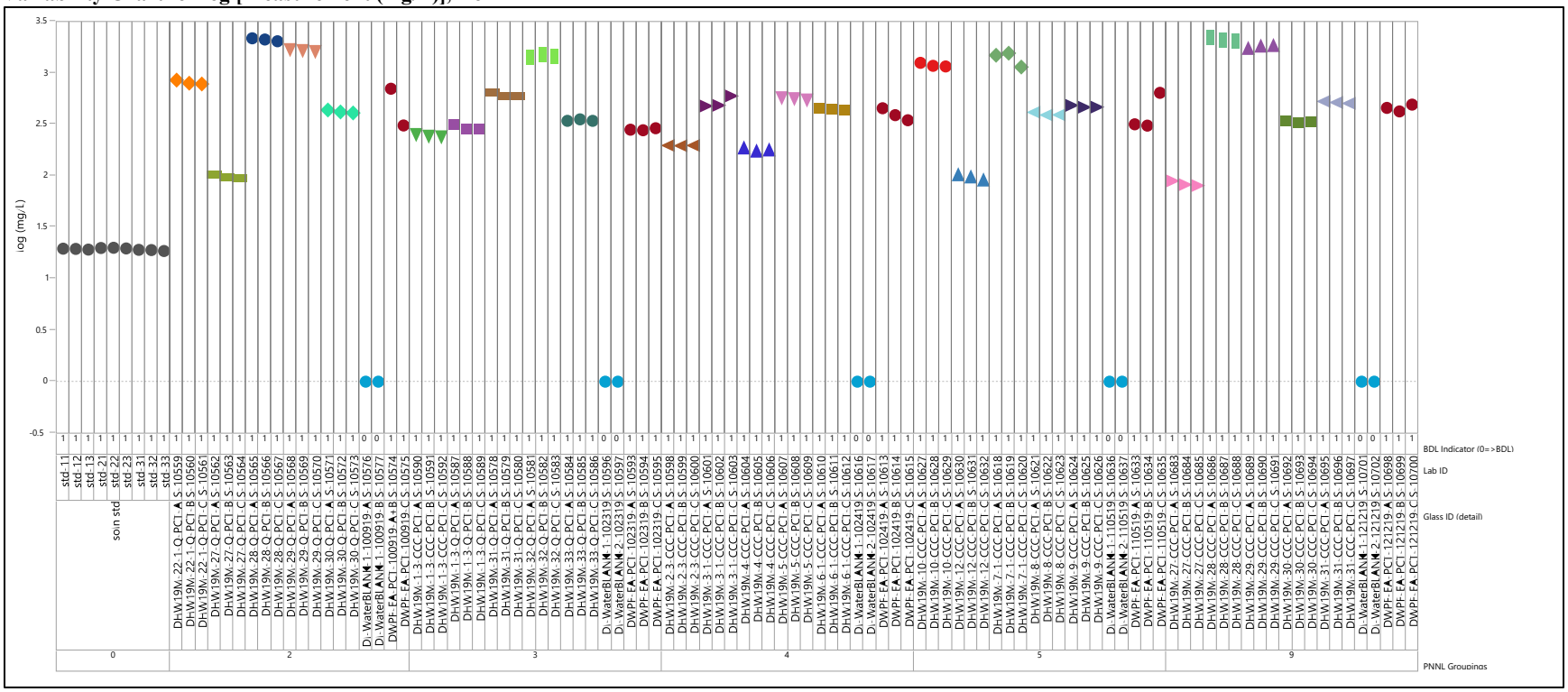
## Exhibit B-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=B**
**Variability Chart for Measurement (mg/L), 2 of 2**



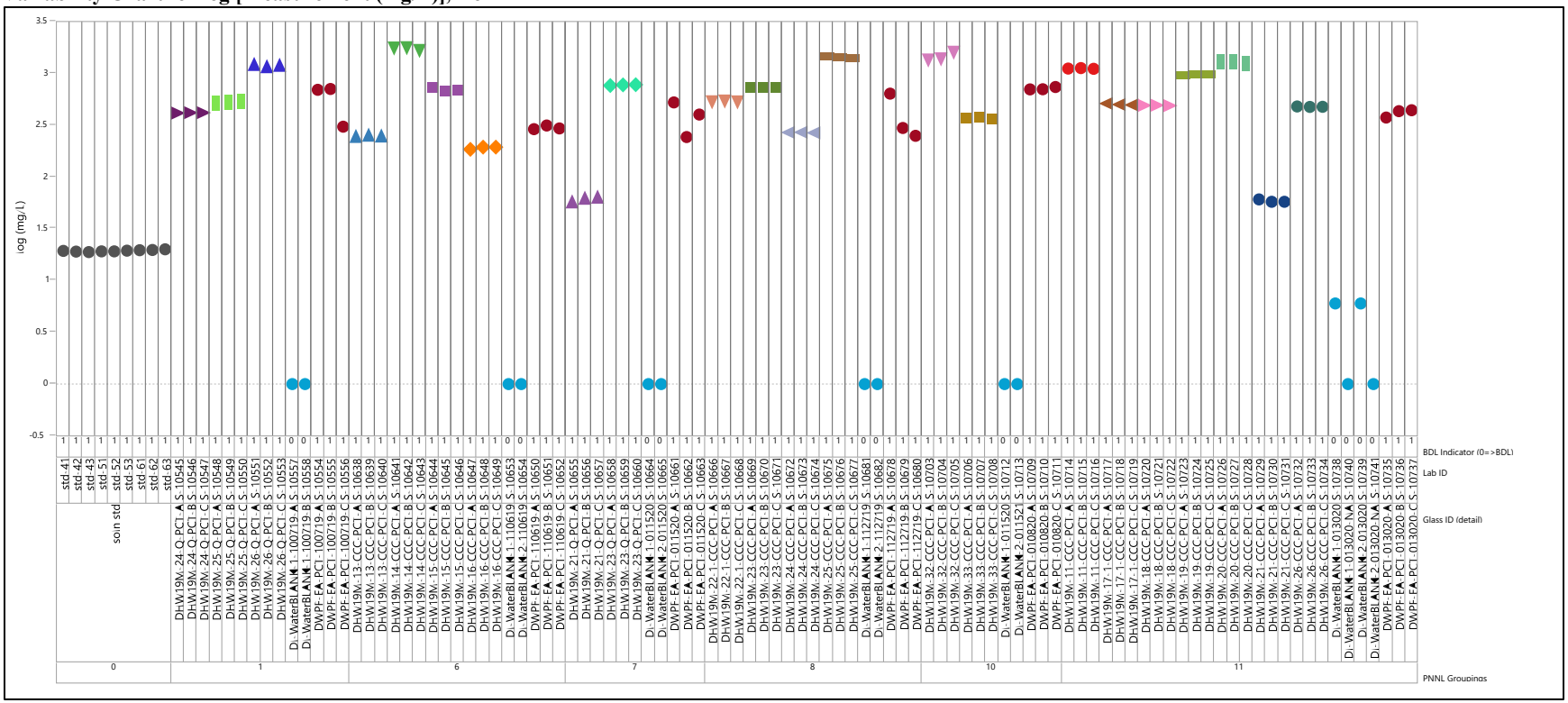
## Exhibit B-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=B**
**Variability Chart for log [Measurement (mg/L)], 1 of 2**



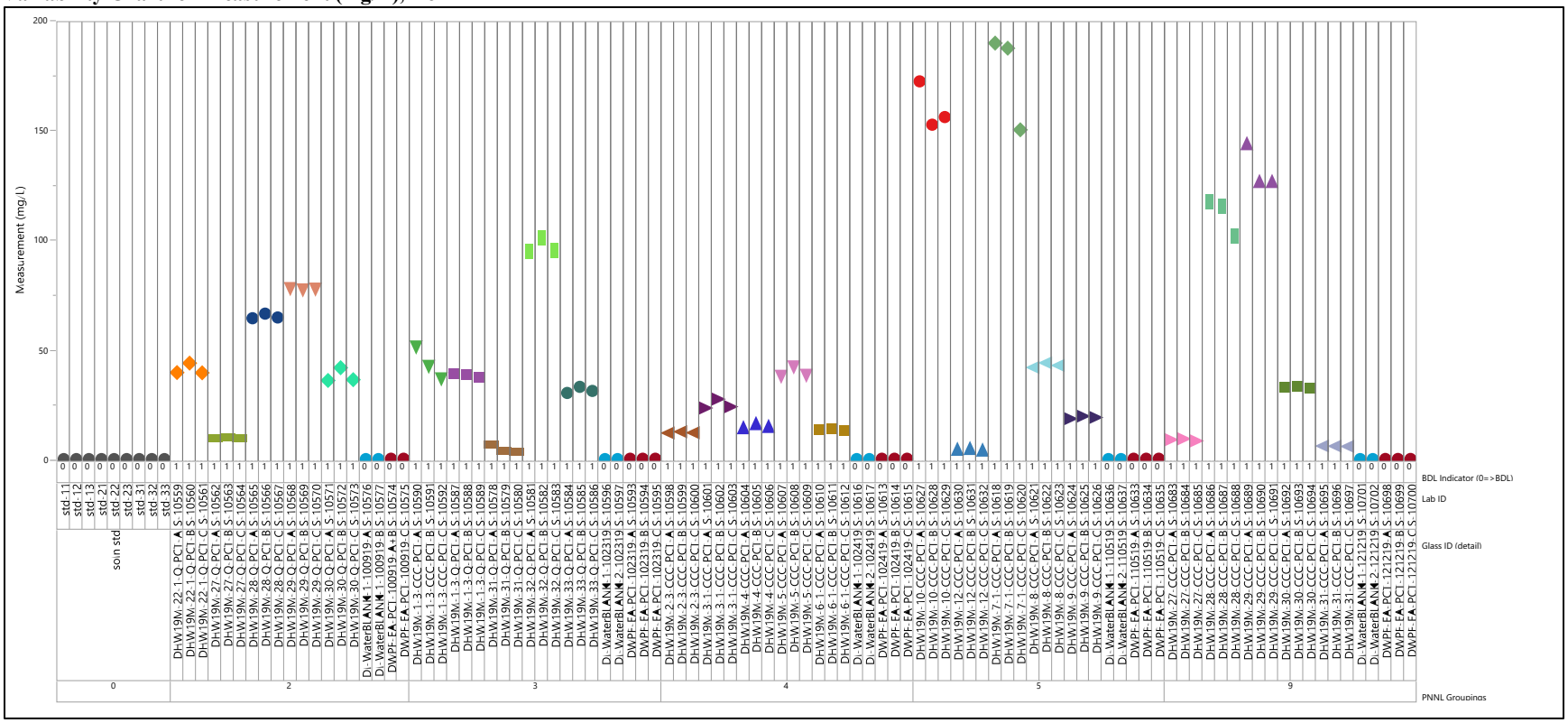
## Exhibit B-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=B**
**Variability Chart for log [Measurement (mg/L)], 2 of 2**



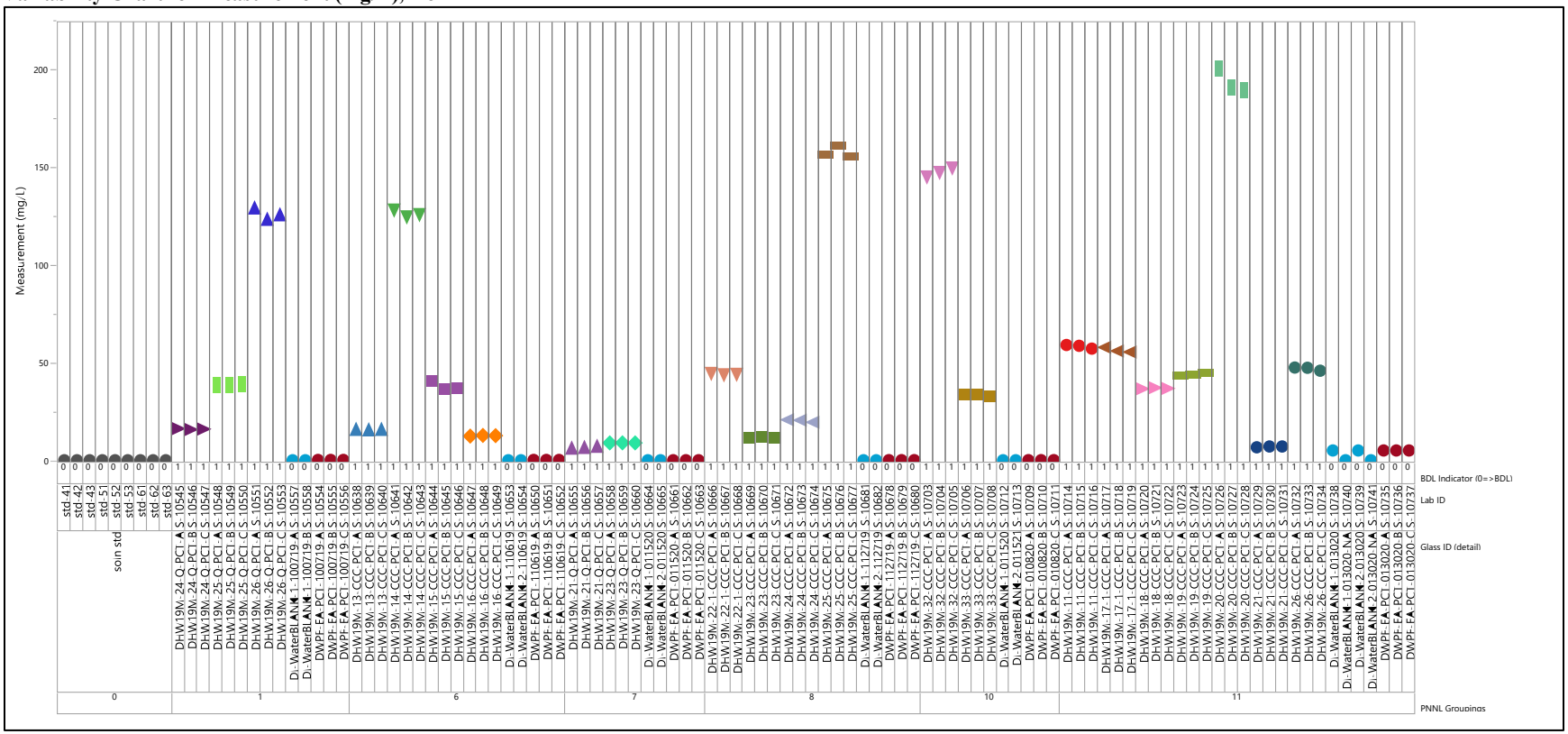
## Exhibit B-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=Cr**
**Variability Chart for Measurement (mg/L), 1 of 2**



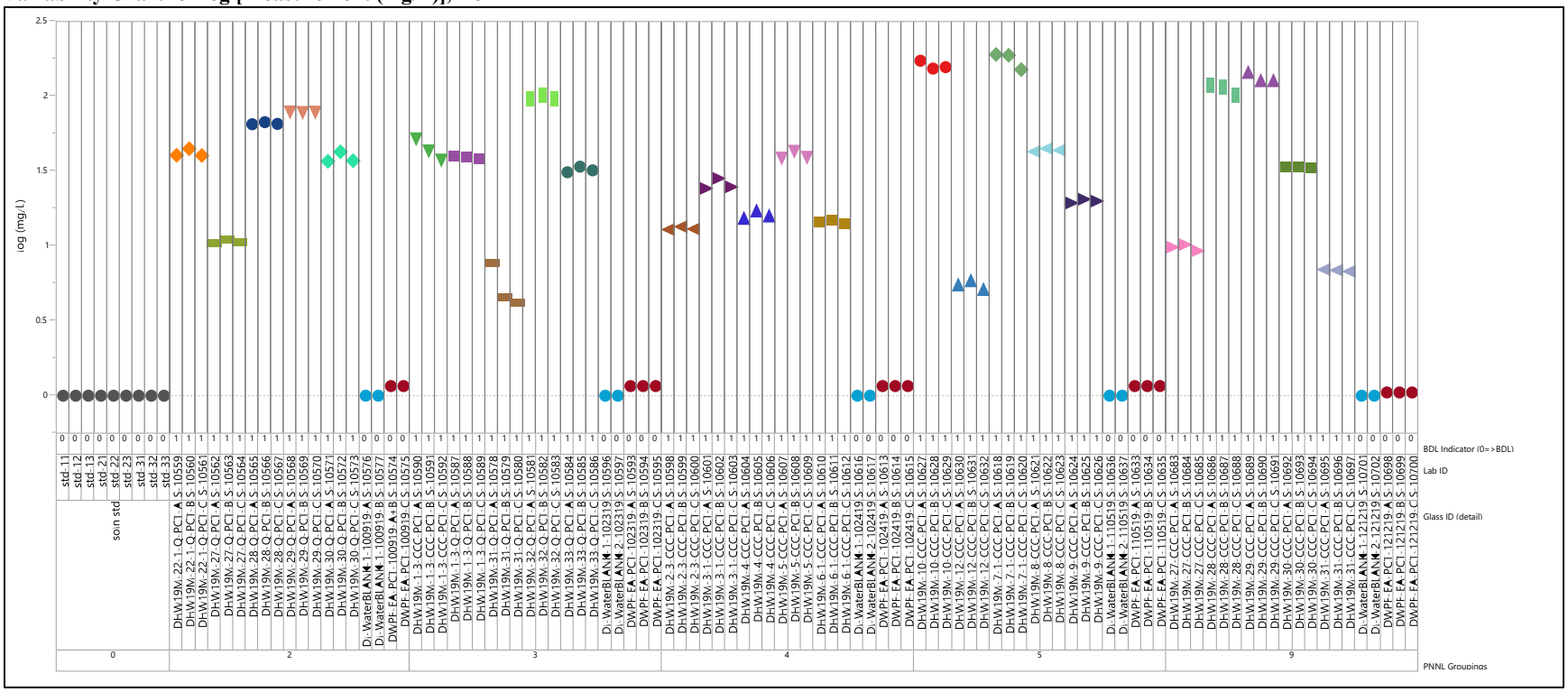
## Exhibit B-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=Cr**
**Variability Chart for Measurement (mg/L), 2 of 2**



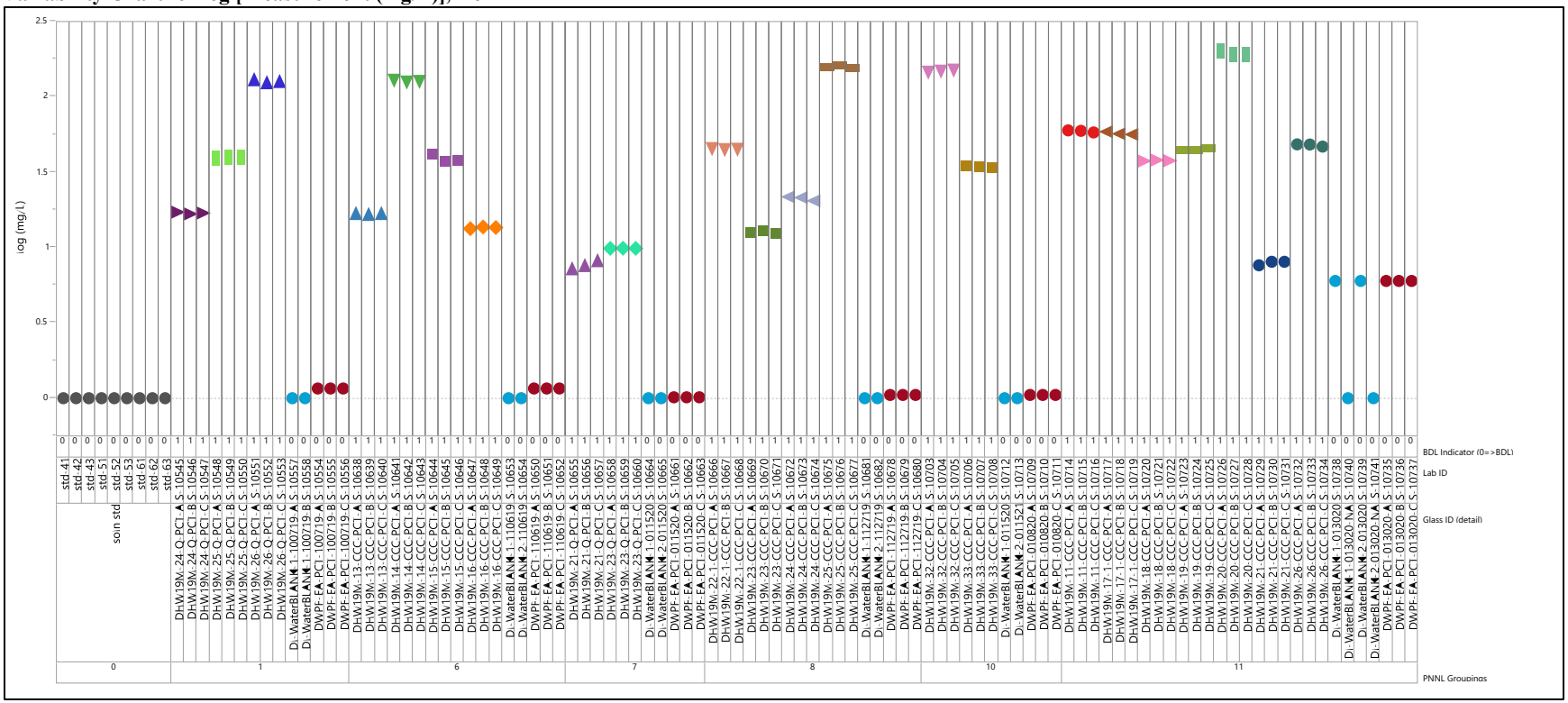
## Exhibit B-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=Cr**
**Variability Chart for log [Measurement (mg/L)], 1 of 2**



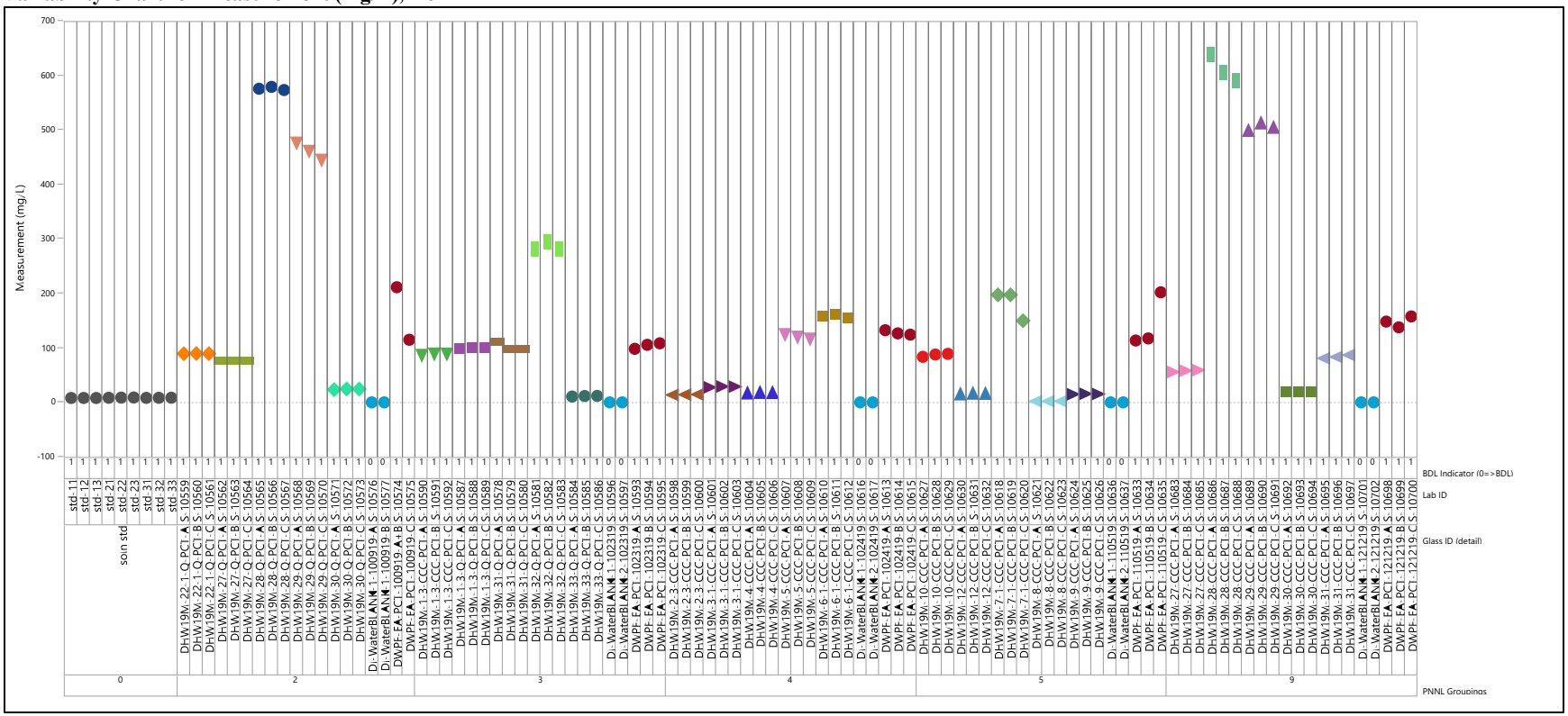
## Exhibit B-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=Cr**
**Variability Chart for log [Measurement (mg/L)], 2 of 2**



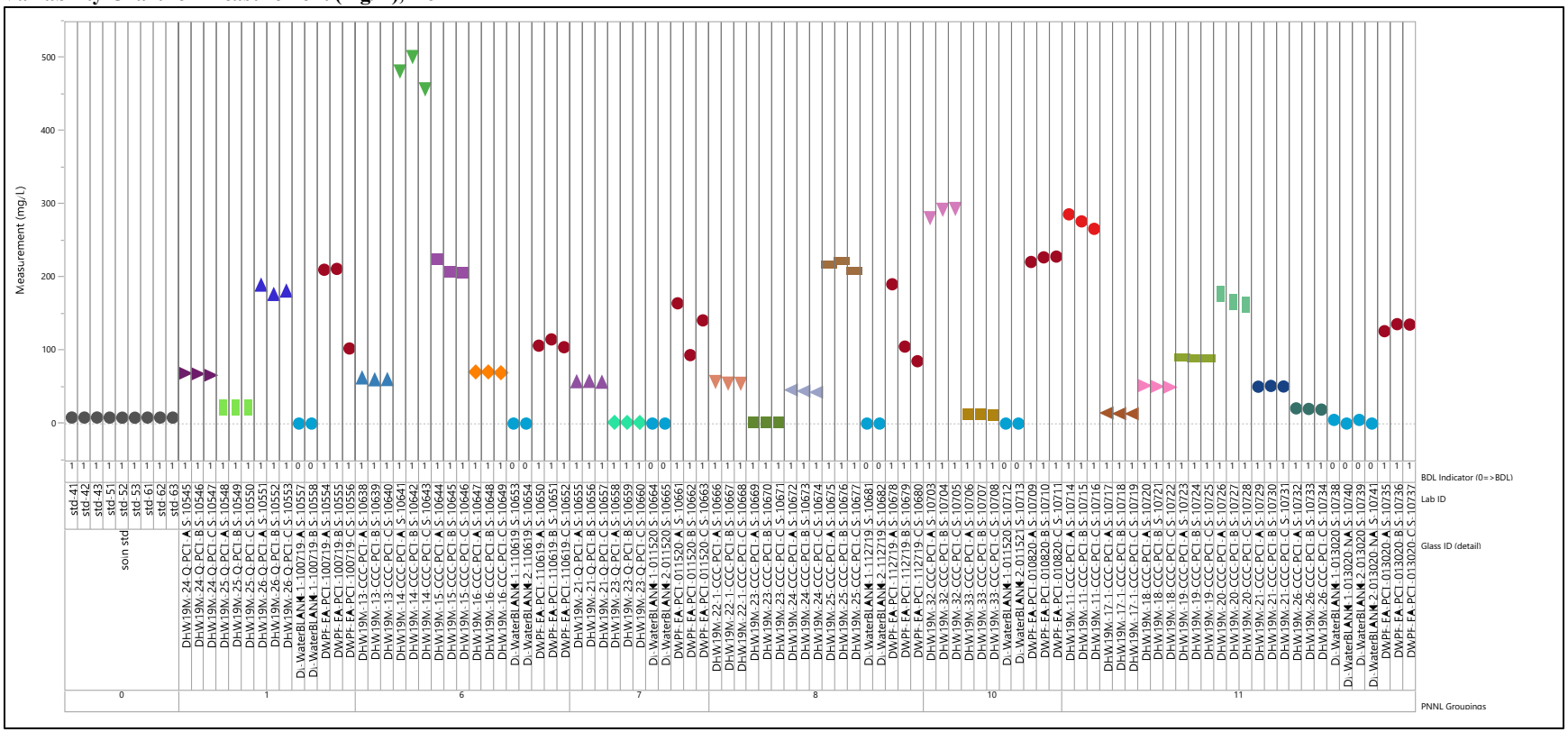
## Exhibit B-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=Li**
**Variability Chart for Measurement (mg/L), 1 of 2**



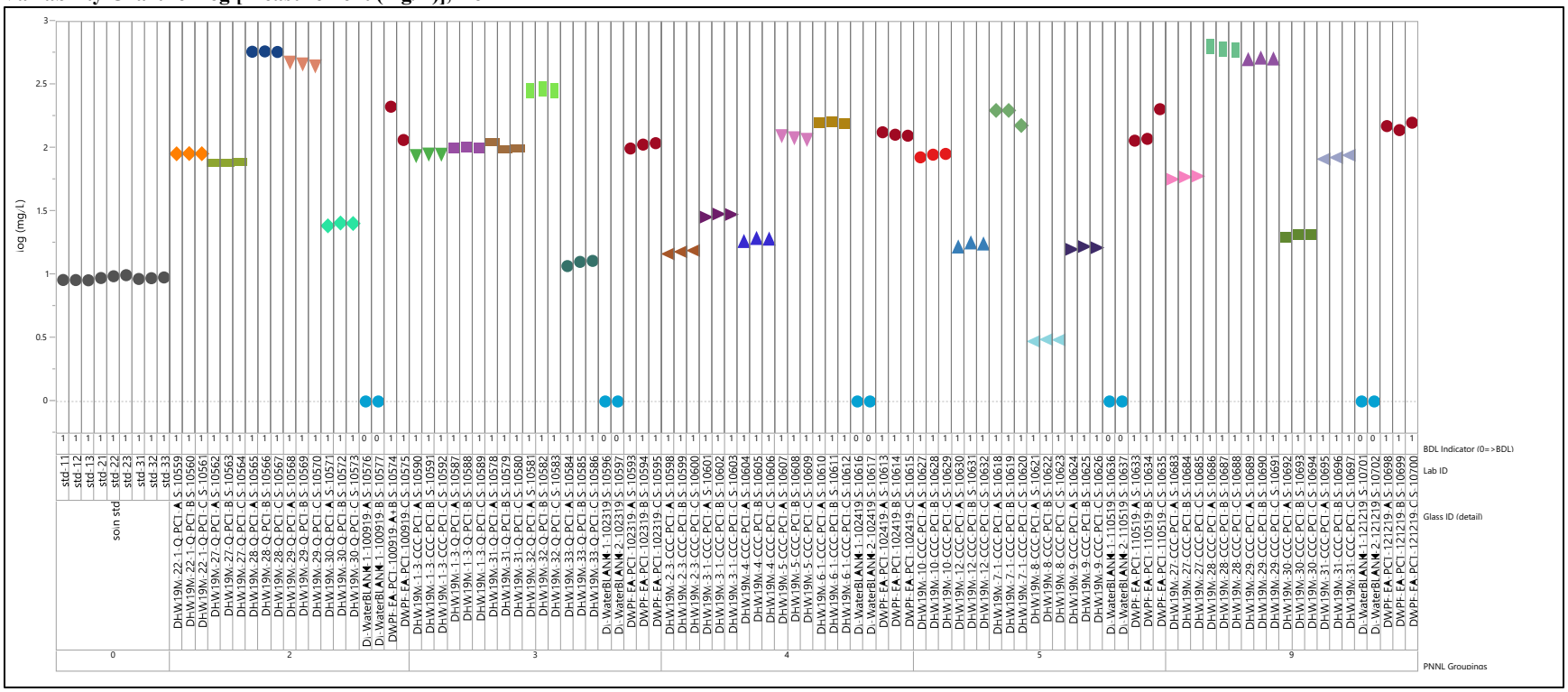
## Exhibit B-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=Li**
**Variability Chart for Measurement (mg/L), 2 of 2**



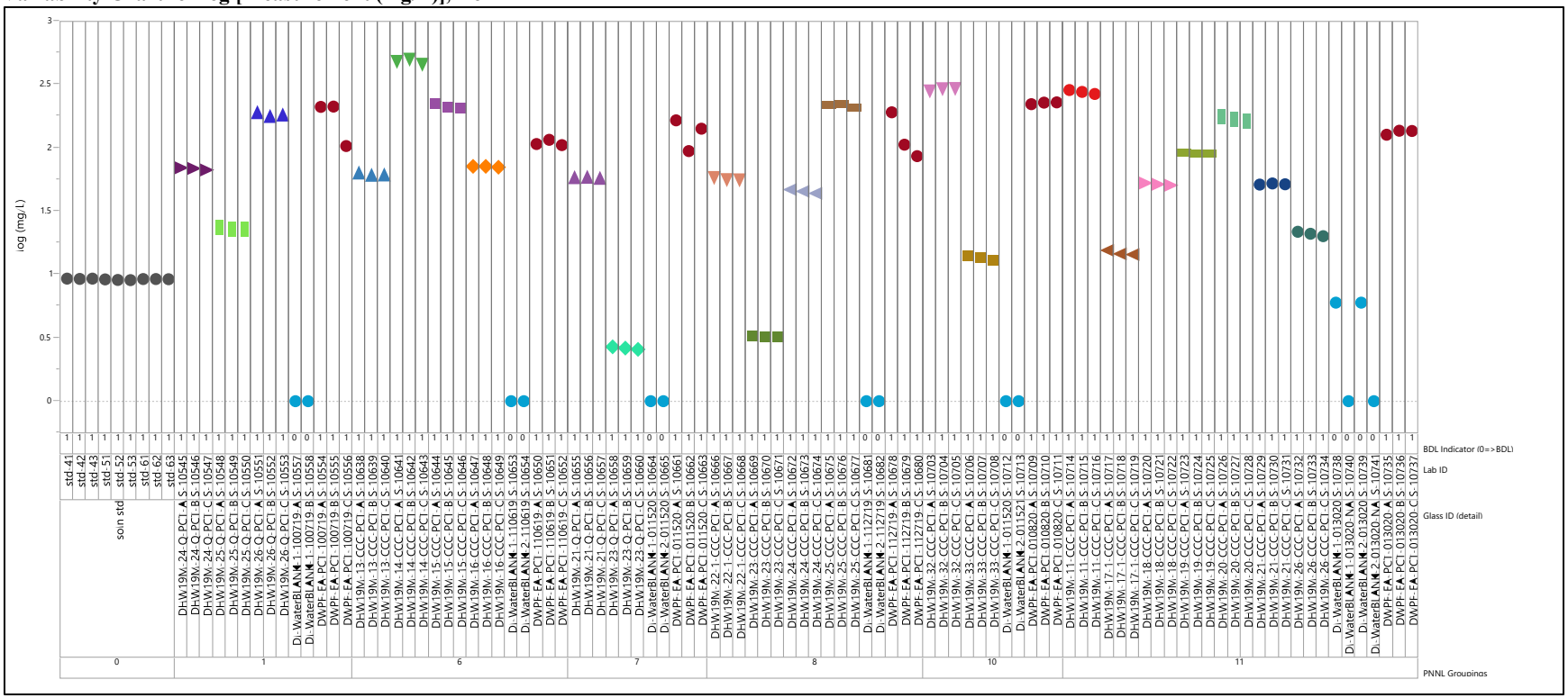
## Exhibit B-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=Li**
**Variability Chart for log [Measurement (mg/L)], 1 of 2**



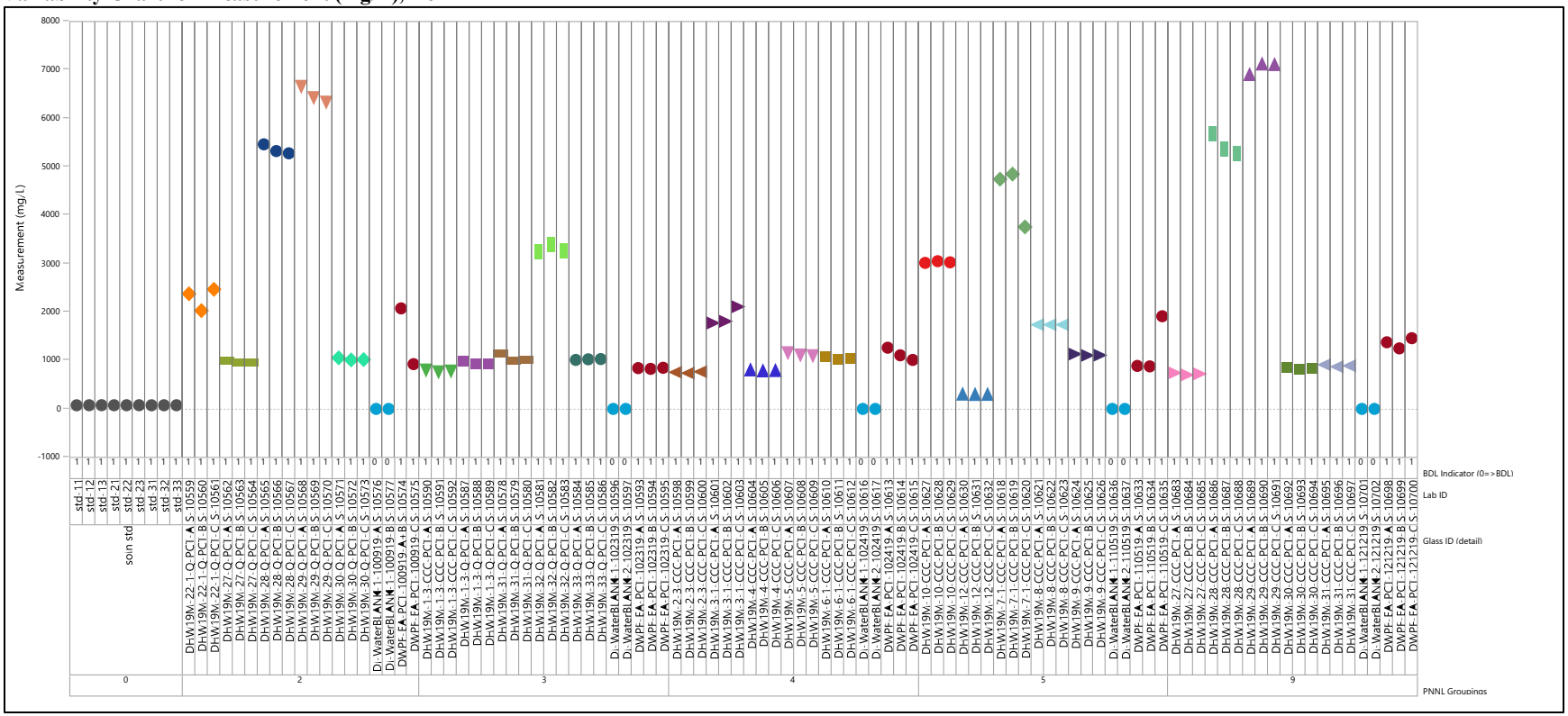
## Exhibit B-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=Li**
**Variability Chart for log [Measurement (mg/L)], 2 of 2**



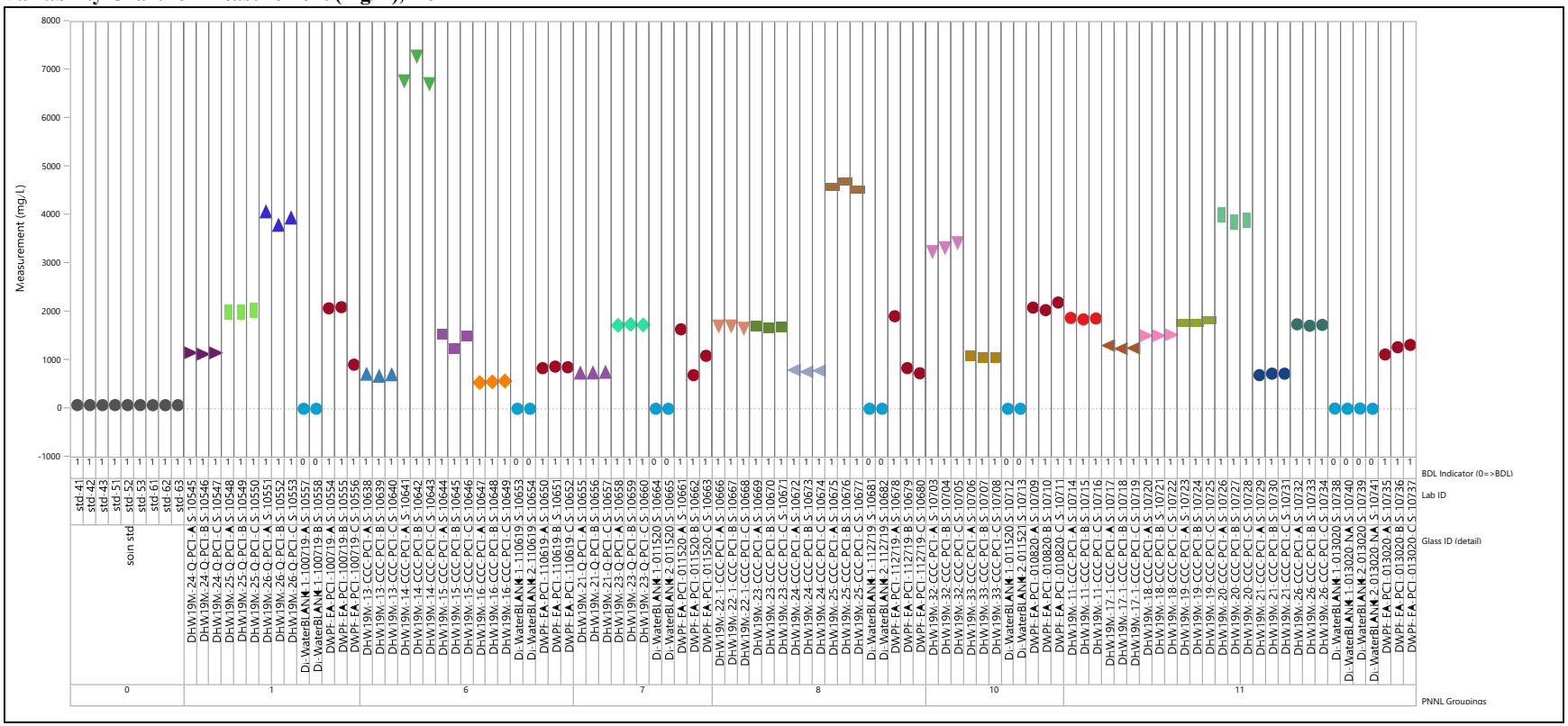
## Exhibit B-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=Na**
**Variability Chart for Measurement (mg/L), 1 of 2**



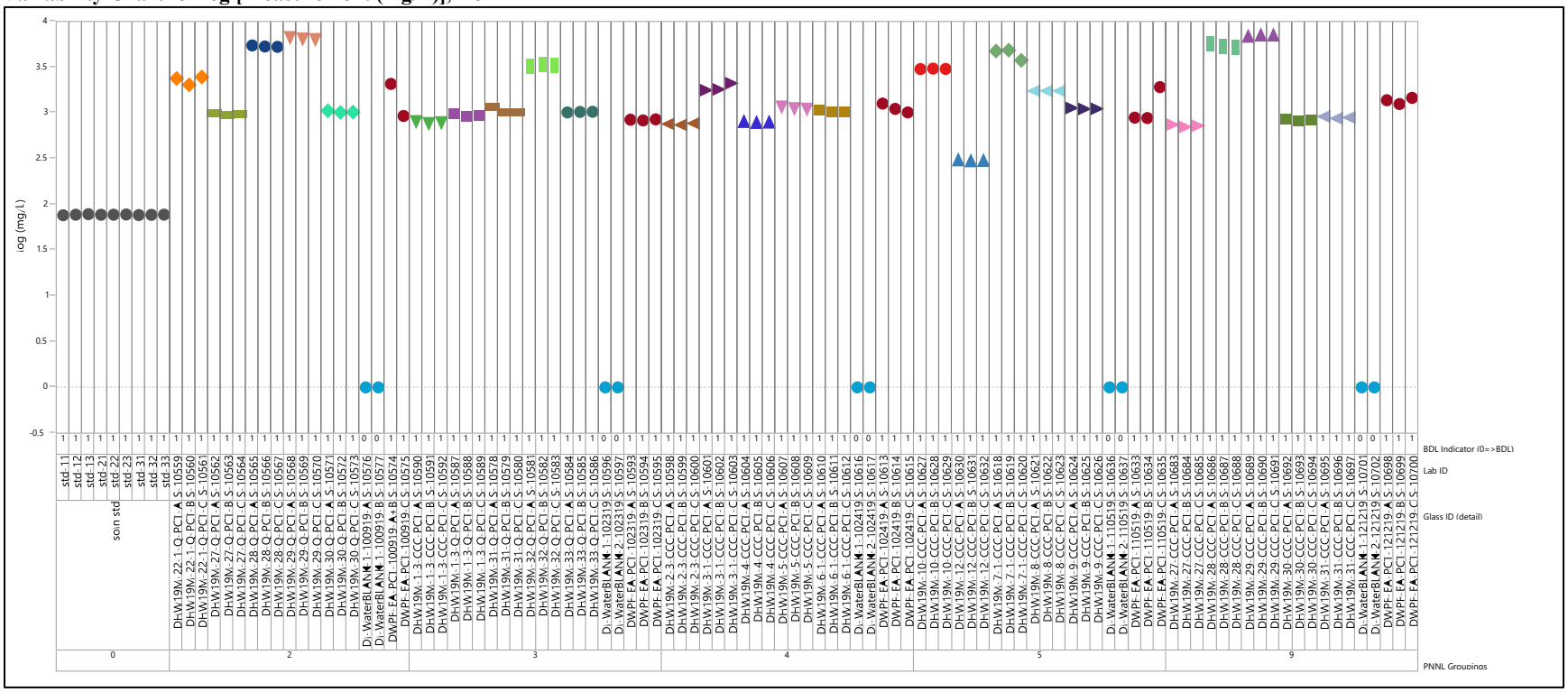
## Exhibit B-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=Na**
**Variability Chart for Measurement (mg/L), 2 of 2**



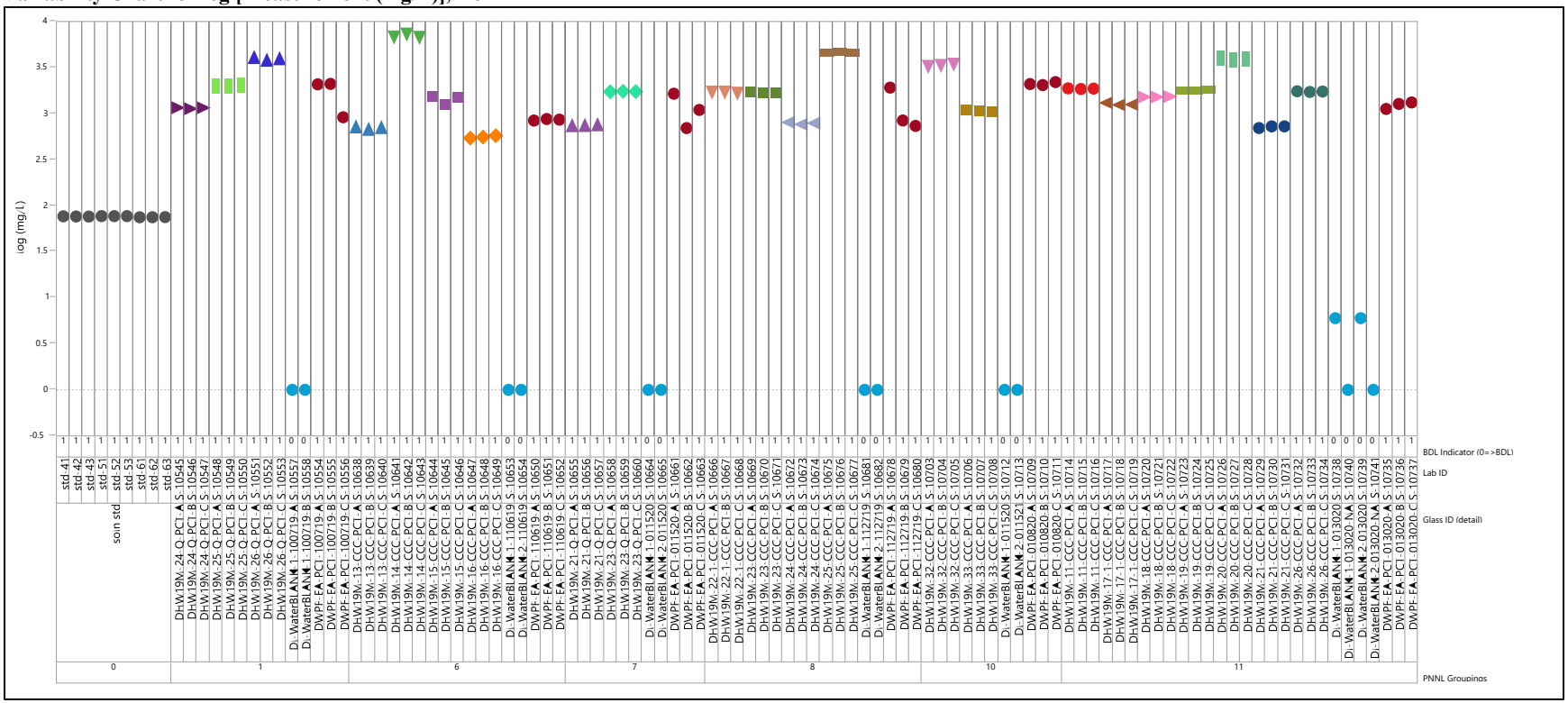
## Exhibit B-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=Na**
**Variability Chart for log [Measurement (mg/L)], 1 of 2**



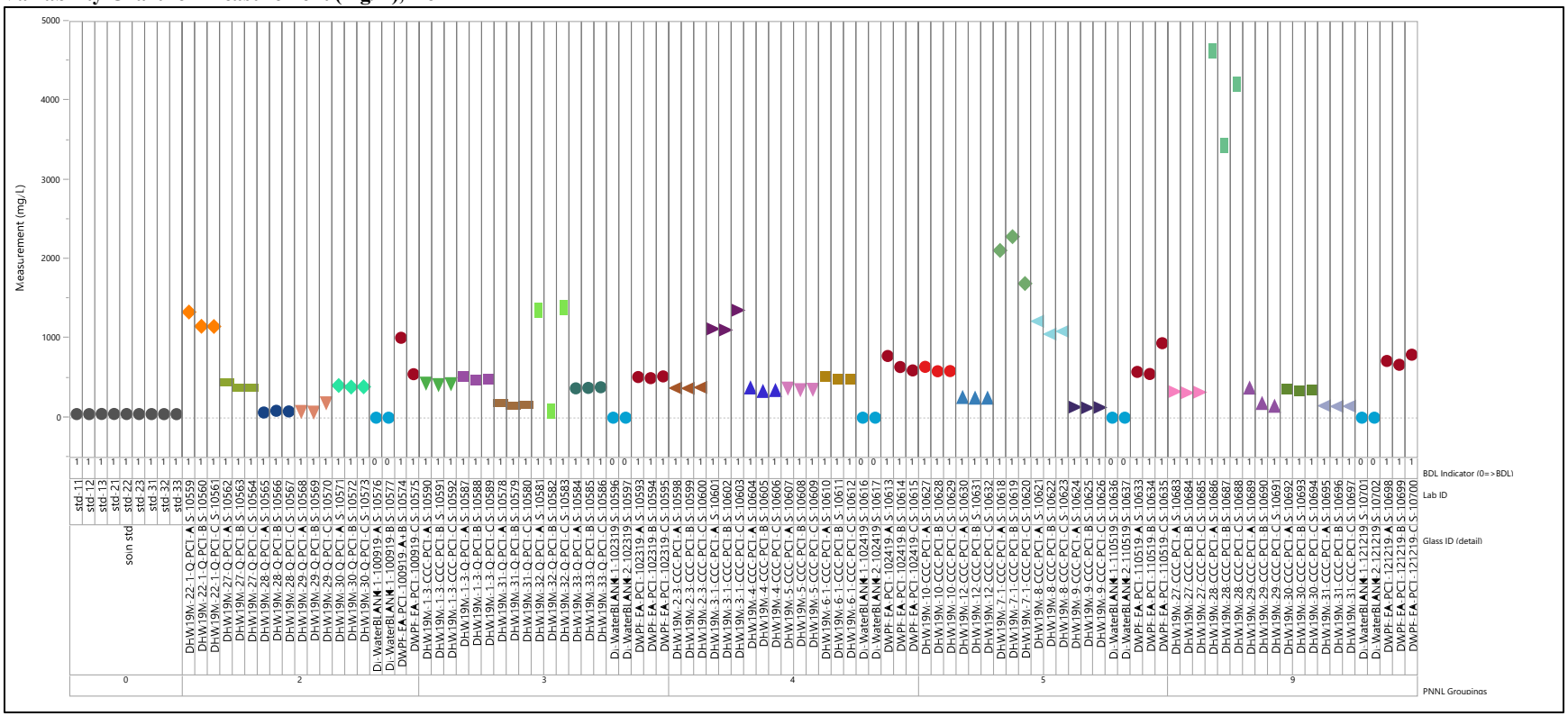
## Exhibit B-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=Na**
**Variability Chart for log [Measurement (mg/L)], 2 of 2**



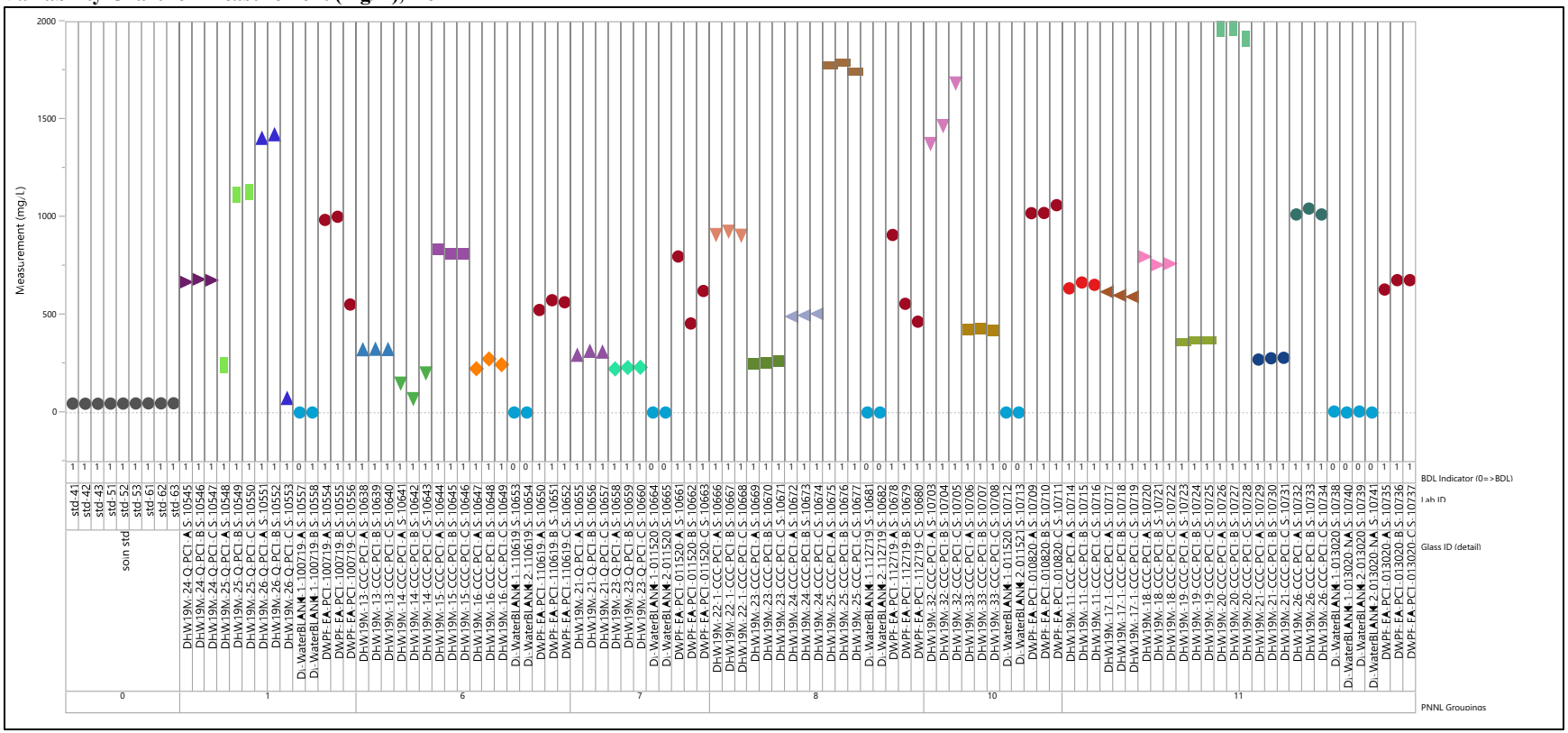
## Exhibit B-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=Si**
**Variability Chart for Measurement (mg/L), 1 of 2**



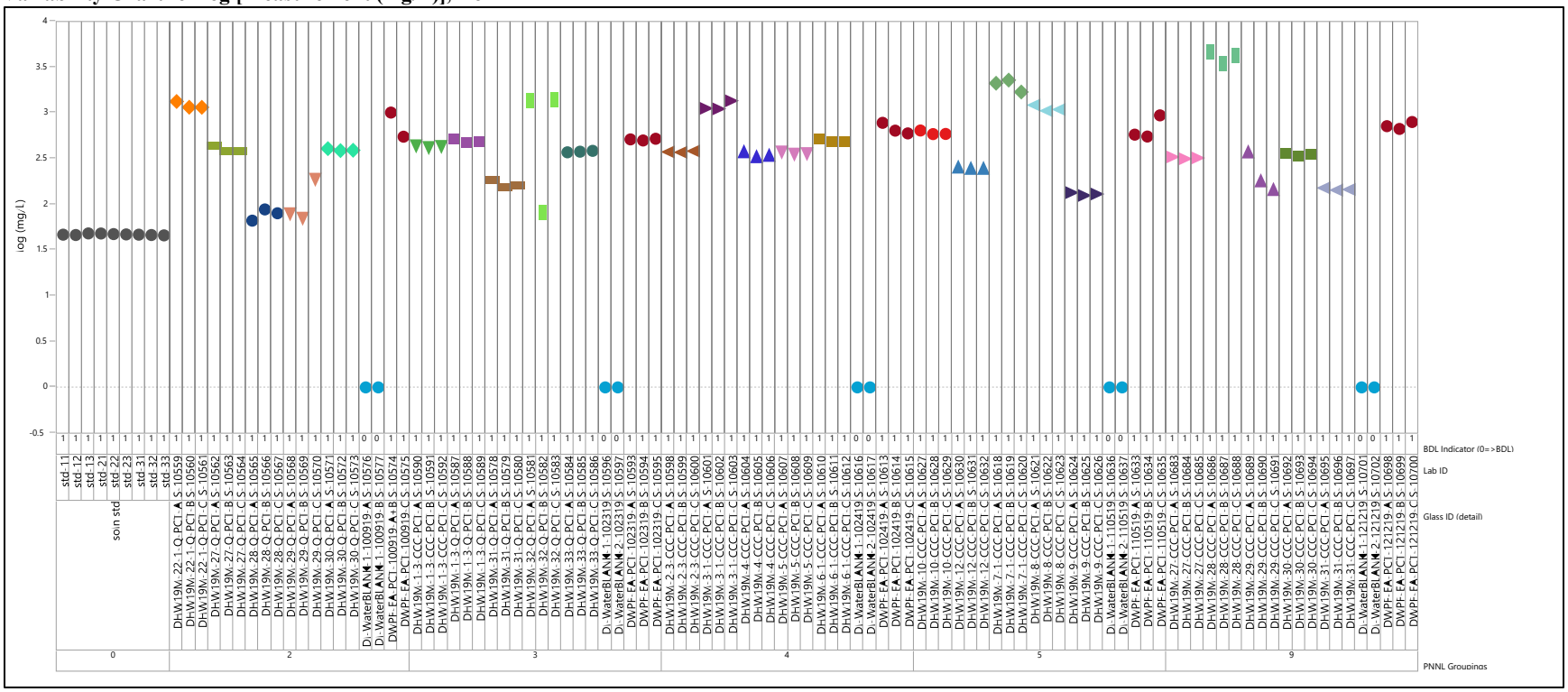
## Exhibit B-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=Si**
**Variability Chart for Measurement (mg/L), 2 of 2**



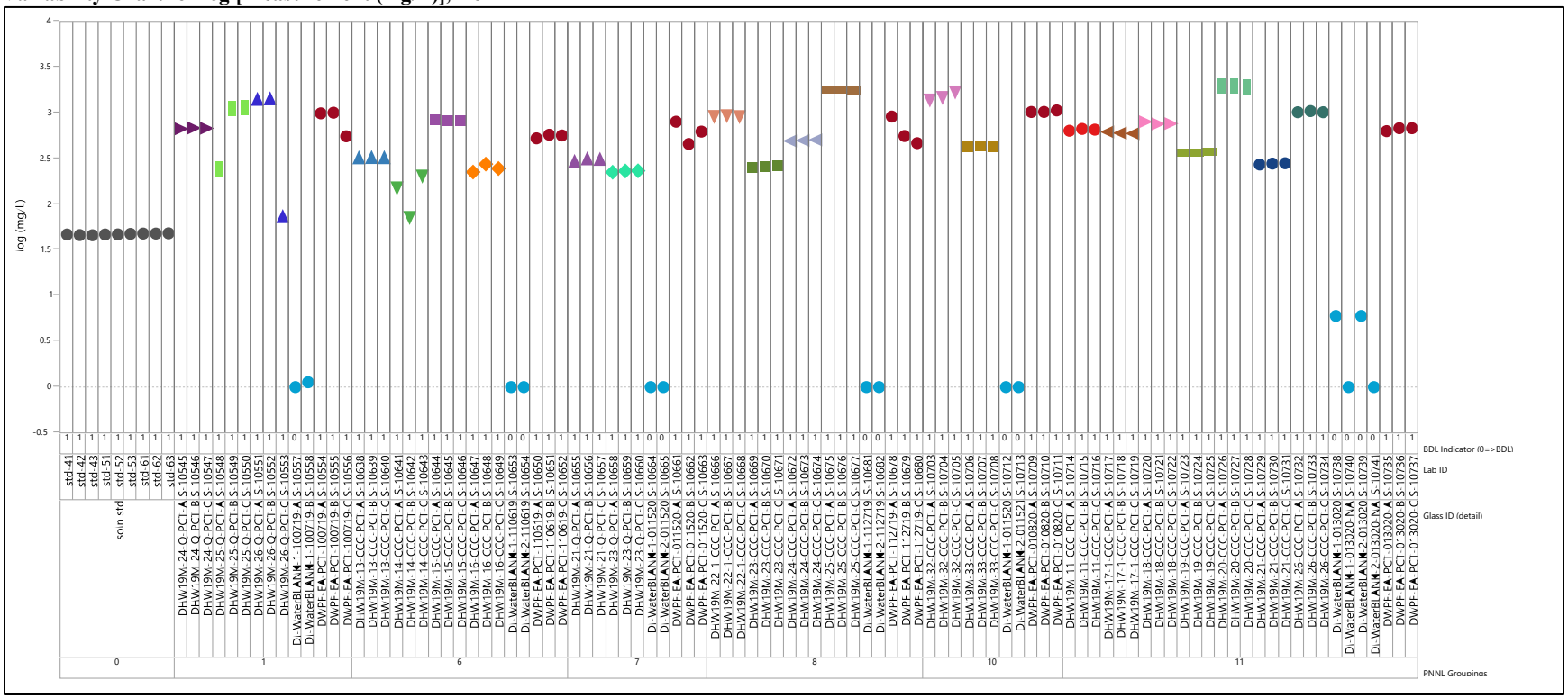
## Exhibit B-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=Si**
**Variability Chart for log [Measurement (mg/L)], 1 of 2**



## Exhibit B-2. PCT Leachate Measurements by PNNL Grouping (continued)

**Analyte=Si**
**Variability Chart for log [Measurement (mg/L)], 2 of 2**



# Appendix C Normalized PCT Results

**Table C-1. Normalized PCT Results**

| Glass ID | Comp. View | $NC_B$ (g/L) | $NC_{Cr}$ (g/L) | $NC_{Li}$ (g/L) | $NC_{Na}$ (g/L) | $NC_{Si}$ (g/L) |
|---|---|---|---|---|---|---|
| DHW19M-1-2-Q | Targeted | 7.507 | 2.229 | 6.369 | 6.529 | 2.349 |
| DHW19M-1-2-Q | Measured | 7.904 | 2.394 | 6.315 | 7.395 | 2.372 |
| DHW19M-1-3-CCC | Targeted | 6.277 | 2.602 | 5.507 | 5.450 | 2.004 |
| DHW19M-1-3-CCC | Measured | 6.666 | 2.701 | 5.916 | 6.102 | 2.006 |
| DHW19M-1-3-Q | Targeted | 7.603 | 2.331 | 6.251 | 6.592 | 2.320 |
| DHW19M-1-3-Q | Measured | 8.073 | 2.419 | 6.715 | 7.381 | 2.322 |
| DHW19M-2-3-CCC | Targeted | 5.780 | 0.882 | 4.338 | 4.743 | 1.582 |
| DHW19M-2-3-CCC | Measured | 6.080 | 0.943 | 4.469 | 5.249 | 1.607 |
| DHW19M-2-3-Q | Targeted | 6.042 | 0.828 | 4.319 | 5.049 | 1.645 |
| DHW19M-2-3-Q | Measured | 6.356 | 0.885 | 4.449 | 5.587 | 1.670 |
| DHW19M-3-1-CCC | Targeted | 16.026 | 2.848 | 12.225 | 14.990 | 4.954 |
| DHW19M-3-1-CCC | Measured | 17.474 | 3.056 | 13.216 | 16.785 | 5.053 |
| DHW19M-3-1-Q | Targeted | 13.382 | 3.686 | 10.703 | 12.043 | 4.075 |
| DHW19M-3-1-Q | Measured | 14.590 | 3.956 | 11.571 | 13.485 | 4.157 |
| DHW19M-4-CCC | Targeted | 5.629 | 2.043 | 4.797 | 5.212 | 1.658 |
| DHW19M-4-CCC | Measured | 5.972 | 2.060 | 4.820 | 5.711 | 1.631 |
| DHW19M-4-Q | Targeted | 5.782 | 2.161 | 4.777 | 5.499 | 1.798 |
| DHW19M-4-Q | Measured | 6.134 | 2.180 | 4.800 | 6.025 | 1.769 |
| DHW19M-5-CCC | Targeted | 10.241 | 3.968 | 9.506 | 8.735 | 1.865 |
| DHW19M-5-CCC | Measured | 11.058 | 4.287 | 9.370 | 9.648 | 1.839 |
| DHW19M-5-Q | Targeted | 11.940 | 1.932 | 10.991 | 10.209 | 1.989 |
| DHW19M-5-Q | Measured | 12.893 | 2.087 | 10.832 | 11.275 | 1.961 |
| DHW19M-6-1-CCC | Targeted | 14.333 | 1.716 | 570.336 | 7.604 | 1.993 |
| DHW19M-6-1-CCC | Measured | 15.596 | 1.759 | >159.163 | 8.320 | 1.990 |
| DHW19M-6-1-Q | Targeted | 13.930 | 4.232 | 11.183 | 13.049 | 4.526 |
| DHW19M-6-1-Q | Measured | 15.158 | 4.338 | >3.121 | 14.278 | 4.519 |
| DHW19M-7-1-CCC | Targeted | 31.169 | 24.912 | 9.912 | 36.478 | 9.659 |
| DHW19M-7-1-CCC | Measured | 33.672 | 26.317 | 9.738 | 40.548 | 9.575 |
| DHW19M-7-1-Q | Targeted | 10.654 | 2.254 | 9.300 | 9.119 | 2.440 |
| DHW19M-7-1-Q | Measured | 11.509 | 2.381 | 9.137 | 10.136 | 2.419 |
| DHW19M-8-CCC | Targeted | 9.318 | 2.851 | 0.387 | 11.069 | 5.150 |
| DHW19M-8-CCC | Measured | 10.010 | 3.027 | 0.378 | 12.153 | 5.072 |
| DHW19M-8-Q | Targeted | 36.287 | 12.754 | 25.496 | 30.242 | 9.683 |
| DHW19M-8-Q | Measured | 38.981 | 13.540 | 24.906 | 33.203 | 9.536 |

**Table C-1. Normalized PCT Results (continued)**

| Glass ID | Comp. View | $NC_B$ (g/L) | $NC_{Cr}$ (g/L) | $NC_{Li}$ (g/L) | $NC_{Na}$ (g/L) | $NC_{Si}$ (g/L) |
|---|---|---|---|---|---|---|
| DHW19M-9-CCC | Targeted | 8.892 | 1.201 | 8.359 | 7.304 | 0.715 |
| DHW19M-9-CCC | Measured | 9.590 | 1.315 | 8.844 | 8.313 | 0.722 |
| DHW19M-9-Q | Targeted | 9.288 | 0.786 | 8.218 | 7.699 | 0.796 |
| DHW19M-9-Q | Measured | 10.017 | 0.860 | 8.694 | 8.762 | 0.803 |
| DHW19M-10-CCC | Targeted | 21.714 | 13.132 | 20.092 | 19.486 | 3.221 |
| DHW19M-10-CCC | Measured | 22.716 | 13.992 | 20.351 | 21.621 | 3.184 |
| DHW19M-10-Q | Targeted | 16.936 | 6.967 | 15.887 | 14.793 | 2.682 |
| DHW19M-10-Q | Measured | 17.718 | 7.423 | 16.093 | 16.413 | 2.651 |
| DHW19M-11-CCC | Targeted | 17.982 | 5.958 | 16.691 | 15.619 | 3.018 |
| DHW19M-11-CCC | Measured | 19.126 | 6.496 | 16.236 | 17.452 | 3.095 |
| DHW19M-11-Q | Targeted | 18.921 | 3.607 | 17.877 | 15.716 | 3.072 |
| DHW19M-11-Q | Measured | 20.125 | 3.932 | 17.390 | 17.560 | 3.150 |
| DHW19M-12-CCC | Targeted | 2.762 | 0.429 | 2.566 | 2.557 | 0.974 |
| DHW19M-12-CCC | Measured | 2.893 | 0.453 | 2.566 | 2.785 | 1.003 |
| DHW19M-12-Q | Targeted | 3.293 | 0.327 | 3.148 | 3.181 | 1.175 |
| DHW19M-12-Q | Measured | 3.449 | 0.345 | 3.148 | 3.464 | 1.210 |
| DHW19M-13-CCC | Targeted | 5.097 | 2.398 | 4.706 | 4.693 | 1.603 |
| DHW19M-13-CCC | Measured | 5.451 | 2.622 | 4.624 | 5.322 | 1.598 |
| DHW19M-13-Q | Targeted | 8.529 | 2.797 | 7.987 | 7.535 | 2.345 |
| DHW19M-13-Q | Measured | 9.121 | 3.058 | 7.849 | 8.544 | 2.337 |
| DHW19M-14-CCC | Targeted | 54.472 | 12.038 | 35.791 | 44.699 | 0.500 |
| DHW19M-14-CCC | Measured | 57.402 | 12.874 | 34.594 | 50.154 | 0.529 |
| DHW19M-14-Q | Targeted | 59.389 | 9.074 | 42.136 | 45.883 | 21.436 |
| DHW19M-14-Q | Measured | 62.582 | 9.704 | 40.727 | 51.482 | 22.659 |
| DHW19M-15-CCC | Targeted | 12.455 | 3.458 | 11.890 | 11.397 | 3.515 |
| DHW19M-15-CCC | Measured | 13.107 | 3.756 | 11.738 | 12.764 | 3.568 |
| DHW19M-15-Q | Targeted | 17.147 | 3.934 | 16.642 | 14.576 | 4.278 |
| DHW19M-15-Q | Measured | 18.045 | 4.273 | 16.430 | 16.325 | 4.341 |
| DHW19M-16-CCC | Targeted | 5.230 | 1.169 | 4.559 | 4.155 | 1.107 |
| DHW19M-16-CCC | Measured | 5.577 | 1.235 | 4.453 | 4.499 | 1.118 |
| DHW19M-16-Q | Targeted | 5.441 | 1.125 | 4.922 | 4.564 | 1.416 |
| DHW19M-16-Q | Measured | 5.802 | 1.189 | 4.807 | 4.941 | 1.431 |
| DHW19M-17-1-CCC | Targeted | 9.982 | 3.654 | 9.685 | 10.628 | 2.691 |
| DHW19M-17-1-CCC | Measured | 11.529 | 3.910 | 12.733 | 10.742 | 2.718 |
| DHW19M-17-1-Q | Targeted | 11.158 | 3.580 | 12.125 | 11.356 | 2.834 |
| DHW19M-17-1-Q | Measured | 12.887 | 3.831 | 15.942 | 11.477 | 2.863 |

**Table C-1. Normalized PCT Results (continued)**

| Glass ID | Comp. View | $NC_B$ (g/L) | $NC_{Cr}$ (g/L) | $NC_{Li}$ (g/L) | $NC_{Na}$ (g/L) | $NC_{Si}$ (g/L) |
|---|---|---|---|---|---|---|
| DHW19M-18-CCC | Targeted | 12.148 | 3.996 | 9.059 | 10.542 | 3.305 |
| DHW19M-18-CCC | Measured | 13.021 | 4.115 | 10.130 | 11.760 | 3.344 |
| DHW19M-18-Q | Targeted | 14.005 | 2.192 | 10.568 | 11.741 | 3.593 |
| DHW19M-18-Q | Measured | 15.012 | 2.257 | 11.817 | 13.097 | 3.636 |
| DHW19M-19-CCC | Targeted | 16.206 | 2.863 | 15.141 | 14.535 | 1.829 |
| DHW19M-19-CCC | Measured | 18.913 | 3.035 | 17.756 | 14.939 | 1.888 |
| DHW19M-19-Q | Targeted | 11.464 | 1.310 | 11.910 | 10.424 | 1.607 |
| DHW19M-19-Q | Measured | 13.380 | 1.389 | 13.968 | 10.714 | 1.660 |
| DHW19M-20-CCC | Targeted | 29.942 | 12.660 | 21.607 | 24.923 | 8.957 |
| DHW19M-20-CCC | Measured | 32.675 | 13.129 | 23.558 | 27.796 | 8.953 |
| DHW19M-20-Q | Targeted | 32.310 | 14.110 | 23.377 | 26.879 | 8.632 |
| DHW19M-20-Q | Measured | 35.259 | 14.633 | 25.488 | 29.977 | 8.628 |
| DHW19M-21-CCC | Targeted | 1.807 | 1.151 | 3.845 | 4.425 | 1.264 |
| DHW19M-21-CCC | Measured | 2.208 | 1.224 | 4.100 | 4.548 | 1.272 |
| DHW19M-21-Q | Targeted | 1.889 | 1.119 | 4.321 | 4.618 | 1.396 |
| DHW19M-21-Q | Measured | 2.308 | 1.189 | 4.607 | 4.747 | 1.405 |
| DHW19M-22-1-CCC | Targeted | 11.019 | 3.885 | 10.641 | 11.276 | 3.696 |
| DHW19M-22-1-CCC | Measured | 11.664 | 3.979 | 12.116 | 12.546 | 3.728 |
| DHW19M-22-1-Q | Targeted | 16.726 | 3.606 | 16.921 | 15.209 | 4.890 |
| DHW19M-22-1-Q | Measured | 17.705 | 3.693 | 19.267 | 16.922 | 4.932 |
| DHW19M-23-CCC | Targeted | 12.902 | 0.955 | 13.946 | 10.852 | 1.163 |
| DHW19M-23-CCC | Measured | 14.084 | 1.007 | >3.243 | 11.221 | 1.194 |
| DHW19M-23-Q | Targeted | 13.601 | 0.744 | 11.307 | 11.135 | 1.038 |
| DHW19M-23-Q | Measured | 14.847 | 0.784 | >2.630 | 11.514 | 1.066 |
| DHW19M-24-CCC | Targeted | 6.505 | 2.893 | 6.177 | 6.053 | 2.157 |
| DHW19M-24-CCC | Measured | 7.076 | 3.035 | 6.640 | 6.685 | 2.154 |
| DHW19M-24-Q | Targeted | 10.074 | 2.309 | 9.340 | 8.860 | 2.926 |
| DHW19M-24-Q | Measured | 10.957 | 2.422 | 10.039 | 9.785 | 2.922 |
| DHW19M-25-CCC | Targeted | 40.487 | 9.303 | 113.597 | 32.545 | 6.959 |
| DHW19M-25-CCC | Measured | 42.909 | 9.379 | >205.175 | 33.384 | 6.726 |
| DHW19M-25-Q | Targeted | 14.835 | 2.318 | 12.137 | 14.205 | 2.640 |
| DHW19M-25-Q | Measured | 15.722 | 2.336 | >21.92 | 14.571 | 2.552 |
| DHW19M-26-CCC | Targeted | 12.854 | 4.849 | 2.411 | 12.444 | 4.930 |
| DHW19M-26-CCC | Measured | 14.045 | 5.060 | 2.636 | 13.717 | 4.874 |
| DHW19M-26-Q | Targeted | 32.182 | 12.898 | 21.115 | 28.305 | 2.539 |
| DHW19M-26-Q | Measured | 35.164 | 13.459 | 23.091 | 31.202 | 2.511 |

**Table C-1. Normalized PCT Results (continued)**

| Glass ID | Comp. View | $NC_B$ (g/L) | $NC_{Cr}$ (g/L) | $NC_{Li}$ (g/L) | $NC_{Na}$ (g/L) | $NC_{Si}$ (g/L) |
|---|---|---|---|---|---|---|
| DHW19M-27-CCC | Targeted | 2.593 | 1.428 | 4.357 | 4.480 | 1.470 |
| DHW19M-27-CCC | Measured | 3.013 | 1.587 | 4.645 | 4.583 | 1.473 |
| DHW19M-27-Q | Targeted | 3.029 | 1.568 | 5.727 | 6.003 | 1.830 |
| DHW19M-27-Q | Measured | 3.519 | 1.742 | 6.106 | 6.141 | 1.833 |
| DHW19M-28-CCC | Targeted | 45.805 | 14.345 | 40.424 | 40.852 | 15.941 |
| DHW19M-28-CCC | Measured | 48.684 | 15.003 | 42.374 | 44.938 | 16.251 |
| DHW19M-28-Q | Targeted | 45.500 | 8.452 | 38.085 | 40.257 | 0.305 |
| DHW19M-28-Q | Measured | 48.360 | 8.840 | 39.922 | 44.282 | 0.311 |
| DHW19M-29-CCC | Targeted | 56.880 | 12.601 | 37.729 | 45.507 | 0.825 |
| DHW19M-29-CCC | Measured | 59.024 | 12.937 | 41.146 | 48.704 | 0.808 |
| DHW19M-29-Q | Targeted | 52.041 | 7.429 | 34.354 | 41.799 | 0.390 |
| DHW19M-29-Q | Measured | 54.002 | 7.627 | 37.466 | 44.735 | 0.382 |
| DHW19M-30-CCC | Targeted | 7.118 | 2.926 | 7.289 | 6.738 | 1.648 |
| DHW19M-30-CCC | Measured | 7.800 | 3.034 | 9.111 | 7.377 | 1.640 |
| DHW19M-30-Q | Targeted | 8.886 | 3.368 | 9.016 | 8.281 | 1.867 |
| DHW19M-30-Q | Measured | 9.736 | 3.493 | 11.270 | 9.066 | 1.858 |
| DHW19M-31-CCC | Targeted | 8.461 | 0.889 | 8.322 | 6.529 | 0.764 |
| DHW19M-31-CCC | Measured | 9.403 | 0.957 | 9.205 | 6.608 | 0.770 |
| DHW19M-31-Q | Targeted | 10.057 | 0.682 | 10.107 | 7.740 | 0.859 |
| DHW19M-31-Q | Measured | 11.176 | 0.734 | 11.179 | 7.834 | 0.866 |
| DHW19M-32-CCC | Targeted | 27.472 | 10.683 | 23.291 | 24.565 | 6.614 |
| DHW19M-32-CCC | Measured | 29.397 | 11.181 | 25.069 | 27.066 | 6.597 |
| DHW19M-32-Q | Targeted | 28.004 | 7.071 | 23.004 | 24.333 | 2.355 |
| DHW19M-32-Q | Measured | 29.966 | 7.400 | 24.759 | 26.810 | 2.349 |
| DHW19M-33-CCC | Targeted | 9.496 | 2.429 | 8.304 | 8.335 | 2.105 |
| DHW19M-33-CCC | Measured | 10.809 | 2.648 | 10.417 | 8.311 | 2.105 |
| DHW19M-33-Q | Targeted | 8.884 | 2.293 | 7.625 | 7.992 | 1.870 |
| DHW19M-33-Q | Measured | 10.112 | 2.499 | 9.566 | 7.968 | 1.870 |
| DWPF-EA-9919 | Reference | 16.559 | na | 9.066 | 13.168 | 3.725 |
| DWPF-EA-91119 | Reference | 17.156 | na | 9.261 | 13.676 | 3.751 |
| DWPF-EA-91919 | Reference | 8.824 | na | 6.022 | 7.384 | 2.539 |
| DWPF-EA-92319 | Reference | 9.654 | na | 6.316 | 8.023 | 2.692 |
| DWPF-EA-100719 | Reference | 15.136 | na | 8.434 | 12.701 | 3.589 |
| DWPF-EA-100919 | Reference | 13.271 | na | 7.929 | 11.115 | 3.271 |
| DWPF-EA-102319 | Reference | 8.053 | na | 5.305 | 6.742 | 2.248 |
| DWPF-EA-102419 | Reference | 11.243 | na | 6.483 | 9.010 | 2.931 |

**Table C-1. Normalized PCT Results (continued)**

| Glass ID | Comp. View | $NC_B$ (g/L) | $NC_{Cr}$ (g/L) | $NC_{Li}$ (g/L) | $NC_{Na}$ (g/L) | $NC_{Si}$ (g/L) |
|---|---|---|---|---|---|---|
| DWPF-EA-110519 | Reference | 11.314 | na | 7.085 | 9.170 | 2.941 |
| DWPF-EA-110619 | Reference | 8.506 | na | 5.531 | 6.870 | 2.435 |
| DWPF-EA-112719 | Reference | 10.290 | na | 6.082 | 8.476 | 2.712 |
| DWPF-EA-121219 | Reference | 13.023 | na | 7.515 | 10.906 | 3.183 |
| DWPF-EA-010820 | Reference | 20.328 | na | 11.424 | 16.903 | 4.540 |
| DWPF-EA-011520 | Reference | 10.567 | na | 6.587 | 8.641 | 2.678 |
| DWPF-EA-013020 | Reference | 11.810 | na | 6.734 | 9.907 | 2.900 |

**Exhibit C-1. Normalized PCT Results by Compositional View by Heat Treatment for Each Glass**

**Analyte=B, Comp View=Measured**
**Variability Chart for log NC[B (g/L)]**

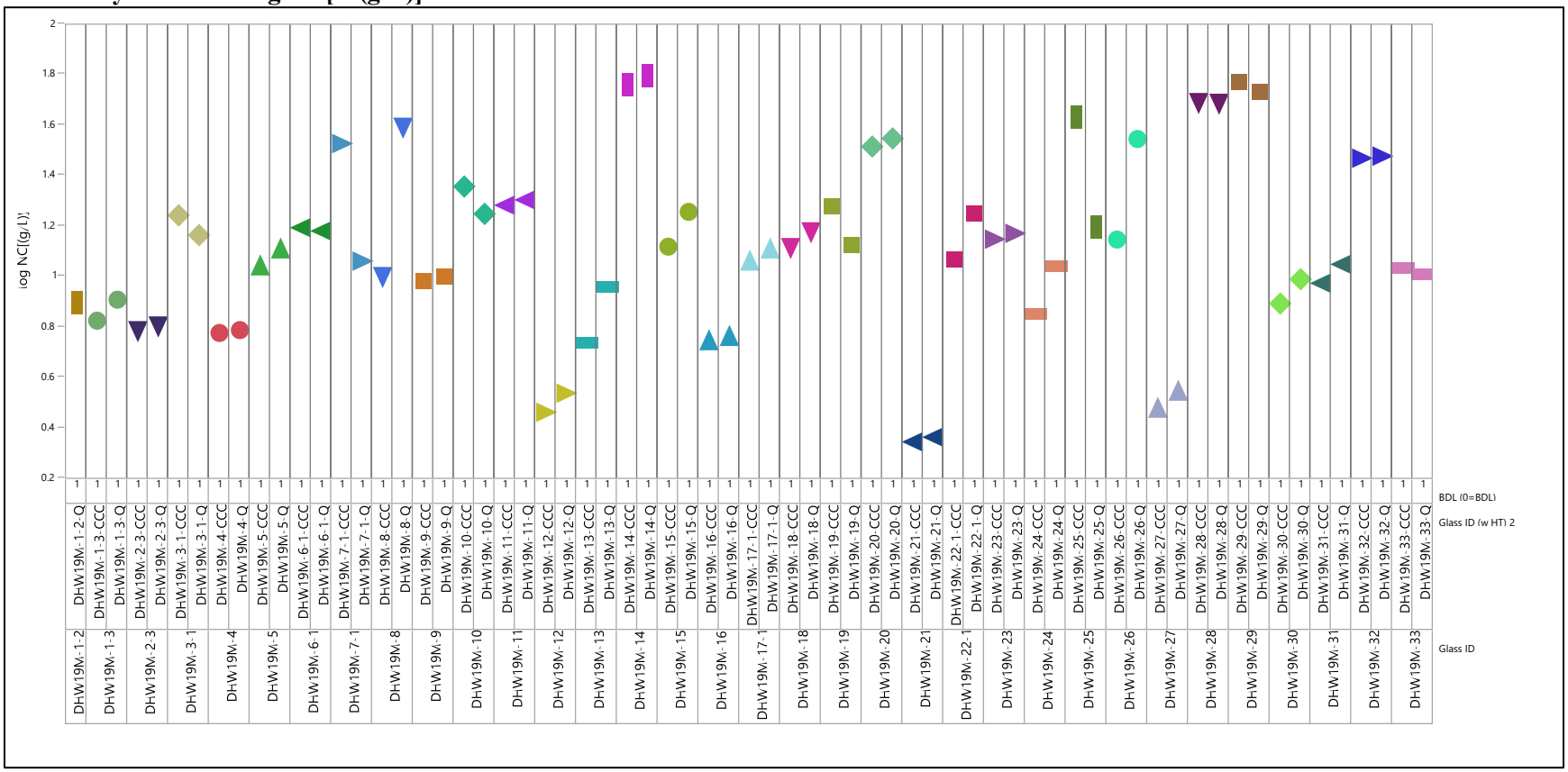


**Exhibit C-1. Normalized PCT Results by Compositional View by Heat Treatment for Each Glass (continued)**

**Analyte=B, Comp View=Target**
**Variability Chart for log NC[B (g/L)]**

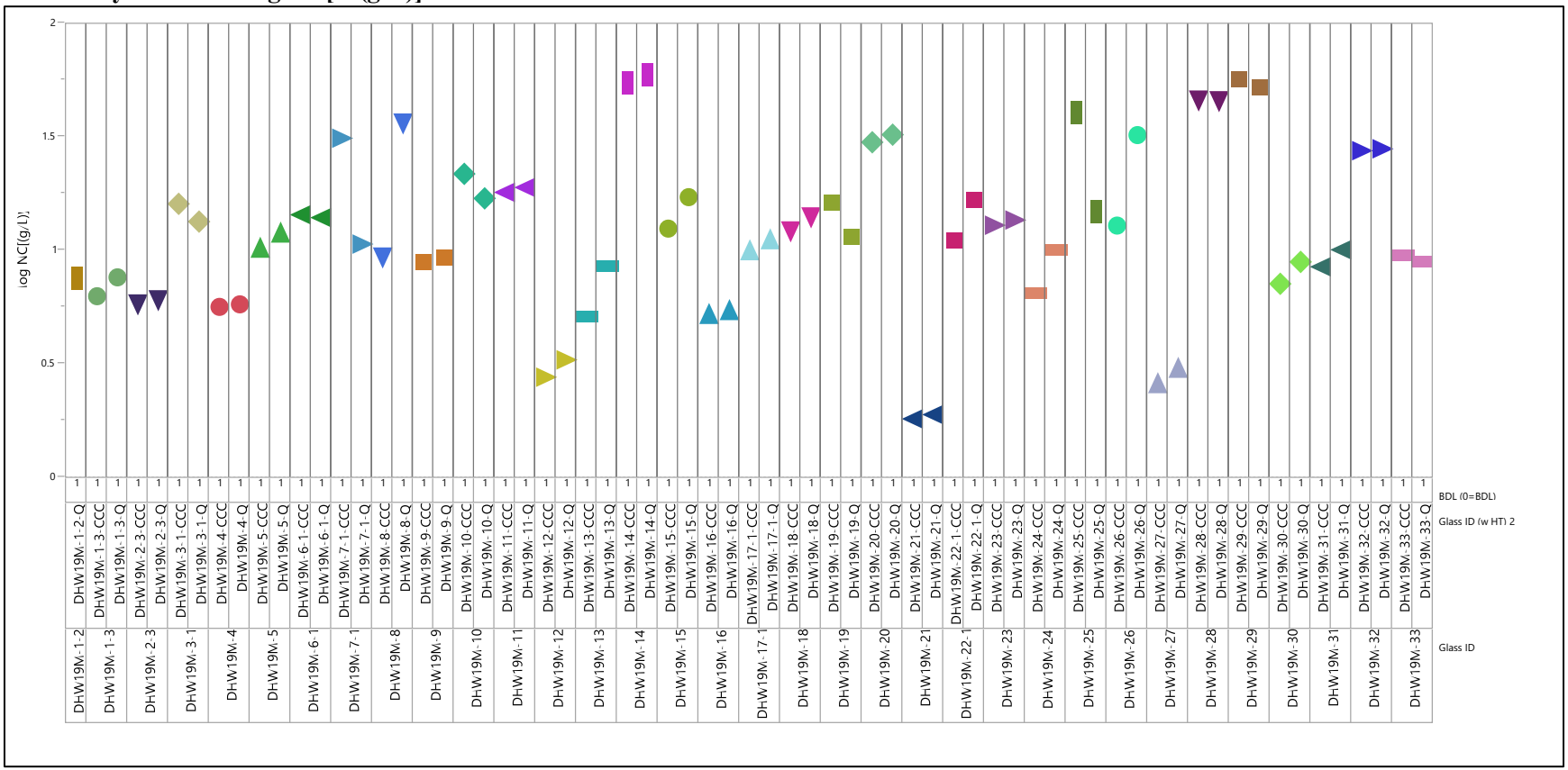


**Exhibit C-1. Normalized PCT Results by Compositional View by Heat Treatment for Each Glass (continued)**

**Analyte=Cr, Comp View=Measured**
**Variability Chart for log NC[Cr (g/L)]**

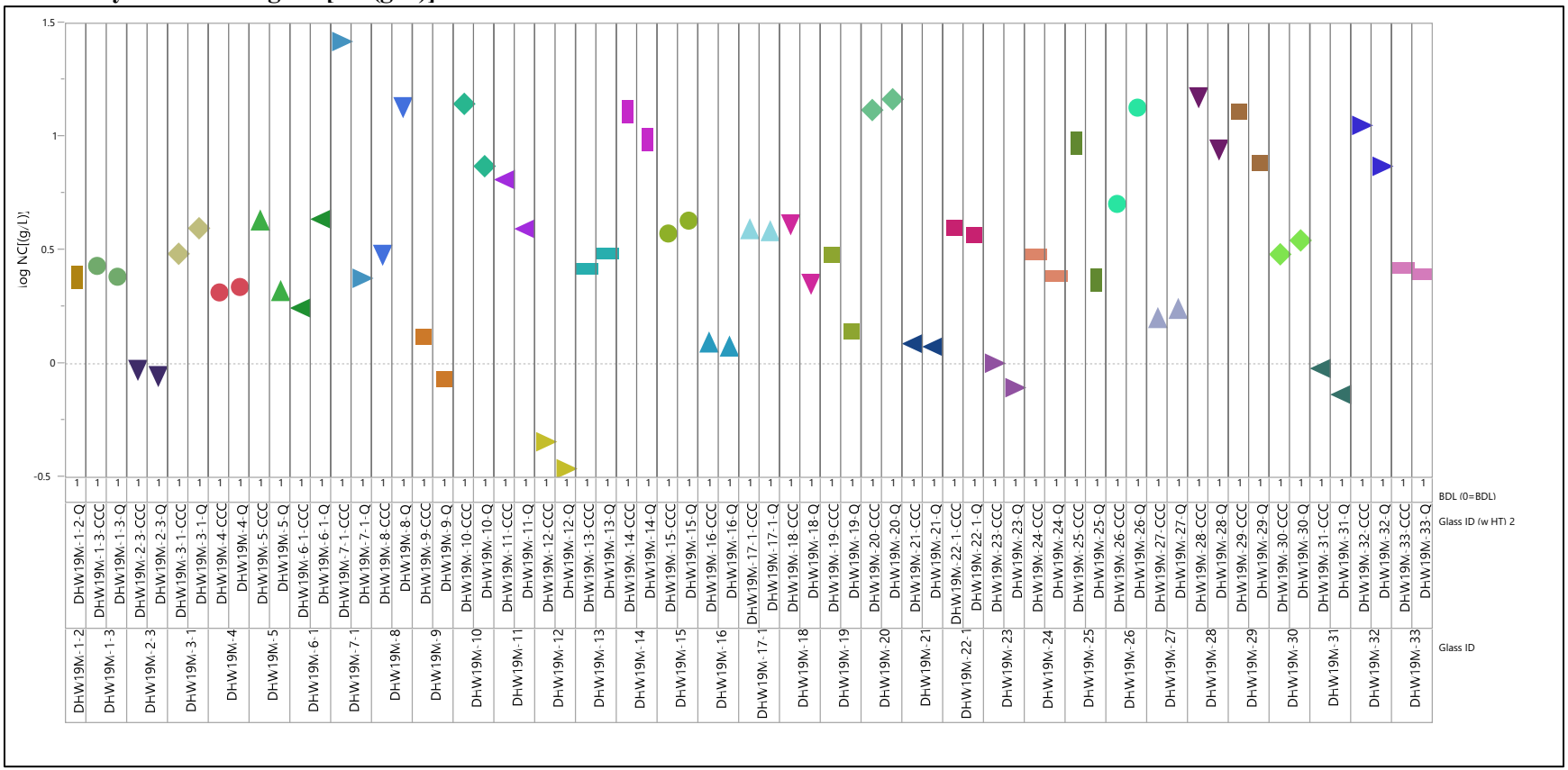


**Exhibit C-1. Normalized PCT Results by Compositional View by Heat Treatment for Each Glass (continued)**

**Analyte=Cr, Comp View=Target**
**Variability Chart for log NC[Cr (g/L)]**

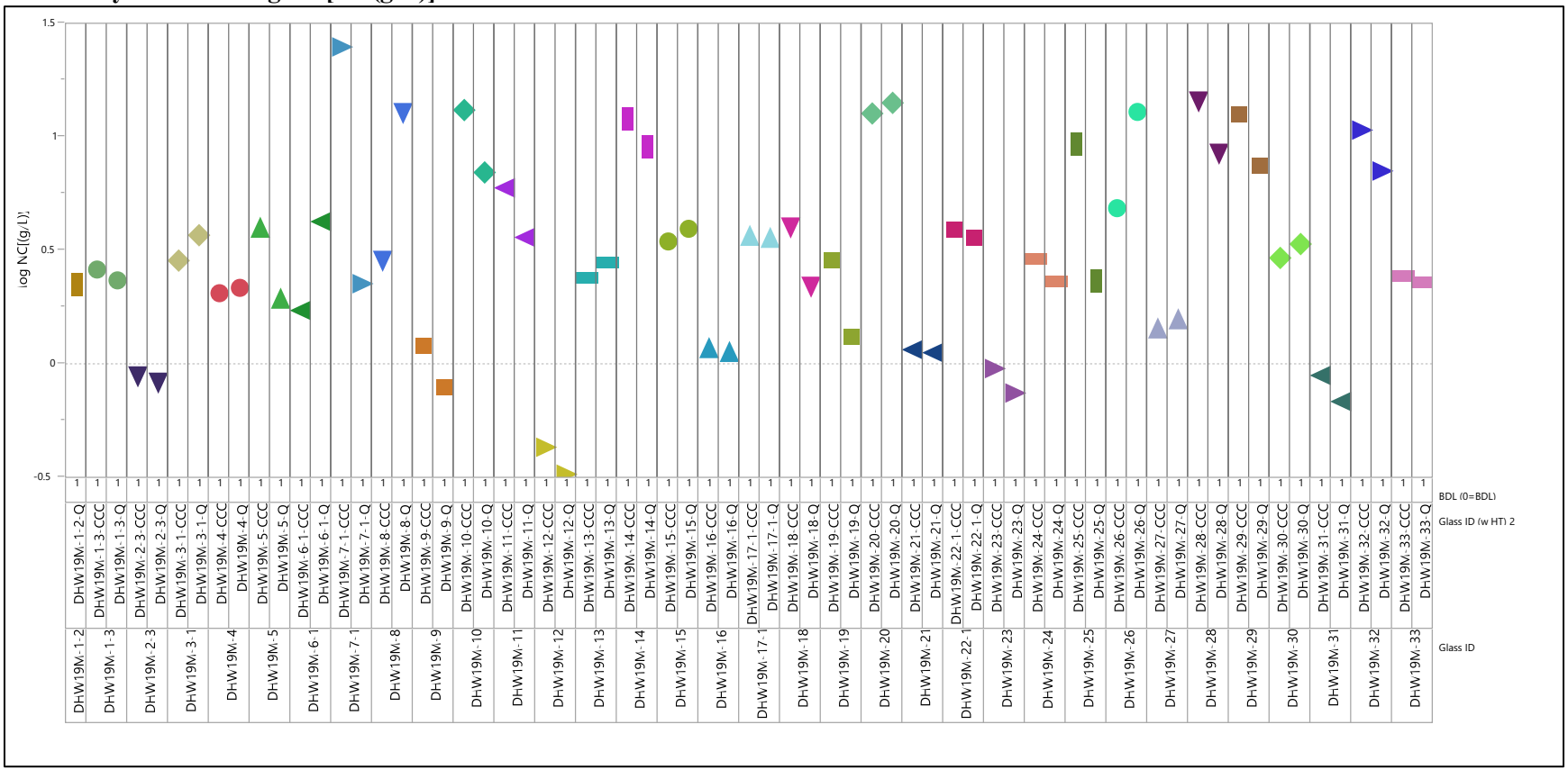


**Exhibit C-1. Normalized PCT Results by Compositional View by Heat Treatment for Each Glass (continued)**

**Analyte=Li, Comp View=Measured**
**Variability Chart for log NC[Li (g/L)]**

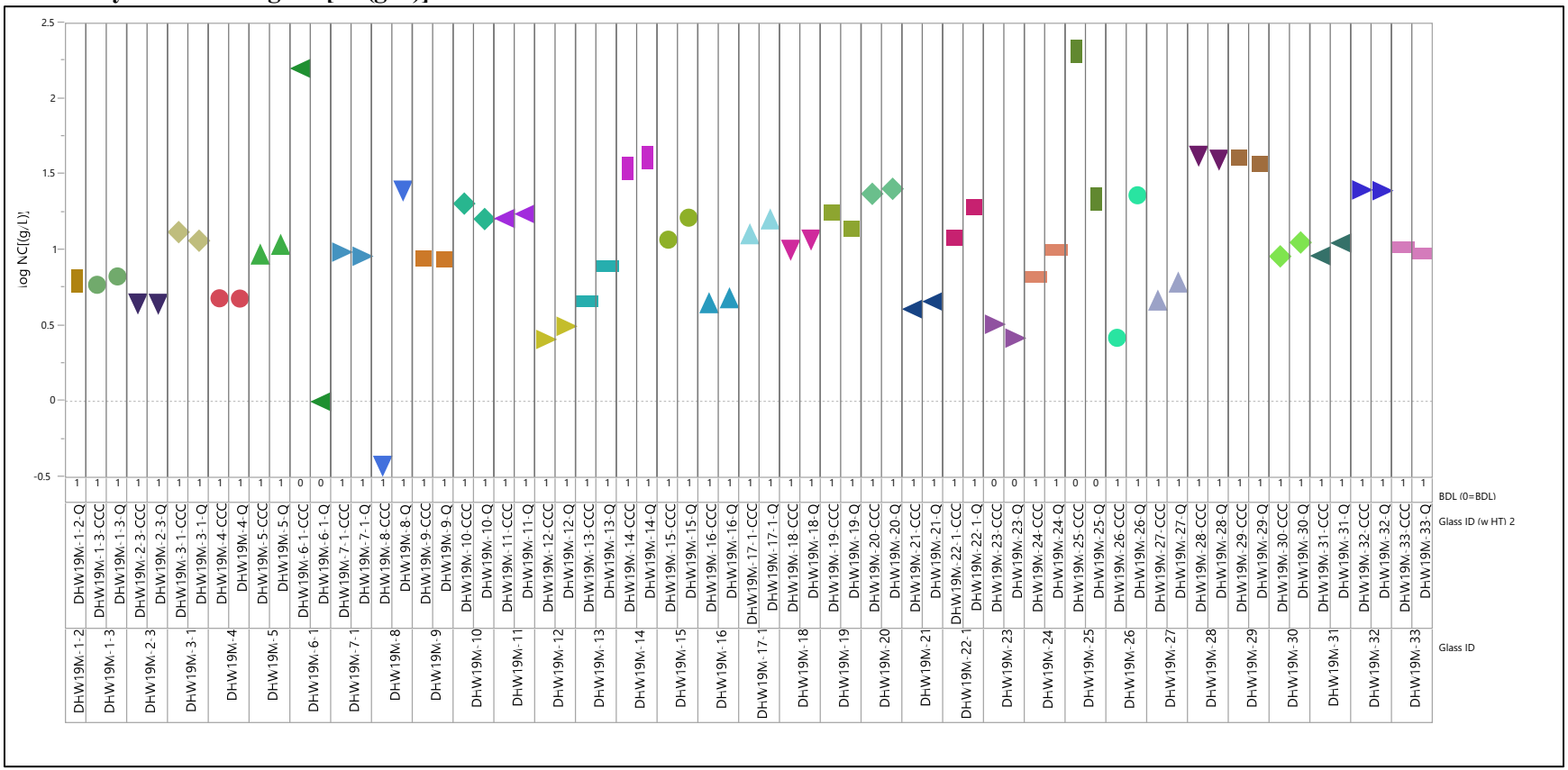


**Exhibit C-1. Normalized PCT Results by Compositional View by Heat Treatment for Each Glass (continued)**

**Analyte=Li, Comp View=Target**
**Variability Chart for log NC[Li (g/L)]**

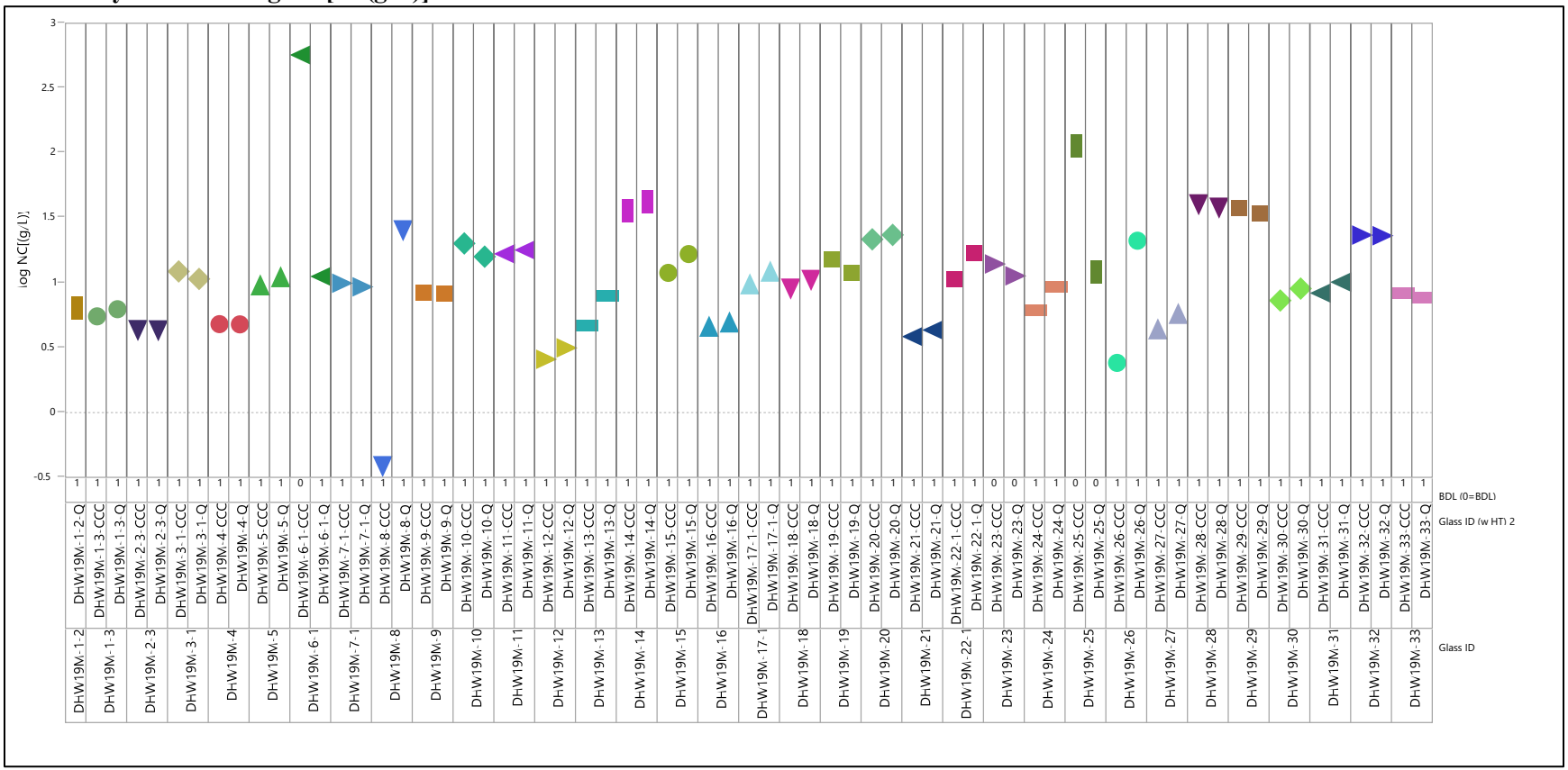


**Exhibit C-1. Normalized PCT Results by Compositional View by Heat Treatment for Each Glass (continued)**

**Analyte=Na, Comp View=Measured**
**Variability Chart for log NC[Na (g/L)]**

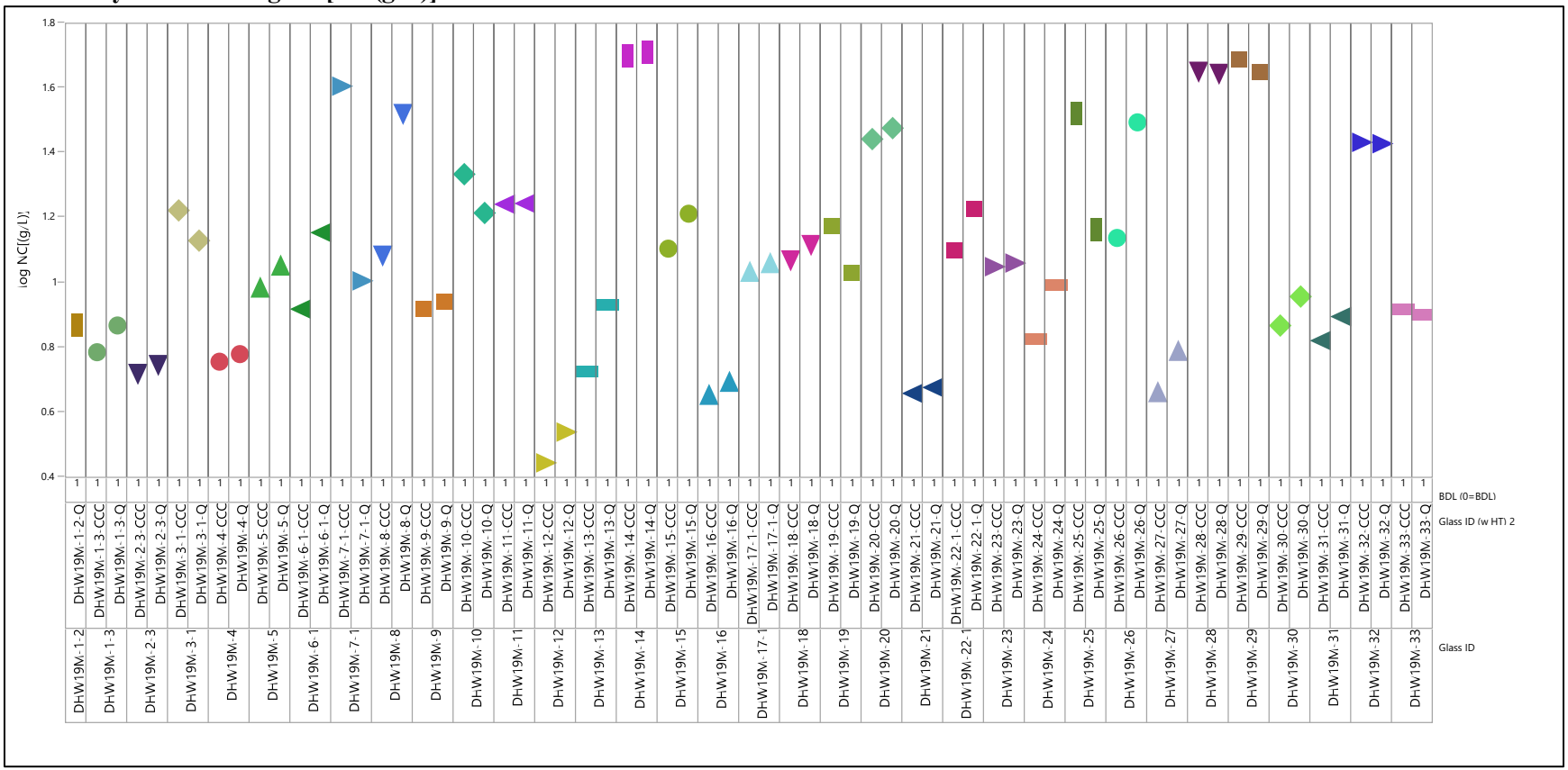


**Exhibit C-1. Normalized PCT Results by Compositional View by Heat Treatment for Each Glass (continued)**

**Analyte=Na, Comp View=Target**
**Variability Chart for log NC[Na (g/L)]**

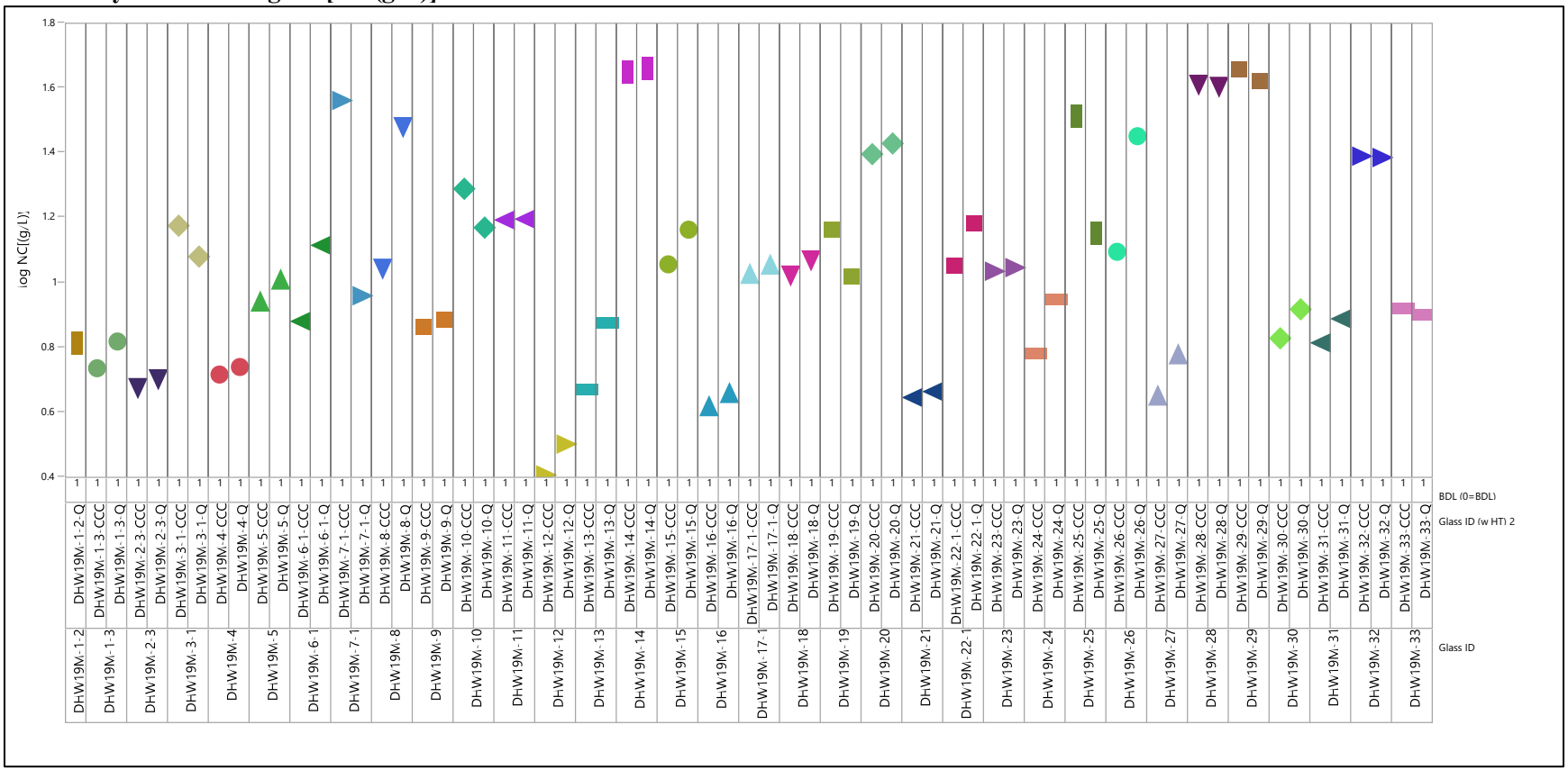


**Exhibit C-1. Normalized PCT Results by Compositional View by Heat Treatment for Each Glass (continued)**

**Analyte=Si, Comp View=Measured**
**Variability Chart for log NC[Si (g/L)]**

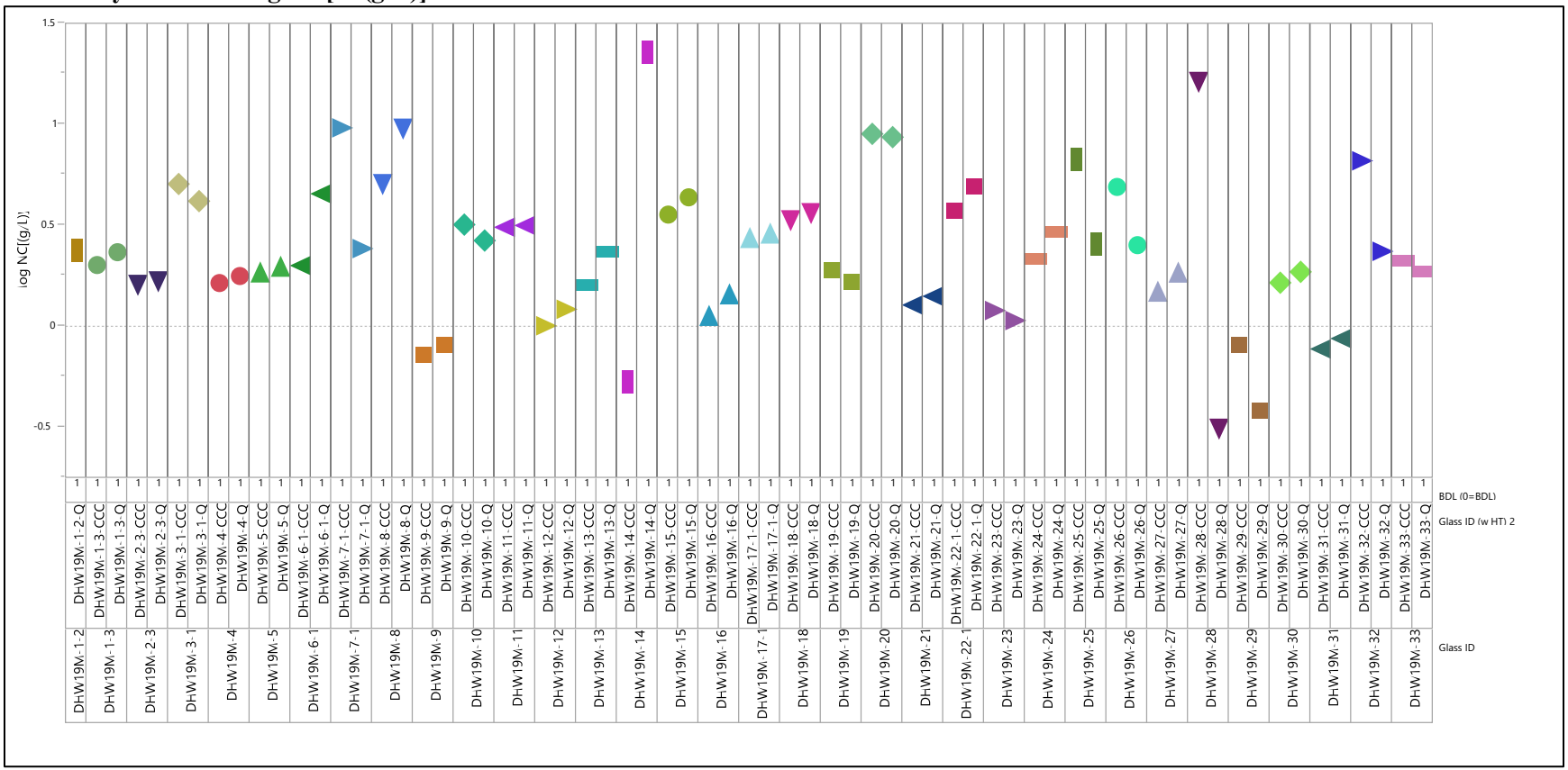


**Exhibit C-1. Normalized PCT Results by Compositional View by Heat Treatment for Each Glass (continued)**

**Analyte=Si, Comp View=Target**
**Variability Chart for log NC[Si (g/L)]**

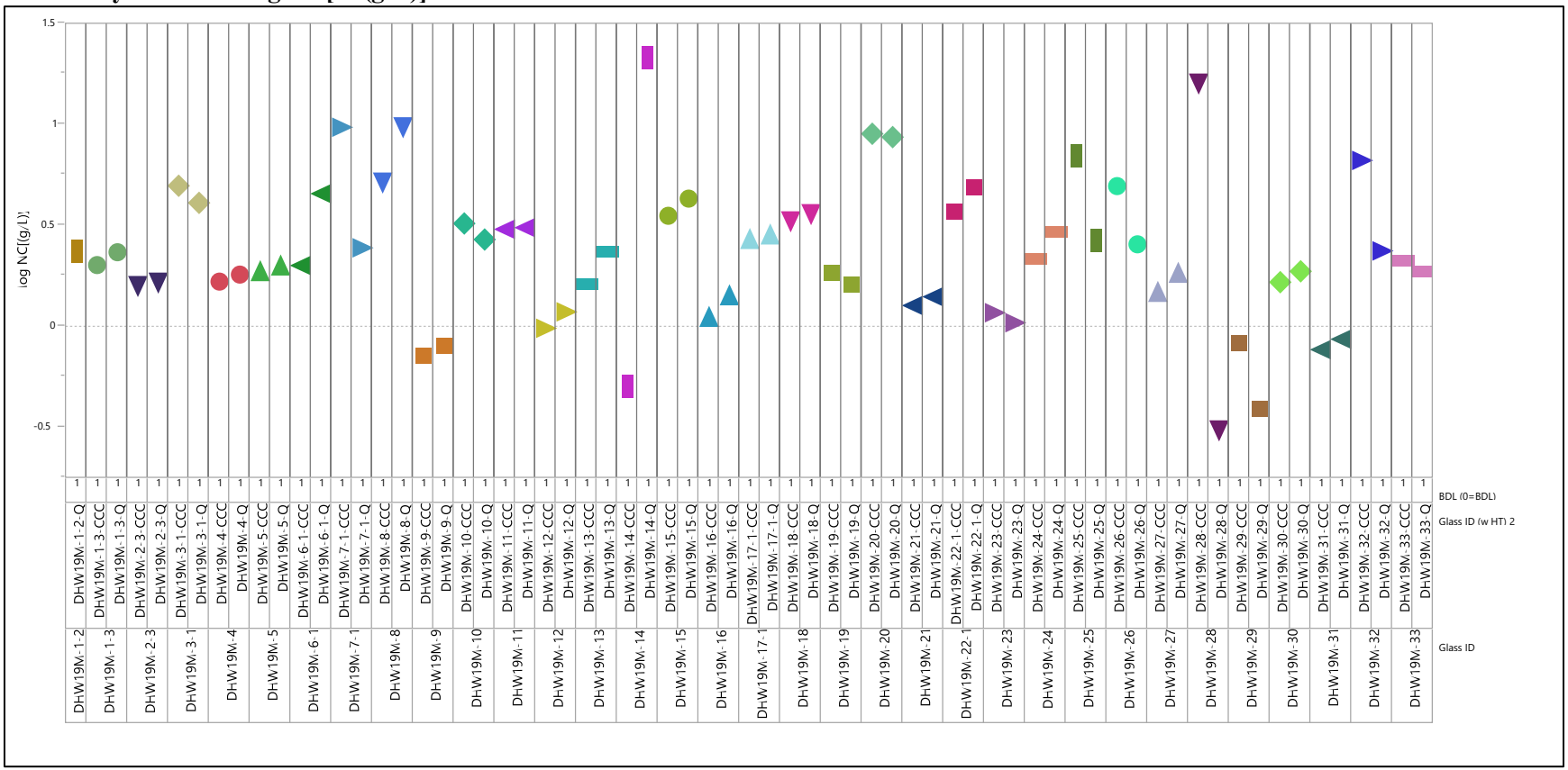


**Exhibit C-1. Normalized PCT Results by Compositional View by Heat Treatment for Each Glass (continued)**

**Analyte=B, Comp View=Reference**
**Variability Chart for log NC[B (g/L)]**

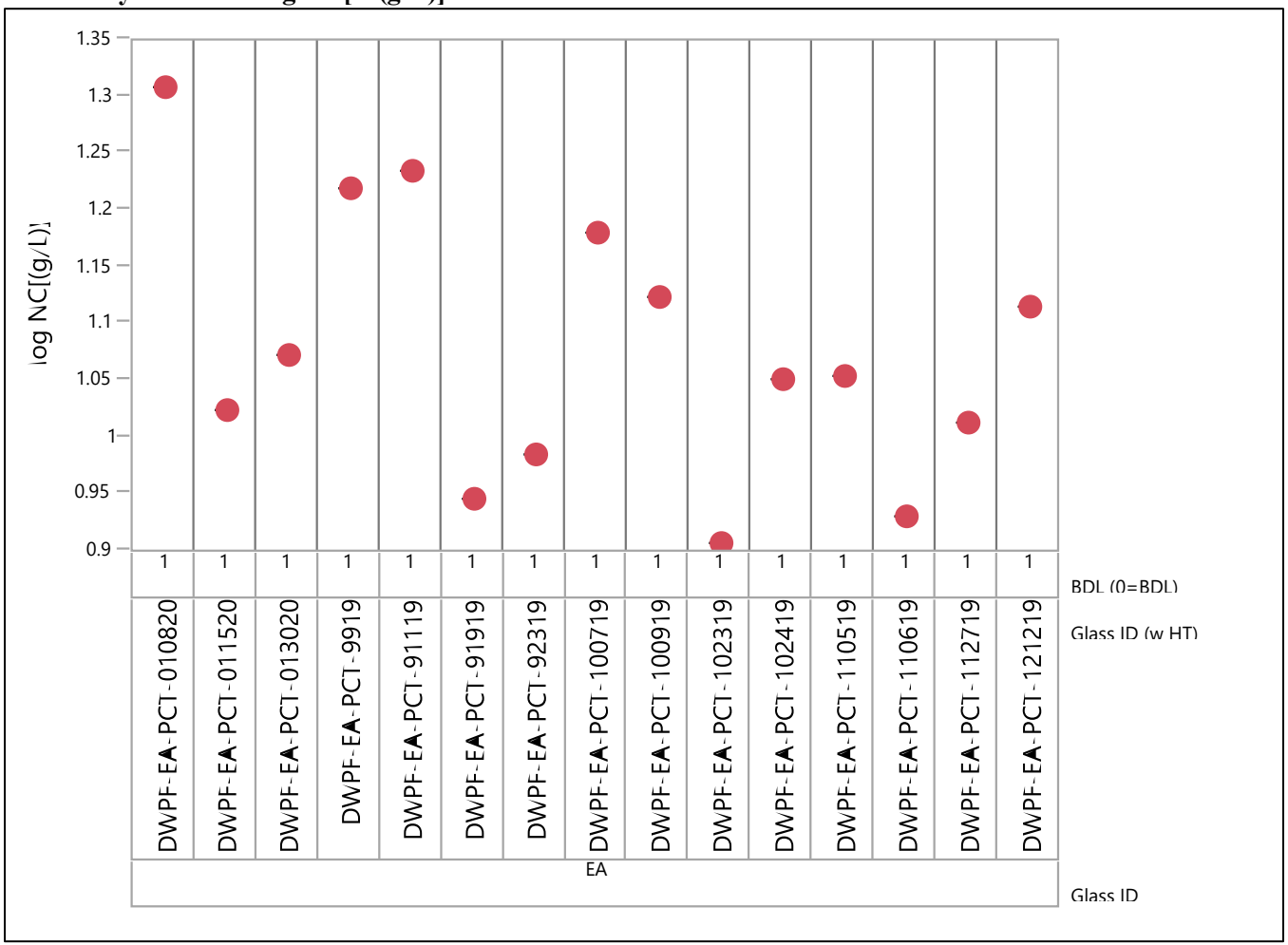


**Exhibit C-1. Normalized PCT Results by Compositional View by Heat Treatment for Each Glass (continued)**

**Analyte=Cr, Comp View=Reference**
**Variability Chart for log NC[Cr (g/L)]**

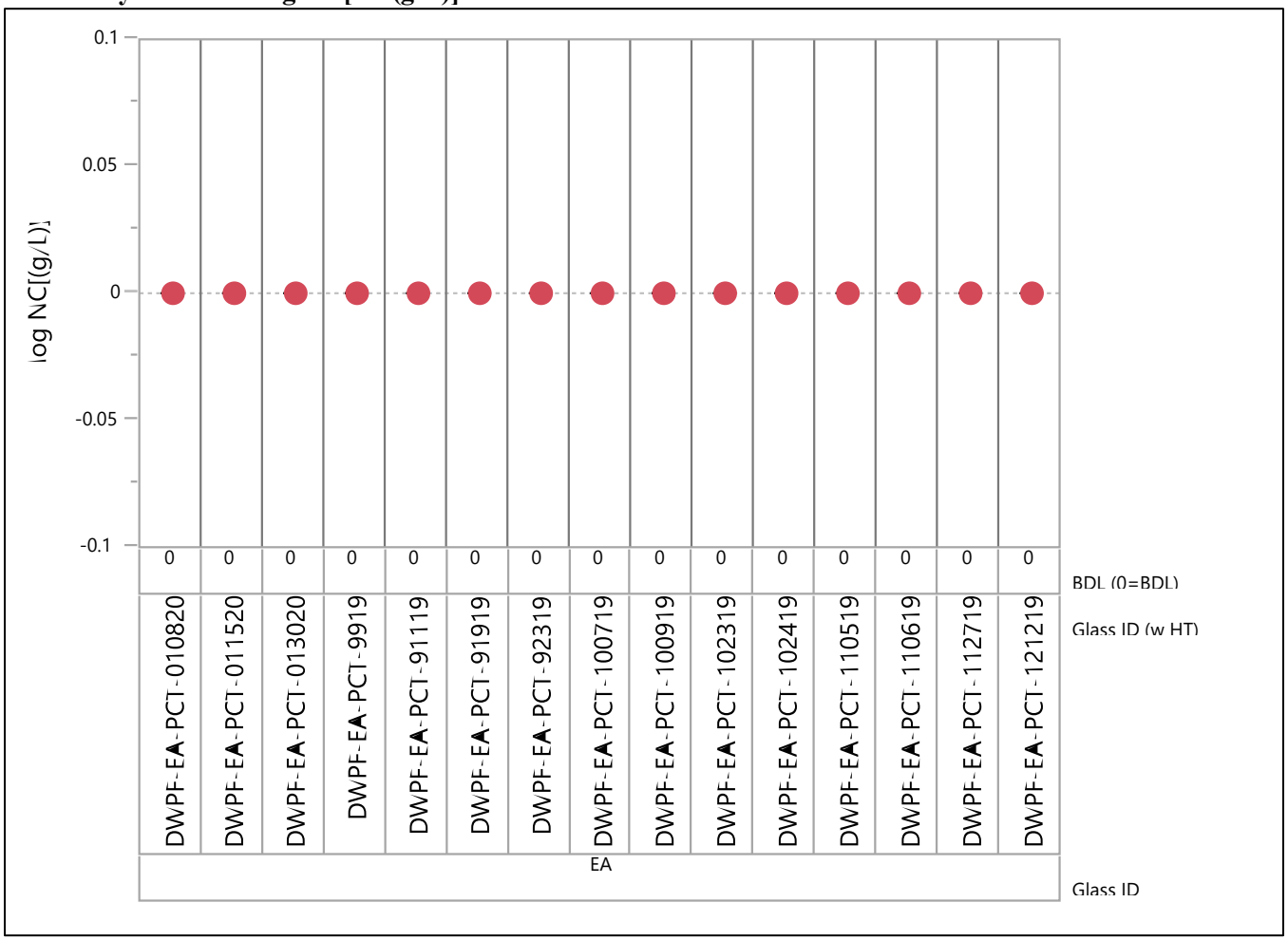


**Exhibit C-1. Normalized PCT Results by Compositional View by Heat Treatment for Each Glass (continued)**

**Analyte=Li, Comp View=Reference**
**Variability Chart for log NC[Li (g/L)]**

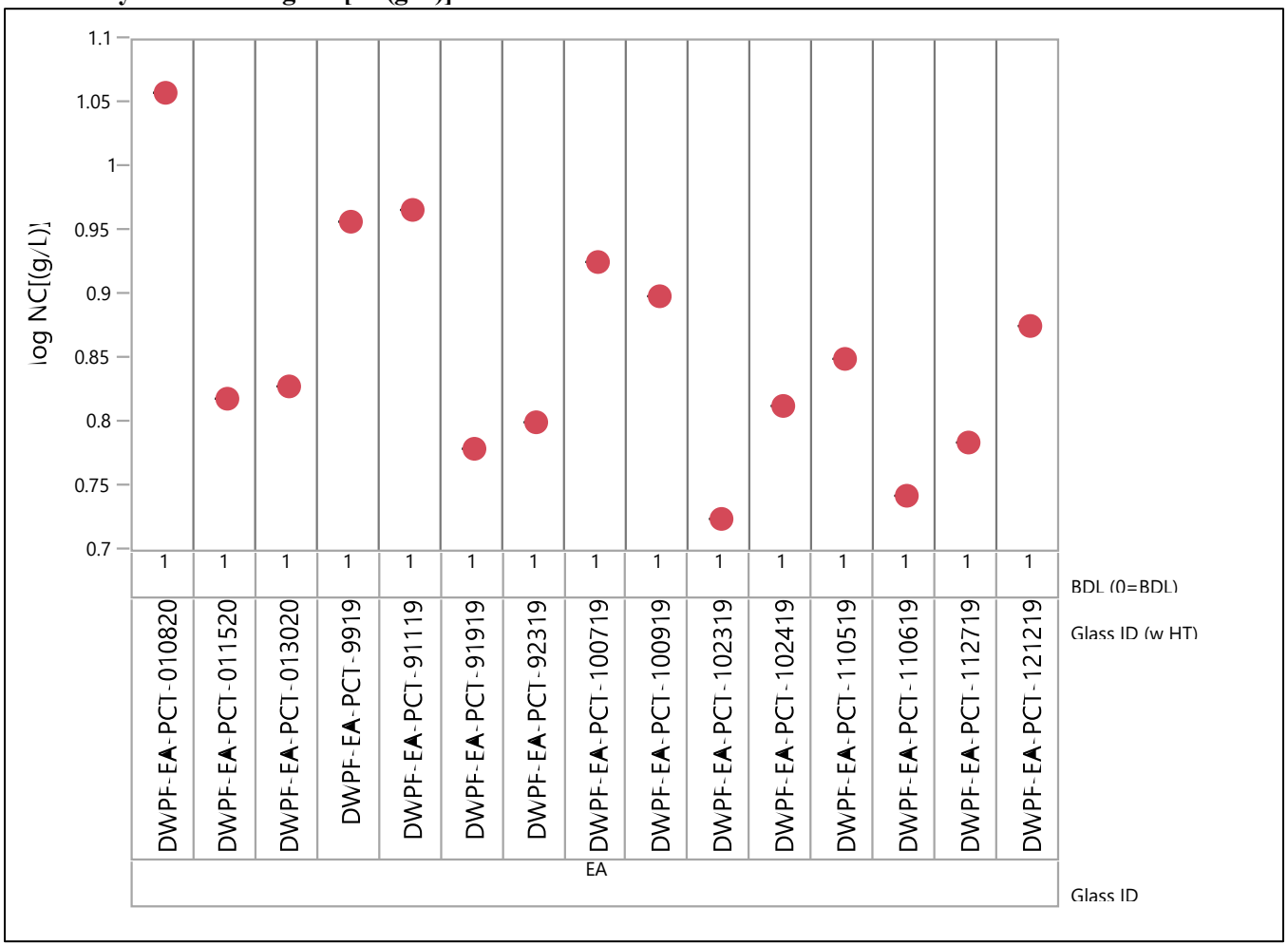


**Exhibit C-1. Normalized PCT Results by Compositional View by Heat Treatment for Each Glass (continued)**

**Analyte=Na, Comp View=Reference**
**Variability Chart for log NC[Na (g/L)]**

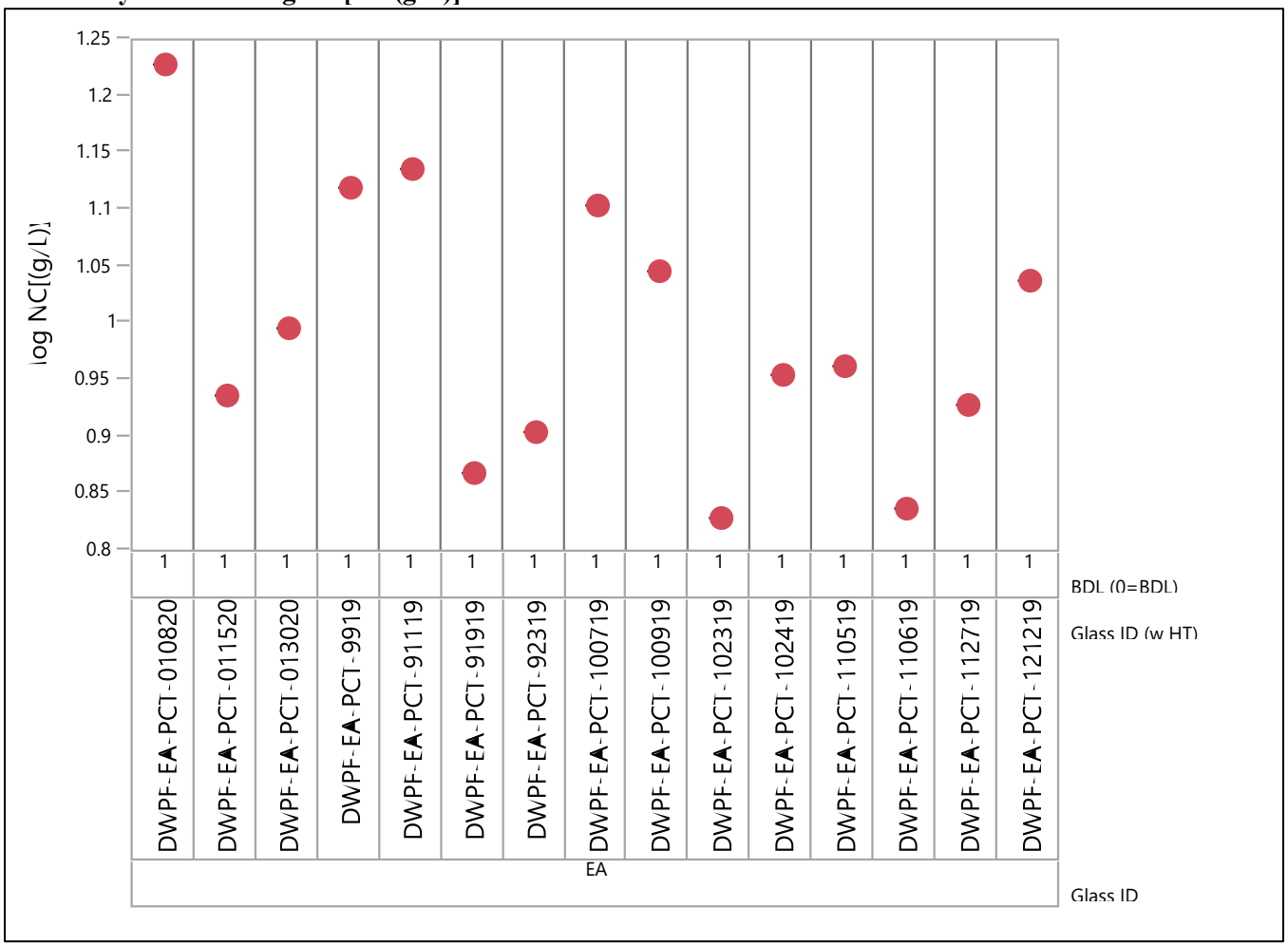


**Exhibit C-1. Normalized PCT Results by Compositional View by Heat Treatment for Each Glass (continued)**

**Analyte=Si, Comp View=Reference**
**Variability Chart for log NC[Si (g/L)]**

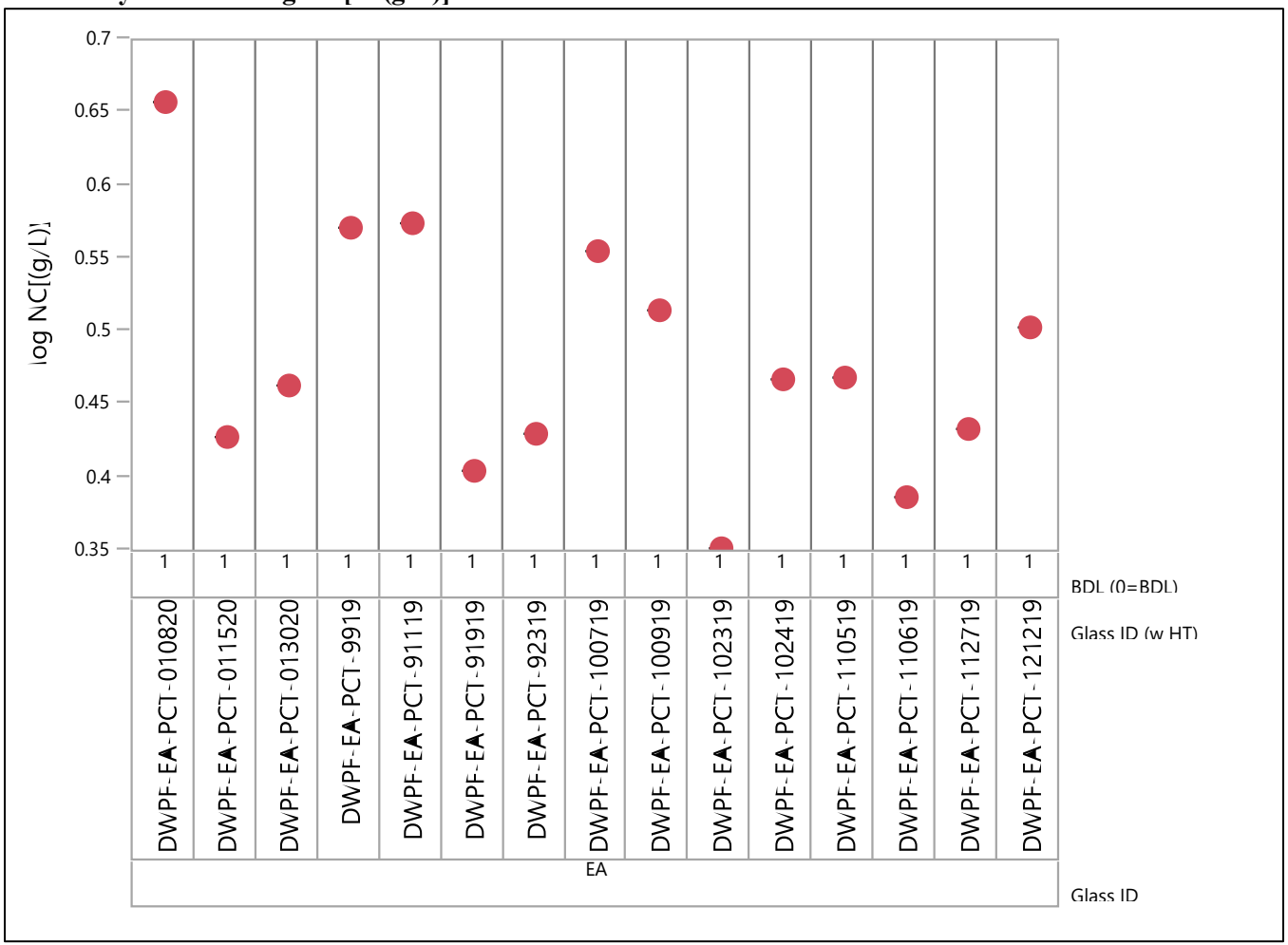


**Exhibit C-2. Congruent Leaching Analysis for the Normalized PCT Results**

**Multivariate Correlations**

Reference-EA

| | log NC[B (g/L)] | log NC[Cr (g/L)] | log NC[Li(g/L)] | log NC[Na (g/L)] | log NC[Si (g/L)] |
|---|---|---|---|---|---|
| log NC[B (g/L)] | 1.0000 | 0.0000 | 0.9855 | 0.9975 | 0.9909 |
| log NC[Cr (g/L)] | 0.0000 | 1.0000 | 0.0000 | 0.0000 | 0.0000 |
| log NC[Li(g/L)] | 0.9855 | 0.0000 | 1.0000 | 0.9868 | 0.9919 |
| log NC[Na (g/L)] | 0.9975 | 0.0000 | 0.9868 | 1.0000 | 0.9916 |
| log NC[Si (g/L)] | 0.9909 | 0.0000 | 0.9919 | 0.9916 | 1.0000 |

The correlations are estimated by Row-wise method.

**Scatterplot Matrix**

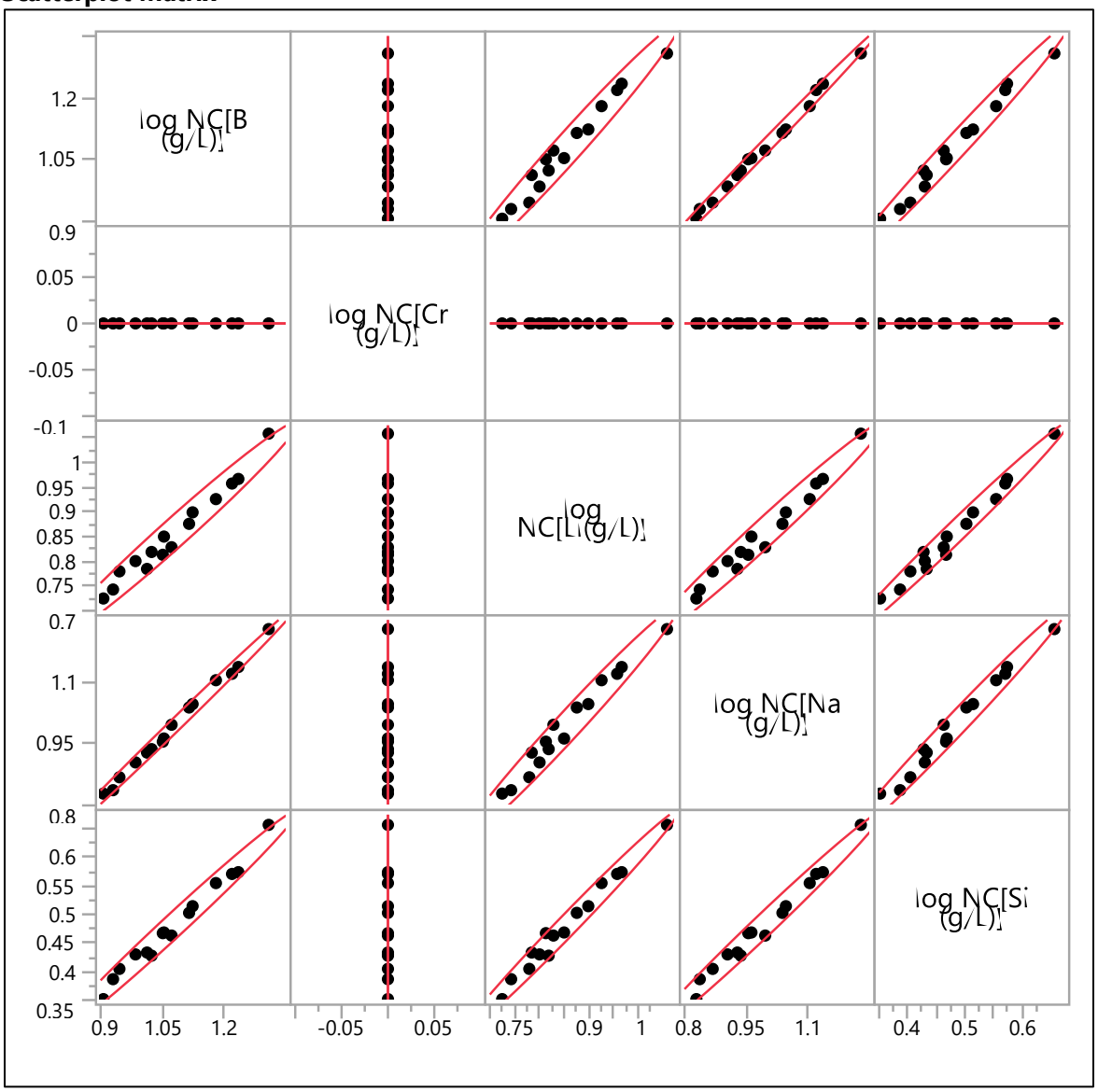


**Exhibit C-2. Congruent Leaching Analysis for the Normalized PCT Results (continued)**

**Multivariate Correlations**

Measured-CCC

| | log NC[B (g/L)] | log NC[Cr (g/L)] | log NC[Li (g/L)] | log NC[Na (g/L)] | log NC[Si (g/L)] |
|---|---|---|---|---|---|
| log NC[B (g/L)] | 1.0000 | 0.8280 | 0.6623 | 0.9641 | 0.4239 |
| log NC[Cr (g/L)] | 0.8280 | 1.0000 | 0.5049 | 0.8977 | 0.5981 |
| log NC[Li(g/L)] | 0.6623 | 0.5049 | 1.0000 | 0.5739 | 0.1951 |
| log NC[Na (g/L)] | 0.9641 | 0.8977 | 0.5739 | 1.0000 | 0.4908 |
| log NC[Si (g/L)] | 0.4239 | 0.5981 | 0.1951 | 0.4908 | 1.0000 |

The correlations are estimated by Row-wise method.

**Scatterplot Matrix**

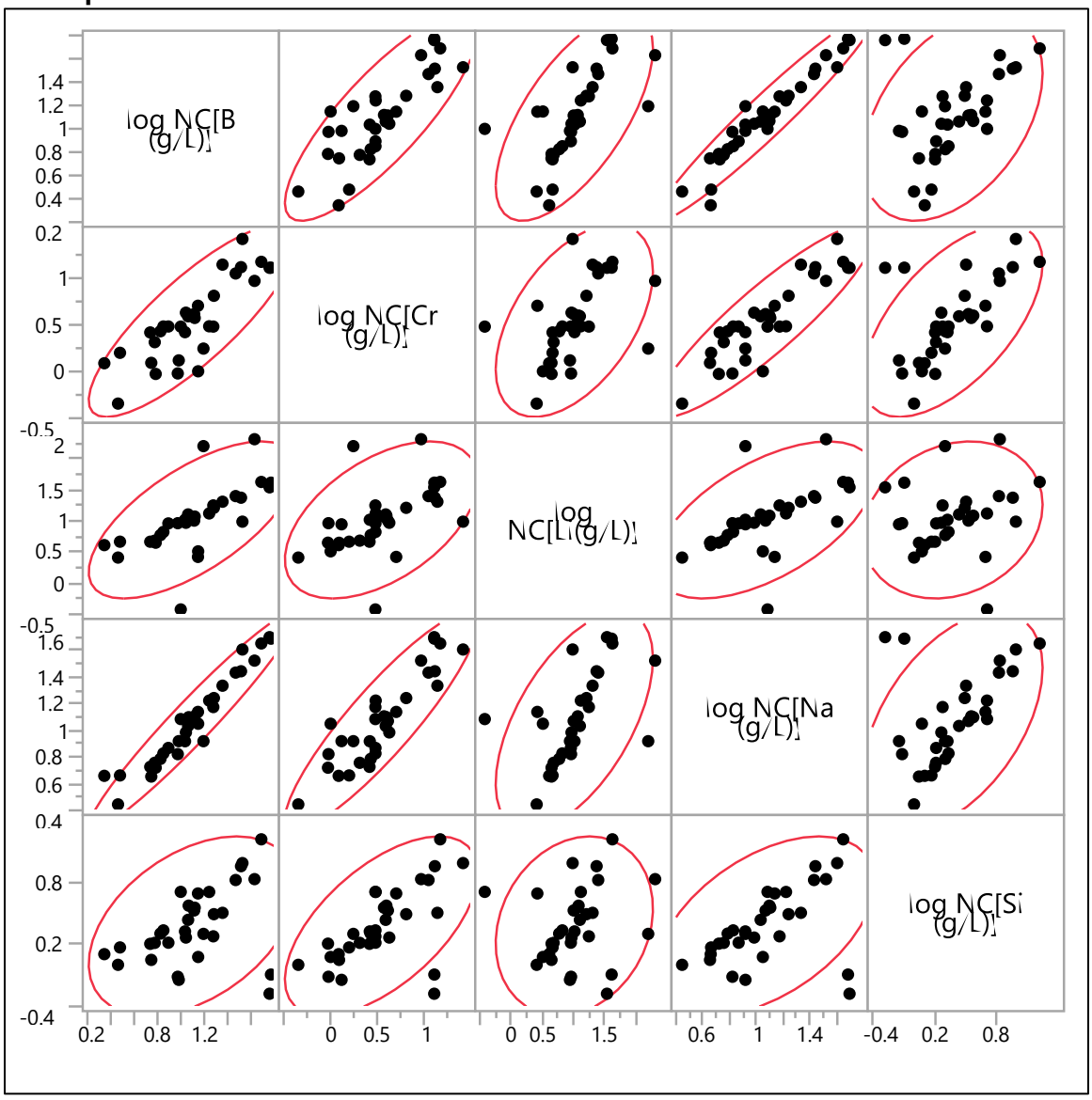


**Exhibit C-2. Congruent Leaching Analysis for the Normalized PCT Results (continued)**

**Multivariate Correlations**

Measured-Q

| | log NC[B (g/L)] | log NC[Cr (g/L)] | log NC[Li (g/L)] | log NC[Na (g/L)] | log NC[Si (g/L)] |
|---|---|---|---|---|---|
| log NC[B (g/L)] | 1.0000 | 0.7909 | 0.7386 | 0.9709 | 0.2589 |
| log NC[Cr (g/L)] | 0.7909 | 1.0000 | 0.6674 | 0.8527 | 0.4435 |
| log NC[Li(g/L)] | 0.7386 | 0.6674 | 1.0000 | 0.7591 | 0.1574 |
| log NC[Na (g/L)] | 0.9709 | 0.8527 | 0.7591 | 1.0000 | 0.2765 |
| log NC[Si (g/L)] | 0.2589 | 0.4435 | 0.1574 | 0.2765 | 1.0000 |

The correlations are estimated by Row-wise method.

**Scatterplot Matrix**

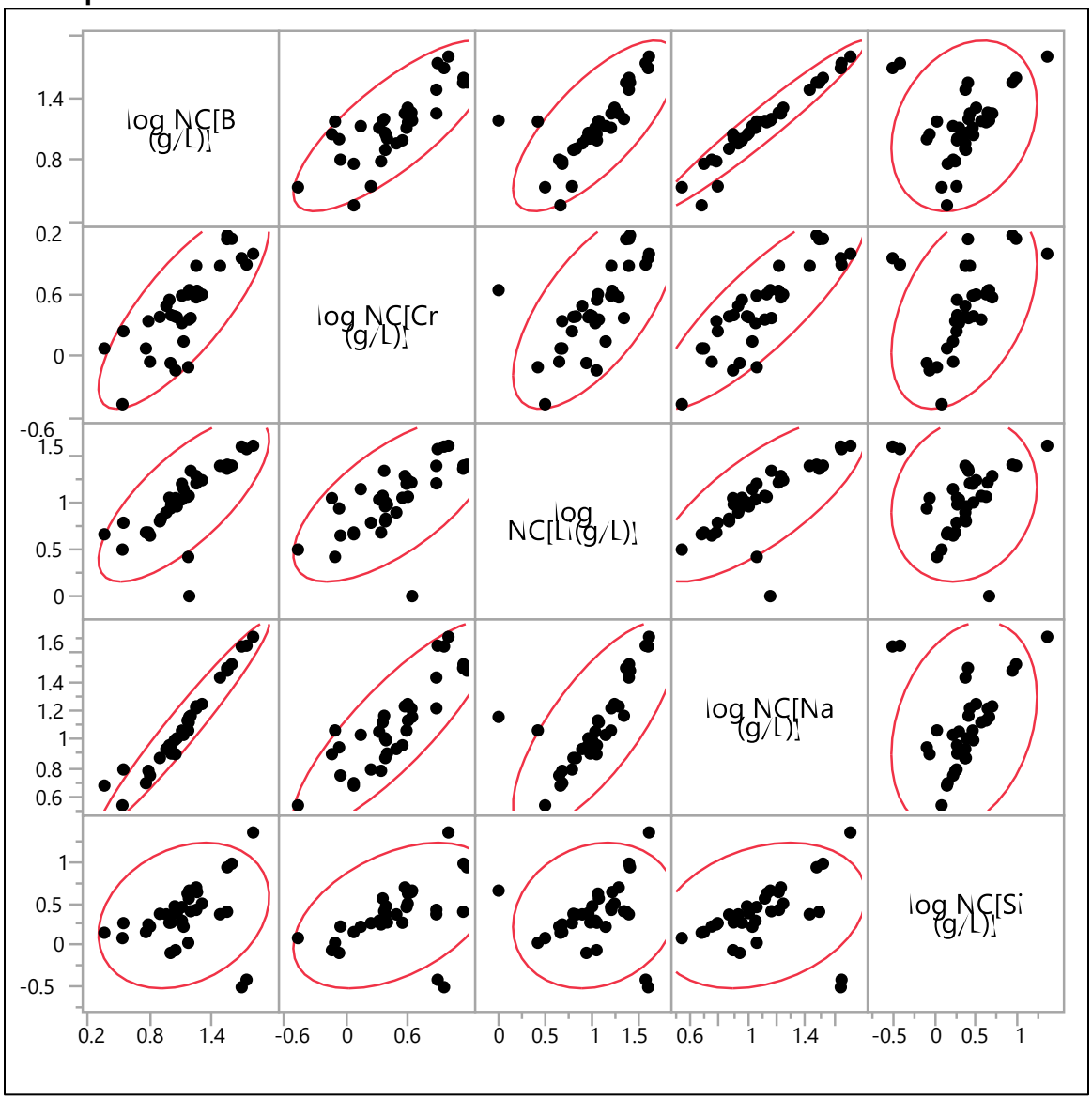


**Exhibit C-2. Congruent Leaching Analysis for the Normalized PCT Results (continued)**

**Multivariate Correlations**

Target-CCC

| | log NC[B (g/L)] | log NC[Cr (g/L)] | log NC[Li (g/L)] | log NC[Na (g/L)] | log NC[Si (g/L)] |
|---|---|---|---|---|---|
| log NC[B (g/L)] | 1.0000 | 0.8279 | 0.6247 | 0.9581 | 0.4193 |
| log NC[Cr (g/L)] | 0.8279 | 1.0000 | 0.4060 | 0.8907 | 0.6029 |
| log NC[Li(g/L)] | 0.6247 | 0.4060 | 1.0000 | 0.5231 | 0.1272 |
| log NC[Na (g/L)] | 0.9581 | 0.8907 | 0.5231 | 1.0000 | 0.4824 |
| log NC[Si (g/L)] | 0.4193 | 0.6029 | 0.1272 | 0.4824 | 1.0000 |

The correlations are estimated by Row-wise method.

**Scatterplot Matrix**

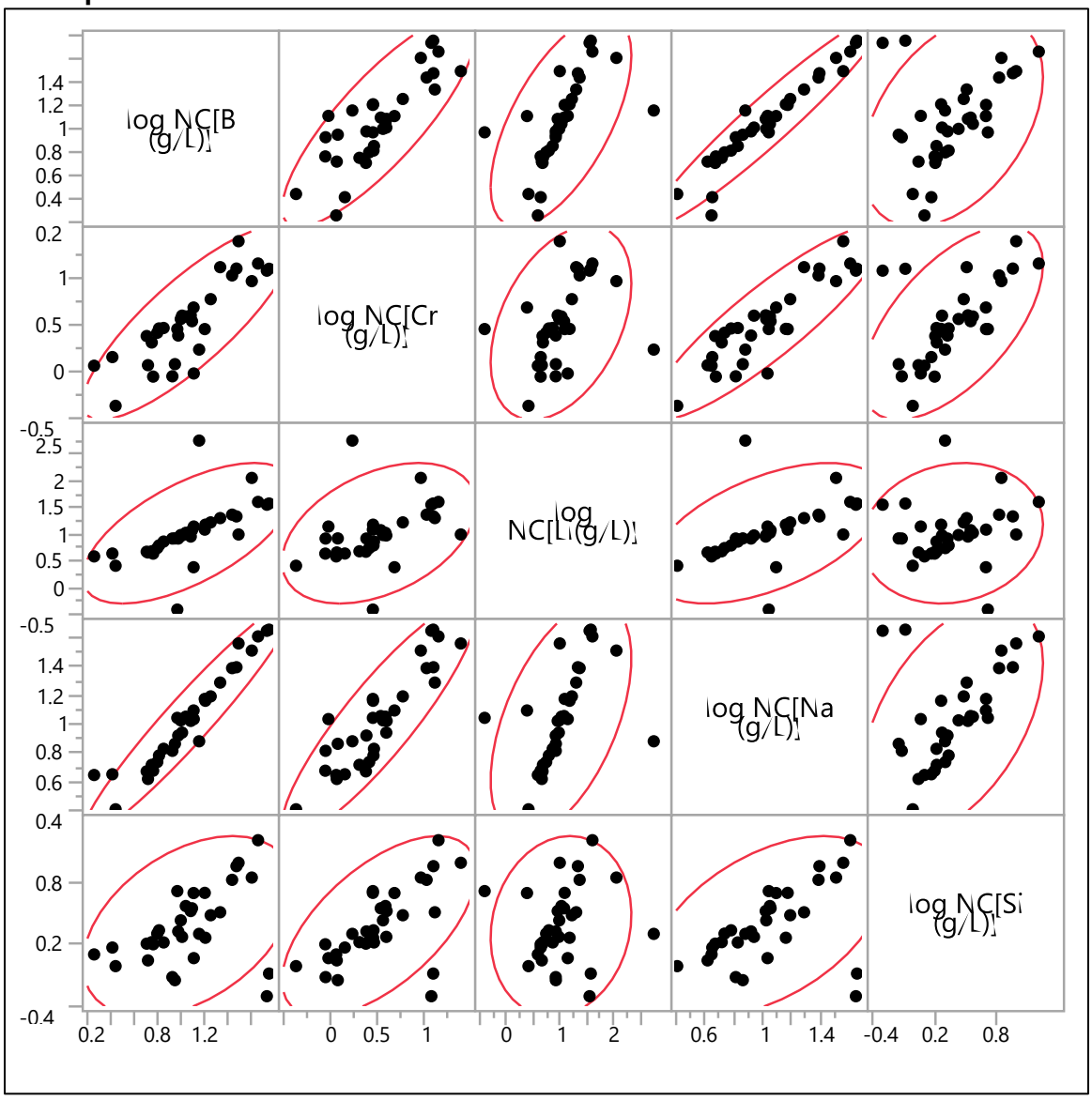


**Exhibit C-2. Congruent Leaching Analysis for the Normalized PCT Results (continued)**

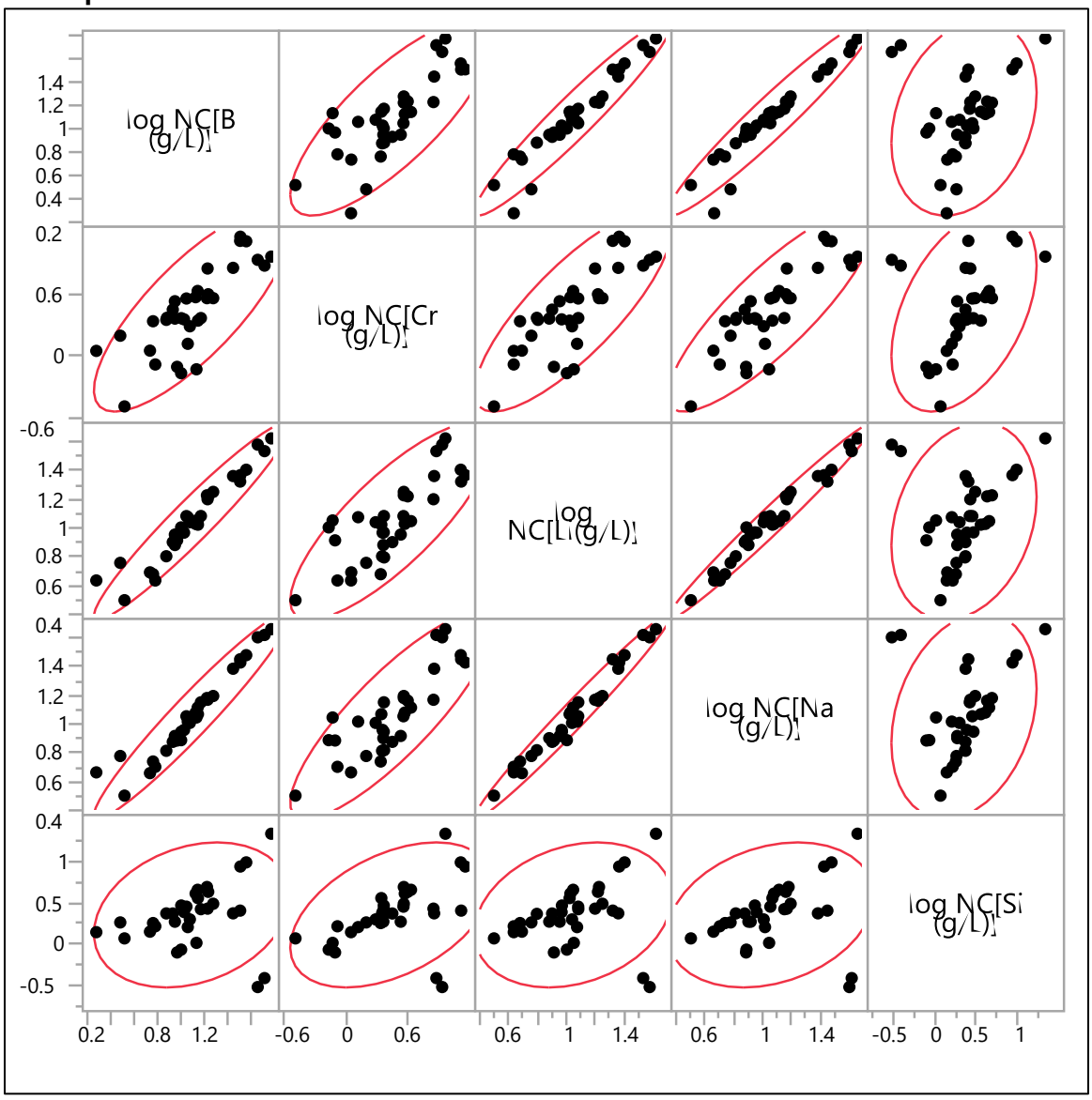
**Multivariate Correlations**

Target-Q

| | log NC[B (g/L)] | log NC[Cr (g/L)] | log NC[Li (g/L)] | log NC[Na (g/L)] | log NC[Si (g/L)] |
|---|---|---|---|---|---|
| log NC[B (g/L)] | 1.0000 | 0.7871 | 0.9588 | 0.9620 | 0.2588 |
| log NC[Cr (g/L)] | 0.7871 | 1.0000 | 0.8060 | 0.8460 | 0.4475 |
| log NC[Li(g/L)] | 0.9588 | 0.8060 | 1.0000 | 0.9845 | 0.2459 |
| log NC[Na (g/L)] | 0.9620 | 0.8460 | 0.9845 | 1.0000 | 0.2635 |
| log NC[Si (g/L)] | 0.2588 | 0.4475 | 0.2459 | 0.2635 | 1.0000 |

The correlations are estimated by Row-wise method.

**Scatterplot Matrix**



**Distribution:**

J. W. Amoroso, 999-W
A. D. Cozzi, 999-W
C. L. Crawford, 773-42A
W. C. Eaton, PNNL
T. B. Edwards, 999-W
A. P. Fellinger, 773-42A
S. D. Fink, 773-A
K. M. Fox, 999-W
B. L. Garcia-Diaz, 999-2W
H. K. Hall, 999-1W
C. C. Herman, 773-A
A. M. Howe, 999-W
M. C. Hsieh, 999-W
T. Jin, PNNL
F. C. Johnson, 999-W
D. S. Kim, PNNL
A. A. Kruger, DOE-ORP
B. Lee, 999-W
C. E. Lonergan, PNNL
J. Manna, 999-W
D. J. McCabe, 773-42A
D. L. McClane, 773-41A
G. A. Morgan, 999-W
F. M. Pennebaker, 773-42A
W. T. Riley, 999-1W
R. L. Russell, PNNL
T. E. Skidmore, 730-A
C. L. Trivelpiece, 999-W
J. D. Vienna, PNNL
B. J. Wiedenman, 773-42A
Records Administration (EDWS)