Test Group Summary Report
C17 Metals in Soil
January 2025 PT Round

Issued: February 28, 2025

PTC | Proficiency Testing Canada

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1.0 The Proficiency Testing Report

The Proficiency Testing Report consists of two parts.

- *PTC Proficiency Testing Report*: This report contains participant-specific data and other confidential information. This report is emailed to participants at the end of the PT round.
- *Test Group Summary Report*: A Test Group Summary Report is created for each quantified test group at the end of the PT round. These reports contain more detailed information on the round than is found in the participant-specific PTC Proficiency Testing Report. These reports do not contain any confidential information and are made available on the PTC web site.

2.0 Definitions

The participant-specific PTC Proficiency Testing Report contains some terms that new participants may not be familiar with.

Code:	The registration code that is unique to each analyte that a participant is registered for.
App:	If a participant is accredited by CALA, this three-digit number is the appendix number that the accredited method is assigned to.
N:	The number of participants results that were used to calculate the summary statistics. This excludes qualified data (e.g., <) and any results that were flagged as outliers.
Assigned:	The Assigned Value is the robust mean of the reported results, outliers excluded. This is often referred to as the "target" value.
± u:	The uncertainty of the assigned value.
Reported:	The result reported by the participant.
s:	The Standard Deviation of Proficiency Assessment (SDPA). This value is used to determine the acceptance limits for the PT evaluation.
z-Score:	A value assigned to each reported result that is a measure of the degree to which it deviates from the Assigned Value.
Score:	The composite score of the four results reported for each analyte. It is normalized to a score out of 100.
Bias:	A flag assigned if bias is detected using the re-scaled *z*-score procedure.

3.0 Scoring System

Participant performance is evaluated for each proficiency testing sample by a quantitative method that is consistent with ISO/IEC 17043 - *Conformity assessment- General requirements for the competence of proficiency testing providers*, the *International Harmonized Protocol for Proficiency Testing of (Chemical) Analytical Laboratories* (2006), and ISO 13528:2015 *Statistical methods for use in proficiency testing by interlaboratory comparisons*.

The following is a brief description of the evaluation procedure used by PTC. The detailed evaluation procedure is described in PROC09 – PT Evaluation *Procedure*, which is available on the PTC website www.PTCanada.org).

3.1 HOMOGENEITY AND STABILITY ASSESSMENT

Homogeneity and stability are assessed using participant data. Regression analysis is performed on reported result against order of sample production (Homogeneity) and reported result against date of analysis (Stability). If the slope is significantly different than zero for either then the Standard Deviation of Proficiency Assessment (s) is increased to minimize the impact.

3.2 THE Z SCORE

A "z-score" is calculated for each reported result as follows:

$$z - Score = \frac{(x - \bar{X})}{SDPA}$$

where: x = participant result;
$\overline{X}$ = the Assigned Value;
SDPA = the Standard Deviation for Proficiency Assessment.

The assigned value $\overline{X}$ is generally estimated from the inter-laboratory Robust mean after outliers due to obvious gross errors (e.g., reported in wrong units) have been removed.

The Standard Deviation for Proficiency Assessment, s, is determined as follows:

- The inter-laboratory Robust standard deviation ($Stdev_{rob}$) is calculated using reported results, obvious outliers removed;
- The regression equation standard deviation ($Stdev_{reg}$) is estimated from regression equations derived from previous studies (see PROC11- *PT Regression Equations* for details);
- The SDPA is the higher of $Stdev_{rob}$ and $Stdev_{reg}$;
- When a laboratory reports its detection limit, s will be estimated using a pooled variance procedure that uses both the inter-laboratory data and the reported detection limit.

3.2 COMPOSITE (PT) SCORE

Since each PT round involves four or two separate samples of distinct concentration for each test, it is necessary to calculate a composite PT score for each test to determine overall performance. The composite score is calculated by first averaging the absolute *z*-scores for the four results and then calculating a final score as 100 + (-15 x avg |z|).

Acceptable PT Scores equal or exceed 70.

3.3 IDENTIFYING BIAS

The proficiency testing report provides flags for bias. These are determined using the re-scaled *z*-score procedure.

$$RSZ = \frac{\sum z}{\sqrt{N}}$$

where *z* = the *z*- score
N = the number of samples

Flags are assigned for each test group/parameter combination as follows:

RSZ ≥ -2 and ≤ 2	no flag assigned
RSZ > 2	H (High)
RSZ > 3	VH (Very High)
RSZ < -2	L (LOW)
RSZ < -3	VL (Very Low)

3.4 DEVIATIONS FROM EVALUATION PROCEDURE

Other than changes to the Standard Deviation of Proficiency Assessment due to homogeneity or stability flags, any deviation from the published evaluation procedure is described on the cover page(s) of the final *PTC Proficiency Testing Report*.

4.0 PT Round Specific Data Summary

The following pages provide more detailed information about the PT round indicated in the cover page of this report than is found in the participant-specific PTC Proficiency Testing Report. The graphical representations and the statistical summaries are based upon the data after outliers have been removed.

4.1 SUMMARY STATISTICS

In addition to some of the statistics found in the customer reports, this table includes additional summary statistics such as Median, different measures of dispersion, the number of outliers removed, the number of results in the Questionable range (|z| between 2 and 3) and the Unacceptable range (z > 3), and whether a data set was flagged for Homogeneity or Stability. This section also includes sorted scatter plots of the data for each sample.

4.2 *z*- SCORE PLOTS

The z -scores for each sample are ranked in increasing order and plotted. When the data is normally distributed, the plot should show a slight sigmoidal curve, with an equal number of points above zero as below. Each bar in these plots is colour-coded to indicate the analytical method used by the participant.

4.3 KERNEL DENSITY PLOTS

Kernel density plots are generated for each data set. These plots are a graphical way to represent the overall data distribution and are used to visualize possible deviations from normality and unimodality.

4.4 STABILITY AND HOMOGENEITY PLOTS

Plots of reported result against analysis date, and reported result against order of bottling are displayed, along with the regression line. These regression analyses are used to determine if the SDPA should be adjusted due to homogeneity or stability.

4.5 BOX-AND-WHISKER PLOTS

Box-and-Whisker plots are another way to display the distribution of the data. The box denotes the first and third quartile and the whiskers are the 5th and 95th percentile.

4.6 HISTORIC COMPARISON PLOT

The Historic Comparison Plot is a plot of robust mean against robust standard deviation for the previous ten PT rounds as well as the current PT round. This plot can be used to identify possible changes in the sample formulation.

ALUMINUM

Summary Statistics

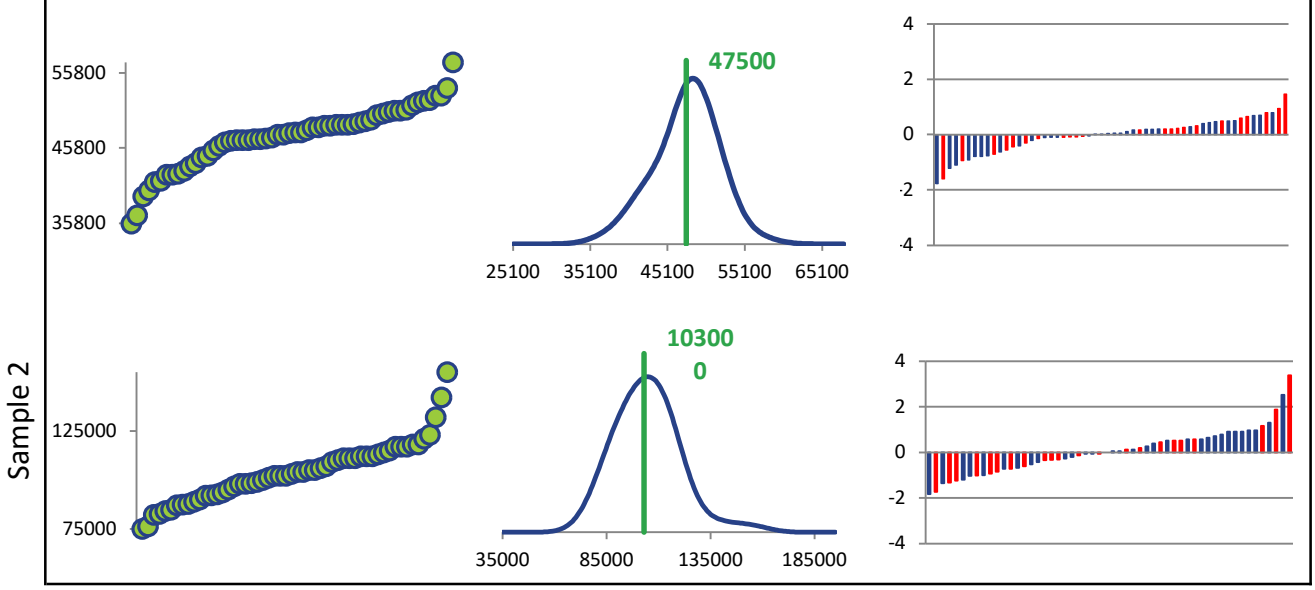
Statistic	C17-1	C17-2	C17-3	C17-4
N	56	54	54	54
Median µg/g	47900	104000	23000	5490
Robust Mean µg/g	47500	103000	23000	5510
U µg/g	651	2400	497	125
Robust Standard Deviation µg/g	3900	14100	2920	735
Regression Standard Deviation µg/g	6620	13900	3410	1120
Stability Flag		Stability		
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	6620	15400	3410	1120
Outliers	0	1	2	2
|z|>3.0	0	1	1	1
2<|z|<3	0	1	1	1

Methods Used

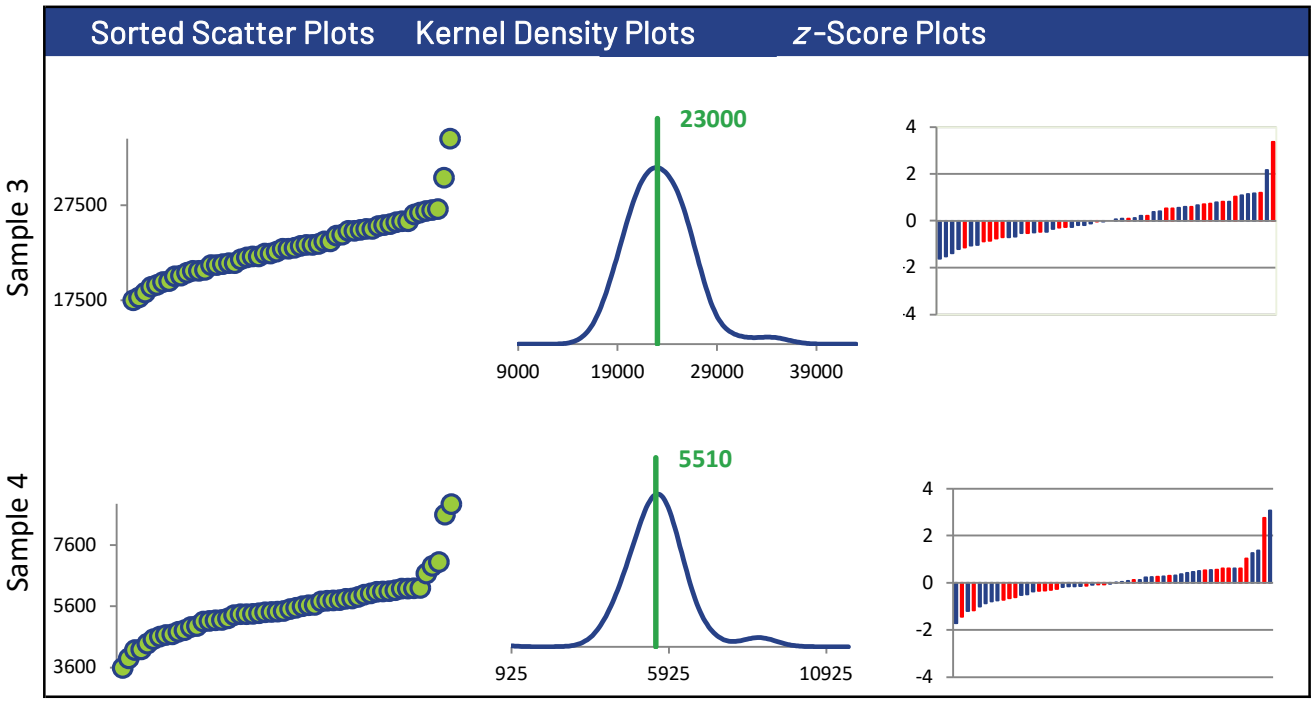
Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	33	32	32	32
ICP/OES (Red)	23	22	22	22

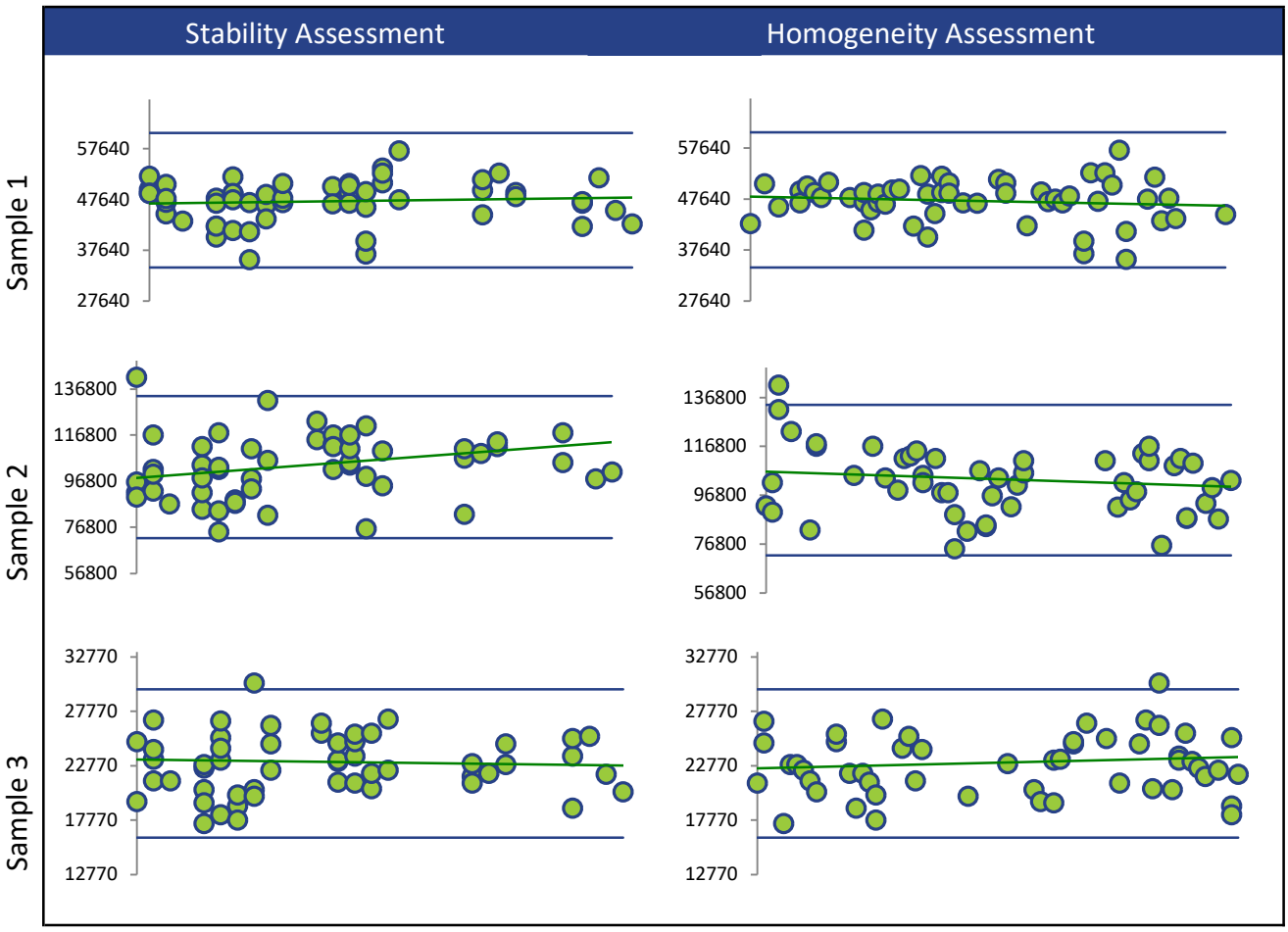
All summary stats and the plots below are based on the data excluding any flagged outliers

Sorted Scatter Plots Kernel Density Plots *z*-Score Plots



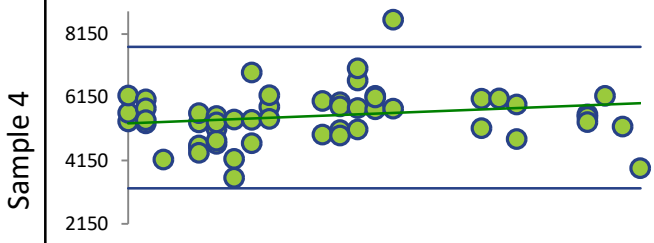
ALUMINUM


Sorted Scatter Plots
Kernel Density Plots
z-Score Plots
Sample 3
27500
17500
23000
9000
19000
29000
39000
4
2
0
-2
-4
Sample 4
7600
5600
3600
5510
925
5925
10925
4
2
0
-2
-4

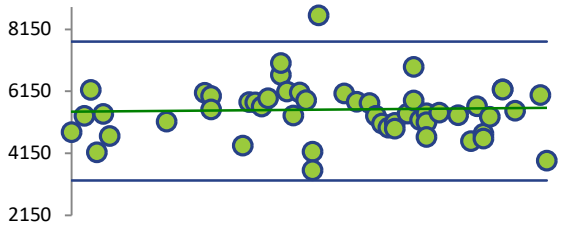

Stability Assessment
Homogeneity Assessment
Sample 1
57640
47640
37640
27640
Sample 2
136800
116800
96800
76800
56800
Sample 3
32770
27770
22770
17770
12770

ALUMINUM

Stability Assessment



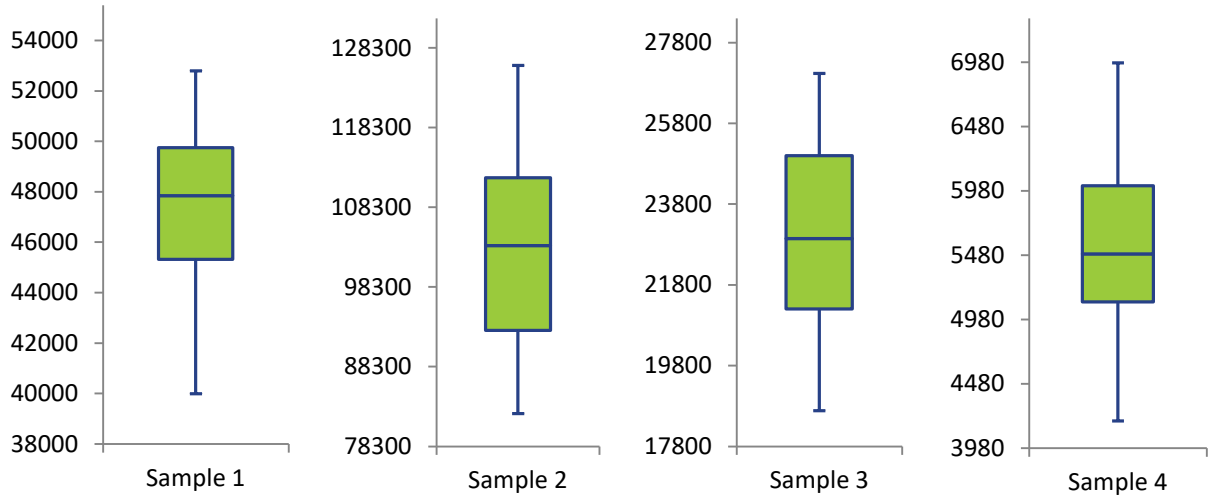
Homogeneity Assessment



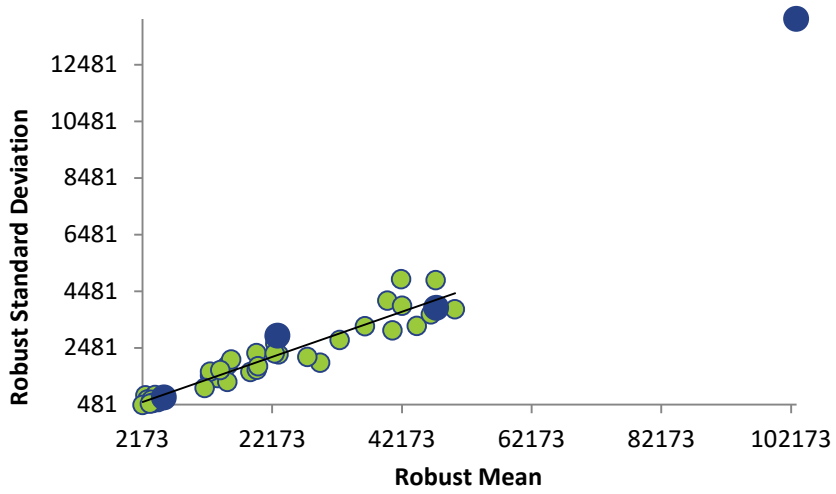
Stability assessments are regression analysis of reported result against date of analysis.

Homogeneity assessments are regression analysis of reported result against bottling order.

Box and Whisker Plots



Current Round (blue) Compared to Historic Rounds (green)



ANTIMONY

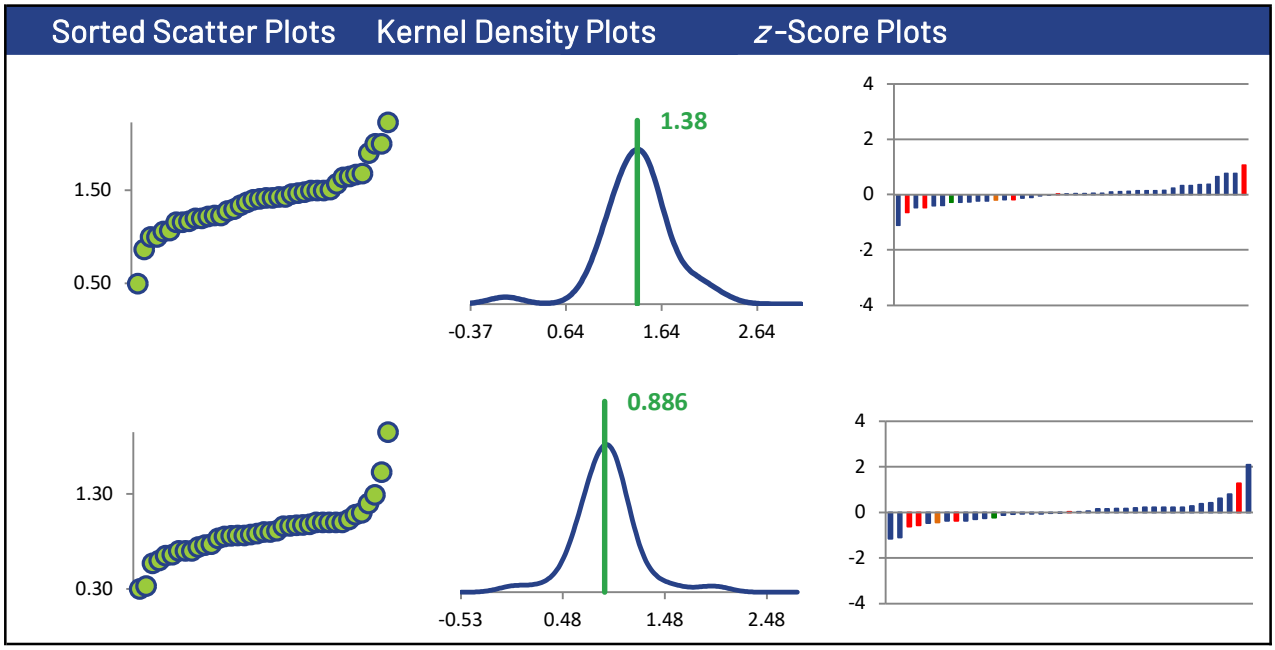
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	40	39	30	39
Median µg/g	1.42	0.900	0.413	1.37
Robust Mean µg/g	1.38	0.886	0.411	1.32
U µg/g	0.0534	0.0402	0.0220	0.0576
Robust Standard Deviation µg/g	0.270	0.201	0.0963	0.288
Regression Standard Deviation µg/g	0.791	0.508	0.235	0.758
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	0.791	0.508	0.235	0.758
Outliers	0	0	1	0
|z|>3.0	0	0	0	0
2<|z|<3	0	1	0	0

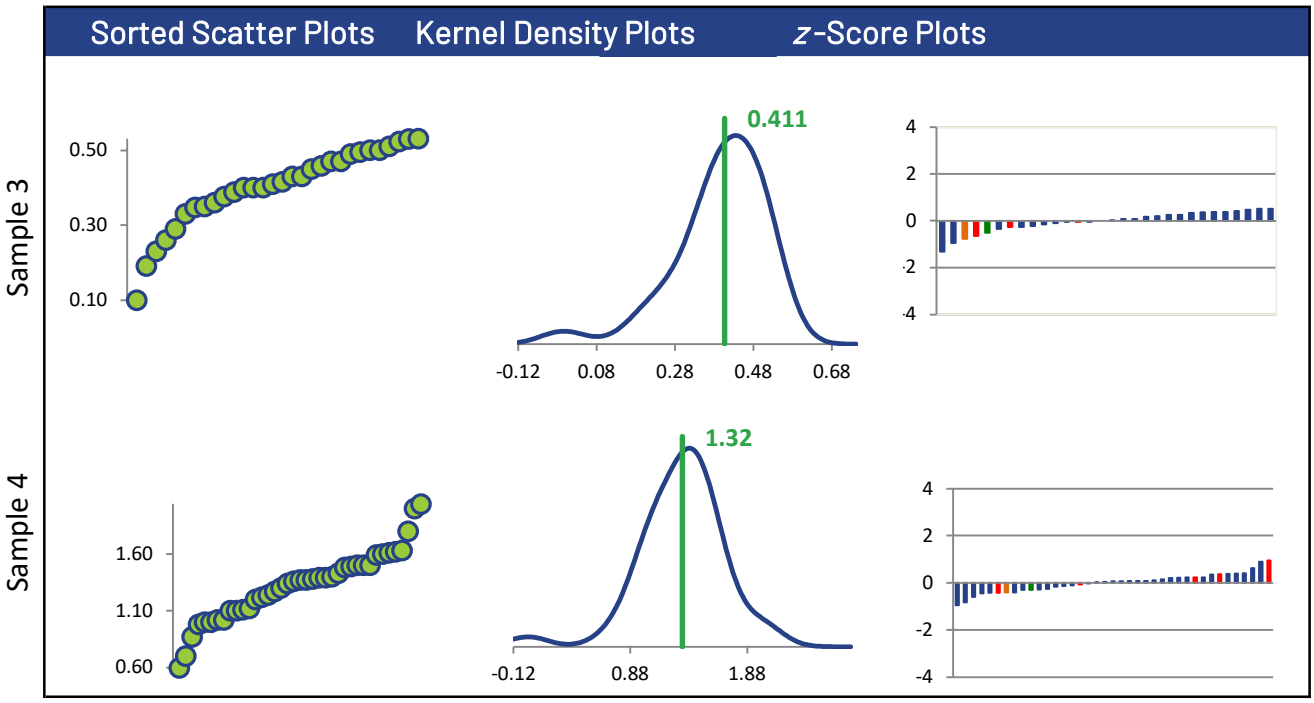
Methods Used

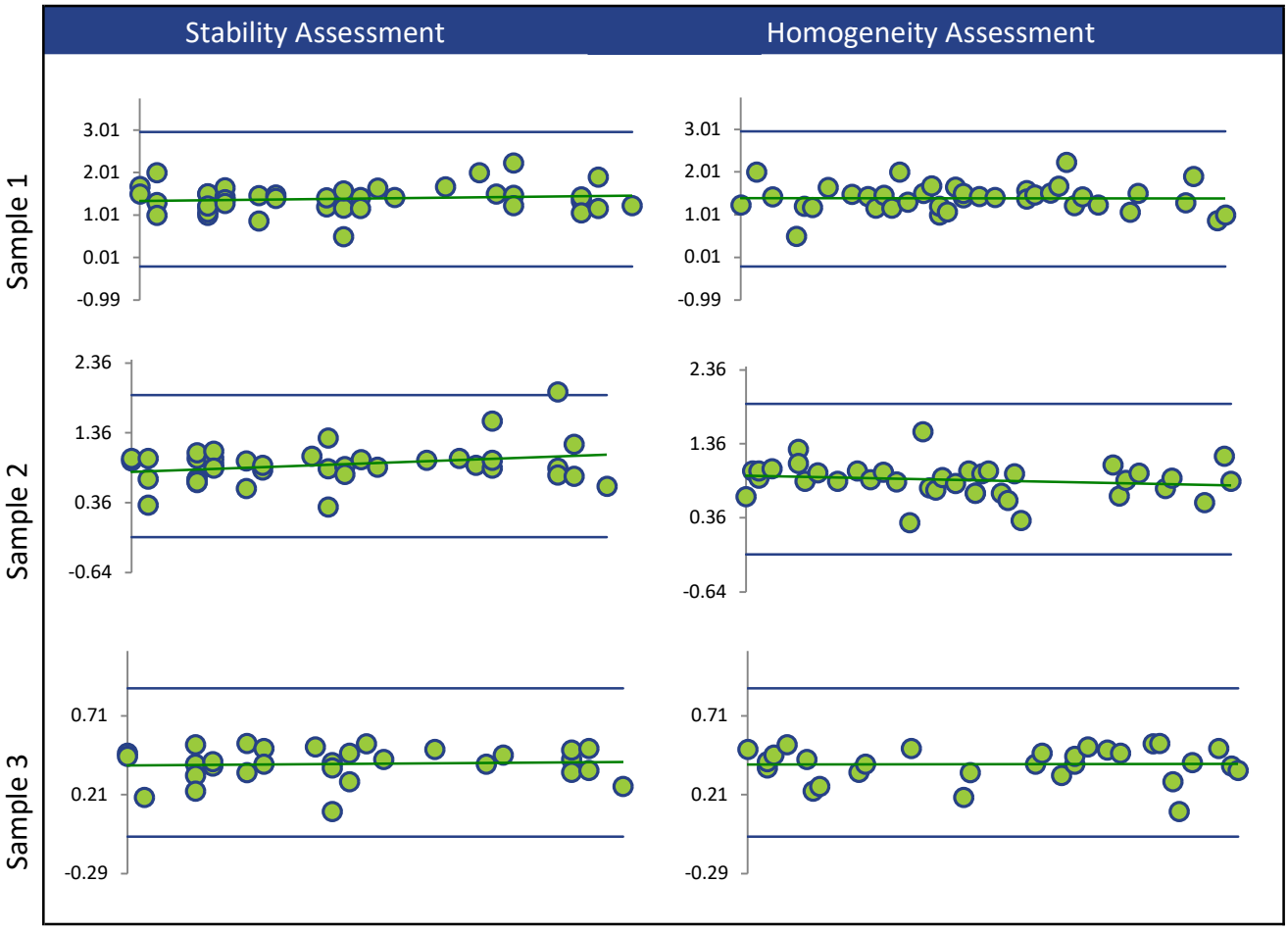
Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	33	32	25	32
ICP/OES (Red)	5	5	3	5
HYDRIDE AA (Green)	1	1	1	1
HYDRIDE ICP (Orange)	1	1	1	1

All summary stats and the plots below are based on the data excluding any flagged outliers



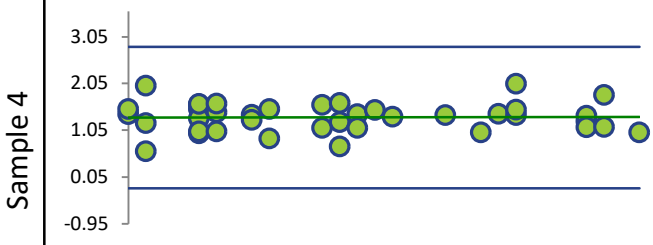
ANTIMONY


Sorted Scatter Plots
Kernel Density Plots
z-Score Plots
Sample 3
0.50
0.30
0.10
0.411
-0.12
0.08
0.28
0.48
0.68
4
2
0
-2
-4
Sample 4
1.60
1.10
0.60
1.32
-0.12
0.88
1.88
4
2
0
-2
-4

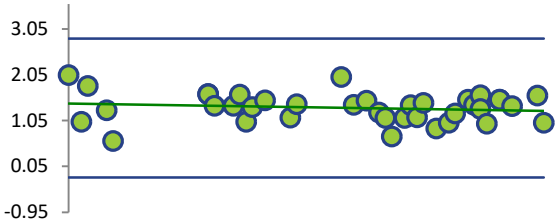

Stability Assessment
Homogeneity Assessment
Sample 1
3.01
2.01
1.01
0.01
-0.99
Sample 2
2.36
1.36
0.36
-0.64
Sample 3
0.71
0.21
-0.29

ANTIMONY

Stability Assessment



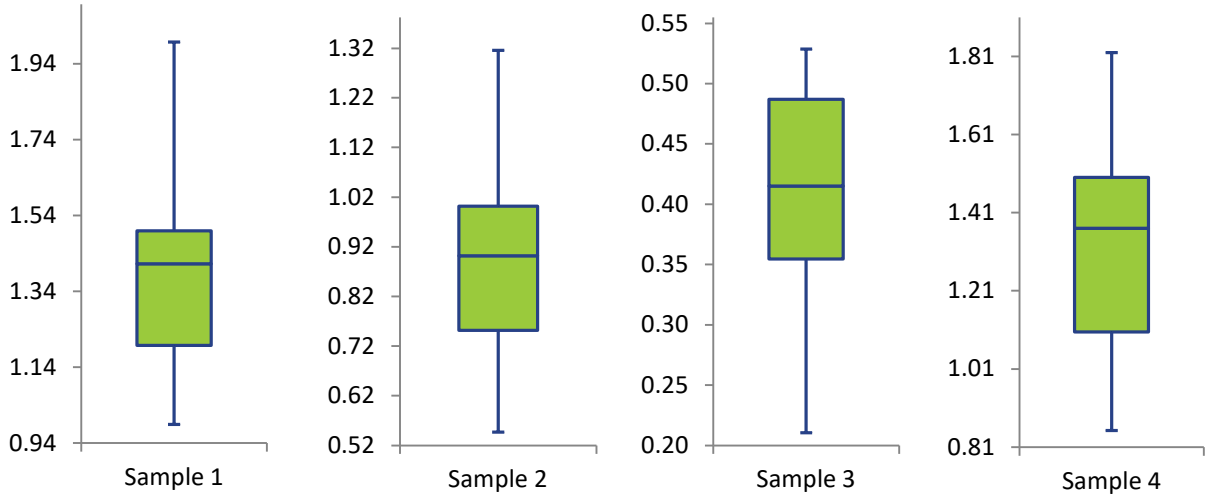
Homogeneity Assessment



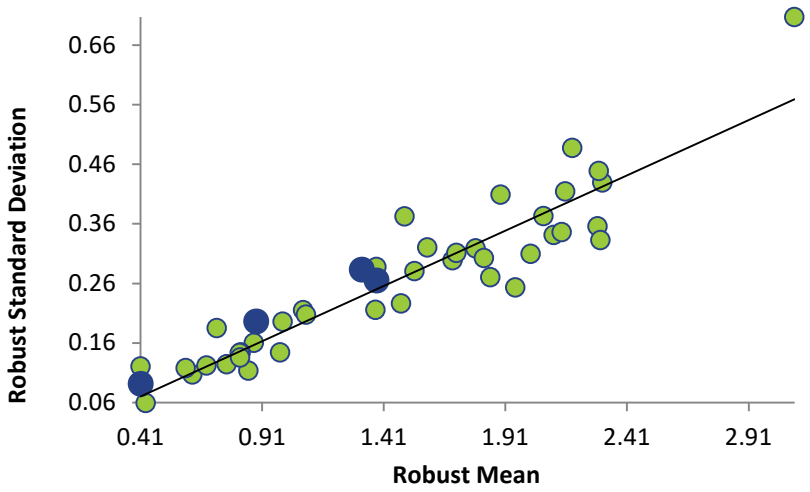
Stability assessments are regression analysis of reported result against date of analysis.

Homogeneity assessments are regression analysis of reported result against bottling order.

Box and Whisker Plots



Current Round (blue) Compared to Historic Rounds (green)



ARSENIC

Summary Statistics

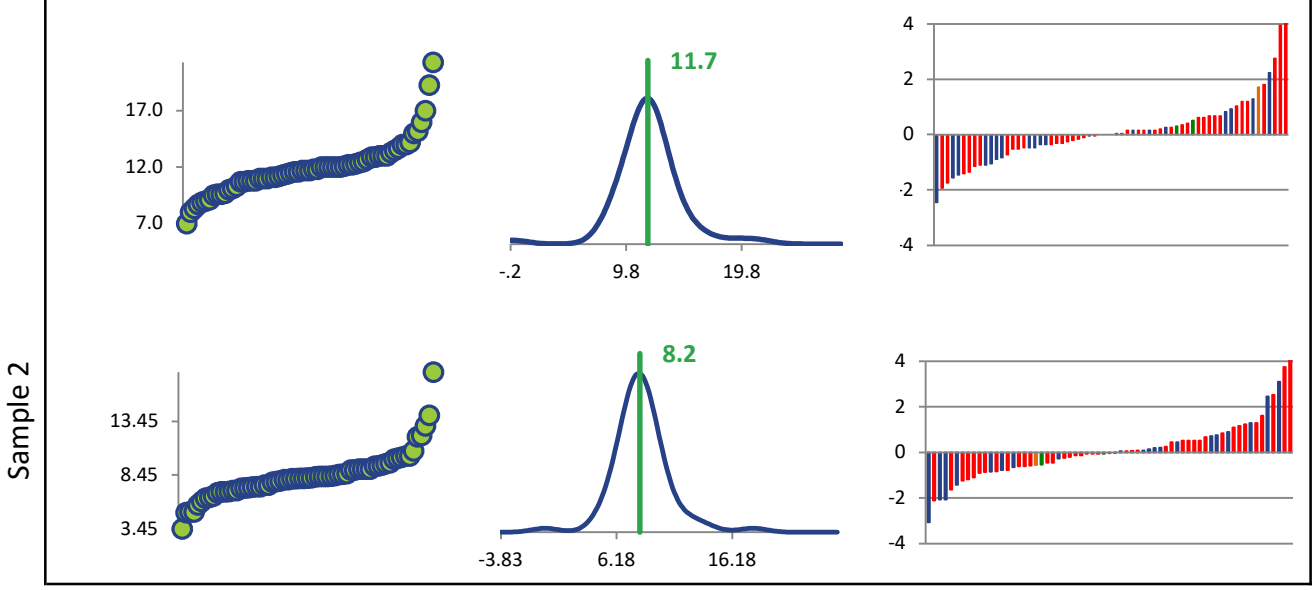
Statistic	C17-1	C17-2	C17-3	C17-4
N	65	65	65	62
Median µg/g	11.7	8.15	11.3	5.81
Robust Mean µg/g	11.7	8.20	11.4	6.04
U µg/g	0.285	0.240	0.194	0.230
Robust Standard Deviation µg/g	1.84	1.55	1.25	1.45
Regression Standard Deviation µg/g	1.92	1.53	1.88	1.29
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	1.92	1.55	1.88	1.45
Outliers	0	0	0	2
|z|>3.0	2	4	1	4
2<|z|<3	3	5	2	2

Methods Used

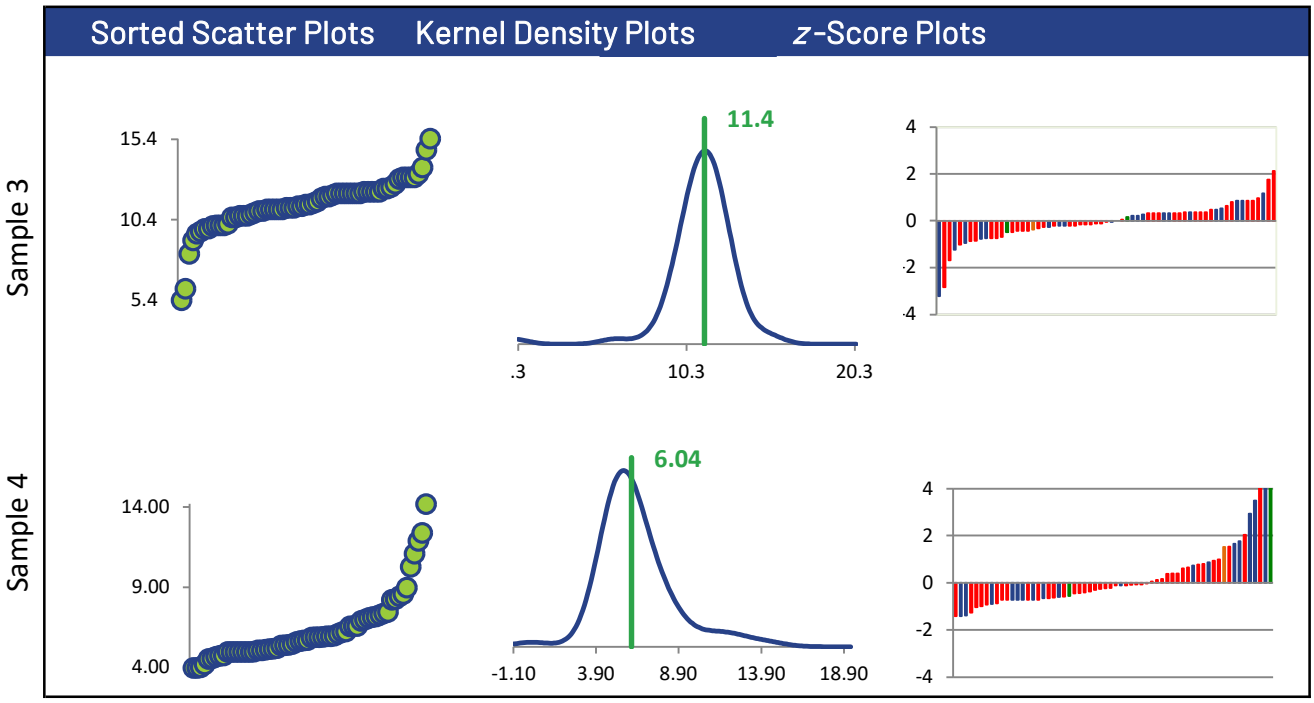
Method	C17-1	C17-2	C17-3	C17-4
ICP/OES (Blue)	20	20	20	17
ICP/MS (Red)	42	42	42	42
HYDRIDE AA (Green)	2	2	2	2
HYDRIDE ICP (Orange)	1	1	1	1

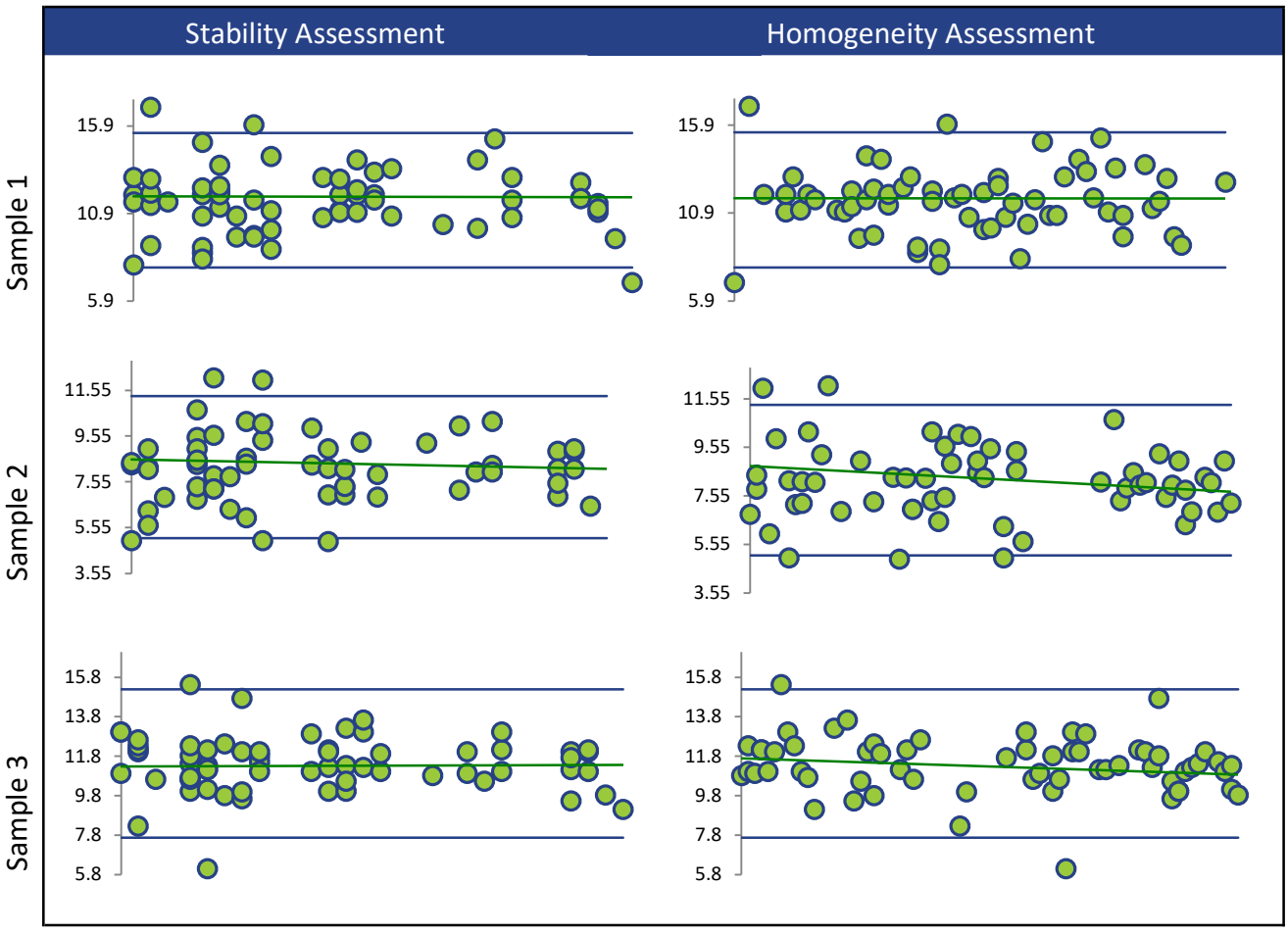
All summary stats and the plots below are based on the data excluding any flagged outliers

Sorted Scatter Plots Kernel Density Plots *z*-Score Plots



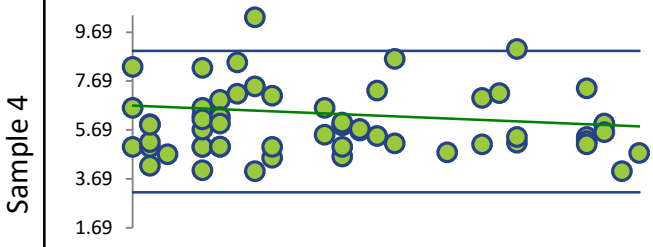
ARSENIC


Sorted Scatter Plots
Kernel Density Plots
z-Score Plots
Sample 3
15.4
10.4
5.4
11.4
.3
10.3
20.3
4
2
0
-2
-4
Sample 4
14.00
9.00
4.00
6.04
-1.10
3.90
8.90
13.90
18.90
4
2
0
-2
-4

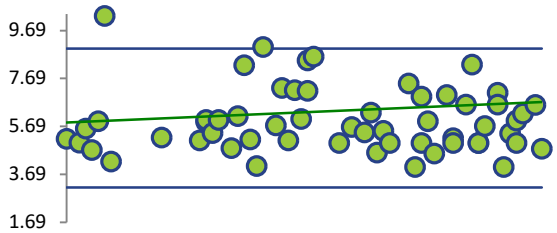

Stability Assessment
Homogeneity Assessment
Sample 1
15.9
10.9
5.9
15.9
10.9
5.9
Sample 2
11.55
9.55
7.55
5.55
3.55
11.55
9.55
7.55
5.55
3.55
Sample 3
15.8
13.8
11.8
9.8
7.8
5.8
15.8
13.8
11.8
9.8
7.8
5.8

ARSENIC

Stability Assessment



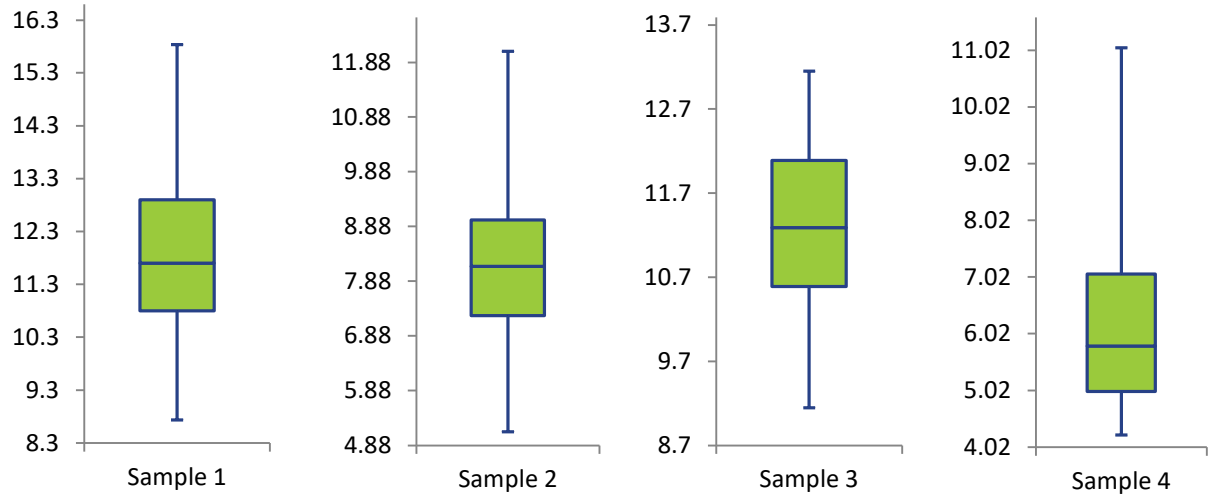
Homogeneity Assessment



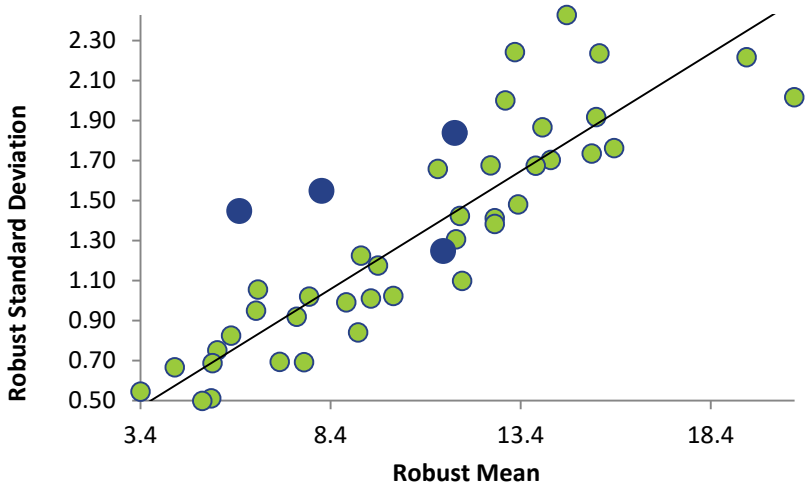
Stability assessments are regression analysis of reported result against date of analysis.

Homogeneity assessments are regression analysis of reported result against bottling order.

Box and Whisker Plots



Current Round (blue) Compared to Historic Rounds (green)



BARIUM

Summary Statistics

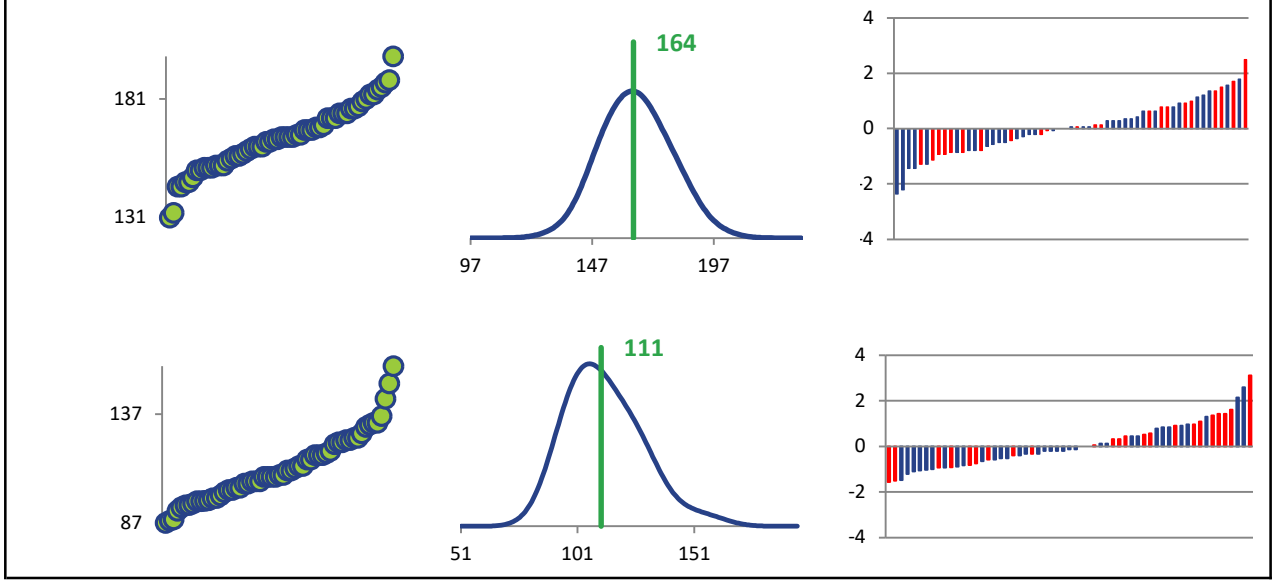
Statistic	C17-1	C17-2	C17-3	C17-4
N	59	59	60	60
Median µg/g	165	109	63.9	110
Robust Mean µg/g	164	111	66.5	110
U µg/g	2.28	2.51	1.71	2.37
Robust Standard Deviation µg/g	14.0	15.4	10.6	14.7
Regression Standard Deviation µg/g	13.5	9.79	6.69	9.70
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	14.0	15.4	10.6	14.7
Outliers	1	1	0	0
|z|>3.0	0	1	4	2
2<|z|<3	3	2	3	5

Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	36	36	37	37
ICP/OES (Red)	23	23	23	23

All summary stats and the plots below are based on the data excluding any flagged outliers

Sorted Scatter Plots Kernel Density Plots *z*-Score Plots



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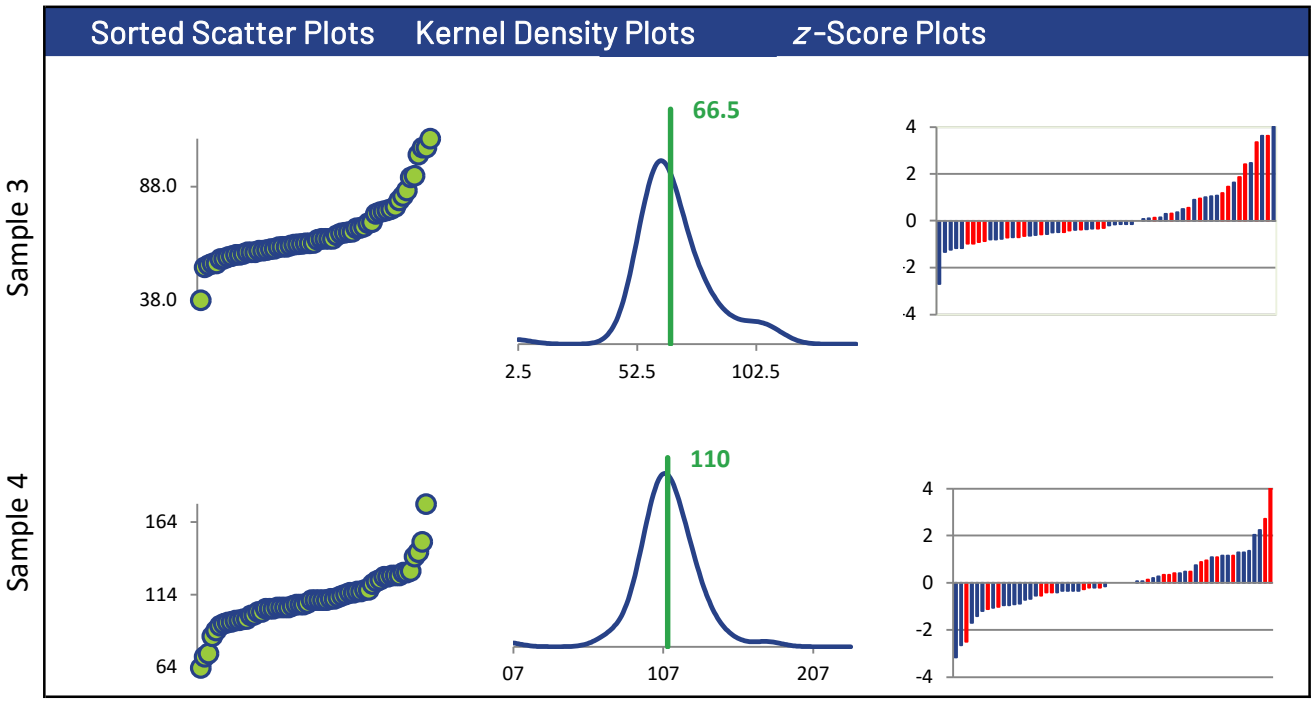
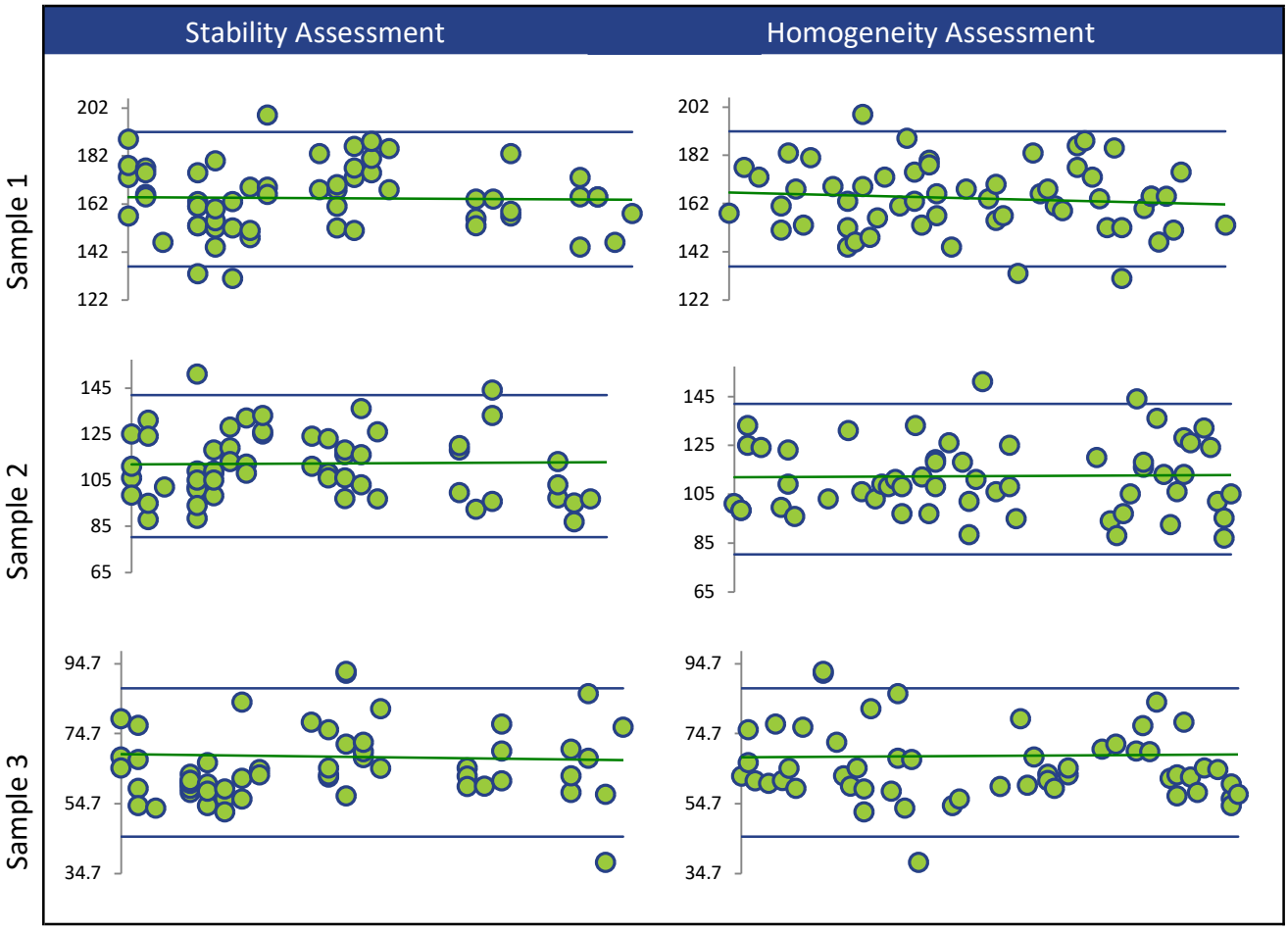
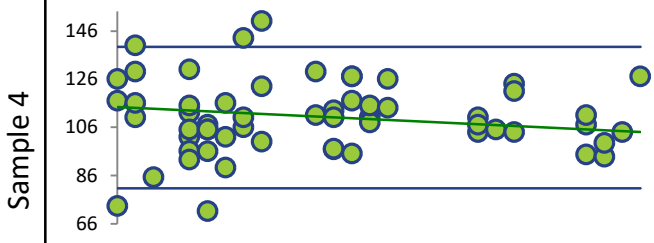

Sorted Scatter Plots
Kernel Density Plots
z-Score Plots
Sample 3
88.0
38.0
66.5
2.5
52.5
102.5
4
2
0
-2
-4
Sample 4
164
114
64
110
07
107
207
4
2
0
-2
-4

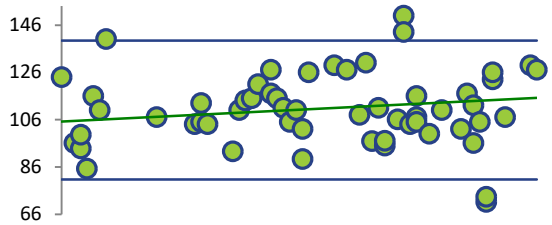

Stability Assessment
Homogeneity Assessment
Sample 1
202
182
162
142
122
Sample 2
145
125
105
85
65
Sample 3
94.7
74.7
54.7
34.7

BARIUM

Stability Assessment



Homogeneity Assessment



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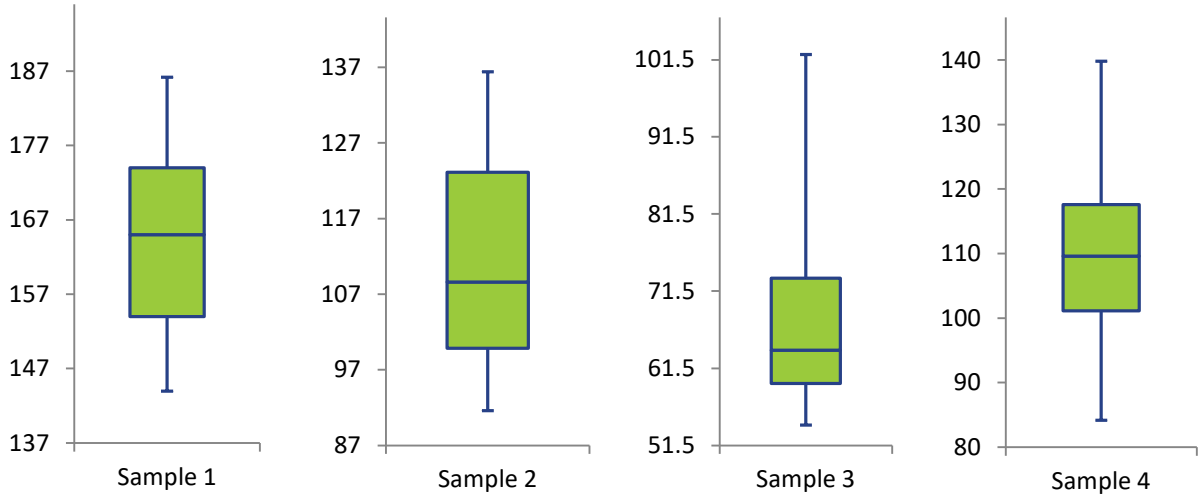
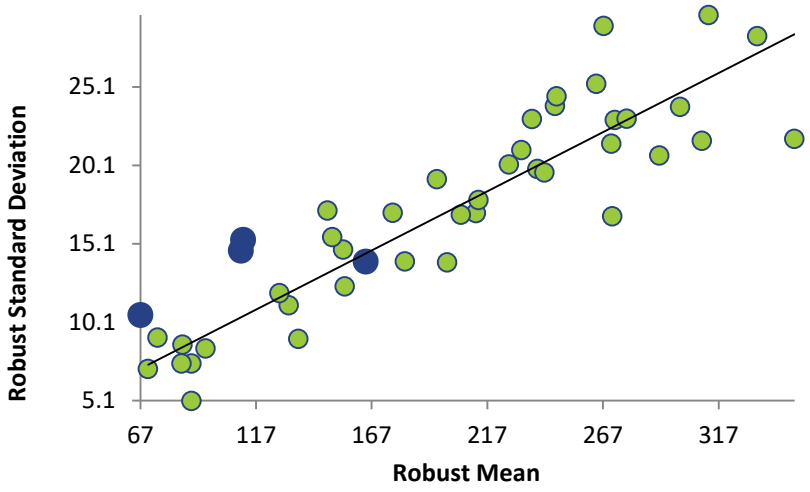
Box and Whisker Plots



Current Round (blue) Compared to Historic Rounds (green)



BERYLLIUM

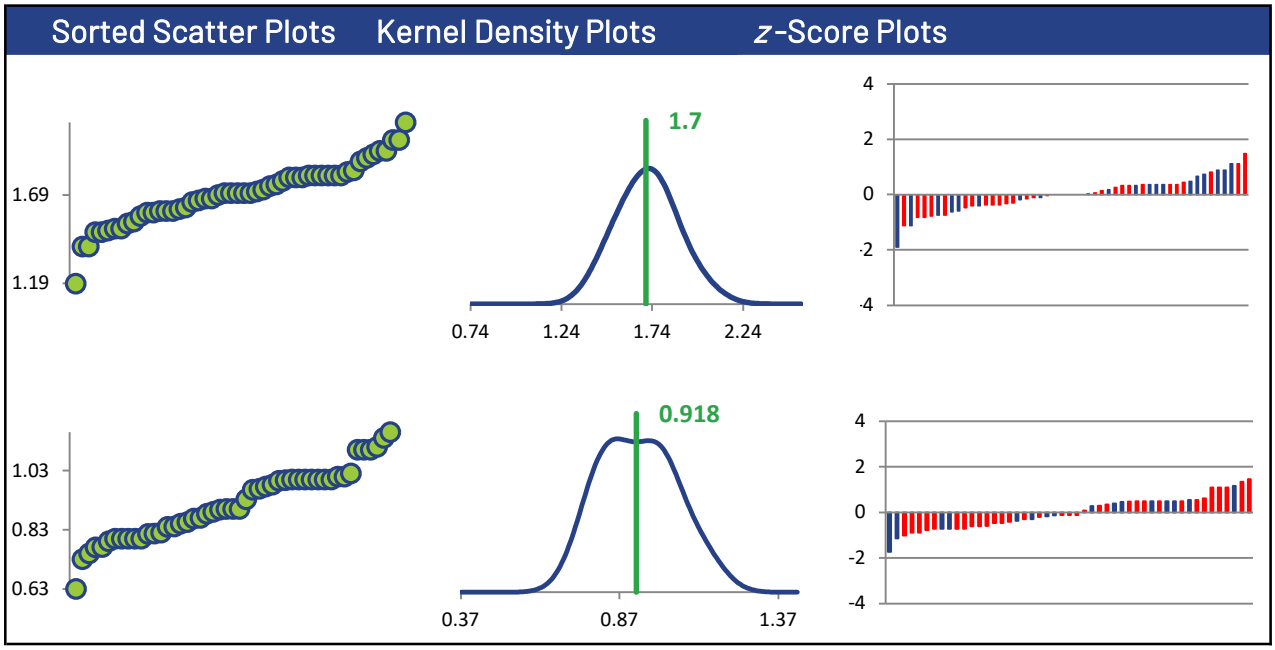
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	52	49	52	52
Median µg/g	1.70	0.900	1.10	2.44
Robust Mean µg/g	1.70	0.918	1.15	2.44
U µg/g	0.0289	0.0225	0.0432	0.0541
Robust Standard Deviation µg/g	0.167	0.126	0.249	0.312
Regression Standard Deviation µg/g	0.269	0.166	0.196	0.367
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	0.269	0.166	0.249	0.367
Outliers	1	3	0	2
|z|>3.0	0	0	5	0
2<|z|<3	0	0	1	2

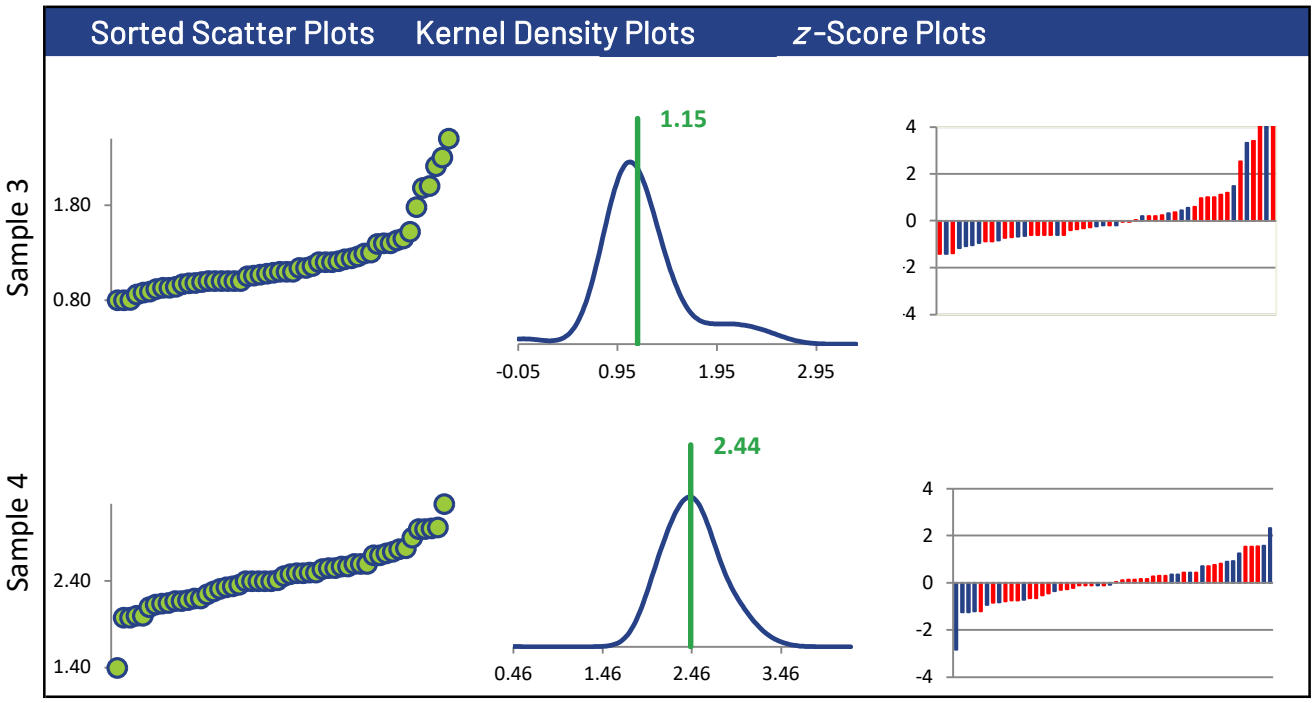
Methods Used

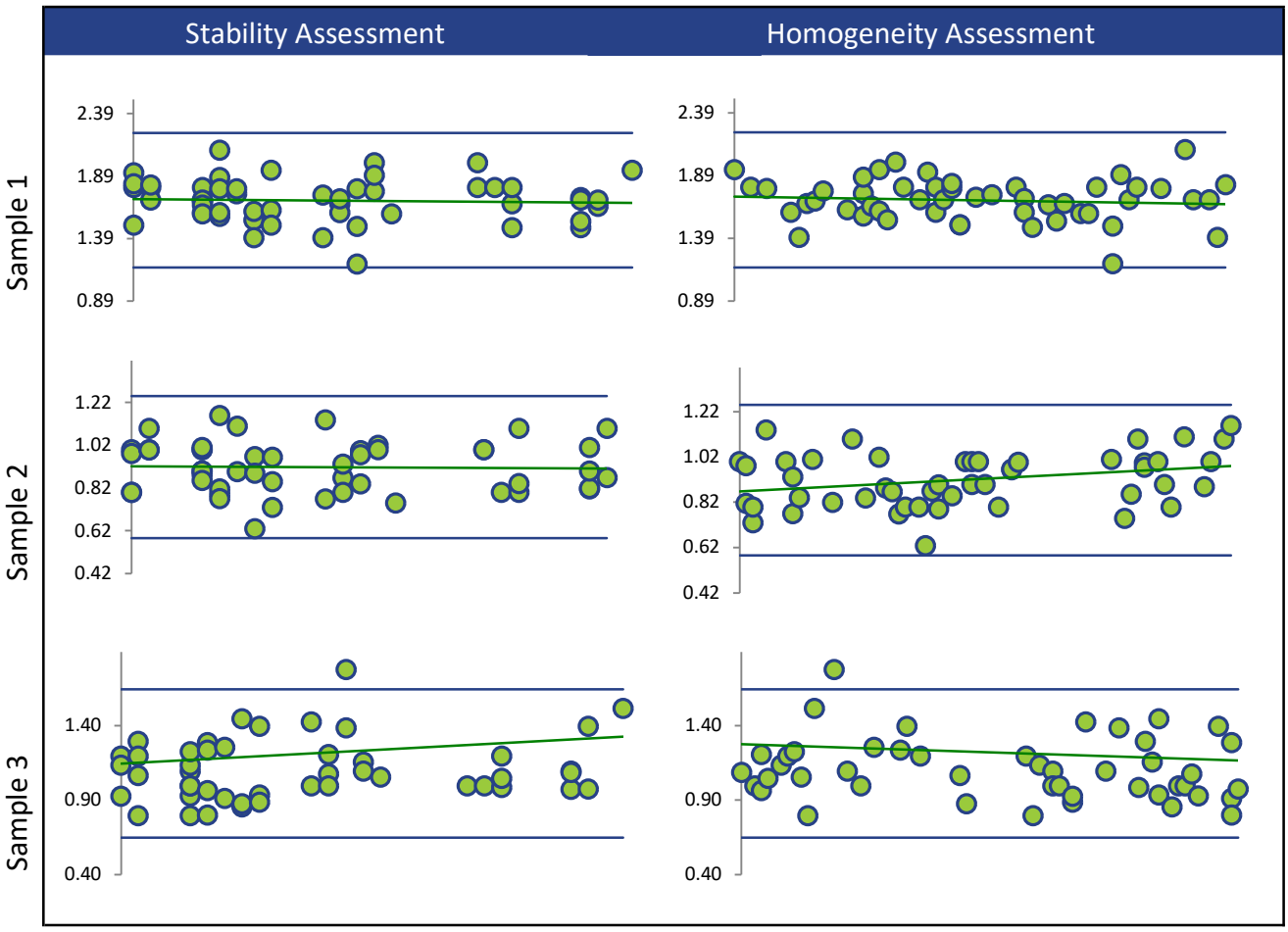
Method	C17-1	C17-2	C17-3	C17-4
ICP/OES (Blue)	19	16	19	19
ICP/MS (Red)	33	33	33	33

All summary stats and the plots below are based on the data excluding any flagged outliers



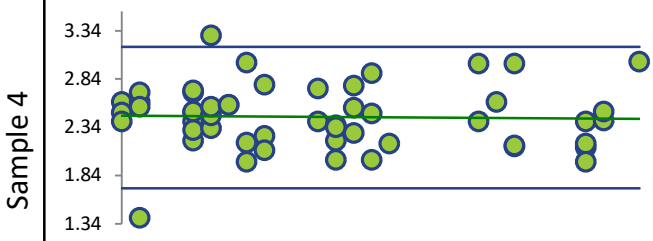
BERYLLIUM


Sorted Scatter Plots
Kernel Density Plots
z-Score Plots
Sample 3
1.80
0.80
1.15
-0.05
0.95
1.95
2.95
4
2
0
-2
-4
Sample 4
2.40
1.40
2.44
0.46
1.46
2.46
3.46
4
2
0
-2
-4

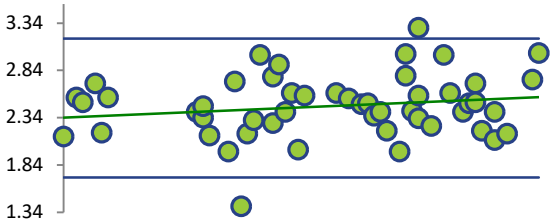

Stability Assessment
Homogeneity Assessment
Sample 1
2.39
1.89
1.39
0.89
Sample 2
1.22
1.02
0.82
0.62
0.42
Sample 3
1.40
0.90
0.40

BERYLLIUM

Stability Assessment



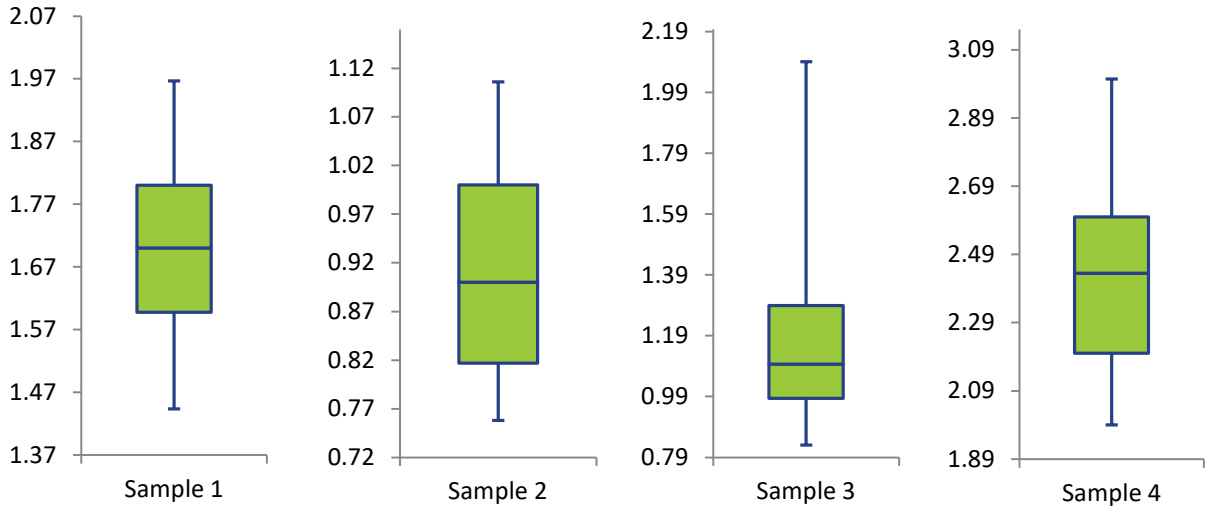
Homogeneity Assessment



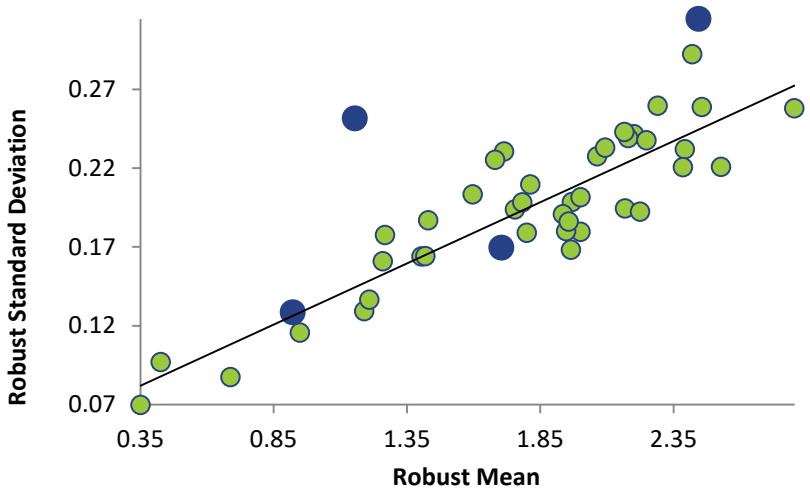
Stability assessments are regression analysis of reported result against date of analysis.

Homogeneity assessments are regression analysis of reported result against bottling order.

Box and Whisker Plots



Current Round (blue) Compared to Historic Rounds (green)



BORON

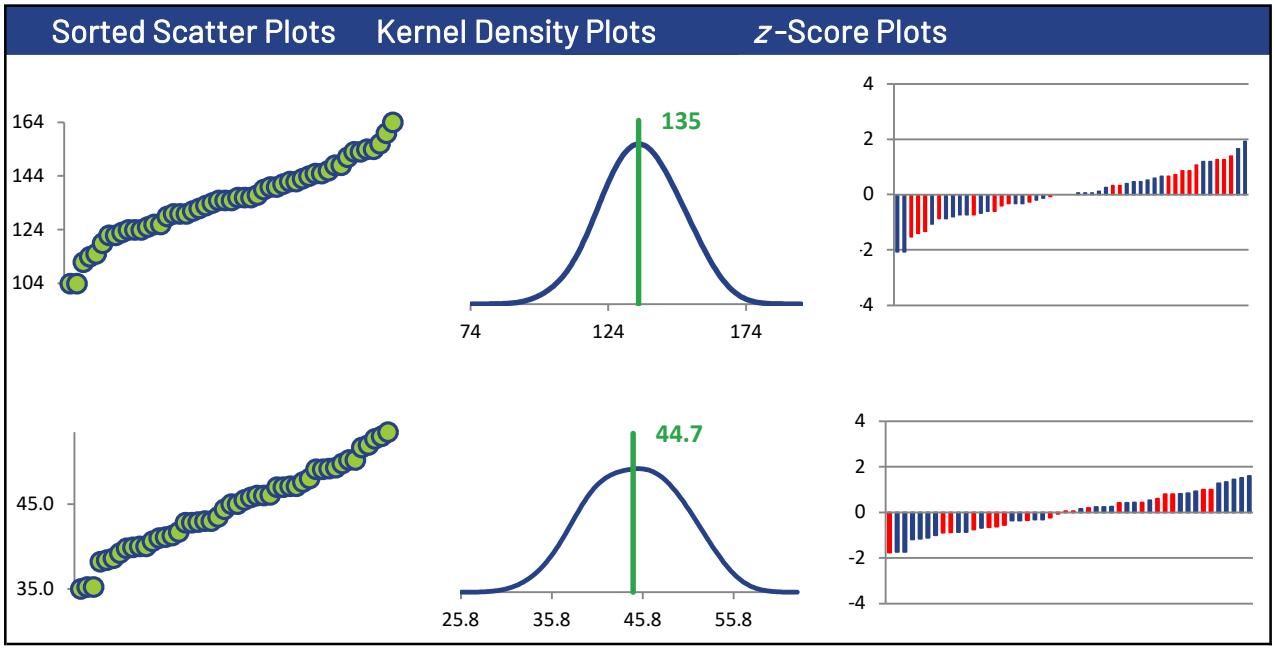
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	51	48	47	48
Median µg/g	135	45.0	19.0	129
Robust Mean µg/g	135	44.7	19.2	128
U µg/g	2.45	0.951	0.512	3.10
Robust Standard Deviation µg/g	14.0	5.27	2.81	17.2
Regression Standard Deviation µg/g	15.0	5.50	2.82	14.2
Stability Flag			Stability	
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	15.0	5.50	3.41	17.2
Outliers	1	2	2	4
|z|>3.0	0	0	1	0
2<|z|<3	2	0	2	0

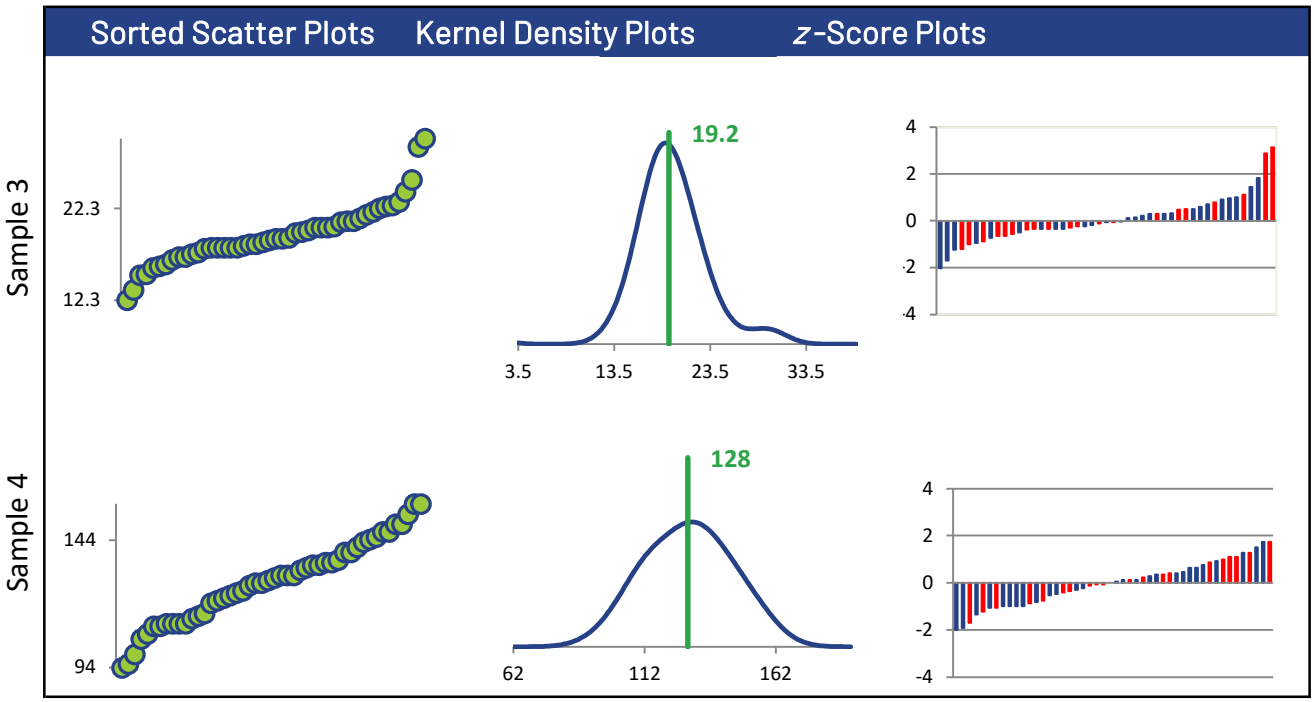
Methods Used

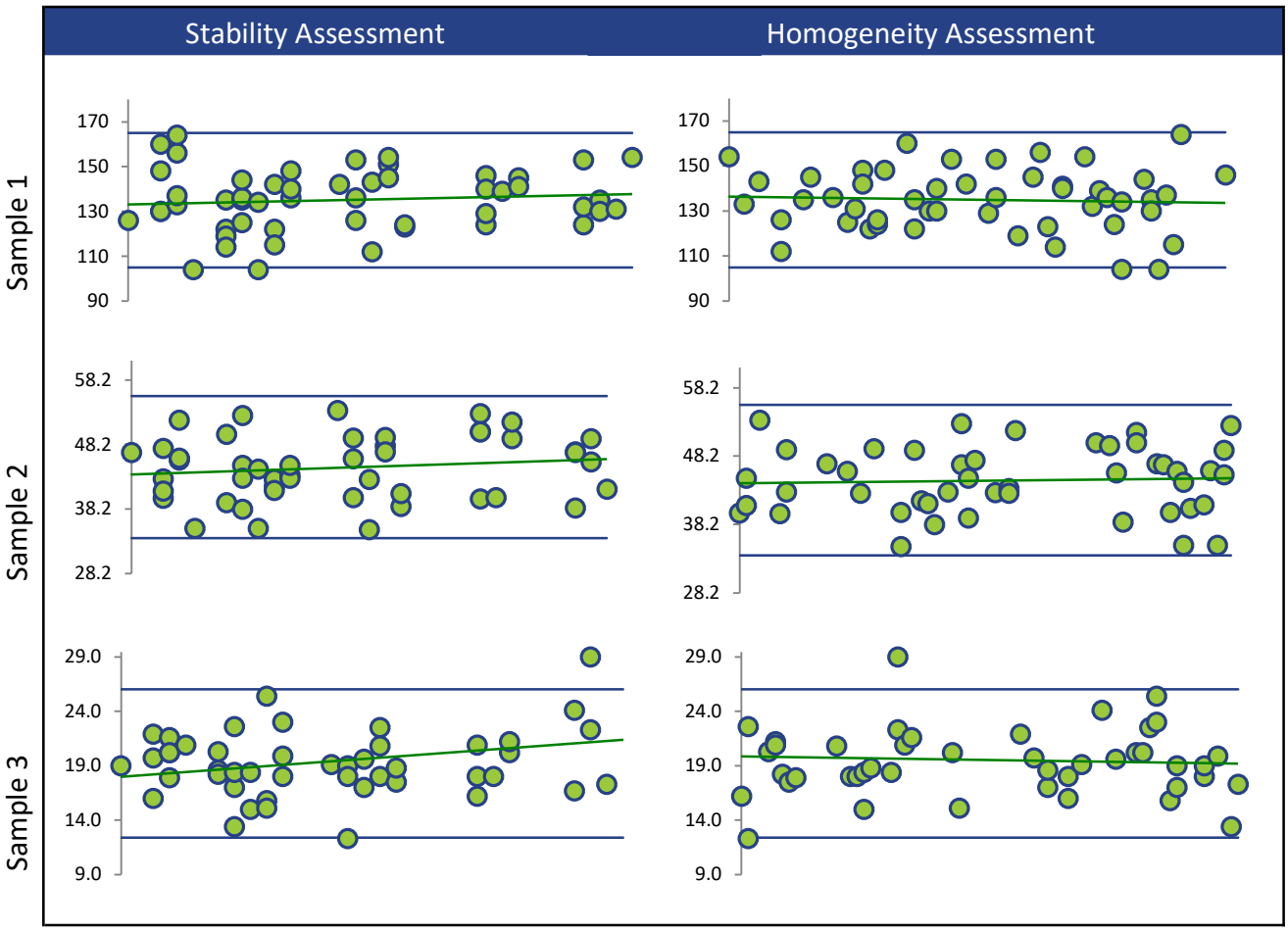
Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	29	28	27	28
ICP/OES (Red)	22	20	20	20

All summary stats and the plots below are based on the data excluding any flagged outliers



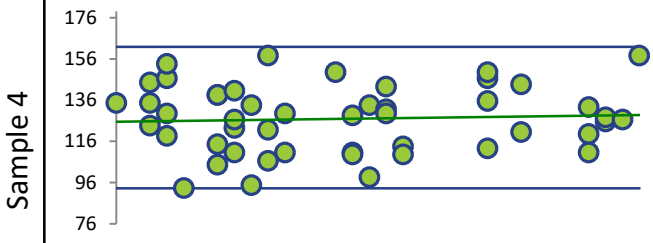
BORON


Sorted Scatter Plots
Kernel Density Plots
z-Score Plots
Sample 3
22.3
12.3
19.2
3.5
13.5
23.5
33.5
4
2
0
-2
-4
Sample 4
144
94
128
62
112
162
4
2
0
-2
-4

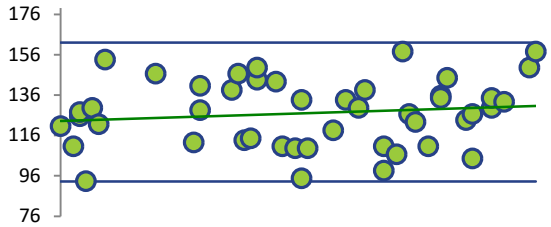

Stability Assessment
Homogeneity Assessment
Sample 1
170
150
130
110
90
Sample 2
58.2
48.2
38.2
28.2
Sample 3
29.0
24.0
19.0
14.0
9.0

BORON

Stability Assessment



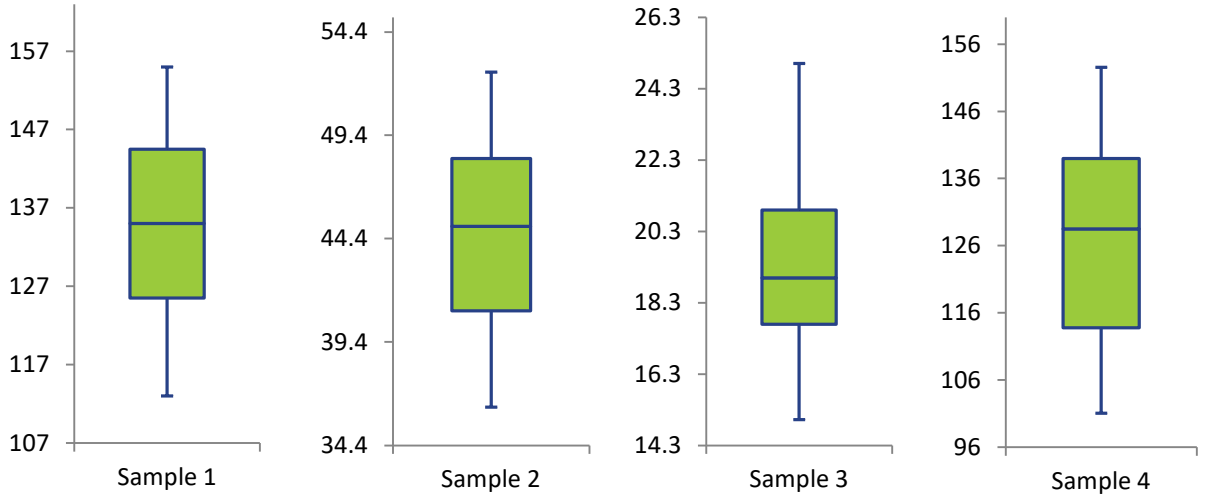
Homogeneity Assessment



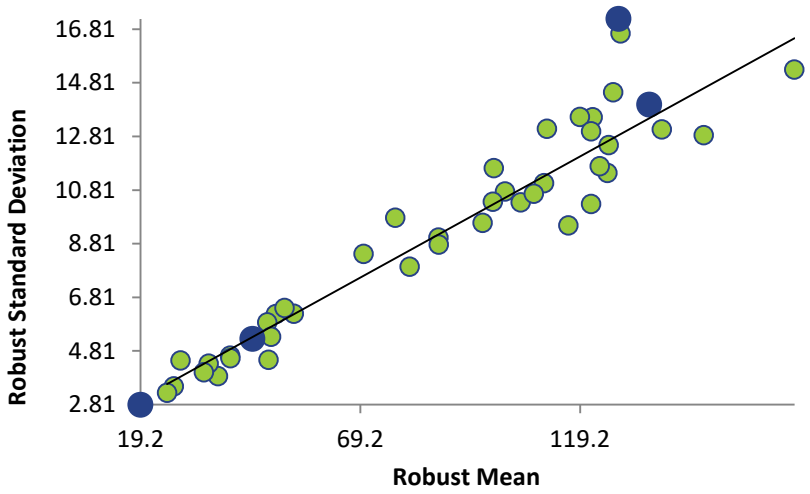
Stability assessments are regression analysis of reported result against date of analysis.

Homogeneity assessments are regression analysis of reported result against bottling order.

Box and Whisker Plots



Current Round (blue) Compared to Historic Rounds (green)



CADMIUM

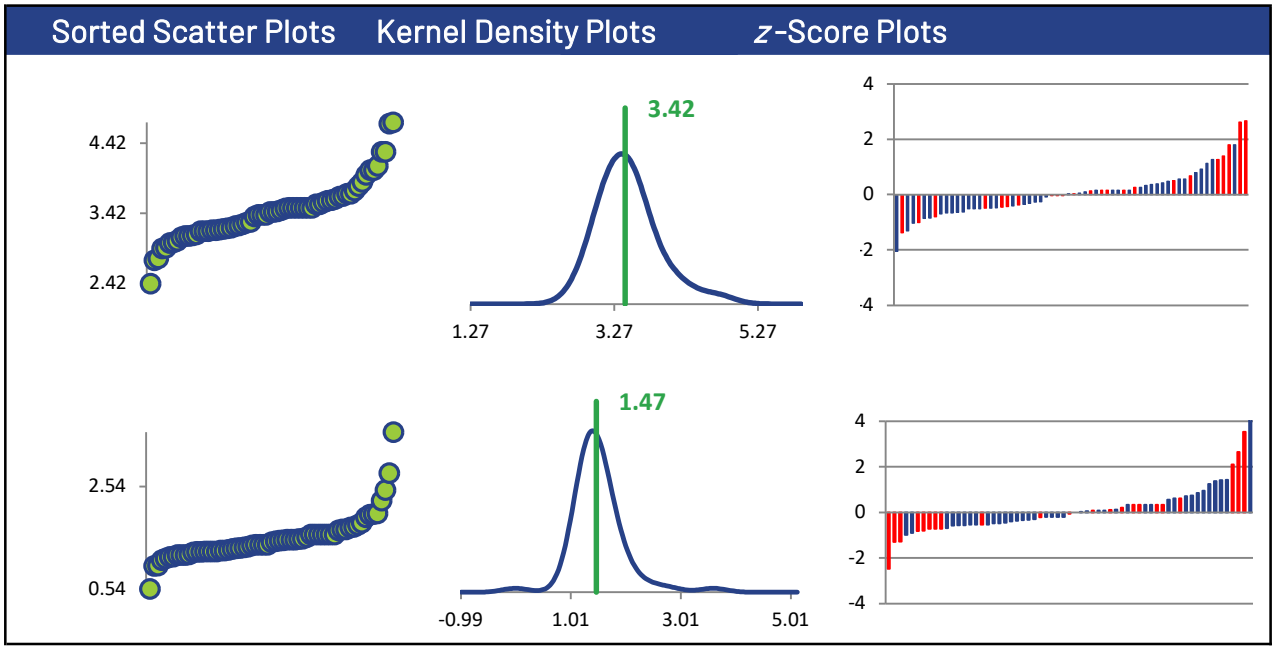
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	64	63	60	62
Median µg/g	3.44	1.45	0.970	3.58
Robust Mean µg/g	3.42	1.47	0.980	3.58
U µg/g	0.0555	0.0446	0.0240	0.0645
Robust Standard Deviation µg/g	0.355	0.283	0.149	0.406
Regression Standard Deviation µg/g	0.449	0.280	0.238	0.463
Stability Flag		Stability		
Homogeneity Flag	Homogeneity			Homogeneity
Standard Deviation Used (SDPA) µg/g	0.487	0.377	0.238	0.741
Outliers	0	0	2	2
|z|>3.0	0	2	1	0
2<|z|<3	3	3	0	1

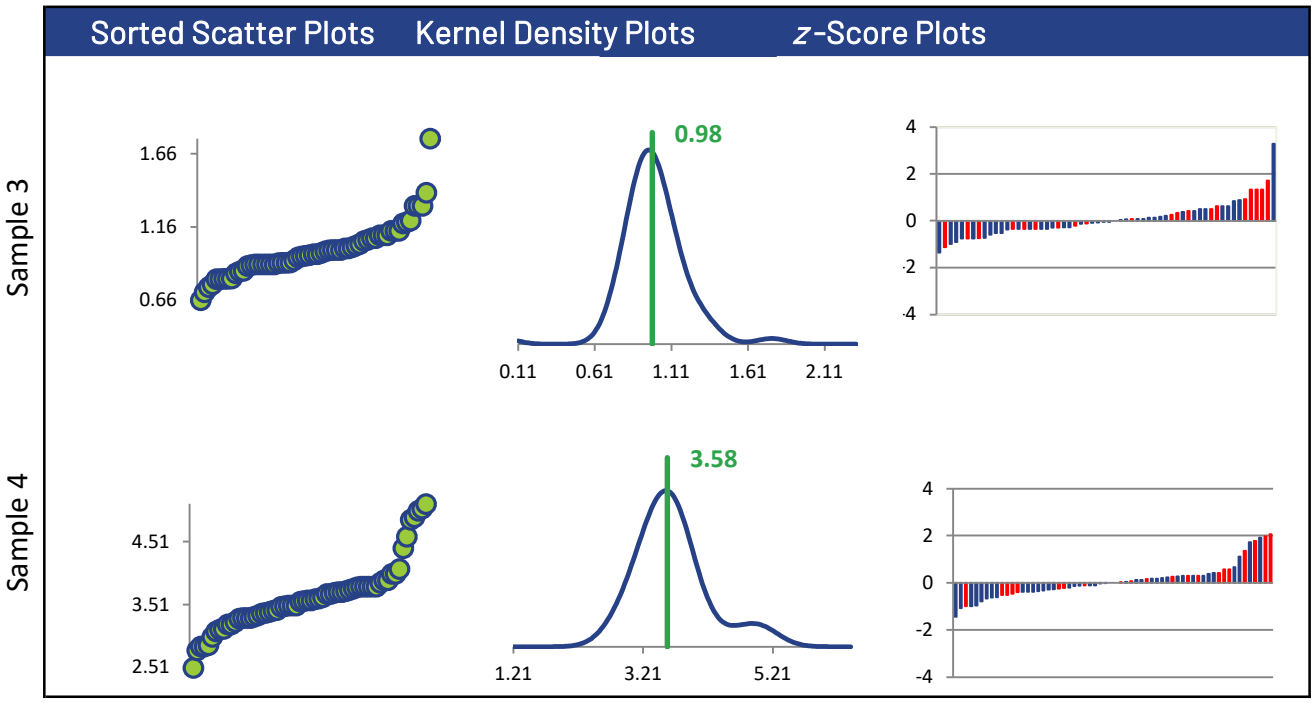
Methods Used

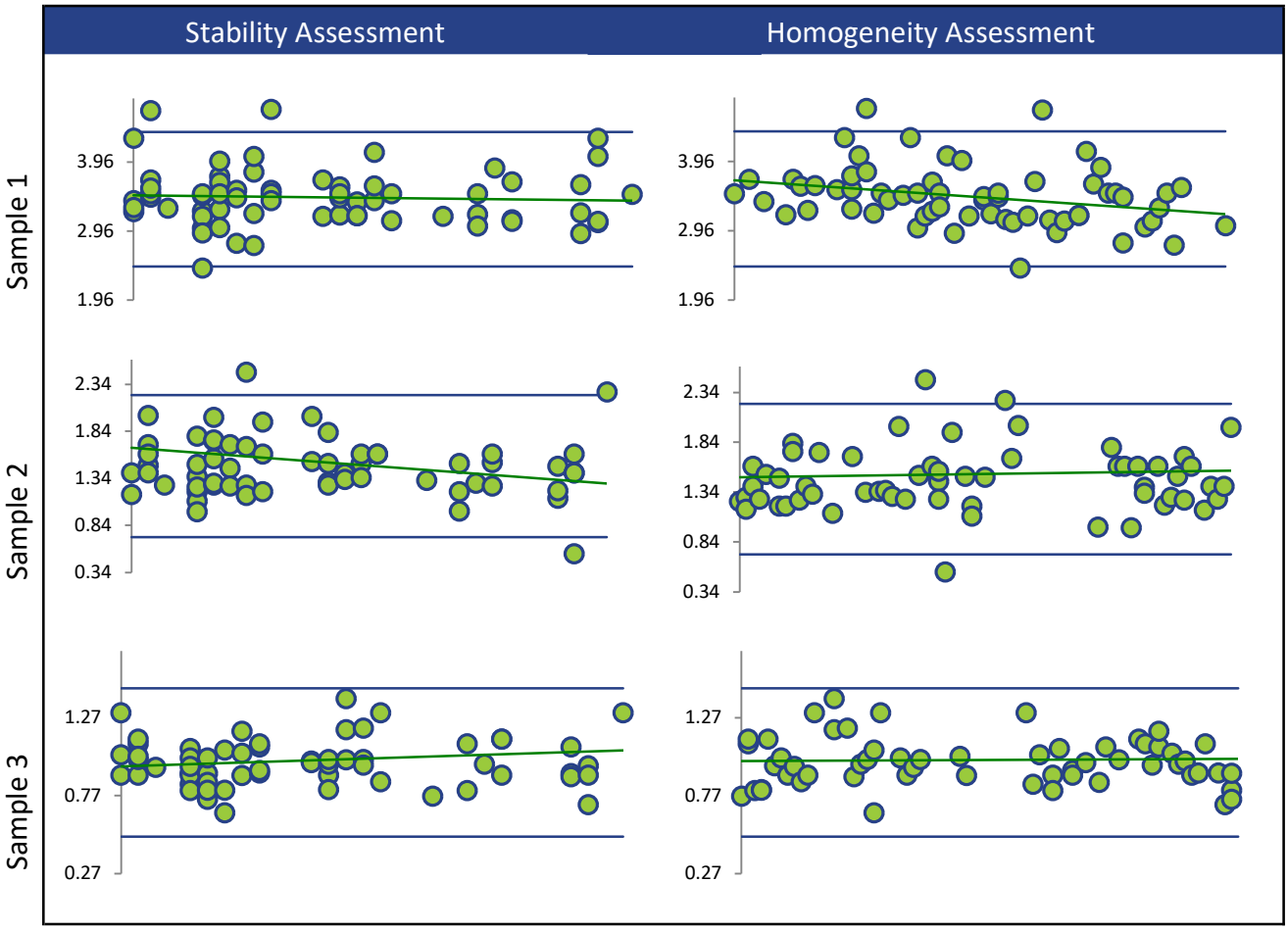
Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	41	41	40	40
ICP/OES (Red)	23	22	20	22

All summary stats and the plots below are based on the data excluding any flagged outliers



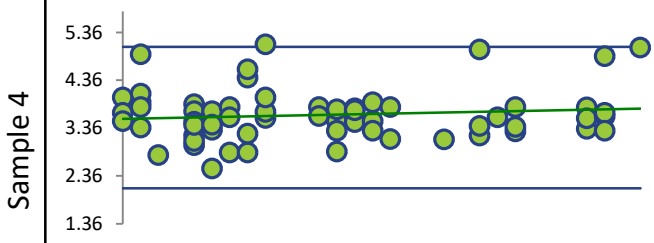
CADMIUM


Sorted Scatter Plots
Kernel Density Plots
z-Score Plots
Sample 3
1.66
1.16
0.66
0.98
0.11
0.61
1.11
1.61
2.11
4
2
0
-2
-4
Sample 4
4.51
3.51
2.51
3.58
1.21
3.21
5.21
4
2
0
-2
-4

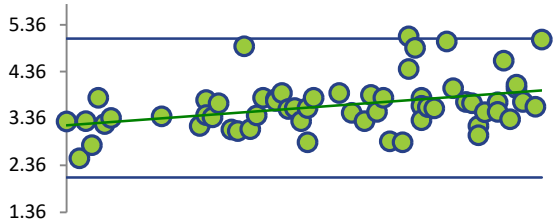

Stability Assessment
Homogeneity Assessment
Sample 1
3.96
2.96
1.96
Sample 2
2.34
1.84
1.34
0.84
0.34
Sample 3
1.27
0.77
0.27

CADMIUM

Stability Assessment



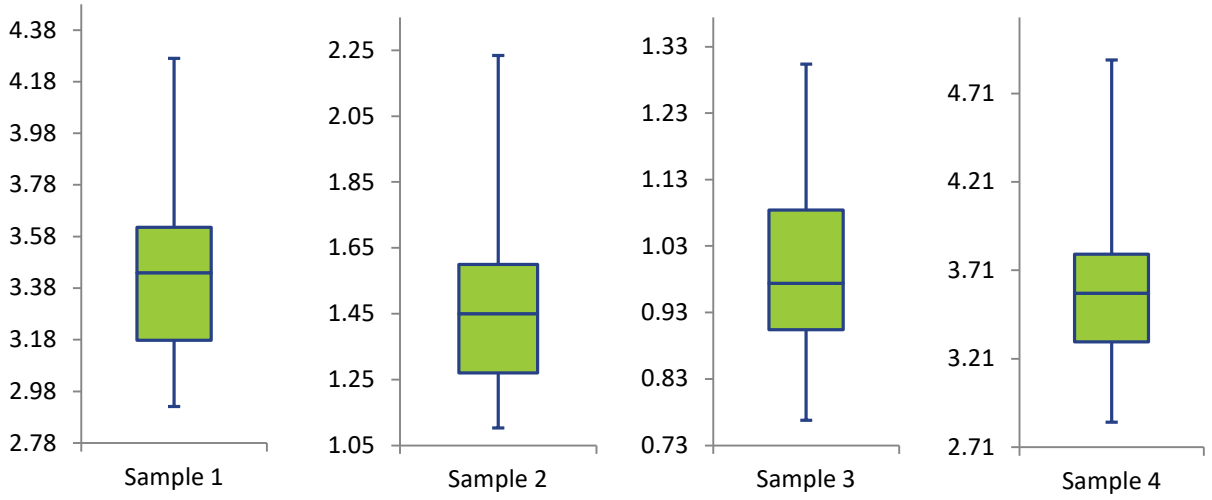
Homogeneity Assessment



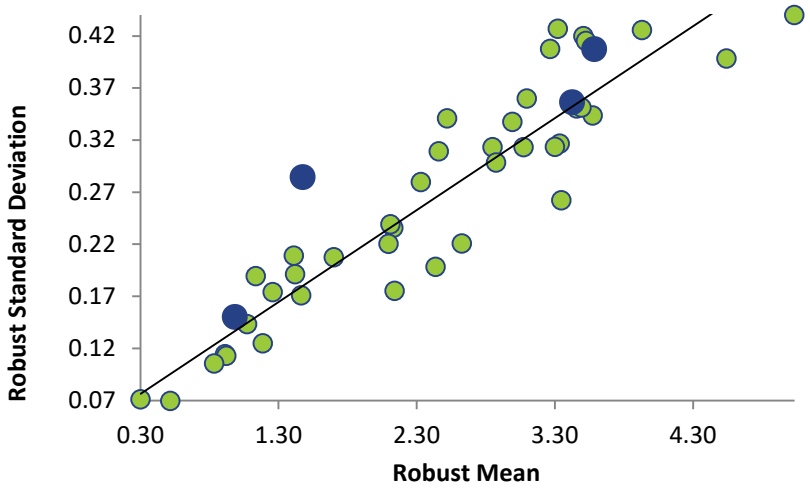
Stability assessments are regression analysis of reported result against date of analysis.

Homogeneity assessments are regression analysis of reported result against bottling order.

Box and Whisker Plots



Current Round (blue) Compared to Historic Rounds (green)



CHROMIUM

Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	64	64	64	64
Median µg/g	73.7	38.4	43.7	91.4
Robust Mean µg/g	74.2	38.8	44.2	91.5
U µg/g	0.813	0.803	0.988	1.77
Robust Standard Deviation µg/g	5.20	5.14	6.32	11.3
Regression Standard Deviation µg/g	7.18	4.48	4.89	8.49
Stability Flag		Stability		
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	7.18	7.13	6.32	11.3
Outliers	0	0	0	0
|z|>3.0	0	1	2	2
2<|z|<3	2	3	6	2

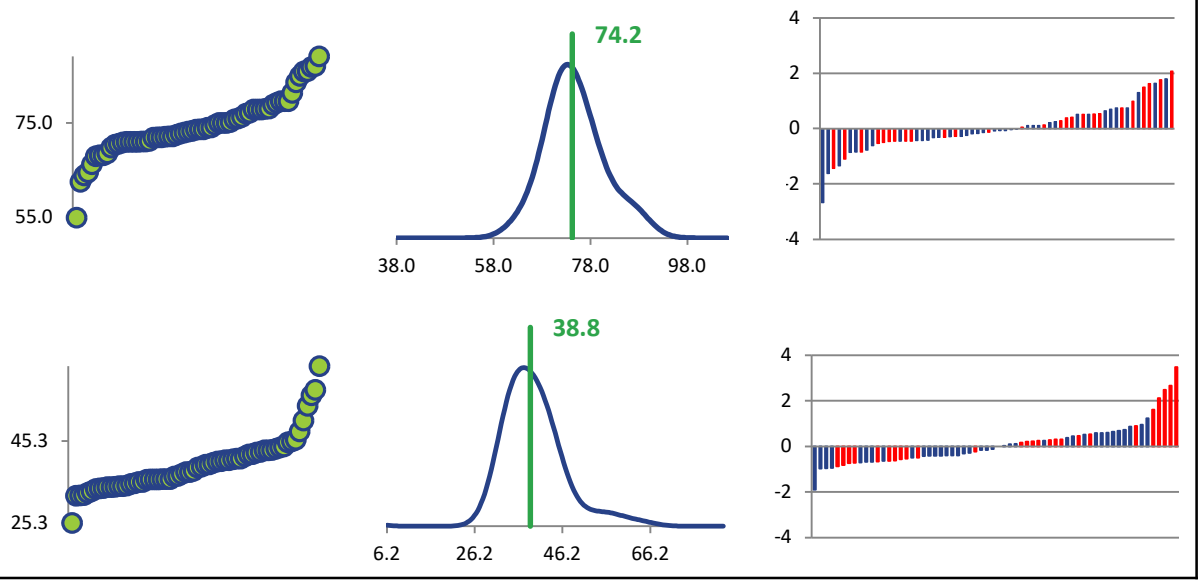
Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	38	38	38	38
ICP/OES (Red)	26	26	26	26

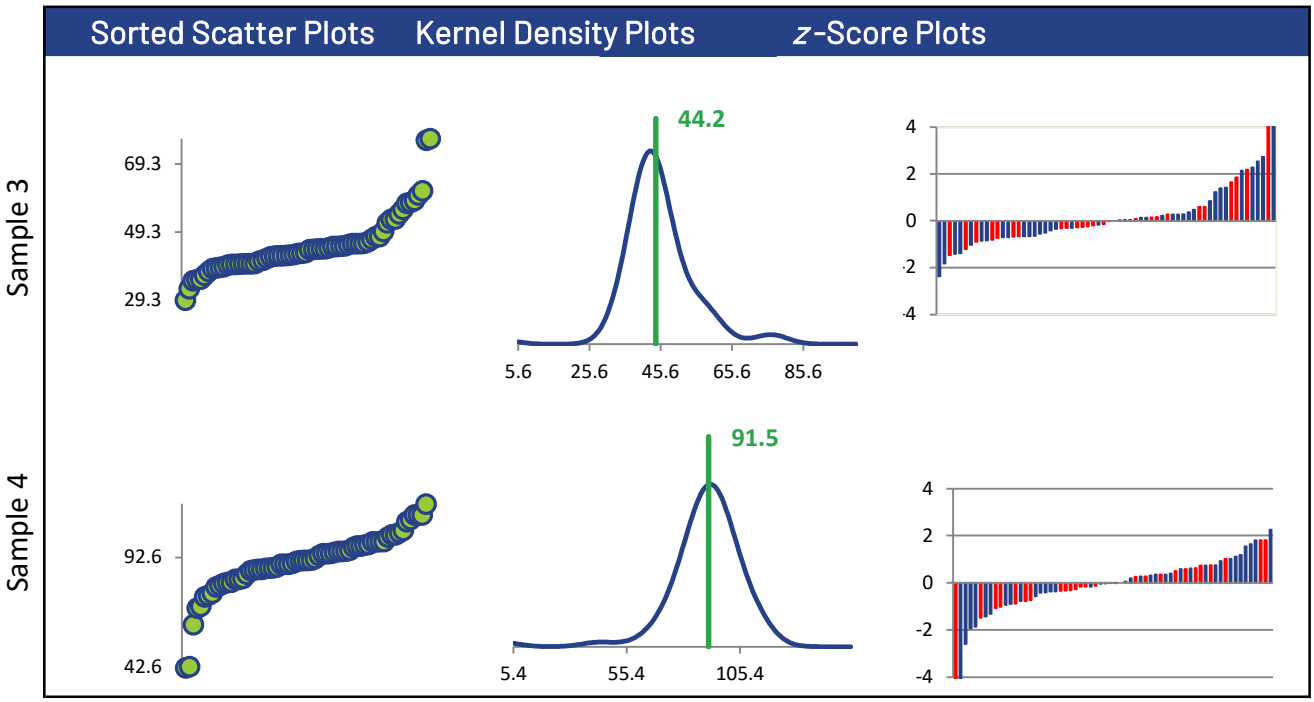
All summary stats and the plots below are based on the data excluding any flagged outliers

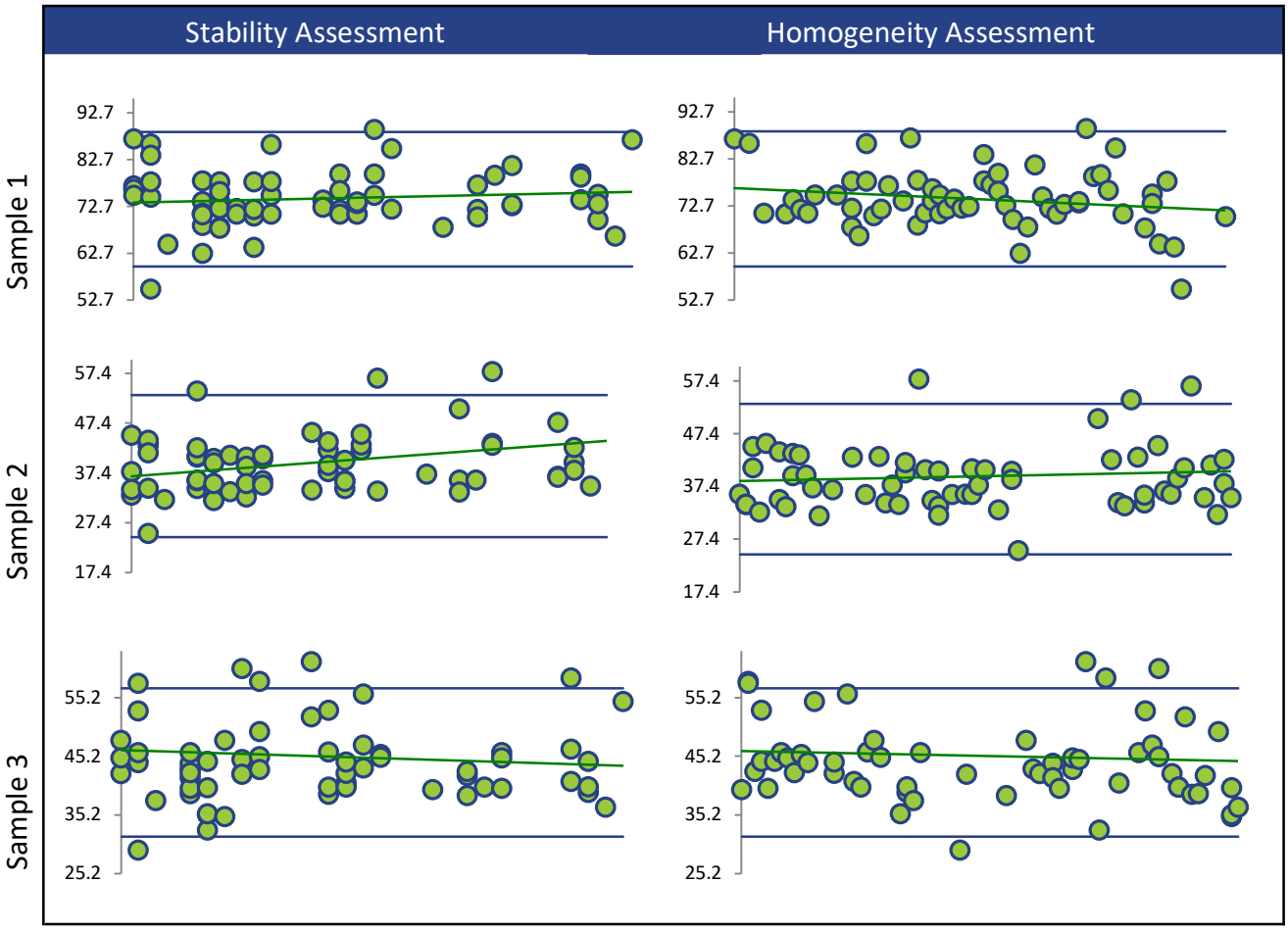
Sorted Scatter Plots Kernel Density Plots *z*-Score Plots

Sample 2



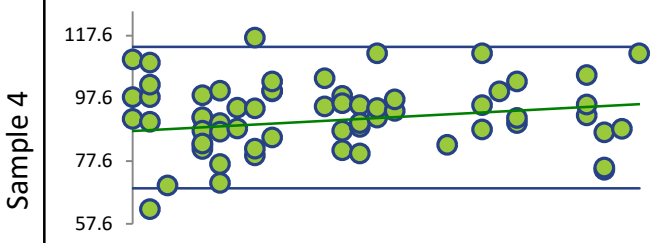
CHROMIUM


Sorted Scatter Plots
Kernel Density Plots
z-Score Plots
Sample 3
69.3
49.3
29.3
44.2
5.6
25.6
45.6
65.6
85.6
4
2
0
-2
-4
Sample 4
92.6
42.6
91.5
5.4
55.4
105.4
4
2
0
-2
-4

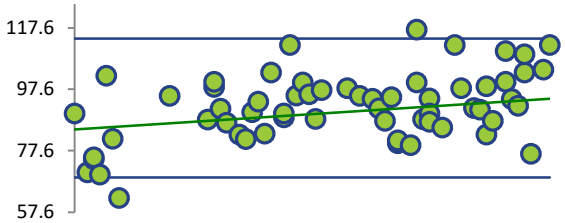

Stability Assessment
Homogeneity Assessment
Sample 1
92.7
82.7
72.7
62.7
52.7
Sample 2
57.4
47.4
37.4
27.4
17.4
Sample 3
55.2
45.2
35.2
25.2

CHROMIUM

Stability Assessment



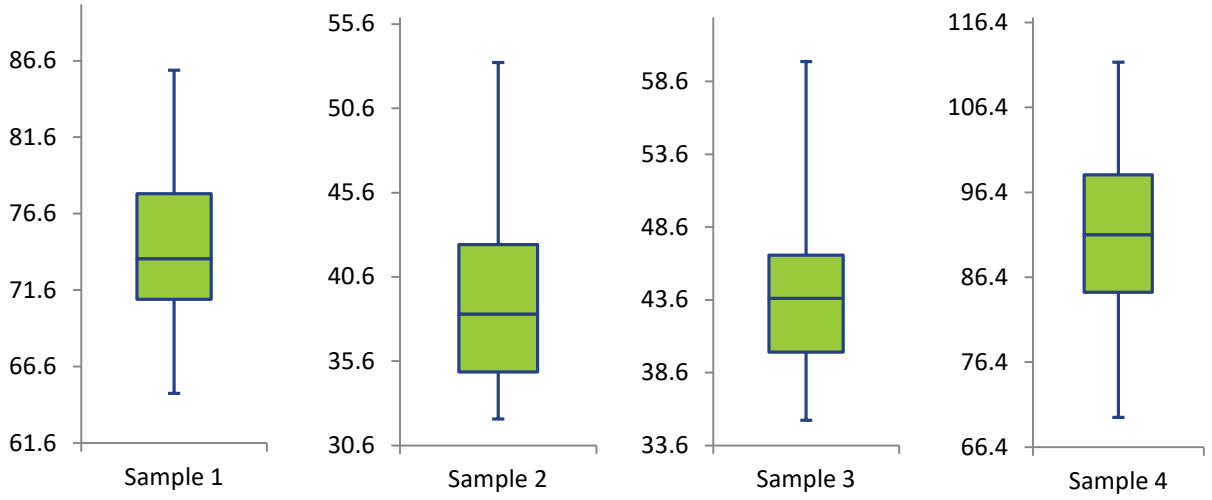
Homogeneity Assessment



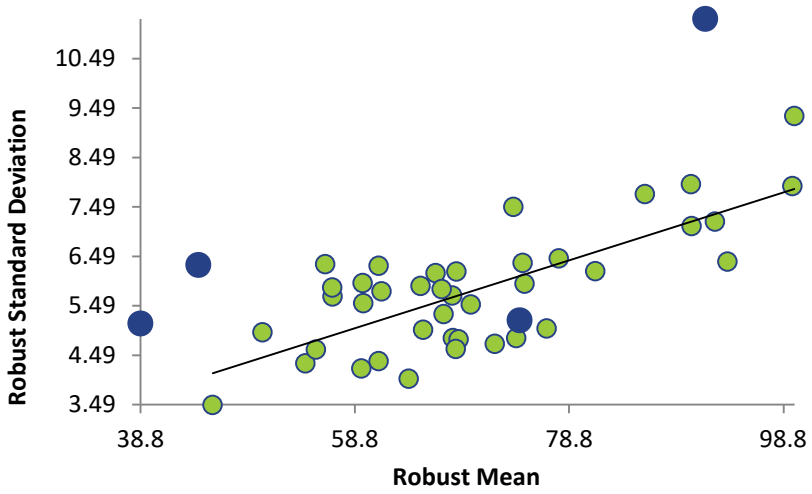
Stability assessments are regression analysis of reported result against date of analysis.

Homogeneity assessments are regression analysis of reported result against bottling order.

Box and Whisker Plots



Current Round (blue) Compared to Historic Rounds (green)



COBALT

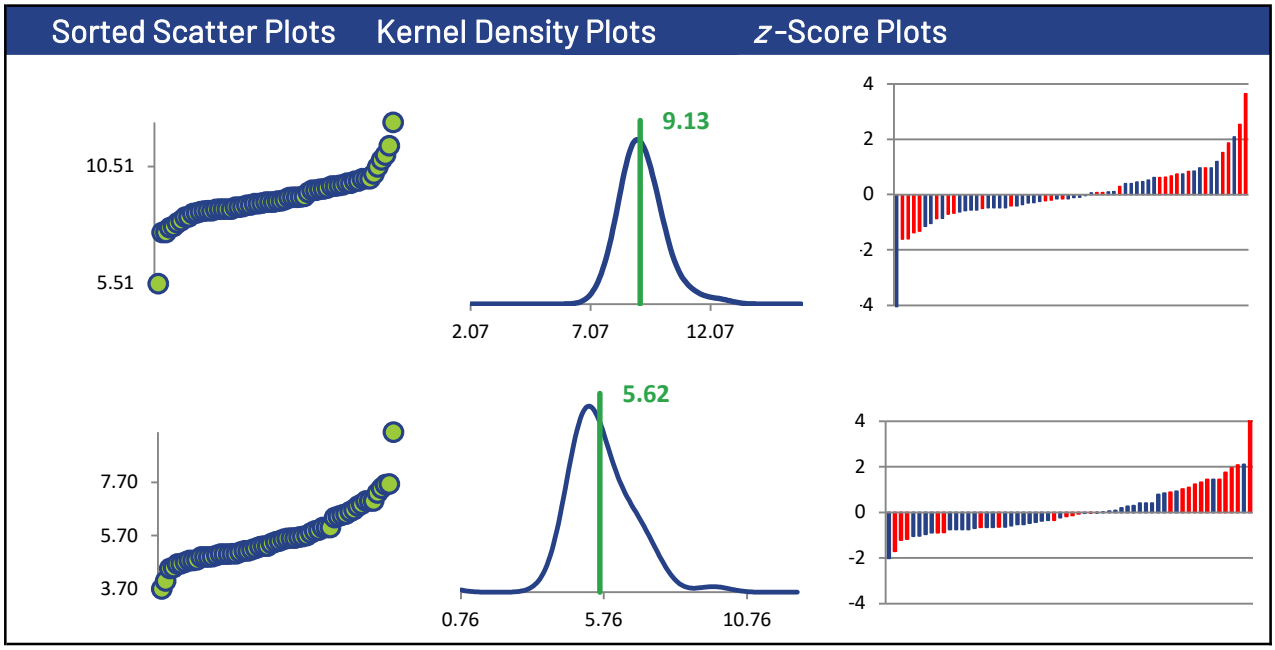
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	62	60	62	62
Median µg/g	9.02	5.48	10.6	14.4
Robust Mean µg/g	9.13	5.62	10.9	14.6
U µg/g	0.120	0.154	0.241	0.275
Robust Standard Deviation µg/g	0.757	0.955	1.52	1.73
Regression Standard Deviation µg/g	0.893	0.550	1.06	1.43
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	0.893	0.955	1.52	1.73
Outliers	0	1	0	0
|z|>3.0	2	1	1	1
2<|z|<3	2	3	2	5

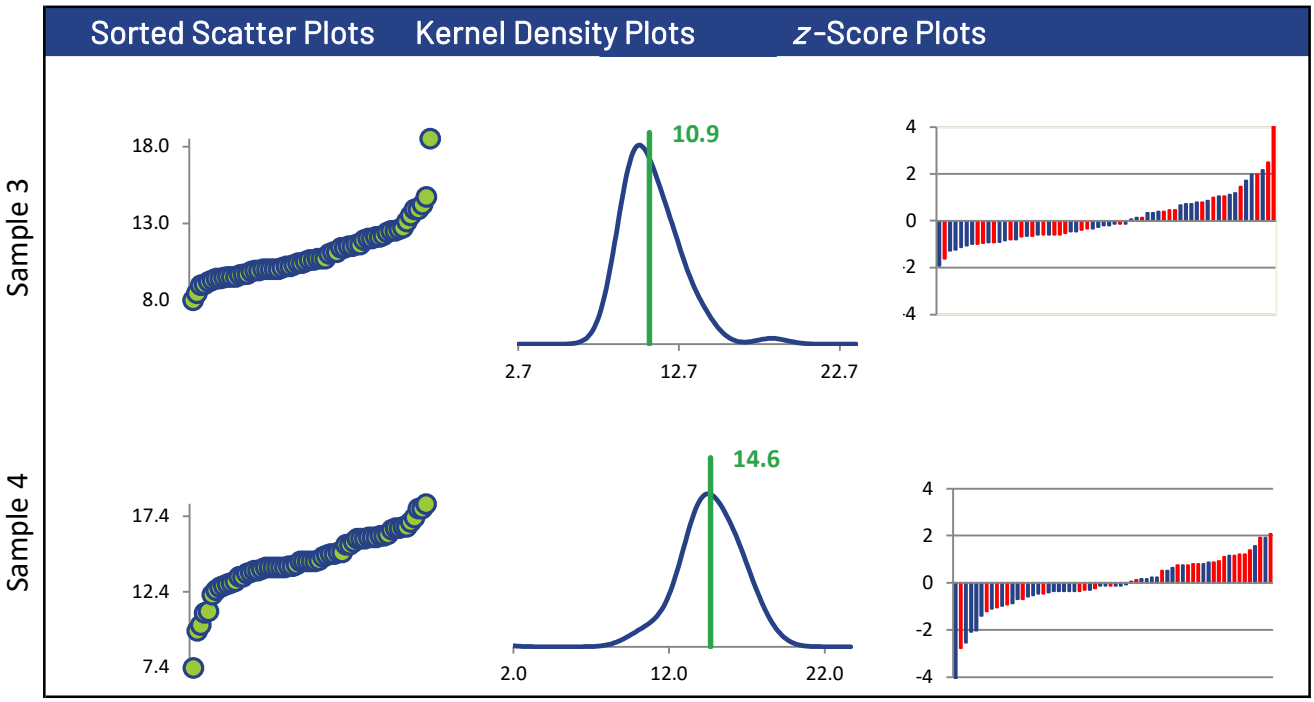
Methods Used

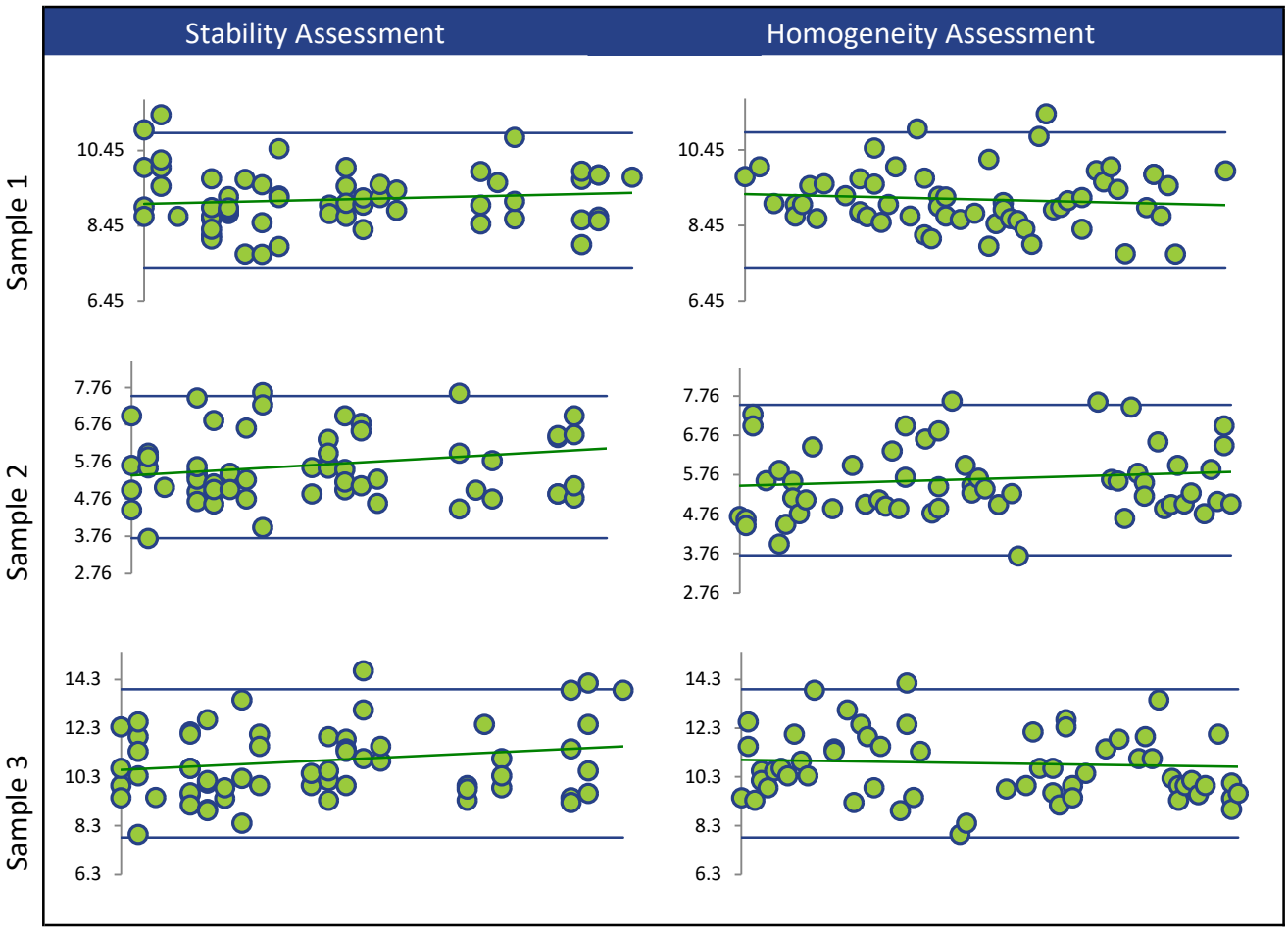
Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	37	37	37	37
ICP/OES (Red)	25	23	25	25

All summary stats and the plots below are based on the data excluding any flagged outliers



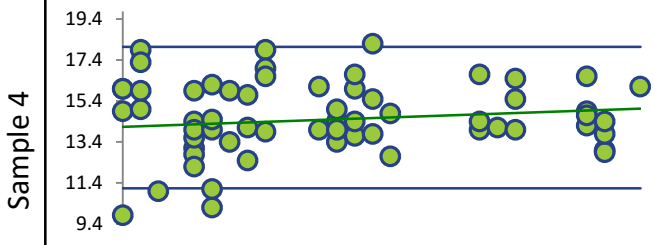
COBALT


Sorted Scatter Plots
Kernel Density Plots
z-Score Plots
Sample 3
18.0
13.0
8.0
10.9
2.7
12.7
22.7
4
2
0
-2
-4
Sample 4
17.4
12.4
7.4
14.6
2.0
12.0
22.0
4
2
0
-2
-4

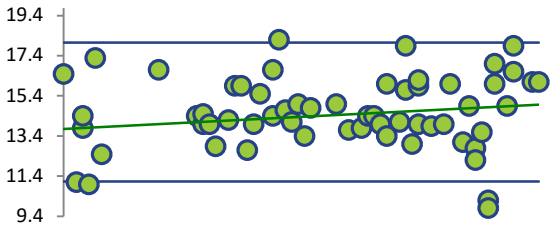

Stability Assessment
Homogeneity Assessment
Sample 1
10.45
8.45
6.45
Sample 2
7.76
6.76
5.76
4.76
3.76
2.76
Sample 3
14.3
12.3
10.3
8.3
6.3

COBALT

Stability Assessment



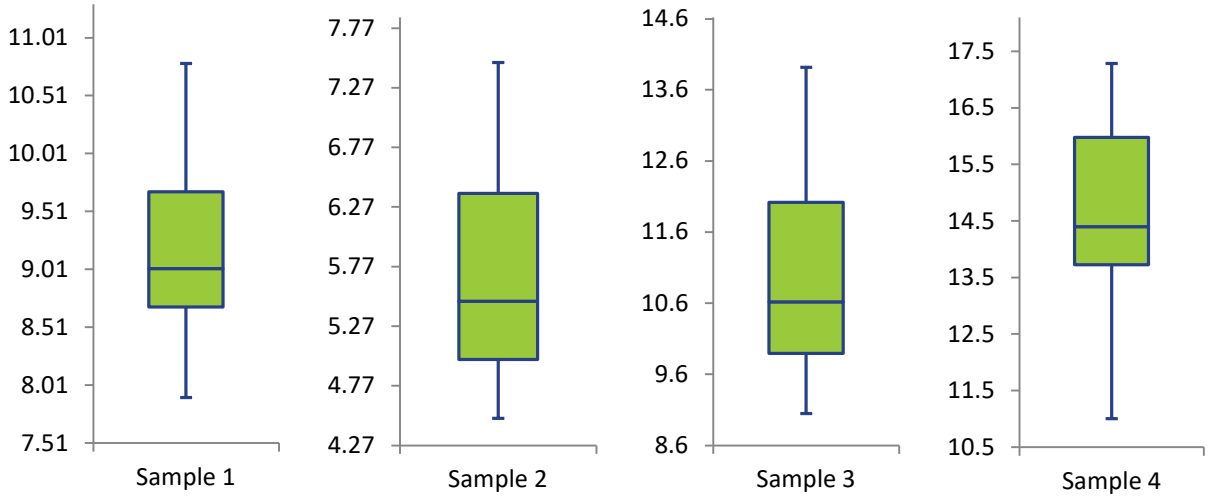
Homogeneity Assessment



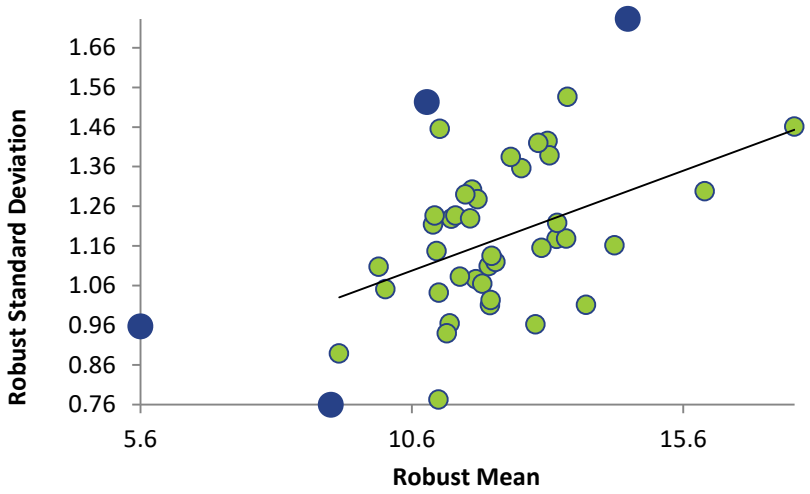
Stability assessments are regression analysis of reported result against date of analysis.

Homogeneity assessments are regression analysis of reported result against bottling order.

Box and Whisker Plots



Current Round (blue) Compared to Historic Rounds (green)



COPPER

Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	65	65	63	63
Median µg/g	208	118	66.0	182
Robust Mean µg/g	208	122	67.1	185
U µg/g	2.82	4.05	1.26	3.24
Robust Standard Deviation µg/g	18.2	26.1	8.01	20.6
Regression Standard Deviation µg/g	17.4	10.2	5.61	15.4
Stability Flag				
Homogeneity Flag	Homogeneity			Homogeneity
Standard Deviation Used (SDPA) µg/g	19.8	26.1	8.01	37.6
Outliers	0	0	2	2
|z|>3.0	2	3	2	0
2<|z|<3	3	4	6	1

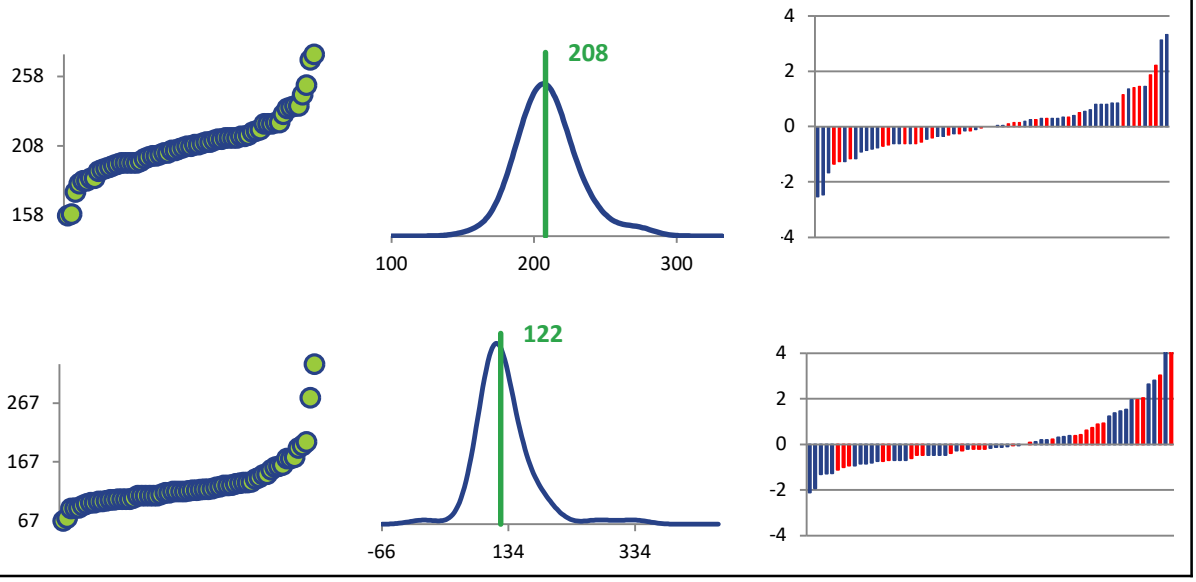
Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	39	39	38	38
ICP/OES (Red)	26	26	25	25

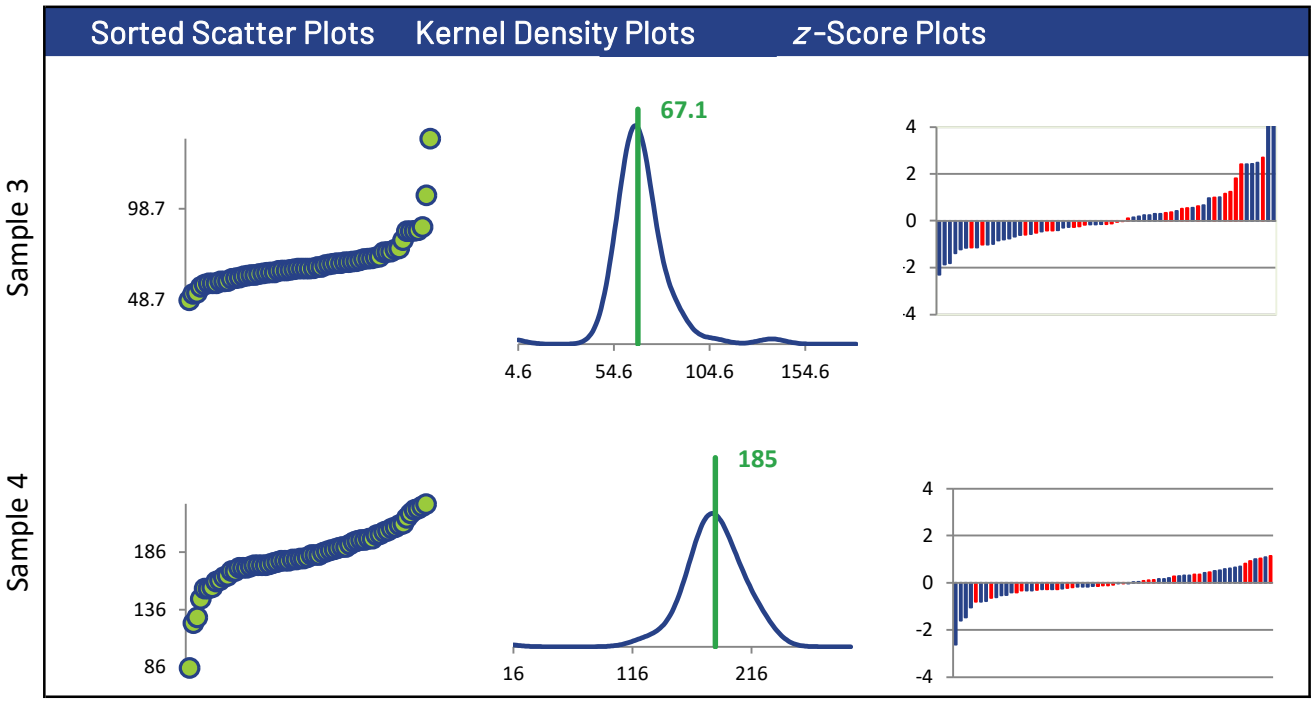
All summary stats and the plots below are based on the data excluding any flagged outliers

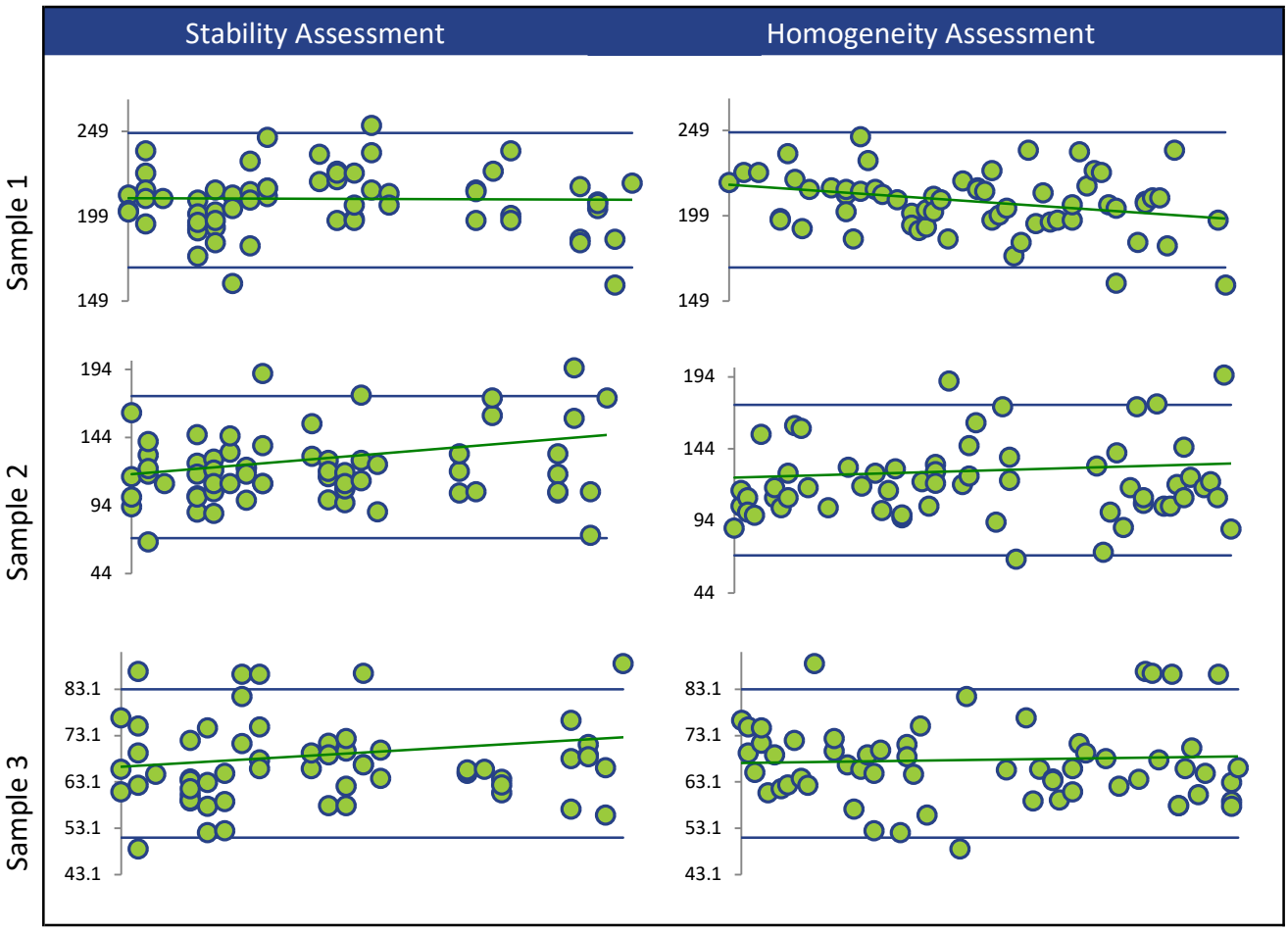
Sorted Scatter Plots Kernel Density Plots *z*-Score Plots

Sample 2



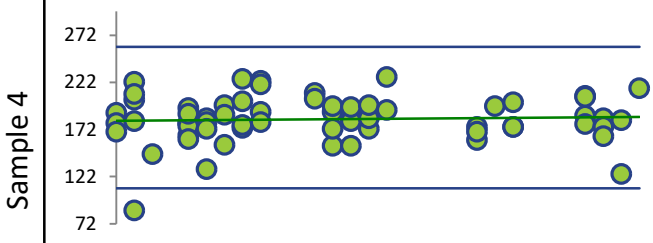
COPPER


Sorted Scatter Plots
Kernel Density Plots
z-Score Plots
Sample 3
98.7
48.7
67.1
4.6
54.6
104.6
154.6
4
2
0
-2
-4
Sample 4
186
136
86
185
16
116
216
4
2
0
-2
-4

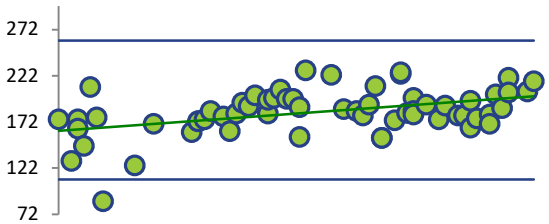

Stability Assessment
Homogeneity Assessment
Sample 1
249
199
149
Sample 2
194
144
94
44
Sample 3
83.1
73.1
63.1
53.1
43.1

COPPER

Stability Assessment



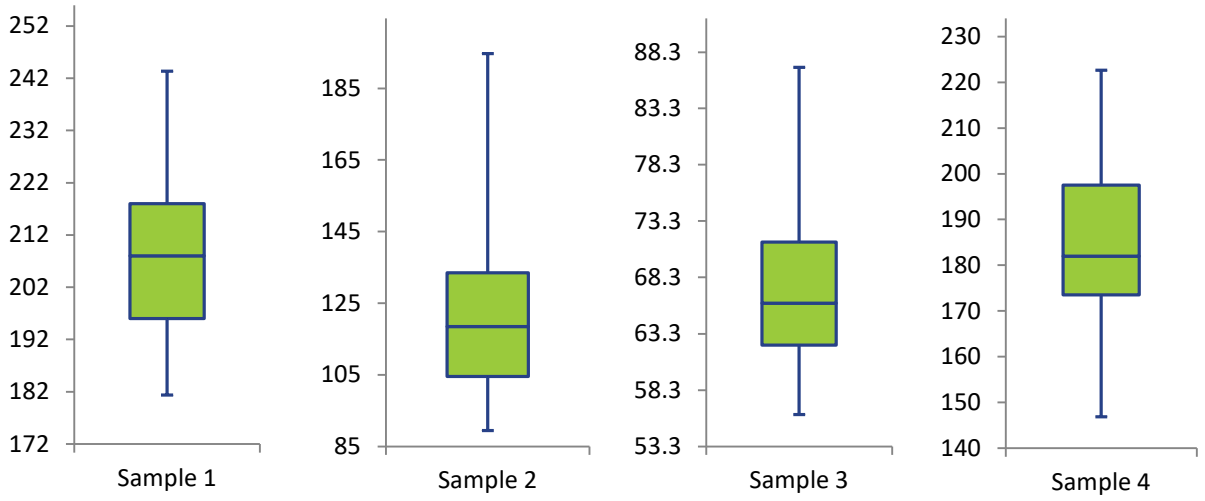
Homogeneity Assessment



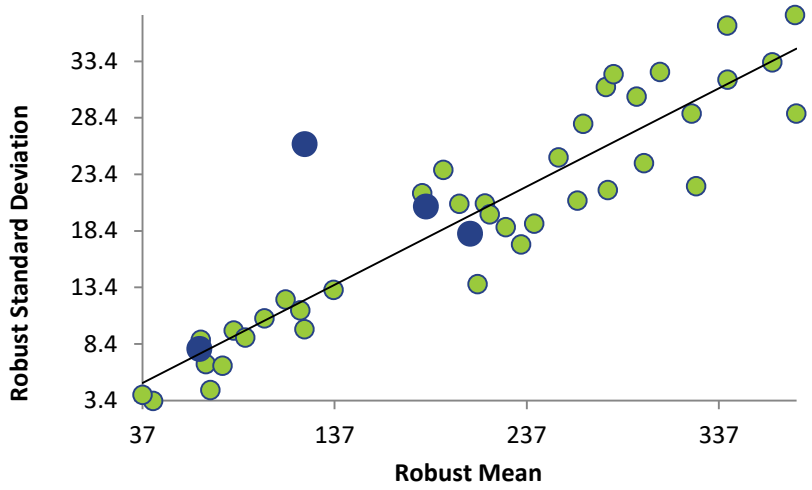
Stability assessments are regression analysis of reported result against date of analysis.

Homogeneity assessments are regression analysis of reported result against bottling order.

Box and Whisker Plots



Current Round (blue) Compared to Historic Rounds (green)



IRON

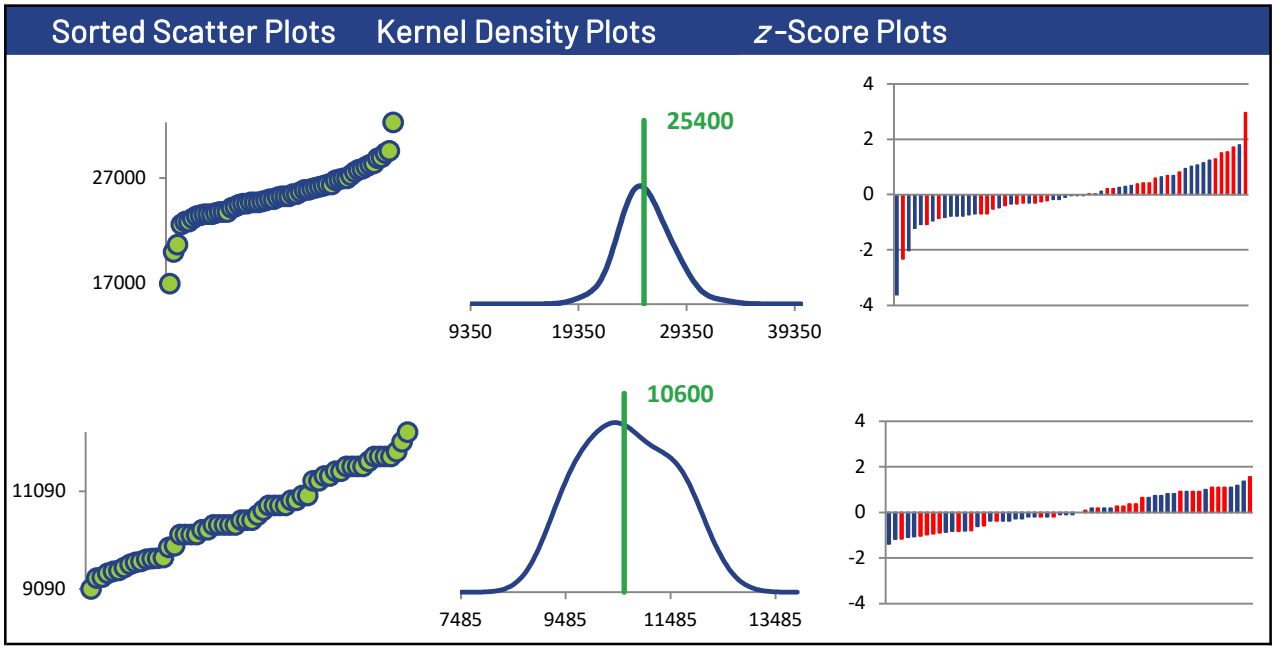
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	59	58	57	56
Median µg/g	25300	10500	1860	23100
Robust Mean µg/g	25400	10600	1880	23100
U µg/g	342	155	28.1	322
Robust Standard Deviation µg/g	2100	945	170	1930
Regression Standard Deviation µg/g	2320	970	172	2110
Stability Flag		Stability		
Homogeneity Flag				Homogeneity
Standard Deviation Used (SDPA) µg/g	2320	1100	172	2330
Outliers	0	1	2	3
|z|>3.0	1	0	2	1
2<|z|<3	3	0	2	3

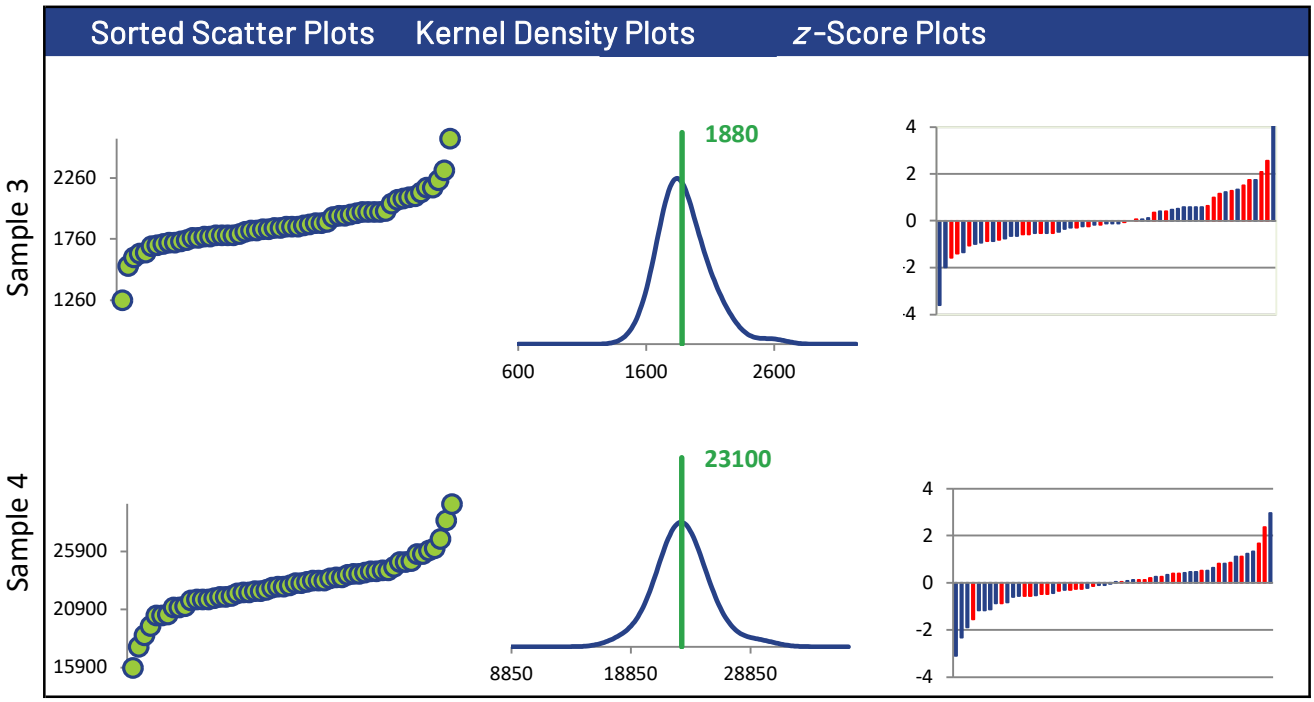
Methods Used

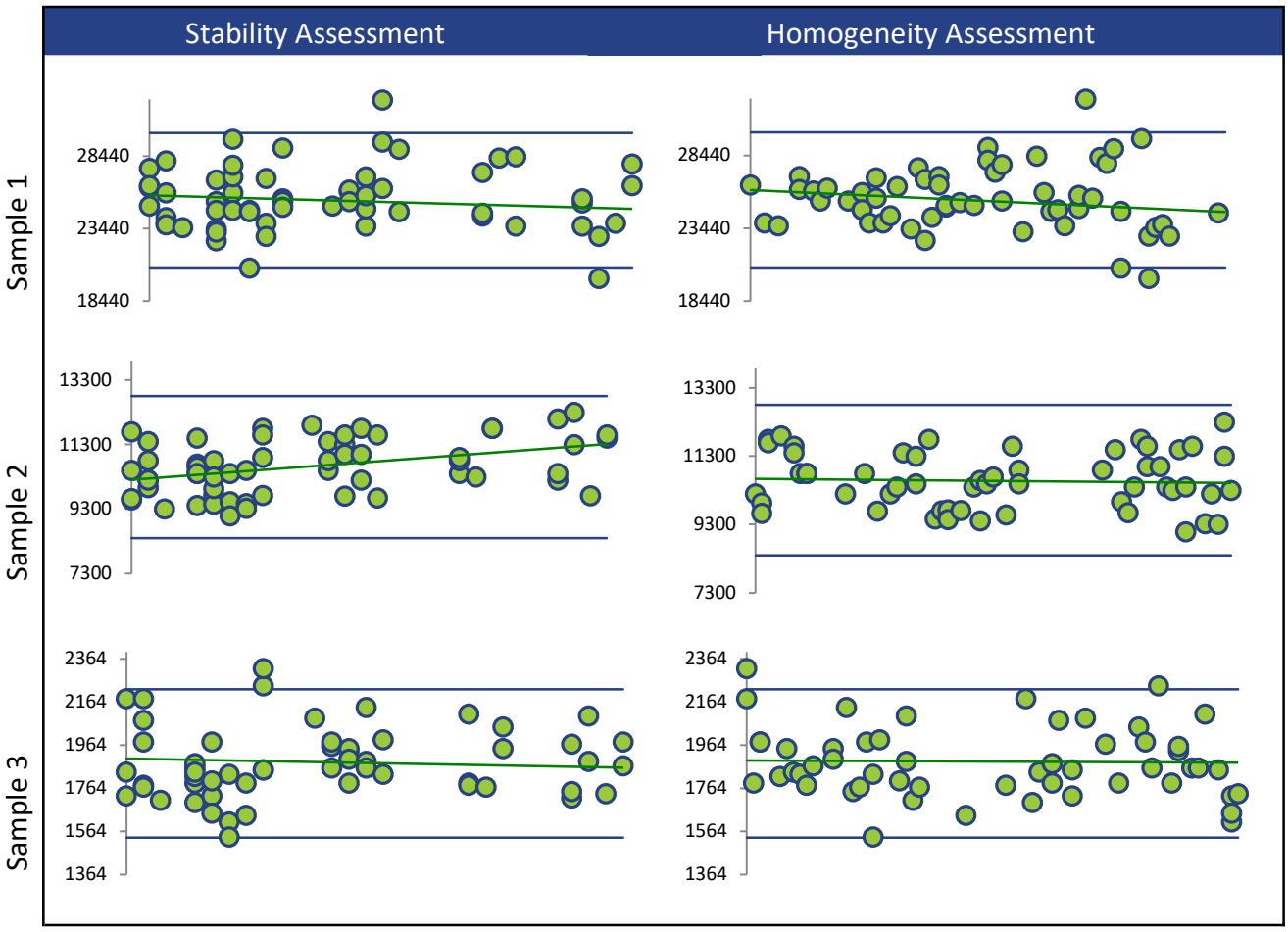
Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	33	32	32	32
ICP/OES (Red)	26	26	25	24

All summary stats and the plots below are based on the data excluding any flagged outliers



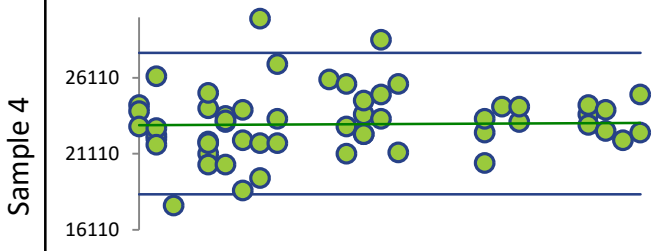
IRON


Sorted Scatter Plots
Kernel Density Plots
z-Score Plots
Sample 3
2260
1760
1260
1880
600
1600
2600
4
2
0
-2
-4
Sample 4
25900
20900
15900
23100
8850
18850
28850
4
2
0
-2
-4

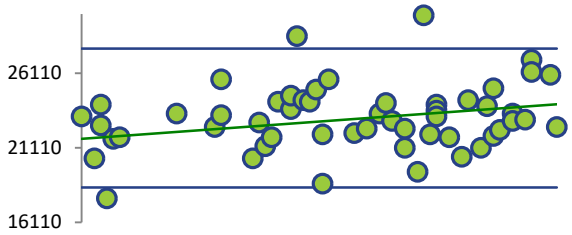

Stability Assessment
Homogeneity Assessment
Sample 1
28440
23440
18440
Sample 2
13300
11300
9300
7300
Sample 3
2364
2164
1964
1764
1564
1364

IRON

Stability Assessment



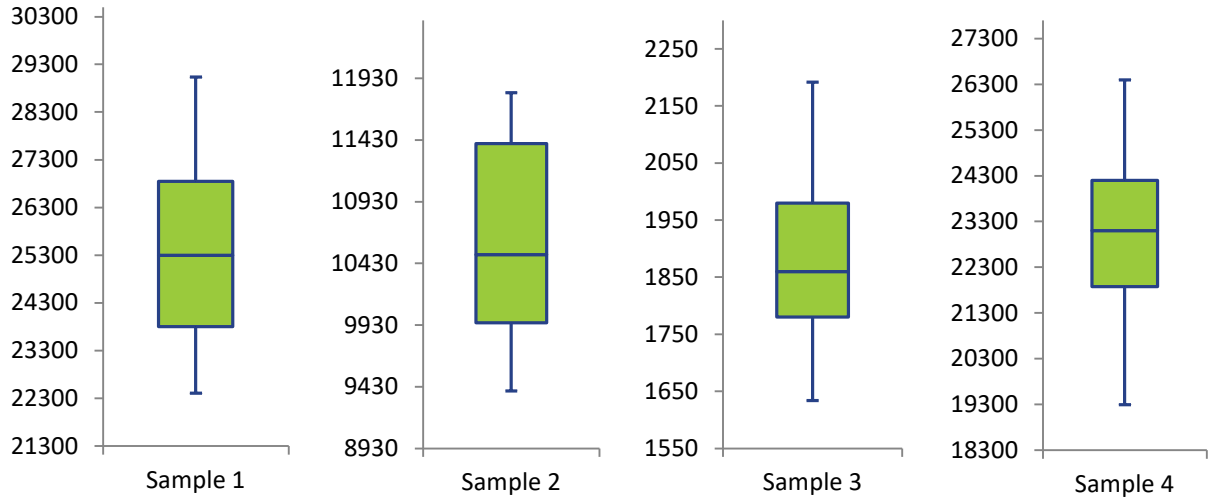
Homogeneity Assessment



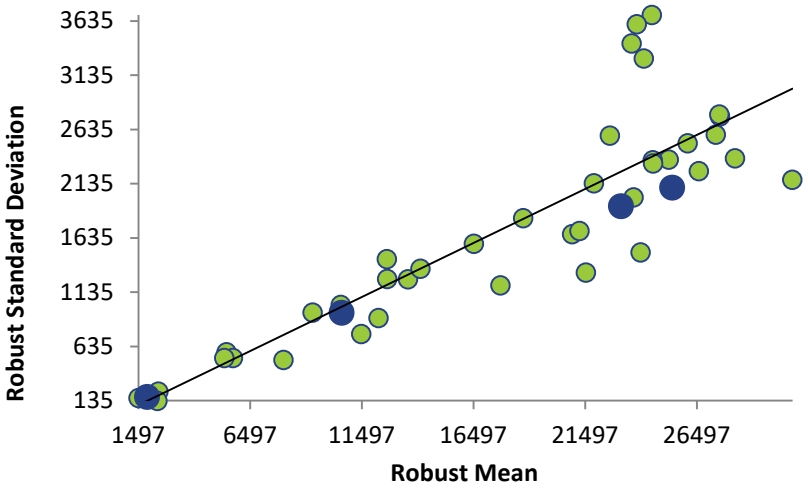
Stability assessments are regression analysis of reported result against date of analysis.

Homogeneity assessments are regression analysis of reported result against bottling order.

Box and Whisker Plots



Current Round (blue) Compared to Historic Rounds (green)



LEAD

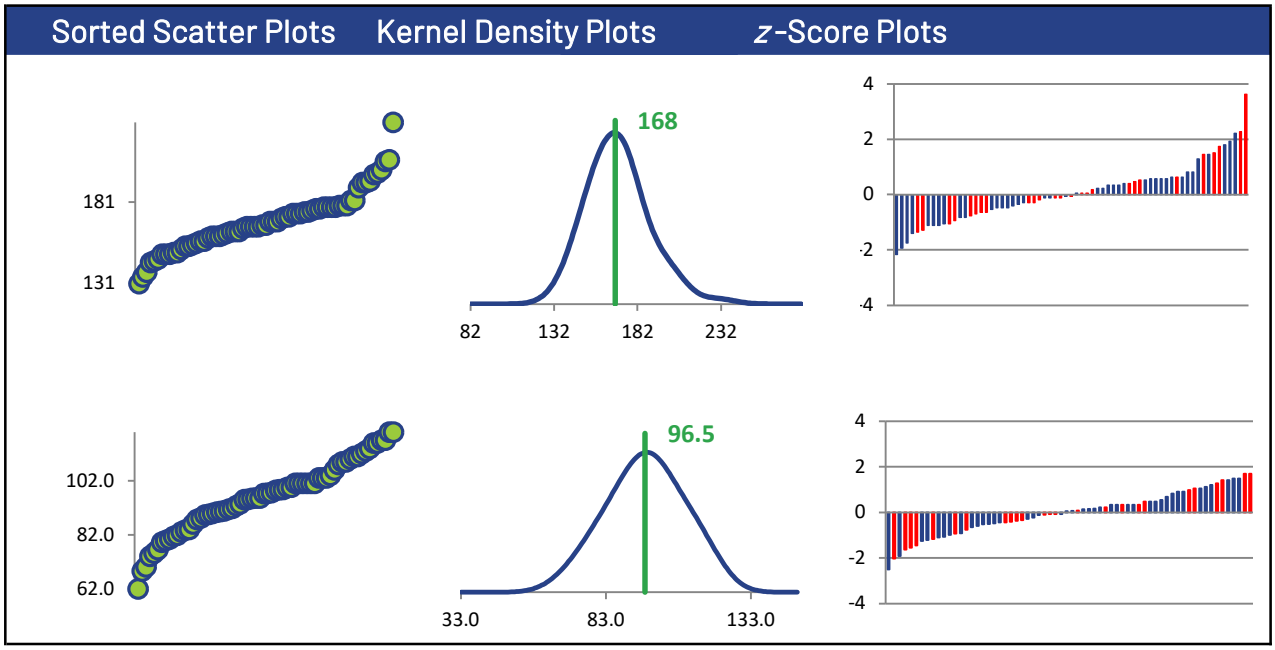
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	67	66	65	65
Median µg/g	167	97.4	14.8	123
Robust Mean µg/g	168	96.5	15.3	125
U µg/g	2.61	2.12	0.512	2.54
Robust Standard Deviation µg/g	17.1	13.8	3.30	16.4
Regression Standard Deviation µg/g	14.2	8.88	2.82	11.0
Stability Flag				
Homogeneity Flag				Homogeneity
Standard Deviation Used (SDPA) µg/g	17.1	13.8	3.30	20.0
Outliers	0	1	2	2
|z|>3.0	1	0	4	0
2<|z|<3	3	2	4	3

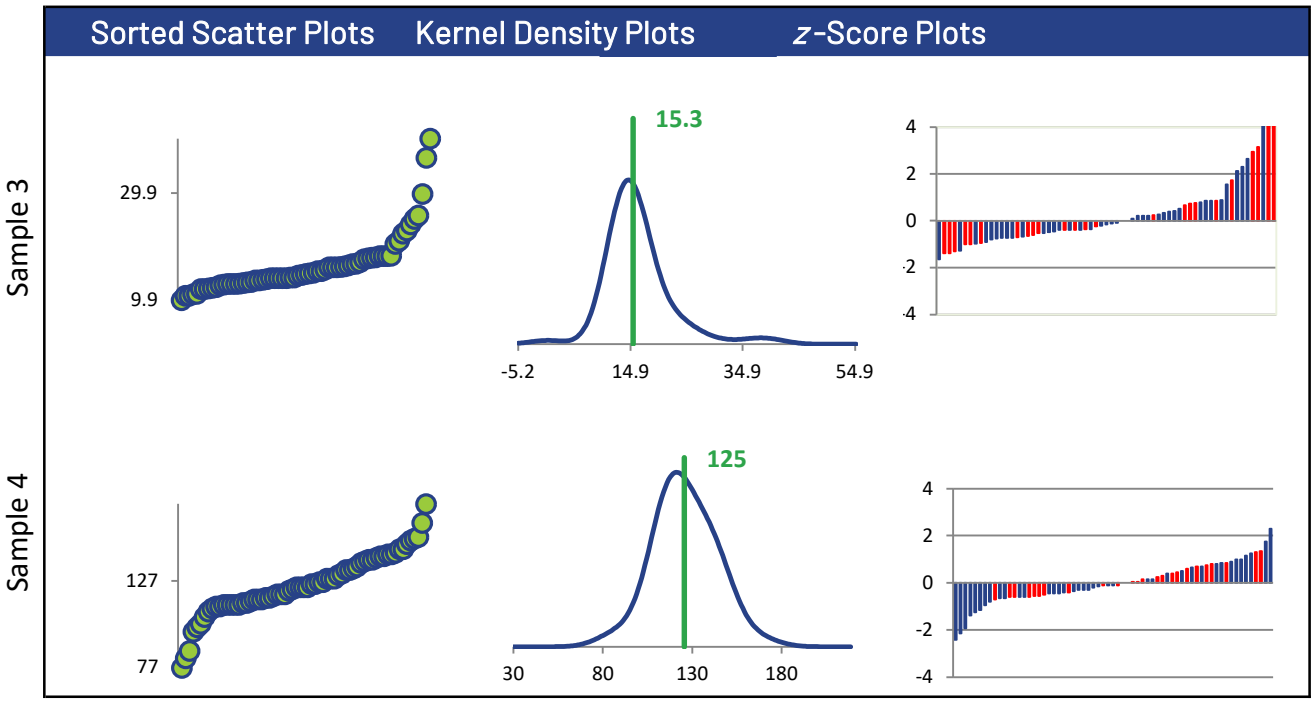
Methods Used

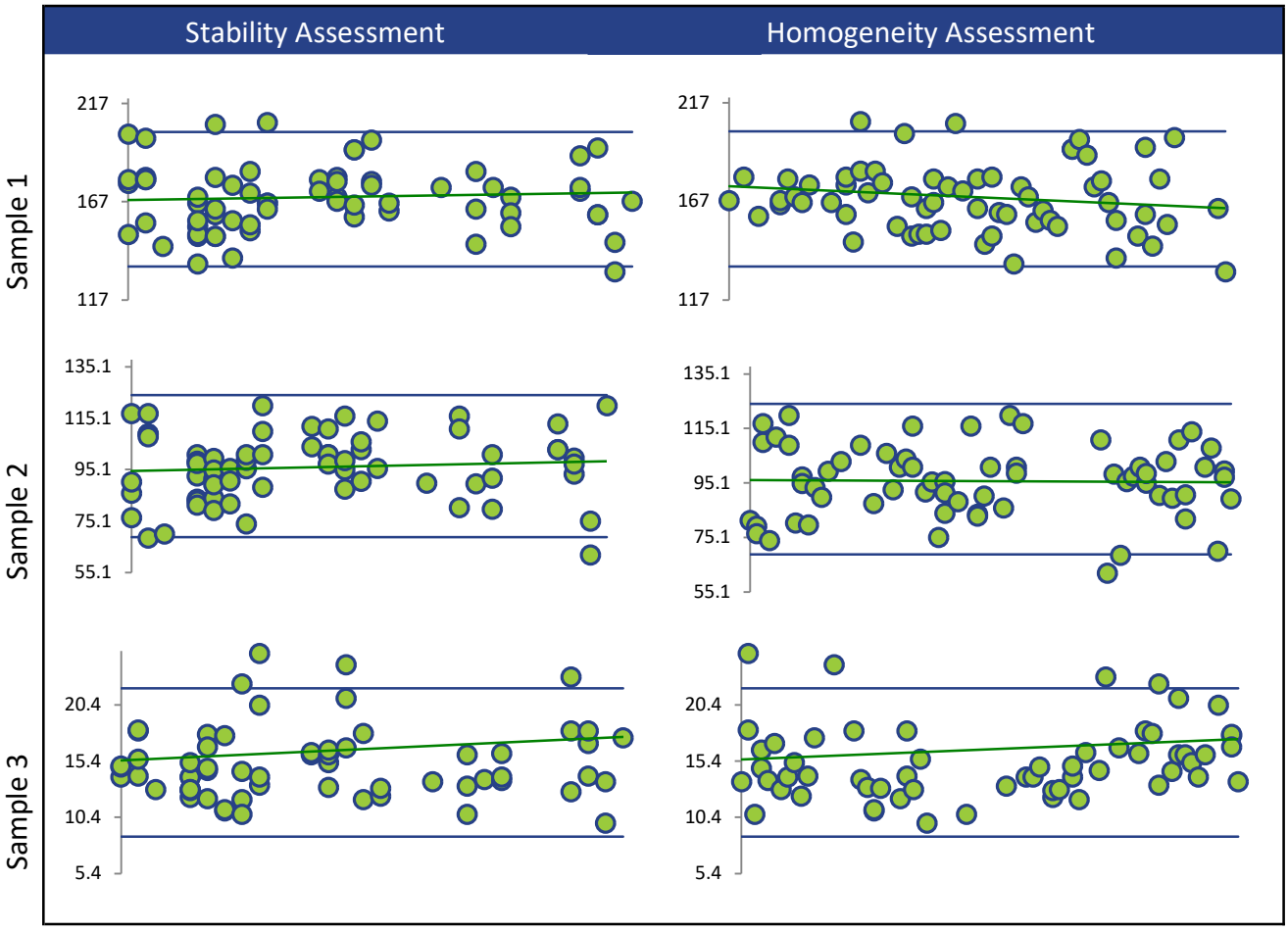
Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	41	41	40	40
ICP/OES (Red)	26	25	25	25

All summary stats and the plots below are based on the data excluding any flagged outliers



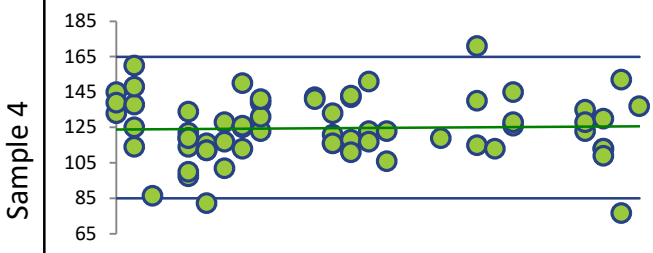
LEAD


Sorted Scatter Plots
Kernel Density Plots
z-Score Plots
Sample 3
29.9
9.9
15.3
-5.2
14.9
34.9
54.9
4
2
0
-2
-4
Sample 4
127
77
125
30
80
130
180
4
2
0
-2
-4

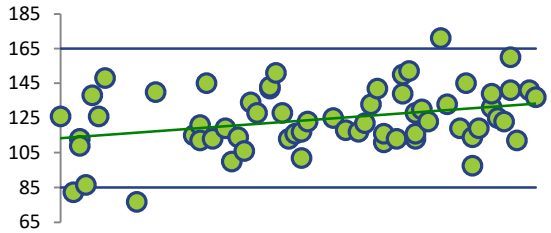

Stability Assessment
Homogeneity Assessment
Sample 1
217
167
117
Sample 2
135.1
115.1
95.1
75.1
55.1
Sample 3
20.4
15.4
10.4
5.4

LEAD

Stability Assessment



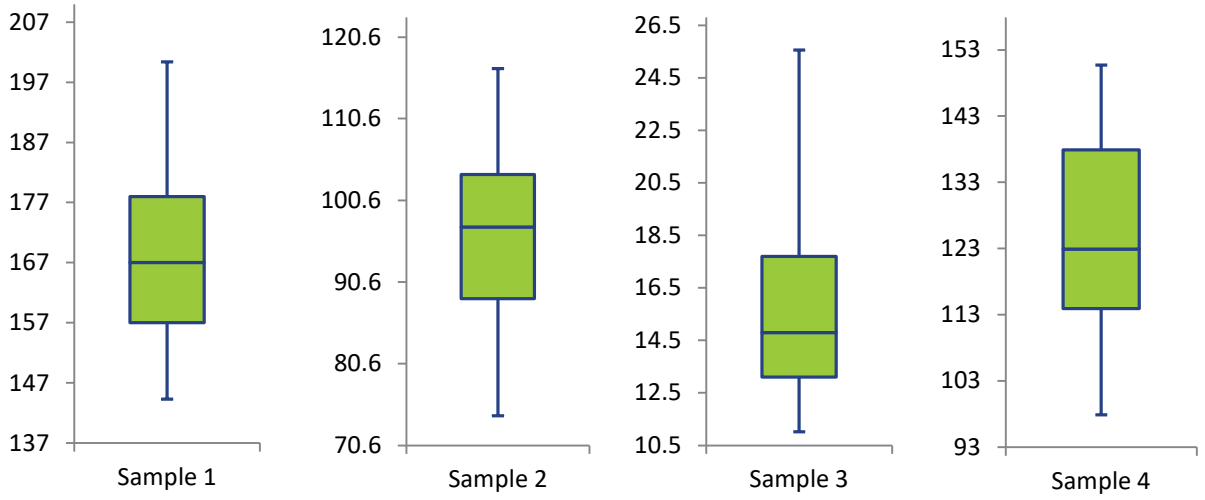
Homogeneity Assessment



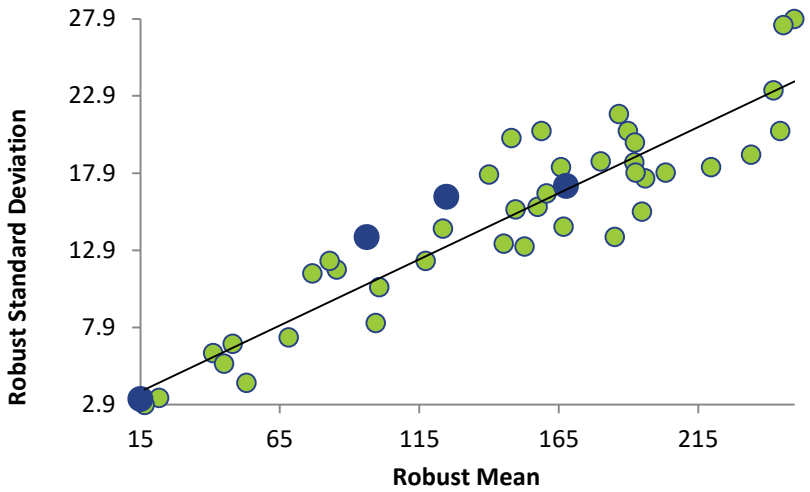
Stability assessments are regression analysis of reported result against date of analysis.

Homogeneity assessments are regression analysis of reported result against bottling order.

Box and Whisker Plots



Current Round (blue) Compared to Historic Rounds (green)



MANGANESE

Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	59	59	58	56
Median µg/g	947	430	139	838
Robust Mean µg/g	954	442	137	846
U µg/g	13.6	9.49	2.51	17.2
Robust Standard Deviation µg/g	83.7	58.3	15.3	103
Regression Standard Deviation µg/g	69.9	32.4	10.0	62.0
Stability Flag				
Homogeneity Flag				Homogeneity
Standard Deviation Used (SDPA) µg/g	83.7	58.3	15.3	184
Outliers	1	1	2	4
|z|>3.0	2	3	2	0
2<|z|<3	7	2	3	2

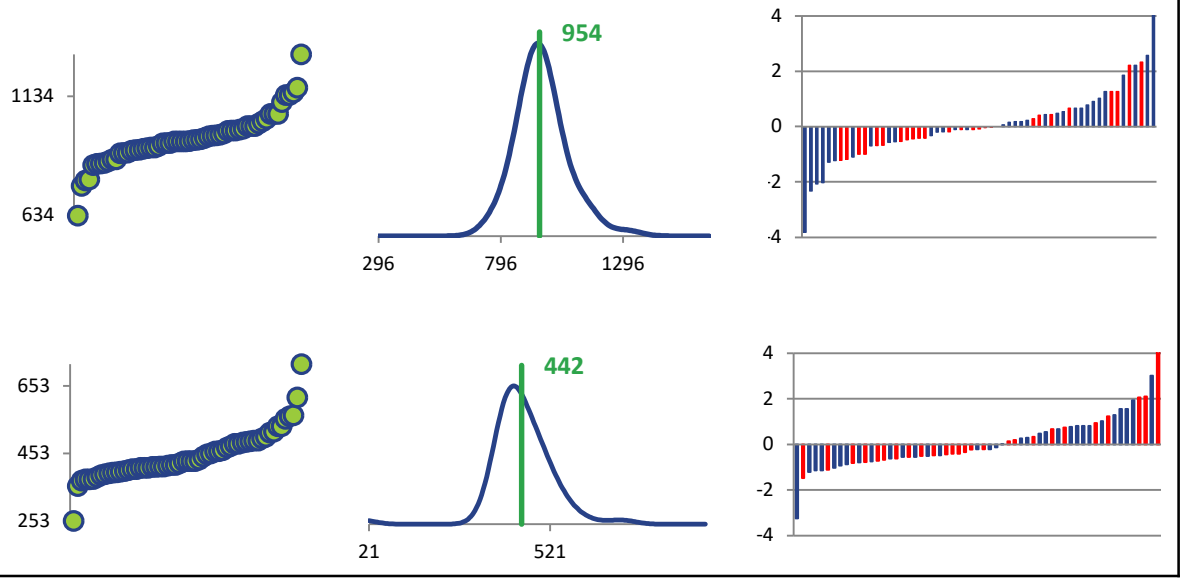
Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	33	33	33	32
ICP/OES (Red)	26	26	25	24

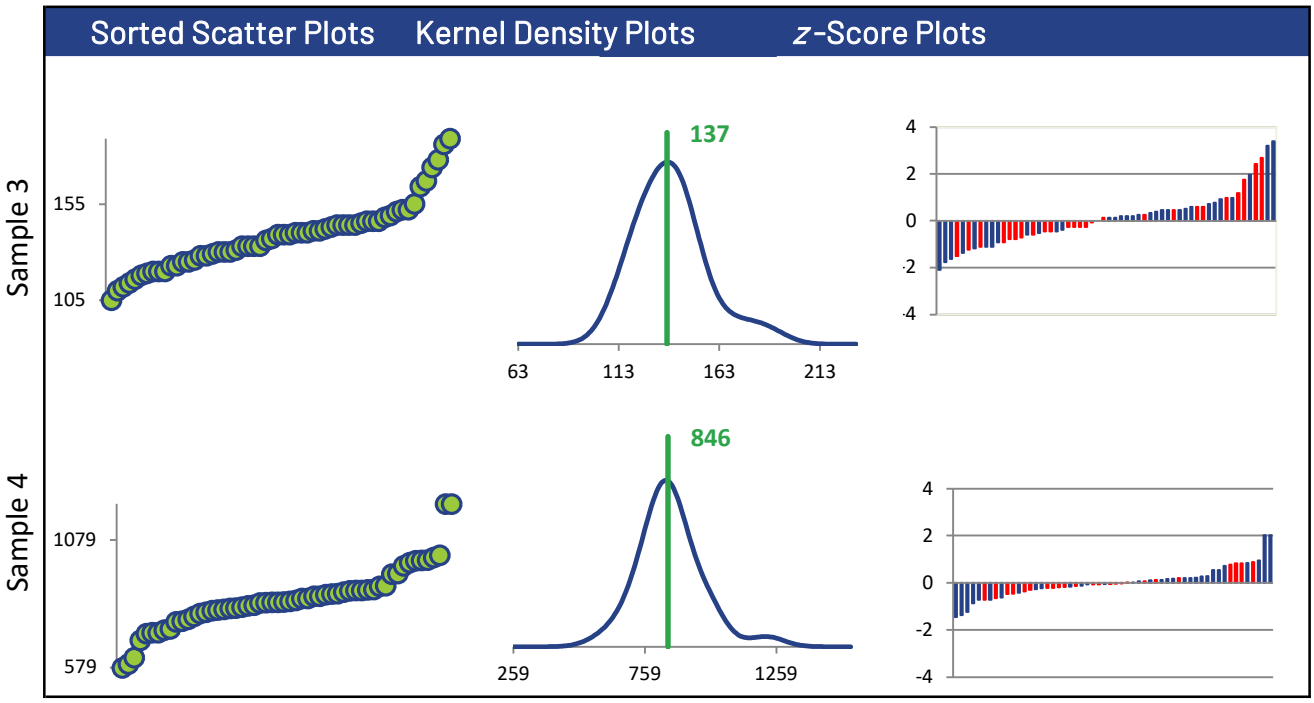
All summary stats and the plots below are based on the data excluding any flagged outliers

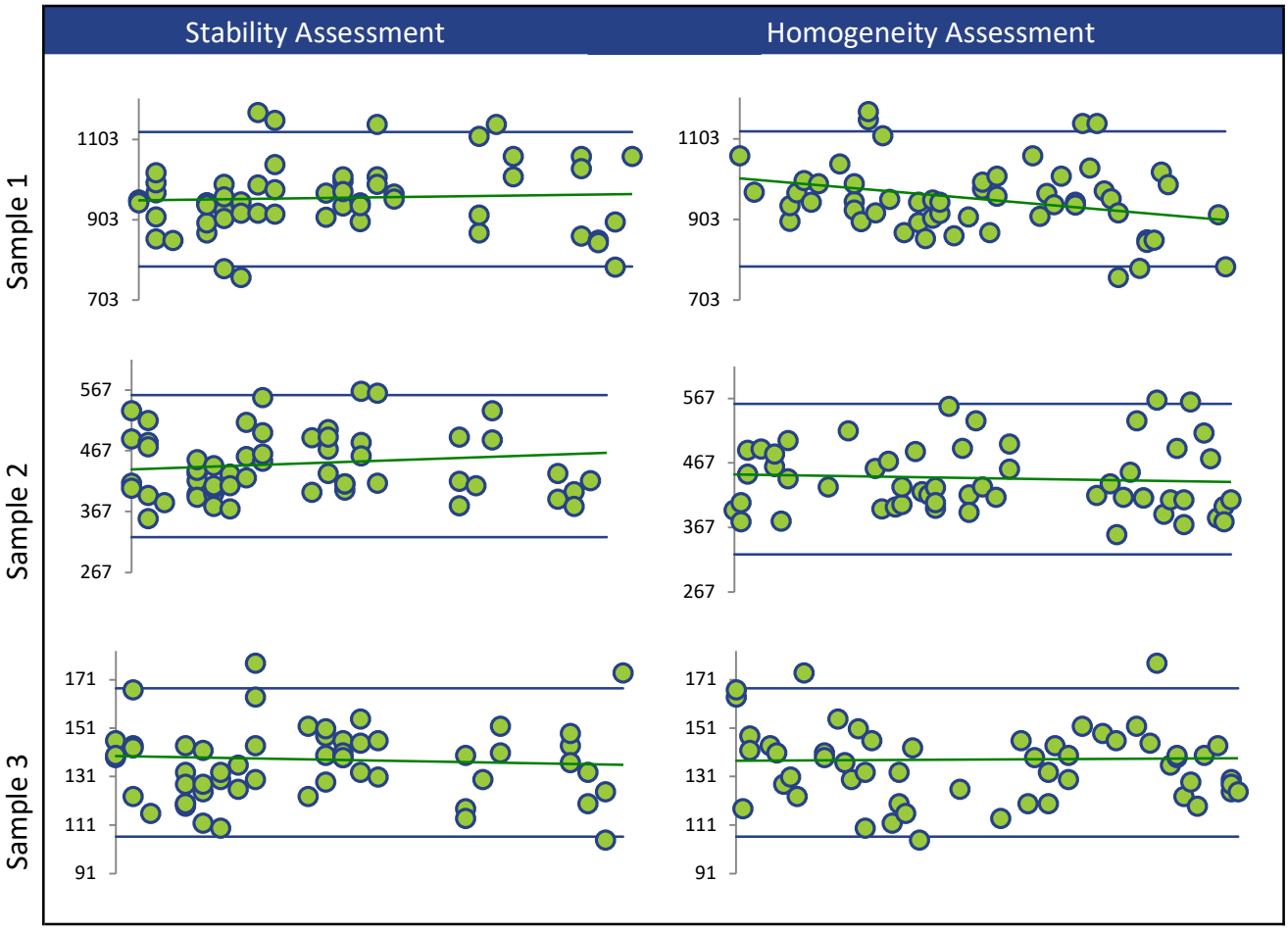
Sorted Scatter Plots Kernel Density Plots *z*-Score Plots

Sample 2



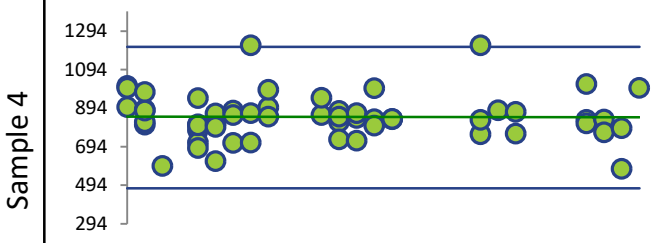
MANGANESE


Sorted Scatter Plots
Kernel Density Plots
z-Score Plots
Sample 3
155
105
137
63
113
163
213
4
2
0
-2
-4
Sample 4
1079
579
846
259
759
1259
4
2
0
-2
-4

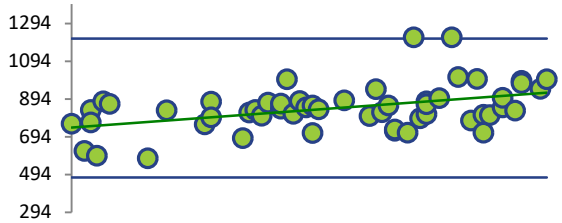

Stability Assessment
Homogeneity Assessment
Sample 1
1103
903
703
1103
903
703
Sample 2
567
467
367
267
567
467
367
267
Sample 3
171
151
131
111
91
171
151
131
111
91

MANGANESE

Stability Assessment



Homogeneity Assessment



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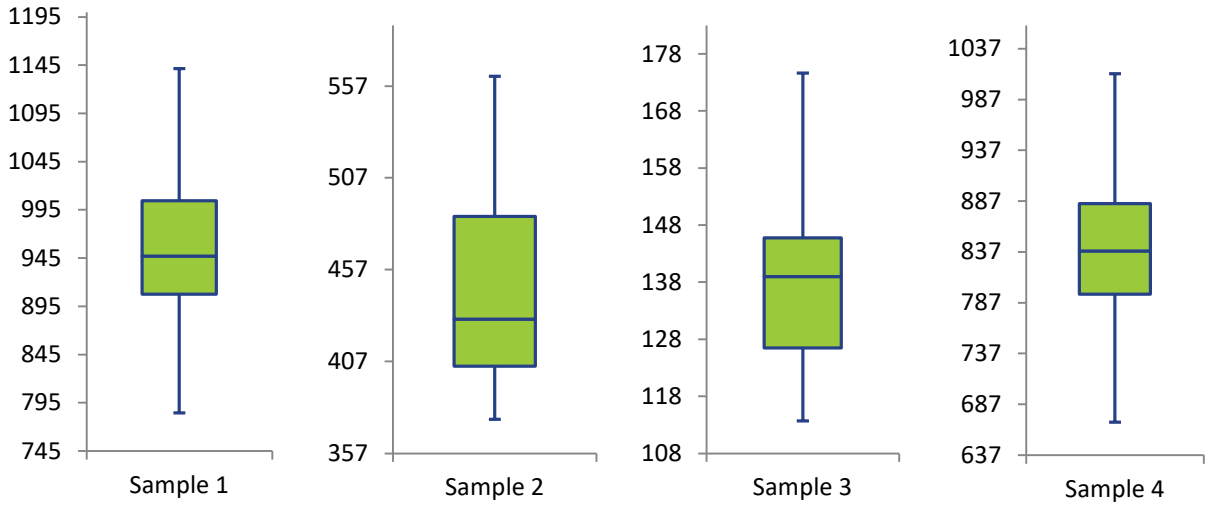
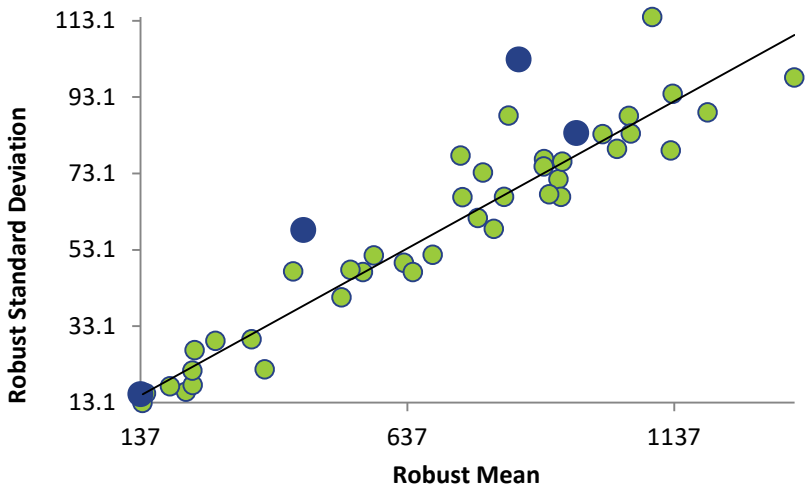
Homogeneity assessments are regression analysis of reported result against bottling order.

Box and Whisker Plots



Current Round (blue) Compared to Historic Rounds (green)



MERCURY

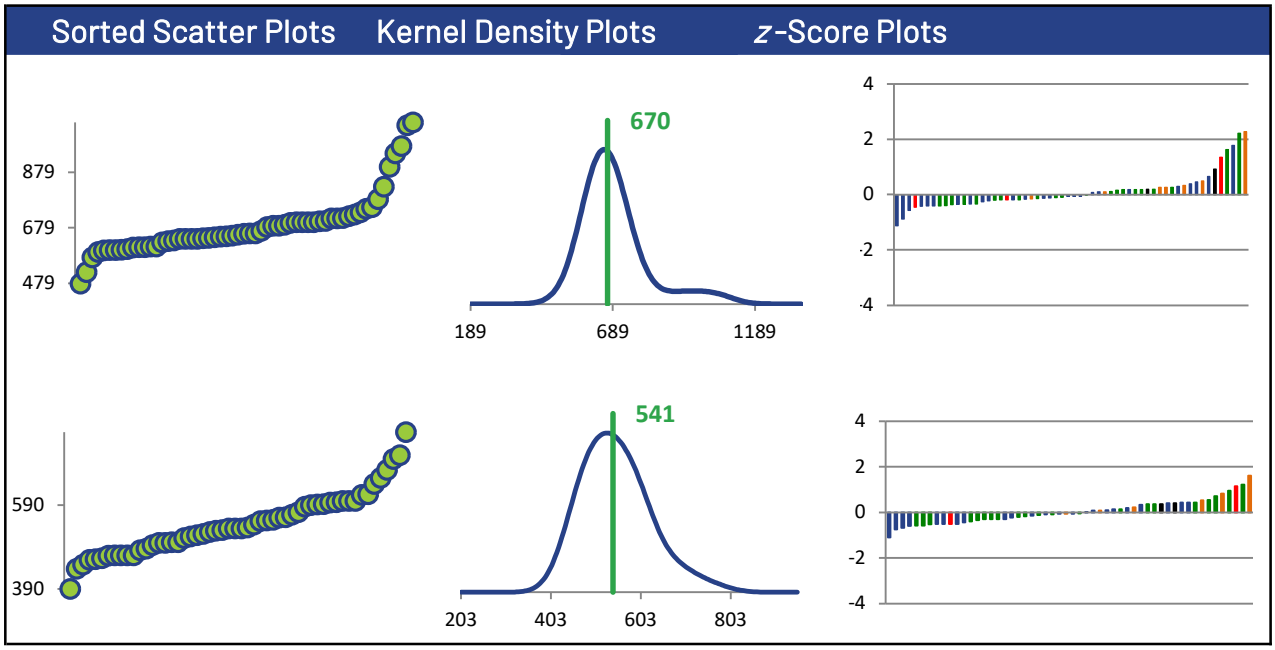
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	58	54	54	58
Median µg/g	660	534	133	878
Robust Mean µg/g	670	541	138	872
U µg/g	10.9	11.7	4.68	17.1
Robust Standard Deviation µg/g	66.7	69.0	27.5	104
Regression Standard Deviation µg/g	171	138	35.2	222
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	171	138	35.2	222
Outliers	2	2	2	2
|z|>3.0	0	0	0	0
2<|z|<3	2	0	1	1

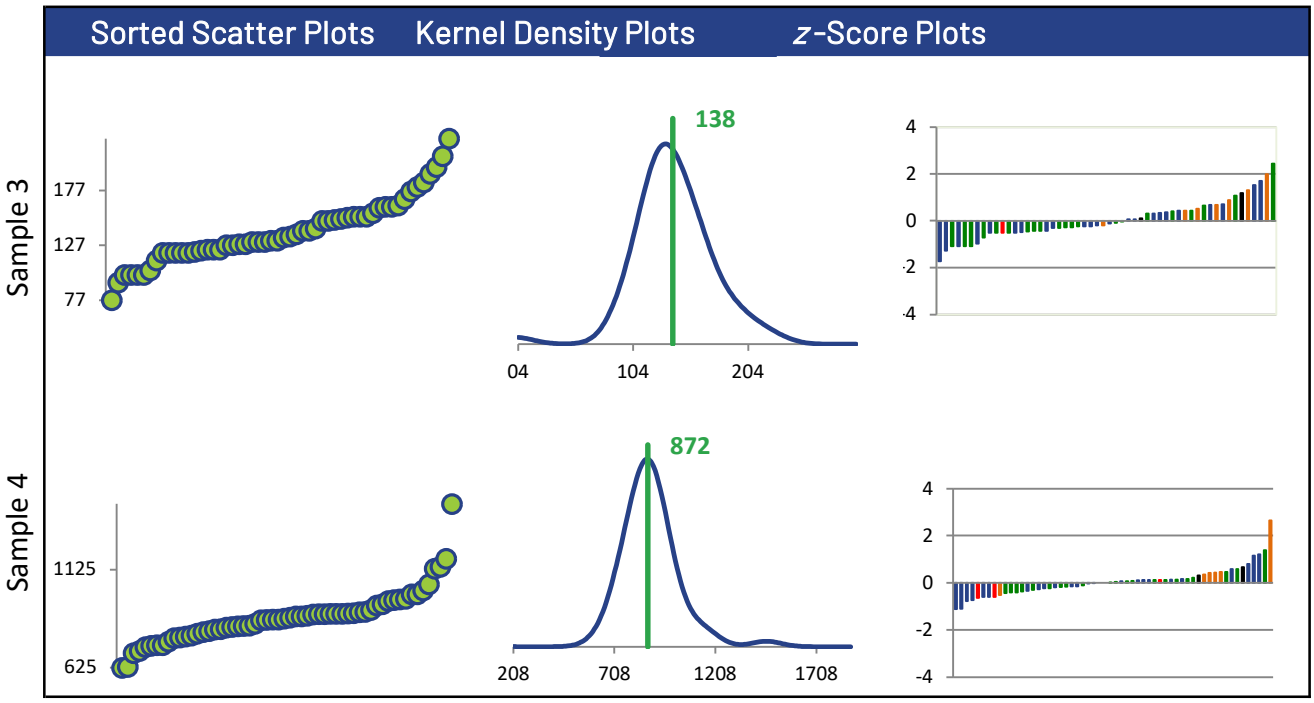
Methods Used

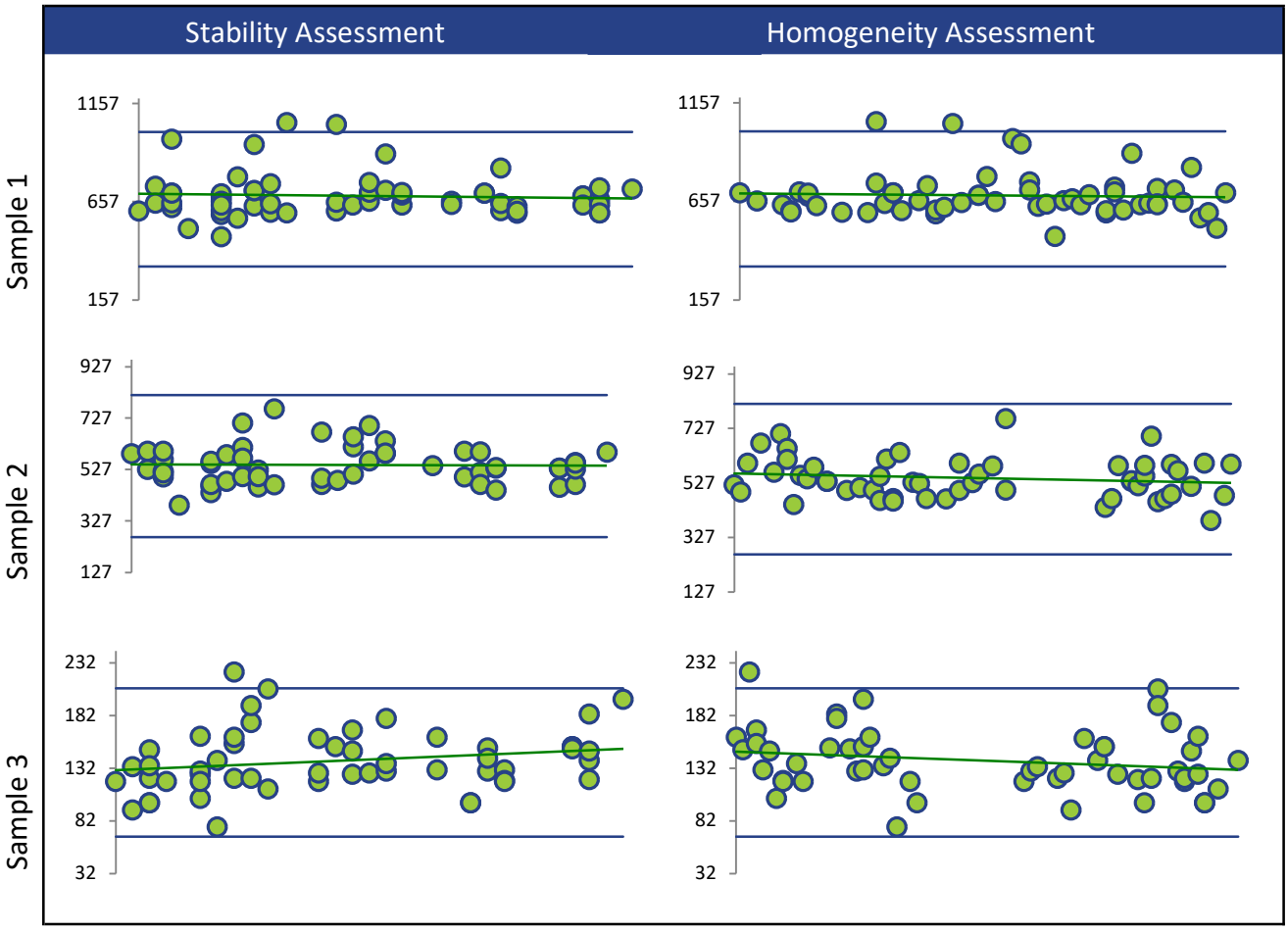
Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	25	23	23	25
ICP/OES (Red)	3	2	1	3
COLD VAPOUR AA (Green)	21	21	21	21
ATOMIC FLUORESCENCE (Orange)	7	6	7	7
PYROLYTIC AA (Black)	2	2	2	2

All summary stats and the plots below are based on the data excluding any flagged outliers



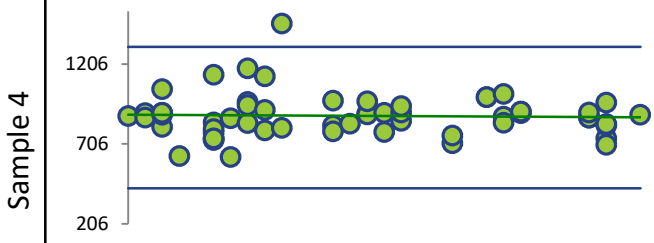
MERCURY


Sorted Scatter Plots
Kernel Density Plots
z-Score Plots
Sample 3
177
127
77
138
04
104
204
4
2
0
-2
-4
Sample 4
1125
625
872
208
708
1208
1708
4
2
0
-2
-4

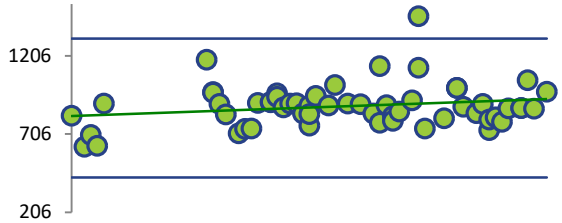

Stability Assessment
Homogeneity Assessment
Sample 1
1157
657
157
Sample 2
927
727
527
327
127
Sample 3
232
182
132
82
32

MERCURY

Stability Assessment



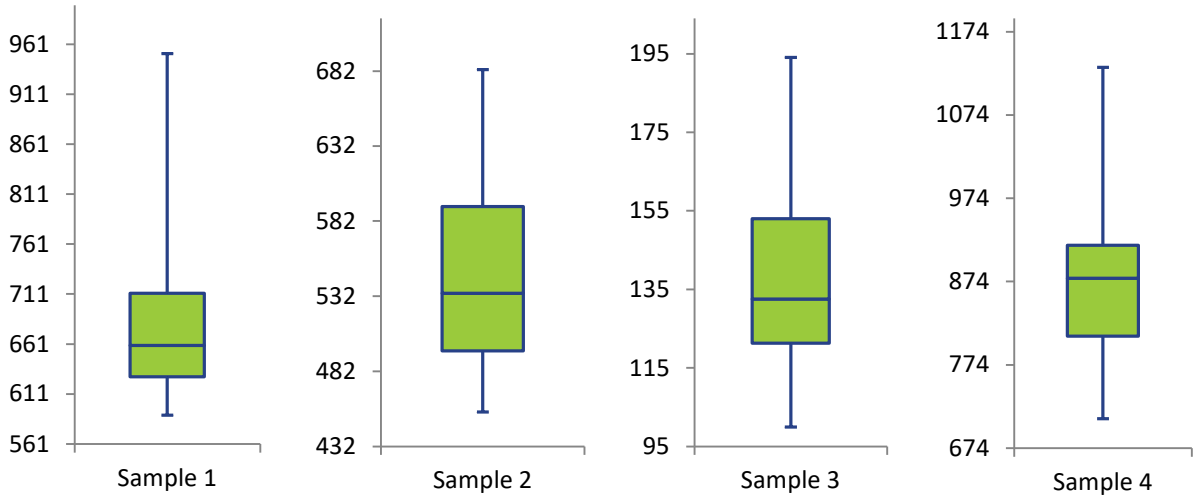
Homogeneity Assessment



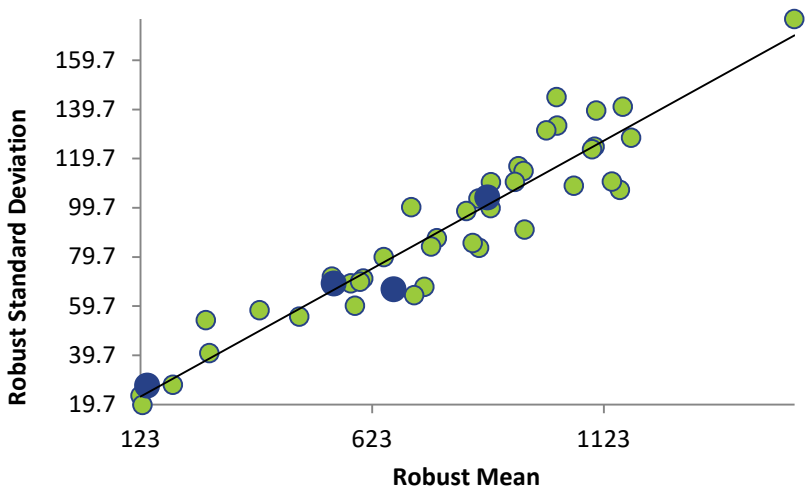
Stability assessments are regression analysis of reported result against date of analysis.

Homogeneity assessments are regression analysis of reported result against bottling order.

Box and Whisker Plots



Current Round (blue) Compared to Historic Rounds (green)



NICKEL

Summary Statistics

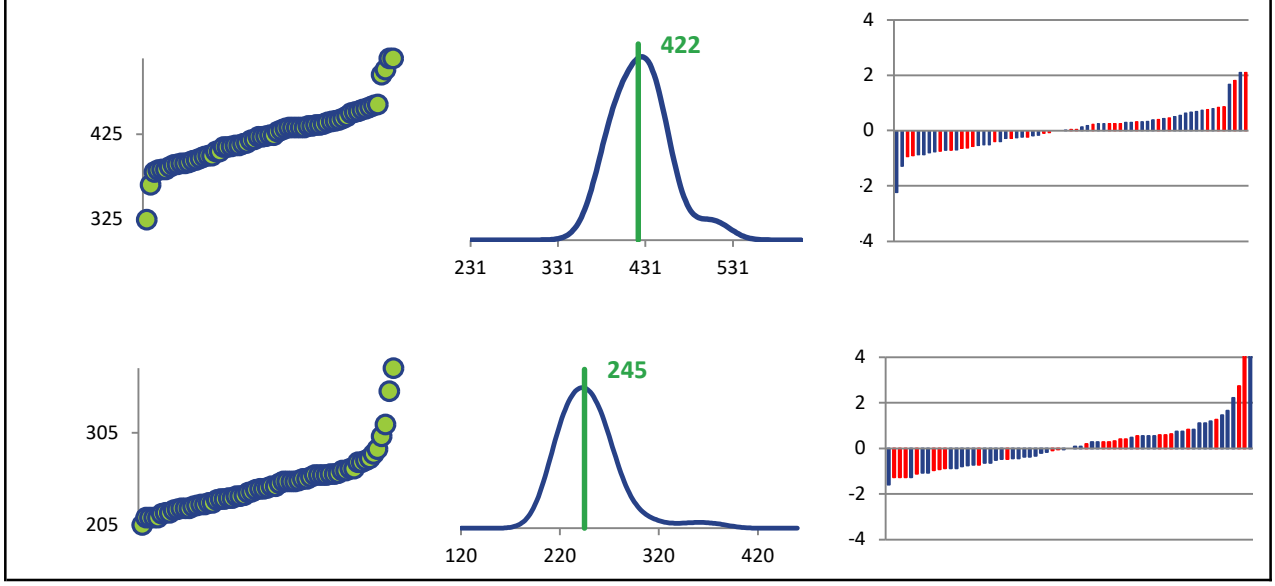
Statistic	C17-1	C17-2	C17-3	C17-4
N	65	65	64	64
Median µg/g	424	245	24.0	416
Robust Mean µg/g	422	245	24.7	416
U µg/g	4.47	3.67	0.473	5.44
Robust Standard Deviation µg/g	28.8	23.7	3.03	34.8
Regression Standard Deviation µg/g	43.5	25.3	2.54	42.9
Stability Flag				
Homogeneity Flag				Homogeneity
Standard Deviation Used (SDPA) µg/g	43.5	25.3	3.03	44.3
Outliers	1	1	2	2
|z|>3.0	0	2	0	2
2<|z|<3	3	2	2	2

Methods Used

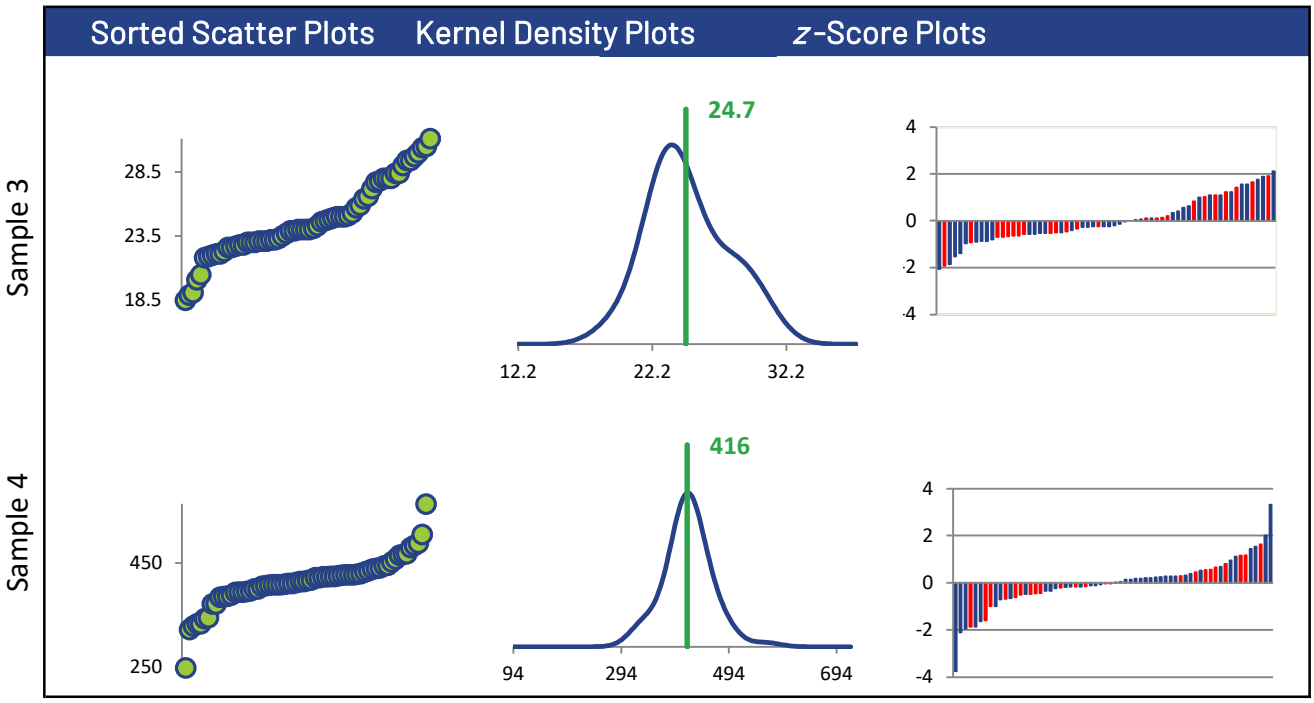
Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	39	39	39	39
ICP/OES (Red)	26	26	25	25

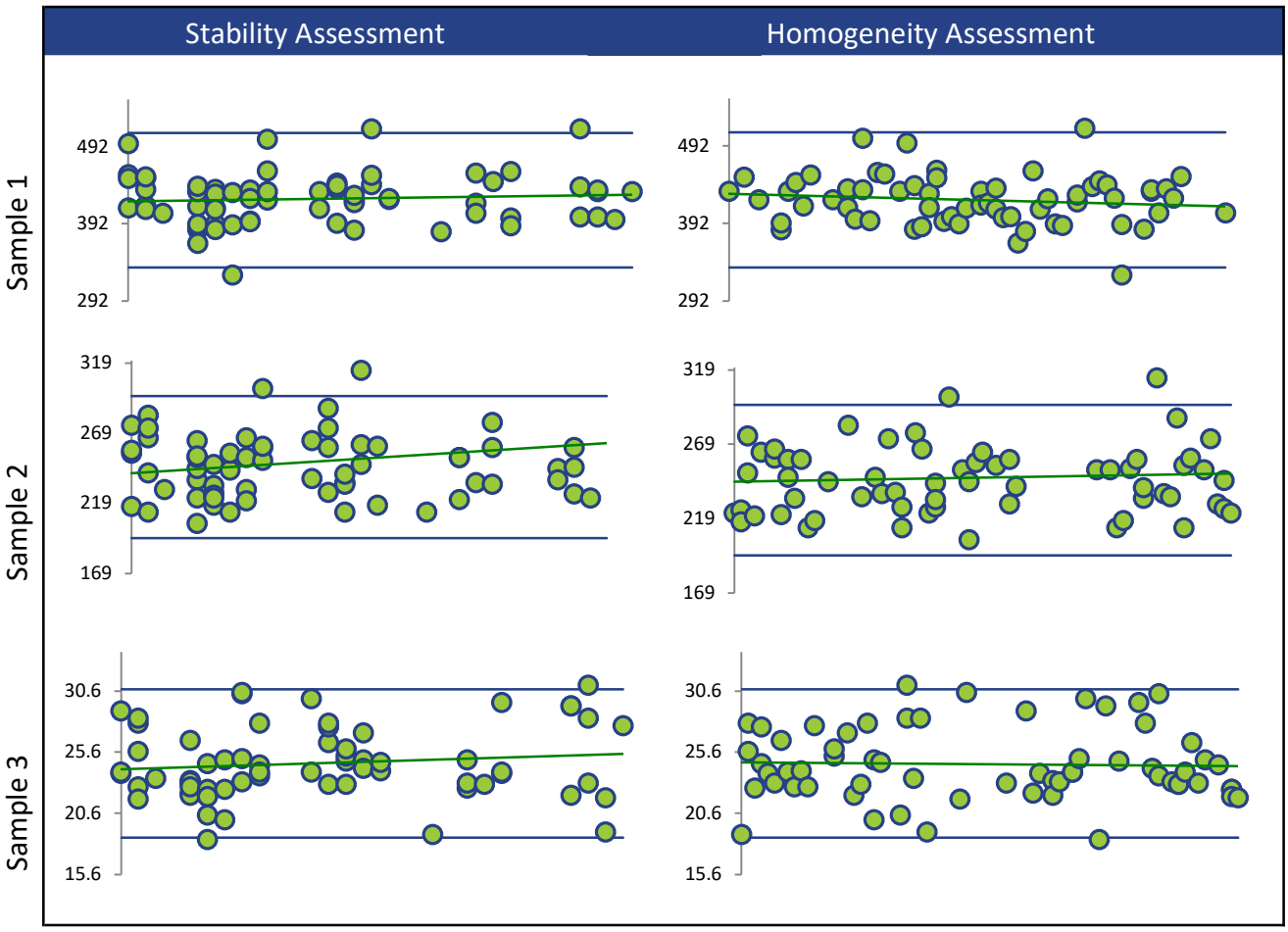
All summary stats and the plots below are based on the data excluding any flagged outliers

Sorted Scatter Plots Kernel Density Plots *z*-Score Plots



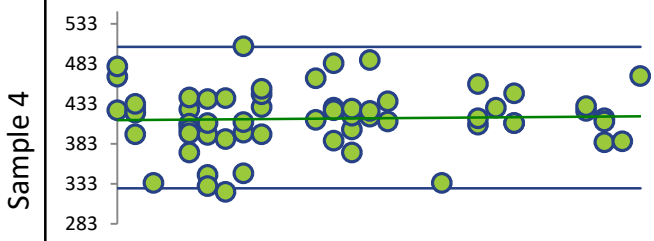
NICKEL


Sorted Scatter Plots
Kernel Density Plots
z-Score Plots
Sample 3
28.5
23.5
18.5
24.7
12.2
22.2
32.2
4
2
0
-2
-4
Sample 4
450
250
416
94
294
494
694
4
2
0
-2
-4

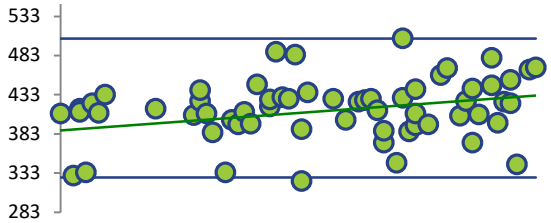

Stability Assessment
Homogeneity Assessment
Sample 1
492
392
292
Sample 2
319
269
219
169
Sample 3
30.6
25.6
20.6
15.6

NICKEL

Stability Assessment



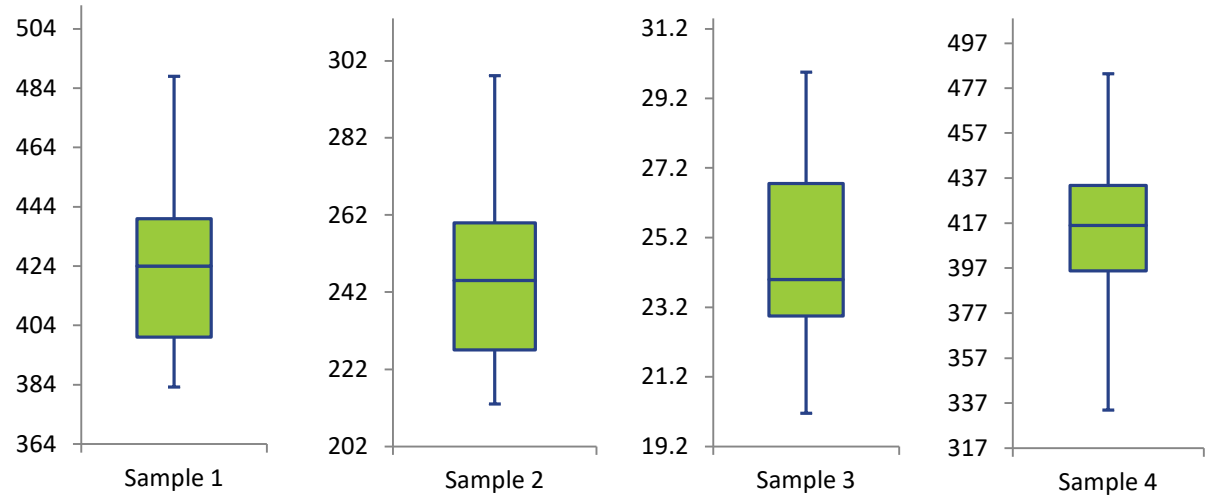
Homogeneity Assessment



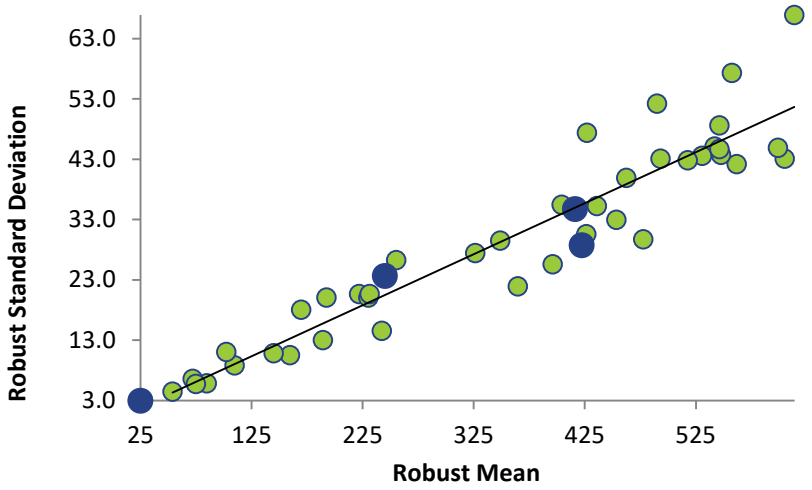
Stability assessments are regression analysis of reported result against date of analysis.

Homogeneity assessments are regression analysis of reported result against bottling order.

Box and Whisker Plots



Current Round (blue) Compared to Historic Rounds (green)



STRONTIUM

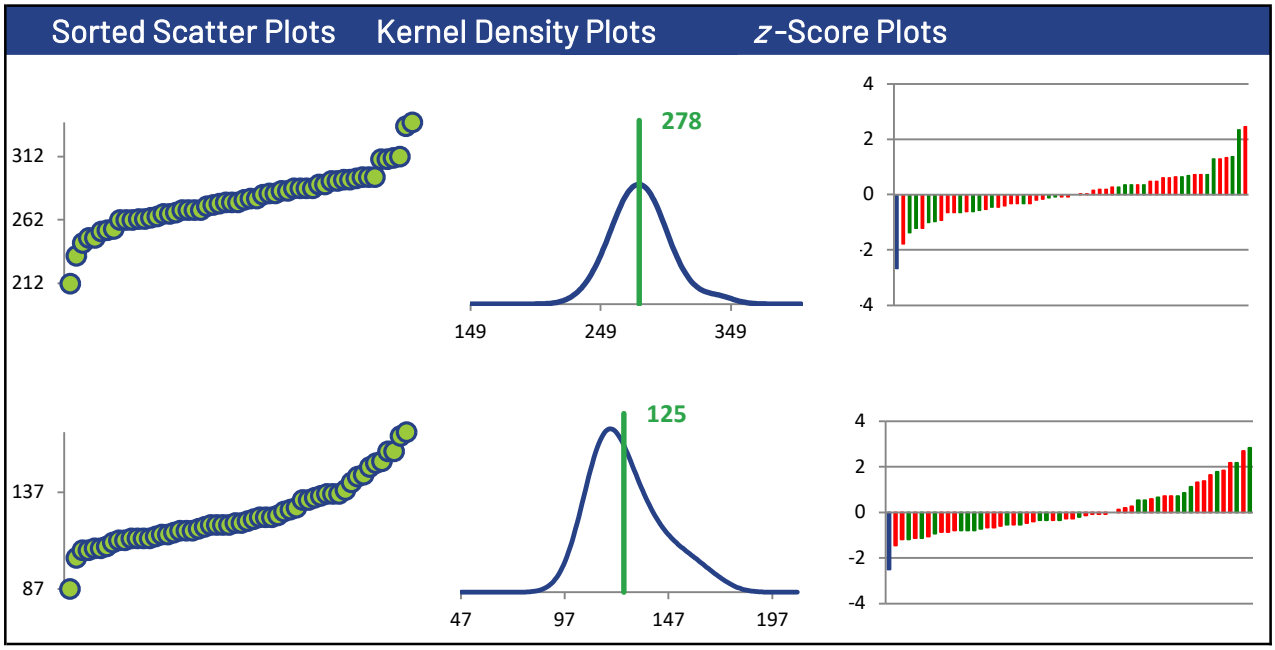
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	56	56	54	54
Median µg/g	277	121	97.3	259
Robust Mean µg/g	278	125	98.8	261
U µg/g	3.29	2.54	2.35	3.76
Robust Standard Deviation µg/g	19.7	15.2	13.8	22.1
Regression Standard Deviation µg/g	24.7	11.3	9.06	23.2
Stability Flag				
Homogeneity Flag				Homogeneity
Standard Deviation Used (SDPA) µg/g	24.7	15.2	13.8	38.8
Outliers	0	0	2	2
|z|>3.0	0	0	1	0
2<|z|<3	3	5	1	3

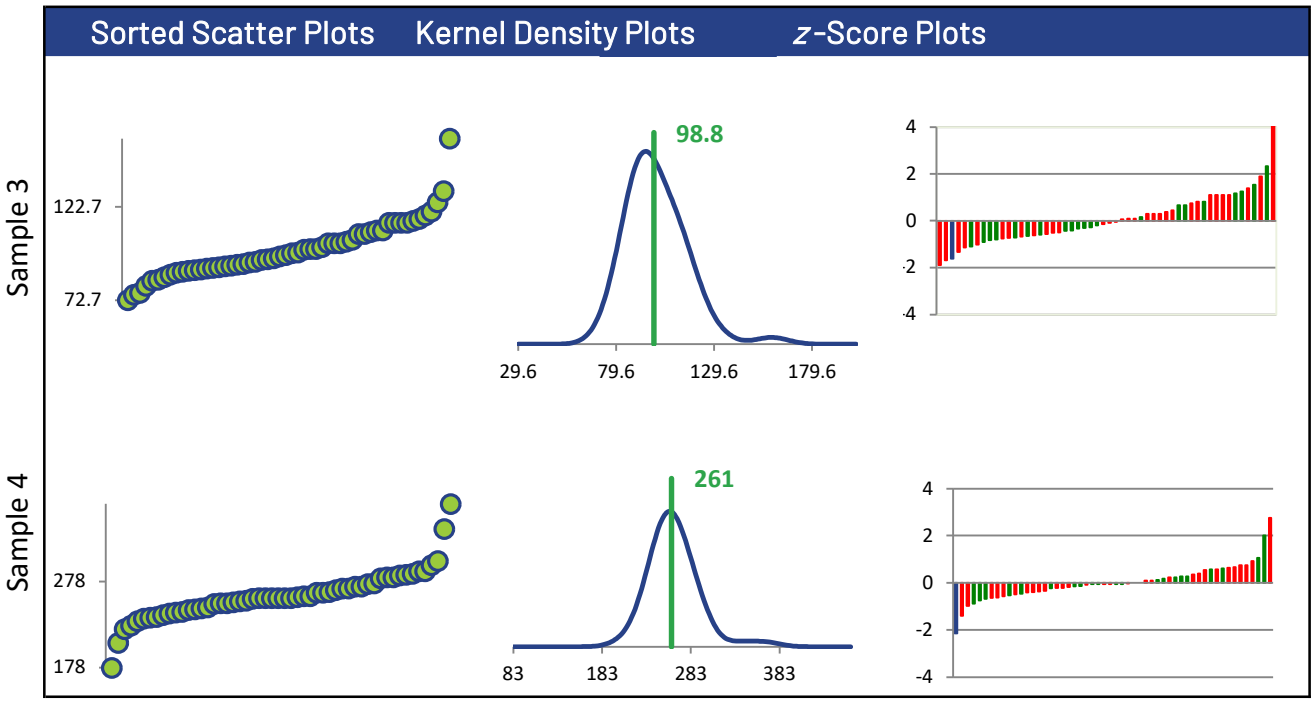
Methods Used

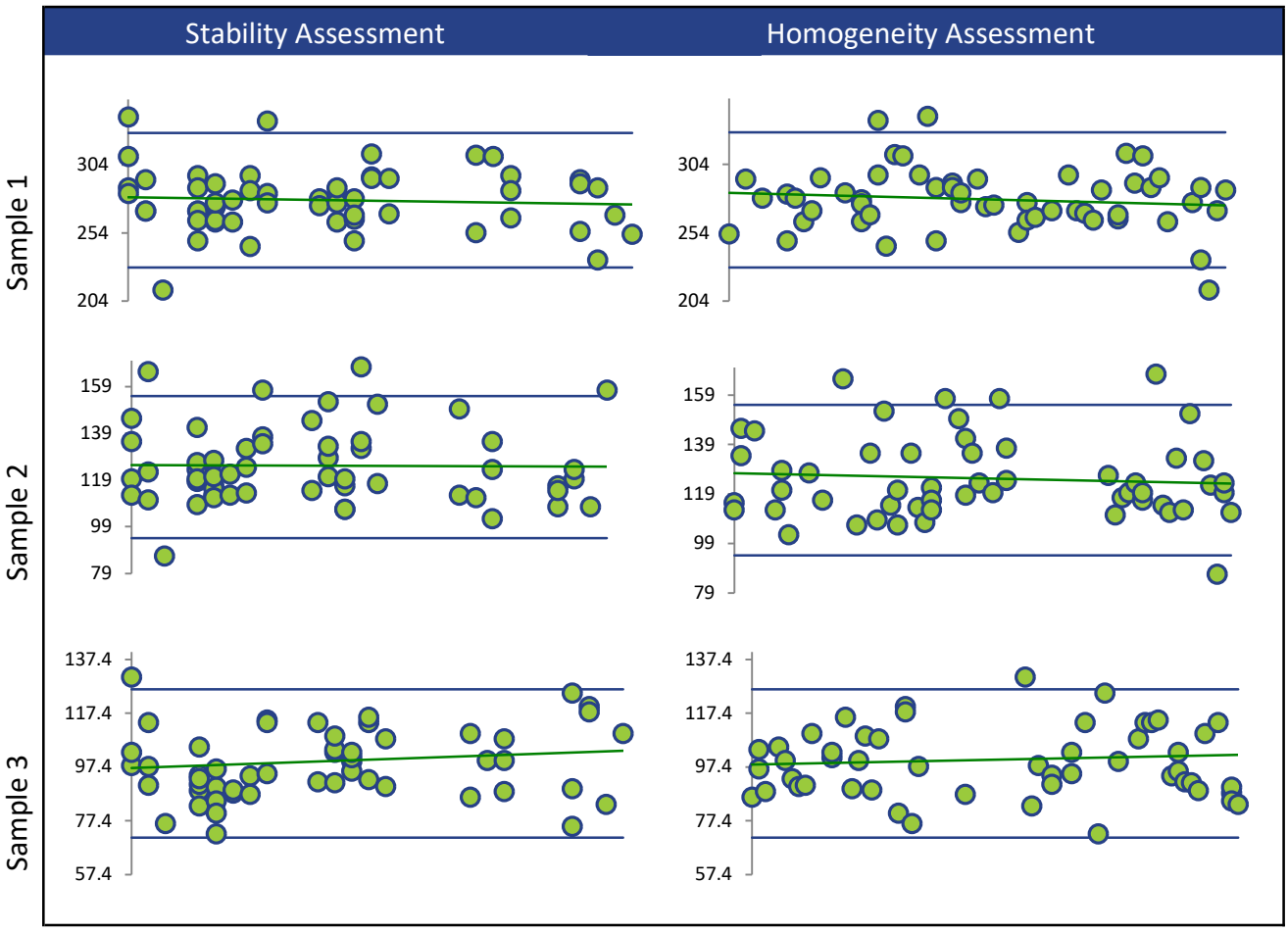
Method	C17-1	C17-2	C17-3	C17-4
AA FLAME (Blue)	1	1	1	1
ICP/MS (Red)	33	33	32	32
ICP/OES (Green)	22	22	21	21

All summary stats and the plots below are based on the data excluding any flagged outliers



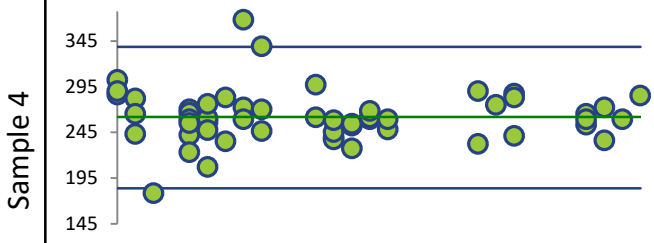
STRONTIUM


Sorted Scatter Plots
Kernel Density Plots
z-Score Plots
Sample 3
122.7
72.7
98.8
29.6
79.6
129.6
179.6
4
2
0
-2
-4
Sample 4
278
178
261
83
183
283
383
4
2
0
-2
-4

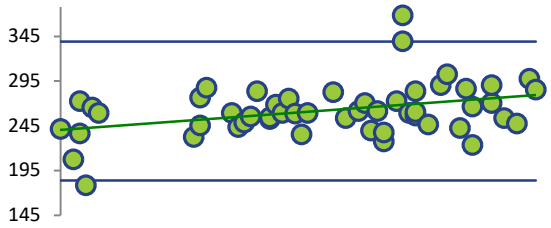

Stability Assessment
Homogeneity Assessment
Sample 1
304
254
204
Sample 2
159
139
119
99
79
Sample 3
137.4
117.4
97.4
77.4
57.4

STRONTIUM

Stability Assessment



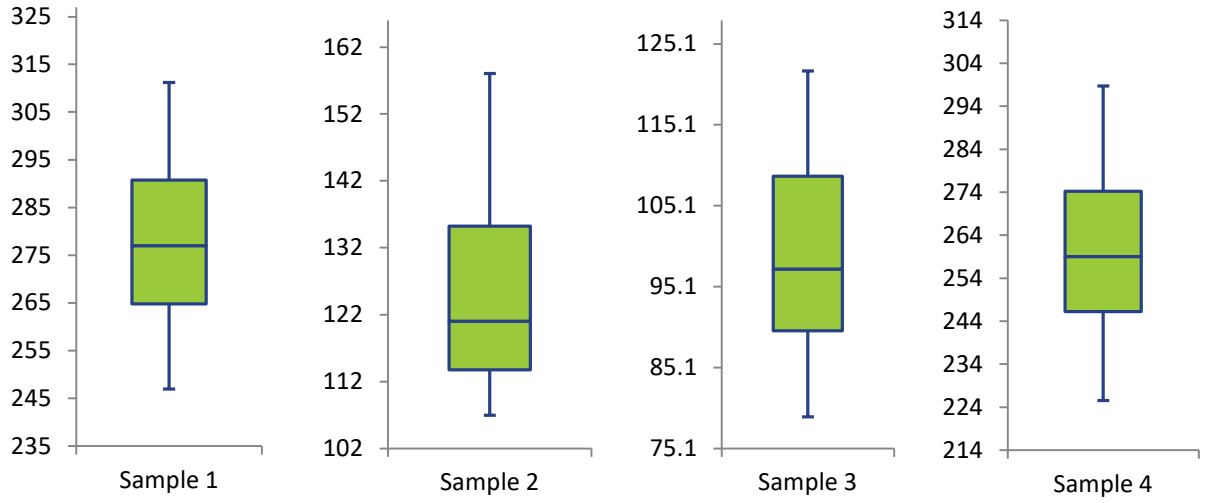
Homogeneity Assessment



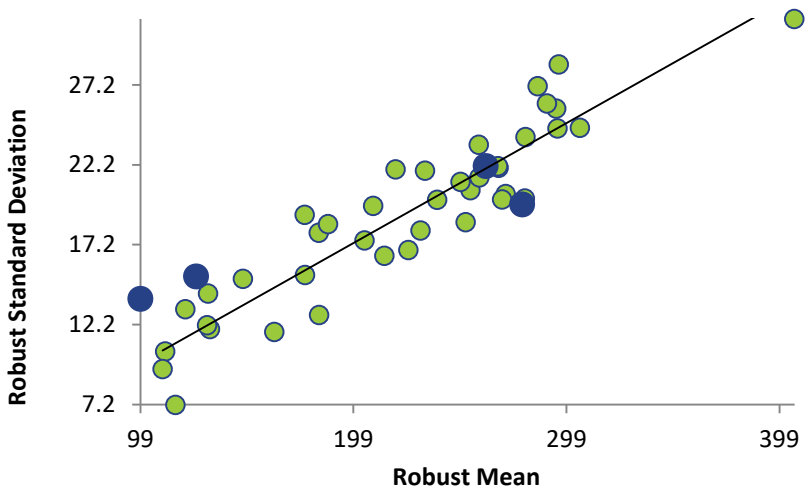
Stability assessments are regression analysis of reported result against date of analysis.

Homogeneity assessments are regression analysis of reported result against bottling order.

Box and Whisker Plots



Current Round (blue) Compared to Historic Rounds (green)



TIN

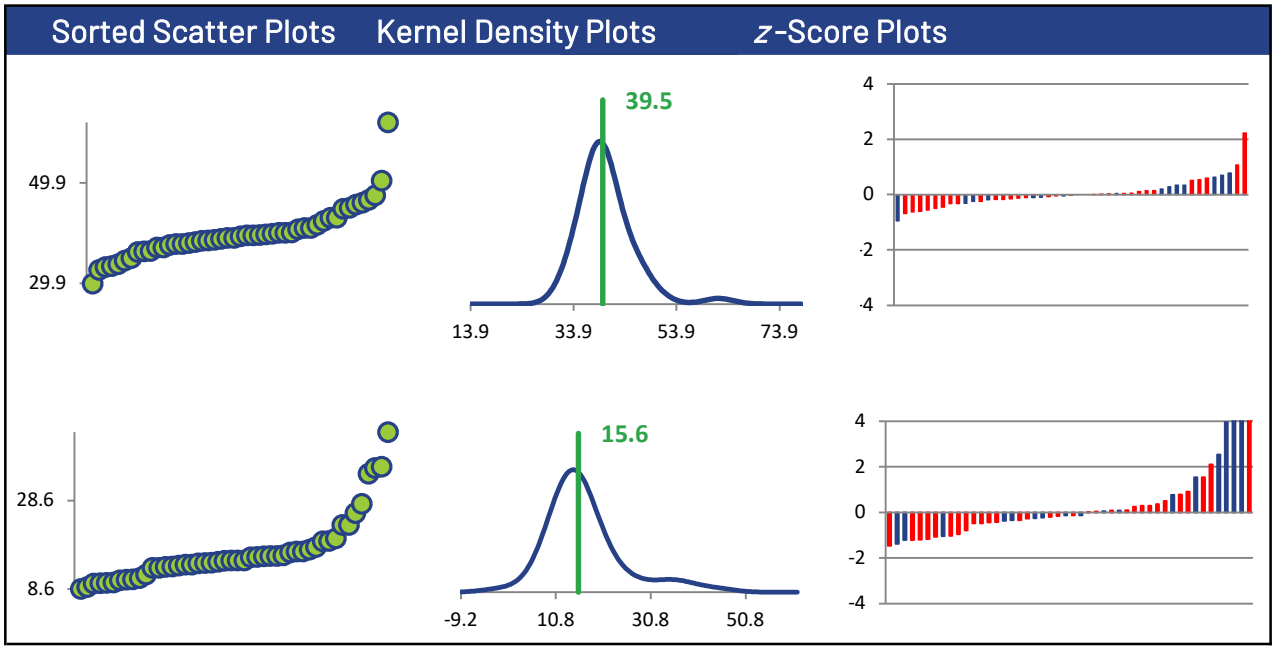
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	47	48	46	46
Median µg/g	39.3	15.0	13.6	51.7
Robust Mean µg/g	39.5	15.6	14.5	52.9
U µg/g	0.766	0.868	0.553	1.82
Robust Standard Deviation µg/g	4.20	4.81	3.00	9.88
Regression Standard Deviation µg/g	10.1	4.35	4.08	13.3
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	10.1	4.81	4.08	13.3
Outliers	1	0	2	2
|z|>3.0	0	4	1	0
2<|z|<3	1	2	0	1

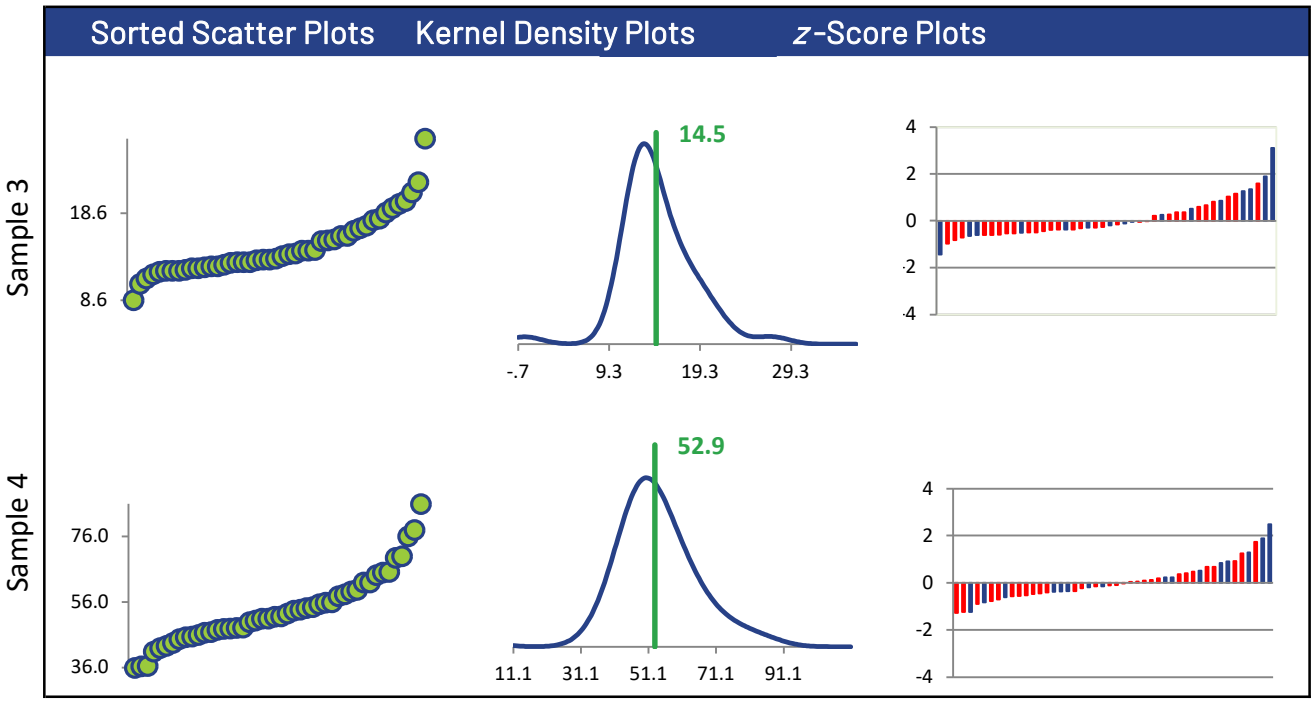
Methods Used

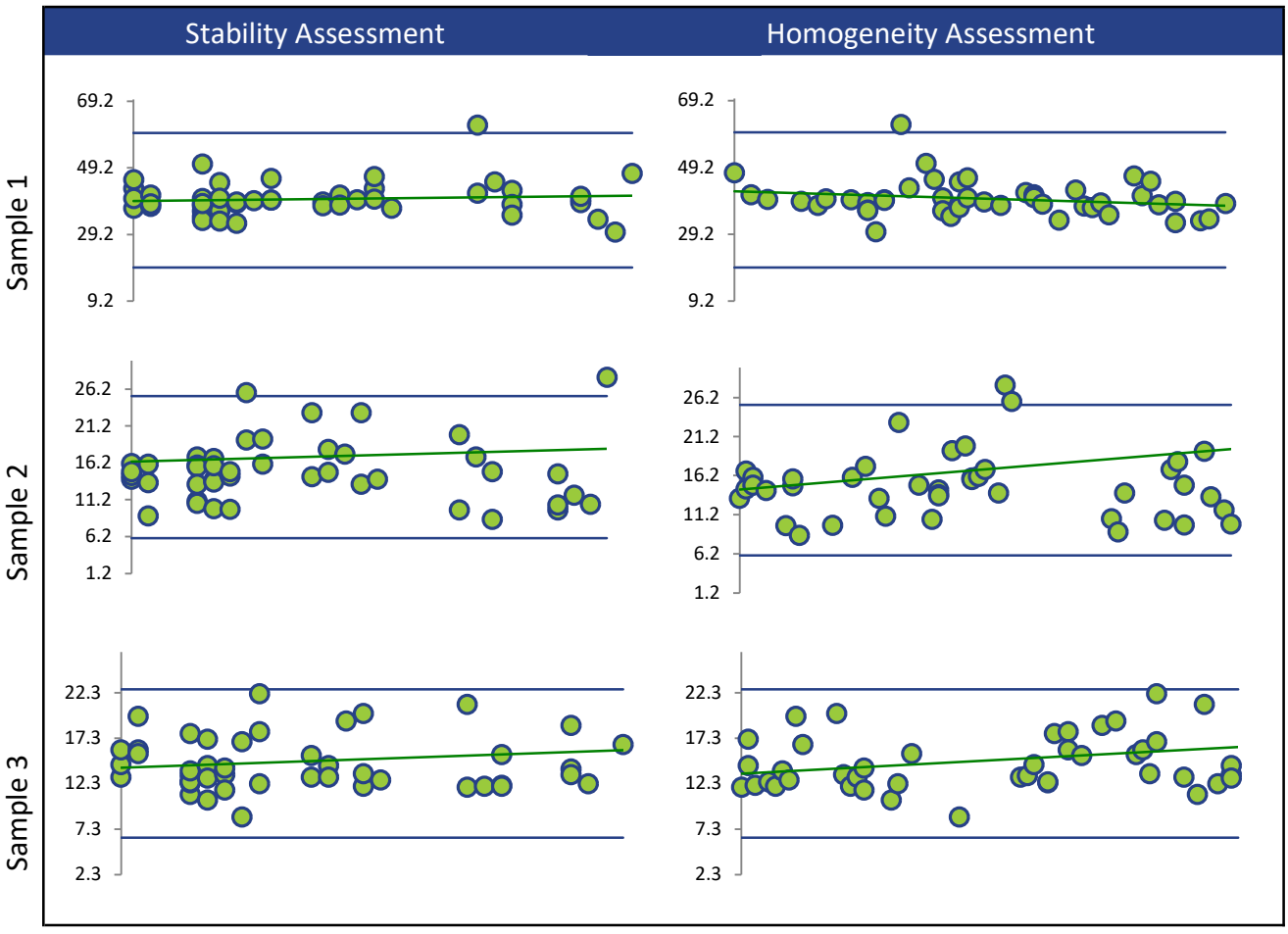
Method	C17-1	C17-2	C17-3	C17-4
ICP/OES (Blue)	16	17	16	16
ICP/MS (Red)	31	31	30	30

All summary stats and the plots below are based on the data excluding any flagged outliers



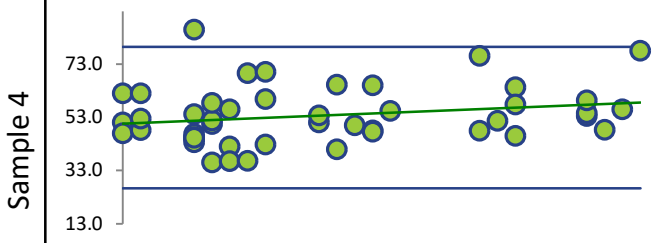
TIN


Sorted Scatter Plots
Kernel Density Plots
z-Score Plots
Sample 3
18.6
8.6
14.5
-.7
9.3
19.3
29.3
4
2
0
-2
-4
Sample 4
76.0
56.0
36.0
52.9
11.1
31.1
51.1
71.1
91.1
4
2
0
-2
-4

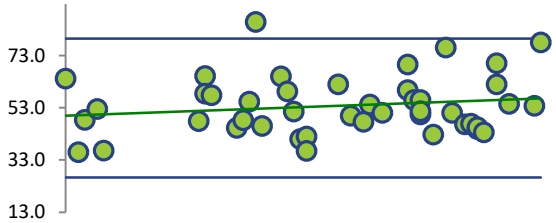

Stability Assessment
Homogeneity Assessment
Sample 1
69.2
49.2
29.2
9.2
Sample 2
26.2
21.2
16.2
11.2
6.2
1.2
Sample 3
22.3
17.3
12.3
7.3
2.3

TIN

Stability Assessment



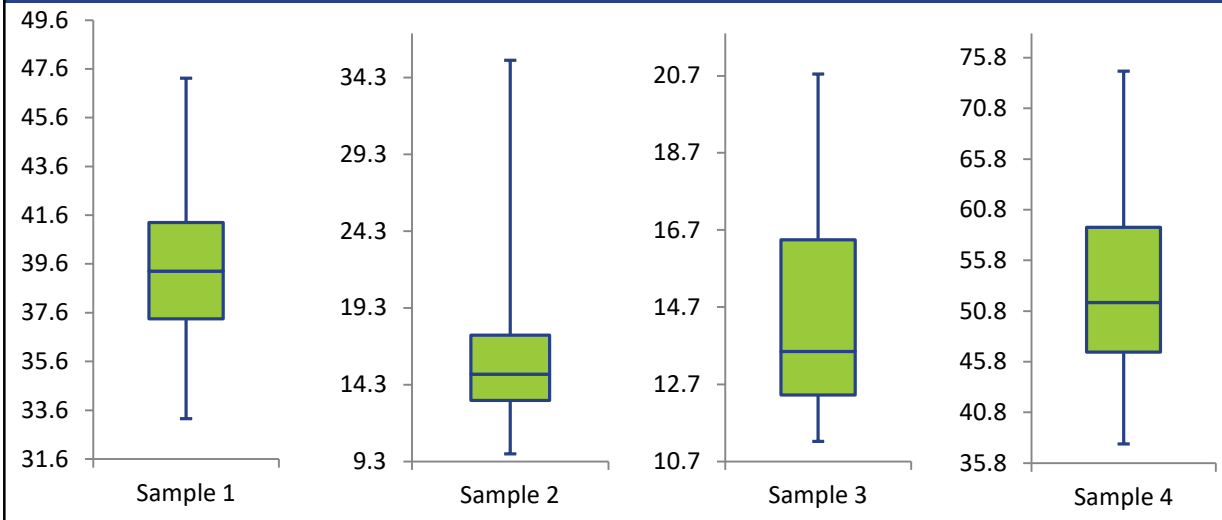
Homogeneity Assessment



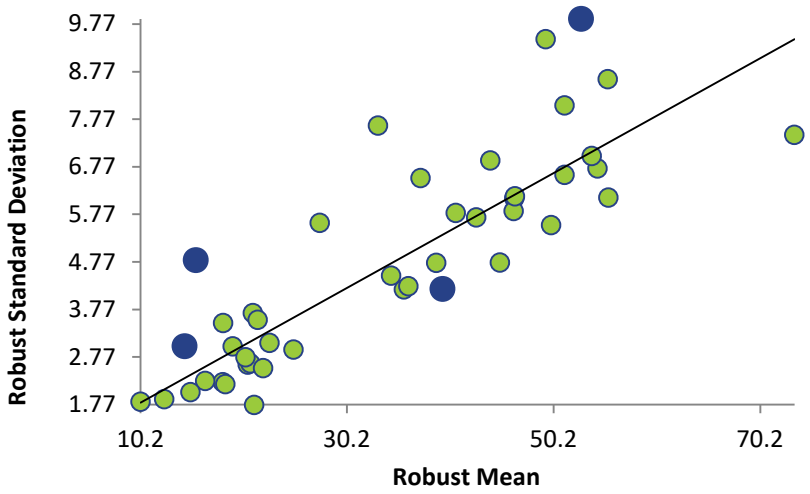
Stability assessments are regression analysis of reported result against date of analysis.

Homogeneity assessments are regression analysis of reported result against bottling order.

Box and Whisker Plots



Current Round (blue) Compared to Historic Rounds (green)



TITANIUM

Summary Statistics

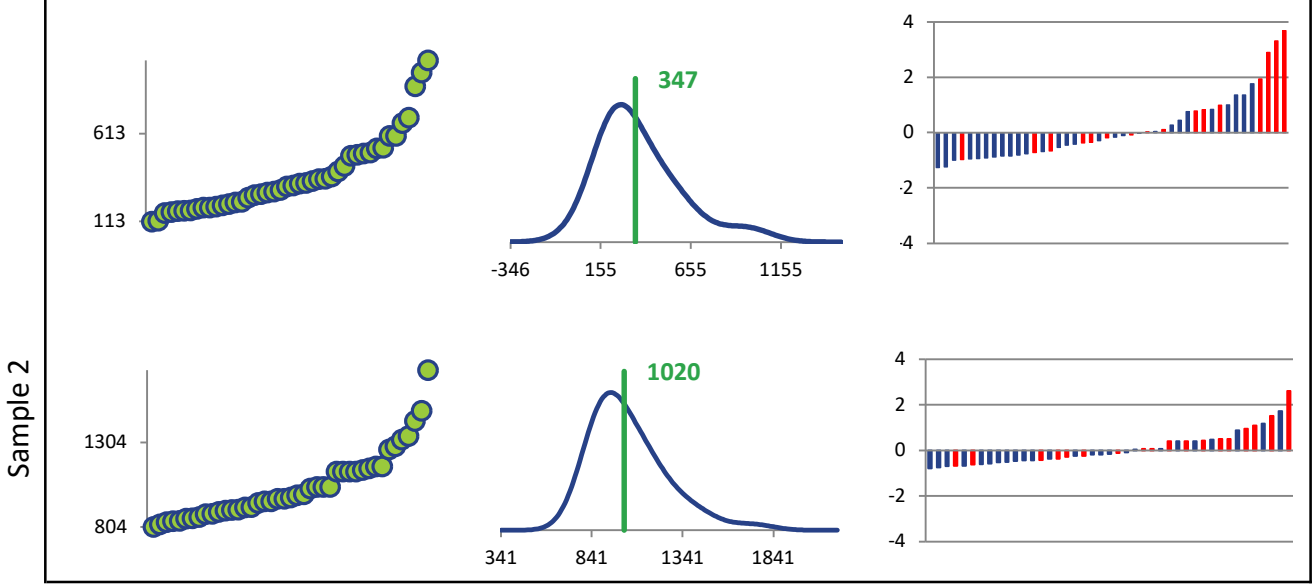
Statistic	C17-1	C17-2	C17-3	C17-4
N	44	43	44	46
Median µg/g	316	977	422	1070
Robust Mean µg/g	347	1020	423	1010
U µg/g	34.9	33.4	15.6	114
Robust Standard Deviation µg/g	185	175	82.9	621
Regression Standard Deviation µg/g	102	272	121	271
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	185	272	121	621
Outliers	2	3	2	0
|z|>3.0	2	0	0	0
2<|z|<3	1	1	2	1

Methods Used

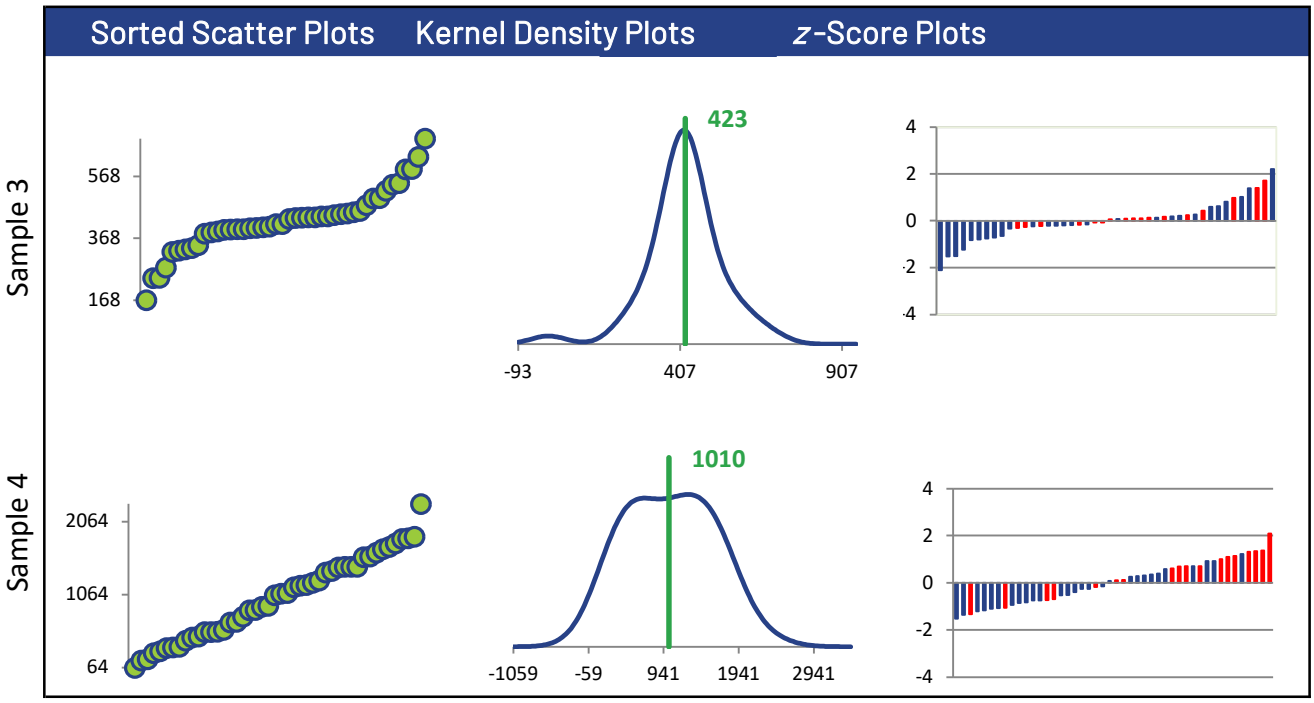
Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	28	25	27	28
ICP/OES (Red)	16	18	17	18

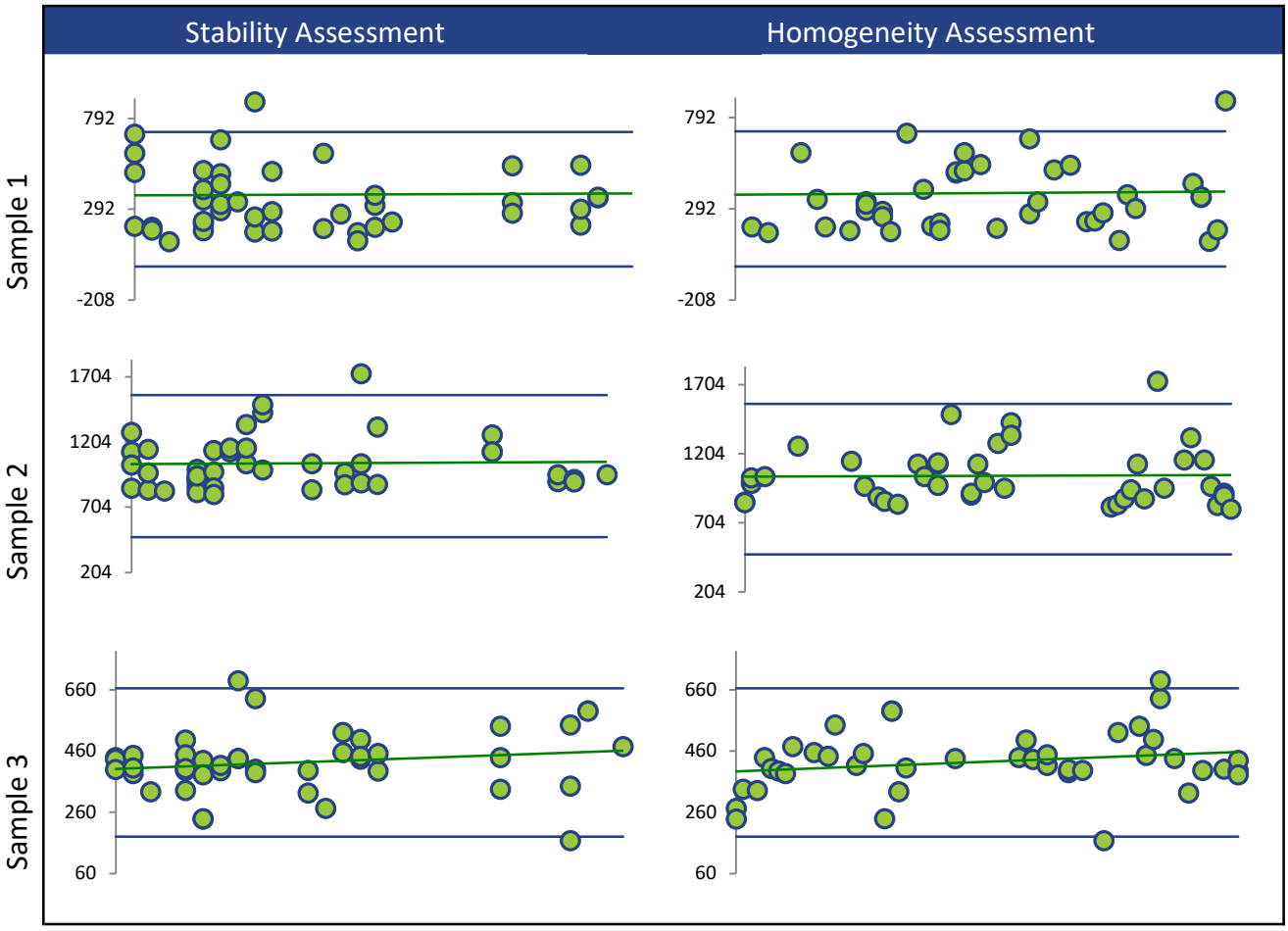
All summary stats and the plots below are based on the data excluding any flagged outliers

Sorted Scatter Plots Kernel Density Plots *z*-Score Plots



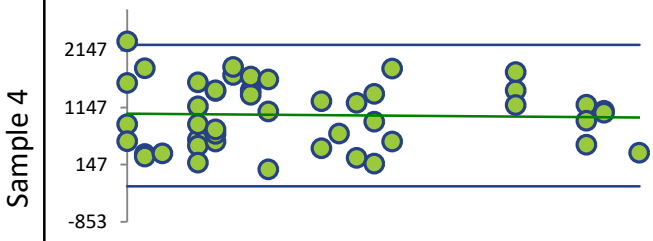
TITANIUM


Sorted Scatter Plots
Kernel Density Plots
z-Score Plots
Sample 3
568
368
168
423
-93
407
907
4
2
0
-2
-4
Sample 4
2064
1064
64
1010
-1059
-59
941
1941
2941
4
2
0
-2
-4

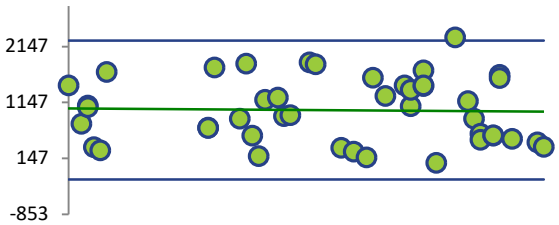

Stability Assessment
Homogeneity Assessment
Sample 1
792
292
-208
792
292
-208
Sample 2
1704
1204
704
204
1704
1204
704
204
Sample 3
660
460
260
60
660
460
260
60

TITANIUM

Stability Assessment



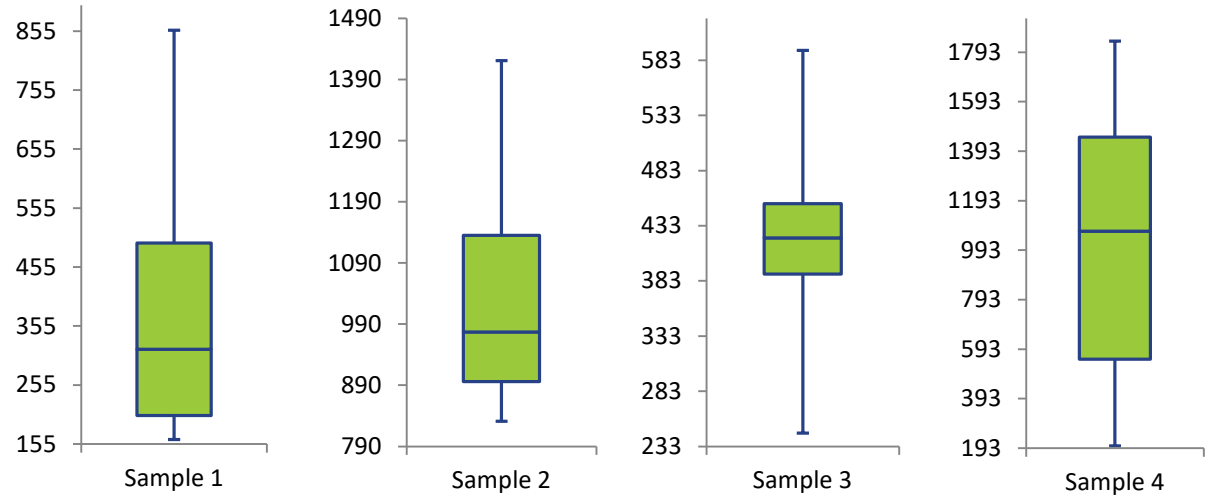
Homogeneity Assessment



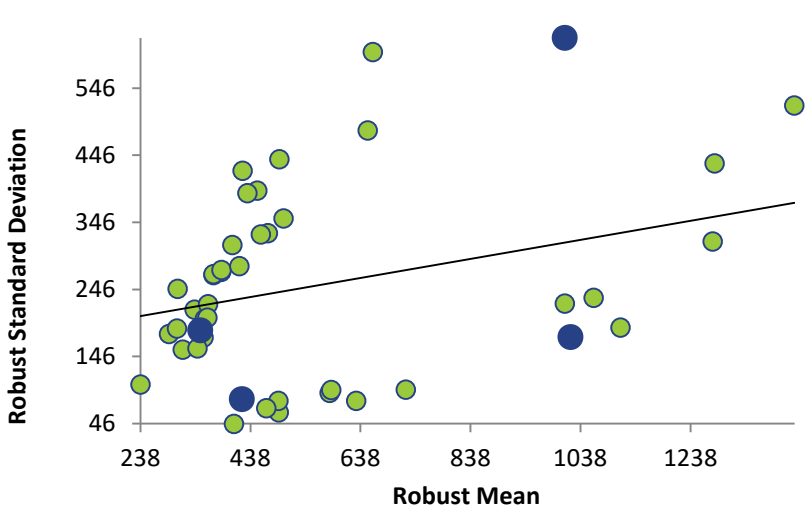
Stability assessments are regression analysis of reported result against date of analysis.

Homogeneity assessments are regression analysis of reported result against bottling order.

Box and Whisker Plots



Current Round (blue) Compared to Historic Rounds (green)



URANIUM

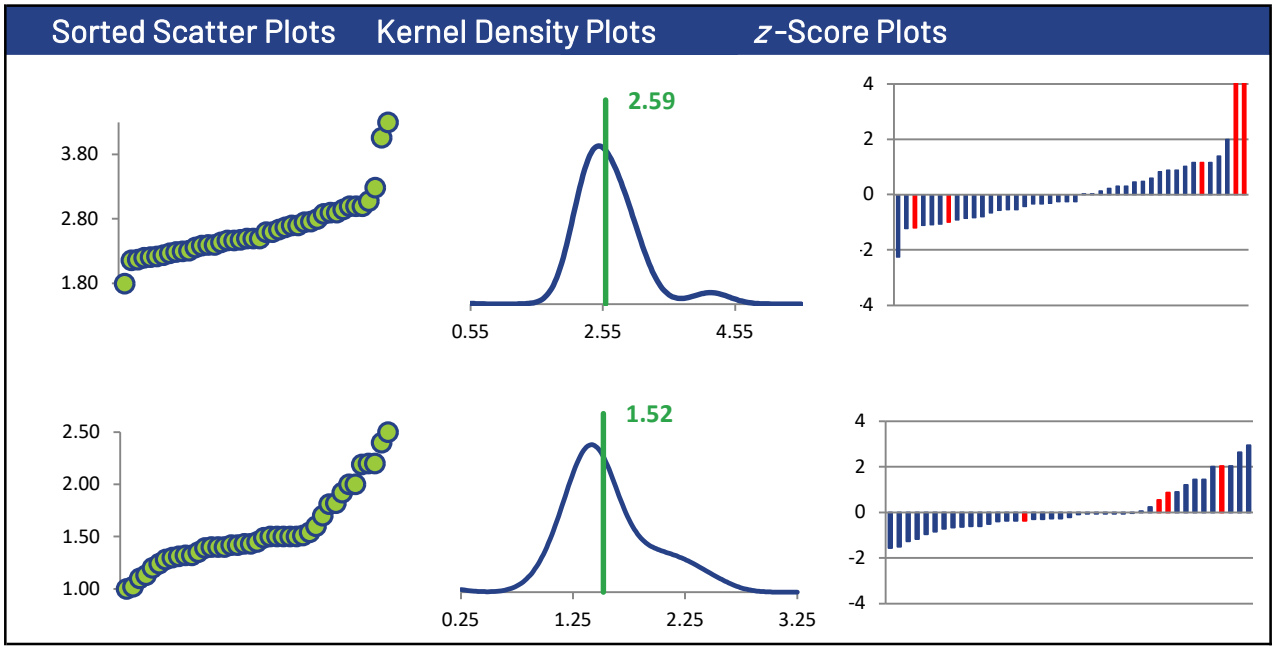
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	42	41	40	42
Median µg/g	2.50	1.45	1.39	3.16
Robust Mean µg/g	2.59	1.52	1.41	3.26
U µg/g	0.0675	0.0650	0.0672	0.0989
Robust Standard Deviation µg/g	0.350	0.333	0.340	0.513
Regression Standard Deviation µg/g	0.290	0.197	0.188	0.349
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	0.350	0.333	0.340	0.513
Outliers	0	0	0	0
|z|>3.0	2	0	1	1
2<|z|<3	1	5	0	2

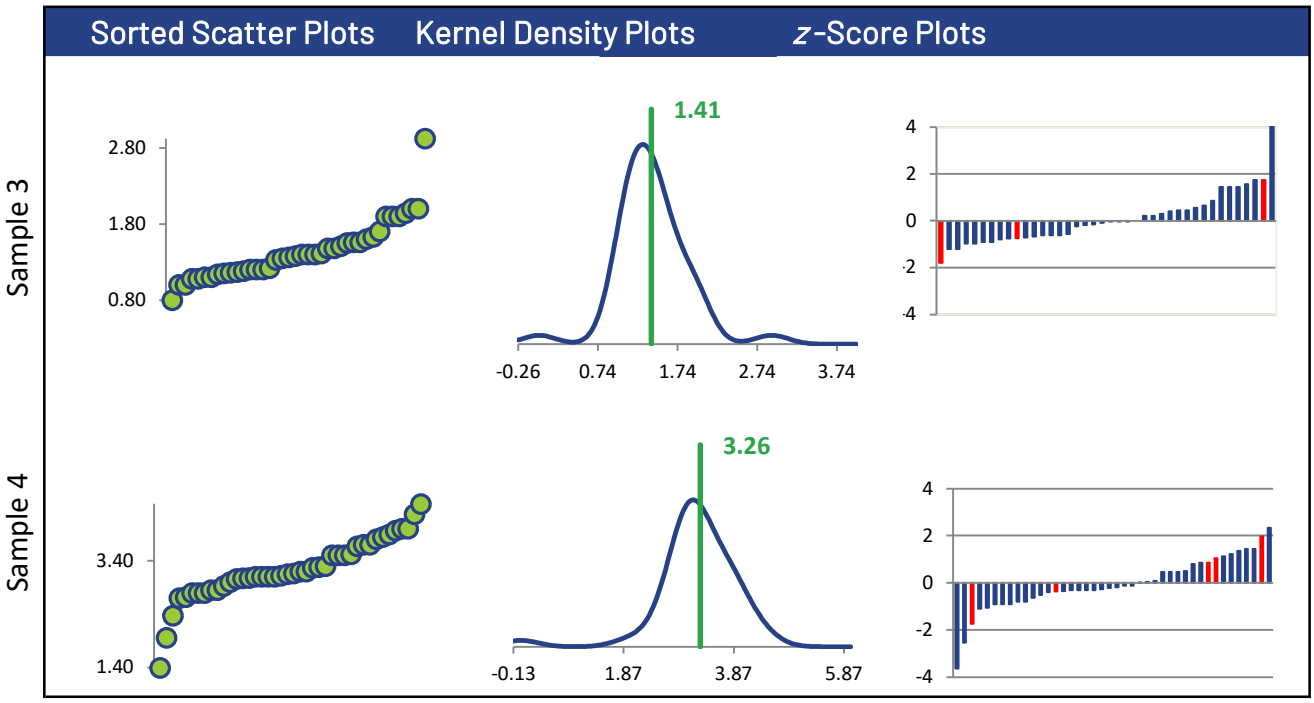
Methods Used

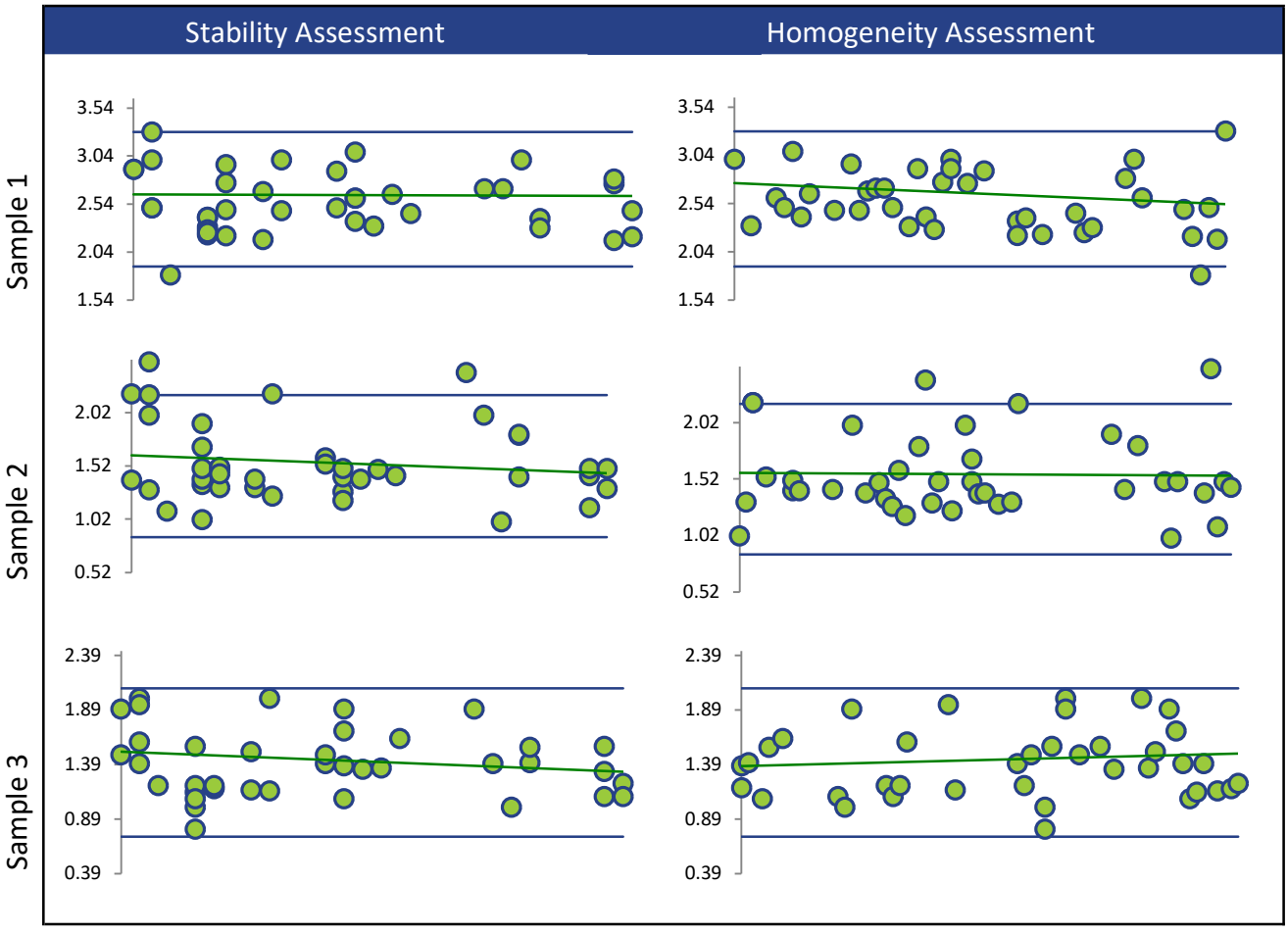
Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	37	37	37	37
ICP/OES (Red)	5	4	3	5

All summary stats and the plots below are based on the data excluding any flagged outliers



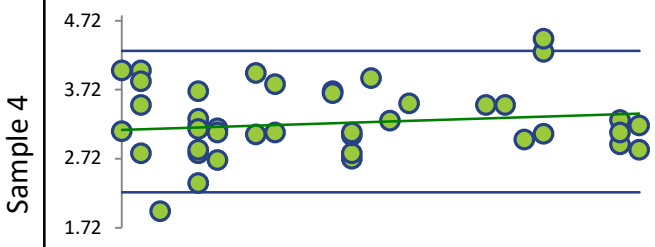
URANIUM


Sorted Scatter Plots
Kernel Density Plots
z-Score Plots
Sample 3
2.80
1.80
0.80
1.41
-0.26
0.74
1.74
2.74
3.74
4
2
0
-2
-4
Sample 4
3.40
1.40
3.26
-0.13
1.87
3.87
5.87
4
2
0
-2
-4

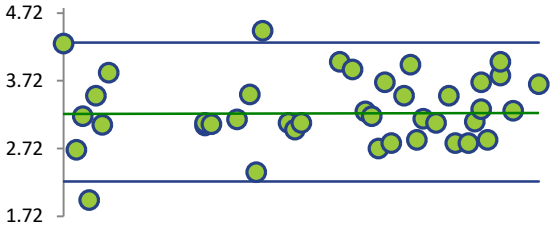

Stability Assessment
Homogeneity Assessment
Sample 1
3.54
3.04
2.54
2.04
1.54
Sample 2
2.02
1.52
1.02
0.52
Sample 3
2.39
1.89
1.39
0.89
0.39

URANIUM

Stability Assessment



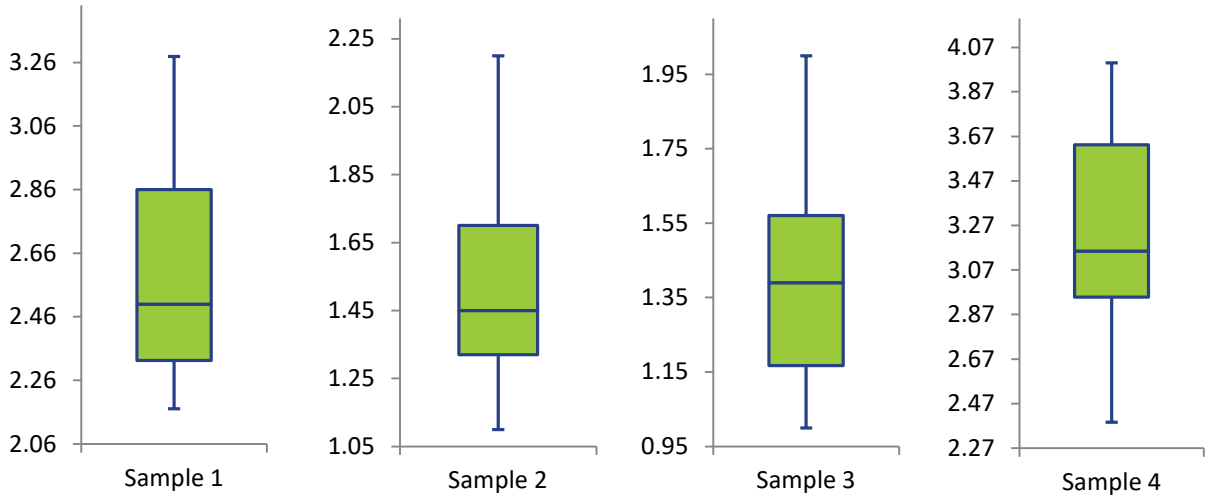
Homogeneity Assessment



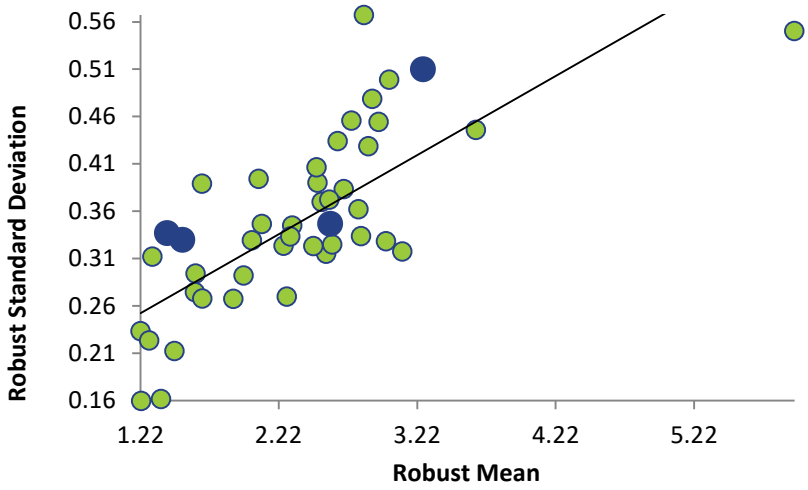
Stability assessments are regression analysis of reported result against date of analysis.

Homogeneity assessments are regression analysis of reported result against bottling order.

Box and Whisker Plots



Current Round (blue) Compared to Historic Rounds (green)



VANADIUM

Summary Statistics

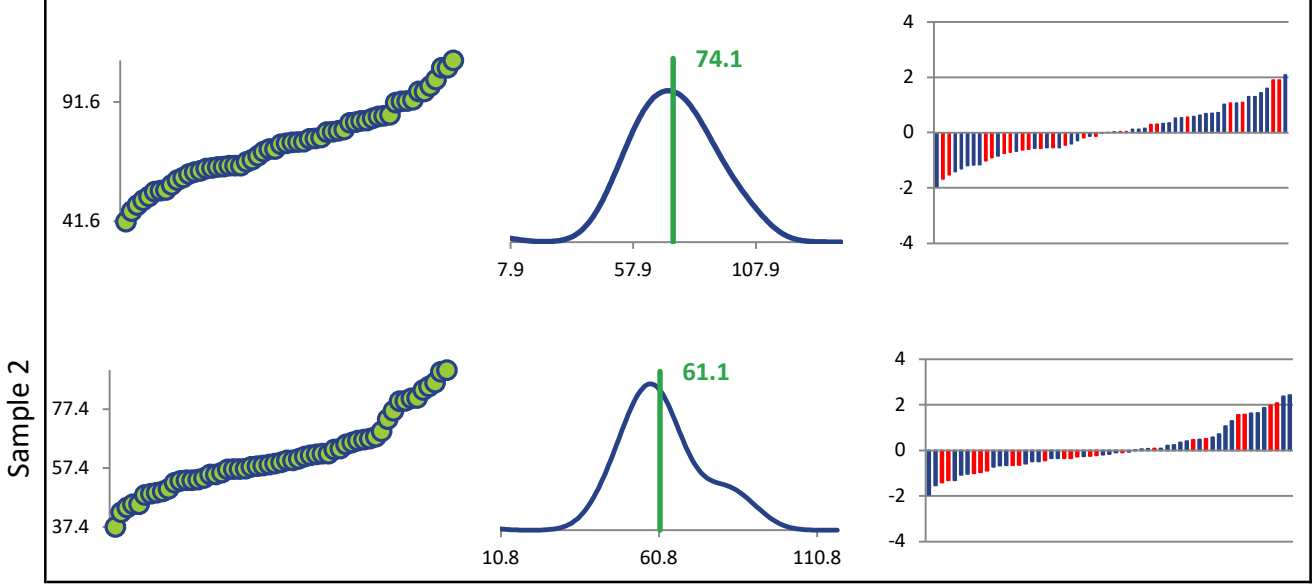
Statistic	C17-1	C17-2	C17-3	C17-4
N	58	57	56	58
Median µg/g	74.6	59.3	28.1	89.4
Robust Mean µg/g	74.1	61.1	28.2	88.7
U µg/g	2.74	2.02	0.862	2.68
Robust Standard Deviation µg/g	16.7	12.2	5.16	16.3
Regression Standard Deviation µg/g	10.6	8.77	4.13	12.7
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	16.7	12.2	5.16	16.3
Outliers	0	1	2	0
|z|>3.0	0	0	4	3
2<|z|<3	1	3	3	5

Methods Used

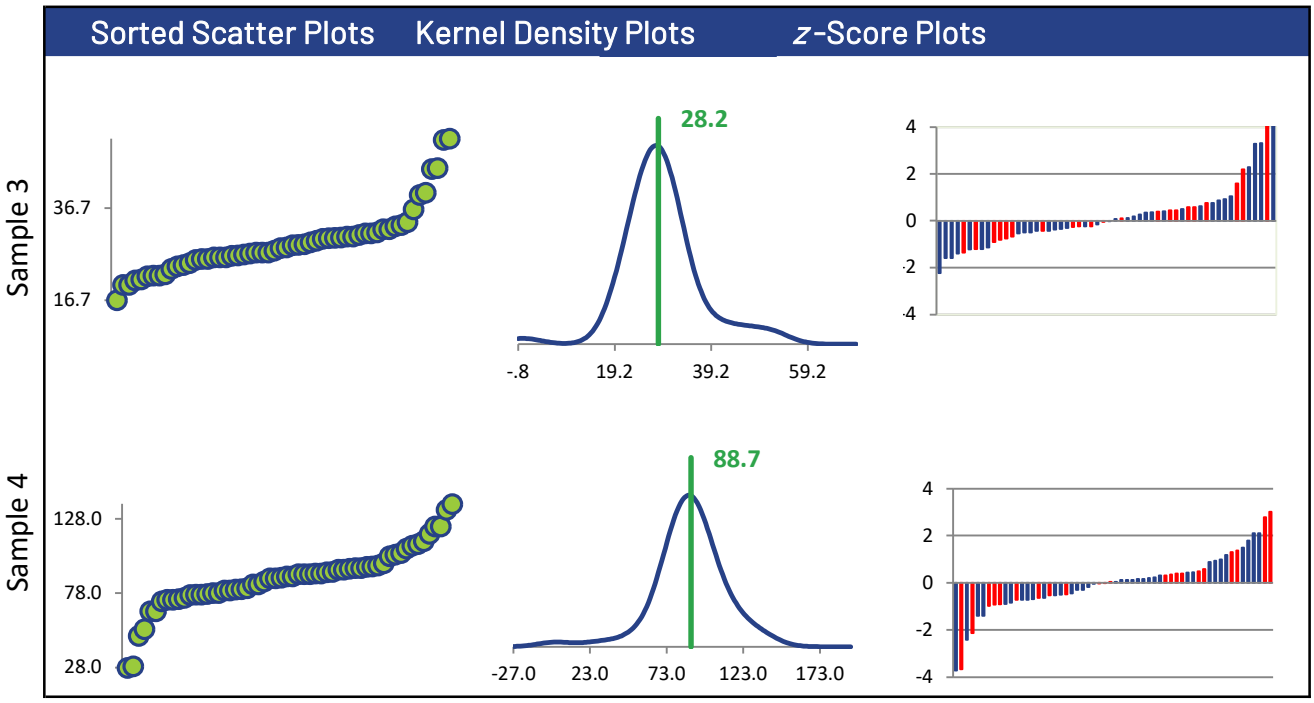
Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	36	36	35	36
ICP/OES (Red)	22	21	21	22

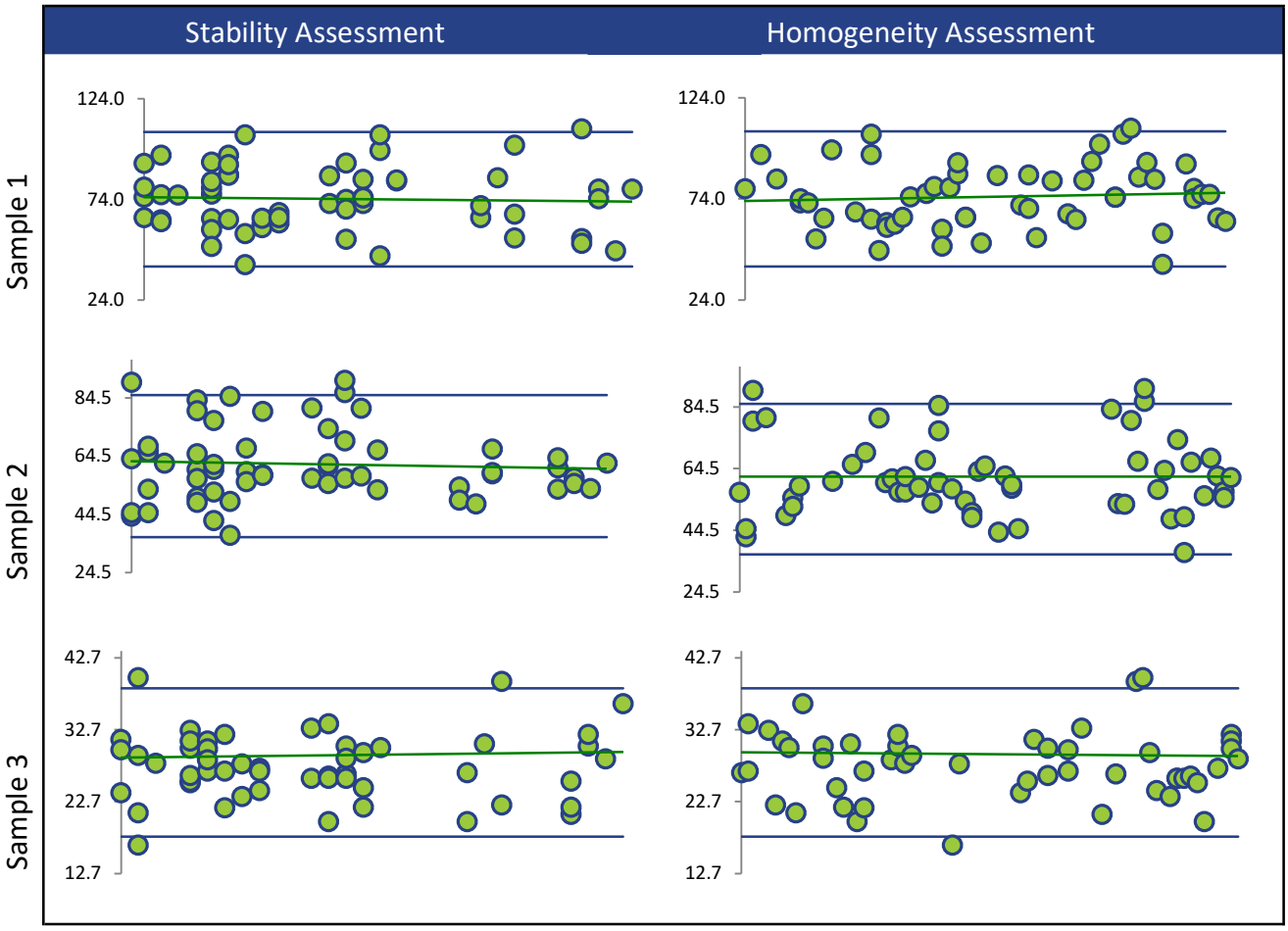
All summary stats and the plots below are based on the data excluding any flagged outliers

Sorted Scatter Plots Kernel Density Plots *z*-Score Plots



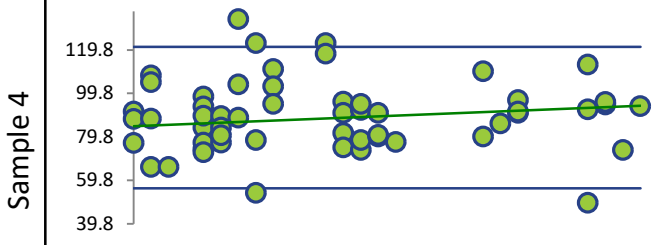
VANADIUM


Sorted Scatter Plots
Kernel Density Plots
z-Score Plots
Sample 3
36.7
16.7
28.2
-.8
19.2
39.2
59.2
4
2
0
-2
-4
Sample 4
128.0
78.0
28.0
88.7
-27.0
23.0
73.0
123.0
173.0
4
2
0
-2
-4

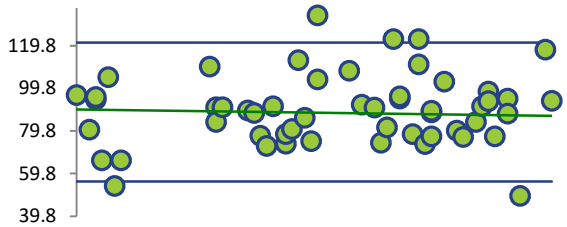

Stability Assessment
Homogeneity Assessment
Sample 1
124.0
74.0
24.0
Sample 2
84.5
64.5
44.5
24.5
Sample 3
42.7
32.7
22.7
12.7

VANADIUM

Stability Assessment



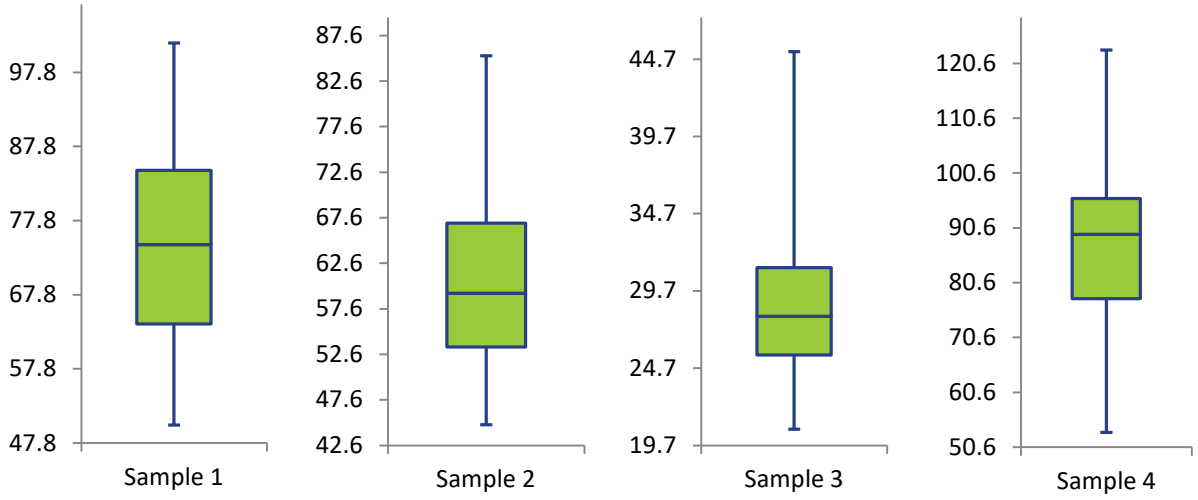
Homogeneity Assessment



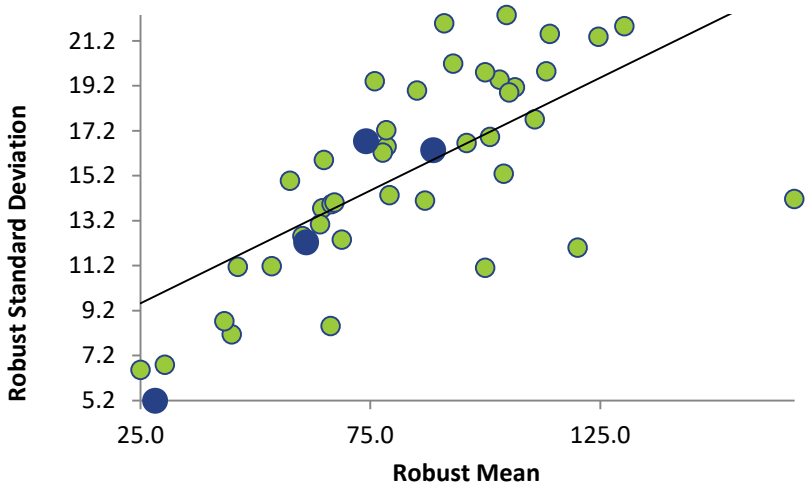
Stability assessments are regression analysis of reported result against date of analysis.

Homogeneity assessments are regression analysis of reported result against bottling order.

Box and Whisker Plots



Current Round (blue) Compared to Historic Rounds (green)



ZINC

Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	67	67	64	65
Median µg/g	525	353	153	902
Robust Mean µg/g	527	352	154	905
U µg/g	5.42	5.02	2.61	13.0
Robust Standard Deviation µg/g	35.5	32.9	16.7	83.8
Regression Standard Deviation µg/g	42.4	28.5	12.6	72.7
Stability Flag				
Homogeneity Flag				Homogeneity
Standard Deviation Used (SDPA) µg/g	42.4	32.9	16.7	101
Outliers	0	0	3	2
|z|>3.0	1	3	0	0
2<|z|<3	4	3	6	3

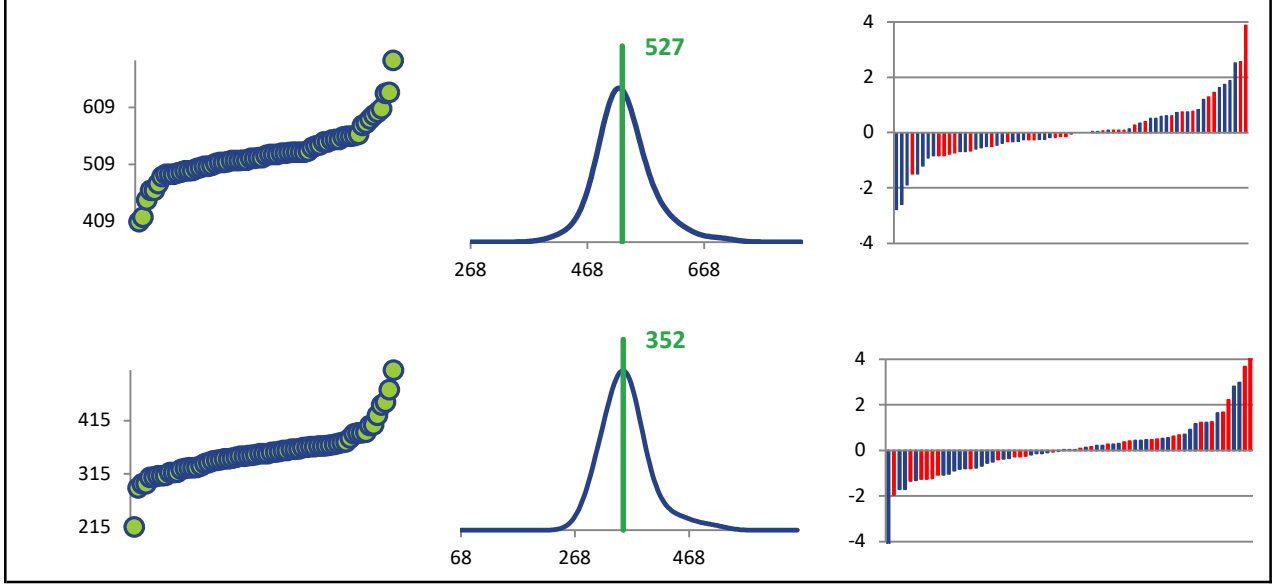
Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	40	40	39	39
ICP/OES (Red)	27	27	25	26

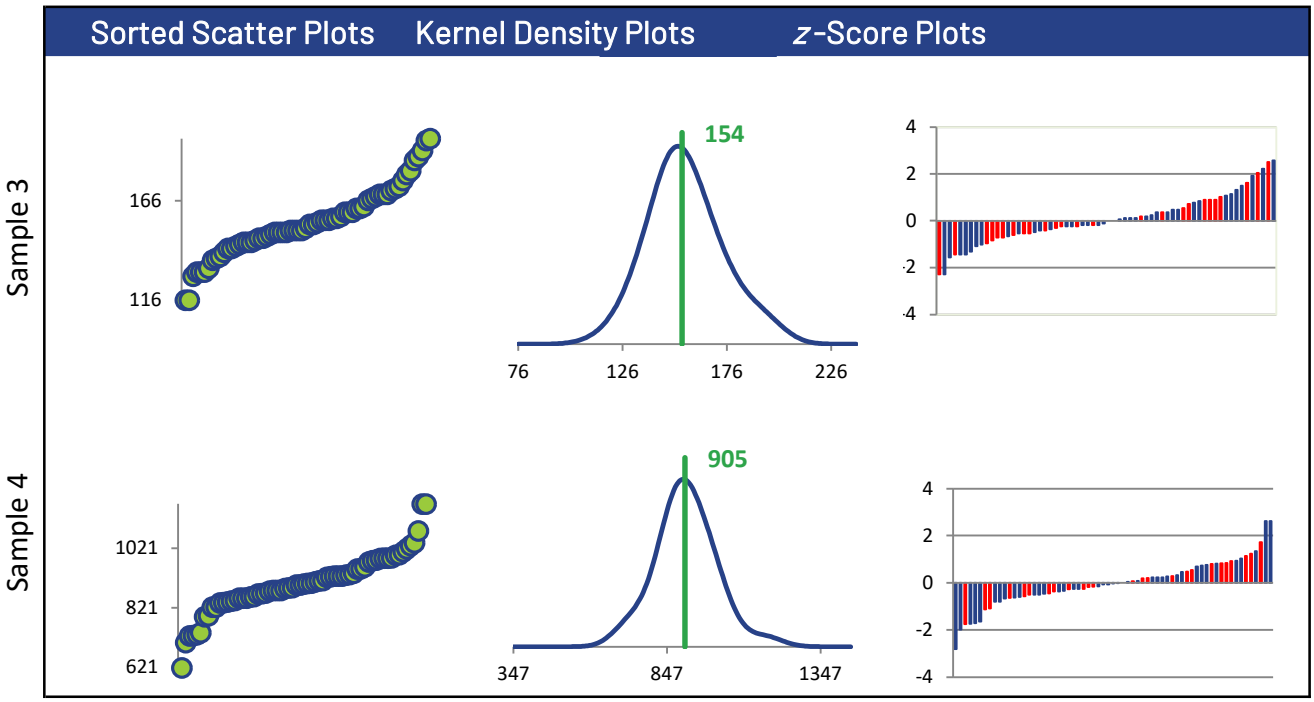
All summary stats and the plots below are based on the data excluding any flagged outliers

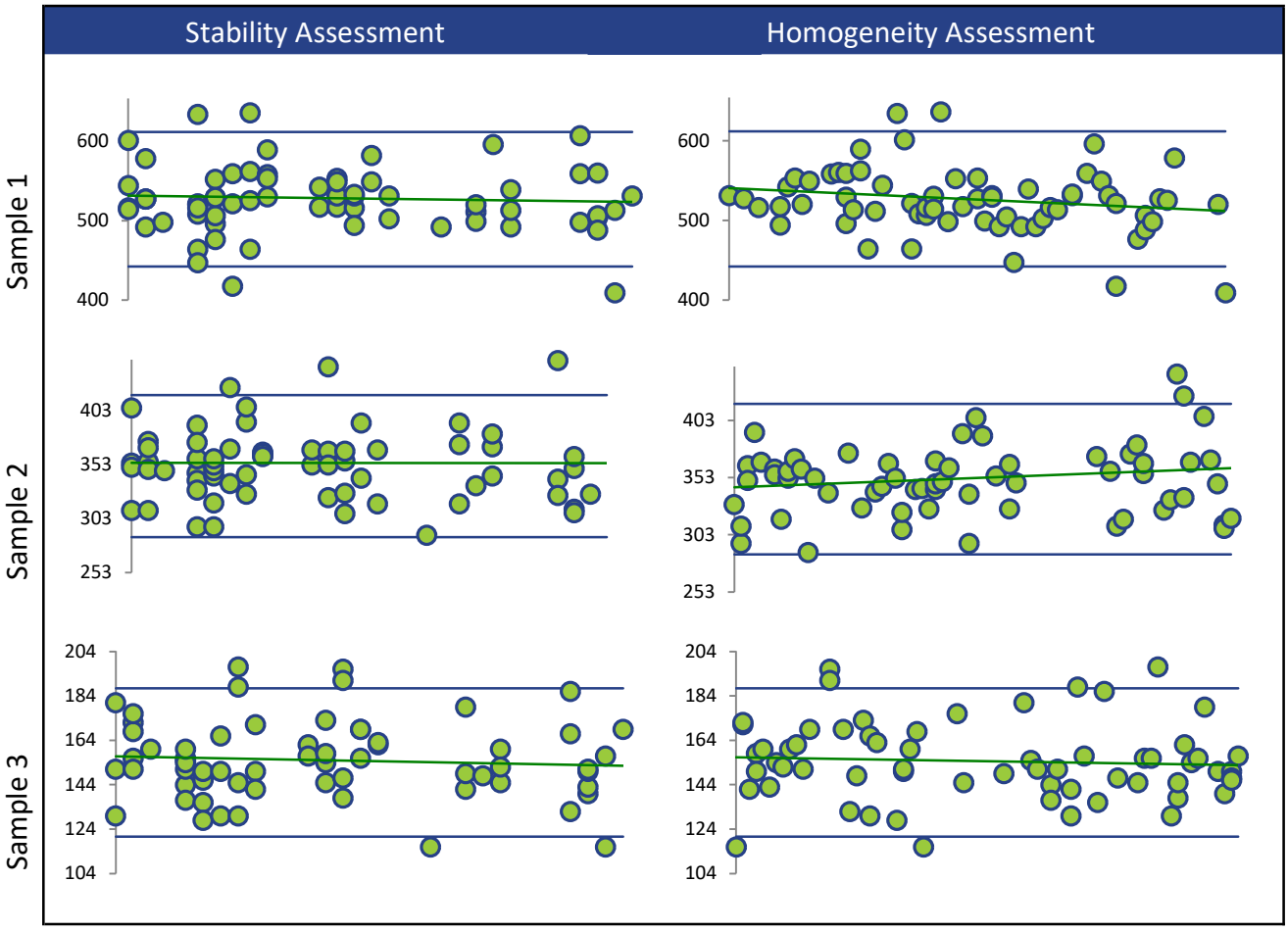
Sorted Scatter Plots Kernel Density Plots *z*-Score Plots

Sample 2



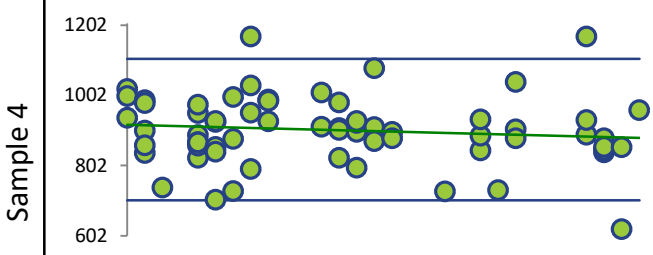
ZINC


Sorted Scatter Plots
Kernel Density Plots
z-Score Plots
Sample 3
166
116
154
76
126
176
226
4
2
0
-2
-4
Sample 4
1021
821
621
905
347
847
1347
4
2
0
-2
-4

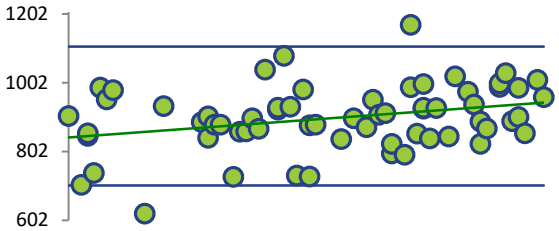

Stability Assessment
Homogeneity Assessment
Sample 1
600
500
400
Sample 2
403
353
303
253
Sample 3
204
184
164
144
124
104

ZINC

Stability Assessment



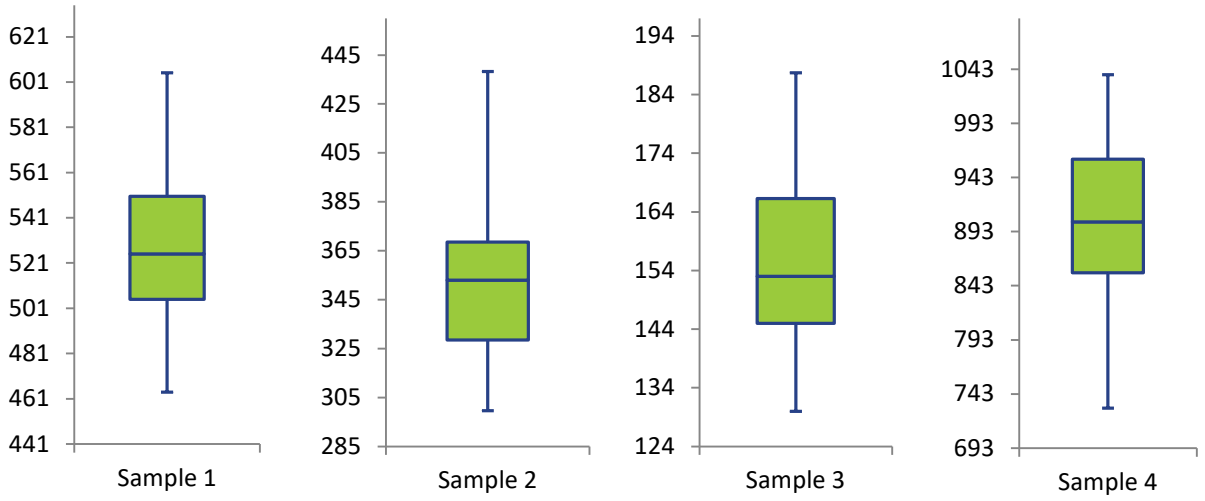
Homogeneity Assessment



Stability assessments are regression analysis of reported result against date of analysis.

Homogeneity assessments are regression analysis of reported result against bottling order.

Box and Whisker Plots



Current Round (blue) Compared to Historic Rounds (green)