Test Group Summary Report
C17 Metals in Soil
January 2024 PT Round

Issued: March 5, 2024

PTC | Proficiency Testing Canada

Table of Contents

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.
$\pm u$:	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

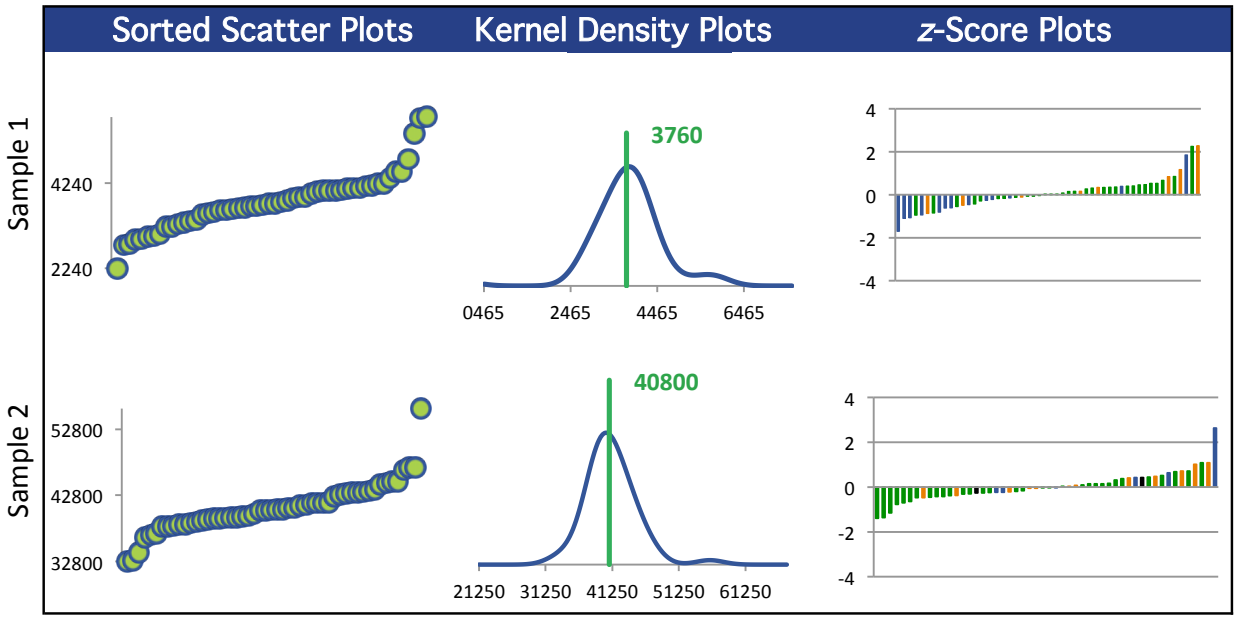
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	52	52	53	53
Median µg/g	3770	40700	46600	27500
Robust Mean µg/g	3760	40800	46500	27600
U µg/g	100	529	637	383
Robust Standard Deviation µg/g	578	3050	3710	2230
Regression Standard Deviation µg/g	892	5740	6500	4010
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	892	5740	6500	4010
Outliers	2	2	1	1
|z|>3.0	0	0	1	0
2<|z|<3	2	1	0	2

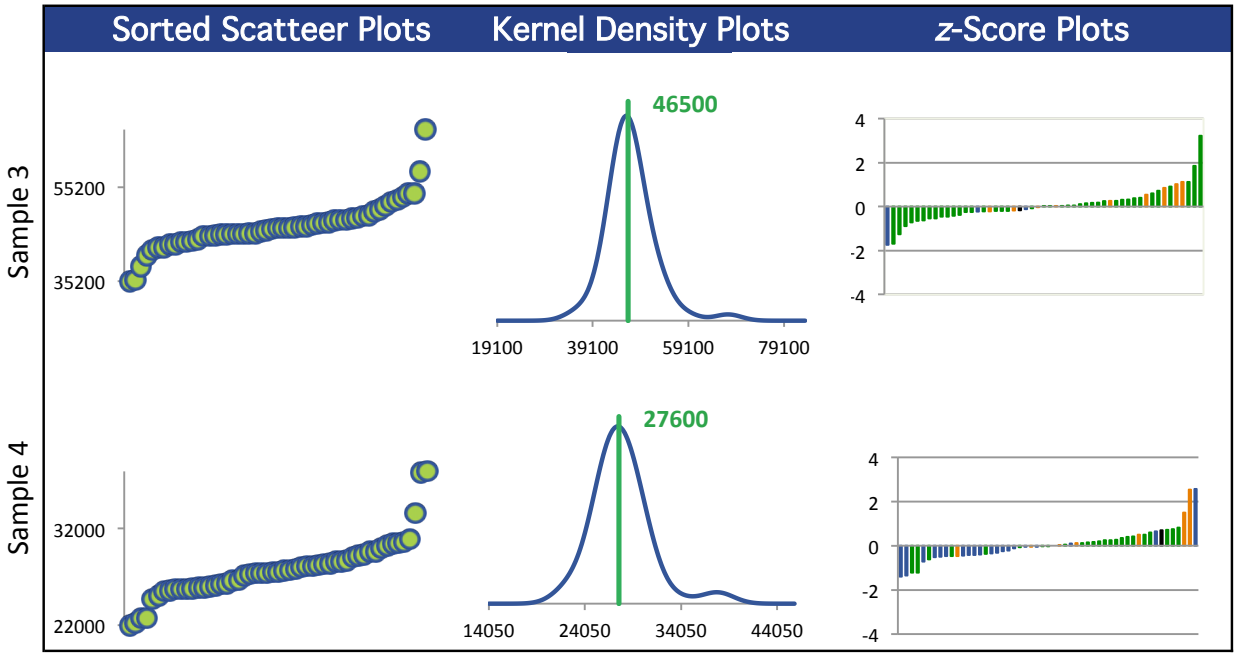
Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/OES (Blue)	20	20	21	21
ICP/MS (Red)	32	32	32	32

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



ALUMINUM


Sorted Scatteer Plots
Kernel Density Plots
z-Score Plots
Sample 3
55200
35200
46500
19100
39100
59100
79100
4
2
0
-2
-4
Sample 4
32000
22000
27600
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24050
34050
44050
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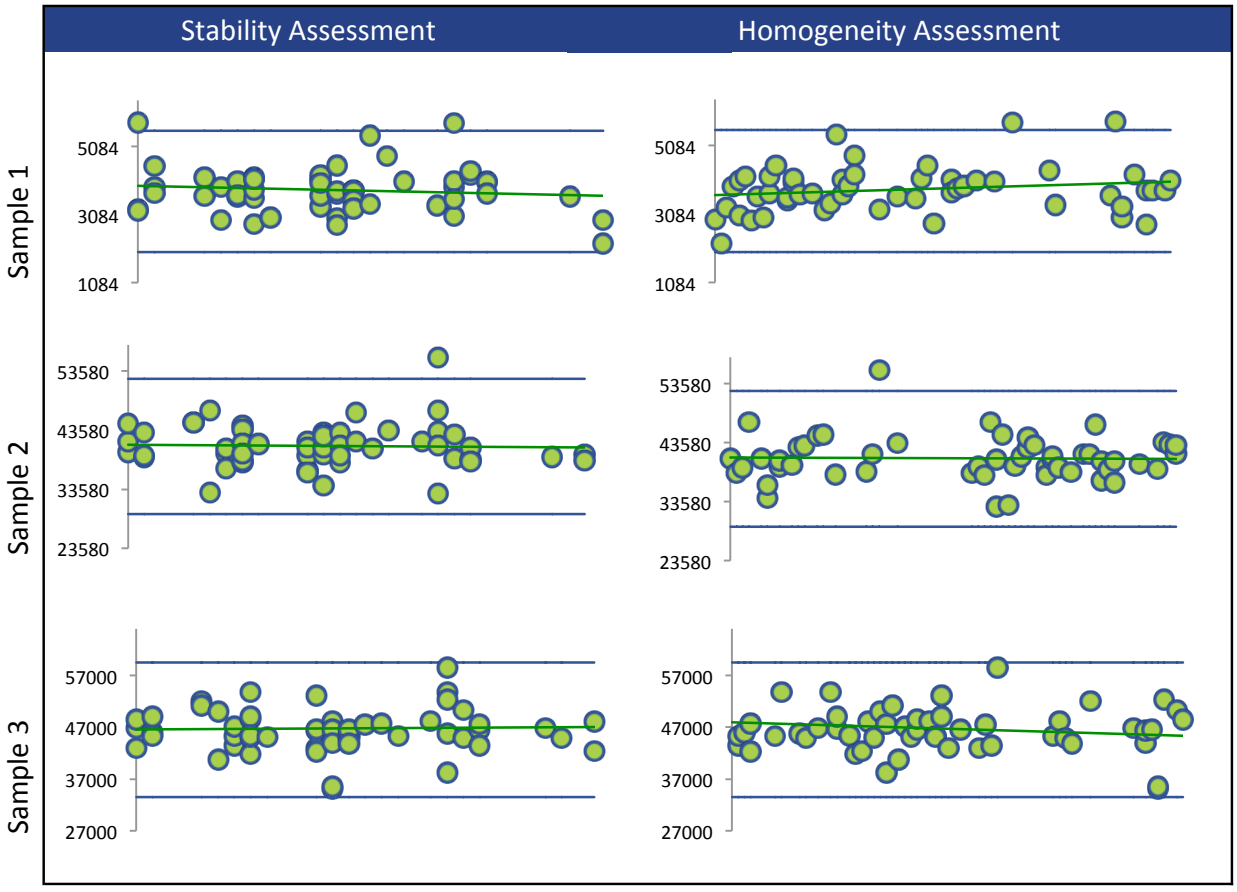
0
-2
-4


Stability Assessment
Homogeneity Assessment
Sample 1
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3084
1084
5084
3084
1084
Sample 2
53580
43580
33580
23580
53580
43580
33580
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Sample 3
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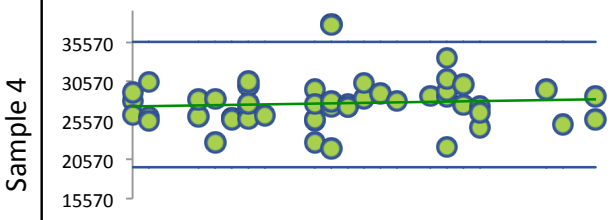
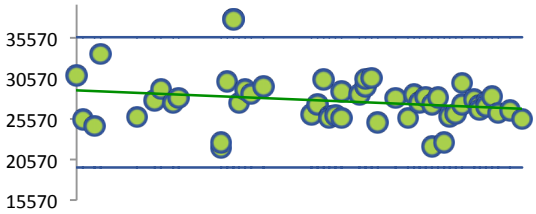
47000
37000
27000
57000
47000
37000
27000

ALUMINUM

Stability Assessment



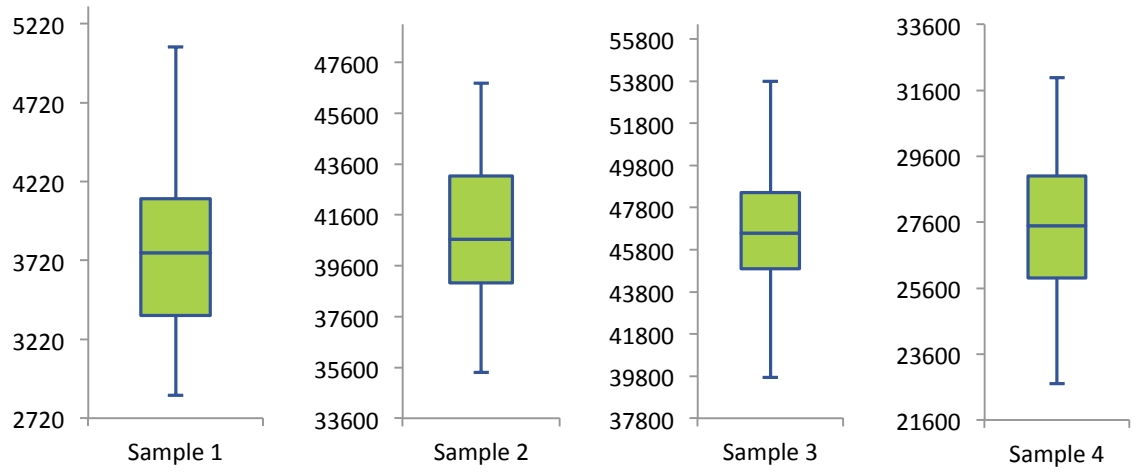
Homogeneity Assessment



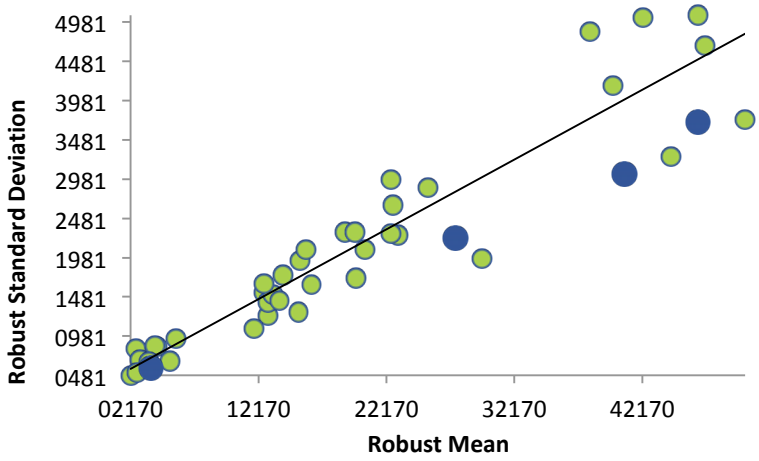
Stability assessments are regression analysis of reported result against date of analysis.

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

Box and Whisker Plots



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



ANTIMONY

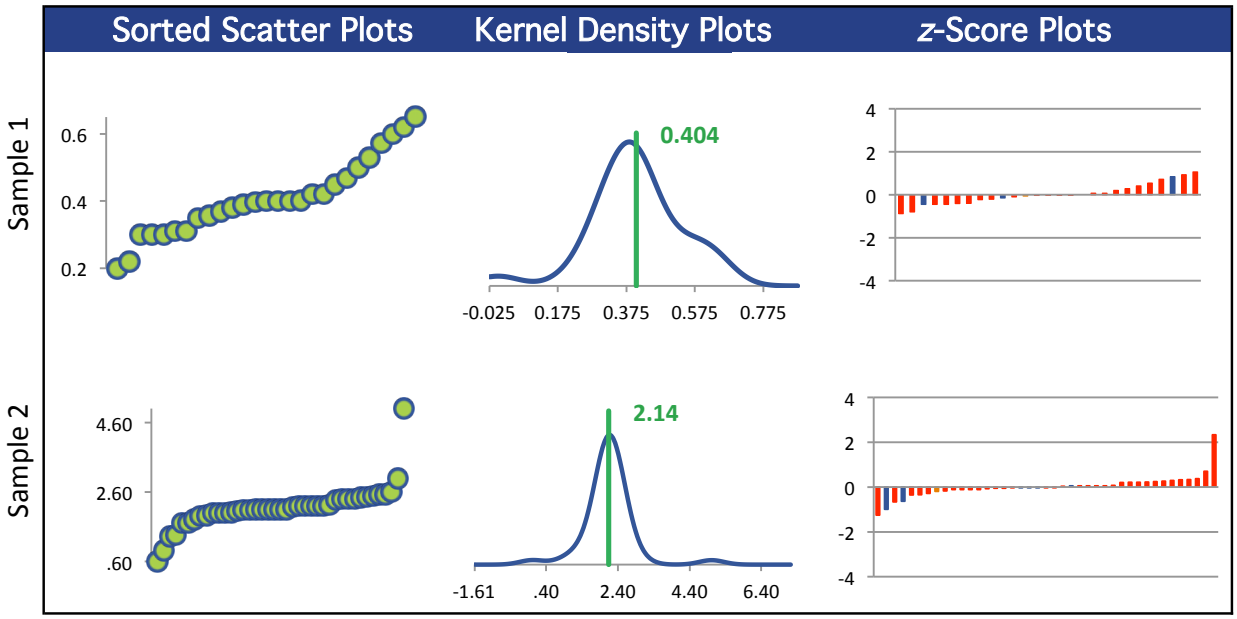
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	27	41	42	40
Median µg/g	0.400	2.10	2.28	1.55
Robust Mean µg/g	0.404	2.14	2.29	1.56
U µg/g	0.0274	0.0625	0.0816	0.0593
Robust Standard Deviation µg/g	0.114	0.320	0.423	0.300
Regression Standard Deviation µg/g	0.232	1.23	1.31	0.891
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	0.232	1.23	1.31	0.891
Outliers	1	0	0	0
|z|>3.0	0	0	0	0
2<|z|<3	0	1	0	1

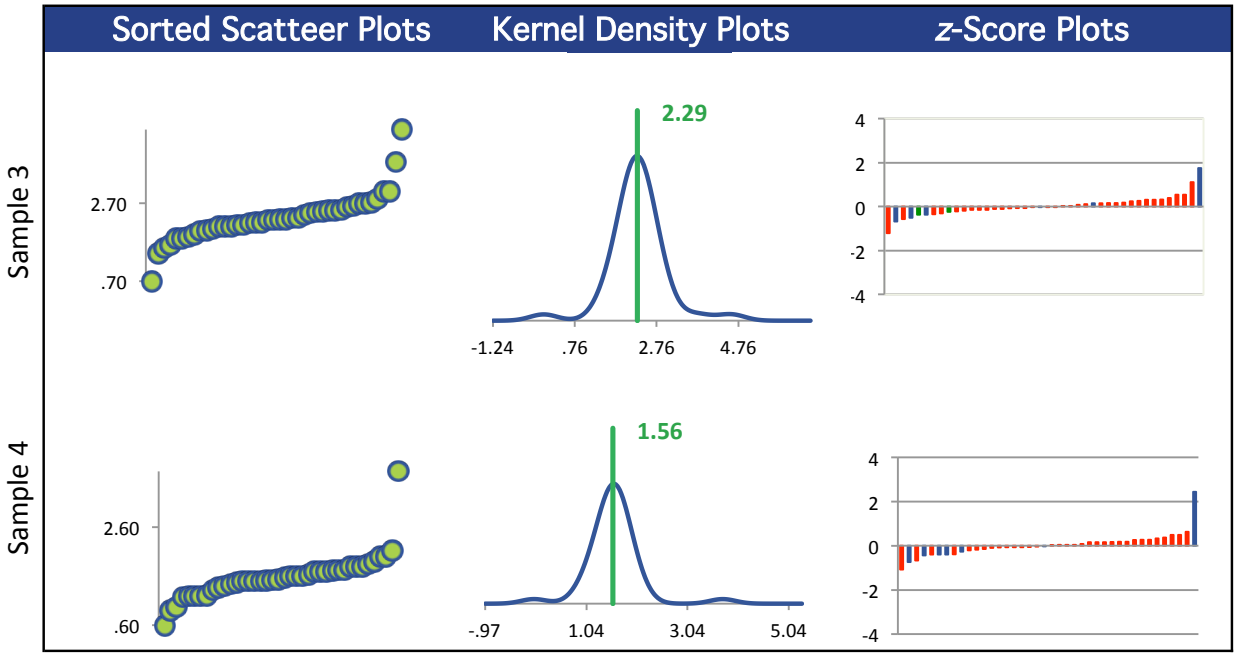
Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	23	34	34	33
ICP/OES (Red)	3	5	6	5
HYDRIDE AA (Green)	1	1	1	1
HYDRIDE ICP (Orange)	0	1	1	1

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



ANTIMONY


Sorted Scatteer Plots
Kernel Density Plots
z-Score Plots
Sample 3
2.70
.70
2.29
-1.24
.76
2.76
4.76
4
2
0
-2
-4
Sample 4
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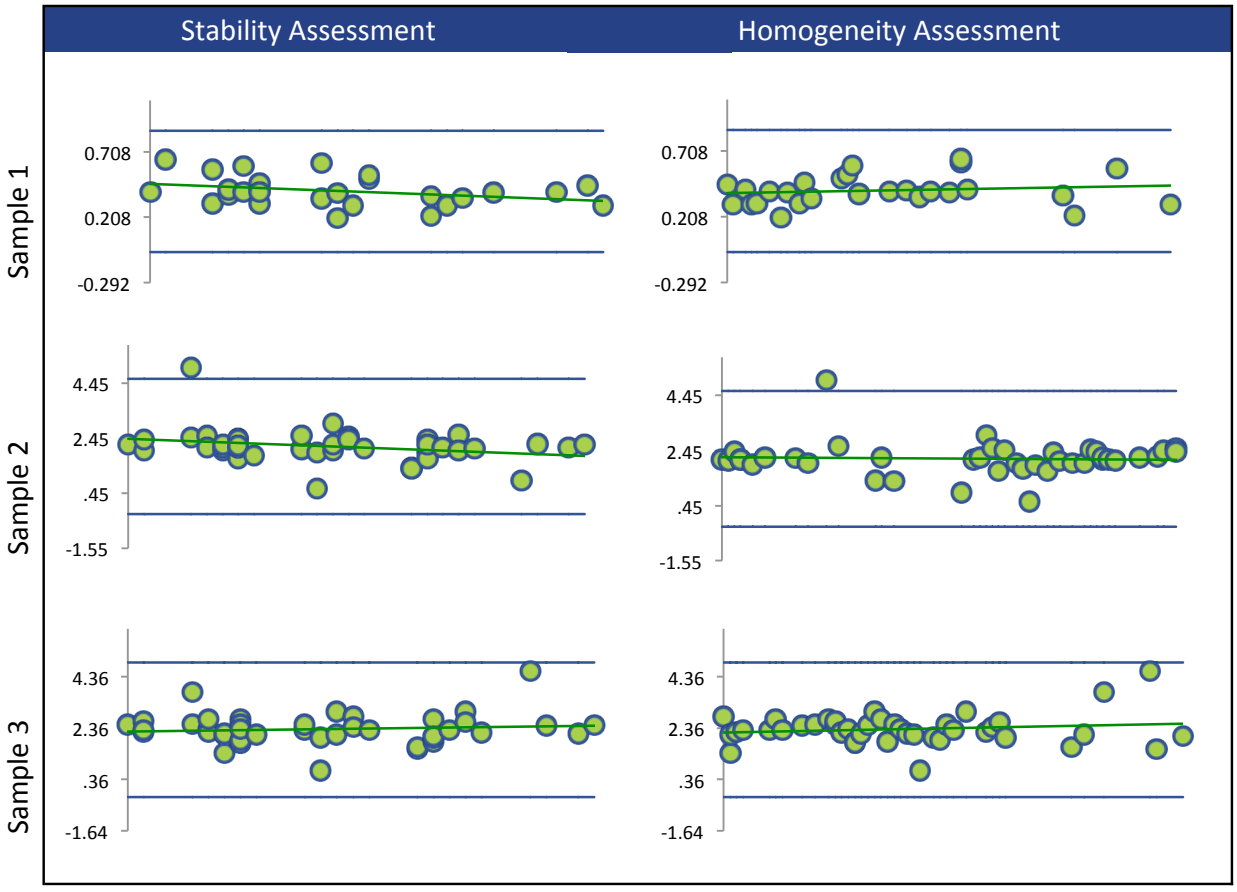
.60
1.56
-.97
1.04
3.04
5.04
4
2
0
-2
-4


Stability Assessment
Homogeneity Assessment
Sample 1
0.708
0.208
-0.292
0.708
0.208
-0.292
Sample 2
4.45
2.45
.45
-1.55
4.45
2.45
.45
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Sample 3
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2.36
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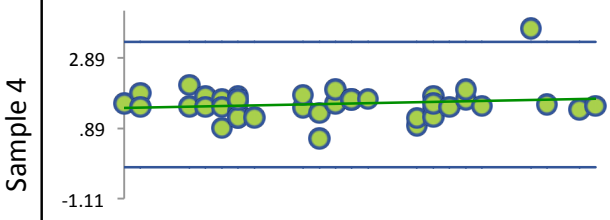
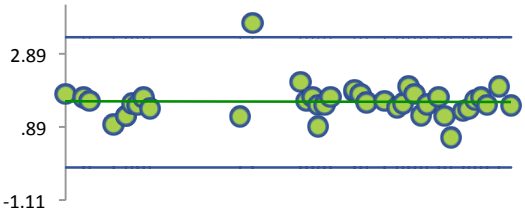
4.36
2.36
.36
-1.64

ANTIMONY

Stability Assessment



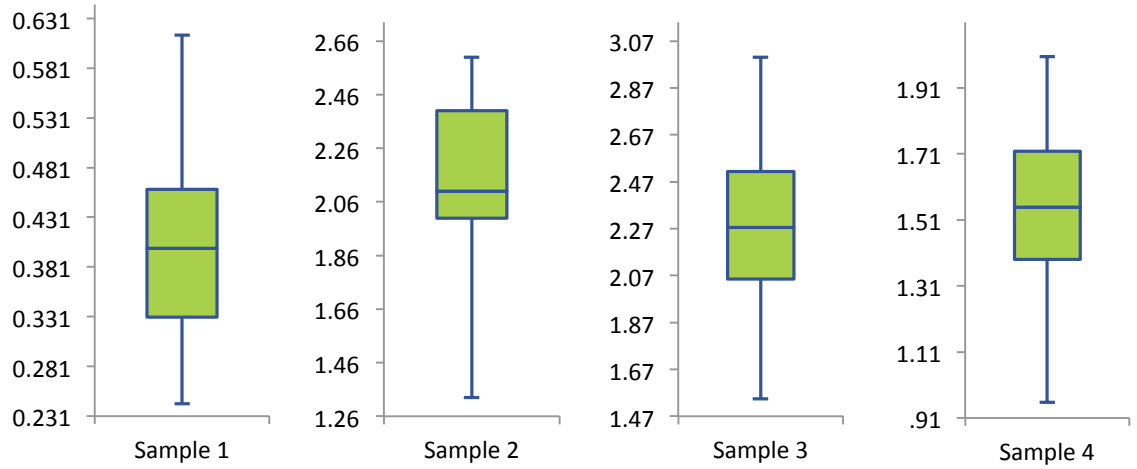
Homogeneity Assessment



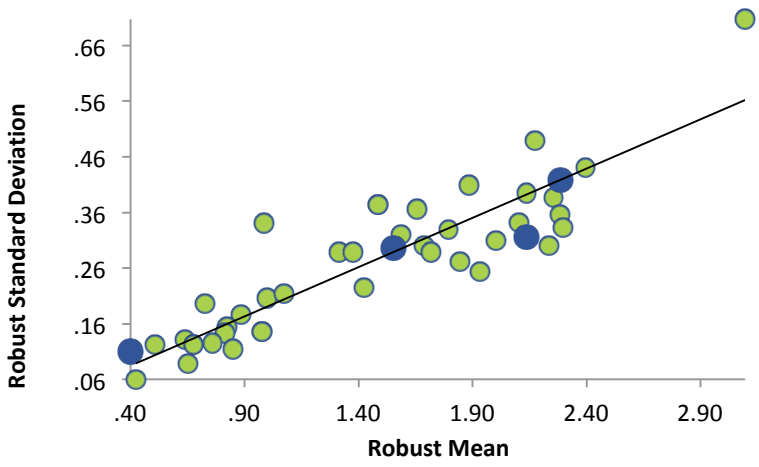
Stability assessments are regression analysis of reported result against date of analysis.

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

Box and Whisker Plots



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



ARSENIC

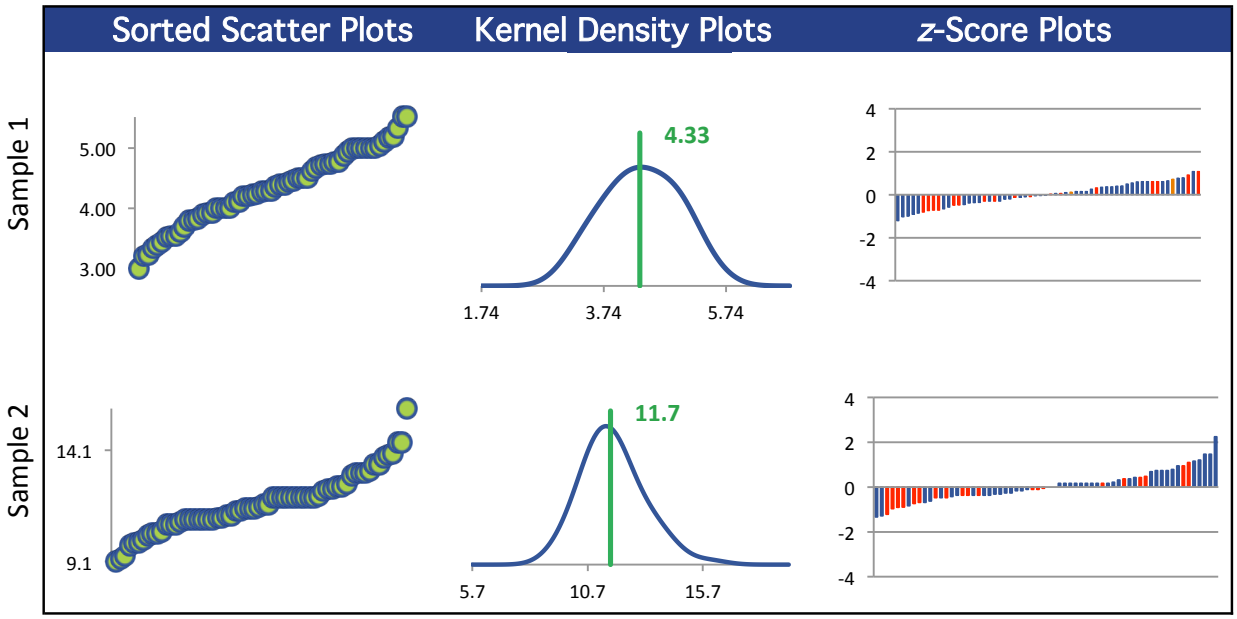
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	60	64	64	62
Median µg/g	4.33	11.7	12.5	6.31
Robust Mean µg/g	4.33	11.7	12.7	6.50
U µg/g	0.109	0.202	0.275	0.153
Robust Standard Deviation µg/g	0.673	1.29	1.76	0.964
Regression Standard Deviation µg/g	1.10	1.92	2.03	1.34
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	1.10	1.92	2.03	1.34
Outliers	0	0	0	0
|z|>3.0	0	0	2	0
2<|z|<3	0	1	0	0

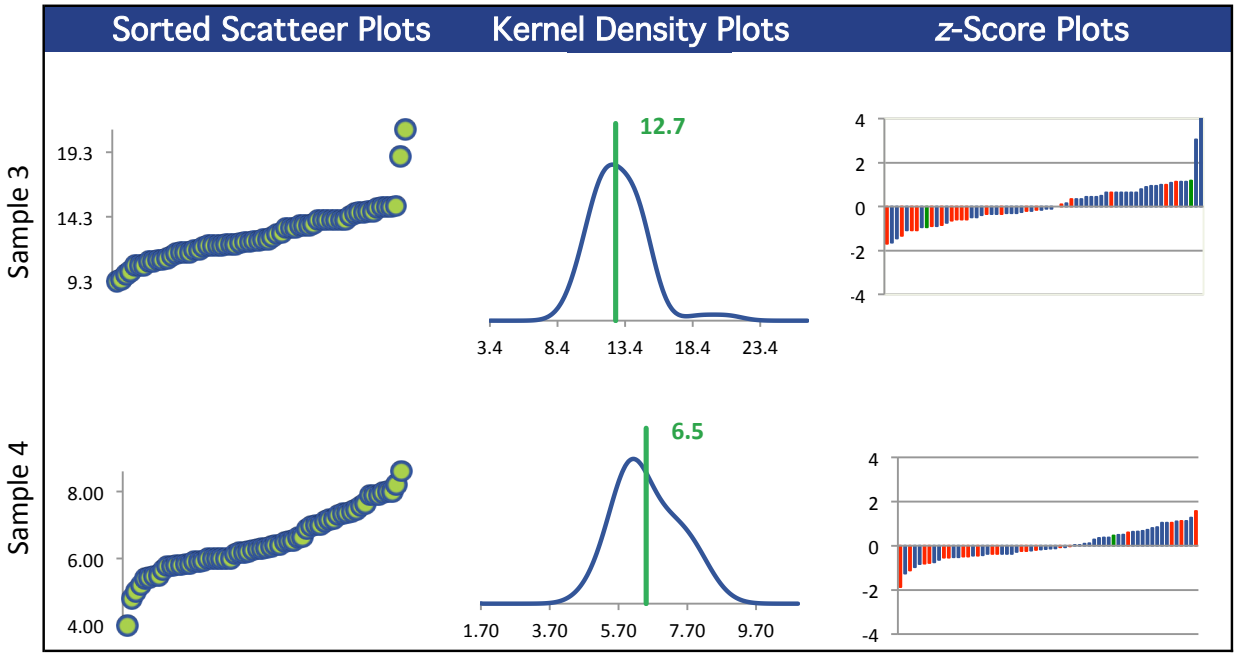
Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	41	41	41	41
PYROLYTIC AA (Red)	1	1	1	1
ICP/OES (Green)	15	19	19	17
HYDRIDE ICP (Orange)	1	1	1	1
HYDRIDE AA (Black)	2	2	2	2

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



ARSENIC


Sorted Scatteer Plots
Kernel Density Plots
z-Score Plots
Sample 3
19.3
14.3
9.3
12.7
3.4
8.4
13.4
18.4
23.4
4
2
0
-2
-4
Sample 4
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6.5
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5.70
7.70
9.70
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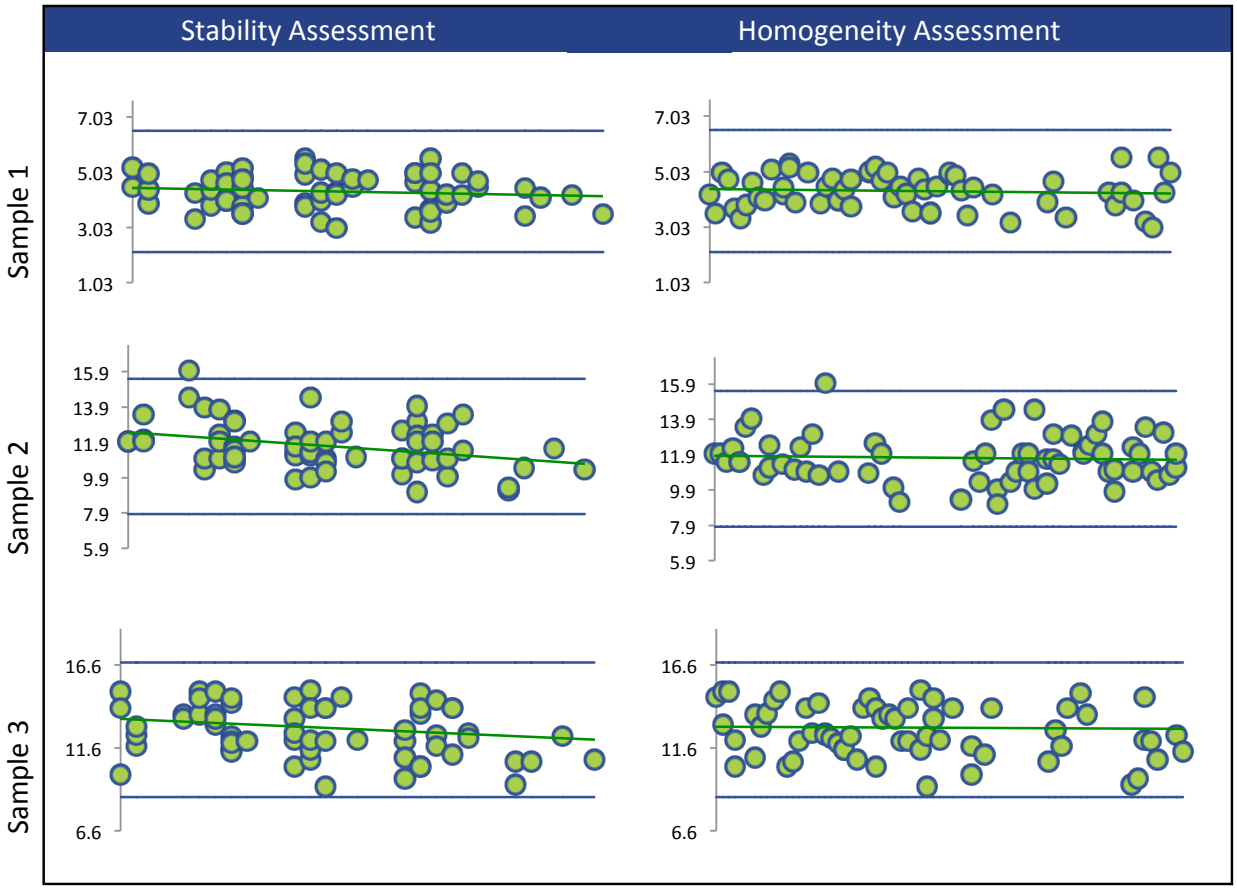
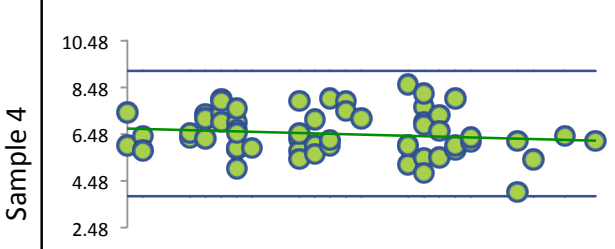
-4

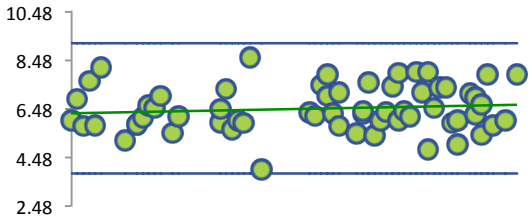

Stability Assessment
Homogeneity Assessment
Sample 1
7.03
5.03
3.03
1.03
7.03
5.03
3.03
1.03
Sample 2
15.9
13.9
11.9
9.9
7.9
5.9
15.9
13.9
11.9
9.9
7.9
5.9
Sample 3
16.6
11.6
6.6
16.6
11.6
6.6

ARSENIC

Stability Assessment



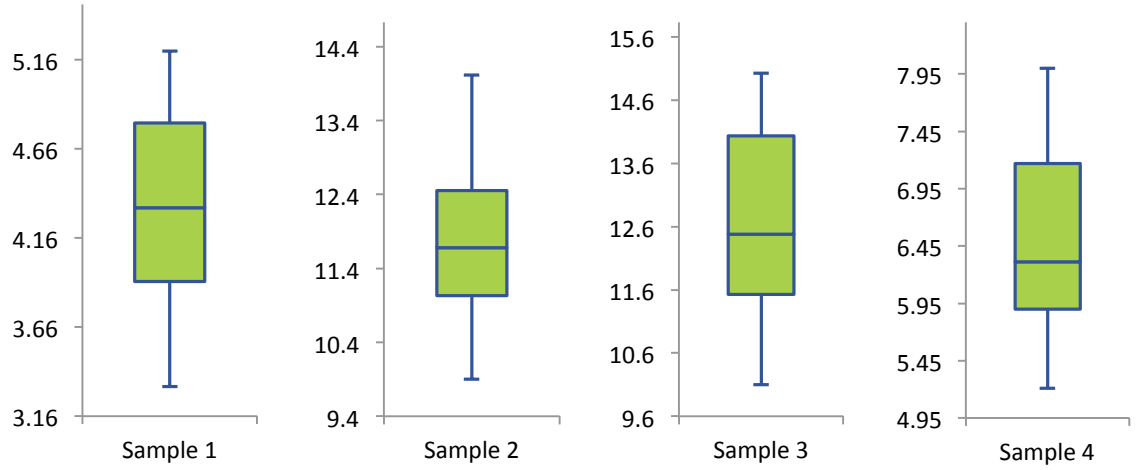
Homogeneity Assessment



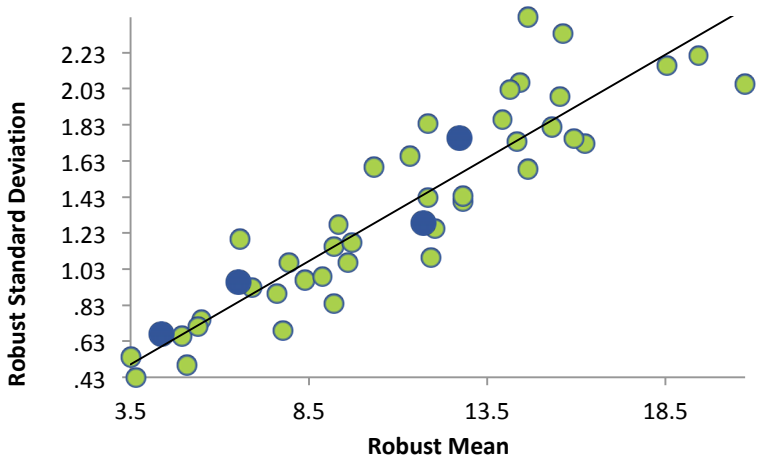
Stability assessments are regression analysis of reported result against date of analysis.

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

Box and Whisker Plots



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



BARIUM

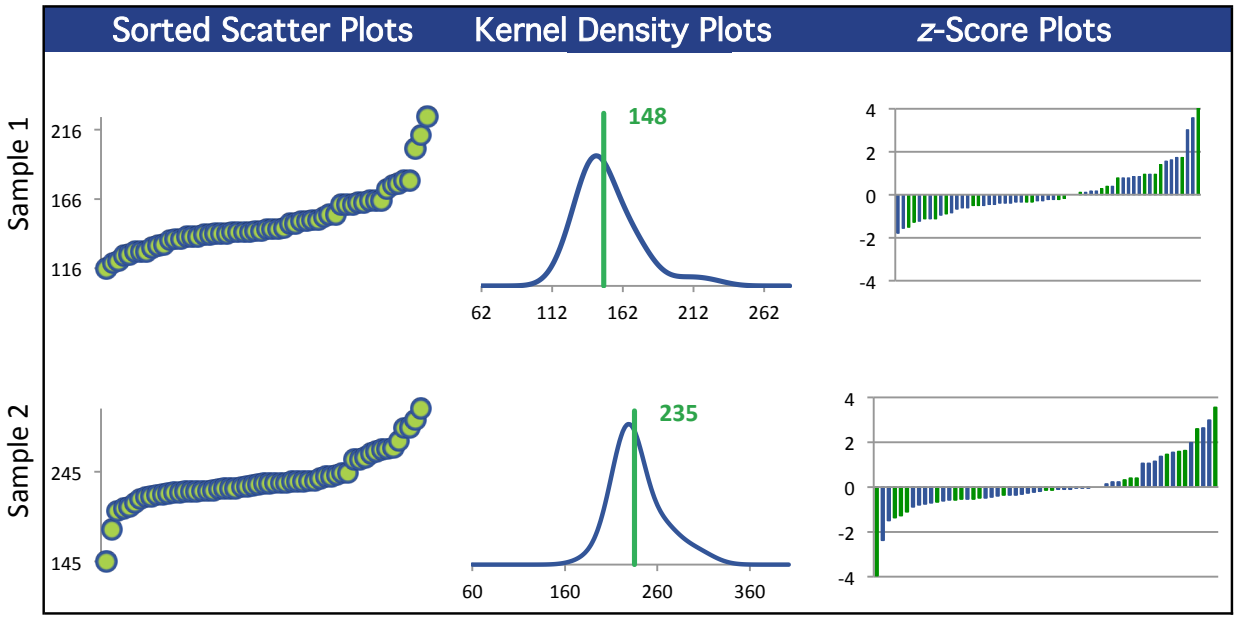
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	57	57	57	57
Median µg/g	144	232	297	227
Robust Mean µg/g	148	235	299	225
U µg/g	2.96	3.77	3.86	3.28
Robust Standard Deviation µg/g	17.9	22.8	23.3	19.8
Regression Standard Deviation µg/g	12.3	18.3	22.8	17.7
Stability Flag			Stability	
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	17.9	22.8	29.6	19.8
Outliers	0	0	0	0
|z|>3.0	3	2	0	1
2<|z|<3	0	4	2	2

Methods Used

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

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



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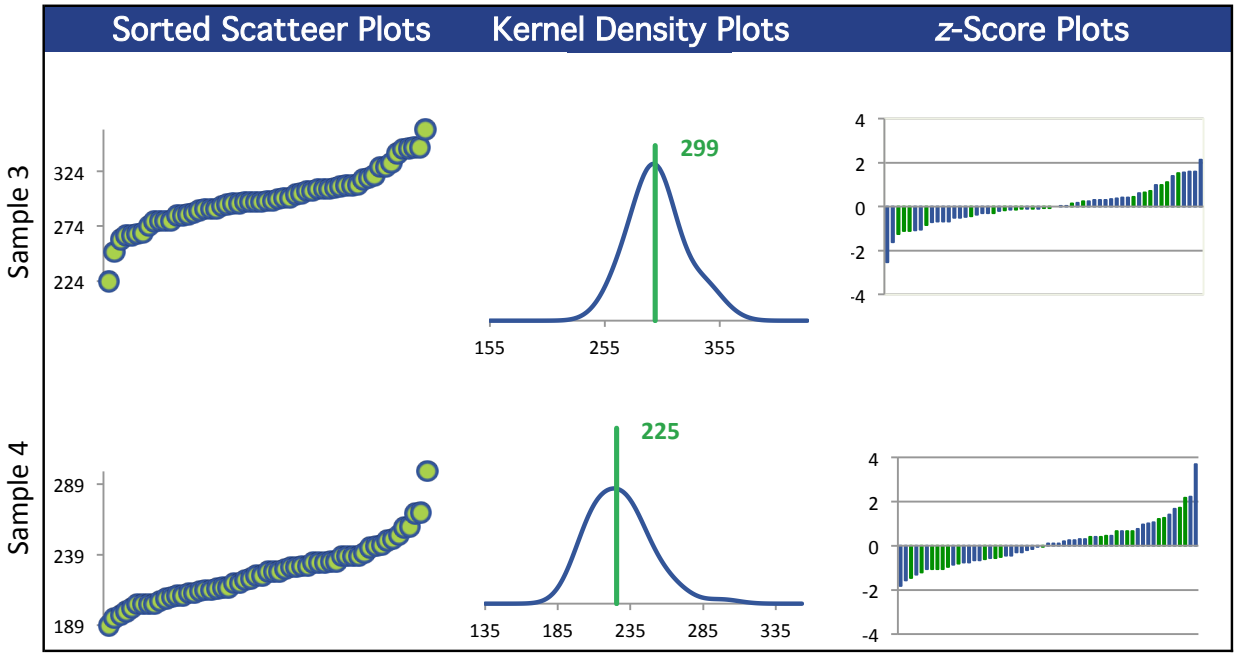
Sorted Scatteer Plots
Kernel Density Plots
z-Score Plots
Sample 3
324
274
224
299
155
255
355
4
2
0
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-4
Sample 4
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239
189
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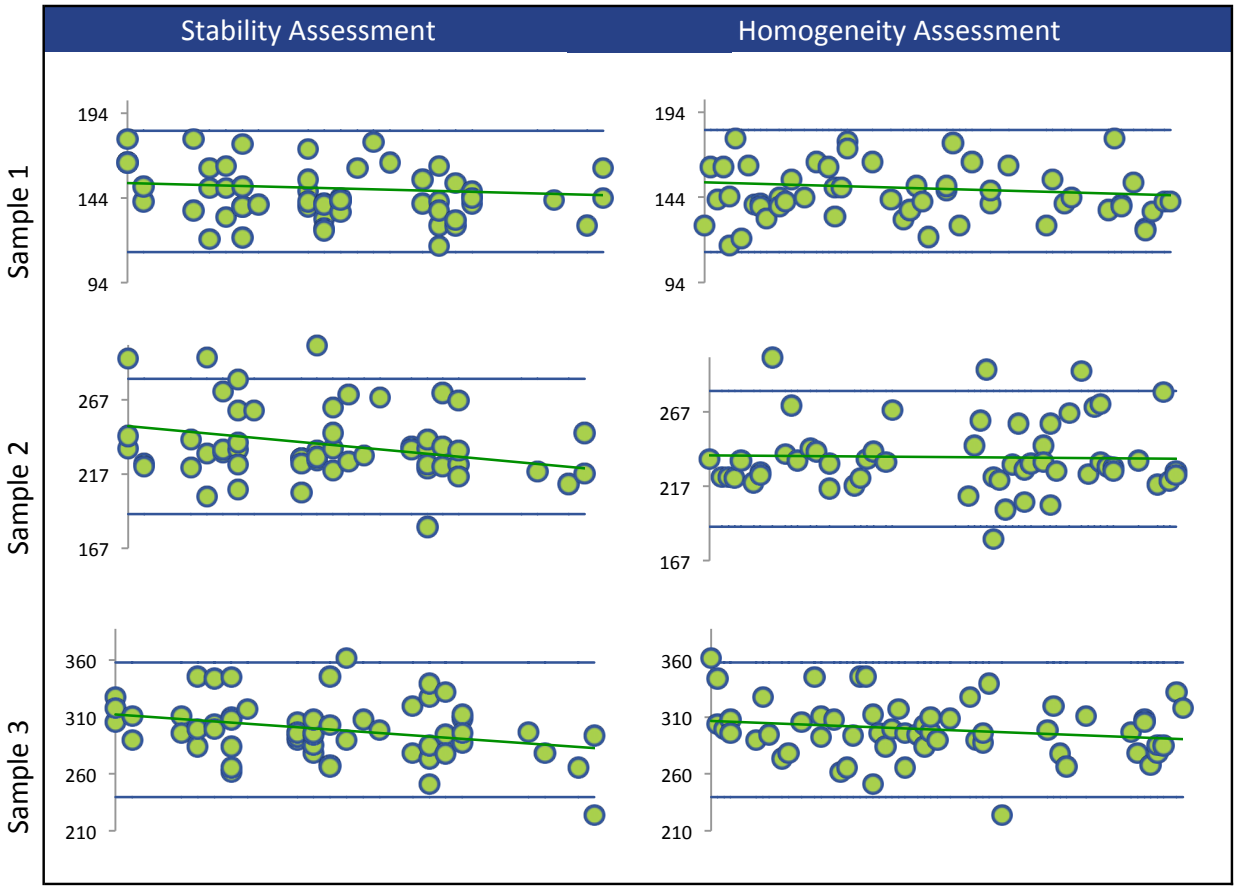
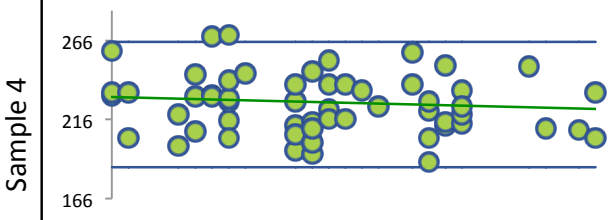
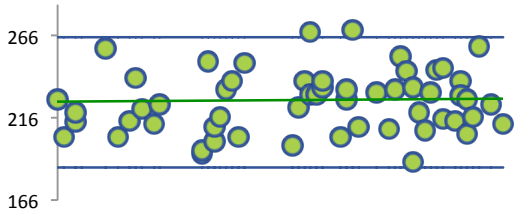

Stability Assessment
Homogeneity Assessment
Sample 1
194
144
94
194
144
94
Sample 2
267
217
167
267
217
167
Sample 3
360
310
260
210
360
310
260
210

BARIUM

Stability Assessment



Homogeneity Assessment



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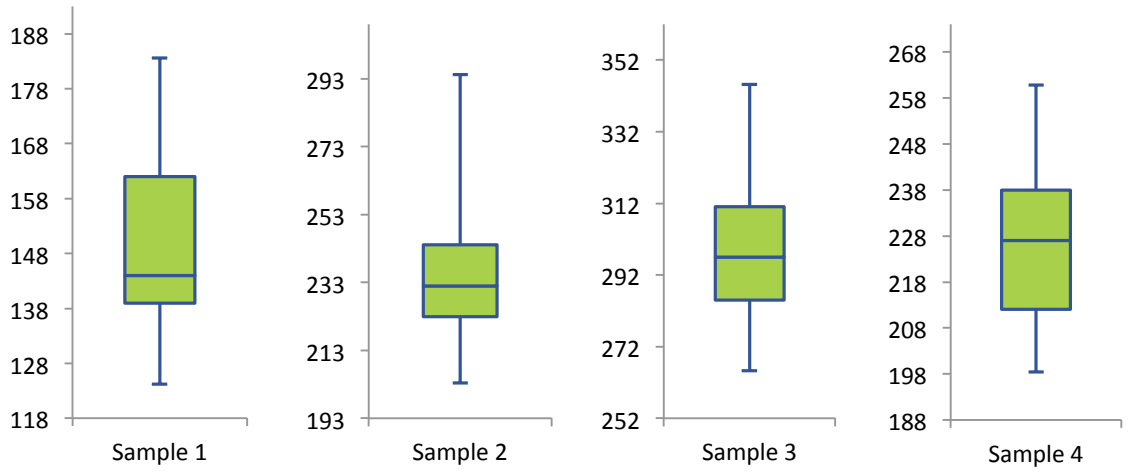
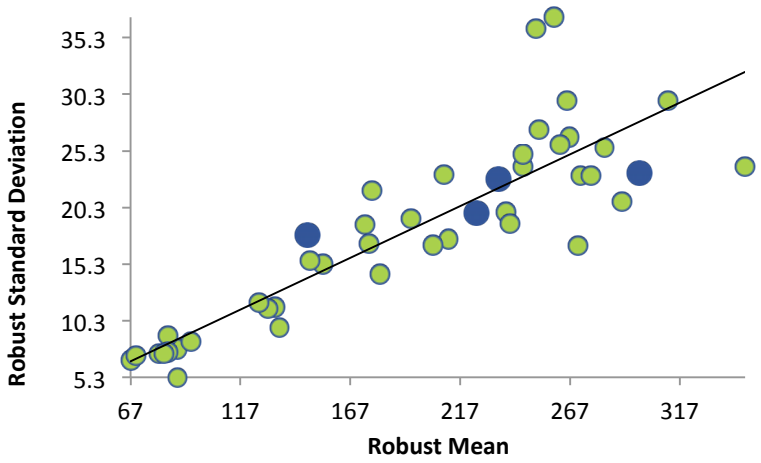
Homogeneity assessments are regression analysis of reported result against bottling order.

Box and Whisker Plots



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



BERYLLIUM

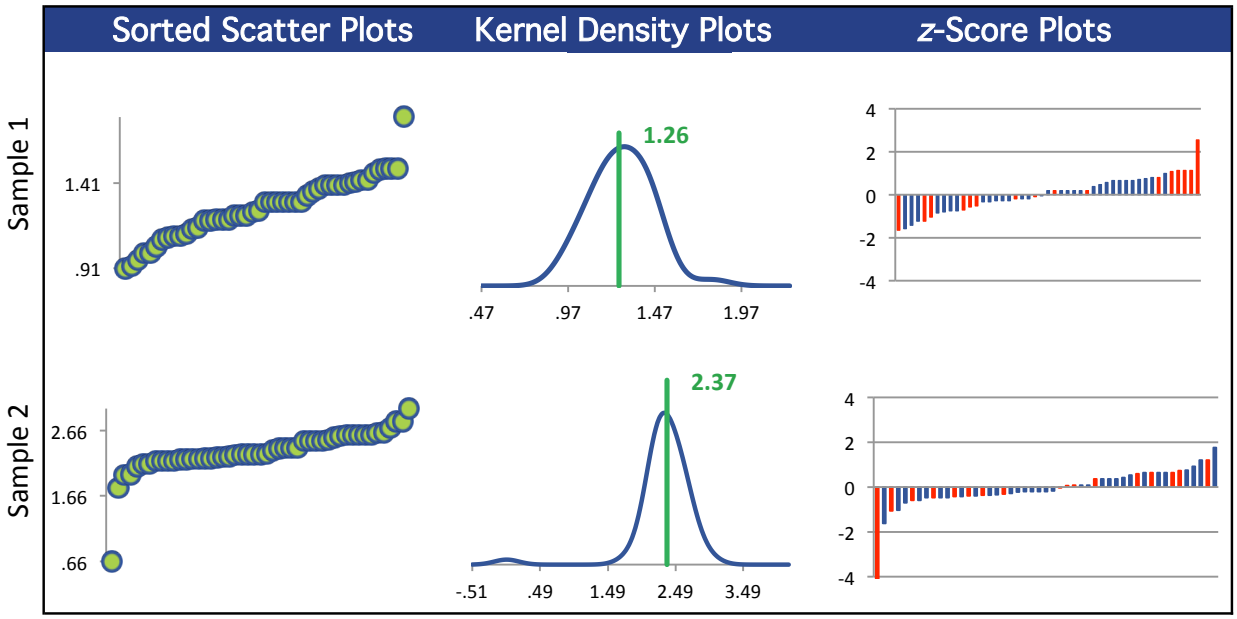
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	47	49	50	49
Median µg/g	1.30	2.30	2.21	1.91
Robust Mean µg/g	1.26	2.37	2.24	1.94
U µg/g	0.0328	0.0411	0.0417	0.0325
Robust Standard Deviation µg/g	0.180	0.230	0.236	0.182
Regression Standard Deviation µg/g	0.212	0.358	0.340	0.301
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	0.212	0.358	0.340	0.301
Outliers	2	1	0	0
|z|>3.0	0	1	0	0
2<|z|<3	1	0	4	2

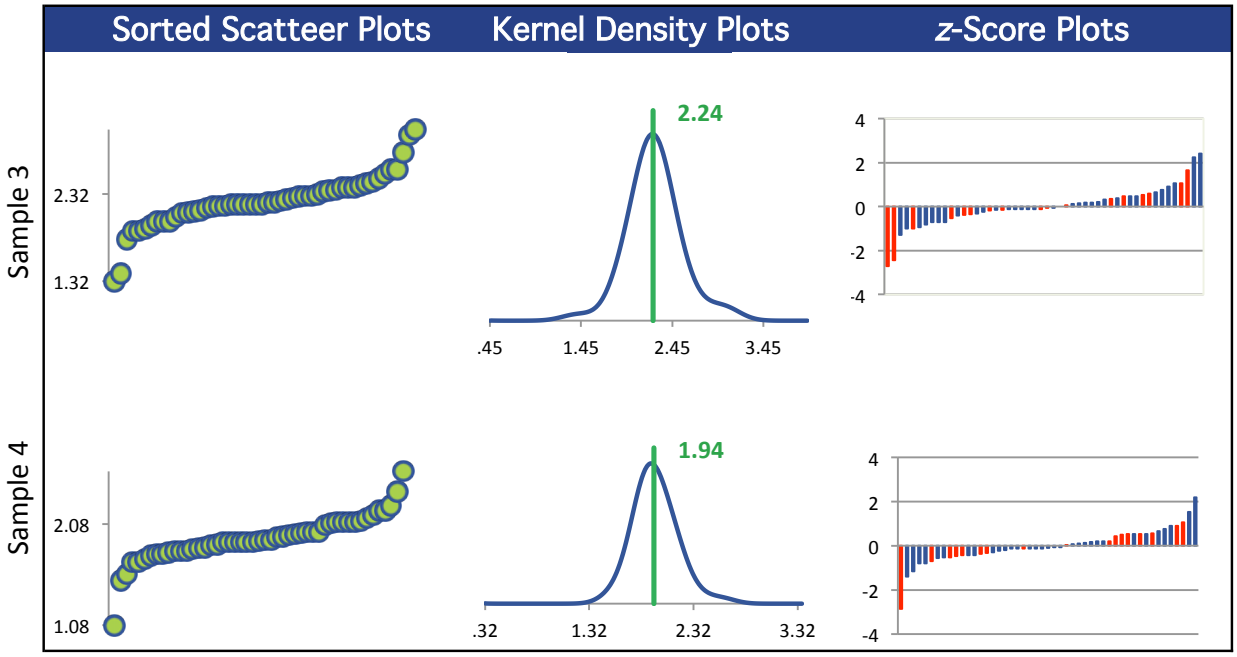
Methods Used

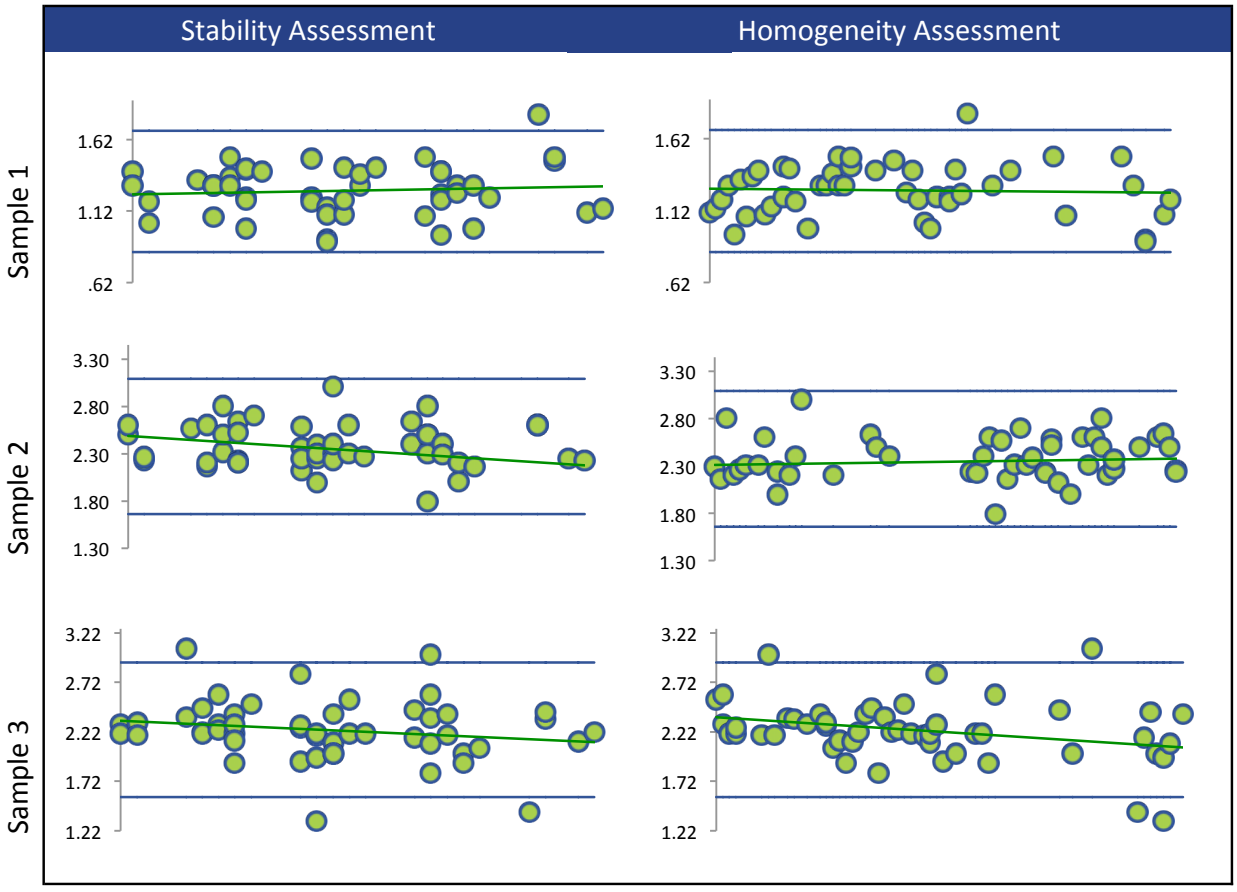
Method	C17-1	C17-2	C17-3	C17-4
ICP/OES (Blue)	16	17	17	17
ICP/MS (Red)	31	32	33	32

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



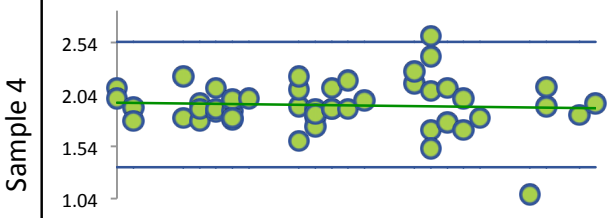
BERYLLIUM


Sorted Scatteer Plots
Kernel Density Plots
z-Score Plots
Sample 3
2.32
1.32
2.24
.45
1.45
2.45
3.45
4
2
0
-2
-4
Sample 4
2.08
1.08
1.94
.32
1.32
2.32
3.32
4
2
0
-2
-4

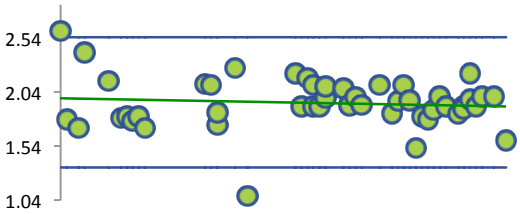

Stability Assessment
Homogeneity Assessment
Sample 1
1.62
1.12
.62
1.62
1.12
.62
Sample 2
3.30
2.80
2.30
1.80
1.30
3.30
2.80
2.30
1.80
1.30
Sample 3
3.22
2.72
2.22
1.72
1.22
3.22
2.72
2.22
1.72
1.22

BERYLLIUM

Stability Assessment



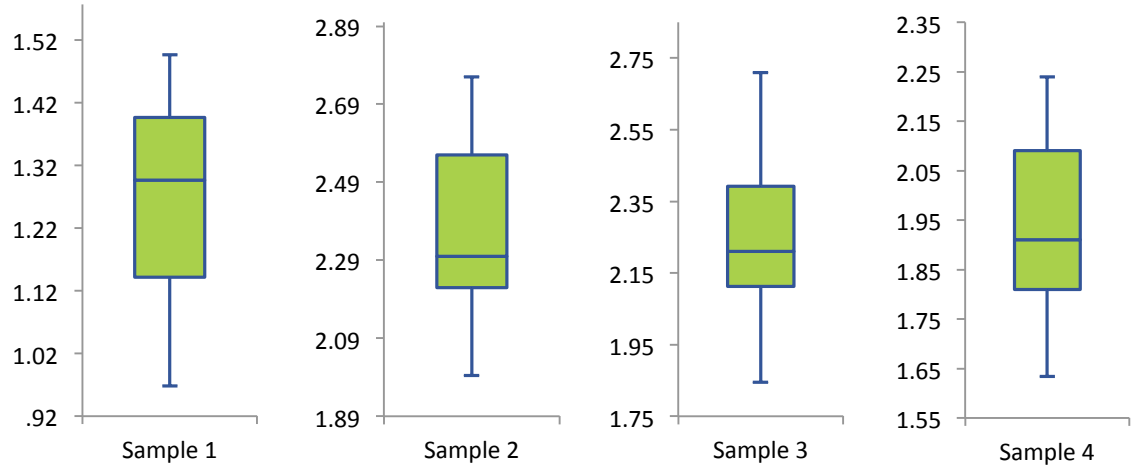
Homogeneity Assessment



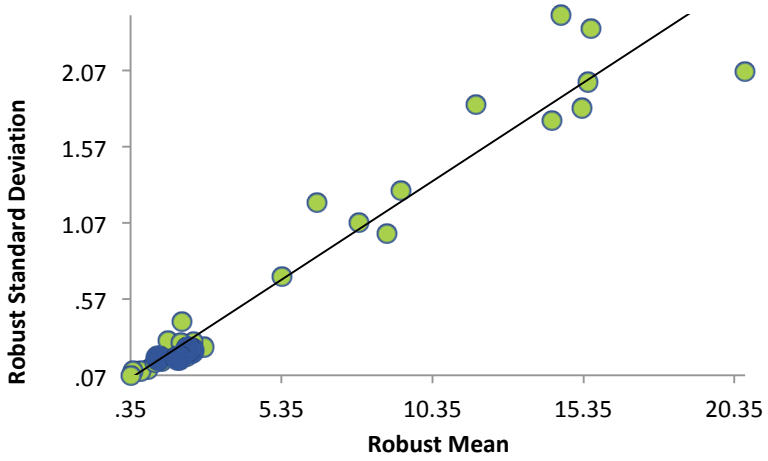
Stability assessments are regression analysis of reported result against date of analysis.

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

Box and Whisker Plots



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



BORON

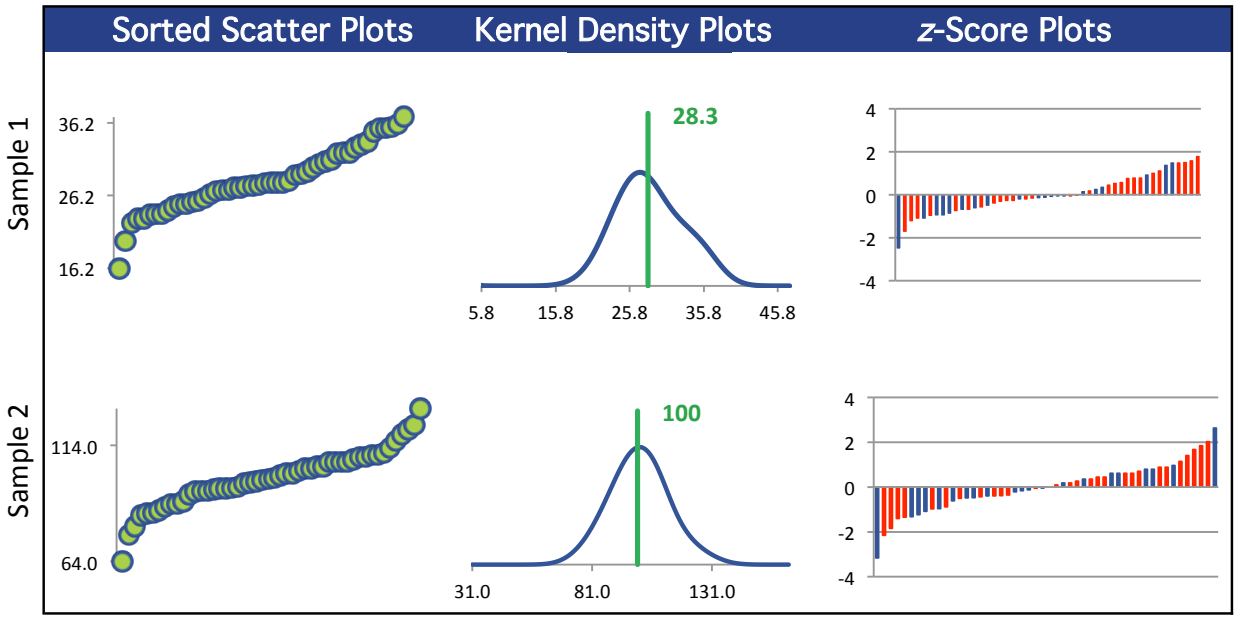
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	48	50	51	51
Median µg/g	27.8	99.8	112	107
Robust Mean µg/g	28.3	100	112	106
U µg/g	0.821	2.02	2.35	1.84
Robust Standard Deviation µg/g	4.55	11.4	13.4	10.5
Regression Standard Deviation µg/g	3.78	11.3	12.5	11.9
Stability Flag	Stability			
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	4.88	11.4	13.4	11.9
Outliers	1	1	0	0
|z|>3.0	0	1	1	2
2<|z|<3	1	3	3	2

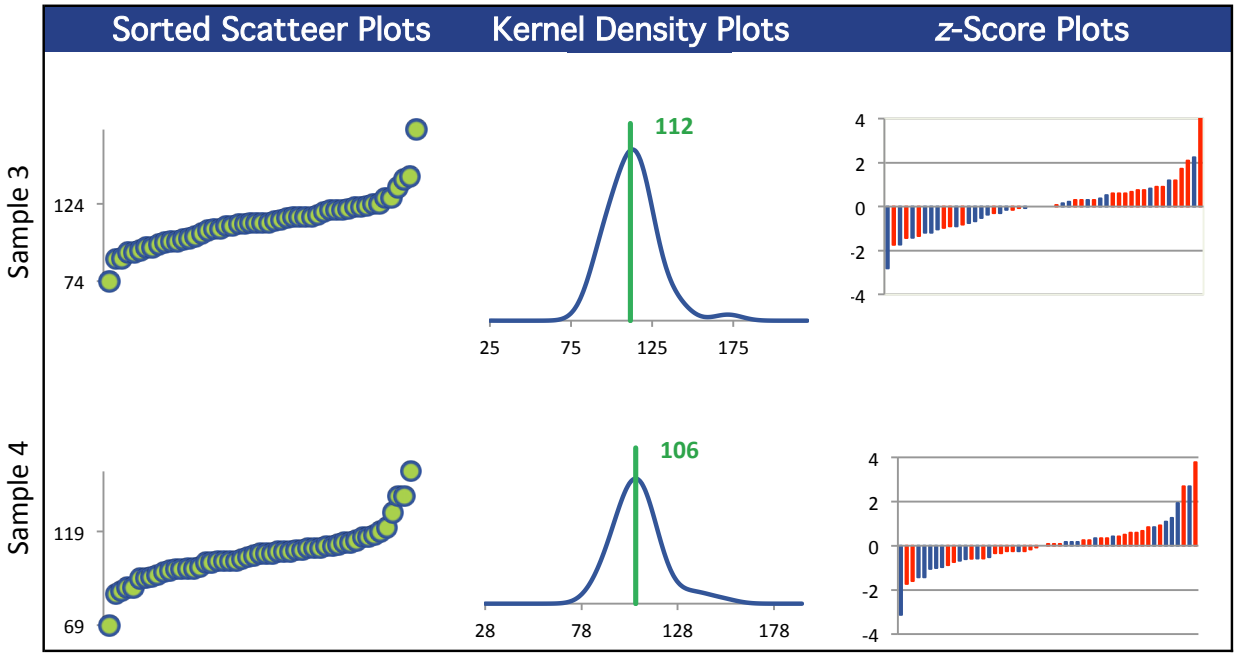
Methods Used

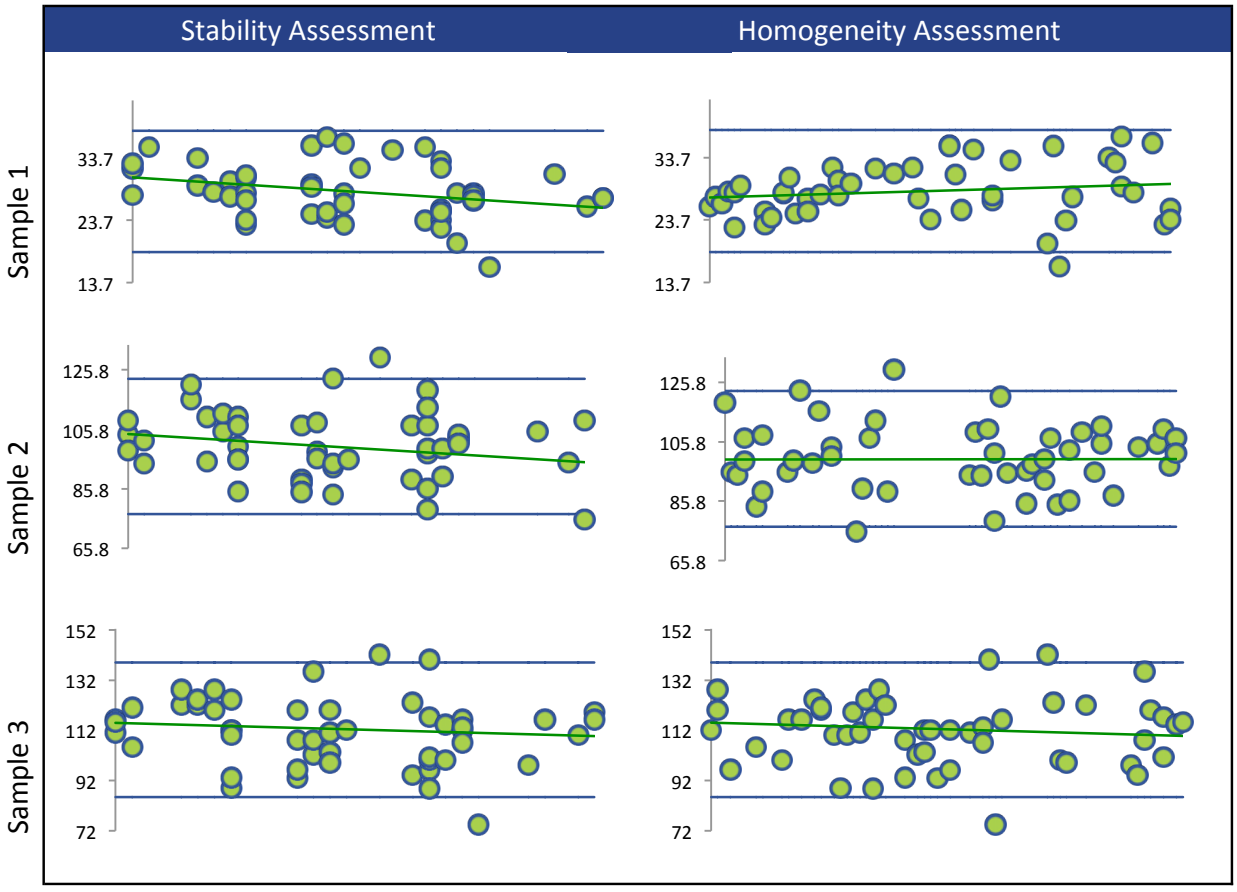
Method	C17-1	C17-2	C17-3	C17-4
ICP/OES (Blue)	20	21	22	22
ICP/MS (Red)	28	29	29	29

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



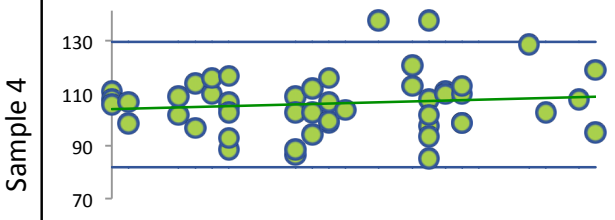
BORON


Sorted Scatteer Plots
Kernel Density Plots
z-Score Plots
Sample 3
124
74
112
25
75
125
175
4
2
0
-2
-4
Sample 4
119
69
106
28
78
128
178
4
2
0
-2
-4

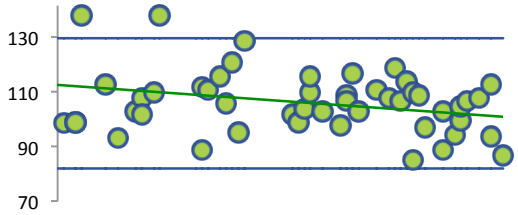

Stability Assessment
Homogeneity Assessment
Sample 1
33.7
23.7
13.7
33.7
23.7
13.7
Sample 2
125.8
105.8
85.8
65.8
125.8
105.8
85.8
65.8
Sample 3
152
132
112
92
72
152
132
112
92
72

BORON

Stability Assessment



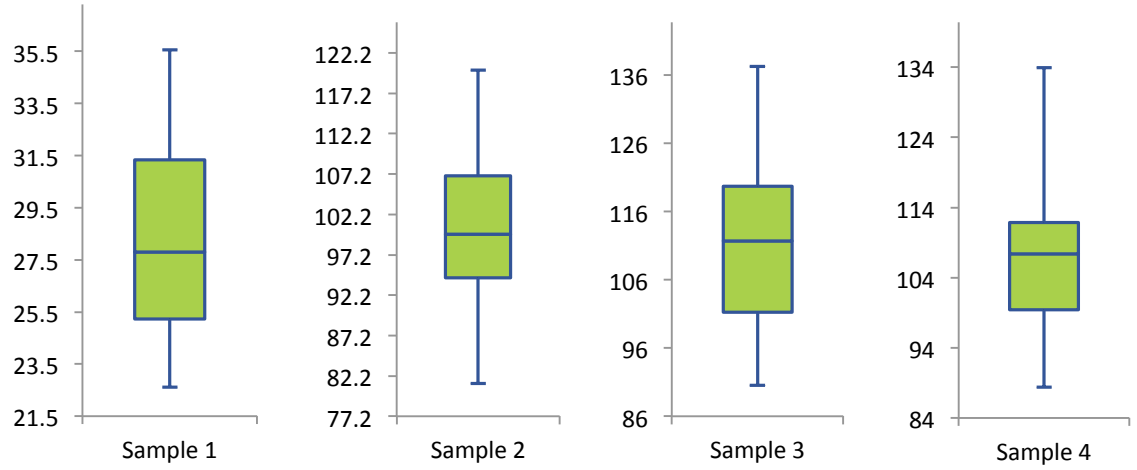
Homogeneity Assessment



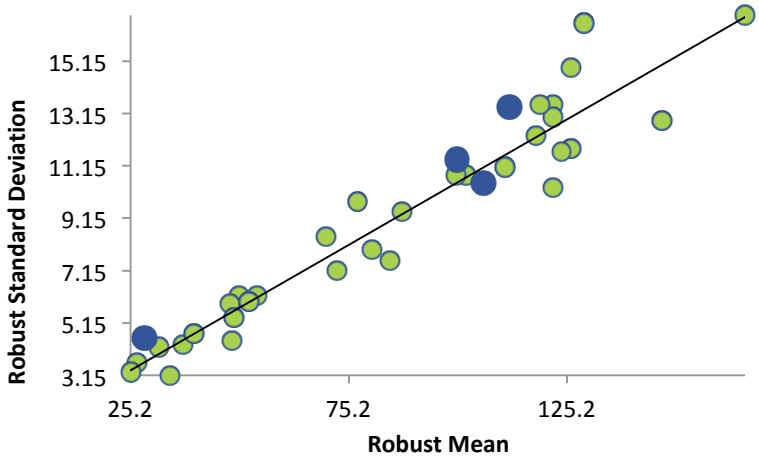
Stability assessments are regression analysis of reported result against date of analysis.

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

Box and Whisker Plots



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



CADMIUM

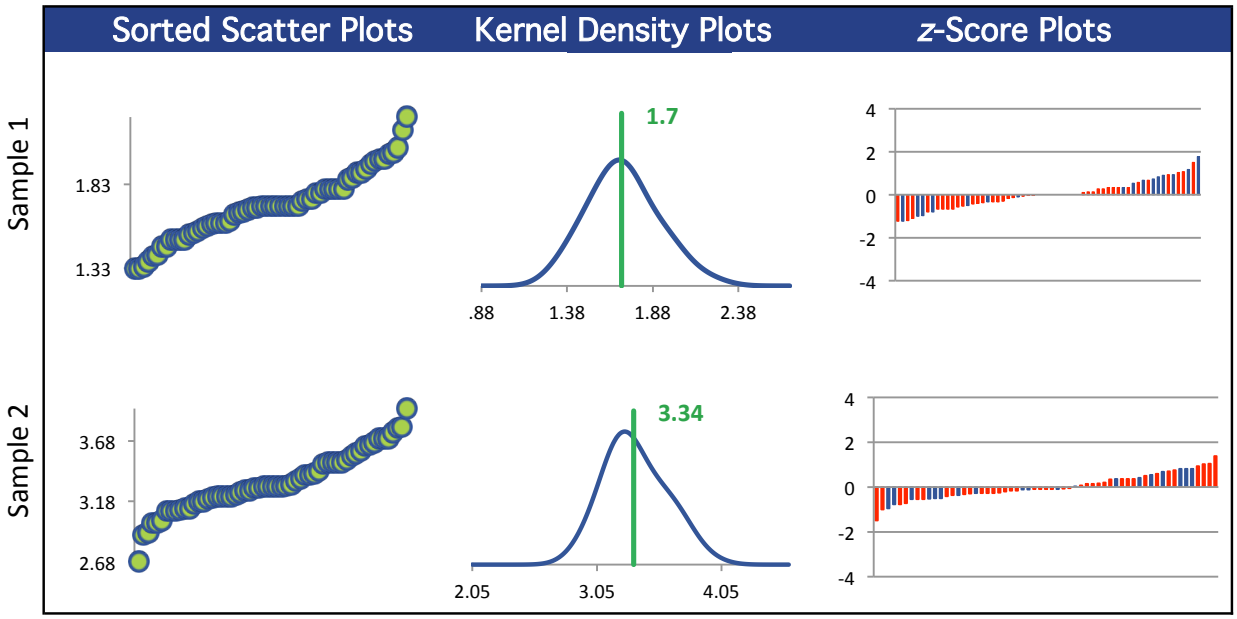
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	61	59	61	61
Median µg/g	1.70	3.30	3.51	1.38
Robust Mean µg/g	1.70	3.34	3.56	1.40
U µg/g	0.0334	0.0415	0.0538	0.0325
Robust Standard Deviation µg/g	0.209	0.255	0.336	0.203
Regression Standard Deviation µg/g	0.300	0.442	0.462	0.274
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	0.300	0.442	0.462	0.274
Outliers	0	2	0	0
|z|>3.0	0	0	0	1
2<|z|<3	0	0	1	2

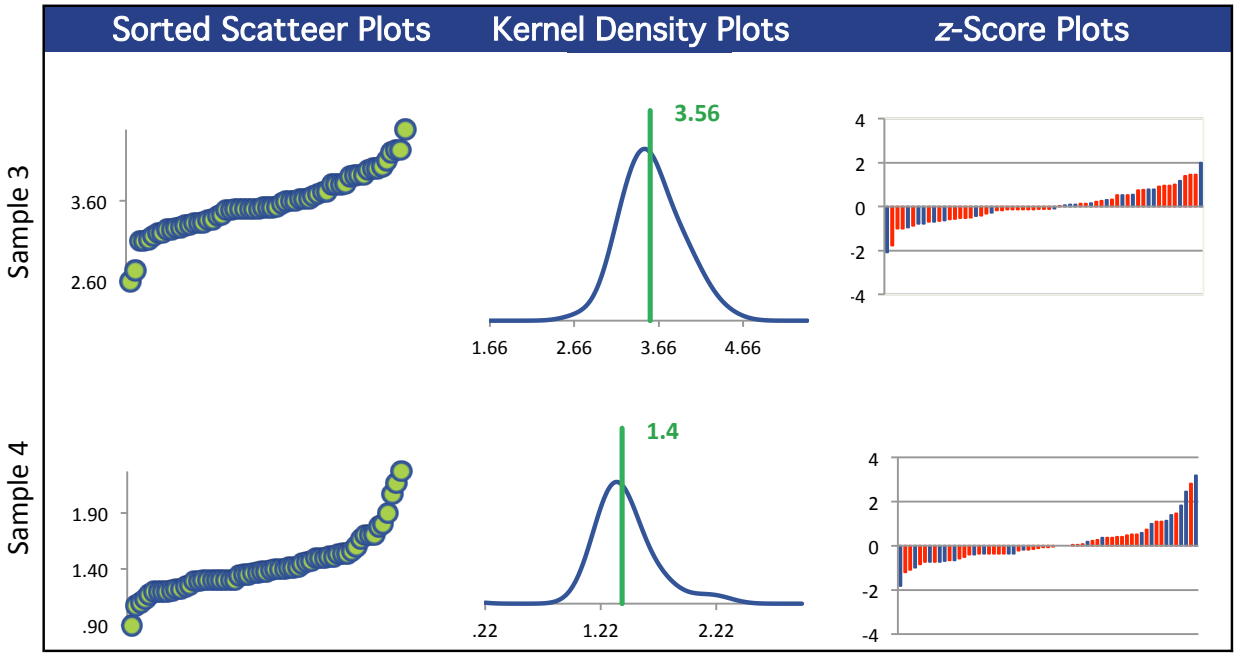
Methods Used

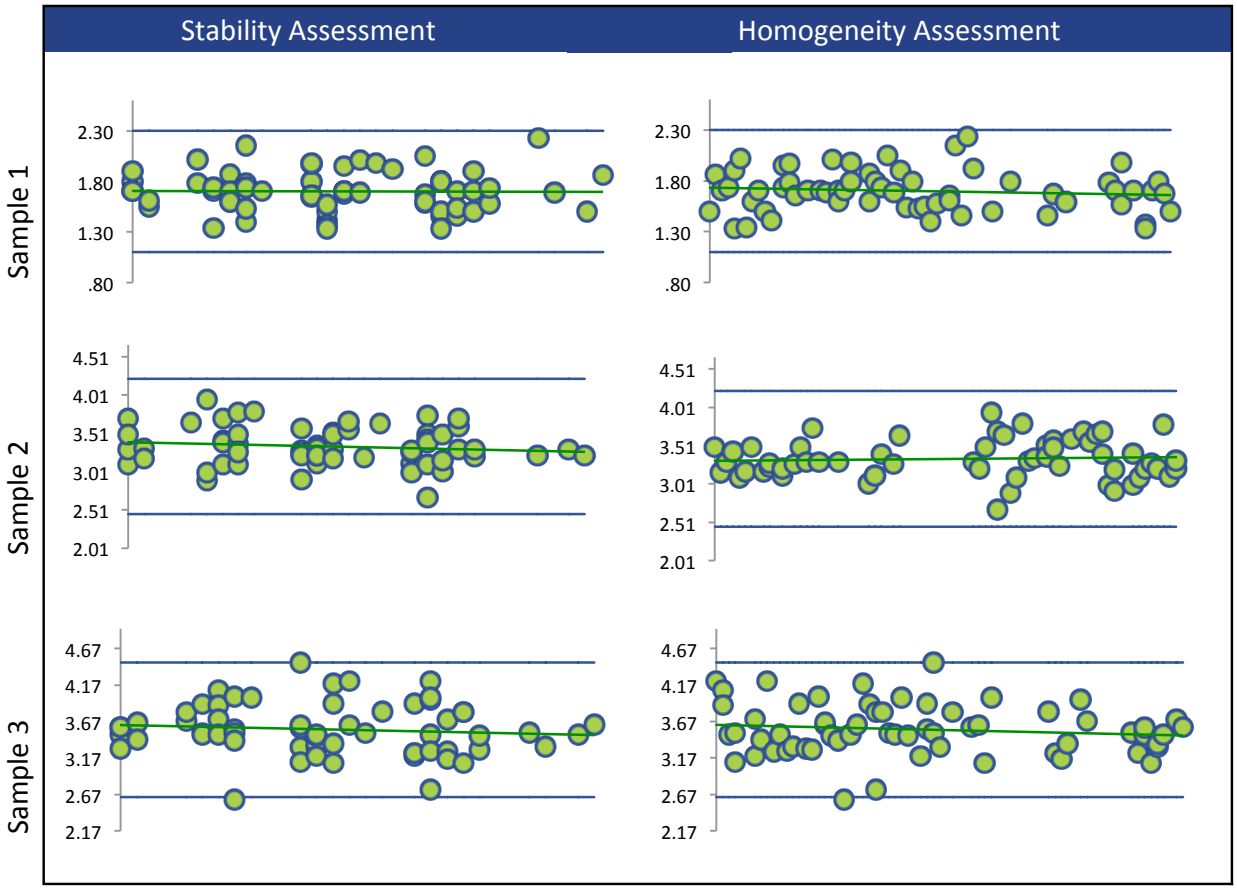
Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	41	40	41	41
ICP/OES (Red)	20	19	20	20

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



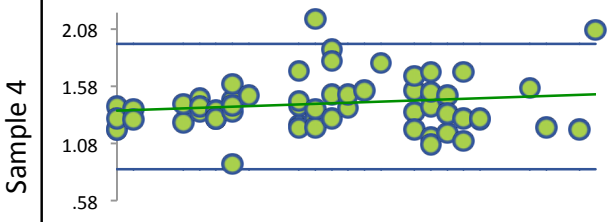
CADMIUM


Sorted Scatteer Plots
Kernel Density Plots
z-Score Plots
Sample 3
3.60
2.60
3.56
1.66
2.66
3.66
4.66
4
2
0
-2
-4
Sample 4
1.90
1.40
.90
1.4
.22
1.22
2.22
4
2
0
-2
-4

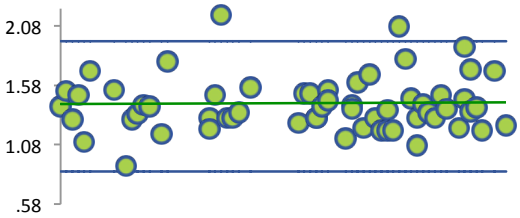

Stability Assessment
Homogeneity Assessment
Sample 1
2.30
1.80
1.30
.80
2.30
1.80
1.30
.80
Sample 2
4.51
4.01
3.51
3.01
2.51
2.01
4.51
4.01
3.51
3.01
2.51
2.01
Sample 3
4.67
4.17
3.67
3.17
2.67
2.17
4.67
4.17
3.67
3.17
2.67
2.17

CADMIUM

Stability Assessment



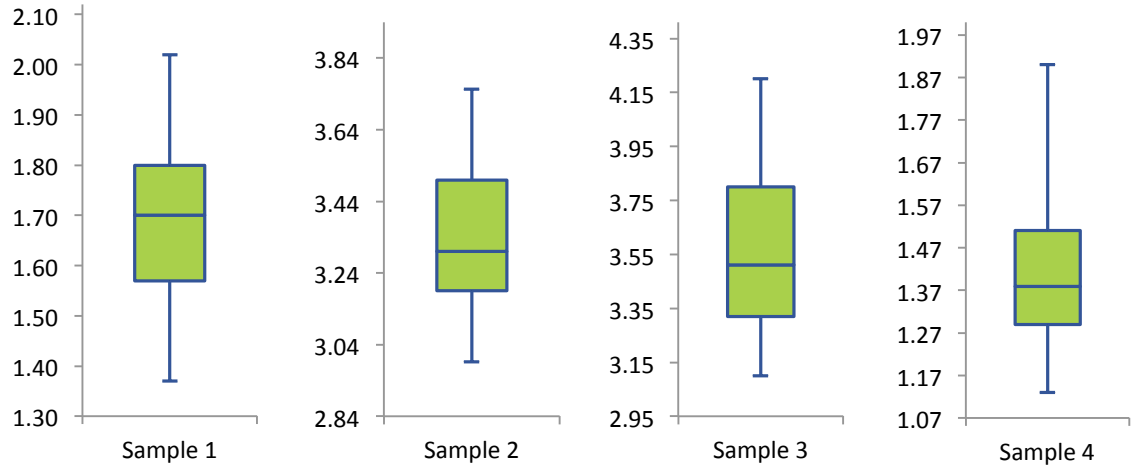
Homogeneity Assessment



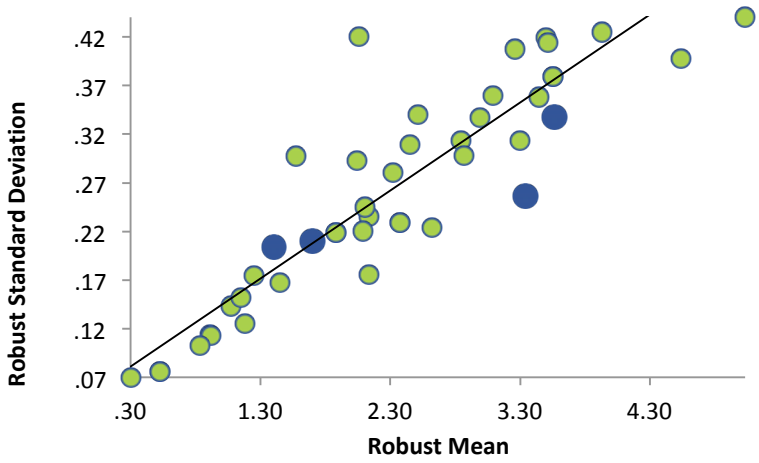
Stability assessments are regression analysis of reported result against date of analysis.

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

Box and Whisker Plots



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



CHROMIUM

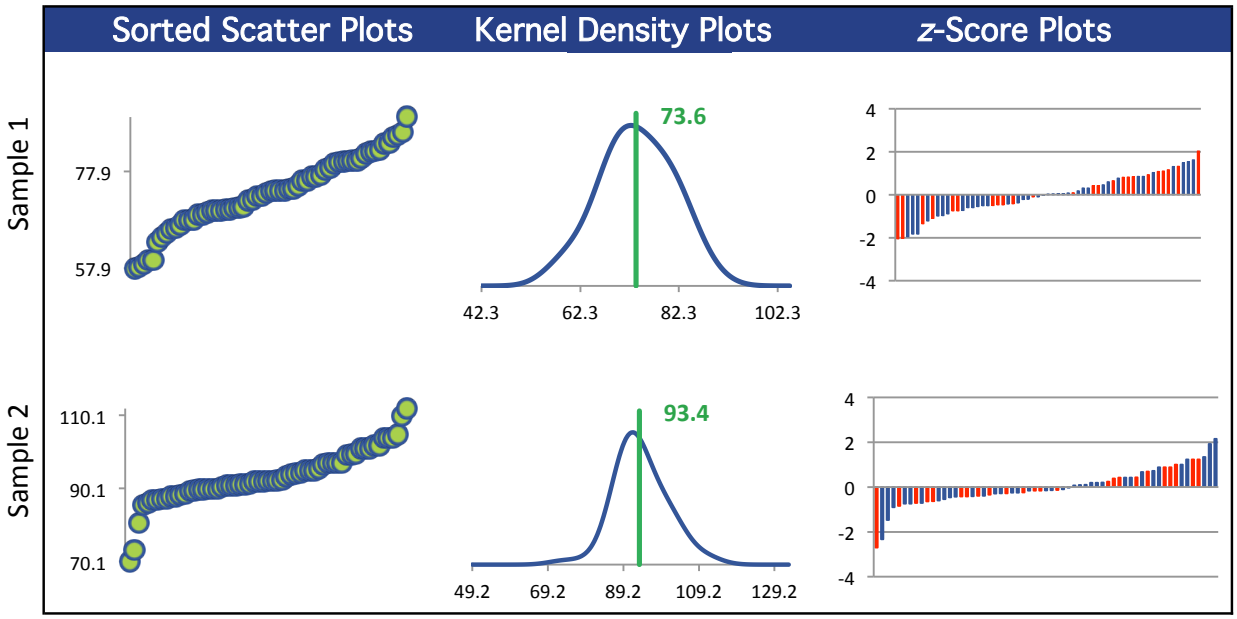
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	61	61	61	61
Median µg/g	73.8	92.1	88.9	76.6
Robust Mean µg/g	73.6	93.4	90.0	77.7
U µg/g	1.22	0.999	1.11	1.03
Robust Standard Deviation µg/g	7.65	6.24	6.94	6.43
Regression Standard Deviation µg/g	7.13	8.64	8.38	7.44
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	7.65	8.64	8.38	7.44
Outliers	0	0	0	0
|z|>3.0	0	0	0	1
2<|z|<3	3	3	3	3

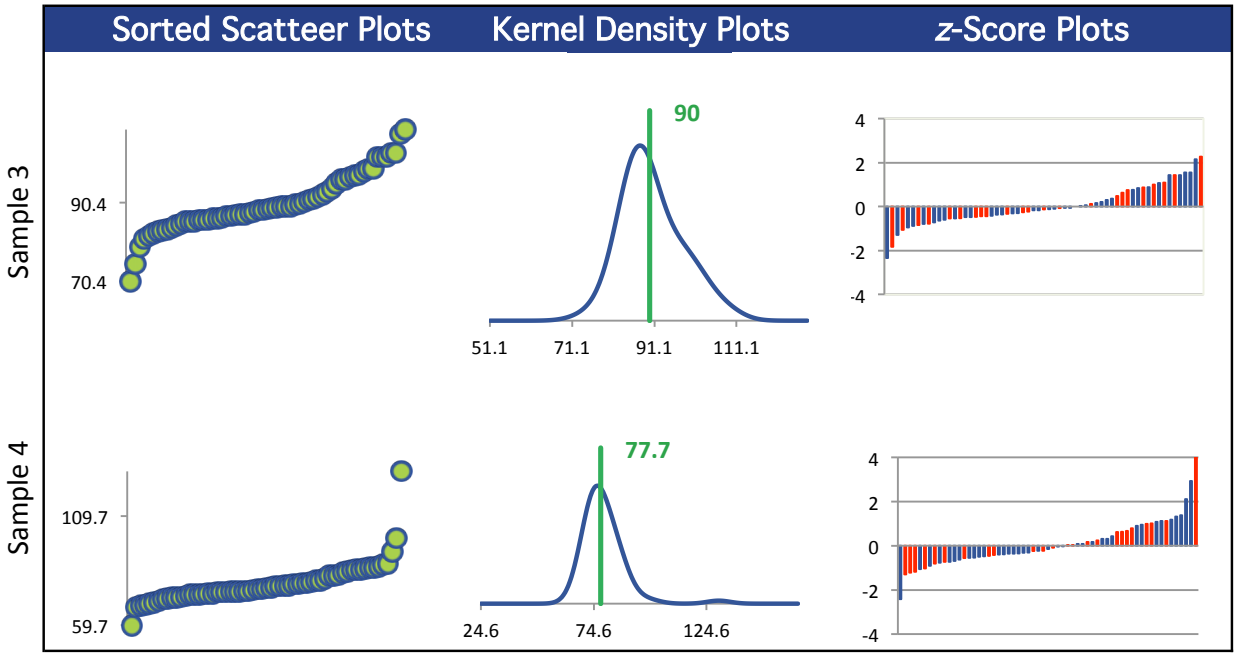
Methods Used

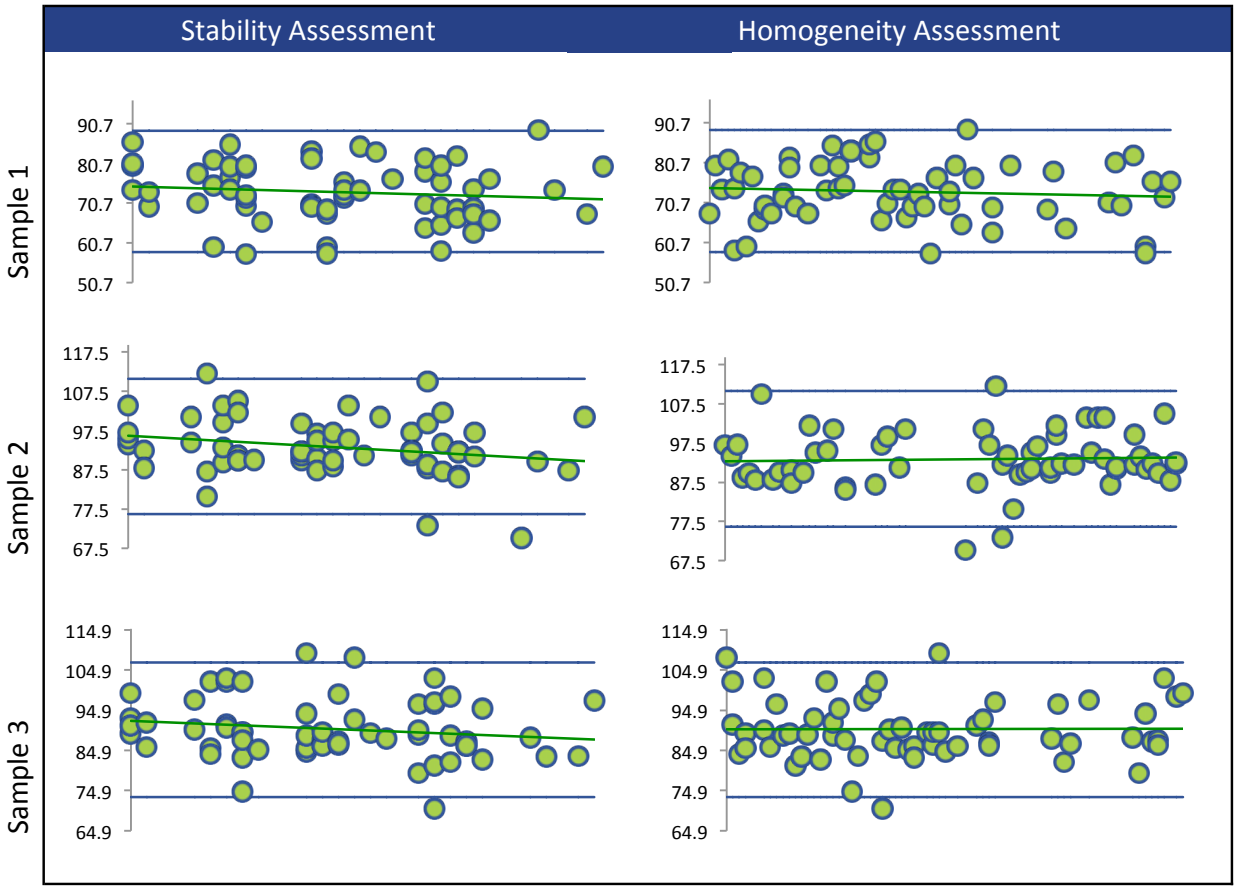
Method	C17-1	C17-2	C17-3	C17-4
ICP/OES (Blue)	24	24	24	24
ICP/MS (Red)	37	37	37	37

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



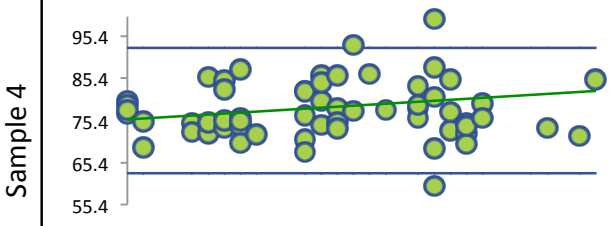
CHROMIUM


Sorted Scatteer Plots
Kernel Density Plots
z-Score Plots
Sample 3
90.4
70.4
90
51.1
71.1
91.1
111.1
4
2
0
-2
-4
Sample 4
109.7
59.7
77.7
24.6
74.6
124.6
4
2
0
-2
-4

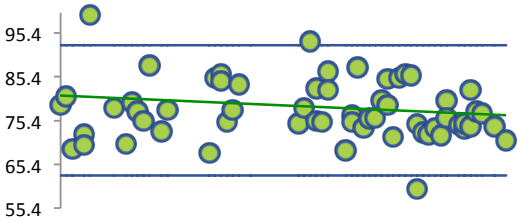

Stability Assessment
Homogeneity Assessment
Sample 1
90.7
80.7
70.7
60.7
50.7
90.7
80.7
70.7
60.7
50.7
Sample 2
117.5
107.5
97.5
87.5
77.5
67.5
117.5
107.5
97.5
87.5
77.5
67.5
Sample 3
114.9
104.9
94.9
84.9
74.9
64.9
114.9
104.9
94.9
84.9
74.9
64.9

CHROMIUM

Stability Assessment



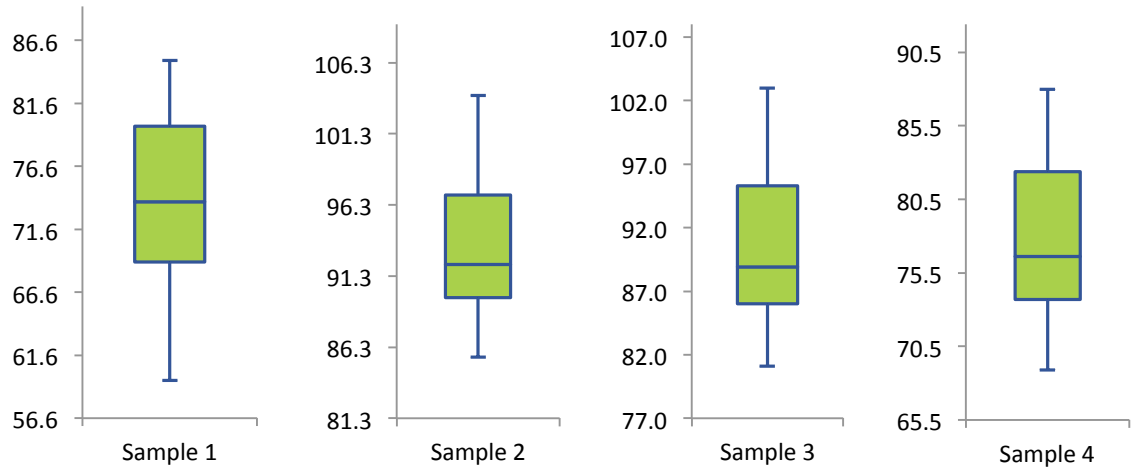
Homogeneity Assessment



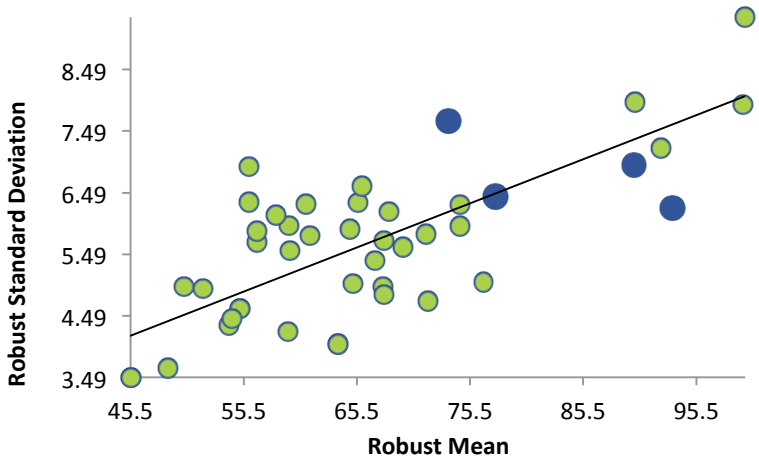
Stability assessments are regression analysis of reported result against date of analysis.

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

Box and Whisker Plots



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



COBALT

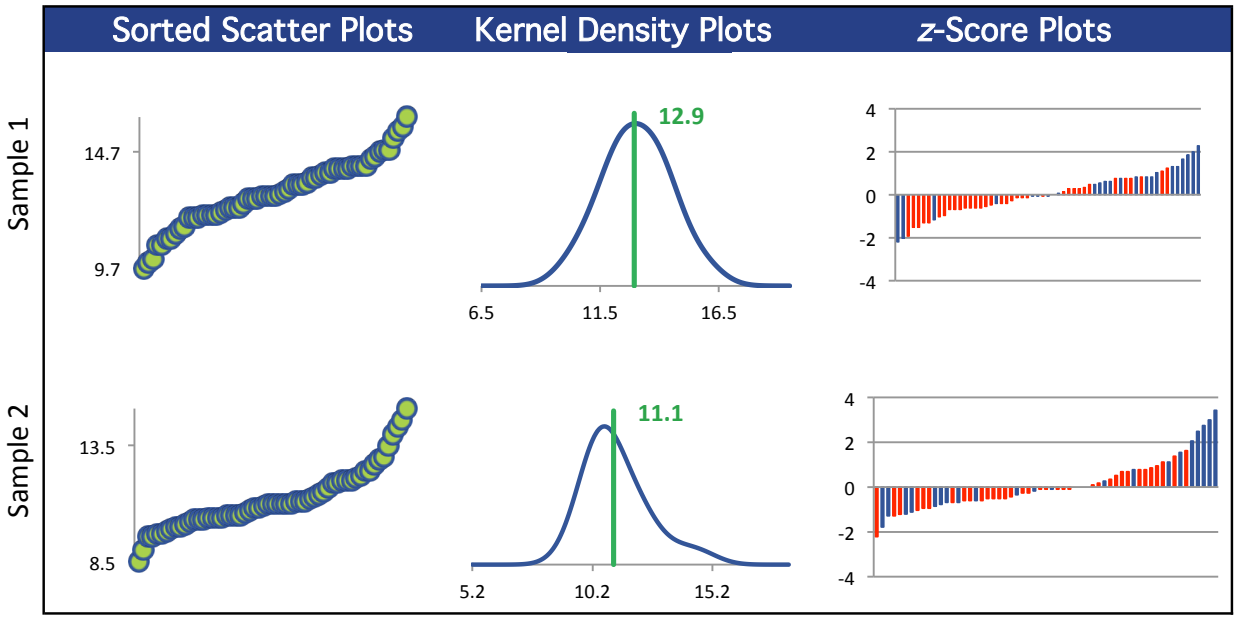
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	59	59	59	59
Median µg/g	12.8	11.0	11.3	9.88
Robust Mean µg/g	12.9	11.1	11.5	10.0
U µg/g	0.236	0.190	0.179	0.182
Robust Standard Deviation µg/g	1.45	1.17	1.10	1.12
Regression Standard Deviation µg/g	1.27	1.08	1.12	0.978
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	1.45	1.17	1.12	1.12
Outliers	0	0	0	0
|z|>3.0	0	1	0	0
2<|z|<3	3	5	4	4

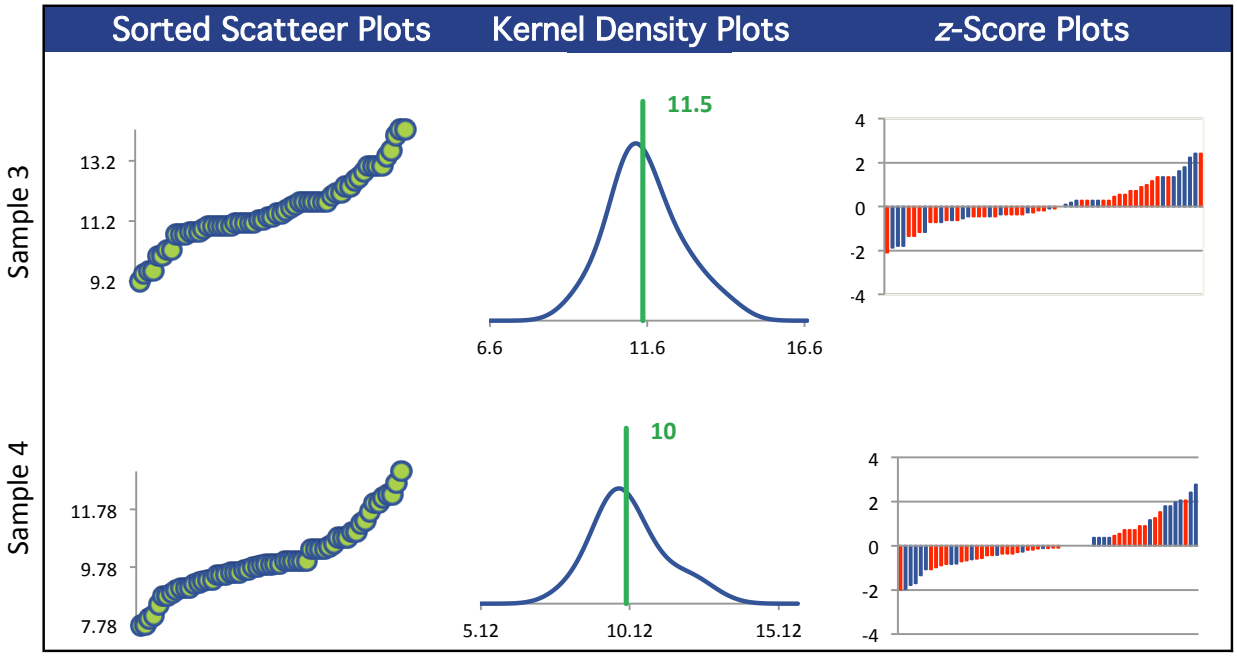
Methods Used

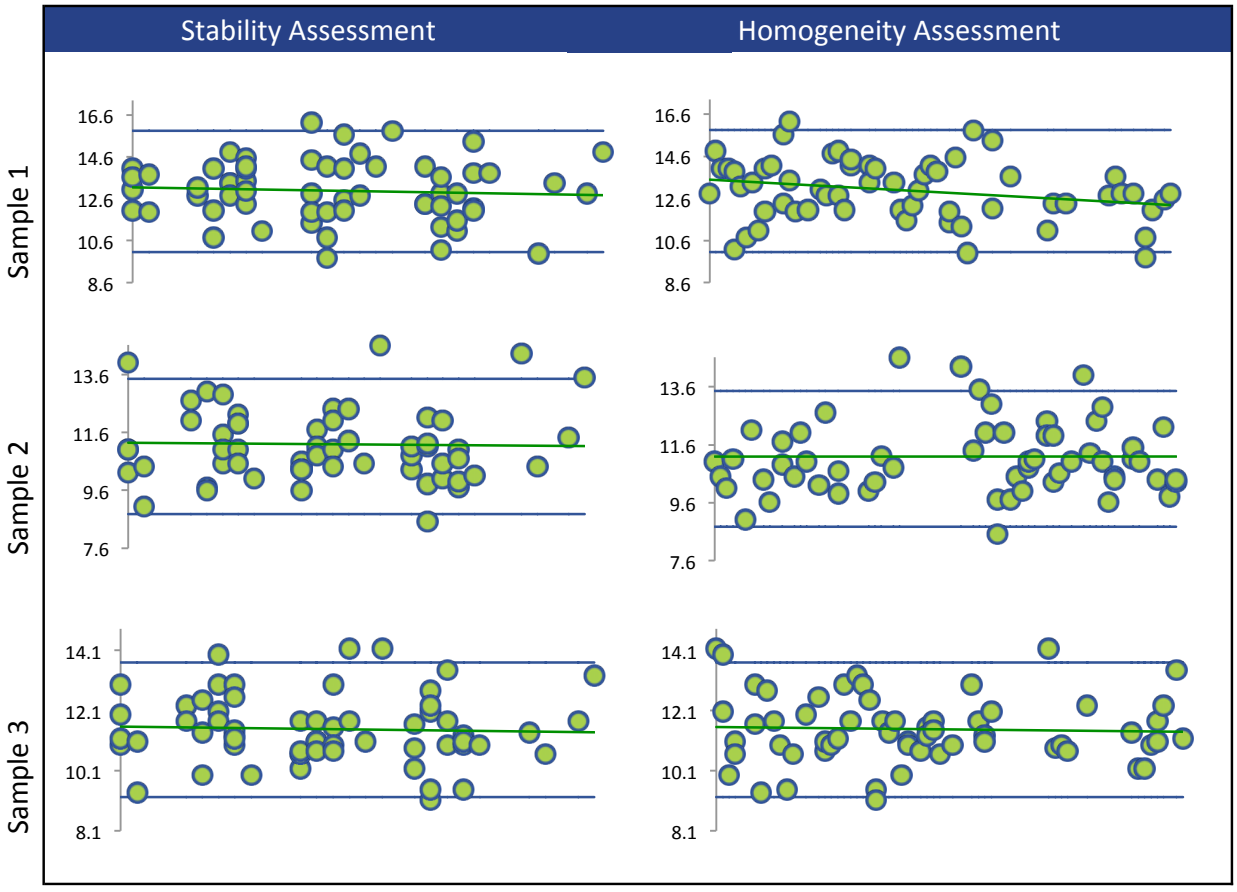
Method	C17-1	C17-2	C17-3	C17-4
ICP/OES (Blue)	23	23	23	23
ICP/MS (Red)	36	36	36	36

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



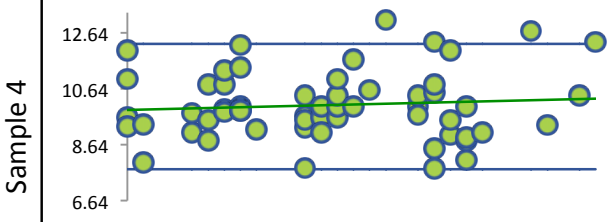
COBALT


Sorted Scatteer Plots
Kernel Density Plots
z-Score Plots
Sample 3
13.2
11.2
9.2
11.5
6.6
11.6
16.6
4
2
0
-2
-4
Sample 4
11.78
9.78
7.78
10
5.12
10.12
15.12
4
2
0
-2
-4

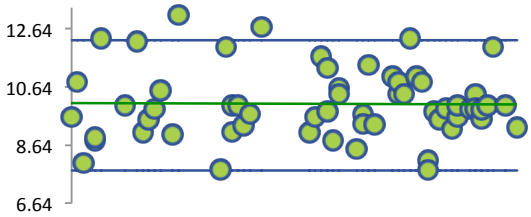

Stability Assessment
Homogeneity Assessment
Sample 1
16.6
14.6
12.6
10.6
8.6
16.6
14.6
12.6
10.6
8.6
Sample 2
13.6
11.6
9.6
7.6
13.6
11.6
9.6
7.6
Sample 3
14.1
12.1
10.1
8.1
14.1
12.1
10.1
8.1

COBALT

Stability Assessment



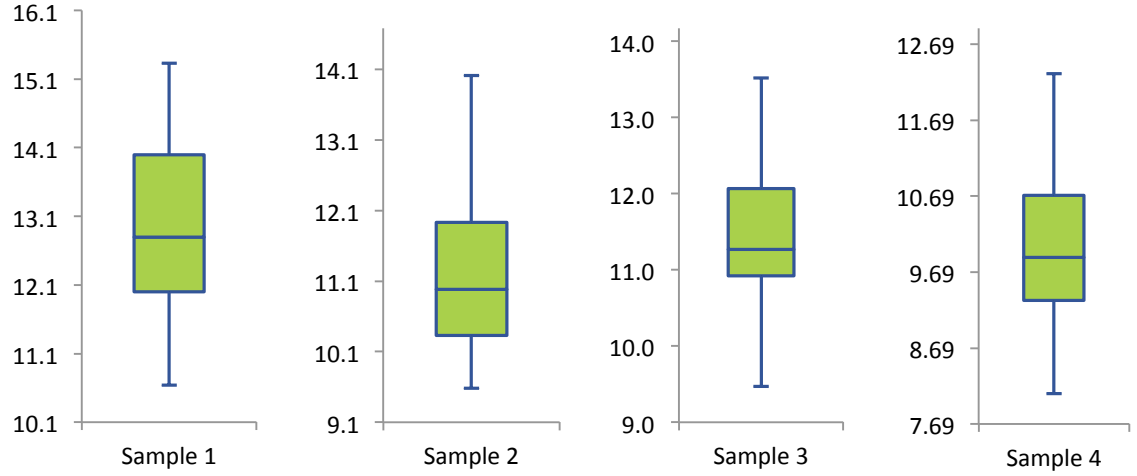
Homogeneity Assessment



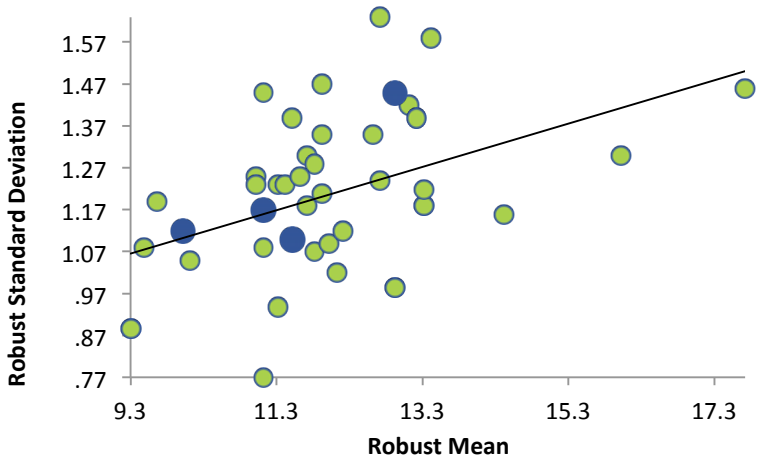
Stability assessments are regression analysis of reported result against date of analysis.

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

Box and Whisker Plots



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



COPPER

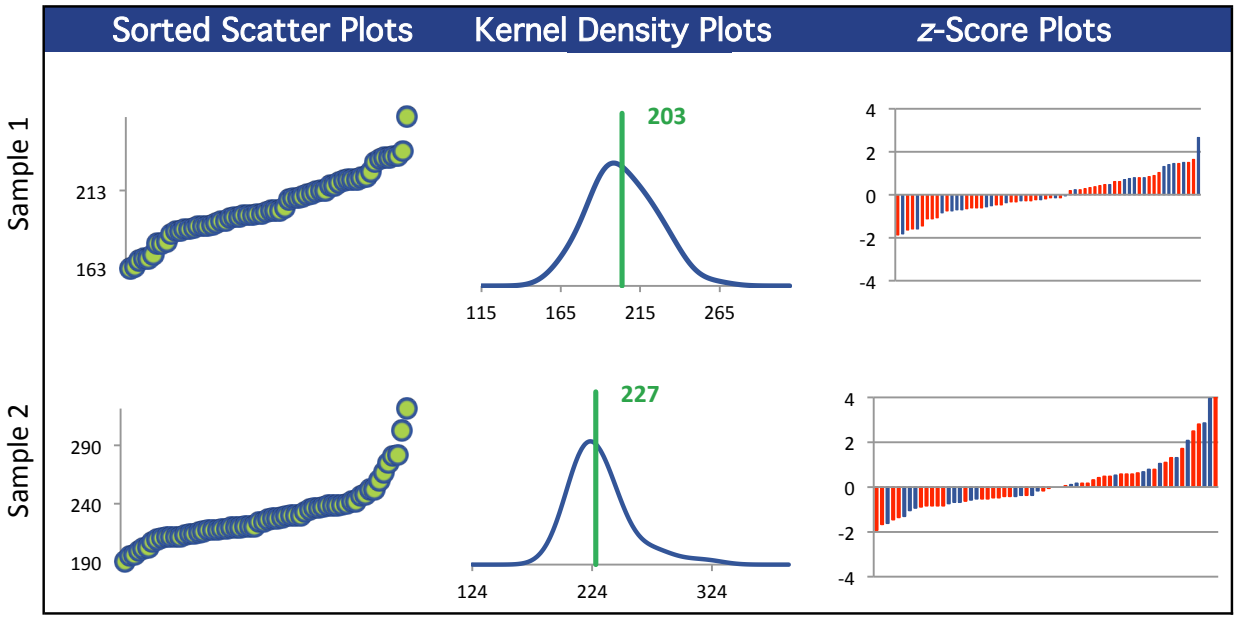
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	62	62	62	62
Median µg/g	200	225	297	240
Robust Mean µg/g	203	227	298	241
U µg/g	3.40	3.06	3.95	3.10
Robust Standard Deviation µg/g	21.4	19.3	24.9	19.5
Regression Standard Deviation µg/g	16.9	19.0	24.9	20.2
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	21.4	19.3	24.9	20.2
Outliers	1	1	1	1
|z|>3.0	0	2	1	2
2<|z|<3	1	4	2	2

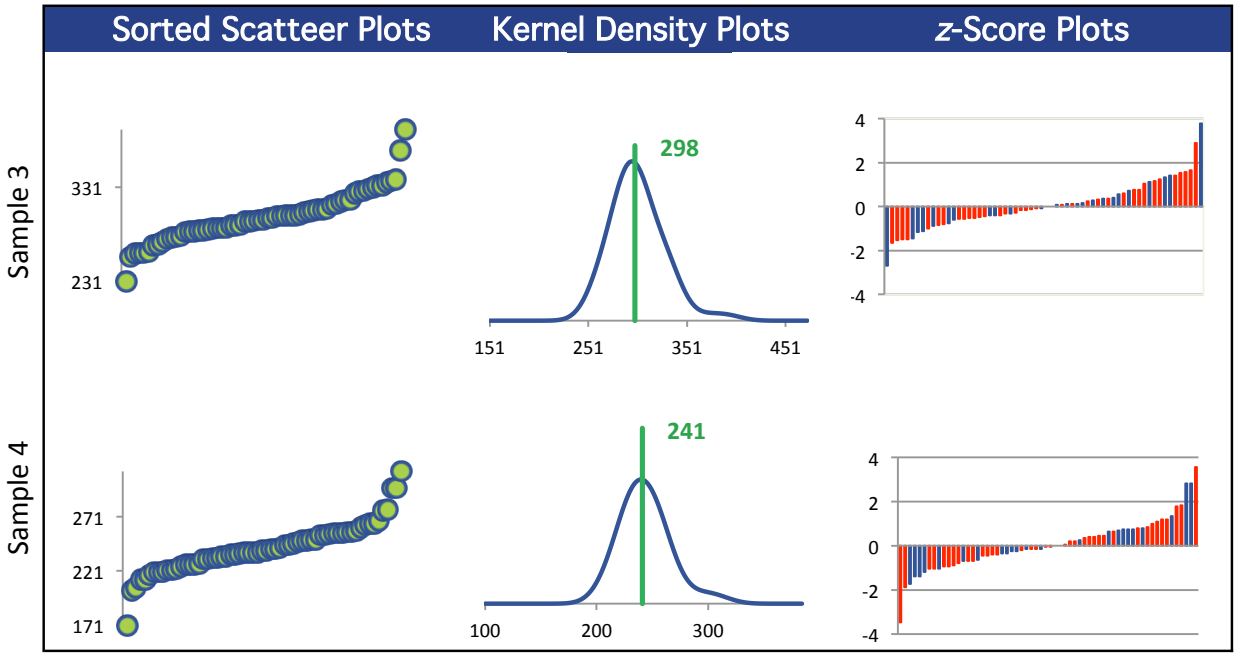
Methods Used

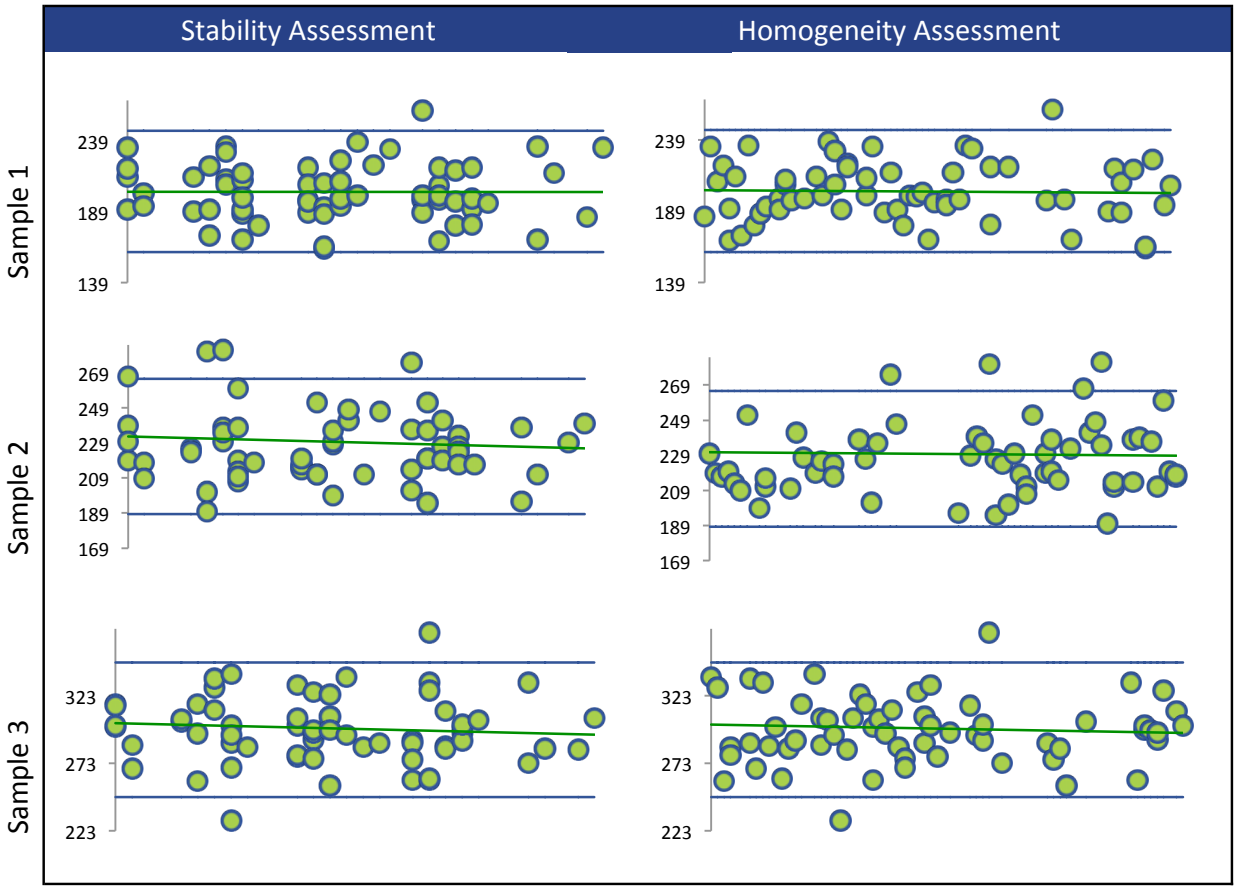
Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	38	38	38	38
ICP/OES (Red)	24	24	24	24

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



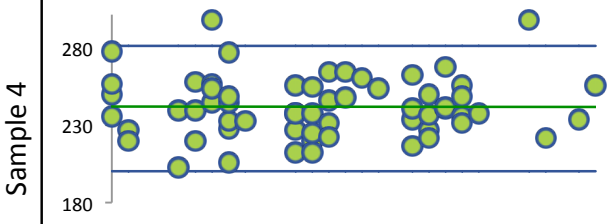
COPPER


Sorted Scatteer Plots
Kernel Density Plots
z-Score Plots
Sample 3
331
231
298
151
251
351
451
4
2
0
-2
-4
Sample 4
271
221
171
241
100
200
300
4
2
0
-2
-4

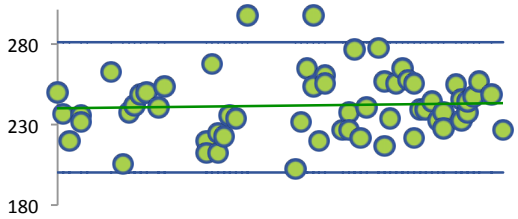

Stability Assessment
Homogeneity Assessment
Sample 1
239
189
139
239
189
139
Sample 2
269
249
229
209
189
169
269
249
229
209
189
169
Sample 3
323
273
223
323
273
223

COPPER

Stability Assessment



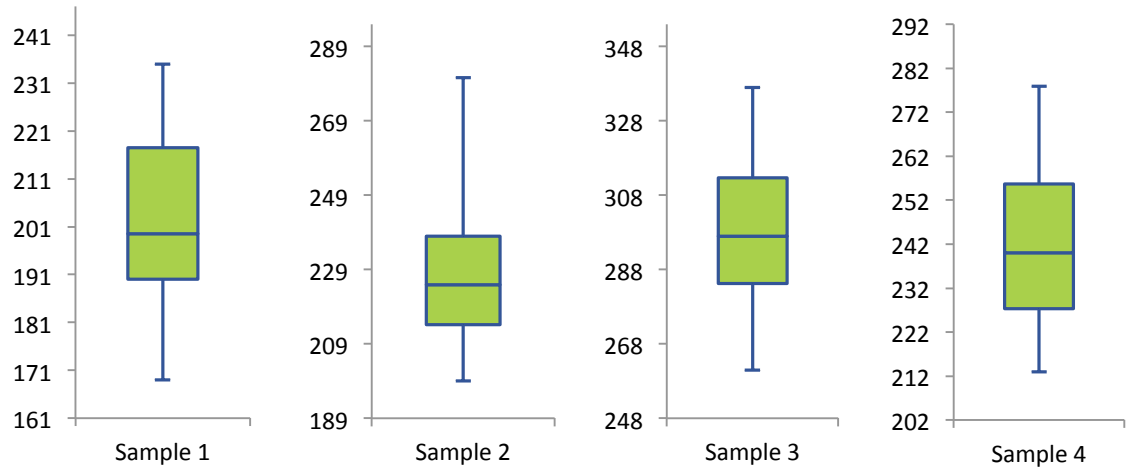
Homogeneity Assessment



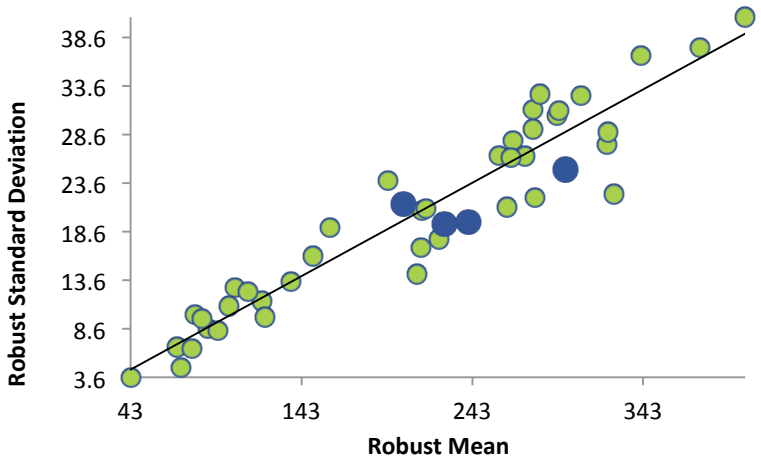
Stability assessments are regression analysis of reported result against date of analysis.

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

Box and Whisker Plots



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



IRON

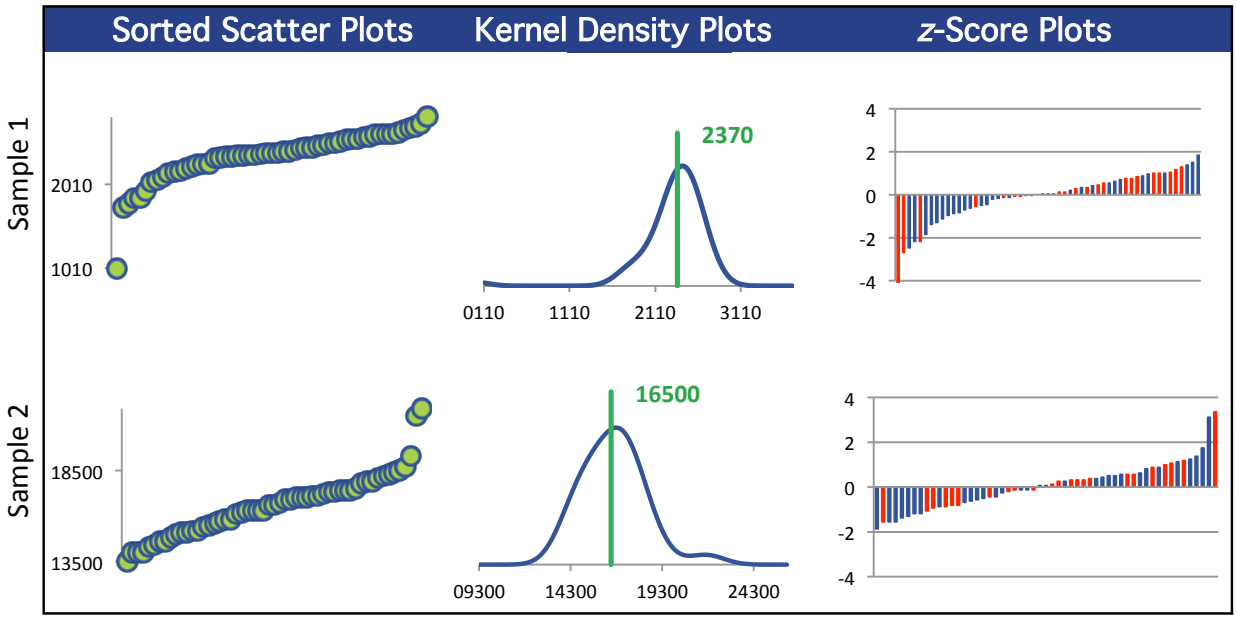
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	55	55	56	56
Median µg/g	2380	16600	28400	23600
Robust Mean µg/g	2370	16500	28100	23600
U µg/g	40.1	271	403	346
Robust Standard Deviation µg/g	238	1610	2410	2070
Regression Standard Deviation µg/g	217	1510	2570	2160
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	238	1610	2570	2160
Outliers	1	1	0	0
|z|>3.0	1	2	1	1
2<|z|<3	4	0	4	3

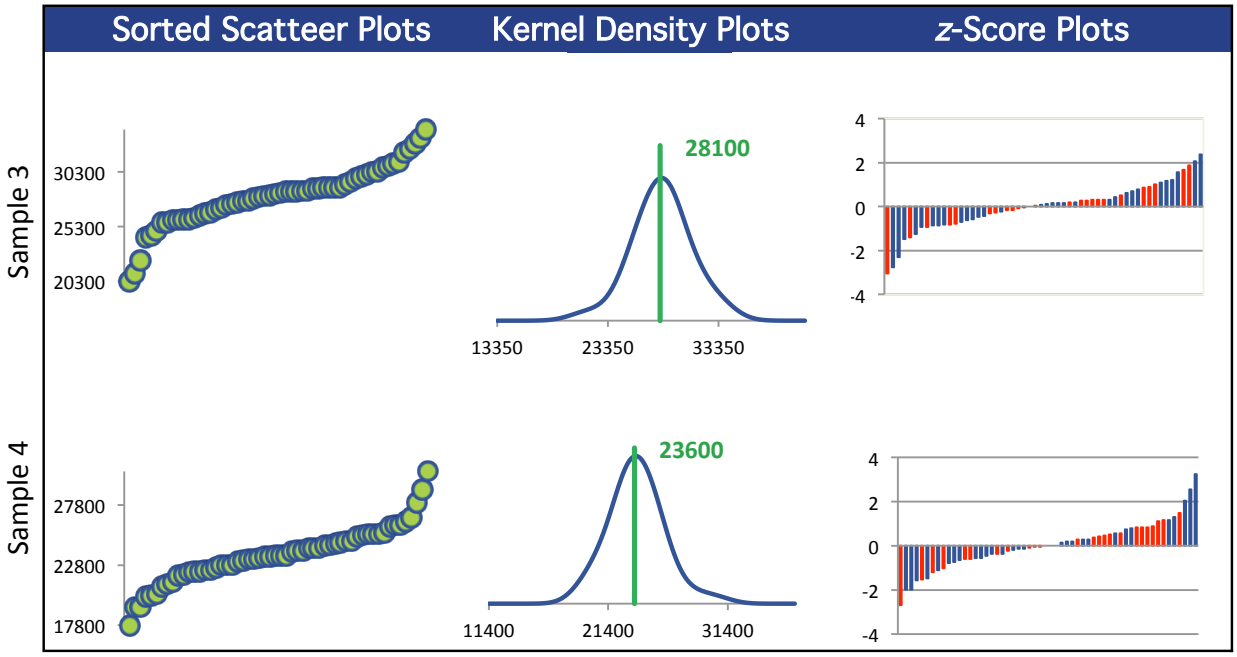
Methods Used

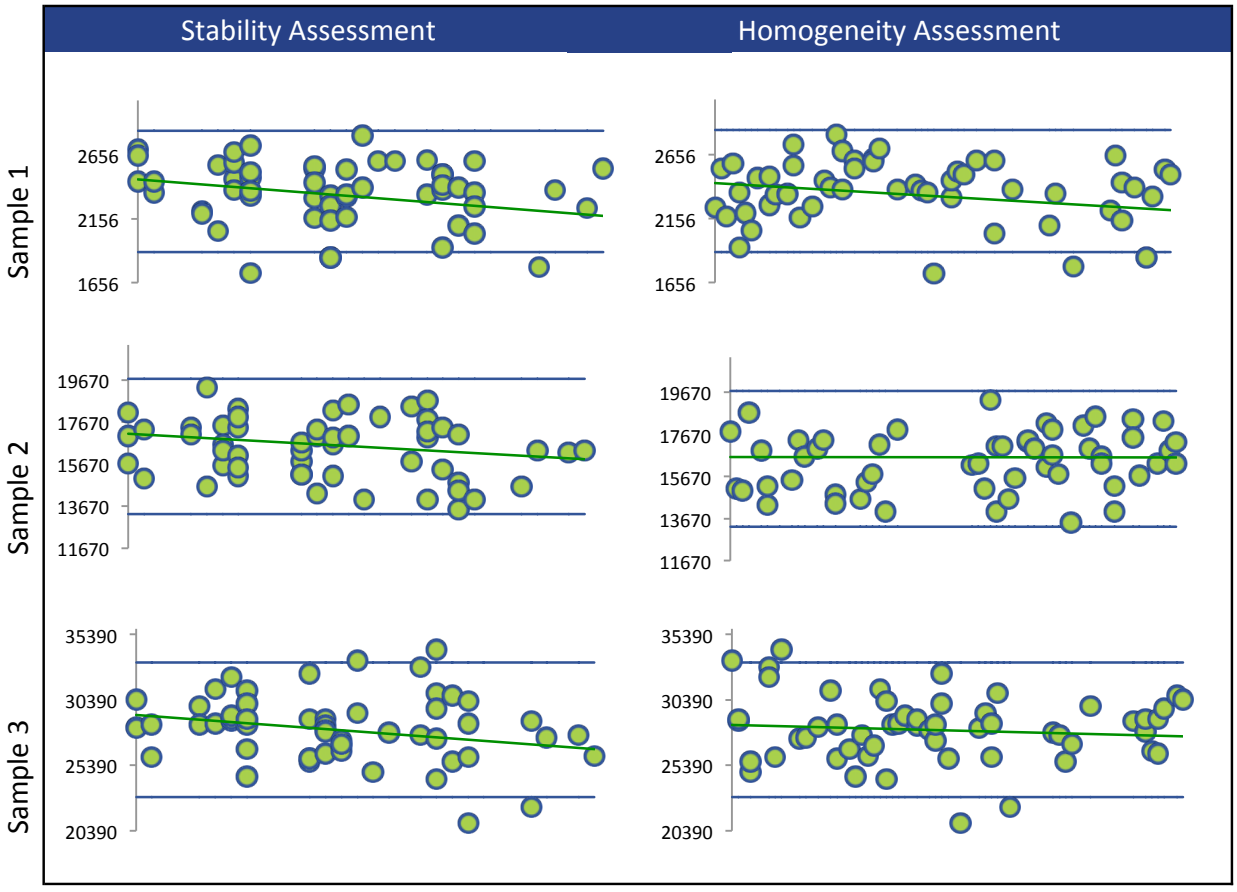
Method	C17-1	C17-2	C17-3	C17-4
ICP/OES (Blue)	23	23	24	24
ICP/MS (Red)	32	32	32	32

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



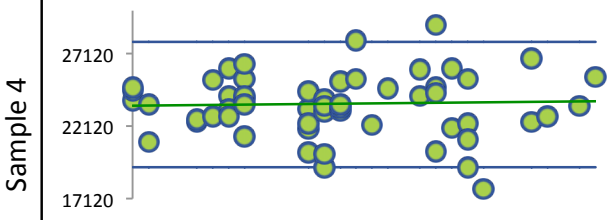
IRON


Sorted Scatteer Plots
Kernel Density Plots
z-Score Plots
Sample 3
30300
25300
20300
28100
13350
23350
33350
4
2
0
-2
-4
Sample 4
27800
22800
17800
23600
11400
21400
31400
4
2
0
-2
-4

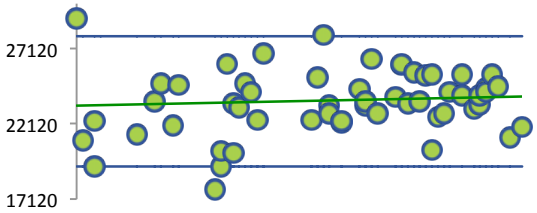

Stability Assessment
Homogeneity Assessment
Sample 1
2656
2156
1656
2656
2156
1656
Sample 2
19670
17670
15670
13670
11670
19670
17670
15670
13670
11670
Sample 3
35390
30390
25390
20390
35390
30390
25390
20390

IRON

Stability Assessment



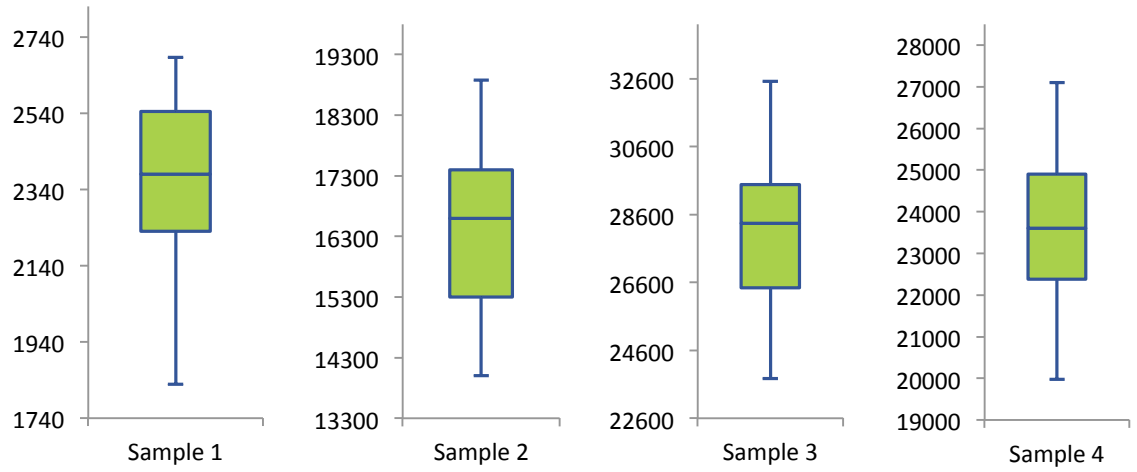
Homogeneity Assessment



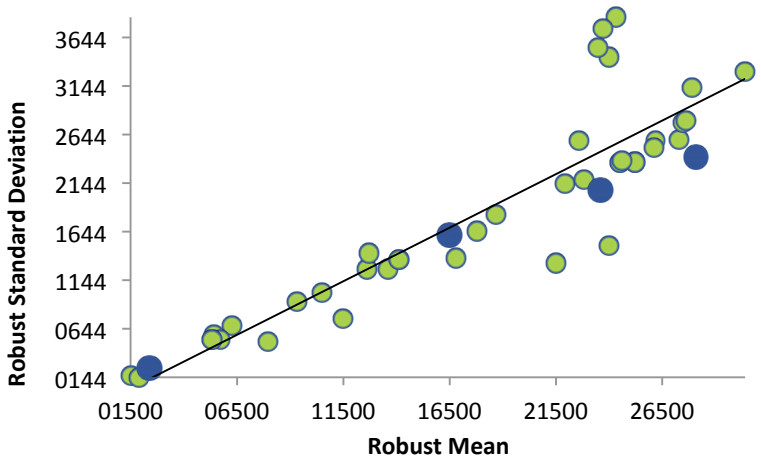
Stability assessments are regression analysis of reported result against date of analysis.

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

Box and Whisker Plots



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



LEAD

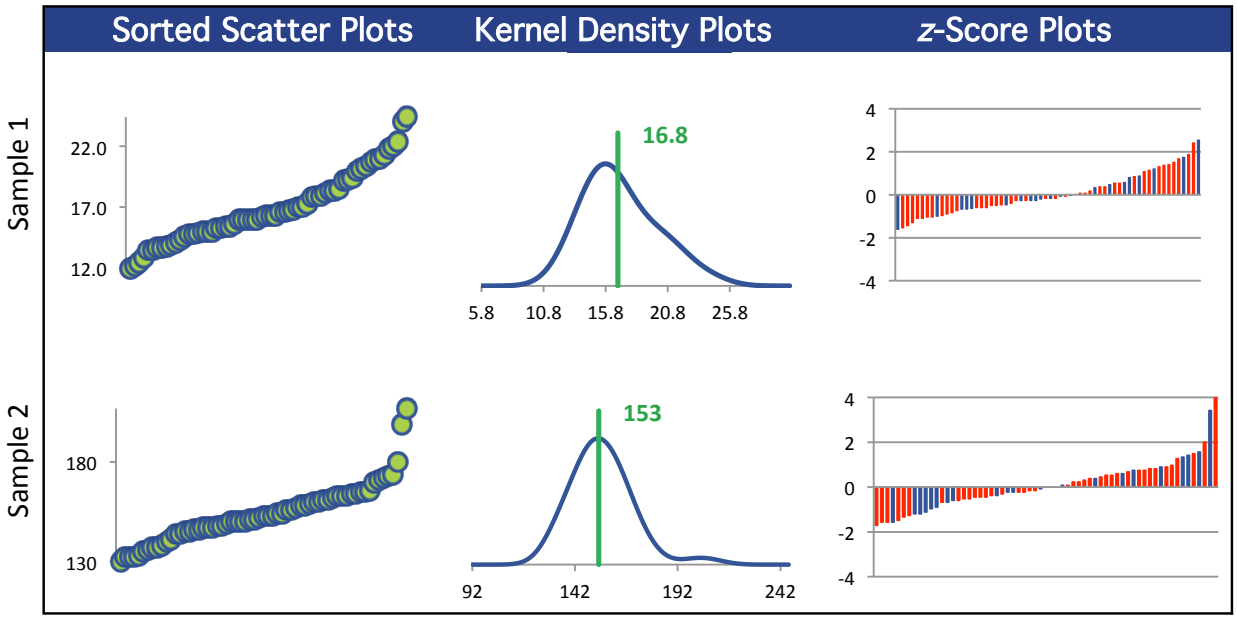
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	62	63	64	64
Median µg/g	16.3	153	234	146
Robust Mean µg/g	16.8	153	234	146
U µg/g	0.475	2.13	3.03	2.14
Robust Standard Deviation µg/g	2.99	13.5	19.4	13.7
Regression Standard Deviation µg/g	2.93	13.1	19.1	12.5
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	2.99	13.5	19.4	13.7
Outliers	2	1	0	0
|z|>3.0	0	2	1	0
2<|z|<3	2	0	5	2

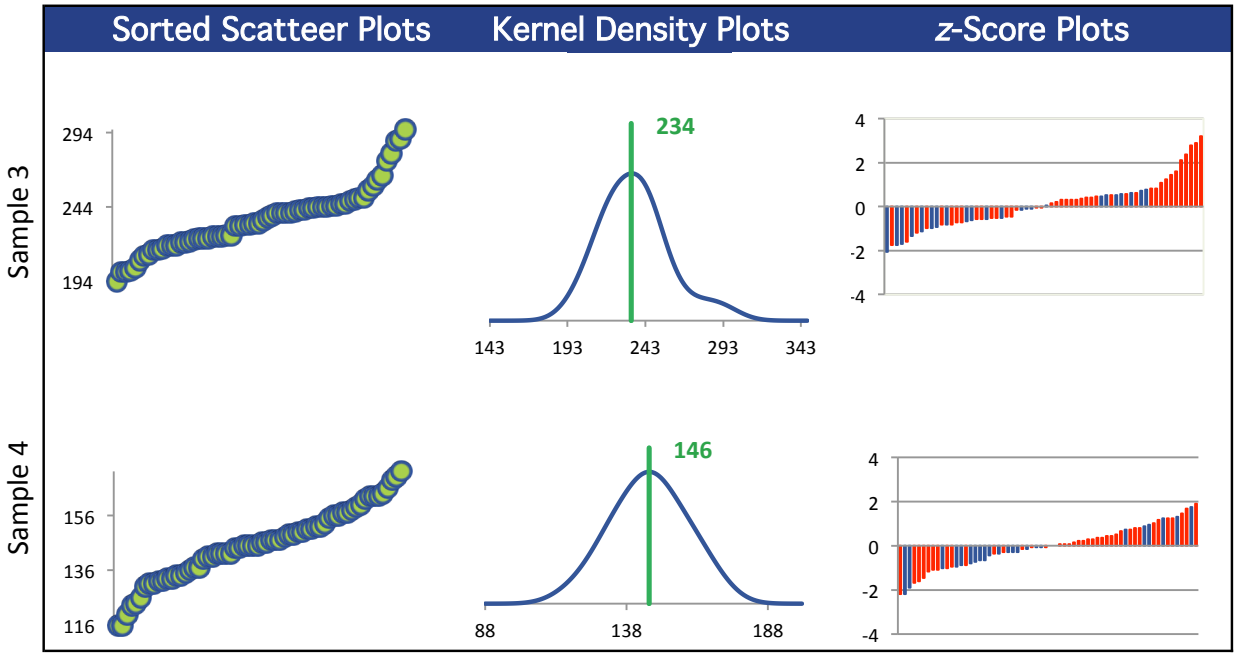
Methods Used

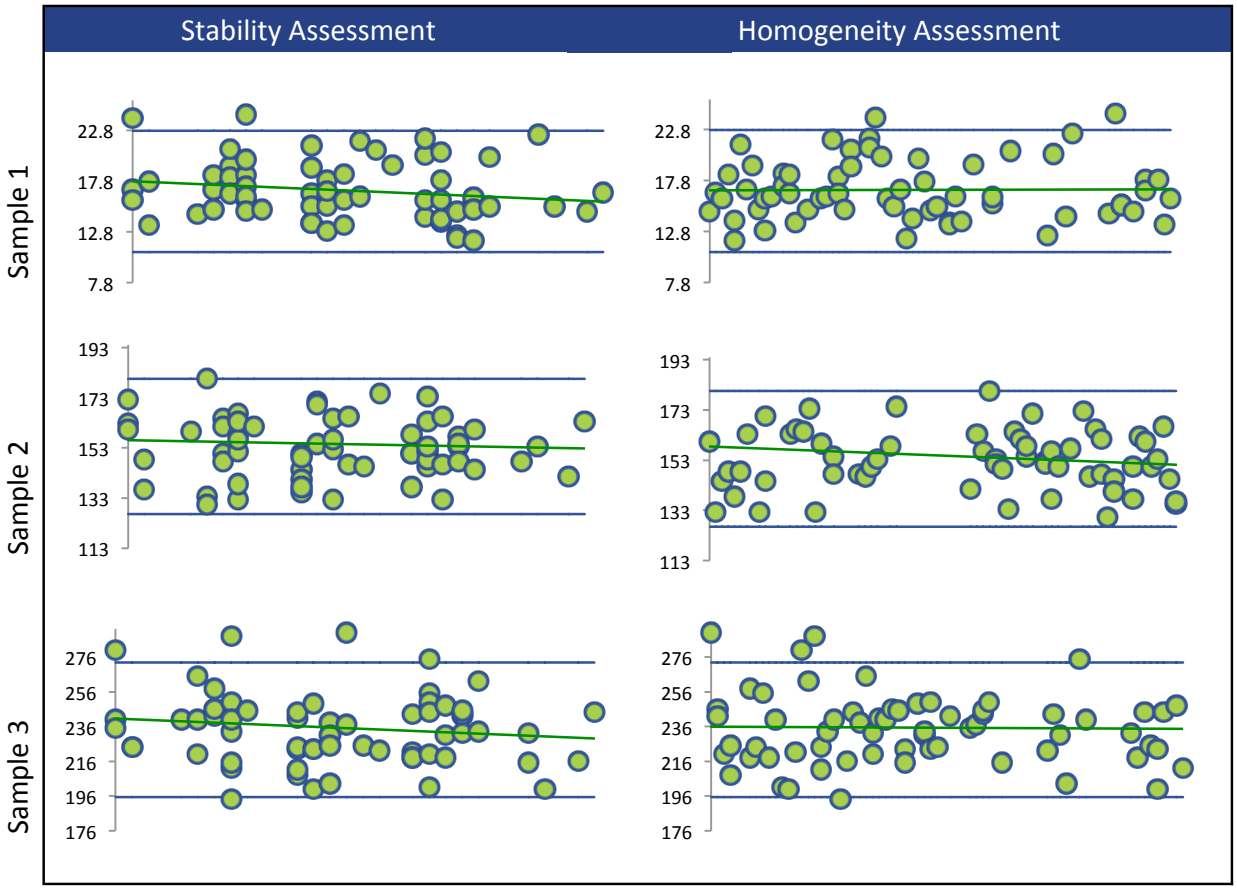
Method	C17-1	C17-2	C17-3	C17-4
ICP/OES (Blue)	22	22	23	23
ICP/MS (Red)	40	41	41	41

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



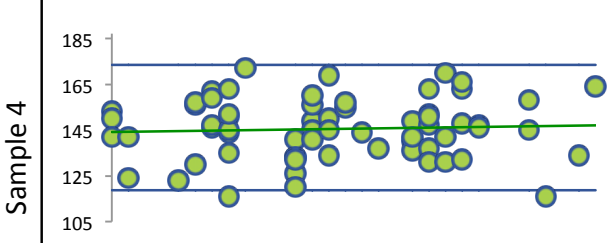
LEAD


Sorted Scatteer Plots
Kernel Density Plots
z-Score Plots
Sample 3
294
244
194
234
143
193
243
293
343
4
2
0
-2
-4
Sample 4
156
136
116
146
88
138
188
4
2
0
-2
-4

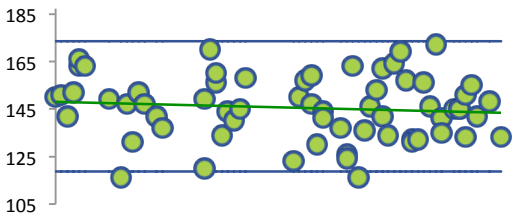

Stability Assessment
Homogeneity Assessment
Sample 1
22.8
17.8
12.8
7.8
Sample 2
193
173
153
133
113
Sample 3
276
256
236
216
196
176

LEAD

Stability Assessment



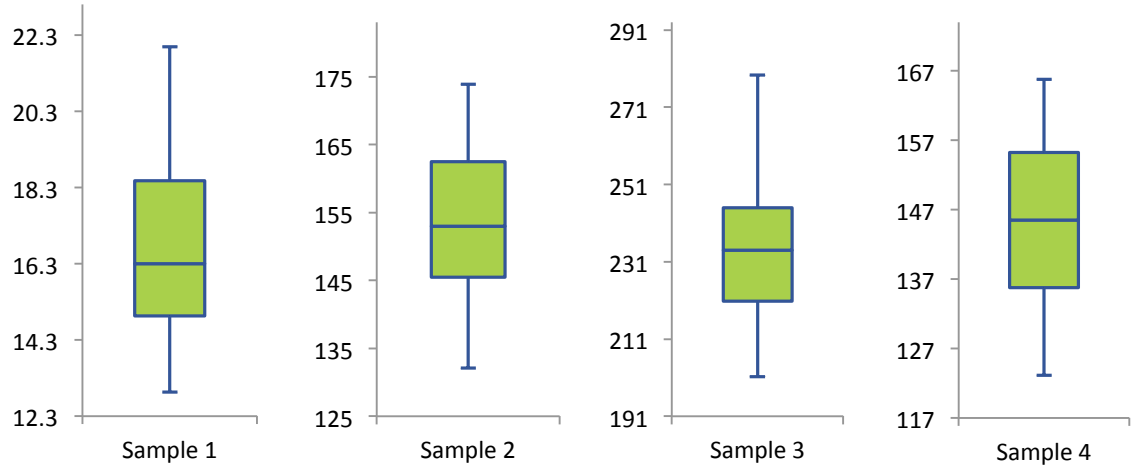
Homogeneity Assessment



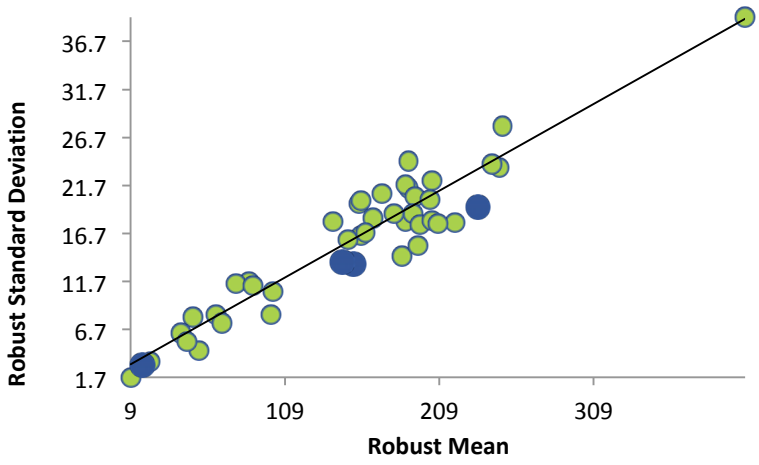
Stability assessments are regression analysis of reported result against date of analysis.

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

Box and Whisker Plots



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



MANGANESE

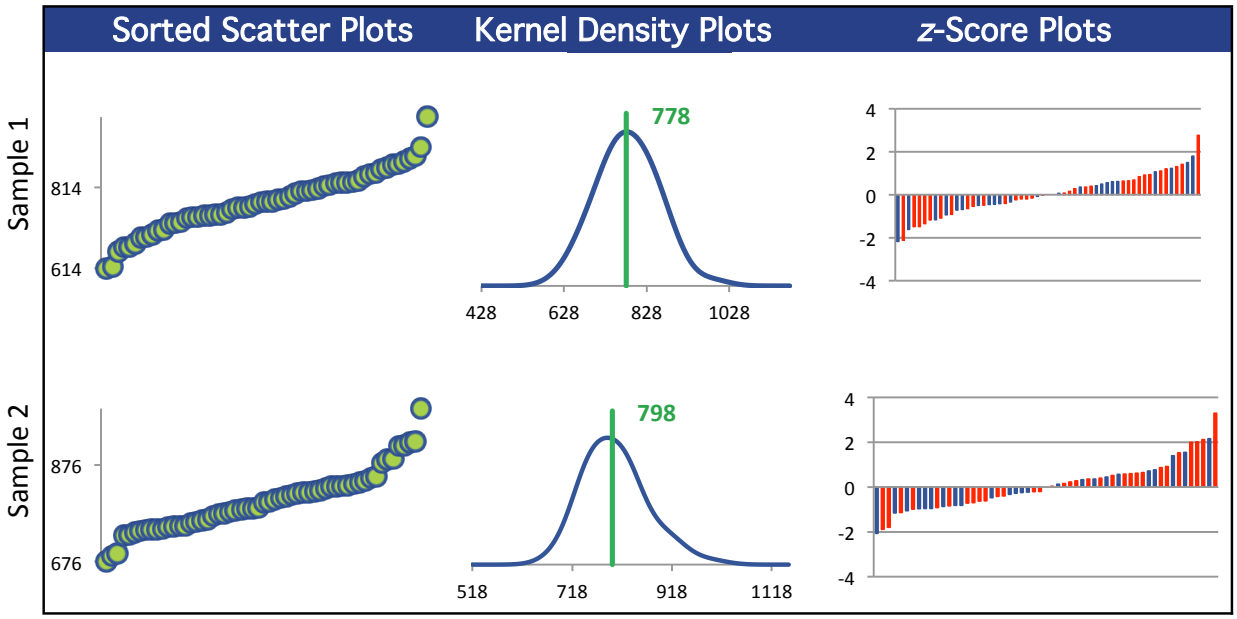
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	57	57	57	56
Median µg/g	778	798	1020	888
Robust Mean µg/g	778	798	1030	891
U µg/g	12.5	9.80	13.3	12.6
Robust Standard Deviation µg/g	75.4	59.2	80.1	75.5
Regression Standard Deviation µg/g	57.1	58.5	75.3	65.3
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	75.4	59.2	80.1	75.5
Outliers	0	0	0	1
|z|>3.0	0	1	0	0
2<|z|<3	3	4	4	1

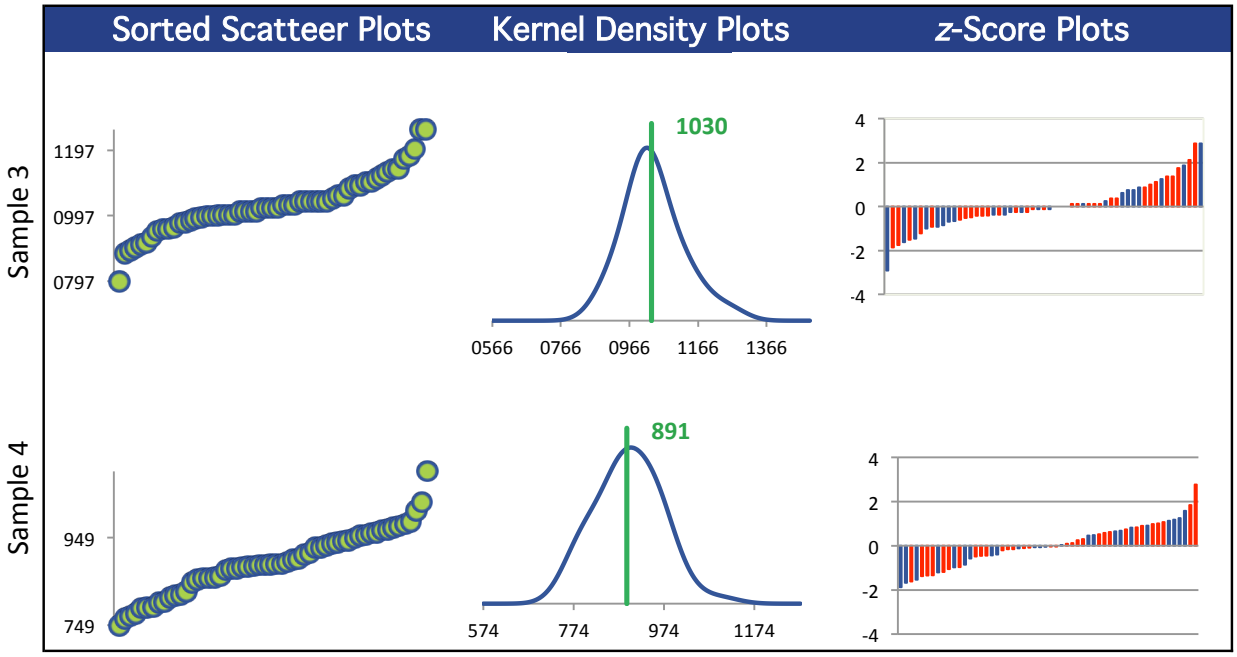
Methods Used

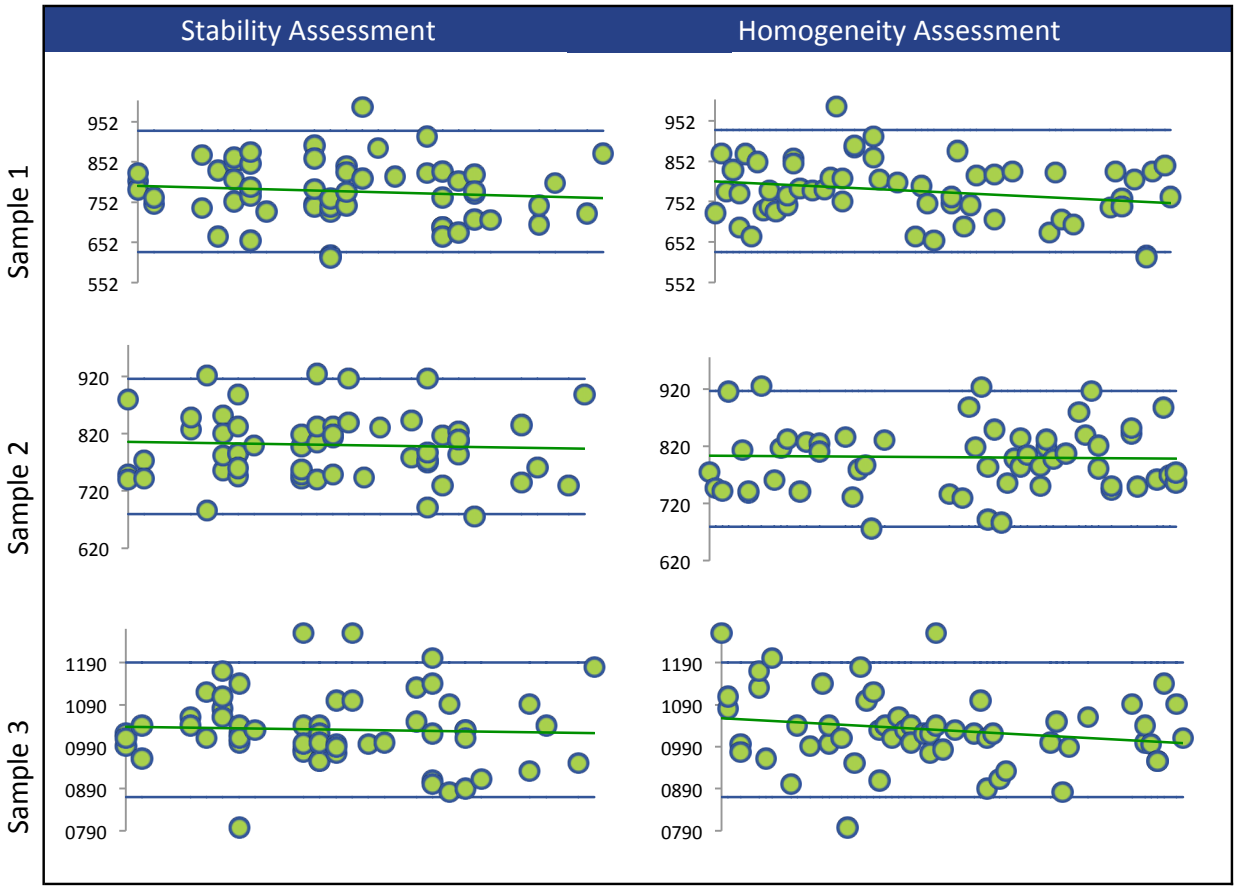
Method	C17-1	C17-2	C17-3	C17-4
ICP/OES (Blue)	24	24	24	24
ICP/MS (Red)	33	33	33	32

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



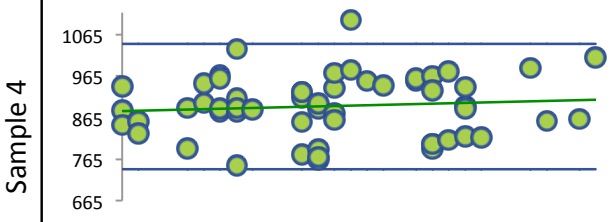
MANGANESE


Sorted Scatteer Plots
Kernel Density Plots
z-Score Plots
Sample 3
1197
0997
0797
1030
0566
0766
0966
1166
1366
4
2
0
-2
-4
Sample 4
949
749
891
574
774
974
1174
4
2
0
-2
-4

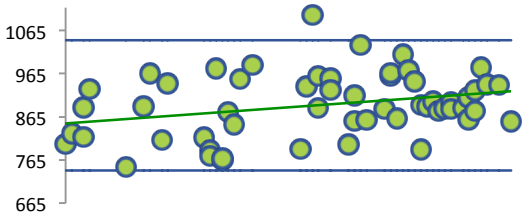

Stability Assessment
Homogeneity Assessment
Sample 1
952
852
752
652
552
952
852
752
652
552
Sample 2
920
820
720
620
920
820
720
620
Sample 3
1190
1090
0990
0890
0790
1190
1090
0990
0890
0790

MANGANESE

Stability Assessment



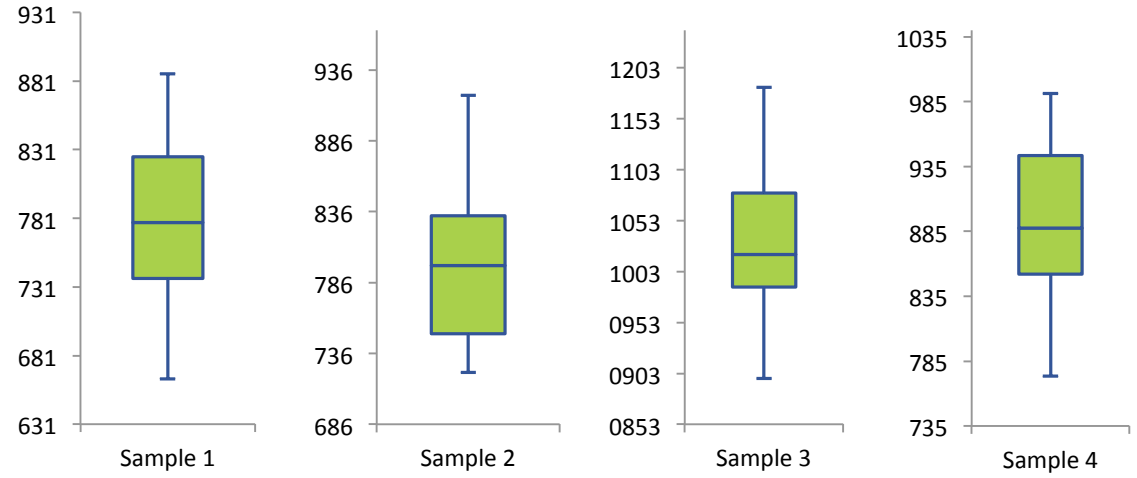
Homogeneity Assessment



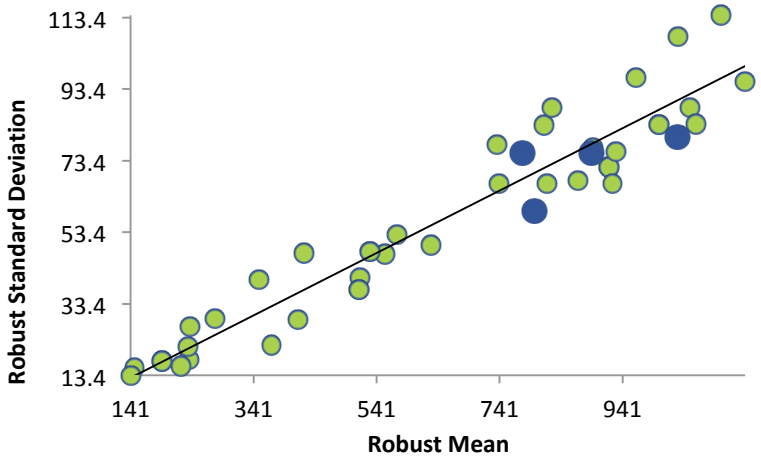
Stability assessments are regression analysis of reported result against date of analysis.

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

Box and Whisker Plots



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



MERCURY

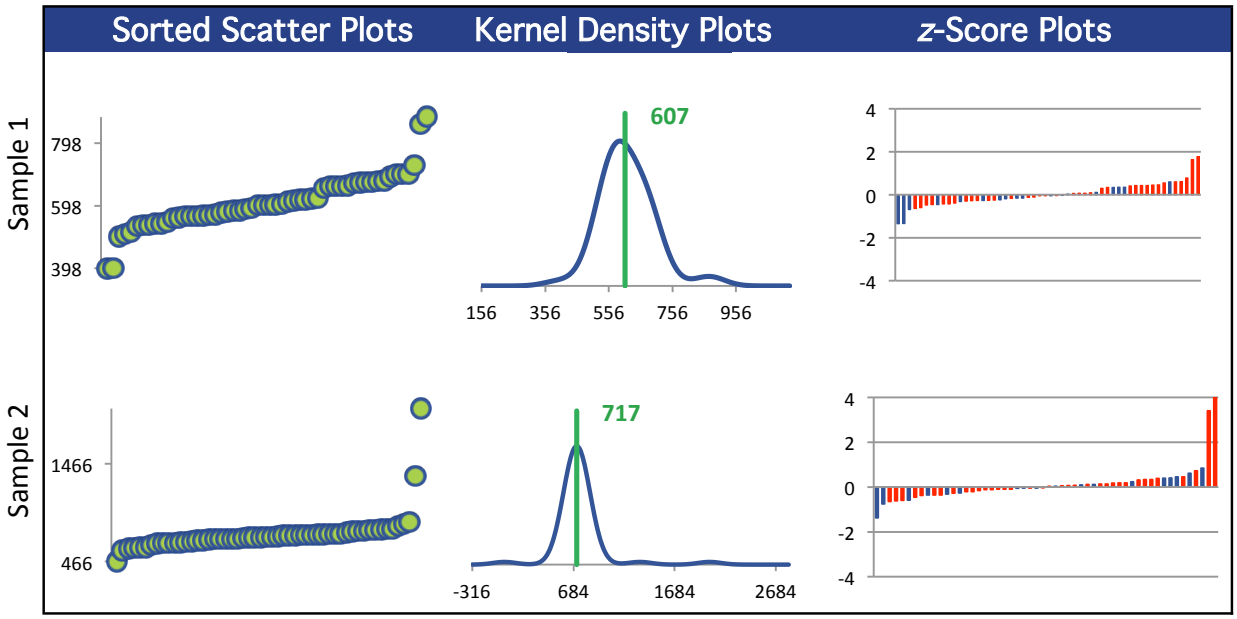
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	54	54	54	54
Median µg/g	600	717	745	829
Robust Mean µg/g	607	717	754	826
U µg/g	12.1	12.2	15.6	16.3
Robust Standard Deviation µg/g	71.2	71.6	91.7	95.9
Regression Standard Deviation µg/g	155	183	192	211
Stability Flag			Stability	
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	155	183	218	211
Outliers	6	6	6	6
|z|>3.0	0	2	1	1
2<|z|<3	0	0	0	0

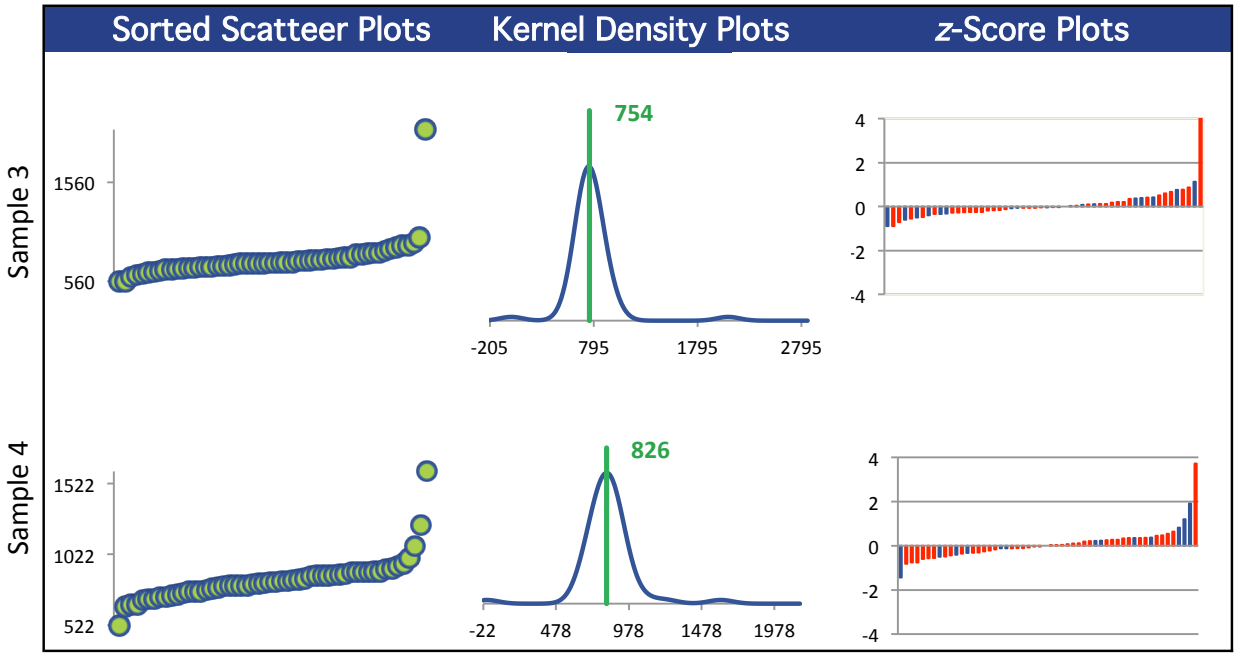
Methods Used

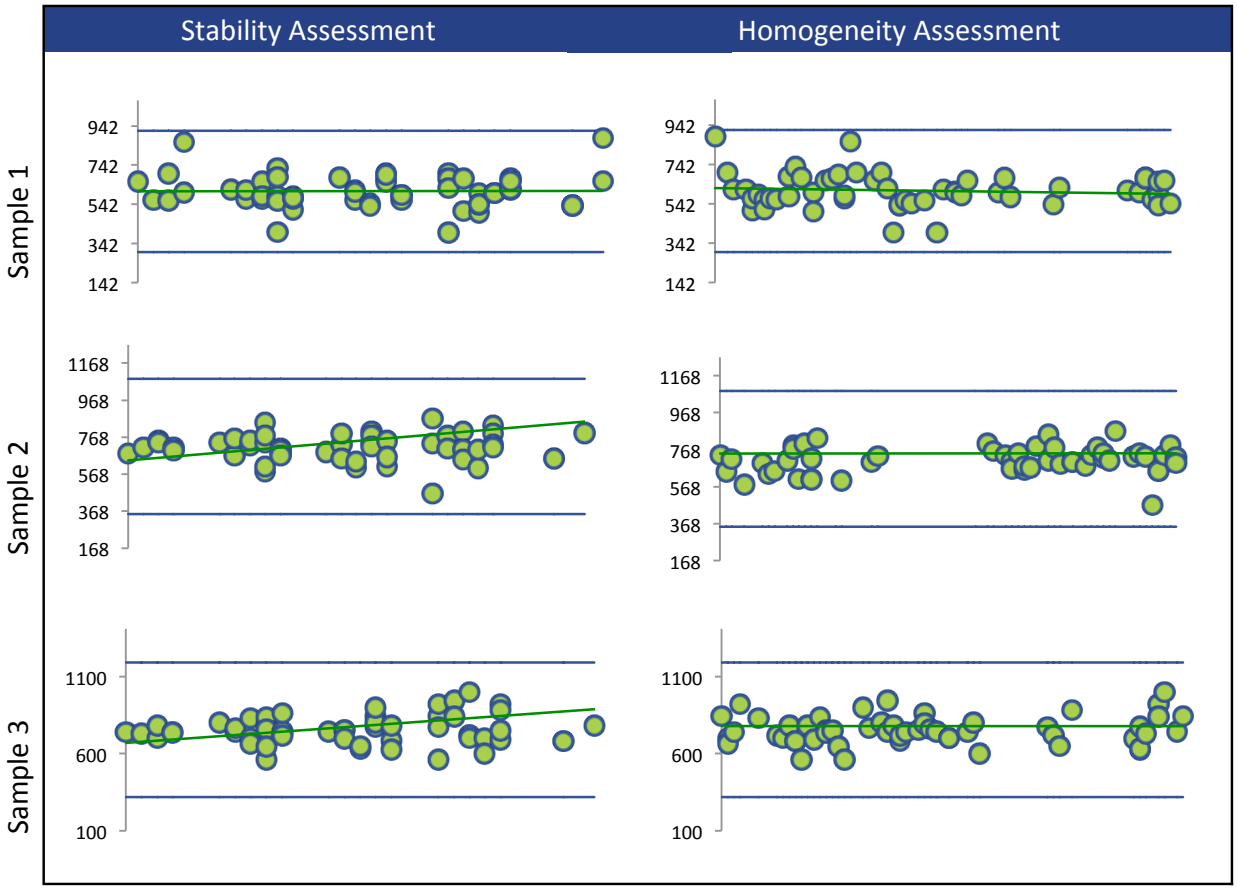
Method	C17-1	C17-2	C17-3	C17-4
COLD VAPOUR AA (Blue)	20	20	20	20
ICP/OES (Red)	4	4	4	4
ICP/MS (Green)	21	21	21	21
ATOMIC FLUORESCENCE (Orange)	7	7	7	7
PYROLYTIC AA (Black)	2	2	2	2

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



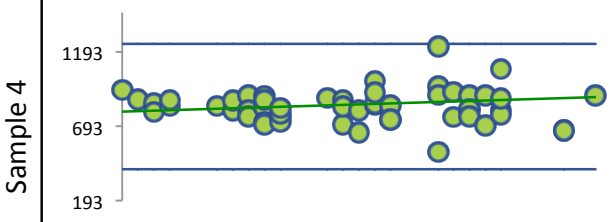
MERCURY


Sorted Scatteer Plots
Kernel Density Plots
z-Score Plots
Sample 3
1560
560
754
-205
795
1795
2795
4
2
0
-2
-4
Sample 4
1522
1022
522
826
-22
478
978
1478
1978
4
2
0
-2
-4

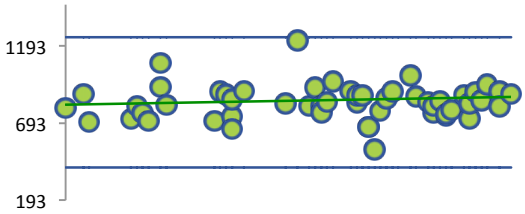

Stability Assessment
Homogeneity Assessment
Sample 1
942
742
542
342
142
Sample 2
1168
968
768
568
368
168
Sample 3
1100
600
100

MERCURY

Stability Assessment



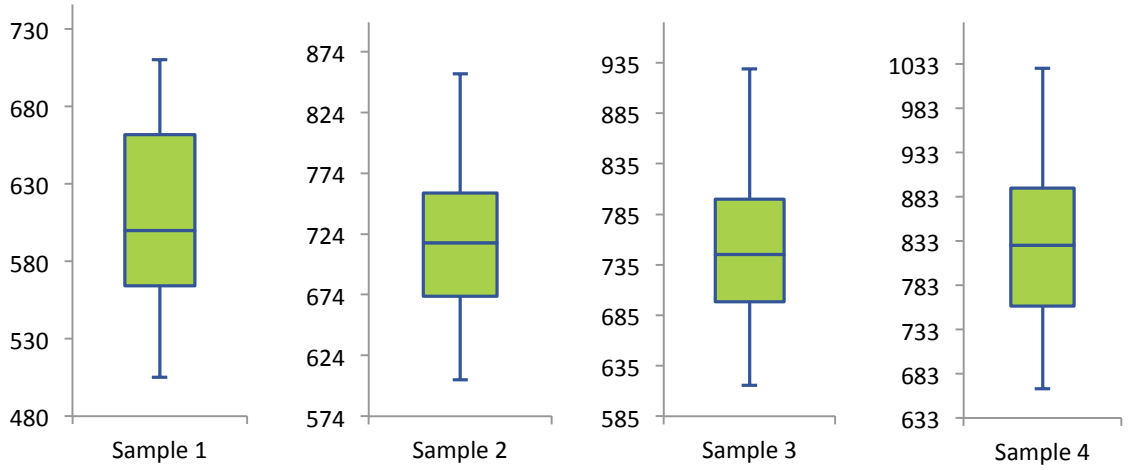
Homogeneity Assessment



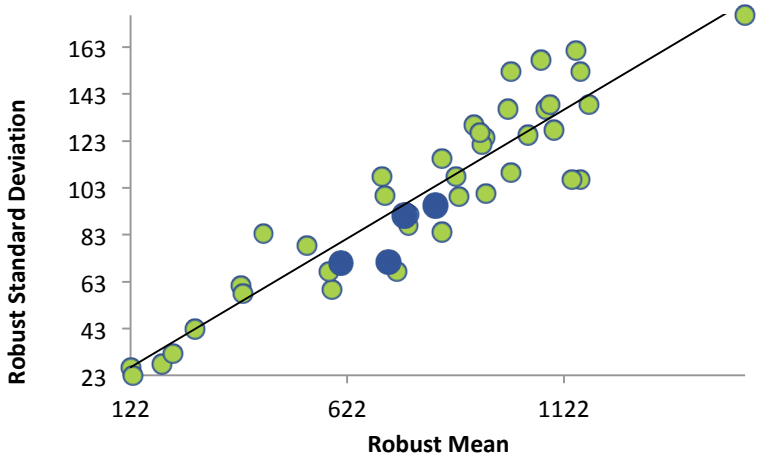
Stability assessments are regression analysis of reported result against date of analysis.

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

Box and Whisker Plots



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



NICKEL

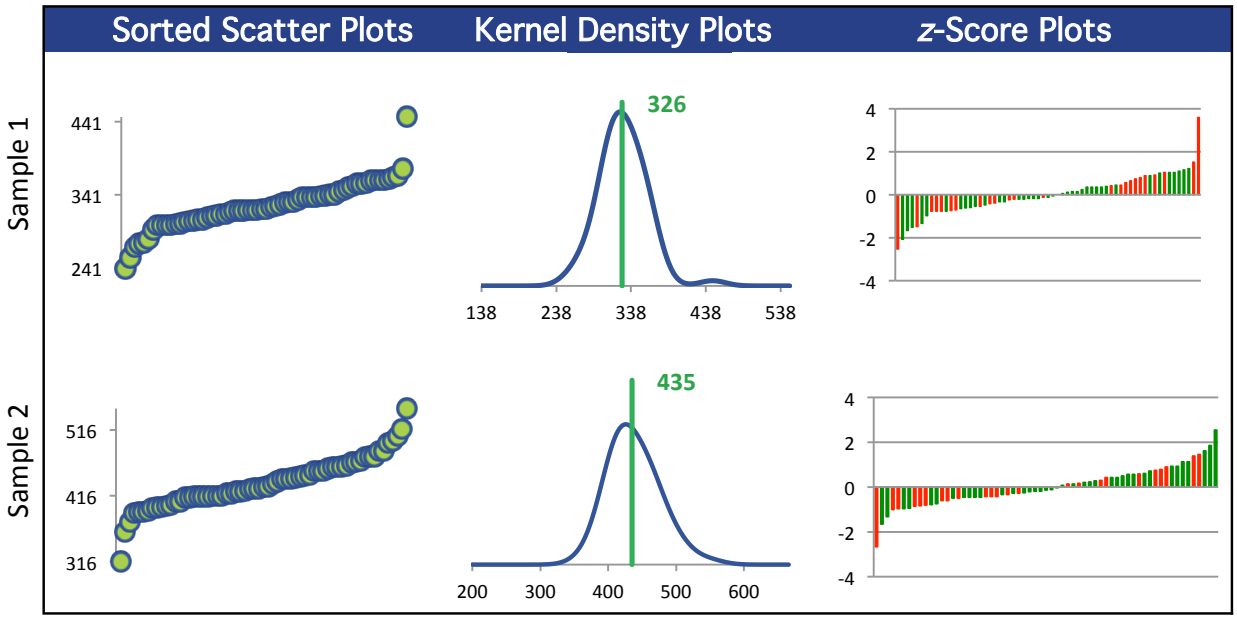
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	63	63	63	62
Median µg/g	322	429	510	474
Robust Mean µg/g	326	435	516	476
U µg/g	4.44	5.61	6.80	4.62
Robust Standard Deviation µg/g	28.2	35.6	43.2	29.1
Regression Standard Deviation µg/g	33.6	44.8	53.2	49.1
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	33.6	44.8	53.2	49.1
Outliers	0	0	0	1
|z|>3.0	1	0	0	0
2<|z|<3	2	2	0	1

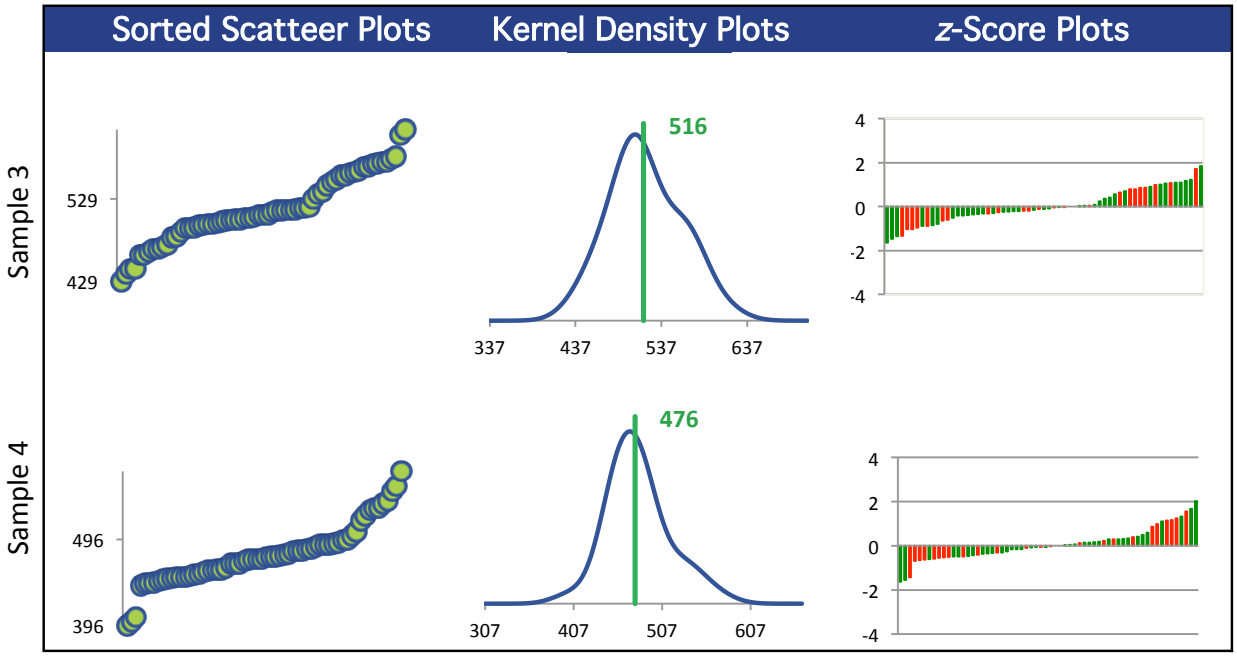
Methods Used

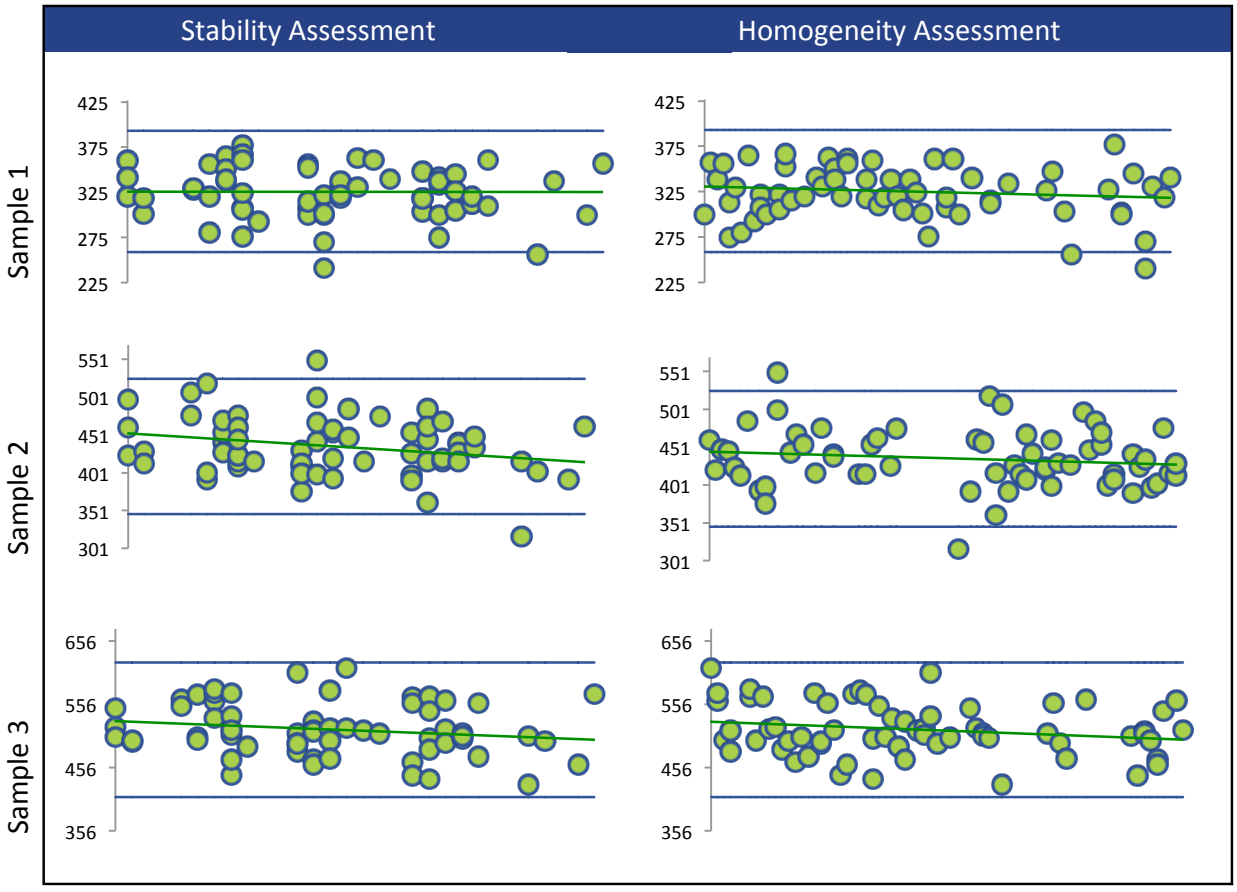
Method	C17-1	C17-2	C17-3	C17-4
ICP/OES (Blue)	24	24	24	24
ICP/MS (Red)	39	39	39	38

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



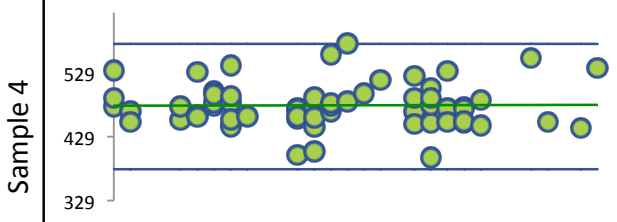
NICKEL


Sorted Scatteer Plots
Kernel Density Plots
z-Score Plots
Sample 3
529
429
516
337
437
537
637
4
2
0
-2
-4
Sample 4
496
396
476
307
407
507
607
4
2
0
-2
-4

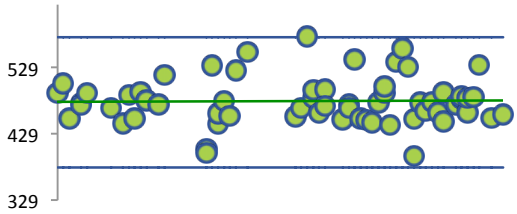

Stability Assessment
Homogeneity Assessment
Sample 1
425
375
325
275
225
Sample 2
551
501
451
401
351
301
Sample 3
656
556
456
356

NICKEL

Stability Assessment



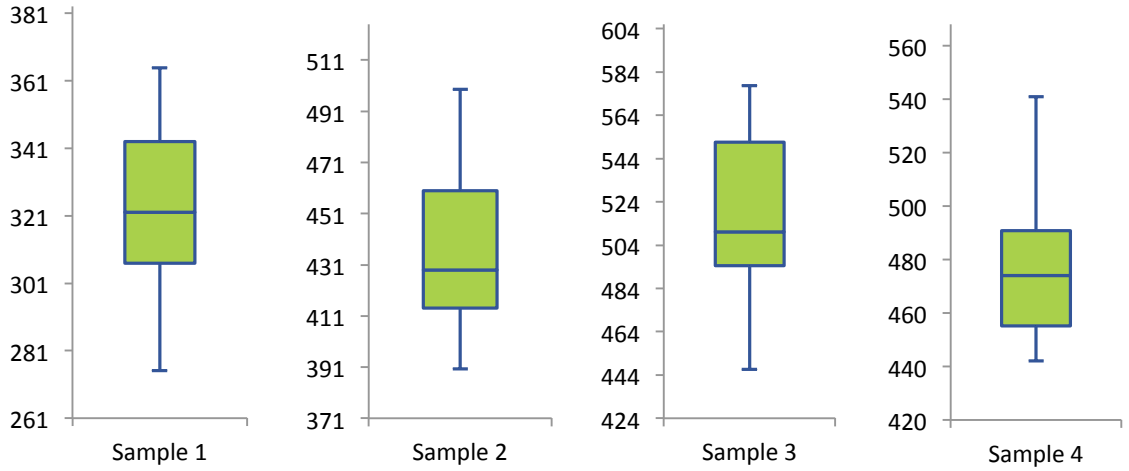
Homogeneity Assessment



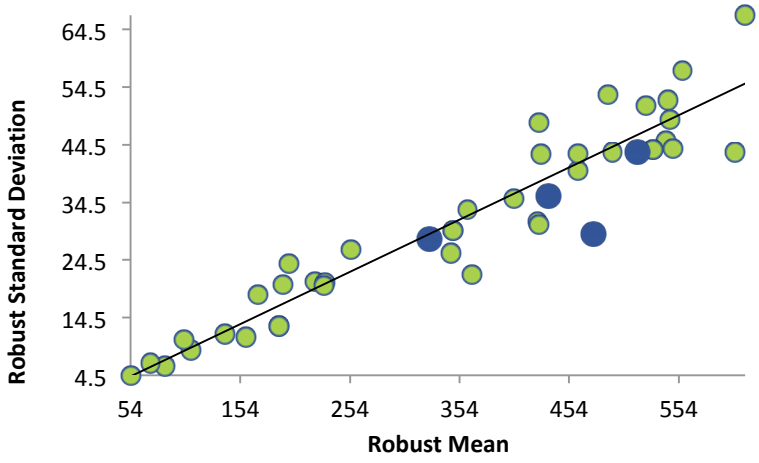
Stability assessments are regression analysis of reported result against date of analysis.

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

Box and Whisker Plots



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



STRONTIUM

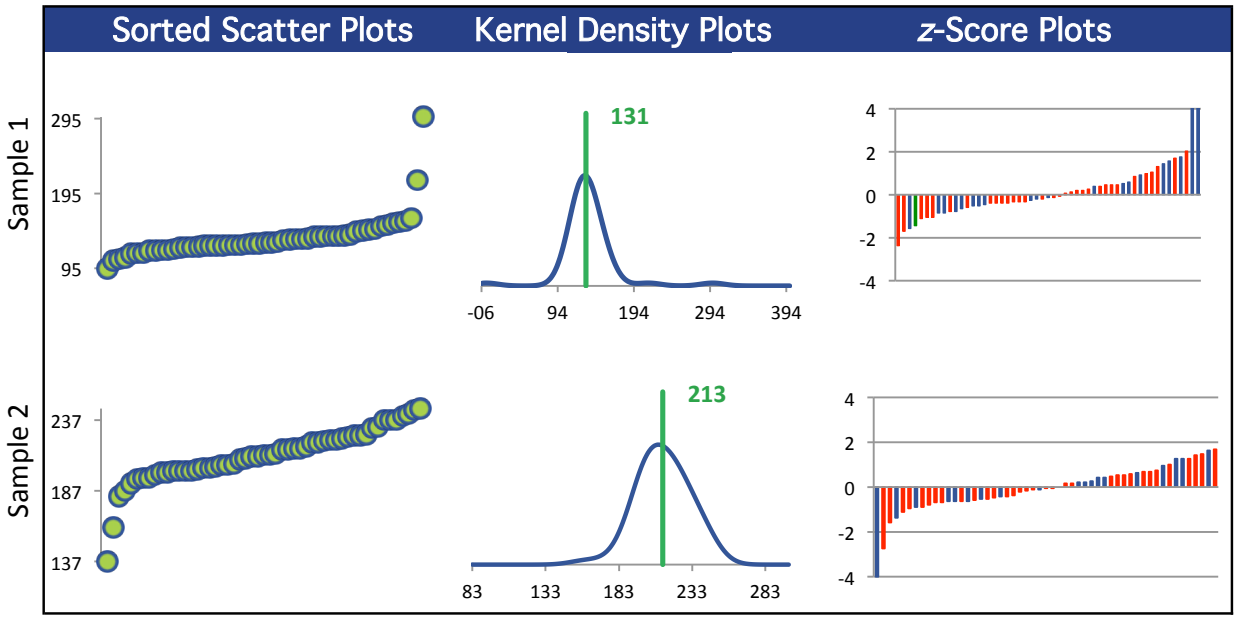
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	53	53	53	53
Median µg/g	129	212	266	284
Robust Mean µg/g	131	213	266	285
U µg/g	2.63	2.99	3.91	4.81
Robust Standard Deviation µg/g	15.3	17.4	22.8	28.0
Regression Standard Deviation µg/g	11.9	19.0	23.7	25.3
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	15.3	19.0	23.7	28.0
Outliers	0	0	0	0
|z|>3.0	2	1	0	0
2<|z|<3	2	1	1	4

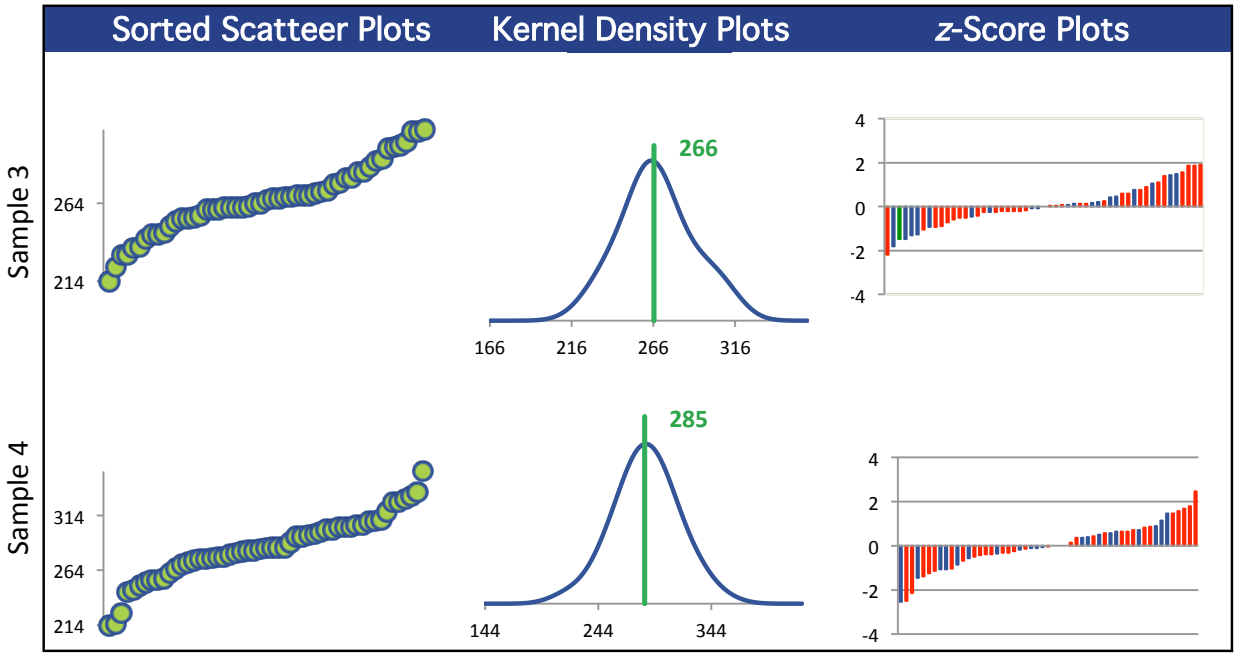
Methods Used

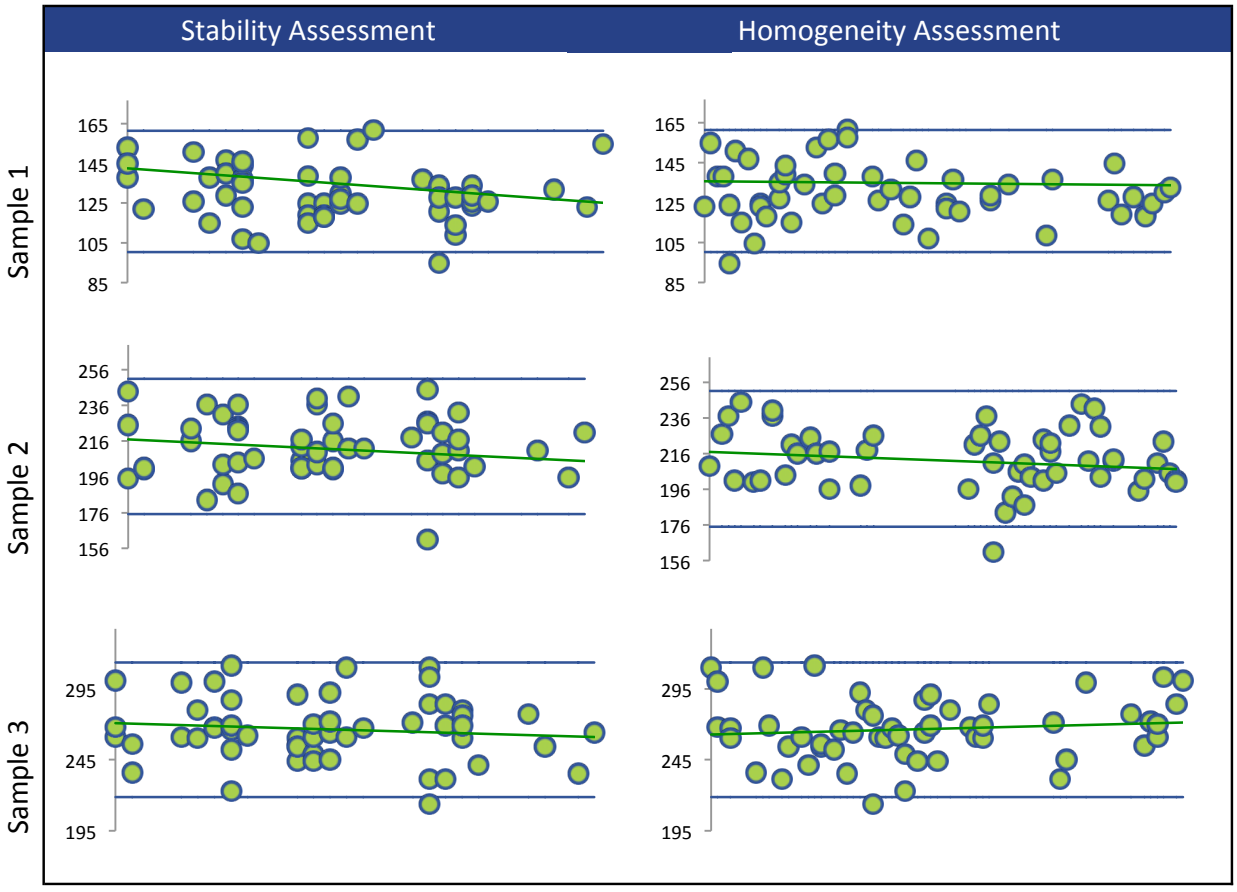
Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	32	32	32	32
ICP/OES (Red)	20	20	20	20
AA FLAME (Green)	1	1	1	1

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



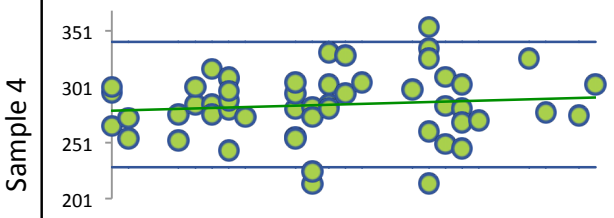
STRONTIUM


Sorted Scatteer Plots
Kernel Density Plots
z-Score Plots
Sample 3
264
214
266
166
216
266
316
4
2
0
-2
-4
Sample 4
314
264
214
285
144
244
344
4
2
0
-2
-4

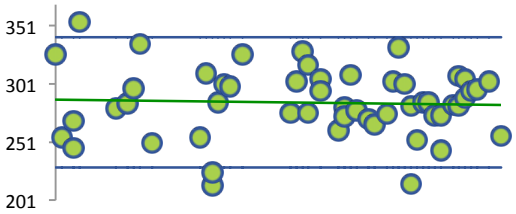

Stability Assessment
Homogeneity Assessment
Sample 1
165
145
125
105
85
Sample 2
256
236
216
196
176
156
Sample 3
295
245
195

STRONTIUM

Stability Assessment



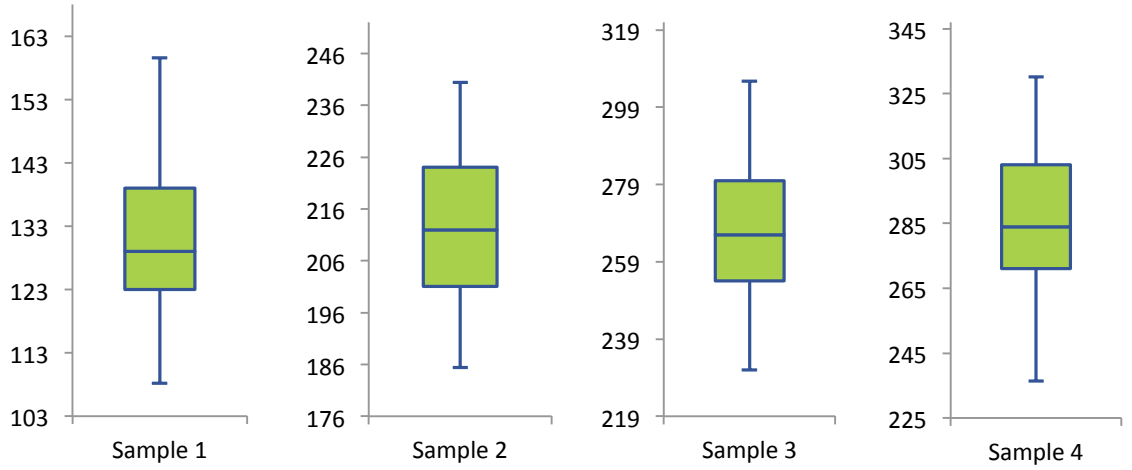
Homogeneity Assessment



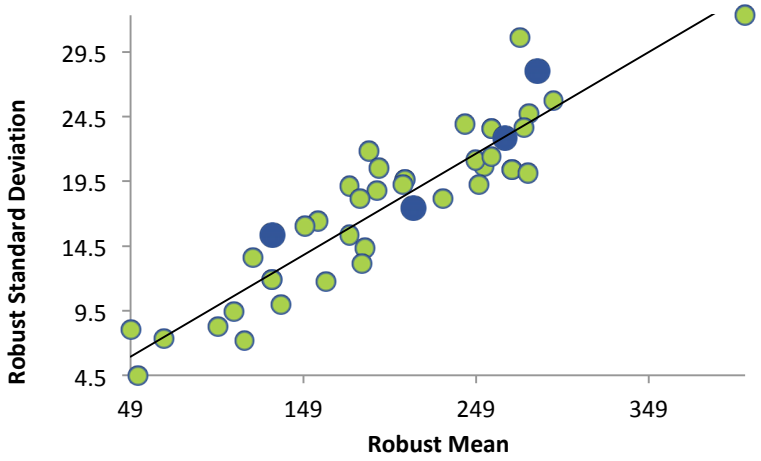
Stability assessments are regression analysis of reported result against date of analysis.

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

Box and Whisker Plots



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



TIN

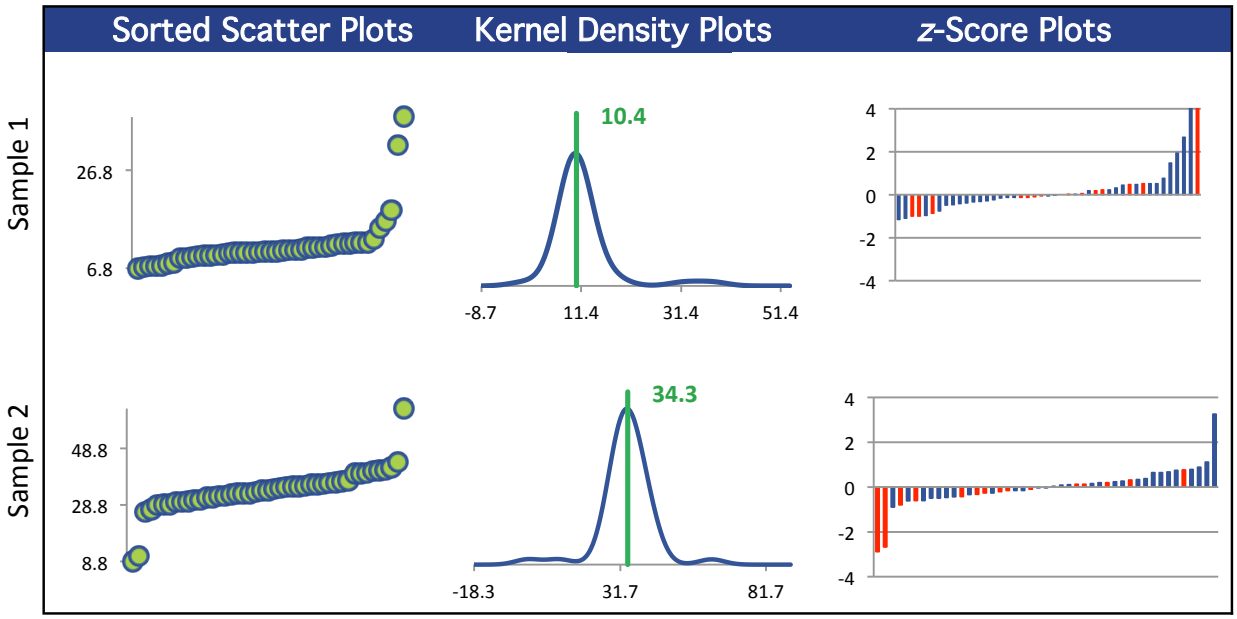
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	45	45	45	45
Median µg/g	10.2	34.0	52.3	46.0
Robust Mean µg/g	10.4	34.3	53.6	46.4
U µg/g	0.375	0.945	1.39	1.24
Robust Standard Deviation µg/g	2.01	5.07	7.45	6.66
Regression Standard Deviation µg/g	3.10	8.84	13.5	11.7
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	3.10	8.84	13.5	11.7
Outliers	0	0	0	0
|z|>3.0	2	1	0	1
2<|z|<3	1	2	2	2

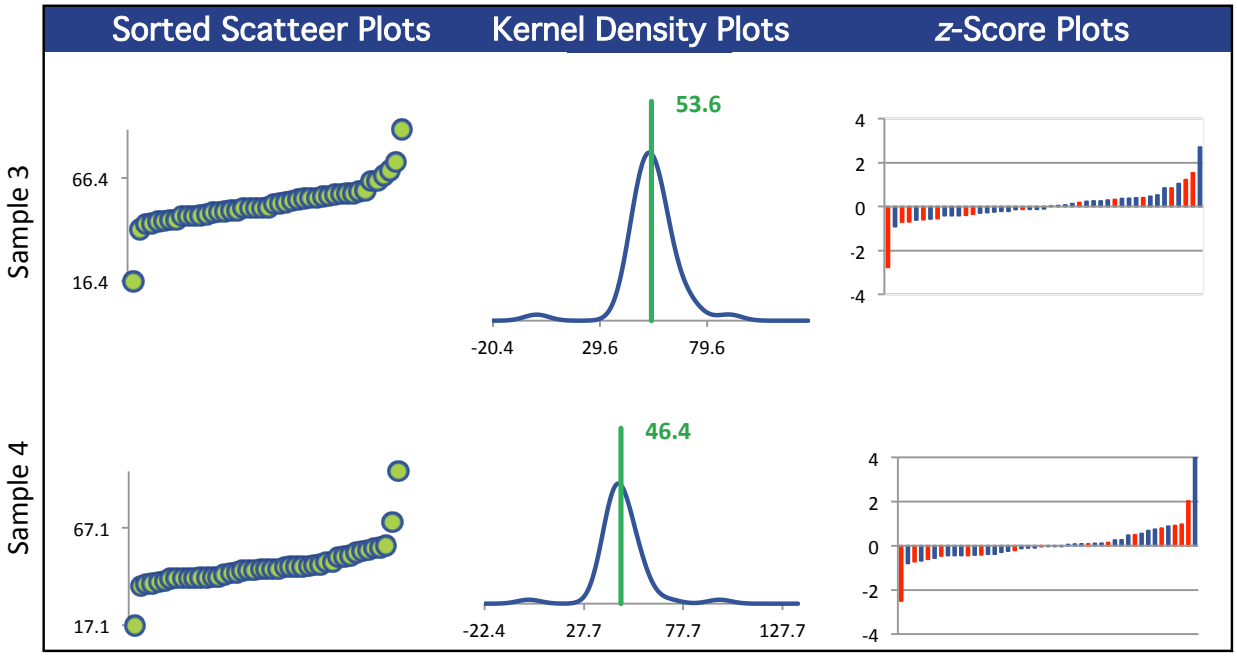
Methods Used

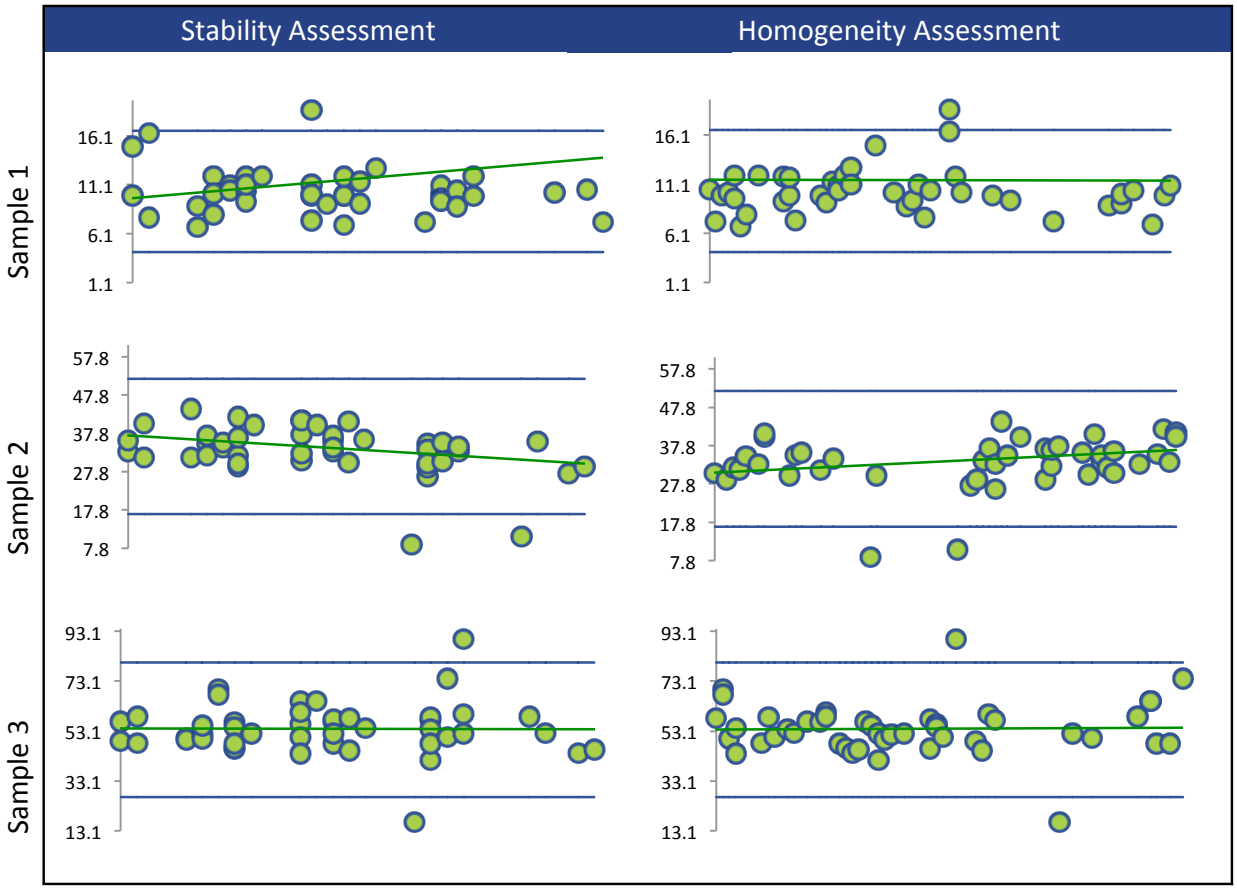
Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	30	30	30	30
ICP/OES (Red)	15	15	15	15

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



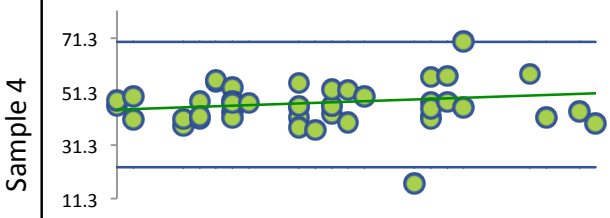
TIN


Sorted Scatteer Plots
Kernel Density Plots
z-Score Plots
Sample 3
66.4
16.4
53.6
-20.4
29.6
79.6
4
2
0
-2
-4
Sample 4
67.1
17.1
46.4
-22.4
27.7
77.7
127.7
4
2
0
-2
-4

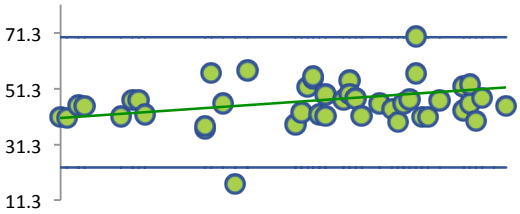

Stability Assessment
Homogeneity Assessment
Sample 1
16.1
11.1
6.1
1.1
16.1
11.1
6.1
1.1
Sample 2
57.8
47.8
37.8
27.8
17.8
7.8
57.8
47.8
37.8
27.8
17.8
7.8
Sample 3
93.1
73.1
53.1
33.1
13.1
93.1
73.1
53.1
33.1
13.1

TIN

Stability Assessment



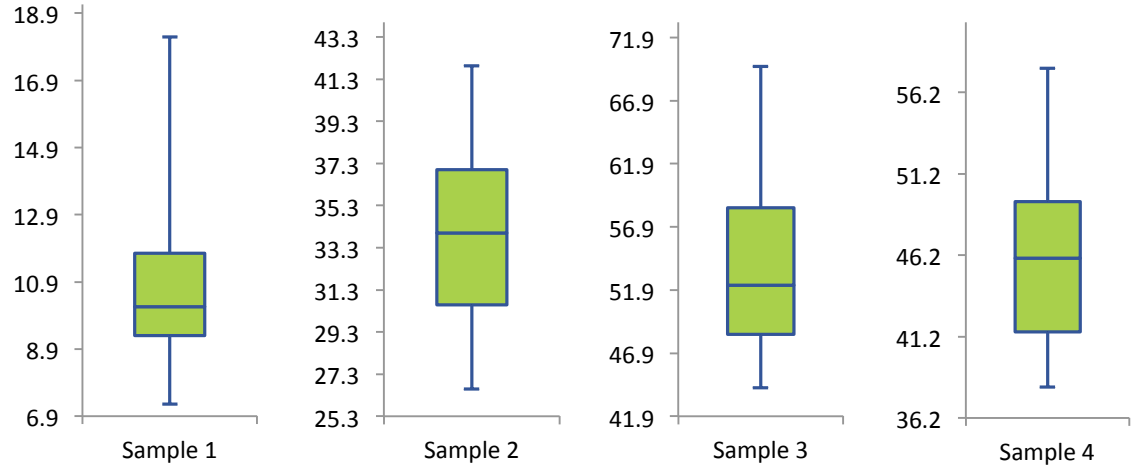
Homogeneity Assessment



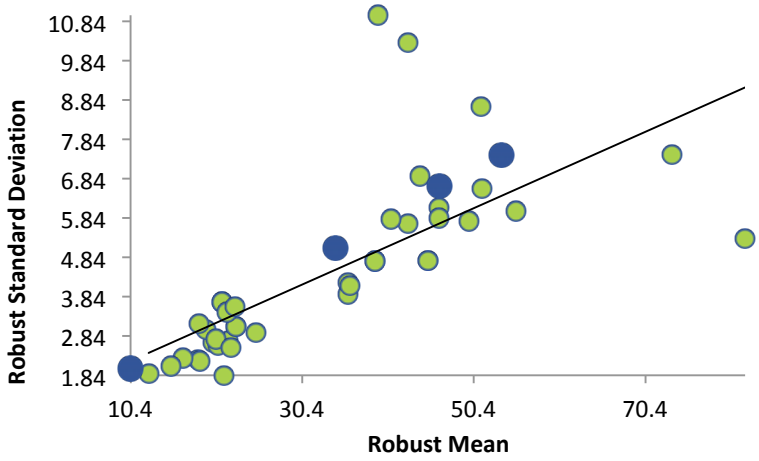
Stability assessments are regression analysis of reported result against date of analysis.

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

Box and Whisker Plots



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



TITANIUM

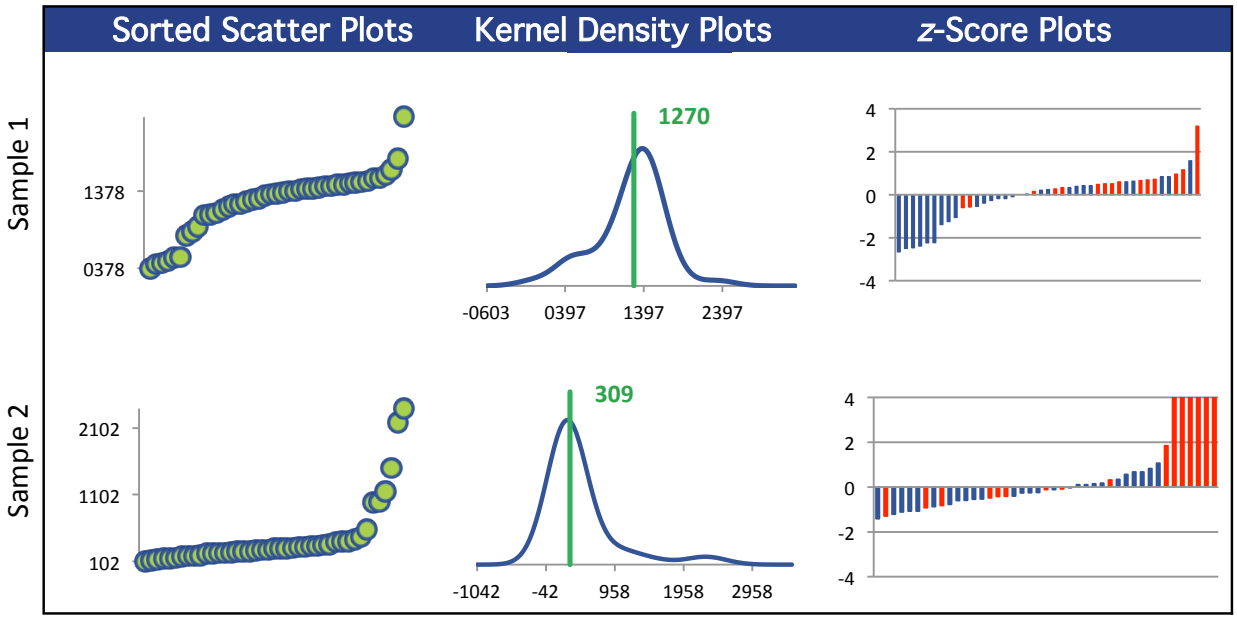
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	43	43	43	43
Median µg/g	1350	293	314	312
Robust Mean µg/g	1270	309	345	370
U µg/g	62.1	28.0	31.5	48.2
Robust Standard Deviation µg/g	326	147	165	253
Regression Standard Deviation µg/g	335	92.3	101	108
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	335	147	165	253
Outliers	0	0	0	0
|z|>3.0	1	6	5	6
2<|z|<3	6	0	1	2

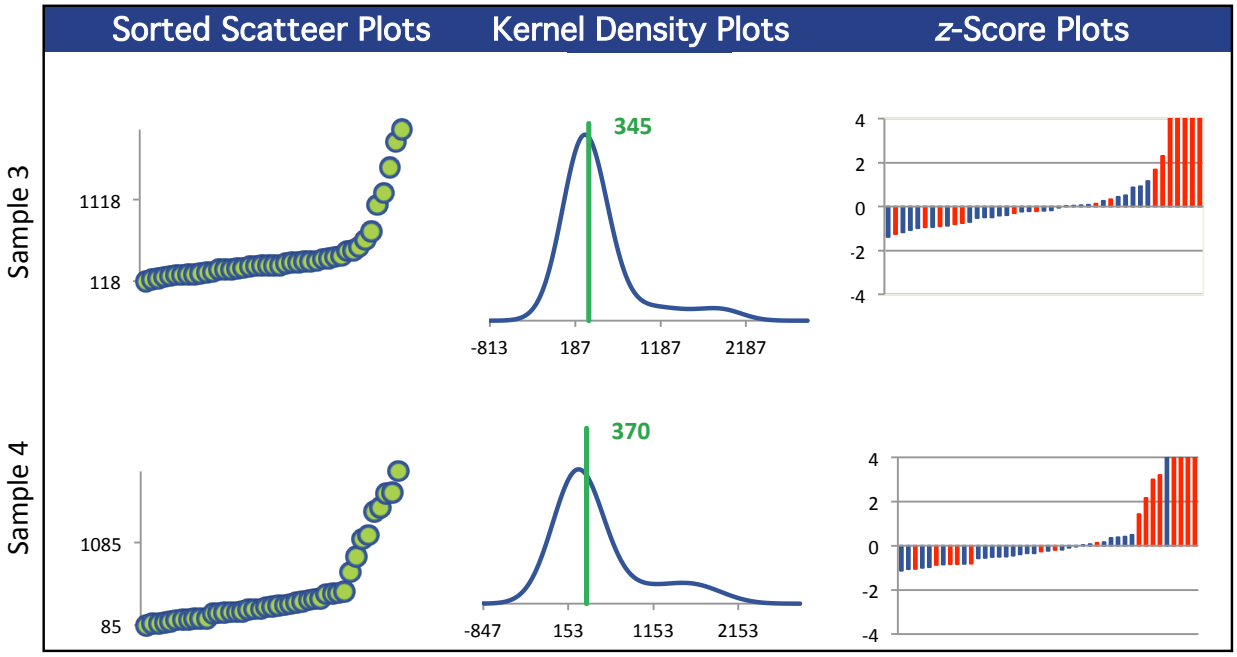
Methods Used

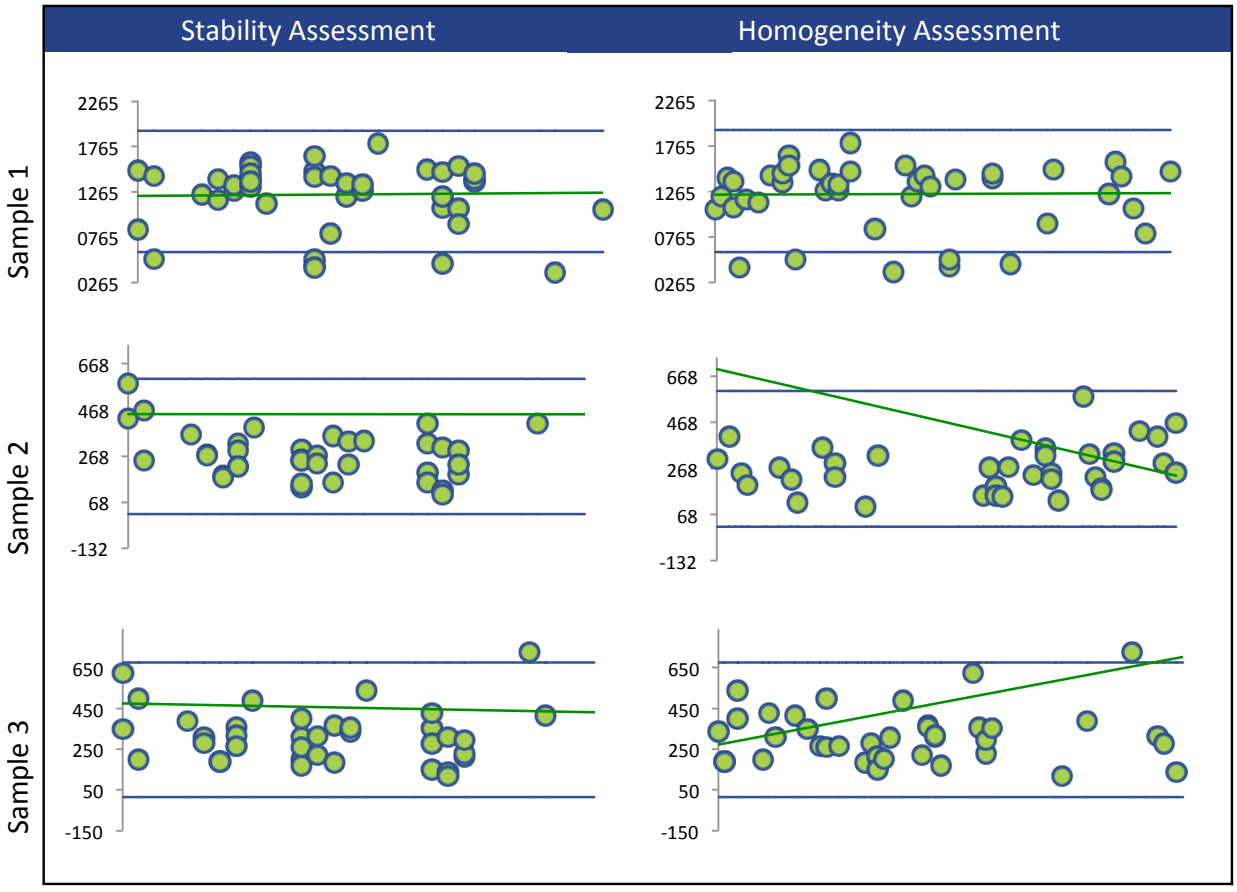
Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	27	27	27	27
ICP/OES (Red)	16	16	16	16

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



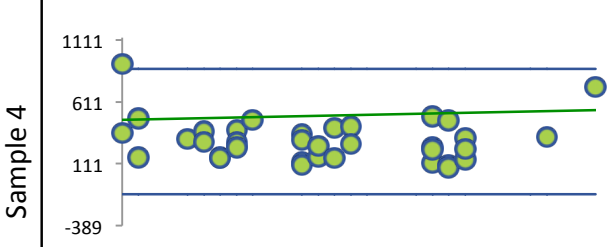
TITANIUM


Sorted Scatteer Plots
Kernel Density Plots
z-Score Plots
Sample 3
1118
118
345
-813
187
1187
2187
4
2
0
-2
-4
Sample 4
1085
85
370
-847
153
1153
2153
4
2
0
-2
-4

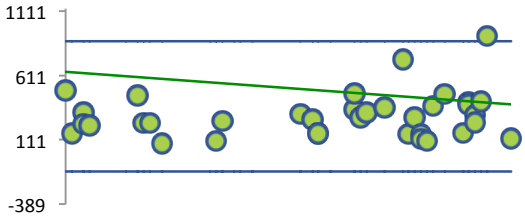

Stability Assessment
Homogeneity Assessment
Sample 1
2265
1765
1265
0765
0265
Sample 2
668
468
268
68
-132
Sample 3
650
450
250
50
-150

TITANIUM

Stability Assessment



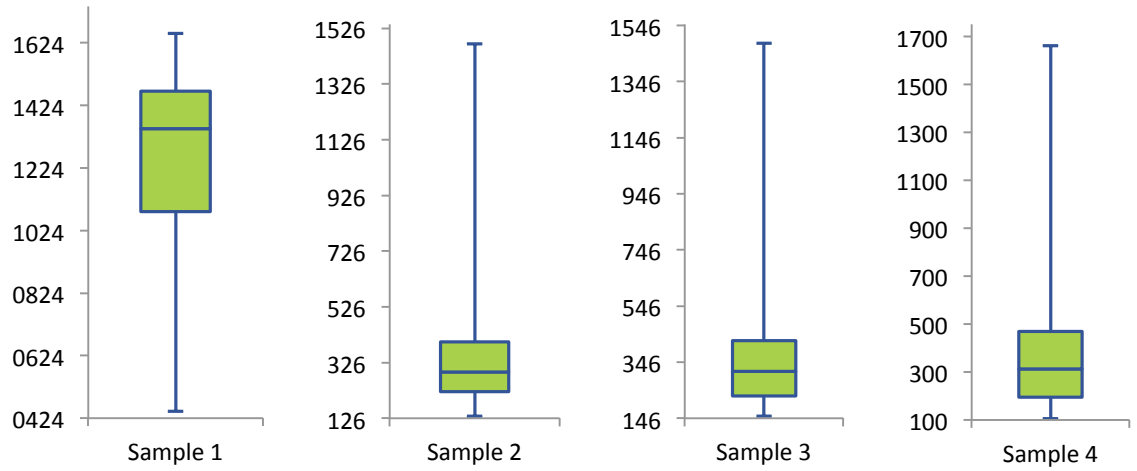
Homogeneity Assessment



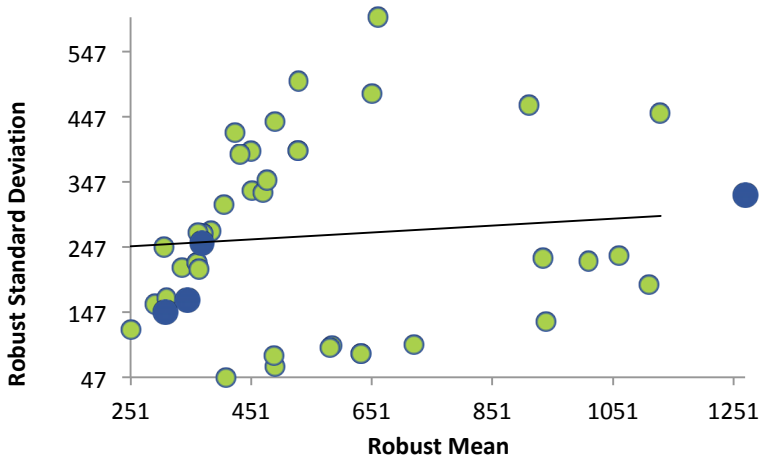
Stability assessments are regression analysis of reported result against date of analysis.

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

Box and Whisker Plots



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



URANIUM

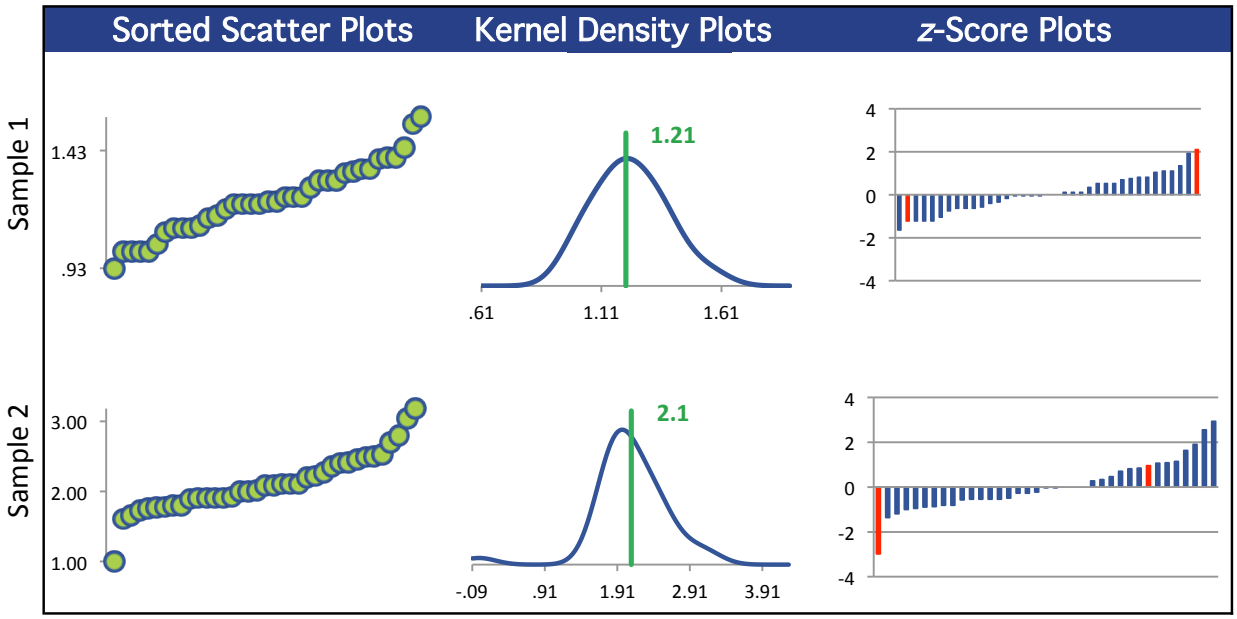
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	37	37	37	37
Median µg/g	1.21	2.09	2.50	1.95
Robust Mean µg/g	1.21	2.10	2.53	1.96
U µg/g	0.0327	0.0758	0.0824	0.0623
Robust Standard Deviation µg/g	0.159	0.369	0.401	0.303
Regression Standard Deviation µg/g	0.171	0.248	0.285	0.236
Stability Flag			Stability	
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	0.171	0.369	0.600	0.303
Outliers	2	2	2	2
|z|>3.0	0	0	0	2
2<|z|<3	1	3	1	1

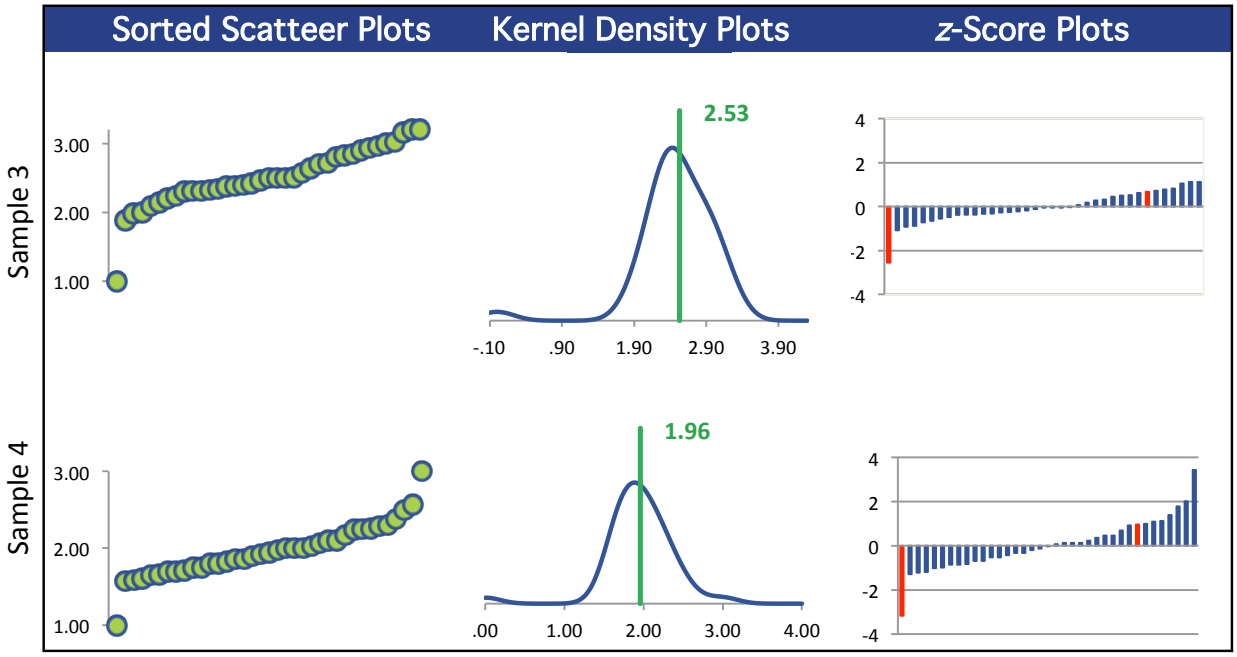
Methods Used

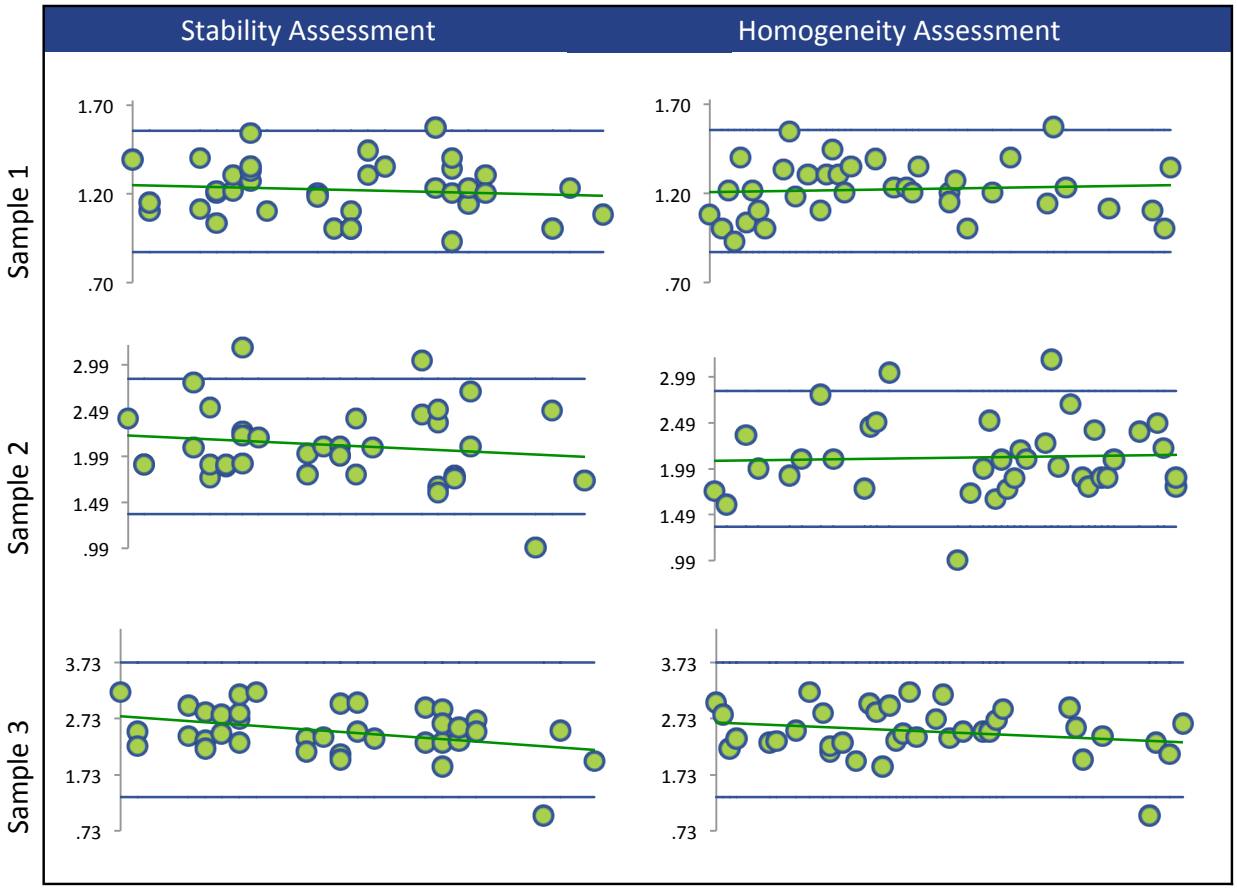
Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	35	35	35	35
ICP/OES (Red)	2	2	2	2

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



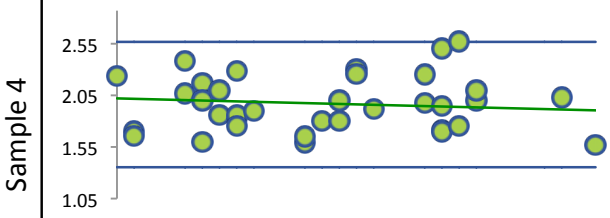
URANIUM


Sorted Scatteer Plots
Kernel Density Plots
z-Score Plots
Sample 3
Sample 4
3.00
2.00
1.00
2.53
1.96
-.10
.90
1.90
2.90
3.90
.00
1.00
2.00
3.00
4.00
4
2
0
-2
-4

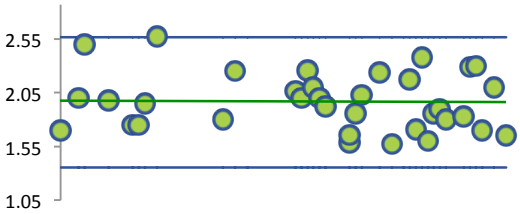

Stability Assessment
Homogeneity Assessment
Sample 1
Sample 2
Sample 3
1.70
1.20
.70
2.99
2.49
1.99
1.49
.99
3.73
2.73
1.73
.73

URANIUM

Stability Assessment



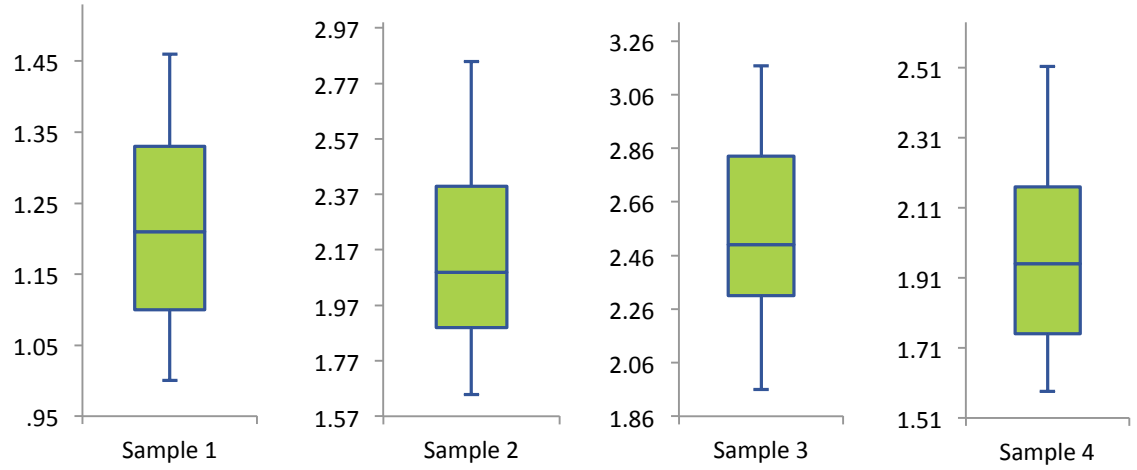
Homogeneity Assessment



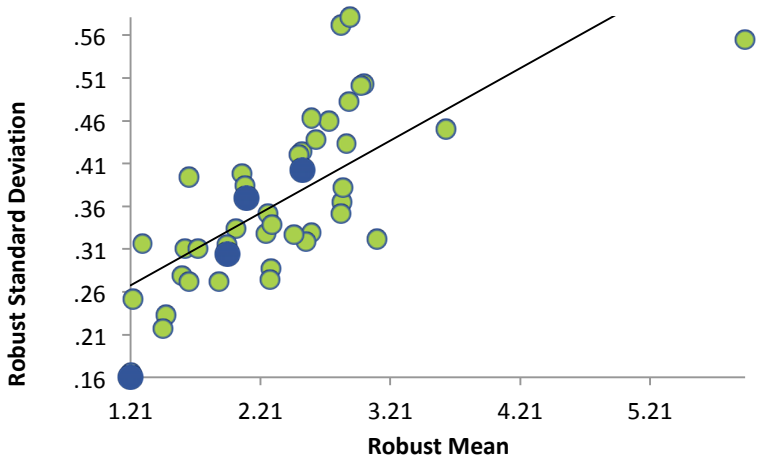
Stability assessments are regression analysis of reported result against date of analysis.

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

Box and Whisker Plots



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



VANADIUM

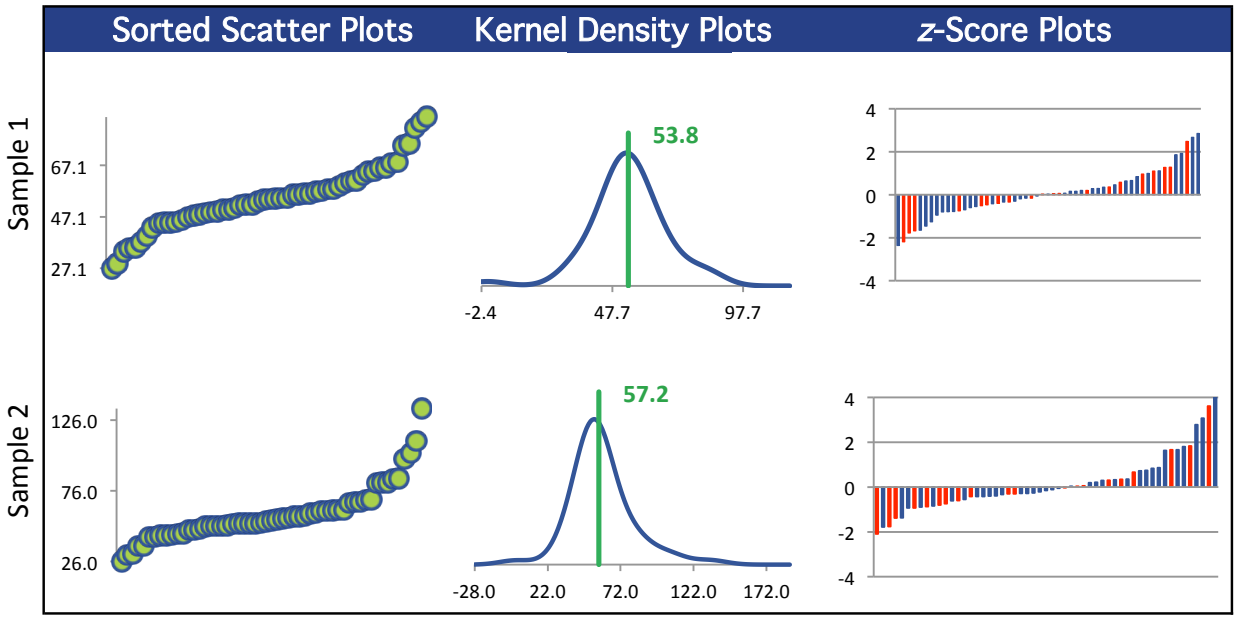
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	55	55	55	55
Median µg/g	54.0	55.0	77.0	76.5
Robust Mean µg/g	53.8	57.2	79.0	76.4
U µg/g	1.90	2.51	2.48	3.27
Robust Standard Deviation µg/g	11.3	14.9	14.7	19.4
Regression Standard Deviation µg/g	7.75	8.22	11.3	10.9
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	11.3	14.9	14.7	19.4
Outliers	0	0	0	0
|z|>3.0	0	3	1	0
2<|z|<3	5	2	4	1

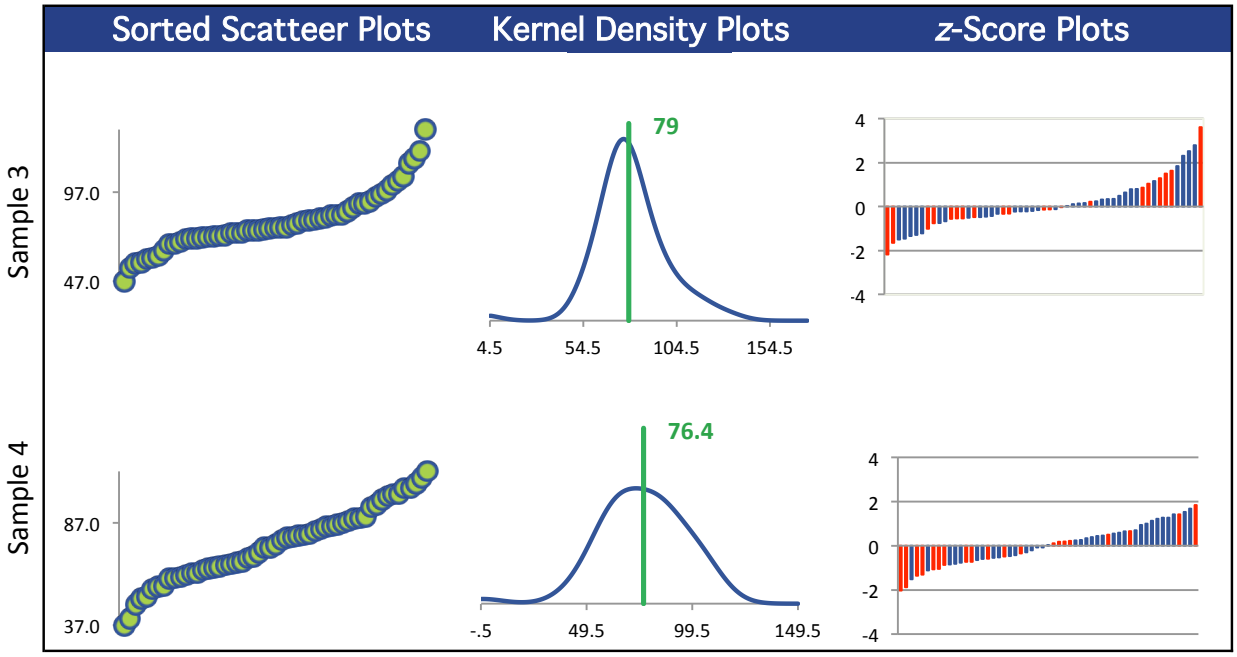
Methods Used

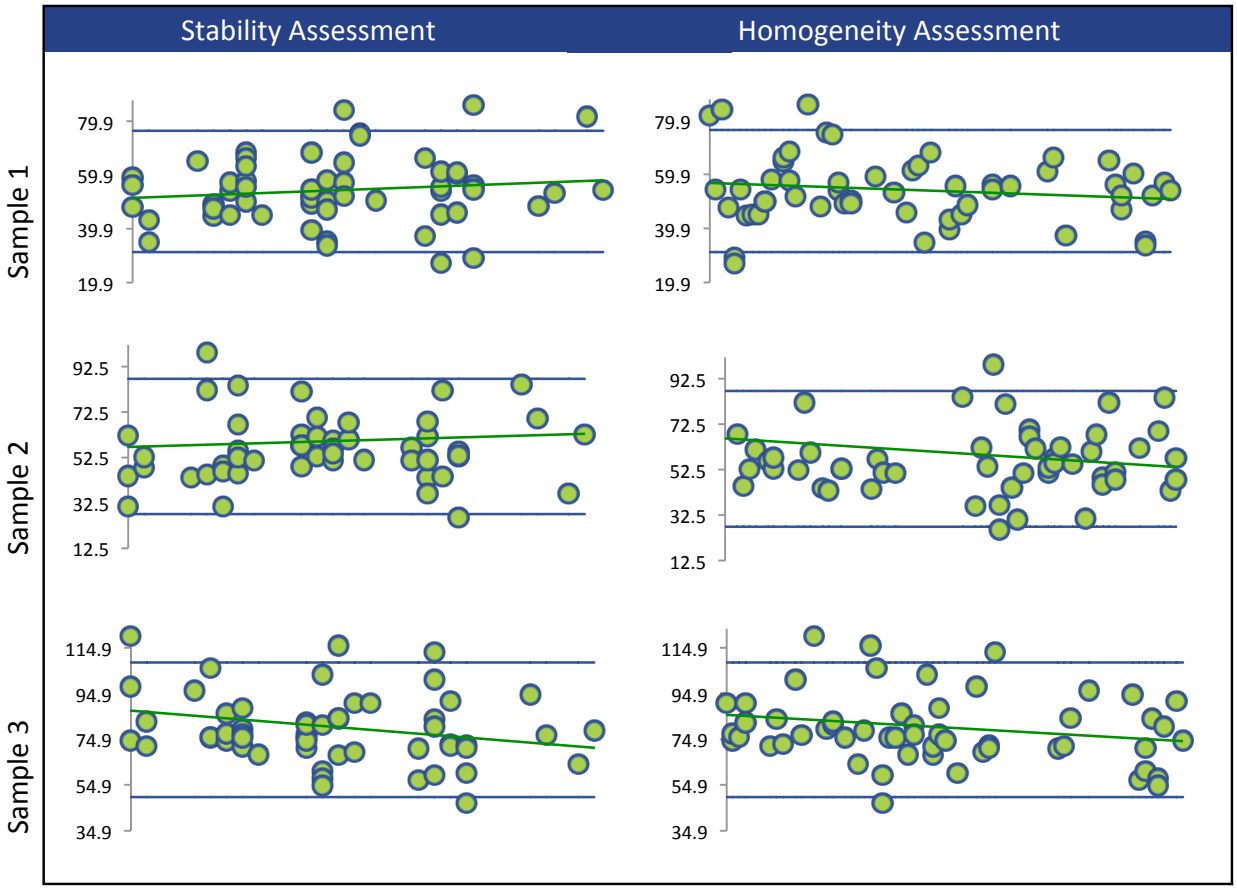
Method	C17-1	C17-2	C17-3	C17-4
ICP/MS (Blue)	35	35	35	35
ICP/OES (Red)	20	20	20	20

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



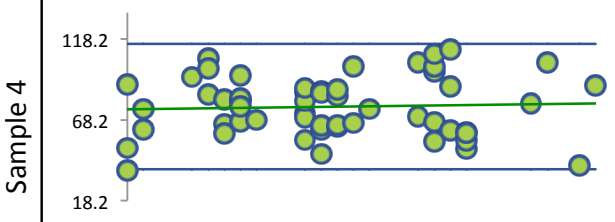
VANADIUM


Sorted Scatteer Plots
Kernel Density Plots
z-Score Plots
Sample 3
97.0
47.0
79
4.5
54.5
104.5
154.5
4
2
0
-2
-4
Sample 4
87.0
37.0
76.4
-.5
49.5
99.5
149.5
4
2
0
-2
-4

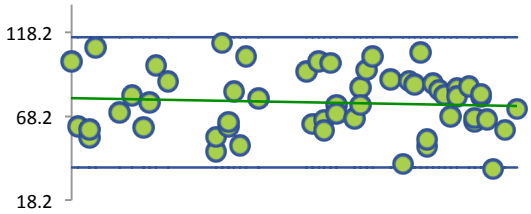

Stability Assessment
Homogeneity Assessment
Sample 1
79.9
59.9
39.9
19.9
Sample 2
92.5
72.5
52.5
32.5
12.5
Sample 3
114.9
94.9
74.9
54.9
34.9

VANADIUM

Stability Assessment



Homogeneity Assessment



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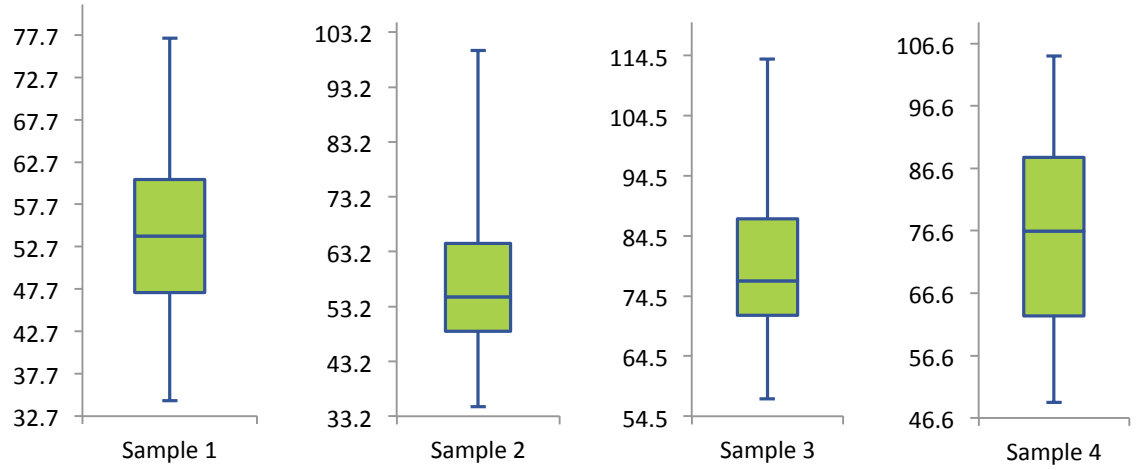
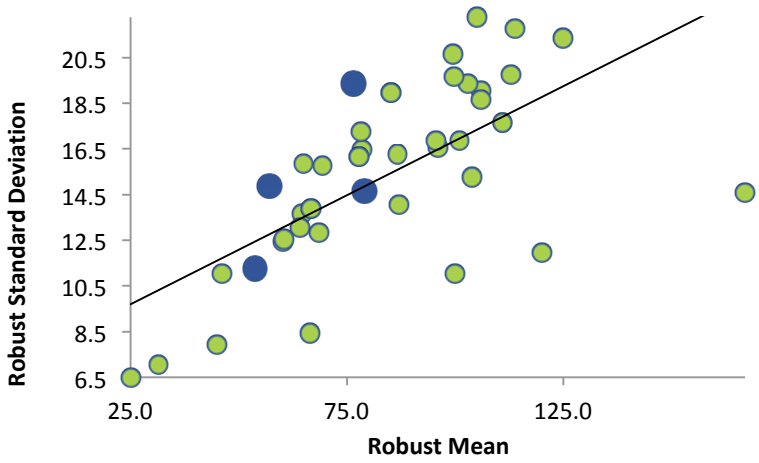
Homogeneity assessments are regression analysis of reported result against bottling order.

Box and Whisker Plots



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



ZINC

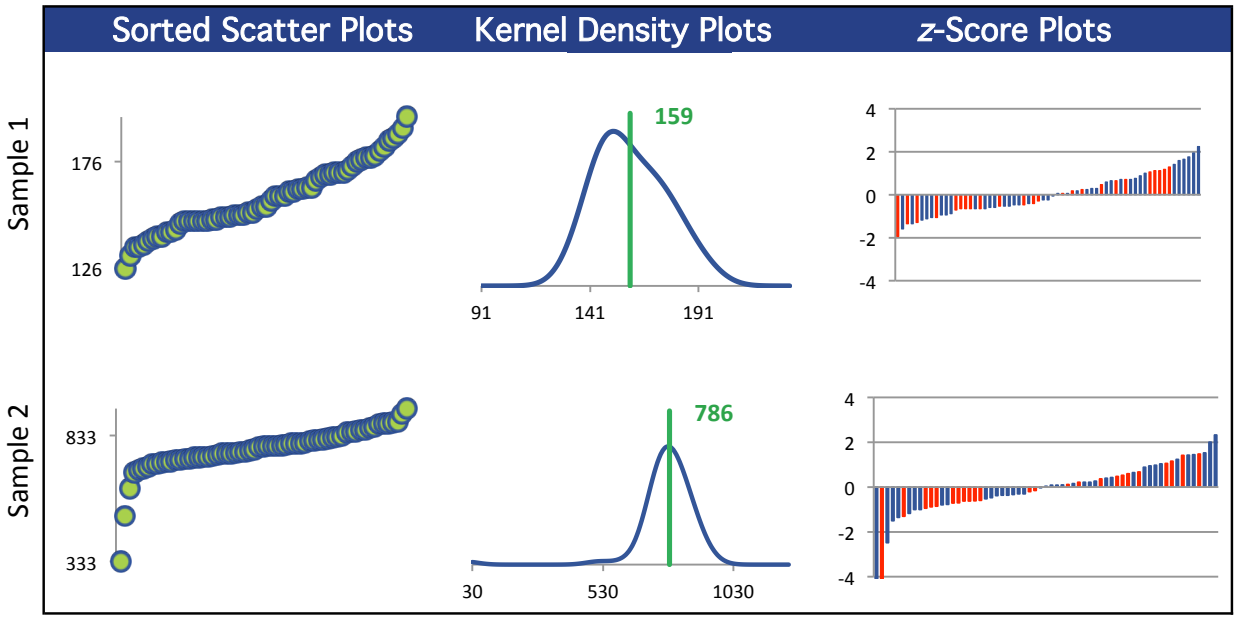
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	63	63	63	63
Median µg/g	155	788	828	777
Robust Mean µg/g	159	786	828	783
U µg/g	2.68	10.4	9.50	9.91
Robust Standard Deviation µg/g	17.0	66.0	60.3	62.9
Regression Standard Deviation µg/g	13.0	63.1	66.6	63.0
Stability Flag				
Homogeneity Flag				
Standard Deviation Used (SDPA) µg/g	17.0	66.0	66.6	63.0
Outliers	1	1	1	1
|z|>3.0	0	2	0	0
2<|z|<3	1	2	3	3

Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/OES (Blue)	24	24	24	24
ICP/MS (Red)	39	39	39	39

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



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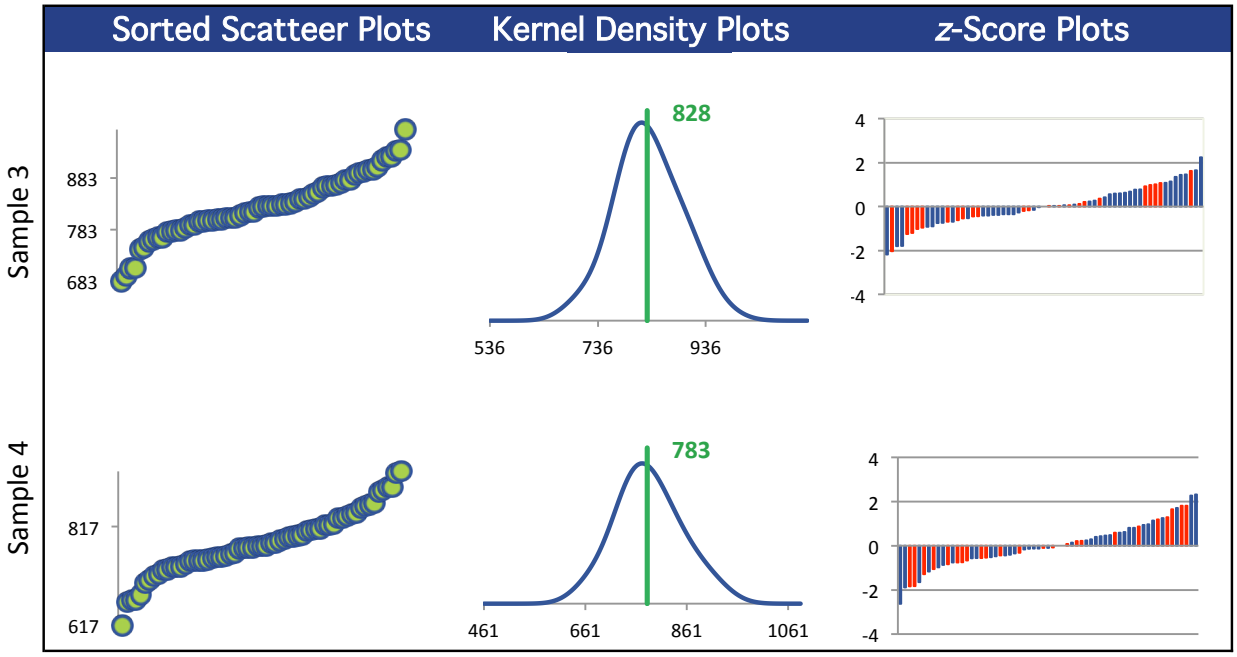
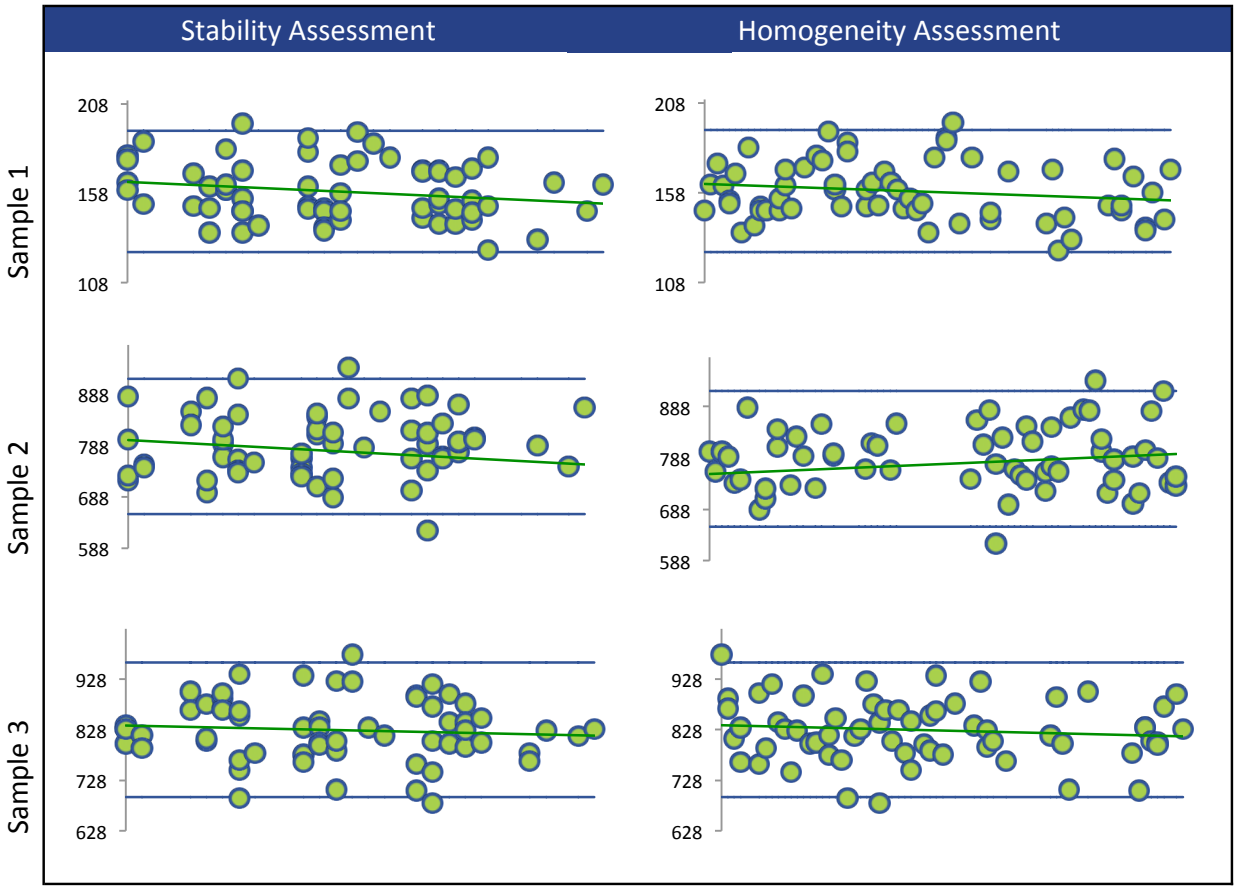
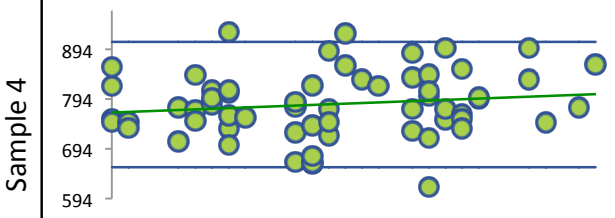

Sorted Scatteer Plots
Kernel Density Plots
z-Score Plots
Sample 3
883
783
683
828
536
736
936
4
2
0
-2
-4
Sample 4
817
617
783
461
661
861
1061
4
2
0
-2
-4

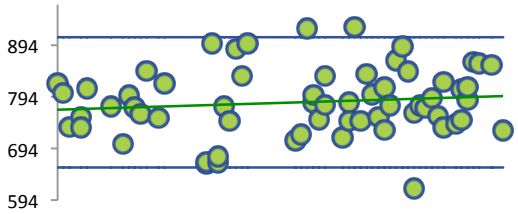

Stability Assessment
Homogeneity Assessment
Sample 1
208
158
108
208
158
108
Sample 2
888
788
688
588
888
788
688
588
Sample 3
928
828
728
628
928
828
728
628

ZINC

Stability Assessment



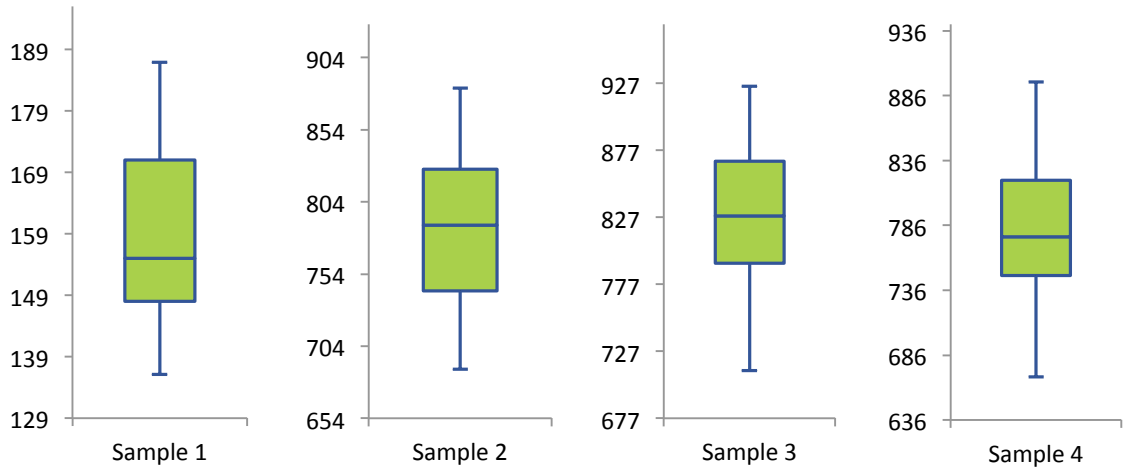
Homogeneity Assessment



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)