

Test Group Summary Report

C17 Metals in Soil

June 2020 PT Round

Issued: October 1, 2020

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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 are 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.

<i>Code:</i>	The registration code that is unique to each analyte that a participant is registered for.
<i>App:</i>	If a participant is accredited by CALA, this three-digit number is the appendix number that the accredited method is assigned to.
<i>N:</i>	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.
<i>Assigned:</i>	The Assigned Value is the robust mean of the reported results, outliers excluded. This is often referred to as the “target” value.
<i>±u:</i>	The uncertainty of the assigned value.
<i>Reported:</i>	The result reported by the participant.
<i>s:</i>	The Standard Deviation of Proficiency Assessment. This value is used to determine the acceptance limits for the PT evaluation.
<i>z-Score:</i>	A value assigned to each reported result that is a measure of the degree to which it deviates from the Assigned Value.
<i>Score:</i>	The composite score of the four results reported for each analyte. It is normalized to a score out of 100.
<i>Bias:</i>	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 17043:2010 *Conformity assessment – General requirements for proficiency testing*, 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.PTCCanada.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:

$$z = \frac{(x - \bar{X})}{s} \quad \text{where: } \begin{array}{l} x = \text{participant result;} \\ \bar{X} = \text{the Assigned Value;} \\ s = \text{the Standard Deviation for Proficiency Assessment.} \end{array}$$

The assigned value \bar{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) is calculated using reported results, obvious outliers removed;
- The expected inter-laboratory standard deviation (s!) is estimated from regression equations derived from previous studies (see PROC11- *PT Regression Equations* for details);
- If s! is higher than stdev then s! is used in the z score equation;
- If s! is lower than stdev then stdev is used in the z score equation;
- 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 $100 + (-15 \times \text{avg } |z|)$.

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:

$RSZ \geq -2$ 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.

Annex A Summary by Analyte

ALUMINUM

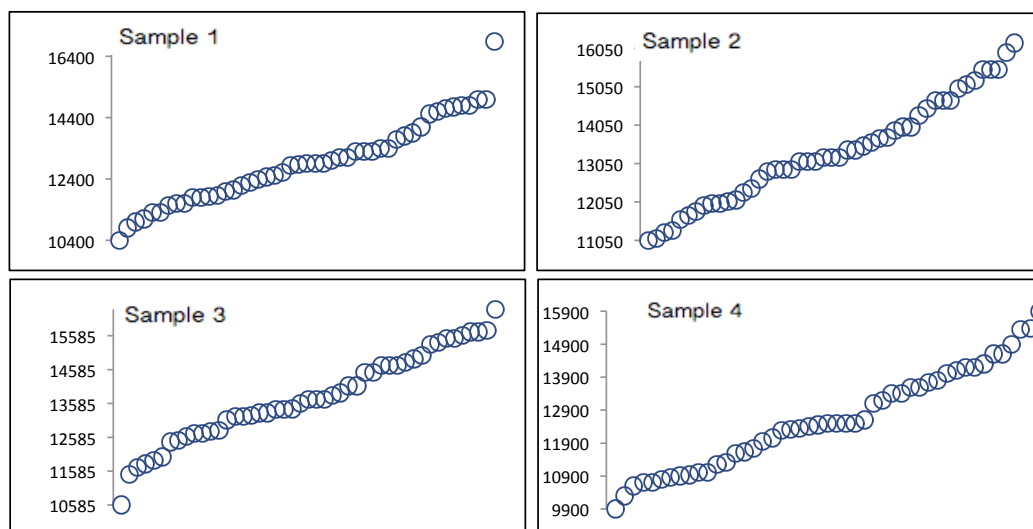
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	47	47	47	47
Median	12900	13200	13700	12500
Robust Mean	12900	13300	13800	12600
U	257	275	261	301
Robust Standard Deviation	1410	1510	1430	1650
Regression Standard Deviation	2090	2150	2200	2050
Stability Flag				
Homogeneity Flag				
Standard Deviation Used	2090	2150	2200	2050
Outliers	0	0	0	0
$ z > 3.0$	0	0	0	0
$2 < z < 3$	0	0	0	0

Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/OES	20	20	20	20
ICP/MS	27	27	27	27

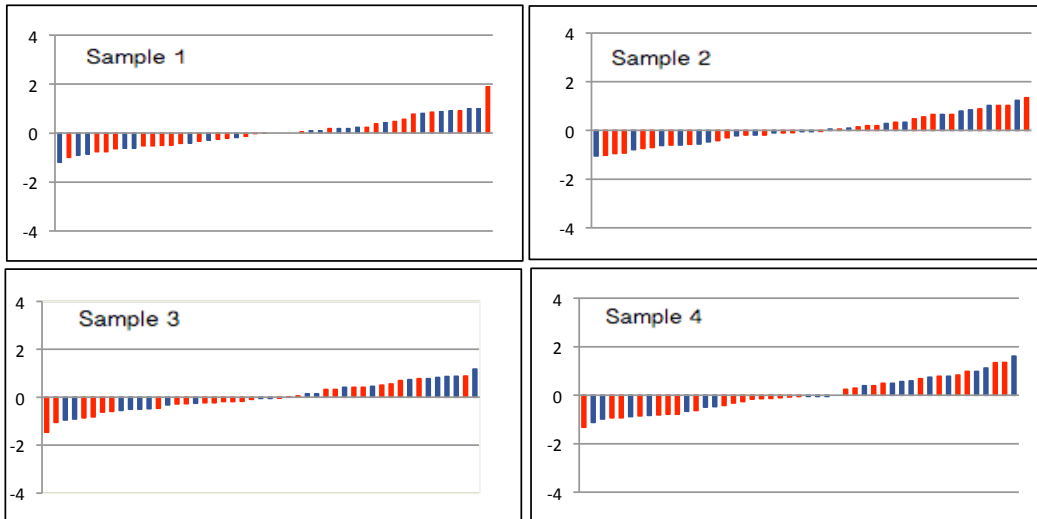
All summary stats and the plots below are based on the data excluding any flagged outliers



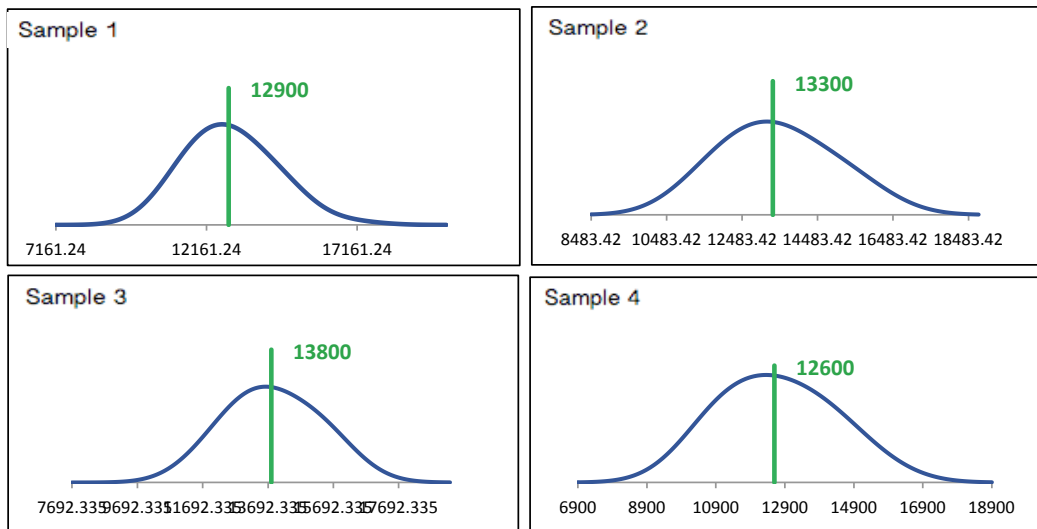
Annex A Summary by Analyte

ALUMINUM

z-Score Plots



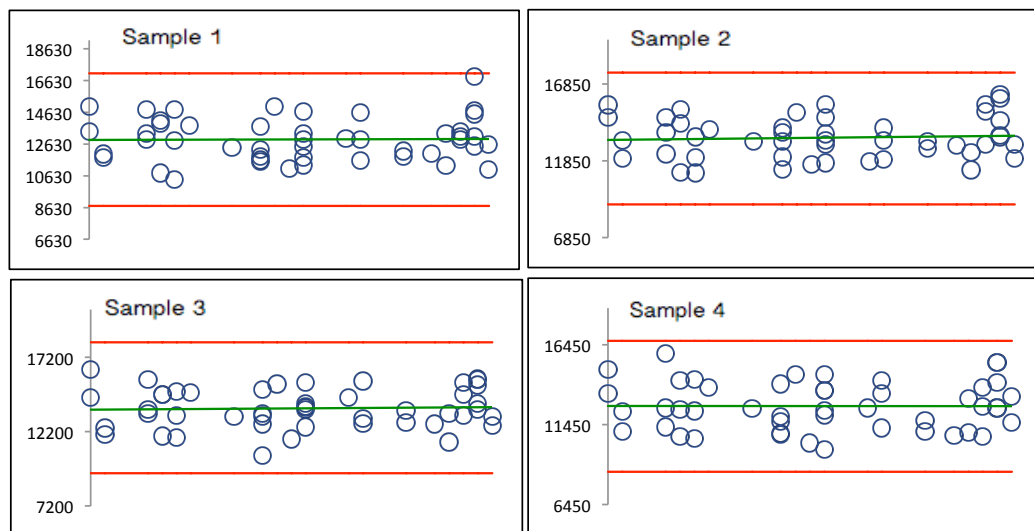
Kernel Density Plots



Annex A Summary by Analyte

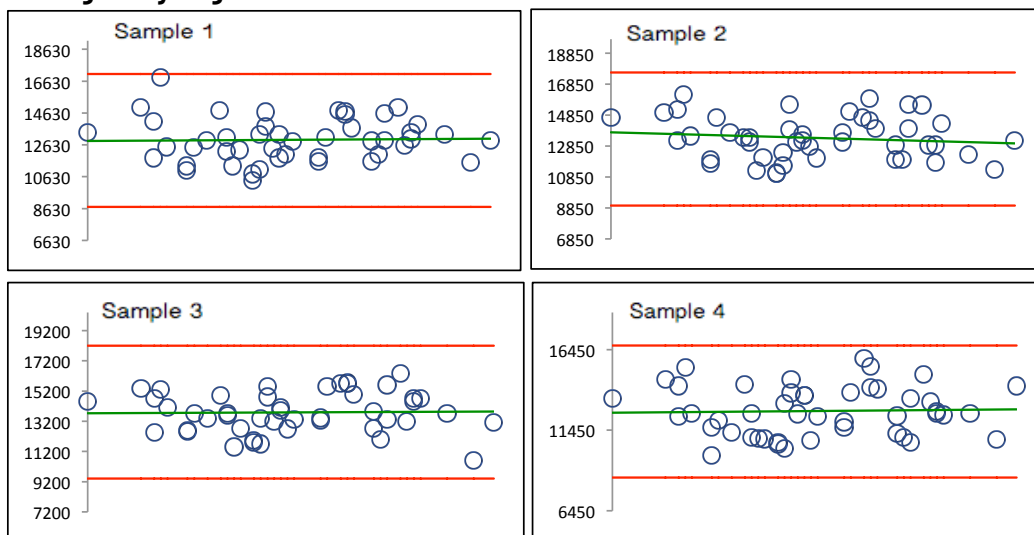
ALUMINUM

Stability Regression



Reported results (Y-axis) plotted against reported analysis date (X-axis)

Homogeneity Regression



Reported results (Y-axis) plotted against bottling order (X-axis).

Annex A Summary by Analyte

ANTIMONY

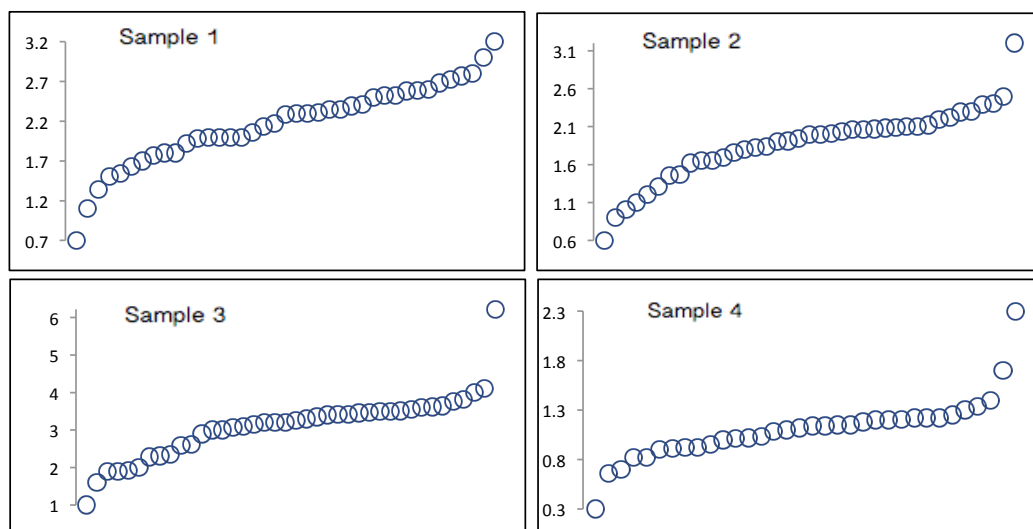
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	39	39	40	34
Median	2.28	2.00	3.23	1.13
Robust Mean	2.18	1.89	3.10	1.09
U	0.10	0.08	0.14	0.05
Robust Standard Deviation	0.493	0.414	0.712	0.213
Regression Standard Deviation	1.25	1.08	1.77	0.62
Stability Flag				
Homogeneity Flag				
Standard Deviation Used	1.25	1.08	1.77	0.624
Outliers	0	0	0	0
$ z > 3.0$	0	0	0	0
$2 < z < 3$	0	0	0	0

Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/MS	32	32	32	28
ICP/OES	5	5	6	4
ICPHY	1	1	1	1
AAHY	1	1	1	1

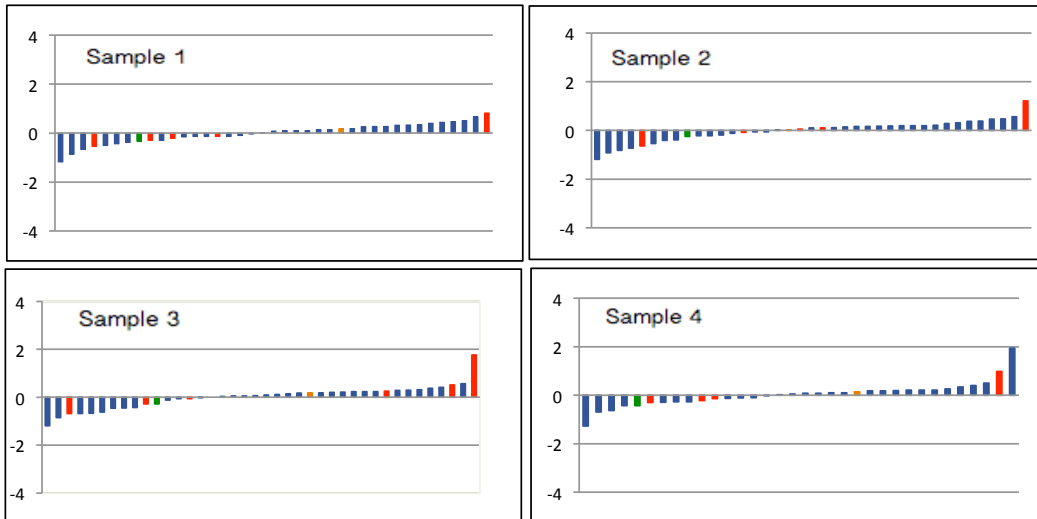
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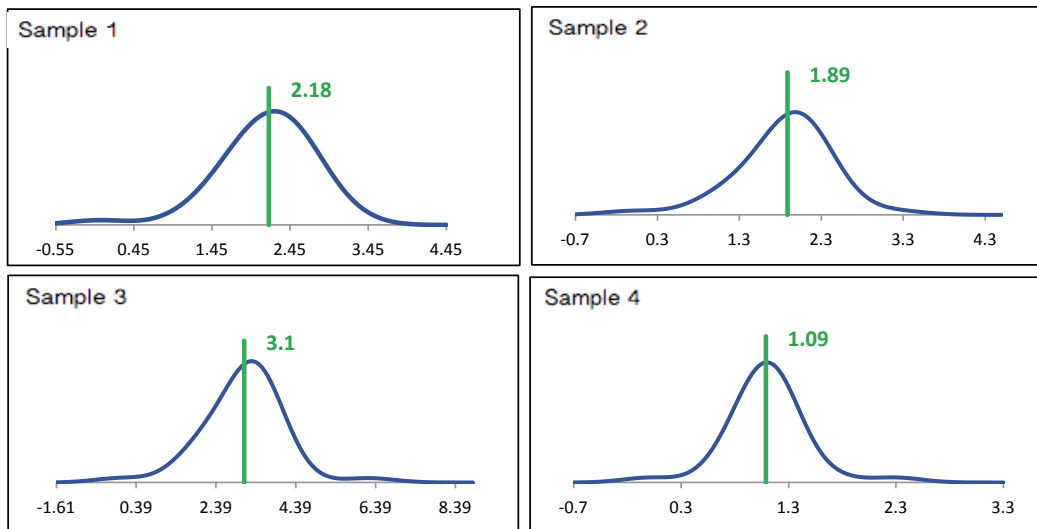
Annex A Summary by Analyte

ANTIMONY

z-Score Plots



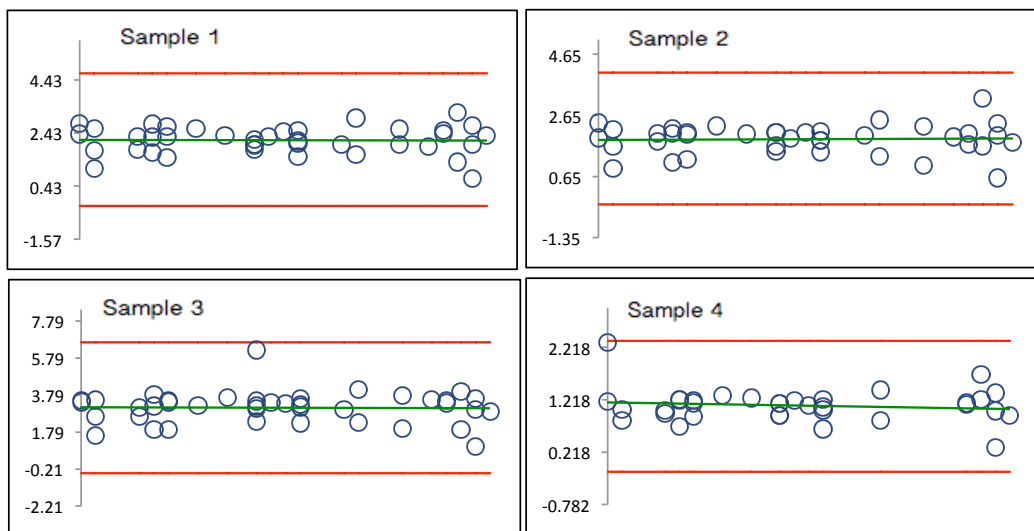
Kernel Density Plots



Annex A Summary by Analyte

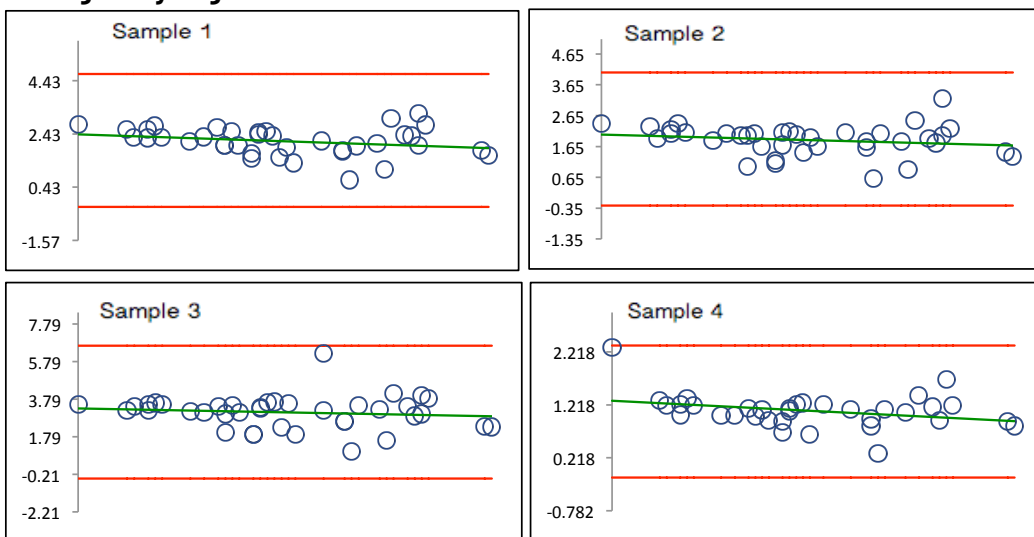
ANTIMONY

Stability Regression



Reported results (Y-axis) plotted against reported analysis date (X-axis)

Homogeneity Regression



Reported results (Y-axis) plotted against bottling order (X-axis).

Annex A Summary by Analyte

ARSENIC

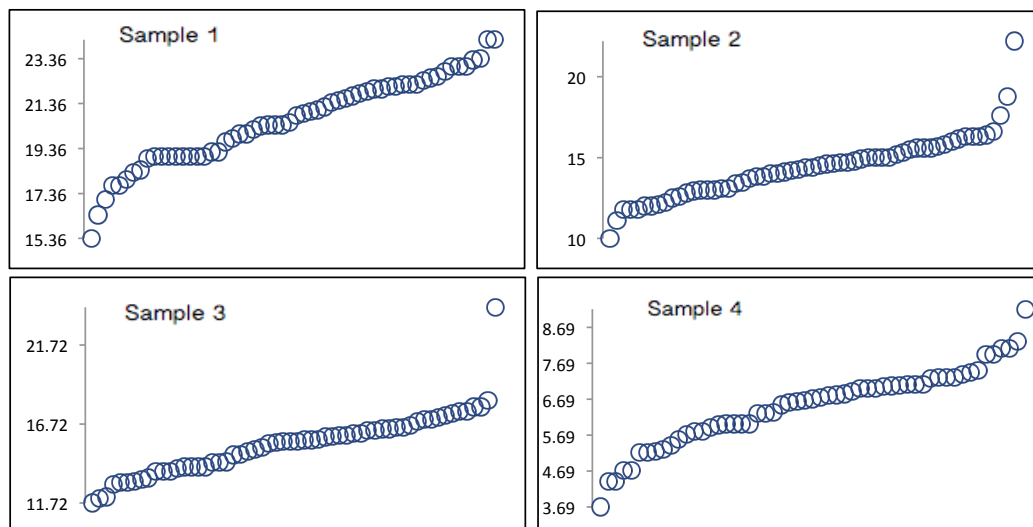
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	58	59	58	55
Median	20.7	14.4	15.6	6.70
Robust Mean	20.6	14.3	15.4	6.53
U	0.33	0.28	0.29	0.18
Robust Standard Deviation	2.02	1.74	1.77	1.06
Regression Standard Deviation	2.91	2.20	2.32	1.35
Stability Flag				
Homogeneity Flag				
Standard Deviation Used	2.91	2.20	2.32	1.35
Outliers	1	0	1	2
$ z > 3.0$	0	1	1	0
$2 < z < 3$	0	1	0	1

Methods Used

Method	C17-1	C17-2	C17-3	C17-4
AAG	1	1	1	1
ICP/OES	18	18	17	15
ICP/MS	36	37	37	36
ICPHY	1	1	1	1
AAHY	2	2	2	2

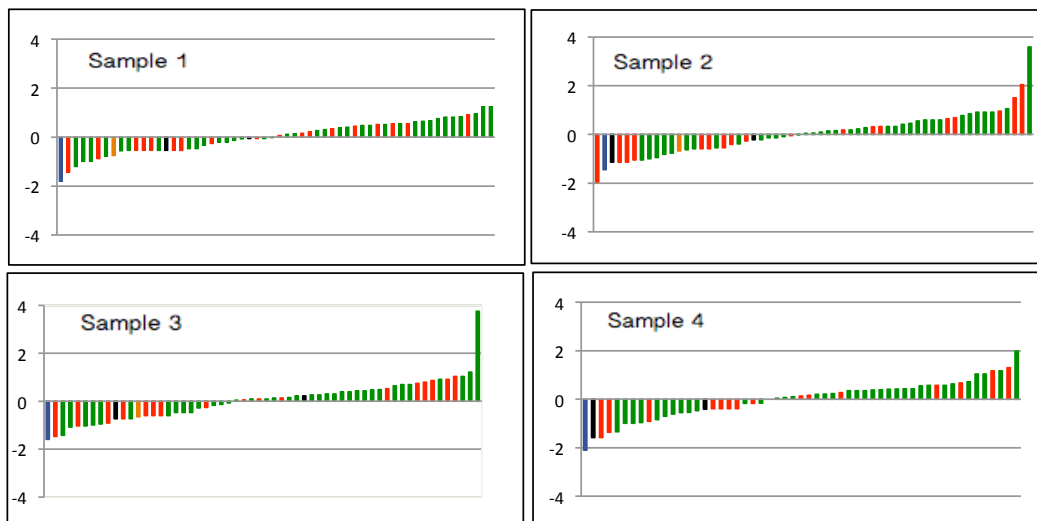
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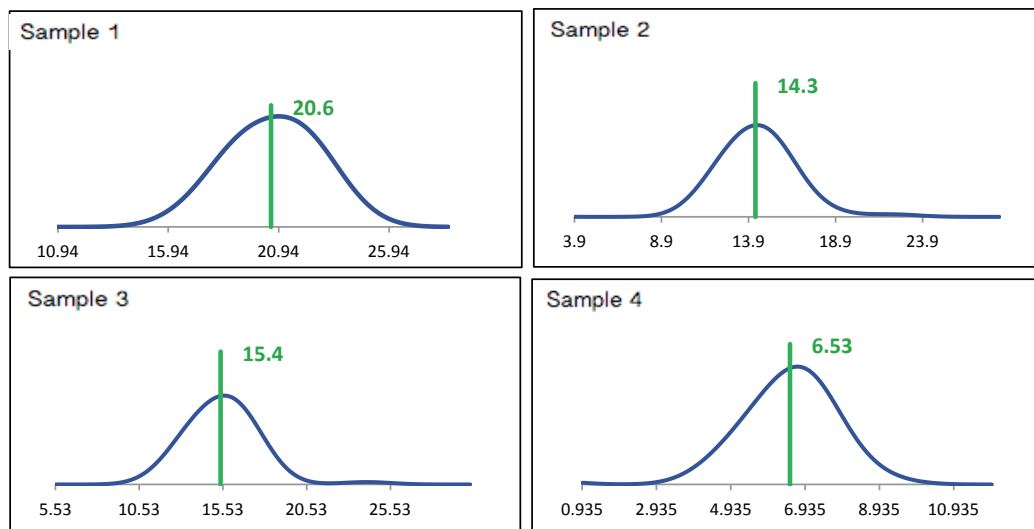
Annex A Summary by Analyte

ARSENIC

z-Score Plots



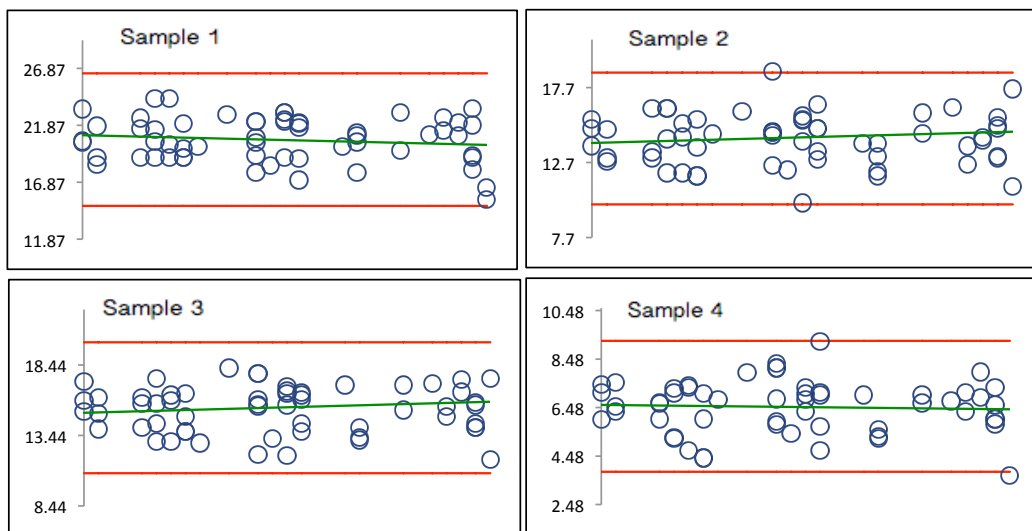
Kernel Density Plots



Annex A Summary by Analyte

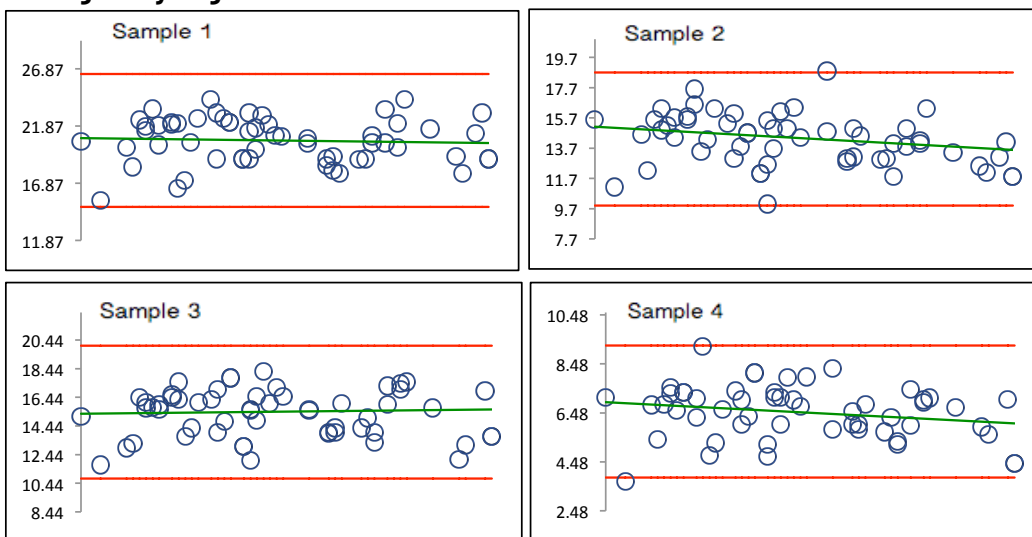
ARSENIC

Stability Regression



Reported results (Y-axis) plotted against reported analysis date (X-axis)

Homogeneity Regression



Reported results (Y-axis) plotted against bottling order (X-axis).

Annex A Summary by Analyte

BARIUM

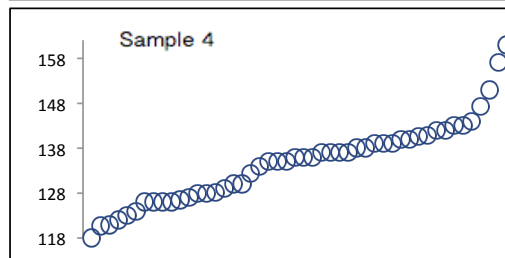
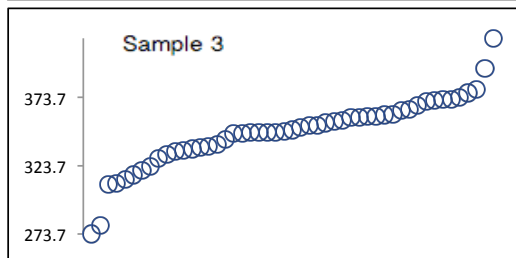
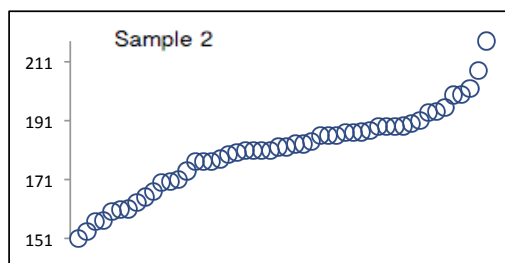
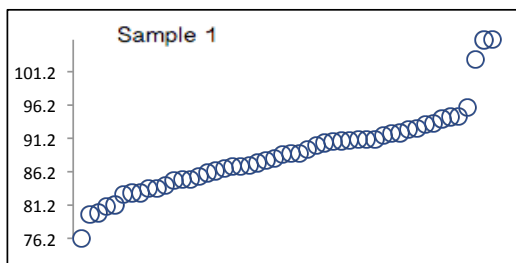
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	50	50	49	49
Median	88.9	182	350	136
Robust Mean	88.5	181	349	135
U	0.91	2.47	3.89	1.62
Robust Standard Deviation	5.13	14.0	21.8	9.09
Regression Standard Deviation	8.22	14.6	26.3	11.4
Stability Flag				
Homogeneity Flag				
Standard Deviation Used	8.22	14.6	26.3	11.4
Outliers	1	1	2	2
$ z > 3.0$	0	0	0	0
$2 < z < 3$	2	2	3	2

Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/MS	30	30	30	30
ICP/OES	20	20	19	19

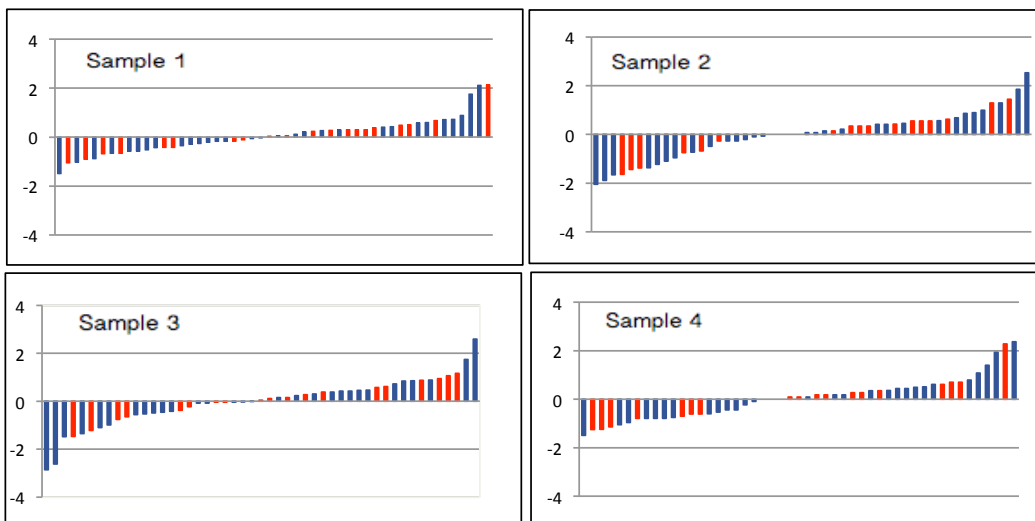
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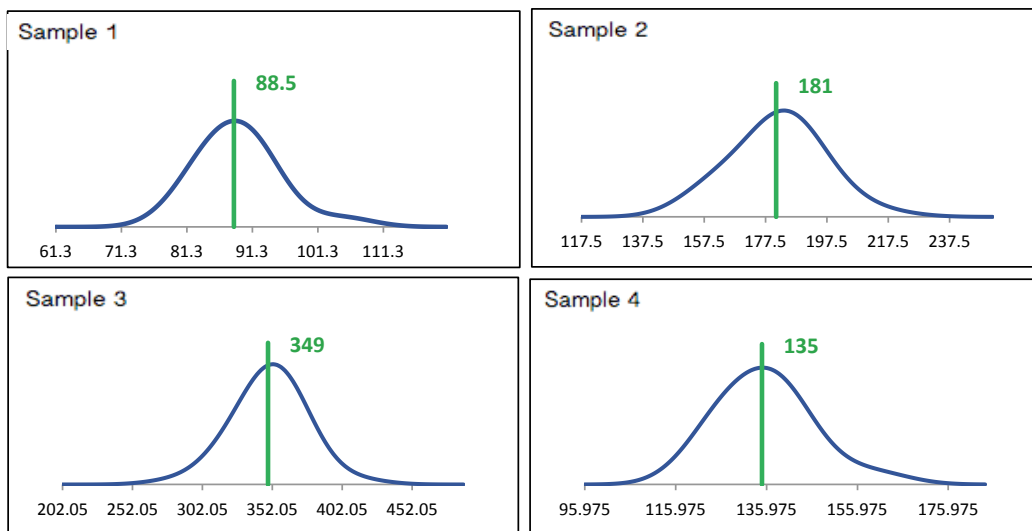
Annex A Summary by Analyte

BARIUM

z-Score Plots



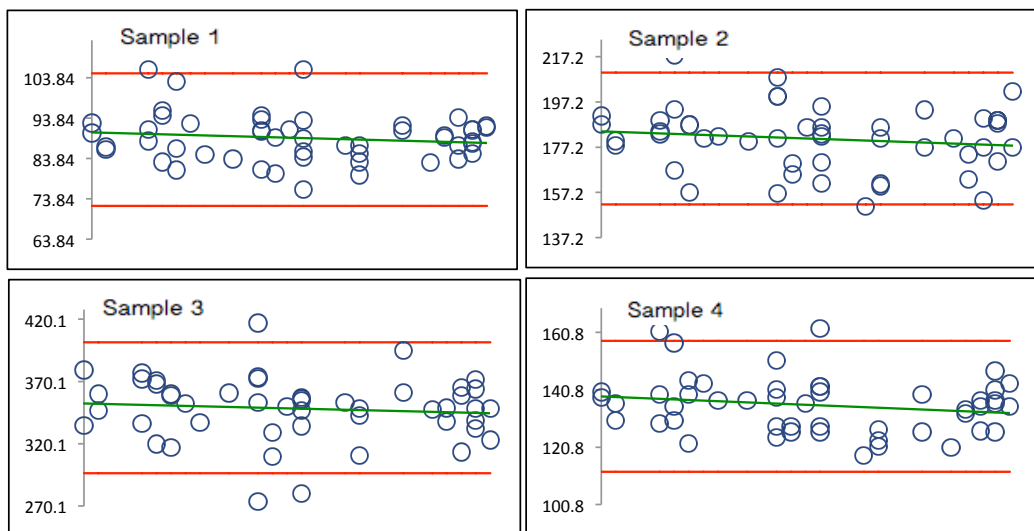
Kernel Density Plots



Annex A Summary by Analyte

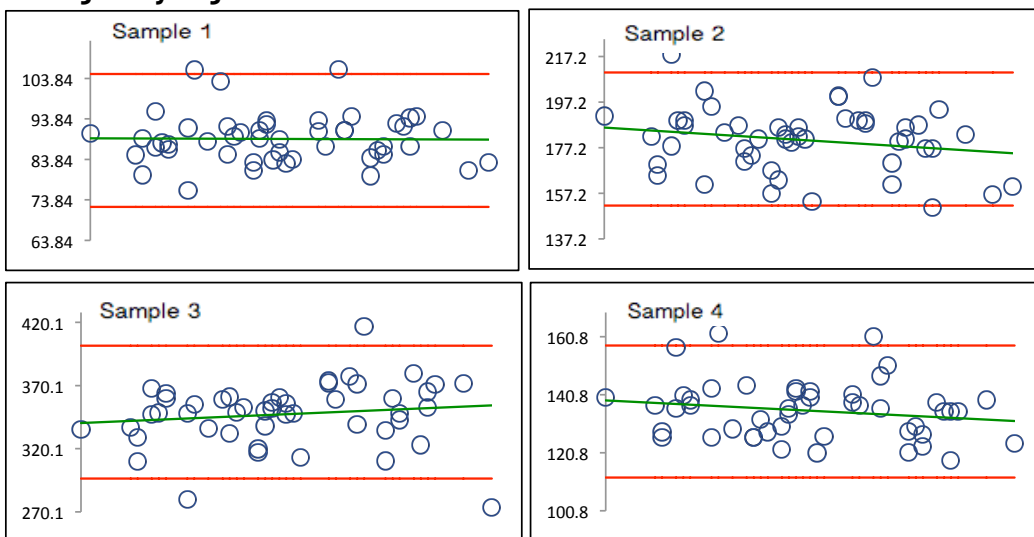
BARIUM

Stability Regression



Reported results (Y-axis) plotted against reported analysis date (X-axis)

Homogeneity Regression



Reported results (Y-axis) plotted against bottling order (X-axis).

Annex A Summary by Analyte

BERYLLIUM

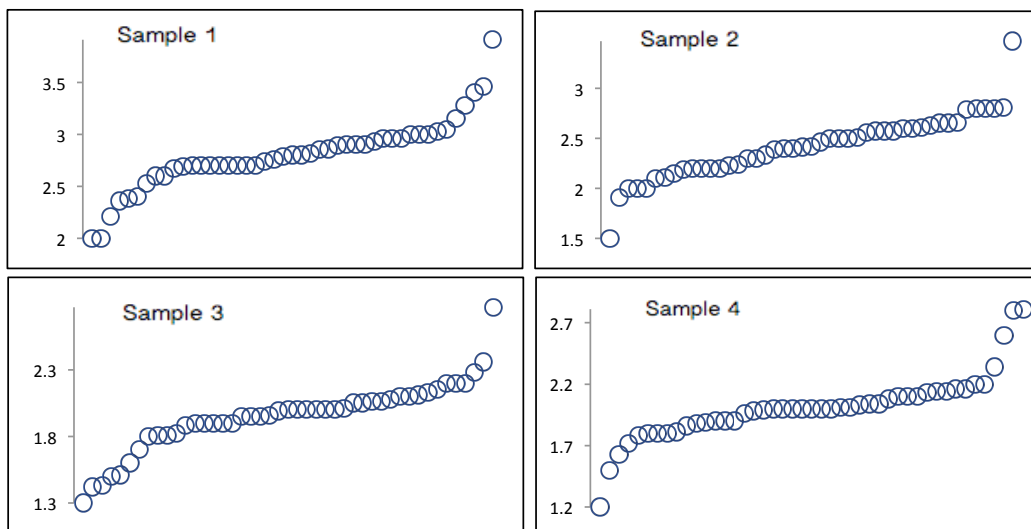
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	45	45	45	45
Median	2.80	2.42	2.00	2.00
Robust Mean	2.80	2.42	1.96	2.00
U	0.048	0.054	0.037	0.033
Robust Standard Deviation	0.255	0.290	0.196	0.177
Regression Standard Deviation	0.415	0.364	0.304	0.309
Stability Flag				
Homogeneity Flag				
Standard Deviation Used	0.415	0.364	0.304	0.309
Outliers	0	0	0	0
$ z > 3.0$	0	0	0	0
$2 < z < 3$	1	2	2	3

Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/OES	17	17	17	17
ICP/MS	28	28	28	28

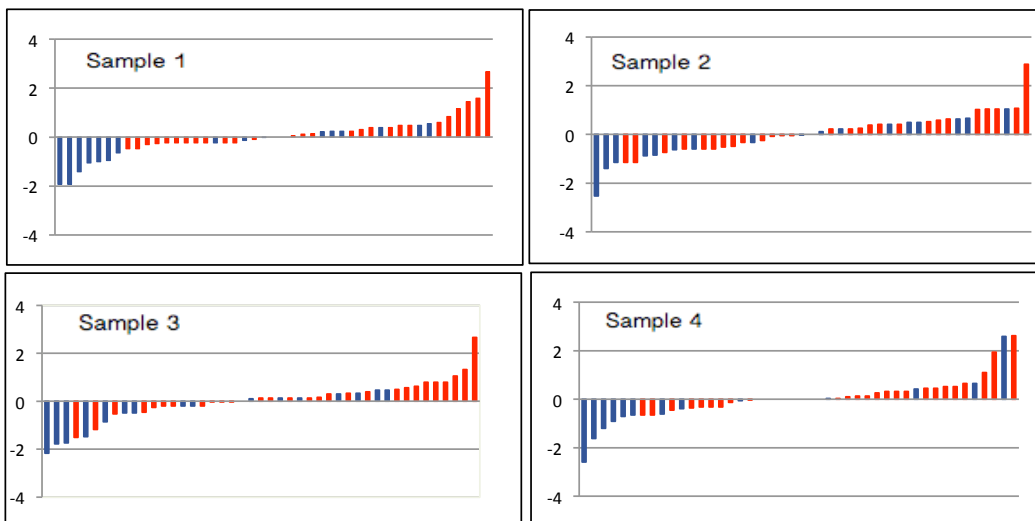
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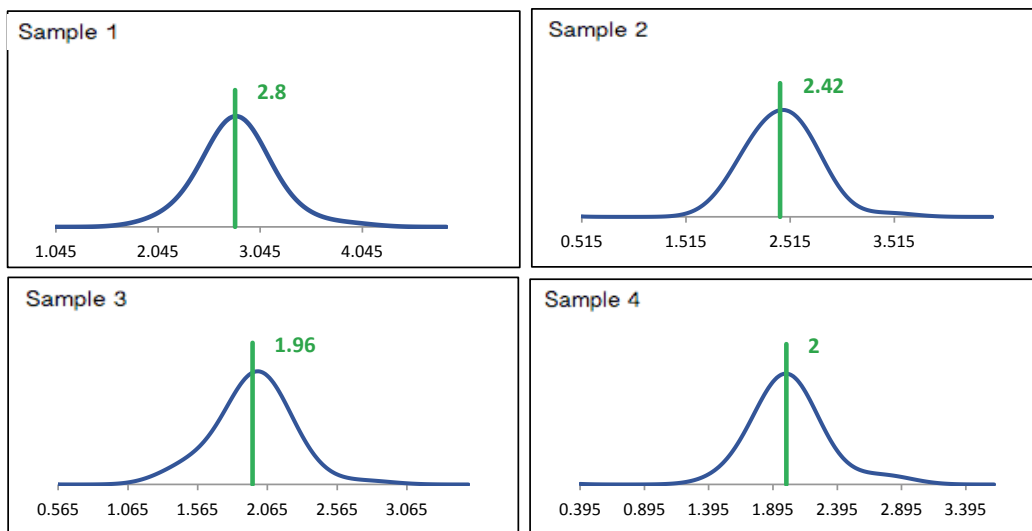
Annex A Summary by Analyte

BERYLLIUM

z-Score Plots



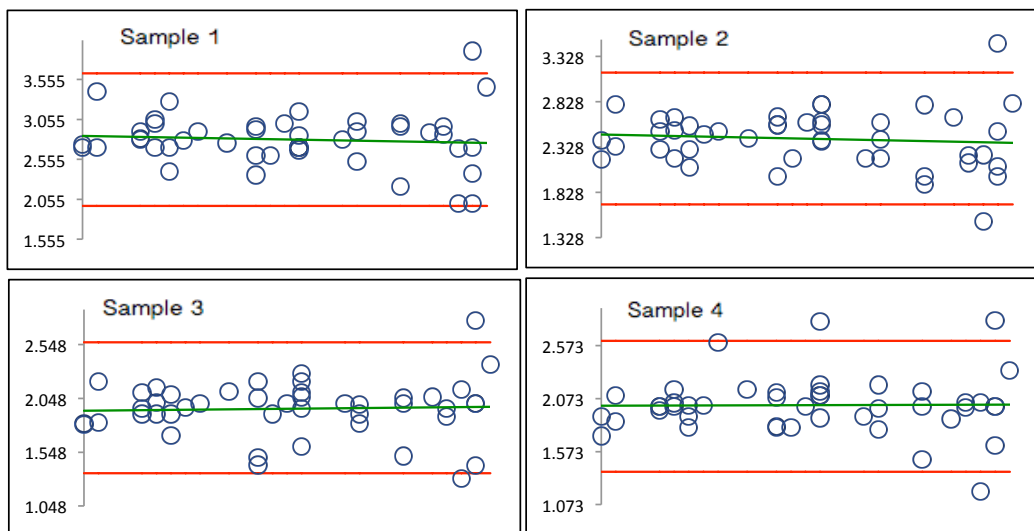
Kernel Density Plots



Annex A Summary by Analyte

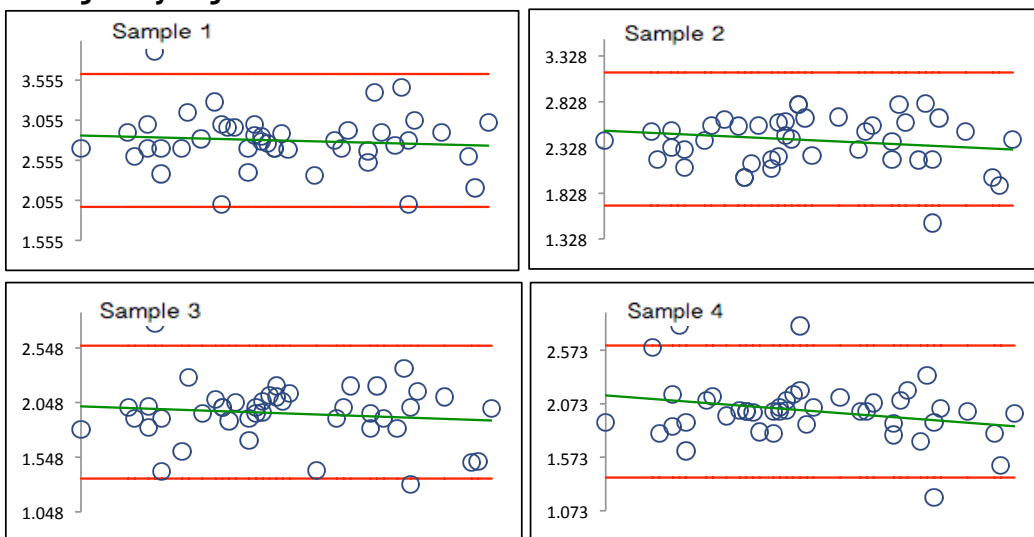
BERYLLIUM

Stability Regression



Reported results (Y-axis) plotted against reported analysis date (X-axis)

Homogeneity Regression



Reported results (Y-axis) plotted against bottling order (X-axis).

Annex A Summary by Analyte

BORON

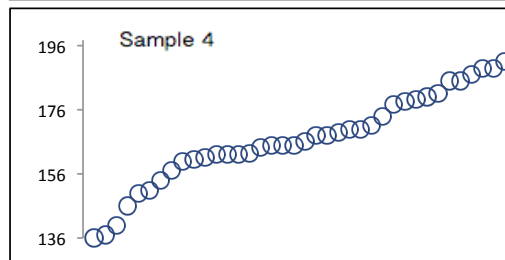
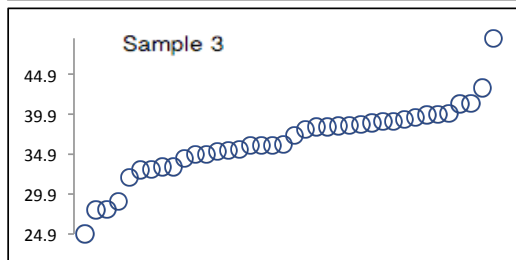
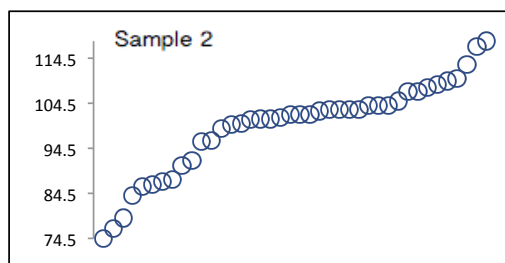
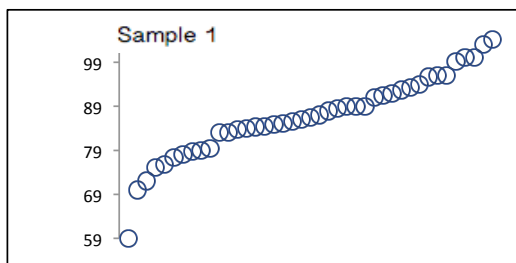
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	41	40	38	39
Median	86.5	102	36.7	166
Robust Mean	87.0	99.9	36.6	168
U	1.77	1.94	0.75	3.06
Robust Standard Deviation	9.05	9.83	3.72	15.3
Regression Standard Deviation	38.1	43.7	16.0	73.6
Stability Flag				
Homogeneity Flag				
Standard Deviation Used	38.1	43.7	16.0	73.6
Outliers	1	2	3	3
$ z > 3.0$	0	0	0	0
$2 < z < 3$	0	0	0	0

Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/MS	23	22	21	22
ICP/OES	18	18	17	17

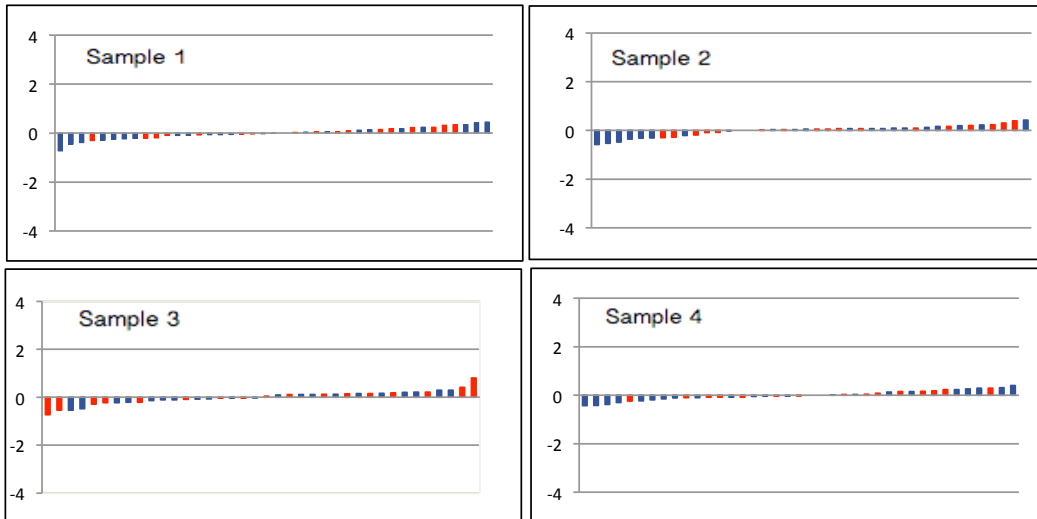
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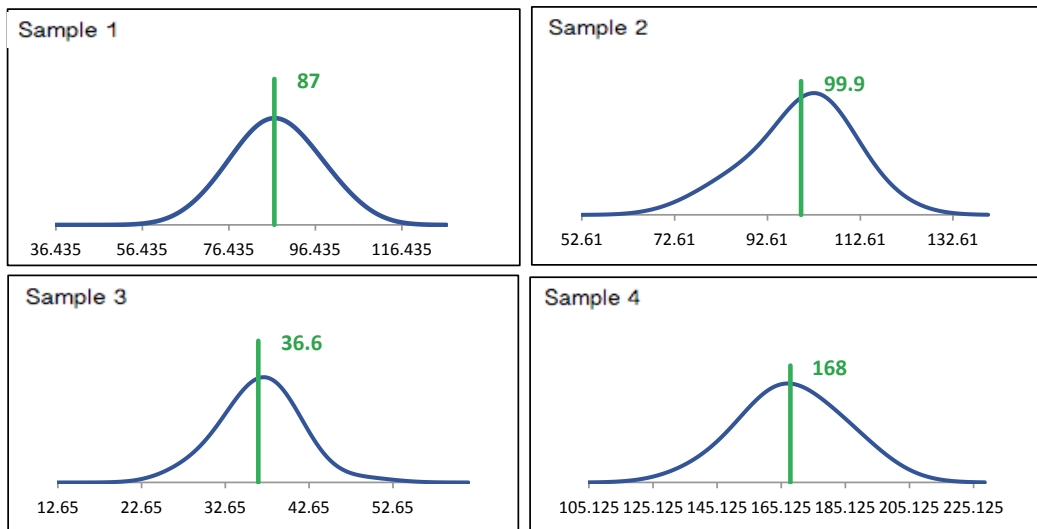
Annex A Summary by Analyte

BORON

z-Score Plots



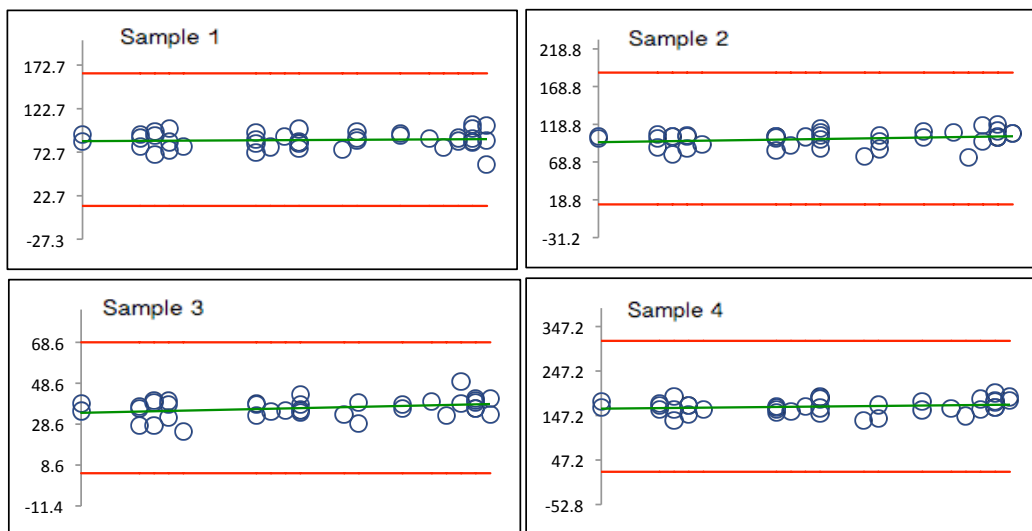
Kernel Density Plots



Annex A Summary by Analyte

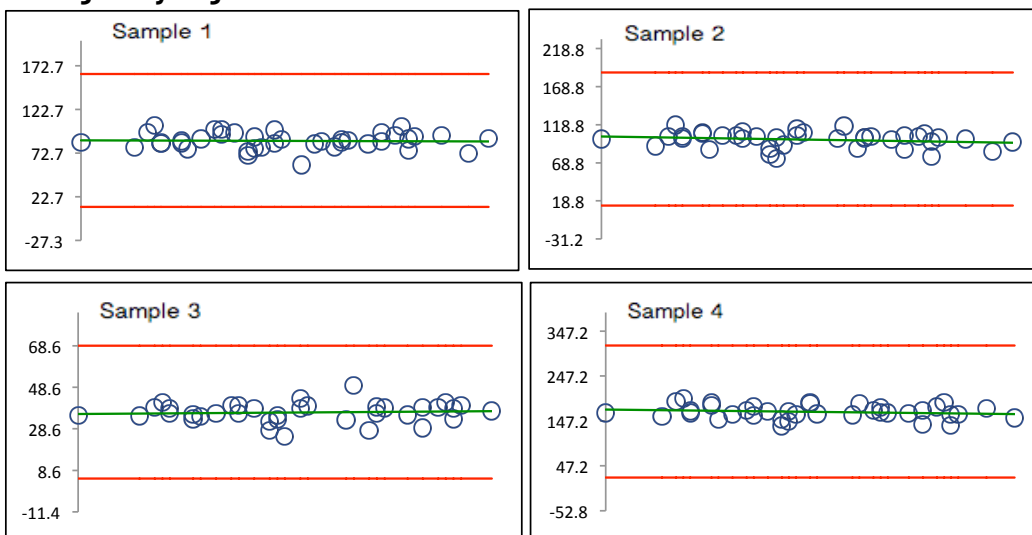
BORON

Stability Regression



Reported results (Y-axis) plotted against reported analysis date (X-axis)

Homogeneity Regression



Reported results (Y-axis) plotted against bottling order (X-axis).

Annex A Summary by Analyte

CADMIUM

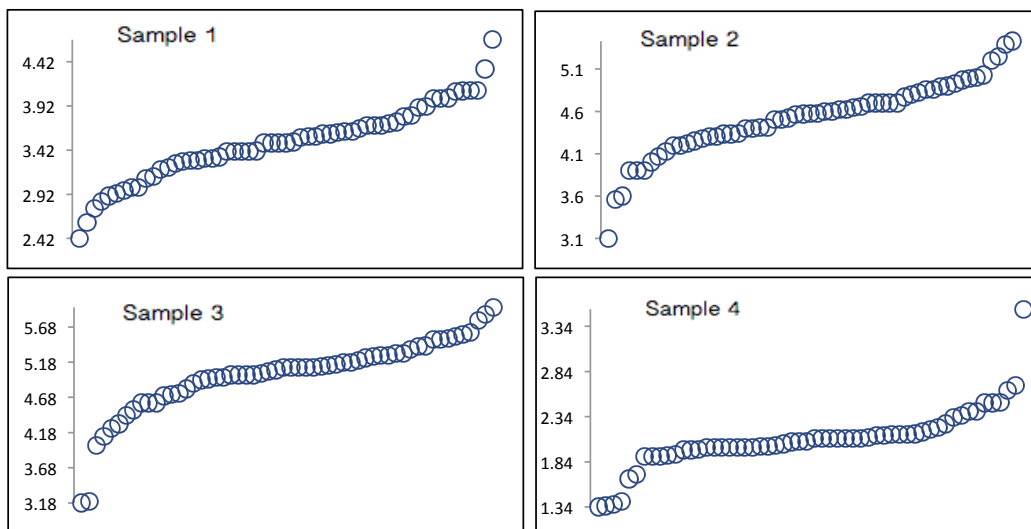
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	57	57	56	56
Median	3.50	4.58	5.10	2.09
Robust Mean	3.50	4.54	5.05	2.08
U	0.069	0.066	0.070	0.035
Robust Standard Deviation	0.418	0.397	0.420	0.207
Regression Standard Deviation	0.456	0.546	0.590	0.333
Stability Flag				
Homogeneity Flag			Homogeneity	
Standard Deviation Used	0.456	0.546	0.665	0.333
Outliers	0	0	1	1
$ z > 3.0$	0	0	0	1
$2 < z < 3$	2	1	2	4

Methods Used

Method	C17-1	C17-2	C17-3	C17-4
AAG	1	1	1	1
ICP/OES	20	20	19	19
ICP/MS	36	36	36	36

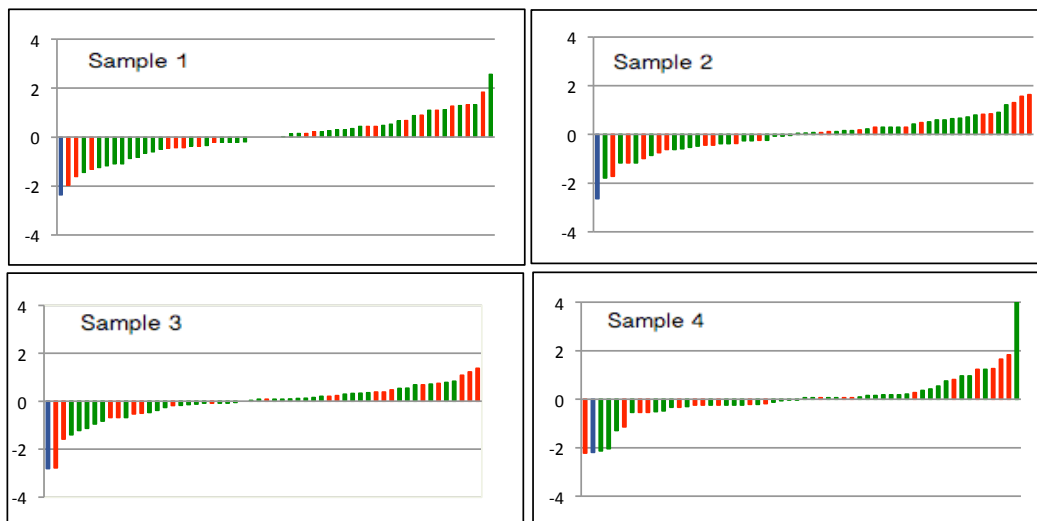
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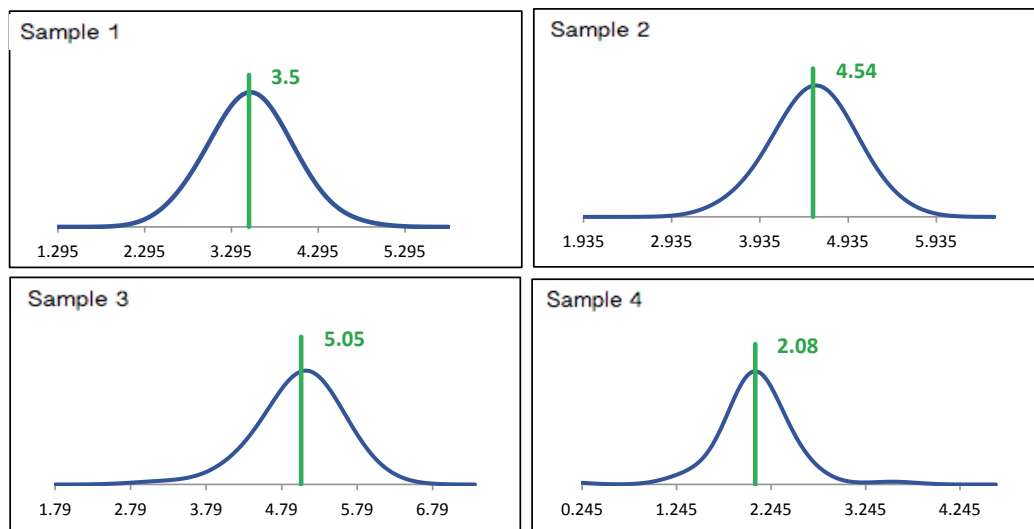
Annex A Summary by Analyte

CADMIUM

z-Score Plots



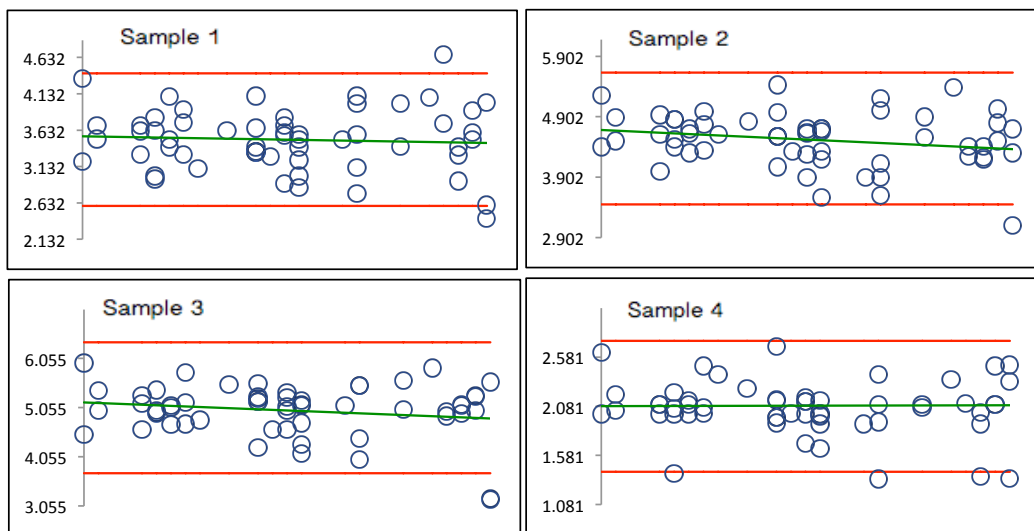
Kernel Density Plots



Annex A Summary by Analyte

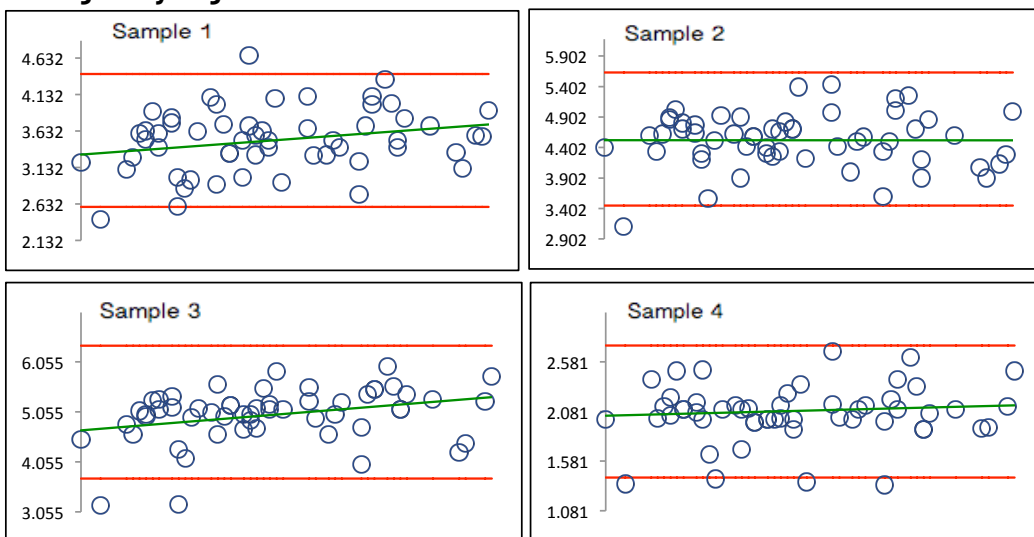
CADMIUM

Stability Regression



Reported results (Y-axis) plotted against reported analysis date (X-axis)

Homogeneity Regression



Reported results (Y-axis) plotted against bottling order (X-axis).

Annex A Summary by Analyte

CHROMIUM

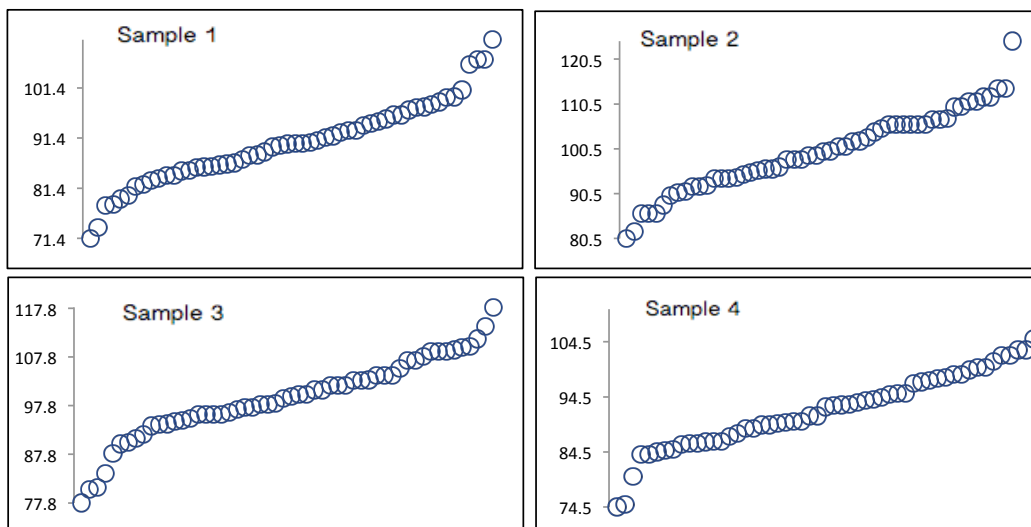
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	54	54	54	54
Median	90.2	99.5	99.5	92.8
Robust Mean	90.1	99.8	99.6	92.4
U	1.35	1.59	1.35	1.23
Robust Standard Deviation	7.96	9.34	7.92	7.21
Regression Standard Deviation	8.39	9.13	9.11	8.56
Stability Flag				
Homogeneity Flag	Homogeneity			
Standard Deviation Used	8.39	9.73	9.11	8.56
Outliers	0	0	0	0
$ z > 3.0$	0	0	0	0
$2 < z < 3$	4	1	4	3

Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/OES	23	23	23	23
ICP/MS	31	31	31	31

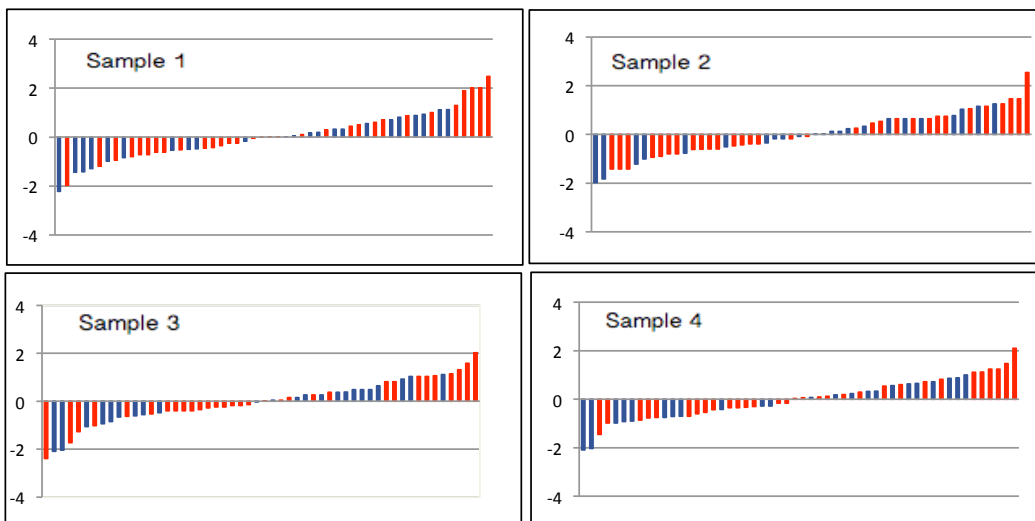
All summary stats and the plots below are based on the data excluding any flagged outliers



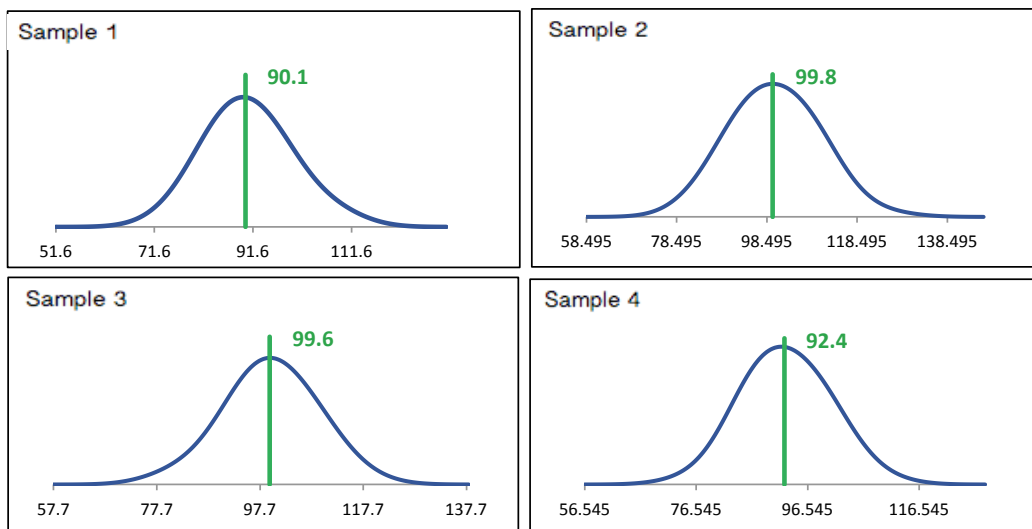
Annex A Summary by Analyte

CHROMIUM

z-Score Plots



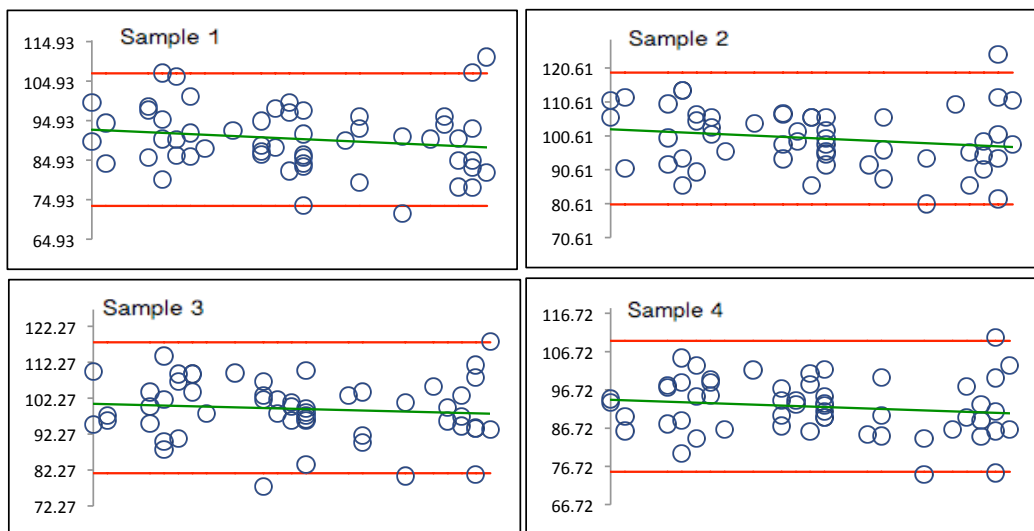
Kernel Density Plots



Annex A Summary by Analyte

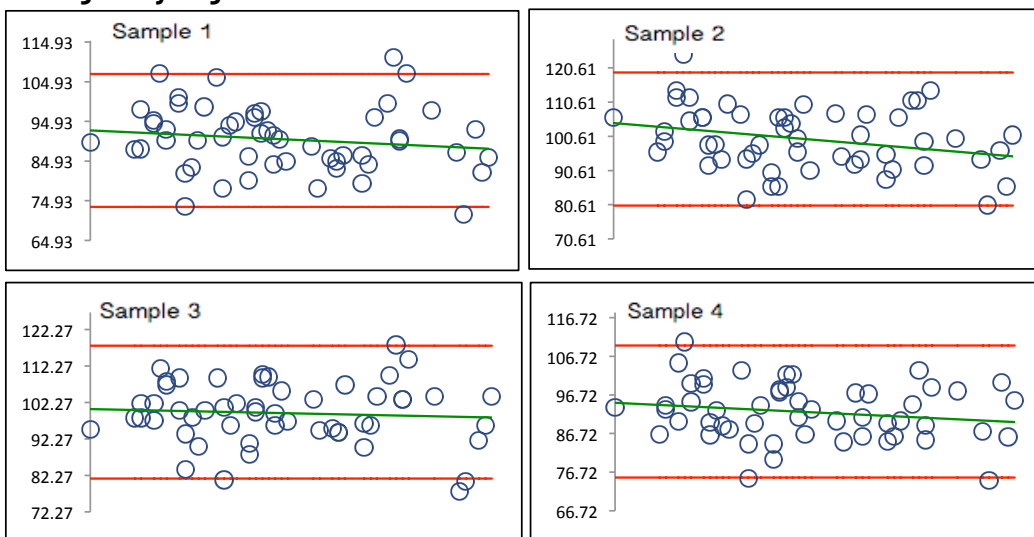
CHROMIUM

Stability Regression



Reported results (Y-axis) plotted against reported analysis date (X-axis)

Homogeneity Regression



Reported results (Y-axis) plotted against bottling order (X-axis).

Annex A Summary by Analyte

COBALT

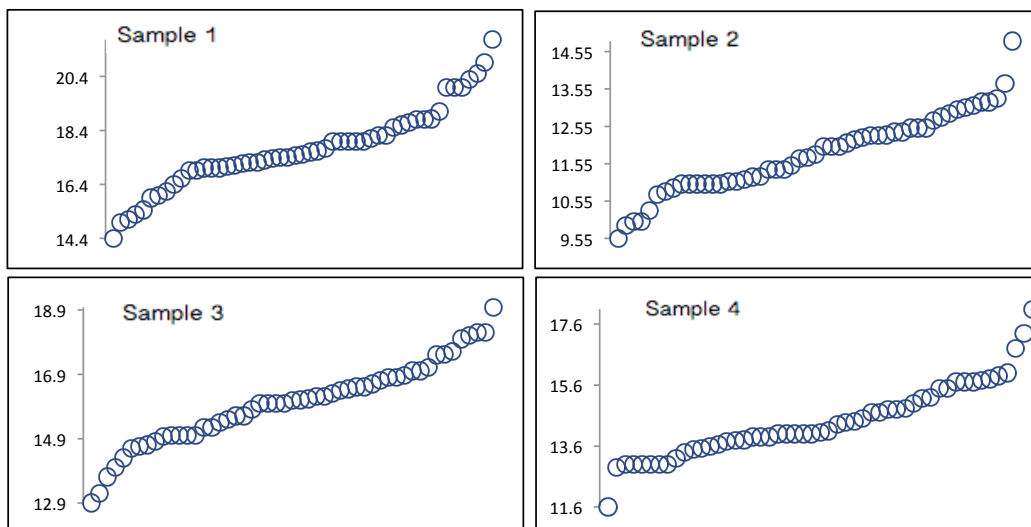
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	51	51	51	51
Median	17.5	11.8	16.1	14.1
Robust Mean	17.7	11.8	16.0	14.4
U	0.26	0.19	0.23	0.20
Robust Standard Deviation	1.46	1.07	1.30	1.16
Regression Standard Deviation	1.73	1.15	1.57	1.40
Stability Flag				
Homogeneity Flag				
Standard Deviation Used	1.73	1.15	1.57	1.40
Outliers	0	0	0	0
$ z > 3.0$	0	0	0	0
$2 < z < 3$	1	1	0	2

Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/OES	21	21	21	21
ICP/MS	30	30	30	30

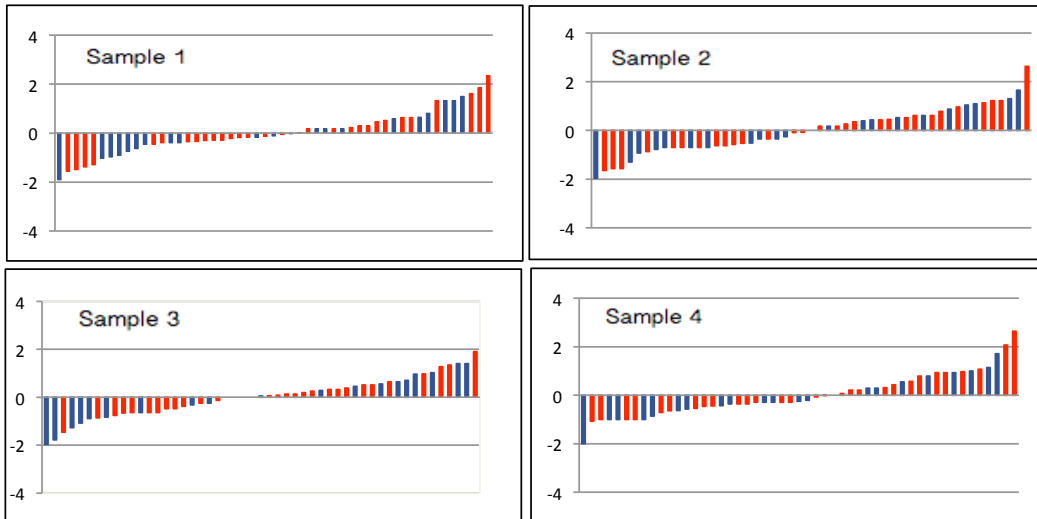
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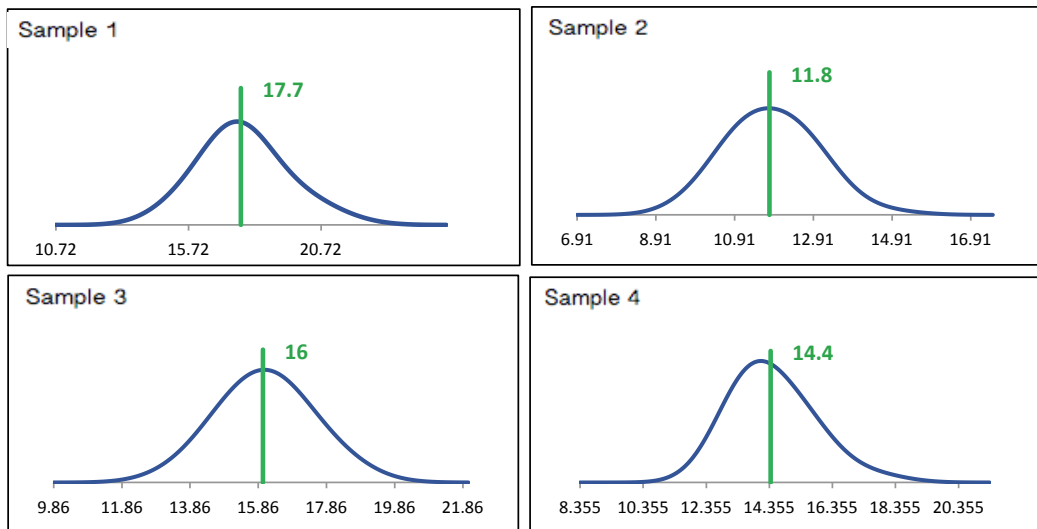
Annex A Summary by Analyte

COBALT

z-Score Plots



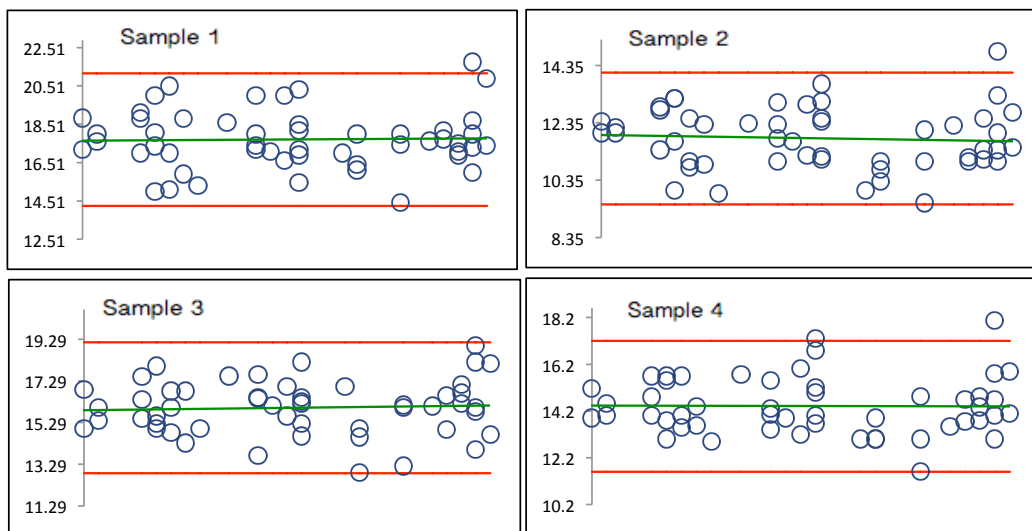
Kernel Density Plots



Annex A Summary by Analyte

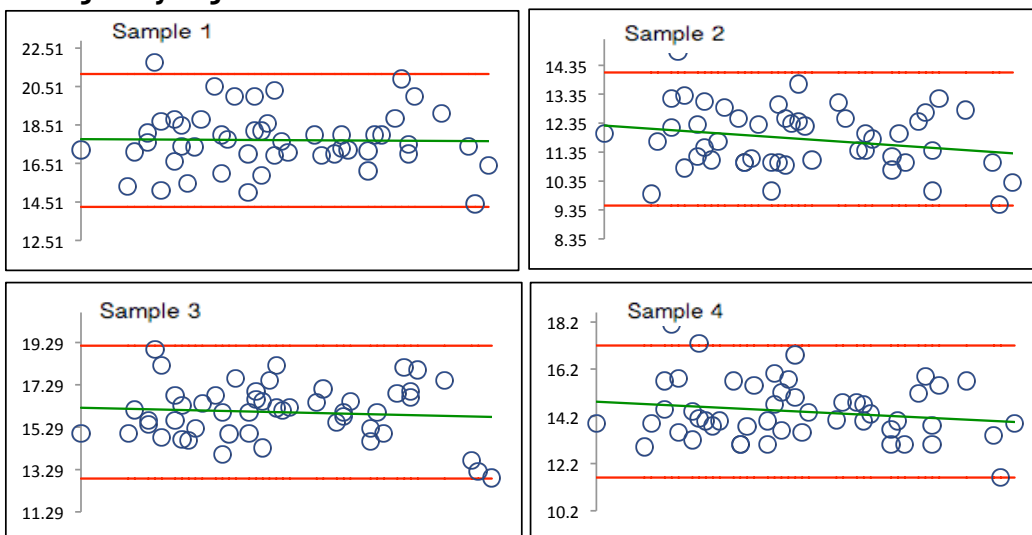
COBALT

Stability Regression



Reported results (Y-axis) plotted against reported analysis date (X-axis)

Homogeneity Regression



Reported results (Y-axis) plotted against bottling order (X-axis).

Annex A Summary by Analyte

COPPER

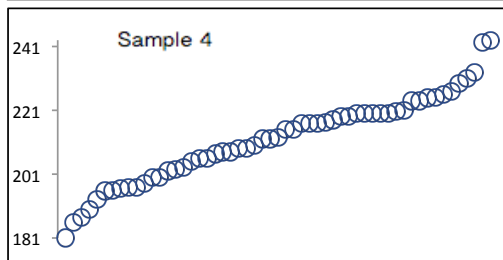
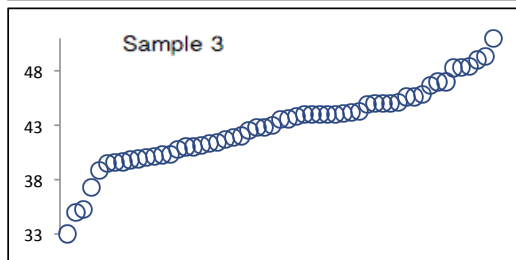
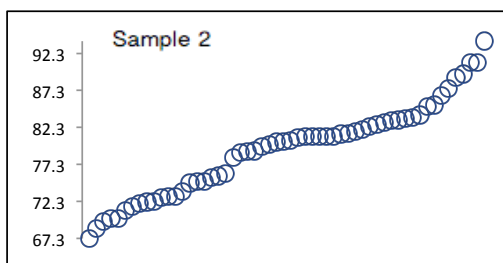
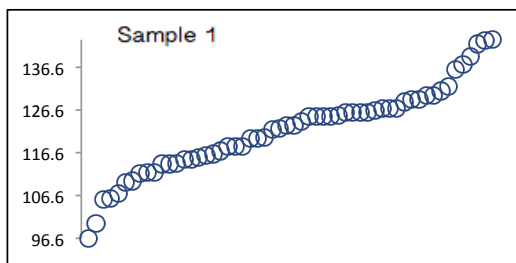
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	56	56	55	55
Median	123	80.5	43.5	213
Robust Mean	122	79.2	43.1	212
U	1.63	1.09	0.58	2.33
Robust Standard Deviation	9.77	6.53	3.43	13.8
Regression Standard Deviation	10.2	6.62	3.60	17.7
Stability Flag				
Homogeneity Flag				
Standard Deviation Used	10.2	6.62	3.60	17.7
Outliers	0	0	1	1
$ z > 3.0$	0	0	0	0
$2 < z < 3$	4	1	4	0

Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/OES	23	23	22	22
ICP/MS	33	33	33	33

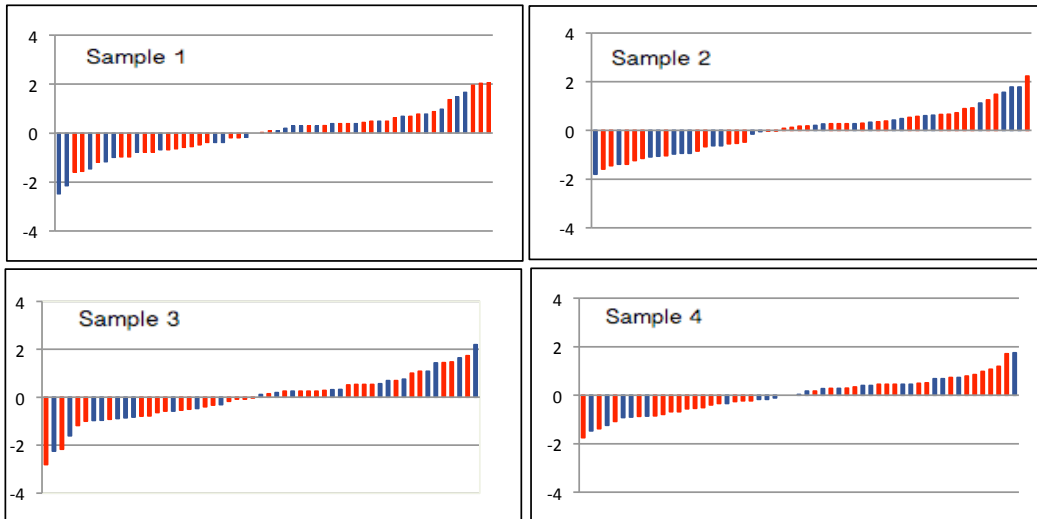
All summary stats and the plots below are based on the data excluding any flagged outliers



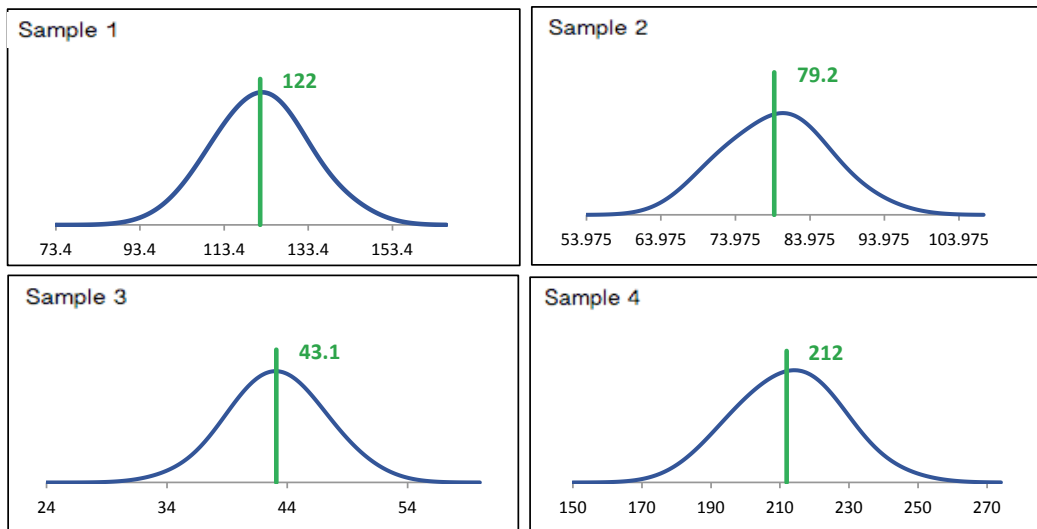
Annex A Summary by Analyte

COPPER

z-Score Plots



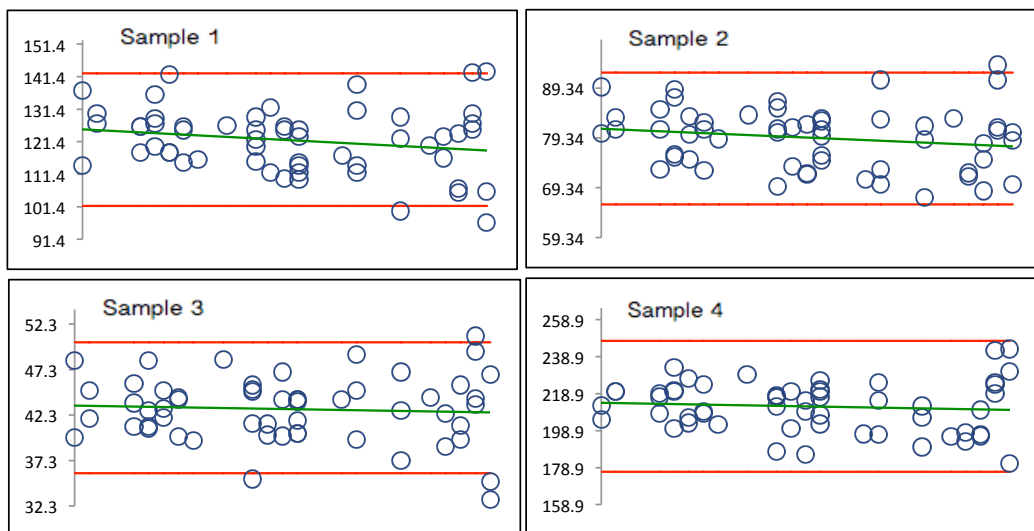
Kernel Density Plots



Annex A Summary by Analyte

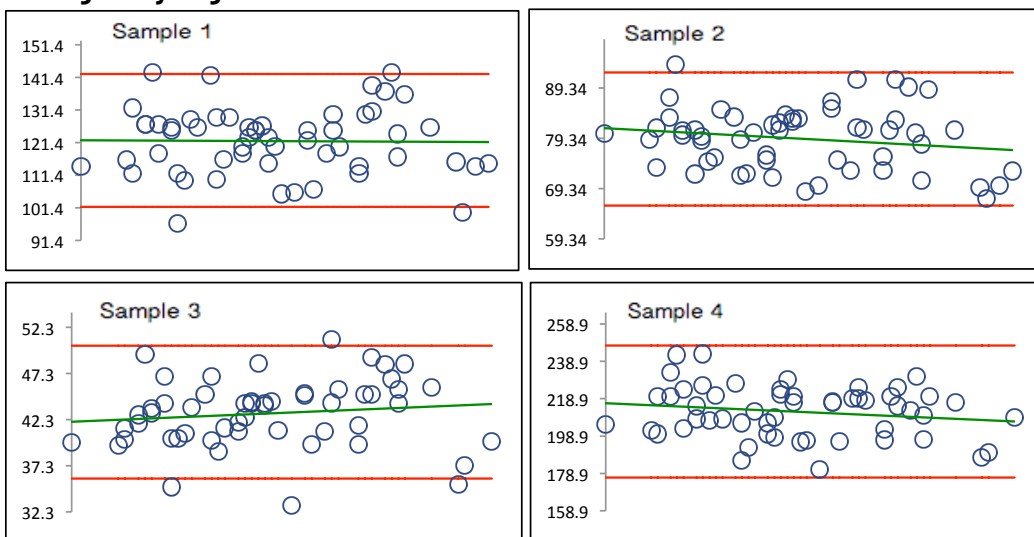
COPPER

Stability Regression



Reported results (Y-axis) plotted against reported analysis date (X-axis)

Homogeneity Regression



Reported results (Y-axis) plotted against bottling order (X-axis).

Annex A Summary by Analyte

IRON

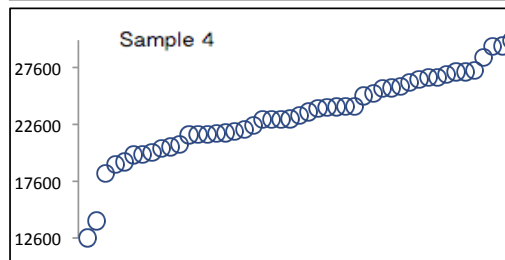
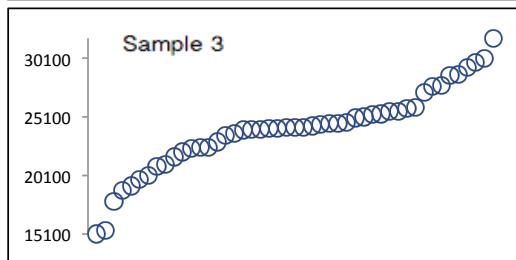
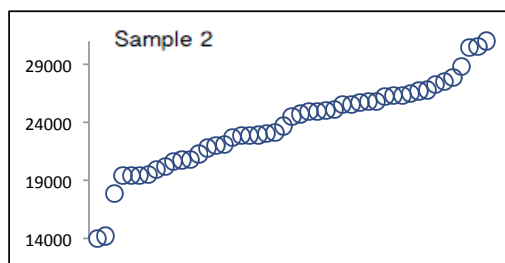
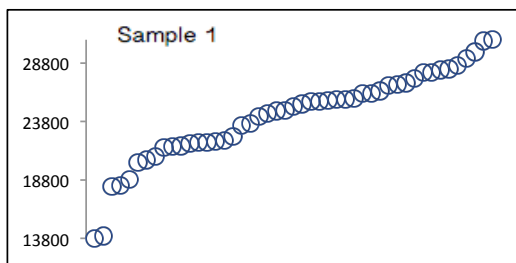
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	47	47	47	47
Median	25100	24500.0	24200.0	23400
Robust Mean	24500	23800.0	24100.0	23600
U	673	658	600	625
Robust Standard Deviation	3690	3610	3290	3430
Regression Standard Deviation	2240	2170	2200	2150
Stability Flag			Stability	Stability
Homogeneity Flag				
Standard Deviation Used	3690	3610	3410	3630
Outliers	1	1	1	1
$ z > 3.0$	0	0	0	1
$2 < z < 3$	2	2	3	1

Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/OES	21	21	21	21
ICP/MS	26	26	26	26

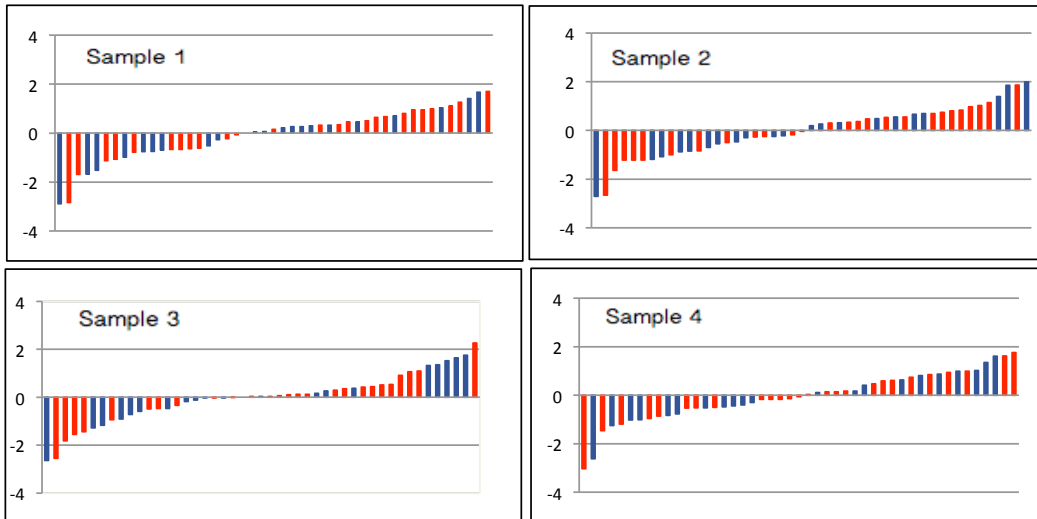
All summary stats and the plots below are based on the data excluding any flagged outliers



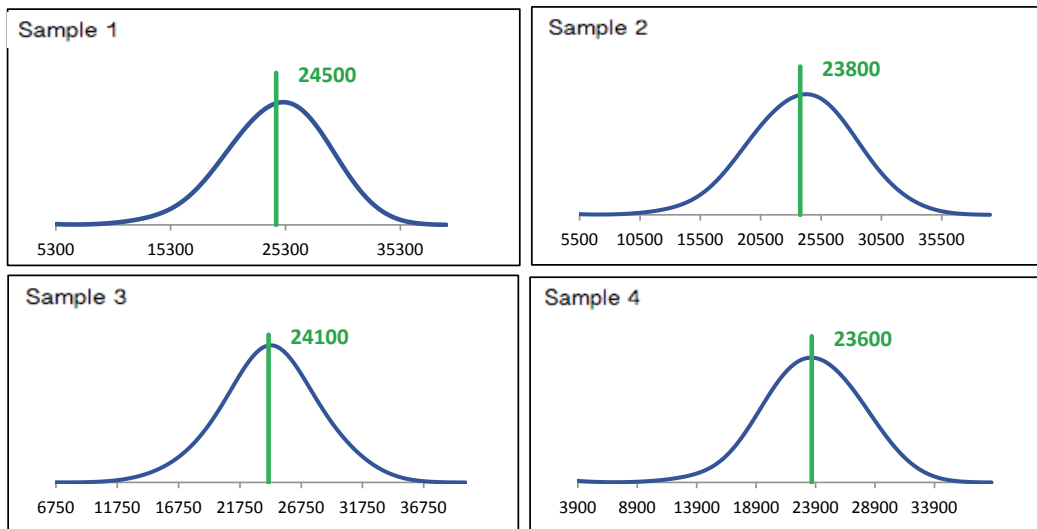
Annex A Summary by Analyte

IRON

z-Score Plots



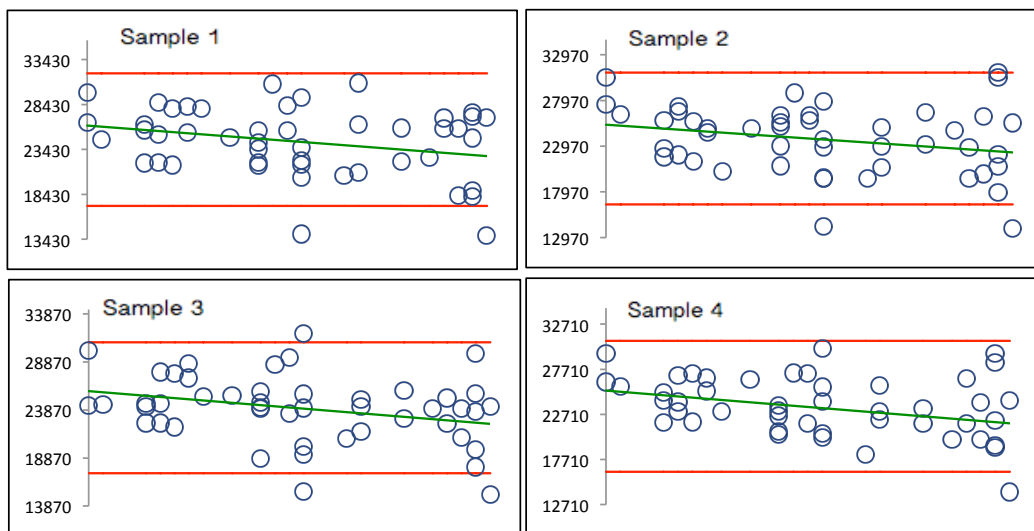
Kernel Density Plots



Annex A Summary by Analyte

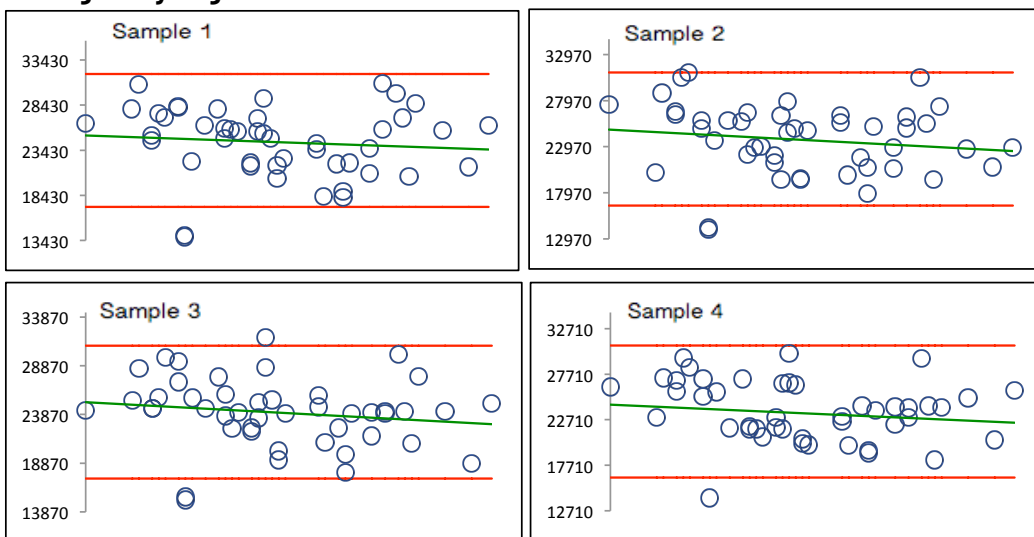
IRON

Stability Regression



Reported results (Y-axis) plotted against reported analysis date (X-axis)

Homogeneity Regression



Reported results (Y-axis) plotted against bottling order (X-axis).

Annex A Summary by Analyte

LEAD

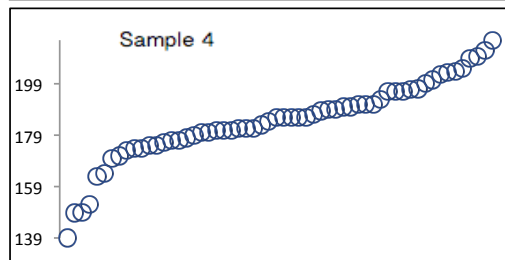
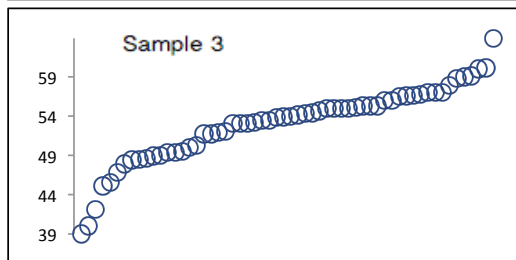
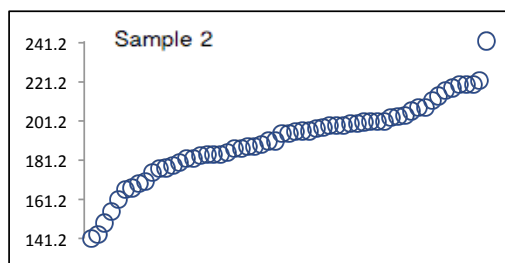
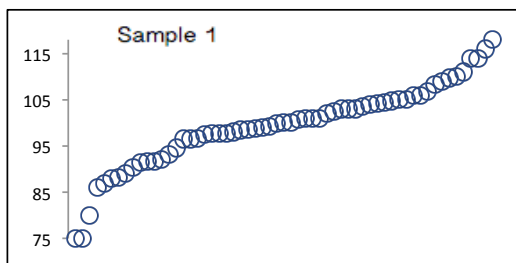
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	59	59	58	58
Median	100	195	54.0	186
Robust Mean	100	192	53.3	185
U	1.3	3.0	0.7	2.3
Robust Standard Deviation	8.24	18.7	4.36	13.8
Regression Standard Deviation	9.12	16.0	5.66	15.5
Stability Flag				
Homogeneity Flag				
Standard Deviation Used	9.12	18.7	5.66	15.5
Outliers	0	0	1	1
$ z > 3.0$	0	0	0	0
$2 < z < 3$	4	4	2	4

Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/OES	21	21	20	20
ICP/MS	36	36	36	36
AA	1	1	1	1
AAG	1	1	1	1

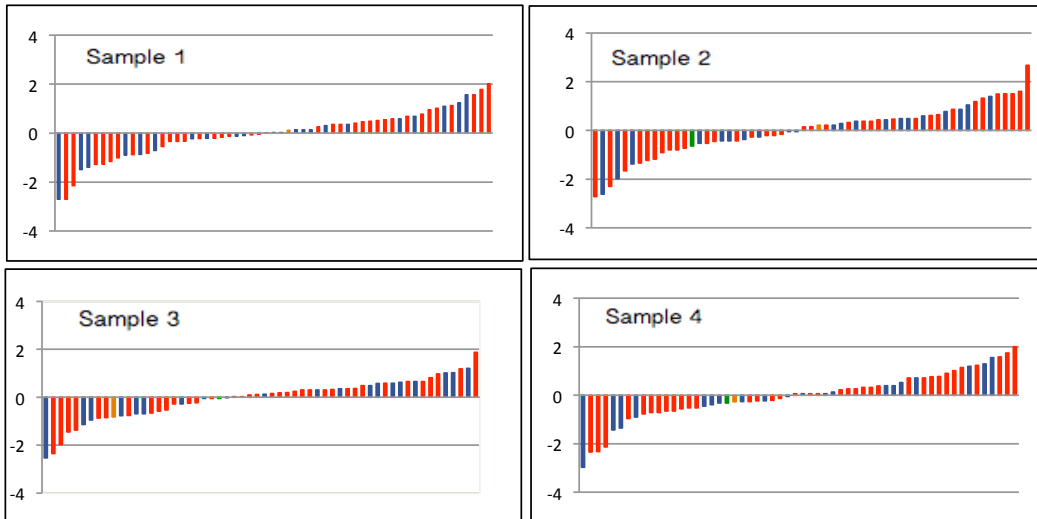
All summary stats and the plots below are based on the data excluding any flagged outliers



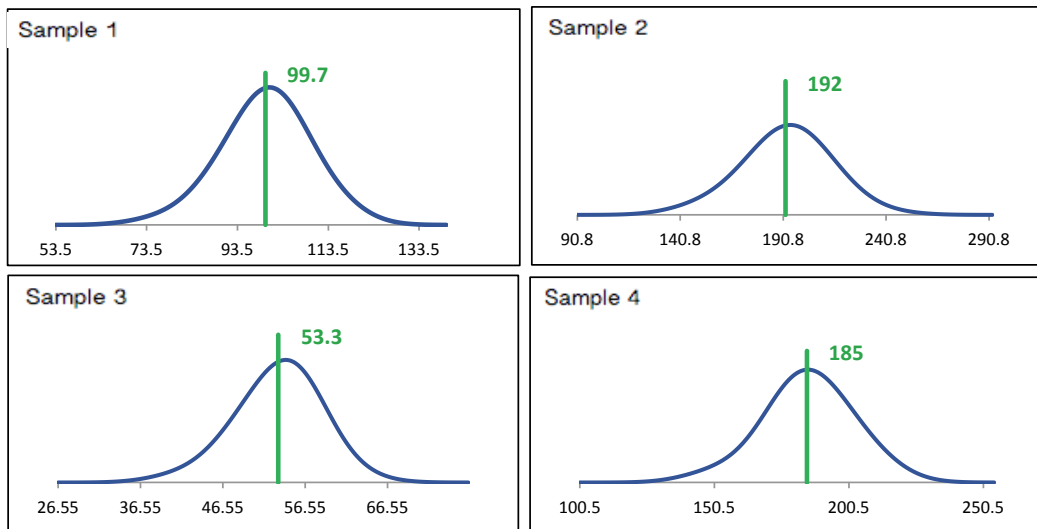
Annex A Summary by Analyte

LEAD

z-Score Plots



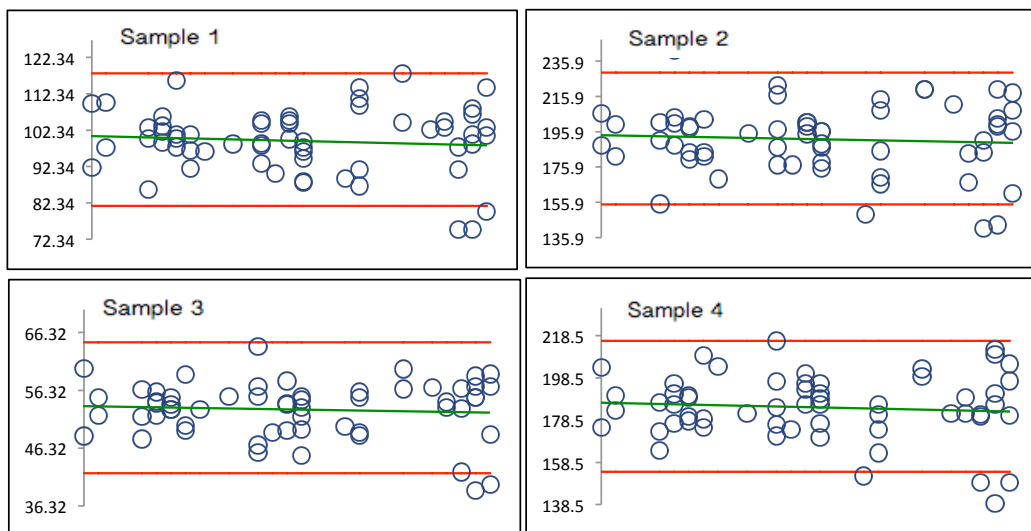
Kernel Density Plots



Annex A Summary by Analyte

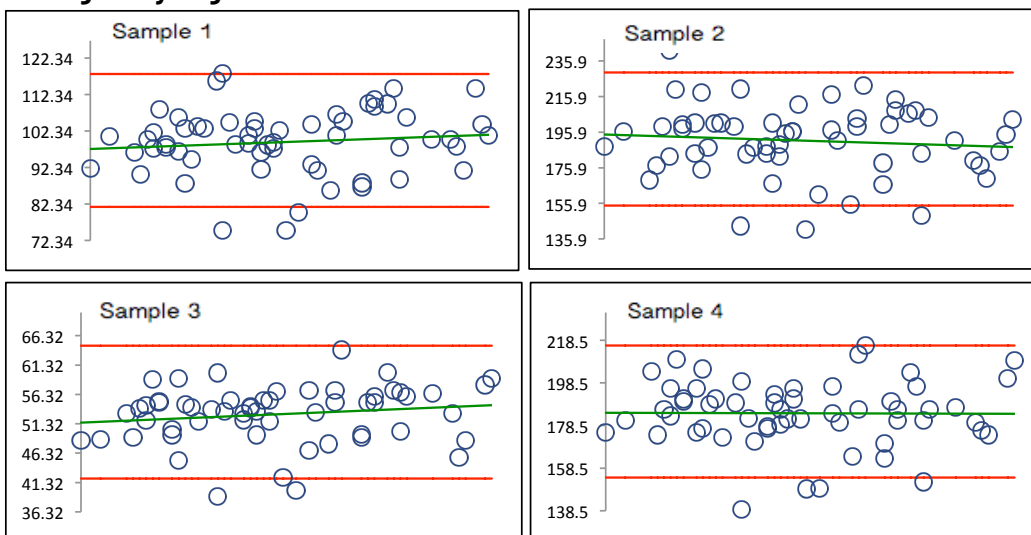
LEAD

Stability Regression



Reported results (Y-axis) plotted against reported analysis date (X-axis)

Homogeneity Regression



Reported results (Y-axis) plotted against bottling order (X-axis).

Annex A Summary by Analyte

MANGANESE

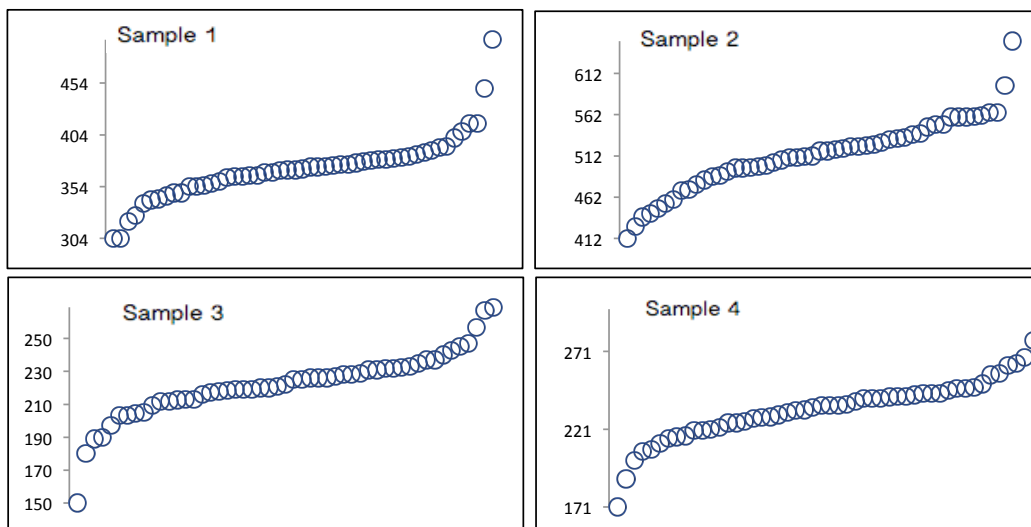
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	51	51	51	51
Median	371	518	222	236
Robust Mean	370	514	222	235
U	3.8	7.1	2.8	3.1
Robust Standard Deviation	21.8	40.7	16.0	17.8
Regression Standard Deviation	27.1	37.6	16.3	17.2
Stability Flag				
Homogeneity Flag				
Standard Deviation Used	27.1	40.7	16.3	17.8
Outliers	0	0	0	0
$ z > 3.0$	1	1	1	2
$2 < z < 3$	3	3	5	2

Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/MS	29	29	29	29
ICP/OES	22	22	22	22

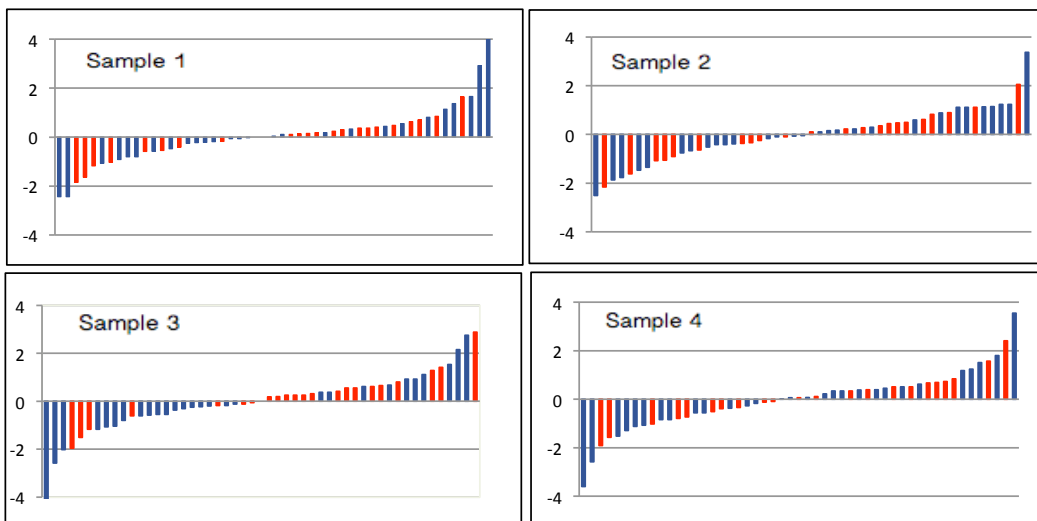
All summary stats and the plots below are based on the data excluding any flagged outliers



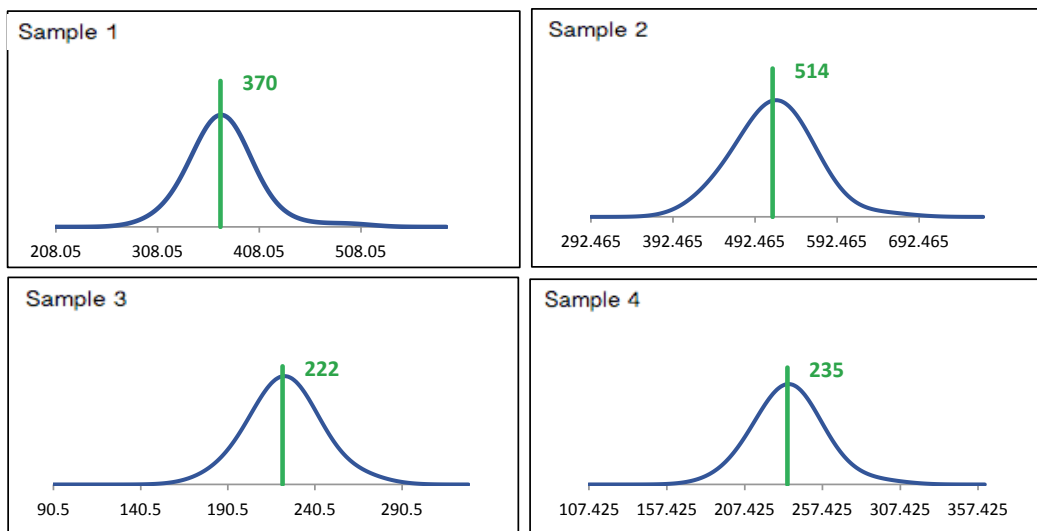
Annex A Summary by Analyte

MANGANESE

z-Score Plots



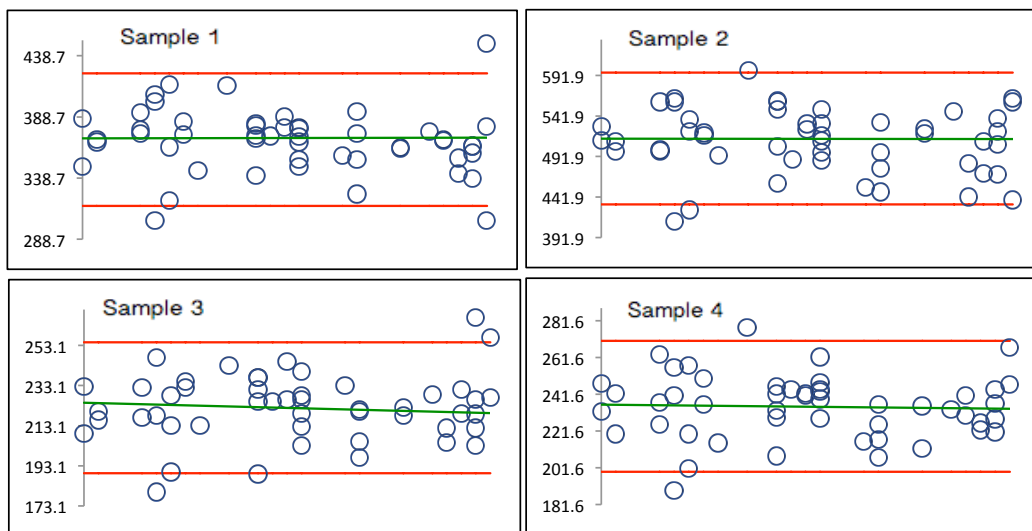
Kernel Density Plots



Annex A Summary by Analyte

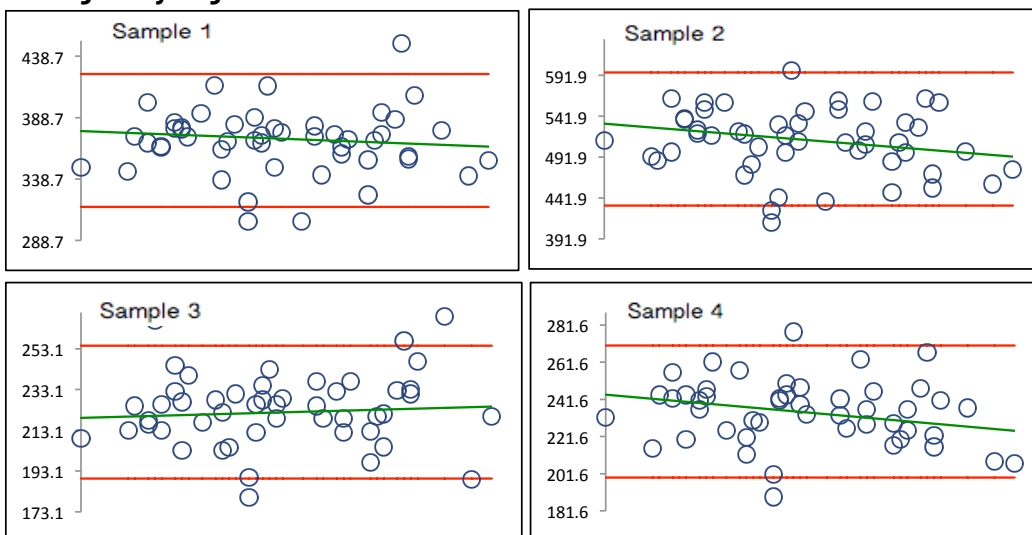
MANGANESE

Stability Regression



Reported results (Y-axis) plotted against reported analysis date (X-axis)

Homogeneity Regression



Reported results (Y-axis) plotted against bottling order (X-axis).

Annex A Summary by Analyte

MERCURY

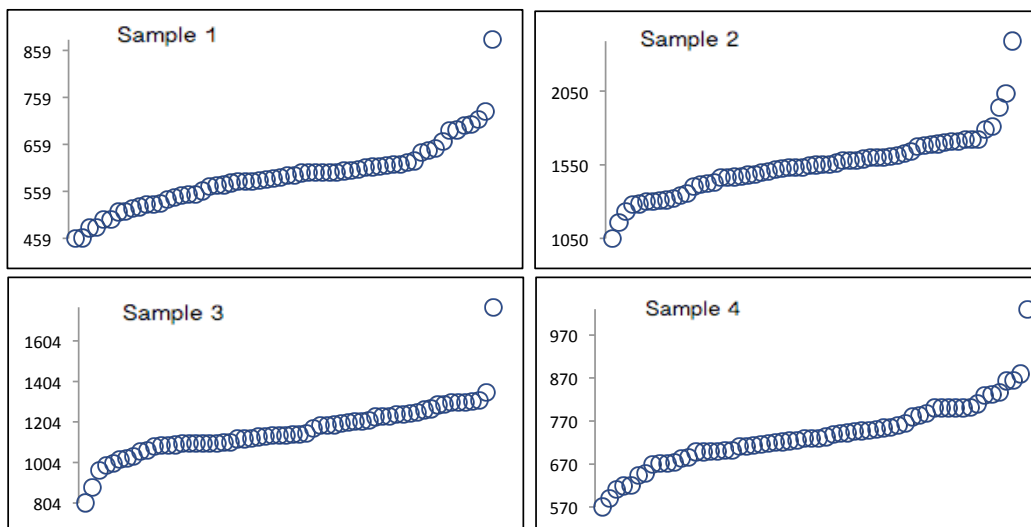
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	60	60	60	60
Median	590	1550	1140	730
Robust Mean	587	1540	1160	736
U	9.7	28.6	17.3	10.9
Robust Standard Deviation	60.0	177	107	67.7
Regression Standard Deviation	150	391	295	188
Stability Flag				
Homogeneity Flag				
Standard Deviation Used	150	391	295	188
Outliers	0	0	0	0
$ z > 3.0$	0	0	0	0
$2 < z < 3$	0	1	1	0

Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/MS	23	23	23	23
CVAP	26	26	26	26
ICP/OES	3	3	3	3
AF	4	4	4	4
CVAFS	2	2	2	2
PYRO-AA	2	2	2	2

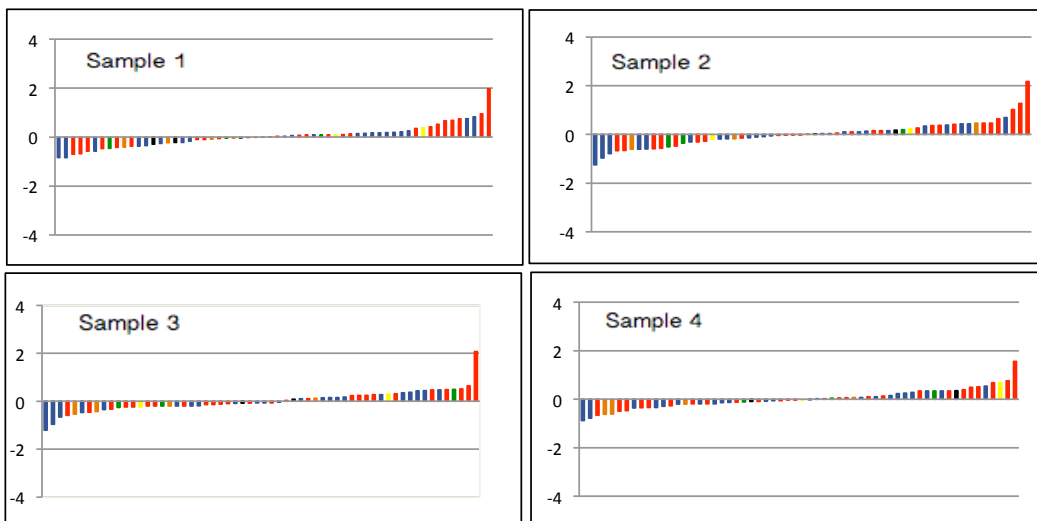
All summary stats and the plots below are based on the data excluding any flagged outliers



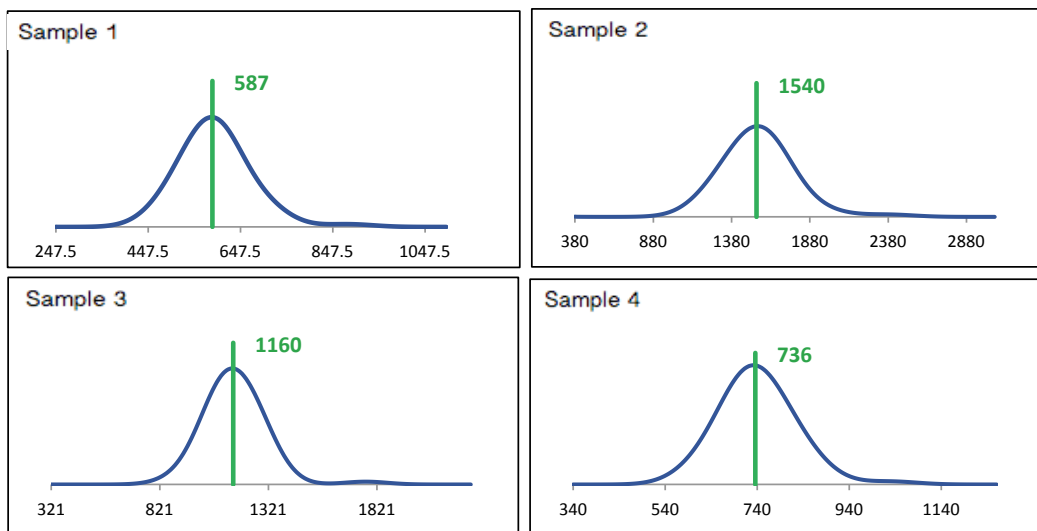
Annex A Summary by Analyte

MERCURY

z-Score Plots



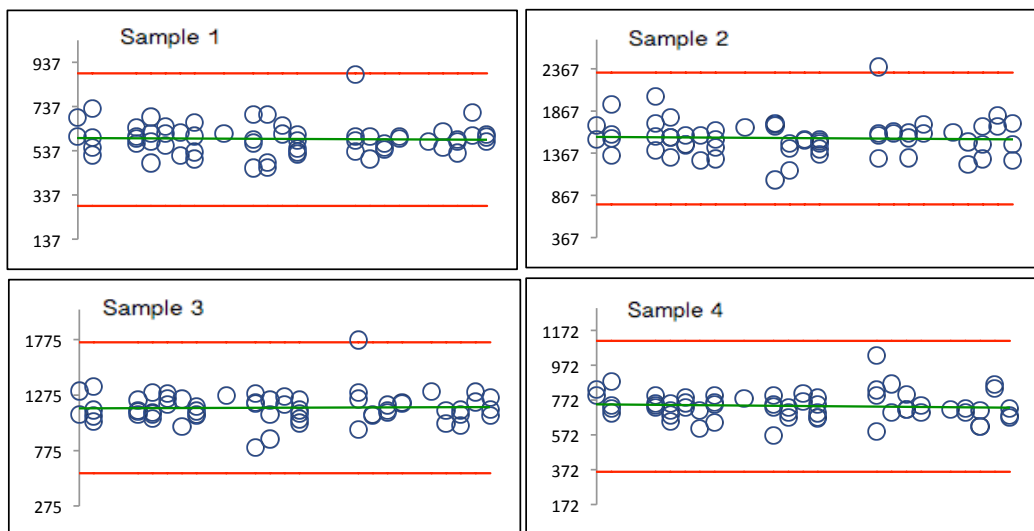
Kernel Density Plots



Annex A Summary by Analyte

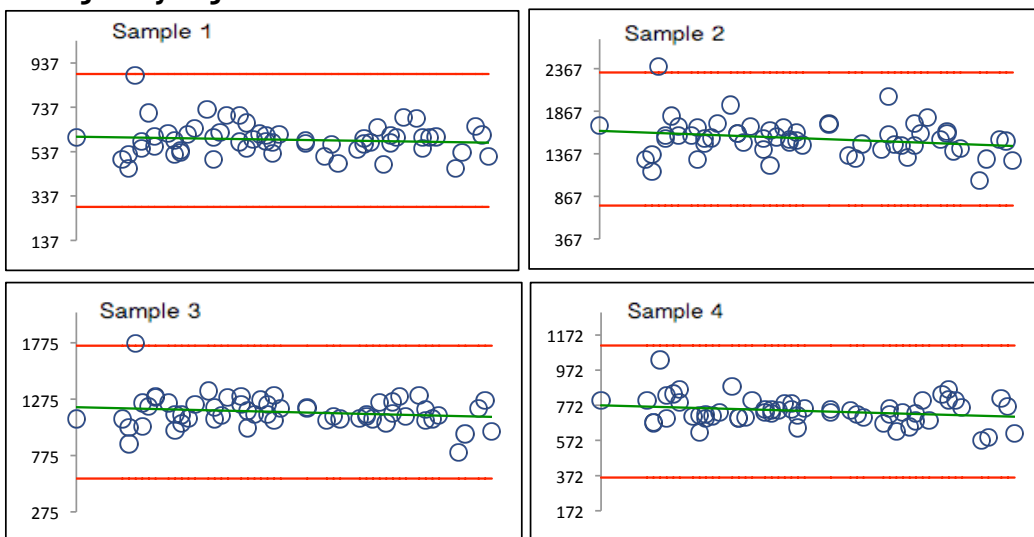
MERCURY

Stability Regression



Reported results (Y-axis) plotted against reported analysis date (X-axis)

Homogeneity Regression



Reported results (Y-axis) plotted against bottling order (X-axis).

Annex A Summary by Analyte

NICKEL

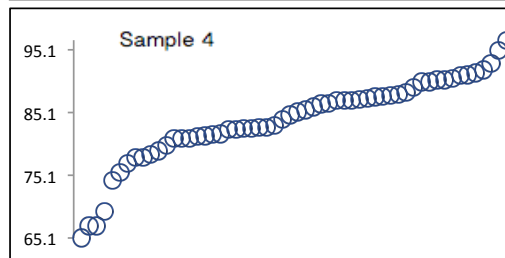
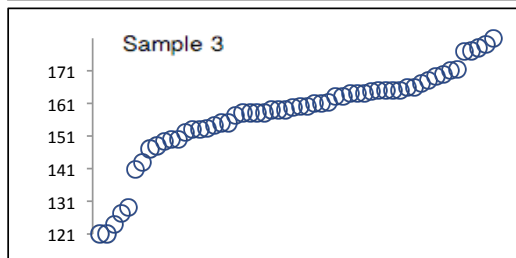
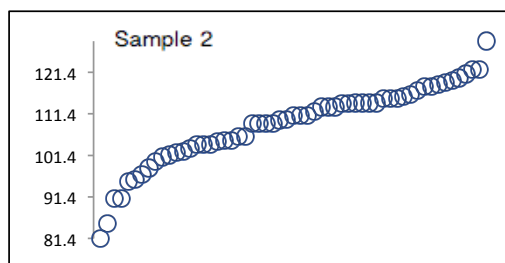
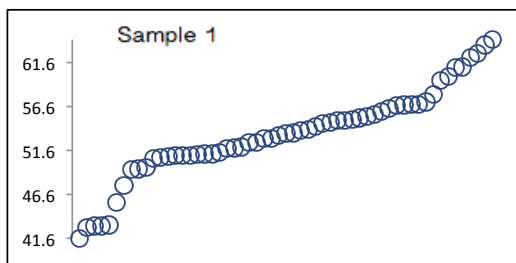
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	57	57	56	56
Median	53.6	111	160	85
Robust Mean	53.6	109	159	85
U	0.8	1.5	1.8	1.0
Robust Standard Deviation	4.54	8.94	10.6	5.96
Regression Standard Deviation	5.52	11.3	16.4	8.70
Stability Flag				
Homogeneity Flag				
Standard Deviation Used	5.52	11.3	16.4	8.70
Outliers	0	0	1	1
$ z > 3.0$	0	0	0	0
$2 < z < 3$	1	2	3	3

Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/OES	23	23	22	22
ICP/MS	33	33	33	33
AAG	1	1	1	1

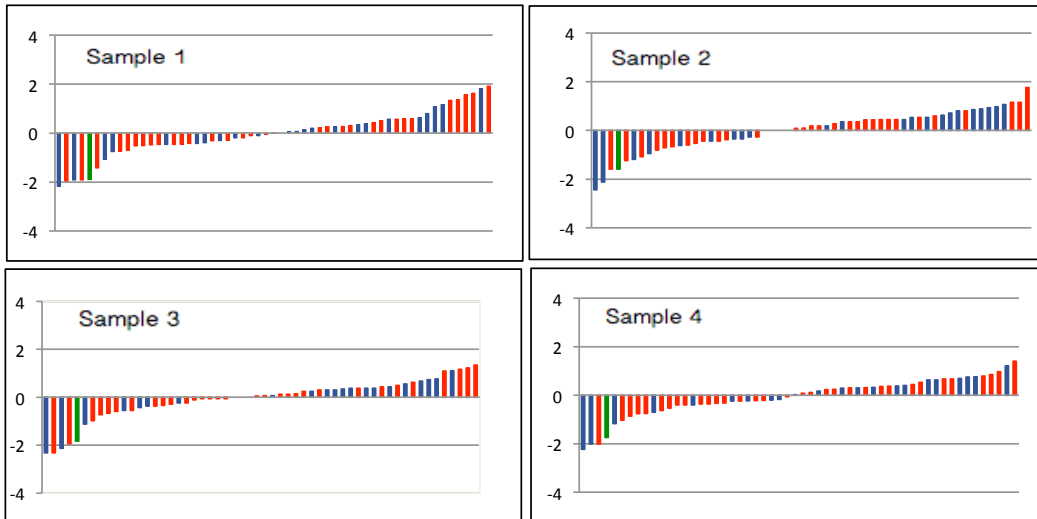
All summary stats and the plots below are based on the data excluding any flagged outliers



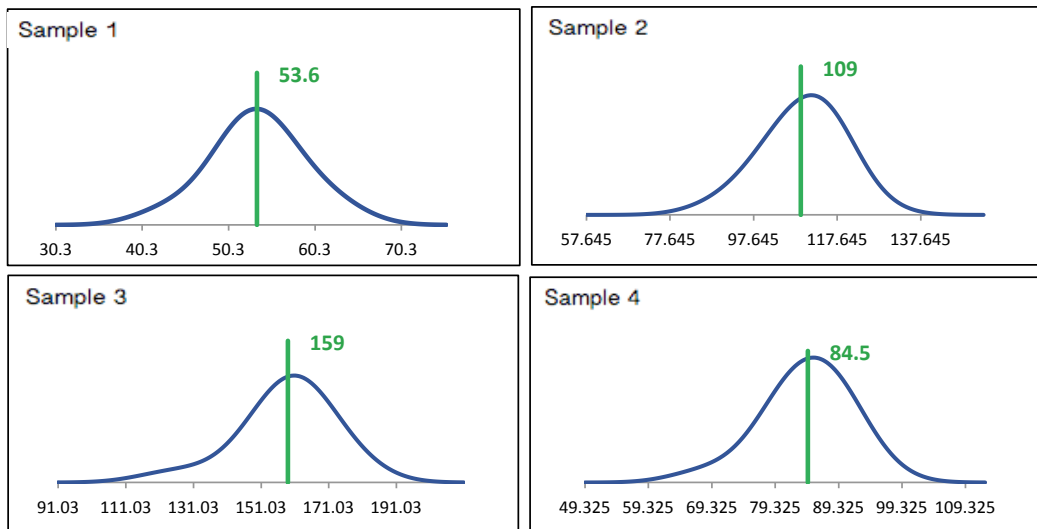
Annex A Summary by Analyte

NICKEL

z-Score Plots



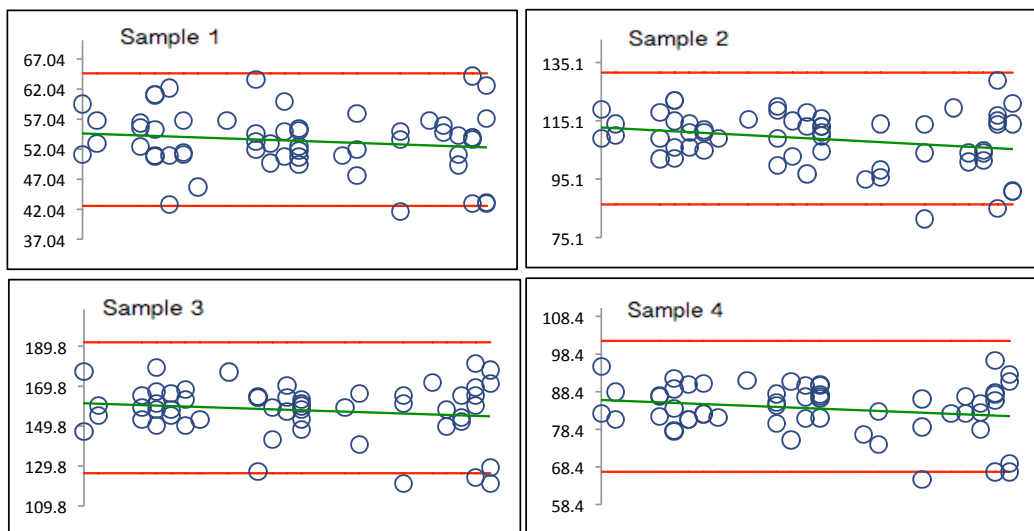
Kernel Density Plots



Annex A Summary by Analyte

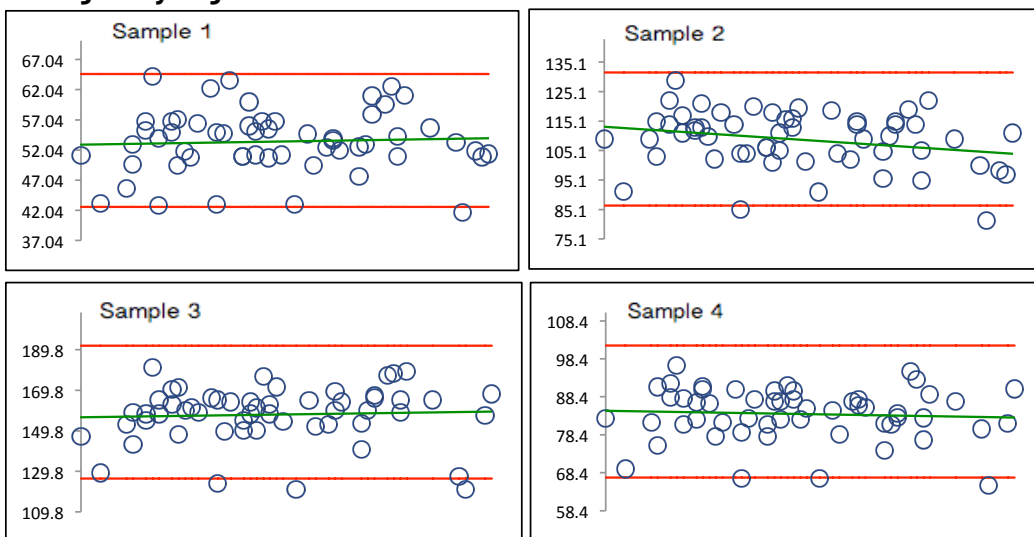
NICKEL

Stability Regression



Reported results (Y-axis) plotted against reported analysis date (X-axis)

Homogeneity Regression



Reported results (Y-axis) plotted against bottling order (X-axis).

Annex A Summary by Analyte

STRONTIUM

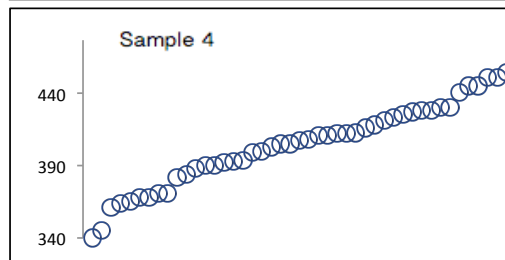
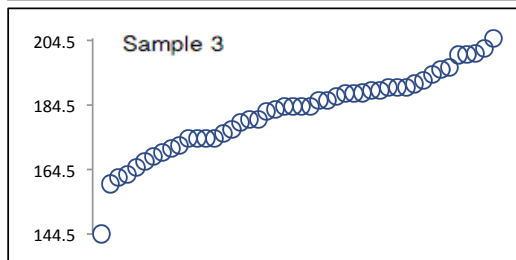
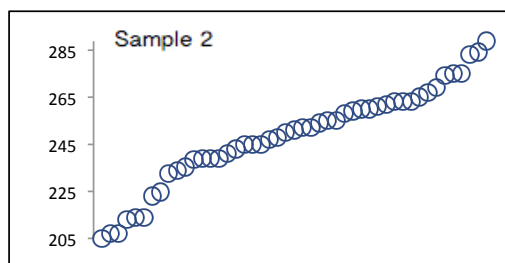
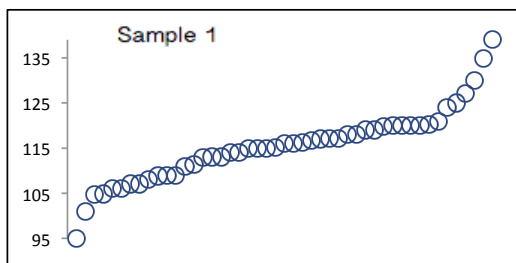
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	47	47	46	46
Median	116	251	184	408
Robust Mean	115	249	183	406
U	1.3	3.9	2.4	5.8
Robust Standard Deviation	7.17	21.1	12.8	31.3
Regression Standard Deviation	10.5	22.2	16.4	35.8
Stability Flag				
Homogeneity Flag	Homogeneity			
Standard Deviation Used	10.5	25.4	16.4	35.8
Outliers	0	0	1	1
$ z > 3.0$	0	0	0	0
$2 < z < 3$	1	0	1	0

Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/MS	28	28	28	28
ICP/OES	19	19	18	18

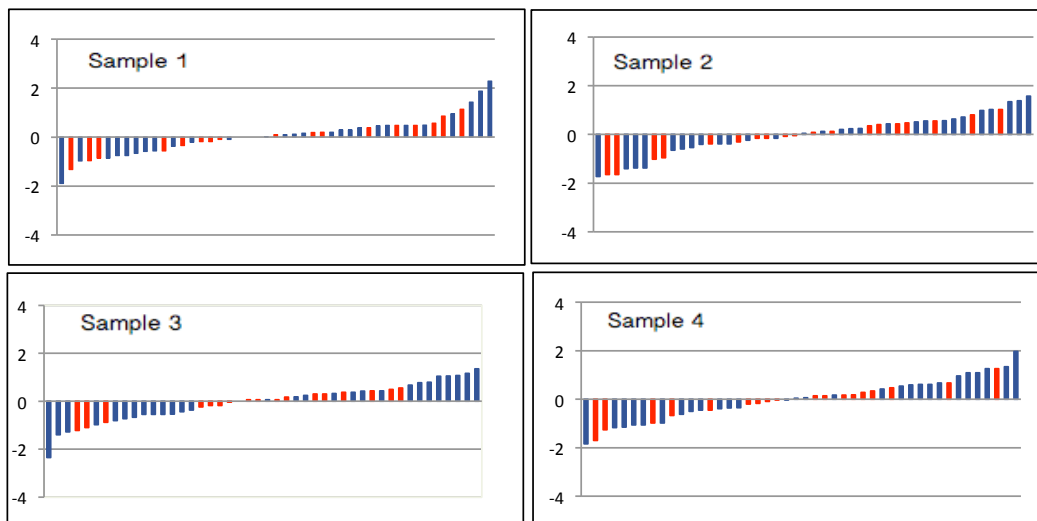
All summary stats and the plots below are based on the data excluding any flagged outliers



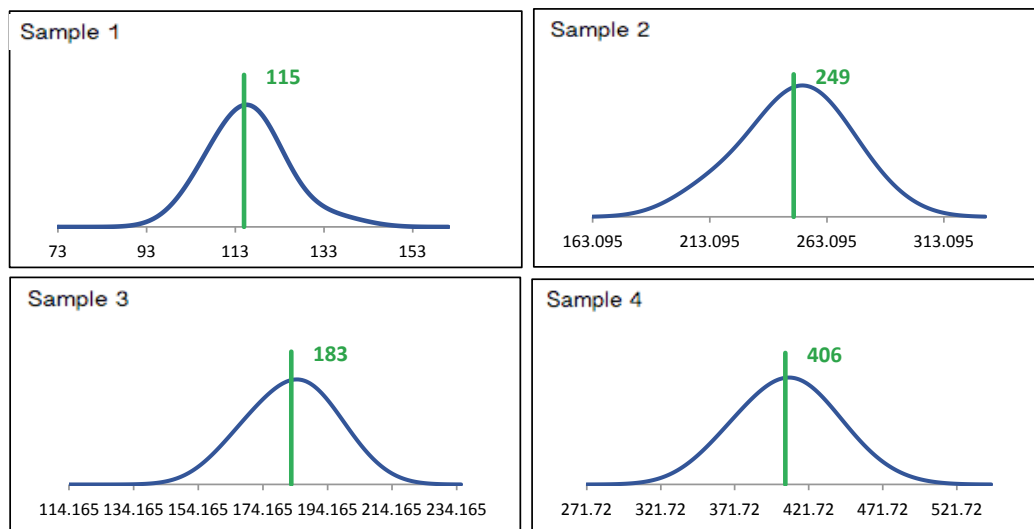
Annex A Summary by Analyte

STRONTIUM

z-Score Plots



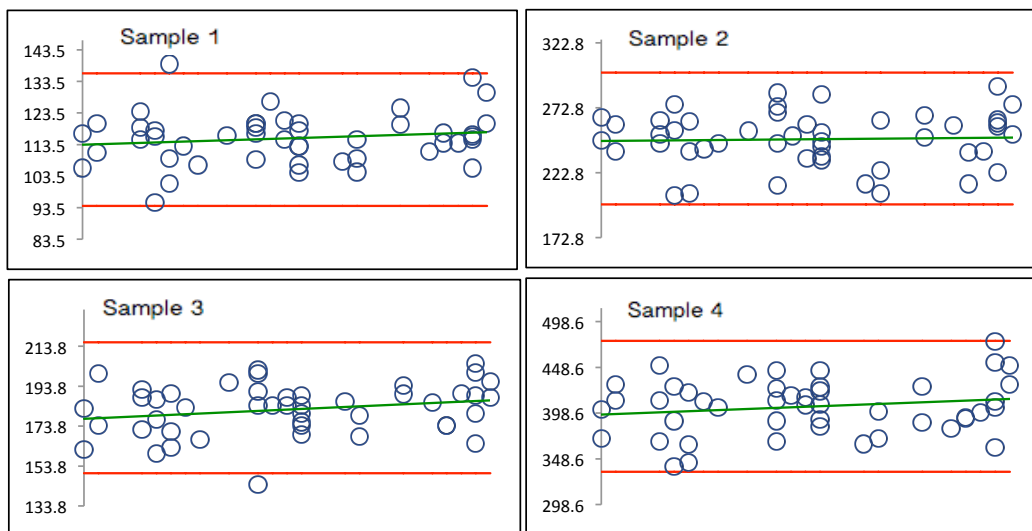
Kernel Density Plots



Annex A Summary by Analyte

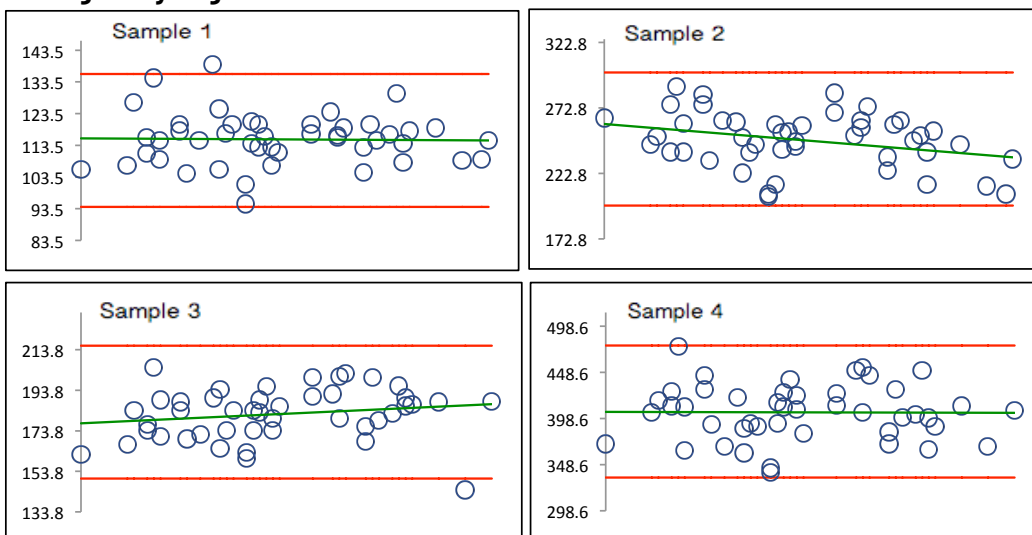
STRONTIUM

Stability Regression



Reported results (Y-axis) plotted against reported analysis date (X-axis)

Homogeneity Regression



Reported results (Y-axis) plotted against bottling order (X-axis).

Annex A Summary by Analyte

TIN

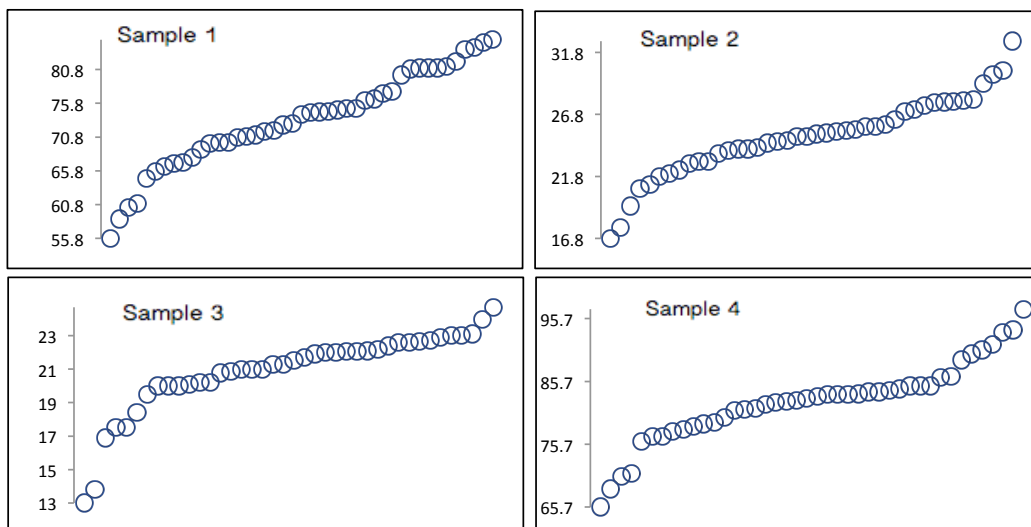
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	43	42	40	42
Median	74.1	25.1	21.4	83.2
Robust Mean	73.5	25.0	21.2	82.7
U	1.4	0.57	0.35	1.1
Robust Standard Deviation	7.45	2.93	1.77	5.52
Regression Standard Deviation	18.3	6.62	5.71	20.5
Stability Flag				
Homogeneity Flag				
Standard Deviation Used	18.3	6.62	5.71	20.5
Outliers	0	0	1	1
$ z > 3.0$	0	0	0	0
$2 < z < 3$	0	0	0	0

Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/OES	14	13	11	13
ICP/MS	29	29	29	29

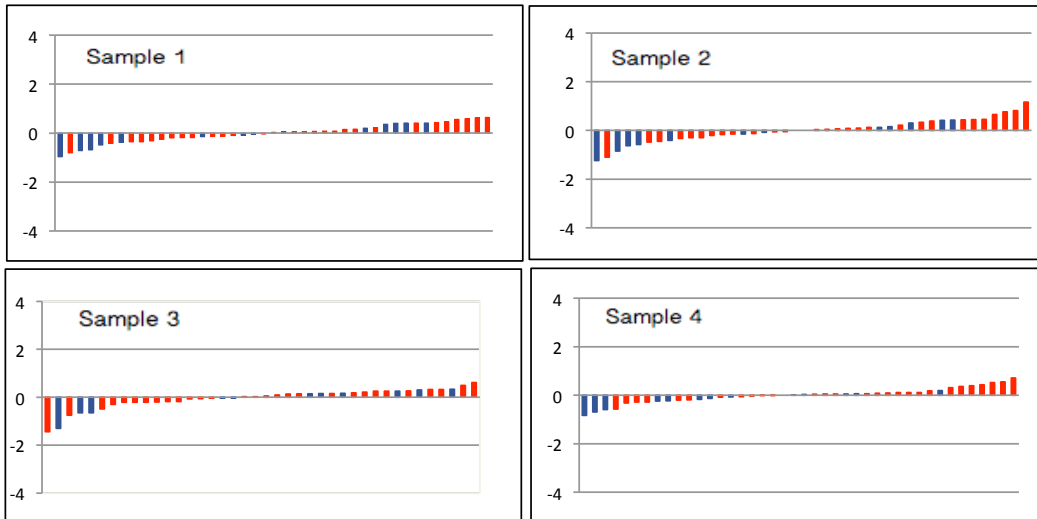
All summary stats and the plots below are based on the data excluding any flagged outliers



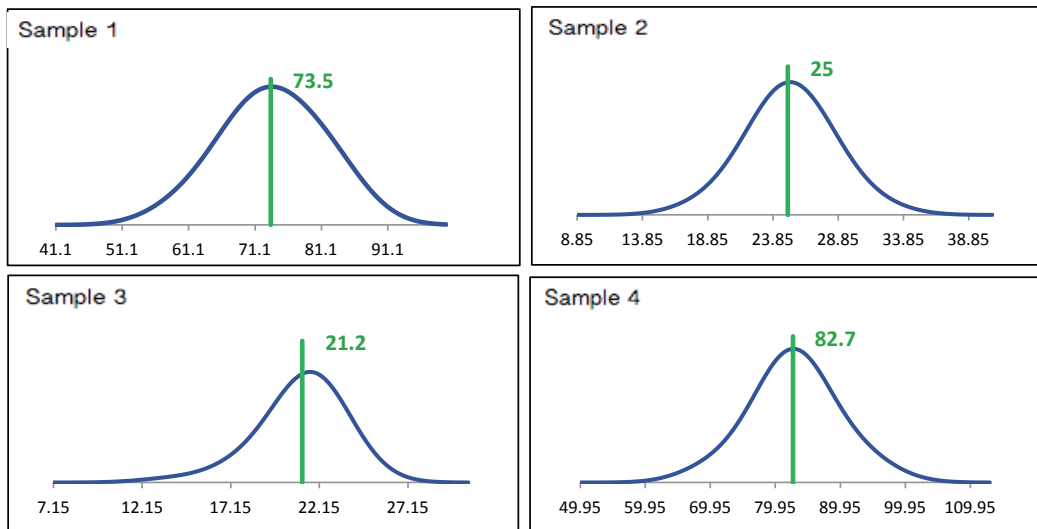
Annex A Summary by Analyte

TIN

z-Score Plots



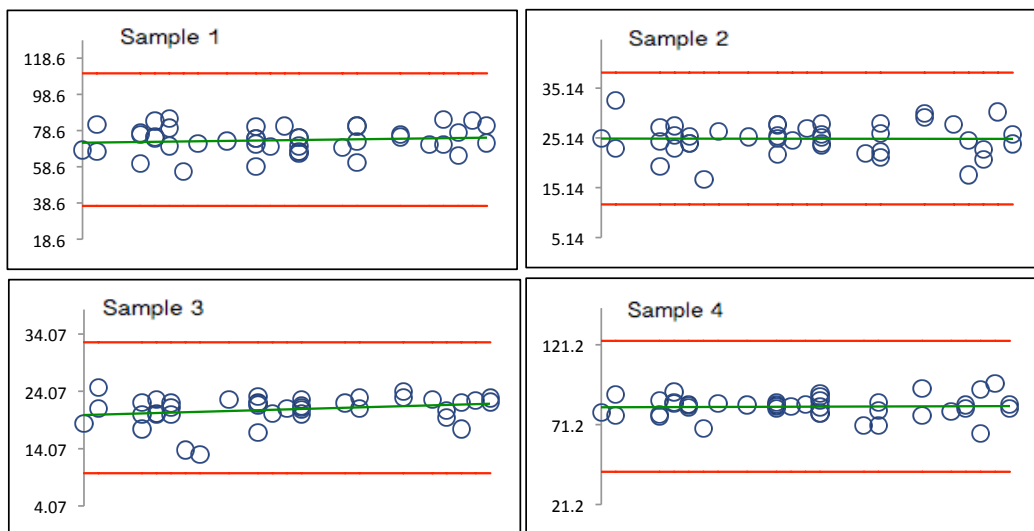
Kernel Density Plots



Annex A Summary by Analyte

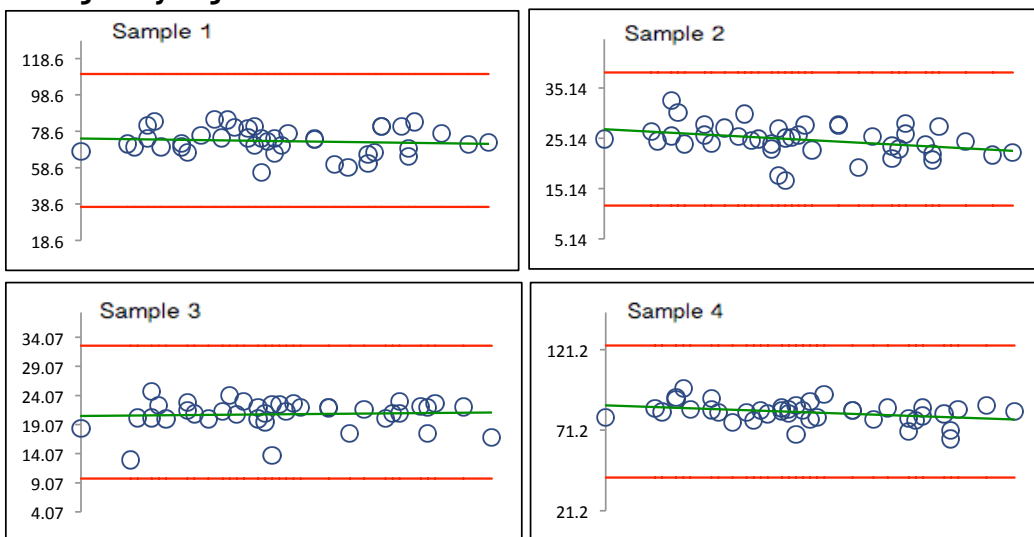
TIN

Stability Regression



Reported results (Y-axis) plotted against reported analysis date (X-axis)

Homogeneity Regression



Reported results (Y-axis) plotted against bottling order (X-axis).

Annex A Summary by Analyte

TITANIUM

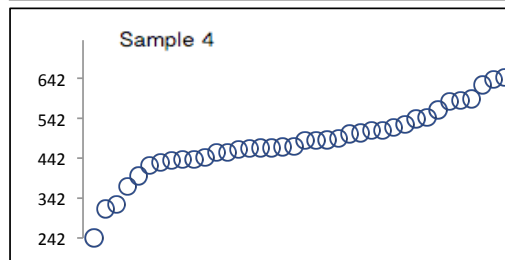
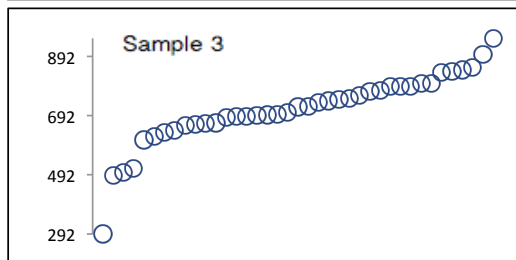
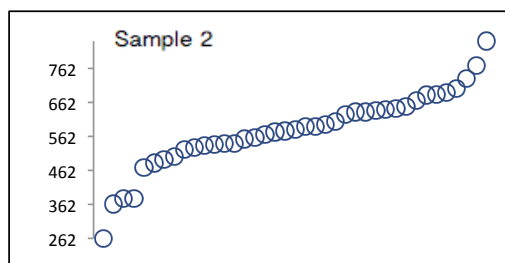
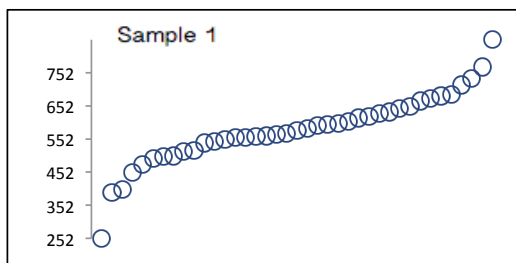
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	39	39	39	39
Median	578	583	721	487
Robust Mean	582	585	721	489
U	18.5	19.3	19.5	16.0
Robust Standard Deviation	92.4	96.4	97.2	80.1
Regression Standard Deviation	162	162	197	138
Stability Flag				
Homogeneity Flag				
Standard Deviation Used	162	162	197	138
Outliers	0	0	0	0
$ z > 3.0$	0	0	0	0
$2 < z < 3$	1	0	1	0

Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/MS	23	23	23	23
ICP/OES	16	16	16	16

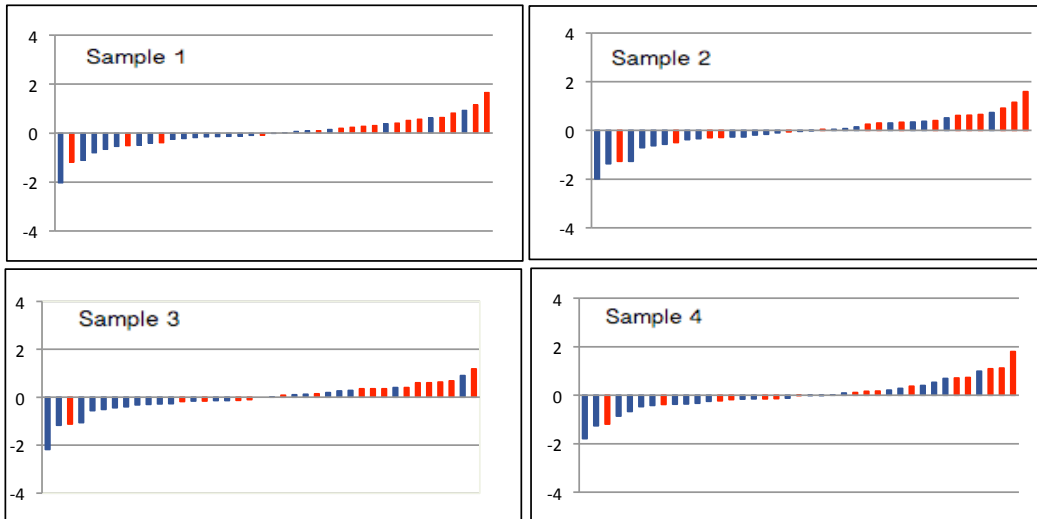
All summary stats and the plots below are based on the data excluding any flagged outliers



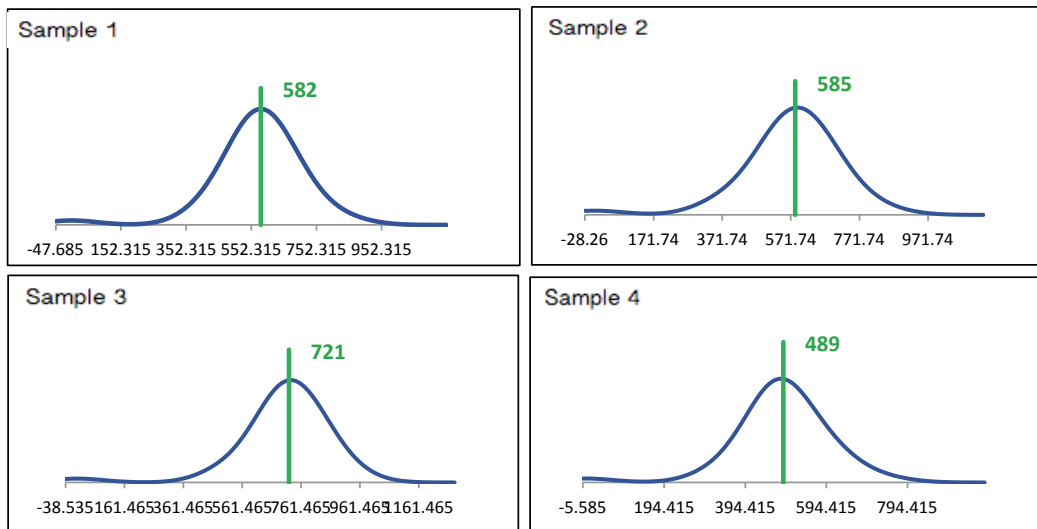
Annex A Summary by Analyte

TITANIUM

z-Score Plots



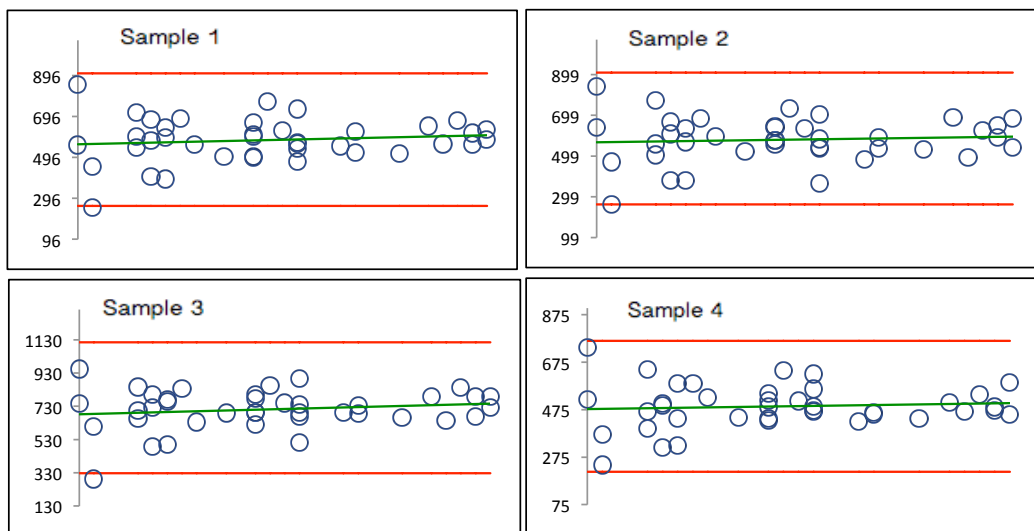
Kernel Density Plots



Annex A Summary by Analyte

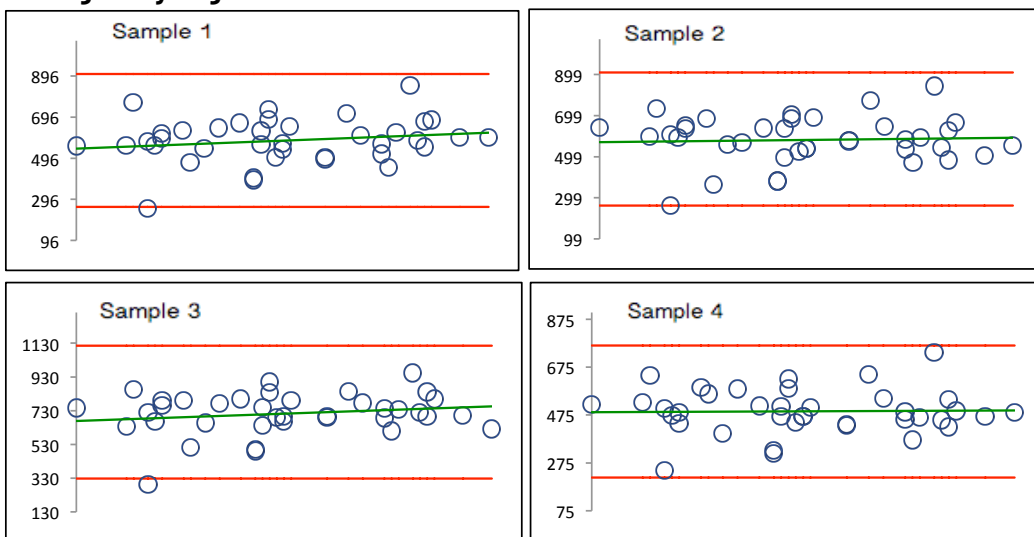
TITANIUM

Stability Regression



Reported results (Y-axis) plotted against reported analysis date (X-axis)

Homogeneity Regression



Reported results (Y-axis) plotted against bottling order (X-axis).

Annex A Summary by Analyte

URANIUM

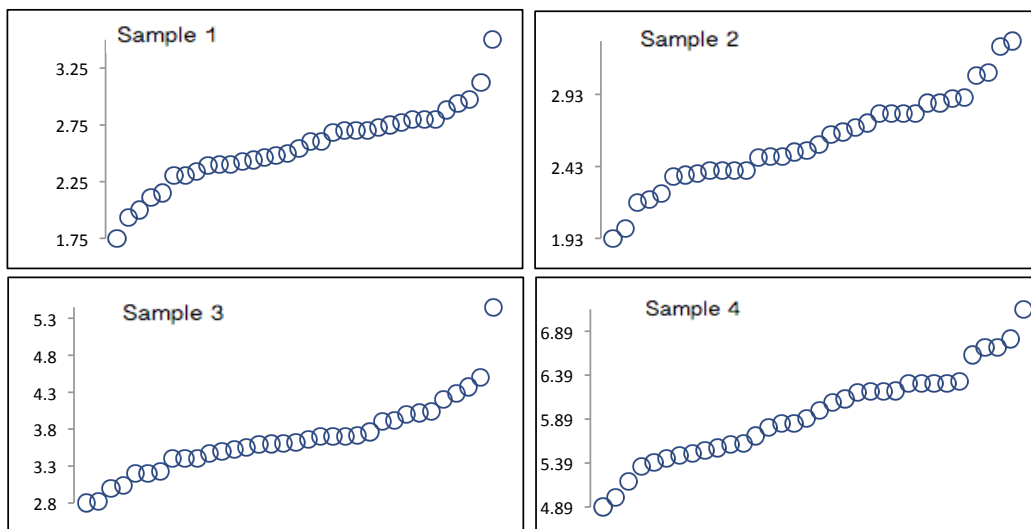
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	34	34	34	34
Median	2.57	2.56	3.62	5.95
Robust Mean	2.56	2.60	3.64	5.94
U	0.068	0.070	0.096	0.119
Robust Standard Deviation	0.318	0.328	0.449	0.554
Regression Standard Deviation	0.288	0.292	0.382	0.583
Stability Flag				
Homogeneity Flag				
Standard Deviation Used	0.318	0.328	0.449	0.583
Outliers	0	0	0	0
$ z > 3.0$	0	0	1	0
$2 < z < 3$	2	3	0	1

Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/OES	2	2	2	2
ICP/MS	32	32	32	32

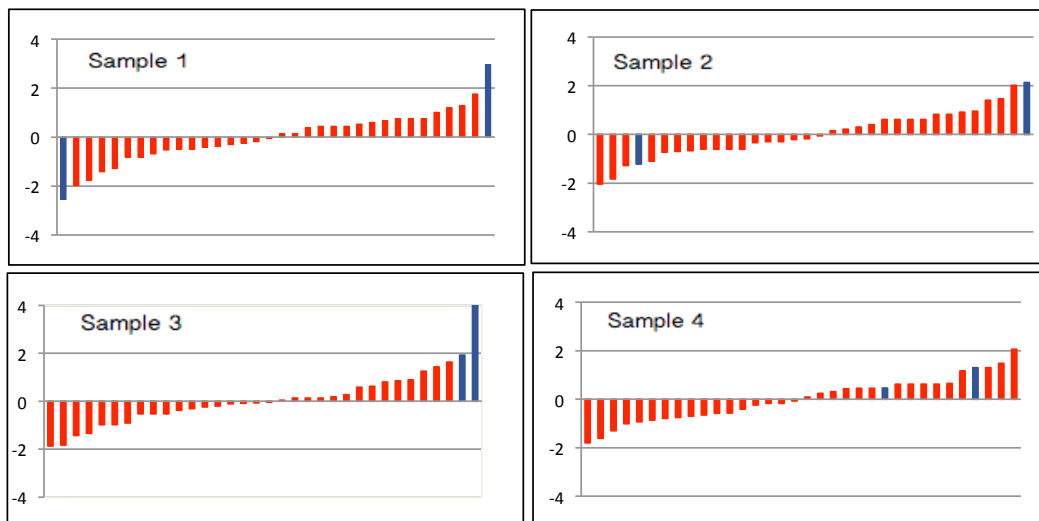
All summary stats and the plots below are based on the data excluding any flagged outliers



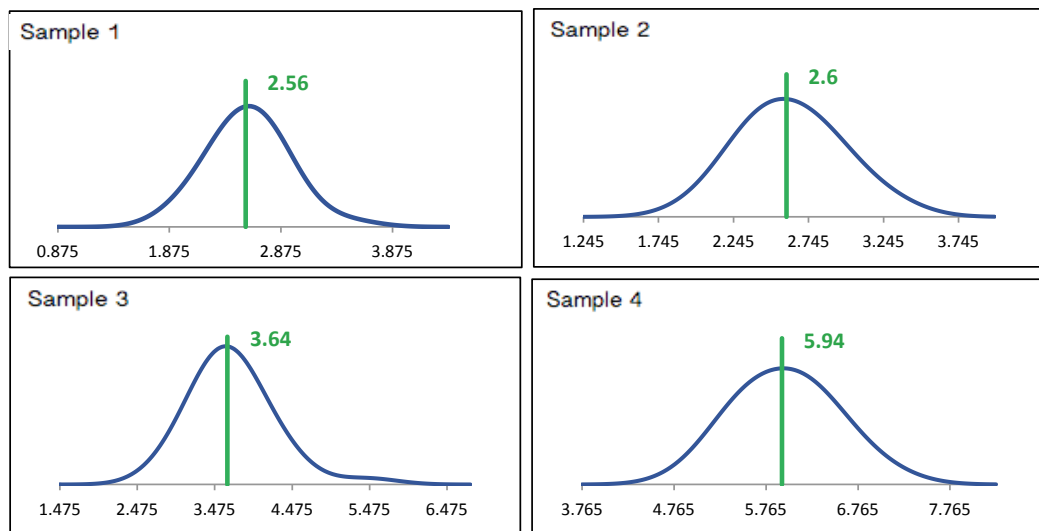
Annex A Summary by Analyte

URANIUM

z-Score Plots



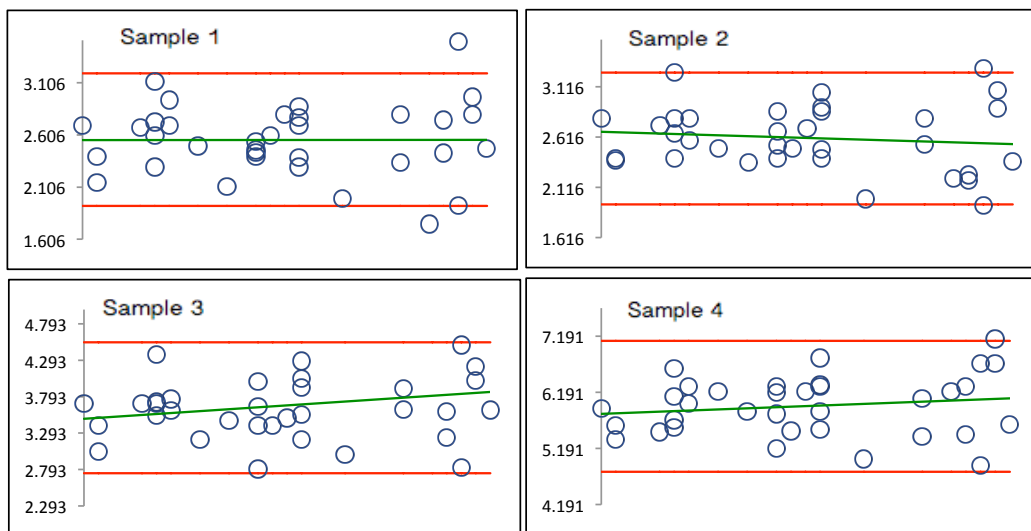
Kernel Density Plots



Annex A Summary by Analyte

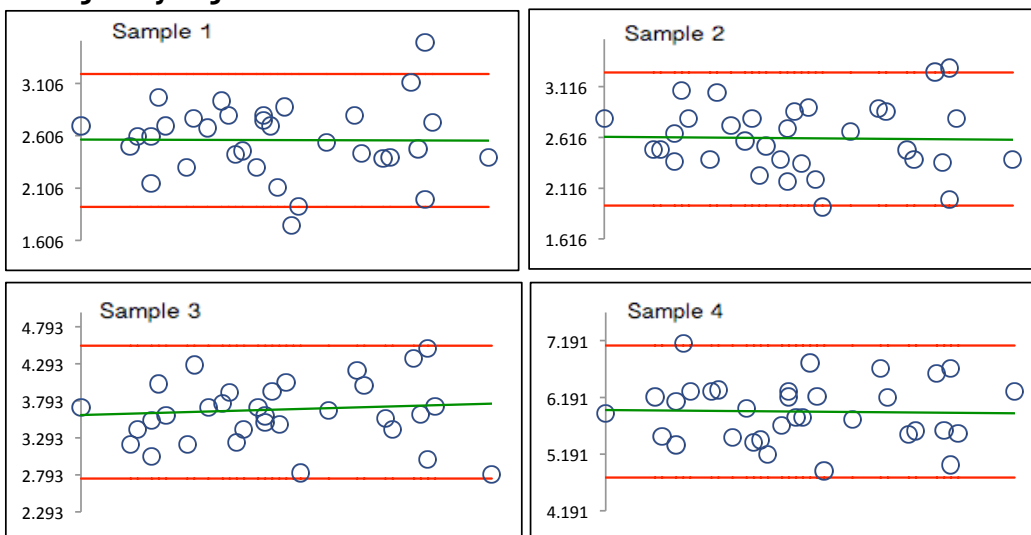
URANIUM

Stability Regression



Reported results (Y-axis) plotted against reported analysis date (X-axis)

Homogeneity Regression



Reported results (Y-axis) plotted against bottling order (X-axis).

Annex A Summary by Analyte

VANADIUM

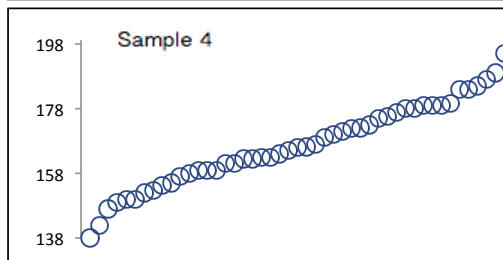
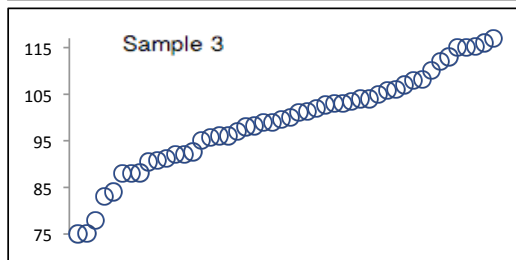
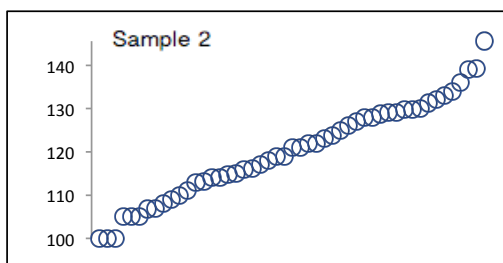
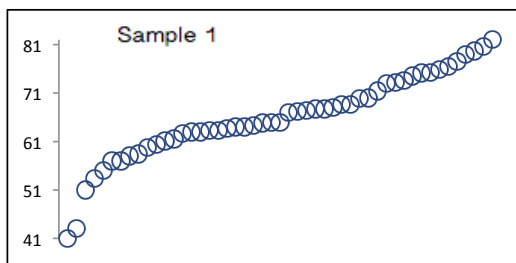
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	49	49	48	48
Median	65.0	121	99.8	166
Robust Mean	66.4	120	99.6	167
U	1.52	2.14	1.95	2.54
Robust Standard Deviation	8.49	12.0	10.8	14.1
Regression Standard Deviation	9.51	17.1	14.2	23.7
Stability Flag				
Homogeneity Flag				
Standard Deviation Used	9.51	17.1	14.2	23.7
Outliers	0	0	1	1
$ z > 3.0$	0	0	0	0
$2 < z < 3$	2	0	0	0

Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/MS	30	30	30	30
ICP/OES	19	19	18	18

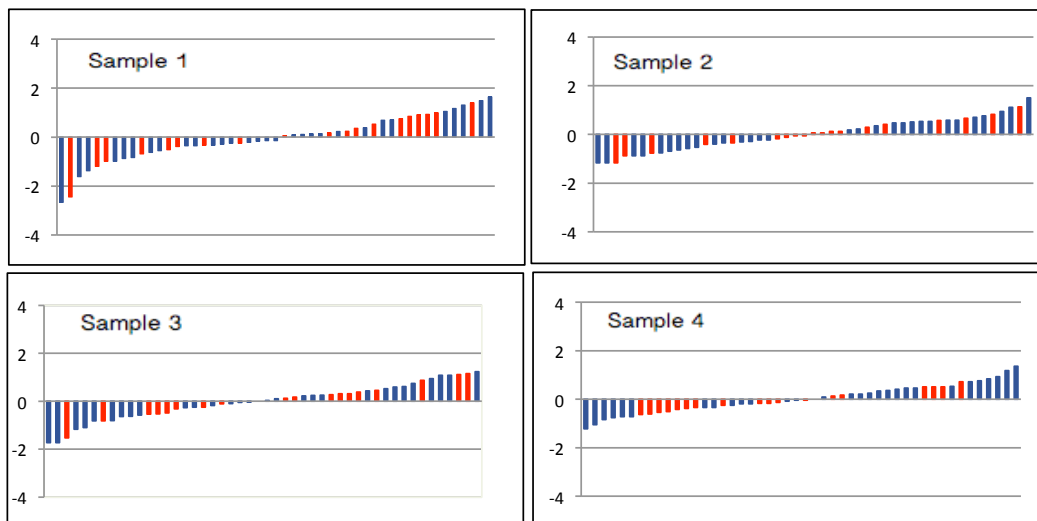
All summary stats and the plots below are based on the data excluding any flagged outliers



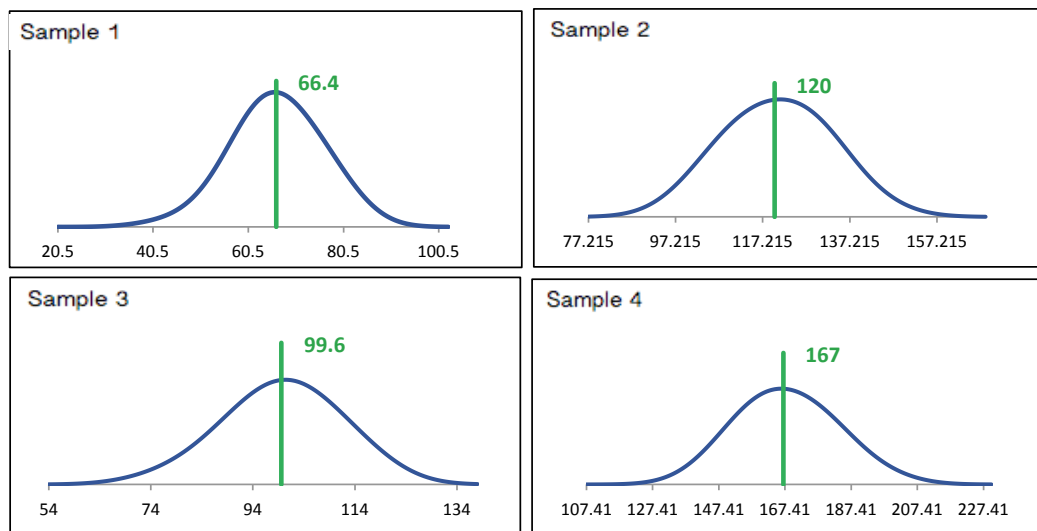
Annex A Summary by Analyte

VANADIUM

z-Score Plots



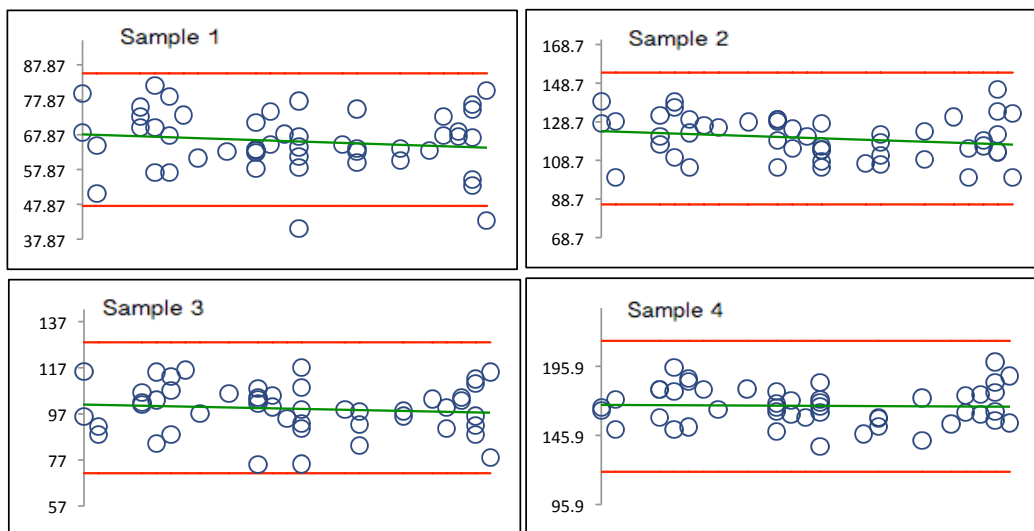
Kernel Density Plots



Annex A Summary by Analyte

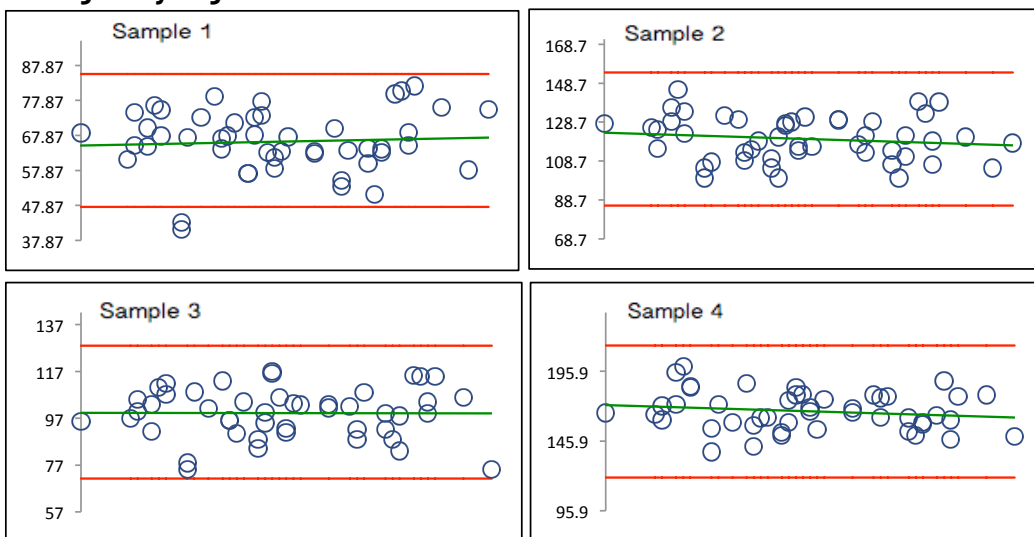
VANADIUM

Stability Regression



Reported results (Y-axis) plotted against reported analysis date (X-axis)

Homogeneity Regression



Reported results (Y-axis) plotted against bottling order (X-axis).

Annex A Summary by Analyte

ZINC

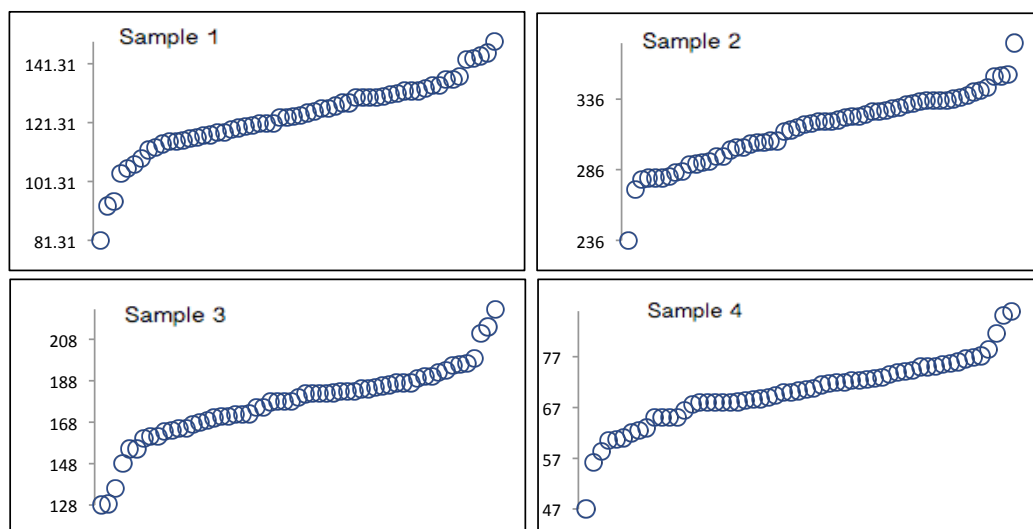
Summary Statistics

Statistic	C17-1	C17-2	C17-3	C17-4
N	58	58	57	57
Median	123	320	180	70.3
Robust Mean	124	315	178	70.1
U	1.85	4.15	2.47	0.98
Robust Standard Deviation	11.3	25.3	14.9	5.91
Regression Standard Deviation	10.2	25.5	14.5	5.89
Stability Flag				
Homogeneity Flag				
Standard Deviation Used	11.3	25.5	14.9	5.91
Outliers	0	0	1	1
$ z > 3.0$	1	1	2	1
$2 < z < 3$	3	1	5	3

Methods Used

Method	C17-1	C17-2	C17-3	C17-4
ICP/MS	34	34	34	34
ICP/OES	23	23	22	22
AA	1	1	1	1

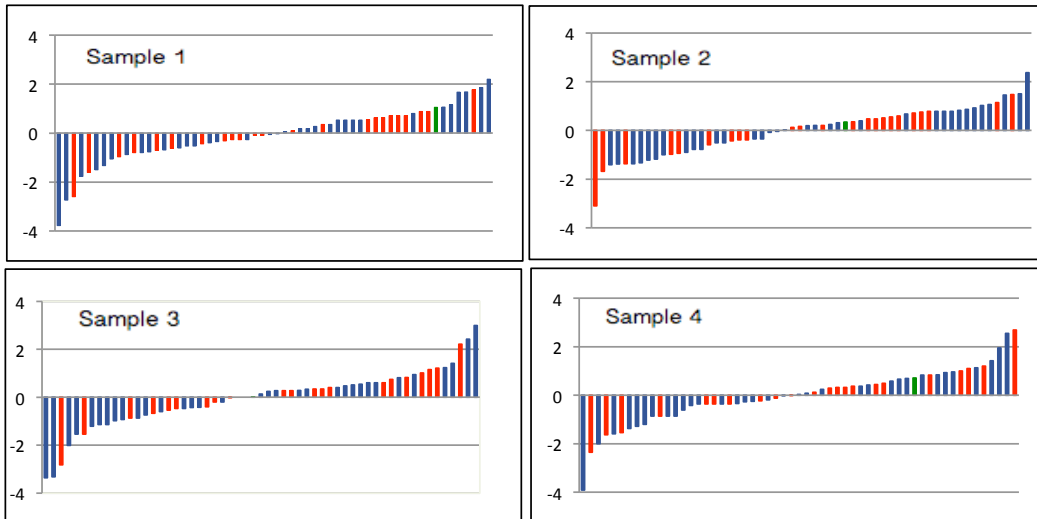
All summary stats and the plots below are based on the data excluding any flagged outliers



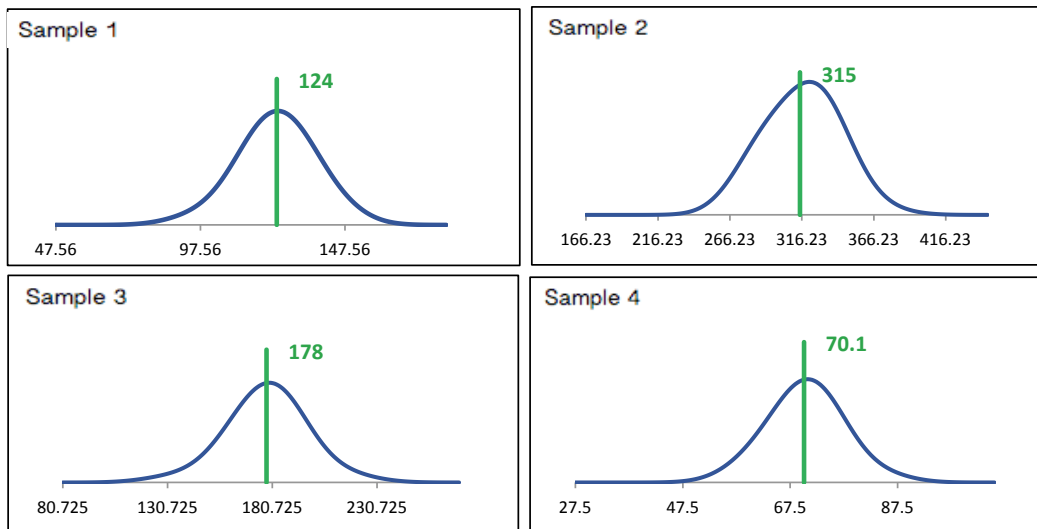
Annex A Summary by Analyte

ZINC

z-Score Plots



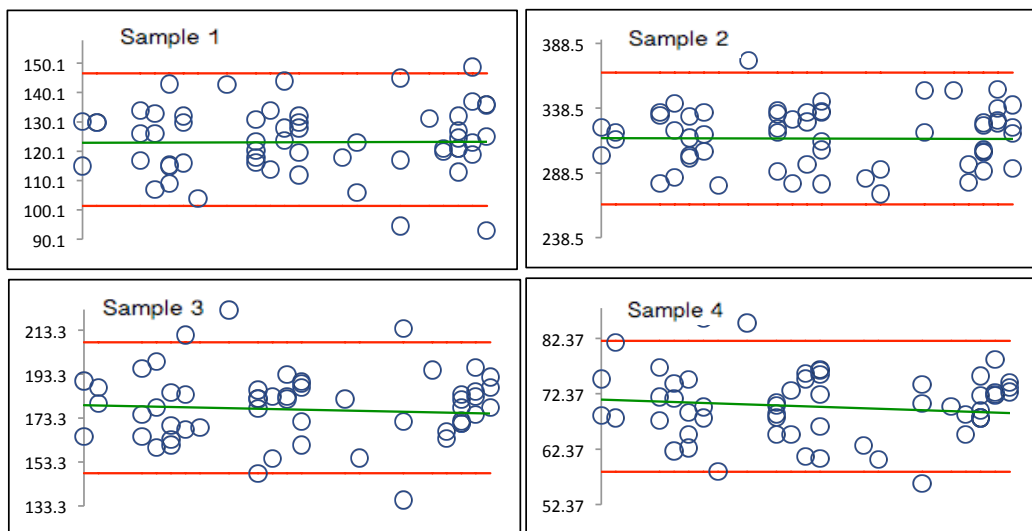
Kernel Density Plots



Annex A Summary by Analyte

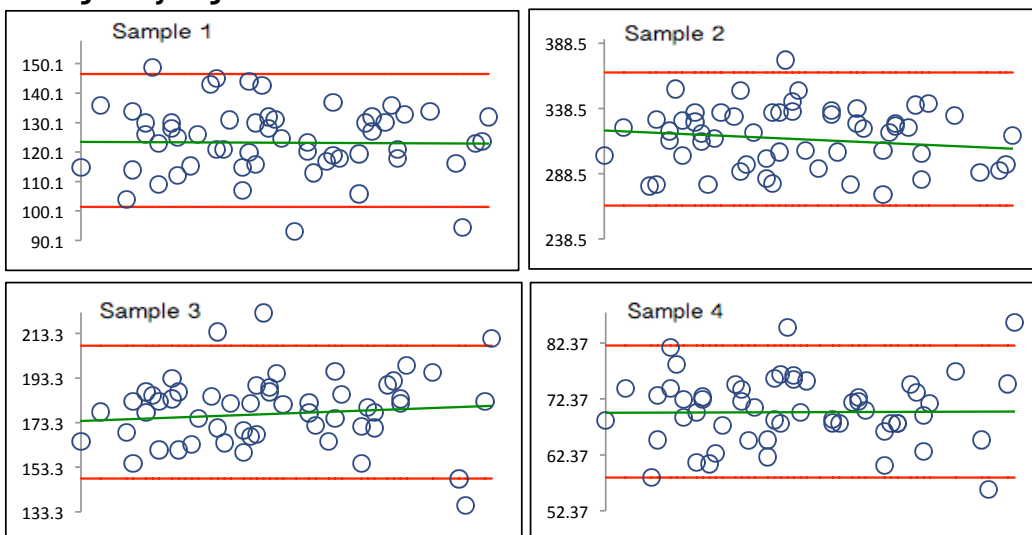
ZINC

Stability Regression



Reported results (Y-axis) plotted against reported analysis date (X-axis)

Homogeneity Regression



Reported results (Y-axis) plotted against bottling order (X-axis).