Results of Proficiency Test
Engine Oil (Used)
June 2017

Organised by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

Author: ing. G.A. Oosterlaken-Buijs
Correctors: dr. R.G. Visser & ing. A.S. Noordman - de Neef
Report : iis17L06

September 2017

- empty page -

CONTENTS

Appendices:

1 INTRODUCTION

Since 1997, a proficiency test for used Engine Oil (Lubricating Oil) is organised every year by the Institute for Interlaboratory Studies (iis). During the annual proficiency testing program 2016/2017, it was decided to continue the proficiency tests for the analysis of used Engine Oil in accordance with the latest applicable version of ASTM D4485 and SAE specifications. In total 80 laboratories from 47 different countries registered for participation in the interlaboratory study for used Engine Oil and used Engine Oil - Metals. See appendix 2 for the number of participants per country. For used Engine Oil 76 participants from 46 countries did register and for the additional sample for wear metals 68 participants from 40 countries. In this report, the results of the 2017 proficiency test on used Engine Oil are presented and discussed. This report is also electronically available through the iis website www.iisnl.com.

2 SET UP

The Institute for Interlaboratory Studies (iis) in Spijkenisse, the Netherlands, was the organiser of this proficiency test (PT). Sample analyses for fit-for-use and homogeneity testing were subcontracted to an ISO/IEC 17025 accredited laboratory. It was decided, depending on the registration, to send a bottle of 0.5 litre used Engine Oil (labelled #17096) and a bottle of 0.1 litre, 50% filled with used Engine Oil especially for wear metals (labelled #17097).
The participants were requested to report rounded and unrounded test results. The unrounded test results were preferably used for statistical evaluation.

2.1 ACCREDITATION

The Institute for Interlaboratory Studies in Spijkenisse, the Netherlands, is accredited in agreement with ISO/IEC 17043:2010 (R007), since January 2000, by the Dutch Accreditation Council (Raad voor Accreditatie). This PT falls under the accredited scope. This ensures strict adherence to protocols for sample preparation and statistical evaluation and 100% confidentiality of participant's data. Feedback from the participants on the reported data is encouraged and customer's satisfaction is measured on regular basis by sending out questionnaires.

2.2 PROTOCOL

The protocol followed in the organisation of this proficiency test was the one as described for proficiency testing in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' of March 2017 (iis-protocol, version 3.4). This protocol is electronically available through the iis website www.iisnl.com, from the FAQ page.

2.3 CONFIDENTIALITY STATEMENT

All data presented in this report must be regarded as confidential and for use by the participating companies only. Disclosure of the information in this report is only allowed by means of the entire report. Use of the contents of this report for third parties is only allowed by written permission of the Institute for Interlaboratory Studies. Disclosure of the identity of one or more of the participating companies will be done only after receipt of a written agreement of the companies involved.

2.4 SAMPLES

Used Engine Oil

The necessary bulk material, approximately 60 litres, was donated by a third party laboratory. After homogenisation, 100 brown glass bottles of 0.5 litre were filled and labelled #17096. The homogeneity of the subsamples #17096 was checked by determination of Density at 15°C in accordance with ISO 12185 and Kinematic Viscosity at 40°C in accordance with ASTM D445 on 8 stratified randomly selected samples.

	Density at 15°C in kg/L	Kinematic Viscosity at 40°C in mm^2/s
Sample #17096-1	0.89469	112.6
Sample #17096-2	0.89469	112.8
Sample #17096-3	0.89469	112.6
Sample #17096-4	0.89470	112.7
Sample #17096-5	0.89470	112.6
Sample #17096-6	0.89470	112.6
Sample #17096-7	0.89470	112.7
Sample #17096-8	0.89470	112.8

Table 1: homogeneity test results of subsamples #17096

From the above test results, the repeatabilities were calculated and compared with 0.3 times the corresponding reproducibilities of the reference test methods in agreement with the procedure of ISO13528, Annex B2 in the next table:

	Density at 15°C in kg/L	Kinematic Viscosity at 40°C in mm^2/s
r (observed)	0.00001	0.25
reference test method	ASTM D4052:16	ASTM D445:17a
0.3 * R (ref. test method)	0.00015	0.61

Table 2: evaluation of repeatabilities of the subsamples #17096

Both calculated repeatabilities are less than 0.3 times the corresponding reproducibilities of the reference test methods. Therefore, homogeneity of the subsamples #17096 was assumed.

Used Engine Oil - Metals

The necessary bulk material, approximately 10 litres, was also donated by a third party laboratory. After homogenisation, 100 PE bottles of 0.1 litre were filled with approximately 50 mL material and labelled #17097. The homogeneity of the subsamples #17097 was checked by determination of Calcium in accordance with ASTM D5185 on 8 stratified randomly selected samples.

	Calcium in mg/kg
Sample #17097-1	3272
Sample #17097-2	3258
Sample #17097-3	3283
Sample #17097-4	3273
Sample #17097-5	3250
Sample #17097-6	3208
Sample #17097-7	3234
Sample #17097-8	3261

Table 3: homogeneity test results of subsamples #17097

From the above test results, the repeatability was calculated and compared with 0.3 times the corresponding reproducibility of the reference test method in agreement with the procedure of ISO 13528, Annex B2 in the next table:

	Calcium in mg/kg
r (observed)	68
reference test method	ASTM D5185:13e1
0.3 * R (ref. test method)	166

Table 4: evaluation of repeatability of the subsamples #17097

The calculated repeatability is less than 0.3 times the corresponding reproducibility of the reference test method. Therefore, homogeneity of the subsample #17096 was assumed.

Depending on the registration to each of the participating laboratories one 0.5 litre brown glass bottle labelled #17096 (used Engine Oil) and/or one 0.1 litre PE bottle, 50% filled and labelled #17097 (Used Engine Oil - Metals) were sent on May 24, 2017. An SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

The stability of Engine Oil, packed in the brown glass bottles and PE Bottles, was checked. The material was found sufficiently stable for the period of the proficiency test.

2.6 ANALYSES

The participants were requested to determine on sample #17096: Acid Number, Base Number, Base Number (Strong), Density at 15°C, Flash Point PMcc, Fuel Dilution, Kinematic Viscosity at 40°C and at 100°C, Viscosity Index, Kinematic Viscosity by Houillon at 40°C and at 100°C and Water. The participants were requested to determine 23 elements (Wear metals: Al, Ba, B, Cd, Cr, Cu, Fe, Pb, Li, Mg, Mn, Mo, Ni, K, Na, Si, Ag, Sn, Ti and V and the additives Ca, P and Zn) on sample #17097.

It was explicitly requested to treat the samples as if they were routine samples and to report the test results using the indicated units on the report form and not to round the test results, but report as much significant figures as possible. It was also requested not to report 'less than' test results, which are above the detection limit, because such test results cannot be used for meaningful statistical calculations.

To get comparable test results, a detailed report form and a letter of instructions are prepared. On the report form the reporting units are given as well as the reference test methods that will be used during the evaluation. The detailed report form and the letter of instructions are both made available on the data entry portal www.kpmd.co.uk/sgs-iis/. The participating laboratories are also requested to confirm the sample receipt on this data entry portal. The letter of instructions can also be downloaded from the iis website www.iisnl.com.

3 RESULTS

During five weeks after sample dispatch, the test results of the individual laboratories were gathered via the data entry portal www.kpmd.co.uk/sgs-iis/. The reported test results are tabulated per determination in appendix 1 of this report. The laboratories are presented by their code numbers.

Directly after the deadline, a reminder was sent to those laboratories that had not reported test results at that moment.
Shortly after the deadline, the available test results were screened for suspect data. A test result was called suspect in case the Huber Elimination Rule (a robust outlier test) found it to be an outlier. The laboratories that produced these suspect data were asked to check the reported test results (no reanalyses). Additional or corrected test results are used for data analysis and original results are placed under 'Remarks' in the result tables in appendix 1. Test results that came in after the deadline were not taken into account in this screening for suspect data and thus these participants were not requested for checks.

3.1 STATISTICS

Statistical calculations were performed as described in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' (iis-protocol, March 2017 version 3.4). For the statistical evaluation the *unrounded* (when available) figures were used instead of the rounded test results. Test results reported as '<…' or '>…' were not used in the statistical evaluation.

First, the normality of the distribution of the various data sets per determination was checked by means of the Lilliefors-test a variant of the Kolmogorov-Smirnov test and by the calculation of skewness and kurtosis. Evaluation of the three normality indicators in combination with the visual evaluation of the graphic Kernel density plot, lead to judgement of the normality being either ‘unknown’, ‘OK’, ‘suspect’ or ‘not OK’. After removal of outliers, this check was repeated. If a dataset does not have a normal distribution, the (results of the) statistical evaluation should be used with due care.

Accordancing to ISO 5725 the original test results per determination were submitted subsequently to Dixon’s and/or Grubbs’ and/or Rosner’s outlier tests. Outliers are marked by D(0.01) for the Dixon’s test, by G(0.01) or DG(0.01) for the Grubbs’ test and by R(0.01) for the Rosner’s test. Stragglers are marked by D(0.05) for the Dixon’s test, by G(0.05) or DG(0.05) for the Grubbs’ test and by R(0.05) for the Rosner’s test. Both outliers and stragglers were not included in the calculations of the averages and the standard deviations.

For each assigned value the uncertainty was determined in accordance with ISO13528. Subsequently the calculated uncertainty was evaluated against the respective requirement based on the target reproducibility in accordance with ISO13528. When the uncertainty passed the evaluation no remarks are made in the report. However, when the uncertainty failed the evaluation it is mentioned in the report and it will have consequences for the evaluation of the test results.

Finally, the reproducibilities were calculated from the standard deviations by multiplying them with a factor of 2.8.

3.2 GRAPHICS

In order to visualize the data against the reproducibilities from literature, Gauss plots were made, using the sorted data for one determination (see appendix 1). On the Y-axis the reported test results are plotted. The corresponding laboratory numbers are on the X-axis. The straight horizontal line presents the consensus value (a trimmed mean). The four striped lines, parallel to the consensus value line, are the +3s, +2s, -2s and -3s target reproducibility limits of the selected standard. Outliers and other data, which were excluded from the calculations, are represented as a “x”. Accepted data are represented as a triangle. Furthermore, Kernel Density Graphs were made. This is a method for producing a smooth density approximation to a set of data that avoids some problems associated with histograms. Also a normal Gauss curve was projected over the Kernel Density Graph.

3.3 Z-SCORES

To evaluate the performance of the participating laboratories the z-scores were calculated. As it was decided to evaluate the performance of the participants in this proficiency test (PT) against the literature requirements, e.g. ASTM reproducibilities, the z-scores were calculated using a target standard deviation. This results in an evaluation independent of the variation in this interlaboratory study.

The target standard deviation was calculated from the literature reproducibility by division with 2.8. In case no literature reproducibility was available, other target values were used. In some cases, a reproducibility based on former iis proficiency tests could be used.

When a laboratory did use a test method with a reproducibility that is significantly different from the reproducibility of the reference test method used in this report, it is strongly advised to recalculate the z-score, while using the reproducibility of the actual test method used, this in order to evaluate whether the reported test result is fit-for-use.

The z-scores were calculated according to:

$$z_{(target)} = (\text{test result} - \text{average of PT}) / \text{target standard deviation}$$

The $z_{(target)}$ scores are listed in the test result tables of appendix 1.

Absolute values for z<2 are very common and absolute values for z>3 are very rare.
Therefore, the usual interpretation of z-scores is as follows:

|z| < 1 good
1 < |z| < 2 satisfactory
2 < |z| < 3 questionable
3 < |z| unsatisfactory

4 EVALUATION

In this interlaboratory study, some problems with sample dispatch were encountered due to several reasons. Some laboratories in Algeria, Indonesia, Jordan received the sample(s) rather late or not at all. For the main round used Engine Oil, three participants did not report any test results at all. For the PT on the additional sample for wear metals six participants did not report any test results at all.
Not all laboratories were able to report all analyses requested. In total 77 participants reported 1680 test results. Observed were 72 statistically outlying test results, which is 4.3% of the numerical test results. In proficiency studies, outlier percentages of 3% - 7.5% are quite normal.

Not all original data sets proved to have a normal Gaussian distribution. These are referred to as “not OK” or “suspect”. The statistical evaluation of these data sets should be used with due care, see also paragraph 3.1.

4.1 EVALUATION PER SAMPLE AND PER TEST

In this section, the reported test results are discussed per sample and per test. The test methods, which were used by the various laboratories were taken into account for explaining the observed differences when possible and applicable. These methods are also in the tables together with the original data. The abbreviations, used in these tables, are listed in appendix 3.

Unfortunately, a suitable standard test method, providing the precision data, is not available for all determinations. For the tests, that have no available precision data, the calculated reproducibility was compared against the reproducibility estimated from the Horwitz equation.

In the iis PT reports, ASTM methods are referred to with a number (e.g. D4739) and an added designation for the year that the method was adopted or revised (e.g. D4739:11). If applicable, a designation in parentheses is added to designate the year of reapproval (e.g. D4739:11(2017)). In the results tables of Appendix 1 only the method number and year of adoption or revision e.g. D4739:11 will be used.

As used Engine Oil is a complex matrix to analyze, strict adherence to the test methods with regards to sample preparation, is advised. Improper sample preparation may be the cause of disagreement of the calculated reproducibility with the requirements of the respective reference test method. Also, one should be aware that for each element spectral interferences may occur, and differences may occur in uptake rates between test specimen and standard solutions through viscosity effects.

Used Engine Oil: sample #17096

Acid Number: This determination was not problematic. One statistical outlier was observed and one other test result was excluded. However, the calculated reproducibility after rejection of the suspect data is in agreement with the requirements of ASTM D664-A:11a(2017).

Base Number: This determination was problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of ASTM D2896:15 (forward filtration).
Also when the reported data of ASTM D2896 were evaluated separately for procedure A and B, the calculated reproducibilities after rejection of the statistical outliers are not in agreement with the respective requirements of ASTM D2896 (-A or -B):15 (forward filtration).

.

Base Number (Strong): This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D4739:11(2017).

Density at 15°C: This determination may be problematic for a number of laboratories. Five statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in full agreement with the requirements of ASTM D4052:16.

Flash Point PMcc: ASTM D93 states the following in the scope: Procedure A is applicable to new and in-use lubricating oils. Procedure B is applicable to used lubricating oils. This may mean that in-use or used lubrication oils may be measured with procedure A as well as with procedure B.

Since the reproducibilities of both methods procedures is different, it was decided to evaluate the test results for both procedures separately.
The average of Flash Point for sample #17096 in 2017 PT is the same for both procedures of ASTM D93 (procedure A: mean = 167.3 °C and procedure B: mean = 167.1 °C).

ASTM D93-A: this determination was not problematic. Two statistical outliers were observed and four other test results were excluded. However, the calculated reproducibility after rejection of the suspect data is in good agreement with the requirements of ASTM D93-A:16a.

ASTM D93-B: this determination was problematic. No statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of ASTM D93-B:16a.

Fuel dilution: This determination was problematic. No statistical outliers were observed. However, the calculated reproducibility is not in agreement with the requirements of ASTM D3524:14.

Kin.Visco. at 40°C: This determination was not problematic. One statistical outlier was observed. However, the calculated reproducibility after rejection of the statistical outlier is in good agreement with the requirements of ASTM D445:17a.

Kin.Visco. at 100°C: This determination was problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of ASTM D445:17a.

Viscosity Index: This determination was not problematic. One statistical outlier was observed and eight other test results were excluded. However, the calculated reproducibility after rejection of the suspect data is in agreement with the requirements of ASTM D2270:10(2016).

Kin.Visco. at 40°C (Houillon): This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in good agreement with the requirements of ASTM D7279:16.

Kin.Visco. at 100°C (Houillon): This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D7279:16.

Water: The preferred method to use for a product containing interfering components may be ASTM D6304:07 method C. This method is applicable for oils with difficult matrix interferences. Thirty one laboratories reported test results determined according ASTM D6304 method C. After excluding fourteen test results from other test methods the calculated reproducibility is in good agreement with the requirements of ASTM D6304-C:16e1.

Used Engine Oil - Metals: sample #17097

One laboratory reported deviating results for many of the elements (wear metals and additives). As the test results of the elements are not independent, it was decided not to use any of the reported results of this laboratory for evaluation. The test results of the metals that were not already statistical outliers, were excluded.

Aluminium: This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in good agreement with the requirements of ASTM D5185:13e1.

Barium: This determination was not problematic. Five statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D5185:13e1.

Boron: This determination was not problematic. Four statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in good agreement with the requirements of ASTM D5185:13e1.

Cadmium: This determination may not be problematic. Three statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in good agreement with the estimated requirements using the Horwitz equation.

Chromium: This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in full agreement with the requirements of ASTM D5185:13e1.

Copper: This determination was not problematic. Three statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in full agreement with the requirements of ASTM D5185:13e1.

Iron: This determination was not problematic. Three statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in full agreement with the requirements of ASTM D5185:13e1.

Lead: This determination was not problematic. Five statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D5185:13e1.

Lithium: Almost all the laboratories agreed on a value <2.5 mg/kg. One laboratory reported a possibly false positive test result.

Magnesium: This determination was not problematic. Five statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in good agreement with the requirements of ASTM D5185:13e1.

Manganese: This determination was not problematic. One statistical outlier was observed. However, the calculated reproducibility after rejection of the statistical outlier is in full agreement with the requirements of ASTM D5185:13e1.

Molybdenum: This determination was not problematic. One statistical outlier was observed. However, the calculated reproducibility after rejection of the statistical outlier is in full agreement with the requirements of ASTM D5185:13e1.

Nickel: This determination was not problematic. Three statistical outliers were observed and one other test result was excluded. However, the calculated reproducibility after rejection of the suspect data is in good agreement with the requirements of ASTM D5185:13e1.

Potassium: Thirty-one participants reported a numerical result, averaging around 1.3 mg/kg. Other laboratories reported <2.5, <20 or <40. One statistical outlier was observed and one test result was excluded. Since the average found for this element is below the application range of ASTM D5185, it was decided not to calculate z-scores.

Sodium: This determination was not problematic. Two statistical outliers were observed and one other test result was excluded. However, the calculated reproducibility after rejection of the suspect data is in good agreement with the requirements of ASTM D5185:13e1.

Silicon: This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in good agreement with the requirements of ASTM D5185:13e1.

Silver: This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in good agreement with the requirements of ASTM D5185:13e1.

Tin: This determination was not problematic. No statistical outliers were observed, but one test result was excluded. However, the calculated reproducibility after rejection of the suspect data is in good agreement with the requirements of ASTM D5185:13e1.

Titanium: This determination was not problematic. Five statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D5185:13e1.

Vanadium: This determination was not problematic. One statistical outlier was observed. However, the calculated reproducibility after rejection of the statistical outlier is in good agreement with the requirements of ASTM D5185:13e1.

Calcium: This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outlier is in full agreement with the requirements of ASTM D5185:13e1.

Phosphorus: This determination was problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the requirements of ASTM D5185:13e1.

Zinc: This determination was not problematic. Three statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outlier is in full agreement with the requirements of ASTM D5185:13e1.

4.2 PERFORMANCE EVALUATION FOR THE GROUP OF LABORATORIES

A comparison has been made between the reproducibility as declared by the relevant reference test method and the reproducibility as found for the group of participating laboratories. The average results, calculated reproducibilities and reproducibilities derived from literature reference test methods (in casu ASTM and IP reference test methods), are compared in the next tables:

Parameter	unit	n	average	2.8 * sd	R (lit)
Acid Number	mg KOH/g	54	3.25	1.51	1.43
Base Number	mg KOH/g	48	9.80	1.08	0.69
Base Number (Strong)	mg KOH/g	18	8.24	1.69	4.12
Density at 15°C	kg/L	46	0.8947	0.0005	0.0005
Flash Point PMcc – method A	°C	29	167.3	7.3	11.9
Flash Point PMcc – method B	°C	21	167.1	16.0	10
Fuel dilution	%M/M	14	4.2	3.0	1.6
Kinematic Viscosity at 40°C	mm^2/s	60	113.29	1.17	2.05
Kinematic Viscosity at 100°C	mm^2/s	56	13.249	0.199	0.147
Viscosity Index		46	112.7	2.2	2
Kinematic Viscosity (Houillon) at 40°C	mm^2/s	19	113.37	1.74	3.40
Kinematic Viscosity (Houillon) at 100°C	mm^2/s	17	13.298	0.189	0.745
Water	mg/kg	31	323	338	541

Table 5: reproducibilities of tests on sample #17096

Parameter	unit	n	average	2.8 * sd	R (lit)
Aluminium as Al	mg/kg	54	16.6	5.6	7.9
Barium as Ba	mg/kg	49	16.0	3.7	7.6
Boron as B	mg/kg	36	16.6	8.5	13.4
Cadmium as Cd	mg/kg	32	15.4	3.8	4.6 *)
Chromium as Cr	mg/kg	59	15.7	4.1	4.3
Copper as Cu	mg/kg	57	16.4	3.7	3.9
Iron as Fe	mg/kg	57	21.8	6.1	6.1
Lead as Pb	mg/kg	54	16.2	3.8	8.2
Lithium as Li	mg/kg	18	<2.5	n.a.	n.a.
Magnesium as Mg	mg/kg	49	23.7	5.7	8.2
Manganese as Mn	mg/kg	52	16.0	3.7	3.6
Molybdenum as Mo	mg/kg	54	15.7	4.6	4.5
Nickel as Ni	mg/kg	56	15.5	4.7	5.9
Potassium as K	mg/kg	29	(1.3) **)	(2.2) **)	n.a.
Sodium as Na	mg/kg	47	17.0	6.7	8.2
Silicon as Si	mg/kg	54	18.0	5.3	9.0
Silver as Ag	mg/kg	48	16.3	3.4	5.7
Tin as Sn	mg/kg	54	15.8	7.1	11.6
Titanium as Ti	mg/kg	47	15.4	3.1	9.1
Vanadium as V	mg/kg	57	15.6	4.4	5.7
Calcium as Ca	mg/kg	54	3167	531	533
Phosphorus as P	mg/kg	56	1255	230	152
Zinc as Zn	mg/kg	54	1411	250	242

Table 6: reproducibilities of tests on sample #17097

*) against the Horwitz equation

**) between brackets: evaluation with care as consensus value is below the application range of the reference test method

Without further statistical calculations, it could be concluded that for many tests there is a good compliance of the group of participating laboratories with the relevant reference test methods. The problematic tests have been discussed in paragraph 4.1.

4.3 COMPARISON OF THE PROFICIENCY TEST OF JUNE 2017 WITH PREVIOUS PTS

	June 2017	June 2016	June 2015	June 2014	May 2013
Number of reporting participants	77	85	80	88	83
Number of results reported	1679	1890	1555	2150	1476
Statistical outliers	72	57	66	61	90
Percentage outliers	4.3%	3.0%	4.2%	2.8%	6.1%

Table 7: comparison with previous proficiency tests

In proficiency tests, outlier percentages of 3% - 7.5% are quite normal.

The performance of the determinations of the proficiency tests was compared against the requirements of the respective standards. The conclusions are given the following table:

Determination	June 2017	June 2016	June 2015	June 2014 *)	May 2013
Acid Number	+/-	--	--	--	-
Base Number	-	--	-	--	--
Base Number (Strong)	++	++	++	++	++
Density at 15°C	+/-	-	+/-	+	--
Flash Point PMcc – method A	+	-	-	-	--
Flash Point PMcc – method B	-	--	--	-	--
Fuel dilution	-	++	+	++	n.e.
Kinematic Viscosity at 40°C	+	++	+	++	++
Kinematic Viscosity at 100°C	-	++	+/-	++	++
Viscosity Index	+/-	--	--	--	-
Kinematic Viscosity (Houillon) at 40°C	+	++	++	++	++
Kinematic Viscosity (Houillon) at 100°C	++	++	++	++	++
Water	+	++	++	-	+
Metals (23 elements) (D5185)	+	+ **)	+ **)	+ **)	+ **)
Metals (D6595)	n.e.	+ **)	n.e.	n.e.	n.e.

Table 8: comparison determinations against the requirements of the reference standards

*) only for sample #14083

**) metals: 20 elements

The performance of the determinations against the requirements of the respective reference test methods is listed in the above table. The following performance categories were used:

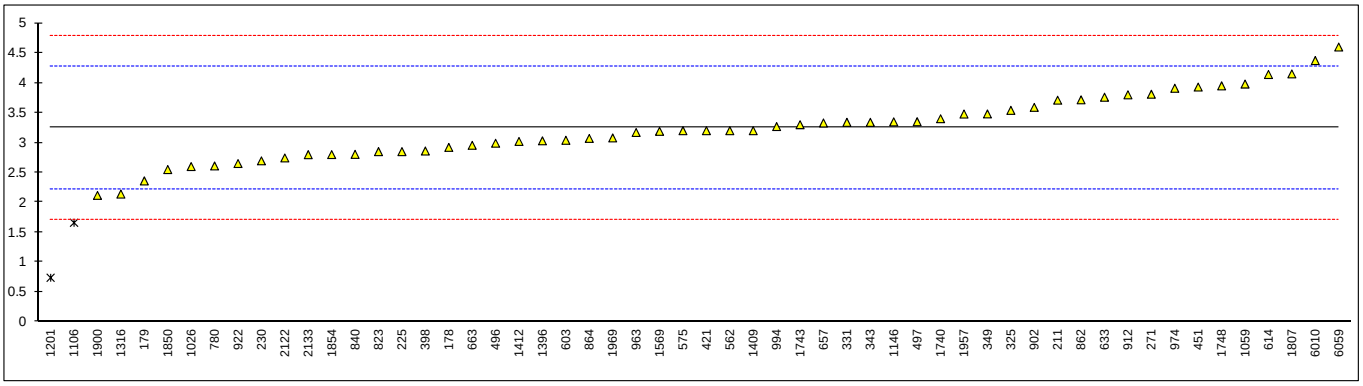
++: group performed much better than the reference test method
+ : group performed better than the reference test method
+/-: group performance equals the reference test method
- : group performed worse than the reference test method
-- : group performed much worse than the reference test method
n.e.: not evaluated

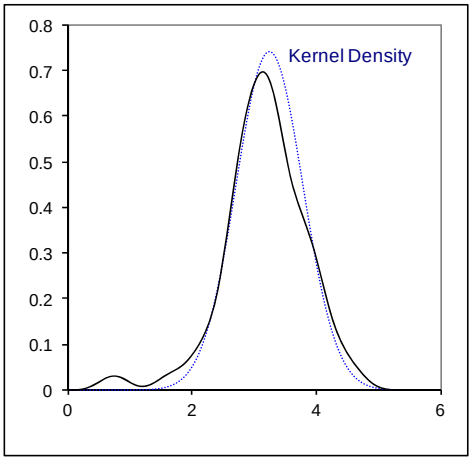
APPENDIX 1

Determination of Acid Number on Sample #17096; results in mg KOH/g

lab	method	value	mark	z(targ)	remarks
178	D664 mod.	2.92		-0.64	
179	D664-A	2.36		-1.74	
211	D664-A	3.71		0.91	
214		-----		-----	
225	D664-A	2.85		-0.78	
230	D664-A	2.695		-1.08	
237		-----		-----	
252		-----		-----	
254		-----		-----	
255		-----		-----	
271	D664-A	3.81		1.11	
311		-----		-----	
325	D664-A	3.54		0.58	
331	D664 mod.	3.34		0.18	
333		-----		-----	
343	D664-A	3.34		0.18	
349	D664-A	3.48		0.46	
398	D664-A	2.86		-0.76	
421	ISO6619	3.2		-0.09	
451	D664 mod.	3.93		1.34	
496	D664-A	2.99		-0.50	
497	D664-A	3.35		0.20	
511		-----		-----	
512		-----		-----	
541		-----		-----	
562	D664-A	3.2		-0.09	
575	D664-A	3.20		-0.09	
603	D664-A	3.04		-0.40	
614	D974	4.14		1.75	
621		-----		-----	
633	D664-A	3.76		1.01	
634		-----		-----	
657	D664-A	3.329		0.16	
663	D664-A	2.955		-0.57	
780	D664-A	2.61		-1.25	
823	D664-A	2.85		-0.78	
840	D664-A	2.804		-0.87	
862	D664-A	3.7161		0.92	
864	D664-A	3.07		-0.35	
875		-----		-----	
902	D664-A	3.59		0.67	
912	D664-A	3.80		1.09	
922	D664-A	2.65		-1.17	
963	D664-A	3.17		-0.15	
974	D664-A	3.91		1.30	
994	D664-A	3.269		0.04	
1023		-----	W	-----	First reported 1.31
1026	D664-A	2.6		-1.27	
1059	ISO6619	3.98		1.44	
1106	D664-B	1.6593	ex	-3.11	Result excluded, method is not equivalent to ASTM D664-A
1146	D664-A	3.348		0.20	
1173		-----		-----	
1201	D664-A	0.74	R(0.01)	-4.91	
1316	D664-A	2.14		-2.17	
1320		-----		-----	
1396	D664-A	3.03		-0.42	
1409	D664-A	3.2		-0.09	
1412	D664-A	3.02		-0.44	
1435		-----		-----	
1456		-----		-----	
1551		-----	W	-----	First reported 0
1569	D664-A	3.19		-0.11	
1648		-----		-----	
1740	D664-A	3.40		0.30	
1743	D664-A	3.3		0.11	
1748	D664-A	3.95		1.38	
1807	D664-A	4.15		1.77	
1850	ISO6619	2.55		-1.36	
1854	D664-A	2.8		-0.87	
1900	D8045	2.117		-2.21	
1957	D664-A	3.479		0.46	
1969	D664-A	3.079		-0.33	
2122	IP177	2.7440166		-0.98	
2133	D664-A	2.799		-0.88	
6010	D664-A	4.373		2.21	
6059	D664-A	4.60		2.65	

normality	OK
n	54
outliers	1 (+ 1ex)
mean (n)	3.246
st.dev. (n)	0.5391
R(calc.)	1.510
R(D664-A:11a)	1.428





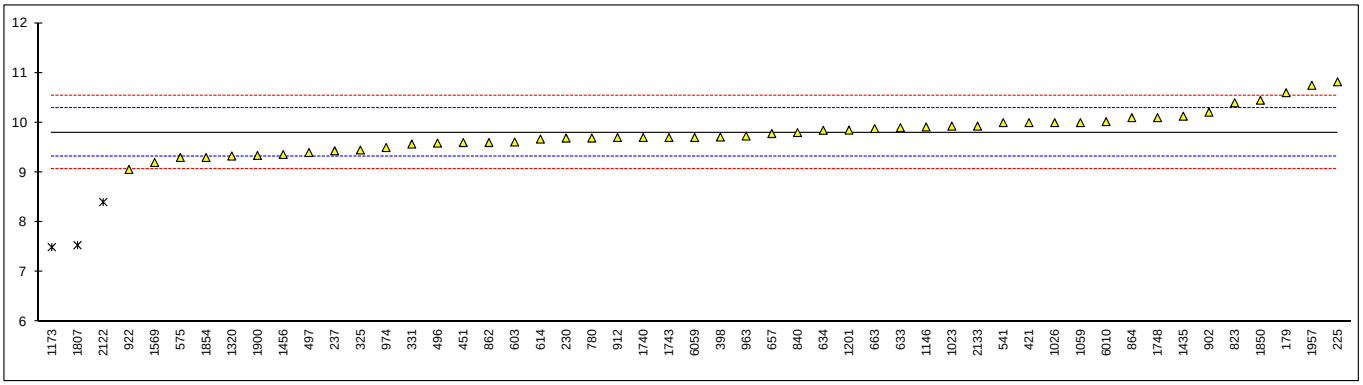
Determination of Base Number on Sample #17096; results in mg KOH/g

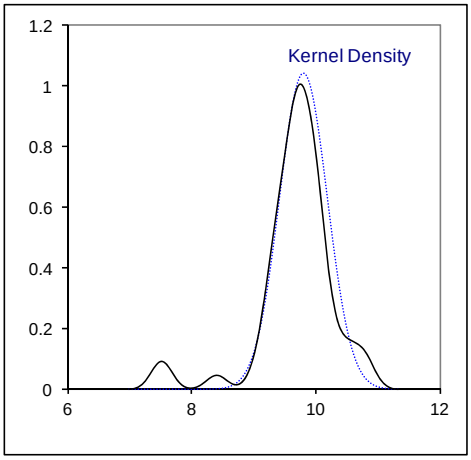
lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179	D2896 - B	10.60	C	3.27	First reported 11.19
211		-----		-----	
214		-----		-----	
225	D2896 - B	10.82		4.17	
230	INH-10	9.69		-0.44	
237	D2896 - B	9.435		-1.49	
252		-----		-----	
254		-----		-----	
255		-----		-----	
271		-----		-----	
311		-----		-----	
325	D2896 - B	9.45		-1.42	
331	D2896 mod	9.57		-0.93	
333		-----		-----	
343		-----		-----	
349		-----		-----	
398	D2896 - B	9.711		-0.36	
421	ISO3771	10.0		0.82	
451	D2896 mod.	9.6		-0.81	
496	D2896 - B	9.59		-0.85	
497	D2896 - B	9.4		-1.63	
511		-----		-----	
512		-----		-----	
541	D2896 - B	10.0		0.82	
562		-----		-----	
575	D2896 - B	9.3		-2.04	
603	D2896 - A1	9.61	C	-0.77	First reported 3.79
614	D2896 - B	9.67		-0.53	
621		-----		-----	
633	D2896 - A1	9.90		0.41	
634	D2896 - B	9.845		0.19	
657	D2896 - B	9.78		-0.08	
663	D2896 - B	9.88		0.33	
780	D2896 - B	9.69		-0.44	
823	D2896 - A1	10.4		2.45	
840	D2896 - B	9.80		0.00	
862	D2896 - B	9.6		-0.81	
864	D2896 - A1	10.1		1.23	
875		-----		-----	
902	D2896 - B	10.21		1.68	
912	D2896 - B	9.70		-0.40	
922	D2896 - B	9.06		-3.02	
963	D2896 - A1	9.73		-0.28	
974	D2896 - B	9.5		-1.22	
994		-----		-----	
1023	D2896	9.93		0.54	
1026	D2896 - B	10.0		0.82	
1059	ISO3771	10.0		0.82	
1106		-----		-----	
1146	D2896 - A1	9.912		0.46	
1173	D5984 mod.	7.5	R(0.01)	-9.38	
1201	D2896 - B	9.85		0.21	
1316		-----		-----	
1320	D2896 - B	9.33		-1.91	
1396		-----		-----	
1409		-----		-----	
1412		-----		-----	
1435	D2896 - A1	10.13		1.35	
1456	D2896 - A1	9.36		-1.79	
1551		-----		-----	
1569	D2896 - A1	9.2		-2.44	
1648		-----	W	-----	First reported 11.7
1740	D2896 - A1	9.7		-0.40	
1743	D2896 - B	9.7		-0.40	
1748	D2896 - A1	10.10		1.23	
1807	D2896 - A1	7.54	R(0.01)	-9.22	
1850	ISO3771	10.45		2.66	
1854	D2896 - B	9.3		-2.04	
1900	INH	9.340		-1.87	Reported method: Inhouse thermotitration
1957	D2896 - A1	10.75		3.88	
1969		-----		-----	
2122	IP400	8.4048	R(0.05)	-5.69	
2133	D2896 - B	9.93		0.54	
6010	D2896 - B	10.02		0.90	
6059	D2896 - B	9.70		-0.40	
					Only method A Only method B

normality	OK	OK	OK
n	48	12	26
outliers	3	1	2
mean (n)	9.799	9.908	9.671
st.dev. (n)	0.3844	0.4306	0.2697
R(calc.)	1.076	1.206	0.755
R(D2896:15)	0.686 *)	0.694 *)	0.677 *)
Compare R(D2896:15)		3.170 **)	

*) forward titration

**) backward titration

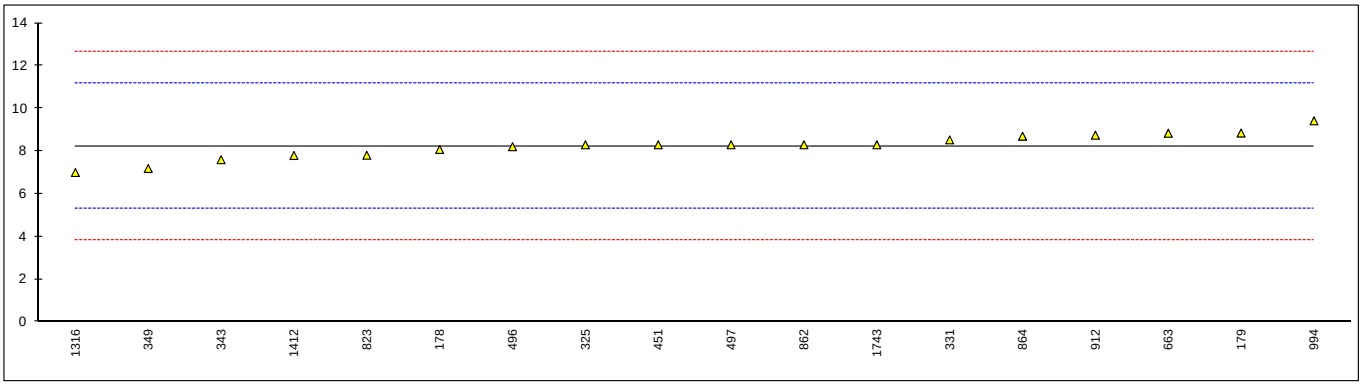


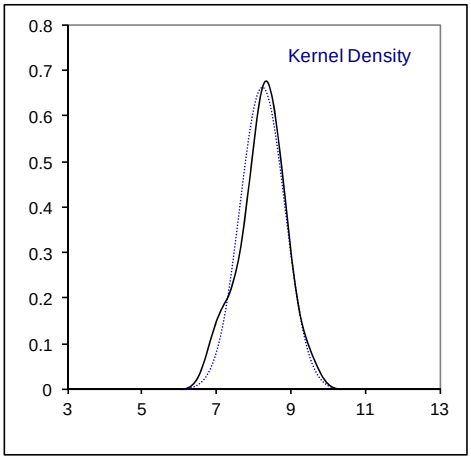


Determination of Base Number (Strong) on Sample #17096; results in mg KOH/g

lab	method	value	mark	z(targ)	remarks
178	D4739 mod	8.08		-0.11	
179	D4739	8.85		0.42	
211		-----		-----	
214		-----		-----	
225		-----		-----	
230		-----		-----	
237		-----		-----	
252		-----		-----	
254		-----		-----	
255		-----		-----	
271		-----		-----	
311		-----		-----	
325	D4739	8.3		0.04	
331	D4739 mod	8.53		0.20	
333		-----		-----	
343	D4739	7.6		-0.43	
349	D4739	7.19		-0.71	
398		-----		-----	
421		-----		-----	
451	D4739	8.3		0.04	
496	D4739	8.21		-0.02	
497	D4739	8.3		0.04	
511		-----		-----	
512		-----		-----	
541		-----		-----	
562		-----		-----	
575		-----		-----	
603		-----		-----	
614		-----		-----	
621		-----		-----	
633		-----		-----	
634		-----		-----	
657		-----		-----	
663	D4739	8.84		0.41	
780		-----		-----	
823	D4739	7.81		-0.29	
840		-----		-----	
862	D4739	8.3		0.04	
864	D4739	8.7		0.31	
875		-----		-----	
902		-----		-----	
912	D4739	8.75		0.35	
922		-----		-----	
963		-----		-----	
974		-----		-----	
994	D4739	9.421		0.80	
1023		-----		-----	
1026		-----		-----	
1059		-----		-----	
1106		-----		-----	
1146		-----		-----	
1173		-----		-----	
1201		-----		-----	
1316	D4739	7.00		-0.84	
1320		-----		-----	
1396		-----		-----	
1409		-----		-----	
1412	D4739	7.80		-0.30	
1435		-----		-----	
1456		-----		-----	
1551		-----		-----	
1569		-----		-----	
1648		-----		-----	
1740		-----		-----	
1743	D4739	8.3		0.04	
1748		-----		-----	
1807		-----		-----	
1850		-----		-----	
1854		-----		-----	
1900		-----		-----	
1957		-----		-----	
1969		-----		-----	
2122		-----		-----	
2133		-----		-----	
6010		-----		-----	
6059		-----		-----	

normality	OK
n	18
outliers	0
mean (n)	8.238
st.dev. (n)	0.6017
R(calc.)	1.685
R(D4739:11)	4.122

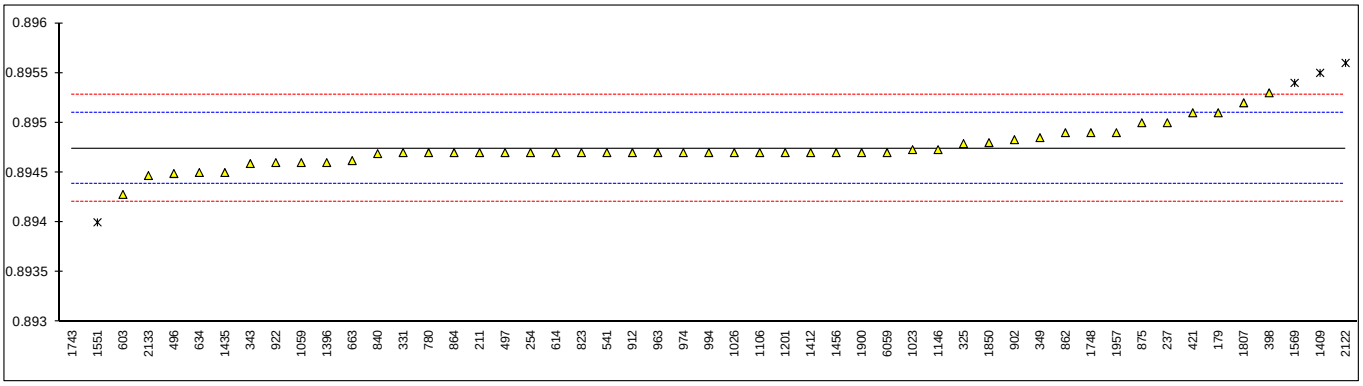


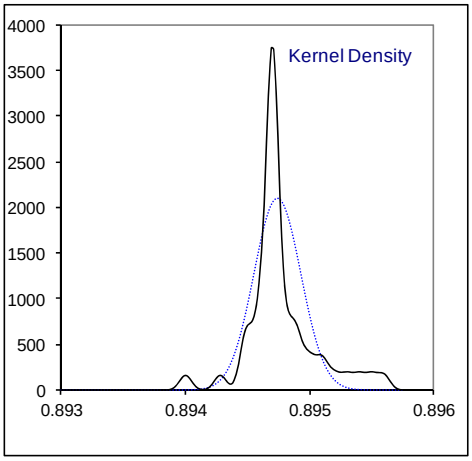


Determination of Density at 15°C on Sample #17096; results in kg/L

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179	D4052	0.8951		2.01	
211	D4052	0.8947		-0.23	
214		-----		-----	
225		-----		-----	
230		-----		-----	
237	D4052	0.8950		1.45	
252		-----		-----	
254	D4052	0.8947		-0.23	
255		-----		-----	
271		-----		-----	
311		-----		-----	
325	D4052	0.89479		0.28	
331	D4052	0.8947		-0.23	
333		-----		-----	
343	D4052	0.89459		-0.84	
349	D4052	0.89485		0.61	
398	D4052	0.8953		3.13	
421	ISO12185	0.8951	C	2.01	First reported 893.6 kg/m^3
451		-----		-----	
496	D4052	0.89449		-1.40	
497	D4052	0.8947		-0.23	
511		-----		-----	
512		-----		-----	
541	D4052	0.8947		-0.23	
562		-----		-----	
575		-----		-----	
603	D4052	0.89428		-2.58	
614	D4052	0.8947		-0.23	
621		-----		-----	
633		-----		-----	
634	D4052	0.89450		-1.35	
657		-----		-----	
663	D4052	0.89462		-0.67	
780	D4052	0.8947		-0.23	
823	D4052	0.8947		-0.23	
840	D4052	0.89469		-0.28	
862	D4052	0.8949		0.89	
864	D4052	0.8947		-0.23	
875	D4052	0.8950		1.45	
902	D4052	0.89483		0.50	
912	D4052	0.8947		-0.23	
922	D4052	0.8946		-0.79	
963	D4052	0.8947		-0.23	
974	D4052	0.8947		-0.23	
994	D4052	0.8947		-0.23	
1023	D4052	0.89473		-0.06	
1026	D4052	0.8947		-0.23	
1059	D4052	0.8946		-0.79	
1106	D5002	0.8947		-0.23	
1146	D4052	0.89473	C	-0.06	First reported 0.89743
1173		-----		-----	
1201	D4052	0.8947		-0.23	
1316		-----		-----	
1320		-----		-----	
1396	IP365	0.8946		-0.79	
1409	ISO12185	0.8955	R(0.05)	4.25	
1412	D4052	0.8947		-0.23	
1435	D4052	0.8945		-1.35	
1456	D4052	0.8947		-0.23	
1551		0.8940	R(0.05)	-4.15	
1569	ISO12185	0.8954	R(0.05)	3.69	
1648		-----		-----	
1740		-----		-----	
1743	ISO12185	0.8910	R(0.01)	-20.95	
1748	D4052	0.8949		0.89	
1807	D4052	0.8952		2.57	
1850	D4052	0.8948		0.33	
1854		-----		-----	
1900	D4052	0.8947		-0.23	
1957	D4052	0.8949		0.89	
1969		-----		-----	
2122	D4052	0.8956	R(0.05)	4.81	
2133	D4052	0.89447		-1.51	
6010		-----		-----	
6059	D4052	0.8947		-0.23	

normality	suspect
n	46
outliers	5
mean (n)	0.89474
st.dev. (n)	0.000189
R(calc.)	0.00053
R(D4052:16)	0.00050

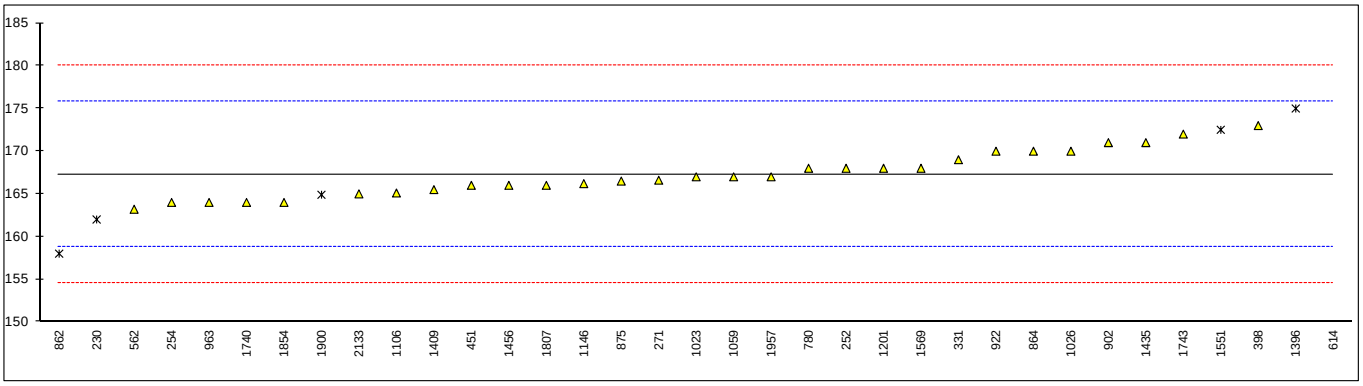


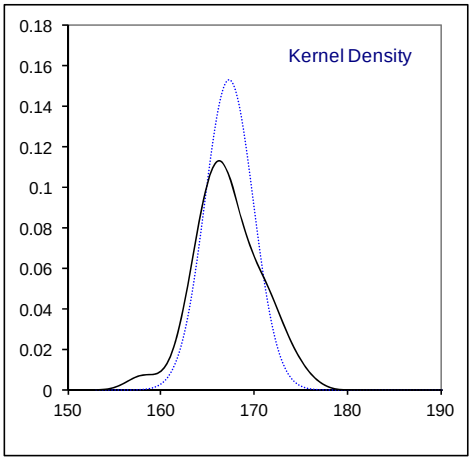


Determination of Flash Point PMcc (procedure A) on Sample #17096; results in °C

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211		-----		-----	
214		-----		-----	
225		-----		-----	
230	D3828	162	ex	-1.24	Result excluded, method is not equivalent to ASTM D93
237		-----		-----	
252	D93-A	168		0.17	
254	D93-A	164		-0.77	
255		-----		-----	
271	D93-A	166.6		-0.16	
311		-----		-----	
325		-----		-----	
331	D93-A	169.0		0.41	
333		-----		-----	
343		-----		-----	
349		-----		-----	
398	D93-A	173		1.35	
421		-----		-----	
451	D93-A	166		-0.30	
496		-----		-----	
497		-----		-----	
511		-----		-----	
512		-----		-----	
541		-----		-----	
562	D93-A	163.2		-0.96	
575		-----		-----	
603		-----		-----	
614	D93-A	209	R(0.01)	9.84	
621		-----		-----	
633		-----		-----	
634		-----		-----	
657		-----		-----	
663		-----		-----	
780	D93-A	168.0		0.17	
823		-----		-----	
840		-----		-----	
862	D93-A	158	R(0.05)	-2.19	
864	D93-A	170.0		0.64	
875	D93-A	166.5		-0.18	
902	D93-A	171.0		0.88	
912		-----		-----	
922	D93-A	170.0		0.64	
963	D93-A	164		-0.77	
974		-----		-----	
994		-----		-----	
1023	D93-A	167		-0.07	
1026	D93-A	170.0		0.64	
1059	ISO2719-A	167.0		-0.07	
1106	D93-A	165.1		-0.51	
1146	D93-A mod	166.2		-0.25	Reported method: Inhouse PMcc (equivalent D93-A)
1173		-----		-----	
1201	D93-A	168.0		0.17	
1316		-----		-----	
1320		-----		-----	
1396	IP523	175	ex	1.82	Result excluded, method is not equivalent to ASTM D93
1409	ISO2719-A	165.5		-0.42	
1412		-----		-----	
1435	D93-A	171		0.88	
1456	D93-A	166.0		-0.30	
1551	IP523	172.5	ex	1.23	Result excluded, method is not equivalent to ASTM D93
1569	D93-A	168		0.17	
1648		-----		-----	
1740	D93-A	164		-0.77	
1743	ISO2719-A	172.0		1.11	
1748		-----		-----	
1807	D93-A	166		-0.30	
1850		-----		-----	
1854	D93-A	164		-0.77	
1900	D7094	164.9	ex	-0.56	Result excluded, method is not equivalent to ASTM D93
1957	D93-A	167.0		-0.07	
1969		-----		-----	
2122		-----		-----	
2133	D93-A	165		-0.54	
6010		-----		-----	
6059		-----		-----	

normality	OK
n	29
outliers	2 (+ 4ex)
mean (n)	167.28
st.dev. (n)	2.606
R(calc.)	7.30
R(D93-A:16a)	11.88

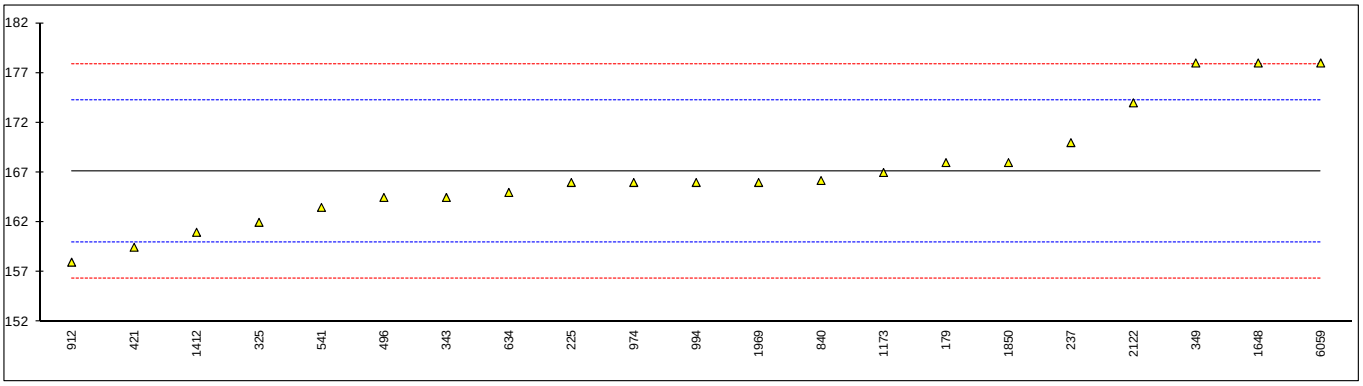


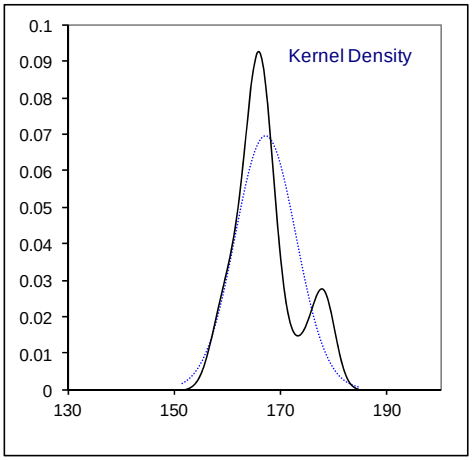


Determination of Flash Point PMcc (procedure B) on Sample #17096; results in °C

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179	D93-B	168.0		0.25	
211		-----		-----	
214		-----		-----	
225	D93-B	166.0	C	-0.31	First reported 116.0
230		-----		-----	
237	D93-B	170		0.81	
252		-----		-----	
254		-----		-----	
255		-----		-----	
271		-----		-----	
311		-----		-----	
325	D93-B	162.0		-1.43	
331		-----		-----	
333		-----		-----	
343	D93-B	164.5		-0.73	
349	D93-B	178		3.05	
398		-----		-----	
421	ISO2719-B	159.5		-2.13	
451		-----		-----	
496	D93-B	164.5		-0.73	
497		-----		-----	
511		-----		-----	
512		-----		-----	
541	D93-B	163.5		-1.01	
562		-----		-----	
575		-----		-----	
603		-----		-----	
614		-----		-----	
621		-----		-----	
633		-----		-----	
634	D93-B	165.0		-0.59	
657		-----		-----	
663		-----		-----	
780		-----		-----	
823		-----		-----	
840	D93-B	166.2		-0.25	
862		-----		-----	
864		-----		-----	
875		-----		-----	
902		-----		-----	
912	D93-B	158		-2.55	
922		-----		-----	
963		-----		-----	
974	D93-B	166.0		-0.31	
994	D93-B	166		-0.31	
1023		-----		-----	
1026		-----		-----	
1059		-----		-----	
1106		-----		-----	
1146		-----		-----	
1173	D93-B	167		-0.03	
1201		-----		-----	
1316		-----		-----	
1320		-----		-----	
1396		-----		-----	
1409		-----		-----	
1412	D93-B	161.0		-1.71	
1435		-----		-----	
1456		-----		-----	
1551		-----		-----	
1569		-----		-----	
1648	ISO2719-B	178.0		3.05	
1740		-----		-----	
1743		-----		-----	
1748		-----		-----	
1807		-----		-----	
1850	ISO2719-B	168		0.25	
1854		-----		-----	
1900		-----		-----	
1957		-----		-----	
1969	ISO2719-B	166		-0.31	
2122	D93-B	174		1.93	
2133		-----		-----	
6010		-----		-----	
6059	D93-B	178		3.05	

normality	OK
n	21
outliers	0
mean (n)	167.10
st.dev. (n)	5.720
R(calc.)	16.02
R(D93-B:16a)	10

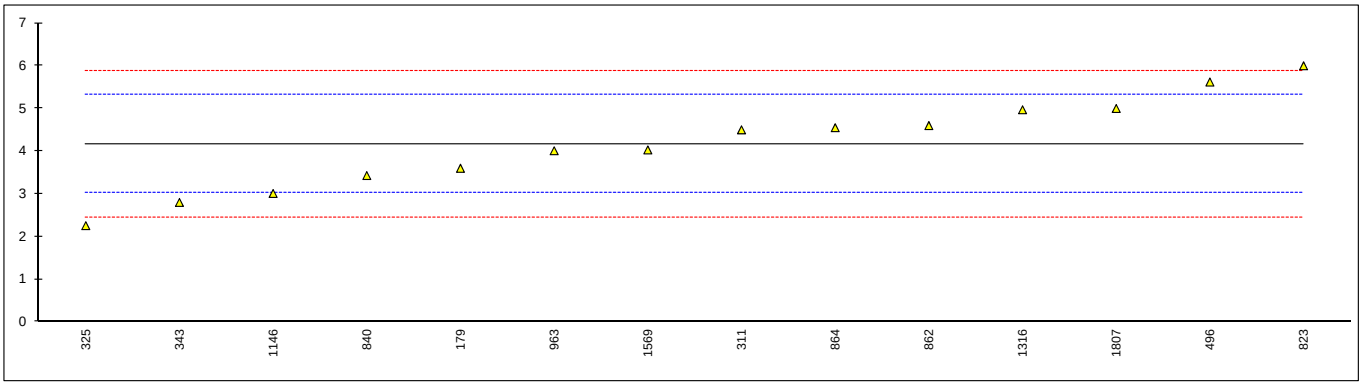


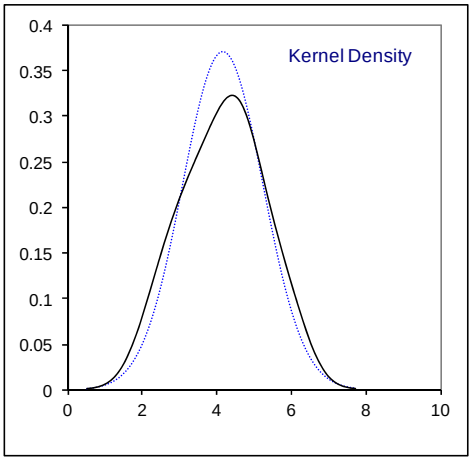


Determination of Fuel dilution on Sample #17096; results in %M/M

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179	D3524	3.6		-1.00	
211		-----		-----	
214		-----		-----	
225		-----		-----	
230		-----		-----	
237		-----		-----	
252		-----		-----	
254		-----		-----	
255		-----		-----	
271		-----		-----	
311	D3524	4.5		0.58	
325	INH-GC	2.255		-3.35	
331		-----		-----	
333		-----		-----	
343	D3524	2.80		-2.40	
349		-----		-----	
398		-----		-----	
421		-----		-----	
451		-----		-----	
496	DIN51454	5.62		2.54	
497		-----		-----	
511		-----		-----	
512		-----		-----	
541		-----		-----	
562		-----		-----	
575		-----		-----	
603		-----		-----	
614		-----		-----	
621		-----		-----	
633		-----		-----	
634		-----		-----	
657		-----		-----	
663		-----		-----	
780		-----		-----	
823	D3524	6.0		3.20	
840	D3524	3.43		-1.29	
862	D3524	4.6		0.75	
864	D3524	4.55		0.67	
875		-----		-----	
902		-----		-----	
912		-----		-----	
922		-----		-----	
963	D3524	4.01		-0.28	
974		-----		-----	
994		-----		-----	
1023		-----		-----	
1026		-----		-----	
1059	D3524	<0,5		< -6.42	False negative test result?
1106		-----		-----	
1146	D3524	3.01		-2.03	
1173		-----		-----	
1201		-----		-----	
1316	D3524	4.97		1.40	
1320		-----		-----	
1396		-----		-----	
1409		-----		-----	
1412		-----		-----	
1435		-----		-----	
1456		-----		-----	
1551		-----		-----	
1569	INH-Chrom	4.03		-0.24	
1648		-----		-----	
1740		-----		-----	
1743		-----		-----	
1748		-----		-----	
1807	D3524	5		1.45	
1850		-----		-----	
1854		-----		-----	
1900		-----		-----	
1957		-----		-----	
1969		-----		-----	
2122		-----		-----	
2133		-----		-----	
6010		-----		-----	
6059		-----		-----	

normality	OK
n	14
outliers	0
mean (n)	4.17
st.dev. (n)	1.075
R(calc.)	3.01
R(D3524:14)	1.6

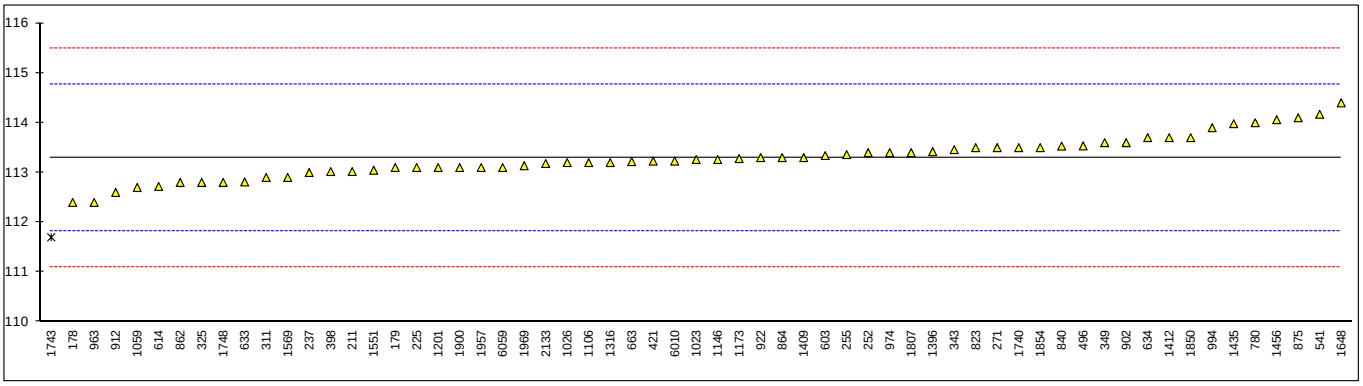


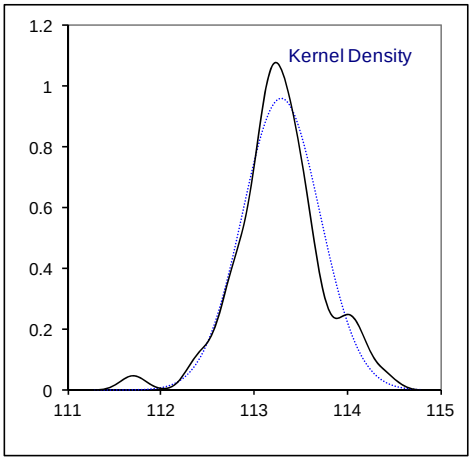


Determination of Kinematic Viscosity at 40°C (D445) on Sample #17096; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
178	D445	112.4		-1.22	
179	D445	113.1		-0.26	
211	D445	113.02		-0.37	
214		-----		-----	
225	D445	113.1		-0.26	
230		-----		-----	
237	D445	113.0		-0.40	
252	D445	113.4		0.15	
254		-----		-----	
255	D7279	113.36		0.09	Reported method: D7279 corrected to D445
271	D445	113.5		0.28	
311	D445	112.9		-0.54	
325	D445	112.8		-0.67	
331		-----		-----	
333		-----		-----	
343	D445	113.46		0.23	
349	D445	113.6		0.42	
398	D445	113.02		-0.37	
421	ISO3104	113.23		-0.09	
451		-----		-----	
496	D7042	113.535		0.33	
497		-----		-----	
511		-----		-----	
512		-----		-----	
541	D7042	114.17		1.20	
562		-----		-----	
575		-----		-----	
603	D7042	113.34		0.06	
614	D445	112.72		-0.78	
621		-----		-----	
633	D7279	112.81		-0.66	Reported method: D7279 corrected to D445
634	D445	113.7		0.56	
657		-----		-----	
663	D445	113.22		-0.10	
780	D445	114.0		0.97	
823	D445	113.5		0.28	
840	D445	113.53		0.32	
862	D445	112.8		-0.67	
864	D445	113.3		0.01	
875	D445	114.1		1.10	
902	D445	113.6		0.42	
912	D445	112.6		-0.95	
922	D7042	113.3		0.01	
963	D445	112.4		-1.22	
974	D445	113.4		0.15	
994	D445	113.9		0.83	
1023	D445	113.26		-0.04	
1026	D445	113.2		-0.13	
1059	ISO3104	112.7		-0.81	
1106	D445	113.2		-0.13	
1146	D445	113.26		-0.04	
1173	IP71	113.28		-0.02	
1201	D445	113.1		-0.26	
1316	ISO3104	113.2		-0.13	
1320		-----		-----	
1396	IP71	113.42		0.17	
1409	D445	113.3		0.01	
1412	D445	113.70	C	0.56	First reported 109.42
1435	D7042	113.98		0.94	
1456	D7042	114.06		1.05	
1551	IP71	113.0470		-0.34	
1569	D445	112.9		-0.54	
1648	ISO3104	114.4		1.51	
1740	D445	113.5		0.28	
1743	D7279	111.7	R(0.05)	-2.18	Reported method: D7279 corrected to D445
1748	D7042	112.8		-0.67	
1807	D445	113.4		0.15	
1850	ISO3104	113.7		0.56	
1854	ISO3104	113.5		0.28	
1900	D445	113.1		-0.26	
1957	D7042	113.1		-0.26	
1969	ISO3104	113.1368		-0.21	
2122		-----		-----	
2133	D445	113.18		-0.15	
6010	D7042	113.23		-0.09	
6059	D445	113.1		-0.26	

normality	OK
n	60
outliers	1
mean (n)	113.293
st.dev. (n)	0.4169
R(calc.)	1.167
R(D445:17a)	2.047

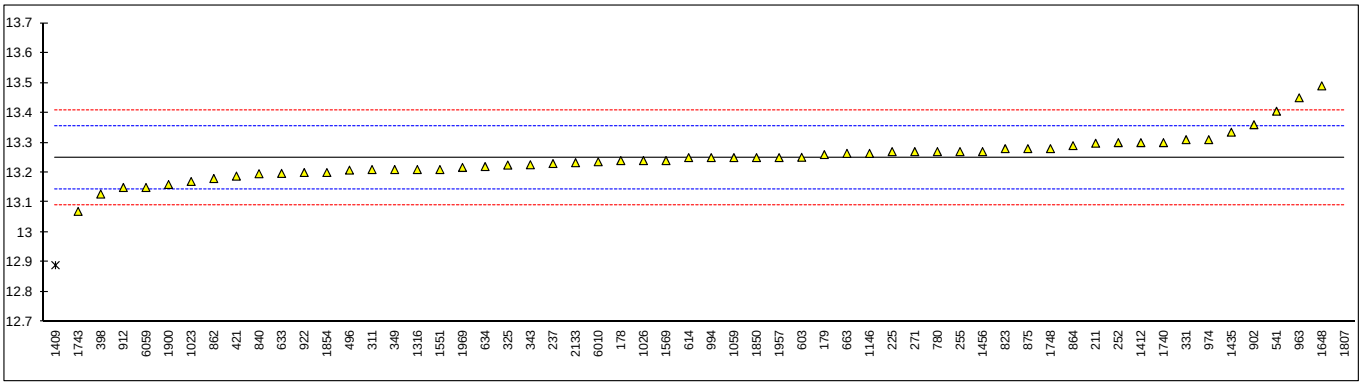


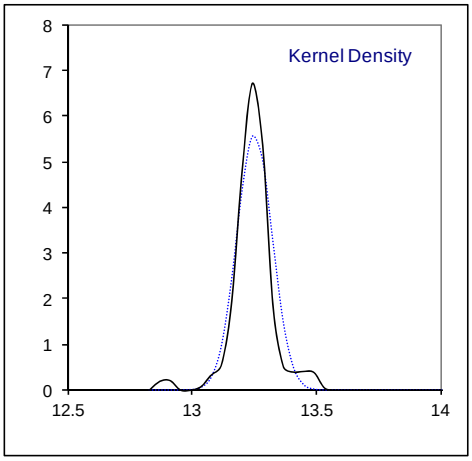


Determination of Kinematic Viscosity at 100°C (D445) on Sample #17096; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
178	D445	13.24		-0.18	
179	D445	13.26		0.20	
211	D445	13.298		0.92	
214		-----		-----	
225	D445	13.27		0.39	
230		-----		-----	
237	D445	13.23		-0.37	
252	D445	13.30		0.96	
254		-----		-----	
255	D7279	13.27		0.39	Reported method: D7279 corrected to D445
271	D445	13.27		0.39	
311	D445	13.21		-0.75	
325	D445	13.225		-0.46	
331	D7279 mod	13.31		1.15	
333		-----		-----	
343	D445	13.226		-0.45	
349	D445	13.21		-0.75	
398	D445	13.128		-2.31	
421	ISO3104	13.188		-1.17	
451		-----		-----	
496	D445	13.208		-0.79	
497		-----		-----	
511		-----		-----	
512		-----		-----	
541	D7042	13.405		2.95	
562		-----		-----	
575		-----		-----	
603	D7042	13.251		0.03	
614	D445	13.25		0.01	
621		-----		-----	
633	D7279	13.197		-1.00	Reported method: D7279 corrected to D445
634	D445	13.22		-0.56	
657		-----		-----	
663	D445	13.264		0.28	
780	D445	13.27		0.39	
823	D445	13.28		0.58	
840	D445	13.196		-1.02	
862	D445	13.18		-1.32	
864	D445	13.29		0.77	
875	D445	13.28		0.58	
902	D445	13.36		2.10	
912	D445	13.15		-1.89	
922	D7042	13.20		-0.94	
963	D445	13.45		3.81	
974	D445	13.31		1.15	
994	D445	13.25		0.01	
1023	D445	13.17		-1.51	
1026	D445	13.24		-0.18	
1059	ISO3104	13.25		0.01	
1106		-----		-----	
1146	D445	13.264		0.28	
1173		-----		-----	
1201		-----		-----	
1316	ISO3104	13.21		-0.75	
1320		-----		-----	
1396		-----		-----	
1409	D445	12.89	R(0.01)	-6.83	
1412	D445	13.30	C	0.96	First reported 12.917
1435	D7042	13.335		1.62	
1456	D7042	13.270		0.39	
1551	IP71	13.2100		-0.75	
1569	D445	13.24		-0.18	
1648	ISO3104	13.49		4.57	
1740	D445	13.3		0.96	
1743	D7279	13.07		-3.41	Reported method: D7279 corrected to D445
1748	D7042	13.28		0.58	
1807	D445	23.32	R(0.01)	191.26	
1850	ISO3104	13.25		0.01	
1854	ISO3104	13.20		-0.94	
1900	D445	13.16		-1.70	
1957	D7042	13.25		0.01	
1969	ISO3104	13.2170		-0.62	
2122		-----		-----	
2133	D445	13.233		-0.31	
6010	D7042	13.236		-0.26	
6059	D445	13.15		-1.89	

normality	not OK
n	56
outliers	2
mean (n)	13.249
st.dev. (n)	0.0712
R(calc.)	0.199
R(D445:17a)	0.147

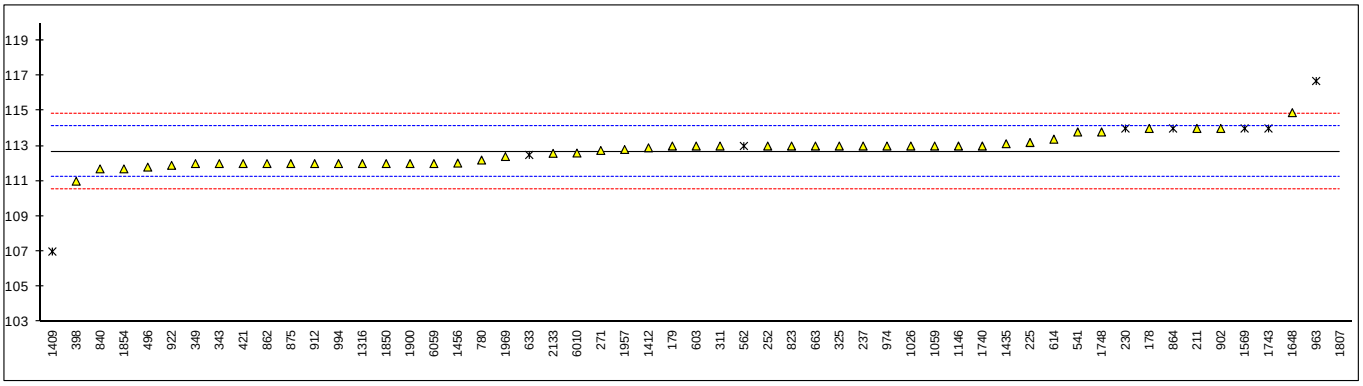


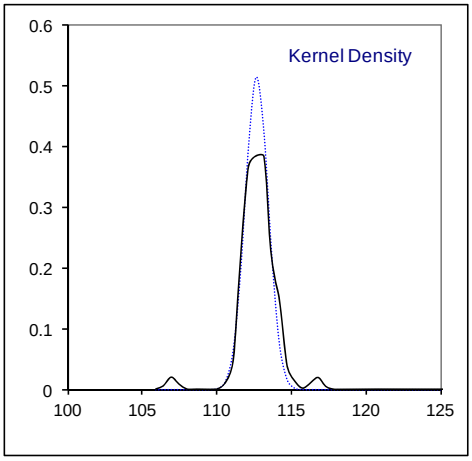


Determination of Viscosity Index on Sample #17096

lab	method	value	mark	z(targ)	iis calc.	remarks
178	D2270	114		1.84	113.63	
179	D2270	113		0.44	113.08	
211	D2270	114		1.84	113.74	
214		-----		-----	-----	
225	D2270	113.2		0.72	113.23	
230	D2270	114	ex	1.84	-----	Result excluded, calculated with Visco Houillon
237	D2270	113		0.44	112.75	
252	D2270	113		0.44	113.31	
254		-----		-----	-----	
255		-----		-----	-----	
271	D2270	112.748		0.09	112.92	
311	D2270	113		0.44	112.58	
325	D2270	113		0.44	112.92	
331		-----		-----	-----	
333		-----		-----	-----	
343	D2270	112		-0.96	112.14	
349	D2270	112		-0.96	111.74	
398	D2270	111		-2.36	111.28	
421	ISO2909	112		-0.96	111.87	
451		-----		-----	-----	
496	D2270	111.8		-1.24	111.79	
497		-----		-----	-----	
511		-----		-----	-----	
512		-----		-----	-----	
541	D2270	113.8		1.56	113.93	
562	D2270	113	ex	0.44	-----	Result excluded, calculated with Visco Houillon
575		-----		-----	-----	
603	D2270	113		0.44	112.66	
614	D2270	113.39		0.98	113.39	
621		-----		-----	-----	
633	D2270	112.494	ex	-0.27	-----	Result excluded, calculated with Visco Houillon
634		-----		-----	111.77	
657		-----		-----	-----	
663	D2270	113		0.44	113.00	
780	D2270	112.2		-0.68	112.15	
823	D2270	113		0.44	112.90	
840	D2270	111.7		-1.38	111.62	
862	D2270	112		-0.96	112.27	
864	D2270	114	E,ex	1.84	113.28	Calculation error? Result excluded
875	D2270	112		-0.96	112.18	
902	D2270	114		1.84	113.96	
912	D2270	112		-0.96	112.09	
922	D2270	111.9		-1.10	111.95	
963	D2270	116.7	R(0.01)	5.62	116.74	
974	D2270	113		0.44	113.46	
994	D2270	112		-0.96	111.97	
1023		-----		-----	111.58	
1026	D2270	113		0.44	112.66	
1059	ISO2909	113		0.44	113.41	
1106		-----		-----	-----	
1146	D2270	113		0.44	112.95	
1173		-----		-----	-----	
1201		-----		-----	-----	
1316	D2270	112		-0.96	112.22	
1320		-----		-----	-----	
1396		-----		-----	-----	
1409	D2270	107	ex	-7.96	107.38	Result excluded, outlier in viscosity at 100 °C
1412	D2270	112.9		0.30	112.95	
1435	D2270	113.13		0.62	113.13	
1456	D2270	112.03		-0.92	112.08	
1551		-----		-----	112.40	
1569	D2270	114	E,ex	1.84	113.02	Calculation error? Result excluded
1648	D2270	114.9		3.10	114.89	
1740	D2270	113		0.44	113.19	
1743	ISO2909	114	ex	1.84	-----	Result excluded, outlier in visc. 40 °C, calc with Houillon
1748	D2270	113.8		1.56	113.74	
1807	D2270	237	ex	174.04	237.32	Result excluded, outlier in viscosity at 100 °C
1850	ISO2909	112		-0.96	112.21	
1854	D2270	111.7		-1.38	111.71	
1900	D2270	112		-0.96	111.63	
1957	D2270	112.8		0.16	112.93	
1969	ISO2909	112.40		-0.40	112.40	
2122		-----		-----	-----	
2133	D2270	112.5826		-0.15	112.58	
6010	D2270	112.6		-0.12	112.57	
6059	D2270	112		-0.96	111.49	

normality	OK	OK
n	46	49
outliers	1 (+ 8ex)	1 (+ 4ex)
mean (n)	112.69	112.63
st.dev. (n)	0.775	0.775
R(calc.)	2.17	2.17
R(D2270:10)	2	2

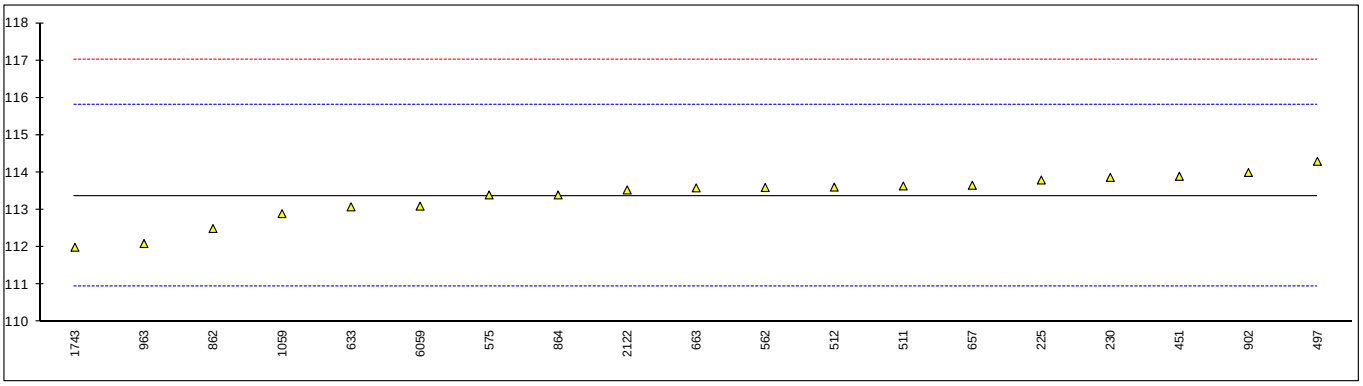


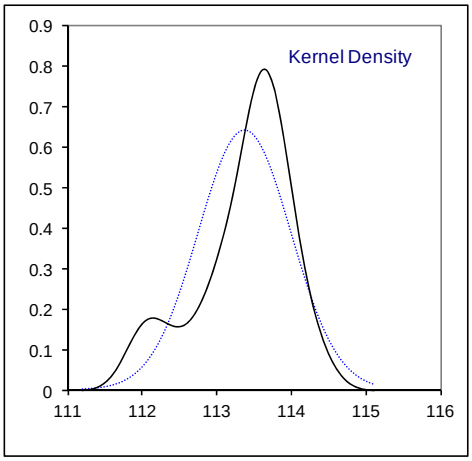


Determination of Kinematic Viscosity at 40°C (Houillon) on Sample #17096; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211		-----		-----	
214		-----		-----	
225	D7279	113.8	C	0.36	Result first reported at 100 °C
230	INH-20	113.87		0.41	
237		-----		-----	
252		-----		-----	
254		-----		-----	
255		-----		-----	
271		-----		-----	
311		-----		-----	
325		-----		-----	
331		-----		-----	
333		-----		-----	
343		-----		-----	
349		-----		-----	
398		-----		-----	
421		-----		-----	
451	D7279	113.9		0.44	
496		-----		-----	
497	D7279	114.3		0.77	
511	D7279	113.64		0.22	
512	D7279	113.61		0.20	
541		-----		-----	
562	D7279	113.6		0.19	
575	D7279	113.4		0.03	
603		-----		-----	
614		-----		-----	
621		-----		-----	
633	D7279	113.081115		-0.24	
634		-----		-----	
657	D7279	113.66		0.24	
663	D7279	113.59		0.18	
780		-----		-----	
823		-----		-----	
840		-----		-----	
862	D7279	112.5		-0.71	
864	D7279	113.4		0.03	
875		-----		-----	
902	D7279	114.0		0.52	
912		-----		-----	
922		-----		-----	
963	D7279	112.1		-1.04	
974		-----		-----	
994		-----		-----	
1023		-----		-----	
1026		-----		-----	
1059	D7279	112.9		-0.39	
1106		-----		-----	
1146		-----		-----	
1173		-----		-----	
1201		-----		-----	
1316		-----		-----	
1320		-----		-----	
1396		-----		-----	
1409		-----		-----	
1412		-----		-----	
1435		-----		-----	
1456		-----		-----	
1551		-----		-----	
1569		-----		-----	
1648		-----		-----	
1740		-----		-----	
1743	D7279	112.0		-1.13	
1748		-----		-----	
1807		-----		-----	
1850		-----		-----	
1854		-----		-----	
1900		-----		-----	
1957		-----		-----	
1969		-----		-----	
2122	In house	113.536		0.14	
2133		-----		-----	
6010		-----		-----	
6059		113.1		-0.22	

normality	OK
N	19
outliers	0
mean (n)	113.368
st.dev. (n)	0.6212
R(calc.)	1.739
R(D7279:16)	3.401

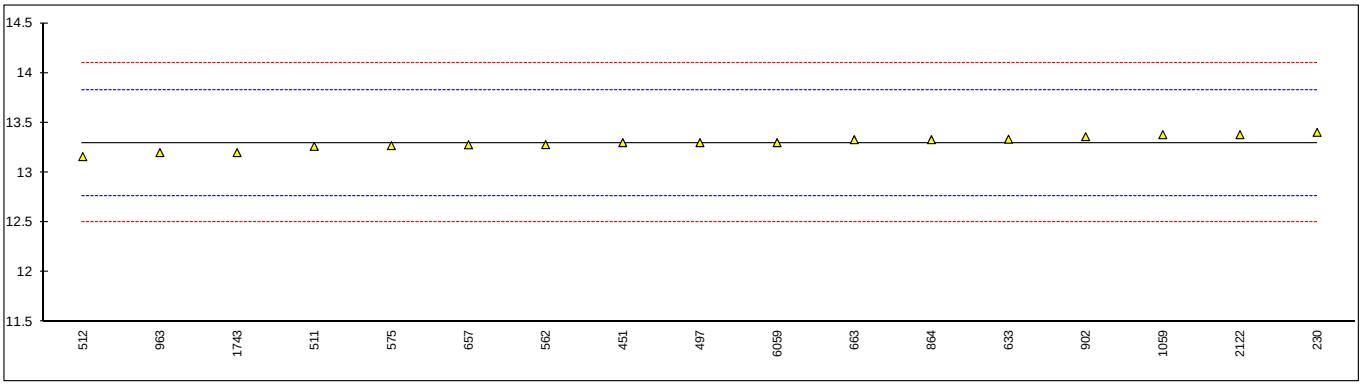


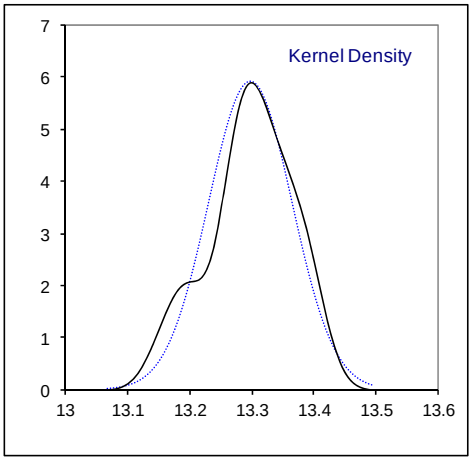


Determination of Kinematic Viscosity at 100°C (Houillon) on Sample #17096; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211		-----		-----	
214		-----		-----	
225		-----		-----	
230	INH-20	13.403		0.39	
237		-----		-----	
252		-----		-----	
254		-----		-----	
255		-----		-----	
271		-----		-----	
311		-----		-----	
325		-----		-----	
331		-----		-----	
333		-----		-----	
343		-----		-----	
349		-----		-----	
398		-----		-----	
421		-----		-----	
451	D7279	13.3		0.01	
496		-----		-----	
497	D7279	13.30		0.01	
511	D7279	13.263		-0.13	
512	D7279	13.16		-0.52	
541		-----		-----	
562	D7279	13.28		-0.07	
575	D7279	13.27		-0.11	
603		-----		-----	
614		-----		-----	
621		-----		-----	
633	D7279	13.3347228		0.14	
634		-----		-----	
657	D7279	13.279		-0.07	
663	D7279	13.330		0.12	
780		-----		-----	
823		-----		-----	
840		-----		-----	
862		-----		-----	
864	D7279	13.33		0.12	
875		-----		-----	
902	D7279	13.36		0.23	
912		-----		-----	
922		-----		-----	
963	D7279	13.20		-0.37	
974		-----		-----	
994		-----		-----	
1023		-----		-----	
1026		-----		-----	
1059	D7279	13.38		0.31	
1106		-----		-----	
1146		-----		-----	
1173		-----		-----	
1201		-----		-----	
1316		-----		-----	
1320		-----		-----	
1396		-----		-----	
1409		-----		-----	
1412		-----		-----	
1435		-----		-----	
1456		-----		-----	
1551		-----		-----	
1569		-----		-----	
1648		-----		-----	
1740		-----		-----	
1743	D7279	13.20		-0.37	
1748		-----		-----	
1807		-----		-----	
1850		-----		-----	
1854		-----		-----	
1900		-----		-----	
1957		-----		-----	
1969		-----		-----	
2122	In house	13.38		0.31	
2133		-----		-----	
6010		-----		-----	
6059		13.30		0.01	

normality	OK
n	17
outliers	0
mean (n)	13.298
st.dev. (n)	0.0674
R(calc.)	0.189
R(D7279:16)	0.745

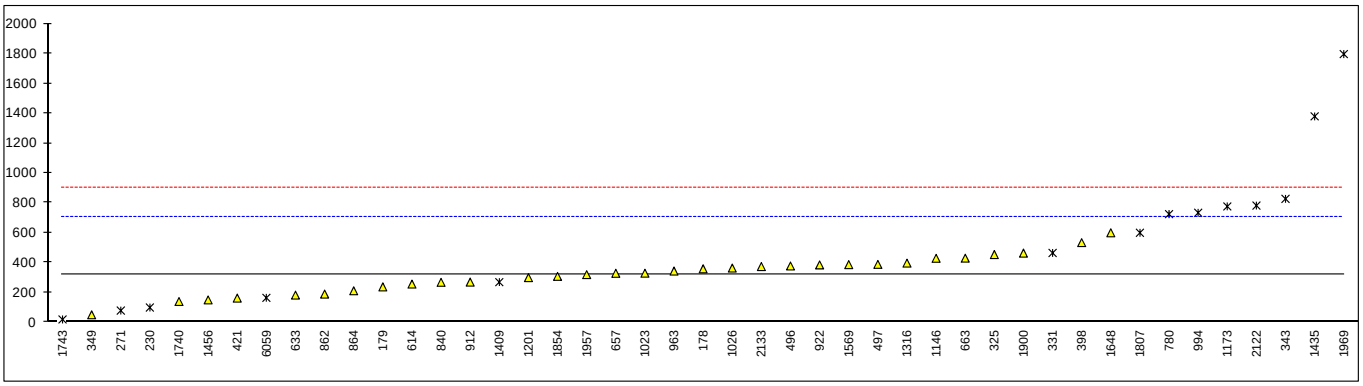


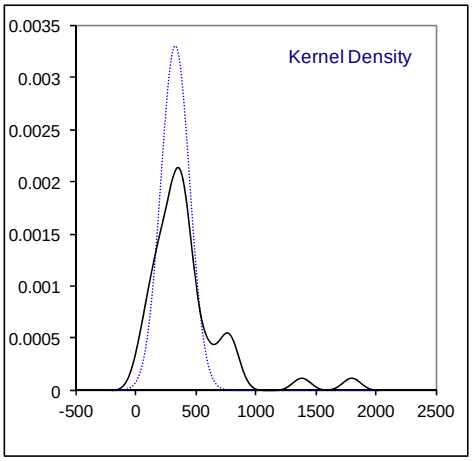


Determination of Water content by KF on Sample #17096; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D6304-C	359		0.19	
179	D6304-C	238		-0.44	
211		-----		-----	
214		-----		-----	
225		-----		-----	
230	INH-16	100	ex	-1.15	Test result excluded, see $4.1
237		-----		-----	
252		-----		-----	
254		-----		-----	
255		-----		-----	
271	D6304-A	79.5	ex	-1.26	Test result excluded, see $4.1
311		-----		-----	
325	D6304-C	454.5		0.68	
331	INH- Oven	465.0	ex	0.74	Test result excluded, see $4.1
333		-----		-----	
343	E203	827	ex	2.61	Test result excluded, see $4.1
349	D6304-C	51		-1.41	
398	D6304-C	534	C	1.10	First reported 2032
421	D6304-C	163		-0.83	
451		-----		-----	
496	D6304-C	378.0		0.29	
497	D6304-C	388.5		0.34	
511		-----		-----	
512		-----		-----	
541		-----		-----	
562		-----		-----	
575		-----		-----	
603		-----		-----	
614	D6304-C	256.8		-0.34	
621		-----		-----	
633	D6304-C	183		-0.72	
634		-----		-----	
657	D6304-C	329.2		0.03	
663	D6304-C	430		0.56	
780	D6304-A	725	ex	2.08	Test result excluded, see $4.1
823		-----		-----	
840	D6304-C	268.6		-0.28	
862	D6304-C	190		-0.69	
864	D6304-C	212		-0.57	
875		-----		-----	
902		-----		-----	
912	D6304-C	270		-0.27	
922	D6304-C	385		0.32	
963	D6304-C	344		0.11	
974		-----		-----	
994	ISO12937	734	ex	2.13	Test result excluded, see $4.1
1023	D6304-C	329.5		0.04	
1026	D6304-C	364		0.21	
1059	D6304-C mod.	<30		<1.52	
1106		-----		-----	
1146	D6304-C	429		0.55	
1173	In house	776.5	ex	2.35	Test result excluded, see $4.1
1201	D6304-C	300		-0.12	
1316	D6304-C	397		0.39	
1320		-----		-----	
1396		-----		-----	
1409	D6304	270	ex	-0.27	Test result excluded, see $4.1
1412		-----		-----	
1435	D1744	1379	ex	5.47	Test result excluded, see $4.1
1456	D6304-C	151		-0.89	
1551	IP74	-----		-----	Reported: Trace, unit %(v/v)
1569	D6304-C	387		0.33	
1648	D6304-C	600		1.44	
1740	D6304-C	140		-0.95	
1743	ISO12937	20	ex	-1.57	Test result excluded, see $4.1
1748		-----		-----	
1807	D6304-A	600	ex	1.44	Test result excluded, see $4.1
1850		-----		-----	
1854	D6304-C	308		-0.08	
1900	D6304-C	464		0.73	
1957	D6304-C	320		-0.01	
1969	ISO12937	1796	ex	7.63	Test result excluded, see $4.1
2122	In house	782	ex	2.38	Test result excluded, see $4.1
2133	D6304-C	374		0.27	
6010		-----		-----	
6059	D6304-A	165	C,ex	-0.82	First reported 1650. Test result excluded, see $4.1

		All results
normality	OK	OK
n	31	43
outliers	0 (+ 14ex)	2
mean (n)	322.52	361.44
st.dev. (n)	120.878	201.256
R(calc.)	338.46	563.52
R(D6304-C:16e1)	540.51	578.76

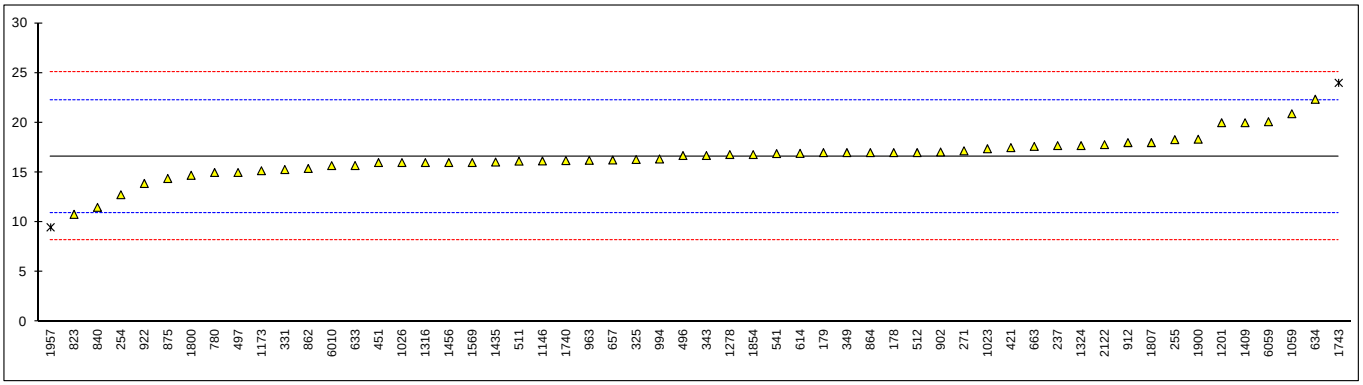


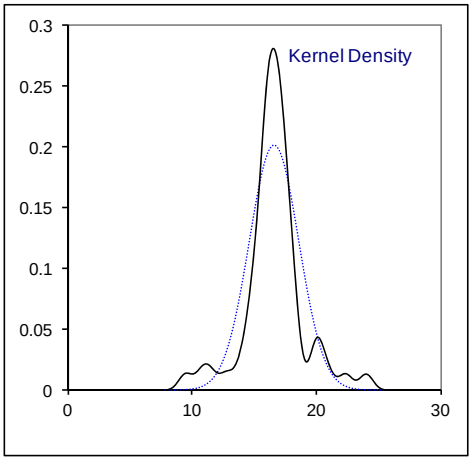


Determination of Aluminium as Al on Sample #17097; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	17		0.14	
179	D5185	17		0.14	
214		-----		-----	
230		-----		-----	
237	D5185	17.7		0.39	
254	INH-018	12.77		-1.36	
255		18.3		0.60	
271	D5185	17.178		0.20	
311		-----		-----	
325	D5185	16.3		-0.11	
331	D5185 mod	15.3		-0.46	
333		-----		-----	
343	D5185	16.70		0.03	
349	D5185	17		0.14	
398		-----		-----	
421		17.5		0.32	
451	INH-00116	16		-0.22	
496	D5185	16.7		0.03	
497	D5185	15		-0.57	
511	D5185	16.14		-0.17	
512	D5185	17.0		0.14	
541	D5185	16.9		0.10	
575		-----		-----	
614	D5185	16.92		0.11	
633	D6595	15.7		-0.32	
634	D6595	22.35		2.04	
657	D5185	16.25		-0.13	
663	D5185	17.62		0.36	
780	D5185	15		-0.57	
823	D5185	10.8		-2.06	
840	D5185	11.5		-1.81	
862	D5185	15.4		-0.43	
864	D5185	17		0.14	
875	D5185	14.4		-0.78	
902	D5185	17.06		0.16	
912	D5185	18		0.49	
922	D5185	13.9		-0.96	
963	D5185	16.22		-0.14	
994	D5185	16.36		-0.09	
1023	D5185	17.388		0.28	
1026	D5185	16		-0.22	
1059	inhouse (XRF)	20.9	C	1.52	First reported 26
1146	D5185 mod	16.16		-0.16	
1173	inhouse (ICP)	15.18		-0.51	
1201	D5185	20		1.20	
1278		16.8		0.07	
1316	D5185	16.0		-0.22	
1320		-----		-----	
1324	D5185	17.7		0.39	
1409	D5185	20		1.20	
1435	D5185	16.05		-0.20	
1456	D5185	16		-0.22	
1551		-----		-----	
1569	D5185	16		-0.22	
1648		-----		-----	
1740	D5185	16.2		-0.14	
1743	D5185	24	R(0.05)	2.62	
1748		-----		-----	
1791		-----		-----	
1800		14.72		-0.67	
1807	D5185	18		0.49	
1850		-----		-----	
1854	D5185	16.8		0.07	
1900	D5185	18.340		0.61	
1957	D5185	9.5	C,R(0.05)	-2.52	First reported 5
2122	D5185	17.80		0.42	
6010	D5185	15.69		-0.33	
6059	D5185	20.1		1.24	

normality	not OK
n	54
outliers	2
mean (n)	16.6073
st.dev. (n)	1.9891
R(calc.)	5.569
R(D5185:13e1)	7.890

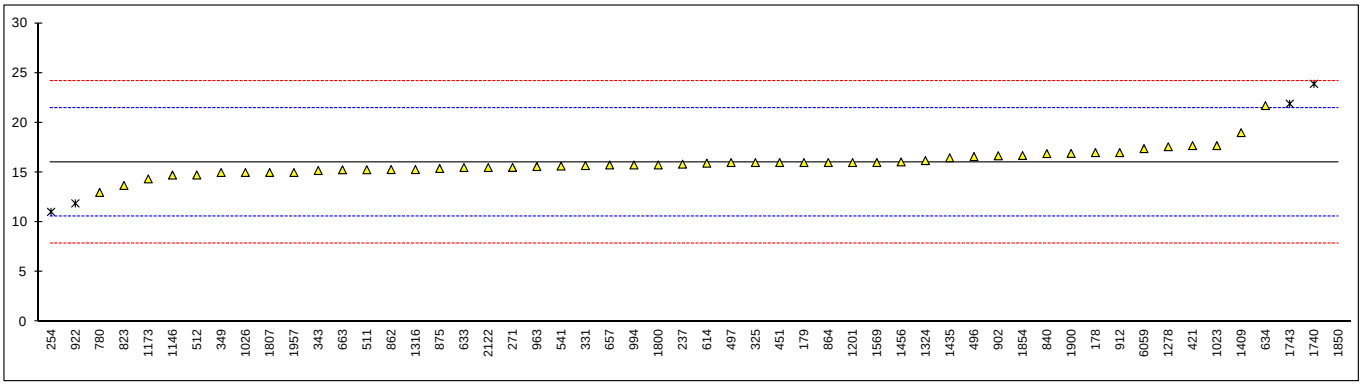

30
25
20
15
10
5
0
1957 823 840 254 922 875 1800 780 497 1173 331 862 6010 633 451 1026 1316 1456 1569 1435 511 1146 1740 963 657 325 994 496 343 1278 1854 541 614 179 349 864 178 512 902 271 1023 421 663 237 1324 2122 912 1807 255 1900 1201 1409 6059 1059 634 1743

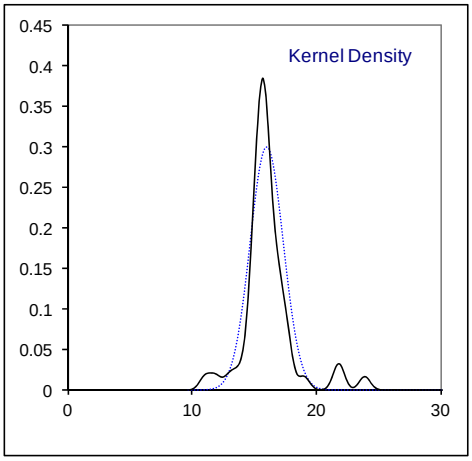

Kernel Density
0.3
0.25
0.2
0.15
0.1
0.05
0
0
10
20
30

Determination of Barium as Ba on Sample #17097; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	17		0.37	
179	D5185	16		0.00	
214		-----		-----	
230		-----		-----	
237	D5185	15.84		-0.06	
254	INH-018	11.05	R(0.01)	-1.84	
255		-----		-----	
271	D5185	15.510		-0.18	
311		-----		-----	
325	D5185	16		0.00	
331	D5185 mod	15.7		-0.11	
333		-----		-----	
343	D5185	15.20		-0.30	
349	D5185	15		-0.37	
398		-----		-----	
421		17.7		0.63	
451	INH-00116	16		0.00	
496	D5185	16.6		0.22	
497	D5185	16.0		0.00	
511	D5185	15.28		-0.27	
512	D5185	14.75		-0.47	
541	D5185	15.64		-0.14	
575		-----		-----	
614	D5185	15.94		-0.03	
633	D6595	15.5		-0.19	
634	D6595	21.72		2.11	
657	D5185	15.76		-0.09	
663	D5185	15.27		-0.27	
780	D5185	13		-1.11	
823	D5185	13.7		-0.85	
840	D5185	16.9		0.33	
862	D5185	15.3		-0.26	
864	D5185	16		0.00	
875	D5185	15.4		-0.23	
902	D5185	16.68		0.25	
912	D5185	17		0.37	
922	D5185	11.9	R(0.01)	-1.52	
963	D5185	15.60		-0.15	
994	D5185	15.76		-0.09	
1023	D5185	17.702		0.63	
1026	D5185	15		-0.37	
1059		-----		-----	
1146	D5185 mod	14.74		-0.47	
1173	inhouse (ICP)	14.36		-0.61	
1201	D5185	16		0.00	
1278		17.59		0.58	
1316	D5185	15.3		-0.26	
1320		-----		-----	
1324	D5185	16.2		0.07	
1409	D5185	19		1.11	
1435	D5185	16.48		0.17	
1456	D5185	16.06		0.02	
1551		-----		-----	
1569	D5185	16		0.00	
1648		-----		-----	
1740	D5185	23.9	R(0.01)	2.92	
1743	D5185	21.9	R(0.01)	2.18	
1748		-----		-----	
1791		-----		-----	
1800		15.76		-0.09	
1807	D5185	15		-0.37	
1850		67	R(0.01)	18.87	
1854	D5185	16.7		0.26	
1900	D5185	16.918		0.34	
1957	D5185	15		-0.37	
2122	D5185	15.50		-0.19	
6010		-----		-----	
6059	D5185	17.4		0.51	

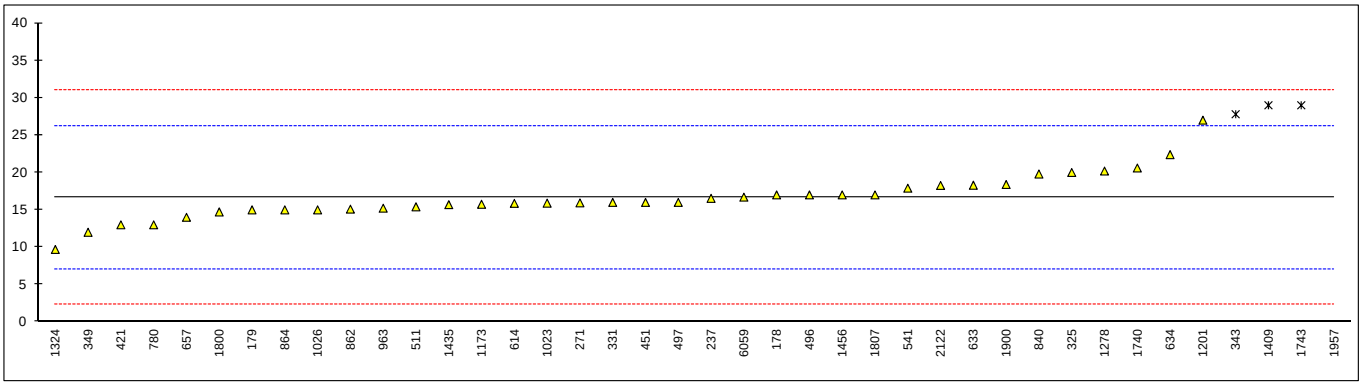
normality	not OK
n	49
outliers	5
mean (n)	16.009
st.dev. (n)	1.3363
R(calc.)	3.742
R(D5185:13e1)	7.566

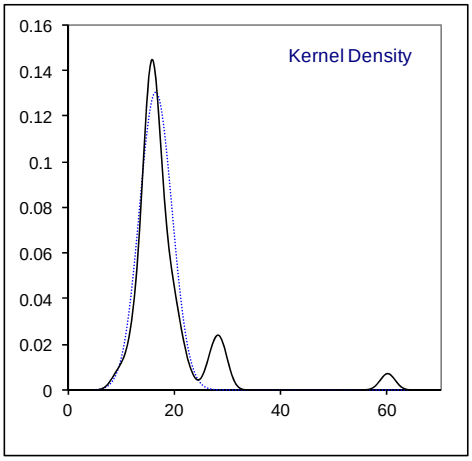

30
25
20
15
10
5
0
254 922 780 823 1173 1146 512 349 1026 1807 1957 343 663 511 862 1316 875 633 2122 271 963 541 331 657 994 1800 237 614 497 325 451 179 864 1201 1569 1456 1324 1435 496 902 1854 840 1900 178 912 6059 1278 421 1023 1409 634 1743 1740 1850


Kernel Density
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
10
20
30

Determination of Boron as B on Sample #17097; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	17		0.08	
179	D5185	15		-0.34	
214		-----		-----	
230		-----		-----	
237	D5185	16.54		-0.02	
254		-----		-----	
255		-----		-----	
271	D5185	15.937		-0.14	
311		-----		-----	
325	D5185	20		0.71	
331	D5185 mod	16.0		-0.13	
333		-----		-----	
343	D5185	27.80	R(0.05)	2.34	
349	D5185	12		-0.97	
398		-----		-----	
421		13.0		-0.76	
451	INH-00116	16		-0.13	
496	D5185	17.0		0.08	
497	D5185	16		-0.13	
511	D5185	15.41		-0.25	
512		-----		-----	
541	D5185	17.9		0.27	
575		-----		-----	
614	D5185	15.87		-0.16	
633	D6595	18.3		0.35	
634	D6595	22.39		1.21	
657	D5185	14.00		-0.55	
663		-----		-----	
780	D5185	13		-0.76	
823		-----		-----	
840	D5185	19.8		0.67	
862	D5185	15.1		-0.32	
864	D5185	15		-0.34	
875		-----		-----	
902		-----		-----	
912		-----		-----	
922		-----		-----	
963	D5185	15.22		-0.29	
994		-----		-----	
1023	D5185	15.901		-0.15	
1026	D5185	15		-0.34	
1059		-----		-----	
1146		-----		-----	
1173	inhouse (ICP)	15.75		-0.18	
1201	D5185	27		2.17	
1278		20.2		0.75	
1316		-----		-----	
1320		-----		-----	
1324	D5185	9.7		-1.45	
1409	D5185	29	R(0.05)	2.59	
1435	D5185	15.69		-0.20	
1456	D5185	17		0.08	
1551		-----		-----	
1569		-----		-----	
1648		-----		-----	
1740	D5185	20.6		0.83	
1743	D5185	29	R(0.05)	2.59	
1748		-----		-----	
1791		-----		-----	
1800		14.72		-0.40	
1807	D5185	17		0.08	
1850		-----		-----	
1854		-----		-----	
1900	D5185	18.390		0.37	
1957	D5185	60	C,R(0.01)	9.08	First reported 34
2122	D5185	18.266		0.34	
6010		-----		-----	
6059	D5185	16.7		0.02	
	normality	not OK			
	n	36			
	outliers	4			
	mean (n)	16.622			
	st.dev. (n)	3.0518			
	R(calc.)	8.545			
	R(D5185:13e1)	13.371			

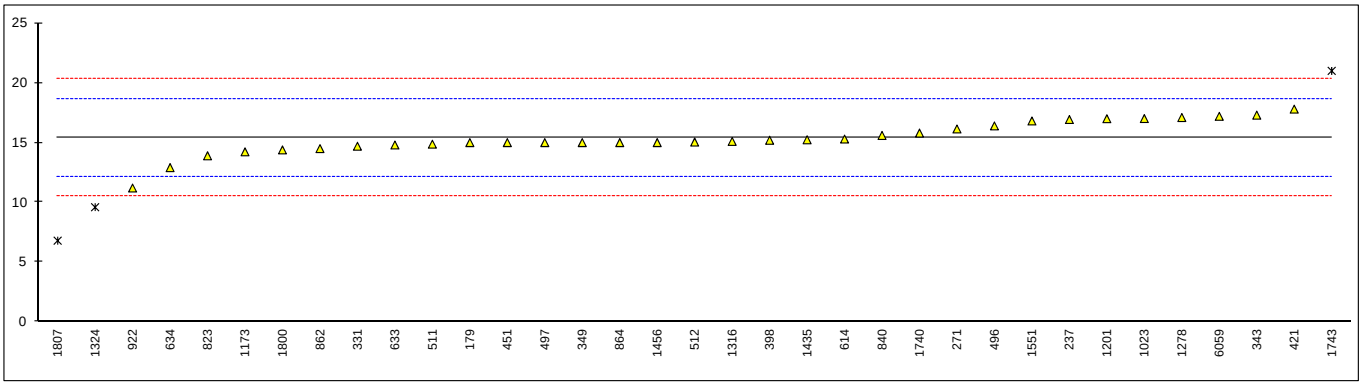

40
35
30
25
20
15
10
5
0
1324
349
421
780
657
1800
179
864
1026
862
963
511
1435
1173
614
1023
271
331
451
497
237
6059
178
496
1456
1807
541
2122
633
1900
840
325
1278
1740
634
1201
343
1409
1743
1957

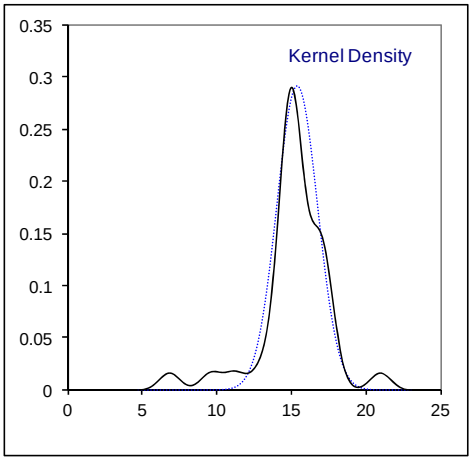

Kernel Density
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0
20
40
60

Determination of Cadmium as Cd on Sample #17097; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179	D5185	15		-0.24	
214		-----		-----	
230		-----		-----	
237	D5185	16.93		0.94	
254		-----		-----	
255		-----		-----	
271	D5185	16.141		0.46	
311		-----		-----	
325		-----		-----	
331	D5185 mod	14.7		-0.42	
333		-----		-----	
343	D5185	17.3		1.17	
349	D5185	15		-0.24	
398	D5185	15.2		-0.12	
421		17.8		1.48	
451	INH-00116	15		-0.24	
496	D5185	16.4		0.62	
497	D5185	15		-0.24	
511	D5185	14.87		-0.32	
512	D5185	15.05		-0.21	
541		-----		-----	
575		-----		-----	
614	D5185	15.3		-0.06	
633	D6595	14.8		-0.36	
634	D6595	12.91		-1.52	
657		-----		-----	
663		-----		-----	
780		-----		-----	
823	D5185	13.9		-0.91	
840	D5185	15.6		0.13	
862	D5185	14.5		-0.55	
864	D5185	15		-0.24	
875		-----		-----	
902		-----		-----	
912		-----		-----	
922	D5185	11.2		-2.57	
963		-----		-----	
994		-----		-----	
1023	D5185	17.010		0.99	
1026		-----		-----	
1059		-----		-----	
1146		-----		-----	
1173	inhouse (ICP)	14.23		-0.71	
1201	D5185	17		0.99	
1278		17.1		1.05	
1316	D5185	15.1		-0.18	
1320		-----		-----	
1324	D5185	9.6	R(0.01)	-3.55	
1409		-----		-----	
1435	D5185	15.24		-0.09	
1456	D5185	15		-0.24	
1551	IP593	16.81		0.87	
1569		-----		-----	
1648		-----		-----	
1740	D5185	15.8		0.25	
1743	D5185	21	R(0.01)	3.44	
1748		-----		-----	
1791		-----		-----	
1800		14.39		-0.61	
1807	D5185	6.8	R(0.01)	-5.26	
1850		-----		-----	
1854		-----		-----	
1900		-----		-----	
1957		-----		-----	
2122		-----		-----	
6010		-----		-----	
6059	D5185	17.2		1.11	

normality	suspect
n	32
outliers	3
mean (n)	15.390
st.dev. (n)	1.3725
R(calc.)	3.843
R(Horwitz)	4.569

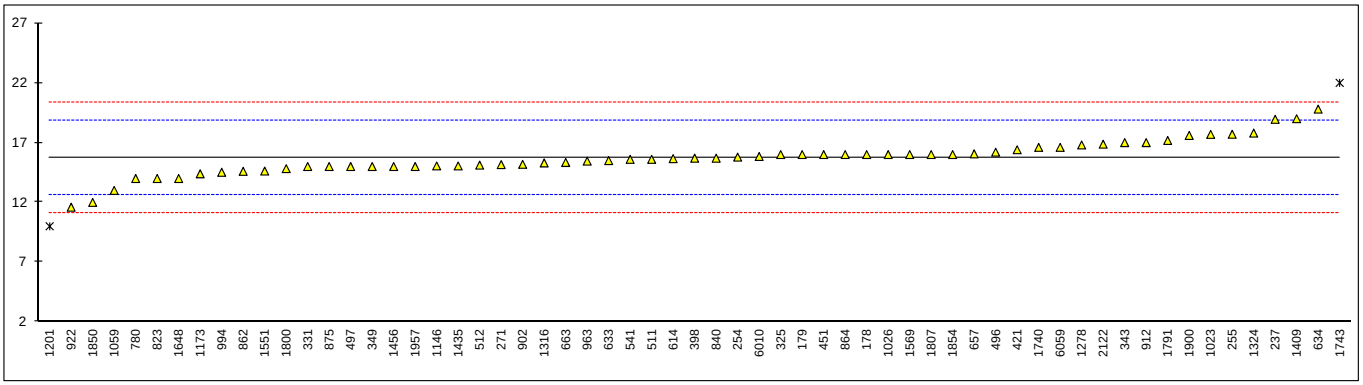

25
20
15
10
5
0
1807
1324
922
634
823
1173
1800
862
331
633
511
179
451
497
349
864
1456
512
1316
398
1435
614
840
1740
271
496
1551
237
1201
1023
1278
6059
343
421
1743

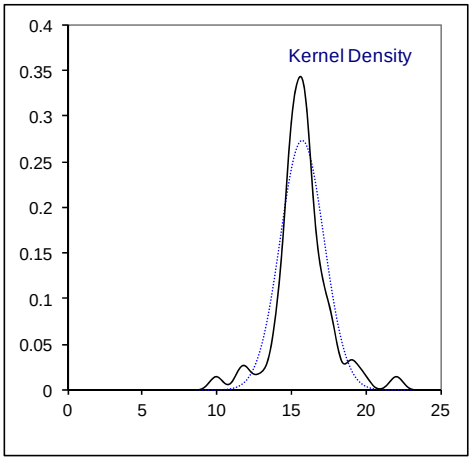

Kernel Density
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
5
10
15
20
25

Determination of Chromium as Cr on Sample #17097; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	16		0.18	
179	D5185	16		0.18	
214		-----		-----	
230		-----		-----	
237	D5185	18.95		2.08	
254	INH-018	15.79	C	0.04	First reported 10.54
255		17.7		1.27	
271	D5185	15.161		-0.36	
311		-----		-----	
325	D5185	16		0.18	
331	D5185 mod	15.0		-0.47	
333		-----		-----	
343	D5185	17.0		0.82	
349	D5185	15		-0.47	
398	D5185	15.7		-0.02	
421		16.4		0.43	
451	INH-00116	16		0.18	
496	D5185	16.2		0.31	
497	D5185	15		-0.47	
511	D5185	15.6		-0.08	
512	D5185	15.12		-0.39	
541	D5185	15.6		-0.08	
575		-----		-----	
614	D5185	15.66		-0.04	
633	D6595	15.5		-0.15	
634	D6595	19.80	C	2.62	First reported 20.82
657	D5185	16.06		0.21	
663	D5185	15.34		-0.25	
780	D5185	14		-1.11	
823	D5185	14.0		-1.11	
840	D5185	15.7		-0.02	
862	D5185	14.6		-0.72	
864	D5185	16		0.18	
875	D5185	15.0		-0.47	
902	D5185	15.18		-0.35	
912	D5185	17		0.82	
922	D5185	11.6		-2.66	
963	D5185	15.45		-0.18	
994	D5185	14.52		-0.78	
1023	D5185	17.690		1.26	
1026	D5185	16		0.18	
1059	inhouse (XRF)	13		-1.76	
1146	D5185 mod	15.05		-0.44	
1173	inhouse (ICP)	14.39		-0.86	
1201	D5185	10	R(0.05)	-3.69	
1278		16.8		0.69	
1316	D5185	15.3		-0.27	
1320		-----		-----	
1324	D5185	17.8		1.34	
1409	D5185	19		2.11	
1435	D5185	15.05		-0.44	
1456	D5185	15		-0.47	
1551	IP593	14.62		-0.71	
1569	D5185	16		0.18	
1648	D5185	14.0		-1.11	
1740	D5185	16.6	C	0.56	First reported 24.6
1743	D5185	22	R(0.05)	4.04	
1748		-----		-----	
1791		17.18		0.94	
1800		14.82		-0.58	
1807	D5185	16		0.18	
1850		12		-2.40	
1854	D5185	16.0		0.18	
1900	D5185	17.602		1.21	
1957	D5185	15		-0.47	
2122	D5185	16.87		0.74	
6010	D5185	15.84		0.07	
6059	D5185	16.6		0.56	

normality	suspect
n	59
outliers	2
mean (n)	15.726
st.dev. (n)	1.4592
R(calc.)	4.086
R(D5185:13e1)	4.349

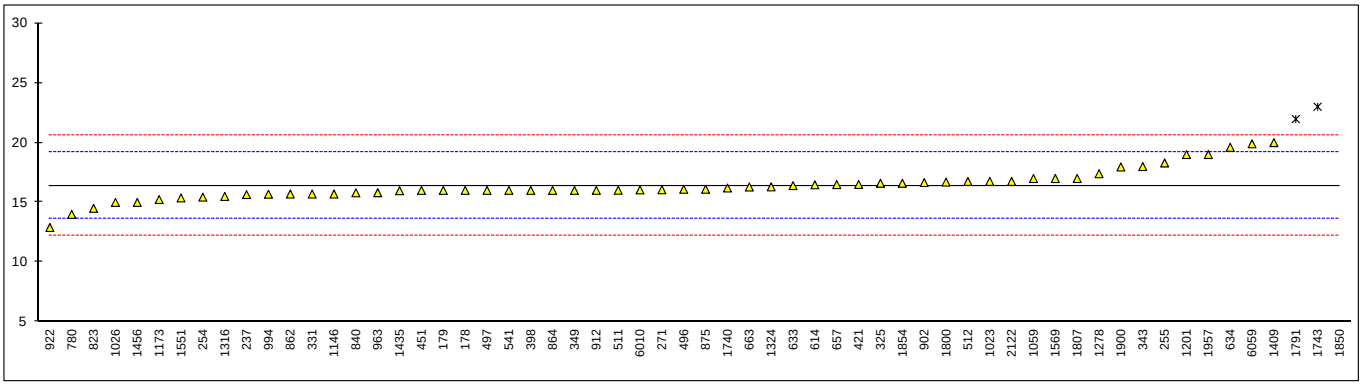

27
22
17
12
7
2
1201 922 1850 1059 780 823 1648 1173 994 862 1551 1800 331 875 497 349 1456 1957 1146 1435 512 271 902 1316 663 963 633 541 511 614 398 840 254 6010 325 179 451 864 178 1026 1569 1807 1854 657 496 421 1740 6059 1278 2122 343 912 1791 1900 1023 255 1324 237 1409 634 1743

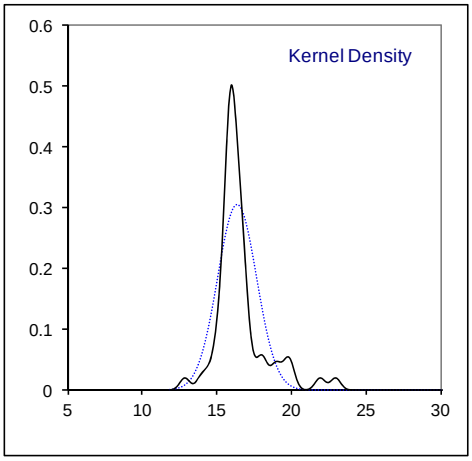

Kernel Density
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0 5 10 15 20 25

Determination of Copper as Cu on Sample #17097; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	16		-0.29	
179	D5185	16		-0.29	
214		-----		-----	
230		-----		-----	
237	D5185	15.65		-0.54	
254	INH-018	15.44	C	-0.68	First reported 11.16
255		18.3		1.35	
271	D5185	16.061		-0.24	
311		-----		-----	
325	D5185	16.6		0.14	
331	D5185 mod	15.7		-0.50	
333		-----		-----	
343	D5185	18		1.14	
349	D5185	16		-0.29	
398	D5185	16.0		-0.29	
421		16.5		0.07	
451	INH-00116	16		-0.29	
496	D5185	16.1		-0.22	
497	D5185	16		-0.29	
511	D5185	16.02		-0.27	
512	D5185	16.75		0.25	
541	D5185	16.0		-0.29	
575		-----		-----	
614	D5185	16.47		0.05	
633	D6595	16.4		0.00	
634	D6595	19.61		2.28	
657	D5185	16.49		0.06	
663	D5185	16.29		-0.08	
780	D5185	14		-1.71	
823	D5185	14.5		-1.35	
840	D5185	15.8		-0.43	
862	D5185	15.7		-0.50	
864	D5185	16		-0.29	
875	D5185	16.1		-0.22	
902	D5185	16.66		0.18	
912	D5185	16		-0.29	
922	D5185	12.9		-2.49	
963	D5185	15.81		-0.42	
994	D5185	15.68		-0.51	
1023	D5185	16.756		0.25	
1026	D5185	15		-1.00	
1059	inhouse (XRF)	17		0.43	
1146	D5185 mod	15.70		-0.50	
1173	inhouse (ICP)	15.24		-0.83	
1201	D5185	19		1.85	
1278		17.4		0.71	
1316	D5185	15.5		-0.64	
1320		-----		-----	
1324	D5185	16.3		-0.07	
1409	D5185	20		2.56	
1435	D5185	15.98		-0.30	
1456	D5185	15		-1.00	
1551	IP593	15.37		-0.73	
1569	D5185	17		0.43	
1648		-----	W	-----	First reported 35.0
1740	D5185	16.2	C	-0.14	First reported 23.2
1743	D5185	23	R(0.01)	4.69	
1748		-----		-----	
1791		21.97	R(0.01)	3.96	
1800		16.70		0.21	
1807	D5185	17		0.43	
1850		46	R(0.01)	21.05	
1854	D5185	16.6		0.14	
1900	D5185	17.964		1.11	
1957	D5185	19		1.85	
2122	D5185	16.76		0.25	
6010	D5185	16.04		-0.26	
6059	D5185	19.9		2.49	

normality	suspect
n	57
outliers	3
mean (n)	16.402
st.dev. (n)	1.3063
R(calc.)	3.658
R(D5185:13e1)	3.937

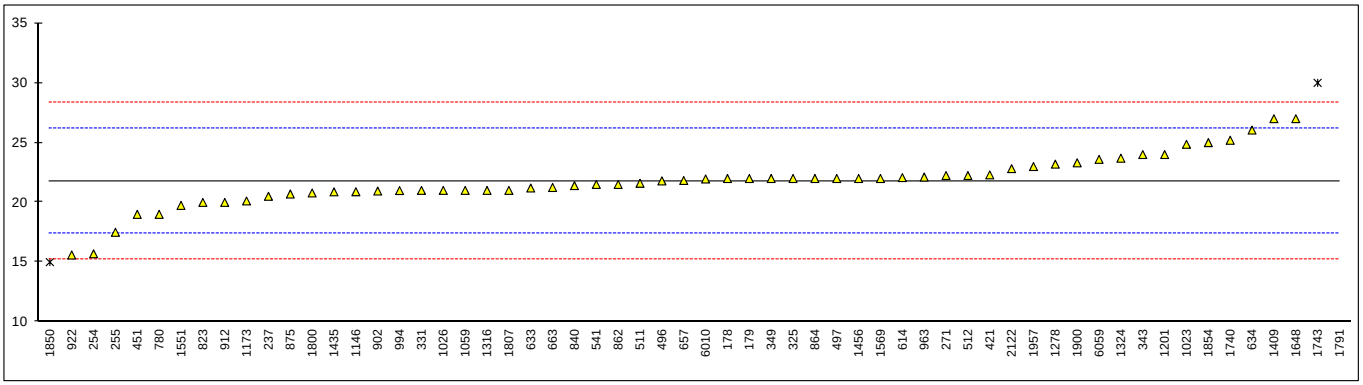

30
25
20
15
10
5
922 780 823 1026 1456 1173 1551 254 1316 237 994 862 331 1146 840 963 1435 451 179 178 497 541 398 864 349 912 511 6010 271 496 875 1740 663 1324 633 614 657 421 325 1854 902 1800 512 1023 2122 1059 1569 1807 1278 1900 343 255 1201 1957 634 6059 1409 1791 1743 1850

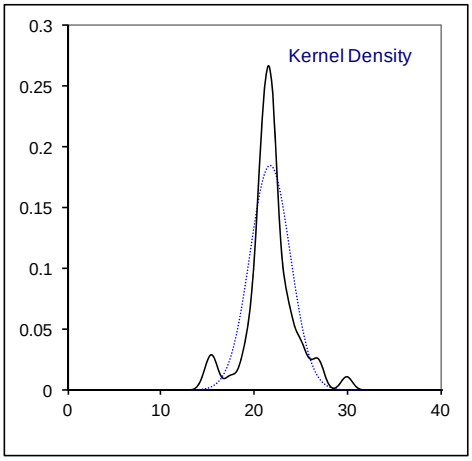

Kernel Density
0.6
0.5
0.4
0.3
0.2
0.1
0
5
10
15
20
25
30

Determination of Iron as Fe on Sample #17097; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	22		0.10	
179	D5185	22		0.10	
214		-----		-----	
230		-----		-----	
237	D5185	20.51		-0.58	
254	INH-018	15.70		-2.78	
255		17.5		-1.96	
271	D5185	22.246		0.22	
311		-----		-----	
325	D5185	22		0.10	
331	D5185 mod	21.0		-0.35	
333		-----		-----	
343	D5185	24		1.02	
349	D5185	22		0.10	
398		-----		-----	
421		22.3		0.24	
451	INH-00116	19		-1.27	
496	D5185	21.8		0.01	
497	D5185	22		0.10	
511	D5185	21.6		-0.08	
512	D5185	22.25		0.22	
541	D5185	21.5		-0.13	
575		-----		-----	
614	D5185	22.07		0.14	
633	D6595	21.2		-0.26	
634	D6595	26.05	C	1.96	First reported 28.79
657	D5185	21.83		0.03	
663	D5185	21.25		-0.24	
780	D5185	19		-1.27	
823	D5185	20.0		-0.81	
840	D5185	21.4		-0.17	
862	D5185	21.5		-0.13	
864	D5185	22		0.10	
875	D5185	20.7		-0.49	
902	D5185	20.95		-0.38	
912	D5185	20		-0.81	
922	D5185	15.6		-2.83	
963	D5185	22.12		0.16	
994	D5185	20.99		-0.36	
1023	D5185	24.858		1.41	
1026	D5185	21		-0.35	
1059	inhouse (XRF)	21		-0.35	
1146	D5185 mod	20.89		-0.41	
1173	inhouse (ICP)	20.12		-0.76	
1201	D5185	24		1.02	
1278		23.2		0.65	
1316	D5185	21.0		-0.35	
1320		-----		-----	
1324	D5185	23.7		0.88	
1409	D5185	27		2.39	
1435	D5185	20.88		-0.41	
1456	D5185	22		0.10	
1551	IP593	19.75		-0.93	
1569	D5185	22		0.10	
1648	D5185	27.0		2.39	
1740	D5185	25.2	C	1.57	First reported 29.2
1743	D5185	30	R(0.05)	3.77	
1748		-----		-----	
1791		56.07	R(0.01)	15.70	
1800		20.79		-0.45	
1807	D5185	21		-0.35	
1850		15	R(0.05)	-3.10	
1854	D5185	25.0		1.48	
1900	D5185	23.313		0.70	
1957	D5185	23		0.56	
2122	D5185	22.82		0.48	
6010	D5185	21.96		0.08	
6059	D5185	23.6		0.84	

normality	suspect
n	57
outliers	3
mean (n)	21.775
st.dev. (n)	2.16384
R(calc.)	6.059
R(D5185:13e1)	6.115

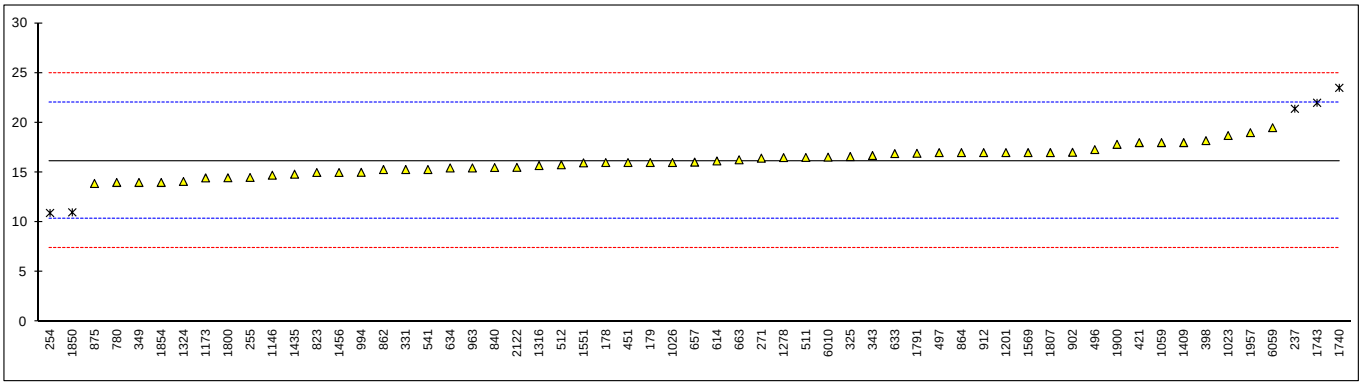

35
30
25
20
15
10
1850 922 254 255 451 780 1551 823 912 1173 237 875 1800 1435 1146 902 994 331 1026 1059 1316 1807 633 663 840 541 862 511 496 657 6010 178 179 349 325 864 497 1456 1569 614 963 271 512 421 2122 1957 1278 1900 6059 1324 343 1201 1023 1854 1740 634 1409 1648 1743 1791

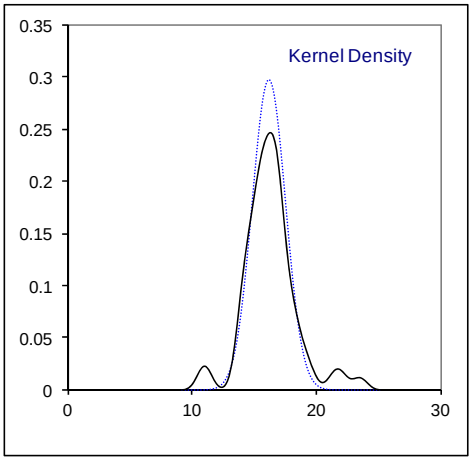

Kernel Density
0.3
0.25
0.2
0.15
0.1
0.05
0
0 10 20 30 40

Determination of Lead as Pb on Sample #17097; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	16		-0.05	
179	D5185	16		-0.05	
214		-----		-----	
230		-----		-----	
237	D5185	21.40	C,R(0.05)	1.80	First reported 29.09
254	INH-018	10.94	R(0.05)	-1.79	
255		14.5		-0.57	
271	D5185	16.438		0.10	
311		-----		-----	
325	D5185	16.6		0.15	
331	D5185 mod	15.3		-0.29	
333		-----		-----	
343	D5185	16.7		0.19	
349	D5185	14		-0.74	
398	D5185	18.2		0.70	
421		18.0		0.63	
451	INH-00116	16		-0.05	
496	D5185	17.3		0.39	
497	D5185	17		0.29	
511	D5185	16.51		0.12	
512	D5185	15.77		-0.13	
541	D5185	15.3		-0.29	
575		-----		-----	
614	D5185	16.16		0.00	
633	D6595	16.9		0.25	
634	D6595	15.46		-0.24	
657	D5185	16.04		-0.04	
663	D5185	16.28		0.04	
780	D5185	14		-0.74	
823	D5185	15.0		-0.40	
840	D5185	15.5		-0.23	
862	D5185	15.3		-0.29	
864	D5185	17		0.29	
875	D5185	13.9		-0.77	
902	D5185	17.03		0.30	
912	D5185	17		0.29	
922		-----		-----	
963	D5185	15.46		-0.24	
994	D5185	15.02		-0.39	
1023	D5185	18.709		0.88	
1026	D5185	16		-0.05	
1059	inhouse (XRF)	18		0.63	
1146	D5185 mod	14.73		-0.49	
1173	inhouse (ICP)	14.46		-0.58	
1201	D5185	17		0.29	
1278		16.5		0.12	
1316	D5185	15.7		-0.16	
1320		-----		-----	
1324	D5185	14.1		-0.70	
1409	D5185	18		0.63	
1435	D5185	14.83		-0.45	
1456	D5185	15		-0.40	
1551	IP593	15.97		-0.06	
1569	D5185	17		0.29	
1648		-----	W	-----	First reported 43.0
1740	D5185	23.5	R(0.05)	2.52	
1743	D5185	22	R(0.05)	2.00	
1748		-----		-----	
1791		16.93		0.27	
1800		14.47		-0.58	
1807	D5185	17		0.29	
1850		11	R(0.05)	-1.77	
1854	D5185	14.0		-0.74	
1900	D5185	17.824		0.57	
1957	D5185	19		0.97	
2122	D5185	15.516		-0.22	
6010	D5185	16.54		0.13	
6059	D5185	19.5		1.15	

normality	OK
n	54
outliers	5
mean (n)	16.156
st.dev. (n)	1.3417
R(calc.)	3.757
R(D5185:13e1)	8.168


30
25
20
15
10
5
0
254 1850 875 780 349 1854 1324 1173 1800 255 1146 1435 823 1456 994 862 331 541 634 963 840 2122 1316 512 1551 178 451 179 1026 657 614 663 271 1278 511 6010 325 343 633 1791 497 864 912 1201 1569 1807 902 496 1900 421 1059 1409 398 1023 1957 6059 237 1743 1740


Kernel Density
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
10
20
30

Determination of Lithium as Li on Sample #17097; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179	D5185	<1		-----	
214		-----		-----	
230		-----		-----	
237		-----		-----	
254		-----		-----	
255		-----		-----	
271		-----		-----	
311		-----		-----	
325		-----		-----	
331	D5185 mod	<1		-----	
333		-----		-----	
343	D5185	<1		-----	
349	D5185	0		-----	
398		-----		-----	
421		-----		-----	
451	INH-00116	0		-----	
496	D5185	0.2		-----	
497	D5185	<1.0		-----	
511		-----		-----	
512		-----		-----	
541		-----		-----	
575		-----		-----	
614	D5185	<1		-----	
633	D6595	0.05		-----	
634		-----		-----	
657		-----		-----	
663		-----		-----	
780		-----		-----	
823		-----		-----	
840		-----		-----	
862	D5185	<0.1		-----	
864	D5185	<1		-----	
875		-----		-----	
902		-----		-----	
912		-----		-----	
922		-----		-----	
963		-----		-----	
994		-----		-----	
1023		-----		-----	
1026		-----		-----	
1059		-----		-----	
1146	D5185 mod	0.0996		-----	
1173		-----		-----	
1201	D5185	23		-----	False positive test result?
1278		-----		-----	
1316		-----		-----	
1320		-----		-----	
1324		-----		-----	
1409		-----		-----	
1435	D5185	0.0769		-----	
1456	D5185	0		-----	
1551		-----		-----	
1569		-----		-----	
1648		-----		-----	
1740	D5185	<2.5		-----	
1743	D5185	0		-----	
1748		-----		-----	
1791		-----		-----	
1800		< 0.5		-----	
1807		-----		-----	
1850		-----		-----	
1854		-----		-----	
1900		-----		-----	
1957		-----		-----	
2122		-----		-----	
6010		-----		-----	
6059	D5185	<1		-----	

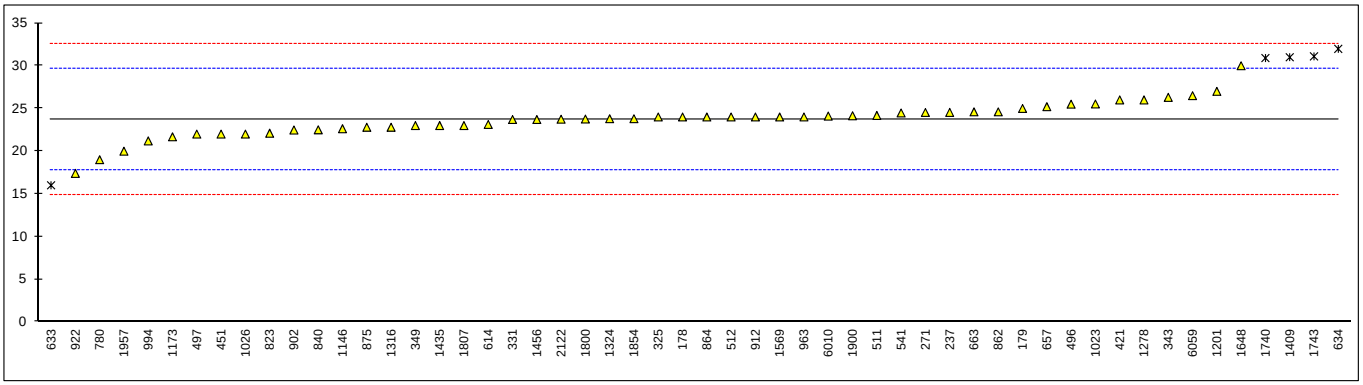
normality	not OK
n	18
outliers	n.a.
mean (n)	<2.5
st.dev. (n)	n.a.
R(calc.)	n.a.
R(Horwitz)	n.a.

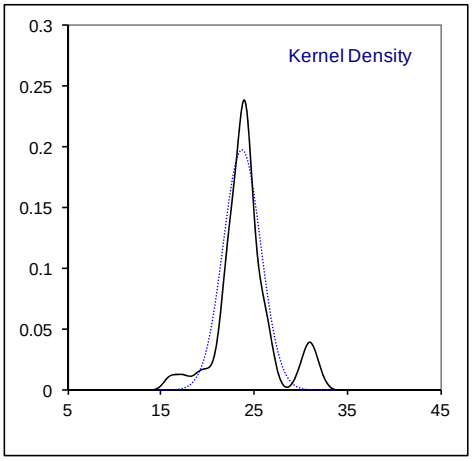
- empty page -

Determination of Magnesium as Mg on Sample #17097; results in mg/kg

lab	method	value	mark	z(targ)	Remarks
178	D5185	24		0.10	
179	D5185	25		0.44	
214		-----		-----	
230		-----		-----	
237	D5185	24.54		0.28	
254		-----		-----	
255		-----		-----	
271	D5185	24.534		0.28	
311		-----		-----	
325	D5185	24		0.10	
331	D5185 mod	23.7		0.00	
333		-----		-----	
343	D5185	26.3		0.88	
349	D5185	23		-0.24	
398		-----		-----	
421		26.0		0.78	
451	INH-00116	22		-0.58	
496	D5185	25.5		0.61	
497	D5185	22.0		-0.58	
511	D5185	24.18		0.16	
512	D5185	24		0.10	
541	D5185	24.47		0.26	
575		-----		-----	
614	D5185	23.12		-0.20	
633	D6595	16.0	R(0.05)	-2.62	
634	D6595	31.98	R(0.05)	2.81	
657	D5185	25.21		0.51	
663	D5185	24.60		0.30	
780	D5185	19		-1.60	
823	D5185	22.1		-0.54	
840	D5185	22.5		-0.41	
862	D5185	24.6		0.30	
864	D5185	24		0.10	
875	D5185	22.8		-0.31	
902	D5185	22.48		-0.42	
912	D5185	24		0.10	
922	D5185	17.4		-2.14	
963	D5185	24.01		0.10	
994	D5185	21.2		-0.85	
1023	D5185	25.528		0.62	
1026	D5185	22		-0.58	
1059		-----		-----	
1146	D5185 mod	22.63		-0.36	
1173	inhouse (ICP)	21.68		-0.69	
1201	D5185	27		1.12	
1278		26.0		0.78	
1316	D5185	22.8		-0.31	
1320		-----		-----	
1324	D5185	23.8		0.03	
1409	D5185	31	R(0.05)	2.48	
1435	D5185	23.00		-0.24	
1456	D5185	23.7		0.00	
1551		-----		-----	
1569	D5185	24		0.10	
1648	D5185	30.0		2.14	
1740	D5185	30.9	R(0.05)	2.45	
1743	D5185	31.1	R(0.05)	2.51	
1748		-----		-----	
1791		-----		-----	
1800		23.76		0.02	
1807	D5185	23		-0.24	
1850		-----		-----	
1854	D5185	23.8		0.03	
1900	D5185	24.148		0.15	
1957	D5185	20		-1.26	
2122	D5185	23.743		0.01	
6010	D5185	24.11		0.14	
6059	D5185	26.5		0.95	

normality	not OK
n	49
outliers	5
mean (n)	23.703
st.dev. (n)	2.0193
R(calc.)	5.654
R(D5185:13e1)	8.240

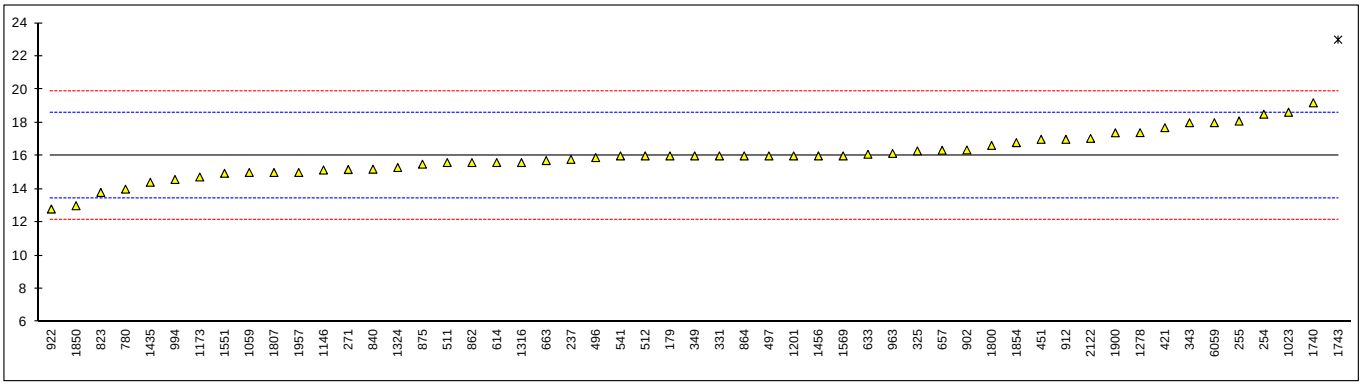

35
30
25
20
15
10
5
0
633 922 780 1957 994 1173 497 451 1026 823 902 840 1146 875 1316 349 1435 1807 614 331 1456 2122 1800 1324 1854 325 178 864 512 912 1569 963 6010 1900 511 541 271 237 663 862 179 657 496 1023 421 1278 343 6059 1201 1648 1740 1409 1743 634

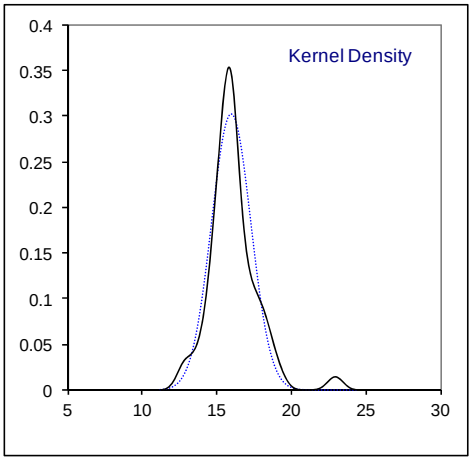

Kernel Density
0.3
0.25
0.2
0.15
0.1
0.05
0
5
15
25
35
45

Determination of Manganese as Mn on Sample #17097; results in mg/kg

lab	method	value	mark	z(targ)	Remarks
178		-----		-----	
179	D5185	16		0.00	
214		-----		-----	
230		-----		-----	
237	D5185	15.79		-0.16	
254	INH-018	18.51	C	1.94	First reported 11.44
255		18.1		1.62	
271	D5185	15.181		-0.63	
311		-----		-----	
325	D5185	16.3		0.23	
331	D5185 mod	16.0		0.00	
333		-----		-----	
343	D5185	18		1.54	
349	D5185	16		0.00	
398		-----		-----	
421		17.7		1.31	
451	INH-00116	17		0.77	
496	D5185	15.9		-0.08	
497	D5185	16		0.00	
511	D5185	15.6		-0.31	
512	D5185	16		0.00	
541	D5185	16.0		0.00	
575		-----		-----	
614	D5185	15.6		-0.31	
633	D6595	16.1		0.08	
634		-----		-----	
657	D5185	16.34		0.26	
663	D5185	15.72		-0.22	
780	D5185	14		-1.55	
823	D5185	13.8		-1.70	
840	D5185	15.2		-0.62	
862	D5185	15.6		-0.31	
864	D5185	16		0.00	
875	D5185	15.5		-0.39	
902	D5185	16.36		0.28	
912	D5185	17		0.77	
922	D5185	12.8		-2.48	
963	D5185	16.15		0.11	
994	D5185	14.58		-1.10	
1023	D5185	18.630		2.03	
1026		-----		-----	
1059	inhouse (XRF)	15		-0.77	
1146	D5185 mod	15.15		-0.66	
1173	inhouse (ICP)	14.73		-0.98	
1201	D5185	16		0.00	
1278		17.4		1.08	
1316	D5185	15.6		-0.31	
1320		-----		-----	
1324	D5185	15.3		-0.54	
1409		-----		-----	
1435	D5185	14.41		-1.23	
1456	D5185	16		0.00	
1551	IP593	14.95		-0.81	
1569	D5185	16		0.00	
1648		-----		-----	
1740	D5185	19.2		2.47	
1743	D5185	23	R(0.01)	5.41	
1748		-----		-----	
1791		-----		-----	
1800		16.63		0.49	
1807	D5185	15		-0.77	
1850		13		-2.32	
1854	D5185	16.8		0.62	
1900	D5185	17.392		1.07	
1957	D5185	15		-0.77	
2122	D5185	17.056		0.82	
6010		-----		-----	
6059	D5185	18.0		1.54	

normality	OK
n	52
outliers	1
mean (n)	16.002
st.dev. (n)	1.3215
R(calc.)	3.700
R(D5185:13e1)	3.622

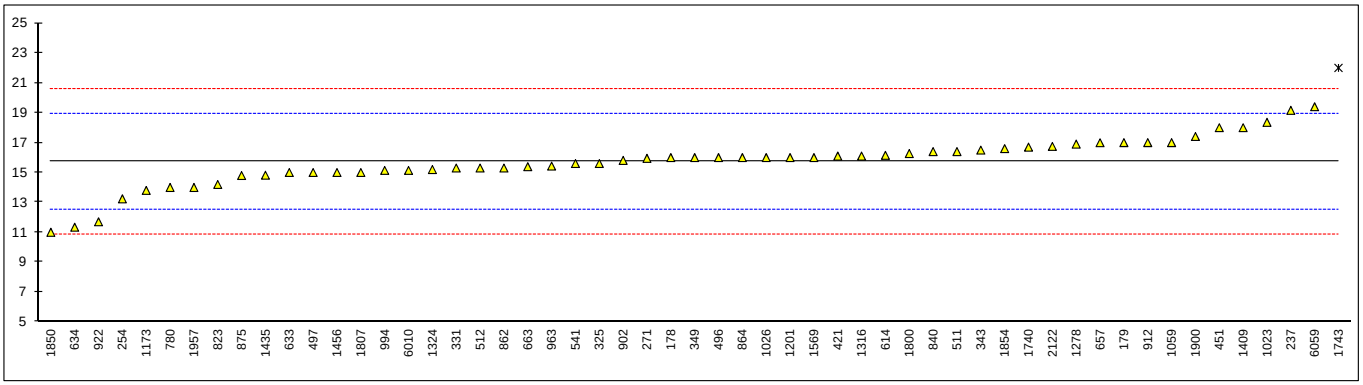

24
22
20
18
16
14
12
10
8
6
922 1850 823 780 1435 994 1173 1551 1059 1807 1957 1146 271 840 1324 875 511 862 614 1316 663 237 496 541 512 179 349 331 864 497 1201 1456 1569 633 963 325 657 902 1800 1854 451 912 2122 1900 1278 421 343 6059 255 254 1023 1740 1743

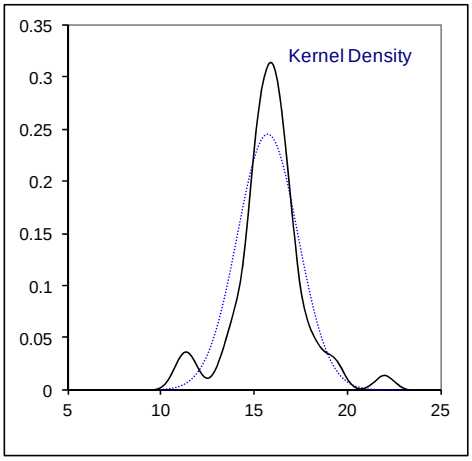

Kernel Density
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
5 10 15 20 25 30

Determination of Molybdenum as Mo on Sample #17097; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	16		0.17	
179	D5185	17		0.79	
214		-----		-----	
230		-----		-----	
237	D5185	19.16		2.12	
254	INH-018	13.24		-1.54	
255		-----		-----	
271	D5185	15.947		0.14	
311		-----		-----	
325	D5185	15.6		-0.08	
331	D5185 mod	15.3		-0.26	
333		-----		-----	
343	D5185	16.5		0.48	
349	D5185	16		0.17	
398		-----		-----	
421		16.1		0.23	
451	INH-00116	18		1.41	
496	D5185	16.0		0.17	
497	D5185	15		-0.45	
511	D5185	16.4		0.42	
512	D5185	15.3		-0.26	
541	D5185	15.6		-0.08	
575		-----		-----	
614	D5185	16.15		0.26	
633	D6595	15.0		-0.45	
634	D6595	11.34		-2.71	
657	D5185	16.99		0.78	
663	D5185	15.39		-0.21	
780	D5185	14		-1.07	
823	D5185	14.2		-0.94	
840	D5185	16.4		0.42	
862	D5185	15.3		-0.26	
864	D5185	16		0.17	
875	D5185	14.8		-0.57	
902	D5185	15.81		0.05	
912	D5185	17		0.79	
922	D5185	11.7		-2.49	
963	D5185	15.43		-0.18	
994	D5185	15.14		-0.36	
1023	D5185	18.357		1.63	
1026	D5185	16		0.17	
1059	inhouse (XRF)	17		0.79	
1146		-----		-----	
1173	inhouse (ICP)	13.80		-1.19	
1201	D5185	16		0.17	
1278		16.9		0.73	
1316	D5185	16.1		0.23	
1320		-----		-----	
1324	D5185	15.2		-0.33	
1409	D5185	18		1.41	
1435	D5185	14.82		-0.56	
1456	D5185	15		-0.45	
1551		-----		-----	
1569	D5185	16		0.17	
1648		-----		-----	
1740	D5185	16.7	C	0.60	First reported 4.7
1743	D5185	22	R(0.05)	3.88	
1748		-----		-----	
1791		-----		-----	
1800		16.27		0.34	
1807	D5185	15		-0.45	
1850		11		-2.92	
1854	D5185	16.6		0.54	
1900	D5185	17.408		1.04	
1957	D5185	14		-1.07	
2122	D5185	16.746		0.63	
6010	D5185	15.14		-0.36	
6059	D5185	19.4		2.27	

normality	suspect
n	54
outliers	1
mean (n)	15.727
st.dev. (n)	1.6271
R(calc.)	4.556
R(D5185:13e1)	4.527

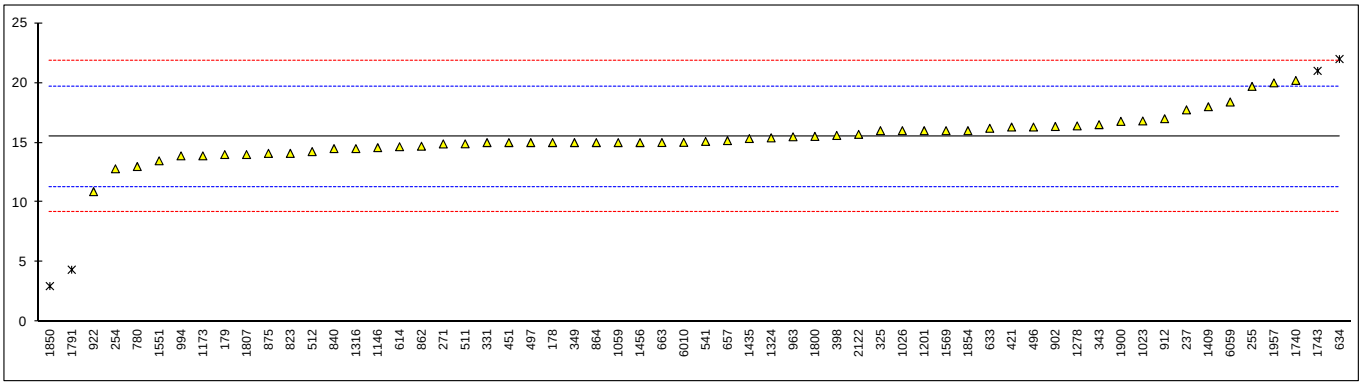

25
23
21
19
17
15
13
11
9
7
5
1850 634 922 254 1173 780 1957 823 875 1435 633 497 1456 1807 994 6010 1324 331 512 862 663 963 541 325 902 271 178 349 496 864 1026 1201 1569 421 1316 614 1800 840 511 343 1854 1740 2122 1278 657 179 912 1059 1900 451 1409 1023 237 6059 1743

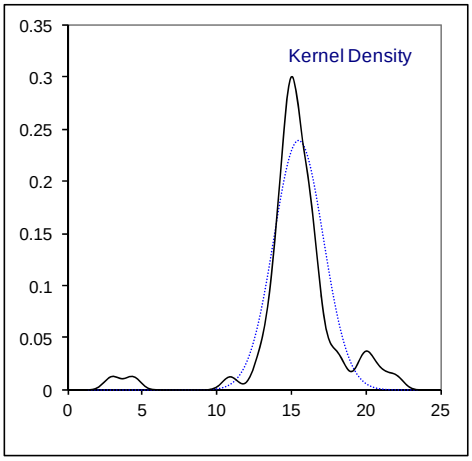

Kernel Density
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
5
10
15
20
25

Determination of Nickel as Ni on Sample #17097; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	15		-0.23	
179	D5185	14		-0.70	
214		-----		-----	
230		-----		-----	
237	D5185	17.74		1.07	
254	INH-018	12.81		-1.27	
255		19.7		2.00	
271	D5185	14.891		-0.28	
311		-----		-----	
325	D5185	16		0.24	
331	D5185 mod	15.0		-0.23	
333		-----		-----	
343	D5185	16.5		0.48	
349	D5185	15		-0.23	
398	D5185	15.6		0.05	
421		16.3		0.39	
451	INH-00116	15		-0.23	
496	D5185	16.3		0.39	
497	D5185	15		-0.23	
511	D5185	14.9		-0.28	
512	D5185	14.25		-0.59	
541	D5185	15.1		-0.18	
575		-----		-----	
614	D5185	14.66		-0.39	
633	D6595	16.2		0.34	
634	D6595	21.99	R(0.05)	3.09	
657	D5185	15.17		-0.15	
663	D5185	15.01		-0.23	
780	D5185	13		-1.18	
823	D5185	14.1		-0.66	
840	D5185	14.5		-0.47	
862	D5185	14.7		-0.37	
864	D5185	15		-0.23	
875	D5185	14.1		-0.66	
902	D5185	16.35		0.41	
912	D5185	17		0.72	
922	D5185	10.9		-2.18	
963	D5185	15.49		0.00	
994	D5185	13.89		-0.76	
1023	D5185	16.811		0.63	
1026	D5185	16		0.24	
1059	inhouse (XRF)	15		-0.23	
1146	D5185 mod	14.58		-0.43	
1173	inhouse (ICP)	13.89		-0.76	
1201	D5185	16		0.24	
1278		16.4		0.43	
1316	D5185	14.5		-0.47	
1320		-----		-----	
1324	D5185	15.4		-0.04	
1409	D5185	18		1.19	
1435	D5185	15.34		-0.07	
1456	D5185	15		-0.23	
1551	IP593	13.48		-0.95	
1569	D5185	16		0.24	
1648		-----	W	-----	First reported 35.0
1740	D5185	20.2		2.24	
1743	D5185	21	ex	2.62	Test result excluded, see $4.1
1748		-----		-----	
1791		4.37	R(0.01)	-5.27	
1800		15.52		0.02	
1807	D5185	14		-0.70	
1850		3	R(0.01)	-5.92	
1854	D5185	16.0		0.24	
1900	D5185	16.780		0.61	
1957	D5185	20		2.14	
2122	D5185	15.69		0.10	
6010	D5185	15.02		-0.22	
6059	D5185	18.4		1.38	

normality	not OK
n	56
outliers	3 (+ 1ex)
mean (n)	15.485
st.dev. (n)	1.6648
R(calc.)	4.662
R(D5185:13e1)	5.903

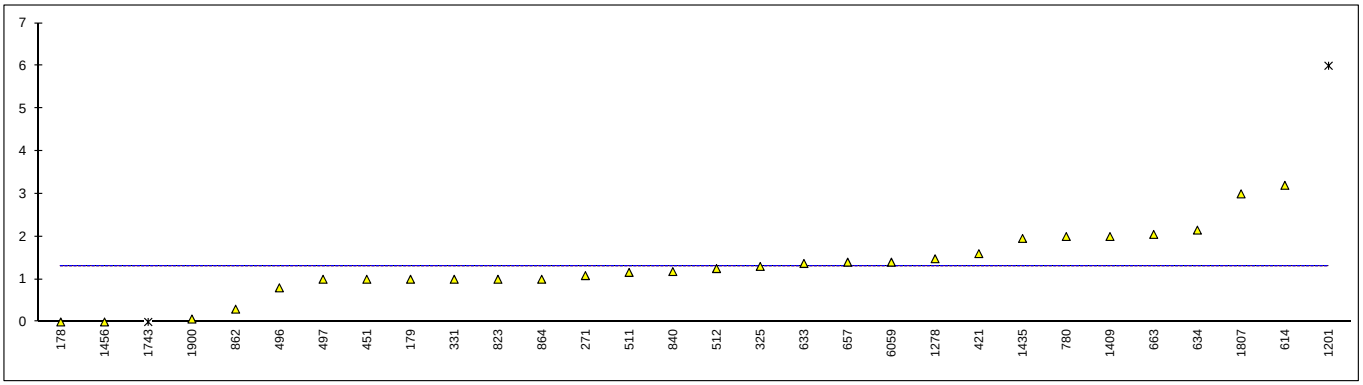

25
20
15
10
5
0
1850 1791 922 254 780 1551 994 1173 179 1807 875 823 512 840 1316 1146 614 862 271 511 331 451 497 178 349 864 1059 1456 663 6010 541 657 1435 1324 963 1800 398 2122 325 1026 1201 1569 1854 633 421 496 902 1278 343 1900 1023 912 237 1409 6059 255 1957 1740 1743 634

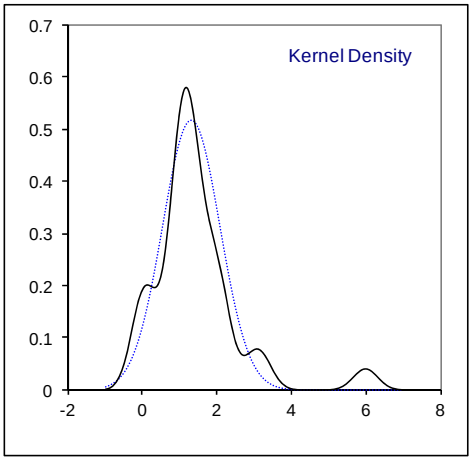

Kernel Density
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0 5 10 15 20 25

Determination of Potassium as K on Sample #17097; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	0		-----	
179	D5185	1		-----	
214		-----		-----	
230		-----		-----	
237	D5185	<40	C	-----	First reported 857.1
254		-----		-----	
255		-----		-----	
271	D5185	1.085		-----	
311		-----		-----	
325	D5185	1.3		-----	
331	D5185 mod	1.0		-----	
333		-----		-----	
343	D5185	<1		-----	
349	D5185	<4		-----	
398		-----		-----	
421		1.6		-----	
451	INH-00116	1		-----	
496	D5185	0.8		-----	
497	D5185	1.0		-----	
511	D5185	1.16		-----	
512	D5185	1.25		-----	
541	D5185	<40		-----	
575		-----		-----	
614	D5185	3.2		-----	
633	D6595	1.37		-----	
634	D6595	2.15		-----	
657	D5185	1.4		-----	
663	D5185	2.05		-----	
780	D5185	2		-----	
823	D5185	1.0		-----	
840	D5185	1.18		-----	
862	D5185	0.30		-----	
864	D5185	1		-----	
875		-----		-----	
902		-----		-----	
912		-----		-----	
922		-----		-----	
963		-----		-----	
994		-----		-----	
1023		-----		-----	
1026		-----		-----	
1059		-----		-----	
1146		-----		-----	
1173		-----		-----	
1201	D5185	6	R(0.01)	-----	
1278		1.48		-----	
1316		-----		-----	
1320		-----		-----	
1324		-----		-----	
1409	D5185	2		-----	
1435	D5185	1.955		-----	
1456	D5185	0		-----	
1551		-----		-----	
1569		-----		-----	
1648		-----		-----	
1740	D5185	<2.5		-----	
1743	D5185	0	ex	-----	
1748		-----		-----	
1791		-----		-----	
1800		< 20		-----	
1807	D5185	3		-----	
1850		-----		-----	
1854		-----		-----	
1900	D5185	0.069		-----	
1957		-----		-----	
2122		-----		-----	
6010		-----		-----	
6059	D5185	1.4		-----	

	normality	OK	
	n	29	
	outliers	1 (+ 1ex)	
	mean (n)	(1.267)	
	st.dev. (n)	(0.7966)	
	R(calc.)	(2.230)	
	R(D5185:13e1)	n.a. (application range: 40-1200 mg/kg)	Compare R(Horwitz):0.548

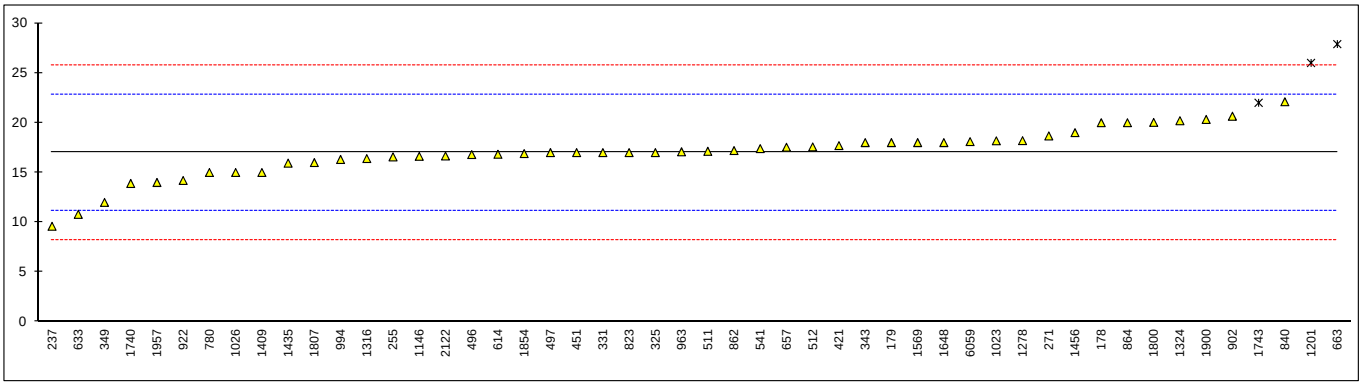

7
6
5
4
3
2
1
0
178
1456
1743
1900
862
496
497
451
179
331
823
864
271
511
840
512
325
633
657
6059
1278
421
1435
780
1409
663
634
1807
614
1201

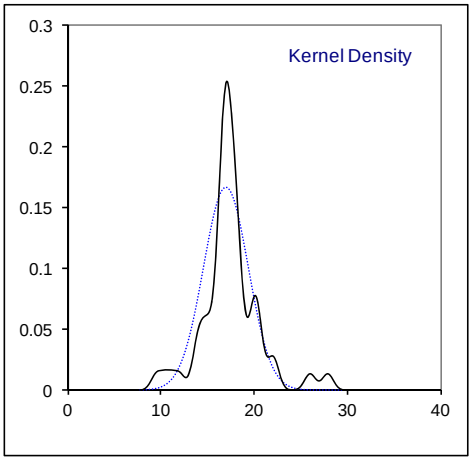

Kernel Density
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-2
0
2
4
6
8

Determination of Sodium as Na on Sample #17097; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	20		1.02	
179	D5185	18		0.34	
214		-----		-----	
230		-----		-----	
237	D5185	9.602		-2.52	
254		-----		-----	
255		16.57		-0.14	
271	D5185	18.673		0.57	
311		-----		-----	
325	D5185	17		0.00	
331	D5185 mod	17.0		0.00	
333		-----		-----	
343	D5185	18		0.34	
349	D5185	12		-1.70	
398		-----		-----	
421		17.7		0.24	
451	INH-00116	17		0.00	
496	D5185	16.8		-0.07	
497	D5185	17		0.00	
511	D5185	17.13		0.05	
512	D5185	17.57		0.20	
541	D5185	17.4		0.14	
575		-----		-----	
614	D5185	16.83		-0.06	
633	D6595	10.8		-2.11	
634		-----		-----	
657	D5185	17.54		0.19	
663	D5185	27.89	R(0.05)	3.71	
780	D5185	15		-0.68	
823	D5185	17.0		0.00	
840	D5185	22.1		1.74	
862	D5185	17.2		0.07	
864	D5185	20		1.02	
875		-----		-----	
902	D5185	20.65		1.25	
912		-----		-----	
922	D5185	14.2		-0.95	
963	D5185	17.08		0.03	
994	D5185	16.31		-0.23	
1023	D5185	18.180		0.40	
1026	D5185	15		-0.68	
1059		-----		-----	
1146	D5185 mod	16.62		-0.13	
1173		-----		-----	
1201	D5185	26	R(0.05)	3.07	
1278		18.2		0.41	
1316	D5185	16.4		-0.20	
1320		-----		-----	
1324	D5185	20.2		1.09	
1409	D5185	15		-0.68	
1435	D5185	15.94		-0.36	
1456	D5185	19		0.68	
1551		-----		-----	
1569	D5185	18		0.34	
1648	D5185	18.0		0.34	
1740	D5185	13.9		-1.05	
1743	D5185	22	ex	1.71	Test result excluded, see $4.1
1748		-----		-----	
1791		-----		-----	
1800		20.03		1.03	
1807	D5185	16		-0.34	
1850		-----		-----	
1854	D5185	16.9		-0.03	
1900	D5185	20.324		1.14	
1957	D5185	14		-1.02	
2122	D5185	16.66		-0.11	
6010		-----		-----	
6059	D5185	18.1		0.38	

normality	suspect
n	47
outliers	2 (+ 1ex)
mean (n)	16.992
st.dev. (n)	2.3960
R(calc.)	6.709
R(D5185:13e1)	8.220

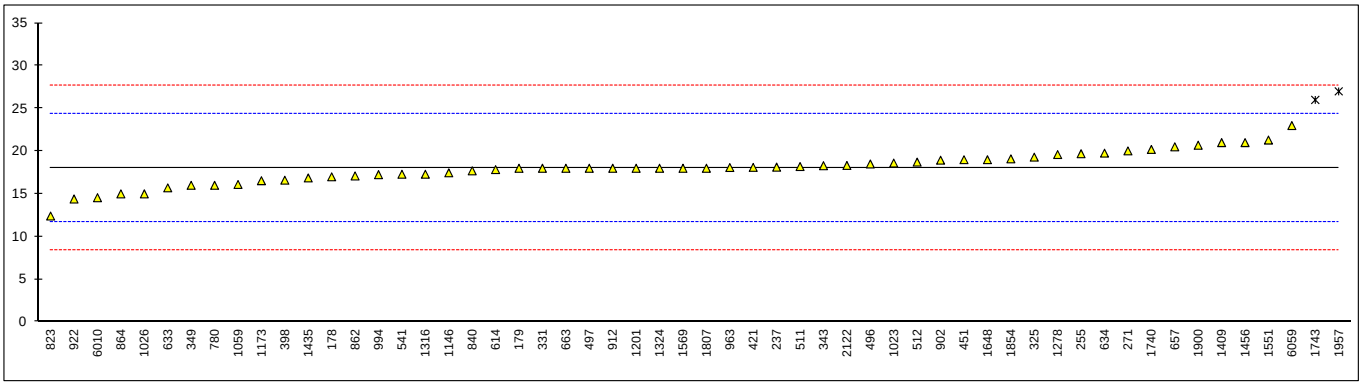

30
25
20
15
10
5
0
237 633 349 1740 1957 922 780 1026 1409 1435 1807 994 1316 255 1146 2122 496 614 1854 497 451 331 823 325 963 511 862 541 657 512 421 343 179 1569 1648 6059 1023 1278 271 1456 178 864 1800 1324 1900 902 1743 840 1201 663

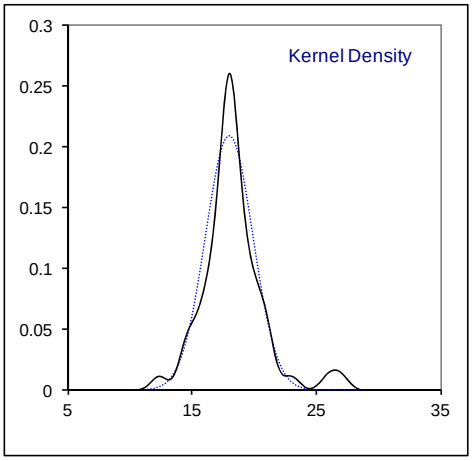

Kernel Density
0.3
0.25
0.2
0.15
0.1
0.05
0
0
10
20
30
40

Determination of Silicon as Si on Sample #17097; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	17		-0.32	
179	D5185	18		-0.01	
214		-----		-----	
230		-----		-----	
237	D5185	18.13		0.03	
254		-----		-----	
255		19.7		0.52	
271	D5185	20.027		0.63	
311		-----		-----	
325	D5185	19.3		0.40	
331	D5185 mod	18.0		-0.01	
333		-----		-----	
343	D5185	18.3		0.09	
349	D5185	16		-0.63	
398	D5185	16.6		-0.44	
421		18.1		0.02	
451	INH-00116	19		0.31	
496	D5185	18.5		0.15	
497	D5185	18		-0.01	
511	D5185	18.2		0.06	
512	D5185	18.72		0.22	
541	D5185	17.3		-0.23	
575		-----		-----	
614	D5185	17.84		-0.06	
633	D6595	15.7		-0.73	
634	D6595	19.77		0.55	
657	D5185	20.51		0.78	
663	D5185	18.00		-0.01	
780	D5185	16		-0.63	
823	D5185	12.4		-1.76	
840	D5185	17.7		-0.10	
862	D5185	17.1		-0.29	
864	D5185	15		-0.94	
875		-----		-----	
902	D5185	18.94		0.29	
912	D5185	18		-0.01	
922	D5185	14.4		-1.13	
963	D5185	18.08		0.02	
994	D5185	17.25		-0.24	
1023	D5185	18.609		0.18	
1026	D5185	15		-0.94	
1059	inhouse (XRF)	16.1	C	-0.60	First reported 30
1146	D5185 mod	17.46		-0.18	
1173	inhouse (ICP)	16.54		-0.46	
1201	D5185	18		-0.01	
1278		19.6		0.49	
1316	D5185	17.3		-0.23	
1320		-----		-----	
1324	D5185	18.0		-0.01	
1409	D5185	21		0.93	
1435	D5185	16.86		-0.36	
1456	D5185	21		0.93	
1551	Inhouse (XRF)	21.3		1.02	
1569	D5185	18		-0.01	
1648	D5185	19.0		0.31	
1740	D5185	20.2		0.68	
1743	D5185	26	R(0.01)	2.49	
1748		-----		-----	
1791		-----		-----	
1800		-----		-----	
1807	D5185	18		-0.01	
1850		-----		-----	
1854	D5185	19.1		0.34	
1900	D5185	20.697		0.84	
1957	D5185	27	R(0.01)	2.81	
2122	D5185	18.326		0.09	
6010	D5185	14.55		-1.09	
6059	D5185	23.0		1.56	

normality	suspect
n	54
outliers	2
mean (n)	18.022
st.dev. (n)	1.9055
R(calc.)	5.335
R(D5185:13e1)	8.957

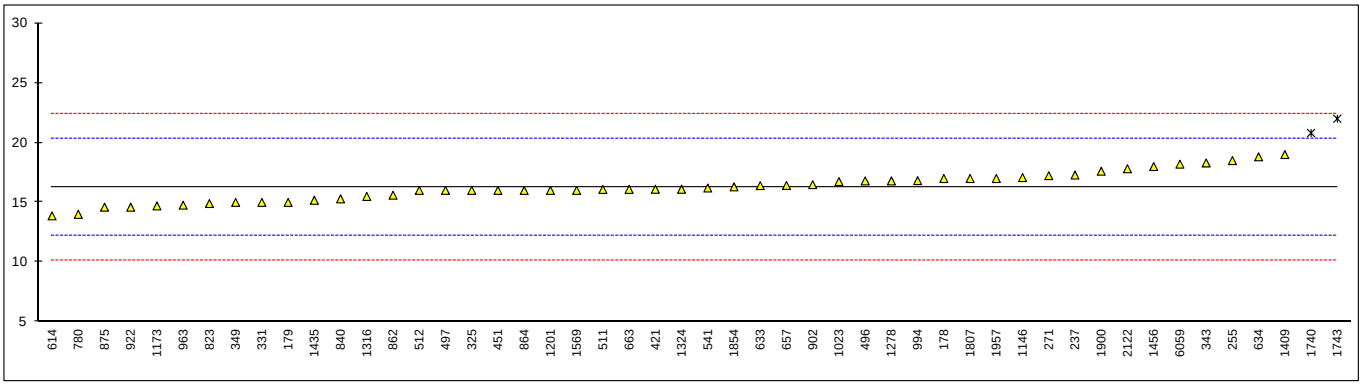

35
30
25
20
15
10
5
0
823 922 6010 864 1026 633 349 780 1059 1173 398 1435 178 862 994 541 1316 1146 840 614 179 331 663 497 912 1201 1324 1569 1807 963 421 237 511 343 2122 496 1023 512 902 451 1648 1854 325 1278 255 634 271 1740 657 1900 1409 1456 1551 6059 1743 1957

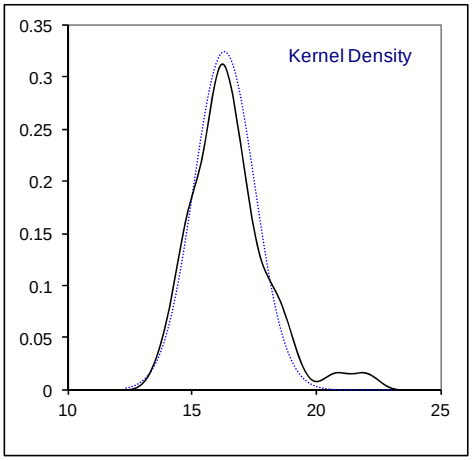

Kernel Density
0.3
0.25
0.2
0.15
0.1
0.05
0
5
15
25
35

Determination of Silver as Ag on Sample #17097; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	17		0.35	
179	D5185	15		-0.64	
214		-----		-----	
230		-----		-----	
237	D5185	17.29	C	0.49	First reported 23.47
254		-----		-----	
255		18.5		1.08	
271	D5185	17.231		0.46	
311		-----		-----	
325	D5185	16		-0.15	
331	D5185 mod	15.0		-0.64	
333		-----		-----	
343	D5185	18.3		0.98	
349	D5185	15		-0.64	
398		-----		-----	
421		16.1		-0.10	
451	INH-00116	16		-0.15	
496	D5185	16.8		0.25	
497	D5185	16		-0.15	
511	D5185	16.08		-0.11	
512	D5185	16		-0.15	
541	D5185	16.2		-0.05	
575		-----		-----	
614	D5185	13.87		-1.19	
633	D6595	16.4		0.05	
634	D6595	18.81		1.23	
657	D5185	16.42		0.06	
663	D5185	16.09		-0.10	
780	D5185	14		-1.13	
823	D5185	14.9		-0.69	
840	D5185	15.3		-0.49	
862	D5185	15.6		-0.34	
864	D5185	16		-0.15	
875	D5185	14.6		-0.83	
902	D5185	16.48		0.09	
912		-----		-----	
922	D5185	14.6		-0.83	
963	D5185	14.77		-0.75	
994	D5185	16.82		0.26	
1023	D5185	16.742		0.22	
1026		-----		-----	
1059		-----		-----	
1146	D5185 mod	17.08		0.39	
1173	inhouse (ICP)	14.70		-0.78	
1201	D5185	16		-0.15	
1278		16.8		0.25	
1316	D5185	15.5		-0.39	
1320		-----		-----	
1324	D5185	16.1		-0.10	
1409	D5185	19		1.33	
1435	D5185	15.18		-0.55	
1456	D5185	18		0.84	
1551		-----		-----	
1569	D5185	16		-0.15	
1648		-----		-----	
1740	D5185	20.8	R(0.05)	2.21	
1743	D5185	22	R(0.01)	2.80	
1748		-----		-----	
1791		-----		-----	
1800		-----		-----	
1807	D5185	17		0.35	
1850		-----		-----	
1854	D5185	16.3		0.00	
1900	D5185	17.610		0.65	
1957	D5185	17		0.35	
2122	D5185	17.815		0.75	
6010		-----		-----	
6059	D5185	18.2		0.93	

normality	OK
n	48
outliers	2
mean (n)	16.296
st.dev. (n)	1.2290
R(calc.)	3.441
R(D5185:13e1)	5.703

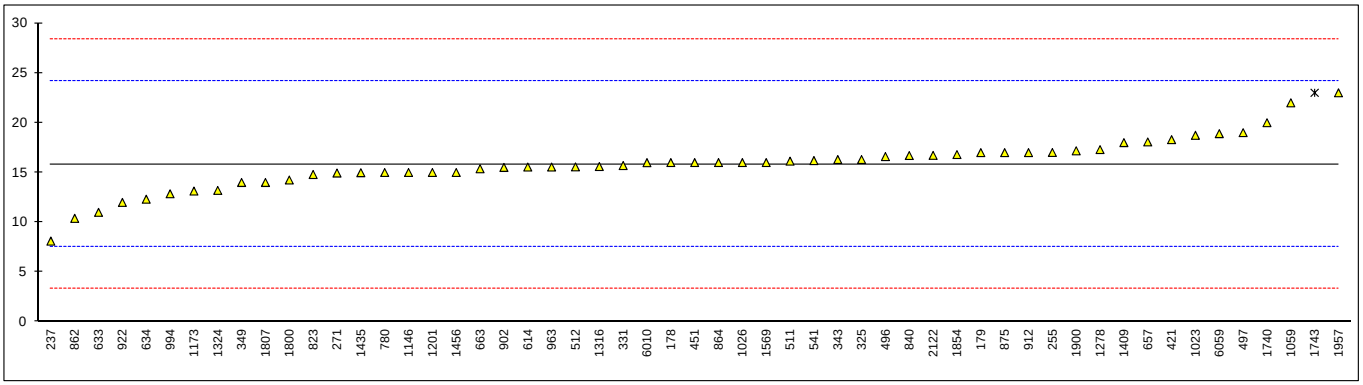

30
25
20
15
10
5
614 780 875 922 1173 963 823 349 331 179 1435 840 1316 862 512 497 325 451 864 1201 1569 511 663 421 1324 541 1854 633 657 902 1023 496 1278 994 178 1807 1957 1146 271 237 1900 2122 1456 6059 343 255 634 1409 1740 1743

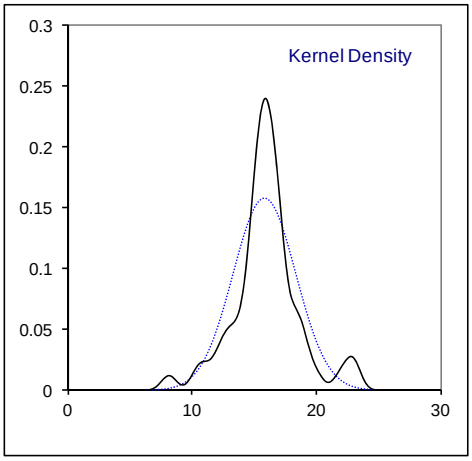

Kernel Density
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
10
15
20
25

Determination of Tin as Sn on Sample #17097; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	16		0.04	
179	D5185	17		0.28	
214		-----		-----	
230		-----		-----	
237	D5185	8.115		-1.86	
254		-----		-----	
255		17.01		0.28	
271	D5185	14.948		-0.21	
311		-----		-----	
325	D5185	16.3		0.11	
331	D5185 mod	15.7		-0.03	
333		-----		-----	
343	D5185	16.3		0.11	
349	D5185	14		-0.44	
398		-----		-----	
421		18.3		0.59	
451	INH-00116	16		0.04	
496	D5185	16.6		0.18	
497	D5185	19	C	0.76	First reported 2.0
511	D5185	16.14		0.07	
512	D5185	15.56		-0.07	
541	D5185	16.2		0.09	
575		-----		-----	
614	D5185	15.55		-0.07	
633	D6595	11.0		-1.16	
634	D6595	12.32		-0.85	
657	D5185	18.07		0.54	
663	D5185	15.38		-0.11	
780	D5185	15		-0.20	
823	D5185	14.8		-0.25	
840	D5185	16.7		0.21	
862	D5185	10.4		-1.31	
864	D5185	16		0.04	
875	D5185	17.0		0.28	
902	D5185	15.51		-0.08	
912	D5185	17		0.28	
922	D5185	12.0		-0.92	
963	D5185	15.55		-0.07	
994	D5185	12.86		-0.72	
1023	D5185	18.735		0.70	
1026	D5185	16		0.04	
1059	inhouse (XRF)	22		1.48	
1146	D5185 mod	15.00		-0.20	
1173	inhouse (ICP)	13.14		-0.65	
1201	D5185	15		-0.20	
1278		17.3		0.35	
1316	D5185	15.6		-0.06	
1320		-----		-----	
1324	D5185	13.2		-0.63	
1409	D5185	18		0.52	
1435	D5185	14.98		-0.21	
1456	D5185	15		-0.20	
1551		-----		-----	
1569	D5185	16		0.04	
1648		-----		-----	
1740	D5185	20		1.00	
1743	D5185	23	ex	1.72	Test result excluded, see $4.1
1748		-----		-----	
1791		-----		-----	
1800		14.25		-0.38	
1807	D5185	14		-0.44	
1850		-----		-----	
1854	D5185	16.8		0.23	
1900	D5185	17.177		0.32	
1957	D5185	23		1.72	
2122	D5185	16.72		0.21	
6010	D5185	15.99		0.04	
6059	D5185	18.9		0.74	

normality	not OK
n	54
outliers	0 (+ 1ex)
mean (n)	15.835
st.dev. (n)	2.5381
R(calc.)	7.107
R(D5185:13e1)	11.641

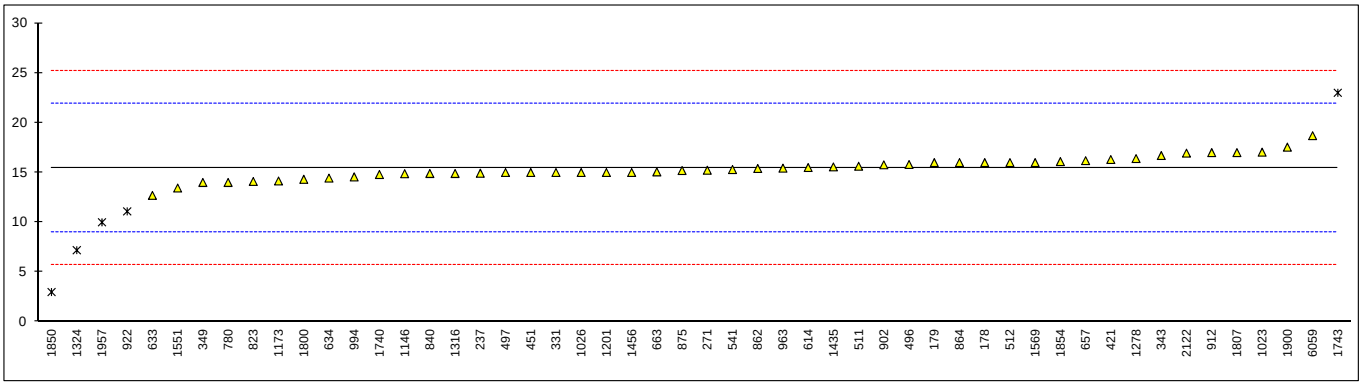

30
25
20
15
10
5
0
237 862 633 922 634 994 1173 1324 349 1807 1800 823 271 1435 780 1146 1201 1456 663 902 614 963 512 1316 331 6010 178 451 864 1026 1569 511 541 343 325 496 840 2122 1854 179 875 912 255 1900 1278 1409 657 421 1023 6059 497 1740 1059 1743 1957

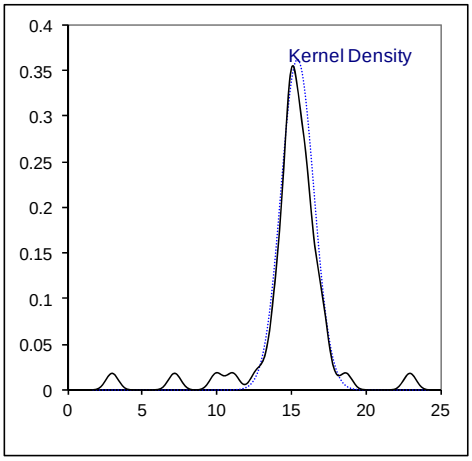

Kernel Density
0.3
0.25
0.2
0.15
0.1
0.05
0
0
10
20
30

Determination of Titanium as Ti on Sample #17097; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	16		0.17	
179	D5185	16		0.17	
214		-----		-----	
230		-----		-----	
237	D5185	14.93		-0.16	
254		-----		-----	
255		-----		-----	
271	D5185	15.229		-0.07	
311		-----		-----	
325		-----		-----	
331	D5185 mod	15.0		-0.14	
333		-----		-----	
343	D5185	16.7		0.39	
349	D5185	14		-0.45	
398		-----		-----	
421		16.3		0.26	
451	INH-00116	15		-0.14	
496	D5185	15.8		0.11	
497	D5185	15		-0.14	
511	D5185	15.63		0.06	
512	D5185	16		0.17	
541	D5185	15.3		-0.04	
575		-----		-----	
614	D5185	15.50		0.02	
633	D6595	12.7		-0.85	
634	D6595	14.44		-0.31	
657	D5185	16.19		0.23	
663	D5185	15.06		-0.12	
780	D5185	14		-0.45	
823	D5185	14.1		-0.42	
840	D5185	14.9		-0.17	
862	D5185	15.4		-0.01	
864	D5185	16		0.17	
875	D5185	15.2		-0.08	
902	D5185	15.77		0.10	
912	D5185	17		0.48	
922	D5185	11.1	R(0.05)	-1.34	
963	D5185	15.44		0.00	
994	D5185	14.56		-0.27	
1023	D5185	17.043		0.49	
1026	D5185	15		-0.14	
1059		-----		-----	
1146	D5185 mod	14.88		-0.17	
1173	inhouse (ICP)	14.15		-0.40	
1201	D5185	15		-0.14	
1278		16.4		0.30	
1316	D5185	14.9		-0.17	
1320		-----		-----	
1324	D5185	7.2	R(0.01)	-2.55	
1409		-----		-----	
1435	D5185	15.56		0.04	
1456	D5185	15		-0.14	
1551	inhouse (XRF)	13.44		-0.62	
1569	D5185	16		0.17	
1648		-----		-----	
1740	D5185	14.8		-0.20	
1743	D5185	23	R(0.01)	2.34	
1748		-----		-----	
1791		-----		-----	
1800		14.32		-0.35	
1807	D5185	17		0.48	
1850		3	R(0.01)	-3.85	
1854	D5185	16.1		0.20	
1900	D5185	17.546		0.65	
1957	D5185	10	R(0.01)	-1.68	
2122	D5185	16.946		0.46	
6010		-----		-----	
6059	D5185	18.7		1.01	

normality	OK
n	47
outliers	5
mean (n)	15.445
st.dev. (n)	1.1035
R(calc.)	3.090
R(D5185:13e1)	9.051

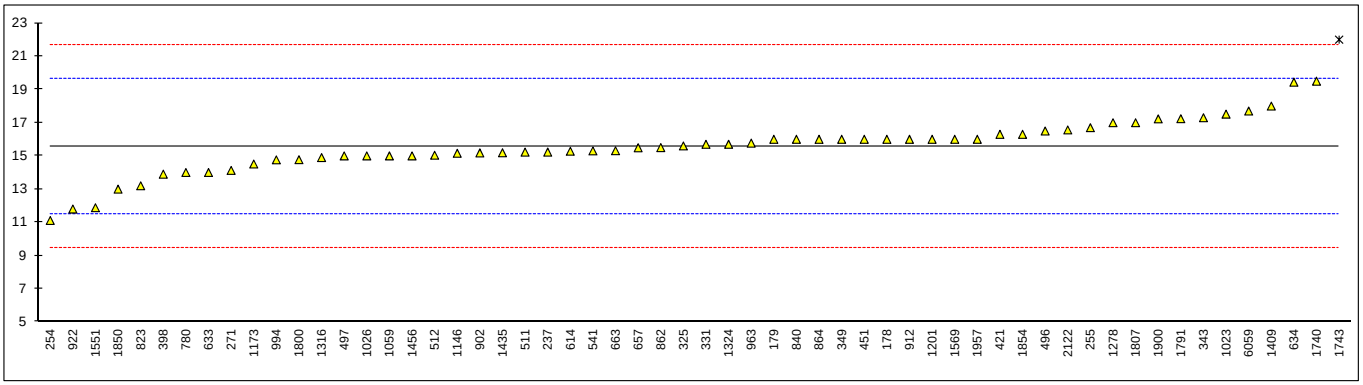

30
25
20
15
10
5
0
1850 1324 1957 922 633 1551 349 780 823 1173 1800 634 994 1740 1146 840 1316 237 497 451 331 1026 1201 1456 663 875 271 541 862 963 614 1435 511 902 496 179 864 178 512 1569 1854 657 421 1278 343 2122 912 1807 1023 1900 6059 1743

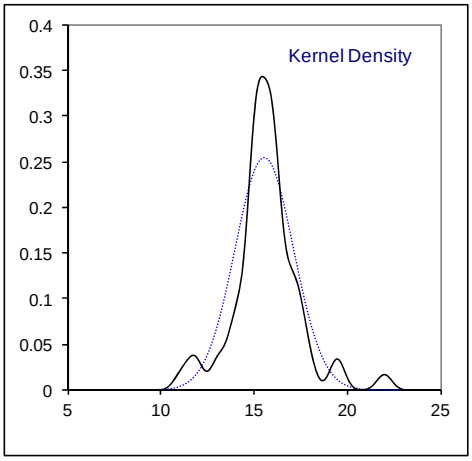

Kernel Density
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0 5 10 15 20 25

Determination of Vanadium as V on Sample #17097; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	16		0.21	
179	D5185	16		0.21	
214		-----		-----	
230		-----		-----	
237	D5185	15.23		-0.16	
254	INH-018	11.11		-2.17	
255		16.7		0.56	
271	D5185	14.126		-0.70	
311		-----		-----	
325	D5185	15.6		0.02	
331	D5185 mod	15.7		0.07	
333		-----		-----	
343	D5185	17.3		0.85	
349	D5185	16		0.21	
398	D5185	13.9		-0.81	
421		16.3		0.36	
451	INH-00116	16		0.21	
496	D5185	16.5		0.46	
497	D5185	15		-0.27	
511	D5185	15.23		-0.16	
512	D5185	15.04		-0.25	
541	D5185	15.3		-0.13	
575		-----		-----	
614	D5185	15.28		-0.14	
633	D6595	14.0		-0.76	
634	D6595	19.44		1.89	
657	D5185	15.49		-0.03	
663	D5185	15.31		-0.12	
780	D5185	14		-0.76	
823	D5185	13.2		-1.15	
840	D5185	16.0		0.21	
862	D5185	15.5		-0.03	
864	D5185	16		0.21	
875		-----		-----	
902	D5185	15.18		-0.19	
912	D5185	16		0.21	
922	D5185	11.8		-1.84	
963	D5185	15.77		0.10	
994	D5185	14.76		-0.39	
1023	D5185	17.516		0.96	
1026	D5185	15		-0.27	
1059	inhouse (XRF)	15		-0.27	
1146	D5185 mod	15.16		-0.20	
1173	inhouse (ICP)	14.51		-0.51	
1201	D5185	16		0.21	
1278		17.0		0.70	
1316	D5185	14.9		-0.32	
1320		-----		-----	
1324	D5185	15.7		0.07	
1409	D5185	18		1.19	
1435	D5185	15.19		-0.18	
1456	D5185	15		-0.27	
1551	IP593	11.88		-1.80	
1569	D5185	16		0.21	
1648		-----		-----	
1740	D5185	19.5		1.92	
1743	D5185	22	R(0.01)	3.15	
1748		-----		-----	
1791		17.24		0.82	
1800		14.77		-0.39	
1807	D5185	17		0.70	
1850		13		-1.25	
1854	D5185	16.3		0.36	
1900	D5185	17.230		0.82	
1957	D5185	16		0.21	
2122	D5185	16.5633		0.49	
6010		-----		-----	
6059	D5185	17.7		1.05	

normality	suspect
n	57
outliers	1
mean (n)	15.560
st.dev. (n)	1.5727
R(calc.)	4.404
R(D5185:13e1)	5.733

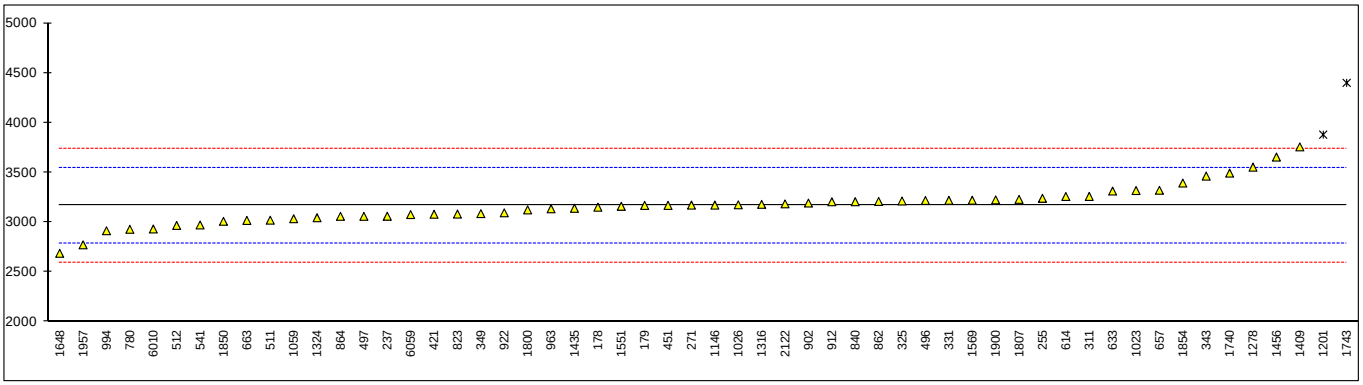

23
21
19
17
15
13
11
9
7
5
254 922 1551 1850 823 398 780 633 271 1173 994 1800 1316 497 1026 1059 1456 512 1146 902 1435 511 237 614 541 663 657 862 325 331 1324 963 179 840 864 349 451 178 912 1201 1569 1957 421 1854 496 2122 255 1278 1807 1900 1791 343 1023 6059 1409 634 1740 1743

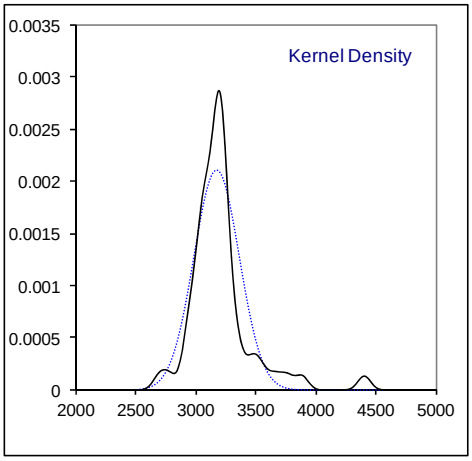

Kernel Density
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
5
10
15
20
25

Determination of Calcium as Ca on Sample #17097; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	3152		-0.08	
179	D5185	3170		0.01	
214		-----		-----	
230		-----		-----	
237	D5185	3061		-0.56	
254		-----		-----	
255		3241		0.39	
271	D5185	3172.83		0.03	
311	D5185	3260		0.49	
325	D5185	3214		0.24	
331	D5185 mod	3220.3		0.28	
333		-----		-----	
343	D5185	3464.0		1.56	
349	D5185	3087		-0.42	
398		-----		-----	
421		3081		-0.45	
451	INH-00116	3170		0.01	
496	D5185	3219.4		0.27	
497	D5185	3060		-0.56	
511	D5185	3021		-0.77	
512	D5185	2968		-1.05	
541	D5185	2973.5		-1.02	
575		-----		-----	
614	D5185	3259		0.48	
633	D6595	3313.7		0.77	
634		-----		-----	
657	D5185	3321.75		0.81	
663	D5185	3019.1		-0.78	
780	D5185	2930		-1.25	
823	D5185	3083		-0.44	
840	D5185	3207		0.21	
862	D5185	3209		0.22	
864	D5185	3060		-0.56	
875		-----		-----	
902	D5185	3193		0.13	
912	D5185	3206		0.20	
922	D5185	3095		-0.38	
963	D5185	3135.5		-0.17	
994	D5185	2915		-1.33	
1023	D5185	3319.150	C	0.80	First reported 3774.523
1026	D5185	3176		0.05	
1059	inhouse (XRF)	3036		-0.69	
1146	D5185 mod	3173		0.03	
1173		-----		-----	
1201	D5185	3880	R(0.05)	3.74	
1278		3554		2.03	
1316	D5185	3180		0.07	
1320		-----		-----	
1324	D5185	3046		-0.64	
1409	D5185	3757		3.10	
1435	D5185	3141		-0.14	
1456	D5185	3655		2.56	
1551	inhouse (XRF)	3160.6		-0.04	
1569	D5185	3222		0.29	
1648	D5185	2689.0		-2.51	
1740	D5185	3494	C	1.71	First reported 2494
1743	D5185	4400	R(0.01)	6.47	
1748		-----		-----	
1791		-----		-----	
1800		3125.0		-0.22	
1807	D5185	3230		0.33	
1850		3010		-0.83	
1854	D5185	3394		1.19	
1900	D5185	3225.272		0.30	
1957	D5185	2774		-2.07	
2122	D5185	3184.903		0.09	
6010	D5185	2933		-1.23	
6059	D5185	3078.0		-0.47	

normality	suspect
n	54
outliers	2
mean (n)	3167.4
st.dev. (n)	189.54
R(calc.)	530.7
R(D5185:13e1)	533.3

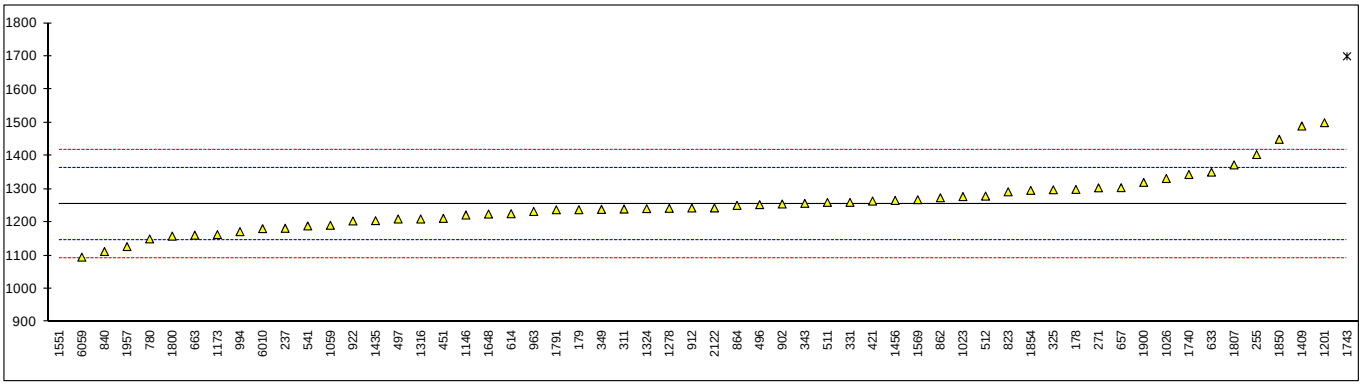

5000
4500
4000
3500
3000
2500
2000
1648 1957 994 780 6010 512 541 1850 663 511 1059 1324 864 497 237 6059 421 823 349 922 1800 963 1435 178 1551 179 451 271 1146 1026 1316 2122 902 912 840 862 325 496 331 1569 1900 1807 255 614 311 633 1023 657 1854 343 1740 1278 1456 1409 1201 1743

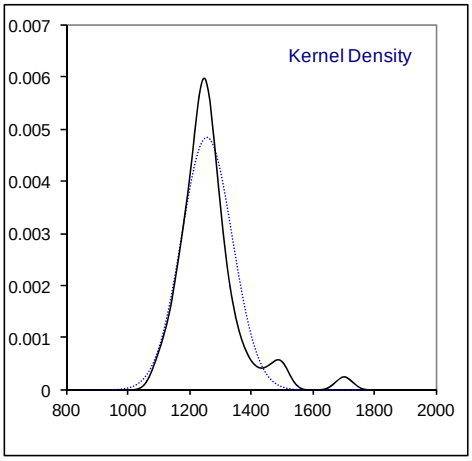

Kernel Density
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
2000 2500 3000 3500 4000 4500 5000

Determination of Phosphorus as P on Sample #17097; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	1299		0.81	
179	D5185	1238		-0.31	
214		-----		-----	
230		-----		-----	
237	D5185	1182		-1.34	
254		-----		-----	
255		1404		2.74	
271	D5185	1303.89		0.90	
311	D5185	1240		-0.27	
325	D5185	1298		0.79	
331	D5185 mod	1260.0		0.09	
333		-----		-----	
343	D5185	1257.0		0.04	
349	D5185	1239		-0.29	
398		-----		-----	
421		1264		0.17	
451	INH-00116	1212		-0.79	
496	D5185	1253.2		-0.03	
497	D5185	1210		-0.83	
511	D5185	1260		0.09	
512	D5185	1279		0.44	
541	D5185	1189.0		-1.21	
575		-----		-----	
614	D5185	1226		-0.53	
633	D6595	1351.1		1.77	
634		-----		-----	
657	D5185	1304.38		0.91	
663	D5185	1161.3		-1.72	
780	D5185	1150		-1.93	
823	D5185	1292		0.68	
840	D5185	1112		-2.63	
862	D5185	1274		0.35	
864	D5185	1251		-0.07	
875		-----		-----	
902	D5185	1255	C	0.00	First reported 1044
912	D5185	1243		-0.22	
922	D5185	1204		-0.94	
963	D5185	1232.7		-0.41	
994	D5185	1172		-1.52	
1023	D5185	1277.532	C	0.42	First reported 1451.494
1026	D5185	1332		1.42	
1059	inhouse (XRF)	1191		-1.17	
1146	D5185 mod	1222		-0.60	
1173	inhouse (ICP)	1163.09		-1.69	
1201	D5185	1500		4.51	
1278		1242		-0.24	
1316	D5185	1210		-0.83	
1320		-----		-----	
1324	D5185	1241		-0.26	
1409	D5185	1490		4.32	
1435	D5185	1205		-0.92	
1456	D5185	1266		0.20	
1551	inhouse (XRF)	432.5	C,R(0.01)	-15.12	First reported 469.2
1569	D5185	1268		0.24	
1648	D5185	1225.0		-0.55	
1740	D5185	1344		1.64	
1743	D5185	1700	R(0.01)	8.18	
1748		-----		-----	
1791		1237.74		-0.32	
1800		1158.5		-1.77	
1807	D5185	1373		2.17	
1850		1450		3.59	
1854	D5185	1296		0.76	
1900	D5185	1320.090		1.20	
1957	D5185	1127		-2.35	
2122	D5185	1243.38		-0.21	
6010	D5185	1181		-1.36	
6059	D5185	1095.0		-2.94	

normality	suspect
n	56
outliers	2
mean (n)	1254.9
st.dev. (n)	82.291
R(calc.)	230.4
R(D5185:13e1)	152.3

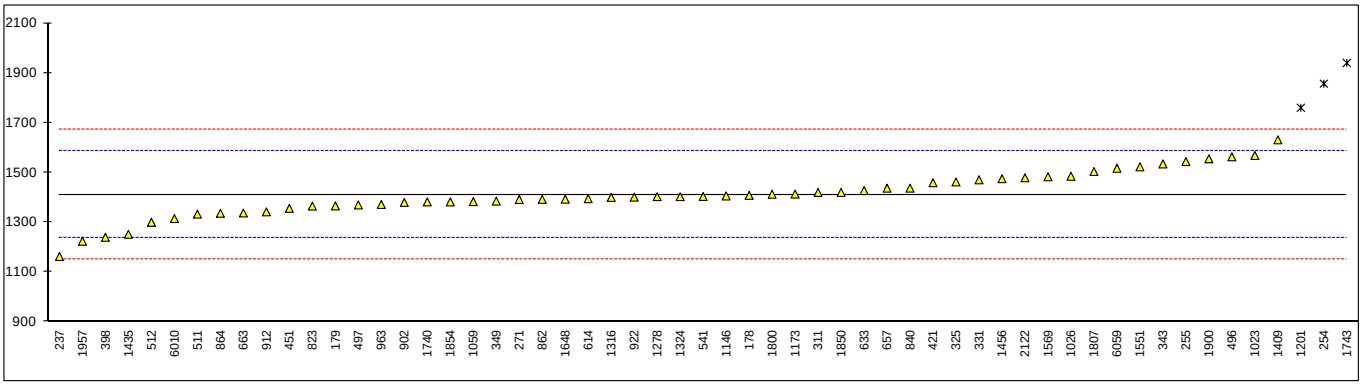

1800
1700
1600
1500
1400
1300
1200
1100
1000
900
1551 6059 840 1957 780 1800 663 1173 994 6010 237 541 1059 922 1435 497 1316 451 1146 1648 614 963 1791 179 349 311 1324 1278 912 2122 864 496 902 343 511 331 421 1456 1569 862 1023 512 823 1854 325 178 271 657 1900 1026 1740 633 1807 255 1850 1409 1201 1743

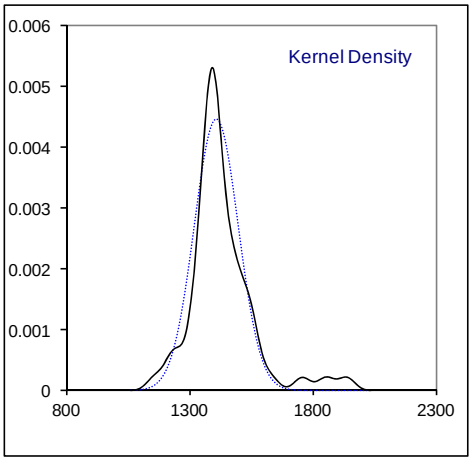

Kernel Density
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
800 1000 1200 1400 1600 1800 2000

Determination of Zinc as Zn on Sample #17097; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	1408		-0.04	
179	D5185	1366		-0.52	
214		-----		-----	
230		-----		-----	
237	D5185	1163		-2.87	
254	INH-018	1856.51	C,R(0.01)	5.16	First reported 1037.89
255		1544		1.54	
271	D5185	1391.83		-0.22	
311	D5185	1420		0.10	
325	D5185	1462		0.59	
331	D5185 mod	1470.7		0.69	
333		-----		-----	
343	D5185	1534.5		1.43	
349	D5185	1385		-0.30	
398	D5185	1240		-1.98	
421		1459		0.55	
451	INH-00116	1356		-0.64	
496	D5185	1563.0		1.76	
497	D5185	1370		-0.48	
511	D5185	1333		-0.90	
512	D5185	1300		-1.29	
541	D5185	1403.8		-0.08	
575		-----		-----	
614	D5185	1395		-0.19	
633	D6595	1427.7		0.19	
634		-----		-----	
657	D5185	1437		0.30	
663	D5185	1337.4		-0.85	
780		-----		-----	
823	D5185	1365		-0.53	
840	D5185	1437		0.30	
862	D5185	1392		-0.22	
864	D5185	1336		-0.87	
875		-----		-----	
902	D5185	1380	C	-0.36	First reported 1090
912	D5185	1342		-0.80	
922	D5185	1401		-0.12	
963	D5185	1371.8		-0.46	
994		-----		-----	
1023	D5185	1568.428		1.82	
1026	D5185	1485		0.86	
1059	inhouse (XRF)	1383		-0.33	
1146	D5185 mod	1406		-0.06	
1173	inhouse (ICP)	1413.24		0.02	
1201	D5185	1760	R(0.05)	4.04	
1278		1403		-0.09	
1316	D5185	1400		-0.13	
1320		-----		-----	
1324	D5185	1403		-0.09	
1409	D5185	1631		2.55	
1435	D5185	1252		-1.84	
1456	D5185	1475		0.74	
1551	inhouse (XRF)	1522.85		1.29	
1569	D5185	1483		0.83	
1648	D5185	1393.0		-0.21	
1740	D5185	1382		-0.34	
1743	D5185	1940	R(0.01)	6.12	
1748		-----		-----	
1791		-----		-----	
1800		1412.9		0.02	
1807	D5185	1504		1.08	
1850		1420		0.10	
1854	D5185	1382		-0.34	
1900	D5185	1555.121		1.67	
1957	D5185	1224		-2.17	
2122	D5185	1478.696		0.78	
6010	D5185	1315		-1.11	
6059	D5185	1517.0		1.23	

normality	OK
n	54
outliers	3
mean (n)	1411.1
st.dev. (n)	89.30
R(calc.)	250.0
R(D5185:13e1)	241.9


2100
1900
1700
1500
1300
1100
900
237
1957
398
1435
512
6010
511
864
663
912
451
823
179
497
963
902
1740
1854
1059
349
271
862
1648
614
1316
922
1278
1324
541
1146
178
1800
1173
311
1850
633
657
840
421
325
331
1456
2122
1569
1026
1807
6059
1551
343
255
1900
496
1023
1409
1201
254
1743


Kernel Density
0.006
0.005
0.004
0.003
0.002
0.001
0
800
1300
1800
2300

APPENDIX 2

Number of participants in iis17L06 + iis17L06M per country

1 lab in ALGERIA
1 lab in ARGENTINA
2 labs in AUSTRALIA
2 labs in AZERBAIJAN
3 labs in BELGIUM
1 lab in BRUNEI
1 lab in CHILE
3 labs in CHINA, People's Republic
1 lab in COLOMBIA
1 lab in COTE D'IVOIRE
1 lab in CROATIA
1 lab in CYPRUS
1 lab in CZECH REPUBLIC
1 lab in DENMARK
3 labs in FRANCE
3 labs in GERMANY
3 labs in GREECE
1 lab in INDIA
1 lab in INDONESIA
1 lab in ITALY
1 lab in JORDAN
2 labs in KENYA
3 labs in MALAYSIA
1 lab in MAURITIUS
2 labs in MOROCCO
4 labs in NETHERLANDS
1 lab in NIGERIA
2 labs in NORWAY
1 lab in PAKISTAN
2 labs in PERU
2 labs in PHILIPPINES
2 labs in RUSSIAN FEDERATION
1 lab in SAUDI ARABIA
1 lab in SINGAPORE
1 lab in SLOVAKIA
1 lab in SLOVENIA
1 lab in SOUTH AFRICA
1 lab in SOUTH KOREA
5 labs in SPAIN
1 lab in SWEDEN
1 lab in TANZANIA
1 lab in THAILAND
1 lab in TURKEY
1 lab in UNITED ARAB EMIRATES
6 labs in UNITED KINGDOM
2 labs in UNITED STATES OF AMERICA
1 lab in VIETNAM

APPENDIX 3

Abbreviations:

C	= final result after checking of first reported suspect test result
D(0.01)	= outlier in Dixon's outlier test
D(0.05)	= straggler in Dixon's outlier test
G(0.01)	= outlier in Grubbs' outlier test
G(0.05)	= straggler in Grubbs' outlier test
DG(0.01)	= outlier in Double Grubbs' outlier test
DG(0.05)	= straggler in Double Grubbs' outlier test
R(0.01)	= outlier in Rosner's outlier test
R(0.05)	= straggler in Rosner's outlier test
E	= probably an error in calculations
ex	= test result excluded from statistical evaluation
W	= test result withdrawn on request of participant
n.a.	= not applicable
n.e.	= not evaluated
n.d.	= not detected
fr.	= first reported
SDS	= Safety Data Sheet

Literature:

1 iis Interlaboratory Studies, Protocol for the Organization, Statistics and Evaluation, March 2017

2 ASTM E178:08

3 ASTM E1301:03

4 ISO 5725:86

5 ISO 5725, parts 1-6, 1994

6 M. Thompson and R. Wood, J. AOAC Int, 76, 926, (1993)

7 W.J. Youden and E.H. Steiner, Statistical Manual of the AOAC, (1975)

8 IP 367/84

9 DIN 38402 T41/42

10 P.L. Davies, Fr. Z. Anal. Chem, 331, 513, (1988)

11 J.N. Miller, Analyst, 118, 455, (1993)

12 Analytical Methods Committee Technical brief, No4 January 2001

13 P.J. Lowthian and M. Thompson,The Royal Society of Chemistry, Analyst, 127, 1359-1364, (2002)

14 Bernard Rosner, Percentage Points for a Generalized ESD Many-Outlier Procedure, *Technometrics*, 25(2), pp. 165-172, (1983)

15 W. Horwitz and R. Albert, J. AOAC Int., Vol. 79, 3, p. 589, (1996)