**Institute for
Interlaboratory Studies**

Results of Proficiency Test
Engine Oil (used)
June 2023

CONTENTS

Appendices:

1   INTRODUCTION

Since 1997 the Institute for Interlaboratory Studies (iis) organizes a proficiency scheme for the analysis of used Engine Oil (Lubricating Oil) based on the latest version of SAE and ASTM D4485 every year. During the annual proficiency testing program 2022/2023 it was decided to continue the round robin for the analysis of used Engine Oil.

In this interlaboratory study registered for participation:
-    82 laboratories in 48 countries for regular analyzes in used Engine Oil iis23L08.
-    75 laboratories in 45 countries on the metal analyzes in used Engine Oil iis23L08M.

In total 88 laboratories in 49 countries registered for participation in one or both proficiency tests, see appendix 3 for the number of participants per country. In this report the results of this Engine Oil (used) proficiency tests 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 organizer of this proficiency test (PT). Sample analyzes for fit-for-use and homogeneity testing were subcontracted to an ISO/IEC17025 accredited laboratory.
In this proficiency test the participants received depending on the registration one sample Engine Oil (used) in a 0.5 L bottle labelled #23082 for regular analyzes and/or one sample Engine Oil (used) in a 50 mL PE bottle labelled #23083 for the analyzes of metals only.
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/IEC17043:2010 (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 organization 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 June 2018 (iis-protocol, version 3.5). 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

For the preparation of the sample for the regular analyzes in Engine Oil (used) a batch of approximately 65 liters of Engine Oil (used) was obtained from a third-party. After homogenization 105 amber glass bottles of 0.5 L were filled and labelled #23082.
The homogeneity of the subsamples was checked by determination of Density at 15 °C in accordance with ISO12185 on 8 stratified randomly selected subsamples.

	Density at 15 °C in kg/L
sample #23082-1	0.89385
sample #23082-2	0.89383
sample #23082-3	0.89385
sample #23082-4	0.89384
sample #23082-5	0.89385
sample #23082-6	0.89385
sample #23082-7	0.89385
sample #23082-8	0.89385

Table 1: homogeneity test results of subsamples #23082

From the above test results the repeatability was calculated and compared with 0.3 times the reproducibility of the reference test method in agreement with the procedure of ISO13528, Annex B2 in the next table.

	Density at 15 °C in kg/L
r (observed)	0.00002
reference test method	ISO12185:96
0.3 x R (reference test method)	0.00015

Table 2: evaluation of the repeatability of subsamples #23082

The calculated repeatability is in agreement with 0.3 times the reproducibility of the reference test method. Therefore, homogeneity of the subsamples was assumed.

For the preparation of the sample for the analyzes of Metals in Engine Oil (used) a batch of approximately 5.5 L of Engine Oil (used) was obtained from a third-party. This batch was made positive with certain wear metals. After homogenization 105 PE bottles of 50 mL were filled and labelled #23083.

The homogeneity of the subsamples was checked by determination of Aluminum and Nickel in accordance with ASTM D5185 on 8 stratified randomly selected subsamples.

	Aluminum in mg/kg	Nickel in mg/kg
sample #23083-1	15.342	19.846
sample #23083-2	15.214	19.605
sample #23083-3	15.463	19.997
sample #23083-4	15.111	19.851
sample #23083-5	15.333	19.571
sample #23083-6	15.196	19.407
sample #23083-7	15.120	19.629
sample #23083-8	15.142	19.399

Table 3: homogeneity test results of subsamples #23083

From the above test results the repeatabilities were 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.

	Aluminum in mg/kg	Nickel in mg/kg
r (observed)	0.354	0.607
reference test method	ASTM D5185:18	ASTM D5185:18
0.3 x R (reference test method)	2.315	1.995

Table 4: evaluation of repeatabilities of subsamples #23083

The calculated repeatabilities are in agreement with 0.3 times the corresponding reproducibility of the reference test method. Therefore, homogeneity of the subsamples was assumed.

Depending on the registration of the participant the appropriate set of PT samples was sent on May 10, 2023. An SDS was added to the sample package.

2.5   STABILITY OF THE SAMPLES

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

2.6   ANALYZES

The participants were requested to determine on sample #23082: Total Acid Number, Base Number ($HClO_4$ and HCl titration), Density at 15 °C, Flash Point PMcc (procedure A and B), Fuel Dilution, Kinematic Viscosity (40 °C and 100 °C), Viscosity Index, Kinematic Viscosity Houillon (40 °C and 100 °C) and Water. Some extra information was asked about the determination of Total Acid Number and Base Number.

On sample #23083 it was requested to determine: Aluminum as Al, Barium as Ba, Boron as B, Cadmium as Cd, Chromium as Cr, Copper as Cu, Iron as Fe, Lead as Pb, Lithium as Li, Magnesium as Mg, Manganese as Mn, Molybdenum as Mo, Nickel as Ni, Potassium as K, Silicon as Si, Silver as Ag, Sodium as Na, Tin as Sn, Titanium as Ti, Vanadium as V, Calcium as Ca, Phosphorus as P and Zinc as Zn.

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 evaluations.

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 (when applicable) 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 appendices 1 and 2 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 reanalyzes). Additional or corrected test results are used for data analysis and original test results are placed under 'Remarks' in the result tables in appendices 1 and 2. Test results that came 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

The protocol followed in the organization 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 June 2018 (iis-protocol, version 3.5).
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 data set does not have a normal distribution, the (results of the) statistical evaluation should be used with due care.

The assigned value is determined by consensus based on the test results of the group of participants after rejection of the statistical outliers and/or suspect data.

According to ISO13528 all (original received or corrected) results per determination were submitted to outlier tests. In the iis procedure for proficiency tests, outliers are detected prior to calculation of the mean, standard deviation and reproducibility. For small data sets, Dixon (up to 20 test results) or Grubbs (up to 40 test results) outlier tests can be used. For larger data sets (above 20 test results) Rosner's outlier test can be used. 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 averages and 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. In this PT the criterion of ISO13528, paragraph 9.2.1, was met for all evaluated tests. Therefore, the uncertainty of all assigned values may be negligible and need not be included in the PT report.

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 reference test method. Outliers and other data, which were excluded from the calculations, are represented as a cross. 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 (dotted line) was projected over the Kernel Density Graph (smooth line) for reference. The Gauss curve is calculated from the consensus value and the corresponding standard deviation.

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 (derived from e.g. ISO or ASTM test methods), 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, like Horwitz or an estimated reproducibility based on former iis proficiency tests.

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:

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

The $z_{(target)}$ scores are listed in the test result tables in 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 proficiency test some problems were encountered with the dispatch of the samples. For the regular Engine Oil (used) PT eight participants reported test results after the final reporting date and seven other participants did not report any test results. For the Metals in Engine Oil (used) PT eight participants reported test results after the final reporting date and nine other participants did not report any test results. Not all participants were able to report all tests requested. In total 81 participants reported 1345 numerical test results. Observed were 43 outlying test results, which is 3.2%. In proficiency tests outlier percentages of 3% - 7.5% are quite normal.

Not all 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 test methods are also in the tables together with the original data in appendix 1. The abbreviations, used in these tables, are explained in appendix 4.

In the iis PT reports ASTM test methods are referred to with a number (e.g. D2270) and an added designation for the year that the test method was adopted or revised (e.g. D2270:10). When a method has been reapproved an "R" will be added and the year of approval (e.g. D2270:10R16).

sample #23082

Total Acid Number: This determination was not problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D664-A:18e2 for end point mode BEP 60 mL, but not for the end point modes BEP 125 mL, IP 60 mL and 125 mL.

Base Number (HClO$_4$): This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D2896:21 appendix X2.5. The participants used different solvents (e.g. Chlorobenzene or the alternative solvent mixed Xylenes). Therefore, the reproducibility as described in Appendix X2 of ASTM D2896 is used for the statistical evaluation.

Base Number (HCl): This determination was not problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D4739:23.

Density at 15 °C: This determination was problematic for a number of laboratories. Six statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ISO12185:96.

Flash Point PMcc procedure A: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ASTM D93-A:20.

Flash Point PMcc procedure B: This determination was very problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not at all in agreement with the requirements of ASTM D93-B:20.

Fuel Dilution: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of ASTM D3524:14R20.

Kinematic Viscosity at 40 °C: This determination was not problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D445:21e2.

Kinematic Viscosity at 100 °C: This determination was problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the requirements of ASTM D445:21e2.

Viscosity Index: This determination was problematic. No statistical outliers were observed but one test result was excluded. The calculated reproducibility after rejection of the suspect data is not in agreement with the requirements of ASTM D2270:10R16.

Kinematic Viscosity Houillon at 40 °C: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ASTM D7279:20.

Kinematic Viscosity Houillon at 100 °C: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ASTM D7279:20.

Water: 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 D6304:20 procedure B nor with procedure A and C.

sample #23083

Aluminum as Al: This determination was not problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D5185:18.

Boron as B: This determination was not problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D5185:18.

Chromium as Cr: This determination was not problematic. Four statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D5185:18.

Copper as Cu: This determination was not problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is agreement with the requirements of ASTM D5185:18.

Iron as Fe: This determination was not problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D5185:18.

Lead as Pb: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D5185:18.

Magnesium as Mg: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ASTM D5185:18.

Molybdenum as Mo: This determination was not problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D5185:18.

Nickel as Ni: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D5185:18.

Silicon as Si: This determination was not problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D5185:18.

Sodium as Na: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ASTM D5185:18.

Calcium as Ca: This determination was not problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D5185:18.

Phosphorus as P: This determination was problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the requirements of ASTM D5185:18.

Zinc as Zn: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ASTM D5185:18.

The majority of the participants agreed on a concentration near or below the limit of detection for all other elements mentioned in paragraph 2.6. Therefore, no z-scores are calculated. The test results of these elements are given in appendix 2.

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 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.

**4.2	PERFORMANCE EVALUATION FOR THE GROUP OF LABORATORIES**

A comparison has been made between the reproducibility as declared by the reference test method and the reproducibility as found for the group of participating laboratories. The number of significant test results, the average, the calculated reproducibility (2.8 * standard deviation) and the target reproducibility derived from reference methods are presented in the next tables.

Parameter	unit	n	average	2.8 * sd	R(lit)
Total Acid Number	mg KOH/g	47	3.65	1.92	1.96
Base Number (HClO$_4$)	mg KOH/g	47	9.30	0.95	1.21
Base Number (HCl)	mg KOH/g	16	7.59	1.22	3.97
Density at 15 °C	kg/L	49	0.8939	0.0004	0.0005
Flash Point PMcc procedure A	°C	42	208.8	12.8	14.8
Flash Point PMcc procedure B	°C	16	198.7	21.5	10
Fuel Dilution	%M/M	9	1.0	1.8	1.6
Kinematic Viscosity at 40 °C	mm^2/s	60	115.31	1.91	2.11
Kinematic Viscosity at 100 °C	mm^2/s	58	13.480	0.245	0.151
Viscosity Index		54	113.6	3.3	2
Kin. Viscosity Houillon at 40 °C	mm^2/s	18	115.08	1.07	3.45
Kin. Viscosity Houillon at 100 °C	mm^2/s	18	13.545	0.239	0.759
Water	mg/kg	51	383	480	269

Table 5: reproducibilities of tests on sample #23082

Element	unit	n	average	2.8 * sd	R(lit)
Aluminum as Al	mg/kg	59	15.6	5.3	7.8
Boron as B	mg/kg	46	19.3	7.7	13.4
Chromium as Cr	mg/kg	61	21.5	4.9	5.3
Copper as Cu	mg/kg	64	28.2	5.3	6.8
Iron as Fe	mg/kg	61	9.6	2.7	3.2
Lead as Pb	mg/kg	64	31.0	9.0	10.3
Magnesium as Mg	mg/kg	59	10.5	3.4	4.4
Molybdenum as Mo	mg/kg	56	10.7	3.0	3.5
Nickel as Ni	mg/kg	64	19.3	5.4	6.6
Silicon as Si	mg/kg	60	17.0	5.1	8.8
Sodium as Na	mg/kg	46	2.3	2.1	2.0
Calcium as Ca	mg/kg	56	3113	471	522
Phosphorus as P	mg/kg	57	1025	171	138
Zinc as Zn	mg/kg	63	1184	185	199

Table 6: reproducibilities of tests on sample #23083

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

4.3   COMPARISON OF THE PROFICIENCY TEST OF JUNE 2023 WITH PREVIOUS PTS

	June 2023	May 2022	June 2021	June 2020	June 2019
Number of reporting laboratories	81	74	80	69	78
Number of test results	1345	1196	1737	1583	1545
Number of statistical outliers	43	41	68	46	89
Percentage of statistical outliers	3.2%	3.4%	3.9%	2.9%	5.8%

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 to the requirements of the reference test methods. The conclusions are given in the following table.

Parameter	June 2023	May 2022	June 2021	June 2020	June 2019
Total Acid Number	+/-	-	+/-	+/-	+/-
Base Number ($HClO_4$)	+	-	-	-	--
Base Number (HCl)	++	++	++	++	++
Density at 15 °C	+	+	+	+/-	-
Flash Point PMcc procedure A	+	+	+	-	-
Flash Point PMcc procedure B	--	--	--	+/-	--
Fuel Dilution	-	-	+	+/-	-
Kinematic Viscosity at 40 °C	+	+	+	+	+
Kinematic Viscosity at 100 °C	-	-	-	-	-
Viscosity Index	-	-	-	-	-
Kin. Viscosity Houillon at 40 °C	++	+	++	++	++
Kin. Viscosity Houillon at 100 °C	++	+	++	++	++
Water	-	-	(--)	+	+
Metals	+	+	+	+	+

Table 8: comparison of determinations to the reference test methods

For results between brackets no z-scores are calculated.

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 Total Acid Number on sample #23082; results in mg KOH/g

lab	method	value	mark	z(targ)	End point determination	Titration volume
178	D664-A	1.68		-2.81	---	---
179		-----		-----	---	---
211		-----		-----	---	---
214		-----		-----	---	---
225		-----		-----	---	---
235	D664-A	4.39		1.06	---	---
237		-----		-----	---	---
254		-----		-----	---	---
256		-----		-----	---	---
257		-----		-----	---	---
309	D664-A	4.40		1.08	Buffer End Point pH 10	125 mL
311		-----		-----	---	---
325	D664-A	2.80		-1.21	Buffer End Point pH 10	125 mL
331	D664-A	3.5		-0.21	---	---
333	D664-A	3.6		-0.07	Inflection Point	125 mL
349		-----		-----	---	---
381		-----		-----	---	---
392		-----		-----	---	---
421	ISO6619	4.2		0.79	Inflection Point	60 mL
451		-----		-----	---	---
496	D664-A	2.822		-1.18	Buffer End Point pH 10	60 mL
512	D974	3.79		0.21	---	---
542	D664-A	3.2		-0.64	Buffer End Point pH 10	60 mL
562	D664-A	9.11	R(0.01)	7.81	---	---
603	D664-A	4.3440		1.00	Inflection Point	125 mL
614		-----		-----	---	---
633	D664-A	4.56		1.31	Inflection Point	125 mL
634	D664-A	4.13		0.69	Inflection Point	60 mL
657	D664-A	4.24		0.85	Inflection Point	60 mL
663	D664-A	2.75		-1.28	Buffer End Point pH 10	60 mL
704	D664-A	3.00		-0.92	Inflection Point	60 mL
780	D664-A	3.1		-0.78	---	---
823	D664-A	4.73		1.55	Inflection Point	125 mL
840	D664-A	3.07		-0.82	Buffer End Point pH 10	60 mL
862	D664-A	3.98		0.48	Inflection Point	60 mL
863	D664-A	3.97		0.46	---	---
864	D664-A	4.04		0.56	Inflection Point	60 mL
875		-----		-----	---	---
901		-----		-----	---	---
912	D664-A	3.93		0.41	---	---
922	D664-A	3.66		0.02	Inflection Point	125 mL
963	D664-B	4.66		1.45	Inflection Point	60 mL
974		-----		-----	---	---
994	D664-A	3.52		-0.18	Inflection Point	125 mL
1023		-----		-----	---	---
1026	D664-A	2.6647		-1.40	Buffer End Point pH 10	125 mL
1059	ISO6619	4.11		0.66	---	---
1146	D664-A	3.738		0.13	Buffer End Point pH 10	125 mL
1173		-----		-----	---	---
1264	D664-A	4.08		0.62	Inflection Point	60 mL
1318		-----		-----	---	---
1396		-----		-----	---	---
1431	D664-A	3.8891		0.35	Inflection Point	60 mL
1435		-----		-----	---	---
1495		-----		-----	---	---
1558	D664-A	4.12		0.68	Inflection Point	125 mL
1648	D664-A	3.887		0.34	Inflection Point	125 mL
1650	D664-A	3.72		0.11	Inflection Point	125 mL
1720		-----		-----	---	---
1740	D664-A	3.98		0.48	Inflection Point	60 mL
1743	D664-A	3.4		-0.35	Buffer End Point pH 11	60 mL
1807	D664-A	2.55		-1.57	---	---
1850		-----		-----	---	---
1854	D664-A	3.70		0.08	Inflection Point	125 mL
1888		-----		-----	---	---
1900	D664-A	3.74		0.13	Inflection Point	60 mL
1957	D664-A	4.358		1.02	---	---
2133	D664-A	2.2869		-1.94	---	---
6002	D664-A	4.331		0.98	Inflection Point	60 mL
6016		-----		-----	---	---
6043	D664-A	2.76		-1.27	Inflection Point	60 mL
6044	D664-A	3.515		-0.19	Inflection Point	60 mL
6307		-----		-----	---	---
6322		-----		-----	---	---
6335	D664-A	3.84		0.28	Buffer End Point pH 11	125 mL

lab	method	value	mark	z(targ)	End point determination	Titration volume
6379		-----		-----	---	---
6402		-----		-----	---	---
6414		-----		-----	---	---
6438	D664-A	4.15		0.72	Inflection Point	60 mL
6441	D664-A	2.50		-1.64	Inflection Point	60 mL
6532	D664-A	6.899	R(0.01)	4.65	Buffer End Point pH 11	60 mL
6537		-----		-----	---	---

					Buffer End Point only	Inflection Point only
	normality	OK			OK	suspect
	n	47			10	26
	outliers	2			1	0
	mean (n)	3.647			3.268	3.886
	st.dev. (n)	0.6869			0.5716	0.5337
	R(calc.)	1.923			1.601	1.494
	st.dev.(D664-A:18e2 BEP - 60mL)	0.6995			0.6286	--
	R(D664-A:18e2 BEP - 60mL)	1.959			1.760	--
Compare						
	R(D664-A:18e2 BEP - 125mL)	1.231			1.098	--
	R(D664-A:18e2 IP - 60mL)	1.162			--	1.224
	R(D664-A:18e2 IP - 125mL)	0.844			--	0.901

Kernel Density
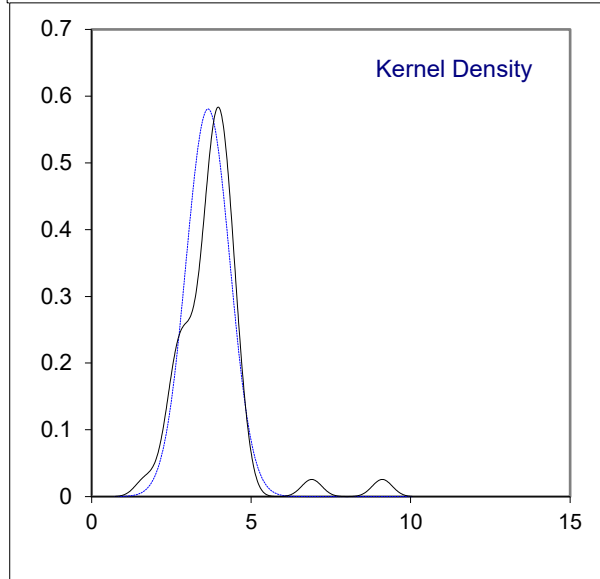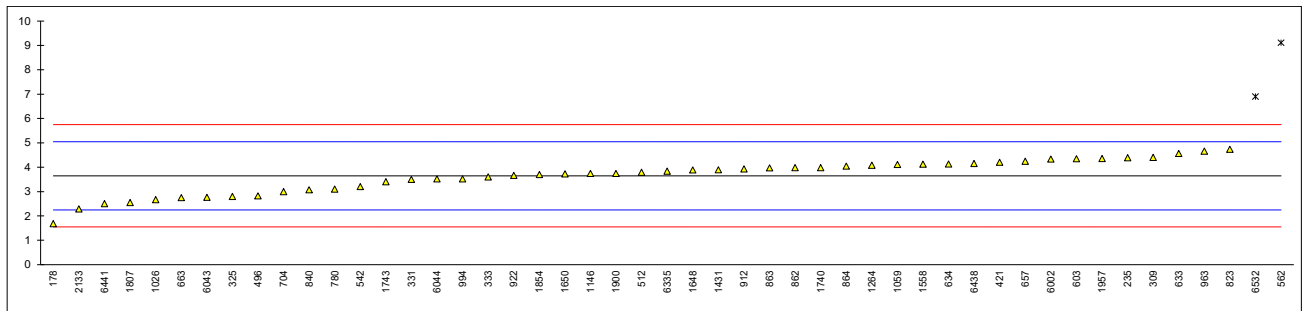
Determination of Base Number (HClO$_4$ titration) on sample #23082; results in mg KOH/g

lab	method	value	mark	z(targ)	Solvent used	remarks
178		-----		-----	---	
179		-----		-----	---	
211		-----		-----	---	
214		-----		-----	---	
225	D2896-B forward	9.5		0.47	---	
235	D2896-A forward	9.45	C	0.35	---	First reported 7.0
237		-----		-----	---	
254		-----		-----	---	
256		-----		-----	---	
257		-----		-----	---	
309	D2896-B forward	8.94		-0.83	Xylenes, mixed	
311		-----		-----	---	
325	D2896-B forward	9.6		0.70	Xylenes, mixed	
331	D2896-B forward	9.3		0.01	---	
333		-----		-----	---	
349		-----		-----	---	
381		-----		-----	---	
392		-----		-----	---	
421	ISO3771	9.6		0.70	---	
451		-----		-----	---	
496	D2896-B back	8.42		-2.03	Xylene/Acetone/Hac	
512	D2896	9.76		1.07	---	
542	D2896-B back	8.78		-1.20	Chlorobenzene	
562		-----		-----	---	
603	D2896-A forward	9.5170		0.51	Xylenes, mixed	
614	D2896-B forward	8.91		-0.90	Chlorobenzene	
633	D2896-A forward	9.44		0.33	Xylenes, mixed	
634	D2896-B forward	9.85		1.28	Xylenes, mixed	
657	D2896-B forward	9.39		0.21	Xylenes, mixed	
663	D2896-B forward	9.5		0.47	Chlorobenzene/Hac	
704	D2896-B forward	9.098		-0.46	Chlorobenzene	
780	D2896-B forward	8.9		-0.92	---	
823	D2896-A back	8.99		-0.71	Chlorobenzene	
840	D2896-B forward	9.27		-0.06	Chlorobenzene	
862	D2896-B	9.3		0.01	---	
863	D2896-B	9.3		0.01	---	
864	D2896-A forward	9.43		0.31	Chlorobenzene	
875		-----		-----	---	
901	D2896-B forward	9.04		-0.60	Chlorobenzene	
912	D2896	10.09		1.84	---	
922	D2896-B forward	9.1		-0.46	---	
963	D2896-B forward	9.15		-0.34	Chlorobenzene	
974	D2896-A forward	9.40		0.24	---	
994	D2896-A forward	9.39		0.21	Chlorobenzene	
1023		-----		-----	---	
1026	D2896-B forward	8.93		-0.85	Chlorobenzene/Hac	
1059	ISO3771	9.5		0.47	---	
1146	D2896-B forward	9.447		0.35	Chlorobenzene	
1173		-----		-----	---	
1264		-----		-----	---	
1318		-----		-----	---	
1396		-----		-----	---	
1431	D2896-B forward	9.2539		-0.10	Chlorobenzene	
1435	D2896-A forward	9.76		1.07	---	
1495		-----		-----	---	
1558		-----		-----	---	
1648	D2896-A back	9.17		-0.29	Chlorobenzene	
1650	D2896-A forward	9.46		0.38	Chlorobenzene	
1720		-----		-----	---	
1740	D2896-A forward	9.13		-0.39	Xylenes, mixed	
1743	D2896-B forward	9.2		-0.23	Chlorobenzene	
1807		-----		-----	---	
1850		-----		-----	---	
1854	D2896-B forward	8.9		-0.92	Chlorobenzene	
1888	D4739	9.22		-0.18	Xylenes, mixed	
1900	In house	9.46		0.38	---	
1957	D2896-A back	9.259		-0.09	---	
2133	D2896-B forward	9.29		-0.02	---	
6002	ISO3771	8.76		-1.24	---	
6016	D2896-B forward	9.054		-0.56	Chlorobenzene/Hac	
6043	D2896-A forward	9.6		0.70	Chlorobenzene/Hac	
6044	D2896-B forward	10.165		2.01	Xylenes, mixed	
6307		-----		-----	---	
6322		-----		-----	---	
6335		-----		-----	---	

lab	method	value	mark	z(targ)	Solvent used	remarks
6379		-----		-----	---	
6402		-----		-----	---	
6414		-----		-----	---	
6438		-----		-----	---	
6441	D2896-A forward	9.0		-0.69	Chlorobenzene	
6532		-----		-----	---	
6537		-----		-----	---	

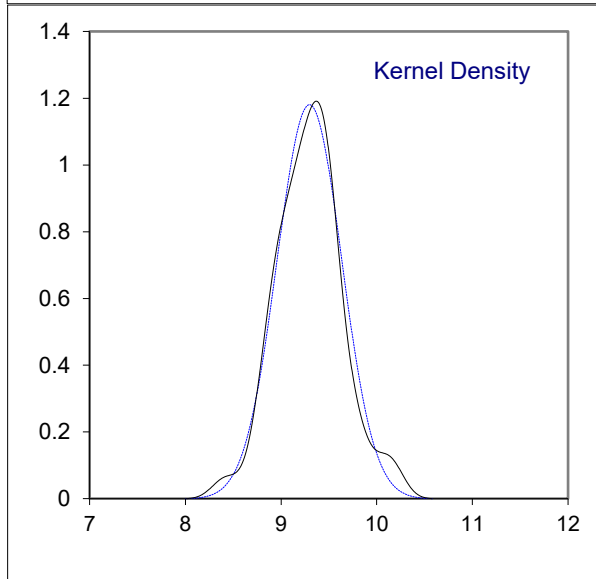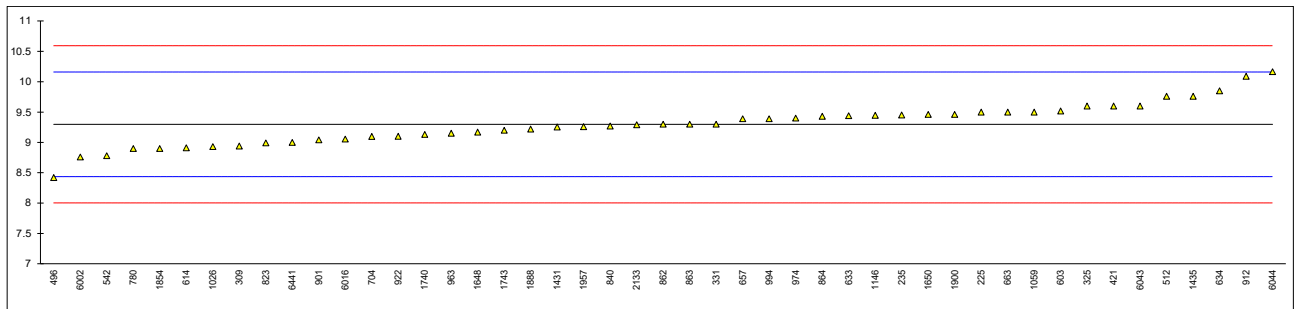|	
normality	OK
n	47
outliers	0
mean (n)	9.297
st.dev. (n)	0.3379
R(calc.)	0.946
st.dev.(D2896-X2.5:21)	0.4317
R(D2896-X2.5:21)	1.209

Kernel Density

Determination of Base Number (HCl titration) on sample #23082; results in mg KOH/g

lab	method	value	mark	z(targ)	remarks
178	D4739	6.40		-0.84	
179		-----		-----	
211		-----		-----	
214		-----		-----	
225		-----		-----	
235		-----		-----	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309	D4739	7.35		-0.17	
311		-----		-----	
325	D4739	3.6	G(0.05)	-2.82	
331	D4739	7.4		-0.13	
333	D4739	8.4		0.57	
349		-----		-----	
381		-----		-----	
392		-----		-----	
421		-----		-----	
451		-----		-----	
496	D4739	7.437		-0.11	
512		-----		-----	
542		-----		-----	
562		-----		-----	
603		-----		-----	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657		-----		-----	
663	D4739	8.0		0.29	
704	D4739	7.62		0.02	
780	D4739	7.2		-0.28	
823		-----		-----	
840		-----		-----	
862	D4739	7.69		0.07	
863	D4739	7.83		0.17	
864	D4739	7.86		0.19	
875		-----		-----	
901		-----		-----	
912		-----		-----	
922		-----		-----	
963		-----		-----	
974		-----		-----	
994	D4739	7.43		-0.11	
1023		-----		-----	
1026	D4739	4.34	G(0.01)	-2.29	
1059		-----		-----	
1146		-----		-----	
1173		-----		-----	
1264	D4739	7.88		0.20	
1318		-----		-----	
1396		-----		-----	
1431		-----		-----	
1435		-----		-----	
1495		-----		-----	
1558		-----		-----	
1648		-----		-----	
1650		-----		-----	
1720		-----		-----	
1740		-----		-----	
1743	D4739	7.6		0.01	
1807		-----		-----	
1850		-----		-----	
1854		-----		-----	
1888		-----		-----	
1900		-----		-----	
1957		-----		-----	
2133		-----		-----	
6002		-----		-----	
6016		-----		-----	
6043		-----		-----	
6044		-----		-----	
6307		-----		-----	
6322		-----		-----	
6335		-----		-----	

lab	method	value	mark	z(targ)	remarks
6379		-----		-----	
6402	D4739	7.5		-0.06	
6414		-----		-----	
6438	D4739	7.84		0.18	
6441		-----		-----	
6532		-----		-----	
6537		-----		-----	

normality	not OK
n	16
outliers	2
mean (n)	7.590
st.dev. (n)	0.4345
R(calc.)	1.216
st.dev.(D4739:23)	1.4166
R(D4739:23)	3.966
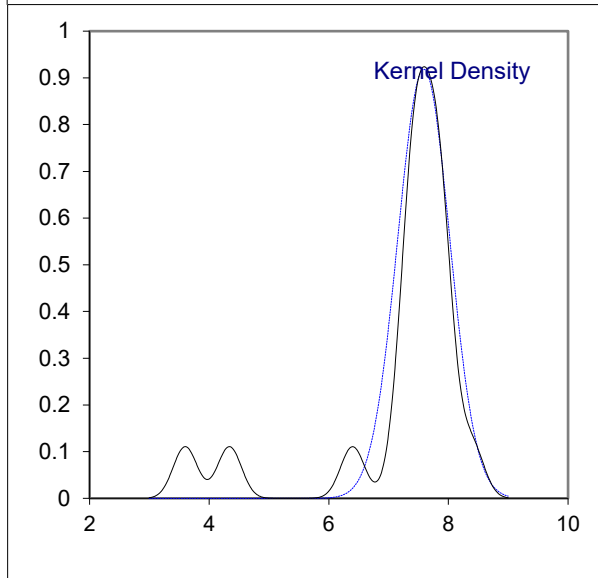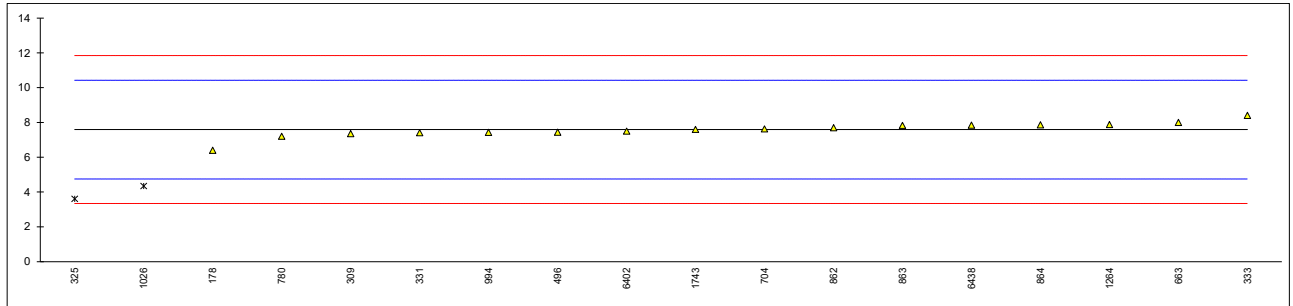
Determination of Density at 15 °C on sample #23082; results in kg/L

lab	method	value	mark	z(targ)	remarks
178	D4052	0.8937		-1.08	
179		-----		-----	
211		-----		-----	
214		-----		-----	
225		-----		-----	
235	D4052	0.8938		-0.52	
237	D4052	0.8939		0.04	
254	D4052	0.8940		0.60	
256		-----		-----	
257		-----		-----	
309	D4052	0.89386		-0.18	
311		-----		-----	
325	D4052	0.8940		0.60	
331	ISO12185	0.8939		0.04	
333	D4052	0.8938		-0.52	
349	D4052	0.89377		-0.69	
381	ISO12185	0.8939	C	0.04	First reported 894.6 kg/m^3
392		-----		-----	
421	ISO12185	0.8941	C	1.16	First reported 894.4 kg/m^3
451		-----		-----	
496	ISO12185	0.89378		-0.63	
512		-----		-----	
542	D4052	0.8936		-1.64	
562		-----		-----	
603	D4052	0.89381		-0.46	
614	D4052	0.8940		0.60	
633	D4052	0.89385		-0.24	
634	D4052	0.8939		0.04	
657	D4052	0.89379		-0.58	
663	D4052	0.8939		0.04	
704	D4052	0.8941	C	1.16	First reported 0.89340
780	ISO12185	0.8939		0.04	
823	ISO12185	0.8938		-0.52	
840	D4052	0.89383		-0.35	
862	D4052	0.8939		0.04	
863	ISO12185	0.8939		0.04	
864	D4052	0.8939		0.04	
875	ISO12185	0.8939		0.04	
901		-----		-----	
912	ISO12185	0.8939		0.04	
922	D4052	0.8939		0.04	
963	D4052	0.8939		0.04	
974	D4052	0.8938		-0.52	
994	ISO12185	0.8939		0.04	
1023	D4052	0.8953	R(0.01)	7.88	
1026	D4052	0.8939		0.04	
1059	ISO12185	0.8938		-0.52	
1146	D4052	0.8937		-1.08	
1173		-----		-----	
1264	D4052	0.89399		0.54	
1318		-----		-----	
1396	IP365	0.8939		0.04	
1431	D4052	0.893457	R(0.01)	-2.44	
1435		-----		-----	
1495		-----		-----	
1558	IP365	0.89447	C,R(0.01)	3.23	Reported 89447 kg/L
1648	D4052	0.8939		0.04	
1650	D4052	0.8939	C	0.04	First reported 0.8933
1720		-----		-----	
1740	ISO12185	0.8938		-0.52	
1743	ISO12185	0.8943		2.28	
1807		-----		-----	
1850	D4052	0.8938		-0.52	
1854	ISO12185	0.8939	C	0.04	First reported 893.9 and no unit
1888		-----		-----	
1900		-----		-----	
1957	D4052	0.894	C	0.60	First reported 893.3 kg/m^3
2133		-----		-----	
6002	ISO12185	0.8940		0.60	
6016		-----		-----	
6043	D4052	0.8945	R(0.01)	3.40	
6044	D4052	0.89384		-0.30	
6307	IP365	0.893725		-0.94	
6322	ISO12185	0.8920	C,R(0.01)	-10.60	First reported 0.8933
6335	D1298	0.898	R(0.01)	23.00	

lab	method	value	mark	z(targ)	remarks
6379		-----		-----	
6402		-----		-----	
6414		-----		-----	
6438	D4052	0.8941		1.16	
6441	D7042	0.8942	C	1.72	First reported 0.8954
6532		-----		-----	
6537		-----		-----	

normality	suspect
n	49
outliers	6
mean (n)	0.89389
st.dev. (n)	0.000126
R(calc.)	0.00035
st.dev.(ISO12185:96)	0.000179
R(ISO12185:96)	0.0005

Kernel Density
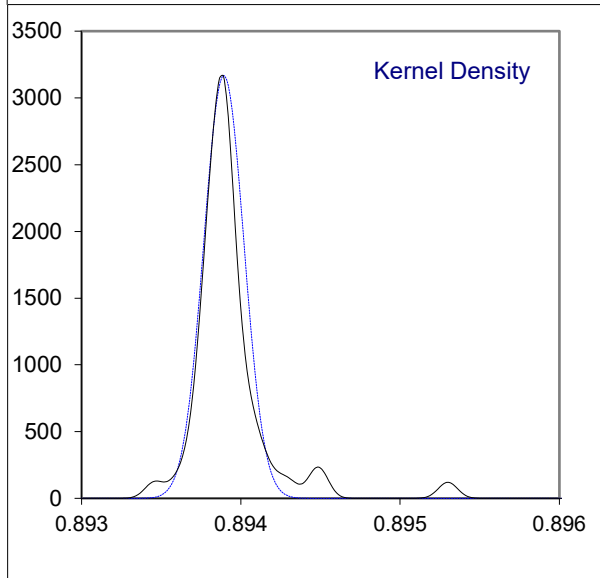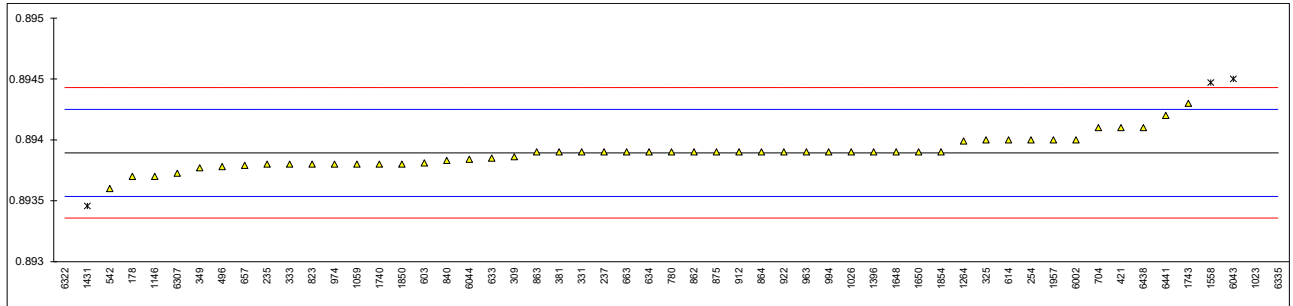
Determination of Flash Point PMcc procedure A on sample #23082; results in °C

lab	method	value	mark	z(targ)	remarks
178	D93-A	215		1.16	
179		-----		-----	
211		-----		-----	
214		-----		-----	
225	D93-A	198.0		-2.05	
235	ISO2719-A	207		-0.35	
237		-----		-----	
254	D93-A	203.0		-1.10	
256	D3828	212.0		0.60	
257	D3828	212.0		0.60	
309	D93-A	211.5		0.50	
311		-----		-----	
325	D93-A	209.0		0.03	
331	D93-A	211		0.41	
333		-----		-----	
349		-----		-----	
381		-----		-----	
392		-----		-----	
421		-----		-----	
451		-----		-----	
496		-----		-----	
512		-----		-----	
542	D7094	212		0.60	
562		-----		-----	
603	D93-A	208		-0.16	
614	D93-A	197		-2.24	
633	D93-A	210		0.22	
634		-----		-----	
657		-----		-----	
663		-----		-----	
704	D93-A	211.0		0.41	
780	D93-A	206.5		-0.44	
823	ISO2719-A	207		-0.35	
840	D3828	212.0		0.60	
862	D93-A	210		0.22	
863	D93-A	207.0		-0.35	
864		-----		-----	
875	D93-A	206.5		-0.44	
901		-----		-----	
912		-----		-----	
922	D93-A	210		0.22	
963	D93-A	204.0		-0.91	
974	D93-A	208		-0.16	
994	D93-A	208.0		-0.16	
1023	D93-A	209		0.03	
1026	D93-A	207.5		-0.25	
1059	ISO2719-A	208.0		-0.16	
1146	D93-A	207.2		-0.31	
1173		-----		-----	
1264	D93-A	207.5		-0.25	
1318		-----		-----	
1396		-----		-----	
1431		-----		-----	
1435	D93-A	211.0		0.41	
1495		-----		-----	
1558	IP523	215.6		1.28	
1648	D93-A	202.5		-1.20	
1650	D93-A	208.0		-0.16	
1720		-----		-----	
1740	D93-A	203		-1.10	
1743	ISO2719-A	213		0.78	
1807		-----		-----	
1850		-----		-----	
1854		-----		-----	
1888	D93-A	220		2.11	
1900	D7094	203.40		-1.03	
1957		-----		-----	
2133	D93-A	216.2		1.39	
6002	ISO2719-A	205.5		-0.63	
6016		-----		-----	
6043		-----		-----	
6044	D93-A	212.5		0.69	
6307	IP523	213.575		0.89	
6322		-----		-----	
6335	ISO2719-A	90	R(0.01)	-22.44	

lab	method	value	mark	z(targ)	remarks
6379		-----		-----	
6402		-----		-----	
6414		-----		-----	
6438		-----		-----	
6441	D93-A	212.5		0.69	
6532		-----		-----	
6537		-----		-----	

normality	OK	
n	42	
outliers	1	
mean (n)	208.845	
st.dev. (n)	4.5670	
R(calc.)	12.788	
st.dev.(D93-A:20)	5.2957	
R(D93-A:20)	14.828	
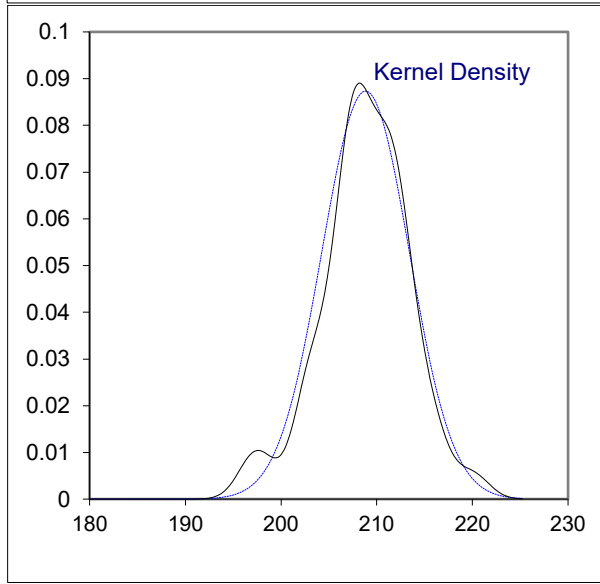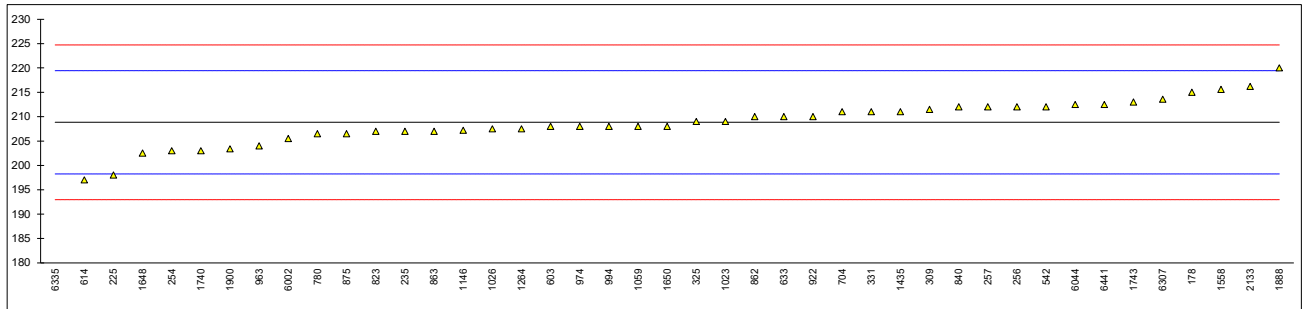
Determination of Flash Point PMcc procedure B on sample #23082; results in °C

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211		-----		-----	
214		-----		-----	
225		-----		-----	
235		-----		-----	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309		-----		-----	
311		-----		-----	
325		-----		-----	
331		-----		-----	
333		-----		-----	
349		-----		-----	
381		-----		-----	
392		-----		-----	
421	ISO2719-B	201.5		0.80	
451		-----		-----	
496		-----		-----	
512		-----		-----	
542		-----		-----	
562		-----		-----	
603		-----		-----	
614		-----		-----	
633		-----		-----	
634	D93-B	213.0		4.02	
657		-----		-----	
663	D93-B	201.5		0.80	
704		-----		-----	
780	D93-B	191.5		-2.00	
823	ISO2719-B	189.0		-2.70	
840		-----		-----	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875	D93-B	190.5		-2.28	
901		-----		-----	
912		-----		-----	
922		-----		-----	
963		-----		-----	
974		-----		-----	
994	D93-B	192.0		-1.86	
1023		-----		-----	
1026	ISO2719-B	208.0		2.62	
1059		-----		-----	
1146		-----		-----	
1173		-----		-----	
1264	D93-B	208.0		2.62	
1318		-----		-----	
1396		-----		-----	
1431	D93-B	190.5		-2.28	
1435		-----		-----	
1495		-----		-----	
1558		-----		-----	
1648		-----		-----	
1650	D93-B	199.0		0.10	
1720		-----		-----	
1740	D93-B	194		-1.30	
1743		-----		-----	
1807		-----		-----	
1850	ISO2719-B	200		0.38	
1854		-----		-----	
1888		-----		-----	
1900		-----		-----	
1957		-----		-----	
2133		-----		-----	
6002		-----		-----	
6016	D93-B	209		2.90	
6043	D93-B	224	G(0.05)	7.10	
6044	D93-B	198.5		-0.04	
6307		-----		-----	
6322		-----		-----	
6335		-----		-----	

lab	method	value	mark	z(targ)	remarks
6379		-----		-----	
6402		-----		-----	
6414		-----		-----	
6438		-----		-----	
6441	D93-B	192.5		-1.72	
6532		-----		-----	
6537		-----		-----	

normality	OK
n	16
outliers	1
mean (n)	198.656
st.dev. (n)	7.6892
R(calc.)	21.530
st.dev.(D93-B:20)	3.5714
R(D93-B:20)	10

Kernel Density
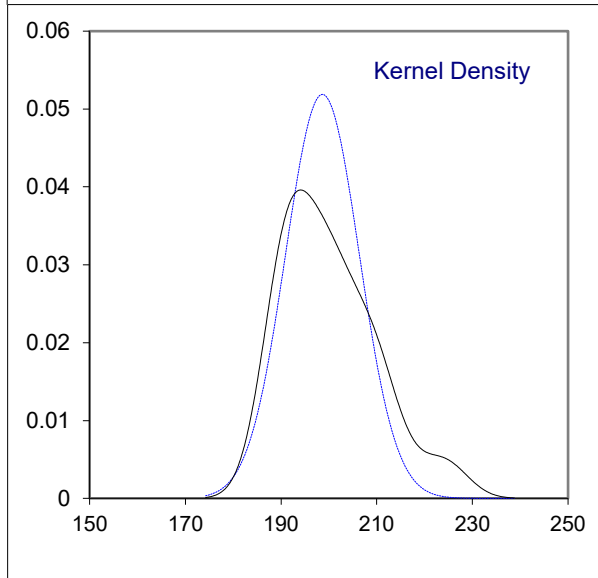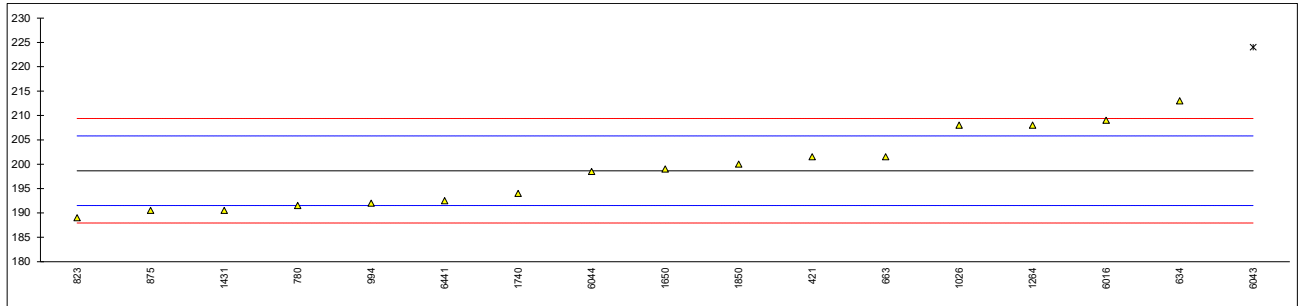
Determination of Fuel Dilution on sample #23082; results in %M/M

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211		-----		-----	
214		-----		-----	
225		-----		-----	
235		-----		-----	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309	D3524	0.4		-1.01	
311		-----		-----	
325		-----		-----	
331		-----		-----	
333		-----		-----	
349		-----		-----	
381		-----		-----	
392		-----		-----	
421		-----		-----	
451		-----		-----	
496	DIN51454	2.16		2.07	
512		-----		-----	
542		-----		-----	
562		-----		-----	
603		-----		-----	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657		-----		-----	
663		-----		-----	
704		-----		-----	
780		-----		-----	
823		-----		-----	
840	D3524	0.64		-0.59	
862	D3524	<0.1		-----	
863	D3524	0.9		-0.14	
864	D3524	1.2		0.39	
875		-----		-----	
901		-----		-----	
912		-----		-----	
922		-----		-----	
963		-----		-----	
974		-----		-----	
994		-----		-----	
1023		-----		-----	
1026	D7593	1.5		0.91	
1059		-----		-----	
1146		-----		-----	
1173		-----		-----	
1264		-----		-----	
1318		-----		-----	
1396		-----		-----	
1431		-----		-----	
1435		-----		-----	
1495		-----		-----	
1558		-----		-----	
1648		-----		-----	
1650		-----		-----	
1720		-----		-----	
1740	D3524	0.7		-0.49	
1743		-----		-----	
1807		-----		-----	
1850		-----		-----	
1854		-----		-----	
1888		-----		-----	
1900		-----		-----	
1957		-----		-----	
2133		-----		-----	
6002		-----		-----	
6016		-----		-----	
6043		-----		-----	
6044		-----		-----	
6307	D7593	1.314		0.59	
6322		-----		-----	
6335		-----		-----	

lab	method	value	mark	z(targ)	remarks
6379		-----		-----	
6402		-----		-----	
6414	D8004	0.0		-1.71	
6438		-----		-----	
6441	D3524	<1		-----	
6532		-----		-----	
6537		-----		-----	

normality	OK
n	9
outliers	0
mean (n)	0.979
st.dev. (n)	0.6442
R(calc.)	1.804
st.dev.(D3524:14R20)	0.5714
R(D3524:14R20)	1.6
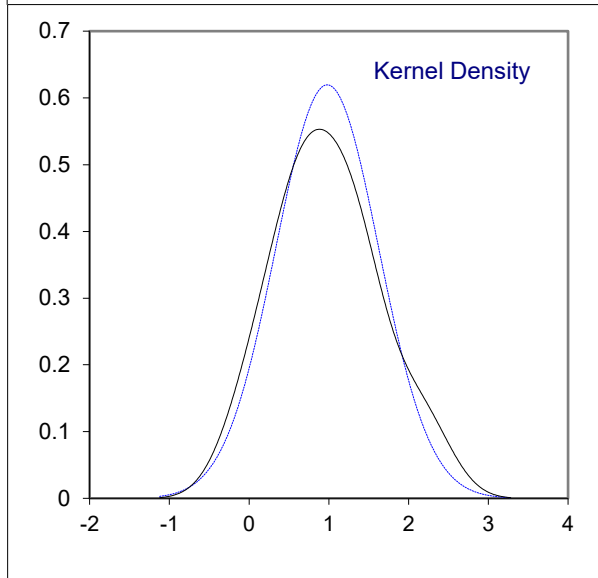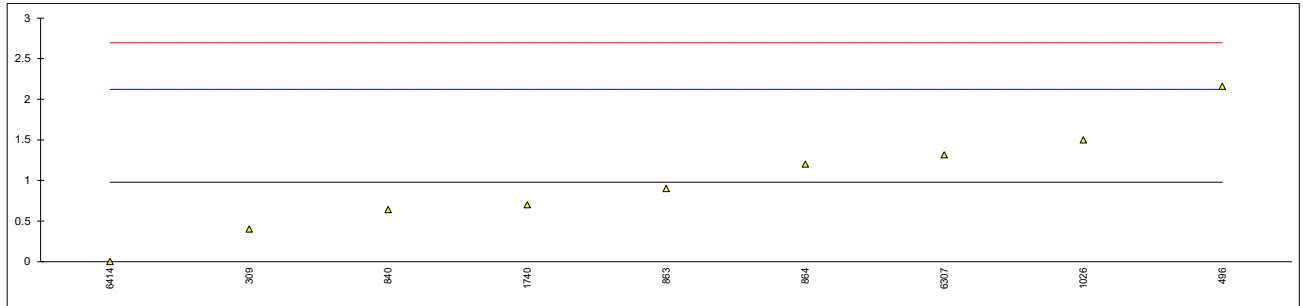
Determination of Kinematic Viscosity at 40 °C on sample #23082; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
178	D7279 corrected to D445	115.35		0.05	
179		-----		-----	
211	D445	115.8		0.65	
214		-----		-----	
225	D445	114.9		-0.55	
235	D445	114.82		-0.65	
237	D445	114.5		-1.08	
254	D445	115.4		0.12	
256	D7279 corrected to D445	117.09		2.36	
257	D7279 corrected to D445	117.12		2.40	
309		-----		-----	
311	D445	115.0		-0.41	
325	D445	114.9		-0.55	
331		-----		-----	
333	D445	115.2		-0.15	
349	D445	115.0		-0.41	
381	D445	115.2		-0.15	
392		-----		-----	
421	ISO3104	115.5		0.25	
451		-----		-----	
496	D445	115.07		-0.32	
512		-----		-----	
542	D7042	115.7		0.51	
562		-----		-----	
603	D7042	115.89		0.77	
614	D7042	115.0		-0.41	
633	D445	115.24		-0.10	
634	D445	113.8		-2.01	
657		-----		-----	
663	D445	115.2		-0.15	
704	D445	115.0		-0.41	
780	D445	115.3		-0.02	
823	D445	114.9		-0.55	
840	D445	115.01		-0.40	
862	D445	115.1		-0.28	
863	D445	115.4		0.12	
864	D445	115.1		-0.28	
875	D445	114.5		-1.08	
901		-----		-----	
912	D445	114.8		-0.68	
922	D445	115.5		0.25	
963	D445	115.0		-0.41	
974	D445	115.1		-0.28	
994	D445	115.4		0.12	
1023	D445	115.2		-0.15	
1026	D445	115.3		-0.02	
1059		-----		-----	
1146	D445	115.28		-0.04	
1173	D445	115.28		-0.04	
1264	D7042	116.15		1.11	
1318		-----		-----	
1396		-----		-----	
1431	D7042	115.76		0.59	
1435	D7042	115.95		0.85	
1495	ISO3104	108.46	R(0.01)	-9.09	
1558	IP71	114.99		-0.43	
1648	D445	116.0		0.91	
1650	D445	116.40		1.44	
1720		-----		-----	
1740	D445	115.1		-0.28	
1743	D445	114.9		-0.55	
1807	D445	115.1		-0.28	
1850	ISO3104	116.0		0.91	
1854	ISO3104	116.2		1.18	
1888		-----		-----	
1900		-----		-----	
1957	D7042	113.65		-2.21	
2133	D445	114.29		-1.36	
6002	ISO3104	115.259		-0.07	
6016	D7042	115.870		0.74	
6043	D7042	115.0		-0.41	
6044	D7042	115.66		0.46	
6307	IP71	114.4948		-1.08	
6322	D7042	116.640		1.76	
6335	D445	64.58	R(0.01)	-67.31	

lab	method	value	mark	z(targ)	remarks
6379		-----		-----	
6402		-----		-----	
6414		-----		-----	
6438	D7042	116.61		1.72	
6441	D7042	114.07		-1.65	
6532	D445	115.8		0.65	
6537		-----		-----	

normality	OK
n	60
outliers	2
mean (n)	115.312
st.dev. (n)	0.6830
R(calc.)	1.912
st.dev.(D445:21e2)	0.7537
R(D445:21e2)	2.110
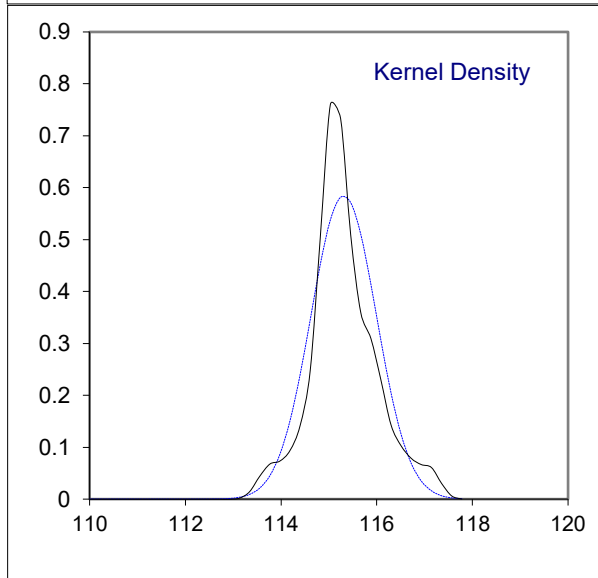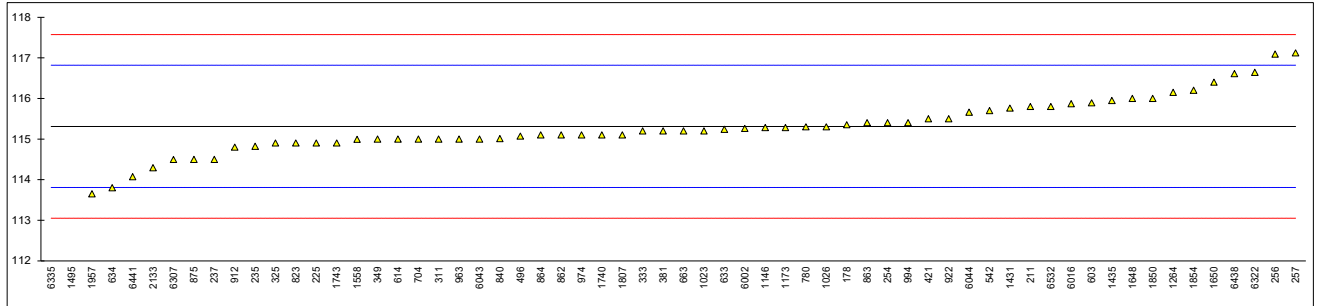
Determination of Kinematic Viscosity at 100 °C on sample #23082; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
178	D7279 corrected to D445	13.51		0.55	
179		-----		-----	
211	D445	13.48		-0.01	
214		-----		-----	
225	D445	13.45		-0.56	
235	D445	13.338		-2.64	
237	D445	13.37		-2.04	
254	D445	13.45		-0.56	
256	D7279 corrected to D445	13.58		1.85	
257	D7279 corrected to D445	13.62		2.59	
309		-----		-----	
311	D445	13.45		-0.56	
325	D445	13.46		-0.38	
331		-----		-----	
333	D445	13.50		0.36	
349	D445	13.50		0.36	
381	D445	13.58		1.85	
392		-----		-----	
421	ISO3104	13.38		-1.86	
451		-----		-----	
496	D445	13.438		-0.78	
512		-----		-----	
542	D7042	13.54		1.11	
562	D445	13.4		-1.49	
603	D7042	13.584		1.92	
614	D7042	13.52		0.73	
633	D445	13.392		-1.64	
634	D445	13.45		-0.56	
657		-----		-----	
663	D445	13.37		-2.04	
704	D445	13.48		-0.01	
780	D445	13.42		-1.12	
823	ISO3104	13.41		-1.30	
840	D445	13.426		-1.01	
862	D445	13.46		-0.38	
863	D445	13.61		2.40	
864	D445	13.57		1.66	
875	D445	13.45		-0.56	
901		-----		-----	
912	D445	13.49		0.18	
922	D445	13.48		-0.01	
963	D445	13.44		-0.75	
974	D445	13.47		-0.19	
994	D445	13.38		-1.86	
1023	D445	13.412		-1.27	
1026	D445	13.49		0.18	
1059		-----		-----	
1146	D445	13.436		-0.82	
1173		-----		-----	
1264	D7042	13.744		4.88	
1318		-----		-----	
1396		-----		-----	
1431	D7042	13.437		-0.80	
1435	D7042	13.532		0.96	
1495	ISO3104	10.72	R(0.01)	-51.12	
1558		-----		-----	
1648	D445	13.50		0.36	
1650	D445	13.625		2.68	
1720		-----		-----	
1740	D445	13.50		0.36	
1743	D445	13.26		-4.08	
1807	D445	13.41	C	-1.30	First reported 13.70
1850	ISO3104	13.41	C	-1.30	First reported 13.81
1854	D445	13.50		0.36	
1888		-----		-----	
1900		-----		-----	
1957	D7042	13.523		0.79	
2133	D445	13.312		-3.12	
6002	ISO3104	13.4119		-1.27	
6016	D7042	13.605		2.31	
6043	D7042	13.62		2.59	
6044	D7042	13.605		2.31	
6307	IP71	13.481685		0.03	
6322	D7042	13.554	C	1.36	First reported 56.882
6335		-----		-----	

lab	method	value	mark	z(targ)	remarks
6379		-----		-----	
6402		-----		-----	
6414		-----		-----	
6438	D7042	13.546		1.22	
6441	D7042	13.496		0.29	
6532		-----		-----	
6537		-----		-----	

normality	OK
n	58
outliers	1
mean (n)	13.4803
st.dev. (n)	0.08767
R(calc.)	0.2455
st.dev.(D445:21e2)	0.05400
R(D445:21e2)	0.1512
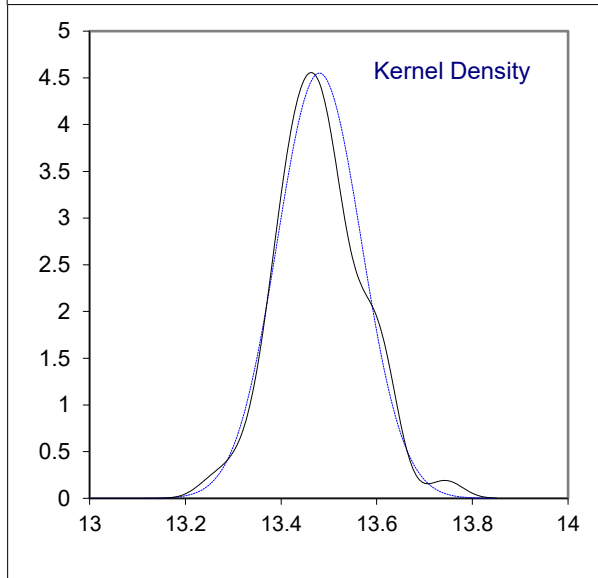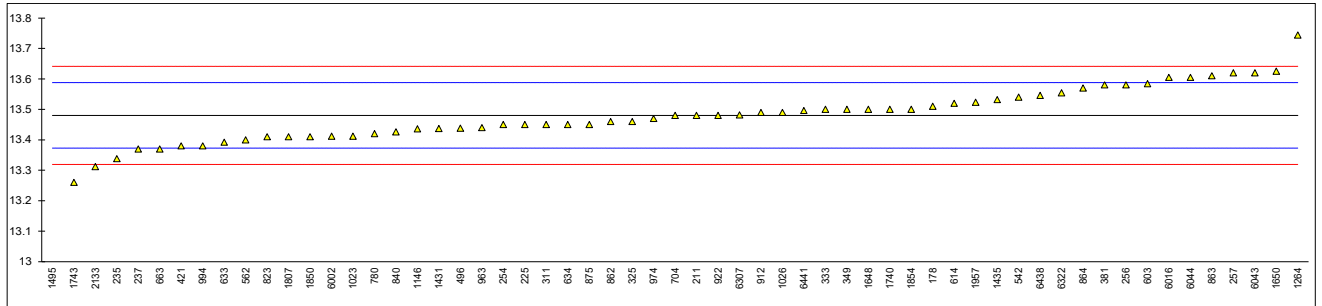
Determination of Viscosity Index on sample #23082

lab	method	value	mark	z(targ)	remarks
178	D2270	115	E	1.90	iis calculated 114
179		-----		-----	
211	D2270	113		-0.90	
214		-----		-----	
225		-----		-----	
235	D2270	112		-2.30	
237	D2270	113		-0.90	
254	D2270	113.13		-0.72	
256		-----		-----	
257		-----		-----	
309		-----		-----	
311	D2270	113.6		-0.06	
325	D2270	114		0.50	
331		-----		-----	
333	D2270	114		0.50	
349	D2270	114		0.50	
381		-----		-----	
392		-----		-----	
421	ISO2909	112		-2.30	
451		-----		-----	
496	D2270	113.3		-0.48	
512		-----		-----	
542	D2270	114		0.50	
562		-----		-----	
603	D2270	114		0.50	
614		-----		-----	
633	D2270	112		-2.30	
634	D2270	115		1.90	
657	D2270	115		1.90	
663	D2270	112		-2.30	
704	D2270	114		0.50	
780	D2270	113		-0.90	
823	D2270	113		-0.90	
840	D2270	113.2		-0.62	
862	D2270	114		0.50	
863	D2270	115		1.90	
864	D2270	115		1.90	
875	D2270	114.20		0.78	
901		-----		-----	
912	D2270	114		0.50	
922	D2270	113		-0.90	
963	D2270	113		-0.90	
974	D2270	114		0.50	
994	D2270	112		-2.30	
1023		-----		-----	
1026	D2270	114		0.50	
1059		-----		-----	
1146	D2270	113		-0.90	
1173		-----		-----	
1264	D2270	116.4		3.86	
1318		-----		-----	
1396		-----		-----	
1431	D2270	112.5		-1.60	
1435	D2270	113.67		0.04	
1495		-----		-----	
1558		-----		-----	
1648	D2270	113.15		-0.69	
1650	D2270	114.5		1.20	
1720		-----		-----	
1740	D2270	114		0.50	
1743	D2270	111		-3.70	
1807	D2270	113	C	-0.90	First reported 117
1850	ISO2909	112	C	-2.30	First reported 118
1854	D2270	113		-0.90	
1888		116	C,ex	3.30	fr. 51, test result excluded. Stat. outlier in KV Houillon 40 & 100°C
1900	D7279	112.00		-2.30	
1957	D2270	116.25		3.65	
2133	D2270	112.43		-1.70	
6002	ISO2909	113		-0.90	
6016	D2270	114.8		1.62	
6043	D2270	116		3.30	
6044	D2270	115		1.90	
6307	D2270	114.642		1.40	
6322	ISO2909	113.4	C	-0.34	First reported 468.3
6335		-----		-----	

lab	method	value	mark	z(targ)	remarks
6379		-----		-----	
6402		-----		-----	
6414		-----		-----	
6438	D2270	113.1		-0.76	
6441	D2270	115.4		2.46	
6532		-----		-----	
6537	D2270	114		0.50	

normality	OK	
n	54	
outliers	0+1ex	
mean (n)	113.64	
st.dev. (n)	1.173	
R(calc.)	3.29	
st.dev.(D2270:10R16)	0.714	
R(D2270:10R16)	2	
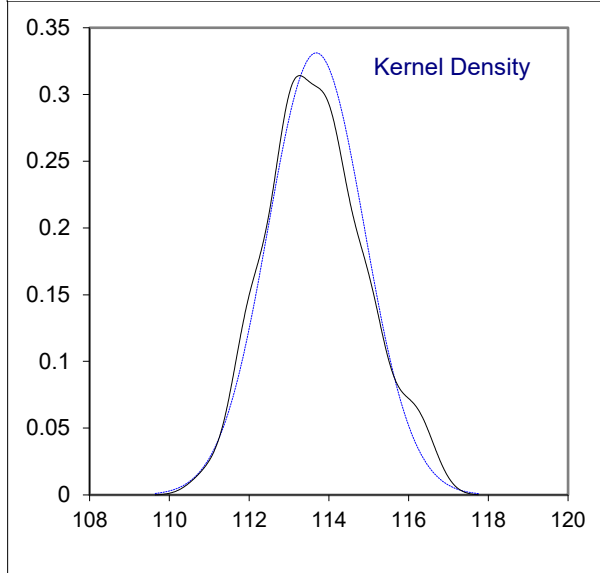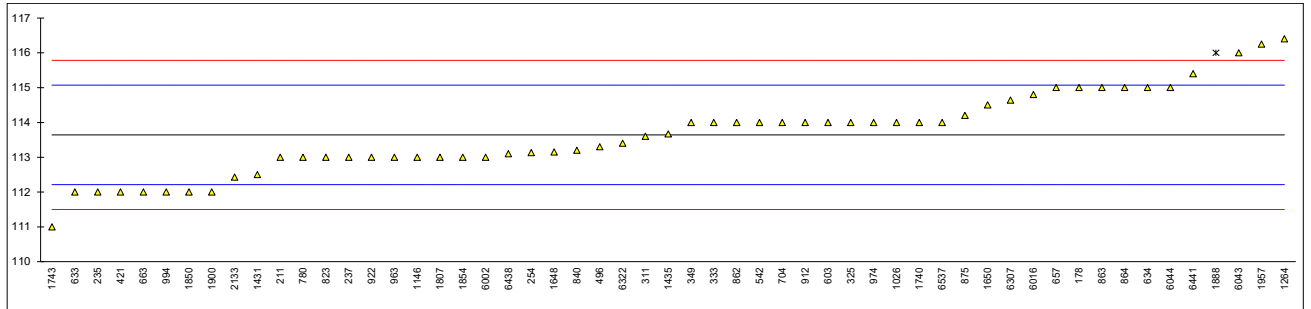
Determination of Kinematic Viscosity Houillon at 40 °C on sample #23082; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211		-----		-----	
214		-----		-----	
225		-----		-----	
235	D7279	114.820		-0.21	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309		-----		-----	
311		-----		-----	
325		-----		-----	
331		-----		-----	
333		-----		-----	
349		-----		-----	
381		-----		-----	
392		-----		-----	
421		-----		-----	
451		-----		-----	
496	D7279	115.3		0.18	
512	D7279	115.04		-0.03	
542		-----		-----	
562		-----		-----	
603		-----		-----	
614		-----		-----	
633	D7279	115.17		0.08	
634	D7279	115.7		0.51	
657	D7279	115.4		0.26	
663		-----		-----	
704		-----		-----	
780		-----		-----	
823		-----		-----	
840		-----		-----	
862	D7279	115.1		0.02	
863	D7279	115.3		0.18	
864	D7279	115.25		0.14	
875		-----		-----	
901	D7279	114.6		-0.39	
912		-----		-----	
922		-----		-----	
963		-----		-----	
974		-----		-----	
994		-----		-----	
1023		-----		-----	
1026		-----		-----	
1059	D7279	114.4		-0.55	
1146		-----		-----	
1173		-----		-----	
1264		-----		-----	
1318		-----		-----	
1396		-----		-----	
1431		-----		-----	
1435		-----		-----	
1495		-----		-----	
1558		-----		-----	
1648		-----		-----	
1650		-----		-----	
1720		-----		-----	
1740	D7279	115.1		0.02	
1743	D7279	114.9		-0.14	
1807		-----		-----	
1850		-----		-----	
1854		-----		-----	
1888	D7279	109.8	C,G(0.01)	-4.28	First reported 111.7
1900	D7279	115.40		0.26	
1957		-----		-----	
2133		-----		-----	
6002	D7279	115.204		0.10	
6016		-----		-----	
6043		-----		-----	
6044		-----		-----	
6307		-----		-----	
6322		-----		-----	
6335		-----		-----	

lab	method	value	mark	z(targ)	remarks
6379		-----		-----	
6402	D7279	114.2		-0.71	
6414	D7279	115.0		-0.06	
6438		-----		-----	
6441		-----		-----	
6532		-----		-----	
6537	D7279	115.50		0.34	

normality	OK	
n	18	
outliers	1	
mean (n)	115.077	
st.dev. (n)	0.3828	
R(calc.)	1.072	
st.dev.(D7279:20)	1.2330	
R(D7279:20)	3.452	
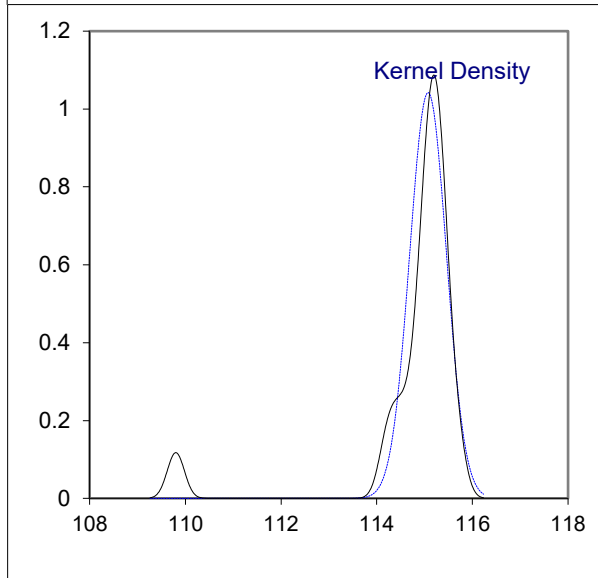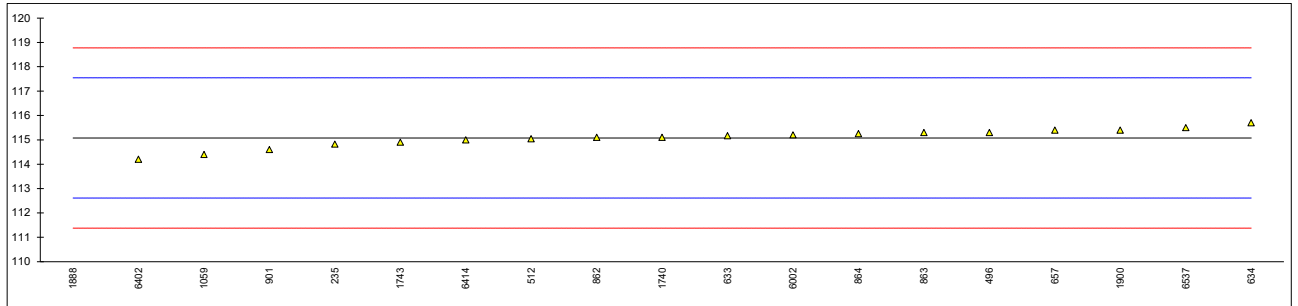
Determination of Kinematic Viscosity Houillon at 100 °C on sample #23082; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211		-----		-----	
214		-----		-----	
225		-----		-----	
235	D7279	13.338		-0.76	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309		-----		-----	
311		-----		-----	
325		-----		-----	
331		-----		-----	
333		-----		-----	
349		-----		-----	
381		-----		-----	
392		-----		-----	
421		-----		-----	
451		-----		-----	
496	D7279	13.63		0.31	
512	D7279	13.54		-0.02	
542		-----		-----	
562		-----		-----	
603		-----		-----	
614		-----		-----	
633	D7279	13.597		0.19	
634	D7279	13.50		-0.17	
657	D7279	13.60		0.20	
663		-----		-----	
704		-----		-----	
780		-----		-----	
823		-----		-----	
840		-----		-----	
862	D7279	13.46		-0.31	
863	D7279	13.63		0.31	
864	D7279	13.585		0.15	
875		-----		-----	
901	D7279	13.60		0.20	
912		-----		-----	
922		-----		-----	
963		-----		-----	
974		-----		-----	
994		-----		-----	
1023		-----		-----	
1026		-----		-----	
1059	D7279	13.59		0.17	
1146		-----		-----	
1173		-----		-----	
1264		-----		-----	
1318		-----		-----	
1396		-----		-----	
1431		-----		-----	
1435		-----		-----	
1495		-----		-----	
1558		-----		-----	
1648		-----		-----	
1650		-----		-----	
1720		-----		-----	
1740	D7279	13.59		0.17	
1743	D7279	13.55		0.02	
1807		-----		-----	
1850		-----		-----	
1854		-----		-----	
1888	D7279	13.20	C,G(0.05)	-1.27	First reported 9.84
1900	D7279	13.40		-0.53	
1957		-----		-----	
2133		-----		-----	
6002	D7279	13.467		-0.29	
6016		-----		-----	
6043		-----		-----	
6044		-----		-----	
6307		-----		-----	
6322		-----		-----	
6335		-----		-----	

lab	method	value	mark	z(targ)	remarks
6379		-----		-----	
6402	D7279	13.66		0.43	
6414	D7279	13.57		0.09	
6438		-----		-----	
6441		-----		-----	
6532		-----		-----	
6537	D7279	13.50		-0.17	

normality	OK
n	18
outliers	1
mean (n)	13.5448
st.dev. (n)	0.08540
R(calc.)	0.2391
st.dev.(D7279:20)	0.27090
R(D7279:20)	0.7585

Kernel Density
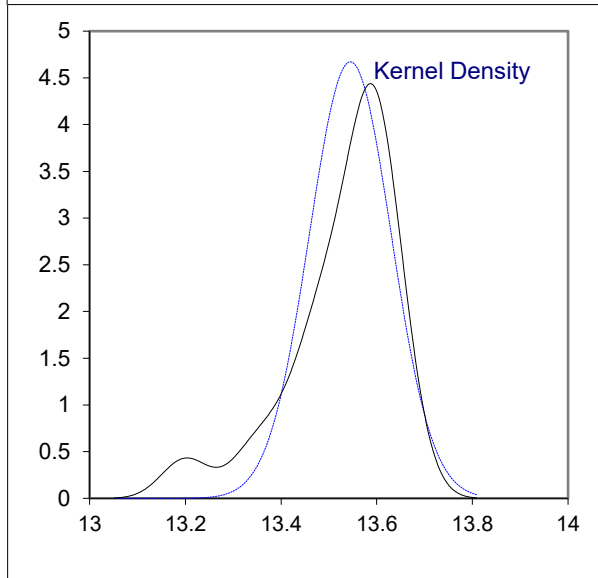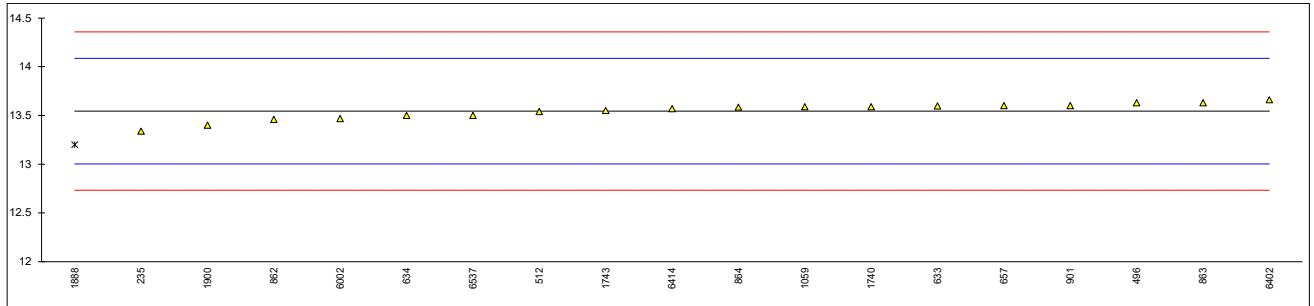
Determination of Water on sample #23082; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D6304-A:20	435		0.54	
179		-----		-----	
211		-----		-----	
214		-----		-----	
225		-----		-----	
235	D6304-A:16e1	374		-0.09	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309	D6304-C:20	521		1.44	
311		-----		-----	
325	D6304-C:20	404		0.22	
331	D6304-C:20	483		1.04	
333		-----		-----	
349	D6304-C:20	509		1.31	
381		-----		-----	
392		-----		-----	
421	D6304-B:20	291.3		-0.95	
451		-----		-----	
496	D6304-B:20	245.0		-1.43	
512		-----		-----	
542		-----		-----	
562		-----		-----	
603	D6304-B:20	361.9		-0.22	
614	D6304-B:20	269		-1.18	
633	D6304-B:20	259.88		-1.28	
634	D6304-B:20	375		-0.08	
657	D6304-B:20	450.8		0.71	
663	D6304-B:20	345		-0.39	
704	D6304-A:20	407	C	0.25	First reported 1289
780	D6304-B:20	100		-2.94	
823		-----		-----	
840	D6304-B:20	235.1		-1.53	
862	D6304-B:20	398		0.16	
863	D6304-B:20	401		0.19	
864	D6304-B:20	444		0.64	
875		-----		-----	
901	D6304-C:20	528.8		1.52	
912	D6304-A	399		0.17	
922	D6304-A:20	428		0.47	
963	D6304-C:20	374		-0.09	
974		-----		-----	
994	D6304-C:20	544		1.67	
1023	D6304-C	522.8		1.45	
1026	D6304-C:20	99.837		-2.94	
1059	D6304-B:20	440		0.59	
1146	D6304-B:20	500		1.22	
1173	In house	720.7		3.51	
1264	D6304-A:20	245		-1.43	
1318		-----		-----	
1396		-----		-----	
1431	D6304-A:20	496		1.18	
1435	D6304-A:20	587		2.12	
1495	E203	900		5.37	
1558	IP74	750		3.82	
1648	D6304-C:16e1	455.7		0.76	
1650		-----		-----	
1720		-----		-----	
1740	D6304-A:20	440		0.59	
1743	In house	100		-2.94	
1807		-----		-----	
1850		-----		-----	
1854	D6304-C:20	350		-0.34	
1888		-----		-----	
1900	D6304-C:16e1	315.00		-0.70	
1957	D6304-C:16e1	1599	C,R(0.01)	12.64	First reported 1139.67
2133	D6304-A:20	336		-0.49	
6002	In house	236.65		-1.52	
6016	D6304-A:16e1	422.6		0.41	
6043	D6304-A:16e1	187		-2.03	
6044	D6304-C:16e1	521		1.44	
6307		-----		-----	
6322	EN60814	474		0.95	
6335	ISO12937	2600	R(0.01)	23.04	

lab	method	value	mark	z(targ)	remarks
6379		-----		-----	
6402	D7889	366		-0.17	
6414	D6304-B:20	45.0		-3.51	
6438	D6304-A:20	240		-1.48	
6441	D6304-A:20	168		-2.23	
6532	ISO12937	21.471		-3.75	
6537		-----		-----	

	normality	suspect
	n	51
	outliers	2
	mean (n)	382.79
	st.dev. (n)	171.461
	R(calc.)	480.09
	st.dev.(D6304-B:20)	96.244
	R(D6304-B:20)	269.48
Compare		
	R(D6304-A:20)	155.16
	R(D6304-C:20)	131.68

Kernel Density
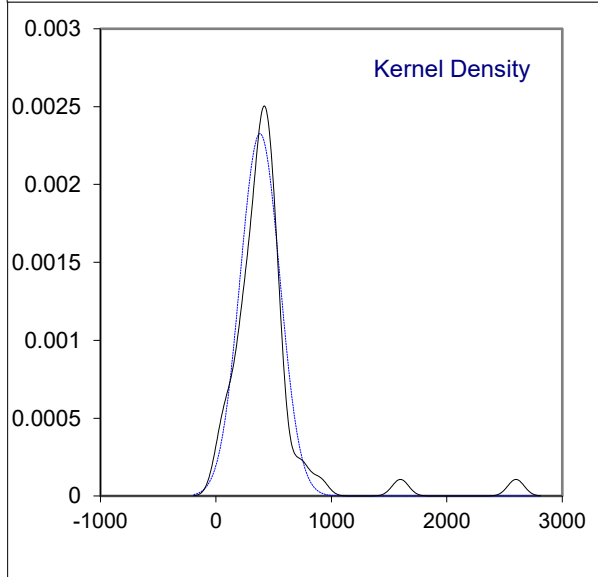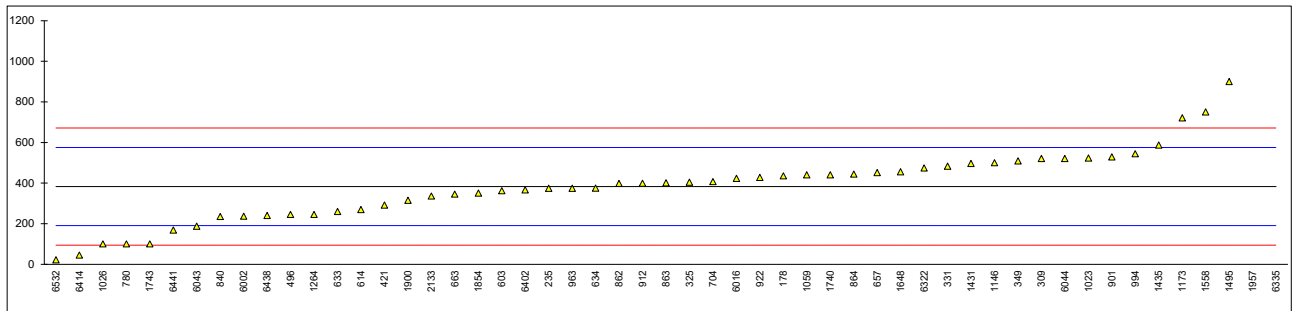
Determination of Aluminum as Al on sample #23083; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	13		-0.95	
179		-----		-----	
214		-----		-----	
225	D6595	15		-0.23	
235		-----		-----	
237		-----		-----	
254	D5185	17.873		0.80	
256		17.94		0.83	
257	D6595	17.89		0.81	
309	D5185	18.0		0.85	
325	D5185	16		0.13	
331	D5185	15		-0.23	
333	D5185	17		0.49	
349		15.5		-0.05	
381		-----		-----	
392		-----		-----	
421	D5185	12.4		-1.17	
451		-----		-----	
455		15.506667		-0.05	
496	D5185	15.1		-0.20	
512	D5185	16.1		0.16	
542	D6595	17		0.49	
562		-----		-----	
603	D5185	19.615		1.43	
614	D5185	15.50		-0.05	
633	D6595	15.06		-0.21	
634	D6595	18		0.85	
657	D5185	16.1		0.16	
663	D5185	16.0		0.13	
780	D5185	15		-0.23	
823	D5185	15		-0.23	
840	D5185	13.7		-0.70	
862	D5185	15.9		0.09	
863	D5185	16.1		0.16	
864	D5185	16.8		0.42	
875	D5185	10.6		-1.82	
901	D5185	12.58		-1.10	
912		-----		-----	
922	D5185	14.4	C	-0.45	First reported 11.6
963	D5185	15.31		-0.12	
974	D5185	15		-0.23	
994	D5185	14.8		-0.30	
1026	D5185	23	R(0.05)	2.65	
1059	In house	17		0.49	
1146	D5185	15		-0.23	
1173	In house	14.61		-0.37	
1264	D6595	16.38		0.27	
1278	D5185	17.44		0.65	
1320		-----		-----	
1431	D5185	14.05		-0.57	
1435	D5185	16.126		0.17	
1495		-----		-----	
1558	IP593Mod.	21.1		1.97	
1648	D5185	15.02		-0.22	
1665	In house	16		0.13	
1720		-----		-----	
1740	D5185	14.7		-0.34	
1743	NF T60-106	14		-0.59	
1807	D5185	16.2		0.20	
1850	In house	13	C	-0.95	First reported 43
1854		18.2		0.92	
1888	D5185	16.5		0.31	
1900	D5185	15.34		-0.11	
1957	D5185	14.946		-0.25	
2133	D5185	11.064		-1.65	
6002	D5185	14.24	C	-0.51	First reported 0.354
6016	D6595	18.889		1.17	
6043	D5185	15		-0.23	
6044	D5185	16		0.13	
6080	D5185	17.8		0.78	
6322	DIN51418	<15		-----	
6380	D5185	14.621		-0.37	
6414	D5185	22.71	R(0.05)	2.55	
6532		-----		-----	
6537	D6595	14.91		-0.26	

normality	suspect
n	59
outliers	2
mean (n)	15.643
st.dev. (n)	1.8961
R(calc.)	5.309
st.dev.(D5185:18)	2.7742
R(D5185:18)	7.768

Kernel Density
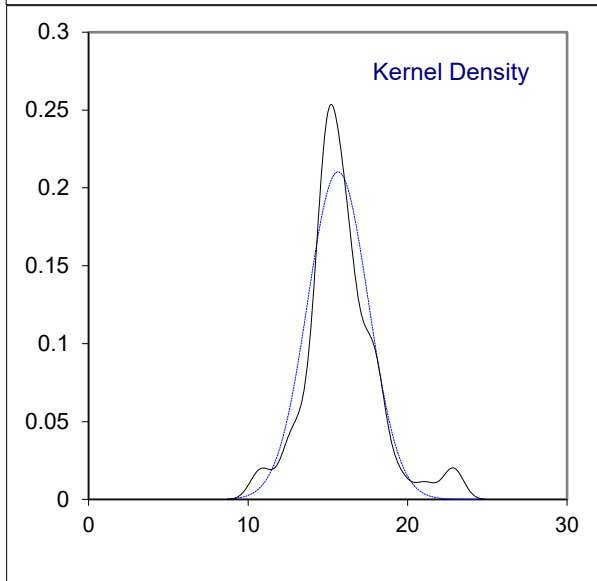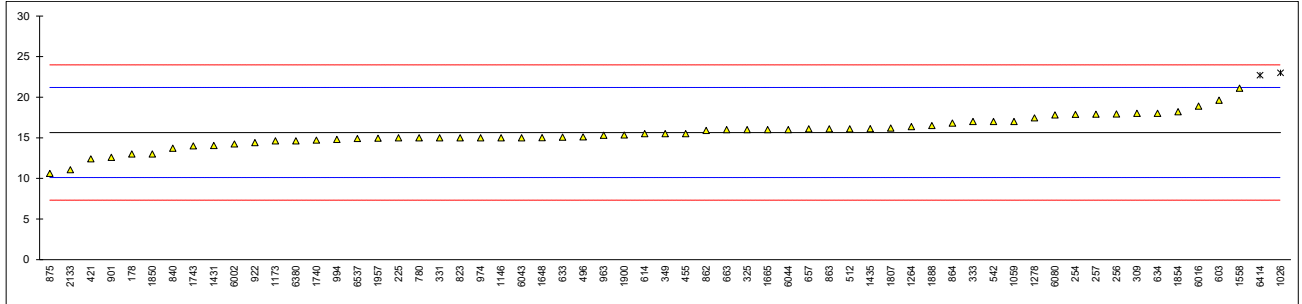
Determination of Boron as B on sample #23083; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	20		0.15	
179		-----		-----	
214		-----		-----	
225	D6595	16		-0.69	
235		-----		-----	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309	D5185	19.6		0.07	
325	D5185	20		0.15	
331	D5185	21		0.36	
333	D5185	23		0.78	
349		19.7		0.09	
381		-----		-----	
392		-----		-----	
421	D5185	15.5		-0.79	
451		-----		-----	
455		21.226667		0.41	
496	D5185	18.8		-0.10	
512	D5185	19		-0.06	
542	D6595	19		-0.06	
562		-----		-----	
603	D5185	21.235		0.41	
614	D5185	17.6		-0.35	
633	D6595	25	C	1.20	First reported 29.8
634	D6595	12		-1.52	
657	D5185	18.9		-0.08	
663	D5185	20.4	C	0.23	First reported 46.7
780	D5185	25		1.20	
823	D5185	16		-0.69	
840	D5185	19.5		0.05	
862	D5185	18		-0.27	
863	D5185	18.8		-0.10	
864	D5185	20.6		0.28	
875	D5185	22.7		0.71	
901		-----		-----	
912		-----		-----	
922		-----		-----	
963	D5185	18.30		-0.21	
974	D5185	18		-0.27	
994	D5185	17.5		-0.37	
1026	D5185	17		-0.48	
1059		-----		-----	
1146		-----		-----	
1173		-----		-----	
1264	D6595	23.05	C	0.79	First reported 31.89
1278	D5185	21.38		0.44	
1320		-----		-----	
1431	D5185	16.76		-0.53	
1435	D5185	17.259		-0.42	
1495		-----		-----	
1558		-----		-----	
1648		-----		-----	
1665	In house	4.15	R(0.01)	-3.16	
1720		-----		-----	
1740	D5185	19.3		0.00	
1743		-----		-----	
1807		-----		-----	
1850		-----		-----	
1854		19		-0.06	
1888	D5185	19.8		0.11	
1900	D5185	26.15		1.44	
1957	D5185	50.51	C,R(0.01)	6.53	First reported 74.365
2133	D5185	17.367		-0.40	
6002	D5185	18.48		-0.17	
6016	D6595	17.135		-0.45	
6043	D5185	21		0.36	
6044	D5185	18		-0.27	
6080	D5185	20.6		0.28	
6322		-----		-----	
6380	D5185	18.299		-0.21	
6414	D5185	20.95		0.35	
6532		-----		-----	
6537	D6595	13.10		-1.29	

normality	suspect
n	46
outliers	2
mean (n)	19.282
st.dev. (n)	2.7676
R(calc.)	7.749
st.dev.(D5185:18)	4.7823
R(D5185:18)	13.390

Kernel Density
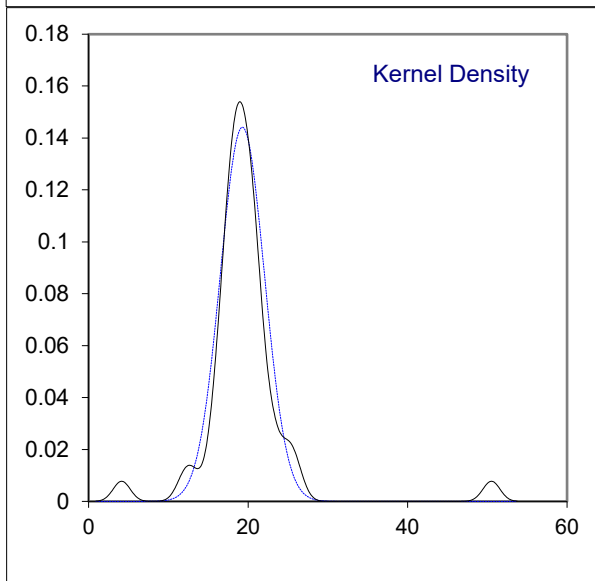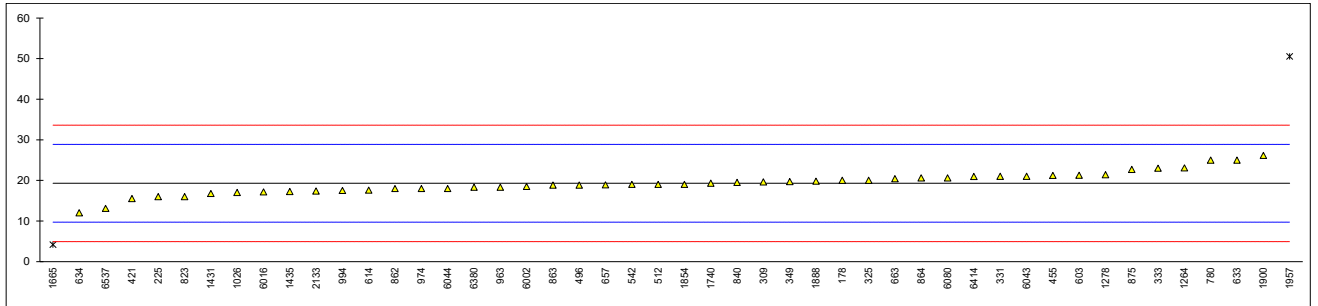
Determination of Chromium as Cr on sample #23083; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	21		-0.25	
179		-----		-----	
214		-----		-----	
225	D6595	22		0.28	
235		-----		-----	
237		-----		-----	
254	D5185	21.093		-0.20	
256		32.33	C,R(0.01)	5.78	First reported 26.98
257	D6595	32.54	C,R(0.01)	5.89	First reported 27.22
309	D5185	22.0		0.28	
325	D5185	23		0.81	
331	D5185	21		-0.25	
333	D5185	22		0.28	
349		22.6		0.60	
381		-----		-----	
392	D5185Mod.	21.33		-0.08	
421	D5185	19.1		-1.27	
451		-----		-----	
455		22.343333		0.46	
496	D5185	21.0		-0.25	
512	D5185	21.1		-0.20	
542	D6595	26		2.41	
562	D5185	24.0		1.34	
603	D5185	23.470		1.06	
614	D5185	20.85		-0.33	
633	D6595	20.05		-0.76	
634	D6595	13	R(0.01)	-4.51	
657	D5185	22.2		0.39	
663	D5185	20.6		-0.47	
780	D5185	24		1.34	
823	D5185	21		-0.25	
840	D5185	19.6		-1.00	
862	D5185	22.7		0.65	
863	D5185	21.5		0.01	
864	D5185	23.1		0.86	
875	D5185	21.2		-0.15	
901	D5185	22.62		0.61	
912		-----		-----	
922	D5185	17.9	C	-1.90	First reported 14.2
963	D5185	21.85		0.20	
974	D5185	21		-0.25	
994	D5185	21.4		-0.04	
1026	D5185	22		0.28	
1059	In house	21		-0.25	
1146	D5185	19.96		-0.81	
1173	In house	20.17		-0.70	
1264	D6595	24.09	C	1.39	First reported 27.71
1278	D5185	21.20		-0.15	
1320		-----		-----	
1431	D5185	19.57		-1.01	
1435	D5185	20.366		-0.59	
1495		17.9		-1.90	
1558	IP593	19.60		-1.00	
1648	D5185	21.08		-0.21	
1665	In house	21.5		0.01	
1720		-----		-----	
1740	D5185	20.7		-0.41	
1743	NF T60-106	20		-0.79	
1807	D5185	24.0		1.34	
1850	In house	22		0.28	
1854		22.6		0.60	
1888	D5185	3.3	C,R(0.01)	-9.68	First reported 11.7
1900	D5185	22.02		0.29	
1957	D5185	18.29	C	-1.70	First reported 14.079
2133	D5185	19.978		-0.80	
6002	D5185	18.54		-1.56	
6016	D6595	25.437		2.11	
6043	D5185	21		-0.25	
6044	D5185	21		-0.25	
6080	D5185	23.4		1.02	
6322	DIN51418	20		-0.79	
6380	D5185	19.321		-1.15	
6414	D5185	23.15		0.89	
6532		-----		-----	
6537	D6595	25.60		2.19	

normality	OK
n	61
outliers	4
mean (n)	21.477
st.dev. (n)	1.7623
R(calc.)	4.934
st.dev.(D5185:18)	1.8786
R(D5185:18)	5.260
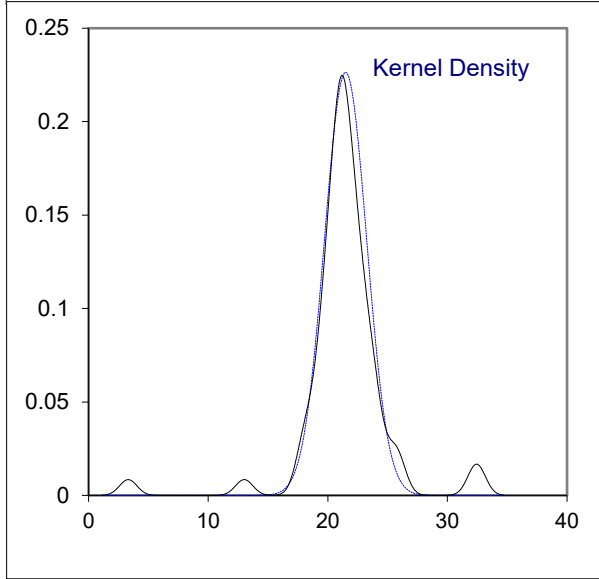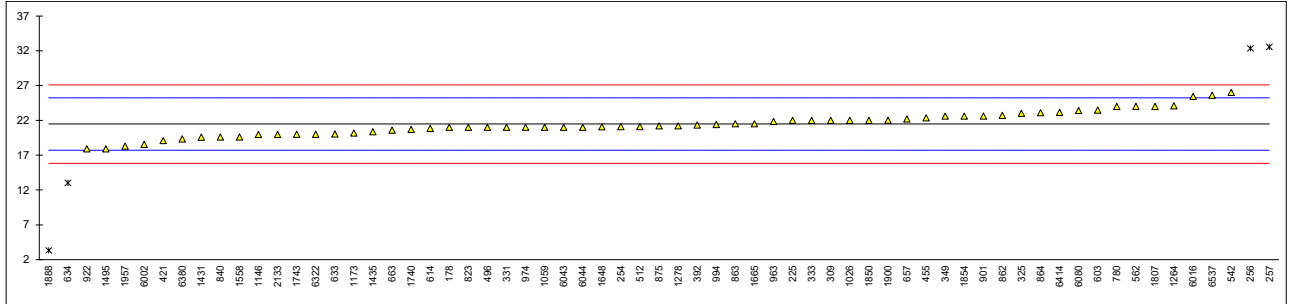
Determination of Copper as Cu on sample #23083; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	26		-0.93	
179		-----		-----	
214		-----		-----	
225	D6595	26		-0.93	
235		-----		-----	
237		-----		-----	
254	D5185	24.371		-1.60	
256		25.57		-1.10	
257	D6595	27.16		-0.45	
309	D5185	30.6		0.97	
325	D5185	31		1.14	
331	D5185	26		-0.93	
333	D5185	30		0.73	
349		28.8		0.23	
381	D5185	28.7		0.19	
392	D5185Mod.	28.24		0.00	
421	D5185	25.8		-1.01	
451		-----		-----	
455		28.943333		0.29	
496	D5185	27.8		-0.18	
512	D5185	28.4		0.07	
542	D6595	32		1.55	
562	D5185	34.7	DG(0.05)	2.67	
603	D5185	31.920		1.52	
614	D5185	26.35		-0.78	
633	D6595	28.30		0.02	
634	D6595	29		0.31	
657	D5185	29.6		0.56	
663	D5185	28.25		0.00	
780	D5185	26		-0.93	
823	D5185	28		-0.10	
840	D5185	26.8		-0.60	
862	D5185	29.6		0.56	
863	D5185	28.5		0.11	
864	D5185	30.3		0.85	
875	D5185	28.6		0.15	
901	D5185	27.54		-0.29	
912		-----		-----	
922	D5185	26.3	C	-0.80	First reported 19.8
963	D5185	27.98		-0.11	
974	D5185	28		-0.10	
994	D5185	28.3		0.02	
1026	D5185	28		-0.10	
1059	In house	33		1.97	
1146	D5185	27.13		-0.46	
1173	In house	27.12		-0.46	
1264	D6595	31.33		1.28	
1278	D5185	29.83		0.66	
1320		-----		-----	
1431	D5185	26.00		-0.93	
1435	D5185	27.077		-0.48	
1495		25.6		-1.09	
1558	IP593	26.2		-0.84	
1648	D5185	28.45		0.09	
1665	In house	28.9		0.27	
1720		-----		-----	
1740	D5185	29.0		0.31	
1743	NF T60-106	27		-0.51	
1807	D5185	30.0		0.73	
1850	In house	26		-0.93	
1854		31.4		1.31	
1888	D5185	29.6		0.56	
1900	D5185	29.18		0.39	
1957	D5185	26.743		-0.62	
2133	D5185	26.128		-0.87	
6002	D5185	26.8		-0.60	
6016	D6595	34.584	DG(0.05)	2.62	
6043	D5185	29		0.31	
6044	D5185	29		0.31	
6080	D5185	31.8		1.47	
6322	DIN51418	27		-0.51	
6380	D5185	26.456		-0.74	
6414	D5185	31.15		1.20	
6532		-----		-----	
6537	D6595	27.78		-0.19	

normality	OK
n	64
outliers	2
mean (n)	28.241
st.dev. (n)	1.9003
R(calc.)	5.321
st.dev.(D5185:18)	2.4206
R(D5185:18)	6.778
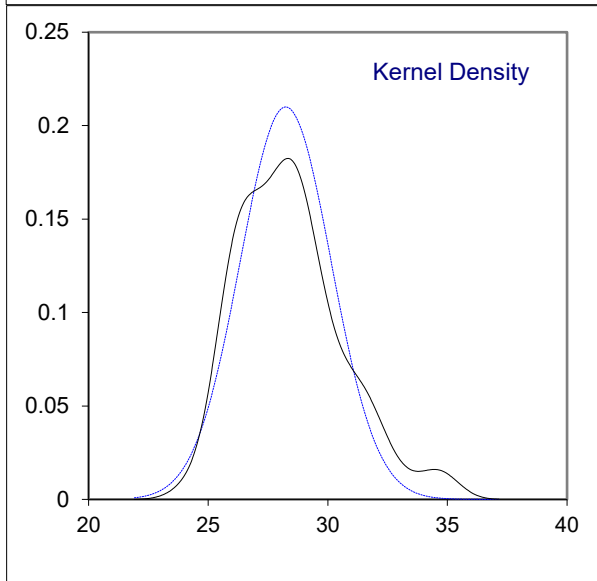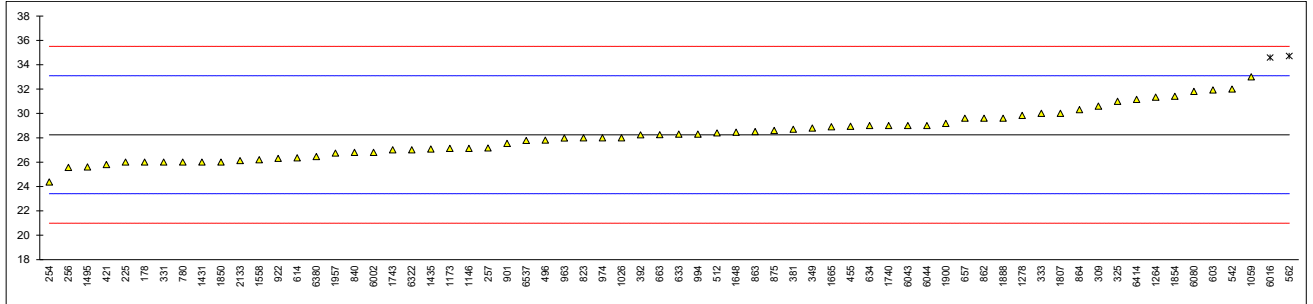
Determination of Iron as Fe on sample #23083; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	12		2.16	
179		-----		-----	
214		-----		-----	
225	D6595	9.5		-0.05	
235		-----		-----	
237		-----		-----	
254	D5185	10.316		0.67	
256		11.68		1.88	
257	D6595	10.34		0.69	
309	D5185	10.0		0.39	
325	D5185	10		0.39	
331	D5185	9		-0.49	
333	D5185	9.4		-0.14	
349		9.6		0.04	
381	D5185	9.45		-0.10	
392		-----		-----	
421	D5185	6.7	DG(0.05)	-2.53	
451		-----		-----	
455		10.22		0.59	
496	D5185	9.18		-0.33	
512	D5185	9.4		-0.14	
542	D6595	11		1.28	
562		-----		-----	
603	D5185	10.380		0.73	
614	D5185	9.06		-0.44	
633	D6595	10.95		1.23	
634	D6595	7.7		-1.64	
657	D5185	10.1		0.48	
663	D5185	8.2		-1.20	
780	D5185	9.1		-0.40	
823	D5185	9.6		0.04	
840	D5185	8.17		-1.23	
862	D5185	9.7		0.13	
863	D5185	9.1		-0.40	
864	D5185	10.1		0.48	
875	D5185	9.0		-0.49	
901	D5185	9.87		0.28	
912		-----		-----	
922	D5185	8.6	C	-0.85	First reported 6.5
963	D5185	9.71		0.13	
974	D5185	9		-0.49	
994	D5185	8.3		-1.11	
1026	D5185	9		-0.49	
1059	In house	6	DG(0.05)	-3.15	
1146	D5185	8.62		-0.83	
1173	In house	11.15		1.41	
1264	D6595	8.59		-0.86	
1278	D5185	9.488		-0.06	
1320		-----		-----	
1431	D5185	8.44		-0.99	
1435	D5185	8.591		-0.86	
1495		-----		-----	
1558	IP593Mod.	11.1		1.36	
1648	D5185	9.44		-0.10	
1665	In house	9.9		0.30	
1720		-----		-----	
1740	D5185	8.9		-0.58	
1743	NF T60-106	8.5		-0.94	
1807	D5185	10.4		0.75	
1850	In house	10		0.39	
1854		10.2		0.57	
1888	D5185	9.7		0.13	
1900	D5185	9.70		0.13	
1957	D5185	8.29	C	-1.12	First reported 2.43
2133	D5185	8.463		-0.97	
6002	D5185	7.84		-1.52	
6016	D6595	10.613		0.93	
6043	D5185	10		0.39	
6044	D5185	9.1		-0.40	
6080	D5185	10.1		0.48	
6322	DIN51418	10		0.39	
6380	D5185	8.077		-1.31	
6414	D5185	10.15		0.52	
6532		-----		-----	
6537	D6595	10.93		1.21	

normality	OK
n	61
outliers	2
mean (n)	9.558
st.dev. (n)	0.9478
R(calc.)	2.654
st.dev.(D5185:18)	1.1301
R(D5185:18)	3.164
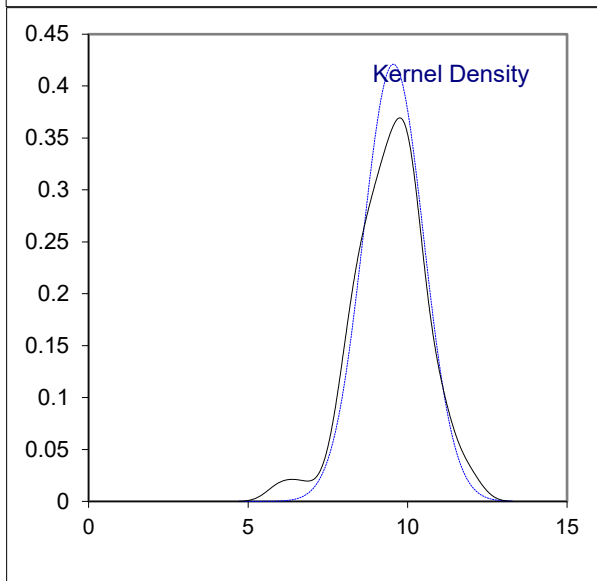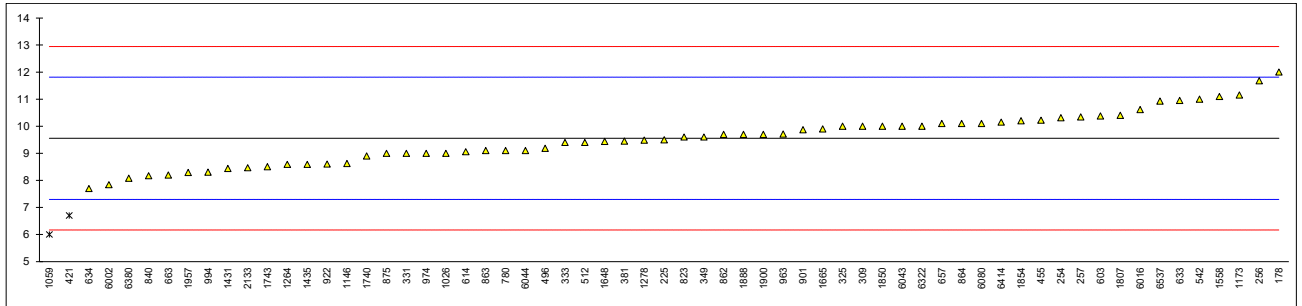
Determination of Lead as Pb on sample #23083; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	32		0.28	
179		-----		-----	
214		-----		-----	
225	D6595	29		-0.53	
235		-----		-----	
237		-----		-----	
254	D5185	31.085		0.03	
256		35.51		1.23	
257	D6595	35.65		1.27	
309	D5185	31.2		0.06	
325	D5185	33		0.55	
331	D5185	29		-0.53	
333	D5185	30		-0.26	
349		29.1		-0.51	
381	D5185	30.3		-0.18	
392	D5185Mod.	29.89		-0.29	
421	D5185	27.2		-1.02	
451		-----		-----	
455		33.983333		0.82	
496	D5185	29.3		-0.45	
512	D5185	30.4		-0.15	
542	D6595	37		1.64	
562		-----		-----	
603	D5185	29.845		-0.30	
614	D5185	29.09		-0.51	
633	D6595	32.58		0.44	
634	D6595	36		1.37	
657	D5185	31.7		0.20	
663	D5185	27.9		-0.83	
780	D5185	30		-0.26	
823	D5185	31		0.01	
840	D5185	28.8		-0.59	
862	D5185	30.9		-0.02	
863	D5185	31.2		0.06	
864	D5185	35.0		1.09	
875	D5185	30.8		-0.04	
901		-----		-----	
912		-----		-----	
922	D5185	28.8	C	-0.59	First reported 20.0
963	D5185	28.56		-0.65	
974	D5185	30		-0.26	
994	D5185	26.6		-1.18	
1026	D5185	30		-0.26	
1059	In house	30		-0.26	
1146	D5185	28.04		-0.79	
1173	In house	27.82		-0.85	
1264	D6595	36.25		1.43	
1278	D5185	28.85		-0.57	
1320		-----		-----	
1431	D5185	26.88		-1.11	
1435	D5185	28.122		-0.77	
1495		26.0		-1.35	
1558	IP593Mod.	27.8		-0.86	
1648	D5185	30.26		-0.19	
1665	In house	32.5		0.42	
1720		-----		-----	
1740	D5185	29.0		-0.53	
1743	NF T60-106	30		-0.26	
1807	D5185	35.8	C	1.31	First reported 45.5
1850	In house	41		2.72	
1854		30.1		-0.23	
1888	D5185	29.6	C	-0.37	First reported 59.4
1900	D5185	33.43		0.67	
1957	D5185	34.711		1.02	
2133	D5185	27.713		-0.88	
6002	D5185	28.9		-0.56	
6016	D6595	36.129		1.40	
6043	D5185	31		0.01	
6044	D5185	32		0.28	
6080	D5185	33.4		0.66	
6322	DIN51418	25		-1.62	
6380	D5185	26.750		-1.14	
6414	D5185	34.04		0.83	
6532		-----		-----	
6537	D6595	38.33		2.00	

normality	OK
n	64
outliers	0
mean (n)	30.966
st.dev. (n)	3.2162
R(calc.)	9.005
st.dev.(D5185:18)	3.6871
R(D5185:18)	10.324
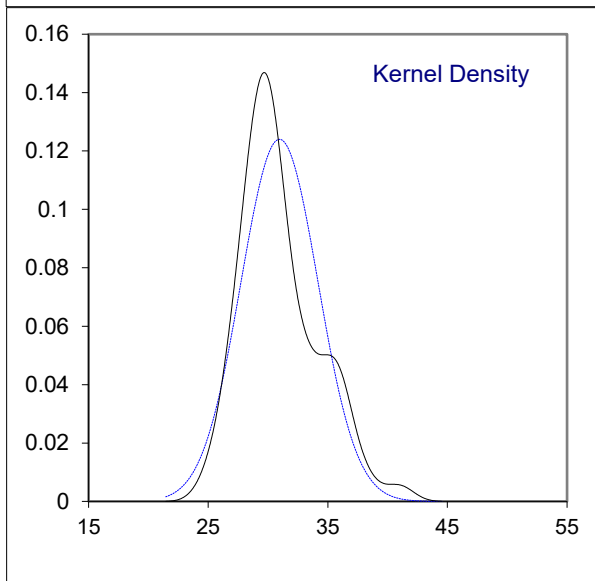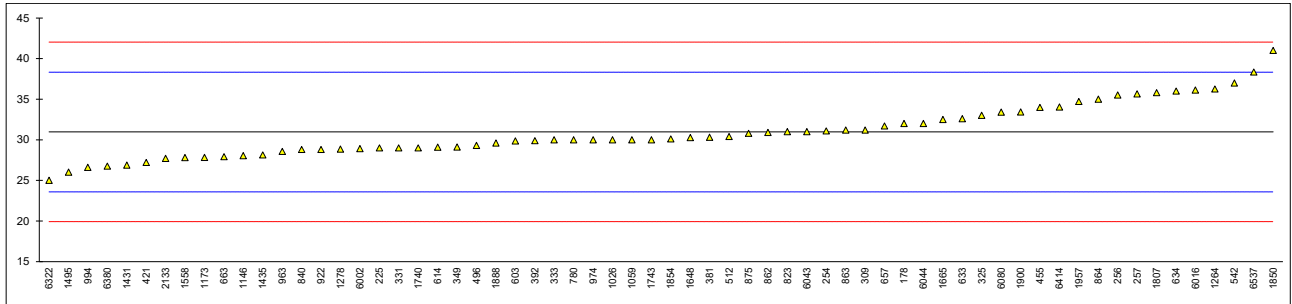
Determination of Magnesium as Mg on sample #23083; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	12		0.99	
179		-----		-----	
214		-----		-----	
225	D6595	10		-0.29	
235		-----		-----	
237		-----		-----	
254	D5185	11.358		0.58	
256		-----		-----	
257	D6595	10.14		-0.20	
309	D5185	10.0		-0.29	
325	D5185	11		0.35	
331	D5185	12		0.99	
333	D5185	10.1		-0.22	
349		9.9		-0.35	
381	D5185	10.1		-0.22	
392		-----		-----	
421	D5185	7.7		-1.76	
451		-----		-----	
455		9.226		-0.78	
496	D5185	10.34		-0.07	
512	D5185	10.4		-0.03	
542	D6595	12		0.99	
562	D5185	12.6		1.37	
603	D5185	11.950		0.96	
614	D5185	10.5		0.03	
633	D6595	9.30		-0.73	
634	D6595	14		2.27	
657	D5185	10.6		0.10	
663	D5185	10.0		-0.29	
780	D5185	10.1		-0.22	
823	D5185	9.8		-0.42	
840	D5185	8.84		-1.03	
862	D5185	10.5		0.03	
863	D5185	9.9		-0.35	
864	D5185	11.98		0.98	
875	D5185	9.8		-0.42	
901	D5185	10.13		-0.20	
912		-----		-----	
922	D5185	8.9	C	-0.99	First reported 7.4
963	D5185	10.54		0.06	
974	D5185	10		-0.29	
994	D5185	9.1		-0.86	
1026	D5185	13		1.63	
1059		-----		-----	
1146	D5185	10.01		-0.28	
1173	In house	11.71		0.80	
1264	D6595	12.32		1.19	
1278	D5185	10.82		0.24	
1320		-----		-----	
1431	D5185	9.397		-0.67	
1435	D5185	9.912		-0.34	
1495		-----		-----	
1558	IP593Mod.	2.7	R(0.01)	-4.95	
1648	D5185	10.08		-0.24	
1665	In house	9.87		-0.37	
1720		-----		-----	
1740	D5185	10.0		-0.29	
1743	NF T60-106	9.47		-0.63	
1807	D5185	10.6		0.10	
1850		-----		-----	
1854		10.6		0.10	
1888	D5185	12.6		1.37	
1900	D5185	9.15		-0.83	
1957	D5185	8.334		-1.35	
2133	D5185	9.333		-0.71	
6002	D5185	10.08		-0.24	
6016	D6595	11.653		0.77	
6043	D5185	10		-0.29	
6044	D5185	10		-0.29	
6080	D5185	12.2		1.12	
6322	DIN51418	<20		-----	
6380	D5185	9.012		-0.92	
6414	D5185	9.65		-0.51	
6532		-----		-----	
6537	D6595	11.95		0.96	

normality	OK
n	59
outliers	1
mean (n)	10.450
st.dev. (n)	1.2267
R(calc.)	3.435
st.dev.(D5185:18)	1.5664
R(D5185:18)	4.386

Kernel Density
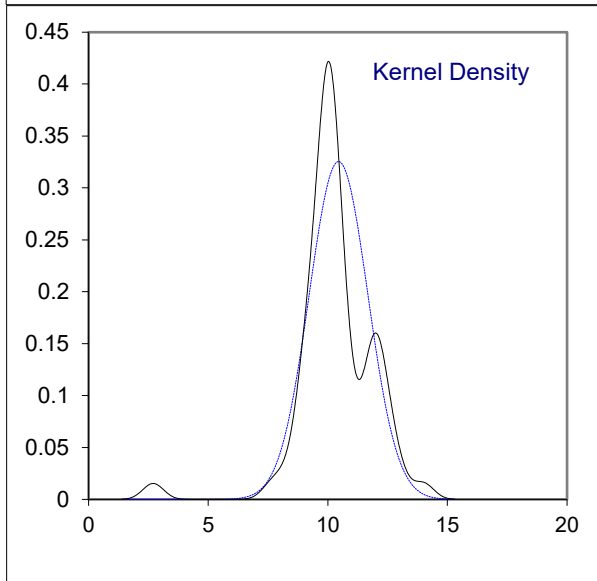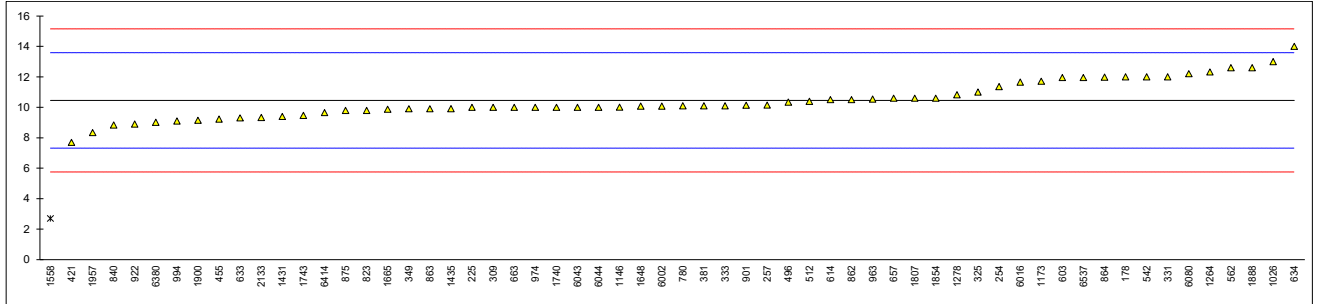
Determination of Molybdenum as Mo on sample #23083; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	11		0.22	
179		-----		-----	
214		-----		-----	
225	D6595	5.0	R(0.01)	-4.65	
235		-----		-----	
237		-----		-----	
254	D5185	9.769		-0.78	
256		-----		-----	
257	D6595	13.52		2.26	
309	D5185	11.0		0.22	
325	D5185	12		1.03	
331	D5185	13		1.84	
333	D5185	11		0.22	
349		11.2		0.38	
381		-----		-----	
392		-----		-----	
421	D5185	9.1		-1.32	
451		-----		-----	
455		10.983333		0.20	
496	D5185	10.7		-0.03	
512	D5185	10.55		-0.15	
542	D6595	11		0.22	
562	D5185	10.7		-0.03	
603	D5185	11.755		0.83	
614	D5185	10.58		-0.12	
633	D6595	9.92		-0.66	
634	D6595	15	R(0.05)	3.46	
657	D5185	11.0		0.22	
663	D5185	10.0		-0.59	
780	D5185	10		-0.59	
823	D5185	10.7		-0.03	
840	D5185	9.38		-1.10	
862	D5185	11.7		0.78	
863	D5185	11.0		0.22	
864	D5185	11.0		0.22	
875	D5185	10.4		-0.27	
901	D5185	11.83		0.89	
912		-----		-----	
922	D5185	9.8	C	-0.76	First reported 7.1
963	D5185	11.07		0.27	
974	D5185	11		0.22	
994	D5185	10.2		-0.43	
1026	D5185	10		-0.59	
1059	In house	13		1.84	
1146		-----		-----	
1173	In house	10.39		-0.28	
1264	D6595	9.28	C	-1.18	First reported 7.22
1278	D5185	11.09		0.29	
1320		-----		-----	
1431	D5185	9.752		-0.80	
1435	D5185	10.025		-0.57	
1495		-----		-----	
1558	IP593Mod.	10.3		-0.35	
1648		-----		-----	
1665	In house	11.0		0.22	
1720		-----		-----	
1740	D5185	9.2		-1.24	
1743	NF T60-106	10		-0.59	
1807	D5185	11.4		0.54	
1850	In house	<21		-----	
1854		10.7		-0.03	
1888	D5185	11.7		0.78	
1900	D5185	11.21		0.39	
1957	D5185	12.008		1.03	
2133	D5185	9.675		-0.86	
6002	D5185	10.25		-0.39	
6016	D6595	9.006		-1.40	
6043		-----		-----	
6044	D5185	10		-0.59	
6080	D5185	12.0		1.03	
6322	DIN51418	13		1.84	
6380	D5185	9.861		-0.71	
6414	D5185	11.21		0.39	
6532		-----		-----	
6537	D6595	8.11		-2.13	

normality	OK
n	56
outliers	2
mean (n)	10.733
st.dev. (n)	1.0661
R(calc.)	2.985
st.dev.(D5185:18)	1.2326
R(D5185:18)	3.451

Kernel Density
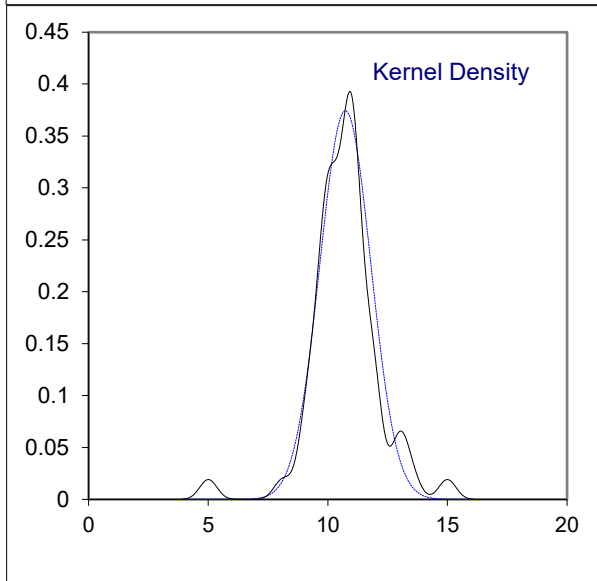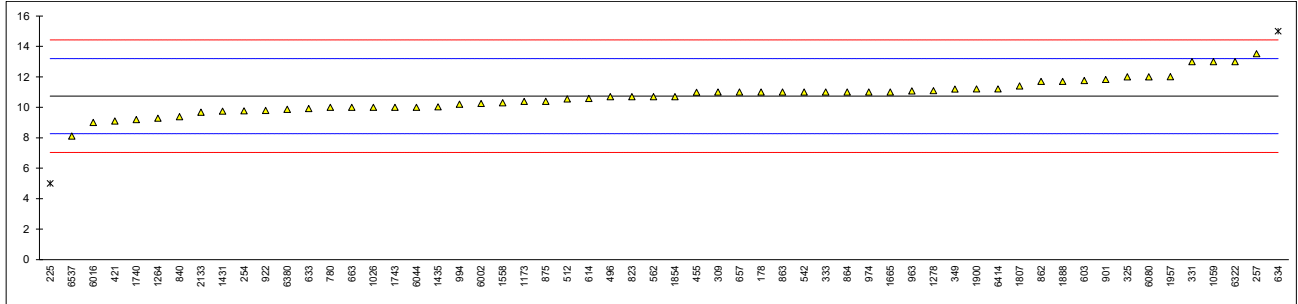
Determination of Nickel as Ni on sample #23083; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	19		-0.14	
179		-----		-----	
214		-----		-----	
225	D6595	19		-0.14	
235		-----		-----	
237		-----		-----	
254	D5185	17.321		-0.85	
256		17.83		-0.63	
257	D6595	18.22		-0.47	
309	D5185	20.4		0.46	
325	D5185	21		0.71	
331	D5185	18		-0.56	
333	D5185	20		0.29	
349		19.4		0.03	
381	D5185	20.0		0.29	
392	D5185Mod.	20.44		0.47	
421	D5185	16.9		-1.03	
451		-----		-----	
455		20.33		0.43	
496	D5185	19.0		-0.14	
512	D5185	19.8		0.20	
542	D6595	23		1.56	
562	D5185	23.8		1.90	
603	D5185	19.665		0.15	
614	D5185	17.73		-0.68	
633	D6595	20.39		0.45	
634	D6595	16		-1.41	
657	D5185	20.6		0.54	
663	D5185	21.4		0.88	
780	D5185	18		-0.56	
823	D5185	19.8		0.20	
840	D5185	17.8		-0.65	
862	D5185	19.8		0.20	
863	D5185	19.2		-0.05	
864	D5185	21.48		0.92	
875	D5185	18.1		-0.52	
901	D5185	21.23		0.81	
912		-----		-----	
922	D5185	15.5	C	-1.62	First reported 12.1
963	D5185	19.60		0.12	
974	D5185	20		0.29	
994	D5185	17.3		-0.86	
1026	D5185	19		-0.14	
1059		-----		-----	
1146	D5185	18.13		-0.51	
1173	In house	17.83		-0.63	
1264	D6595	23.89		1.94	
1278	D5185	19.23		-0.04	
1320		-----		-----	
1431	D5185	17.82		-0.64	
1435	D5185	18.100		-0.52	
1495		16.3		-1.28	
1558	IP593	18.72		-0.26	
1648	D5185	18.55		-0.33	
1665	In house	19.4		0.03	
1720		-----		-----	
1740	D5185	17.1		-0.94	
1743	NF T60-106	18		-0.56	
1807	D5185	21.5		0.92	
1850	In house	<5		<-6.08	Possibly a false negative test result?
1854		19.8		0.20	
1888	D5185	18.9		-0.18	
1900	D5185	19.40		0.03	
1957	D5185	15.682		-1.55	
2133	D5185	17.907		-0.60	
6002	D5185	18.74		-0.25	
6016	D6595	24.471		2.19	
6043	D5185	20		0.29	
6044	D5185	19		-0.14	
6080	D5185	20.8		0.63	
6322	DIN51418	19		-0.14	
6380	D5185	17.200		-0.90	
6414	D5185	20.86		0.65	
6532		-----		-----	
6537	D6595	24.30		2.11	

normality	OK
n	64
outliers	0
mean (n)	19.323
st.dev. (n)	1.9420
R(calc.)	5.438
st.dev.(D5185:18)	2.3549
R(D5185:18)	6.594

Kernel Density
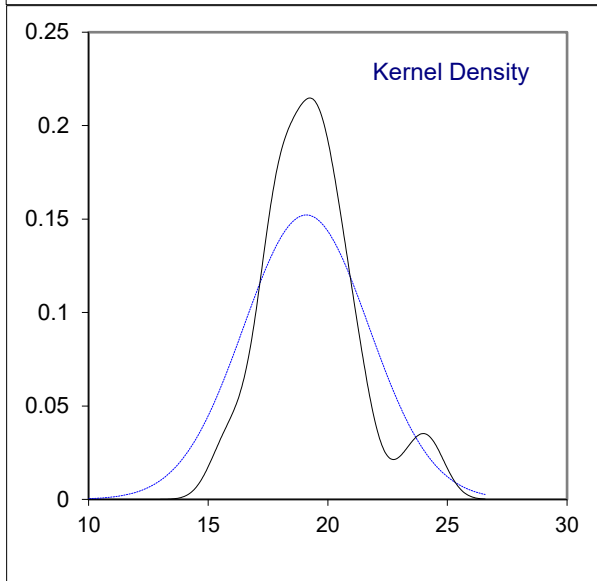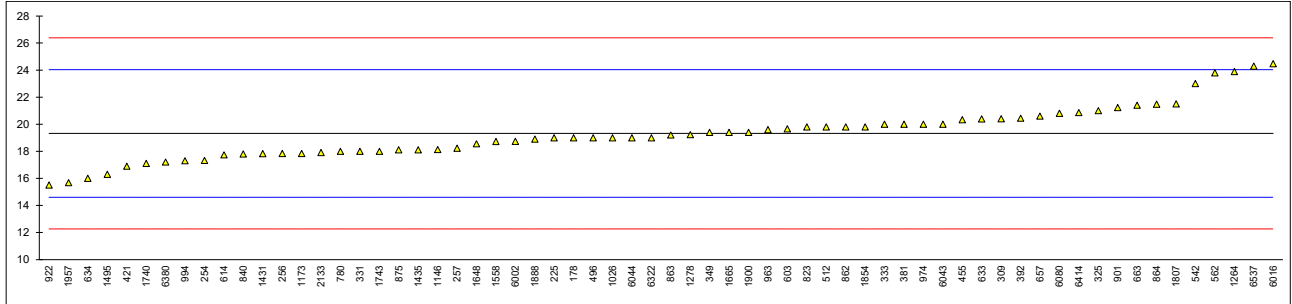
Determination of Silicon as Si on sample #23083; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	17		0.01	
179		-----		-----	
214		-----		-----	
225	D6595	15		-0.63	
235		-----		-----	
237		-----		-----	
254	D5185	18.405		0.46	
256		18.21		0.39	
257	D6595	18.11		0.36	
309	D5185	18.0		0.33	
325	D5185	20		0.97	
331	D5185	2	R(0.01)	-4.79	
333	D5185	18		0.33	
349		16.9		-0.02	
381	D5185	17.7		0.23	
392	D5185Mod.	18.84		0.60	
421	D5185	14.4		-0.82	
451		-----		-----	
455		15.67		-0.42	
496	D5185	16.5		-0.15	
512	D5185	17.2		0.07	
542	D6595	19		0.65	
562	D5185	15.0		-0.63	
603	D5185	19.425		0.78	
614	D5185	15.94		-0.33	
633	D6595	21	C	1.29	First reported 23.50
634	D6595	20		0.97	
657	D5185	17.8		0.26	
663	D5185	17.5		0.17	
780	D5185	18		0.33	
823	D5185	16.5		-0.15	
840	D5185	16.3		-0.22	
862	D5185	17.6		0.20	
863	D5185	16.5		-0.15	
864	D5185	17.72		0.24	
875	D5185	14.2		-0.89	
901	D5185	17.0		0.01	
912		-----		-----	
922	D5185	30.0	C,R(0.01)	4.17	First reported 23.6
963	D5185	17.09		0.04	
974	D5185	17		0.01	
994	D5185	16.11		-0.28	
1026	D5185	14		-0.95	
1059	In house	14		-0.95	
1146	D5185	15.77		-0.39	
1173	In house	17.8		0.26	
1264	D6595	16.82		-0.05	
1278	D5185	17.91		0.30	
1320		-----		-----	
1431	D5185	16.28		-0.22	
1435	D5185	15.506		-0.47	
1495		-----		-----	
1558	IP593Mod.	17.7		0.23	
1648	D5185	15.77		-0.39	
1665	In house	0.74	R(0.01)	-5.20	
1720		-----		-----	
1740	D5185	16.2		-0.25	
1743	NF T60-106	15		-0.63	
1807	D5185	21.1		1.32	
1850		-----		-----	
1854		18.5		0.49	
1888	D5185	18.8		0.58	
1900	D5185	17.61		0.20	
1957	D5185	11.966		-1.60	
2133	D5185	15.466		-0.48	
6002	D5185	13.8		-1.02	
6016	D6595	18.755		0.57	
6043	D5185	15		-0.63	
6044	D5185	16		-0.31	
6080	D5185	19.5		0.81	
6322	DIN51418	<15		-----	
6380	D5185	15.520		-0.47	
6414	D5185	18.43		0.46	
6532		-----		-----	
6537	D6595	15.80		-0.38	

normality	OK
n	60
outliers	3
mean (n)	16.977
st.dev. (n)	1.8215
R(calc.)	5.100
st.dev.(D5185:18)	3.1253
R(D5185:18)	8.751

Kernel Density
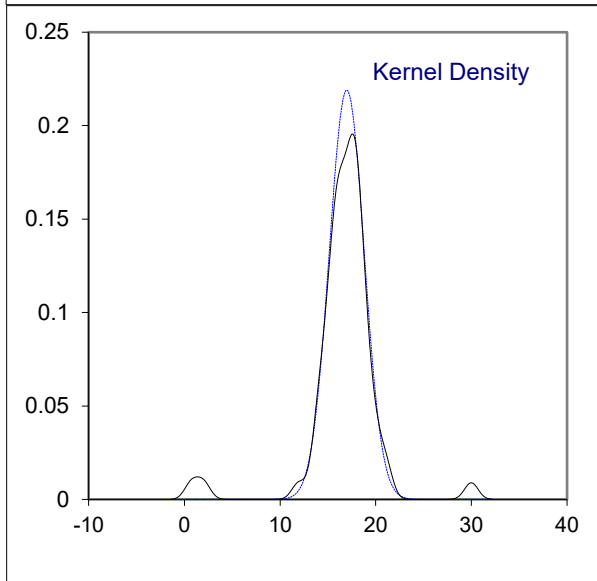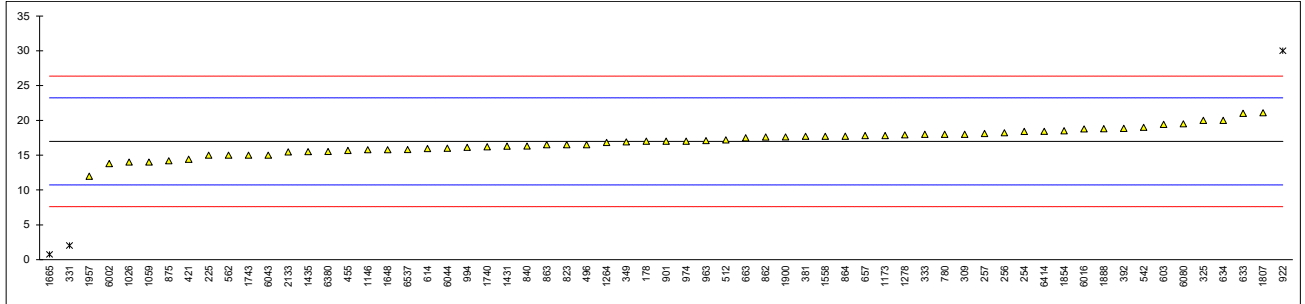
Determination of Sodium as Na on sample #23083; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	2		-0.46	
179		-----		-----	
214		-----		-----	
225	D6595	2.0		-0.46	
235		-----		-----	
237		-----		-----	
254	D5185	3.123		1.11	
256		2.93		0.84	
257	D6595	3.01		0.95	
309	D5185	2.4		0.10	
325	D5185	2		-0.46	
331	D5185	<2		-----	
333	D5185	<7		-----	
349		1.9		-0.60	
381	D5185	2.14		-0.26	
392		-----		-----	
421	D5185	<1,0		-----	
451		-----		-----	
455		1.923		-0.57	
496	D5185	2.43		0.14	
512	D5185	<7		-----	
542	D6595	3.2		1.22	
562	D5185	3.51		1.65	
603	D5185	0.553	C	-2.48	First reported 8.687
614	D5185	4.6		3.17	
633	D6595	2.93		0.84	
634	D6595	<1		-----	
657	D5185	3.41		1.51	
663	D5185	3.23		1.26	
780	D5185	<7.0		-----	
823	D5185	<6		-----	
840	D5185	2.01		-0.45	
862	D5185	1.9		-0.60	
863	D5185	1.9		-0.60	
864	D5185	1.595		-1.03	
875	D5185	2.6		0.38	
901	D5185	1.66		-0.93	
912		-----		-----	
922	D5185	2.3		-0.04	
963	D5185	2.14		-0.26	
974	D5185	2		-0.46	
994	D5185	<7		-----	
1026	D5185	2		-0.46	
1059		-----		-----	
1146	D5185	<4		-----	
1173		-----		-----	
1264	D6595	3.52	C	1.66	First reported 9.46
1278	D5185	1.886		-0.62	
1320		-----		-----	
1431	D5185	1.606		-1.01	
1435	D5185	2.467		0.19	
1495		-----		-----	
1558	IP593Mod.	151.3	R(0.01)	208.04	
1648	D5185	1.88		-0.63	
1665	In house	<3.0		-----	
1720		-----		-----	
1740	D5185	<1		-----	
1743	NF T60-106	2.4		0.10	
1807		-----		-----	
1850		-----		-----	
1854		2.6		0.38	
1888	D5185	0.9		-2.00	
1900	D5185	2.91		0.81	
1957	D5185	<1	C	-----	First reported -13.304
2133	D5185	1.388		-1.31	
6002	D5185	1.914		-0.58	
6016	D6595	3.441		1.55	
6043	D5185	3		0.94	
6044	D5185	1.9		-0.60	
6080	D5185	1.6		-1.02	
6322	DIN51418	<10		-----	
6380	D5185	1.441		-1.24	
6414	D5185	2.57		0.34	
6532		-----		-----	
6537	D6595	2.33		0.00	

normality	OK
n	46
outliers	1
mean (n)	2.329
st.dev. (n)	0.7585
R(calc.)	2.124
st.dev.(D5185:18)	0.7161
R(D5185:18)	2.005
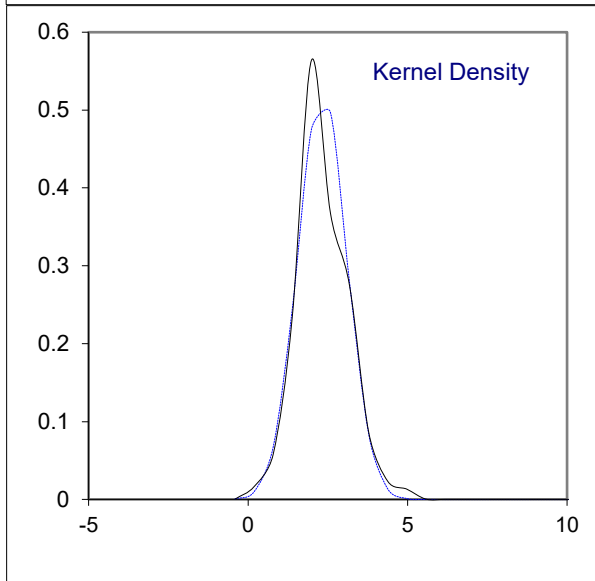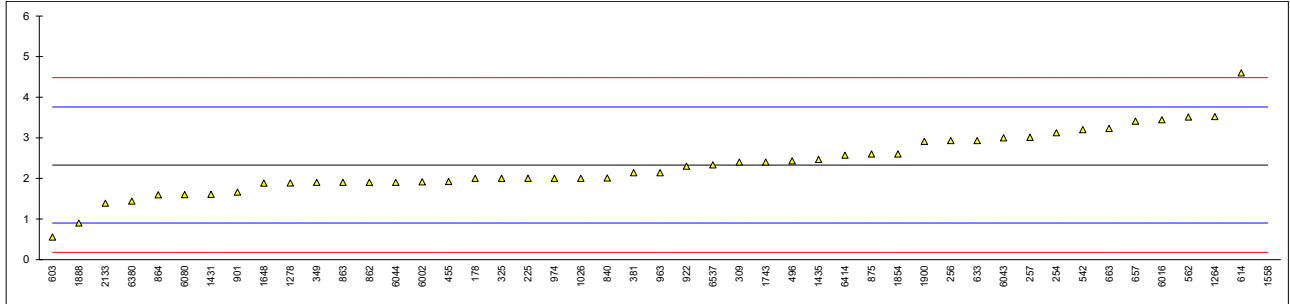
Determination of Calcium as Ca on sample #23083; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	3120		0.04	
179		-----		-----	
214		-----		-----	
225	D6595	3200		0.46	
235		-----		-----	
237		-----		-----	
254	D5185	3209.469		0.52	
256		-----		-----	
257		-----		-----	
309	D5185	3132.6		0.10	
325	D5185	3125		0.06	
331	D5185	3199		0.46	
333	D5185	4796	R(0.01)	9.03	
349		3132		0.10	
381		-----		-----	
392		-----		-----	
421	D5185	3094		-0.10	
451		-----		-----	
455		3226.6667		0.61	
496	D5185	3143		0.16	
512	D5185	3008		-0.57	
542	D6595	2720		-2.11	
562	D5185	2477.4	R(0.05)	-3.41	
603	D5185	3298		0.99	
614	D5185	3009		-0.56	
633	D6595	4242	C,R(0.01)	6.06	First reported 4501
634	D6595	3588		2.55	
657	D5185	2990		-0.66	
663	D5185	3496		2.05	
780	D5185	3230		0.63	
823	D5185	3156		0.23	
840	D5185	3020		-0.50	
862	D5185	3045		-0.37	
863	D5185	3094		-0.10	
864	D5185	3266		0.82	
875	D5185	3410		1.59	
901		-----		-----	
912		-----		-----	
922	D5185	3145		0.17	
963	D5185	3155.10		0.22	
974	D5185	3100		-0.07	
994	D5185	3148		0.19	
1026	D5185	2976		-0.74	
1059	In house	3036		-0.42	
1146	D5185	3062		-0.28	
1173		-----		-----	
1264	D6595	2805		-1.66	
1278	D5185	3169.85		0.30	
1320		-----		-----	
1431	D5185	2947.1		-0.89	
1435	D5185	2945.065		-0.90	
1495		-----		-----	
1558	IP593Mod.	3100.9		-0.07	
1648	D5185	3125		0.06	
1665	In house	3029		-0.45	
1720		-----		-----	
1740	D5185	3192		0.42	
1743	NF T60-106	2890		-1.20	
1807	D5185	3307		1.04	
1850	In house	3180		0.36	
1854		3050		-0.34	
1888	D5185	3466.4		1.89	
1900	D5185	2977.30		-0.73	
1957	D5185	2676.155		-2.35	
2133	D5185	3057.314		-0.30	
6002	D5185	3204		0.49	
6016	D6595	2826.4		-1.54	
6043	D5185	3067		-0.25	
6044	D5185	3156		0.23	
6080	D5185	3231		0.63	
6322	DIN51418	3069		-0.24	
6380	D5185	3262.74		0.80	
6414	D5185	3063.3		-0.27	
6532		-----		-----	
6537	D6595	3020.1		-0.50	

normality	suspect
n	56
outliers	3
mean (n)	3113.42
st.dev. (n)	168.083
R(calc.)	470.63
st.dev.(D5185:18)	186.270
R(D5185:18)	521.56

Kernel Density
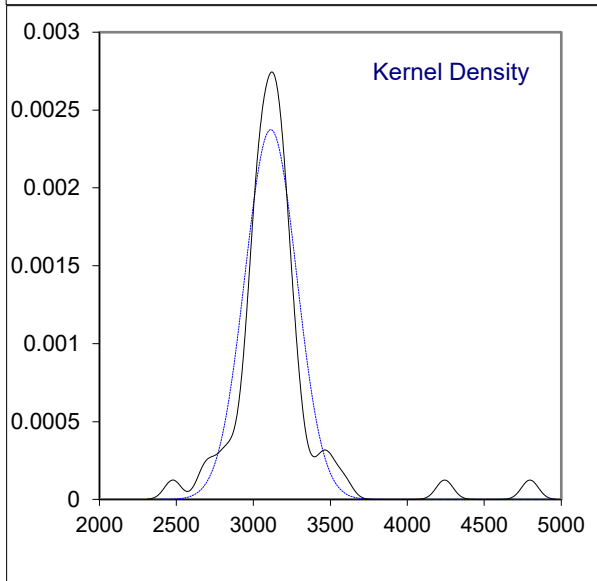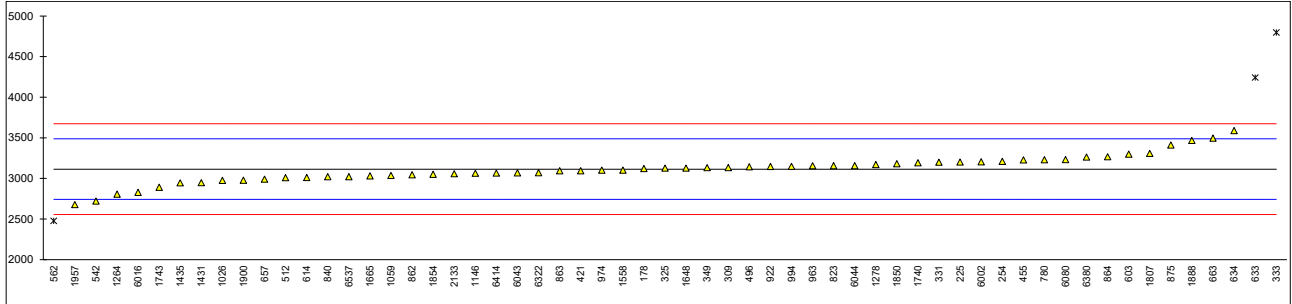
Determination of Phosphorus as P on sample #23083; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	1015		-0.20	
179		-----		-----	
214		-----		-----	
225	D6595	1022		-0.06	
235		-----		-----	
237		-----		-----	
254	D5185	1056.247		0.64	
256		-----		-----	
257	D6595	1060		0.72	
309	D5185	1030.8		0.12	
325	D5185	1062		0.76	
331	D5185	968		-1.16	
333	D5185	>1000		-----	
349		1044		0.39	
381	D5185	980		-0.91	
392		-----		-----	
421	D5185	1012		-0.26	
451		-----		-----	
455		937.66667		-1.77	
496	D5185	1046		0.43	
512	D5185	984		-0.83	
542	D6595	1058		0.68	
562		-----		-----	
603	D5185	670.7	C,R(0.01)	-7.20	First reported 715.3
614	D5185	1029		0.09	
633	D6595	1086	C	1.24	First reported 1192
634	D6595	1032		0.15	
657	D5185	1015		-0.20	
663	D5185	861	C	-3.33	First reported 1233
780	D5185	1030		0.11	
823	D5185	1041		0.33	
840	D5185	1000		-0.50	
862	D5185	1003		-0.44	
863	D5185	999		-0.52	
864	D5185	1040		0.31	
875	D5185	1110		1.73	
901	D5185	1098		1.49	
912		-----		-----	
922	D5185	959		-1.34	
963	D5185	1002.28		-0.46	
974	D5185	1011		-0.28	
994	D5185	>1000		-----	
1026	D5185	1078		1.08	
1059	In house	1113		1.79	
1146	D5185	984.1		-0.83	
1173		-----		-----	
1264	D6595	1082		1.16	
1278	D5185	971.285		-1.09	
1320		-----		-----	
1431	D5185	909.15		-2.35	
1435	D5185	1007.847		-0.34	
1495		-----		-----	
1558	IP593Mod.	1091.3		1.35	
1648	D5185	1070		0.92	
1665	In house	888		-2.78	
1720		-----		-----	
1740	D5185	1053		0.57	
1743	NF T60-106	934		-1.85	
1807	D5185	1155		2.65	
1850		-----		-----	
1854		1093		1.39	
1888	D5185	1048.2		0.48	
1900	D5185	964.34		-1.23	
1957	D5185	1005.604		-0.39	
2133	D5185	972.845		-1.06	
6002	D5185	1010		-0.30	
6016	D6595	1118.5		1.91	
6043	D5185	1034		0.19	
6044	D5185	1009		-0.32	
6080	D5185	1057		0.65	
6322	DIN51418	1027		0.04	
6380	D5185	1006.46		-0.37	
6414	D5185	1185.7		3.27	
6532		-----		-----	
6537	D6595	953.6		-1.45	

normality	OK
n	57
outliers	1
mean (n)	1024.81
st.dev. (n)	60.918
R(calc.)	170.57
st.dev.(D5185:18)	49.162
R(D5185:18)	137.65
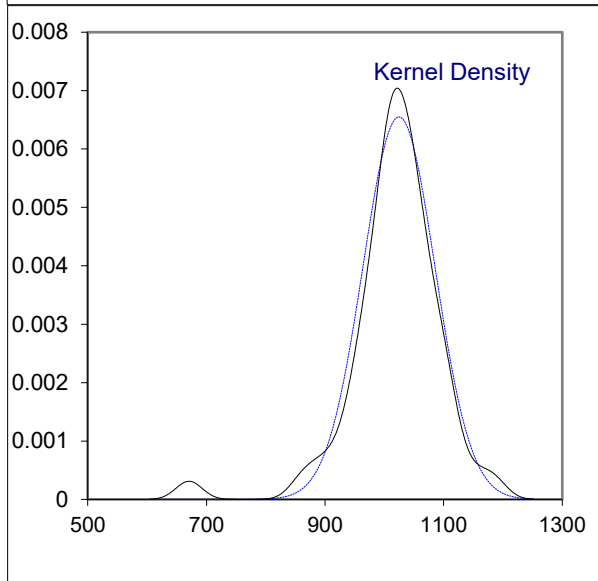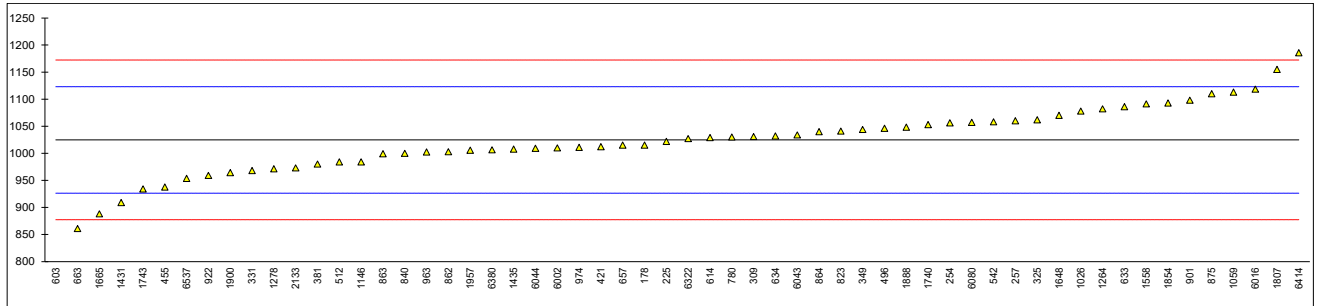
Determination of Zinc as Zn on sample #23083; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	1188		0.06	
179		-----		-----	
214		-----		-----	
225	D6595	1174		-0.14	
235		-----		-----	
237		-----		-----	
254	D5185	1190.827		0.10	
256		1078		-1.49	
257	D6595	1198		0.20	
309	D5185	1179.6		-0.06	
325	D5185	1229		0.63	
331	D5185	1164		-0.28	
333	D5185	1160		-0.34	
349		1085		-1.39	
381	D5185	1181		-0.04	
392	D5185Mod.	1210.42		0.37	
421	D5185	1179		-0.07	
451		-----		-----	
455		1202		0.25	
496	D5185	1183		-0.01	
512	D5185	1163		-0.29	
542	D6595	1370		2.61	
562		-----		-----	
603	D5185	1159		-0.35	
614	D5185	1165		-0.27	
633	D6595	1288		1.46	
634	D6595	1149		-0.49	
657	D5185	1150		-0.48	
663	D5185	1229		0.63	
780	D5185	1210		0.37	
823	D5185	1152		-0.45	
840	D5185	1187		0.04	
862	D5185	1179		-0.07	
863	D5185	1134		-0.70	
864	D5185	1200		0.23	
875	D5185	1380		2.75	
901	D5185	1260		1.07	
912		-----		-----	
922	D5185	1162		-0.31	
963	D5185	1178.63		-0.07	
974	D5185	1178		-0.08	
994	D5185	1146		-0.53	
1026	D5185	1330		2.05	
1059	In house	1190		0.09	
1146	D5185	1166.1		-0.25	
1173		-----		-----	
1264	D6595	1278.5		1.33	
1278	D5185	1160.83		-0.32	
1320		-----		-----	
1431	D5185	1043.5		-1.97	
1435	D5185	1076.836		-1.50	
1495		905.2	R(0.01)	-3.91	
1558	IP593	1042.5		-1.99	
1648	D5185	1207		0.32	
1665	In house	1206		0.31	
1720		-----		-----	
1740	D5185	1188		0.06	
1743	NF T60-106	1080		-1.46	
1807	D5185	1253		0.97	
1850	In house	1250		0.93	
1854		1245		0.86	
1888	D5185	1186.4		0.04	
1900	D5185	1208.60		0.35	
1957	D5185	1043.254		-1.97	
2133	D5185	1192.009		0.11	
6002	D5185	1101		-1.16	
6016	D6595	1145.5		-0.54	
6043	D5185	1178		-0.08	
6044	D5185	1201		0.24	
6080	D5185	1180		-0.05	
6322	DIN51418	1144		-0.56	
6380	D5185	1184.17		0.00	
6414	D5185	1197.2		0.19	
6532		-----		-----	
6537	D6595	1265.0		1.14	

normality	suspect
n	63
outliers	1
mean (n)	1183.89
st.dev. (n)	66.234
R(calc.)	185.46
st.dev.(D5185:18)	71.213
R(D5185:18)	199.40
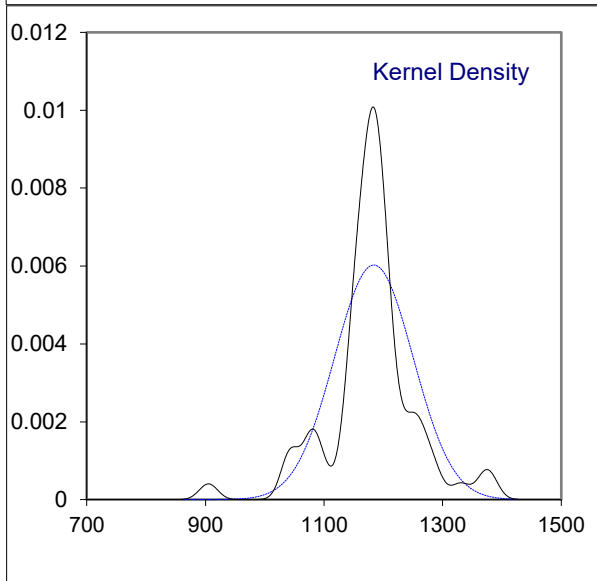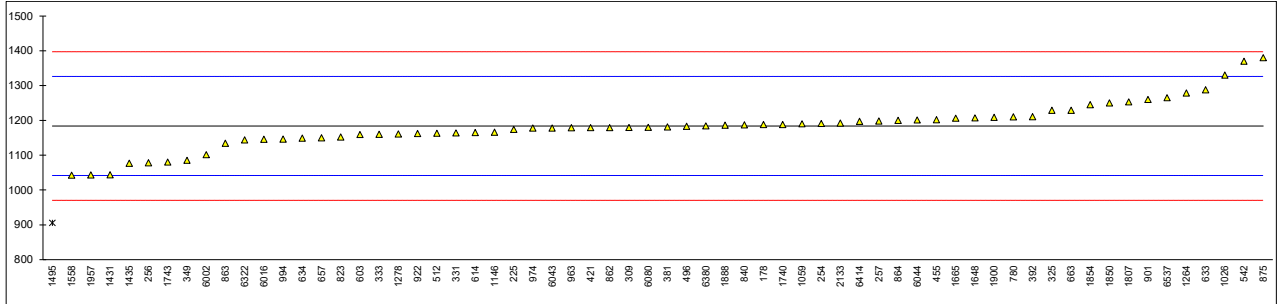
APPENDIX 2
Other reported test results on sample #23083

lab	Ba	Cd	Li	Mn	K	Ag	Sn	Ti	V
178	0	1	-----	1	1	0	1	0	0
179	-----	-----	-----	-----	-----	-----	-----	-----	-----
214	-----	-----	-----	-----	-----	-----	-----	-----	-----
225	0.2	0.0	-----	0.9	0.4	0.2	0.0	0.0	0.3
235	-----	-----	-----	-----	-----	-----	-----	-----	-----
237	-----	-----	-----	-----	-----	-----	-----	-----	-----
254	-----	-----	-----	-----	-----	-----	-----	-----	-----
256	-----	-----	-----	-----	-----	0.92	0.0	-----	0.38
257	0.19	0.09	-----	0.86	0.55	0.11	0.0	0.1	0.44
309	<2	<2	<2	<2	<2	<2	<5	<2	<2
325	<1	<1	<1	<1	<2	<1	<1	<1	<1
331	<2	<2	<2	<2	<2	16	<2	<2	<2
333	<0.5	<1	<1	<5	<40	<0.5	<10	<5	<1
349	0.1	0.1	0.1	10.4	1	0.1	8.3	0.1	0.1
381	-----	-----	-----	-----	-----	-----	2.0	-----	-----
392	-----	-----	-----	-----	-----	-----	-----	-----	-----
421	<1,0	<1,0	-----	<1,0	<1,0	<1,0	9.2	<1,0	<1,0
451	-----	-----	-----	-----	-----	-----	-----	-----	-----
455	0.1056667	0.124	-----	0.5886667	0.569	0.0453333	1.7146667	0.1363333	0.0296667
496	<1	<1	<1	<1	<1	<1	10.2	<1	<1
512	<0.5	-----	-----	<5	<40	<0.5	<10	<5	<1
542	0	0.01	0	0.32	0.40	0	0.93	0	0.57
562	-----	-----	-----	-----	-----	-----	-----	-----	-----
603	0.738	-----	-----	0.946	0.721	0.752	-2.424	0.538	0.430
614	<1	<1	<1	<1	<1	<1	1.05	<1	<1
633	0.157	0	0.10	0	0.57	0	6	0.06	0.36
634	<1	<1	-----	<1	<1	<1	<1	<1	1.1
657	<1	<1	<1	<1	<1	<1	1.3	<1	<1
663	0.13	-----	-----	0.55	-----	0.77	0.75	0.00	0.00
780	<1.00	<1.00	-----	<5.0	<40	<1.0	<10	<5.0	<1.0
823	<1	<1	<1	<1	<3	<1	<3	<1	<1
840	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0
862	<1	<1	<1	<1	<1	<1	<1	<1	<1
863	<1	<1	-----	<1	1.2	<1	<1	<1	<1
864	0.113	0.137	0.098	0	0	0.213	1.00	0.365	0
875	0.12	0.51	-----	0.53	<40	1	-----	0.13	0.1
901	-----	-----	-----	-----	-----	-----	-----	-----	-----
912	-----	-----	-----	-----	-----	-----	-----	-----	-----
922	<1.0	<1.0	<1.0	<5.0	<40	<1.0	<10	<5.0	<1.0
963	<0.10	0.12	<0.10	0.57	<1.0	<0.10	1.15	<0.10	<0.10
974	<1	<1	<1	<1	<1	<1	1	<1	<1
994	<0.5	<1	-----	<5	<40	<0.5	<10	<5	<1
1026	0	-----	-----	-----	-----	-----	0	-----	0
1059	-----	-----	-----	-----	-----	-----	<8	-----	-----
1146	<5	-----	<1	<1	-----	<5	10.41	<5	<1
1173	0.29	-----	-----	0.69	-----	-----	-----	-----	-----
1264	0.05	-----	-----	0.20	-----	0.0	0.0	0.0	0.56
1278	0.0790	0.188	-----	0.520	<1.7	0.120	1.001	<0.2	<0.09
1320	-----	-----	-----	-----	-----	-----	-----	-----	-----
1431	0.1168	0.1144	-----	0.5321	0.8355	0.1047	1.14	0.0827	0.0612
1435	0.076	0.173	0	0.526	0	0.217	0	0.089	0
1495	-----	0	-----	0.4	-----	-----	0.2	-----	0
1558	0.0	0.37	-----	0.81	0.6	0.8	0.7	0.9	0.49
1648	-----	-----	-----	-----	-----	-----	0.88	-----	<0.10
1665	0.14	0.14	<4.5	0.59	<11.5	<0.01	0.61	0.28	0.03
1720	-----	-----	-----	-----	-----	-----	-----	-----	-----
1740	<0.5	-----	<1	<1	<1	<0.5	<1	<1	<1
1743	0.03	0.26	1.0	0.52	0.30	0.32	0.66	0.05	0.01
1807	0.1	0.2	-----	0.4	-----	0.4	0.9	0.0	0.0
1850	<10	<5	-----	<3	-----	10	3	<50	<3
1854	0.1	-----	-----	0.3	-----	-----	2.6	0.07	0.05
1888	0.7	0.4	-----	0.8	-----	0.6	2	0.5	0.2
1900	0.18	-----	-----	0.77	0.04	4.68	4.30	0.10	0.11
1957	0.069	-----	-0.699	1.030	-----	<1	0.744	-2.515	-0.444
2133	0.080	0.093	-----	0.519	-----	0.038	0.367	0.377	-0.082
6002	0.0798	0.0	0.0	0.662	0.0	0.664	0.0	0.0	0.0
6016	0.069	0.139	0.111	0.739	0.460	-----	<1	<1	0.141
6043	0	-----	-----	-----	-----	-----	0	-----	-----
6044	0	-----	0	0	0	0	0	0	0
6080	0.2	0.2	-----	0.9	0	0	0.9	0.2	0.4
6322	<10	<10	-----	<10	<10	<10	<10	<5	<10
6380	0.043	0.031	-----	0.304	-----	<1	0.329	<1	<1
6414	0.42	-----	0.72	1.52	0.27	0.78	1.09	0.52	0.62
6532	-----	-----	-----	-----	-----	-----	-----	-----	-----
6537	0.0	0.0	0.0	0.50	0.10	0.0	1.49	0.0	1.49

APPENDIX 3

Number of participants per country

1 lab in   ALGERIA
1 lab in   ARGENTINA
1 lab in   AUSTRALIA
1 lab in   AZERBAIJAN
2 labs in   BELGIUM
1 lab in   BOTSWANA
1 lab in   CHILE
3 labs in   CHINA, People's Republic
1 lab in   COTE D'IVOIRE
1 lab in   CROATIA
1 lab in   CZECH REPUBLIC
2 labs in   DENMARK
1 lab in   FINLAND
4 labs in   FRANCE
2 labs in   GERMANY
5 labs in   GREECE
1 lab in   INDIA
1 lab in   IRELAND
2 labs in   ITALY
1 lab in   KAZAKHSTAN
1 lab in   KENYA
1 lab in   KOREA, Republic of
3 labs in   MALAYSIA
1 lab in   MAURITIUS
2 labs in   MOROCCO
4 labs in   NETHERLANDS
1 lab in   NIGERIA
1 lab in   NORTH MACEDONIA, Republic of
3 labs in   NORWAY
1 lab in   PAKISTAN
2 labs in   PERU
2 labs in   PHILIPPINES
1 lab in   POLAND
2 labs in   RUSSIAN FEDERATION
3 labs in   SAUDI ARABIA
1 lab in   SERBIA
1 lab in   SINGAPORE
1 lab in   SLOVAKIA
1 lab in   SLOVENIA
6 labs in   SPAIN
1 lab in   SUDAN
2 labs in   TANZANIA
1 lab in   THAILAND
1 lab in   TURKEY
1 lab in   UKRAINE
2 labs in   UNITED ARAB EMIRATES
6 labs in   UNITED KINGDOM
2 labs in   UNITED STATES OF AMERICA
1 lab in   VIETNAM

APPENDIX 4

Abbreviations

C	= final test 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	= calculation difference between reported test result and result calculated by iis
W	= test result withdrawn on request of participant
ex	= test result excluded from statistical evaluation
n.a.	= not applicable
n.e.	= not evaluated
n.d.	= not detected
fr.	= first reported
f+?	= possibly a false positive test result?
f-?	= possibly a false negative test result?
SDS	= Safety Data Sheet

Literature

1 iis Interlaboratory Studies, Protocol for the Organisation, Statistics & Evaluation, June 2018

2 ISO5725:86

3 ISO5725 parts 1-6:94

4 ISO13528:05

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

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

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

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

9 Analytical Methods Committee, Technical Brief, No 4, January 2001

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

11 W. Horwitz and R. Albert, J. AOAC Int, 79.3, 589-621, (1996)

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