Results of Proficiency Test
Fuel Oil
December 2016

CONTENTS

Appendices:

1   INTRODUCTION

Since 1994 the Institute for Interlaboratory Studies organizes a proficiency test for Fuel Oil
every year. In the annual proficiency testing program of 2016/2017, it was decided to continue
the round robin for the analyses of Fuel Oil twice per year. The scope for this interlaboratory
study is according to the latest applicable version of the specification ISO 8217.
In the round robin with regular Fuel Oil 89 laboratories in 46 different countries registered for
participation. In the round robin for Metals in Fuel Oil study 68 laboratories in 37 different
countries registered for participation, for the Bromine and p-Value proficiency study 29
laboratories in 18 different countries registered for participation and for the Compatability
proficiency study 34 laboratories in 22 different countries registered for participation. See
appendix 2 for the number of participants per country for the main round.
In this report, the test results of the December 2016 interlaboratory study on Fuel Oil are
presented and discussed. This report is also electronically available through the iis website
www.iisnl.com.

2   SET-UP

The Institute for Interlaboratory Studies (iis) in Spijkenisse, the Netherlands, was the organiser
of this proficiency test (PT). Sample analyses for fit-for-use and homogeneity testing were
subcontracted to an ISO/IEC 17025 accredited laboratory. Depending on the registration it
was decided to send one bottle of 1L Fuel Oil (labelled #16280), one bottle of 0.1L Fuel Oil
(labelled #16281) specifically prepared for metal determinations, one bottle of 1L Fuel Oil
(labelled #16282) specifically obtained for Bromine Number and p-Value determinations and/or
one specially prepared filter (labelled #16283) for the determination of Compatibility of residual
oils. During the PT of January 2016 participants did receive two incompatible fuels for the
determination of Compatibility and Cleanliness, but a significant number of laboratories could
not participate due to the lack of sufficient samples. Therefore it was decided to prepare the
filters for Compatibility and to use the prepared filters in this PT. In this way sufficient samples
for all laboratories were made available.
Participants were requested to report rounded and unrounded test results. The unrounded test
results were preferably used for statistical evaluation.

2.1   ACCREDITATION

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

2.2 PROTOCOL

The protocol followed in the organisation of this proficiency test was the one as described for proficiency testing in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' of April 2014 (iis-protocol, version 3.3). This protocol can be downloaded from 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 this proficiency test four different samples were prepared; a regular Fuel Oil, a Fuel Oil positive on metals, a sample for Bromine Number and p-Value and a prepared filter for the determination of the Compatibility of residual oils.

From 200 litre Fuel Oil, obtained from a refinery in Germany, 128 amber glass bottles of 1L were filled after heating to 60°C and homogenisation and labelled #16280. The homogeneity of these subsamples was checked by determination of Density at 15°C in accordance with ISO12185 on 8 stratified randomly selected samples.

	Density at 15°C in kg/m^3
Sample #16280-1	987.0
Sample #16280-2	987.1
Sample #16280-3	987.0
Sample #16280-4	987.1
Sample #16280-5	987.1
Sample #16280-6	987.0
Sample #16280-7	987.0
Sample #16280-8	987.1

Table 1: homogeneity test results of subsamples #16280

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

	Density at 15°C in kg/m^3
r (observed)	0.06
reference test method	ISO12185:96
0.3 * R (ref. test method)	0.45

Table 2: evaluation of the repeatability of test results of subsamples #16280

The calculated repeatability for Density was in agreement with 0.3 times the corresponding reproducibility of the reference test method. Therefore, homogeneity of the subsamples of #16280 was assumed.

For subsample #16281, 50 kg of a batch of Fuel Oil obtained at a local supplier was spiked with Calcium (approx. 20 mg/kg), Phosphorus (approx. 15 mg/kg) and Zinc (approx. 17 mg/kg). From the batch after heating to 60°C and homogenisation, 108 plastic bottles of 0.1L were filled and labelled #16281. The homogeneity of the subsamples was checked by determination of Phosphorus in accordance with IP501 and Density at 15°C in accordance with ISO12185 on 8 stratified randomly selected samples.

	Phosphorus in mg/kg	Density at 15°C in kg/m^3
Sample #16281-1	17.0	1007.0
Sample #16281-2	17.0	1007.1
Sample #16281-3	17.0	1007.2
Sample #16281-4	16.0	1007.2
Sample #16281-5	16.0	1007.2
Sample #16281-6	17.0	1007.2
Sample #16281-7	17.0	1007.2
Sample #16281-8	17.0	1007.2

Table 3: homogeneity test results of subsamples #16281

From the test results of table 3, the repeatabilities were calculated and compared with 0.3 times the corresponding reproducibilities of the reference test methods in agreement with the procedure of ISO 13528, Annex B2 in the next table:

	Phosphorus in mg/kg	Density at 15°C in kg/m^3
r (observed)	1.3	0.21
reference test method	IP501:05	ISO12185:96
0.3 * R (ref. test method)	1.8	0.45

Table 4: evaluation of the repeatabilities of subsamples #16281

The calculated repeatabilities for Phosphorus and Density were in agreement with 0.3 times the corresponding reproducibilities of IP501:05 and ISO12185:96. Therefore, homogeneity of the subsamples of #16281 was assumed.

For subsample #16282, 70 litre Fuel Oil was obtained from a refinery in Germany. From the batch, after heating to 60°C and homogenisation, 50 amber glass bottles of 1L were filled and labelled #16282. The homogeneity of the subsamples #16282 was checked by determination of Density at 15°C in accordance with ISO12185 on 8 stratified randomly selected samples.

	Density at 15°C in kg/m^3
Sample #16282-1	987.5
Sample #16282-2	987.5
Sample #16282-3	987.5
Sample #16282-4	987.5
Sample #16282-5	987.5
Sample #16282-6	987.5
Sample #16282-7	987.5
Sample #16282-8	987.5

Table 5: homogeneity test results of subsamples #16282

From the test results of table 5, the repeatabilities were calculated and compared with 0.3 times the corresponding reproducibilities of the reference test method in agreement with the procedure of ISO 13528, Annex B2 in the next table:

	Density at 15°C in kg/m^3
r (observed)	0.00
reference test method	ISO12185:96
0.3 * R (ref. test method)	0.45

Table 6: evaluation of the repeatability of the test results of subsamples #16282

The calculated repeatability for Density was in agreement with 0.3 times the corresponding reproducibilities of the reference test method. Therefore, homogeneity of the subsamples of #16282 was assumed.

For the preparation of the samples #16283 two incompatible Fuel Oils were mixed according to ASTM D4740 and the mixture was applied to paper filters as per D4740. The paper filters with a spot were kept in a tin box, labelled #16283. The homogeneity was done visually and the homogeneity of the samples #16283 was assumed.

Depending on the registration of the participant; one bottle of 1L, labelled #16280, one bottle of 0.1L, labelled #16281, one bottle of 1L, labelled #16282 and/or a tin box with a paper filter labelled #16283 was sent to each of the participating laboratories on November 30, 2016. An SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

The stability of Fuel Oil, packed in the amber glass and plastic bottles was checked. The material has been found sufficiently stable for the period of the proficiency test.

2.6 ANALYSES

The participants were requested to determine one to all of the following parameters:

On sample #16280: Acid Number, API Gravity, Ash Content, Asphaltenes, Calculated Carbon Aromaticity Index (CCAI), Carbon Residue – Micro Method, Conradson Carbon Residue, Density at 15°C, Flash Point PMcc, Heat of Combustion (Gross and Net), Kinematic Viscosity (at 50°C and 100°C), Viscosity Stabinger (at 50°C and 100°C), Nitrogen Content, Pour Point (Lower, Upper and Automated), Sediment by Extraction, Total Sediment (by Hot filtration, Accelerated and Potential), Total Sulphur Content, Water by Distillation, Water and Sediment, Distillation (IBP, 5% - 50% recovered and FBP) and Total Carbon, Hydrogen and Nitrogen (CHN-analyzer).

On sample #16281: Aluminium, Silicon, Sum of Aluminium and Silicon, Iron, Nickel, Sodium, Vanadium, Calcium, Phosphorus and Zinc content.

On Sample #16282: Bromine Number on distillate <360°C AET and p-Value.

On Sample #16283: Compatibility rating on residual oils.

It was explicitly requested to treat the samples as if they were routine samples. Therefore, each laboratory is advised to perform only those analyses that normally are done in daily routine (but the laboratories are allowed to do all analyses).
Furthermore, it was requested to report the test results using the indicated units on the report form and not to round the test results more, but report as much significant figures as possible.
It was also requested not to report 'less than' test results, which are above the detection limit, because such test results cannot be used for meaningful statistical calculations.
To get comparable test results, a detailed report form and a letter of instructions are prepared. On the report form the reporting units are given as well as the reference test methods that will be used during the evaluation. The detailed report form and the letter of instructions are both made available on the data entry portal www.kpmd.co.uk/sgs-iis/. The participating laboratories are also requested to confirm the sample receipt on this data entry portal. The letter of instructions can also be downloaded from the iis website www.iisnl.com.

3 RESULTS

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

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

3.1 STATISTICS

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 April 2014 (iis-protocol, version 3.3).

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.

According to ISO 5725 the original test results per determination were submitted to Dixon's, Grubbs' and/or Rosner's outlier tests. Outliers are marked by D(0.01) for the Dixon's test, by G(0.01) or DG(0.01) for the Grubbs' test and by R(0.01) for the Rosner's test. Stragglers are marked by D(0.05) for the Dixon's test, by G(0.05) or DG(0.05) for the Grubbs' test and by R(0.05) for the Rosner's test. Both outliers and stragglers were not included in the calculations of 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. When the uncertainty passed the evaluation, no remarks are made in the report. However, when the uncertainty failed the evaluation it is mentioned in the report and it will have consequences for the evaluation of the test results.

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

3.2 GRAPHICS

In order to visualise 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 was projected over the Kernel Density Graph for reference.

3.3 Z-SCORES

To evaluate the performance of the participating laboratories the z-scores were calculated. As it was decided to evaluate the performance of the participants in this proficiency test (PT) against the literature requirements, e.g. ASTM, EN or ISO reproducibilities, the z-scores were calculated using a target standard deviation. This results in an evaluation independent of the variation of 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 targets values were used. In some cases a reproducibility based on former iis proficiency tests could be used.

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

$z_{(target)}$ = (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.
The usual interpretation of z-scores is as follows:

	$\lvert z \rvert < 1$	good
1 <	$\lvert z \rvert < 2$	satisfactory
2 <	$\lvert z \rvert < 3$	questionable
3 <	$\lvert z \rvert$	unsatisfactory

4   EVALUATION

In this proficiency test major problems were encountered with the dispatch of the samples. Several laboratories in Brazil, Greece, Philippines, Turkmenistan, Russia, Saudi Arabia, Spain, United Kingdom and United States of America received the samples late or not at all. Fortunate most of them were able to report via the data entry portal before closure. Eight participants did not report any test results for sample #16280. Five participants did not report any test results for sample #16281 and three participants reported the test results after the final reporting date. Eight participants did not report any test results for sample #16282 and one participant reported the test results after the final reporting date. Three participants did not report any test results for sample #16283 and one participant reported the test results after the final reporting date.

Not all laboratories were able to report all analyses requested. Finally over the four PTs, 83 participants reported in total 1936 numerical test results. Observed were 72 statistically outlying test results, which is 3.7 %. In proficiency studies, 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 are used by the different laboratories, are taken into account for explaining the observed differences when possible and applicable. These test methods are also listed in the tables together with the reported test results. The abbreviations, used in these tables, are listed in appendix 3.

In the iis PT reports, ASTM test methods are referred to with a number (e.g. D189) and an added designation for the year that the test method was adopted or revised (e.g. D189:06). If applicable, a designation in parentheses is added to designate the year of reapproval (e.g. D189:06(2014)). In the test results tables of appendix 1 only the test method number and year of adoption or revision (e.g. D189:06) are used.

Sample #16280

Acid Number: This determination was problematic for a number of participants. Four statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D664A:11ae1.

API Gravity: This determination may be problematic dependent on the test method used. Three statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D1298:12b but not with the more stict requirements of ASTM D4052:16.

Ash: This determination was very problematic at an ash content of 0.021 %M/M. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not at all in agreement with requirements of ISO6245:01.

Asphaltenes: This determination was very problematic. No statistical outliers were observed. However, the calculated reproducibility is not at all in agreement with the requirements of IP143:04.

Calculated Carbon Aromaticity Index: This determination was not problematic. One statistical outlier was observed and four other test results were excluded from the statistical evaluation. Three of the four excluded test results probably contained a calculation error and the other one was not adapted after correction of the Density. However, the calculated reproducibility after rejection of the suspect data is in agreement with the requirements of ISO8217:12.

Carbon Residue Micro Method: This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ISO10370:14.

Conradson Carbon Residue: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in full agreement with the requirements of ASTM D189:06(2014).

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

Flash Point PMcc: This determination was not problematic. Three statistical outliers were observed and another four test results were excluded as method A is not applicable for Fuel Oil. However, the calculated reproducibility after rejection of the suspect data is in agreement with the requirements of ISO2719-B:02.

HOC Gross: This determination of the Gross Heat of Combustion was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in good agreement with the requirements of ASTM D240:14.

HOC Net: This determination of the Net Heat of Combustion was not problematic. Four statistical outliers were observed. However, the calculated reproducibility after rejection of the outliers is in good agreement with the requirements of ASTM D240:14.

Kin. Visc. at 50°C: This determination was problematic for a number of participants. Five statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ISO3104:94.

Kin. Visc. at 100°C: This determination was problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of ISO3104:94.

Vis Stab.at 50°C: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D7042:16e3.

Vis Stab.at 100°C: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in good agreement with the requirements of ASTM D7042:16e3.

Nitrogen: This determination was problematic. No statistical outliers were observed. However, the calculated reproducibility is not in agreement with the requirements of ASTM D5762:12. When the test results of ASTM D5762 volumetric and gravimetric test methods were evaluated separately, the calculated reproducibility of the volumetric test results was much smaller than the calculated reproducibility of the gravimetric test results. This finding is the same to the January 2016 Fuel Oil PT (iis16F01) findings.

Pour Point Lower: 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 ISO3016:94. Rounding to 3 degrees acc. ISO3016:94 may (partly) explain the large variation.

Pour Point Upper: This determination was problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with ISO3016:94. Rounding to 3 degrees acc. ISO3016:94 may (partly) explain the large variation.

Pour Point Automated: This determination was very problematic. No statistical outliers were observed. However, the calculated reproducibility is not at all in agreement with ASTM D5950:14. The large variation may (partly) be explained by possible problems with the detector sensitivity or by not following the test method properly (see Note 8 in ASTM D5950:14).

Sediment by Extraction: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in good agreement with the requirements of ASTM D473:07e1(2012).

Sediment by hot filtration: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in good agreement with the requirements of IP375:11.

Total sediment (Accelerated): This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in good agreement with IP390:11. IP390:11 is identical to ISO10307-2:09 and technically equivalent to ASTM D4870 (see appendix X1).

Total sediment (Potential): This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in good agreement with IP390:11. IP390:11 is identical to ISO10307-2:09 and technically equivalent to ASTM D4870 (see appendix X1).

Total Sulphur: This determination may be problematic dependent on the test method used. No statistical outliers were observed. The calculated reproducibility is in full agreement with the requirements of ISO 8754:03 but not with the more strict requirements of ASTM D4294:16e1.

Water by distillation: This determination was not problematic. One statistical outlier was observed. However, the calculated reproducibility after rejection of the statistical outlier is in good agreement with the requirements of ISO3733:99 or ASTM D95:13e1.

Water and Sediment: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D1796:11(2016).

Vacuum Distillation: This determination may be problematic. In total eigth statistical outliers were observed and four other test results were excluded as the other reported test results of these laboratories were marked as statistical outliers. The calculated reproducibility after rejection of the suspect data is in agreement for IBP, 20%, 30% and 40% recovered with the requirements of ASTM D1160:15. The calculated reproducibilities for 5%, 10%, 50%

recovered and FBP are not in agreement with the requirements of ASTM D1160:15.

CHN-Analyzer: This determination was not problematic for Carbon, Hydrogen and Nitrogen. No statistical outliers were observed for Carbon, but respectively two and one statistical outliers for Hydrogen and Nitrogen. The calculated reproducibilities after rejection of the statistical outliers are all in agreement with the respective requirements of ASTM D5291:16.

Sample #16281:

Aluminium: This determination may be problematic for a number of participants. Two statistical outliers were observed. The consensus value for Aluminium was below the precision range of 5-150 mg/kg mentioned in IP470:05 or in IP501:05. Therefore, no z-scores were calculated.

Silicon: This determination may be problematic for a number of participants. Two statistical outliers were observed and two other test results were excluded as about 50% of the other metal tests results were marked as statistical outliers. The consensus value for Silicon was below the precision range of 10-250 mg/kg mentioned in IP470:05 or in IP501:05. Therefore, no z-scores were calculated.

Total Al/Si: This determination may be problematic for a number of participants. Three statistical outliers were observed and five other test results were excluded for several reasons (see appendix 1). As mentioned above the consensus values for Aluminium and Silicion were below the precision ranges mentioned in IP470:05 or in IP501:05. Therefore, no z-scores were calculated.

Iron: This determination may be problematic dependent on the test method used. Three statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the reproducibility of IP470:05, but not in agreement with the more strict requirements of IP501:05.

Nickel: This determination may be problematic dependent on the test method used. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in good agreement with the reproducibilities of IP470:05 but not in agreement with the more strict requirements of IP501:05.

Sodium: This determination may be problematic dependent on the test method used. One statistical outlier was observed and three other test results were excluded. For these participants more test results in these metal analyses were indicated as statistical outliers and the determinations are not independent. However, the calculated reproducibility after rejection of the suspect data is in full agreement with the reproducibility of IP470:05, but not in agreement with the more strict requirements of IP501:05.

Vanadium: This determination was problematic for a number of participants. Three statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in good agreement with the estimated reproducibilities of IP470:05 and IP501:05.

Calcium: This determination may be problematic dependent on the test method used. Three statistical outliers were observed and two other test results were excluded. For these participants more test results in these metal analyses were indicated as statistical outliers and the determinations are not independent. The calculated reproducibility after rejection of the suspect data is in full agreement with the requirements of IP470:05 but not in agreement with the more strict requirements of IP501:05.

The average recovery of Calcium (theoretical increment of 19.6 mg Calcium/kg) may be good: "< 102%" (the actual blank Calcium content is unknown).

Zinc: This determination was problematic for a number of participants. Five statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in full agreement with the reproducibilities of IP470:05 or IP501:05.

The average recovery of Zinc (theoretical increment of 17.1 mg Zinc/kg) may be good: "< 102%" (the actual blank Zinc content is unknown).

Phosphorus: This determination was problematic for a number of particpants. Four statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in full agreement with the reproducibility of IP500:03 or IP501:05.

The average recovery of Phosphorus (theoretical increment of 14.8 mg Phosphorus/kg) may be good: "< 108%" (the actual blank Phosphorus content is unknown).

Finally it should be noted that proper attention for homogenisation is crucial for a material such as Fuel Oil. Due to the nature of the material it is very susceptible to problems when not handled correctly. Practically most test methods for the determination of metals in Fuel Oil have similar statements regarding homogenization. Recommended is the use of a quality control fuel oil with known amounts of metals like Al, Fe, Si and V. This control standard may be of use to detect deviations in metals with respect to the preparation steps.

Sample #16282

Bromine Number: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in full agreement with the requirements of ASTM D1159:07 (2012).

P-Value: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in full agreement with the reproducibility requirements of target test method estimated from the repeatability.

Sample #16283

Compatibility This determination was not problematic. One test result was excluded as the test result is not reliable. All other test results are within the reproducibility range of 1 as per requirements of ASTM D4740:04 (2014).

4.2 PERFORMANCE EVALUATION FOR THE GROUP OF LABORATORIES

A comparison has been made between the reproducibility (2.8 * sd) as declared by the relevant reference test methods and the reproducibility (R (lit)) as found for the group of participating laboratories. The average test results of the evaluated parameters, calculated reproducibilities and reproducibilities, derived from reference test methods (in casu ASTM, EN, ISO and IP reference methods) are compared in the next table.

Parameters	unit	n	average	2.8 * sd	R (lit)
Acid Number	mg KOH/g	43	0.20	0.08	0.17
API Gravity		48	11.7	0.2	0.5
Ash Content	%M/M	65	0.021	0.010	0.005
Asphaltenes	%M/M	44	3.31	1.21	0.66
Calc. Carbon Aromaticity Index		40	851.5	1.6	2.4
Carbon Residue, Micro Method	%M/M	51	9.59	0.72	1.11
Conradson Carbon Residue	%M/M	30	9.68	1.55	1.55
Density at 15°C	kg/m^3	71	987.4	1.3	1.5
Flash Point PMcc	°C	63	121.2	6.1	6.0
Heat of Combustion, Gross	MJ/kg	32	42.99	0.17	0.40
Heat of Combustion, Net	MJ/kg	29	40.66	0.12	0.40
Kinematic Viscosity at 50°C	mm^2/s	72	285.1	12.9	21.1
Kinematic Viscosity at 100°C	mm^2/s	55	27.1	1.6	1.4
Stabinger Viscosity at 50°C	mm^2/s	9	287.9	19.2	29.6
Stabinger Viscosity at 100°C	mm^2/s	7	26.9	0.8	1.9
Nitrogen Content	µg/g	20	2898	1170	771
Pour Point, Lower	°C	30	2.9	9.5	6.6
Pour Point, Upper	°C	59	4.9	9.5	6.6
Pour Point (automated), Δ3°C	°C	16	0.5	13.7	6.1
Sediment by Extraction	%M/M	52	0.016	0.020	0.037
Total Sediment (Hot Filtration)	%M/M	48	0.014	0.015	0.035
Total Sediment (Accelerated)	%M/M	47	0.015	0.014	0.035
Total Sediment (Potential)	%M/M	41	0.013	0.015	0.034
Total Sulphur Content	%M/M	71	0.96	0.09	0.09
Water by Distillation	%V/V	55	0.05	0.07	0.20
Water and Sediment	%V/V	30	0.06	0.06	0.11
Distillation at 10mmHg calculated to 760 mmHg					
Initial Boiling Point	°C	18	213.7	38.0	49.5
5% recovered	°C	17	272.7	36.3	23.8
10% recovered	°C	18	313.4	33.0	20.1
20% recovered	°C	18	370.7	18.3	17.5
30% recovered	°C	17	407.0	15.3	15.9
40% recovered	°C	17	444.4	17.5	17.3
50% recovered	°C	18	498.2	21.0	14.4

Parameters	unit	n	average	2.8 * sd	R (lit)
Final Boiling Point	°C	14	523.2	31.7	26.9
CHN analyser					
Total Carbon	%M/M	13	87.9	1.8	2.5
Total Hydrogen	%M/M	11	10.62	0.52	0.75
Total Nitrogen	%M/M	7	0.37	0.10	0.10

Table 7: summary of test results on Fuel Oil sample #16280

Parameters	unit	n	average	2.8 * sd	R (lit)
Aluminium as Al	mg/kg	44	2.0	3.3	(1.3)
Silicon as Si	mg/kg	41	3.4	6.5	(3.1)
Total Aluminium+Silicon	mg/kg	34	5.8	8.7	(3.4)
Iron as Fe	mg/kg	48	21.6	8.2	11.9
Nickel as Ni	mg/kg	52	30.3	13.1	15.2
Sodium as Na	mg/kg	57	10.2	5.5	5.3
Vanadium as V	mg/kg	57	116.9	25.9	35.3
Calcium as Ca	mg/kg	49	19.9	6.1	6.0
Phosphorus as P	mg/kg	39	16.0	3.4	5.9
Zinc as Zn	mg/kg	50	17.4	4.1	5.0

Table 8: summary of test results on Fuel Oil sample #16281

Results between brackets; mean value under range of the precision of the reference test method.

Parameters	unit	n	average	2.8 * sd	R (lit)
Bromine Number	g Br$_2$/100g	21	10.7	3.5	3.8
p-Value		18	1.57	0.55	0.60

Table 9: summary of test results on Fuel Oil sample #16282

Parameters	unit	n	average	2.8 * sd	R (lit)
Compatibility	rating	30	3.6	1.4	1.0

Table 10: summary of test result on Fuel Oil sample #16283

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

4.3 COMPARISON OF THE PROFICIENCY TEST OF DECEMBER 2016 WITH PREVIOUS PTS

	December 2016	January 2016	January 2015	January 2014	January 2013
Number of reporting labs	83	226	207	200	188
Number of results reported	1936	4787	4048	3835	3261
Statistical outliers	72	115	130	112	98
Percentage outliers	3.7%	2.4%	3.2%	2.9%	3.2%

Table 11: comparison with previous proficiency tests

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

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

Determination	December 2016	January 2016	January 2015	January 2014	January 2013
Acid Number	++	+	++	+	+/-
API Gravity	++	++	++	++	++
Ash Content	--	-	--	--	--
Asphaltenes	--	+/-	-	+	+/-
Calc. Carbon Aromaticity Index	+	+	+	+	++
Carbon Residue, Micro Method	+	+	++	+/-	-
Conradson Carbon Residue	+/-	+	+	+	+/-
Density at 15 °C	+	+/-	+/-	+	-
Flash Point PMcc	+/-	-	-	+/-	-
Heat of Combustion Gross	++	-	--	+	+/-
Heat of Combustion Net	++	-	--	+	+/-
Kinematic Viscosity at 50 °C	++	+	++	+	+
Kinematic Viscosity at 100 °C	-	+/-	-	-	-
Stabinger Viscosity at 50 °C	+	n.e.	n.e.	n.e.	n.e.
Stabinger Viscosity at 100 °C	++	n.e.	n.e.	n.e.	n.e.
Nitrogen	-	-	--	-	-
Pour Point Lower	-	-	-	-	-
Pour Point Upper	-	-	-	-	-
Pour Point (automated), Δ3°C	--	-	--	-	-
Sediments by Extraction	++	++	++	+	+
Total Sediment (Hot Filtration)	++	++	++	+	n.e
Total Sediment (Accelerated)	++	++	++	++	++
Total Sediment (Potential)	++	++	++	++	++
Total Sulphur	+/-	+	--	+/-	-
Water by Distillation	++	++	++	++	+
Water and Sediment	++	+	+/-	+	+/-
Distillation at 10mmHg to AET	-	+/-	+/-	+/-	+
Total Carbon	+	+	+	+	+
Total Hydrogen	+	+	++	+	+
Total Nitrogen	+/-	-	--	-	-
Aluminium as Al	n.e.	n.e.	+/-	-	--

Determination	December 2016	January 2016	January 2015	January 2014	January 2013
Silicon as Si	n.e.	n.e.	+	-	--
Total Aluminium/Silicon	n.e.	n.e.	+	-	--
Iron as Fe	+	+	++	-	n.e
Nickel as Ni	+	+	++	+	++
Sodium as Na	+/-	+/-	+	-	--
Vanadium as V	+	+	++	++	++
Calcium as Ca	+/-	-	--	-	n.e
Phosphorus as P	+	+	++	+	n.e
Zinc as Zn	+	-	-	+/-	n.e
Bromine Number	+	-	+/-	n.e.	n.e.
p-Value	+/-	++	+/-	n.e.	n.e.
Compatibility	+/-	n.e.	n.e.	n.e.	n.e.

Table 12: comparison determinations against the reference test method

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

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

APPENDIX 1

Determination of Acid Number on sample #16280; results in mg KOH/g

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	D664-A	0.16		-0.60	705	D664-A	0.233		0.62
120	D664-A	0.18		-0.26	732		-----		-----
131		-----		-----	750		-----		-----
132	D664-A	0.21		0.23	781	D664-A	0.19		-0.10
140		-----		-----	823	D664-A	0.2		0.07
150		-----		-----	840	D664-A	0.261	C	1.08
154		-----		-----	842		-----		-----
158		-----		-----	873	D664-A	0.22		0.40
159	D664-A	0.25		0.90	874	D664-A	0.19		-0.10
168		-----		-----	875	D664-A	0.19		-0.10
169		-----		-----	886		-----		-----
171		-----		-----	887	D664-A	0.1631		-0.54
175		-----		-----	922	D664-A	0.185		-0.18
194	D664-A	0.16		-0.60	962		-----		-----
228		-----		-----	963		-----		-----
230	D664-A	0.191		-0.08	971	D664-A	0.21		0.23
237	D664-A	0.115		-1.34	974		-----		-----
238		-----		-----	994	D664-A	0.20		0.07
256		-----		-----	995	D664-A	0.1595		-0.60
273		-----		-----	996		-----		-----
311	D664-A	0.21		0.23	1040	ISO6619	0.407	R(0.01)	3.51
313		-----		-----	1131		-----		-----
323	D664-A	0.22		0.40	1135	D664-A	0.179		-0.28
336		-----		-----	1347		-----		-----
342	D664-A	0.19		-0.10	1348	D664-A	0.23		0.57
349		-----		-----	1356	D664-A	0.210		0.23
351		-----		-----	1367	IP177	0.17		-0.43
353		-----		-----	1385	D664-A	0.25		0.90
356	D664-A	0.20		0.07	1455	D664-A	0.19		-0.10
371		-----		-----	1510		-----		-----
399		-----		-----	1540		-----		-----
445	IP177	0.260		1.06	1544	D664-A	0.20		0.07
447	D664-A	0.173		-0.38	1586	D664-A	0.39	R(0.01)	3.22
494	D664-A	0.196		0.00	1631		-----		-----
507	D664-A	0.1950		-0.02	1648		-----		-----
529		-----		-----	1854	D664-A	0.20		0.07
541		-----		-----	1906		-----		-----
551	D664-A	0.208		0.20	1986	D664-A	0.209		0.22
557	D664-A	0.134866		-1.01	1995		-----		-----
558		-----		-----	2129	D664-A	0.152		-0.73
633		-----		-----	6044	D664-A	0.712	R(0.01)	8.57
634	D664-A	0.35	R(0.01)	2.56	6049	D664-A	0.20		0.07
657	D664-A	0.20		0.07	6057	D664-A	0.19		-0.10
663	D664-A	0.19		-0.10	6092		-----		-----
671		-----		-----					

normality	OK
n	43
outliers	4
mean (n)	0.1959
st.dev. (n)	0.03025
R(calc.)	0.0847
R(D664-A:11ae1)	0.1686
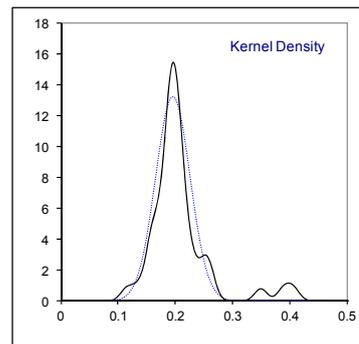
Lab 840 first reported: 0.406

Kernel Density
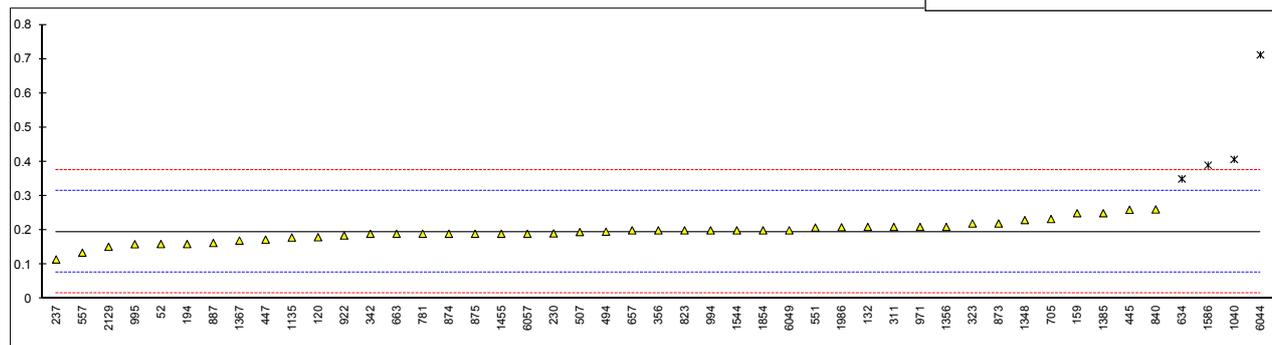
Determination of API Gravity on sample #16280

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	D4052	11.6		-0.62	705	D1298	11.68		-0.18
120	D4052	11.7		-0.06	732	ISO12185	11.66		-0.29
131		-----		-----	750		-----		-----
132	D4052	11.7		-0.06	781	D4052	11.63		-0.46
140	D4052	11.8		0.50	823	D1298	11.7		-0.06
150	D1298	11.7		-0.06	840	ISO12185	11.69		-0.12
154	D4052	11.7		-0.06	842	D1298	11.61		-0.57
158		-----		-----	873		-----		-----
159	D4052	11.7		-0.06	874	D4052	11.7		-0.06
168		-----		-----	875	D1298	11.73		0.10
169	D1298	11.6		-0.62	886		-----		-----
171		-----		-----	887		-----		-----
175	D4052	11.7		-0.06	922	D4052	11.63		-0.46
194		-----		-----	962		-----		-----
228		-----		-----	963		-----		-----
230		-----		-----	971	D4052	11.76		0.27
237	D4052	11.57		-0.79	974	Calculated	11.79		0.44
238	D1298	11.98	R(0.05)	1.50	994	D1250	11.70		-0.06
256		-----		-----	995	D1298	11.70		-0.06
273	D1298	11.5		-1.18	996		-----		-----
311		-----		-----	1040		-----		-----
313		-----		-----	1131		-----		-----
323	D1298	11.75		0.22	1135	ISO12185	11.77		0.33
336		-----		-----	1347	D4052	11.76		0.27
342		-----		-----	1348		-----		-----
349		-----		-----	1356		-----		-----
351		-----		-----	1367		-----		-----
353		-----		-----	1385	D4052	11.762		0.28
356	D4052	11.81		0.55	1455	D4052	11.77		0.33
371	D1298	11.79		0.44	1510		-----		-----
399		-----		-----	1540		-----		-----
445		-----		-----	1544	D1298	11.720		0.05
447	D1250	12.1	R(0.01)	2.18	1586	D1298	11.73		0.10
494	ISO12185	11.66		-0.29	1631		-----		-----
507	D1298	11.72		0.05	1648		-----		-----
529		-----		-----	1854	D4052	11.8		0.50
541	D4052	11.7		-0.06	1906		-----		-----
551	D4052	11.70		-0.06	1986	D1298	11.63		-0.46
557	D4052	11.695		-0.09	1995	D1298	12.00	R(0.05)	1.62
558		-----		-----	2129	D4052Calc.	11.78		0.38
633		-----		-----	6044	D1298	11.82		0.61
634	D1298	11.80		0.50	6049	Calculated	11.79		0.44
657	D4052	11.8		0.50	6057	D4052	11.78		0.38
663	D4052	11.66		-0.29	6092		-----		-----
671	D287	11.7		-0.06					

normality	OK
n	48
outliers	3
mean (n)	11.711
st.dev. (n)	0.0697
R(calc.)	0.195
R(D1298:12b)	0.500
Compare R(D4052:16)	0.133

Kernel Density
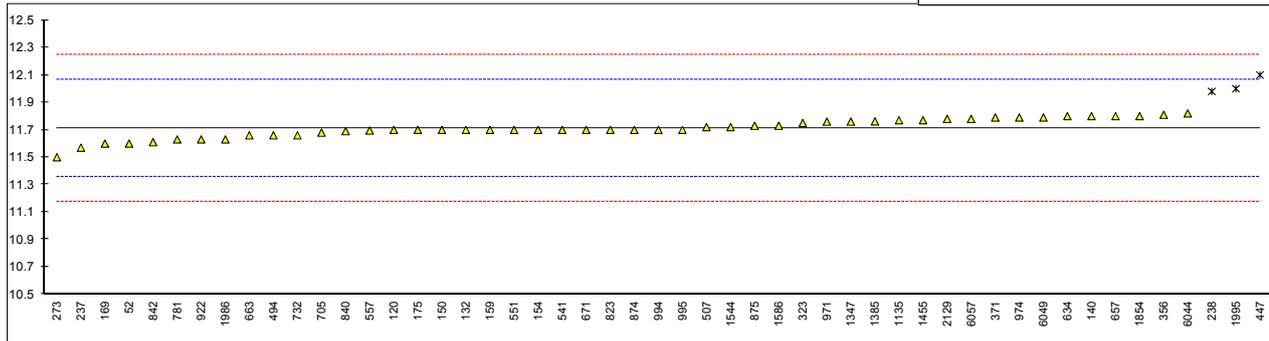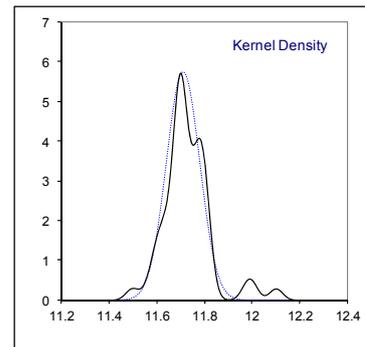
Determination of Ash on sample #16280; results in %M/M

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	D482	0.024		1.97	705	ISO6245	0.0231		1.47
120	ISO6245	0.020		-0.27	732	D482	0.028	C	4.21
131	D482	0.0236		1.75	750		-----		-----
132	ISO6245	0.020		-0.27	781	ISO6245	0.021		0.29
140	ISO6245	0.008	R(0.05)	-6.99	823	ISO6245	0.019		-0.83
150	D482	0.015		-3.07	840	ISO6245	0.0201		-0.21
154	D482	0.019		-0.83	842	D482	0.0214		0.52
158		-----		-----	873	D482	0.018		-1.39
159	D482	0.018		-1.39	874	D482	0.022		0.85
168		-----		-----	875	D482	0.018		-1.39
169	D482	0.018	C	-1.39	886	D482	0.017		-1.95
171		-----		-----	887		-----		-----
175	D482	0.019		-0.83	922	D482	0.024		1.97
194	D482	0.0198		-0.38	962		-----		-----
228	D482	0.01845		-1.14	963		-----		-----
230	ISO6245	0.0196		-0.49	971	ISO6245	0.0190		-0.83
237		-----		-----	974	D482	0.017		-1.95
238		-----		-----	994	D482	0.027		3.65
256	D482	0.025	C	2.53	995	D482	0.021		0.29
273	D482	0.0273		3.82	996	D482	0.0195		-0.55
311	ISO6245	0.022		0.85	1040	ISO6245	0.015		-3.07
313		-----		-----	1131		-----		-----
323		-----		-----	1135	ISO6245	0.0259		3.04
336		-----		-----	1347	D482	0.0147		-3.24
342	ISO6245	0.019		-0.83	1348	D482	0.014		-3.63
349		-----		-----	1356	ISO6245	0.042	R(0.01)	12.05
351	ISO6245	0.0182		-1.28	1367	IP4	0.026		3.09
353	IP4	0.0274		3.88	1385	D482	0.03		5.33
356		-----		-----	1455	D482	0.016		-2.51
371	ISO6245	0.0197		-0.44	1510	IP4	0.020		-0.27
399		-----		-----	1540		-----		-----
445	IP4	0.018		-1.39	1544	ISO6245	0.022		0.85
447	IP4	0.019		-0.83	1586	ISO6245	0.021		0.29
494	ISO6245	0.017		-1.95	1631	ISO6245	0.0176		-1.61
507	ISO6245	0.0267		3.48	1648	ISO6245	0.022	C	0.85
529		-----		-----	1854		-----		-----
541	ISO6245	0.0185	C	-1.11	1906		-----		-----
551	D482	0.0214		0.52	1986	D482	0.0182		-1.28
557	D482	0.01524824	C	-2.93	1995	D482	0.021		0.29
558		-----		-----	2129	ISO6245	0.02395		1.94
633	D482	0.02007814		-0.22	6044	ISO6245	0.0194		-0.60
634	D482	0.017		-1.95	6049	ISO6245	0.0205		0.01
657	ISO6245	0.021		0.29	6057	ISO6245	0.022		0.85
663	D482	0.0188		-0.94	6092	ISO6245	0.021	C	0.29
671		-----		-----					

normality	OK
n	65
outliers	2
mean (n)	0.0205
st.dev. (n)	0.00349
R(calc.)	0.0098
R(ISO6245:01)	0.0050
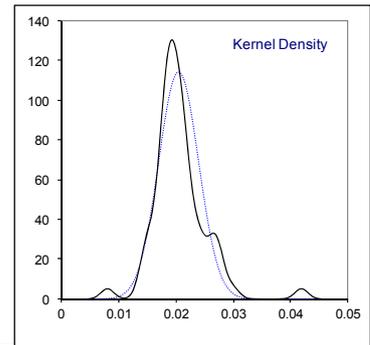
Lab 169 first reported: 0.0045   Lab 732 first reported: 0.03
Lab 256 first reported: 0.030   Lab 1648 first reported: 0.034
Lab 541 first reported: 0.0085   Lab 6092 first reported: 0.031
Lab 557 first reported: 1524824
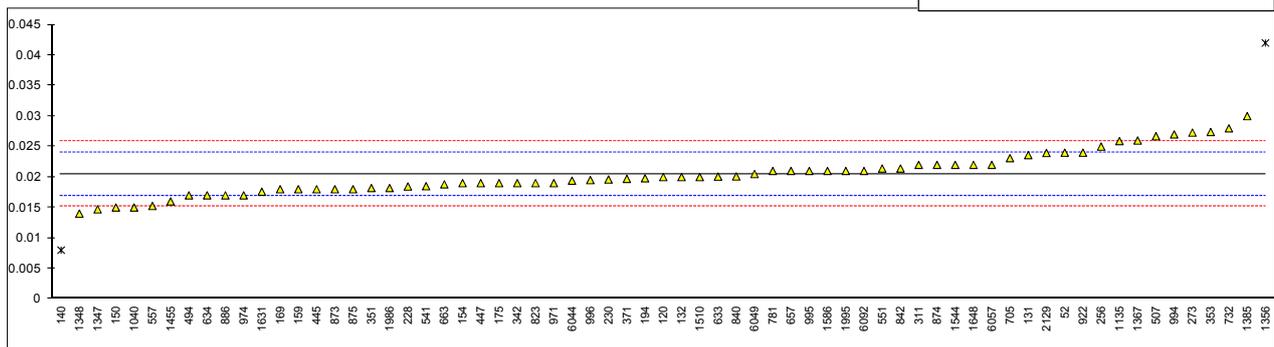
Determination of Asphaltenes on sample #16280; results in %M/M

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	IP143	3.3		-0.04	705	IP143	3.29		-0.09
120		-----		-----	732		-----		-----
131	D6560	2.90		-1.74	750		-----		-----
132	D6560	3.0		-1.31	781	IP143	3.40		0.38
140		-----		-----	823		-----		-----
150		-----		-----	840	IP143	3.62		1.31
154	D6560	2.9		-1.74	842		-----		-----
158		-----		-----	873	IP143	3.58		1.14
159		-----		-----	874	IP143	3.50		0.80
168		-----		-----	875		-----		-----
169		-----		-----	886		-----		-----
171		-----		-----	887		-----		-----
175		-----		-----	922		-----		-----
194	D6560	2.654		-2.78	962		-----		-----
228		-----		-----	963		-----		-----
230	IP143	3.47		0.67	971	IP143	2.90		-1.74
237		-----		-----	974	IP143	2.80		-2.16
238		-----		-----	994	D6560	3.6		1.22
256	IP143	3.44		0.55	995	IP143	3.28		-0.13
273		-----		-----	996		-----		-----
311	IP143	3.6		1.22	1040		-----		-----
313		-----		-----	1131		-----		-----
323	IP143	4.3		4.18	1135	IP143	3.27		-0.17
336		-----		-----	1347	IP143	3.05		-1.10
342	IP143	3.209		-0.43	1348	IP143	3.64		1.39
349		-----		-----	1356	D6560	3.84		2.24
351		-----		-----	1367		-----		-----
353		-----		-----	1385	IP143	3.26		-0.21
356	IP143	2.8		-2.16	1455	IP143	3.4		0.38
371	IP143	3.57		1.10	1510	IP143	3.5		0.80
399		-----		-----	1540		-----		-----
445	IP143	2.77		-2.29	1544	IP143	3.07		-1.02
447	IP143	3.964		2.76	1586	IP143	3.12		-0.81
494		-----		-----	1631		3.23		-0.34
507	IP143	3.96		2.75	1648		-----		-----
529		-----		-----	1854	IP143	2.9		-1.74
541	IP143	2.75		-2.37	1906		-----		-----
551	IP143	2.58	C	-3.09	1986	IP143	4.32		4.27
557	D6560	3.826823		2.18	1995		-----		-----
558		-----		-----	2129	IP143	3.02		-1.23
633		-----		-----	6044		-----		-----
634		-----		-----	6049	IP143	3.52		0.89
657	IP143	3.9		2.49	6057	IP143	2.8		-2.16
663		-----		-----	6092	IP143	2.86		-1.91
671		-----		-----					

normality	OK
n	44
outliers	0
mean (n)	3.311
st.dev. (n)	0.4319
R(calc.)	1.209
R(IP143:04)	0.662
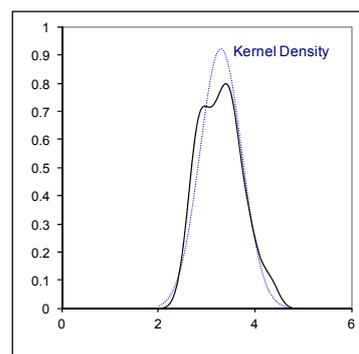
Lab 551 first reported: 6.10
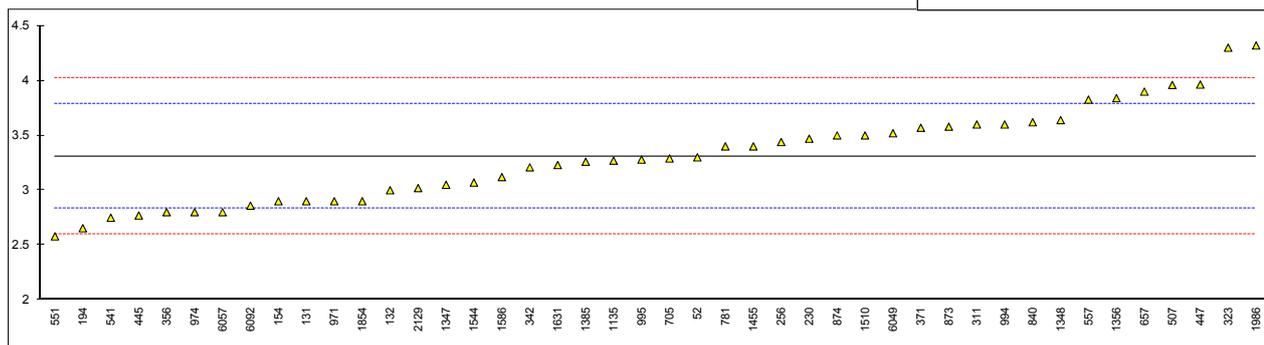
Determination of Calculated Carbon Aromaticity Index on sample #16280

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52		-----		-----	705	ISO8217	852		0.61
120	ISO8217	851		-0.56	732		-----		-----
131		-----		-----	750		-----		-----
132	ISO8217	852		0.61	781	ISO8217	852.0		0.61
140	ISO8217	853		1.78	823	ISO8217	851		-0.56
150	ISO8217	851	ex,E,C	-0.56	840	ISO8217	851.49		0.02
154		-----		-----	842	ISO8217	852.14		0.77
158		-----		-----	873		-----		-----
159		-----		-----	874	ISO8217	851.7		0.26
168		-----		-----	875		-----		-----
169		-----		-----	886		-----		-----
171		-----		-----	887		-----		-----
175		-----		-----	922	ISO8217	852.2		0.84
194		-----		-----	962		-----		-----
228	ISO8217	851		-0.56	963		-----		-----
230	ISO8217	851		-0.56	971	ISO8217	851		-0.56
237		-----		-----	974	ISO8217	851		-0.56
238	ISO8217	849	ex, E*	-2.89	994	ISO8217	851.7		0.26
256	ISO8217	851		-0.56	995	ISO8217	851.7		0.26
273		-----		-----	996		-----		-----
311		-----		-----	1040	ISO8217	852		0.61
313		-----		-----	1131		-----		-----
323	ISO8217	851.3		-0.21	1135	ISO8217	851		-0.56
336	ISO8217	852		0.61	1347	ISO8217	850.46		-1.19
342	ISO8217	851		-0.56	1348	ISO8217	855.0	R(0.01)	4.11
349		-----		-----	1356		-----		-----
351	ISO8217	851.65		0.20	1367	ISO8217	852		0.61
353		-----		-----	1385	ISO8217	852.5		1.19
356		-----		-----	1455		-----		-----
371	ISO8217	851		-0.56	1510		-----		-----
399		-----		-----	1540		-----		-----
445		-----		-----	1544	ISO8217	851		-0.56
447	ISO8217	892	ex, E	47.28	1586	ISO8217	851.3		-0.21
494	ISO8217	852		0.61	1631		-----		-----
507	ISO8217	851.0		-0.56	1648	ISO8217	852.0		0.61
529		-----		-----	1854	ISO8217	851		-0.56
541	ISO8217	851.0		-0.56	1906		-----		-----
551		-----		-----	1986	ISO8217	852.0		0.61
557	ISO8217	852		0.61	1995		-----		-----
558		-----		-----	2129	ISO8217	852	ex, E	0.61
633		-----		-----	6044	ISO8217	851		-0.56
634		-----		-----	6049	ISO8217	851		-0.56
657	ISO8217	850.9		-0.67	6057	ISO8217	851		-0.56
663		-----		-----	6092		-----		-----
671		-----		-----					

normality	OK
n	40
outliers	1+4 ex
mean (n)	851.476
st.dev. (n)	0.5671
R(calc.)	1.588
R(ISO8217:12)	2.400
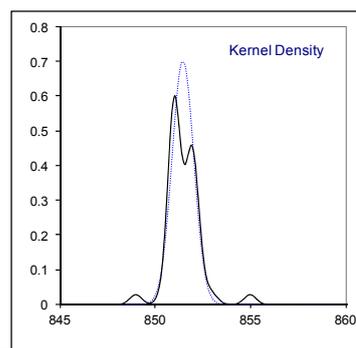
Lab 150 first reported: 855

Labs 150, 447, 2129: reported value excluded, probably a calc.error

Lab 238 excluded as CCAI was not adapted to corrected Density

Kernel Density
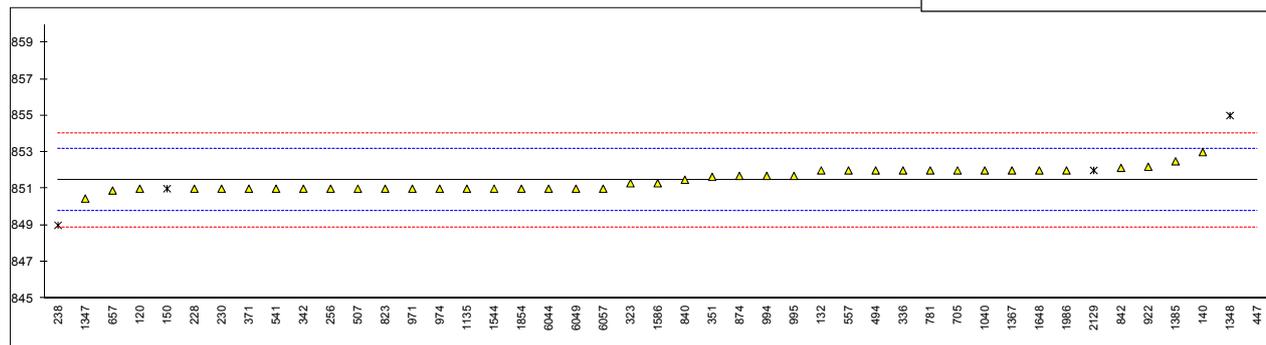
Determination of Carbon Residue Micro method on sample #16280; results in %M/M

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	D4530	9.7		0.28	705		-----		-----
120	ISO10370	9.6		0.02	732		-----		-----
131		-----		-----	750		-----		-----
132	ISO10370	9.75		0.40	781	ISO10370	9.52		-0.18
140	ISO10370	9.68		0.22	823	ISO10370	9.7		0.28
150	D4530	9.80		0.53	840		-----		-----
154	D4530	9.8		0.53	842		-----		-----
158		-----		-----	873	D4530	9.66		0.17
159	D4530	9.5		-0.23	874	ISO10370	9.69		0.25
168		-----		-----	875	D4530	9.64		0.12
169		-----		-----	886	D4530	9.93		0.86
171		-----		-----	887		-----		-----
175		-----		-----	922	D4530	9.25		-0.86
194	D4530	9.517		-0.19	962		-----		-----
228		-----		-----	963		-----		-----
230	ISO10370	9.310		-0.71	971	ISO10370	9.53		-0.16
237	D4530	8.89		-1.77	974	D4530	9.69		0.25
238		-----		-----	994		-----		-----
256		-----		-----	995		-----		-----
273	D4530	9.8	C	0.53	996		-----		-----
311	D4530	9.48		-0.28	1040	ISO10370	12.15	R(0.01)	6.48
313		-----		-----	1131		-----		-----
323	ISO10370	9.53		-0.16	1135	ISO10370	9.84		0.63
336		-----		-----	1347	D4530	9.48		-0.28
342	ISO10370	9.52		-0.18	1348	D4530	9.84		0.63
349		-----		-----	1356	ISO10370	9.985		1.00
351	ISO10370	9.298		-0.74	1367	D4530	9.61		0.05
353		-----		-----	1385	D4530	9.08		-1.29
356	D4530	9.72		0.33	1455	D4530	10.0		1.03
371		-----		-----	1510	D4530	9.46		-0.33
399	ISO10370	9.83		0.60	1540		-----		-----
445	IP398	9.63		0.10	1544	ISO10370	9.478		-0.29
447	IP398	9.649		0.15	1586	ISO10370	9.51		-0.21
494	ISO10370	9.782		0.48	1631	ISO10370	10.2		1.54
507	ISO10370	9.36		-0.59	1648		-----		-----
529		-----		-----	1854	ISO10370	9.58		-0.03
541		-----		-----	1906		-----		-----
551	ISO10370	10.67	R(0.01)	2.73	1986	ISO10370	9.55		-0.10
557		-----		-----	1995	D4530	9.94	C	0.88
558		-----		-----	2129	ISO10370	9.12		-1.19
633		-----		-----	6044	ISO10370	9.5734		-0.05
634		-----		-----	6049	ISO10370	9.88		0.73
657	ISO10370	9.44		-0.38	6057	ISO10370	9.54		-0.13
663	D4530	9.265		-0.83	6092		-----		-----
671	D4530	9.03		-1.42					

normality	OK
n	51
outliers	2
mean (n)	9.5913
st.dev. (n)	0.25759
R(calc.)	0.7213
R(ISO10370:14)	1.1064
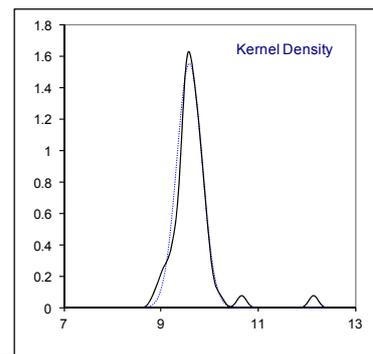
Lab 273 first reported: 12.8

Lab 1995 first reported: 11.76
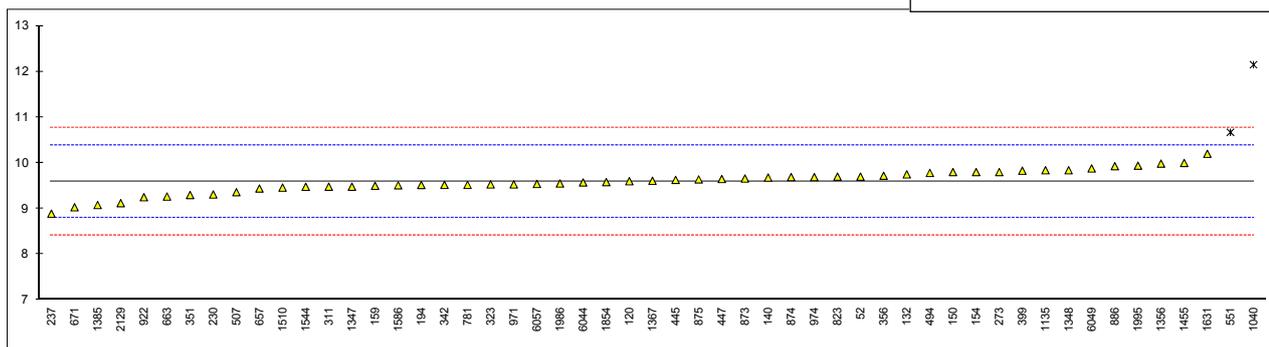
Determination of Conradson Carbon Residue on sample #16280; results in %M/M

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52		-----		-----	705	D189	9.503		-0.31
120		-----		-----	732		-----		-----
131		-----		-----	750		-----		-----
132		-----		-----	781	D189	9.41		-0.48
140		-----		-----	823	D189	9.82		0.26
150		-----		-----	840	D189	8.89		-1.42
154		-----		-----	842	D189	9.27		-0.73
158		-----		-----	873		-----		-----
159		-----		-----	874		-----		-----
168		-----		-----	875				
169		-----		-----	886		-----		-----
171		-----		-----	887		-----		-----
175		-----		-----	922	D189	9.64		-0.07
194		-----		-----	962		-----		-----
228	D189	10.75		1.93	963		-----		-----
230		-----		-----	971	D189	9.65		-0.05
237	D189	9.11		-1.02	974	D189	9.72		0.08
238		-----		-----	994	D189	9.00		-1.22
256	D189	9.91		0.42	995	D189	9.5662		-0.20
273		-----		-----	996	D189	10.64		1.74
311		-----		-----	1040		-----		-----
313		-----		-----	1131		-----		-----
323		-----		-----	1135		-----		-----
336		-----		-----	1347	D189	9.45		-0.41
342		-----		-----	1348	D189	8.9		-1.40
349		-----		-----	1356		-----		-----
351		-----		-----	1367		-----		-----
353	IP13	10.240		1.02	1385	D189	8.96		-1.29
356	D189	9.21		-0.84	1455		-----		-----
371	D189	10.18		0.91	1510		-----		-----
399		-----		-----	1540		-----		-----
445	D189	10.11		0.78	1544	D189	9.681		0.01
447		-----		-----	1586	D4530	10.56		1.59
494		-----		-----	1631		-----		-----
507	D189	10.36		1.23	1648	D189	9.223		-0.82
529		-----		-----	1854		-----		-----
541	D189	9.432		-0.44	1906		-----		-----
551	D189	10.67		1.79	1986	D189	9.71		0.06
557		-----		-----	1995		-----		-----
558		-----		-----	2129	D189	9.67		-0.01
633		-----		-----	6044		-----		-----
634	D189	9.07		-1.09	6049		-----		-----
657		-----		-----	6057		-----		-----
663		-----		-----	6092		-----		-----
671		-----		-----					

normality	OK	
n	30	
outliers	0	
mean (n)	9.6768	
st.dev. (n)	0.55239	
R(calc.)	1.5467	
R(D189:06)	1.5534	

Kernel Density
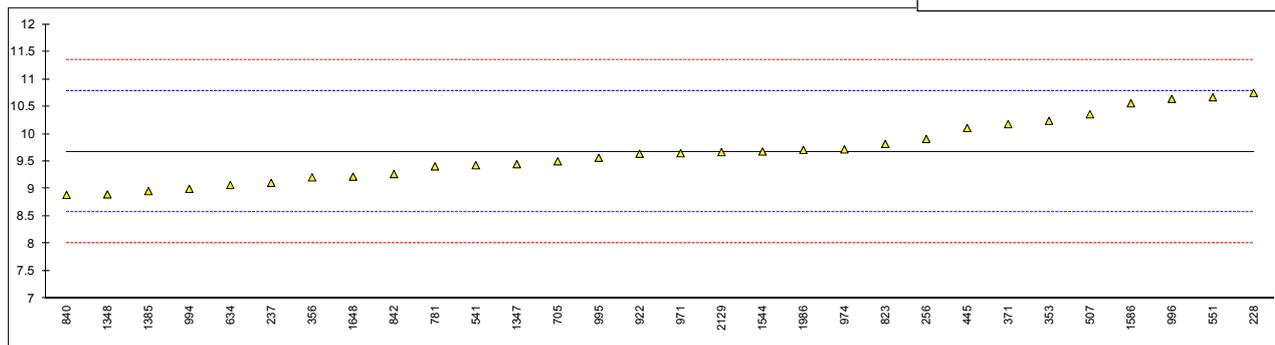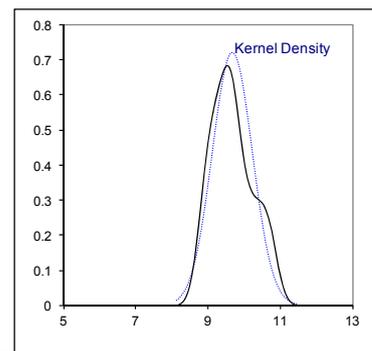
Determination of Density at 15°C on sample #16280; results in kg/m^3

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	D4052	987.9		0.97	705	D1298	987.7		0.60
120	D4052	987.5		0.22	732	ISO12185	987.4		0.04
131	D4052	987.60		0.41	750		-----		-----
132	D4052	987.4		0.04	781	ISO12185	987.7		0.60
140		-----		-----	823	ISO12185	987.0		-0.71
150	D1298	988.2		1.53	840	ISO12185	987.55		0.32
154	D4052	987.5		0.22	842	D1298	988.11		1.36
158		-----		-----	873		-----		-----
159	D4052	987.5		0.22	874	ISO12185	987.6		0.41
168		-----		-----	875	D1298	987.3		-0.15
169		-----		-----	886	D4052	989.6	R(0.05)	4.14
171		-----		-----	887		-----		-----
175		-----		-----	922	D4052	988.0		1.16
194	D4052	988.0		1.16	962		-----		-----
228	D1298	986.7		-1.27	963		-----		-----
230	ISO12185	987.4		0.04	971	ISO12185	987.2		-0.34
237	D4052	988.03		1.21	974	D1298	987.6		0.41
238	D4052	986.5	C	-1.64	994	ISO12185	987.5		0.22
256	D1298	987.7		0.60	995	ISO12185	987.68		0.56
273	D1298	988.3	C	1.72	996	D4052	987.0		-0.71
311	ISO12185	986.8		-1.08	1040	ISO12185	987.9		0.97
313	ISO12185	986.8		-1.08	1131	ISO12185	990.1	C,R(0.01)	5.08
323	ISO12185	986.8		-1.08	1135	ISO12185	987.1		-0.52
336	ISO12185	987.8		0.78	1347	D4052	986.8		-1.08
342	D4052	987.28		-0.19	1348	D4052	987.3		-0.15
349		-----		-----	1356	ISO12185	987.2		-0.34
351	ISO3675	987.77		0.73	1367	IP365	987.0		-0.71
353	IP365	987.1		-0.52	1385	D4052	987.1		-0.52
356	D4052	986.8		-1.08	1455	ISO12185	987.0		-0.71
371	D4052	986.9		-0.90	1510	IP365	986.6		-1.46
399	ISO12185	985.6	R(0.05)	-3.32	1540	ISO3675	988.0		1.16
445	IP365	988.0		1.16	1544	ISO12185	987.4		0.04
447	IP365	987.8	C	0.78	1586	ISO12185	987.3		-0.15
494	ISO12185	987.8		0.78	1631	ISO12185	987.2		-0.34
507	ISO12185	987.40		0.04	1648	ISO12185	988.3		1.72
529		-----		-----	1854	ISO12185	986.6		-1.46
541	ISO12185	986.9		-0.90	1906		-----		-----
551	D4052	987.16		-0.41	1986	D1298	988.0		1.16
557	D4052	987.59		0.39	1995	ISO12185	985.5	R(0.05)	-3.51
558	D1298	986.4		-1.83	2129	D4052	987.0		-0.71
633	D1298	987.9464		1.06	6044	D4052	986.897		-0.90
634	D1298	986.8		-1.08	6049	ISO12185	986.9		-0.90
657	ISO12185	986.8		-1.08	6057	ISO12185	987.0		-0.71
663	D4052	987.8		0.78	6092	D4052	987.4		0.04
671	D1298	988.0		1.16					

normality	OK
n	71
outliers	4
mean (n)	987.380
st.dev. (n)	0.4780
R(calc.)	1.338
R(ISO12185:96)	1.500
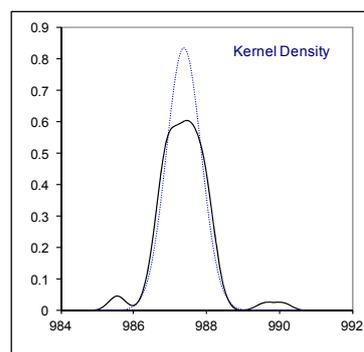
Lab 238 first reported: 985.6
Lab 273 first reported: 989.3
Lab 447 first reported: 984.8
Lab 1131 first reported: 989.7
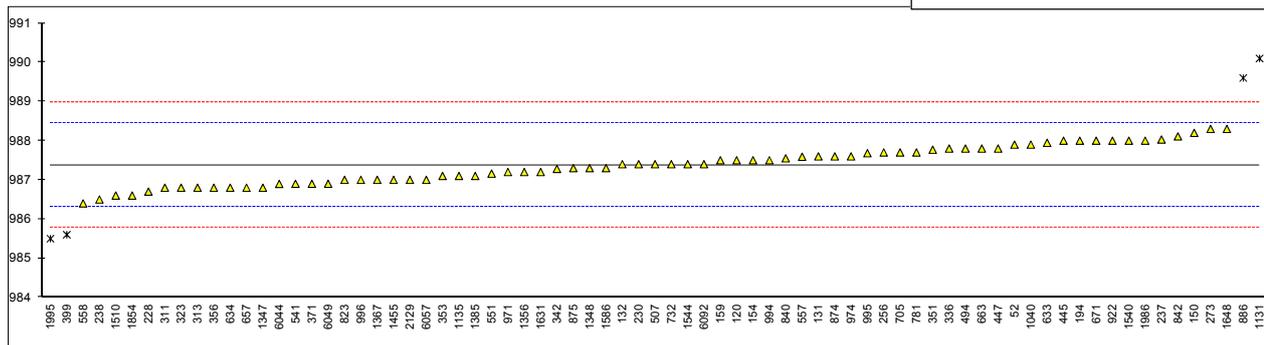
Determination of Flash Point PMcc on sample #16280; results in °C

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	D93-B	119.0		-1.01	705	ISO2719-B	122.0		0.39
120	D93-B	124.5		1.55	732	ISO2719-B	122		0.39
131	D93-B	121		-0.08	750		-----		-----
132	ISO2719-B	119.0		-1.01	781	ISO2719-B	122.0		0.39
140	ISO2719-B	>110		-----	823	ISO2719-B	120.0		-0.55
150	D93-B	>110		-----	840	ISO2719-B	121.0		-0.08
154	D93-B	>110		-----	842	D93-B	120.0		-0.55
158		-----		-----	873	D93-B	122.0		0.39
159	D93-B	118		-1.48	874	ISO2719-B	126.0		2.25
168		-----		-----	875	D93-B	122.0		0.39
169	D93-B	118.9		-1.06	886	D93-B	122.0		0.39
171		-----		-----	887	D93-B	122.5		0.62
175	D93-B	120		-0.55	922	D93-B	117		-1.95
194	D93-B	122.7		0.71	962		-----		-----
228	D93-B	118.0		-1.48	963		-----		-----
230	ISO2719-B	121		-0.08	971	ISO2719-B	121.5		0.15
237	D93-B	124.0		1.32	974	D93-B	124.0		1.32
238	D93-B	122.0		0.39	994	D93-B	122.0		0.39
256	D93-B	124		1.32	995	D93-B	122.0		0.39
273	D93-B	116		-2.41	996	D93-B	118.0		-1.48
311	ISO2719-B	121.0		-0.08	1040	ISO2719	119		-1.01
313	ISO2719-B	122.0		0.39	1131		-----		-----
323	ISO2719-B	119.0		-1.01	1135	ISO2719-B	119.5		-0.78
336		-----		-----	1347	D93-A	> 100		-----
342	ISO2719-B	119.5		-0.78	1348	D93-A	> 100		-----
349	D93-B	120		-0.55	1356	ISO2719-A	126.0	ex	2.25
351	ISO2719-B	122.50		0.62	1367	D93-A	124.0	ex	1.32
353	IP34-B	123.6		1.13	1385	D93-A	> 100		-----
356	D93-B	122.0		0.39	1455	D93-B	118.5		-1.25
371	ISO2719-B	118.0		-1.48	1510		-----		-----
399	ISO2719-B	127		2.72	1540	ISO2719-B	158	C,R(0.01)	17.19
445	IP34-B	121.5		0.15	1544	ISO2719-B	119.25		-0.90
447	D93-B	119		-1.01	1586	D93-B	122.0		0.39
494	ISO2719-B	121.5		0.15	1631	ISO2719-B	121		-0.08
507	D93-B	>110	C	-----	1648	ISO2719-A	126.5	ex	2.49
529		-----		-----	1854	ISO2719-B	125		1.79
541	ISO2719-B	121.5		0.15	1906		-----		-----
551	D93-B	122.0		0.39	1986	D93-B	120.0		-0.55
557	D93-B	122		0.39	1995	D93-A	123.90	ex	1.27
558	D93-B	91	R(0.01)	-14.08	2129	ISO2719-B	123.7		1.18
633	D93-B	124.25		1.44	6044	D93-B	123		0.85
634	D93-B	118.0		-1.48	6049	ISO2719-B	121.0		-0.08
657	D93-B	120		-0.55	6057	ISO2719-B	122.0		0.39
663	D93-B	121.25		0.04	6092	D93-B	160	R(0.01)	18.12
671		-----		-----					

normality	OK
n	63
outliers	3+4ex
mean (n)	121.169
st.dev. (n)	2.1877
R(calc.)	6.126
R(ISO2719-B:02)	6.000
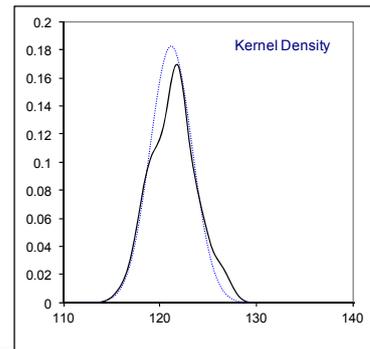
Lab 507 first reported: <110

Lab 1540 first reported: 168
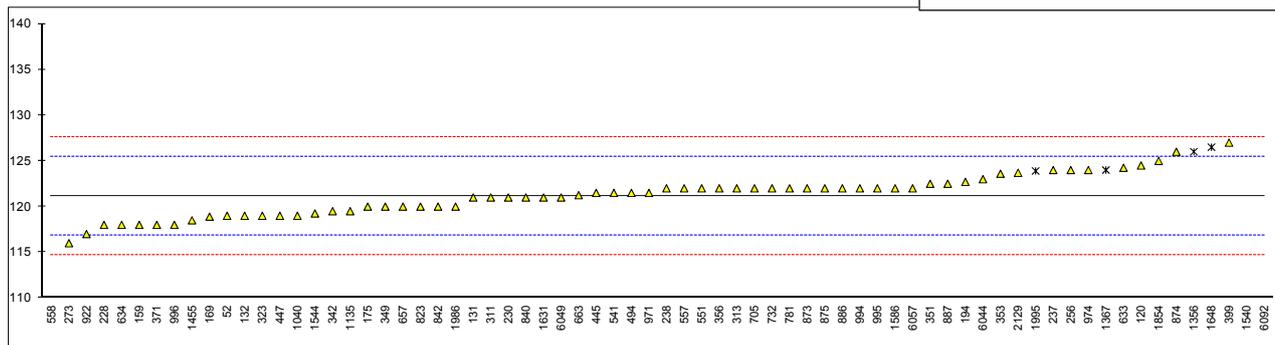
Determination of Heat of Combustion Gross on sample #16280; results in MJ/kg

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52		-----		-----	705		-----		-----
120		-----		-----	732	D4868	42.979		-0.11
131		-----		-----	750		-----		-----
132	D240	42.965		-0.21	781	D4868	42.99		-0.03
140		-----		-----	823	D240	42.960		-0.24
150		-----		-----	840	D240	43.103		0.76
154		-----		-----	842	D240	42.973		-0.15
158		-----		-----	873		-----		-----
159		-----		-----	874		-----		-----
168		-----		-----	875	D4868	43.00		0.04
169		-----		-----	886		-----		-----
171		-----		-----	887		-----		-----
175		-----		-----	922	D240	42.9635		-0.22
194		-----		-----	962		-----		-----
228		-----		-----	963		-----		-----
230		-----		-----	971	D4868	43.00		0.04
237		-----		-----	974	D4868	43.00		0.04
238		-----		-----	994	D4868	42.99		-0.03
256	D4868	42.98		-0.10	995		42.95		-0.31
273		-----		-----	996	D4868	42.995		0.00
311	D240	43.185		1.33	1040		-----		-----
313		-----		-----	1131	D4809	42.894		-0.70
323	D240	43.00		0.04	1135	D240	42.930		-0.45
336		-----		-----	1347	D4868	43.017		0.16
342		-----		-----	1348	D4868	43.00		0.04
349		-----		-----	1356		-----		-----
351	D4868	42.994		0.00	1367		-----		-----
353		-----		-----	1385	D4868	42.97		-0.17
356		-----		-----	1455		-----		-----
371		-----		-----	1510	D240	42.995		0.00
399		-----		-----	1540		-----		-----
445	D240	42.875		-0.84	1544		-----		-----
447	D240	43.00		0.04	1586	D240	42.64	R(0.01)	-2.48
494		-----		-----	1631		-----		-----
507		-----		-----	1648		-----		-----
529		-----		-----	1854	D240	42.916		-0.55
541		-----		-----	1906		-----		-----
551	D4868	42.99		-0.03	1986	D4868	43.010		0.11
557	D4868	43.008		0.09	1995		-----		-----
558		-----		-----	2129	D240	43.0312		0.26
633		-----		-----	6044		-----		-----
634	D240	43.111	C	0.82	6049		-----		-----
657	D240	43.050		0.39	6057		-----		-----
663		-----		-----	6092		-----		-----
671		-----		-----					

normality	not OK
n	32
outliers	1
mean (n)	42.9945
st.dev. (n)	0.05915
R(calc.)	0.1656
R(D240:14)	0.4000
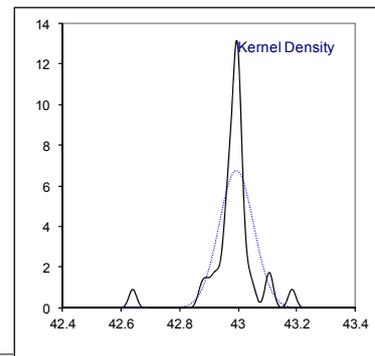
Lab 634 first reported: 42.175
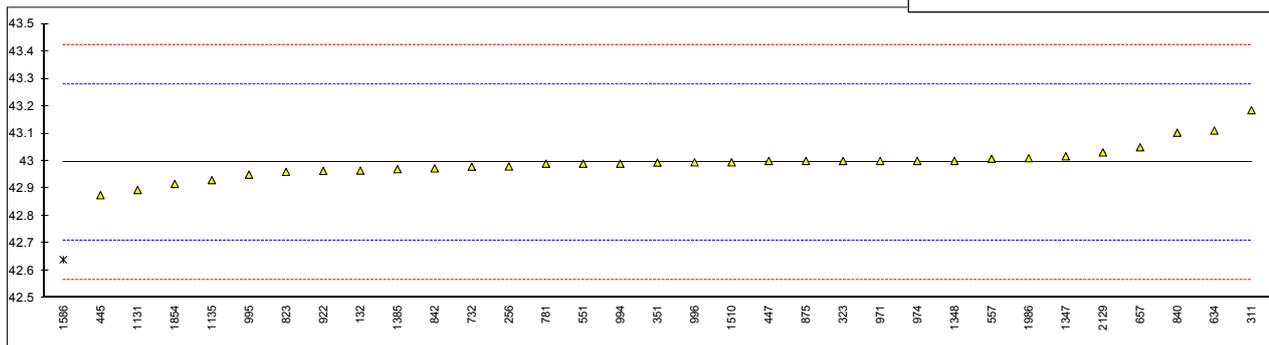
Determination of Heat of Combustion Net on sample #16280; results in MJ/kg

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52		-----		-----	705		-----		-----
120		-----		-----	732	D4868	40.638		-0.16
131		-----		-----	750		-----		-----
132		-----		-----	781	D4868	40.65		-0.08
140		-----		-----	823	D240	40.711		0.35
150		-----		-----	840	D4868	40.640		-0.15
154		-----		-----	842	D4868	40.620		-0.29
158		-----		-----	873		-----		-----
159		-----		-----	874		-----		-----
168		-----		-----	875	D4868	40.66		-0.01
169		-----		-----	886		-----		-----
171		-----		-----	887		-----		-----
175		-----		-----	922	D240	40.9375	R(0.01)	1.93
194		-----		-----	962		-----		-----
228		-----		-----	963		-----		-----
230		-----		-----	971	D4868	40.66		-0.01
237		-----		-----	974	D4868	40.66		-0.01
238		-----		-----	994	D4868	40.65		-0.08
256	D4868	40.64		-0.15	995		40.61		-0.36
273		-----		-----	996	D4868	40.654		-0.05
311	D240	40.890	R(0.01)	1.60	1040		-----		-----
313		-----		-----	1131	D4809	40.669		0.05
323	D240	40.75		0.62	1135	D240	40.620		-0.29
336		-----		-----	1347	D4868	40.675		0.09
342		-----		-----	1348	D4868	40.66		-0.01
349		-----		-----	1356		-----		-----
351	D4868	40.656		-0.04	1367		-----		-----
353		-----		-----	1385	D4868	40.63		-0.22
356		-----		-----	1455		-----		-----
371		-----		-----	1510	D240	40.750		0.62
399		-----		-----	1540		-----		-----
445	D240	40.605		-0.40	1544	D4868	40.650		-0.08
447	D240	40.775		0.79	1586	D240	40.37	R(0.01)	-2.04
494		-----		-----	1631		-----		-----
507		-----		-----	1648		-----		-----
529		-----		-----	1854	D240	40.706		0.31
541		-----		-----	1906		-----		-----
551	D4868	40.65		-0.08	1986	D4868	40.670		0.06
557	D4868	40.6690		0.05	1995		-----		-----
558		-----		-----	2129	D240	40.854	R(0.01)	1.35
633		-----		-----	6044		-----		-----
634		-----		-----	6049	D4868	40.66		-0.01
657	D240	40.595		-0.47	6057		-----		-----
663		-----		-----	6092		-----		-----
671		-----		-----					

normality	not OK
n	29
outliers	4
mean (n)	40.6615
st.dev. (n)	0.04232
R(calc.)	0.1185
R(D240:14)	0.4000

Kernel Density
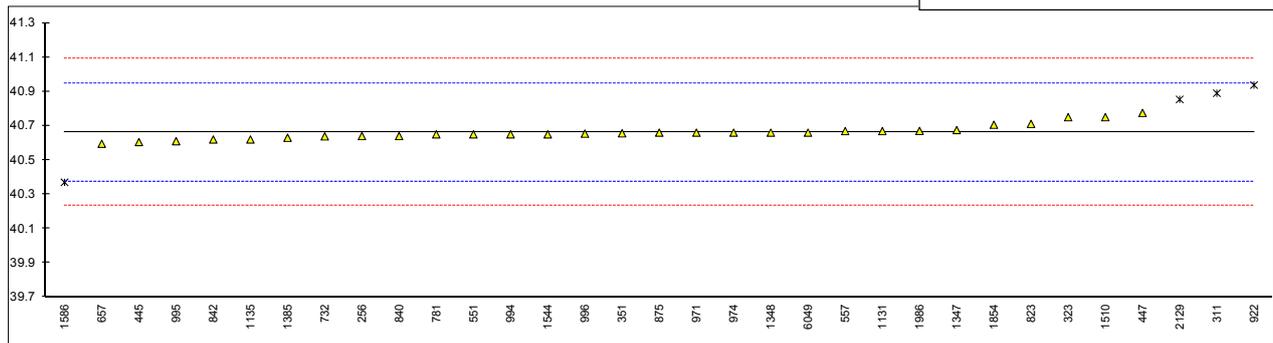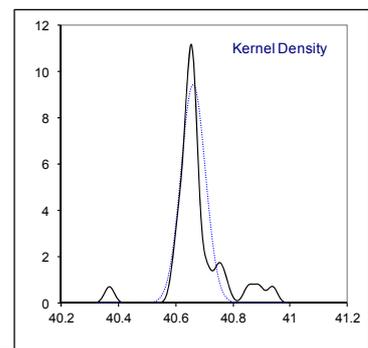
Determination of Kinematic Viscosity at 50°C on sample #16280; results in mm^2/s

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	D445	274.1		-1.46	705	ISO3104	282.61		-0.34
120	ISO3104	287.6		0.33	732	D445	279.9		-0.70
131	D445	289.0		0.51	750		-----		-----
132	ISO3104	279.8		-0.71	781	ISO3104	275.3		-1.31
140	ISO3104	285.36		0.03	823	ISO3104	285.5		0.05
150	D445	285.1		-0.01	840	D445	287.18		0.27
154	D445	283.5		-0.22	842	D445	283.23		-0.25
158		-----		-----	873	D445	284.0		-0.15
159	D445	288.9		0.50	874	D445	282.1		-0.40
168		-----		-----	875	D445	282.5		-0.35
169	D445	286.090		0.13	886	D445	289.7		0.61
171		-----		-----	887	D445	293.7		1.14
175	D445	286.7		0.21	922	D445	279.6		-0.74
194	D445	285.12		0.00	962		-----		-----
228	D445	286.8		0.22	963		-----		-----
230	ISO3104	285.23		0.01	971	ISO3104	285.0		-0.02
237	D445	287.7		0.34	974	D445	286.7		0.21
238	D445	288.6		0.46	994	D445	280.2		-0.66
256	D445	291.5		0.84	995	D445	284.3		-0.11
273	D445	293.0		1.04	996	D445	297.7		1.67
311	D445	279.6		-0.74	1040	ISO3104	288.75		0.48
313	D445	277.2		-1.05	1131	ISO3104	283.56		-0.21
323	ISO3104	282.7		-0.32	1135	ISO3104	285.82		0.09
336	ISO3104	286.5		0.18	1347	D445	292.55		0.98
342	ISO3104	281.3		-0.51	1348	D445	221.0	R(0.01)	-8.51
349		-----		-----	1356	ISO3104	287.733		0.34
351	ISO3104	288.30		0.42	1367	IP71	280.7		-0.59
353		-----		-----	1385	D445	256.47	R(0.01)	-3.80
356	D445	287.6		0.33	1455	D445	276.3		-1.17
371	ISO3104	283.4		-0.23	1510	D445	283.5		-0.22
399	ISO3104	262.2	R(0.01)	-3.04	1540		-----		-----
445	IP71	287.8		0.35	1544	ISO3104	287.89		0.36
447	D445	315.2	R(0.01)	3.99	1586	ISO3104	284.1		-0.14
494	ISO3104	287.5		0.31	1631	ISO3104	286.26		0.15
507	ISO3104	285.25		0.01	1648	D445	294.9		1.30
529		-----		-----	1854	ISO3104	276.9		-1.09
541	ISO3104	280.90		-0.56	1906		-----		-----
551	D445	278.345		-0.90	1986	ISO3104	284.7		-0.06
557	D445	280.0960958		-0.67	1995	D445	287.81		0.35
558	D445	304.7	R(0.01)	2.60	2129	ISO3104	286.3		0.15
633	D445	290.99149		0.78	6044	ISO3104	291.104		0.79
634	D445	289.5		0.58	6049	ISO3104	288.4		0.43
657	ISO3104	281.5		-0.48	6057	ISO3104	282.8		-0.31
663	D445	281.47		-0.49	6092	D445	286.7		0.21
671		-----		-----					

normality	OK	
n	72	
outliers	5	
mean (n)	285.1395	
st.dev. (n)	4.61604	
R(calc.)	12.9249	
R(ISO3104:94)	21.1003	
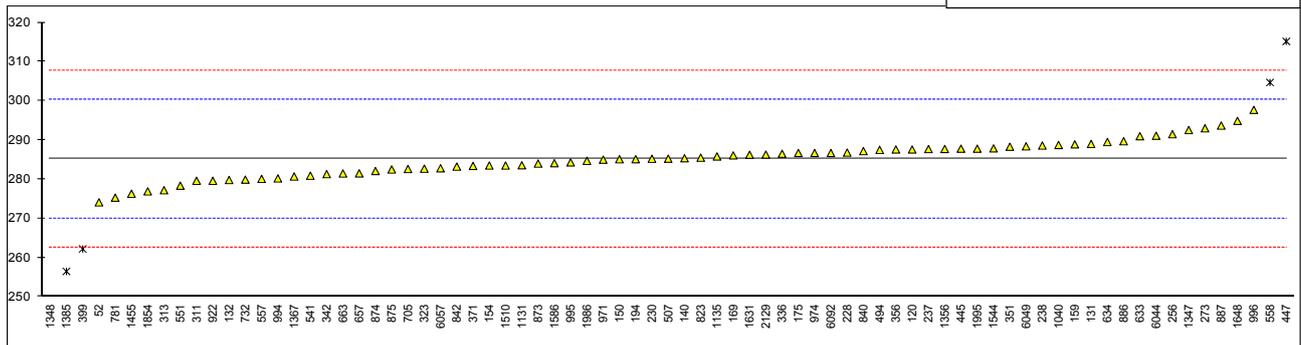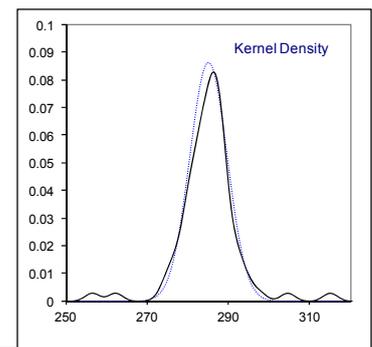
Determination of Kinematic Viscosity at 100°C on sample #16280; results in mm^2/s

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52		-----		-----	705	ISO3104	26.585		-1.07
120		-----		-----	732	D445	27.32		0.40
131		-----		-----	750		-----		-----
132		-----		-----	781	ISO3104	26.67		-0.90
140	ISO3104	27.85		1.45	823	ISO3104	26.83		-0.58
150	D445	26.86		-0.52	840	D445	26.917		-0.41
154		-----		-----	842		-----		-----
158		-----		-----	873	D445	26.88		-0.48
159		-----		-----	874	D445	26.92		-0.40
168		-----		-----	875	D445	27.16		0.08
169	D445	26.865		-0.51	886	D445	27.0		-0.24
171		-----		-----	887	D445	26.86		-0.52
175		-----		-----	922		-----		-----
194		-----		-----	962		-----		-----
228	D445	27.86		1.47	963		-----		-----
230	ISO3104	27.441		0.64	971	ISO3104	27.47		0.69
237	D445	27.33		0.42	974	D445	27.49		0.73
238		-----		-----	994	D445	27.05		-0.14
256		-----		-----	995	D445	27.07		-0.10
273	D445	25.68		-2.87	996	D445	27.35		0.46
311	D445	26.82		-0.60	1040		-----		-----
313	D445	26.08		-2.08	1131	ISO3104	27.365		0.49
323	ISO3104	26.95		-0.34	1135	ISO3104	27.03		-0.18
336	ISO3104	27.23		0.22	1347	D445	26.82		-0.60
342		-----		-----	1348	D445	25.0	DG(0.05)	-4.23
349		-----		-----	1356		-----		-----
351	ISO3104	26.720		-0.80	1367	IP71	27.93		1.61
353	IP71	27.056		-0.13	1385	D445	28.65		3.05
356	D445	27.40		0.55	1455	D445	26.97		-0.30
371	ISO3104	27.185		0.13	1510	D445	26.23		-1.78
399	ISO3104	25.48	DG(0.05)	-3.27	1540		-----		-----
445	IP71	27.31		0.38	1544	ISO3104	27.315		0.39
447	D445	28.46		2.67	1586	ISO3104	26.19		-1.86
494	ISO3104	27.28		0.32	1631	ISO3104	26.788		-0.66
507	ISO3104	26.680		-0.88	1648		-----	W	-----
529		-----		-----	1854	ISO3104	26.19		-1.86
541	ISO3104	27.327		0.41	1906		-----		-----
551	D445	27.840		1.43	1986	ISO3104	27.49		0.73
557	D445	27.834900	C	1.42	1995	D445	26.638		-0.96
558		-----		-----	2129	ISO3104	28.30		2.35
633		-----		-----	6044	ISO3104	27.124		0.00
634		-----		-----	6049		-----		-----
657	ISO3104	26.93		-0.38	6057	ISO3104	27.13		0.02
663	D445	26.970		-0.30	6092		-----		-----
671		-----		-----					

normality	suspect
n	55
outliers	2
mean (n)	27.1217
st.dev. (n)	0.55843
R(calc.)	1.5636
R(ISO3104:94)	1.4049
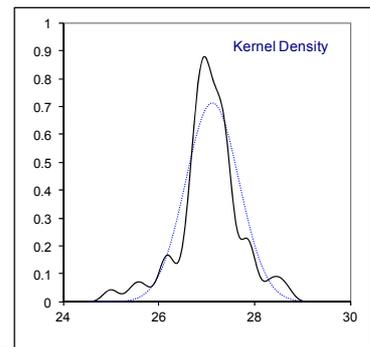
Lab 557 first reported: 23.55450099

Lab 1648 reported: 29.12, result withdrawn
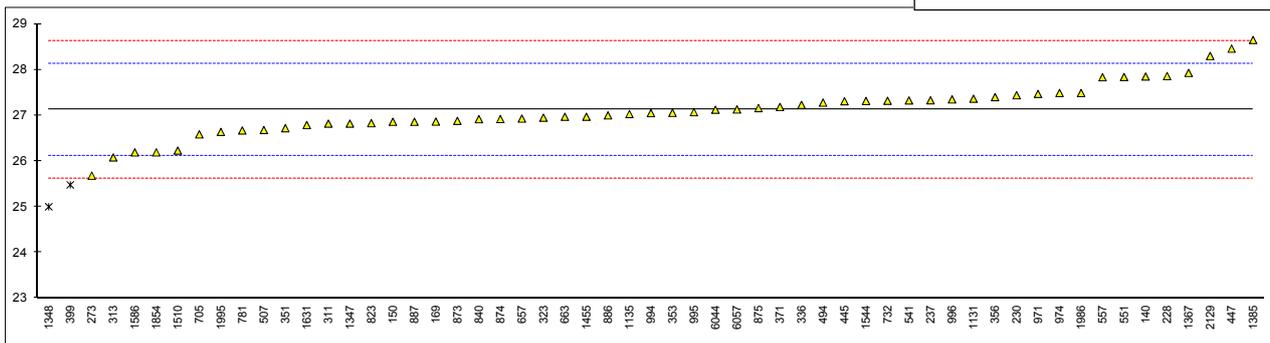
Determination of Viscosity Stabinger at 50°C on sample #16280; results in mm^2/s

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52		-----		-----	705		-----		-----
120		-----		-----	732		-----		-----
131		-----		-----	750		-----		-----
132		-----		-----	781		-----		-----
140		-----		-----	823		-----		-----
150		-----		-----	840	D7042	287.48		-0.04
154		-----		-----	842		-----		-----
158		-----		-----	873		-----		-----
159		-----		-----	874		-----		-----
168		-----		-----	875		-----		-----
169		-----		-----	886		-----		-----
171		-----		-----	887		-----		-----
175		-----		-----	922	D7042	283.2		-0.44
194		-----		-----	962		-----		-----
228		-----		-----	963		-----		-----
230		-----		-----	971		-----		-----
237		-----		-----	974		-----		-----
238		-----		-----	994	D7042	284.6		-0.31
256		-----		-----	995		-----		-----
273		-----		-----	996		-----		-----
311		-----		-----	1040		-----		-----
313		-----		-----	1131		-----		-----
323		-----		-----	1135	D7042	293.56		0.54
336		-----		-----	1347		-----		-----
342		-----		-----	1348		-----		-----
349		-----		-----	1356		-----		-----
351		-----		-----	1367		-----		-----
353		-----		-----	1385		-----		-----
356		-----		-----	1455		-----		-----
371		-----		-----	1510		-----		-----
399		-----		-----	1540		-----		-----
445		-----		-----	1544		-----		-----
447		-----		-----	1586		-----		-----
494		-----		-----	1631		-----		-----
507		-----		-----	1648	D7042	300.2		1.17
529		-----		-----	1854	D7042	280.7		-0.68
541		-----		-----	1906		-----		-----
551		-----		-----	1986		-----		-----
557		-----		-----	1995	D7042	287.81		0.00
558		-----		-----	2129		-----		-----
633		-----		-----	6044	D7042	293.81		0.56
634		-----		-----	6049		-----		-----
657		-----		-----	6057	D7042	279.3		-0.81
663		-----		-----	6092		-----		-----
671		-----		-----					

normality	OK
n	9
outliers	0
mean (n)	287.8511
st.dev. (n)	6.86656
R(calc.)	19.2264
R(D7042:16e3)	29.6199
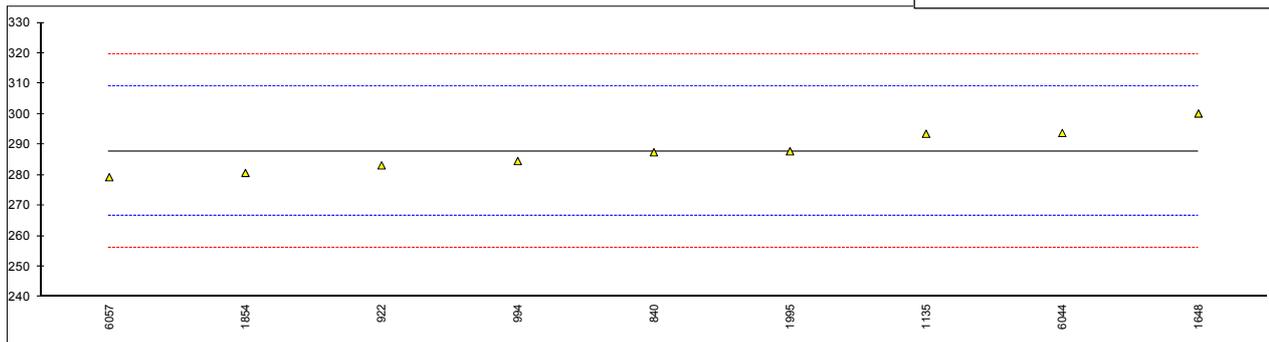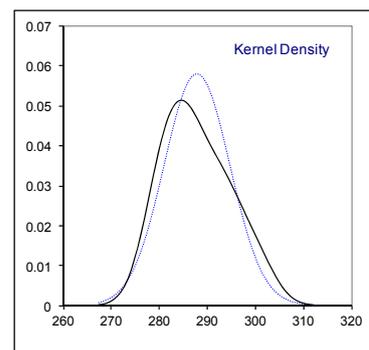
Determination of Viscosity Stabinger at 100°C on sample #16280; results in mm^2/s

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52		-----		-----	705		-----		-----
120		-----		-----	732		-----		-----
131		-----		-----	750		-----		-----
132		-----		-----	781		-----		-----
140		-----		-----	823		-----		-----
150		-----		-----	840	D7042	26.820		-0.10
154		-----		-----	842		-----		-----
158		-----		-----	873		-----		-----
159		-----		-----	874		-----		-----
168		-----		-----	875		-----		-----
169		-----		-----	886		-----		-----
171		-----		-----	887		-----		-----
175		-----		-----	922		-----		-----
194		-----		-----	962		-----		-----
228		-----		-----	963		-----		-----
230		-----		-----	971		-----		-----
237		-----		-----	974		-----		-----
238		-----		-----	994	D7042	27.07		0.27
256		-----		-----	995		-----		-----
273		-----		-----	996		-----		-----
311		-----		-----	1040		-----		-----
313		-----		-----	1131		-----		-----
323		-----		-----	1135	D7042	26.742		-0.21
336		-----		-----	1347		-----		-----
342		-----		-----	1348		-----		-----
349		-----		-----	1356		-----		-----
351		-----		-----	1367		-----		-----
353		-----		-----	1385		-----		-----
356		-----		-----	1455		-----		-----
371		-----		-----	1510		-----		-----
399		-----		-----	1540		-----		-----
445		-----		-----	1544		-----		-----
447		-----		-----	1586		-----		-----
494		-----		-----	1631		-----		-----
507		-----		-----	1648	D7042	29.14	D(0.05)	3.27
529		-----		-----	1854	D7042	26.65		-0.34
541		-----		-----	1906		-----		-----
551		-----		-----	1986		-----		-----
557		-----		-----	1995	D7042	26.638		-0.36
558		-----		-----	2129		-----		-----
633		-----		-----	6044	D7042	27.434		0.79
634		-----		-----	6049		-----		-----
657		-----		-----	6057	D7042	26.85		-0.05
663		-----		-----	6092		-----		-----
671		-----		-----					

normality	unknown
n	7
outliers	1
mean (n)	26.8863
st.dev. (n)	0.28218
R(calc.)	0.7901
R(D7042:16e3)	1.9320
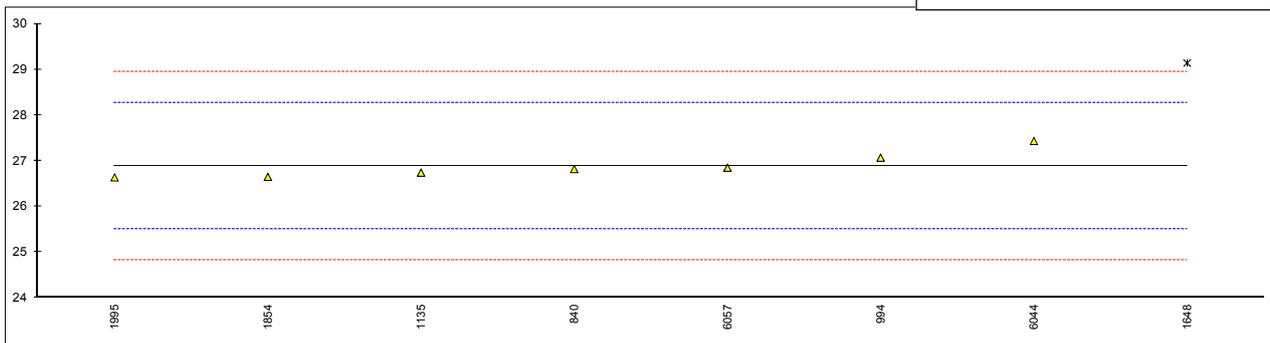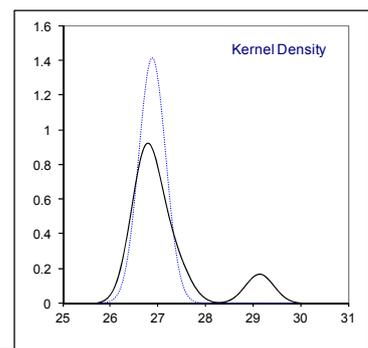
Determination of Nitrogen on sample #16280; results in µg/g

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52		-----		-----	705		-----		-----
120		-----		-----	732		-----		-----
131		-----		-----	750		-----		-----
132		-----		-----	781	D5762 Volumetric	2639		-0.94
140	D5762 Gravimetric	3062		0.60	823	D5762 Gravimetric	3000		0.37
150	D5762 Volumetric	2857		-0.15	840	D3228	3188		1.05
154		-----		-----	842		-----		-----
158		-----		-----	873		-----		-----
159		-----		-----	874	D5762 Volumetric	2650		-0.90
168		-----		-----	875	D5762 Gravimetric	2777		-0.44
169		-----		-----	886		-----		-----
171		-----		-----	887		-----		-----
175		-----		-----	922		-----		-----
194		-----		-----	962		-----		-----
228		-----		-----	963		-----		-----
230		-----		-----	971		-----		-----
237		-----		-----	974		-----		-----
238		-----		-----	994	D5762 Volumetric	2724		-0.63
256		-----		-----	995	D3228	2320		-2.10
273		-----		-----	996		-----		-----
311	D5762 Volumetric	2900		0.01	1040		-----		-----
313		-----		-----	1131		-----		-----
323	D5762 Gravimetric	3049		0.55	1135	D5762 Gravimetric	2595.2		-1.10
336		-----		-----	1347		-----		-----
342		-----		-----	1348		-----		-----
349		-----		-----	1356		-----		-----
351		-----		-----	1367		-----		-----
353		-----		-----	1385		-----		-----
356		-----		-----	1455	D5762 Gravimetric	3550		2.37
371		-----		-----	1510		-----		-----
399		-----		-----	1540		-----		-----
445	D5762 Gravimetric	3626		2.65	1544		-----		-----
447		-----		-----	1586	D5762 Gravimetric	2478		-1.52
494	D5762 Gravimetric	3700		2.91	1631		-----		-----
507		-----		-----	1648		-----		-----
529		-----		-----	1854		-----		-----
541		-----		-----	1906		-----		-----
551		-----		-----	1986		-----		-----
557		-----		-----	1995		-----		-----
558		-----		-----	2129	D3228	3370		1.72
633		-----		-----	6044		-----		-----
634		-----		-----	6049		-----		-----
657	D5762 Gravimetric	2700		-0.72	6057	D5762 Volumetric	2327	C	-2.07
663	D5762 Volumetric	2443		-1.65	6092		-----		-----
671		-----		-----					

		Results of		
			Volumetric only	Gravimetrc only
normality	OK		OK	OK
n	20		7	10
outliers	0		0	0
mean (n)	2897.76		2648.57	3053.72
st.dev. (n)	417.694		207.409	439.424
R(calc.)	1169.54		580.74	1230.39
R(D5762:12)	770.80		704.52	812.29
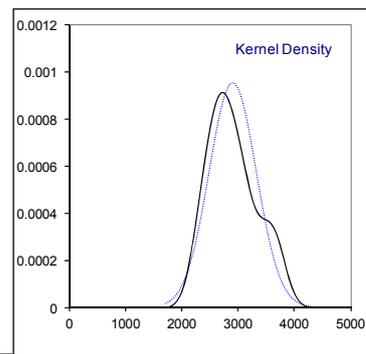
Lab 6057 first reported: 1993
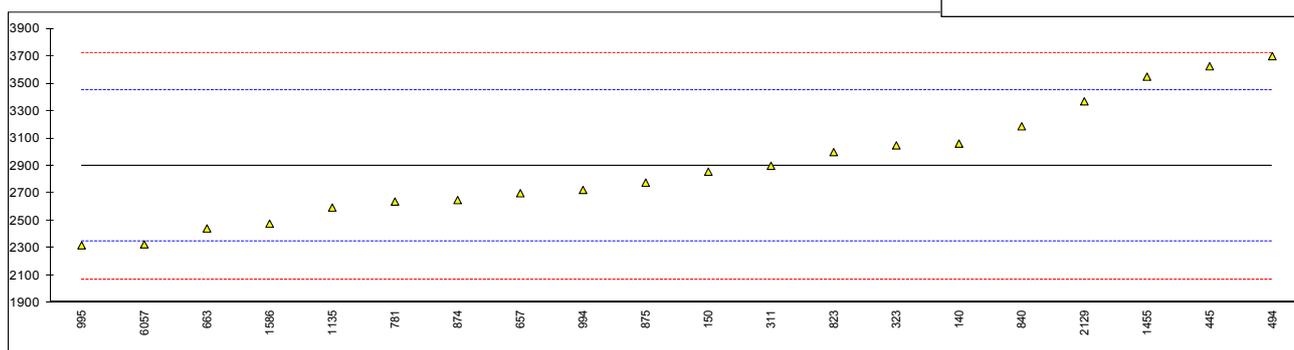
Determination of Pour Point (Lower) on sample #16280; results in °C

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52		-----		-----	705		-----		-----
120		-----		-----	732	D97	3		0.04
131		-----		-----	750		-----		-----
132	ISO3016	6		1.32	781	ISO3016	6		1.32
140	ISO3016	6		1.32	823	ISO3016	3		0.04
150		-----		-----	840	ISO3016	6		1.32
154		-----		-----	842	D97	3		0.04
158		-----		-----	873		-----		-----
159		-----		-----	874		-----		-----
168		-----		-----	875	D97	6		1.32
169		-----		-----	886		-----		-----
171		-----		-----	887		-----		-----
175		-----		-----	922	D97	9		2.59
194	D97	6		1.32	962		-----		-----
228		-----		-----	963		-----		-----
230	ISO3016	-3		-2.51	971		-----		-----
237	D97	3		0.04	974	D97	-3		-2.51
238		-----		-----	994	D97	6		1.32
256		-----		-----	995	ISO3016	6		1.32
273		-----		-----	996	D97	0		-1.23
311		-----		-----	1040		-----		-----
313		-----		-----	1131		-----		-----
323	ISO3016	6		1.32	1135	ISO3016	3		0.04
336		-----		-----	1347	D97	-3		-2.51
342		-----		-----	1348	D97	6		1.32
349		-----		-----	1356		-----		-----
351		-----		-----	1367		-----		-----
353		-----		-----	1385	D97	0		-1.23
356		-----		-----	1455		-----		-----
371		-----		-----	1510	D97	3		0.04
399	ISO3016	0		-1.23	1540		-----		-----
445	ISO3016	-3		-2.51	1544	ISO3016	3		0.04
447		-----		-----	1586		-----		-----
494		-----		-----	1631		-----		-----
507		-----		-----	1648		-----		-----
529		-----		-----	1854		-----		-----
541		-----		-----	1906		-----		-----
551		-----		-----	1986		-----		-----
557	D97	-12	R(0.01)	-6.33	1995		-----		-----
558		-----		-----	2129	ISO3016	0		-1.23
633		-----		-----	6044		-----		-----
634		-----		-----	6049	ISO3016	0		-1.23
657	ISO3016	6		1.32	6057		-----		-----
663	D97	0		-1.23	6092		-----		-----
671	D97	3		0.04					

normality	OK
n	30
outliers	1
mean (n)	2.90
st.dev. (n)	3.387
R(calc.)	9.48
R(ISO3016:94)	6.59

Kernel Density
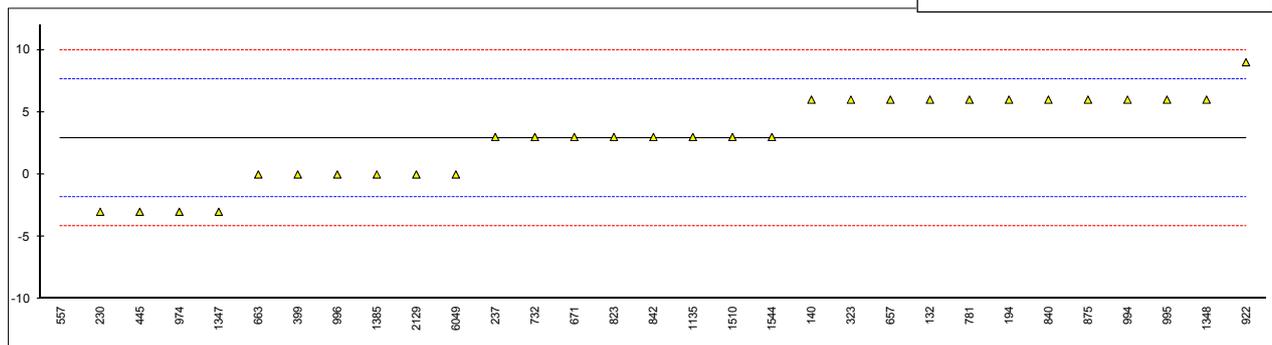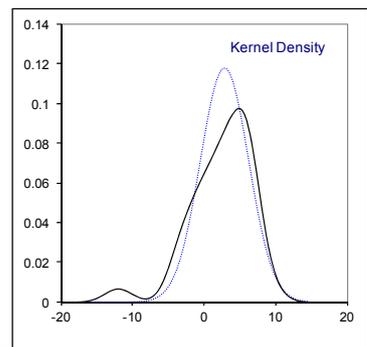
Determination of Pour Point (Upper) on sample #16280; results in °C

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	D97	6		0.45	705	ISO3016	3		-0.82
120	D97	6		0.45	732	D97	6		0.45
131	ISO3016	0		-2.10	750		-----		-----
132	ISO3016	6		0.45	781	ISO3016	12		3.00
140		-----		-----	823	ISO3016	3		-0.82
150	D97	3		-0.82	840	ISO3016	9		1.73
154	D97	3		-0.82	842	D97	6		0.45
158		-----		-----	873	D97	6		0.45
159	D97	9		1.73	874	D97	6		0.45
168		-----		-----	875	D97	9		1.73
169	D97	0		-2.10	886		-----		-----
171		-----		-----	887		-----		-----
175		-----		-----	922	D97	12		3.00
194		-----		-----	962		-----		-----
228	D97	6		0.45	963		-----		-----
230	ISO3016	3		-0.82	971	ISO3016	3		-0.82
237	D97	3		-0.82	974	D97	0		-2.10
238	D97	6.0		0.45	994	D97	9		1.73
256	D97	9		1.73	995	ISO3016	9		1.73
273	D97	3		-0.82	996	D97	6		0.45
311		-----		-----	1040		-----		-----
313		-----		-----	1131		-----		-----
323	ISO3016	6		0.45	1135	ISO3016	3		-0.82
336		-----		-----	1347	D97	3		-0.82
342	ISO3016	6		0.45	1348	D97	9		1.73
349		-----		-----	1356	ISO3016	0		-2.10
351		-----		-----	1367	D97	3		-0.82
353	ISO3016	9		1.73	1385	D97	3		-0.82
356	D97	3		-0.82	1455		-----		-----
371	ISO3016	9		1.73	1510	D97	6		0.45
399	ISO3016	6		0.45	1540	ISO3016	3		-0.82
445	ISO3016	-3		-3.37	1544	ISO3016	6		0.45
447	D97	6		0.45	1586	ISO3016	0		-2.10
494		-----		-----	1631	ISO3016	-3		-3.37
507	ISO3016	6		0.45	1648	ISO3016	0		-2.10
529		-----		-----	1854	ISO3016	6		0.45
541		-----		-----	1906		-----		-----
551		-----		-----	1986	D97	3		-0.82
557	D97	-9	R(0.01)	-5.92	1995		-----		-----
558		-----		-----	2129	ISO3016	3		-0.82
633		-----		-----	6044		-----		-----
634	D97	9		1.73	6049	ISO3016	6		0.45
657	ISO3016	9		1.73	6057	ISO3016	0	C	-2.10
663	D97	6		0.45	6092		-----		-----
671	D97	6		0.45					

normality	OK	
n	59	
outliers	1	
mean (n)	4.93	
st.dev. (n)	3.378	
R(calc.)	9.46	
R(ISO3016:94)	6.59	
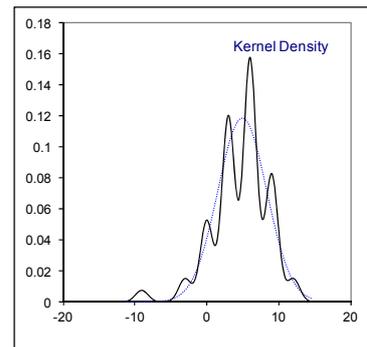
Lab 6057 first reported: -6

Kernel Density
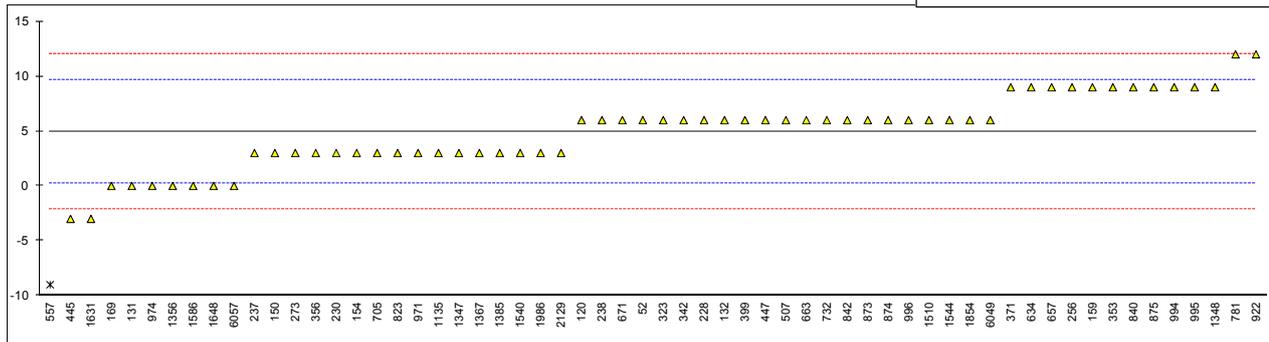
Determination of Pour Point (Automated), 3°C interval on sample #16280; results in °C

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52		-----		-----	705		-----		-----
120		-----		-----	732		-----		-----
131		-----		-----	750		-----		-----
132		-----		-----	781		-----		-----
140		-----		-----	823	D5950	3		1.15
150		-----		-----	840		-----		-----
154		-----		-----	842		-----		-----
158		-----		-----	873		-----		-----
159		-----		-----	874		-----		-----
168		-----		-----	875		-----		-----
169		-----		-----	886	D5950	6		2.52
171		-----		-----	887	D6749	9		3.90
175	D5950	6		2.52	922		-----		-----
194		-----		-----	962		-----		-----
228		-----		-----	963		-----		-----
230		-----		-----	971		-----		-----
237		-----		-----	974		-----		-----
238		-----		-----	994		-----		-----
256		-----		-----	995		-----		-----
273		-----		-----	996		-----		-----
311	D5950	-3		-1.61	1040	ISO3016	-6		-2.98
313		-----		-----	1131		-----		-----
323		-----		-----	1135	D5950	3		1.15
336	D5950	3		1.15	1347		-----		-----
342		-----		-----	1348		-----		-----
349		-----		-----	1356		-----		-----
351	D6749	-3		-1.61	1367		-----		-----
353		-----		-----	1385		-----		-----
356		-----		-----	1455	D6892	-3		-1.61
371		-----		-----	1510		-----		-----
399		-----		-----	1540		-----		-----
445		-----		-----	1544		-----		-----
447		-----		-----	1586		-----		-----
494	D6892	0		-0.23	1631		-----		-----
507		-----		-----	1648		-----		-----
529		-----		-----	1854		-----		-----
541	D5950	-7		-3.44	1906		-----		-----
551		-----		-----	1986		-----		-----
557		-----		-----	1995		0.0		-0.23
558		-----		-----	2129	D5950	0		-0.23
633		-----		-----	6044	D6749	6		2.52
634		-----		-----	6049		-----		-----
657		-----		-----	6057	D5950	-6		-2.98
663		-----		-----	6092		-----		-----
671		-----		-----					

normality	OK	
n	16	
outliers	0	
mean (n)	0.50	
st.dev. (n)	4.899	
R(calc.)	13.72	
R(D5950:14)	6.10	
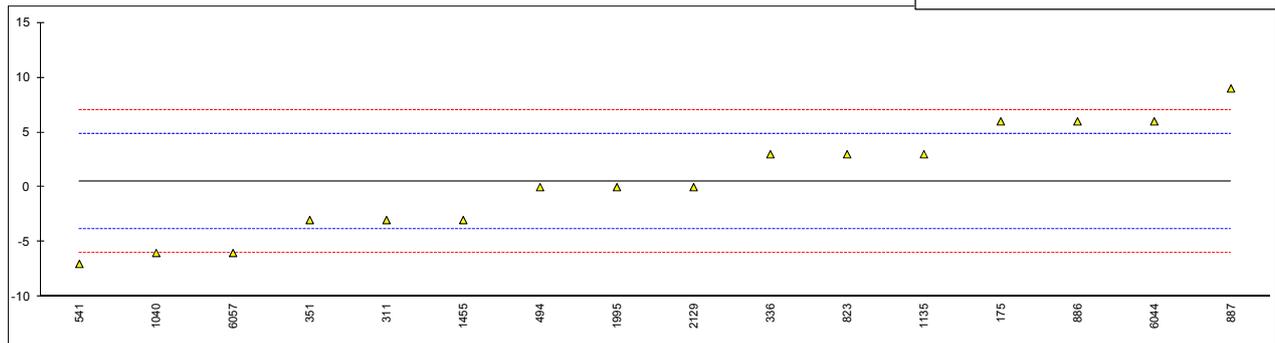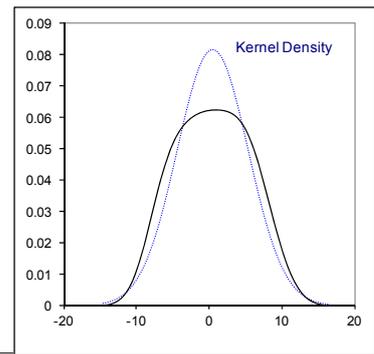
Determination of Sediment by Extraction on sample #16280; results in %M/M

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	D473	0.01		-0.47	705	D473	0.021		0.36
120	D473	0.02		0.29	732	D473	0.022		0.44
131		-----		-----	750		-----		-----
132	D473	0.01		-0.47	781	D473	0.010		-0.47
140	D473	0.03		1.04	823	D473	0.02		0.29
150	D473	0.01		-0.47	840	D473	0.012		-0.32
154	D473	0.02		0.29	842	D473	0.007		-0.69
158		-----		-----	873	D473	0.018		0.13
159	D473	0.01		-0.47	874	D473	0.02		0.29
168		-----		-----	875	D473	0.02		0.29
169		-----		-----	886		-----		-----
171		-----		-----	887		-----		-----
175	D473	0.02		0.29	922	D473	0.020		0.29
194	D473	0.0099		-0.48	962		-----		-----
228	D473	0.0149		-0.10	963		-----		-----
230	D473	0		-1.22	971	D473	0.022		0.44
237		-----		-----	974	D473	0.020		0.29
238	D473	0.015		-0.09	994	D473	0.017		0.06
256	D473	0.027		0.81	995	D473	0.013		-0.24
273	D473	0.0195		0.25	996	D473	0.0147	C	-0.11
311	D473	<0.01		-----	1040		-----		-----
313		-----		-----	1131		-----		-----
323	D473	0.02		0.29	1135	D473	0.026		0.74
336		-----		-----	1347	D473	0.0087		-0.57
342		-----		-----	1348	D473	0.003		-1.00
349		-----		-----	1356		-----		-----
351		-----		-----	1367		-----		-----
353		-----		-----	1385	D473	0.01		-0.47
356	D473	0.01		-0.47	1455	D473	0.01		-0.47
371	D473	0.009		-0.54	1510	D473	0.02		0.29
399		-----		-----	1540		-----		-----
445	ISO3735	0.013		-0.24	1544	D473	0.014		-0.17
447	D473	0.01		-0.47	1586	D473	0.01		-0.47
494		-----		-----	1631		-----		-----
507	D473	0.013		-0.24	1648		-----		-----
529		-----		-----	1854	D473	0.0099		-0.48
541	D473	0.031		1.12	1906		-----		-----
551	D473	0.010		-0.47	1986	D473	0.013		-0.24
557	D473	0.02952012		1.00	1995		-----		-----
558		-----		-----	2129	D473	0.0208		0.35
633		-----		-----	6044		-----		-----
634		-----		-----	6049		-----		-----
657	D473	0.02		0.29	6057		-----		-----
663	D473	0.0290		0.96	6092		-----		-----
671	D473	0.03		1.04					

|		
normality	OK	
n	52	
outliers	0	
mean (n)	0.0162	
st.dev. (n)	0.00719	
R(calc.)	0.0201	
R(D473:07e1)	0.0371	
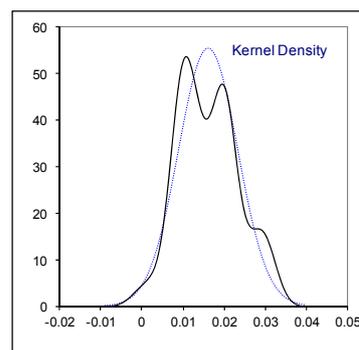
Lab 996 first reported: 0.0447
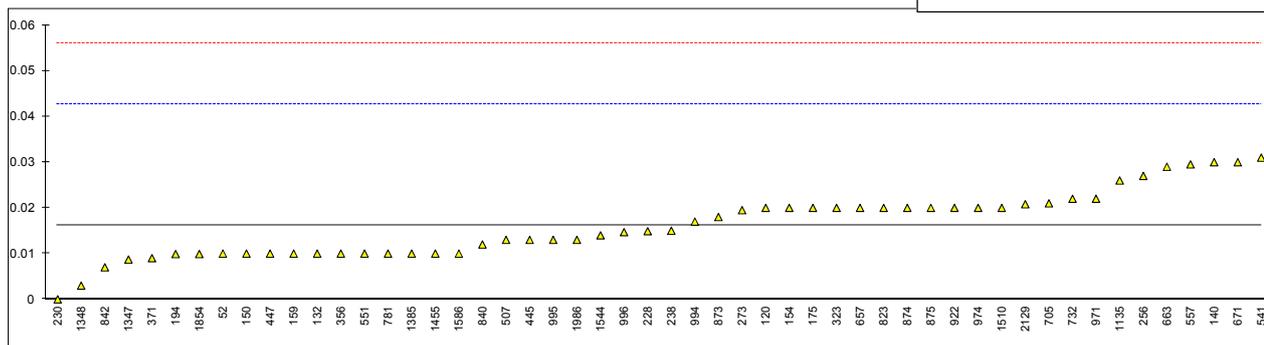
Determination of Total Sediment (Hot filtration) of sample #16280; results in %M/M

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	D4870	0.02		0.43	705	IP375	0.019		0.36
120	D4870	0.02		0.43	732		-----		-----
131	D4870	0.011		-0.28	750		-----		-----
132	ISO10307-1	0.01		-0.36	781	IP375	0.017		0.20
140	IP375	0.03		1.22	823	IP375	0.02		0.43
150		-----		-----	840	ISO10307-1	0.016		0.12
154		-----		-----	842		-----		-----
158		-----		-----	873	IP375	0.015		0.04
159		-----		-----	874	IP375	0.020		0.43
168		-----		-----	875	IP375	0.012		-0.20
169		-----		-----	886		-----		-----
171		-----		-----	887		-----		-----
175		-----		-----	922	ISO10307-1	0.020		0.43
194		-----		-----	962		-----		-----
228		-----		-----	963		-----		-----
230	ISO10307-1	0.019		0.36	971	IP375	0.014		-0.04
237	D4870	0.00432		-0.81	974	IP375	0.011		-0.28
238		-----		-----	994	IP375	0.015		0.04
256		-----		-----	995	D4870	0.015		0.04
273		-----		-----	996		-----		-----
311	IP375	0.01		-0.36	1040	ISO10307-1	0.01		-0.36
313		-----		-----	1131		-----		-----
323	IP375	0.02		0.43	1135	ISO10307-1	0.014		-0.04
336	IP375	0.02		0.43	1347		-----		-----
342	ISO10307-1	0.00		-1.15	1348		-----		-----
349		-----		-----	1356	ISO10307-1	0.014		-0.04
351	ISO10307-1	0.015		0.04	1367	IP375	<0.01		-----
353		-----		-----	1385		-----		-----
356		-----		-----	1455	ISO10307-1	0.01		-0.36
371	IP375	0.006		-0.67	1510	IP375	0.01		-0.36
399		-----		-----	1540		-----		-----
445	IP375	0.014		-0.04	1544	ISO10307-1	0.01		-0.36
447	D4870	0.01		-0.36	1586	ISO10307-1	0.02		0.43
494	ISO10307-1	0.014		-0.04	1631		-----		-----
507	IP375	0.012		-0.20	1648	ISO10307-1	0.010		-0.36
529		-----		-----	1854	ISO10307-1	0.012		-0.20
541	D4870	0.016	C	0.12	1906		-----		-----
551		-----		-----	1986	IP375	0.014		-0.04
557		-----		-----	1995	IP375	0.002		-0.99
558		-----		-----	2129	IP375	0.0195		0.39
633		-----		-----	6044	ISO10307-1	0.018564		0.32
634		-----		-----	6049	IP375	0.02		0.43
657	IP375	0.02		0.43	6057	ISO10307-1	0.015		0.04
663	IP375	0.012		-0.20	6092	IP375	0.02		0.43
671		-----		-----					

|	
normality	OK
n	48
outliers	0
mean (n)	0.0145
st.dev. (n)	0.00550
R(calc.)	0.0154
R(IP375:11)	0.0354
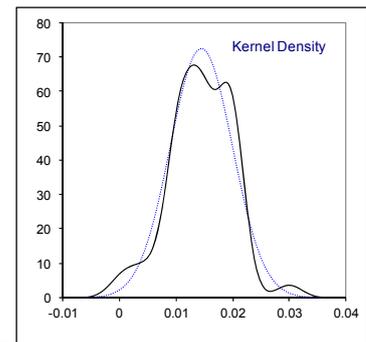
Lab 541 first reported: 0.06

Kernel Density
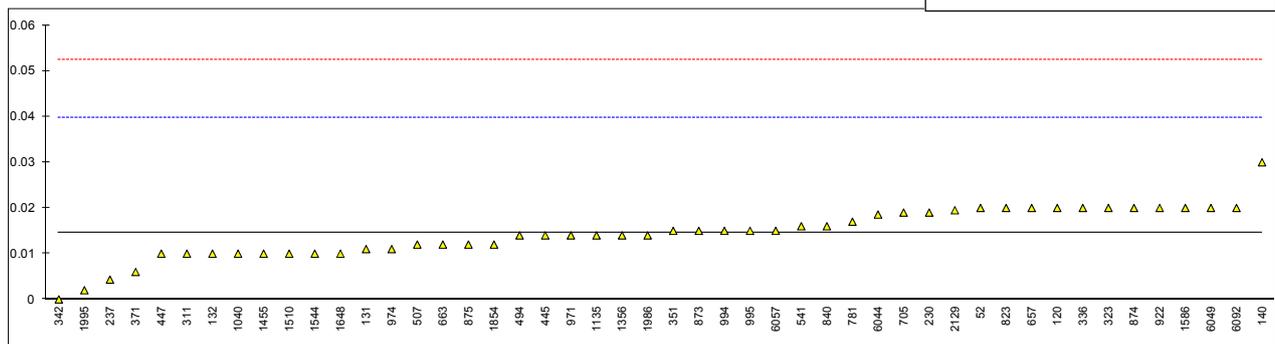
Determination of Total Sediment (Accelerated) of sample #16280; results in %M/M

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	D4870	0.02		0.43	705	IP390	0.020		0.43
120	D4870	0.02		0.43	732		-----		-----
131		-----		-----	750		-----		-----
132	ISO10307-2	0.02		0.43	781	IP390	0.015		0.04
140		-----		-----	823	IP390	0.02		0.43
150		-----		-----	840	ISO10307-2	0.014		-0.04
154		-----		-----	842		-----		-----
158		-----		-----	873	IP390	0.015		0.04
159		-----		-----	874	IP390	0.018		0.28
168		-----		-----	875	IP390	0.012		-0.20
169		-----		-----	886		-----		-----
171		-----		-----	887		-----		-----
175		-----		-----	922	ISO10307-2	0.021		0.51
194	D4870	0.011		-0.28	962		-----		-----
228		-----		-----	963		-----		-----
230	ISO10307-2	0.013		-0.12	971	IP390	0.013		-0.12
237	D4870	0.00482		-0.77	974	IP390	0.009		-0.44
238		-----		-----	994	IP390	0.015		0.04
256		-----		-----	995	IP390	0.017		0.20
273		-----		-----	996		-----		-----
311	IP390	0.01		-0.36	1040		-----		-----
313		-----		-----	1131		-----		-----
323	IP390	0.02		0.43	1135	ISO10307-2	0.013		-0.12
336		-----		-----	1347	D4870	0.0135		-0.08
342	ISO10307-2	0.01		-0.36	1348	D4870	0.024		0.75
349		-----		-----	1356	ISO10307-2	0.015		0.04
351	ISO10307-2	0.0200		0.43	1367		-----		-----
353		-----		-----	1385	D4870	0.026		0.91
356		-----		-----	1455	ISO10307-2	0.01		-0.36
371	IP390	0.006		-0.67	1510	IP390	0.01		-0.36
399		-----		-----	1540		-----		-----
445	IP390	0.012		-0.20	1544	ISO10307-2	0.01		-0.36
447	D4870	0.02		0.43	1586	ISO10307-2	0.01		-0.36
494	ISO10307-2	0.012		-0.20	1631	ISO10307-2	0.0124		-0.17
507	IP390	0.010		-0.36	1648	ISO10307-2	0.012		-0.20
529		-----		-----	1854	ISO10307-2	0.011		-0.28
541		-----		-----	1906		-----		-----
551		-----		-----	1986	IP390	0.015		0.04
557	D4870	0.0173358		0.22	1995	IP390	0.001		-1.07
558		-----		-----	2129	IP390	0.0195		0.40
633		-----		-----	6044	ISO10307-2	0.017983		0.28
634		-----		-----	6049	ISO10307-2	0.01		-0.36
657	IP390	0.02		0.43	6057	ISO10307-2	0.016		0.12
663		-----		-----	6092		-----		-----
671		-----		-----					

normality	OK	
n	47	
outliers	0	
mean (n)	0.0145	
st.dev. (n)	0.00512	
R(calc.)	0.0143	
R(IP390:11)	0.0354	
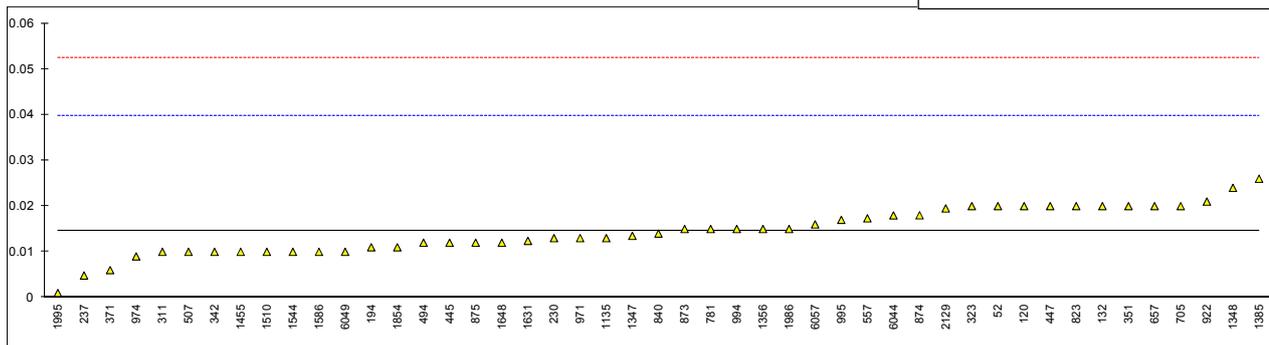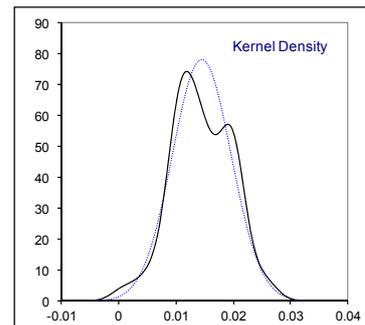
Determination of Total Sediment (Potential) of sample #16280; results in %M/M

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	D4870	0.02		0.56	705	IP390	0.022		0.73
120	D4870	0.02		0.56	732		-----		-----
131	D4870	0.014		0.06	750		-----		-----
132	ISO10307-2	0.01		-0.27	781	IP390	0.011		-0.18
140		-----		-----	823	IP390	0.02		0.56
150		-----		-----	840	ISO10307-2	0.014		0.06
154		-----		-----	842		-----		-----
158		-----		-----	873	IP390	0.015		0.15
159		-----		-----	874	IP390	0.016		0.23
168		-----		-----	875	IP390	0.014		0.06
169		-----		-----	886		-----		-----
171		-----		-----	887		-----		-----
175		-----		-----	922	ISO10307-2	0.022		0.73
194	D4870	0.008		-0.43	962		-----		-----
228		-----		-----	963		-----		-----
230	ISO10307-2	0.015		0.15	971	IP390	0.012		-0.10
237	D4870	0.00507		-0.68	974	IP390	0.010		-0.27
238		-----		-----	994	IP390	0.015		0.15
256		-----		-----	995	IP390	0.018		0.39
273		-----		-----	996		-----		-----
311		-----		-----	1040	ISO10307-2	<0,01		-----
313		-----		-----	1131		-----		-----
323	IP390	0.02		0.56	1135	ISO10307-2	0.008		-0.43
336		-----		-----	1347		-----		-----
342	ISO10307-2	0.00		-1.10	1348		-----		-----
349		-----		-----	1356	ISO10307-2	0.015		0.15
351	ISO10307-2	0.0199		0.55	1367	IP390	<0.01		-----
353		-----		-----	1385		-----		-----
356		-----		-----	1455	ISO10307-2	0.01		-0.27
371	IP390	0.014		0.06	1510		-----		-----
399		-----		-----	1540		-----		-----
445	IP390	0.011		-0.18	1544	ISO10307-2	0.01		-0.27
447	D4870	0.01		-0.27	1586		-----		-----
494	ISO10307-2	0.014		0.06	1631		-----		-----
507	IP390	0.008		-0.43	1648	ISO10307-2	0.016		0.23
529		-----		-----	1854	ISO10307-2	0.016		0.23
541		-----		-----	1906		-----		-----
551		-----		-----	1986	IP390	0.012		-0.10
557		-----		-----	1995	IP390	0.001		-1.01
558		-----		-----	2129	IP390	0.01725		0.33
633		-----		-----	6044	ISO10307-2	0.0092		-0.33
634		-----		-----	6049	ISO10307-2	0.01		-0.27
657	IP390	0.02		0.56	6057	ISO10307-2	0.01		-0.27
663	IP390	0.010		-0.27	6092		-----		-----
671		-----		-----					

normality	OK
n	41
outliers	0
mean (n)	0.0132
st.dev. (n)	0.00522
R(calc.)	0.0146
R(IP390:11)	0.0338

Kernel Density
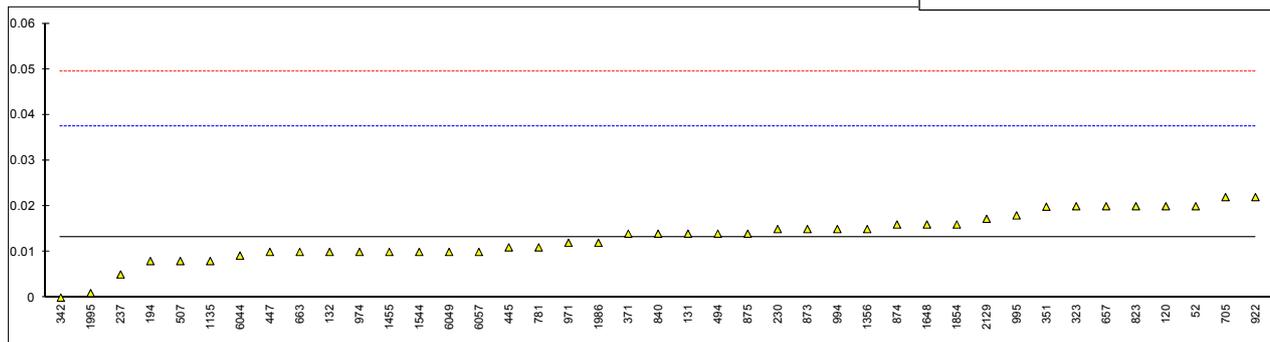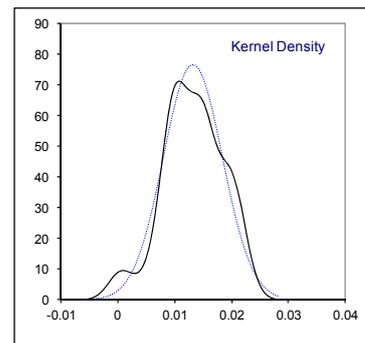
Determination of Total Sulphur on sample #16280; results in %M/M

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	D4294	0.974		0.43	705	ISO8754	0.922		-1.19
120	ISO8754	0.986		0.80	732	ISO8754	0.937		-0.72
131		-----		-----	750		-----		-----
132	ISO8754	1.00		1.23	781	ISO8754	0.934		-0.82
140	D4294	0.966		0.18	823	ISO8754	0.976		0.49
150	D4294	0.959		-0.04	840	ISO8754	0.9856		0.79
154	D4294	0.970		0.30	842	D4294	1.027		2.07
158		-----		-----	873	D4294	0.939		-0.66
159	D4294	1.03		2.16	874	D4294	0.933		-0.85
168		-----		-----	875	D4294	0.932		-0.88
169	D4294	0.9658		0.17	886		-----		-----
171		-----		-----	887		-----		-----
175	D4294	0.982		0.67	922	D4294	0.977		0.52
194	D4294	0.9674		0.22	962		-----		-----
228	D4294	1.023		1.95	963		-----		-----
230		-----		-----	971	D4294	0.938		-0.69
237		-----		-----	974	D4294	0.964		0.11
238	D4294	0.9388		-0.67	994	D4294	0.953		-0.23
256	D4294	0.96		-0.01	995	D4294	0.9673		0.22
273	D4294	0.99		0.92	996	D4294	0.9586		-0.05
311	D4294	0.964		0.11	1040	ISO8754	0.987		0.83
313	D4294	0.974		0.43	1131	ISO8754	0.92		-1.25
323	ISO8754	0.97		0.30	1135	ISO8754	0.916		-1.38
336	D4294	0.948		-0.38	1347	D4294	0.977		0.52
342	ISO8754	0.964		0.11	1348	D4294	0.935		-0.79
349		-----		-----	1356	ISO8754	0.940		-0.63
351	ISO8754	0.992		0.98	1367	D4294	0.94		-0.63
353		-----		-----	1385	D4294	0.999		1.20
356	D4294	0.933		-0.85	1455	D2622	0.906		-1.69
371	D4294	0.993		1.02	1510	IP336	0.96		-0.01
399	ISO8754	0.97		0.30	1540	D2622	0.902		-1.81
445	IP336	0.951		-0.29	1544	ISO8754	0.938		-0.69
447	IP336	0.900		-1.87	1586	ISO8754	0.93		-0.94
494	ISO8754	0.94		-0.63	1631	ISO8754	0.974		0.43
507	ISO8754	0.9770		0.52	1648	D4294	1.02		1.85
529		-----		-----	1854	ISO8754	0.970		0.30
541	ISO8754	0.9973		1.15	1906		-----		-----
551	D4294	1.0292		2.14	1986	IP336	0.943		-0.54
557	D4294	0.961424		0.03	1995	D4294	0.9078		-1.63
558		-----		-----	2129	ISO8754	0.951		-0.29
633		-----		-----	6044	ISO8754	0.945		-0.48
634	D4294	0.971		0.33	6049	ISO8754	0.937		-0.72
657	D4294	0.921		-1.22	6057	ISO8754	0.933		-0.85
663	D4294	0.9250		-1.10	6092		-----		-----
671	D4294	1.015		1.70					

normality	OK	
n	71	
outliers	0	
mean (n)	0.9603	
st.dev. (n)	0.03112	
R(calc.)	0.0871	
R(ISO8754:03)	0.0902	
Compare R(D4294:16e1)	0.0709	
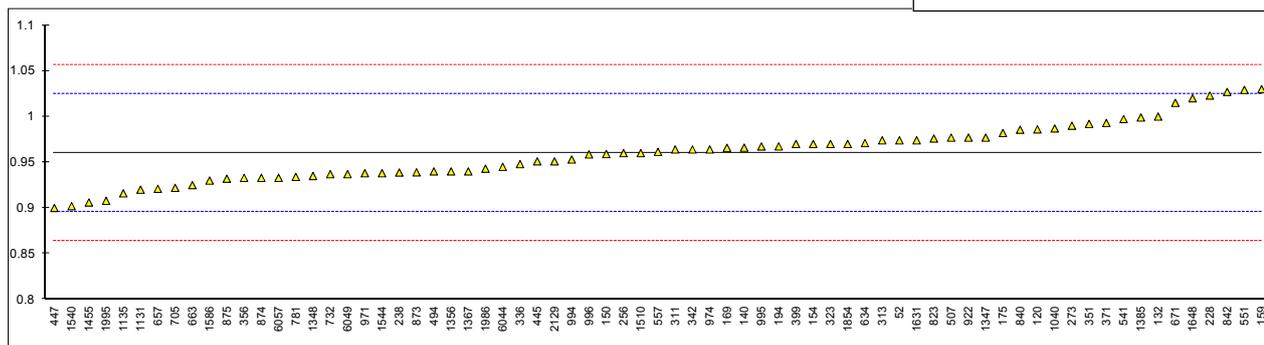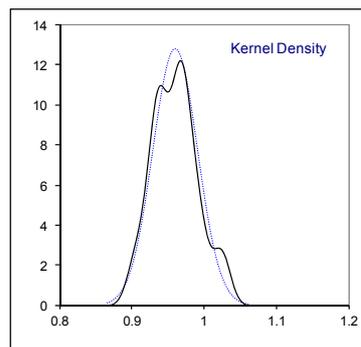
Determination of Water by distillation on sample #16280; results in %V/V

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	D95	<0.05		-----	705	ISO3733	0.05		0.04
120	ISO3733	<0.05		-----	732	GOST2477	0.06		0.18
131	D95	0.05		0.04	750		-----		-----
132	ISO3733	0.10		0.74	781	ISO3733	0.05		0.04
140		-----		-----	823	ISO3733	0.05		0.04
150	D95	0.10		0.74	840	ISO3733	0.05		0.04
154	D95	0.05		0.04	842	D95	0.05		0.04
158		-----		-----	873	D95	0.05		0.04
159	D95	0.0		-0.66	874	D95	0.05		0.04
168		-----		-----	875	D95	0.05		0.04
169		-----		-----	886	D95	0.05		0.04
171		-----		-----	887	D95	0.05		0.04
175	D95	0		-0.66	922	D95	<0.05		-----
194	ISO3733	0.05		0.04	962		-----		-----
228	D95	0		-0.66	963		-----		-----
230	ISO3733	0.05		0.04	971	D95	0.050		0.04
237	D95	0.05		0.04	974	D95	0.05		0.04
238	D95	0.05		0.04	994	D95	0.05		0.04
256	D95	0.05		0.04	995	ISO3733	0.05		0.04
273	D95	0.05		0.04	996	D95	0.05		0.04
311	D95	<0.05		-----	1040		-----		-----
313	D95	0.05		0.04	1131	ISO3733	<0.05		-----
323	ISO3733	<0.05		-----	1135	ISO3733	0.05		0.04
336		-----		-----	1347	D95	0		-0.66
342	ISO3733	< 0,1		-----	1348	D95	0.05		0.04
349	D95	<0.1		-----	1356	D6304-A	0.02		-0.38
351	ISO3733	<0.05		-----	1367	D95	0.0		-0.66
353		-----		-----	1385	D95	0.05		0.04
356	D95	0.10		0.74	1455	D95	<0.05		-----
371	ISO3733	0.10		0.74	1510	D95	0.05		0.04
399	ISO3733	<0.05		-----	1540	ISO3733	0.05		0.04
445	ISO3733	<0.05		-----	1544	ISO3733	0.05		0.04
447	D95	0.05		0.04	1586	D95	<0.10		-----
494	ISO3733	0.05		0.04	1631	D95	<0.05		-----
507	ISO3733	0.05		0.04	1648	ISO3733	0.05		0.04
529		-----		-----	1854	D6304-C	0.018		-0.41
541	ISO3733	<0.05		-----	1906		-----		-----
551	D95	<0,05		-----	1986	D95	0.00		-0.66
557	D95	0.00		-0.66	1995	D95	0.0		-0.66
558		-----		-----	2129	ISO3733	0.05		0.04
633	D95	0.1		0.74	6044	D6304-C	0.03396		-0.18
634	D95	0.05		0.04	6049	D95	traces		-----
657	D95	0.10		0.74	6057	ISO3733	0.05		0.04
663	D95	<0.1		-----	6092	D95	<0.05		-----
671	D95	0.2	R(0.01)	2.14					

normality	OK
n	55
outliers	1
mean (n)	0.0469
st.dev. (n)	0.02609
R(calc.)	0.0731
R(ISO3733:99)	0.2000
Compare R(D95:13e1)	0.2000

Kernel Density
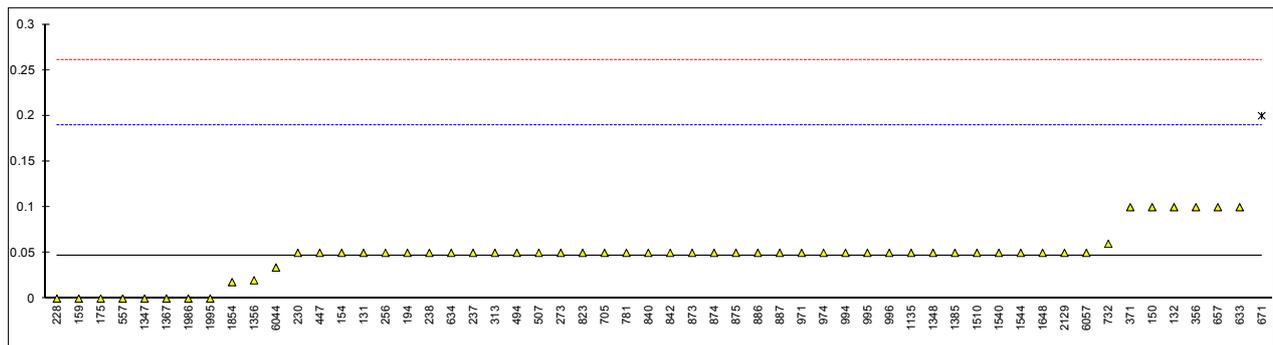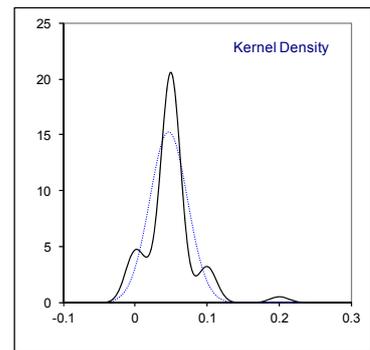
Determination of Water and Sediment on sample #16280; results in %V/V

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	D1796	0.05		-0.20	705		-----		-----
120	D1796	<0.05		-----	732		-----		-----
131	D1796	0.05		-0.20	750		-----		-----
132	D1796	0.10		1.13	781	D1796	0.075		0.47
140		-----		-----	823	D1796	0.05		-0.20
150	D1796	0.05		-0.20	840	D1796	0.05		-0.20
154	D1796	0.05		-0.20	842		-----		-----
158		-----		-----	873		-----		-----
159	D1796	0.05		-0.20	874	D1796	0.075		0.47
168		-----		-----	875		-----		-----
169	D1796	0.050		-0.20	886	D1796	0.10		1.13
171		-----		-----	887		-----		-----
175		-----		-----	922	D1796	<0.10		
194	D1796	0.05		-0.20	962		-----		-----
228		-----		-----	963		-----		-----
230		-----		-----	971		-----		-----
237	D1796	0.05		-0.20	974	D1796	0.05		-0.20
238		-----		-----	994	D1796	0.05		-0.20
256		-----		-----	995		-----		-----
273		-----		-----	996		-----		-----
311		-----		-----	1040		-----		-----
313		-----		-----	1131		-----		-----
323		-----		-----	1135	D1796	0.05		-0.20
336		-----		-----	1347	D1796	0.1		1.13
342		-----		-----	1348	D1796	0.05		-0.20
349		-----		-----	1356		-----		-----
351		-----		-----	1367		-----		-----
353		-----		-----	1385	D1796	0.05		-0.20
356		-----		-----	1455		-----		-----
371		-----		-----	1510		-----		-----
399		-----		-----	1540		-----		-----
445		-----		-----	1544	D1796	0.05		-0.20
447		-----		-----	1586	D1796	0.10		1.13
494		-----		-----	1631		-----		-----
507	D1796	0.050		-0.20	1648		-----		-----
529		-----		-----	1854		-----		-----
541		-----		-----	1906		-----		-----
551	D1796	0.05		-0.20	1986	D1796	0.00		-1.53
557	D1796	0.10		1.13	1995		-----		-----
558		-----		-----	2129		-----		-----
633		-----		-----	6044		-----		-----
634	D1796	0.05		-0.20	6049		-----		-----
657	D1796	0.05		-0.20	6057		-----		-----
663	D1796	0.025		-0.87	6092		-----		-----
671	D1796	0.05		-0.20					

normality	suspect
n	30
outliers	0
mean (n)	0.0575
st.dev. (n)	0.02288
R(calc.)	0.0641
R(D1796:11)	0.1050
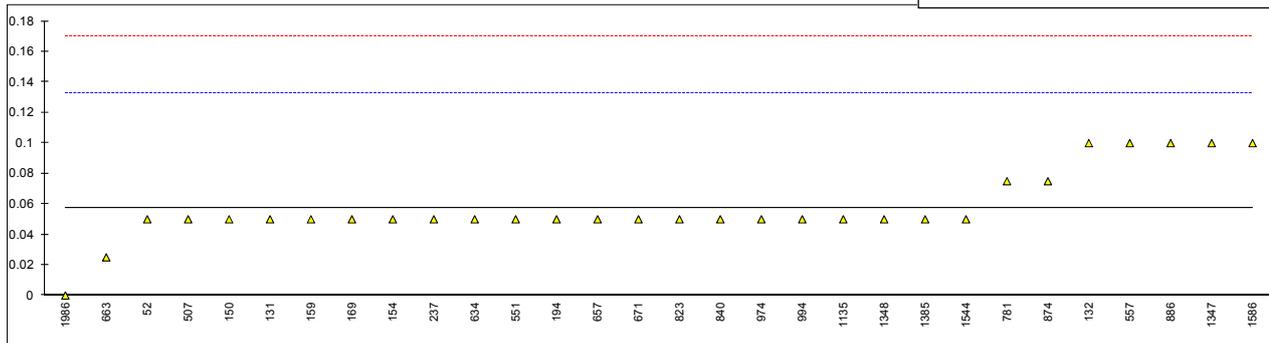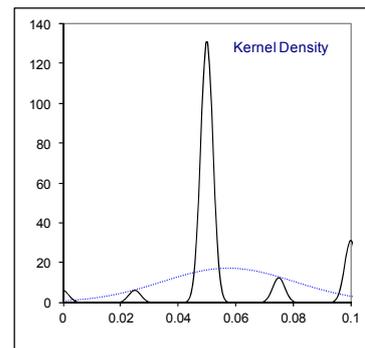
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Vacuum Distillation according to ASTM D1160 (as AET) on sample #16280, results in °C

lab	method	IBP	5% rec	10% rec	20% rec	30% rec	40% rec	50% rec	FBP
52		-----	-----	-----	-----	-----	-----	-----	-----
120	D1160	226.3	**238.8**	296.0	365.1	401.9	442.4	497.6	**550.8**
131		-----	-----	-----	-----	-----	-----	-----	-----
132		-----	-----	-----	-----	-----	-----	-----	-----
140		-----	-----	-----	-----	-----	-----	-----	-----
150	D1160	248.6	294.4	334.0	382.2	416.9	454.6	508.4	527.5
154		-----	-----	-----	-----	-----	-----	-----	-----
158		-----	-----	-----	-----	-----	-----	-----	-----
159		-----	-----	-----	-----	-----	-----	-----	-----
168		-----	-----	-----	-----	-----	-----	-----	-----
169		-----	-----	-----	-----	-----	-----	-----	-----
171		-----	-----	-----	-----	-----	-----	-----	-----
175		-----	-----	-----	-----	-----	-----	-----	-----
194		-----	-----	-----	-----	-----	-----	-----	-----
228		-----	-----	-----	-----	-----	-----	-----	-----
230		-----	-----	-----	-----	-----	-----	-----	-----
237	D1160	203.0	250.0	302.0	362.0	400.0	434.0	498.0 **C**	545.0 **C**
238		-----	-----	-----	-----	-----	-----	-----	-----
256		-----	-----	-----	-----	-----	-----	-----	-----
273		-----	-----	-----	-----	-----	-----	-----	-----
311	D1160	222.6	285.3	323.9	376.8	412.6	452.1	505.8	521.5
313		-----	-----	-----	-----	-----	-----	-----	-----
323	D1160	228	286	324	374	409	446	504	-----
336		-----	-----	-----	-----	-----	-----	-----	-----
342		-----	-----	-----	-----	-----	-----	-----	-----
349		-----	-----	-----	-----	-----	-----	-----	-----
351		-----	-----	-----	-----	-----	-----	-----	-----
353		-----	-----	-----	-----	-----	-----	-----	-----
356	D1160	_227 ex_	_300 ex_	_343 ex_	**391**	**425**	**465**	**523**	**565**
371		-----	-----	-----	-----	-----	-----	-----	-----
399		-----	-----	-----	-----	-----	-----	-----	-----
445	D1160	206.7	267.9	314.0	367.8	404.0	443.5	494.3	503.1
447		-----	-----	-----	-----	-----	-----	-----	-----
494	D1160	220.7	275.9	314.1	370.1	408.2	450.0	502.6	508.8
507		-----	-----	-----	-----	-----	-----	-----	-----
529		-----	-----	-----	-----	-----	-----	-----	-----
541		-----	-----	-----	-----	-----	-----	-----	-----
551		-----	-----	-----	-----	-----	-----	-----	-----
557		-----	-----	-----	-----	-----	-----	-----	-----
558		-----	-----	-----	-----	-----	-----	-----	-----
633		-----	-----	-----	-----	-----	-----	-----	-----
634		-----	-----	-----	-----	-----	-----	-----	-----
657	D1160	220.0	256.8	299.5	365.7	407.4	442.0	489.0	#
663		-----	-----	-----	-----	-----	-----	-----	-----
671		-----	-----	-----	-----	-----	-----	-----	-----
705		-----	-----	-----	-----	-----	-----	-----	-----
732		-----	-----	-----	-----	-----	-----	-----	-----
750		-----	-----	-----	-----	-----	-----	-----	-----
781	D1160	199.8	278.7	317.7	374.6	410.6	447.7	493.1	523.1
823	D1160	205.0	252.5	289.5	359.1	397.6	433.4	484.8	520.9
840		-----	-----	-----	-----	-----	-----	-----	-----
842		-----	-----	-----	-----	-----	-----	-----	-----
873	D1160	200.0	271.5	317.1	372.0	406.7	440.0	489.2	516.9
874	D1160	200	274 **C**	312	373	408	446	497	520
875	D1160	220	277	310	371	410	444	498	538
886		-----	-----	-----	-----	-----	-----	-----	-----
887		-----	-----	-----	-----	-----	-----	-----	-----
922		-----	-----	-----	-----	-----	-----	-----	-----
962		-----	-----	-----	-----	-----	-----	-----	-----
963		-----	-----	-----	-----	-----	-----	-----	-----
971		-----	-----	-----	-----	-----	-----	-----	-----
974		-----	-----	-----	-----	-----	-----	-----	-----
994	D1160	202.0	262.0	301.0	359.0	396.0	434.0	487.0	520.0
995		-----	-----	-----	-----	-----	-----	-----	-----
996		-----	-----	-----	-----	-----	-----	-----	-----
1040		-----	-----	-----	-----	-----	-----	-----	-----
1131		-----	-----	-----	-----	-----	-----	-----	-----
1135	D1160	195.1	257.2	316.1	379.6	**421.8**	_457.9 ex_	510.9	539.3
1347		-----	-----	-----	-----	-----	-----	-----	-----
1348		-----	-----	-----	-----	-----	-----	-----	-----
1356		-----	-----	-----	-----	-----	-----	-----	-----
1367		-----	-----	-----	-----	-----	-----	-----	-----
1385		-----	-----	-----	-----	-----	-----	-----	-----
1455	D1160	220	281	325	374	409	449	501	519
1510		-----	-----	-----	-----	-----	-----	-----	-----

lab	method	IBP	5% rec	10% rec	20% rec	30% rec	40% rec	50% rec	FBP
1540		-----	-----	-----	-----	-----	-----	-----	-----
1544		-----	-----	-----	-----	-----	-----	-----	-----
1586		-----	-----	-----	-----	-----	-----	-----	-----
1631		216.3	281.1	322.7	374.8	409.3	446.7	501.5	-----
1648		-----	-----	-----	-----	-----	-----	-----	-----
1854		-----	-----	-----	-----	-----	-----	-----	-----
1906		-----	-----	-----	-----	-----	-----	-----	-----
1986		-----	-----	-----	-----	-----	-----	-----	-----
1995		-----	-----	-----	-----	-----	-----	-----	-----
2129	D1160	212	284	323	372	411	449	505	522
6044		-----	-----	-----	-----	-----	-----	-----	-----
6049		-----	-----	-----	-----	-----	-----	-----	-----
6057		-----	-----	-----	-----	-----	-----	-----	-----
6092		-----	-----	-----	-----	-----	-----	-----	-----
normality		OK	OK	OK	OK	OK	OK	OK	OK
n		18	17	18	18	17	17	18	14
outliers		0+1ex	1+1ex	0+1ex	1	2	1+1ex	1	2
mean (n)		213.67	272.66	313.42	370.71	406.95	444.38	498.18	523.22
st.dev. (n)		13.57	12.98	11.79	6.52	5.46	6.25	7.49	11.34
R(calc.)		37.99	36.34	33.02	18.27	15.28	17.51	20.98	31.74
R(D1160:15)		49.45	23.84	20.06	17.49	15.86	17.31	14.38	26.89

**The reported results underlined and bold are statistical outliers.**

*The reported results inderlined and italic are excluded (see §4.1)*

Lab 237 first reported: 478.0 for 50% rec. and 575.0 for FBP

Lab 657 reported: #) distillation end at 53.0% recovered and T=508.3°C. Liquid temp is 400.0 °C

Lab 873 reported: test was discontinued as the critical bottom temp of 400°C was achieved

Lab 874 first reported: 174 for 5% rec.
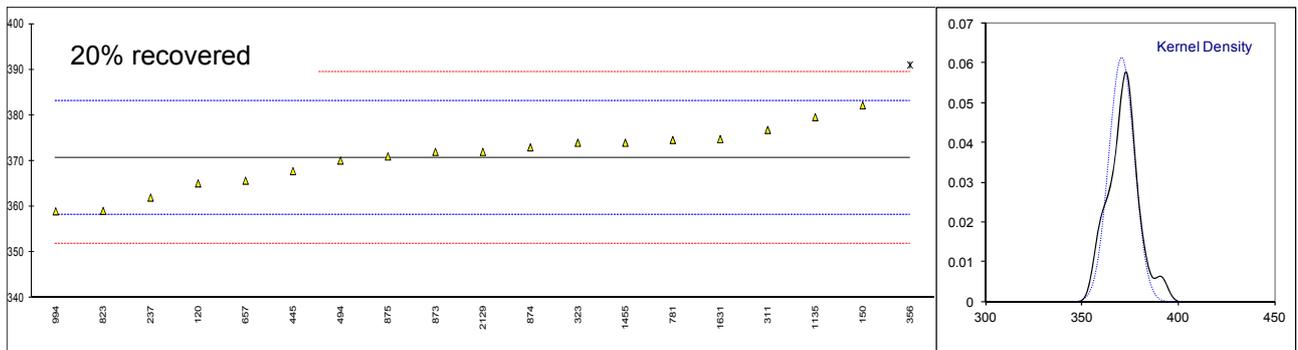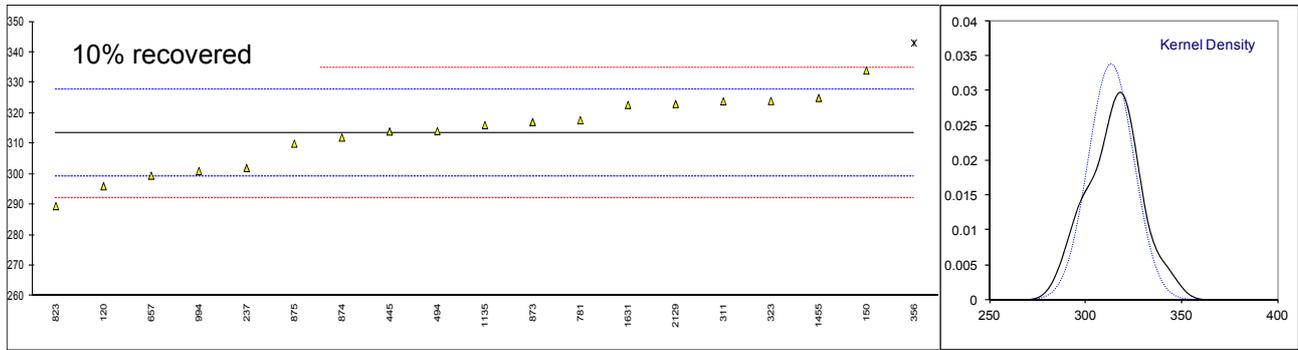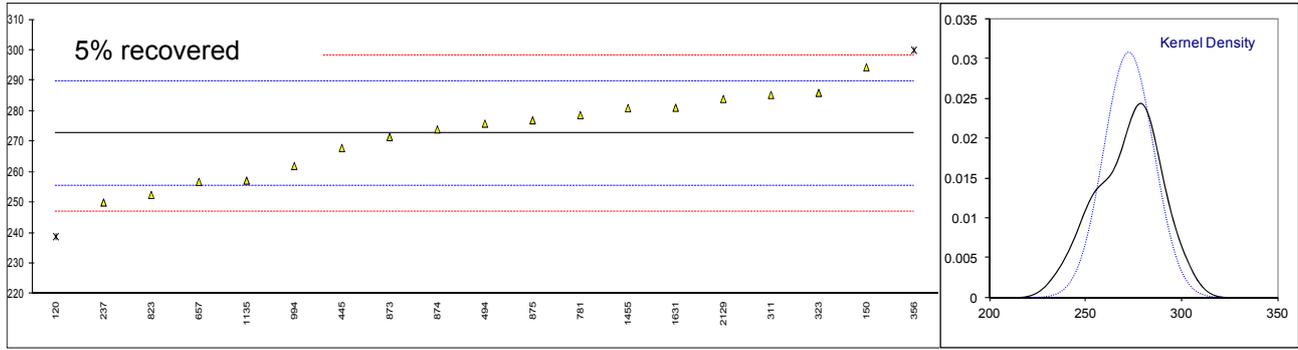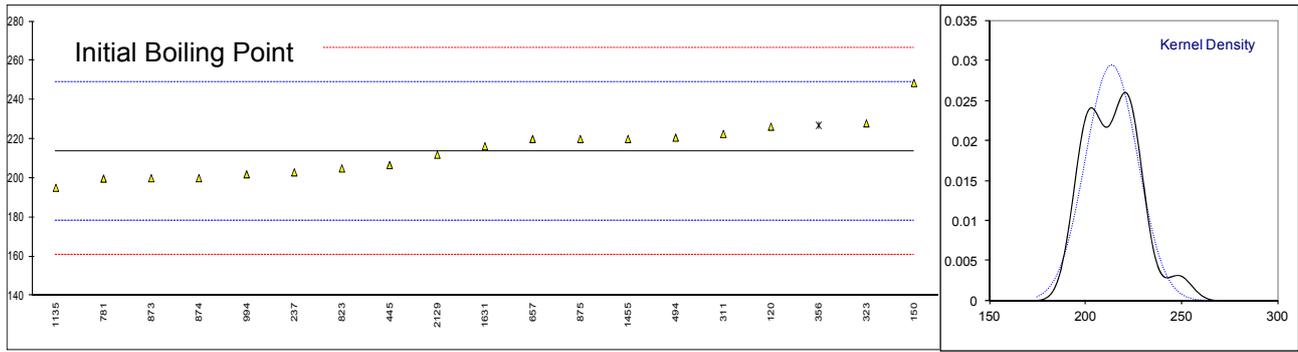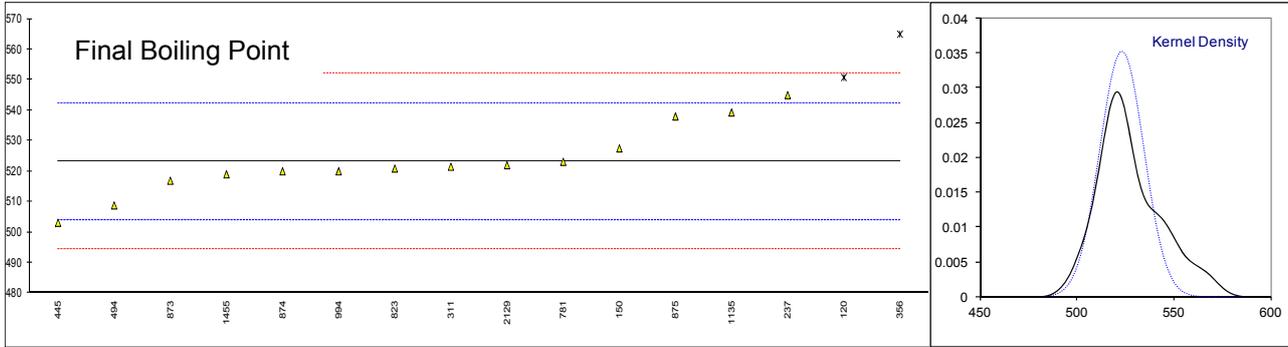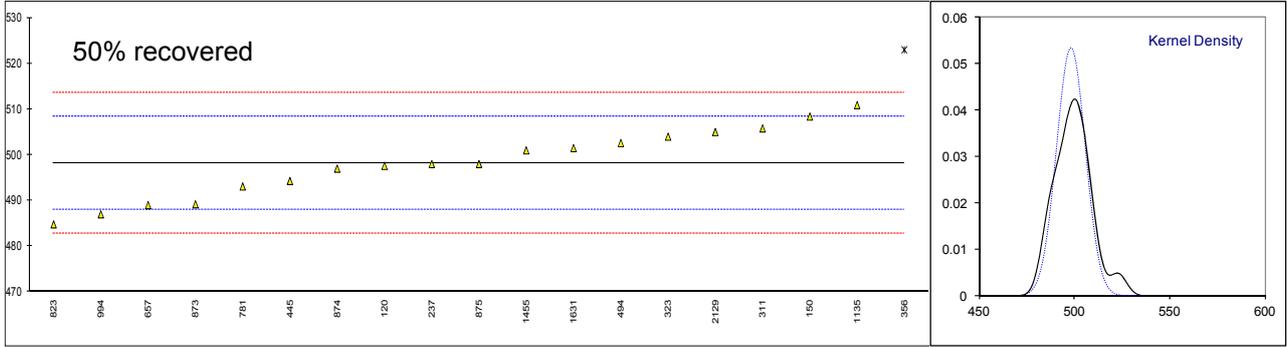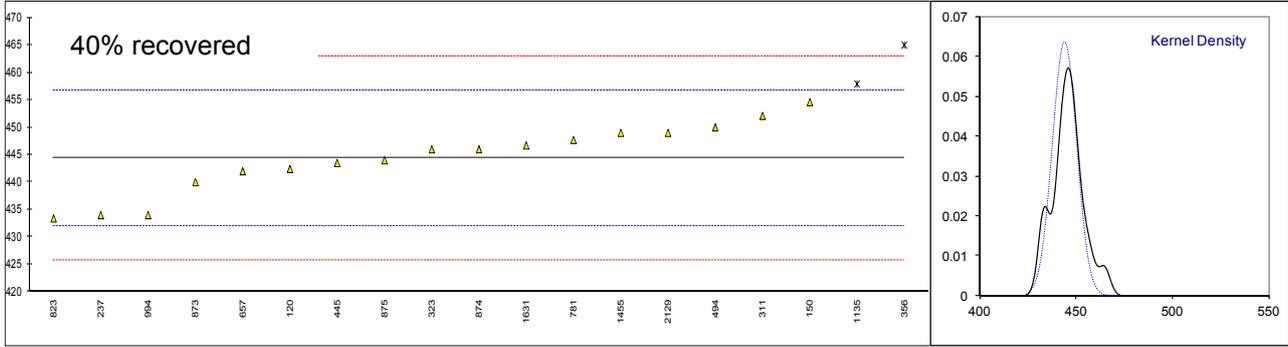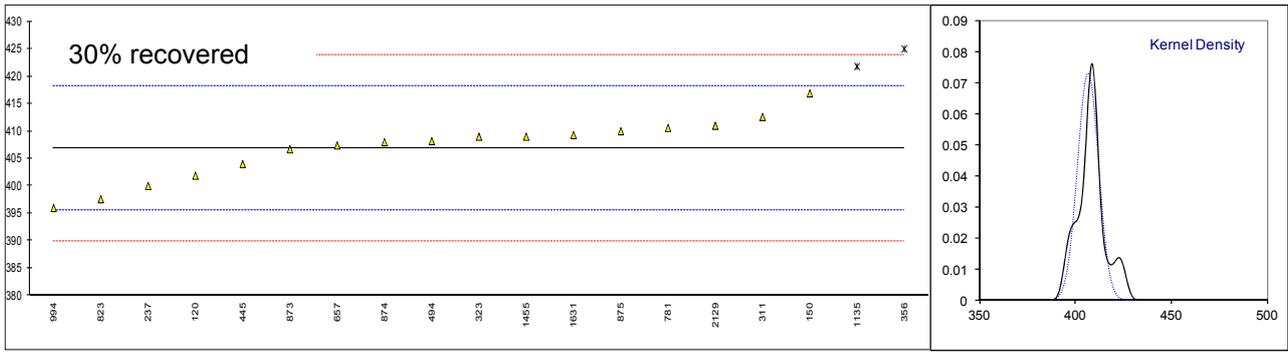
z-scores of Vacuum Distillation according to ASTM D1160 on sample #16280, results in °C

lab	method	IBP	5% rec	10% rec	20% rec	30% rec	40% rec	50% rec	FBP
52		-----	-----	-----	-----	-----	-----	-----	-----
120	D1160	0.72	-3.98	-2.43	-0.90	-0.89	-0.32	-0.11	2.87
131		-----	-----	-----	-----	-----	-----	-----	-----
132		-----	-----	-----	-----	-----	-----	-----	-----
140		-----	-----	-----	-----	-----	-----	-----	-----
150	D1160	1.98	2.55	2.87	1.84	1.76	1.65	1.99	0.45
154		-----	-----	-----	-----	-----	-----	-----	-----
158		-----	-----	-----	-----	-----	-----	-----	-----
159		-----	-----	-----	-----	-----	-----	-----	-----
168		-----	-----	-----	-----	-----	-----	-----	-----
169		-----	-----	-----	-----	-----	-----	-----	-----
171		-----	-----	-----	-----	-----	-----	-----	-----
175		-----	-----	-----	-----	-----	-----	-----	-----
194		-----	-----	-----	-----	-----	-----	-----	-----
228		-----	-----	-----	-----	-----	-----	-----	-----
230		-----	-----	-----	-----	-----	-----	-----	-----
237	D1160	-0.60	-2.66	-1.59	-1.39	-1.23	-1.68	-0.03	2.27
238		-----	-----	-----	-----	-----	-----	-----	-----
256		-----	-----	-----	-----	-----	-----	-----	-----
273		-----	-----	-----	-----	-----	-----	-----	-----
311	D1160	0.51	1.48	1.46	0.97	1.00	1.25	1.48	-0.18
313		-----	-----	-----	-----	-----	-----	-----	-----
323	D1160	0.81	1.57	1.48	0.53	0.36	0.26	1.13	-----
336		-----	-----	-----	-----	-----	-----	-----	-----
342		-----	-----	-----	-----	-----	-----	-----	-----
349		-----	-----	-----	-----	-----	-----	-----	-----
351		-----	-----	-----	-----	-----	-----	-----	-----
353		-----	-----	-----	-----	-----	-----	-----	-----
356	D1160	0.75	3.21	4.13	3.25	3.19	3.34	4.83	4.35
371		-----	-----	-----	-----	-----	-----	-----	-----
399		-----	-----	-----	-----	-----	-----	-----	-----
445	D1160	-0.39	-0.56	0.08	-0.47	-0.52	-0.14	-0.75	-2.09
447		-----	-----	-----	-----	-----	-----	-----	-----
494	D1160	0.40	0.38	0.09	-0.10	0.22	0.91	0.86	-1.50
507		-----	-----	-----	-----	-----	-----	-----	-----
529		-----	-----	-----	-----	-----	-----	-----	-----
541		-----	-----	-----	-----	-----	-----	-----	-----
551		-----	-----	-----	-----	-----	-----	-----	-----
557		-----	-----	-----	-----	-----	-----	-----	-----
558		-----	-----	-----	-----	-----	-----	-----	-----
633		-----	-----	-----	-----	-----	-----	-----	-----
634		-----	-----	-----	-----	-----	-----	-----	-----
657	D1160	0.36	-1.86	-1.94	-0.80	0.08	-0.38	-1.79	-----
663		-----	-----	-----	-----	-----	-----	-----	-----
671		-----	-----	-----	-----	-----	-----	-----	-----
705		-----	-----	-----	-----	-----	-----	-----	-----
732		-----	-----	-----	-----	-----	-----	-----	-----
750		-----	-----	-----	-----	-----	-----	-----	-----
781	D1160	-0.79	0.71	0.60	0.62	0.64	0.54	-0.99	-0.01
823	D1160	-0.49	-2.37	-3.34	-1.86	-1.65	-1.78	-2.60	-0.24
840		-----	-----	-----	-----	-----	-----	-----	-----
842		-----	-----	-----	-----	-----	-----	-----	-----
873	D1160	-0.77	-0.14	0.51	0.21	-0.04	-0.71	-1.75	-0.66
874	D1160	-0.77	0.16	-0.20	0.37	0.18	0.26	-0.23	-0.34
875	D1160	0.36	0.51	-0.48	0.05	0.54	-0.06	-0.03	1.54
886		-----	-----	-----	-----	-----	-----	-----	-----
887		-----	-----	-----	-----	-----	-----	-----	-----
922		-----	-----	-----	-----	-----	-----	-----	-----
962		-----	-----	-----	-----	-----	-----	-----	-----
963		-----	-----	-----	-----	-----	-----	-----	-----
971		-----	-----	-----	-----	-----	-----	-----	-----
974		-----	-----	-----	-----	-----	-----	-----	-----
994	D1160	-0.66	-1.25	-1.73	-1.87	-1.93	-1.68	-2.18	-0.34
995		-----	-----	-----	-----	-----	-----	-----	-----
996		-----	-----	-----	-----	-----	-----	-----	-----
1040		-----	-----	-----	-----	-----	-----	-----	-----
1131		-----	-----	-----	-----	-----	-----	-----	-----
1135	D1160	-1.05	-1.82	0.37	1.42	2.62	2.19	2.48	1.67
1347		-----	-----	-----	-----	-----	-----	-----	-----
1348		-----	-----	-----	-----	-----	-----	-----	-----
1356		-----	-----	-----	-----	-----	-----	-----	-----
1367		-----	-----	-----	-----	-----	-----	-----	-----
1385		-----	-----	-----	-----	-----	-----	-----	-----
1455	D1160	0.36	0.98	1.62	0.53	0.36	0.75	0.55	-0.44
1510		----	----	----	----	----	----	----	----

lab	method	IBP	5% rec	10% rec	20% rec	30% rec	40% rec	50% rec	FBP
1540		-----	-----	-----	-----	-----	-----	-----	-----
1544		-----	-----	-----	-----	-----	-----	-----	-----
1586		-----	-----	-----	-----	-----	-----	-----	-----
1631		0.15	0.99	1.30	0.65	0.41	0.38	0.65	-----
1648		-----	-----	-----	-----	-----	-----	-----	-----
1854		-----	-----	-----	-----	-----	-----	-----	-----
1906		-----	-----	-----	-----	-----	-----	-----	-----
1986		-----	-----	-----	-----	-----	-----	-----	-----
1995		-----	-----	-----	-----	-----	-----	-----	-----
2129	D1160	-0.09	1.33	1.34	0.21	0.71	0.75	1.33	-0.13
6044		-----	-----	-----	-----	-----	-----	-----	-----
6049		-----	-----	-----	-----	-----	-----	-----	-----
6057		-----	-----	-----	-----	-----	-----	-----	-----
6092		-----	-----	-----	-----	-----	-----	-----	-----

Determination of Total Carbon, Hydrogen and Nitrogen on sample #16280; results in %M/M

Lab	method	Total C	mark	z(targ)	Total H	mark	z(targ)	Total N	mark	z(targ)
52		-----		-----	-----		-----	-----		-----
120		-----		-----	-----		-----	-----		-----
131		-----		-----	-----		-----	-----		-----
132		-----		-----	-----		-----	-----		-----
140		-----		-----	-----		-----	-----		-----
150		-----		-----	-----		-----	-----		-----
154		-----		-----	-----		-----	-----		-----
158		-----		-----	-----		-----	-----		-----
159		-----		-----	-----		-----	-----		-----
168		-----		-----	-----		-----	-----		-----
169		-----		-----	-----		-----	-----		-----
171		-----		-----	-----		-----	-----		-----
175		-----		-----	-----		-----	-----		-----
194		-----		-----	-----		-----	-----		-----
228		-----		-----	-----		-----	-----		-----
230		-----		-----	-----		-----	-----		-----
237		-----		-----	-----		-----	-----		-----
238		-----		-----	-----		-----	-----		-----
256		-----		-----	-----		-----	-----		-----
273		-----		-----	-----		-----	-----		-----
311		88.0		0.16	10.8		0.65	<0.75		-----
313		-----		-----	-----		-----	-----		-----
323	D5291 - C	87.5		-0.41	10.7		0.28	0.3		-2.00
336		-----		-----	-----		-----	-----		-----
342		-----		-----	-----		-----	-----		-----
349		-----		-----	-----		-----	-----		-----
351		-----		-----	-----		-----	-----		-----
353		-----		-----	-----		-----	-----		-----
356		-----		-----	-----		-----	-----		-----
371		-----		-----	-----		-----	-----		-----
399		-----		-----	-----		-----	-----		-----
445	D5291 - C	88.94		1.24	10.68		0.21	0.38		0.24
447	D5291 - B	88.15		0.34	10.46		-0.61	-----		-----
494		-----		-----	-----		-----	-----		-----
507		-----		-----	-----		-----	-----		-----
529		-----		-----	-----		-----	-----		-----
541		-----		-----	-----		-----	-----		-----
551		-----		-----	-----		-----	-----		-----
557		-----		-----	-----		-----	-----		-----
558		-----		-----	-----		-----	-----		-----
633		-----		-----	-----		-----	-----		-----
634		-----		-----	-----		-----	-----		-----
657	D5291 - B	87.88		0.03	11.59	D(0.01)	3.58	0.38		0.24
663		-----		-----	-----		-----	-----		-----
671		-----		-----	-----		-----	-----		-----
705		-----		-----	-----		-----	-----		-----
732		-----		-----	-----		-----	-----		-----
750		-----		-----	-----		-----	-----		-----
781		-----		-----	-----		-----	-----		-----
823	D5291 - D	88.0		0.16	10.6		-0.09	-----		-----
840		-----		-----	-----		-----	-----		-----
842		-----		-----	-----		-----	-----		-----
873		-----		-----	-----		-----	-----		-----
874		-----		-----	-----		-----	-----		-----
875		-----		-----	-----		-----	-----		-----
886		-----		-----	-----		-----	-----		-----
887		-----		-----	-----		-----	-----		-----
922		-----		-----	-----		-----	-----		-----
962		-----		-----	-----		-----	-----		-----
963		-----		-----	-----		-----	-----		-----
971		-----		-----	-----		-----	-----		-----
974		-----		-----	-----		-----	-----		-----
994		-----		-----	-----		-----	-----		-----
995		-----		-----	-----		-----	-----		-----
996		-----		-----	-----		-----	-----		-----
1040	DIN51732	86.54		-1.50	12.40	D(0.01)	6.59	0.36		-0.32
1131	D5291 - D	87.91		0.06	10.67		0.17	0.37		-0.04
1135	D5291 - A	88.36		0.57	10.89		0.99	0.27	DG(0.05)	-2.84
1347		-----		-----	-----		-----	-----		-----
1348		-----		-----	-----		-----	-----		-----
1356		-----		-----	-----		-----	-----		-----
1367		-----		-----	-----		-----	-----		-----
1385		-----		-----	-----		-----	-----		-----
1455		-----		-----	-----		-----	-----		-----
1510	D5291 - D	88.16		0.35	10.59		-0.13	0.41		1.08

Lab	method	Total C	mark	z(targ)	Total H	mark	z(targ)	Total N	mark	z(targ)
1540		-----		-----	-----		-----	-----		-----
1544		-----		-----	-----		-----	-----		-----
1586	D5291 - D	86.8		-1.21	10.8		0.65	-----		-----
1631		-----		-----	-----		-----	-----		-----
1648		-----		-----	-----		-----	-----		-----
1854	D5291 - C	88.27		0.47	10.42		-0.76	-----		-----
1906		-----		-----	-----		-----	-----		-----
1986		-----		-----	-----		-----	-----		-----
1995		-----		-----	-----		-----	-----		-----
2129	D5291 - D	87.62		-0.27	10.26		-1.35	0.40		0.80
6044		-----		-----	-----		-----	-----		-----
6049		-----		-----	-----		-----	-----		-----
6057		-----		-----	-----		-----	-----		-----
6092		-----		-----	-----		-----	-----		-----
normality		OK			OK			unknown		
n		13			11			7		
outliers		0			2			1		
mean (n)		87.8562			10.6245			0.3714		
st.dev. (n)		0.63598			0.18614			0.03579		
R(calc.)		1.7808			0.5212			0.1002		
R(D5291:16)		2.4541			0.7543			0.1000		
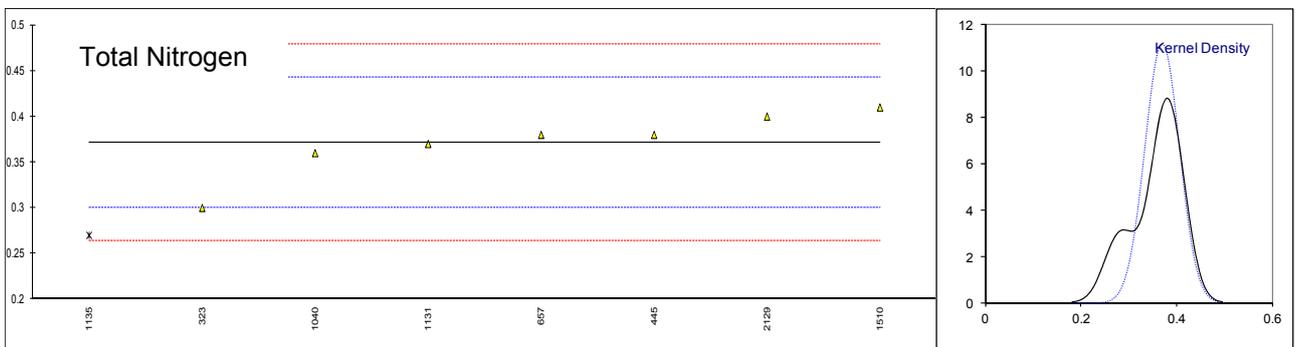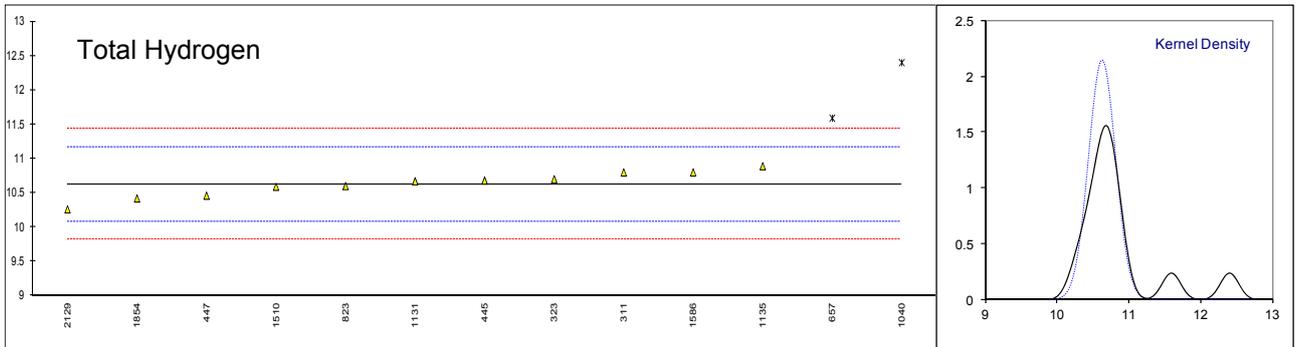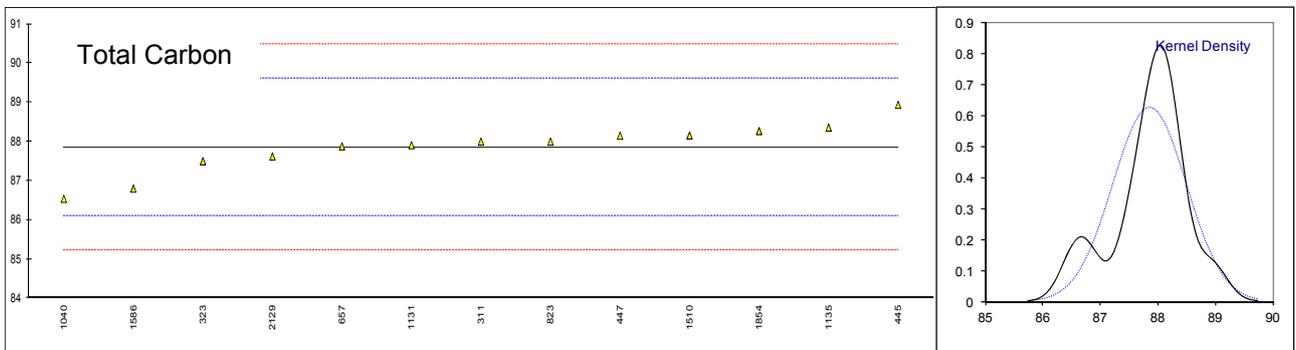
Determination of Aluminium as Al, Silicon as Si and total Al+Si on sample #16281; results in mg/kg

Lab	method	Al	mark	z(targ)	Si	mark	z(targ)	Sum Al+Si	mark	z(targ)
52	IP470	<5		-----	<10		-----	<15		-----
120	IP501	1		-----	2		-----	3		-----
131	IP501	1.936		-----	0.912		-----	2.848		-----
132	IP470	<5		-----	<10		-----	<15		-----
140		-----		-----	-----		-----	-----		-----
150	IP501	4.6		-----	2.4		-----	7		-----
154	D5184	<5		-----	<10		-----	-----		-----
158		-----		-----	-----		-----	-----		-----
159	D5184	1.0	C	-----	1.1		-----	1.1	ex	-----
168		-----		-----	-----		-----	-----		-----
169	D5184	2.871		-----	<2		-----	-----		-----
171		-----		-----	-----		-----	-----		-----
194	IP470	0.55		-----	1.0	C	-----	0.55	ex	-----
230	IP470	2.66		-----	3.91		-----	6.57		-----
237	IP501	2.215		-----	3.341		-----	5.556		-----
273	IP470	4	C	-----	8	C	-----	12	C	-----
311	IP501	<5		-----	<10		-----	<15		-----
323	IP501	< 5		-----	< 10		-----	< 15		-----
336	IP470	<5		-----	<10		-----	<15	C	-----
342	IP501	1.7		-----	3.7		-----	5.4		-----
351	IP501	2.2		-----	1.2		-----	3.4		-----
356	IP501	3		-----	8		-----	11		-----
371	IP470	Less than 5		-----	Less than 10		-----	Less than 15		-----
399	IP501	1.23		-----	2.04		-----	3.27		-----
445	IP501	5		-----	10		-----	15		-----
447	IP470	0		-----	8.6		-----	9		-----
494	IP501	< 5		-----	< 10		-----	<15		-----
507	D5184	0.70		-----	6.5		-----	7.2		-----
541	IP470	<5		-----	<10		-----	<15		-----
551	IP501	1.29		-----	4.54		-----	5.83		-----
557	IP501	3.0326		-----	3.9419		-----	6.9745		-----
634		-----		-----	-----		-----	-----		-----
657	IP501	0.996		-----	2.346		-----	3.34		-----
663	IP501	2.04		-----	1.86		-----	3.90		-----
705	IP470	1.2		-----	2.6		-----	3.8		-----
750	IP501	1.5		-----	3		-----	4.5		-----
781	IP501	<5		-----	<10		-----	<15		-----
823	IP501	2.2		-----	2.8		-----	5		-----
840	IP501	1.2		-----	<10	C	-----	12.5	ex	-----
873	IP470	0.7		-----	1.8		-----	-----		-----
874	IP501	0.8		-----	1.0		-----	1.8		-----
875	IP501	<5		-----	<10		-----	<15		-----
922	IP470	<5		-----	<10		-----	<15		-----
963		-----		-----	-----		-----	-----		-----
971	IP501	1		-----	2		-----	3		-----
994	IP501	2.07		-----	2.58		-----	4.65		-----
995	IP470	2.01		-----	3.02		-----	5.03		-----
1131	IP470	1.91		-----	3.52		-----	-----		-----
1135	IP501	0.902		-----	2.770		-----	3.672		-----
1347	In house	0.7		-----	-----		-----	-----		-----
1348	In house	4	ex	-----	20	R(0.01)	-----	24	R(0.01)	-----
1356	IP501	1.00		-----	2.67		-----	4		-----
1367	IP501	2		-----	5		-----	-----		-----
1385	In house	7	R(0.05)	-----	30	R(0.01)	-----	37	R(0.01)	-----
1455	IP501	3.5		-----	1.5		-----	5		-----
1510		-----		-----	-----		-----	-----		-----
1544	IP470	2.19		-----	2.58		-----	4.77		-----
1586	IP470	2		-----	3		-----	5		-----
1648	ISO10478	5.0		-----	8.0		-----	13.0		-----
1854	IP501	1.2		-----	1.3		-----	2.5		-----
1986	IP470	1.5		-----	2.5		-----	5.0	ex, E	-----
1995	IP501	5.8	ex	-----	4.8	ex	-----	10.6	ex	-----
2129	IP470	2.7		-----	6.0		-----	8.7		-----
6044	IP501	9.71	R(0.01)	-----	8.33	ex	-----	18.04	R(0.05)	-----
6049	IP501	2.7		-----	2.9		-----	5.6		-----
6057	IP501	3		-----	2		-----	5		-----
6075		-----		-----	-----		-----	-----		-----
6092	IP501	2		-----	1		-----	-----		-----

Lab 159 first reported: 0.0 for Al, but did not correct sum Al+Si (therefore sum excluded)

Lab 194 first reported: 0.0 for Si, but did not correct sum Al+Si (therefore sum excluded)

Lab 273 first reported: 9 for Al, 26 for Si, sum Al+Si 35

Lab 336 first reported: 15 for Al+Si

Lab 840 first reported: 11.3 for Si, but did not correct sum Al+Si (therefore sum excluded)

Lab 1348: test result for Al excluded as 3 of the 6 related test values are outliers

Lab 1986: test result for sum Al+Si excluded due to calculation error

Lab 1995: test results are excluded as 6 of the 9 related test results are outliers

Lab 6044: test result for Si is excluded as the other related test results are outliers

	Al	Si	Sum Al+Si
normality	OK	not OK	not OK
n	44	41	34
outliers	2+2ex	2+2ex	3+5ex
mean (n)	1.98	3.39	5.77
st.dev. (n)	1.170	2.325	3.106
R(calc.)	3.28	6.51	8.70
R(IP470:05)	(1.25)	(3.14)	(3.38)
Compare R(IP501:05)	(0.67)	(1.13)	(1.31)
Appl. Range IP470/IP501	5-150	10-250	n.a.
Compare R(iis16F01)	3.43	5.98	8.21

Aluminium

Silicon
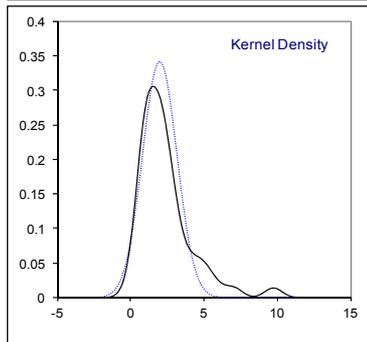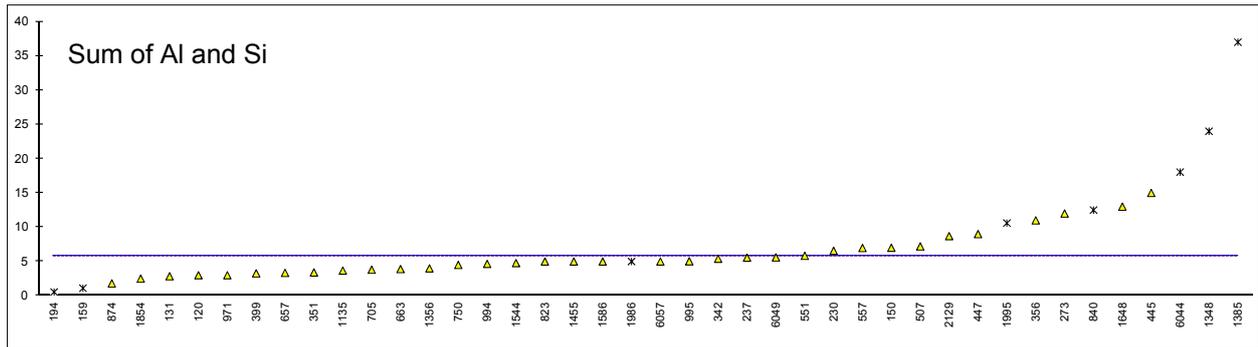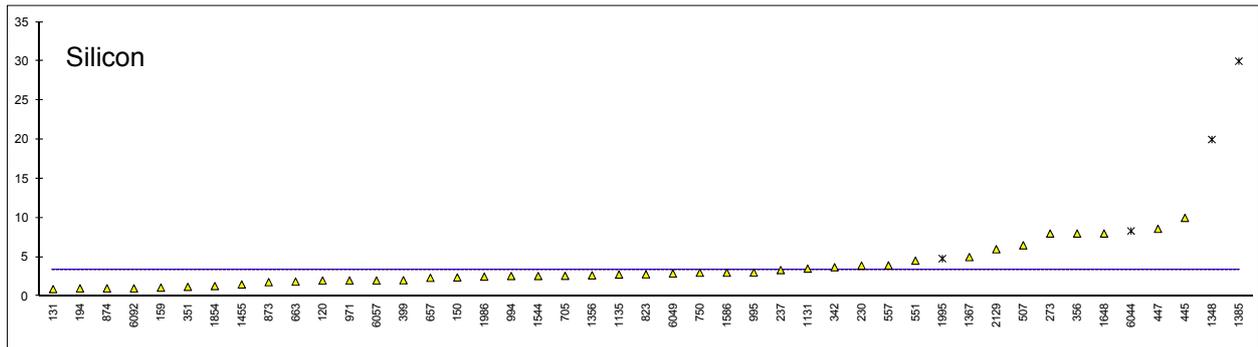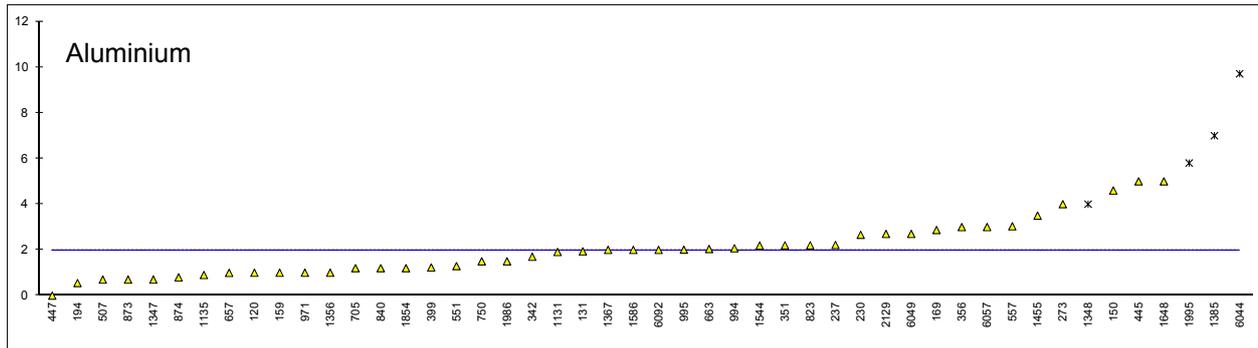
Sum of Al and Si

Aluminium
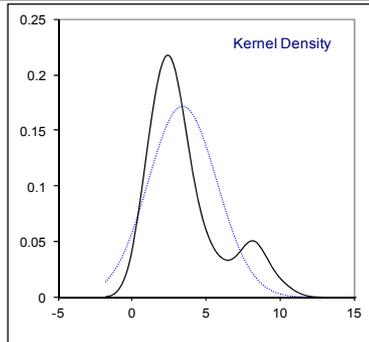
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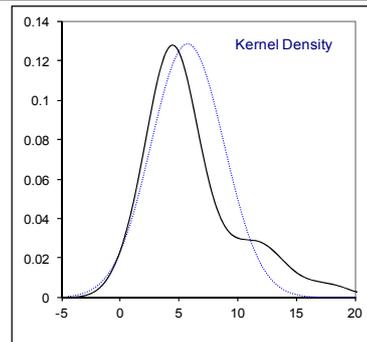
Sum of Al and Si

Determination of Iron as Fe, Nickel as Ni and Sodium as Na on sample #16281; results in mg/kg

Lab	method	Fe	mark	z(targ)	Ni	mark	z(targ)	Na	mark	z(targ)
52	IP470	23		0.34	32		0.30	9		-0.65
120	IP501	17		-1.07	21		-1.72	9		-0.65
131	IP501	22.67		0.26	33.83		0.64	10.08		-0.08
132	IP470	-----		-----	32		0.30	11		0.41
140	IP501	-----		-----	-----		-----	10.55		0.17
150	IP501	14.9		-1.56	17.1		-2.43	9.3		-0.49
154	D5863-B	-----		-----	-----		-----	7		-1.72
158		-----		-----	-----		-----	-----		-----
159	IP501	23		0.34	28		-0.43	9		-0.65
168		-----		-----	-----		-----	-----		-----
169		-----		-----	-----		-----	-----		-----
171		-----		-----	-----		-----	-----		-----
194	IP470	-----		-----	-----		-----	9.85		-0.20
230	IP470	20.7		-0.20	30.5		0.03	12.6		1.27
237	IP501	27.67		1.44	36.05		1.05	11.48		0.67
273	IP470	14		-1.78	-----		-----	7	C	-1.72
311	IP501	20		-0.36	28		-0.43	8		-1.18
323	IP501	22		0.11	33		0.49	10		-0.12
336		-----		-----	-----		-----	-----		-----
342	IP501	23.4		0.44	33.9		0.65	10.3		0.04
351	IP501	20.4		-0.27	29.5		-0.16	12.1		1.00
356	IP501	19		-0.60	27		-0.61	12		0.95
371	IP470	23.7		0.51	28.4		-0.36	8.31		-1.02
399	IP501	23.74		0.52	37.45		1.31	14.40		2.23
445	IP501	23		0.34	33		0.49	12		0.95
447	IP470	37.3	R(0.01)	3.70	31.7		0.25	26.1	R(0.01)	8.46
494	IP501	20.38		-0.27	28.94		-0.26	12.12		1.01
507	IP501	19.5		-0.48	28.4		-0.36	9.6		-0.33
541	IP470	-----		-----	-----		-----	10.5		0.15
551	IP501	17.89		-0.86	22.94		-1.36	9.04		-0.63
557	IP501	21.0001		-0.13	35.6725		0.98	15.4154		2.77
634	D5863-B	-----		-----	19		-2.08	6.5		-1.98
657	IP501	18.04		-0.83	26.48		-0.71	13.02		1.49
663	IP501	17.06		-1.06	21.83		-1.56	9.89		-0.18
705	IP470	22.3		0.18	34.3		0.73	11.0		0.41
750	IP501	22		0.11	34		0.67	10		-0.12
781	IP501	22.6		0.25	34.0		0.67	10.6		0.20
823	IP501	20.3		-0.29	29.7		-0.12	12.3		1.11
840	IP501 *)	24.0		0.58	33.2		0.52	6.3		-2.09
873	IP470	22.9		0.32	32.6		0.41	9.5		-0.38
874	IP501	22.3		0.18	32.7		0.43	10.0		-0.12
875	IP501	22.1		0.13	31.4		0.19	10.3		0.04
922	IP470	25		0.81	29		-0.25	8		-1.18
963		-----		-----	-----		-----	-----		-----
971	IP501	21		-0.13	31		0.12	10		-0.12
994	IP501	23.85		0.54	30.34		0.00	10.59		0.20
995	IP470	23.88		0.55	31.17		0.15	11.07		0.45
1131	IP470	22.14		0.14	32.60		0.41	9.03		-0.64
1135	IP501	21.976		0.10	31.809		0.27	10.402		0.10
1347	In house	-----		-----	-----		-----	5		-2.78
1348	In house	-----		-----	-----		-----	6	ex	-2.25
1356	IP501	16.00		-1.30	21.33		-1.66	9.67		-0.29
1367	IP501	26		1.05	36		1.04	14		2.01
1385	In house	-----		-----	-----		-----	6	ex	-2.25
1455	IP501	23		0.34	24		-1.17	11		0.41
1510		-----		-----	-----		-----	-----		-----
1544	IP470	22.04		0.12	32.87		0.46	11.91		0.90
1586	IP501	21		-0.13	33		0.49	11		0.41
1648	IP501	29.0		1.75	39.0		1.59	9.0		-0.65
1854	IP501	22		0.11	31		0.12	11.5		0.68
1986	IP470	22.0		0.11	36.0		1.04	11.0		0.41
1995	IP501	4.2	R(0.01)	-4.08	4.6	R(0.01)	-4.73	7.4	ex	-1.50
2129	IP470	23.0		0.34	33.4		0.56	11.9		0.89
6044	D5185	10.42	R(0.05)	-2.62	25.69		-0.85	8.94		-0.68
6049	IP501	17.9		-0.86	30.8		0.08	9.8		-0.22
6057	IP501	23		0.34	33		0.49	10		-0.12
6075	D5863-B	-----		-----	28.3		-0.38	7.79		-1.30
6092	IP501	21		-0.13	30		-0.06	12		0.95

*) Lab 840: reported method D5185 voor Sodium Determination
Lab 273 first reported: 18 for Na
Lab 1348: test result for Na excluded as 3 of the 6 related test values are outliers
Lab 1385: test result for Na excluded as 4 of the 6 related test values are outliers
Lab 1995: test results for Na excluded as 6 of the 9 related test results are outliers

	Fe	Ni	Na
normality	OK	OK	OK
n	48	52	57
outliers	3	1	1+3ex
mean (n)	21.55	30.34	10.22
st.dev. (n)	2.936	4.672	1.965
R(calc.)	8.22	13.08	5.50
R(IP470:05)	11.91	15.24	5.26
Compare R(IP501:05)	5.07	10.99	3.83
Appl. Range IP470/IP501	2-60	1-100	1-100

Iron

Nickel

Sodium

Kernel Density

Kernel Density

Kernel Density
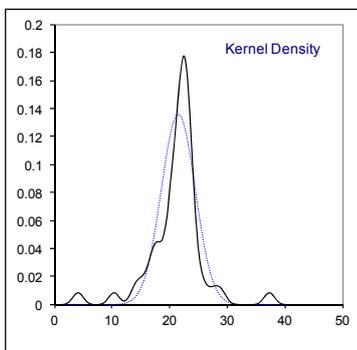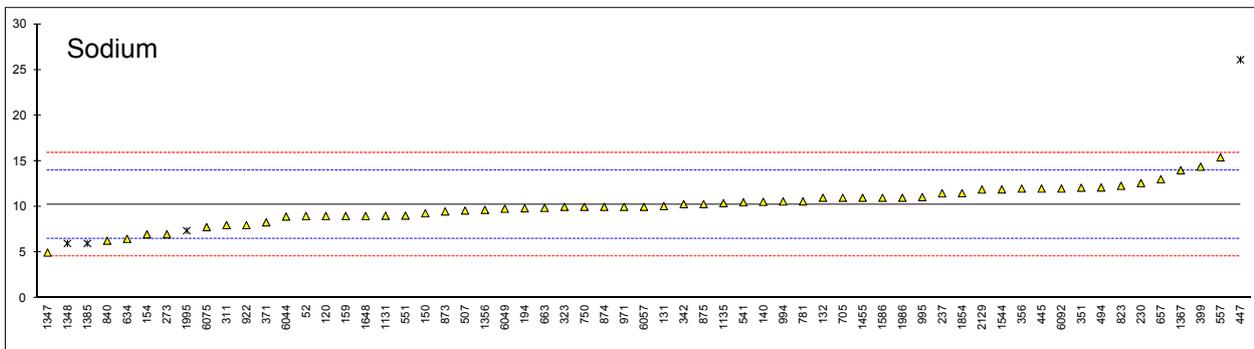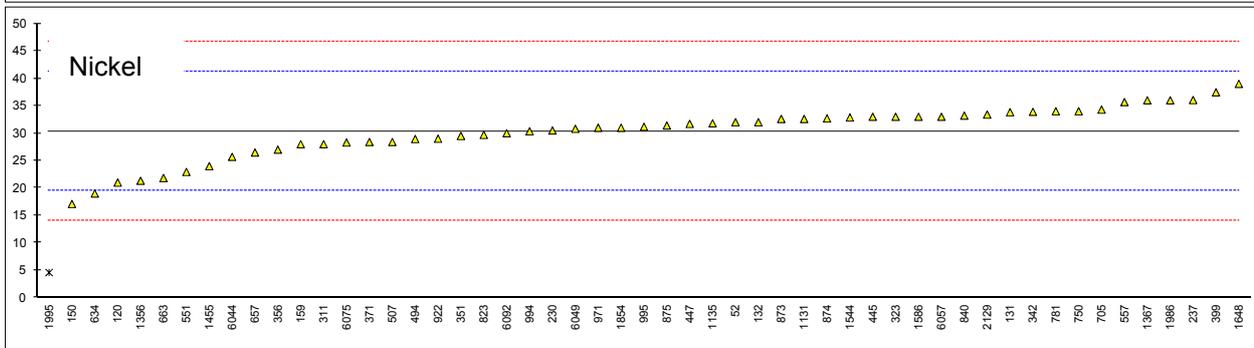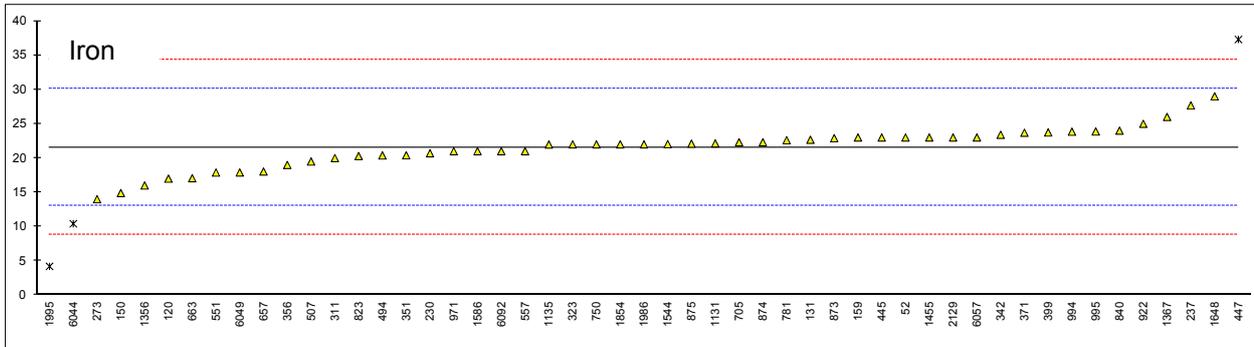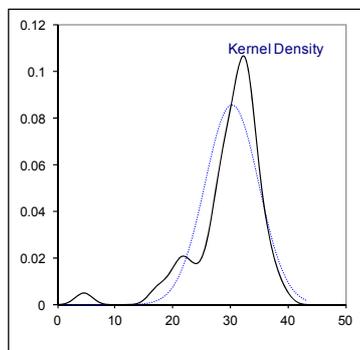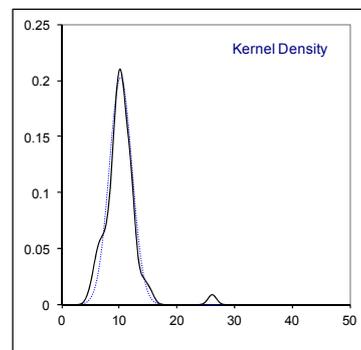
Iron　　　　　　　　　　　　　　　Nickel　　　　　　　　　　　　　　　Sodium

Determination of Vanadium as V, Calcium as Ca and Zinc as Zn on sample #16281; results in mg/kg

| Lab	method	V	mark	z(targ)	Ca	mark	z(targ)	Zn	mark	z(targ)
52	IP470	123		0.48	25		2.37	-----		-----
120	IP501	119		0.17	23		1.43	20		1.46
131	IP501	121.8		0.39	17.52		-1.13	16.80		-0.36
132	IP470	122		0.41	20		0.03	17		-0.24
140	IP501	-----		-----	-----		-----	-----		-----
150	IP501	131.5		1.16	17.8		-1.00	17.0		-0.24
154	D5863-B	137		1.60	-----		-----	-----		-----
158		-----		-----	-----		-----	-----		-----
159	IP501	121		0.33	19		-0.44	18		0.32
168		-----		-----	-----		-----	-----		-----
169		-----		-----	-----		-----	-----		-----
171		-----		-----	-----		-----	-----		-----
194	IP470	124.13		0.57	19.92		-0.01	15.50		-1.09
230	IP470	116.7		-0.02	15.9		-1.89	17.8		0.21
237	IP501	133.9		1.35	20.47		0.25	18.63		0.68
273	IP470	102		-1.18	4	C,R(0.01)	-7.45	12	R(0.05)	-3.07
311	IP501	100		-1.34	16		-1.84	16		-0.81
323	IP501	121		0.33	20		0.03	18		0.32
336		-----		-----	-----		-----	-----		-----
342	IP501	113.9		-0.24	21.1		0.54	18.3		0.49
351	IP501	117.3		0.03	20.1		0.08	15.6		-1.03
356	IP501	133		1.28	21		0.50	18		0.32
371	IP470	100.4		-1.31	18.5		-0.67	15.7		-0.98
399	IP501	126.7		0.78	23.56		1.69	19.73		1.30
445	IP501	122		0.41	23		1.43	18		0.32
447	IP470	116.3		-0.05	-----		-----	20.6		1.80
494	IP501	110.67		-0.49	17.97		-0.92	18.76		0.75
507	IP501	103.9		-1.03	16.8		-1.47	14.9		-1.43
541	IP470	107.5		-0.75	-----		-----	-----		-----
551	IP501	95.14		-1.73	17.82		-0.99	16.58		-0.48
557	IP501	120.7735		0.31	21.2544		0.62	17.2668		-0.09
634	D5863-B	120		0.25	-----		-----	-----		-----
657	IP501	103.5		-1.06	17.21		-1.27	13.89		-2.00
663	IP501	115.35		-0.12	21.77		0.86	17.45		0.01
705	IP470	121.5		0.37	20.1		0.08	18.3		0.49
750	IP501	120		0.25	20		0.03	18		0.32
781	IP501	123.8		0.55	20.9		0.45	18.2		0.44
823	IP501	105.7		-0.89	19.2		-0.34	16.5		-0.53
840	IP501	120.6		0.29	20.7		0.36	18.3		0.49
873	IP470	118.8		0.15	19.5		-0.20	17.4		-0.02
874	IP501	119.0		0.17	20.3		0.17	17.2		-0.13
875	IP501	117		0.01	23.4		1.62	18.7		0.72
922	IP470	116		-0.07	21		0.50	18		0.32
963		-----		-----	-----		-----	-----		-----
971	IP501	114		-0.23	19		-0.44	17		-0.24
994	IP501	117.6		0.06	18.62		-0.62	17.3		-0.07
995	IP470	117		0.01	18.55		-0.65	17.53		0.06
1131	IP470	114.86		-0.16	19.08		-0.40	18.11		0.39
1135	IP501	115.279		-0.13	20.804		0.41	18.060		0.36
1347	In house	90		-2.14	16		-1.84	9	R(0.01)	-4.77
1348	In house	46	R(0.01)	-5.63	18	ex	-0.90	12	R(0.05)	-3.07
1356	IP501	106.33		-0.84	18.67		-0.59	14.67		-1.56
1367	IP501	130		1.04	29	R(0.05)	4.24	19		0.89
1385	In house	67	R(0.01)	-3.96	13	ex	-3.24	8	R(0.01)	-5.34
1455	IP501	116		-0.07	22		0.96	18		0.32
1510		-----		-----	-----		-----	-----		-----
1544	IP470	116.66		-0.02	23.91		1.86	15.89		-0.87
1586	IP501	123		0.48	21		0.50	19		0.89
1648	IP501	123.0		0.48	-----	W	-----	17.0		-0.24
1854	IP501	117		0.01	21.3		0.64	17.4		-0.02
1986	IP470	118.0		0.09	20.0		0.03	18.0		0.32
1995	IP501	6.7	R(0.01)	-8.75	0.67	R(0.01)	-9.00	0.74	R(0.01)	-9.44
2129	IP470	103.7		-1.05	19.8		-0.06	17.4		-0.02
6044	D5185	117.48		0.05	15.76		-1.95	13.05		-2.48
6049	IP501	121.5		0.37	19.6		-0.16	18.9		0.83
6057	IP501	118		0.09	20		0.03	18		0.32
6075	D5863-B	117.9		0.08	-----		-----	-----		-----
6092	IP501	124		0.56	23		1.43	17		-0.24

Lab 273 first reported: 9 for Ca
Lab 1648 reported: 27 for Ca, result withdrawn
Lab 1348: test result for Ca excluded as 3 of the 6 related test values are outliers
Lab 1385: test result for Ca excluded as 4 of the 6 related test values are outliers

	V	Ca	Zn
normality	OK	OK	suspect
n	57	49	50
outliers	3	3+2ex	5
mean (n)	116.90	19.94	17.43
st.dev. (n)	9.263	2.164	1.456
R(calc.)	25.94	6.06	4.08
R(IP470:05)	35.25	5.99	4.95
Compare R(IP501:05)	29.24	4.50	3.76
Range IP470/IP501	1-400	3-100	1-70
Spike		19.6 (Recovery < 102%)	17.1 (Recovery < 102%)

Vanadium
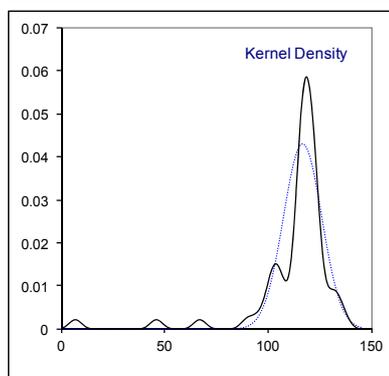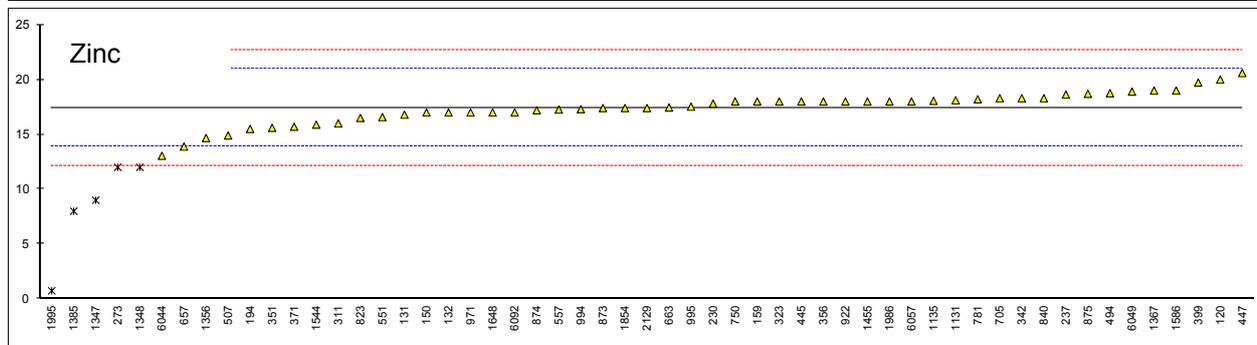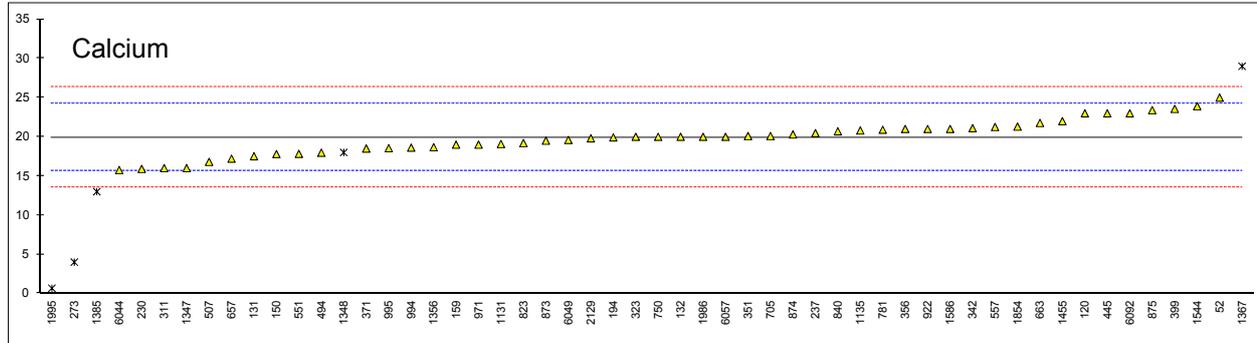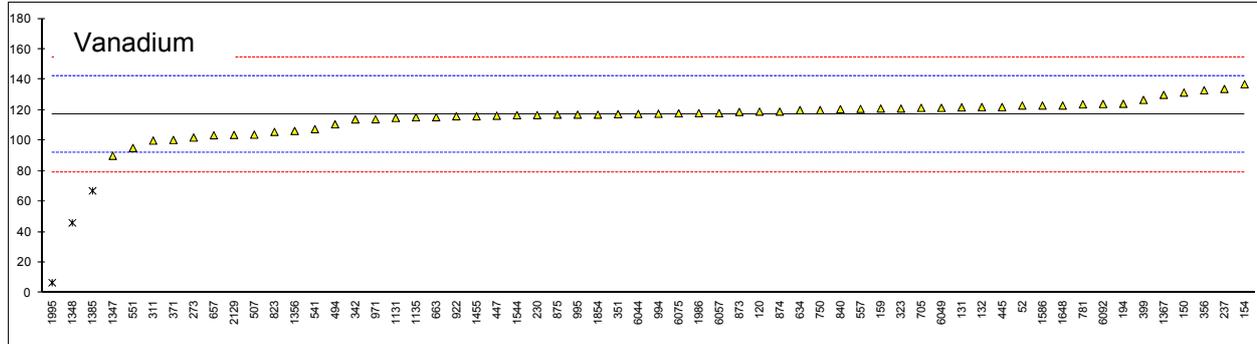
Calcium

Zinc

Vanadium
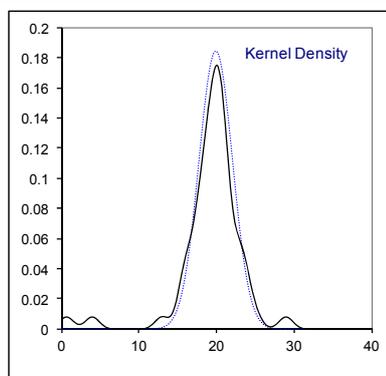
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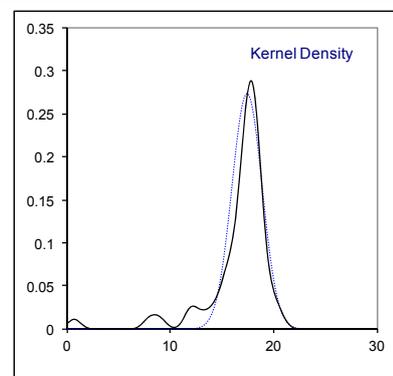
Zinc

Determination of Phosphorus as P on sample #16281; results in mg/kg

Lab	method	Value	mark	z(targ)	remarks
52		-----		-----	
120	IP501	16		0.01	
131	IP501	16.66		0.32	
132	IP501	16.0		0.01	
140		-----		-----	
150	IP501	14.6		-0.66	
154		-----		-----	
158		-----		-----	
159	IP501	16		0.01	
168		-----		-----	
169		-----		-----	
171		-----		-----	
194		-----		-----	
230	IP500	16.45		0.22	
237	IP501	20.08	R(0.01)	1.96	
273		-----		-----	
311	IP501	15		-0.47	
323	IP501	16		0.01	
336		-----		-----	
342	IP501	16.5		0.25	
351	IP501	16.2		0.11	
356	IP501	15		-0.47	
371		-----		-----	
399		-----		-----	
445	IP501	17		0.49	
447		-----		-----	
494	IP501	15.63		-0.17	
507	IP501	13.7		-1.09	
541		-----		-----	
551	IP501	12	C	-1.90	first reported: 2.34
557	IP501	10.8335	R(0.01)	-2.46	
634		-----		-----	
657	IP501	14.62		-0.65	
663	IP501	16.32		0.16	
705	IP500	16.54		0.27	
750	IP501	18		0.97	
781	IP501	16.4		0.20	
823	IP501	15.1		-0.42	
840	IP501	16.1		0.06	
873	IP500	16.3		0.15	
874	IP500	16.2		0.11	
875	IP501	15.9		-0.04	
922		-----		-----	
963		-----		-----	
971	IP501	17		0.49	
994	IP501	15.1		-0.42	
995		-----		-----	
1131		-----		-----	
1135	IP501	16.186		0.10	
1347		-----		-----	
1348		-----		-----	
1356	IP501	14.00		-0.95	
1367	IP501	17		0.49	
1385		-----		-----	
1455	IP501	16		0.01	
1510		-----		-----	
1544	IP501	16.27		0.14	
1586	IP501	19		1.44	
1648		-----	W	-----	reported: 3, result withdrawn
1854	IP501	16		0.01	
1986	IP500	15.94	C	-0.02	first reported: 59.4
1995	IP501	0.54	R(0.01)	-7.38	
2129	IP500	16.0		0.01	
6044	D5185	8.05	R(0.01)	-3.79	
6049	IP501	16.5		0.25	
6057	IP501	16		0.01	
6075		-----		-----	
6092	IP501	18		0.97	

normality	not OK	
n	39	
outliers	4	Spike
mean (n)	15.98	14.8 (Recovery < 108%)
st.dev. (n)	1.202	
R(calc.)	3.37	
R(IP501:05)	5.86	Range IP500/IP501=1-60
Compare R(IP500:03)	3.67	
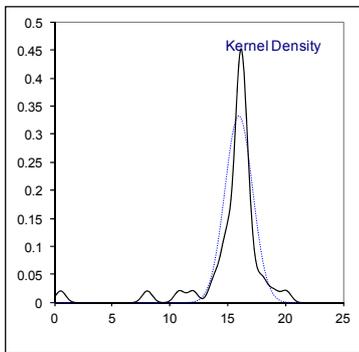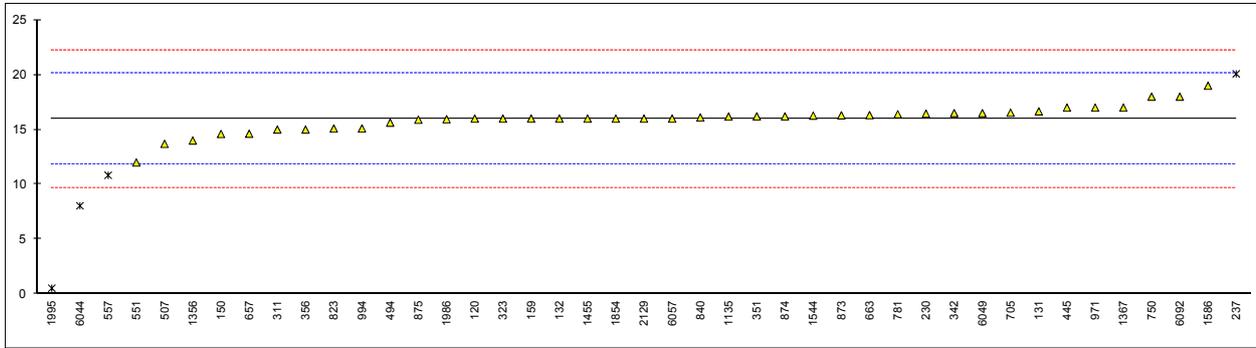
Determination of Bromine Number on distillate <360°C AET on sample #16282; results in g Br$_2$/100g

lab	method	value	mark	z(targ)	remarks
140	D1159	10.9		0.18	
150	D1159	8.9		-1.29	
158		-----		-----	
171		-----		-----	
311		-----		-----	
356	D1159	11.35		0.51	
371	D1159	10.02		-0.46	
399	D1159	13.33		1.97	
445	D1159	11.8		0.85	
551		-----		-----	
657	D1159	13.7		2.24	
705	D1159	10.16		-0.36	
750	D1159	10.08		-0.42	
781	D1159	9.68		-0.71	
823	D1159	12.2		1.14	
840		-----		-----	
873	D1159	9.78		-0.64	
874	D1159	9.60		-0.77	
875	D1159	9.9		-0.55	
963		-----		-----	
994	D1159	10.41		-0.18	
995	D1159	11.08		0.32	
1455	D1159	8.9		-1.29	
1544	D1159	10.7		0.04	
1586	D1159	10.6		-0.04	
1854		-----		-----	
1986	D1159	10.27		-0.28	
2129	D1159	10.3		-0.26	
6057		-----		-----	

normality	suspect
n	21
outliers	0
mean (n)	10.650
st.dev. (n)	1.2595
R(calc.)	3.527
R(D1159:07)	3.806
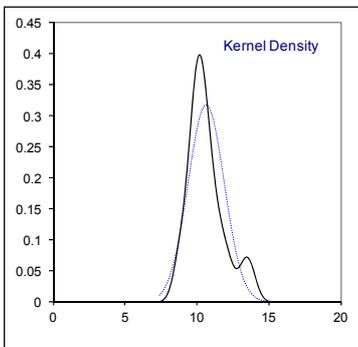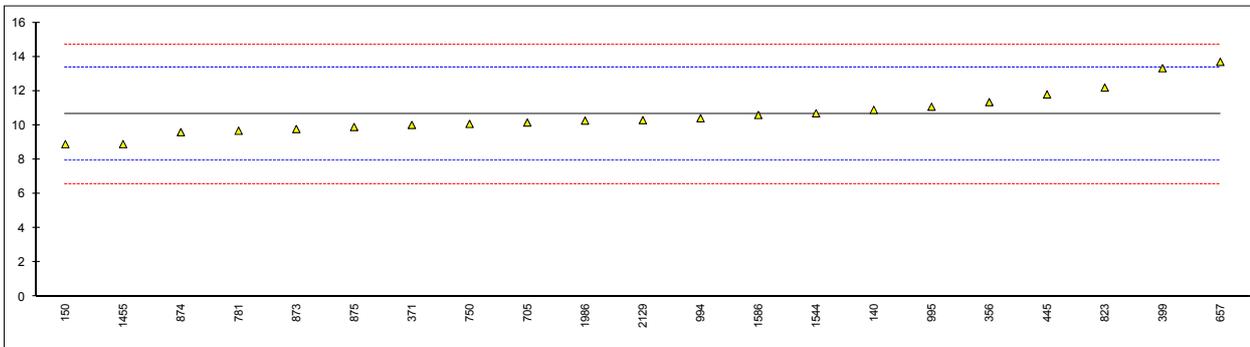
Determination of P-Value on sample #16282;

lab	method	value	mark	z(targ)	remarks
140		-----		-----	
150		-----		-----	
158		-----		-----	
171		-----		-----	
311		-----		-----	
356	SMS1600	1.7		0.61	
371	SMS1600	1.50		-0.32	
399	SMS1600	1.8		1.08	
445		-----		-----	
551		-----		-----	
657	SMS1600	1.7		0.61	
705	SMS1600	1.30		-1.26	
750	SMS1600	1.35		-1.02	
781	SMS1600	1.45		-0.56	
823	SMS1600	1.7		0.61	
840		-----		-----	
873	SMS1600	1.35		-1.02	
874	SMS1600	1.35		-1.02	
875	SMS1600	1.40		-0.79	
963		-----		-----	
994	SMS1600	1.5		-0.32	
995		1.75		0.84	
1455	SMS1600	2.0		2.01	
1544	SMS1600	1.5		-0.32	
1586	SMS1600	1.8		1.08	
1854		-----		-----	
1986	SMS1600	1.60		0.14	
2129	SMS1600	1.50		-0.32	
6057		-----		-----	

normality	OK
n	18
outliers	0
mean (n)	1.569
st.dev. (n)	0.1964
R(calc.)	0.550
R(target)	0.600
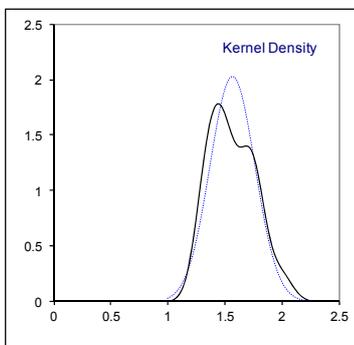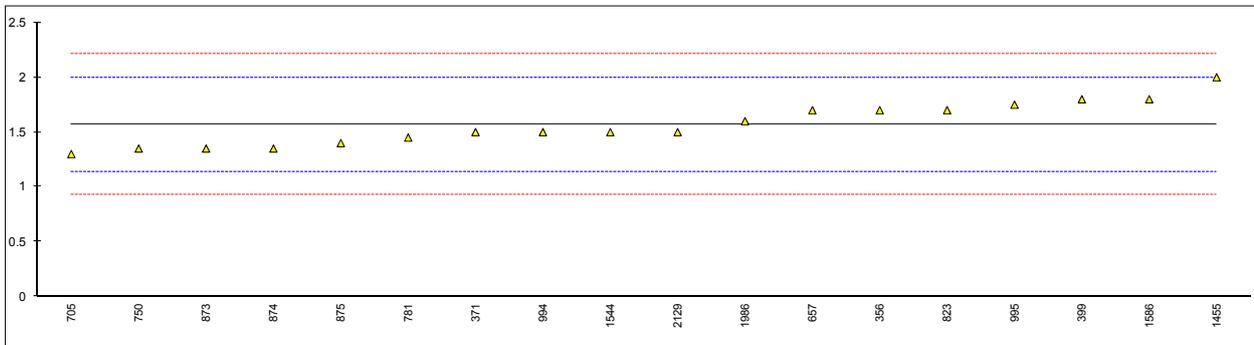
Determination of Compatibility rating on sample #16283;

lab	method	value	mark	z(targ)	remarks
52	D4740	3		-1.59	
132	D4740	4		1.21	
140	D4740	5	ex	4.01	test result excluded; 5 is not a reliable score for this sample
154	D4740	4		1.21	
171		-----		-----	
230	D4740	4		1.21	
237		-----		-----	
311	D4740	4		1.21	
323	D4740	4		1.21	
342	D4740	3		-1.59	
351	D4740	4		1.21	
371	D4740	4		1.21	
399	D4740	4	C	1.21	first reported: 5
445	D4740	4		1.21	
447	D4740	4		1.21	
494	D4740	3		-1.59	
507	D4740	3		-1.59	
557	D4740	4	C	1.21	first reported: 2
657	D4740	3		-1.59	
663	D4740	3		-1.59	
705	D4740	4		1.21	
750	D4740	3		-1.59	
781	D4740	3		-1.59	
840	D4740	4		1.21	
873	D4740	3		-1.59	
874	D4740	4		1.21	
875	D4740	3		-1.59	
971	D4740	3		-1.59	
974	D4740	4		1.21	
1544	D4740	4		1.21	
1586	D4740	3		-1.59	
1995		-----		-----	
2129	D4740	3		-1.59	
6057	D4740	4		1.21	

normality	OK
n	30
outliers	0+1ex
mean (n)	3.6
st.dev. (n)	0.5
R(calc.)	1.4
R(D4740:04)	1.0

Kernel Density
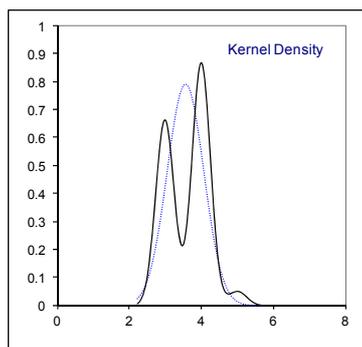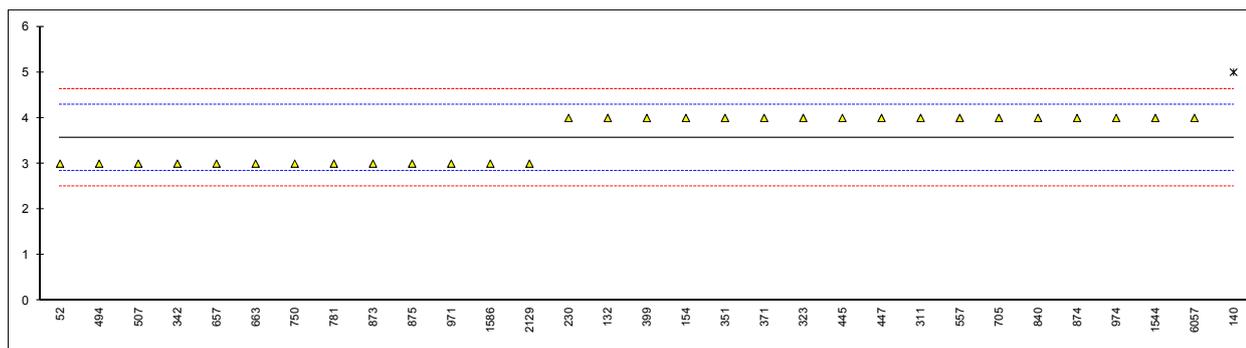
APPENDIX 2

Number of participants per country of the main round

```
 1 lab in  ARGENTINA
 1 lab in  AZERBAIJAN
 2 labs in BELGIUM
 3 labs in BRAZIL
 1 lab in  BULGARIA
 1 lab in  CANADA
 1 lab in  CYPRUS
 1 lab in  EGYPT
 1 lab in  FRANCE
 1 lab in  GEORGIA
 3 labs in GERMANY
 4 labs in GREECE
 1 lab in  GUAM
 1 lab in  IRELAND
 1 lab in  ITALY
 1 lab in  KAZAKHSTAN
 1 lab in  LATVIA
 3 labs in LEBANON
 1 lab in  LITHUANIA
 2 labs in MALTA
 1 lab in  MAURITIUS
 1 lab in  MEXICO
 3 labs in NETHERLANDS
 2 labs in NIGERIA
 1 lab in  PAKISTAN
 1 lab in  PANAMA
 2 labs in PHILIPPINES
 1 lab in  PORTUGAL
 6 labs in RUSSIAN FEDERATION
 2 labs in SAUDI ARABIA
 1 lab in  SERBIA
 1 lab in  SINGAPORE
 1 lab in  SOUTH AFRICA
 1 lab in  SOUTH KOREA
 3 labs in SPAIN
 2 labs in TAIWAN
 1 lab in  TANZANIA
 1 lab in  THAILAND
 1 lab in  TOGO
 1 lab in  TURKEY
 1 lab in  TURKMENISTAN
 1 lab in  UKRAINE
 2 labs in UNITED ARAB EMIRATES
 6 labs in UNITED KINGDOM
13 labs in UNITED STATES OF AMERICA
 2 labs in VIETNAM
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APPENDIX 3

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   = probably an error in calculations

U   = test result probably reported in a different unit

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

SDS = Safety Data Sheet

Literature:

1 iis Interlaboratory Studies, Protocol for the Organisation, Statistics & Evaluation, April 2014

2 ASTM E178:02

3 ASTM E1301:95(2003)

4 ISO 5725:86

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6 ISO 13528:05

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

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

9 IP 367/84

10 DIN 38402 T41/42

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

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

13 Analytical Methods Committee Technical brief, No 4.January 2001

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

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

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