

Results of Proficiency Test
Vacuum Gasoil
December 2015

Organised by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

Authors: ing. A.S. Noordman-de Neef
Correctors: dr. R.G. Visser, ing. R.J. Starink
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1 INTRODUCTION

In 2014, a proficiency test was organized for Vacuum Gas Oil (VGO) by the Institute for Interlaboratory Studies on request of several participants. During the annual proficiency testing program 2015/2016, it was decided to continue the round robin for the analysis of VGO. In this interlaboratory study 59 laboratories in 27 different countries have participated. See appendix 3 for the number of participants per country. In this report, the results of the 2015 VGO proficiency test are presented and discussed. This report is also available through the iis internet site www.iisnl.com.

2 SETUP

The Institute for Interlaboratory Studies (iis) in Spijkenisse, the Netherlands, was the organizer of this proficiency test. It was decided to send one bottle of 1L VGO (labelled #15250) that was obtained from a local supplier. The analyses for fit-for-use and homogeneity were subcontracted to an accredited laboratory. Participants were requested to report the analytical results using the indicating units and to report rounded and unrounded results. The unrounded results were preferably used for statistical evaluation.

2.1 QUALITY SYSTEM

The Institute for Interlaboratory Studies in Spijkenisse, the Netherlands, has implemented a quality system based on ISO/IEC17043:2010 (R007). 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 a regular basis by sending out questionnaires.

2.2 PROTOCOL

The protocol followed in the organisation of this proficiency test was the one as described for proficiency testing in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' of April 2014 (iis-protocol, version 3.3). This protocol can be downloaded from the FAQ page of the iis website www.iisnl.com.

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

The necessary bulk material was obtained from a local supplier. The 80 litre bulk material was transferred after homogenizing into 73 brown glass bottles of 1 litre (labelled #15250). The homogeneity of the subsamples #15250 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 #15250-1	915.30
Sample #15250-2	915.30
Sample #15250-3	915.30
Sample #15250-4	915.30
Sample #15250-5	915.20
Sample #15250-6	915.20
Sample #15250-7	915.30
Sample #15250-8	915.30

Table 1: homogeneity test results of subsamples #15250

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

	Density at 15 °C in kg/m ³
r (observed)	0.05
reference method	ISO12185:96
0.3 x R(reference method)	0.45

Table 2: evaluation of the repeatability of the subsamples #15250

The calculated repeatability is less than 0.3 times the corresponding reproducibility of the reference test method. Therefore, homogeneity of the subsamples #15250 was assumed.

To each of the participating laboratories, 1 sample of 1 L brown glass (labelled #15250) was sent on Nov 25, 2015.

2.5 STABILITY OF THE SAMPLES

The stability of Vacuum Gas Oil was tested in the past and proved to be sufficiently stable for the period of the proficiency test.

2.6 ANALYSES

The participants were requested to determine on sample #15250: Acid Number (Total), Aniline Point, Asphaltenes, Carbon Residue (Micro method), Density at 15°C, Flash Point PMcc, Kinematic Viscosity at 50°C and at 100°C, Nitrogen, Pour Point (manual or automatic), Sulphur (Total), Metals (Arsenic, Calcium, Copper, Iron, Nickel, Silicon, Sodium, Vanadium), Simulated Distillation and Distillation (IBP, 10% rec, 30% rec, 50% rec, 70% rec, 90% rec and FBP).

To get comparable results, a detailed report form on which the units were prescribed as well as the required standards and a letter of instructions were prepared and made available on the data entry portal www.kpmd.co.uk/sqs-iis/. A SDS and a form to confirm receipt of the sample were added to the sample package.

3 RESULTS

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

Directly after deadline, a reminder was sent to those laboratories that had not reported results at that moment. Shortly after the deadline, the available test results were screened for suspect data. A 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 (raw data of the) reported results. Additional or corrected results have been used for data analysis and original results are placed under 'Remarks' in the result tables in appendix 1.

3.1 STATISTICS

Statistical calculations were performed as described in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' (iis-protocol, April 2014 version 3.3). For the statistical evaluation the *unrounded* (when available) figures were used instead of the rounded results. 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. Not all data sets proved to have a normal distribution, in which cases the statistical evaluation of the results should be used with due care.

In accordance to ISO 5725 the original results per determination were submitted to Dixon's, and/or Grubbs' and/or Rosner's outlier tests. Outliers are marked by D(0.01) for the Dixon's test, by G(0.01) or DG(0.01) for the Grubbs' test and by R(0.01) for the Rosner's test. Stragglers are marked by D(0.05) for the Dixon's test, by G(0.05) or DG(0.05) for the Grubbs' test and by

R(0.05) for the Rosner's test. Both outliers and stragglers were not included in the calculations of the averages and the standard deviations.

For each assigned value, the uncertainty was determined in accordance to ISO13528. Subsequently the calculated uncertainty was evaluated against the respective requirement based on the target reproducibility in accordance to 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.

3.2 GRAPHICS

In order to visualise the data against the reproducibilities from literature, Gauss plots were made, using the sorted data for each determination (see appendix 1). On the Y-axis the reported analysis results are plotted. The corresponding laboratory numbers are under the X-axis. The straight horizontal line presents the consensus value (a trimmed mean). The four striped lines, parallel to the consensus value line, are the +3s, +2s, -2s and -3s target reproducibility limits of the selected standard. Outliers and other data, which were excluded from the calculations, are represented as a 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. In order to be able to have an objective evaluation of the performance of each participant, it was decided to evaluate this performance against the literature requirements, e.g. ASTM reproducibilities. Therefore, the z-scores were calculated using a target standard deviation. This target standard deviation was calculated from the literature reproducibility (R) by division with 2.8.

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:

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

The $Z_{(\text{target})}$ scores are listed 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:

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

4 EVALUATION

In this interlaboratory study, some problems with sample dispatch were encountered due to several reasons. Four participants reported the test results after the final reporting date and five participants did not report any test results at all. Not all laboratories were able to report all requested parameters. In total 54 participants reported 897 test results. Observed were 22 outlying results, which is 2.5% of the numerical results. In proficiency studies, outlier percentages of 3% - 7.5% are quite normal.

4.1 EVALUATION PER TEST

In this section the results are discussed per test. The specified test methods and requirements were taken into account for explaining the observed differences when possible and applicable. These methods are also in the tables together with the reported data. The abbreviations, used in these tables, are listed in appendix 4.

In the iis PT reports, ASTM methods are referred to with a number (e.g. D2086) and an added designation for the year that the method was adopted or revised (e.g. D2086-08). If applicable, a designation in parentheses is added to designate the year of reapproval (e.g. D2086-08 (2013)). In the results tables of Appendix 1 only the method number and year of adoption or revision will be used.

Although VGO is an important feedstock for cracking installations, there are very few analytical standard methods specifically designed for the analysis of VGO. Most parameters are to be determined by using methods that are intended for residual fuel oil and blending components, where applicable, precision data for Fuel Oil were used.

The IP-PM-CW standard is a specific method for the determination of metallic elements in vacuum gasoil in the concentration range 0.1 mg/kg to 10 mg/kg. Regretfully IP-PM-CW does not mention precision data. It is expected that the precision data of this method will be determined in the near future.

Acid Number (total): This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D664:11a.

Aniline Point: This determination was very problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not at all in agreement with the requirements of ASTM D611:12.

The test results of the aniline point of n-heptane vary over a small range (69.2 – 69.5). When the Aniline Point results of the participants who had reported a value for the aniline point of n-heptane are only evaluated, the reproducibility hardly improves.

Asphaltenes: No significant conclusions were drawn because the precision data of IP143:04 are applicable to values between 0.50% M/M and 30.0% M/M.

Carbon Residue: (Micro method) This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in full agreement with the requirements of ASTM D4530:15.

Density at 15°C: 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 ISO 12185:96.

Flash Point PMcc: This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with requirements of ASTM D93-B:15a.

Kin.Visco. at 50°C: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in good agreement with the requirements of ASTM D445:15a.

Kin.Visco.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 D445:15a.

Nitrogen: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with ASTM D5762:12.

Pour Point (Manual): This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in good agreement with ASTM D97:15.

Pour Point (Automatic): This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in good agreement with ASTM D5950:14.

Sulphur (Total): This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in good agreement with the requirements of ASTM D4294:10.

Arsenic (As): Only two participants reported a numerical result. Therefore no significant conclusions were drawn.

- Calcium (Ca): This determination may be not problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is almost in agreement with the requirements of IP501:05.
- Copper (Cu): All reported test results were near or below the application range of method IP-PM-CW (0.1 – 10 mg/kg). Therefore no statistical conclusions were drawn.
- Iron (Fe): This determination may be not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in full agreement with the requirements of IP501:05.
- Nickel (Ni): This determination may be not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of IP501:05.
- Silicon (Si): This determination may be problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the (strict) requirements of IP501:05, nor with the less strict requirements of IP470. When the IP501 results test results were evaluated separately, the calculated reproducibility is still not in agreement with the requirements of IP501:05.
- Sodium (Na): This determination may be not problematic. No statistical outliers were observed. The calculated reproducibility in full agreement with the requirements of IP501:05.
- Vanadium (V): This determination may be not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in good agreement with the requirements of IP501:05.
- Sim. Distillation The Simulated Distillation according to ASTM D6352:14 was partly problematic. In total two statistical outliers were observed. The calculated reproducibilities were in agreement with the requirements of ASTM D6352:15 for IBP, 30% and 50% recovery. For 10%, 70%, 90% recovery and FBP the calculated reproducibilities were not in agreement with the requirements of ASTM D6352:15.
- Distillation
Acc. D1160 The distillation according to ASTM D1160 was partly problematic. In total two statistical outliers were observed and one result was excluded as the determination was terminated prior to the reading of FBP. The calculated reproducibilities were in agreement for 30%, 50%, 90% recovery and FBP with the requirements of ASTM D1160:15. For IBP, 10%, 70% recovery the calculated reproducibilities were not in agreement with the requirements of ASTM D1160:15.

4.2 PERFORMANCE EVALUATION FOR THE GROUP OF LABORATORIES

A comparison has been made between the reproducibility as declared by the relevant standard and the reproducibility as found for the group of participating laboratories that participated. The average results, calculated reproducibilities and reproducibilities derived from literature standards (in casu ASTM standards), are compared in the next table.

Parameter	unit	n	Average	2.8 * sd	R(lit)
Acid Number (Total)	mg KOH/g	39	0.87	0.18	0.26
Aniline Point	°C	23	81.6	1.9	1.0
Asphaltenes	%M/M	26	0.13	0.31	(0.03)
Carbon Residue, micro method	%M/M	38	0.40	0.16	0.16
Density at 15 °C	kg/m ³	52	915.6	1.6	1.5
Flash Point PMcc	°C	43	168.1	6.6	10.0
Kinematic Viscosity at 50 °C	mm ² /s	49	32.6	0.7	2.4
Kinematic Viscosity at 100 °C	mm ² /s	42	6.7	0.2	0.6
Nitrogen	mg/kg	29	1396	406	371
Pour Point, manual	°C	38	26.1	8.1	9.0
Pour Point, automated, 3°C interval	°C	11	26.7	4.6	4.5
Sulphur Content (Total)	%M/M	52	0.52	0.03	0.05
Arsenic (As)	mg/kg	6	<1	n.a.	n.a.
Calcium (Ca)	mg/kg	20	0.66	0.56	0.49
Copper (Cu)	mg/kg	25	<0.1	n.a.	n.a.
Iron (Fe)	mg/kg	32	0.53	0.66	0.66
Nickel (Ni)	mg/kg	30	0.16	0.19	0.61
Silicon (Si)	mg/kg	16	0.65	1.20	0.21
Sodium (Na)	mg/kg	31	0.92	1.05	1.02
Vanadium (V)	mg/kg	31	0.37	0.52	0.93
Simulated distillation D6352					
- Initial Boiling Point	°C	13	243.5	28.2	49.1
- Temp 10% recovered	°C	13	330.9	9.1	7.1
- Temp 30% recovered	°C	12	390.5	5.4	5.9
- Temp 50% recovered	°C	12	427.3	6.1	6.4
- Temp 70% recovered	°C	13	466.7	8.7	7.2
- Temp 90% recovered	°C	13	519.8	12.8	10.5
- Final Boiling Point	°C	12	617.4	105.1	38.1

Parameter	unit	n	Average	2.8 * sd	R(lit)
Distillation D1160					
- Initial Boiling Point	°C	24	265.7	56.7	49.5
- Temp 10% recovered	°C	24	347.6	24.3	17.1
- Temp 30% recovered	°C	22	399.2	10.7	12.7
- Temp 50% recovered	°C	24	433.1	11.8	11.6
- Temp 70% recovered	°C	24	468.0	12.3	9.8
- Temp 90% recovered	°C	24	518.4	16.8	22.4
- Final Boiling Point	°C	22	553.8	26.3	26.9

Table 3: reproducibilities of results of sample #15250

results between brackets should used with care, because the average was below the application range

Without further statistical calculations it can be concluded that for a number of tests there is a not a good compliance of the group of participants with the relevant standards. The tests that are problematic have been discussed in paragraph 4.1.

4.3 COMPARISON OF THE PROFICIENCY TEST OF DECEMBER 2015 WITH PREVIOUS PTS

	<i>December 2015</i>	<i>December 2014</i>	<i>November 2013</i>
Number of reporting labs	54	51	32
Number of results reported	897	785	474
Statistical outliers	22	35	12
Percentage outliers	2.5%	4.5%	2.5%

Table 4: comparison with previous proficiency tests.

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

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

Determination	<i>December 2015</i>	<i>December 2014</i>	<i>November 2013</i>
Acid Number (Total)	+	+	++
Aniline Point	--	--	--
Asphaltenes	(--)	(--)	(--)
Carbon Residue, micro method	+/-	--	+
Density at 15 °C	+/-	+/-	+/-
Flash Point PMcc	+	+/-	+
Kinematic Viscosity at 50 °C	++	--	++
Kinematic Viscosity at 100 °C	++	++	++
Nitrogen	+/-	-	+
Sulphur Content (Total)	+	+/-	+/-
Arsenic (As)	n.e.	n.e.	n.e.
Calcium (Ca)	+/-	--	-
Copper (Cu)	n.e.	n.e.	n.e.
Nickel (Ni)	++	+/-	++
Iron (Fe)	+/-	+	++
Silicon (Si)	--	(--)	(--)
Sodium (Na)	+/-	+/-	+/-

Determination	December 2015	December 2014	November 2013
Vanadium (V)	+	++	++
Simulated distillation D6352			
- Initial Boiling Point	+	+/-	+
- Temp 10% recovered	-	-	+
- Temp 30% recovered	+/-	-	-
- Temp 50% recovered	+/-	-	-
- Temp 70% recovered	-	+/-	-
- Temp 90% recovered	-	+/-	+
- Final Boiling Point	--	-	+
Distillation D1160			
- Initial Boiling Point	-	--	--
- Temp 10% recovered	-	+	+
- Temp 30% recovered	+	+/-	+
- Temp 50% recovered	+/-	+/-	+
- Temp 70% recovered	-	-	+
- Temp 90% recovered	+	++	++
- Final Boiling Point	+/-	-	-

Table 5: comparison determinations against the standard

results between brackets should used with care, because the average was below the application range

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

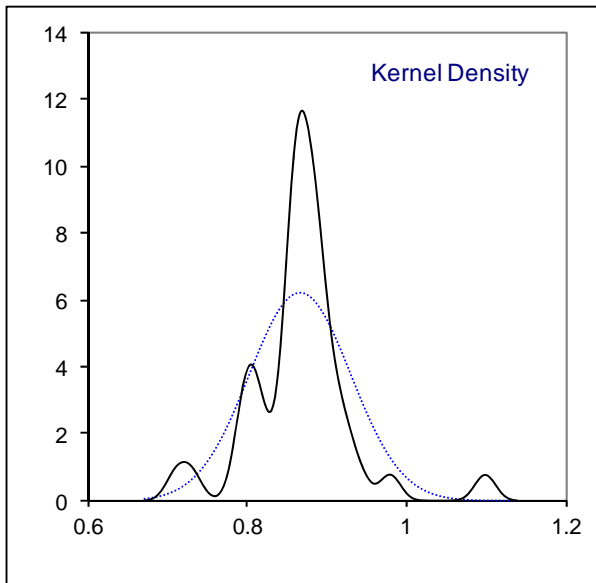
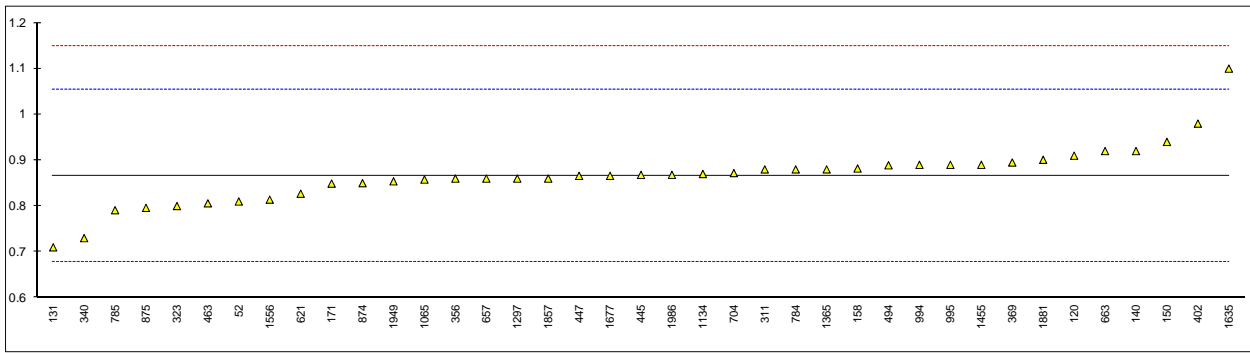
- ++: group performed much better than the standard
- + : group performed better than the standard
- +/-: group performance equals the standard
- : group performed worse than the standard
- : group performed much worse than the standard
- n.e.: not evaluated

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APPENDIX 1

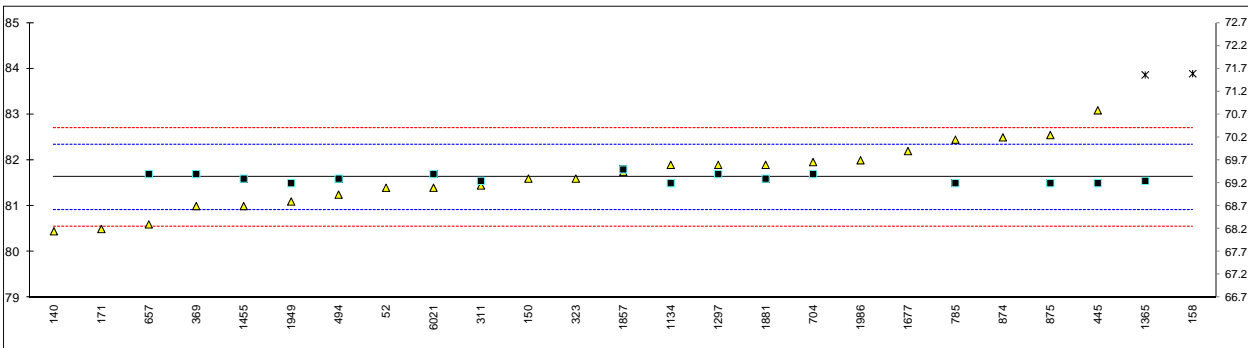
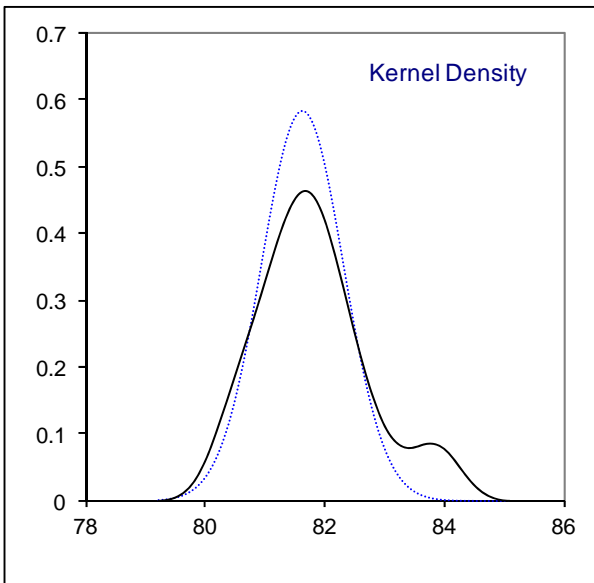
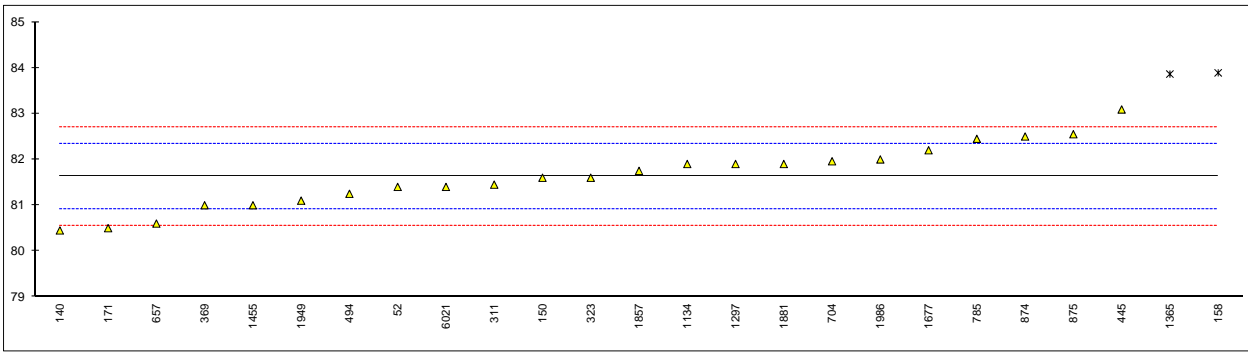
Determination of Acid Number (Total) on sample #15250; results in mg KOH/g

lab	method	value	mark	z(targ)	remarks
52	D664	0.81		-0.60	
62		----		----	
120	D664	0.91		0.46	
131	D664	0.71		-1.66	
133		----		----	
140	D664	0.920		0.57	
150	D664	0.94		0.78	
158	D664	0.8820		0.17	
171	D664	0.849		-0.19	
228		----		----	
311	D664	0.88		0.14	
313		----		----	
317		----		----	
323	D664	0.80		-0.71	
333		----		----	
334		----		----	
336		----		----	
337		----		----	
340	D664	0.730		-1.45	
356	D664	0.86	C	-0.07	First reported: 0.02
369	D664	0.895		0.30	
402	D664	0.98		1.21	
445	D664	0.868		0.02	
447	D664	0.866		0.00	
463	D664	0.806		-0.64	
494	D664	0.889		0.24	
621	D664	0.827		-0.42	
657	D664	0.86		-0.07	
663	D664	0.92		0.57	
704	D664	0.872		0.06	
732		----		----	
743		----		----	
781		----		----	
784	D664	0.88		0.14	
785	D664	0.791		-0.80	
791		----		----	
874	D664	0.85		-0.18	
875	D664	0.796		-0.75	
994	D664	0.89		0.25	
995	D664	0.89		0.25	
1065	D664	0.8578		-0.09	
1134	D664	0.87		0.04	
1297	D664	0.86		-0.07	
1365	D664	0.88		0.14	
1379		----		----	
1397		----		----	
1455	D664	0.89		0.25	
1510		----		----	
1543		----		----	
1556	D664	0.814		-0.56	
1635	D664	1.10		2.48	
1677	D664	0.866		0.00	
1857	D664	0.86		-0.07	
1881	D664	0.901		0.37	
1949	D664-A	0.854		-0.13	
1986	D664	0.868		0.02	
1995		----		----	
6020		----		----	
6021		----		----	
	normality	not OK			
	n	39			
	outliers	0			
	mean (n)	0.8665			
	st.dev. (n)	0.06403			
	R(calc.)	0.1793			
	R(D664:11a)	0.2632			



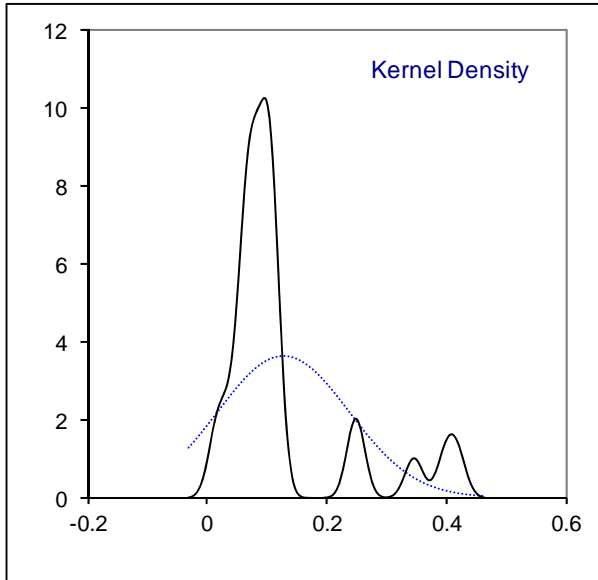
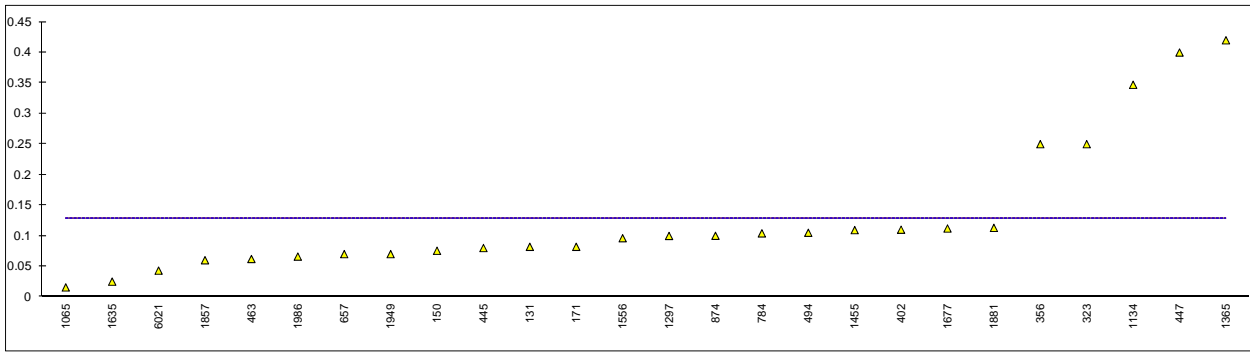
Determination of Aniline Point on sample #15250; results in °C

lab	method	value	mark	z(targ)	remarks	Aniline Point n-Heptane
52	D611-E	81.4		-0.65		----
62		----		----		----
120		----		----		----
131		----		----		----
133		----		----		----
140	D611-B	80.45		-3.31		----
150	D611-E	81.60		-0.09		----
158	D611-B	83.89	DG(0.05)	6.32		----
171	D611-E	80.5	C	-3.17	First reported: 84.1	----
228		----		----		----
311	D611-B	81.45		-0.51		69.25
313		----		----		----
317		----		----		----
323	D611-A	81.6		-0.09		----
333		----		----		----
334		----		----		----
336		----		----		----
337		----		----		----
340		----		----		----
356		----		----		----
369	D611-B	81.0	C	-1.77	First reported: 84.3	69.4
402		----		----		----
445	D611-B	83.09		4.08		69.20
447		----		----		----
463		----		----		----
494	D611-E	81.25		-1.07		69.3
621		----		----		----
657	D611-B	80.6	C	-2.89	First reported: 79	69.40
663		----		----		----
704	D611-B	81.96		0.92		69.40
732		----		----		----
743		----		----		----
781		----		----		----
784		----		----		----
785	D611-E	82.45		2.29		69.2
791		----		----		----
874	D611-E	82.50		2.43		----
875	D611-E	82.55		2.57		69.20
994		----		----		----
995		----		----		----
1065		----		----		----
1134	D611-B	81.9		0.75		69.2
1297	D611-E	81.9		0.75		69.4
1365	D611-E	83.863	DG(0.05)	6.25		69.25
1379		----		----		----
1397		----		----		----
1455	D611-E	81.00		-1.77		69.30
1510		----		----		----
1543		----		----		----
1556		----		----		----
1635		----		----		----
1677	D611-A	82.2		1.59		----
1857	D611-B	81.75		0.33		69.5
1881	D611-B	81.900		0.75		69.300
1949	D611-B	81.10		-1.49		69.20
1986	D611-B	82.00		1.03		----
1995		----		----		----
6020		----		----		----
6021	D611-B	81.40		-0.65	results Aniline Point only of which an Aniline Point of n-Heptane was reported	69.40
	normality	OK		OK		OK
	n	23		15		16
	outliers	2		1		0
	mean (n)	81.633		81.687		69.306
	st.dev. (n)	0.6842		0.6713		0.0981
	R(calc.)	1.916		1.880		0.275
	R(D611:12)	1.000		1.000		n.a.



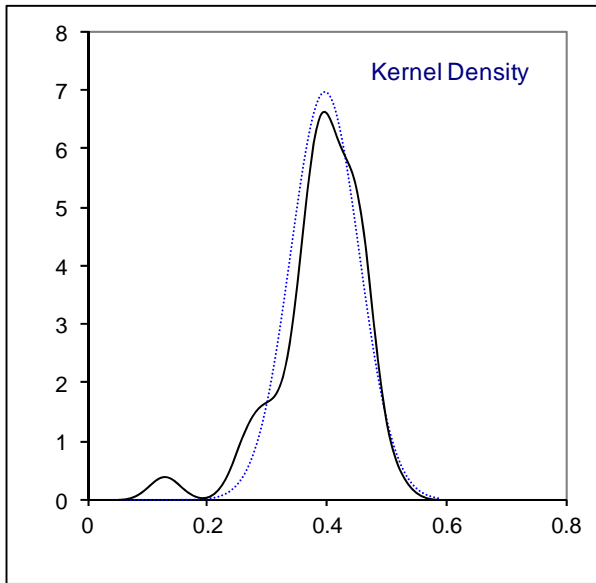
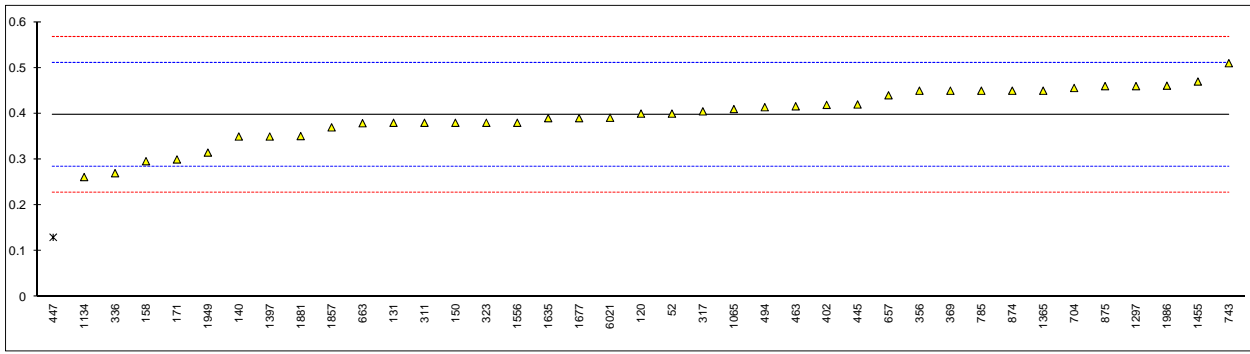
Determination of Asphaltenes on sample #15250; results in %M/M

lab	method	value	mark	z(targ)	remarks
52		----		----	
62		----		----	
120		----		----	
131	D6560	0.082		----	
133		----		----	
140		----		----	
150	IP143	0.0755		----	
158		----		----	
171	IP143	0.082	C	----	First reported: 0.648
228		----		----	
311		----		----	
313		----		----	
317		----		----	
323	IP143	0.25		----	
333		----		----	
334		----		----	
336		----		----	
337		----		----	
340		----		----	
356	IP143	0.25		----	
369		----		----	
402	D6560	0.11		----	
445	IP143	0.08		----	
447	IP143	0.40		----	
463	IP143	0.062		----	
494	IP143	0.105		----	
621		----		----	
657	IP143	0.07		----	
663		----		----	
704	IP143	<0.50		----	
732		----		----	
743		----		----	
781		----		----	
784	IP143	0.104		----	
785		----		----	
791		----		----	
874	IP143	0.10		----	
875		----		----	
994		----		----	
995	IP143	<0.5		----	
1065	IP143	0.01551		----	
1134	IP143	0.3472		----	
1297	D6560	0.0998		----	
1365	IP143	0.42		----	
1379		----		----	
1397	D6560	<0.5		----	
1455	INH-642	0.1093		----	
1510		----		----	
1543		----		----	
1556	IP143	0.0961		----	
1635	D6560	0.025		----	
1677	INH-642	0.112		----	
1857	IP143	0.06		----	
1881	INH-642	0.113		----	
1949	IP143	0.07	C	----	First reported: 0.28, also reported for INH-642: 0.0989
1986	D6560	0.066		----	
1995		----		----	
6020		----		----	
6021	IP143	0.043		----	
	normality	not OK			precision applicable between 0.50 and 30.0 %M/M
	n	26			
	outliers	0			
	mean (n)	0.1287			
	st.dev. (n)	0.10977			
	R(calc.)	0.3074			
	R(IP143:04)	(0.0257)			Compare R(iis14G06)=0.2978 at a mean conc. of 0.10%M/M



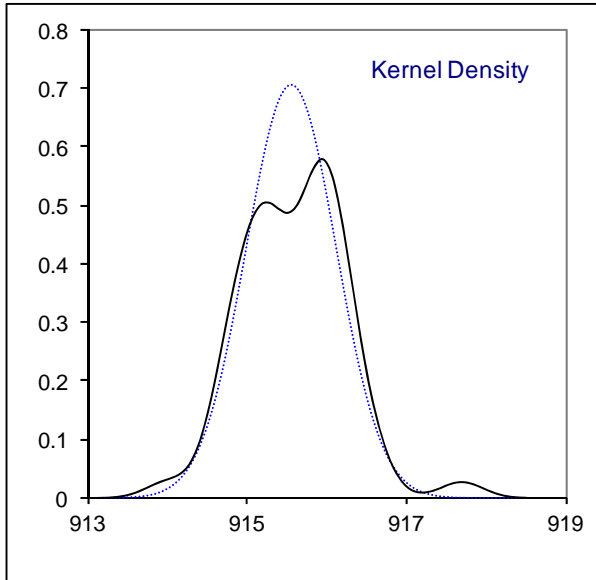
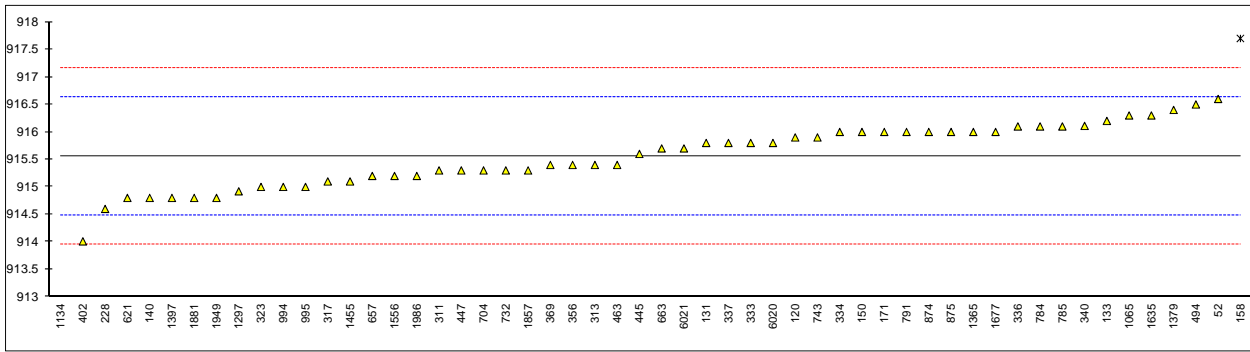
Determination of Carbon Residue, Micro method on sample #15250; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D4530	0.40		0.04	
62		----		----	
120	D4530	0.40		0.04	
131	D4530	0.38		-0.31	
133		----		----	
140	D4530	0.35		-0.84	
150	D4530	0.38		-0.31	
158	D4530	0.2962		-1.78	
171	D4530	0.30		-1.72	
228		----		----	
311	D4530	0.38		-0.31	
313		----		----	
317	D4530	0.405		0.13	
323	D4530	0.38		-0.31	
333		----		----	
334		----		----	
336	D4530	0.27		-2.24	
337		----		----	
340		----		----	
356	D4530	0.45		0.92	
369	D4530	0.45		0.92	
402	ISO10370	0.419		0.38	
445	D4530	0.42		0.40	
447	D4530	0.13	R(0.01)	-4.71	
463	D4530	0.416		0.33	
494	D4530	0.414		0.29	
621		----		----	
657	D4530	0.44		0.75	
663	D4530	0.379		-0.33	
704	D4530	0.456		1.03	
732		----		----	
743	D4530	0.51		1.98	
781		----		----	
784		----		----	
785	D4530	0.45		0.92	
791		----		----	
874	D4530	0.45		0.92	
875	D4530	0.46		1.10	
994		----		----	
995		----		----	
1065	D4530	0.41		0.22	
1134	IP398	0.2616		-2.39	
1297	D4530	0.460		1.10	
1365	D4530	0.45		0.92	
1379		----		----	
1397	D4530	0.35		-0.84	
1455	D4530	0.47		1.28	
1510		----		----	
1543		----		----	
1556	ISO10370	0.380		-0.31	
1635	D4530	0.39		-0.13	
1677	D4530	0.39		-0.13	
1857	D4530	0.37		-0.48	
1881	D4530	0.351		-0.82	
1949	D4530	0.315		-1.45	
1986	ISO10370	0.461		1.12	
1995		----		----	
6020		----		----	
6021	D4530	0.391		-0.11	
	normality	OK			
	n	38			
	outliers	1			
	mean (n)	0.3975			
	st.dev. (n)	0.05727			
	R(calc.)	0.1603			
	R(D4530:15)	0.1590			



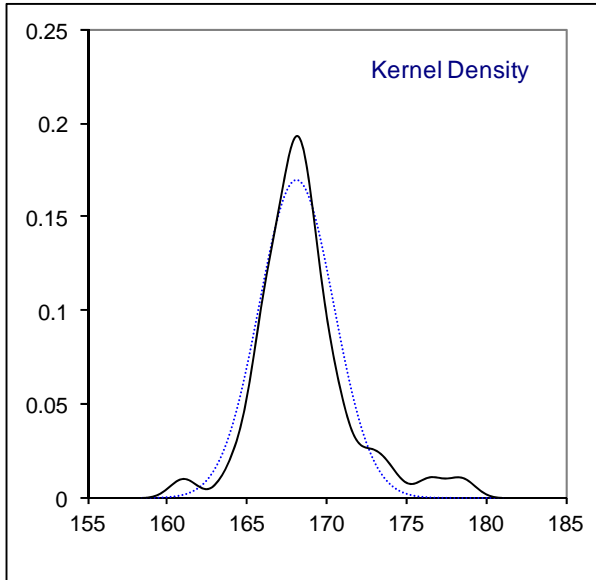
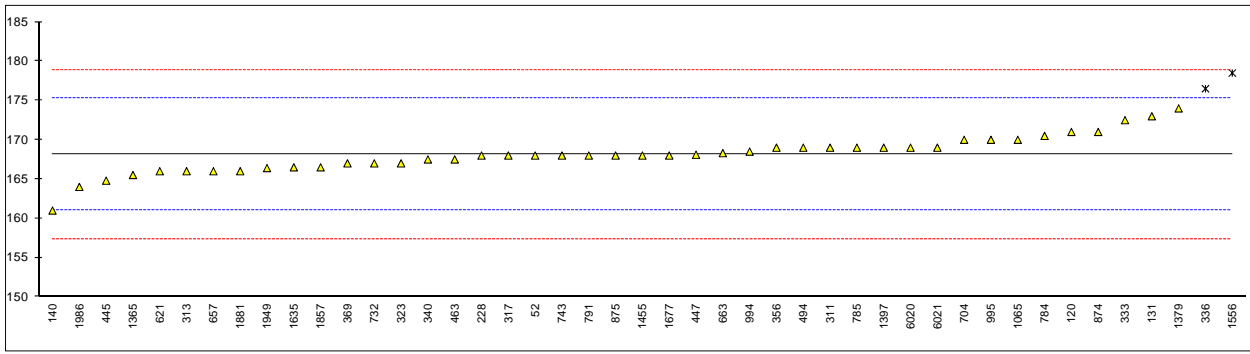
Determination of Density at 15°C on sample #15250; results in kg/m³

lab	method	value	mark	z(targ)	remarks
52	D4052	916.6		1.94	
62		-----		-----	
120	D4052	915.9		0.63	
131	D4052	915.8		0.45	
133	D4052	916.2		1.19	
140	D4052	914.8		-1.42	
150	D4052	916.0		0.82	
158	D1298	917.7	R(0.05)	3.99	
171	D4052	916		0.82	
228	D4052	914.6		-1.79	
311	ISO12185	915.3		-0.49	
313	ISO12185	915.4		-0.30	
317	D4052	915.1		-0.86	
323	ISO12185	915.0		-1.05	
333	D4052	915.8		0.45	
334	D4052	916.0		0.82	
336	ISO12185	916.1		1.01	
337	ISO12185	915.8		0.45	
340	ISO12185	916.11		1.03	
356	D4052	915.4		-0.30	
369	D4052	915.4		-0.30	
402	ISO12185	914.01		-2.89	
445	D4052	915.6		0.07	
447	IP365	915.3	C	-0.49	Reported: 0.9153 kg/m ³
463	ISO12185	915.4		-0.30	
494	D4052	916.5		1.75	
621	D4052	914.8		-1.42	
657	D4052	915.2		-0.67	
663	D4052	915.7		0.26	
704	ISO12185	915.3		-0.49	
732	ISO12185	915.3		-0.49	
743	D1298	915.9		0.63	
781		-----		-----	
784	D1298	916.1		1.01	
785	D1298	916.1		1.01	
791	D1298	916.0		0.82	
874	ISO12185	916.0	C	0.82	First reported: 0.9160 kg/m ³
875	D1298	916.0		0.82	
994	ISO12185	915.0		-1.05	
995	D4052	915.0		-1.05	
1065	D1298	916.3		1.38	
1134	IP365	891.0	R(0.01)	-45.85	
1297	D4052	914.92		-1.20	
1365	D4052	916.0		0.82	
1379	D4052	916.4		1.57	
1397	ISO12185	914.8		-1.42	
1455	ISO12185	915.1		-0.86	
1510		-----		-----	
1543		-----		-----	
1556	ISO12185	915.2		-0.67	
1635	ISO12185	916.3		1.38	
1677	D4052	916.0		0.82	
1857	ISO12185	915.3		-0.49	
1881	ISO12185	914.8		-1.42	
1949	ISO12185	914.8		-1.42	
1986	ISO3675	915.2		-0.67	
1995		-----		-----	
6020	ISO12185	915.8		0.45	
6021	ISO12185	915.7		0.26	
	normality	OK			
	n	52			
	outliers	2			
	mean (n)	915.56			
	st.dev. (n)	0.564			
	R(calc.)	1.58			
	R(ISO12185:96)	1.50			



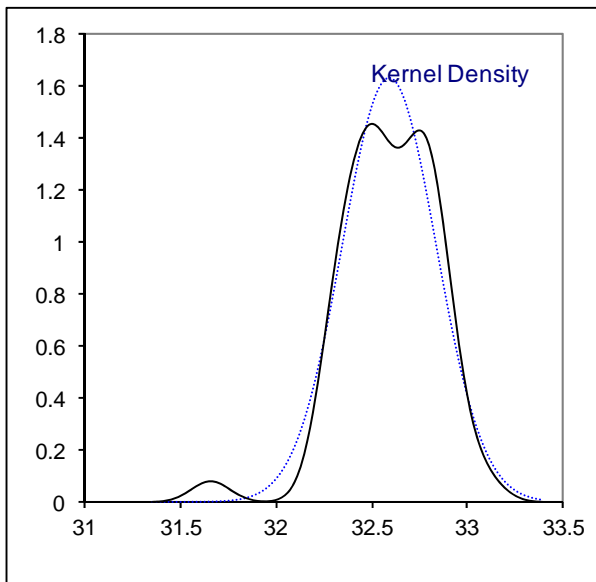
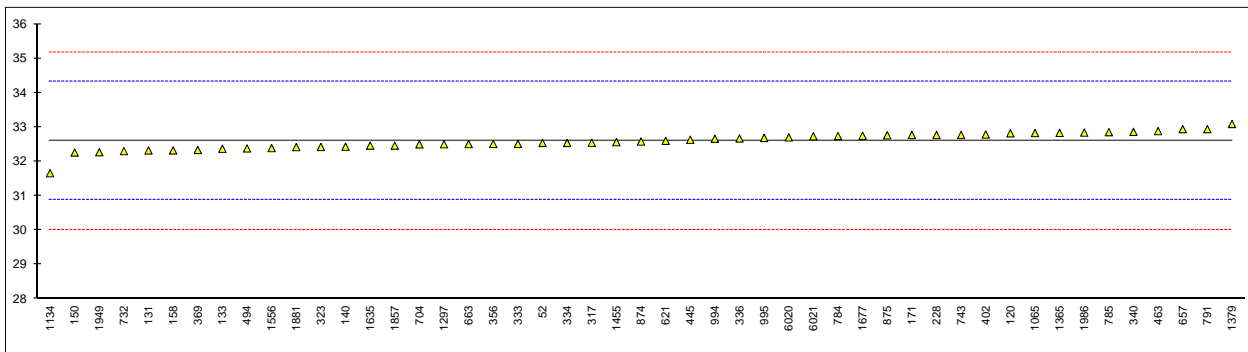
Determination of Flash Point PMcc on sample #15250; results in °C

lab	method	value	mark	z(targ)	remarks
52	D93-A	168.0		-0.03	
62		----		----	
120	D93-B	171		0.81	
131	D93-B	173		1.37	
133		----		----	
140	D93-B	161.0		-1.99	
150	D93-B	>110		----	
158	D93-B	>110		----	
171		----		----	
228	D93-B	168.0		-0.03	
311	D93-B	169.0		0.25	
313	D93-B	166.0	C	-0.59	First reported: 156.0
317	D93-B	168.0		-0.03	
323	D93-B	167.0		-0.31	
333	D93-B	172.5		1.23	
334		----		----	
336	D93-B	176.5	R(0.05)	2.35	
337		----		----	
340	D93-B	167.5		-0.17	
356	D93-B	169.0		0.25	
369	D93-B	167.0		-0.31	
402		----		----	
445	D93-B	164.8		-0.93	
447	D93-B	168.1		0.00	
463	D93-B	167.5		-0.17	
494	D93-A	169.0		0.25	
621	D93-B	166.0		-0.59	
657	D93-B	166		-0.59	
663	D93-B	168.3		0.05	
704	D93-B	170.0		0.53	
732	D93-B	167.0		-0.31	
743	D93-B	168.0		-0.03	
781		----		----	
784	D93-B	170.5		0.67	
785	D93-B	169.0		0.25	
791	D93-B	168.0		-0.03	
874	D93-B	171.0		0.81	
875	D93-B	168.0		-0.03	
994	D93-B	168.5		0.11	
995	D93-B	170.0		0.53	
1065	D93-B	170		0.53	
1134		----		----	
1297		----		----	
1365	D93-B	165.52		-0.72	
1379	D93-B	174		1.65	
1397	D93-A	169.0		0.25	
1455	D93-A	168.0		-0.03	
1510		----		----	
1543		----		----	
1556	ISO2719	178.5	R(0.05)	2.91	
1635	D93-B	166.5		-0.45	
1677	D93-B	168.0		-0.03	
1857	D93-B	166.5		-0.45	
1881	D93-B	166.0		-0.59	
1949	D93-B	166.4		-0.48	
1986	ISO2719	164.0		-1.15	
1995		----		----	
6020	D93-B	169.0		0.25	
6021	D93-B	169.0		0.25	
	normality	suspect			
	n	43			
	outliers	2			
	mean (n)	168.11			
	st.dev. (n)	2.352			
	R(calc.)	6.59			
	R(D93-B:15a)	10.00			



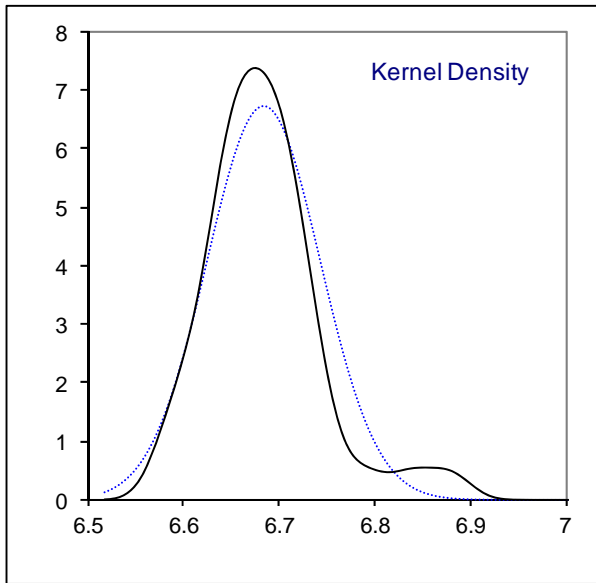
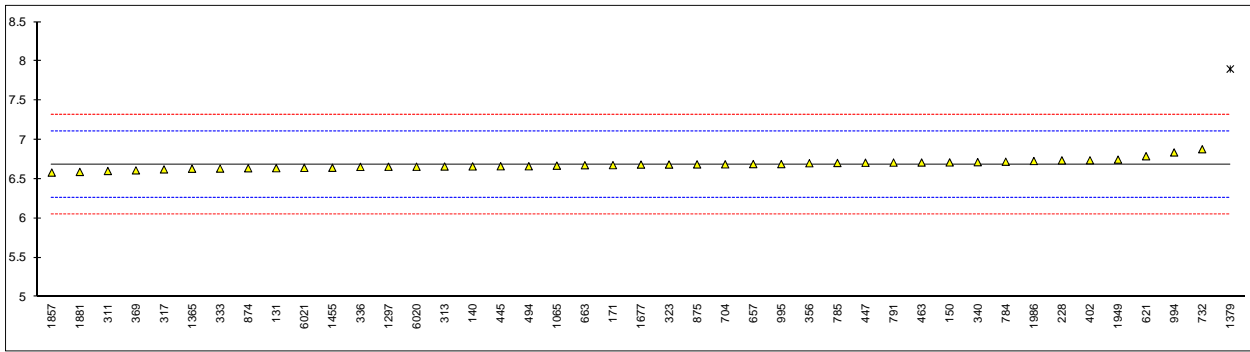
Determination of Kinematic Viscosity at 50°C on sample #15250; results in mm²/s

lab	method	value	mark	z(targ)	remarks
52	D445	32.54		-0.06	
62		-----		-----	
120	D445	32.82		0.27	
131	D445	32.32		-0.31	
133	D445	32.37		-0.26	
140	D445	32.43		-0.19	
150	D445	32.26		-0.38	
158	D445	32.3202		-0.31	
171	D445	32.77		0.21	
228	D445	32.77		0.21	
311		-----		-----	
313		-----		-----	
317	D445	32.542		-0.06	
323	D445	32.42		-0.20	
333	ISO3104	32.51		-0.09	
334	D445	32.54		-0.06	
336	D445	32.67		0.09	
337		-----		-----	
340	D445	32.860		0.31	
356	D445	32.51		-0.09	
369	D445	32.334		-0.30	
402		32.785		0.22	
445	D445	32.63		0.05	
447		-----		-----	
463	D7042	32.882		0.34	
494	D445	32.378		-0.25	
621	D445	32.60		0.01	
657	D445	32.94		0.40	
663	D445	32.506		-0.10	
704	D445	32.499		-0.11	
732	D445	32.30		-0.34	
743	D445	32.77		0.21	
781		-----		-----	
784	D445	32.74		0.17	
785	D445	32.851		0.30	
791	D445	32.94		0.40	
874	D445	32.58		-0.01	
875	D445	32.76		0.20	
994	D445	32.66		0.08	
995	D445	32.685		0.11	
1065	D445	32.825		0.27	
1134	D445	31.6572332		-1.08	
1297	D7042	32.500		-0.11	
1365	D445	32.83		0.28	
1379	D445	33.09		0.58	
1397		-----		-----	
1455	D445	32.56		-0.04	
1510		-----		-----	
1543		-----		-----	
1556	ISO3104	32.388		-0.24	
1635	ISO3104	32.46		-0.15	
1677	D445	32.747		0.18	
1857	D445	32.46		-0.15	
1881	D445	32.417		-0.20	
1949	D445	32.269		-0.37	
1986	D445	32.84		0.29	
1995		-----		-----	
6020	D445	32.70		0.13	
6021	D445	32.734		0.17	
	normality	not OK			
	n	49			
	outliers	0			
	mean (n)	32.591			
	st.dev. (n)	0.2454			
	R(calc.)	0.687			
	R(D445:15a)	2.412			



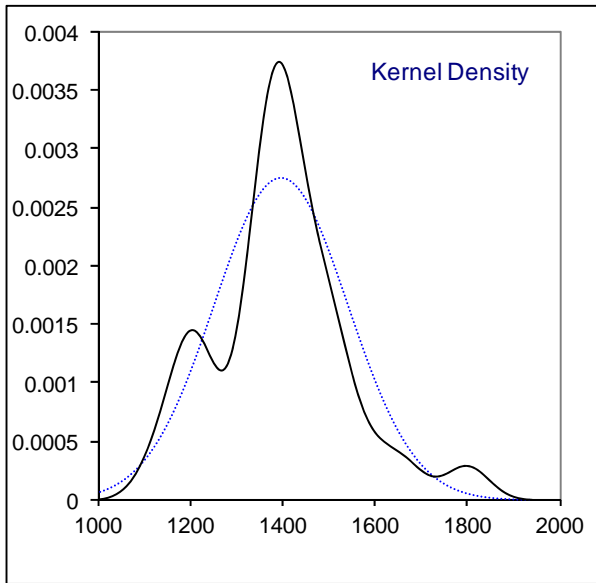
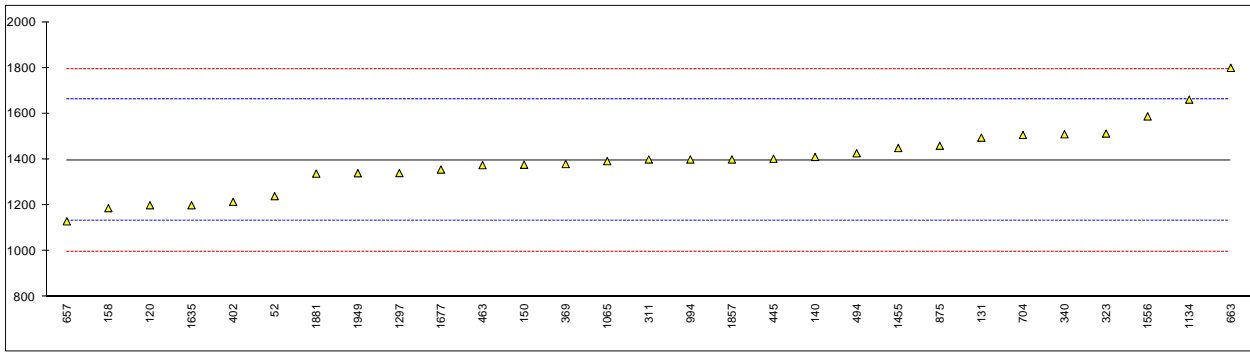
Determination of Kinematic Viscosity at 100°C on sample #15250; results in mm²/s

lab	method	value	mark	z(targ)	remarks
52		----		----	
62		----		----	
120		----		----	
131	D445	6.639		-0.22	
133		----		----	
140	D445	6.661		-0.11	
150	D445	6.712		0.13	
158		----		----	
171	D445	6.678		-0.03	
228	D445	6.738		0.25	
311	D445	6.603		-0.39	
313	D445	6.660		-0.12	
317	D445	6.6231		-0.29	
323	D445	6.685		0.00	
333	ISO3104	6.634		-0.24	
334		----		----	
336	D445	6.655		-0.14	
337		----		----	
340	D445	6.7156		0.15	
356	D445	6.702		0.08	
369	D445	6.611		-0.35	
402	D7042	6.7395		0.26	
445	D445	6.663		-0.10	
447	D445	6.708		0.11	
463	D7042	6.7110		0.13	
494	D445	6.663		-0.10	
621	D445	6.791		0.51	
657	D445	6.691		0.03	
663	D445	6.6766		-0.04	
704	D445	6.688		0.02	
732	D445	6.88		0.93	
743		----		----	
781		----		----	
784	D445	6.721		0.17	
785	D445	6.7053		0.10	
791	D445	6.71		0.12	
874	D445	6.638		-0.22	
875	D445	6.687		0.01	
994	D445	6.839		0.74	
995	D445	6.691		0.03	
1065	D445	6.67085		-0.07	
1134		----		----	
1297	D7042	6.6568		-0.13	
1365	D445	6.632		-0.25	
1379	D445	7.901	R(0.01)	5.80	
1397		----		----	
1455	D445	6.644		-0.19	
1510		----		----	
1543		----		----	
1556		----	W	----	First reported: 5.001
1635		----		----	
1677	D445	6.6842		0.00	
1857	D445	6.583		-0.48	
1881	D445	6.5912		-0.45	
1949	D445	6.7479		0.30	
1986	D445	6.730		0.22	
1995		----		----	
6020	D445	6.657		-0.13	
6021	D445	6.6432		-0.20	
	normality	not OK			
	n	42			
	outliers	1			
	mean (n)	6.685			
	st.dev. (n)	0.0592			
	R(calc.)	0.166			
	R(D445:15a)	0.587			



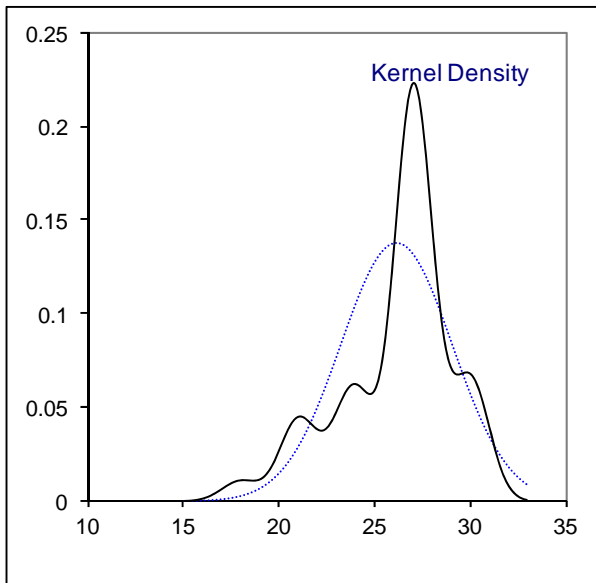
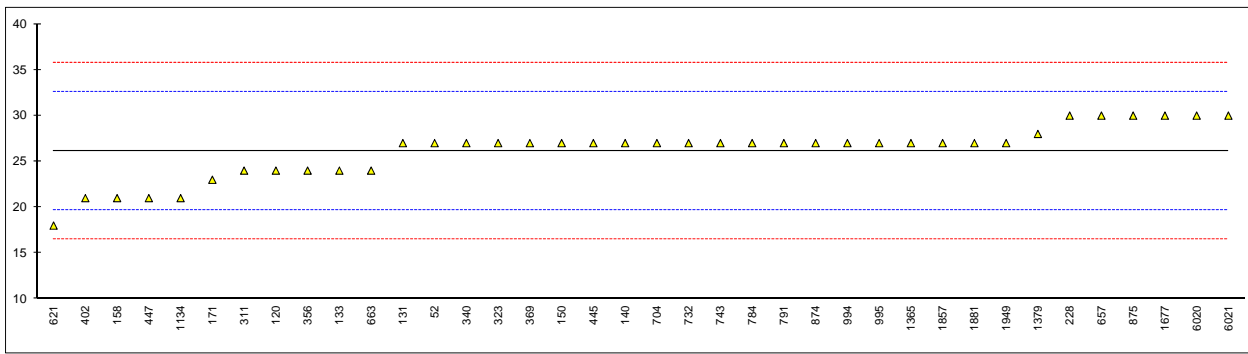
Determination of Nitrogen on sample #15250; results in mg/kg

lab	method	value	mark	z(targ)	remarks
52	D5762	1240		-1.18	
62		----		----	
120	D5762 Gravimetric	1200	C	-1.48	First reported: 2500
131	D5762 Gravimetric	1495		0.74	
133		----		----	
140	D5762 Gravimetric	1411		0.11	
150	D5762 Volumetric	1377		-0.15	
158	D5762 Gravimetric	1187.5		-1.57	
171		----		----	
228		----		----	
311	D5762 Volumetric	1400		0.03	
313		----		----	
317		----		----	
323	D5762 Gravimetric	1513		0.88	
333		----		----	
334		----		----	
336		----		----	
337		----		----	
340	D5762 Gravimetric	1510		0.86	
356		----		----	
369	D3228	1380		-0.12	
402	D5762 Volumetric	1215		-1.37	
445	D5762 Gravimetric	1403	C	0.05	Reported: 1403 %M/M
447		----		----	
463	D5762 Gravimetric	1375		-0.16	
494	D5762 Gravimetric	1427		0.23	
621		----		----	
657	D5762 Gravimetric	1130	C	-2.01	Reported: 1130 %M/M
663	D5762 Gravimetric	1800		3.04	
704	D5762 Volumetric	1507		0.83	
732		----		----	
743		----		----	
781		----		----	
784		----		----	
785		----		----	
791		----		----	
874		----		----	
875	D5762 Gravimetric	1460		0.48	
994	D5762 Volumetric	1400		0.03	
995		----		----	
1065		1392.46	C	-0.03	First reported: 2104.83
1134	D5762 Volumetric	1661.236		2.00	
1297	D4629	1340.5		-0.42	
1365		----		----	
1379		----		----	
1397		----		----	
1455	D5762 Gravimetric	1450		0.40	
1510		----		----	
1543		----		----	
1556	D5762 Gravimetric	1588		1.44	
1635	D5762 Gravimetric	1200		-1.48	
1677	D5762 Gravimetric	1356		-0.30	
1857	D5762 Volumetric	1400		0.03	
1881	D5762 Volumetric	1338		-0.44	
1949	D5762	1340		-0.43	
1986		----		----	
1995		----		----	
6020		----		----	
6021		----		----	
	normality	suspect			
	n	29			
	outliers	0			
	mean (n)	1396.44			
	st.dev. (n)	144.906			
	R(calc.)	405.74			
	R(D5762:12)	371.45			



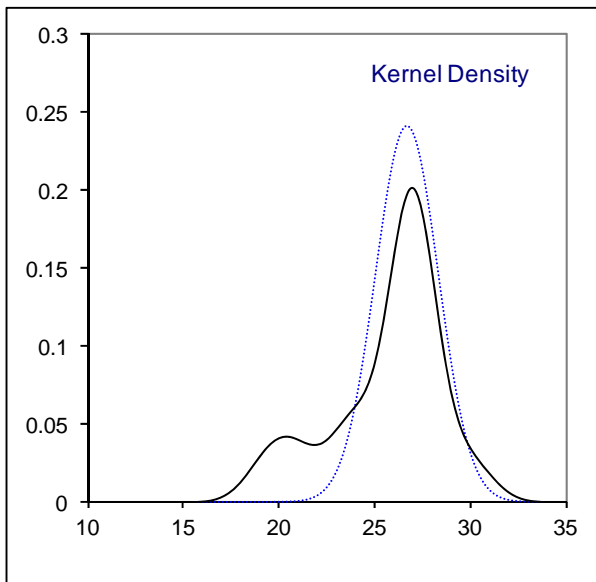
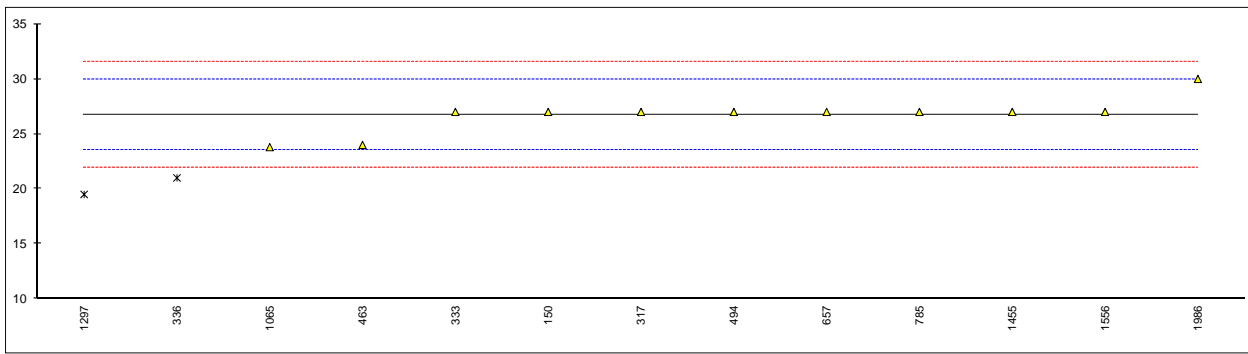
Determination of Pour Point, manual on sample #15250; results in °C

lab	method	value	mark	z(targ)	remarks
52	D97	27		0.27	
62		----		----	
120	D97	24		-0.66	
131	D97	27		0.27	
133	D97	24		-0.66	
140	D97	27		0.27	
150	D97	27		0.27	
158	D97	21		-1.60	
171	D97	23		-0.97	
228	D97	30		1.20	
311	D97	24		-0.66	
313		----		----	
317		----		----	
323	D97	27		0.27	
333		----		----	
334		----		----	
336		----		----	
337		----		----	
340	D97	27		0.27	
356	D97	24		-0.66	
369	D97	27		0.27	
402	D97	21		-1.60	
445	D97	27		0.27	
447	D97	21		-1.60	
463		----		----	
494		----		----	
621	D97	18	C	-2.53	First reported: 15
657	D97	30		1.20	
663	D97	24		-0.66	
704	D97	27		0.27	
732	D97	27		0.27	
743	D97	27		0.27	
781		----		----	
784	D97	27		0.27	
785		----		----	
791	D97	27		0.27	
874	D97	27		0.27	
875	D97	30		1.20	
994	D97	27		0.27	
995	D97	27		0.27	
1065		----		----	
1134	IP15	21		-1.60	
1297		----		----	
1365	D97	27		0.27	
1379	D97	28		0.58	
1397		----		----	
1455		----		----	
1510		----		----	
1543		----		----	
1556		----		----	
1635		----		----	
1677	D97	30		1.20	
1857	D97	27		0.27	
1881	D97	27		0.27	
1949	D97	27		0.27	
1986		----		----	
1995		----		----	
6020	D97	30		1.20	
6021	D97	30		1.20	
	normality	OK			
	n	38			
	outliers	0			
	mean (n)	26.13			
	st.dev. (n)	2.905			
	R(calc.)	8.14			
	R(D97:15)	9.00			



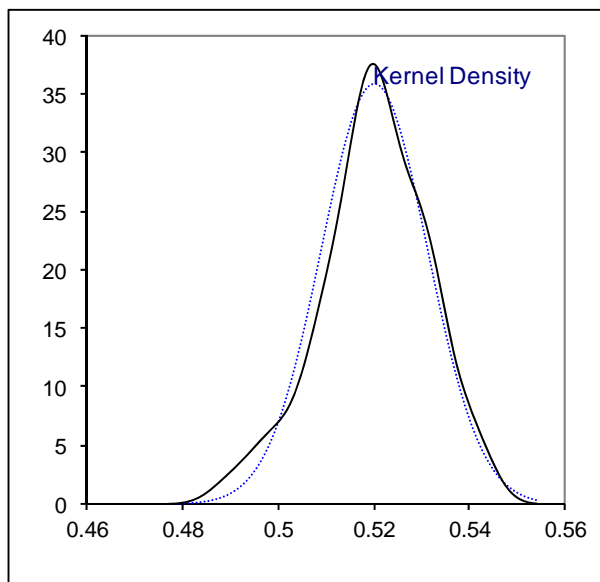
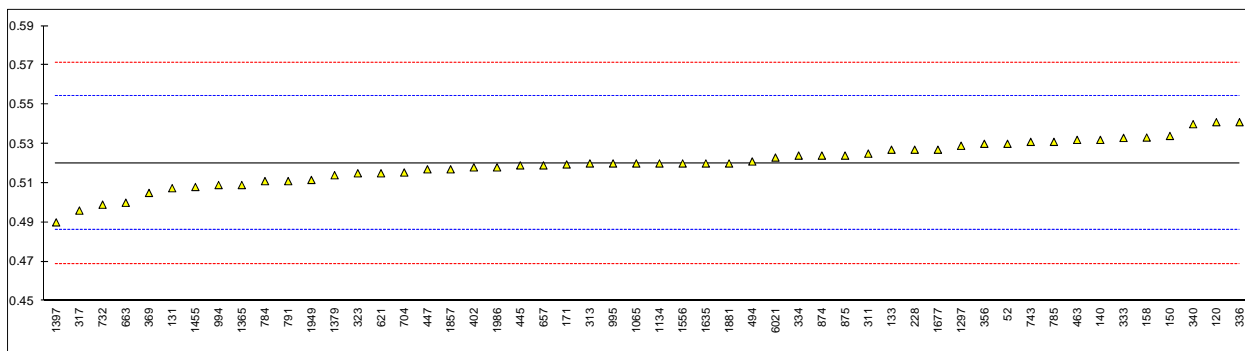
Determination of Pour Point, automated, 3°C interval on sample #15250; results in °C

lab	method	value	mark	z(targ)	remarks
52		----		----	
62		----		----	
120		----		----	
131		----		----	
133		----		----	
140		----		----	
150	D5950	27		0.18	
158		----		----	
171		----		----	
228		----		----	
311		----		----	
313		----		----	
317	D6749	27		0.18	
323		----		----	
333	D5950	27		0.18	
334		----		----	
336	D5950	21	DG(0.05)	-3.55	
337		----		----	
340		----		----	
356		----		----	
369		----		----	
402		----		----	
445		----		----	
447		----		----	
463	D6892	24		-1.69	
494	D5950	27		0.18	
621		----		----	
657	D5950	27		0.18	
663		----		----	
704		----		----	
732		----		----	
743		----		----	
781		----		----	
784		----		----	
785	D6749	27		0.18	
791		----		----	
874		----		----	
875		----		----	
994		----		----	
995		----		----	
1065	D5950	23.8		-1.81	
1134		----		----	
1297	D5950	19.5	DG(0.05)	-4.49	
1365		----		----	
1379		----		----	
1397		----		----	
1455	D5950	27		0.18	
1510		----		----	
1543		----		----	
1556	ISO3016	27		0.18	
1635		----		----	
1677		----		----	
1857		----		----	
1881		----		----	
1949		----		----	
1986	ISO3016	30		2.05	
1995		----		----	
6020		----		----	
6021		----		----	
	normality	suspect			
	n	11			
	outliers	2			
	mean (n)	26.71			
	st.dev. (n)	1.653			
	R(calc.)	4.63			
	R(D5950:14)	4.50			



Determination of Total Sulphur on sample #15250; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D4294	0.53		0.58	
62		-----		-----	
120	D4294	0.541		1.23	
131	D4294	0.5074		-0.74	
133	D4294	0.527		0.41	
140	D4294	0.532		0.70	
150	D4294	0.534		0.82	
158	D4294	0.5332		0.77	
171	D4294	0.5195		-0.03	
228	D4294	0.527		0.41	
311	D4294	0.525		0.29	
313	D4294	0.52		0.00	
317	D2622	0.496		-1.41	
323	D4294	0.515		-0.30	
333	D4294	0.533		0.76	
334	D4294	0.524		0.23	
336	D4294	0.541		1.23	
337		-----		-----	
340	D4294	0.540		1.17	
356	D4294	0.530		0.58	
369	D2622	0.505		-0.88	
402	D4294	0.518		-0.12	
445	IP336	0.519		-0.06	
447	IP336	0.517		-0.18	
463	D4294	0.532		0.70	
494	D4294	0.521		0.06	
621	D4294	0.515		-0.30	
657	D4294	0.519		-0.06	
663	D4294	0.500		-1.18	
704	D4294	0.5154		-0.27	
732	D4294	0.499		-1.24	
743	D4294	0.531		0.64	
781		-----		-----	
784	D4294	0.511		-0.53	
785	D4294	0.531		0.64	
791	D4294	0.511		-0.53	
874	D4294	0.524		0.23	
875	D4294	0.524		0.23	
994	D4294	0.509		-0.65	
995	D4294	0.520		0.00	
1065	D4294	0.52		0.00	
1134	IP336	0.52		0.00	
1297	D4294	0.5290		0.53	
1365	D4294	0.509		-0.65	
1379	D4294	0.514		-0.36	
1397	D2622	0.49		-1.77	
1455	D2622	0.508		-0.71	
1510		-----		-----	
1543		-----		-----	
1556	ISO8754	0.520		0.00	
1635	D4294	0.52		0.00	
1677	D4294	0.527		0.41	
1857	D4294	0.517		-0.18	
1881	D4294	0.520		0.00	
1949	D4294	0.5116		-0.50	
1986	D4294	0.518		-0.12	
1995		-----		-----	
6020		-----		-----	
6021	D4294	0.5230		0.17	
	normality	OK			
	n	52			
	outliers	0			
	mean (n)	0.5201			
	st.dev. (n)	0.01113			
	R(calc.)	0.0312			
	R(D4294:10)	0.0477			



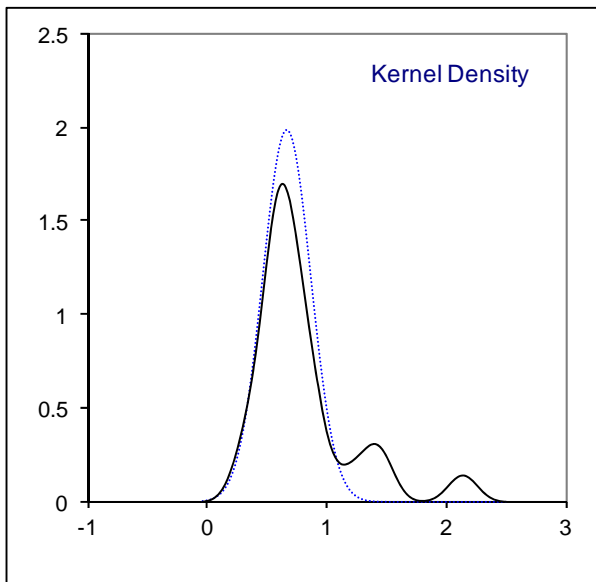
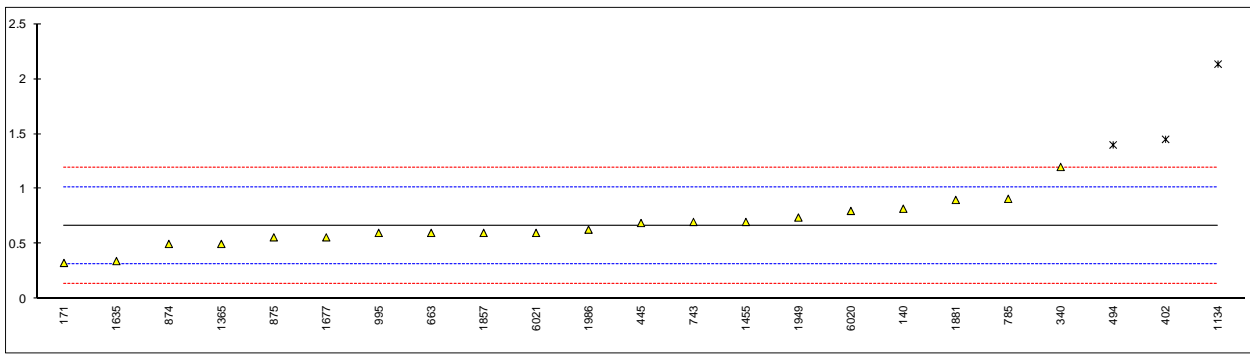
Determination of Arsenic on sample #15250; results in mg/kg

lab	method	value	mark	z(targ)	remarks
52		----		----	
62		----		----	
120	IP501	<1		----	
131		----		----	
133		----		----	
140		----		----	
150	D5708	<1		----	
158		----		----	
171		----		----	
228		----		----	
311	UOP986	<1		----	
313		----		----	
317		----		----	
323	in house	<50		----	
333		----		----	
334		----		----	
336		----		----	
337		----		----	
340		----		----	
356		----		----	
369		----		----	
402		----		----	
445		----		----	
447		----		----	
463		----		----	
494		----		----	
621		----		----	
657		----		----	
663		----		----	
704		----		----	
732		----		----	
743		----		----	
781		----		----	
784		----		----	
785		----		----	
791		----		----	
874		----		----	
875		----		----	
994		----		----	
995		----		----	
1065		----		----	
1134	E885	0.009		----	
1297	in house	0.027		----	
1365		----		----	
1379		----		----	
1397		----		----	
1455		----		----	
1510		----		----	
1543		----		----	
1556		----		----	
1635	D5185	<2		----	
1677	IP PM CW	< 0.1		----	
1857		----		----	
1881		----		----	
1949		----		----	
1986		----		----	
1995		----		----	
6020		----		----	
6021		----		----	
	normality	n.a.			
	n	6			
	outliers	0			
	mean (n)	<1			

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Determination of Calcium on sample #15250; results in mg/kg

lab	method	value	mark	z(targ)	remarks
52	IP470	<1		----	
62		----		----	
120		----		----	
131		----		----	
133		----		----	
140	D5708	0.82		0.88	
150	D5708	<1		----	
158		----		----	
171	D5708	0.327		-1.91	
228		----		----	
311		----		----	
313		----		----	
317	IP501	<0.5		----	
323	D4752BMod.	<1		----	
333		----		----	
334		----		----	
336		----		----	
337		----		----	
340	IP501	1.2		3.04	
356		----		----	
369	IP501	<3		----	
402	IP501	1.451	R(0.05)	4.46	
445	IP PM CW	0.69		0.15	
447		----		----	
463		----		----	
494	IP501	1.4	R(0.05)	4.18	
621		----		----	
657	IP501	<3		----	
663	IP501	0.6		-0.36	
704	IP470	<3		----	
732		----		----	
743	IP470	0.7		0.20	
781		----		----	
784		----		----	
785	IP470	0.91		1.40	
791		----		----	
874	IP501	0.5		-0.93	
875	IP501	0.56		-0.59	
994	IP501	<3		----	
995	D5863	0.6		-0.36	
1065		----		----	
1134	IP PM CW	2.135	R(0.01)	8.35	
1297		----		----	
1365	IP470	0.5		-0.93	
1379		----		----	
1397		----		----	
1455	IP PM CW	0.7		0.20	
1510		----		----	
1543		----		----	
1556		----		----	
1635	D5185	0.344		-1.82	
1677	IP PM CW	0.56		-0.59	
1857	IP501	0.6		-0.36	
1881	IP PM CW	0.90		1.34	
1949	IP PM CW	0.74		0.43	
1986	IP470	0.63		-0.19	
1995		----		----	
6020	IP470	0.8		0.77	
6021	IP501	0.6		-0.36	
	normality	suspect			Application range IP501/IP470: 3-100 mg/kg
	n	20			Application range IP PM CW/04: 0.1-10 mg/kg
	outliers	3			
	mean (n)	0.664			
	st.dev. (n)	0.2006			
	R(calc.)	0.562			
	R(IP501:05)	0.494			Compare R(IP470:05) = 3.583



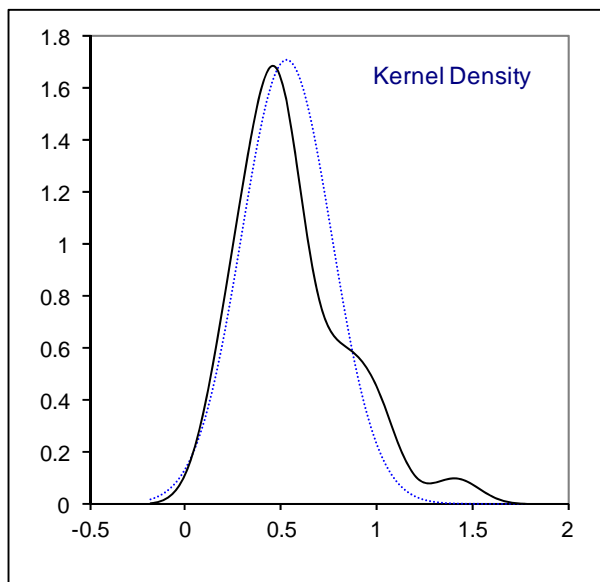
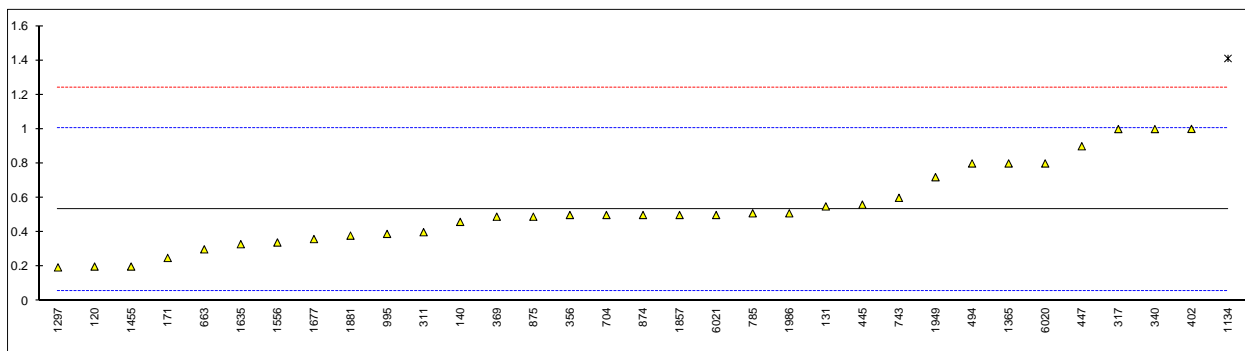
Determination of Copper on sample #15250; results in mg/kg

lab	method	value	mark	z(targ)	remarks
52		----		----	
62		----		----	
120	IP501	<0.1		----	
131		----		----	
133		----		----	
140	D5708	0.02		----	
150	D5708	<1		----	
158		----		----	
171	D5708	0.18		----	
228		----		----	
311	IP PM CW	<0.1		----	
313		----		----	
317	D7111	<0.5		----	
323	D4752BMod.	<1		----	
333		----		----	
334		----		----	
336		----		----	
337		----		----	
340		----		----	
356	IP PM CW	<0.1		----	
369	IP PM CW	<0.1		----	
402	IP501	0.01		----	
445	IP PM CW	<0.1		----	
447	IP PM CW	0		----	
463		----		----	
494	D7111	0.01		----	
621		----		----	
657	IP501	<1		----	
663		----		----	
704	IP PM CW	<0.1		----	
732		----		----	
743	IP470	0.004		----	
781		----		----	
784		----		----	
785	IP470	0.03		----	
791	IP470	<1		----	
874	IP501	0.0		----	
875	IP501	<1		----	
994	IP501	<0.1		----	
995	D5863	<0.1		----	
1065		----		----	
1134	IP PM CW	0.172		----	
1297		----		----	
1365	in house	0.03		----	
1379		----		----	
1397		----		----	
1455	IP PM CW	<0.1		----	
1510		----		----	
1543		----		----	
1556	in house	0.005		----	
1635	D5185	0.41		----	
1677	IP PM CW	<0.1		----	
1857	UOP407	0.007		----	
1881	IP PM CW	0.02		----	
1949	IP PM CW	0.04		----	
1986	IP PM CW	0.01		----	
1995		----		----	
6020	IP470	0.01		----	
6021	IP PM CW	0.01		----	
	normality	n.a.			Application range IP PM CW/04: 0.1 – 10 mg/kg
	n	25			
	outliers	n.a.			
	mean (n)	<0.1			
	st.dev. (n)	n.a.			
	R(calc.)	n.a.			
	R(lit)	unknown			

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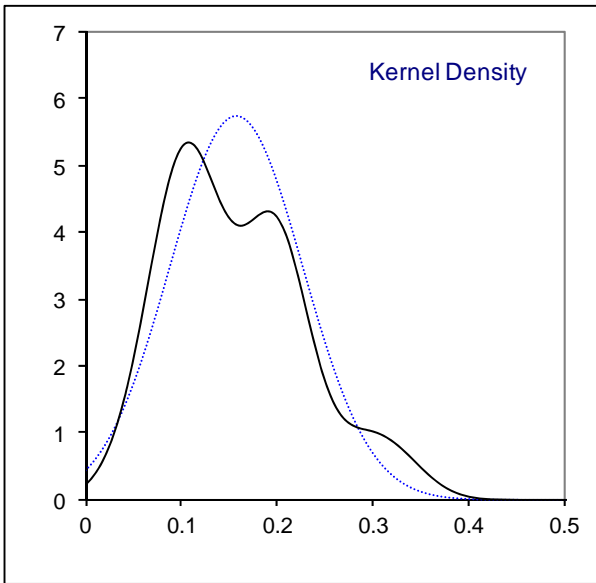
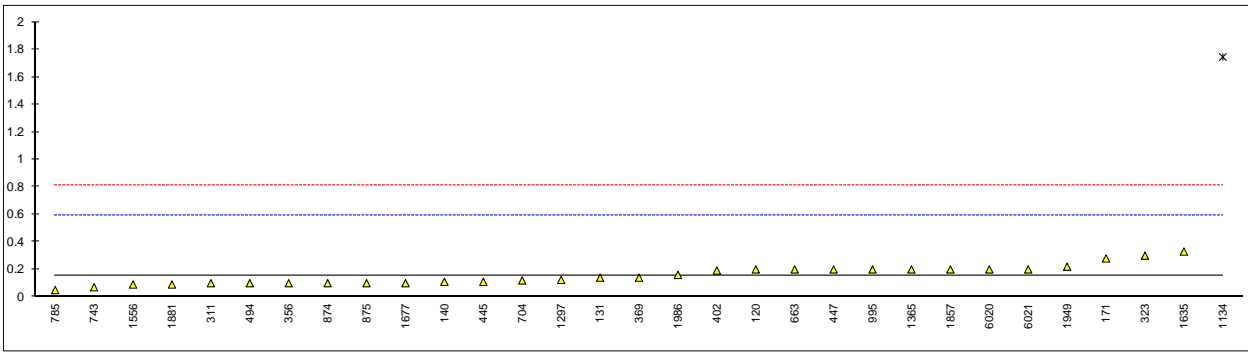
Determination of Iron on sample #15250; results in mg/kg

lab	method	value	mark	z(targ)	remarks
52	IP470	<1		----	
62		----		----	
120	IP501	0.2	C	-1.40	First reported: 1.5
131	IP501	0.55		0.07	
133		----		----	
140	D5708	0.46		-0.31	
150	D5708	<1		----	
158		----		----	
171	D5708	0.25		-1.19	
228		----		----	
311	IP PM CW	0.4		-0.56	
313		----		----	
317	IP501	1	C	1.98	First reported: 2
323	D4752BMod.	<1		----	
333		----		----	
334		----		----	
336		----		----	
337		----		----	
340	IP501	1		1.98	
356	IP PM CW	0.5		-0.14	
369	IP PM CW	0.49		-0.18	
402	IP501	1.001		1.98	
445	IP PM CW	0.56		0.12	
447	IP PM CW	0.9		1.55	
463		----		----	
494	IP501	0.8		1.13	
621		----		----	
657	IP501	<2		----	
663	IP501	0.3		-0.98	
704	IP PM CW	0.50		-0.14	
732		----		----	
743	IP470	0.6		0.29	
781		----		----	
784		----		----	
785	IP470	0.51		-0.09	
791	IP470	<2		----	
874	IP501	0.5		-0.14	
875	IP501	0.49		-0.18	
994	IP501	<2		----	
995	D5863	0.39		-0.60	
1065		----		----	
1134	IP PM CW	1.411	R(0.05)	3.71	
1297	D5708	0.195		-1.43	
1365	IP470	0.8		1.13	
1379		----		----	
1397		----		----	
1455	IP PM CW	0.2		-1.40	
1510		----		----	
1543		----		----	
1556	in house	0.34		-0.81	
1635	D5185	0.33		-0.85	
1677	IP PM CW	0.36		-0.73	
1857	IP501	0.5		-0.14	
1881	IP PM CW	0.38		-0.64	
1949	IP PM CW	0.72		0.79	
1986	IP PM CW	0.51		-0.09	
1995		----		----	
6020	IP470	0.8		1.13	
6021	IP501	0.5		-0.14	
	normality	OK			Application range IP501/IP470: 2 – 60 mg/kg
	n	32			Application range IP PM CW/04: 0.1 – 10 mg/kg
	outliers	1			
	mean (n)	0.5323			
	st.dev. (n)	0.23418			
	R(calc.)	0.6557			
	R(IP501:05)	0.6629			Compare R(IP470:05) = 1.2927



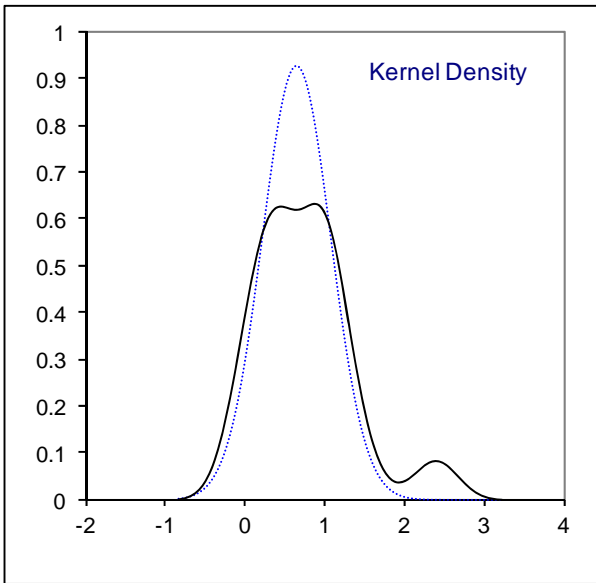
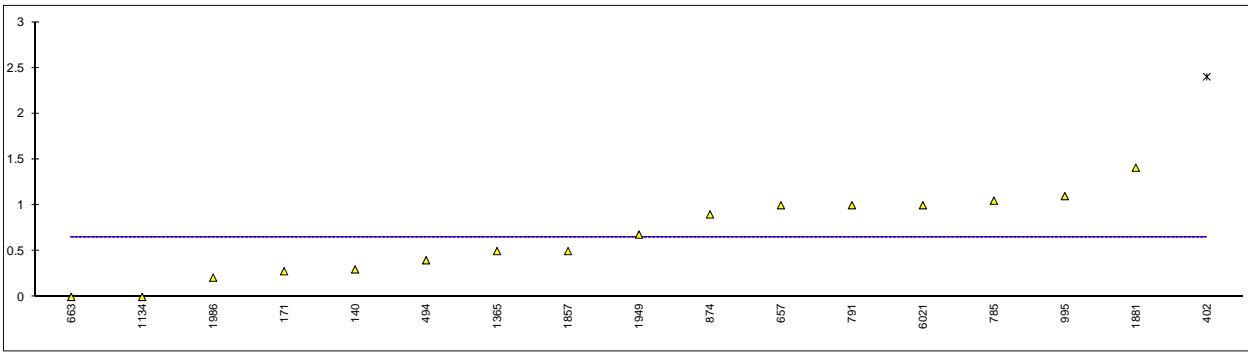
Determination of Nickel on sample #15250; results in mg/kg

lab	method	value	mark	z(targ)	remarks
52	IP470	<1		----	
62		----		----	
120	IP501	0.2		0.20	
131	IP501	0.14		-0.08	
133		----		----	
140	D5708	0.11		-0.22	
150	D5708	<1		----	
158		----		----	
171	D5708	0.28		0.56	
228		----		----	
311	IP PM CW	0.1		-0.26	
313		----		----	
317	IP501	<1		----	
323	INH-018	0.3		0.66	
333		----		----	
334		----		----	
336		----		----	
337		----		----	
340	IP501	<1		----	
356	IP PM CW	0.1		-0.26	
369	IP PM CW	0.14		-0.08	
402	IP501	0.192		0.16	
445	IP PM CW	0.11		-0.22	
447	IP PM CW	0.2		0.20	
463		----		----	
494	IP501	0.1		-0.26	
621		----		----	
657	IP501	<1		----	
663	IP501	0.2		0.20	
704	IP PM CW	0.12		-0.17	
732		----		----	
743	IP470	0.07		-0.40	
781		----		----	
784		----		----	
785	IP470	0.05		-0.49	
791	IP470	<1		----	
874	IP501	0.1		-0.26	
875	IP501	0.10		-0.26	
994	IP501	<1		----	
995	D5863	0.20		0.20	
1065		----		----	
1134	IP PM CW	1.745	R(0.01)	7.31	
1297	D5708	0.124		-0.15	
1365	IP470	0.2		0.20	
1379		----		----	
1397		----		----	
1455	IP PM CW	<0.1		----	
1510		----		----	
1543		----		----	
1556	in house	0.09		-0.31	
1635	D5185	0.33		0.79	
1677	IP PM CW	0.10		-0.26	
1857	IP501	0.2		0.20	
1881	IP PM CW	0.09		-0.31	
1949	IP PM CW	0.22		0.29	
1986	IP PM CW	0.16		0.01	
1995		----		----	
6020	IP470	0.2		0.20	
6021	IP501	0.2		0.20	
	normality	OK			Application range IP501/IP470: 1 – 100 mg/kg
	n	30			Application range IP PM CW/04: 0.1 – 10 mg/kg
	outliers	1			
	mean (n)	0.1575			
	st.dev. (n)	0.06959			
	R(calc.)	0.1949			
	R(IP501:05)	0.6085			Compare R(IP470:05) = 0.8442



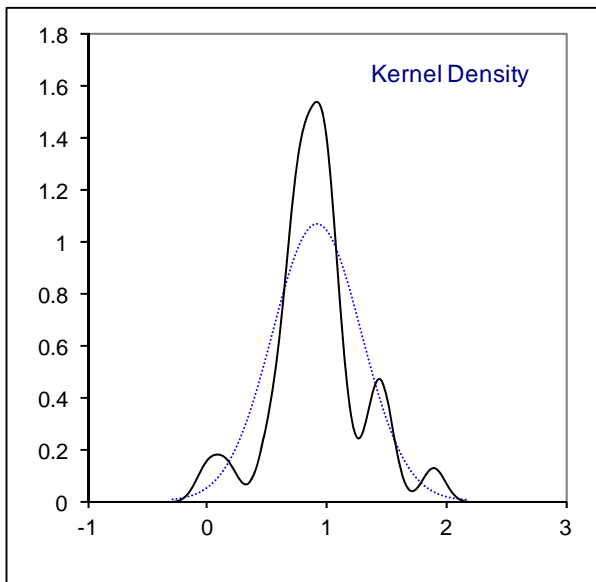
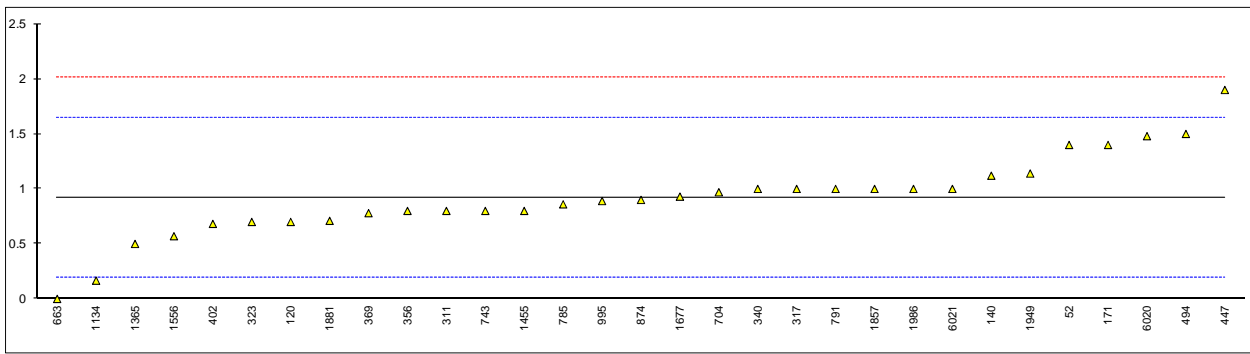
Determination of Silicon on sample #15250; results in mg/kg

lab	method	value	mark	z(targ)	remarks
52	IP470	<10		----	
62		----		----	
120	IP501	<0.1		----	
131		----		----	
133		----		----	
140	D5708	0.30		----	
150	D5708	<1		----	
158		----		----	
171	D5708	0.28		----	
228		----		----	
311	UOP796	<1.0		----	
313		----		----	
317	IP501	<10		----	
323		<10		----	
333		----		----	
334		----		----	
336		----		----	
337		----		----	
340	IP501	<10		----	
356		----		----	
369	D5184	<5		----	
402	IP501	2.402	G(0.05)	----	
445		----		----	
447		----		----	
463		----		----	
494	IP501	0.4		----	
621		----		----	
657	IP501	1		----	
663	IP501	0.0		----	
704	IP470	<10		----	
732		----		----	
743		----		----	
781		----		----	
784		----		----	
785	IP470	1.05		----	
791	IP470	1		----	
874	IP501	0.9		----	
875	IP501	<1		----	
994	IP501	<10		----	
995	IP470	1.1		----	
1065		----		----	
1134	IP PM CW	0		----	
1297		----		----	
1365	IP470	0.5		----	
1379		----		----	
1397		----		----	
1455		----		----	
1510		----		----	
1543		----		----	
1556		----		----	
1635	D5185	<0.2		----	
1677	IP501	<10		----	
1857	IP501	0.5		----	
1881	IP470	1.41		----	
1949	IP PM CW	0.68		----	
1986	IP470	0.21		----	
1995		----		----	
6020		----		----	
6021	IP501	1.0		----	
				Results of IP501 only	
	normality	OK		OK	Application range IP501/IP470: 10 – 250 mg/kg
	n	16		6	Application range IP PM CW/04: 0.1 – 10 mg/kg
	outliers	1		1	
	mean (n)	0.6456		0.6333	
	st.dev. (n)	0.43021		0.40332	
	R(calc.)	1.2046		1.1293	
	R(IP501:05)	0.2143		0.2143	Compare R(IP470:05) = 1.0353



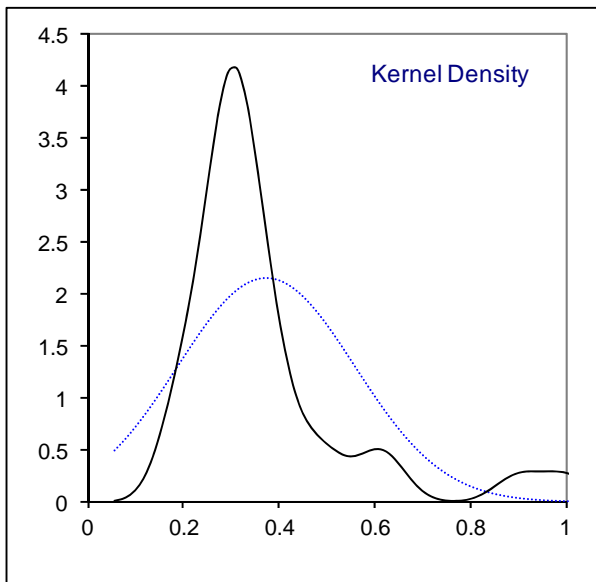
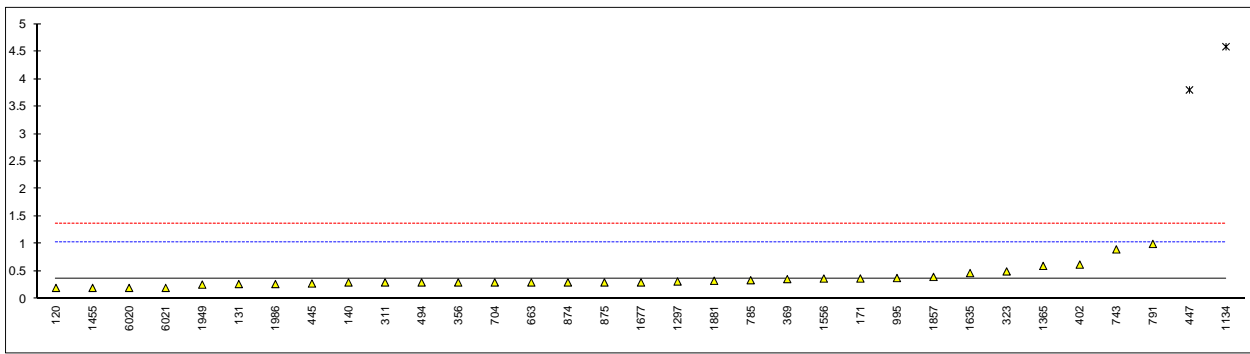
Determination of Sodium on sample #15250; results in mg/kg

lab	method	value	mark	z(targ)	remarks
52	IP470	1.4		1.32	
62		----		----	
120	IP501	0.7		-0.60	
131		----		----	
133		----		----	
140	D5708	1.12		0.55	
150	D5708	<1		----	
158		----		----	
171	D5708	1.4		1.32	
228		----		----	
311	IP PM CW	0.8		-0.33	
313		----		----	
317	IP501	1	C	0.22	First reported: 2
323	D4752BMod.	0.7		-0.60	
333		----		----	
334		----		----	
336		----		----	
337		----		----	
340	IP501	1.0		0.22	
356	IP PM CW	0.8		-0.33	
369	IP PM CW	0.78		-0.38	
402	IP501	0.682		-0.65	
445		----		----	
447	IP PM CW	1.9		2.70	
463		----		----	
494	IP501	1.5		1.60	
621		----		----	
657	IP501	<1		----	
663	IP501	0.0		-2.53	
704	IP PM CW	0.97		0.14	
732		----		----	
743	IP470	0.8		-0.33	
781		----		----	
784		----		----	
785	IP470	0.86		-0.16	
791	IP470	1		0.22	
874	IP501	0.9		-0.05	
875	IP501	<1		----	
994		----		----	
995	D5863	0.89		-0.08	
1065		----		----	
1134	IP PM CW	0.166		-2.07	
1297		----		----	
1365	IP470	0.5		-1.15	
1379		----		----	
1397		----		----	
1455	IP PM CW	0.8		-0.33	
1510		----		----	
1543		----		----	
1556	in house	0.57		-0.96	
1635	D5185	<1		----	
1677	IP PM CW	0.93		0.03	
1857	IP501	1		0.22	
1881	IP PM CW	0.71		-0.58	
1949	IP PM CW	1.14		0.61	
1986	IP PM CW	1.00		0.22	
1995		----		----	
6020	IP470	1.48		1.54	
6021	IP501	1.0		0.22	
	normality	suspect			Application range IP501/IP470: 1 – 100 mg/kg
	n	31			Application range IP PM CW/04: 0.1 – 10 mg/kg
	outliers	0			
	mean (n)	0.9193			
	st.dev. (n)	0.37390			
	R(calc.)	1.0469			
	R(IP501:05)	1.0185			Compare R(IP470:05) = 1.2388



Determination of Vanadium on sample #15250; results in mg/kg

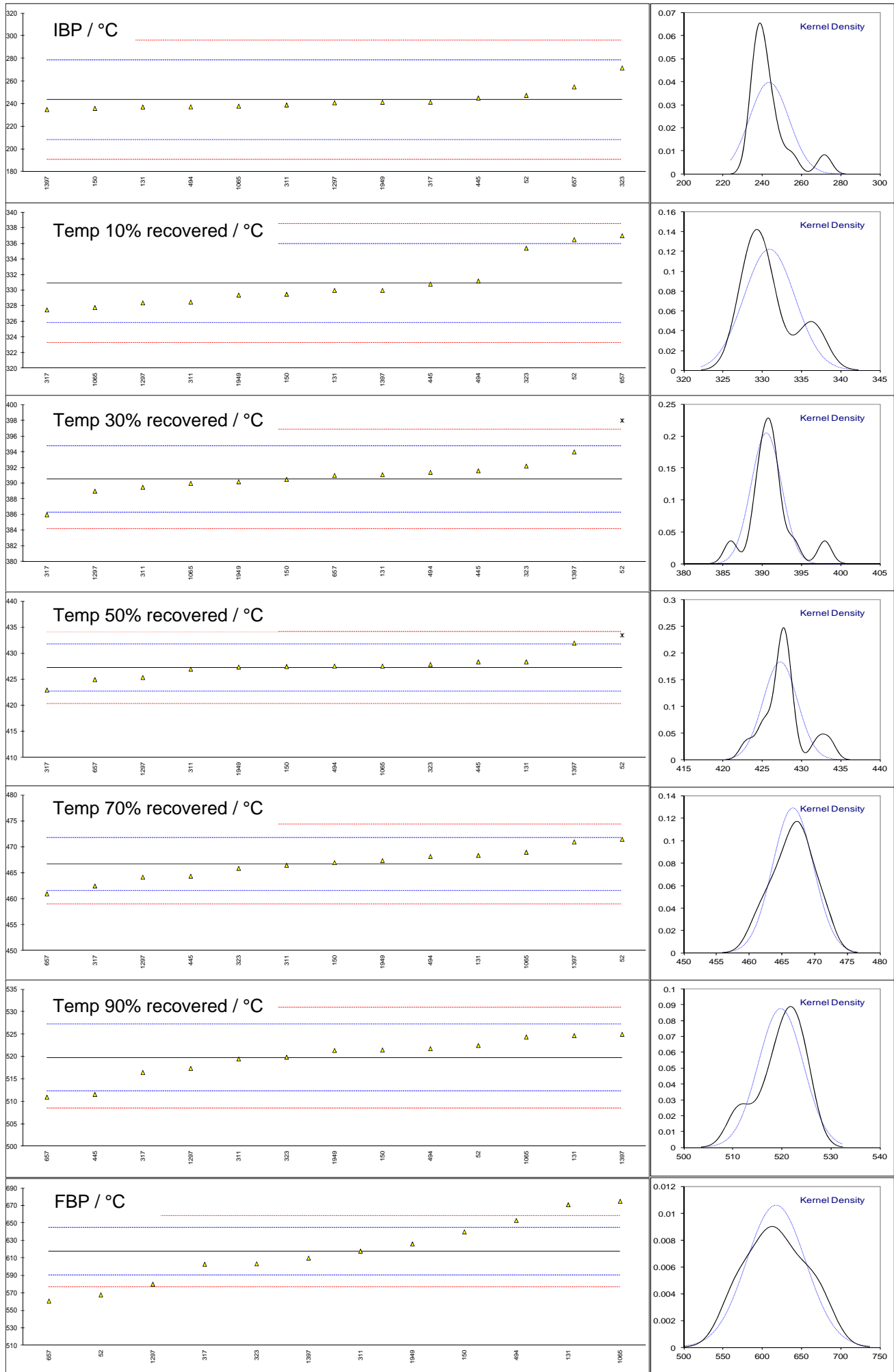
lab	method	value	mark	z(targ)	remarks
52	IP470	<1		----	
62		----		----	
120	IP501	0.2		-0.52	
131	IP501	0.27		-0.31	
133		----		----	
140	D5708	0.30		-0.22	
150	D5708	<1		----	
158		----		----	
171	D5708	0.371		0.00	
228		----		----	
311	IP PM CW	0.3		-0.22	
313		----		----	
317	IP501	<1		----	
323	INH-018	0.5		0.38	
333		----		----	
334		----		----	
336		----		----	
337		----		----	
340	IP501	<1		----	
356	IP PM CW	0.3		-0.22	
369	IP PM CW	0.36		-0.04	
402	IP501	0.624		0.76	
445	IP PM CW	0.28		-0.28	
447	IP PM CW	3.8	R(0.01)	10.34	
463		----		----	
494	IP501	0.3		-0.22	
621		----		----	
657	IP501	<1		----	
663	IP501	0.3		-0.22	
704	IP PM CW	0.30		-0.22	
732		----		----	
743	IP470	0.9		1.59	
781		----		----	
784		----		----	
785	IP470	0.34		-0.10	
791	IP470	1		1.89	
874	IP501	0.3		-0.22	
875	IP501	0.30		-0.22	
994	IP501	<1		----	
995	D5863	0.38		0.02	
1065		----		----	
1134	IP PM CW	4.586	R(0.01)	12.71	
1297	D5708	0.317		-0.17	
1365	IP470	0.6		0.69	
1379		----		----	
1397		----		----	
1455	IP PM CW	0.2		-0.52	
1510		----		----	
1543		----		----	
1556	in house	0.37		-0.01	
1635	D5185	0.47		0.29	
1677	IP PM CW	0.30		-0.22	
1857	IP501	0.4		0.08	
1881	IP PM CW	0.33		-0.13	
1949	IP PM CW	0.26		-0.34	
1986	IP PM CW	0.27		-0.31	
1995		----		----	
6020	IP470	0.2		-0.52	
6021	IP501	0.2		-0.52	
	normality	not OK			Application range IP501/IP470: 1 – 400 mg/kg
	n	31			Application range IP PM CW/04: 0.1 – 10 mg/kg
	outliers	2			
	mean (n)	0.3723			
	st.dev. (n)	0.18514			
	R(calc.)	0.5184			
	R(IP501:05)	0.9286			Compare R(IP470:05) = 1.989



Determination of Simulated Distillation acc. to ASTM D6352 on sample #15250; result in °C

lab	method	IBP	10% rec	30% rec	50% rec	70% rec	90% rec	FBP
52	D7213	247.5	336.5	398.0 D(0.05)	433.5 D(0.05)	471.5	522.5	568.0
62		----	----	----	----	----	----	----
120		----	----	----	----	----	----	----
131	D6352	237.2	330	391.1	428.4	468.4	524.7	671
133		----	----	----	----	----	----	----
140		----	----	----	----	----	----	----
150	D7169	236.0	329.5	390.5	427.5	467.0	521.5	640.0
158		----	----	----	----	----	----	----
171		----	----	----	----	----	----	----
228		----	----	----	----	----	----	----
311	D6352	239.0	328.5	389.5	427.0	466.5	519.5	618.0
313		----	----	----	----	----	----	----
317	D6352	241.5	327.5	386.0	423.0	462.5	516.5	603.0
323	D6352	271.7	335.4	392.2	427.9	465.9	519.9	603.5
333		----	----	----	----	----	----	----
334		----	----	----	----	----	----	----
336		----	----	----	----	----	----	----
337		----	----	----	----	----	----	----
340		----	----	----	----	----	----	----
356		----	----	----	----	----	----	----
369		----	----	----	----	----	----	----
402		----	----	----	----	----	----	----
445	D2887	245.2	330.8	391.6	428.4	464.4	511.6	>538
447		----	----	----	----	----	----	----
463		----	----	----	----	----	----	----
494	D6352	237.4	331.2	391.4	427.6	468.2	521.8	653.0
621		----	----	----	----	----	----	----
657	D6352	255.0	337.0	391.0	425.0	461.0	511.0	561.0
663		----	----	----	----	----	----	----
704		----	----	----	----	----	----	----
732		----	----	----	----	----	----	----
743		----	----	----	----	----	----	----
781		----	----	----	----	----	----	----
784		----	----	----	----	----	----	----
785		----	----	----	----	----	----	----
791		----	----	----	----	----	----	----
874		----	----	----	----	----	----	----
875		----	----	----	----	----	----	----
994		----	----	----	----	----	----	----
995		----	----	----	----	----	----	----
1065	D6352	238.0	327.8	390.0	427.6	469.0	524.4	675.0
1134		----	----	----	----	----	----	----
1297	D7213	241.0	328.4	389.0	425.4	464.2	517.4	580.2
1365		----	----	----	----	----	----	----
1379		----	----	----	----	----	----	----
1397	D6352	235.0	330.0	394.0	432.0	471.0	525.0	610.0
1455		----	----	----	----	----	----	----
1510		----	----	----	----	----	----	----
1543		----	----	----	----	----	----	----
1556		----	----	----	----	----	----	----
1635		----	----	----	----	----	----	----
1677		----	----	----	----	----	----	----
1857		----	----	----	----	----	----	----
1881		----	----	----	----	----	----	----
1949	combination	241.4	329.4	390.2	427.4	467.4	521.4	626.2
1986		----	----	----	----	----	----	----
1995		----	----	----	----	----	----	----
6020		----	----	----	----	----	----	----
6021		----	----	----	----	----	----	----
	normality	not OK	suspect	not OK	not OK	OK	OK	OK
	n	13	13	12	12	13	13	12
	outliers	0	0	1	1	0	0	0
	mean (n)	243.53	330.92	390.54	427.27	466.69	519.78	617.41
	st.dev. (n)	10.070	3.265	1.944	2.186	3.094	4.568	37.546
	R(calc.)	28.20	9.14	5.44	6.12	8.66	12.79	105.13
	R(D6352:15)	49.10	7.10	5.90	6.40	7.20	10.50	38.10

Lab 1949 reported to use a combination of methods: D7169/D7500/D6352



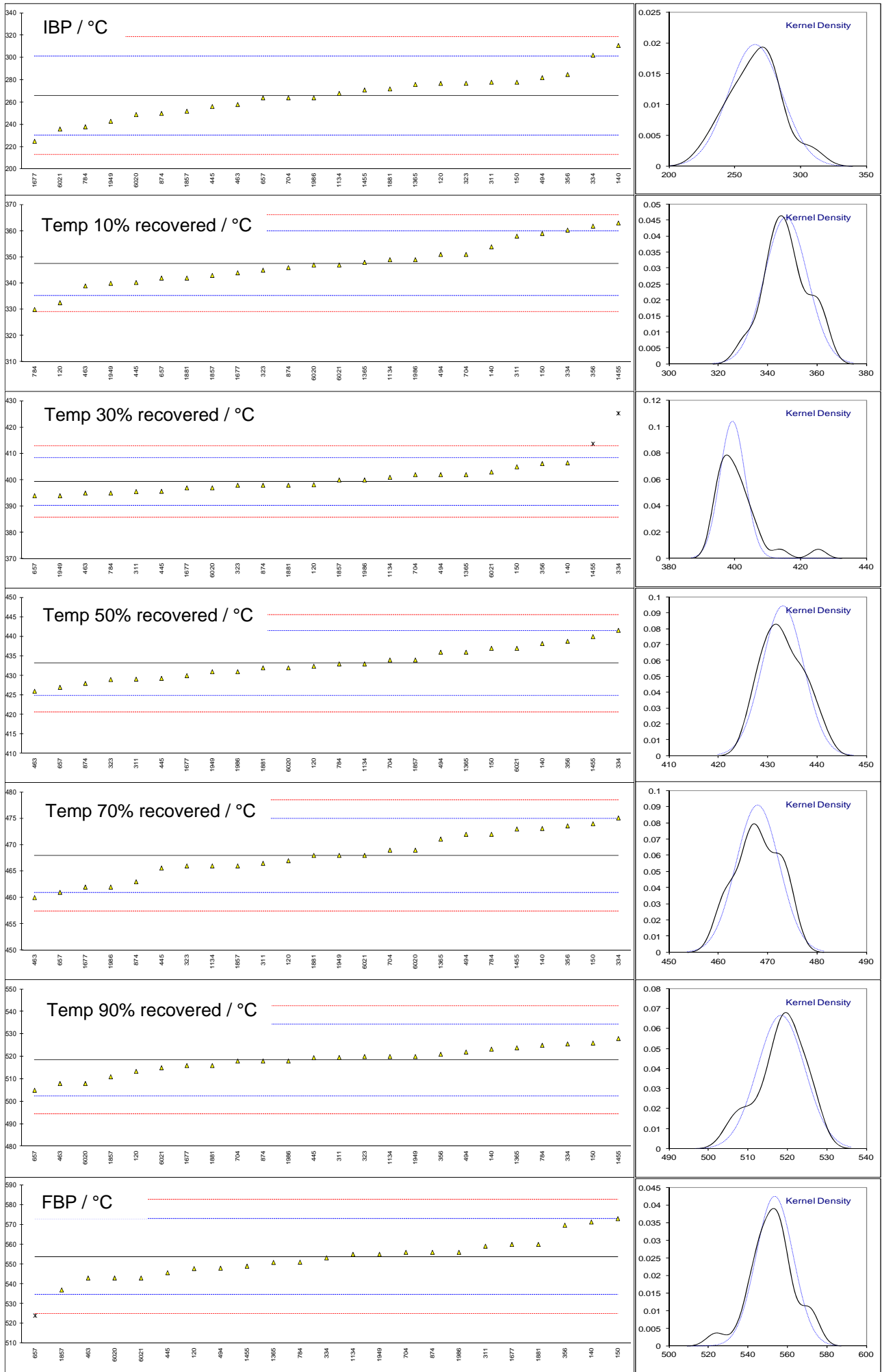
Determination of Distillation acc. to ASTM D1160 on sample #15250; result in °C

lab	method	IBP	10% rec	30% rec	50% rec	70% rec	90% rec	FBP
52		----	----	----	----	----	----	----
62		----	----	----	----	----	----	----
120	D1160	276.9	332.6	398.2	432.4	467.0	513.4	547.8
131		----	----	----	----	----	----	----
133		----	----	----	----	----	----	----
140	D1160	310.9	353.9	406.5	438.2	473.1	523.3	571.3
150	D1160	278	359	405	437	474	526	573
158		----	----	----	----	----	----	----
171		----	----	----	----	----	----	----
228		----	----	----	----	----	----	----
311	D1160	278.0	358.0	395.6	429.1	466.5	519.6	559.1
313		----	----	----	----	----	----	----
317		----	----	----	----	----	----	----
323	D1160	277	345	398	429	466	520	----
333		----	----	----	----	----	----	----
334	D1160	302.2	360.3	425.3 R(0.01)	441.6	475.1	525.6	553.2
336		----	----	----	----	----	----	----
337		----	----	----	----	----	----	----
340		----	----	----	----	----	----	----
356	D1160	284.9	361.8	406.2	438.8	473.6	521.0	569.7
369		----	----	----	----	----	----	----
402		----	----	----	----	----	----	----
445	D1160	256.2	340.3	395.7	429.3	465.6	519.5	545.7
447		----	----	----	----	----	----	----
463	D1160	258	339	395	426	460	508	543
494	D1160	282	351	402	436	472	522	548
621		----	----	----	----	----	----	----
657	D1160	264	342	394	427	461	505	524 ex
663		----	----	----	----	----	----	----
704	D1160	264	351	402	434	469	518	556
732		----	----	----	----	----	----	----
743		----	----	----	----	----	----	----
781		----	----	----	----	----	----	----
784	D1160	238.0	330.0	395.0	433.0	472.0	525.0	551.0
785		----	----	----	----	----	----	----
791		----	----	----	----	----	----	----
874	D1160	250	346	398	428	463	518	556
875		----	----	----	----	----	----	----
994		----	----	----	----	----	----	----
995		----	----	----	----	----	----	----
1065		----	----	----	----	----	----	----
1134	D1160	268	349	401	433	466	520	555
1297		----	----	----	----	----	----	----
1365	D1160	276.0	348.0	402.0	436.0	471.1	523.9	550.9
1379		----	----	----	----	----	----	----
1397		----	----	----	----	----	----	----
1455	D1160	271	363	413.7 C.R(0.05)	440	473	528	549
1510		----	----	----	----	----	----	----
1543		----	----	----	----	----	----	----
1556		----	----	----	----	----	----	----
1635		----	----	----	----	----	----	----
1677	D1160	225	344	397	430	462	516	560
1857	D1160	252	343	400	434	466	511	537
1881	D1160	272	342	398	432	468	516	560
1949	D1160	243	340	394	431	468	520	555
1986	D1160	264	349	400	431	462	518	556
1995		----	----	----	----	----	----	----
6020	D1160	249	347	397	432	469	508	543
6021	D1160	236	347	403	437	468	515	543
	normality	OK	OK	OK	OK	OK	OK	OK
	n	24	24	22	24	24	24	22
	outliers	0	0	2	0	0	0	0+1ex
	mean (n)	265.67	347.58	399.24	433.14	467.96	518.35	553.76
	st.dev. (n)	20.256	8.677	3.829	4.219	4.390	6.003	9.404
	R(calc.)	56.72	24.30	10.72	11.81	12.29	16.81	26.33
	R(D1160:15)	49.45	17.14	12.70	11.61	9.81	22.42	26.89

Lab 657 the reported value for FBP excluded, has stopped the determination

Lab 1455 first reported: 414

Lab 1949 also reported values for manual distillation: 273; 348; 404; 434; 469; 519; 542 respectively



APPENDIX 2

z-scores of the determination of Simulated Distillation acc. to ASTM D6352 on sample #15250

lab	IBP	10%	30%	50%	70%	90%	FBP
52	0.23	2.20	<u>3.54</u>	<u>2.73</u>	1.87	0.72	-3.63
62	----	----	----	----	----	----	----
120	----	----	----	----	----	----	----
131	-0.36	-0.36	0.26	0.50	0.66	1.31	3.94
133	----	----	----	----	----	----	----
140	----	----	----	----	----	----	----
150	-0.43	-0.56	-0.02	0.10	0.12	0.46	1.66
158	----	----	----	----	----	----	----
171	----	----	----	----	----	----	----
228	----	----	----	----	----	----	----
311	-0.26	-0.96	-0.49	-0.12	-0.07	-0.08	0.04
313	----	----	----	----	----	----	----
317	-0.12	-1.35	-2.16	-1.87	-1.63	-0.88	-1.06
323	1.61	1.77	0.79	0.28	-0.31	0.03	-1.02
333	----	----	----	----	----	----	----
334	----	----	----	----	----	----	----
336	----	----	----	----	----	----	----
337	----	----	----	----	----	----	----
340	----	----	----	----	----	----	----
356	----	----	----	----	----	----	----
369	----	----	----	----	----	----	----
402	----	----	----	----	----	----	----
445	0.10	-0.05	0.50	0.50	-0.89	-2.18	----
447	----	----	----	----	----	----	----
463	----	----	----	----	----	----	----
494	-0.35	0.11	0.41	0.15	0.59	0.54	2.62
621	----	----	----	----	----	----	----
657	0.65	2.40	0.22	-0.99	-2.21	-2.34	-4.15
663	----	----	----	----	----	----	----
704	----	----	----	----	----	----	----
732	----	----	----	----	----	----	----
743	----	----	----	----	----	----	----
781	----	----	----	----	----	----	----
784	----	----	----	----	----	----	----
785	----	----	----	----	----	----	----
791	----	----	----	----	----	----	----
874	----	----	----	----	----	----	----
875	----	----	----	----	----	----	----
994	----	----	----	----	----	----	----
995	----	----	----	----	----	----	----
1065	-0.32	-1.23	-0.26	0.15	0.90	1.23	4.23
1134	----	----	----	----	----	----	----
1297	-0.14	-1.00	-0.73	-0.82	-0.97	-0.64	-2.73
1365	----	----	----	----	----	----	----
1379	----	----	----	----	----	----	----
1397	-0.49	-0.36	1.64	2.07	1.68	1.39	-0.54
1455	----	----	----	----	----	----	----
1510	----	----	----	----	----	----	----
1543	----	----	----	----	----	----	----
1556	----	----	----	----	----	----	----
1635	----	----	----	----	----	----	----
1677	----	----	----	----	----	----	----
1857	----	----	----	----	----	----	----
1881	----	----	----	----	----	----	----
1949	-0.12	-0.60	-0.16	0.06	0.28	0.43	0.65
1986	----	----	----	----	----	----	----
1995	----	----	----	----	----	----	----
6020	----	----	----	----	----	----	----
6021	----	----	----	----	----	----	----

z-scores underlined and bold belong to the statistical outliers acc. to Dixon outlier test.

z-scores of the determination of Distillation according to ASTM D1160 on sample #15250

lab	IBP	10%	30%	50%	70%	90%	FBP
52	----	----	----	----	----	----	----
62	----	----	----	----	----	----	----
120	0.64	-2.45	-0.23	-0.18	-0.27	-0.62	-0.62
131	----	----	----	----	----	----	----
133	----	----	----	----	----	----	----
140	2.56	1.03	1.60	1.22	1.47	0.62	1.83
150	0.70	1.87	1.27	0.93	1.72	0.96	2.00
158	----	----	----	----	----	----	----
171	----	----	----	----	----	----	----
228	----	----	----	----	----	----	----
311	0.70	1.70	-0.80	-0.97	-0.42	0.16	0.56
313	----	----	----	----	----	----	----
317	----	----	----	----	----	----	----
323	0.64	-0.42	-0.27	-1.00	-0.56	0.21	----
333	----	----	----	----	----	----	----
334	2.07	2.08	5.75	2.04	2.04	0.91	-0.06
336	----	----	----	----	----	----	----
337	----	----	----	----	----	----	----
340	----	----	----	----	----	----	----
356	1.09	2.32	1.54	1.36	1.61	0.33	1.66
369	----	----	----	----	----	----	----
402	----	----	----	----	----	----	----
445	-0.54	-1.19	-0.78	-0.93	-0.67	0.14	-0.84
447	----	----	----	----	----	----	----
463	-0.43	-1.40	-0.93	-1.72	-2.27	-1.29	-1.12
494	0.92	0.56	0.61	0.69	1.15	0.46	-0.60
621	----	----	----	----	----	----	----
657	-0.09	-0.91	-1.15	-1.48	-1.99	-1.67	-3.10
663	----	----	----	----	----	----	----
704	-0.09	0.56	0.61	0.21	0.30	-0.04	0.23
732	----	----	----	----	----	----	----
743	----	----	----	----	----	----	----
781	----	----	----	----	----	----	----
784	-1.57	-2.87	-0.93	-0.03	1.15	0.83	-0.29
785	----	----	----	----	----	----	----
791	----	----	----	----	----	----	----
874	-0.89	-0.26	-0.27	-1.24	-1.42	-0.04	0.23
875	----	----	----	----	----	----	----
994	----	----	----	----	----	----	----
995	----	----	----	----	----	----	----
1065	----	----	----	----	----	----	----
1134	0.13	0.23	0.39	-0.03	-0.56	0.21	0.13
1297	----	----	----	----	----	----	----
1365	0.58	0.07	0.61	0.69	0.90	0.69	-0.30
1379	----	----	----	----	----	----	----
1397	----	----	----	----	----	----	----
1455	0.30	2.52	3.19	1.65	1.44	1.21	-0.50
1510	----	----	----	----	----	----	----
1543	----	----	----	----	----	----	----
1556	----	----	----	----	----	----	----
1635	----	----	----	----	----	----	----
1677	-2.30	-0.58	-0.49	-0.76	-1.70	-0.29	0.65
1857	-0.77	-0.75	0.17	0.21	-0.56	-0.92	-1.74
1881	0.36	-0.91	-0.27	-0.28	0.01	-0.29	0.65
1949	-1.28	-1.24	-1.15	-0.52	0.01	0.21	0.13
1986	-0.09	0.23	0.17	-0.52	-1.70	-0.04	0.23
1995	----	----	----	----	----	----	----
6020	-0.94	-0.09	-0.49	-0.28	0.30	-1.29	-1.12
6021	-1.68	-0.09	0.83	0.93	0.01	-0.42	-1.12

z-scores underlined and bold belong to the statistical outliers acc. to Rosner outlier test.

APPENDIX 3

Number of participants per country

2 labs in CANADA
7 labs in UNITED STATES OF AMERICA
1 lab in TOGO
4 labs in NETHERLANDS
1 lab in BELGIUM
5 labs in FRANCE
1 lab in MALTA
1 lab in LATVIA
1 lab in ROMANIA
4 labs in UNITED KINGDOM
2 labs in SWEDEN
1 lab in GERMANY
1 lab in INDONESIA
1 lab in SINGAPORE
1 lab in THAILAND
2 labs in UKRAINE
1 lab in KAZAKHSTAN
12 labs in RUSSIAN FEDERATION
1 lab in AZERBAIJAN
2 labs in GEORGIA
1 lab in ISRAEL
1 lab in GREECE
2 labs in CROATIA
1 lab in SUDAN
1 lab in ESTONIA
1 lab in LITHUANIA
1 lab in EGYPT

APPENDIX 4

Abbreviations

C	= final result after checking of first reported suspect 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
ex	= test result excluded from calculations
E	= probably error in calculations
W	= withdrawn result on request of participant
n.a.	= not applicable
SDS	= Safety Data Sheet

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