**Institute for
Interlaboratory Studies**

Results of Proficiency Test
PCBs in Mineral Oil
November 2022

Organized by: **Institute for Interlaboratory Studies**
                   Spijkenisse, the Netherlands

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1   INTRODUCTION

Since 2001 the Institute for Interlaboratory Studies (iis) organizes a proficiency scheme for the analysis of Poly Chlorinated Biphenyls (PCBs) in Mineral Oil every year. During the annual proficiency testing program 2022/2023 it was decided to continue the round robin for the analysis of PCBs in Mineral Oil.

In this interlaboratory study 61 laboratories in 24 countries registered for participation, see appendix 2 for the number of participants per country. In this report the results of the PCBs in Mineral Oil proficiency test are presented and discussed. This report is also electronically available through the iis website www.iisnl.com.

2   SET UP

The Institute for Interlaboratory Studies (iis) in Spijkenisse, the Netherlands, was the organizer of this proficiency test (PT). Sample analyzes for fit-for-use and homogeneity testing were subcontracted to an ISO/IEC17025 accredited laboratory.
It was decided to send one sample of Mineral Oil with a detectable level on PCBs in an 8 mL vial labelled #22228.
The participants were requested to report rounded and unrounded test results. The unrounded test results were preferably used for statistical evaluation.

2.1   ACCREDITATION

The Institute for Interlaboratory Studies in Spijkenisse, the Netherlands, is accredited in agreement with ISO/IEC17043:2010 (R007), since January 2000, by the Dutch Accreditation Council (Raad voor Accreditatie). This PT falls under the accredited scope. This ensures strict adherence to protocols for sample preparation and statistical evaluation and 100% confidentiality of participant's data. Feedback from the participants on the reported data is encouraged and customer's satisfaction is measured on regular basis by sending out questionnaires.

2.2   PROTOCOL

The protocol followed in the organization of this proficiency test was the one as described for proficiency testing in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' of June 2018 (iis-protocol, version 3.5). This protocol is electronically available through the iis website www.iisnl.com, from the FAQ page.

2.3   CONFIDENTIALITY STATEMENT

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

2.4 SAMPLES

A batch of approximately 1 liter of Mineral Oil with a detectable level of PCBs was obtained from a third-party laboratory. After homogenization 70 amber glass vials of 8 mL were filled and labelled #22228.

The homogeneity of the subsamples was checked by determination of Total Organic Chlorides content in accordance with UOP779 on 8 stratified randomly selected subsamples.

	Total Organic Chlorides as Cl in mg/kg
sample #22228-1	46.17
sample #22228-2	46.86
sample #22228-3	46.85
sample #22228-4	46.30
sample #22228-5	46.24
sample #22228-6	46.23
sample #22228-7	46.48
sample #22228-8	46.75

Table 1: homogeneity test results of subsamples of #22228

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

	Total Organic Chlorides as Cl in mg/kg
r (observed)	0.82
reference test method	UOP779:08
0.3 x R (reference test method)	2.37

Table 2: evaluation of the repeatability of subsamples #22228

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

To each of the participating laboratories one sample PCB in Mineral Oil labelled #22228 was sent on October 26, 2022. An SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

The stability of PCBs in Mineral Oil packed in amber glass vials was checked. The material was found sufficiently stable for the period of the proficiency test.

2.6   ANALYZES

The participants were requested to determine: Total Organohalogenic Compounds (TOX) as Cl and Poly Chlorinated Biphenyls (via seven individual PCBs and/or via Aroclor standards). It was requested to determine 5 times the sum of 6 congeners. It was also requested to determine the sum of the seven congeners asked in this PT + all other congeners present in the sample. Further it was requested to determine all four Aroclor components and not only the main Aroclor component.

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

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

3   RESULTS

During five weeks after sample dispatch, the test results of the individual laboratories were gathered via the data entry portal www.kpmd.co.uk/sgs-iis/. The reported test results are tabulated per determination in 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 reanalyzes). Additional or corrected test results are used for data analysis and the original test results are placed under 'Remarks' in the result tables in appendix 1. Test results that came in after the deadline were not taken into account in this screening for suspect data and thus these participants were not requested for checks.

3.1   STATISTICS

The protocol followed in the organization of this proficiency test was the one as described for proficiency testing in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' of June 2018 (iis-protocol, version 3.5).
For the statistical evaluation the *unrounded* (when available) figures were used instead of the rounded test results. Test results reported as '<…' or '>…' were not used in the statistical evaluation.

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

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

According to ISO13528 all (original received or corrected) results per determination were submitted to outlier tests. In the iis procedure for proficiency tests, outliers are detected prior to calculation of the mean, standard deviation and reproducibility. For small data sets, Dixon (up to 20 test results) or Grubbs (up to 40 test results) outlier tests can be used. For larger data sets (above 20 test results) Rosner's outlier test can be used. Outliers are marked by D(0.01) for the Dixon's test, by G(0.01) or DG(0.01) for the Grubbs' test and by R(0.01) for the Rosner's test. Stragglers are marked by D(0.05) for the Dixon's test, by G(0.05) or DG(0.05) for the Grubbs' test and by R(0.05) for the Rosner's test. Both outliers and stragglers were not included in the calculations of averages and standard deviations.

For each assigned value the uncertainty was determined in accordance with ISO13528. Subsequently the calculated uncertainty was evaluated against the respective requirement based on the target reproducibility in accordance with ISO13528. In this PT, the criterion of ISO13528, paragraph 9.2.1. was met for all evaluated tests, therefore, the uncertainty of all assigned values may be negligible and need not be included in the PT report.

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

3.2 GRAPHICS

In order to visualize the data against the reproducibilities from literature, Gauss plots were made, using the sorted data for one determination (see appendix 1). On the Y-axis the reported test results are plotted. The corresponding laboratory numbers are on the X-axis. The straight horizontal line presents the consensus value (a trimmed mean). The four striped lines, parallel to the consensus value line, are the +3s, +2s, -2s and -3s target reproducibility limits of the selected reference test method. Outliers and other data, which were excluded from the calculations, are represented as a cross. Accepted data are represented as a triangle.

Furthermore, Kernel Density Graphs were made. This is a method for producing a smooth density approximation to a set of data that avoids some problems associated with histograms. Also, a normal Gauss curve (dotted line) was projected over the Kernel Density Graph (smooth line) for reference. The Gauss curve is calculated from the consensus value and the corresponding standard deviation.

3.3 Z-SCORES

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

The target standard deviation was calculated from the literature reproducibility by division with 2.8. In case no literature reproducibility was available, other target values were used, like Horwitz or an estimated reproducibility based on former iis proficiency tests.

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

The z-scores were calculated according to:

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

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:

$$|z| < 1 \quad \text{good}$$
$$1 < |z| < 2 \quad \text{satisfactory}$$
$$2 < |z| < 3 \quad \text{questionable}$$
$$3 < |z| \quad \text{unsatisfactory}$$

4 EVALUATION

In this proficiency test some problems were encountered with the dispatch of the samples. Four participants reported test results after the final reporting date and six other participants did not report any test results. Not all participants were able to report all tests requested. In total 55 participants reported 312 numerical test results. Observed were 11 outlying test results, which is 3.5%. In proficiency tests outlier percentages of 3% - 7.5% are quite normal.

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

4.1   EVALUATION PER TEST

In this section the reported test results are discussed per test. The test methods which were used by the various laboratories were taken into account for explaining the observed differences when possible and applicable. These test methods are also in the tables together with the original data in appendix 1. The abbreviations, used in these tables, are explained in appendix 3.

In the iis PT reports ASTM test methods are referred to with a number (e.g. D4059) and an added designation for the year that the test method was adopted or revised (e.g. D4059:00). When a method has been reapproved an "R" will be added and the year of approval (e.g. D4059:00R18).

For the statistical evaluation of the individual PCBs the test method EN12766-1:00 was used, this test method is equal to IP462-1:01. In the test methods IEC61619:99 and DIN51527:93 only the reproducibility of the total PCB content is mentioned while in EN12766-1:00 / IP462-1:01 the reproducibilities for individual congeners are mentioned.

Total Organohalogenic Compounds TOX as Cl: This determination may be problematic. Only five test results were reported. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the requirements of UOP779:08.

Poly Chlorinated Biphenyls as PCB no 28: This determination was very problematic. No statistical outliers were observed but one test result was excluded. The calculated reproducibility after rejection of the suspect data is not at all in agreement with the requirements of EN12766-1:00.

Poly Chlorinated Biphenyls as PCB no 52: This determination was problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of EN12766-1:00.

Poly Chlorinated Biphenyls as PCB no 101: 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 EN12766-1:00.

Poly Chlorinated Biphenyls as PCB no 118: This determination was very problematic. No statistical outliers were observed. The calculated reproducibility is not at all in agreement with the requirements of EN12766-1:00.

Poly Chlorinated Biphenyls as PCB no 138: 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 EN12766-1:00.

Poly Chlorinated Biphenyls as PCB no 153: 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 EN12766-1:00.

Poly Chlorinated Biphenyls as PCB no 180: 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 EN12766-1:00.

Poly Chlorinated Biphenyls as Aroclor 1242: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of ASTM D4059:00R18.

Poly Chlorinated Biphenyls as Aroclor 1248: Only three test results were reported. Therefore, no z-scores are calculated.

Poly Chlorinated Biphenyls as Aroclor 1254: This determination was very problematic. No statistical outliers were observed. The calculated reproducibility is not at all in agreement with the requirements of ASTM D4059:00R18.

Poly Chlorinated Biphenyls as Aroclor 1260: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of ASTM D4059:00R18.

Total PCB, 5 times the sum of 6 PCB congeners: This determination was problematic. No statistical outliers were observed but six test results were excluded. The calculated reproducibility after rejection of the suspect data is not in agreement with the requirements of EN12766-2 test method B:01.

Total PCB, sum of all congeners: One participant reported the sum of the seven congeners which are asked in the PT while the total sum PCB of **all** congeners present in the PT sample is requested for this parameter. Therefore, this test result based on the sum of the reported congeners is excluded from the statistical analysis.
This determination was very problematic. No statistical outliers were observed but one test result was excluded. The calculated reproducibility after rejection of the suspect data is not at all in agreement with the requirements of EN61619:97 and EN12766-2 test method A:01 as this test method is identical to EN61619:97.

Total PCB, sum of all Aroclors: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of ASTM D4059:00R18. Remarkably, some participants did report the sum but did not report all Aroclors.

All participants agree that sample #22228 is positive on PCBs. From the data on total organic halogenic components (TOX) an average concentration of 41.8 mg/kg was found in this PT. From this concentration, a total content of 75.3 mg PCB/kg is estimated using an average Cl content of 75.3%, assuming the presence of 15.2% Aroclor 1242 (42% Cl), 30.3% Aroclor 1254 (54% Cl) and 54.5% Aroclor 1260 (60% Cl). All values for total PCB are given in the next table.

	total PCB content in mg/kg
estimated by TOX as Cl	75.3
5 times the sum of 6 congeners	70.2
sum of all congeners	50.3
sum of all Aroclors	39.6

Table 3: comparison of estimations of total PCB content in sample #22228

The sum of all Aroclors is lower than the total PCB content based on the sum of all congeners. Furthermore, the two other estimates (from TOX as Cl and 5 times the sum of 6 congeners) are both much higher than the other two estimates.

4.2 PERFORMANCE EVALUATION FOR THE GROUP OF LABORATORIES

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

Parameter	unit	n	average	2.8 * sd	R(lit)
TOX as Cl	mg/kg	4	41.8	9.9	7.1
PCB no. 28	mg/kg	28	0.55	0.62	0.26
PCB no. 52	mg/kg	27	0.58	0.46	0.27
PCB no. 101	mg/kg	29	2.25	1.60	1.11
PCB no. 118	mg/kg	21	0.71	0.71	0.33
PCB no. 138	mg/kg	29	3.93	2.66	1.95
PCB no. 153	mg/kg	29	3.67	2.19	1.82
PCB no. 180	mg/kg	30	2.57	1.55	1.27
Aroclor 1242	mg/kg	12	6.29	9.48	5.32
Aroclor 1248	mg/kg	2	<0.2	n.e.	n.e.
Aroclor 1254	mg/kg	10	12.50	19.38	8.91
Aroclor 1260	mg/kg	13	22.49	20.55	13.84
Total PCB, 5 x sum 6 congeners	mg/kg	19	70.2	20.7	31.7
Total PCB, sum of all congeners	mg/kg	25	50.3	35.1	14.6
Total PCB, sum of Aroclors	mg/kg	15	39.6	41.3	21.2

Table 4: reproducibilities of tests on sample #22228

Without further statistical calculations it can be concluded that for almost all tests there is not a good compliance of the group of participating laboratories with the reference test methods. The problematic tests have been discussed in paragraph 4.1.

4.3   COMPARISON OF THE PROFICIENCY TEST OF NOVEMBER 2022 WITH PREVIOUS PTS

	November 2022	November 2021	November 2020	November 2019	November 2018
Number of reporting laboratories	55	51	45	45	45
Number of test results	312	288	251	277	247
Number of statistical outliers	11	11	9	14	13
Percentage of statistical outliers	3.5%	3.8%	3.6%	5.1%	5.3%

Table 5: comparison with previous proficiency tests

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

The performance of the determinations of the proficiency tests was compared to the requirements of the reference test methods. The conclusions are given in the following table.

	November 2022	November 2021	November 2020	November 2019	November 2018
TOX as Cl	-	--	n.e.	n.e.	--
PCB individual	-	-	-	+/-	-
Aroclor individual	-	-	-	-	--
Total PCB, 5 x the sum of 6 cong	+	-	+	+	+/-
Total PCB, sum of all congeners	--	-	-	+	-
Total PCB, sum of Aroclors	-	-	-	-	-

Table 6: comparison of determinations to the reference test methods

The following performance categories were used:

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

APPENDIX 1

Determination of Total Organohalogenic Compounds (TOX) as Cl on sample #22228; results in mg/kg

lab	method	value	mark	z(targ)	remarks
341		-----		-----	
343		-----		-----	
357		-----		-----	
392		-----		-----	
398		-----		-----	
455		-----		-----	
498		-----		-----	
511		-----		-----	
614		-----		-----	
912		-----		-----	
1059		-----		-----	
1066	UOP779Mod.	40		-0.70	
1072		-----		-----	
1126	EN14077	44.42		1.05	
1135		-----		-----	
1170		-----		-----	
1243		-----		-----	
1264		-----		-----	
1304		-----		-----	
1306		-----		-----	
1352		-----		-----	
1374		-----		-----	
1396		-----		-----	
1435		-----		-----	
1440		-----		-----	
1442		-----		-----	
1458		-----		-----	
1495	EN14077	45		1.28	
1505		-----		-----	
1513		-----		-----	
1529		-----		-----	
1551		-----		-----	
1633		-----		-----	
1660		-----		-----	
1702		-----		-----	
1801		-----		-----	
1816		-----		-----	
1841		-----		-----	
1875		-----		-----	
1885		-----		-----	
1888		-----		-----	
1965		-----		-----	
2300		-----		-----	
2622		-----		-----	
6067		-----		-----	
6278		-----		-----	
6283		-----		-----	
6334		-----		-----	
6335		-----		-----	
6352		-----		-----	
6355		-----		-----	
6382		-----		-----	
6394	EPA9076	37.62		-1.64	
6402		-----		-----	
6414		-----		-----	
6422		-----		-----	
6427	EN14077	1.25	G(0.05)	-16.01	
6491		-----		-----	
6498		-----		-----	
6500		-----		-----	
8001		-----		-----	

normality	unknown	
n	4	
outliers	1	
mean (n)	41.760	
st.dev. (n)	3.5501	
R(calc.)	9.940	
st.dev.(UOP779:08)	2.5301	
R(UOP779:08)	7.084	
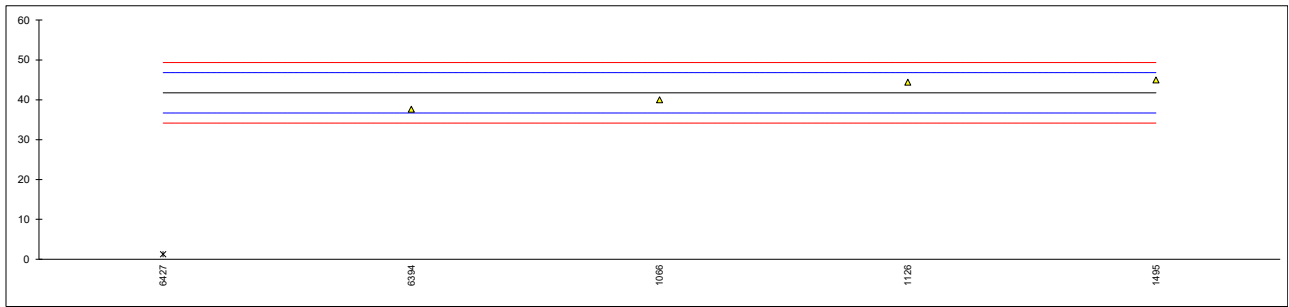
Determination of Poly Chlorinated Biphenyls as PCB no. 28 on sample #22228; results in mg/kg

lab	method	value	mark	z(targ)	remarks
341		-----		-----	
343		-----		-----	
357	EN12766-1	0.81		2.82	
392		-----		-----	
398		-----		-----	
455		-----		-----	
498	EN12766-1	0.431		-1.34	
511		-----		-----	
614		-----		-----	
912		-----		-----	
1059		-----		-----	
1066	EN12766-1	0.34		-2.33	
1072	IEC61619	0.6374		0.92	
1126	EN12766-1	0.40		-1.68	
1135	EN12766-1	0.68		1.39	
1170	EN12766-1	0.596		0.47	
1243	EN12766-1	0.48		-0.80	
1264		-----		-----	
1304		-----		-----	
1306		-----		-----	
1352		-----		-----	
1374		-----		-----	
1396	IP462-1	0.502280		-0.56	
1435	EN12766-1	0.52		-0.36	
1440	IEC61619	0.4707		-0.90	
1442	EN12766-1	0.426		-1.39	
1458		-----		-----	
1495		-----		-----	
1505		-----		-----	
1513	IEC61619	0.287		-2.91	
1529	EN12766-1/EN61619	0.58		0.30	
1551	IP462-1	1.148		6.52	
1633	IEC61619	0.436		-1.28	
1660	IEC61619	0.50		-0.58	
1702		-----		-----	
1801		-----		-----	
1816		-----		-----	
1841	IEC61619	0.00		-6.06	
1875	EN12766-1	0.6295		0.84	
1885		-----		-----	
1888		-----		-----	
1965		-----		-----	
2300	EN12766-1	Not Detected		-----	possibly a false negative test result?
2622		-----		-----	
6067		-----		-----	
6278		-----		-----	
6283	IEC61619	0.52		-0.36	
6334		-----		-----	
6335	EN12766-1	<0.02		<-5.84	possibly a false negative test result?
6352		0.82		2.92	
6355	EN12766-1	0.391		-1.78	
6382	EN12766-1	0.774		2.42	
6394	EN12766-1	0.40		-1.68	
6402		-----		-----	
6414		-----		-----	
6422	IEC61619	0.74		2.05	
6427	EN12766-1	0.55		-0.03	
6491	EN12766-1	0.496		-0.62	
6498	In house	0.92		4.02	
6500	EN12766-1	0.124	ex,C	-4.70	test result excluded as stat. outliers in related parameters/fr 0.619
8001		-----		-----	

|		
normality	suspect	
n	28	
outliers	0+1ex	
mean (n)	0.5530	
st.dev. (n)	0.21978	
R(calc.)	0.6154	
st.dev.(EN12766-1:00)	0.09127	
R(EN12766-1:00)	0.2556	
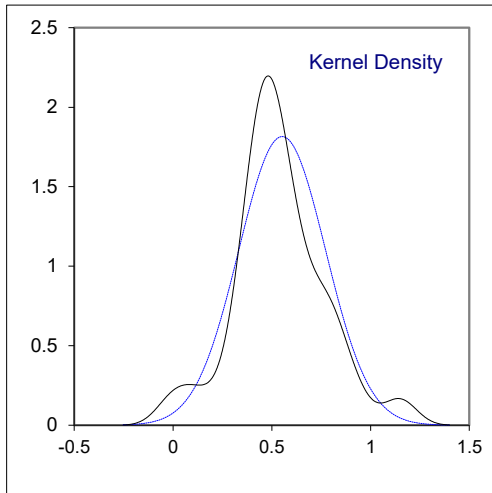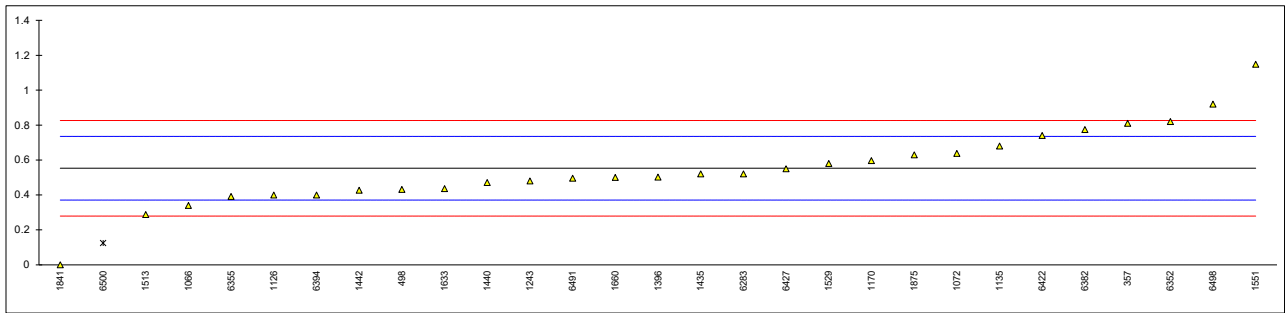
Determination of Poly Chlorinated Biphenyls as PCB no. 52 on sample #22228; results in mg/kg

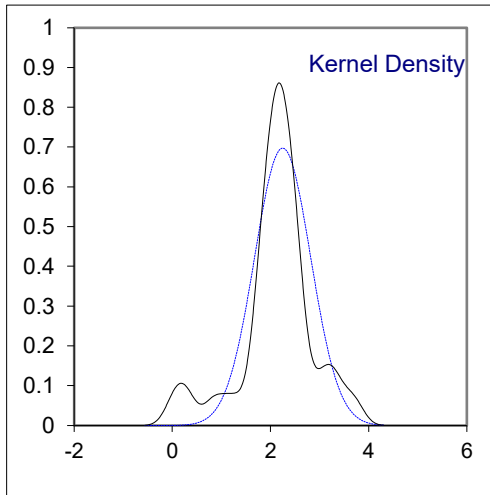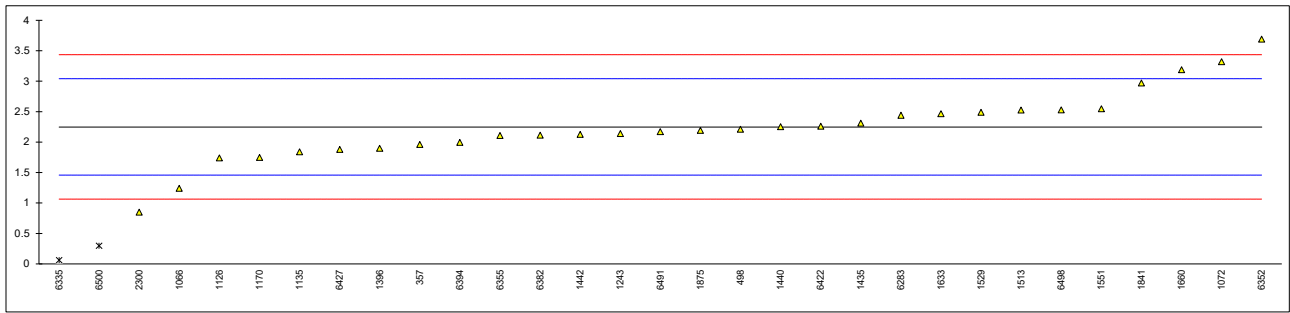| lab	method	value	mark	z(targ)	remarks
341		-----		-----	
343		-----		-----	
357	EN12766-1	0.79		2.20	
392		-----		-----	
398		-----		-----	
455		-----		-----	
498	EN12766-1	0.467		-1.17	
511		-----		-----	
614		-----		-----	
912		-----		-----	
1059		-----		-----	
1066	EN12766-1	<0.20		<-3.95	possibly a false negative test result?
1072	IEC61619	0.8566		2.89	
1126	EN12766-1	0.61		0.32	
1135	EN12766-1	0.35		-2.39	
1170	EN12766-1	0.601		0.23	
1243	EN12766-1	0.57		-0.09	
1264		-----		-----	
1304		-----		-----	
1306		-----		-----	
1352		-----		-----	
1374		-----		-----	
1396	IP462-1	0.674980		1.00	
1435	EN12766-1	0.47		-1.14	
1440	IEC61619	0.4724		-1.11	
1442	EN12766-1	0.507		-0.75	
1458		-----		-----	
1495		-----		-----	
1505		-----		-----	
1513	IEC61619	0.488		-0.95	
1529	EN12766-1/EN61619	0.59		0.11	
1551	IP462-1	0.770		1.99	
1633	IEC61619	0.556		-0.24	
1660	IEC61619	0.89		3.24	
1702		-----		-----	
1801		-----		-----	
1816		-----		-----	
1841	IEC61619	0.00	DG(0.05)	-6.04	
1875	EN12766-1	0.5160		-0.66	
1885		-----		-----	
1888		-----		-----	
1965		-----		-----	
2300	EN12766-1	1.57	G(0.01)	10.33	
2622		-----		-----	
6067		-----		-----	
6278		-----		-----	
6283	IEC61619	0.59		0.11	
6334		-----		-----	
6335	EN12766-1	0.24		-3.53	
6352		0.92		3.55	
6355	EN12766-1	0.320		-2.70	
6382	EN12766-1	0.586		0.07	
6394	EN12766-1	0.468		-1.16	
6402		-----		-----	
6414		-----		-----	
6422	IEC61619	0.66		0.84	
6427	EN12766-1	0.57		-0.09	
6491	EN12766-1	0.470		-1.14	
6498	In house	0.63		0.53	
6500	EN12766-1	0.062	C,DG(0.05)	-5.39	first reported 0.308
8001		-----		-----	
	normality	OK			
	n	27			
	outliers	3			
	mean (n)	0.5790			
	st.dev. (n)	0.16452			
	R(calc.)	0.4607			
	st.dev.(EN12766-1:00)	0.09593			
	R(EN12766-1:00)	0.2686			

Kernel Density
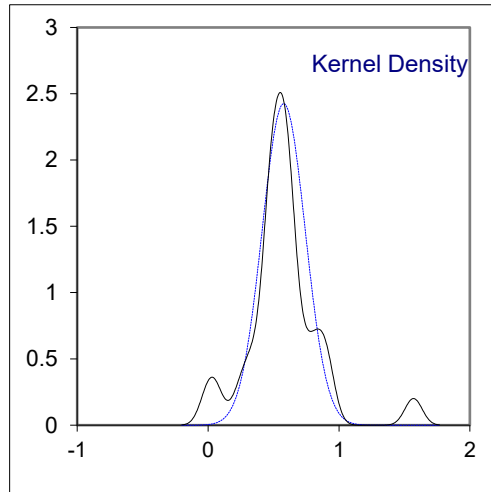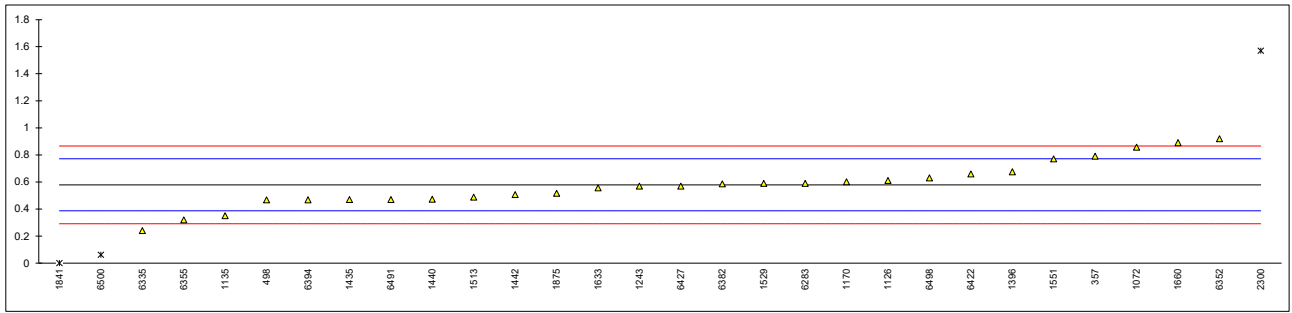
Determination of Poly Chlorinated Biphenyls as PCB no. 101 on sample #22228; results in mg/kg

lab	method	value	mark	z(targ)	remarks
341		-----		-----	
343		-----		-----	
357	EN12766-1	1.96		-0.73	
392		-----		-----	
398		-----		-----	
455		-----		-----	
498	EN12766-1	2.21		-0.10	
511		-----		-----	
614		-----		-----	
912		-----		-----	
1059		-----		-----	
1066	EN12766-1	1.24		-2.55	
1072	IEC61619	3.3222		2.72	
1126	EN12766-1	1.74		-1.29	
1135	EN12766-1	1.84		-1.03	
1170	EN12766-1	1.750		-1.26	
1243	EN12766-1	2.14		-0.28	
1264		-----		-----	
1304		-----		-----	
1306		-----		-----	
1352		-----		-----	
1374		-----		-----	
1396	IP462-1	1.89749		-0.89	
1435	EN12766-1	2.31		0.15	
1440	IEC61619	2.2524		0.01	
1442	EN12766-1	2.128		-0.31	
1458		-----		-----	
1495		-----		-----	
1505		-----		-----	
1513	IEC61619	2.528		0.71	
1529	EN12766-1/EN61619	2.49		0.61	
1551	IP462-1	2.549		0.76	
1633	IEC61619	2.466		0.55	
1660	IEC61619	3.19		2.38	
1702		-----		-----	
1801		-----		-----	
1816		-----		-----	
1841	IEC61619	2.97		1.82	
1875	EN12766-1	2.1923		-0.14	
1885		-----		-----	
1888		-----		-----	
1965		-----		-----	
2300	EN12766-1	0.85		-3.54	
2622		-----		-----	
6067		-----		-----	
6278		-----		-----	
6283	IEC61619	2.44		0.48	
6334		-----		-----	
6335	EN12766-1	0.06	DG(0.05)	-5.54	
6352		3.69		3.65	
6355	EN12766-1	2.110		-0.35	
6382	EN12766-1	2.113		-0.34	
6394	EN12766-1	1.996		-0.64	
6402		-----		-----	
6414		-----		-----	
6422	IEC61619	2.26		0.03	
6427	EN12766-1	1.88		-0.93	
6491	EN12766-1	2.171		-0.20	
6498	In house	2.53		0.71	
6500	EN12766-1	0.297	C,DG(0.05)	-4.94	first reported 1.483
8001		-----		-----	

|		
normality	suspect	
n	29	
outliers	2	
mean (n)	2.2488	
st.dev. (n)	0.57193	
R(calc.)	1.6014	
st.dev.(EN12766-1:00)	0.39524	
R(EN12766-1:00)	1.1067	

Kernel Density

Determination of Poly Chlorinated Biphenyls as PCB no. 118 on sample #22228; results in mg/kg

lab	method	value	mark	z(targ)	remarks
341		-----		-----	
343		-----		-----	
357	EN12766-1	1.01		2.55	
392		-----		-----	
398		-----		-----	
455		-----		-----	
498	EN12766-1	0.718		0.10	
511		-----		-----	
614		-----		-----	
912		-----		-----	
1059		-----		-----	
1066	EN12766-1	0.32		-3.25	
1072	IEC61619	0.9115		1.73	
1126	EN12766-1	0.54		-1.40	
1135	EN12766-1	0.48		-1.91	
1170	EN12766-1	0.774		0.57	
1243		-----		-----	
1264		-----		-----	
1304		-----		-----	
1306		-----		-----	
1352		-----		-----	
1374		-----		-----	
1396		-----		-----	
1435	EN12766-1	0.70		-0.05	
1440	IEC61619	0.7467		0.34	
1442	EN12766-1	0.865		1.33	
1458		-----		-----	
1495		-----		-----	
1505		-----		-----	
1513	IEC61619	0.397		-2.61	
1529	EN12766-1/EN61619	0.73		0.20	
1551		-----		-----	
1633	IEC61619	0.668		-0.32	
1660	IEC61619	0.48		-1.91	
1702		-----		-----	
1801		-----		-----	
1816		-----		-----	
1841	IEC61619	1.05		2.89	
1875		-----		-----	
1885		-----		-----	
1888		-----		-----	
1965		-----		-----	
2300	EN12766-1	Not Detected		-----	possibly a false negative test result?
2622		-----		-----	
6067		-----		-----	
6278		-----		-----	
6283	IEC61619	0.83		1.04	
6334		-----		-----	
6335		-----		-----	
6352		1.04		2.81	
6355	EN12766-1	0.616		-0.76	
6382		-----		-----	
6394		-----		-----	
6402		-----		-----	
6414		-----		-----	
6422	IEC61619	0.78		0.62	
6427		-----		-----	
6491	EN12766-1	< 0,20		<-4.26	possibly a false negative test result?
6498	In house	1.06		2.98	
6500	EN12766-1	0.121	C	-4.93	first reported 2.309
8001		-----		-----	

|		
normality	OK	
n	21	
outliers	0	
mean (n)	0.7065	
st.dev. (n)	0.25189	
R(calc.)	0.7053	
st.dev.(EN12766-1:00)	0.11879	
R(EN12766-1:00)	0.3326	
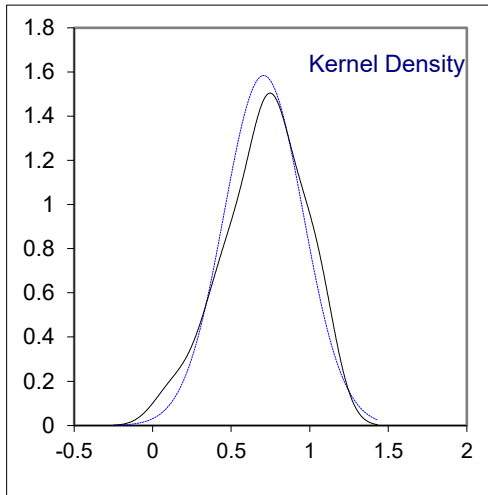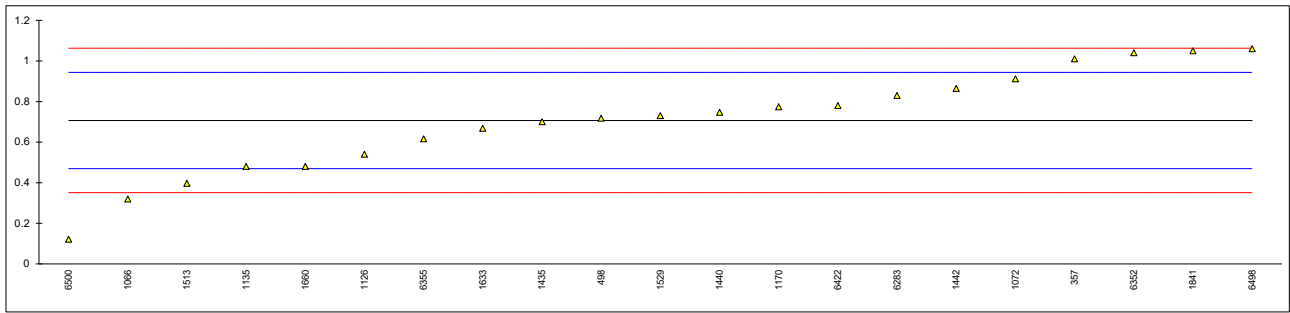
Determination of Poly Chlorinated Biphenyls as PCB no. 138 on sample #22228; results in mg/kg

lab	method	value	mark	z(targ)	remarks
341		-----		-----	
343		-----		-----	
357	EN12766-1	3.79		-0.20	
392		-----		-----	
398		-----		-----	
455		-----		-----	
498	EN12766-1	3.69		-0.34	
511		-----		-----	
614		-----		-----	
912		-----		-----	
1059		-----		-----	
1066	EN12766-1	0.98	DG(0.05)	-4.23	
1072	IEC61619	5.7581		2.63	
1126	EN12766-1	3.46		-0.67	
1135	EN12766-1	2.91	C	-1.46	first reported 8.60
1170	EN12766-1	3.264		-0.96	
1243	EN12766-1	2.46		-2.11	
1264		-----		-----	
1304		-----		-----	
1306		-----		-----	
1352		-----		-----	
1374		-----		-----	
1396	IP462-1	4.69739	C	1.10	first reported 3.50360
1435	EN12766-1	4.00		0.10	
1440	IEC61619	4.0689		0.20	
1442	EN12766-1	5.245		1.89	
1458		-----		-----	
1495		-----		-----	
1505		-----		-----	
1513	IEC61619	4.061		0.19	
1529	EN12766-1/EN61619	3.46		-0.67	
1551	IP462-1	3.913		-0.02	
1633	IEC61619	4.897		1.39	
1660	IEC61619	4.21		0.40	
1702		-----		-----	
1801		-----		-----	
1816		-----		-----	
1841	IEC61619	4.99		1.52	
1875	EN12766-1	4.6537		1.04	
1885		-----		-----	
1888		-----		-----	
1965		-----		-----	
2300	EN12766-1	1.25		-3.85	
2622		-----		-----	
6067		-----		-----	
6278		-----		-----	
6283	IEC61619	4.49		0.81	
6334		-----		-----	
6335	EN12766-1	3.02		-1.31	
6352		4.16		0.33	
6355	EN12766-1	3.464		-0.67	
6382	EN12766-1	4.448		0.74	
6394	EN12766-1	2.668		-1.81	
6402		-----		-----	
6414		-----		-----	
6422	IEC61619	3.18		-1.08	
6427	EN12766-1	4.99		1.52	
6491	EN12766-1	4.132		0.29	
6498	In house	4.62		0.99	
6500	EN12766-1	0.256	C,DG(0.05)	-5.27	first reported 1.279
8001		-----		-----	

|		
normality	suspect	
n	29	
outliers	2	
mean (n)	3.9293	
st.dev. (n)	0.94839	
R(calc.)	2.6555	
st.dev.(EN12766-1:00)	0.69647	
R(EN12766-1:00)	1.9501	

Kernel Density
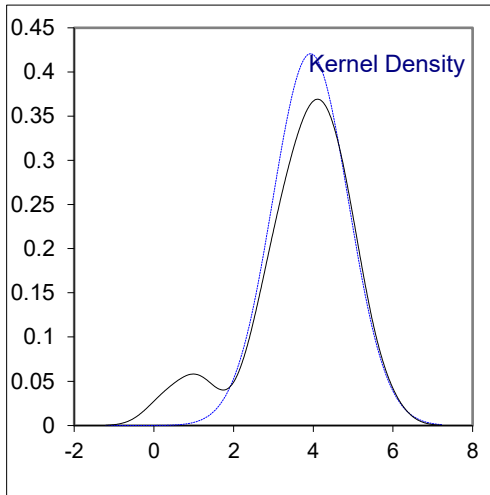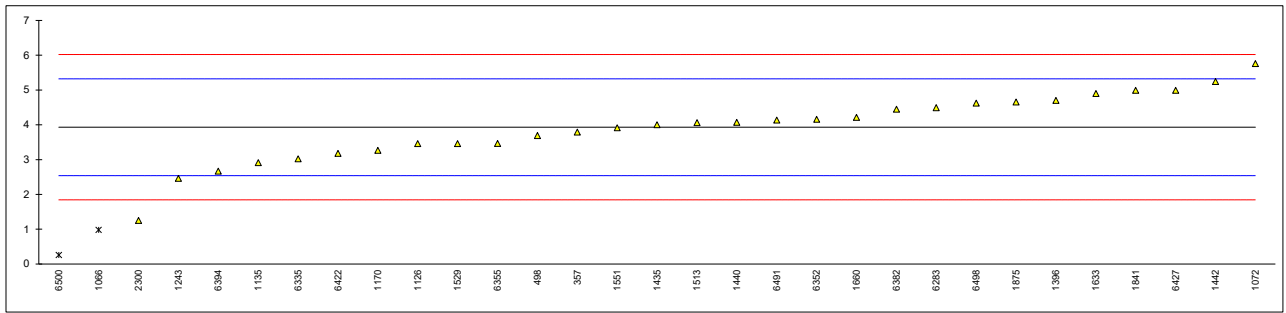
Determination of Poly Chlorinated Biphenyls as PCB no. 153 on sample #22228; results in mg/kg

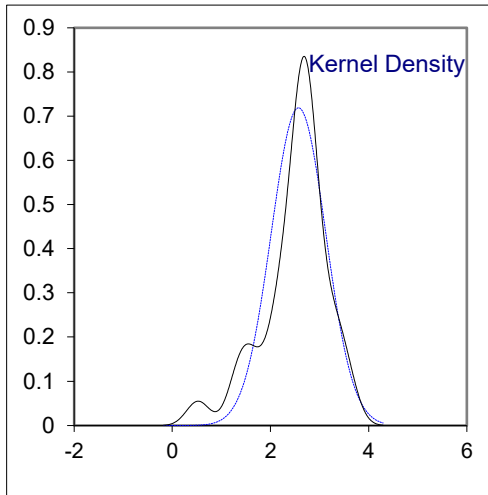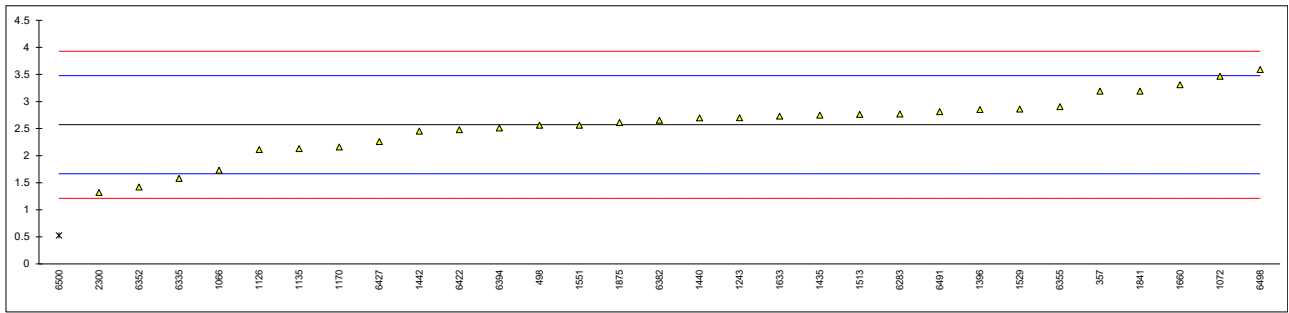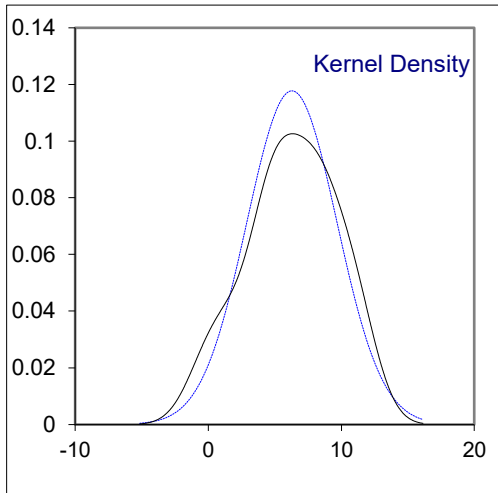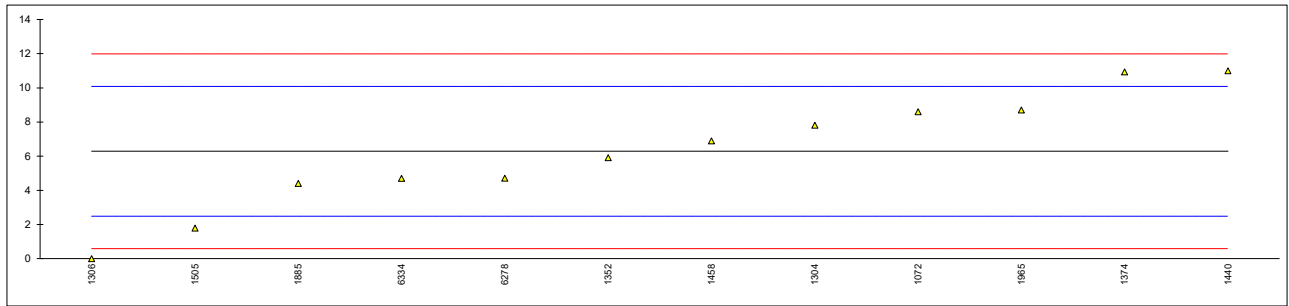| lab	method	value	mark	z(targ)	remarks
341		-----		-----	
343		-----		-----	
357	EN12766-1	3.87		0.31	
392		-----		-----	
398		-----		-----	
455		-----		-----	
498	EN12766-1	4.37		1.07	
511		-----		-----	
614		-----		-----	
912		-----		-----	
1059		-----		-----	
1066	EN12766-1	3.61		-0.09	
1072	IEC61619	6.4089	D(0.05)	4.21	
1126	EN12766-1	2.93		-1.14	
1135	EN12766-1	2.71	C	-1.48	first reported 10.08
1170	EN12766-1	3.243		-0.66	
1243	EN12766-1	3.20		-0.73	
1264		-----		-----	
1304		-----		-----	
1306		-----		-----	
1352		-----		-----	
1374		-----		-----	
1396	IP462-1	3.50360	C	-0.26	first reported 0.334185
1435	EN12766-1	4.17		0.77	
1440	IEC61619	3.2764		-0.61	
1442	EN12766-1	3.775		0.16	
1458		-----		-----	
1495		-----		-----	
1505		-----		-----	
1513	IEC61619	3.369		-0.47	
1529	EN12766-1/EN61619	4.42		1.15	
1551	IP462-1	2.309		-2.10	
1633	IEC61619	4.645		1.50	
1660	IEC61619	3.75		0.12	
1702		-----		-----	
1801		-----		-----	
1816		-----		-----	
1841	IEC61619	2.79		-1.36	
1875	EN12766-1	3.8699		0.30	
1885		-----		-----	
1888		-----		-----	
1965		-----		-----	
2300	EN12766-1	1.99		-2.59	
2622		-----		-----	
6067		-----		-----	
6278		-----		-----	
6283	IEC61619	3.76		0.14	
6334		-----		-----	
6335	EN12766-1	2.9		-1.19	
6352		4.56		1.37	
6355	EN12766-1	4.358		1.06	
6382	EN12766-1	5.769		3.23	
6394	EN12766-1	3.63		-0.06	
6402		-----		-----	
6414		-----		-----	
6422	IEC61619	3.64		-0.05	
6427	EN12766-1	3.87		0.31	
6491	EN12766-1	3.589		-0.13	
6498	In house	4.60		1.43	
6500	EN12766-1	0.556	C,D(0.05)	-4.79	first reported 2.790
8001		-----		-----	
	normality	OK			
	n	29			
	outliers	2			
	mean (n)	3.6716			
	st.dev. (n)	0.78228			
	R(calc.)	2.1904			
	st.dev.(EN12766-1:00)	0.65028			
	R(EN12766-1:00)	1.8208			

Kernel Density
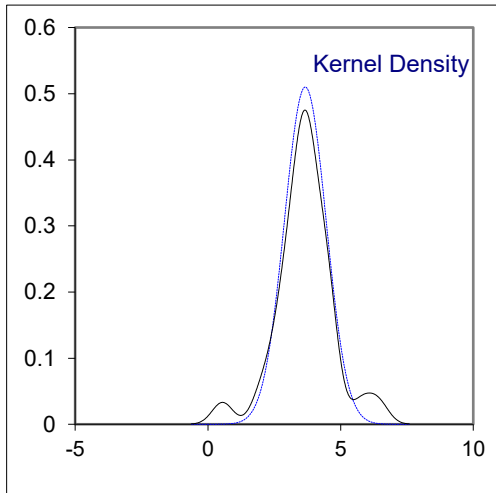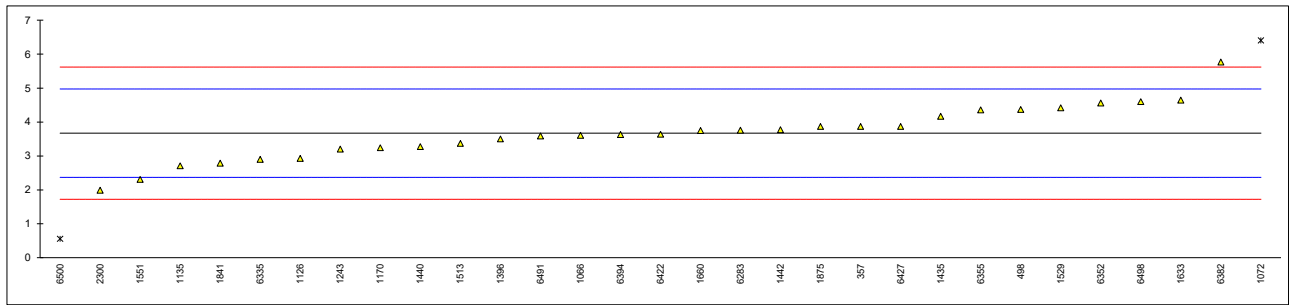
Determination of Poly Chlorinated Biphenyls as PCB no. 180 on sample #22228; results in mg/kg

lab	method	value	mark	z(targ)	remarks
341		-----		-----	
343		-----		-----	
357	EN12766-1	3.19		1.37	
392		-----		-----	
398		-----		-----	
455		-----		-----	
498	EN12766-1	2.56		-0.02	
511		-----		-----	
614		-----		-----	
912		-----		-----	
1059		-----		-----	
1066	EN12766-1	1.73		-1.86	
1072	IEC61619	3.4671		1.98	
1126	EN12766-1	2.11		-1.02	
1135	EN12766-1	2.13	C	-0.97	first reported 12.96
1170	EN12766-1	2.158		-0.91	
1243	EN12766-1	2.70		0.29	
1264		-----		-----	
1304		-----		-----	
1306		-----		-----	
1352		-----		-----	
1374		-----		-----	
1396	IP462-1	2.85198		0.62	
1435	EN12766-1	2.75		0.40	
1440	IEC61619	2.6973		0.28	
1442	EN12766-1	2.454		-0.26	
1458		-----		-----	
1495		-----		-----	
1505		-----		-----	
1513	IEC61619	2.761		0.42	
1529	EN12766-1/EN61619	2.86		0.64	
1551	IP462-1	2.560		-0.02	
1633	IEC61619	2.731		0.35	
1660	IEC61619	3.31		1.63	
1702		-----		-----	
1801		-----		-----	
1816		-----		-----	
1841	IEC61619	3.19		1.37	
1875	EN12766-1	2.6120		0.09	
1885		-----		-----	
1888		-----		-----	
1965		-----		-----	
2300	EN12766-1	1.32		-2.76	
2622		-----		-----	
6067		-----		-----	
6278		-----		-----	
6283	IEC61619	2.77		0.44	
6334		-----		-----	
6335	EN12766-1	1.58		-2.19	
6352		1.42		-2.54	
6355	EN12766-1	2.905		0.74	
6382	EN12766-1	2.651		0.18	
6394	EN12766-1	2.512		-0.13	
6402		-----		-----	
6414		-----		-----	
6422	IEC61619	2.48		-0.20	
6427	EN12766-1	2.26		-0.69	
6491	EN12766-1	2.812		0.53	
6498	In house	3.59		2.25	
6500	EN12766-1	0.524	C,R(0.05)	-4.52	first reported 2.619
8001		-----		-----	

normality	OK	
n	30	
outliers	1	
mean (n)	2.5707	
st.dev. (n)	0.55520	
R(calc.)	1.5546	
st.dev.(EN12766-1:00)	0.45295	
R(EN12766-1:00)	1.2683	

Determination of Poly Chlorinated Biphenyls as Aroclor 1242 on sample #22228; results in mg/kg

lab	method	value	mark	z(targ)	remarks
341		-----		-----	
343		-----		-----	
357		-----		-----	
392		-----		-----	
398		-----		-----	
455		-----		-----	
498		-----		-----	
511	D4059	<2		-----	
614		-----		-----	
912		-----		-----	
1059		-----		-----	
1066		-----		-----	
1072	D4059	8.60		1.22	
1126		-----		-----	
1135		-----		-----	
1170		-----		-----	
1243		-----		-----	
1264		-----		-----	
1304	In house	7.819		0.81	
1306	In house	0		-3.31	
1352	In house	5.903		-0.20	
1374	D4059	10.94		2.45	
1396		-----		-----	
1435		-----		-----	
1440	In house	11		2.48	
1442		-----		-----	
1458	D4059	6.9		0.32	
1495		-----		-----	
1505	D4059	1.79		-2.37	
1513		-----		-----	
1529		-----		-----	
1551		-----		-----	
1633		-----		-----	
1660		-----		-----	
1702		-----		-----	
1801		-----		-----	
1816		-----		-----	
1841		-----		-----	
1875		-----		-----	
1885	EPA6013	4.4		-0.99	
1888		-----		-----	
1965	D6160	8.7		1.27	
2300		-----		-----	
2622		-----		-----	
6067		-----		-----	
6278	EPA8082A	4.7107		-0.83	
6283		-----		-----	
6334	IEC61619Mod.	4.7		-0.84	
6335		-----		-----	
6352		-----		-----	
6355		-----		-----	
6382		-----		-----	
6394		-----		-----	
6402		-----		-----	
6414		-----		-----	
6422		-----		-----	
6427		-----		-----	
6491		-----		-----	
6498		-----		-----	
6500		-----		-----	
8001		-----		-----	

normality	OK	
n	12	
outliers	0	
mean (n)	6.2886	
st.dev. (n)	3.38740	
R(calc.)	9.4847	
st.dev.(D4059:00R18 (silicone))	1.90047	
R(D4059:00R18 (silicone))	5.3213	

Kernel Density

Determination of Poly Chlorinated Biphenyls as Aroclor 1248 on sample #22228; results in mg/kg

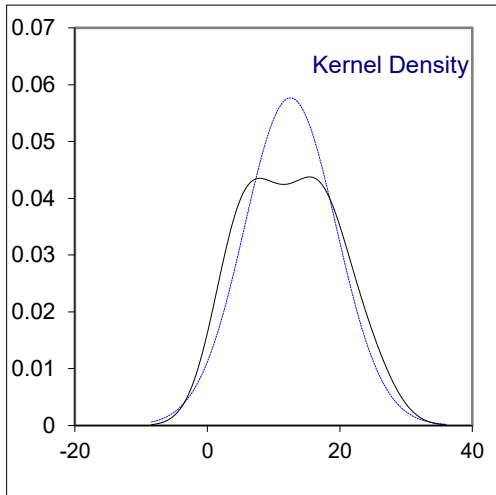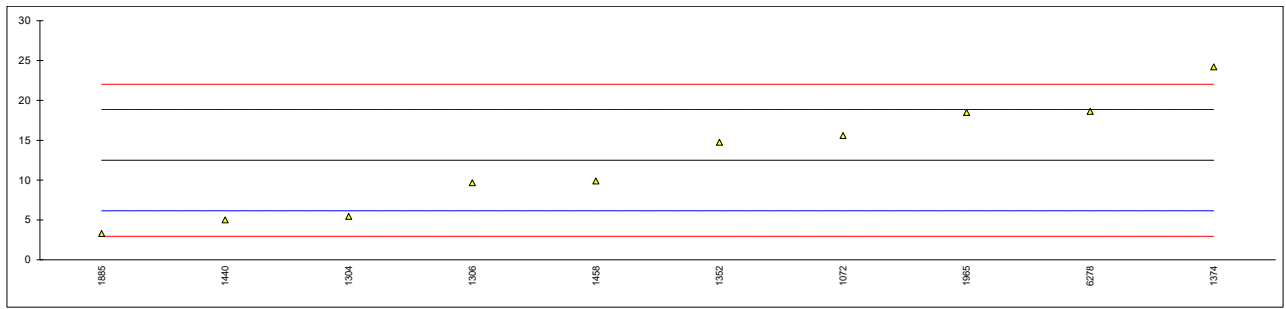| lab	method	value	mark	z(targ)	remarks
341		-----		-----	
343		-----		-----	
357		-----		-----	
392		-----		-----	
398		-----		-----	
455		-----		-----	
498		-----		-----	
511		-----		-----	
614		-----		-----	
912		-----		-----	
1059		-----		-----	
1066		-----		-----	
1072	D4059	10.20		-----	possibly a false positive test result?
1126		-----		-----	
1135		-----		-----	
1170		-----		-----	
1243		-----		-----	
1264		-----		-----	
1304		-----		-----	
1306		-----		-----	
1352		-----		-----	
1374	D4059	0		-----	
1396		-----		-----	
1435		-----		-----	
1440		-----		-----	
1442		-----		-----	
1458		-----		-----	
1495		-----		-----	
1505		-----		-----	
1513		-----		-----	
1529		-----		-----	
1551		-----		-----	
1633		-----		-----	
1660		-----		-----	
1702		-----		-----	
1801		-----		-----	
1816		-----		-----	
1841		-----		-----	
1875		-----		-----	
1885	EPA6013	<0.2		-----	
1888		-----		-----	
1965		-----		-----	
2300		-----		-----	
2622		-----		-----	
6067		-----		-----	
6278		-----		-----	
6283		-----		-----	
6334		-----		-----	
6335		-----		-----	
6352		-----		-----	
6355		-----		-----	
6382		-----		-----	
6394		-----		-----	
6402		-----		-----	
6414		-----		-----	
6422		-----		-----	
6427		-----		-----	
6491		-----		-----	
6498		-----		-----	
6500		-----		-----	
8001		-----		-----	

Determination of Poly Chlorinated Biphenyls as Aroclor 1254 on sample #22228; results in mg/kg

lab	method	value	mark	z(targ)	remarks
341		-----		-----	
343		-----		-----	
357		-----		-----	
392		-----		-----	
398		-----		-----	
455		-----		-----	
498		-----		-----	
511		-----		-----	
614		-----		-----	
912		-----		-----	
1059		-----		-----	
1066		-----		-----	
1072	D4059	15.60		0.97	
1126		-----		-----	
1135		-----		-----	
1170		-----		-----	
1243		-----		-----	
1264		-----		-----	
1304	In house	5.452		-2.22	
1306	In house	9.66		-0.89	
1352	In house	14.764		0.71	
1374	D4059	24.22		3.68	
1396		-----		-----	
1435		-----		-----	
1440	In house	5		-2.36	
1442		-----		-----	
1458	D4059	9.9		-0.82	
1495		-----		-----	
1505		-----		-----	
1513		-----		-----	
1529		-----		-----	
1551		-----		-----	
1633		-----		-----	
1660		-----		-----	
1702		-----		-----	
1801		-----		-----	
1816		-----		-----	
1841		-----		-----	
1875		-----		-----	
1885	EPA6013	3.3		-2.89	
1888		-----		-----	
1965	D6160	18.5		1.88	
2300		-----		-----	
2622		-----		-----	
6067		-----		-----	
6278	EPA8082A	18.6286		1.93	
6283		-----		-----	
6334	IEC61619Mod.	<1		<-3.61	possibly a false negative test result?
6335		-----		-----	
6352		-----		-----	
6355		-----		-----	
6382		-----		-----	
6394		-----		-----	
6402		-----		-----	
6414		-----		-----	
6422		-----		-----	
6427		-----		-----	
6491		-----		-----	
6498		-----		-----	
6500		-----		-----	
8001		-----		-----	

|		
normality	OK	
n	10	
outliers	0	
mean (n)	12.5025	
st.dev. (n)	6.92053	
R(calc.)	19.3775	
st.dev.(D4059:00R18 (silicone))	3.18195	
R(D4059:00R18 (silicone))	8.9095	

Kernel Density

Determination of Poly Chlorinated Biphenyls as Aroclor 1260 on sample #22228; results in mg/kg

lab	method	value	mark	z(targ)	remarks
341		-----		-----	
343		-----		-----	
357		-----		-----	
392		-----		-----	
398		-----		-----	
455		-----		-----	
498		-----		-----	
511		-----		-----	
614		-----		-----	
912		-----		-----	
1059		-----		-----	
1066		-----		-----	
1072	D4059	24.70		0.45	
1126		-----		-----	
1135		-----		-----	
1170		-----		-----	
1243		-----		-----	
1264		-----		-----	
1304	In house	19.894		-0.53	
1306	In house	20.19		-0.47	
1352	In house	26.872		0.89	
1374	D4059	23.16		0.14	
1396		-----		-----	
1435		-----		-----	
1440	In house	32		1.92	
1442		-----		-----	
1458	D4059	18.1		-0.89	
1495		-----		-----	
1505	D4059	9.66		-2.60	
1513		-----		-----	
1529		-----		-----	
1551		-----		-----	
1633		-----		-----	
1660		-----		-----	
1702		-----		-----	
1801		-----		-----	
1816		-----		-----	
1841		-----		-----	
1875		-----		-----	
1885	EPA6013	8.6		-2.81	
1888		-----		-----	
1965	D6160	31.4		1.80	
2300	D4059	30.21		1.56	
2622		-----		-----	
6067		-----		-----	
6278	EPA8082A	23.4623		0.20	
6283		-----		-----	
6334	IEC61619Mod.	24.15		0.34	
6335		-----		-----	
6352		-----		-----	
6355		-----		-----	
6382		-----		-----	
6394		-----		-----	
6402		-----		-----	
6414		-----		-----	
6422		-----		-----	
6427		-----		-----	
6491		-----		-----	
6498		-----		-----	
6500		-----		-----	
8001		-----		-----	

|		
normality	OK	
n	13	
outliers	0	
mean (n)	22.4922	
st.dev. (n)	7.33999	
R(calc.)	20.5520	
st.dev.(D4059:00R18 (silicone))	4.94277	
R(D4059:00R18 (silicone))	13.8398	

Kernel Density
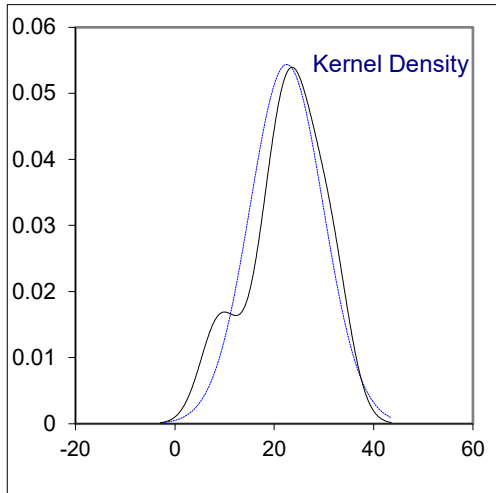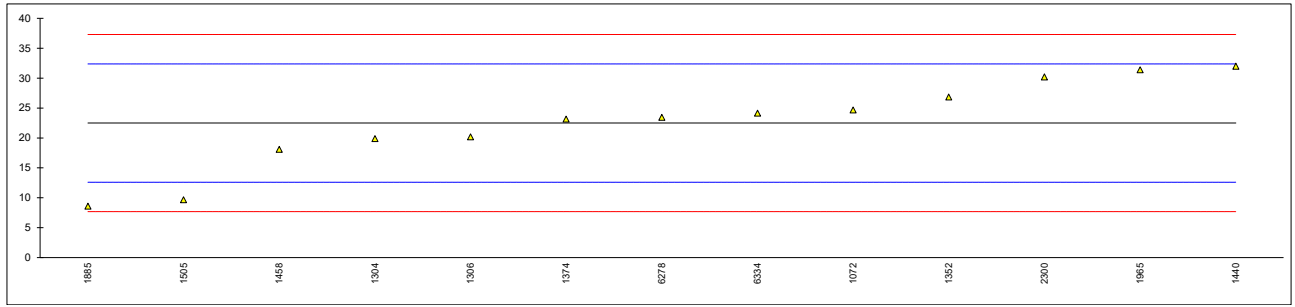
Determination of Total PCB, 5 times the sum of 6 congeners on sample #22228; results in mg/kg

lab	method	value	mark	z(targ)	remarks
341		-----		-----	
343		-----		-----	
357	EN12766-2-B	72.05		0.16	
392		-----		-----	
398		-----		-----	
455		-----		-----	
498	EN12799-1	72.25	ex	0.18	test result excluded as iis calc. 68.64 (6 cong.) and 72.25 (7 cong.)
511		-----		-----	
614		-----		-----	
912		-----		-----	
1059		-----		-----	
1066		-----		-----	
1072	EN12766-2-B	102.25	ex	2.83	test result excluded as statistical outlier in related parameter
1126		-----		-----	
1135		-----		-----	
1170	EN12766-2-B	58.06	C	-1.07	first reported 12.39
1243	EN12766-2-B	57.75	C	-1.10	first reported 11.55
1264		-----		-----	
1304		-----		-----	
1306		-----		-----	
1352		-----		-----	
1374		-----		-----	
1396	IP462-2	70.6386	C	0.04	first reported 48.8155
1435	EN12766-2-B	71.15		0.08	
1440		-----		-----	
1442	EN12766-2-B	72.68		0.22	
1458		-----		-----	
1495	EN12766-2-B	67.8		-0.21	
1505		-----		-----	
1513		-----		-----	
1529		-----		-----	
1551	IP462-2	66.243		-0.35	
1633	IEC61619	78.654		0.75	
1660		-----		-----	
1702		-----		-----	
1801		-----		-----	
1816		-----		-----	
1841	EN12766-2-B	69.70	ex	-0.04	test result excluded as statistical outlier in related parameter
1875	EN12766-2-B	72.367		0.19	
1885		-----		-----	
1888		-----		-----	
1965		-----		-----	
2300	EN12766-2-B	34.9	ex	-3.12	test result excluded as statistical outlier in related parameter
2622		-----		-----	
6067		-----		-----	
6278		-----		-----	
6283	EN12766-2-B	72.85		0.23	
6334		-----		-----	
6335	EN12766-2-B	39.022	ex	-2.76	test result excluded as statistical outlier in related parameter
6352		77.85		0.68	
6355	EN12766-2-B	67.737		-0.22	
6382	EN12766-2-B	81.70		1.02	
6394	EN12766-2-B	58.37		-1.05	
6402		-----		-----	
6414		-----		-----	
6422	IEC61619	64.78		-0.48	
6427	EN12766-2-B	70.6	C	0.03	first reported 14.12
6491	EN12766-2-B	68.353		-0.16	
6498	In house	84.25		1.24	
6500	EN12766-2-B	9.088	ex,C	-5.40	test result excluded as stat. outliers in related parameters/fr. 36.85
8001		-----		-----	

|		
normality	OK	
n	19	
outliers	0+6ex	
mean (n)	70.2043	
st.dev. (n)	7.39667	
R(calc.)	20.7107	
st.dev.(EN12766-2B:01)	11.30779	
R(EN12766-2B:01)	31.6618	
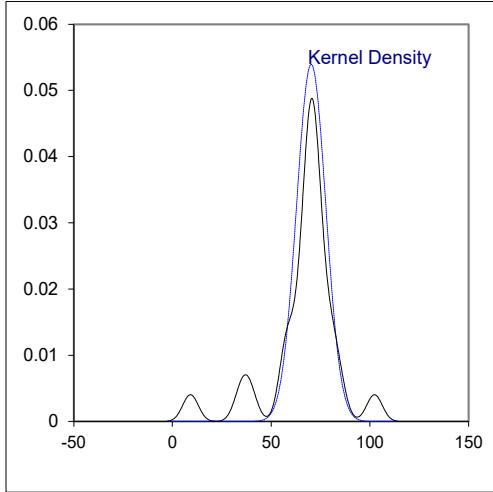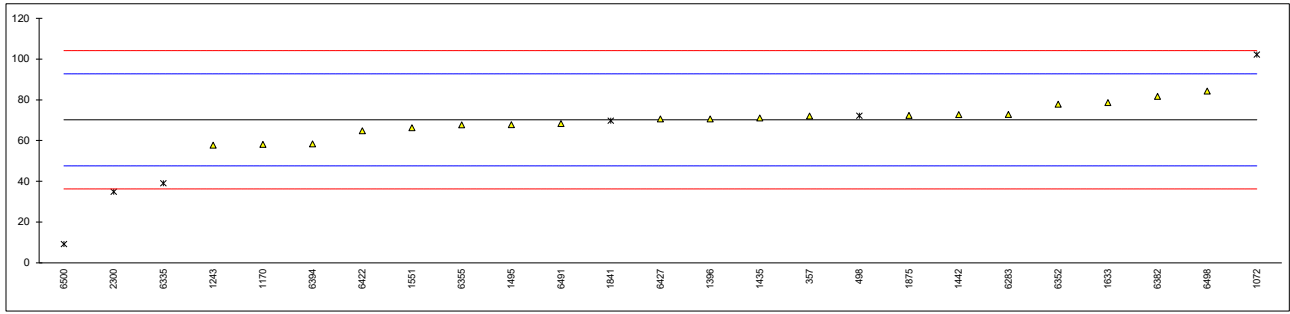
Determination of Total PCB, sum of all congeners on sample #22228; results in mg/kg

lab	method	value	mark	z(targ)	remarks
341	EN61619	50		-0.06	
343	EN61619	47		-0.63	
357		-----		-----	
392	EN12766-2A	55		0.90	
398	EN61619	80.4		5.78	
455	EN61619	49.5		-0.15	
498		-----		-----	
511		-----		-----	
614		-----		-----	
912		-----		-----	
1059		-----		-----	
1066		-----		-----	
1072	IEC61619	60.7113		2.00	
1126		-----		-----	
1135		-----		-----	
1170		-----		-----	
1243		-----		-----	
1264		-----		-----	
1304		-----		-----	
1306		-----		-----	
1352		-----		-----	
1374		-----		-----	
1396		-----		-----	
1435	EN61619	46.76		-0.68	
1440	EN61619	49		-0.25	
1442	EN61619	43.86		-1.24	
1458		-----		-----	
1495	EN12766-2A	46.8		-0.67	
1505		-----		-----	
1513	IEC61619	39.1		-2.15	
1529	EN12766-1/EN61619	56		1.10	
1551		-----		-----	
1633	IEC61619	52.81		0.48	
1660	IEC61619	54.10		0.73	
1702	IEC61619	29.71		-3.95	
1801	EN61619	64.41		2.71	
1816	EN61619	66.9		3.19	
1841	IEC61619	50.21		-0.02	
1875		-----		-----	
1885		-----		-----	
1888	IEC61619	51		0.14	
1965		-----		-----	
2300	EN61619	37.19		-2.52	
2622	EN61619	67.73		3.35	
6067		-----		-----	
6278		-----		-----	
6283	IEC61619	52.2		0.37	
6334		-----		-----	
6335		-----		-----	
6352		-----	W	-----	test result withdrawn, reported 16.61
6355		-----		-----	
6382		-----		-----	
6394		-----		-----	
6402		-----		-----	
6414	IEC61619	21.9		-5.46	
6422	IEC61619	51.87		0.30	
6427		-----		-----	
6491	EN12766-2A	33.21	C	-3.28	first reported 75.155
6498	In house	17.95	ex	-6.21	test result excluded, see § 4.1
6500		-----		-----	
8001		-----		-----	

	normality	OK
	n	25
	outliers	0+1ex
	mean (n)	50.2949
	st.dev. (n)	12.54028
	R(calc.)	35.1128
	st.dev.(EN61619:97)	5.20490
	R(EN61619:97)	14.5737
Compare		
	R(EN12766-2A:01)	14.5737

Kernel Density
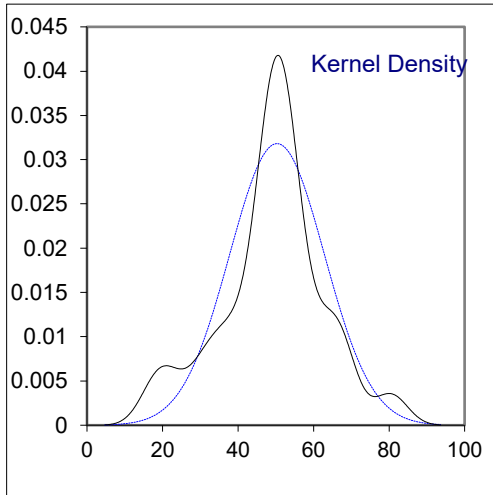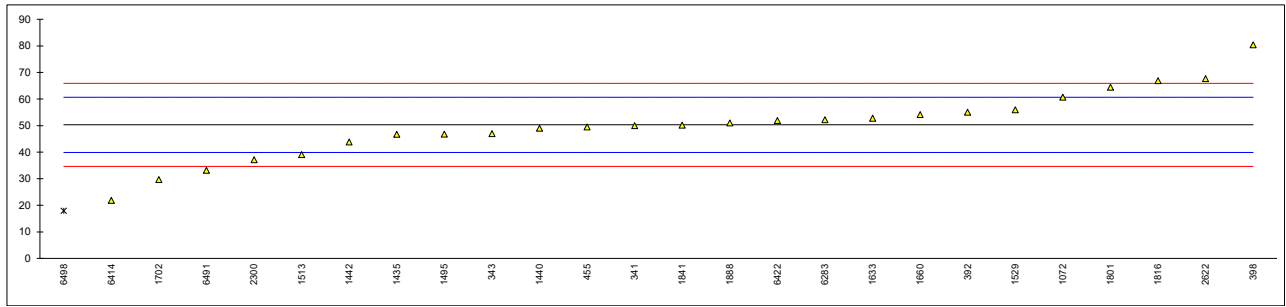
Determination of Total PCB, sum of all Aroclors on sample #22228; results in mg/kg

lab	method	value	mark	z(targ)	remarks
341		-----		-----	
343		-----		-----	
357		-----		-----	
392		-----		-----	
398		-----		-----	
455		-----		-----	
498		-----		-----	
511	D4059	44.14		0.60	
614		-----		-----	
912		-----		-----	
1059		-----		-----	
1066		-----		-----	
1072	D4059	59.10		2.58	
1126		-----		-----	
1135		-----		-----	
1170		-----		-----	
1243		-----		-----	
1264	D4059	47.2		1.00	
1304	In house	33.165		-0.86	
1306	In house	29.88		-1.29	
1352	In house	47.539		1.05	
1374	D4059	58.32		2.47	
1396		-----		-----	
1435		-----		-----	
1440	In house	48		1.11	
1442		-----		-----	
1458	D4059	34.9		-0.63	
1495		-----		-----	
1505	D4059	11.45		-3.73	
1513		-----		-----	
1529		-----		-----	
1551		-----		-----	
1633		-----		-----	
1660		-----		-----	
1702		-----		-----	
1801		-----		-----	
1816		-----		-----	
1841		-----		-----	
1875		-----		-----	
1885	EPA6013	16.3		-3.09	
1888		-----		-----	
1965	D6160	58.6		2.51	
2300		30.21		-1.25	
2622		-----		-----	
6067		-----		-----	
6278	EPA8082A	46.8016		0.95	
6283		-----		-----	
6334	IEC61619Mod.	28.85		-1.43	
6335		-----		-----	
6352		-----		-----	
6355		-----		-----	
6382		-----		-----	
6394		-----		-----	
6402		-----		-----	
6414		-----		-----	
6422		-----		-----	
6427		-----		-----	
6491		-----		-----	
6498		-----		-----	
6500		-----		-----	
8001		-----		-----	

normality	OK	
n	15	
outliers	0	
mean (n)	39.6304	
st.dev. (n)	14.76608	
R(calc.)	41.3450	
st.dev.(D4059:00R18 (silicone))	7.55906	
R(D4059:00R18 (silicone))	21.1654	

Kernel Density
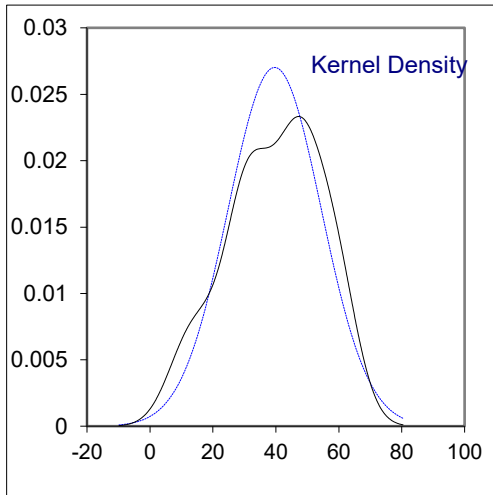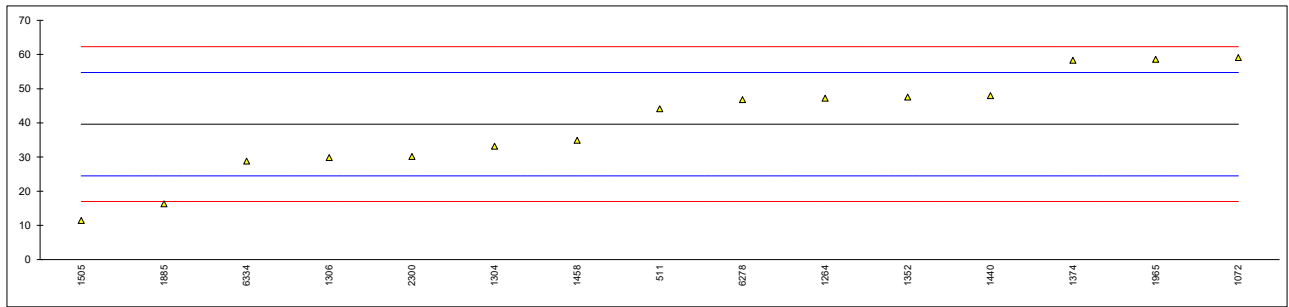
APPENDIX 2

Number of participants per country

<pre>
7 labs in AUSTRALIA
2 labs in BELGIUM
 1 lab in BOTSWANA
 1 lab in FINLAND
2 labs in FRANCE
6 labs in GERMANY
2 labs in GREECE
2 labs in INDIA
 1 lab in IRELAND
5 labs in ITALY
 1 lab in MALAYSIA
2 labs in MOROCCO
4 labs in NETHERLANDS
2 labs in NORWAY
 1 lab in PERU
 1 lab in PHILIPPINES
4 labs in PORTUGAL
 1 lab in QATAR
 1 lab in SAUDI ARABIA
 1 lab in SLOVENIA
 1 lab in SOUTH AFRICA
8 labs in SPAIN
 1 lab in TURKEY
4 labs in UNITED KINGDOM
</pre>

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

Literature

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

2   ISO5725:86

3   ISO5725 parts 1-6:94

4   ISO13528:05

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

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

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

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

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

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

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

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