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Worldwide and Regional Laboratory Comparison on the Determination of Organochlorine Compounds, Polybrominated Diphenyl Ethers and Petroleum Hydrocarbons in IAEA-451 Clam (*Gafrarium tumidum*) Sample

IAEA
International Atomic Energy Agency

WORLDWIDE AND REGIONAL LABORATORY COMPARISON ON THE DETERMINATION OF ORGANOCHLORINE COMPOUNDS, POLYBROMINATED DIPHENYL ETHERS AND PETROLEUM HYDROCARBONS IN IAEA-451 CLAM (*Gafrarium tumidum*) SAMPLE

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IAEA Analytical Quality in Nuclear Applications No. IAEA/AQ/28

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INTERNATIONAL ATOMIC ENERGY AGENCY
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WORLDWIDE AND REGIONAL LABORATORY COMPARISON ON THE DETERMINATION OF ORGANOCHLORINE COMPOUNDS, POLYBROMINATED DIPHENYL ETHERS AND PETROLEUM HYDROCARBONS IN IAEA-451 CLAM (*Gafrarium tumidum*) SAMPLE
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FOREWORD

For nearly thirty years, the Marine Environmental Studies Laboratory (MESL) of the IAEA Environment Laboratories has conducted worldwide laboratory performance studies, also known as interlaboratory comparisons (ILCs). The results have been used to evaluate the participating laboratories' performance with respect to a wide range of organic and inorganic pollutants. This work has been conducted in collaboration with the Regional Seas Programme of the United Nations Environment Programme.

The goal of the performance studies is to demonstrate the measurement capabilities of laboratories participating in ILCs and proficiency tests (PTs). The results of ILCs or PTs are of crucial interest to laboratories, as they provide clear information about the laboratories' measurement capabilities. Participation is voluntary or is undertaken to fulfil external requirements (e.g. legal, accreditation, control bodies). The ILC and PT schemes involve the comparison of participant results with an assigned value, usually delivered as a consensus value from the overall population of test results.

These exercises are designed to monitor and demonstrate the performance and analytical capabilities of the participating laboratories, and to identify gaps and problem areas where further development is needed. Regular participation has benefits with regard to training and educational opportunities, enhanced mutual trust in results and methodology, and objective evidence for accreditation purposes.

The present interlaboratory study was designed to evaluate the measurement performance of the participating laboratories on the analysis of organic contaminants in biota samples. The data reported by the laboratories, together with the technical and statistical evaluations of the results for each element, are included in this report.

The IAEA officers responsible for this publication were C. Cattini, P. Mandjukov, I. Tolosa and E. Vasileva of the IAEA Environment Laboratories.

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1. INTRODUCTION

The Marine Environmental Studies Laboratory (MESL) of the IAEA-NAEL has conducted interlaboratory comparisons (ILCs) on trace organic compounds for over thirty years as part of its contribution to the IAEA's reference material programme, UNEP's Regional Seas Programme, and occasionally, in association with the Intergovernmental Oceanographic Commission of UNESCO, the Global Investigation of the Pollution in the Marine Environment (GIPME) programme. These ILCs are organized once per year, on a continuous basis.

The accurate and precise determination of organochlorine compounds and petroleum hydrocarbons in marine samples is fundamental to the pollution assessment in coastal and ocean environments. Interlaboratory comparisons represent an essential element of method testing, and allow analysts to check the accuracy of their results. Furthermore, interlaboratory comparisons are used as a basic tool for evaluating data quality on global and regional levels.

The results from previous ILCs have revealed some serious difficulties for many regional laboratories to obtain comparable data. To help improve the quality of analytical data, MESL intensified the quality assurance (QA) programme. This includes more training of analysts on modern measurement techniques, production and supply of appropriate and reliable reference methods and materials and, whenever possible, improving the analytical instruments of the IAEA's Member States' laboratories. Moreover, it includes an enhanced programme of interlaboratory comparisons using suitable marine samples.

This report describes and evaluates results from the IAEA/UNEP Interlaboratory comparison study, for the chemical analysis of organochlorine compounds, polybrominated diphenyl ethers and petroleum hydrocarbons in clam (*Gafrarium tumidum*) sample (IAEA-451), prepared and distributed to laboratories worldwide in January 2009.

A total of 94 laboratories from 51 countries reported some results. Those included 75 laboratories participating in the UNEP's Regional Seas Programme and are distributed as follows:

	Number of Laboratories	Number of Countries
Mediterranean Action Plan	35	12
Caribbean Action Plan	9	5
East Asian Seas	6	6
South-West Atlantic Action Plan	4	1
Black Sea Environmental Programme	4	3
South East Pacific	2	2
Kuwait Action Plan	5	4
Western Indian Ocean	3	3
Yellow Sea	3	2
South Asian Seas	2	1
North West Pacific	3	3

The data sets reported by the laboratories and the statistical evaluation of results for each determinant are given in this report. The final results from this interlaboratory comparison will enable individual participants to assess their performances and where necessary, to introduce appropriate modifications to their analytical procedures. Each laboratory performance (in terms of accuracy) was evaluated by *z*-scores.

Participants who require further information or who have questions concerning this report are encouraged to write to IAEA-EL, MESL, 4 Quai Antoine 1er, MC-98000 MONACO or to send an email to NAEL-Interlaboratory-Comparisons@iaea.org

2. SCOPE OF THE INTERLABORATORY COMPARISON

For the organochlorine part of this exercise, the participants were requested to determine as many compounds as possible including: HCB, lindane, *pp'*DDE, *pp'*DDD, *pp'*DDT, Aroclor 1254, and Aroclor 1260. The participants were also requested to report the PCBs as individual congeners whenever possible. For the petroleum hydrocarbon part of this exercise, the participants were requested to report individual aliphatics, such as *n*-C_{17}, *n*-C_{18}, pristane, phytane, total resolved and unresolved aliphatics, and all individual aromatic compounds that could be identified. MESL, however, was also interested in receiving results for additional compounds, such as polybrominated diphenyl ethers (PBDEs).

3. DESCRIPTION OF THE MATERIAL

A sample of sixty kg of Tumid Venus clams (*Gafrarium tumidum*) was collected in Noumea, New Caledonia. This sample was dried, ground and sieved at 250 μm. This powder, about 12 kg, was homogenized by mixing it in a stainless steel rotating drum for three weeks. Then, aliquots of about 20 g were packaged into glass bottles with aluminium screw caps, labeled IAEA-451 and sealed with Teflon tape.

4. HOMOGENEITY TEST

The homogeneity (between and within bottle) of the material for organochlorine compounds, polybrominated diphenyl ethers and petroleum hydrocarbons was assessed by determining the concentration of these compounds in 10 bottles randomly selected from the bottling of the bulk dry powder. A one-way variance analysis of the results indicated that the material can be considered homogeneous.

5. MOISTURE CONTENT

The moisture content of the lyophilized material, determined by drying an aliquot to a constant mass at 105 °C, was found to be 5.1±0.3% at the time of the preparation of this sample. However, as the moisture content may change with the ambient humidity and temperature, it was recommended that it be determined again by the analyzing laboratories from a separate sub-sample (not the one taken for analysis of contaminants), by drying for 48 hrs at 105 °C at the time of analysis in the laboratory.

6. SAMPLE DISPATCH AND DATA RETURN

In January 2009, 179 bottles of biota sample labeled IAEA-451 were distributed to laboratories worldwide along with a sample description and general instructions to analysts. The participants were requested to analyze chlorinated compounds, polybrominated diphenyl ethers and petroleum hydrocarbons using their usual technique. They were also requested to make at least one, but preferably three separate determinations for each compound, and to report the results together with a short description of the method used (e.g. extraction, clean-up, gas chromatographic conditions). A suitable reporting form was attached to the information sheet for this purpose.

It was stated that concentrations were to be reported as net values (i.e. after correction for blank, moisture content, etc.), leaving as many significant figures as justified by the precision of the method used.

For each group of compounds the participants were requested to report:

1 The average weight of the sample taken for analysis;

2 Extractable Organic Matter (E.O.M.) and moisture content;

3 Methods used to confirm identity of the compounds;

4 Calculation of the results;

5 Summary of the quality control procedures routinely employed within the laboratory;

6 The arithmetic mean value and the relative standard deviations (in %) of determinations.

Results of the analysis were reported by 94 laboratories, of which: 34 provided data for both chlorinated and petroleum hydrocarbons; 38 provided results for organochlorine compounds only; and 13 laboratories only provided data for petroleum hydrocarbons. Polybrominated diphenyl ethers were reported by 13 participants.

7. EVALUATION OF THE RESULTS

7.1. DATA TABLES

Results are presented in Annex I (Tables I.1.–I.4.).

For the purpose of this report, each laboratory is represented by a code number which remains unchanged throughout the data tables. The numbers do not correspond to the sequence of laboratories in the list of participants given at the end of the report, so that the anonymity of each laboratory is preserved.

Laboratory means, when reported, are presented as reported, regardless of significant figures justified by the precision of the method used. When a laboratory reported replicate determinations of a given compound, the laboratory value shown in the tables is the computed arithmetic mean. In these tables, laboratories using QA/QC are indicated by an asterisk close to their code numbers.

7.2. ANALYTICAL METHODS

The information on the pretreatment of the samples for the determination of chlorinated compounds and PCBs is given in Table I.9. of Annex I, and the gas chromatographic conditions are reported in Table I.10. The pretreatment of the samples for polybrominated diphenyl ethers is described for each laboratory in Table I.11. of Annex I, and gas chromatographic conditions are reported in Table I.12. The pretreatment of the samples for petroleum hydrocarbons is described for each laboratory in Table I.13 of Annex I, and gas chromatographic conditions are reported in Table I.14.

7.3. ASSIGNMENT OF CONSENSUS VALUES

The assigned values for organic contaminants in the IAEA-451 sample were established from the robust means of the participants' results, as suggested by ISO standard 13528 [1].

The robust mean was calculated per Algorithm A described in the standard.

Briefly, individual results were ranked in increasing order: (x_1, x_2, x_i,…,x_p)

Initial values of the robust mean x* were calculated as follow:

$$x^* = \text{median } x_i \ (1,2,.,p) \qquad \textit{Eq. 1}$$

$$s^* = 1.483 \text{ median } |x_i - x^*| \ (1,2,.,p) \qquad \textit{Eq. 2}$$

The initial values x* were updated by calculating:

$$\delta = 1.5 s^* \qquad \textit{Eq. 3}$$

For each x_i, x_i* was calculated where:

if $x_i < x^* - \delta$; $x_i^* = x^* - \delta$

if $x_i > x^* - \delta$; $x_i^* = x^* + \delta$

otherwise: $x_i^* = x_i$ *Eq. 4*

New values for the robust mean x* were calculated as:

$$x^* = \Sigma x_i^* / p \qquad \textit{Eq. 5}$$

These values were compared to other robust estimates of the mean, which were calculated with an algorithm proposed by the Analytical Methods Committee of the Royal Society of Chemistry (AMC) [2].

This is rather a straightforward method which does not significantly differ from other methods, such as other robust estimates of the mean, which were calculated with an algorithm proposed by the AMC.

The standard deviation for the proficiency assessment (also called target standard deviation), σ_p, was set to be fit for purpose, according to the Harmonized Protocol [3] and was fixed to 12.5 % of the assigned values. The determination of the target standard deviation was done on the basis of the outcome of previous ILCs organized by MESL, for the same group of laboratories.

7.3.1. Performance indicator and target standard deviation

The performance of an individual laboratory *i* was expressed by the z_i-score, which was calculated according to equation 6:

$$z_i = \frac{x_i - x^*}{\sigma_P} \qquad \textit{Eq. 6}$$

Where:

z_i is the *z*-score of laboratory i for the respective sample;

x_i is the reported result of laboratory i for that sample, expressed as the mean of multiple determinations;

x^* is the assigned value for the respective analyte;

σ_P is the target standard deviation for proficiency assessment.

The laboratory performance was evaluated using *z*-scores in accordance with ISO 13528 [1].

The acceptability of a laboratory's performance was evaluated according to the following generally accepted limits [3]:

	$\lvert z \rvert$	$\leq$ 2.0	satisfactory
2.0 $<$	$\lvert z \rvert$	$<$ 3.0	questionable
	$\lvert z \rvert$	$\geq$ 3.0	unsatisfactory

The assigned values and the standard deviations for proficiency assessment of all measurants are presented below.

ASSIGNED VALUES FOR THE INTERLABORATORY COMPARISON 451

1. Chlorinated compounds (ng/g dry mass)

Analyte	Concentration*	Target S.D.**	N***
EOM (mg/g)	43.0	5.4	45
HCB	0.38	0.05	30
α-HCH	0.80	0.10	12
γ-HCH (Lindane)	0.59	0.07	44
pp' DDE	1.53	0.19	56
pp' DDD	1.11	0.14	47
pp' DDT	1.51	0.19	45
op DDE	4.34	0.54	08
op DDT	0.32	0.04	05
Heptachlor	1.64	0.20	29
Heptachlor Epoxide	0.73	0.09	15
Aldrin	1.00	0.12	29
Dieldrin	2.00	0.25	37
Endrin	4.60	0.60	26
α-Endosulfan	1.31	0.16	18
β-Endosulfan	2.60	0.32	15
Endosulfan sulfate	1.95	0.24	11
α-Chlordane	0.58	0.07	20
γ-Chlordane	0.45	0.06	16
trans-Nonachlor	0.15	0.02	06
Aroclor 1254	34.3	4.3	19
Aroclor 1260	63.2	7.9	19

* Consensus value expressed on a dry mass basis;
** Target standard deviation set to 12.5%;
*** Number of laboratory means which were used for calculation of the assigned values.

2. PCBs (ng/g dry mass)

Analyte (IUPAC congener No)	Concentration*	Target S.D.**	N***
8	1.44	0.18	07
18	0.58	0.07	08
28	0.87	0.11	30
31	0.33	0.04	08
44	0.40	0.05	13
49	0.92	0.12	04
52	0.86	0.11	36
66	0.45	0.06	08
70	0.65	0.08	05
87	0.31	0.04	08
95	0.60	0.08	07
99	1.21	0.15	07
101	1.83	0.23	47
105	0.49	0.06	17
110	0.92	0.11	13
118	1.04	0.13	40
128	0.56	0.07	11
138	5.33	0.67	53
149	3.18	0.40	17
151	1.54	0.19	06
153	8.96	1.12	55
156	0.56	0.07	14
157	0.40	0.05	05
167	0.34	0.04	05
170	2.97	0.37	24
174	1.32	0.16	04
177	0.94	0.12	07
180	6.56	0.82	52
183	1.74	0.22	12
187	3.74	0.47	20
189	0.21	0.03	05
194	1.48	0.18	19
195	0.43	0.05	09
206	0.26	0.03	09
209	0.15	0.02	04

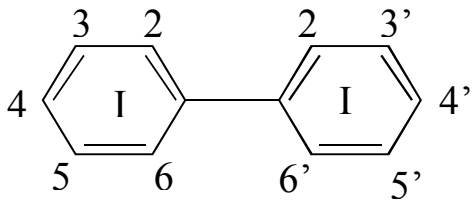
* Consensus value expressed on a dry mass basis;

** Target standard deviation set to 12.5%;

*** Number of laboratory means which were used for calculation of the assigned values.

Systematic numbering of PCB congeners

IUPAC No	
	Dichlorobiphenyl
8	2,4’
	Trichlorobiphenyl
18	2,2’,5
19	2,2’,6
20	2,3,3’
22	2,3,4’
28	2,4,4’
31	2,4’,5
33	2’,3,4
37	3,4,4’
	Tetrachlorobiphenyl
44	2,2’,3,5’
47	2,2’,4,4’
49	2,2’,4,5’
52	2,2’,5,5’
60	2,3,4,4’
66	2,3’,4,4’
70	2,3’,4’,5
74	2,4,4’,5
77	3,3’,4,4’
81	3,4,4’,5
	Pentachlorobiphenyl
84	2,2’,3,3’,6
87	2,2’,3,4,5’
95	2,2’,3,5’,6
99	2,2’,4,4’,5
101	2,3,4,4’,5
104	2,2’,4,6,6’
105	2,3,3’,4,4’
110	2,3,3’,4’,6
112	2,3,3’,5,6
114	2,3,4,4’,5
118	2,3’,4,4’,5
123	2’,3,4,4’,5
126	3,3’,4,4’,5



	Hexachlorobiphenyl
128	2,2’,3,3’,4,4’
136	2,2’,3,3’,6,6’
138	2,2’,3,4,4’,5
141	2,2’,3,4,5,5’
143	2,2’,3,4,5,6’
146	2,2’,3,4’,5,5’
149	2,2’,3,4’,5’,6
151	2,2’,3,5,5’,6
153	2,2’,4,4’,5,5’
156	2,3,3’,4,4’,5
157	2,3,3’,4,4’,5’
158	2,3,3’,4,4’,6
160	2,3,3’,4,5,6
167	2,3’,4,4’,5,5’
169	3,3’,4,4’,5,5’
	Heptachlorobiphenyl
170	2,2’,3,3’,4,4’,5
171	2,2’,3,3’,4,4’,6
174	2,2’,3,3’,4,5,6
177	2,2’,3,3’,4’,5,6
178	2,2’,3,3’,5,5’,6
180	2,2’,3,4,4’,5,5’
183	2,2’,3,4,4’,5’,6
187	2,2’,3,4’,5,5’,6
189	2,3,3’,4,4’,5,5’
	Octachlorobiphenyl
194	2,2’,3,3’,4,4’,5,5’
195	2,2’,3,3’,4,4’,5,6
196	2,2’,3,3’,4,4’,5,6’
199	2,2’,3,3’,4,5,5’,6’
200	2,2’,3,3’,4,5,6,6’
201	2,2’,3,3’,4,5’,6,6
	Nonachlorobiphenyl
203	2,2’,3,4,4’,5,5’,6
205	2,3,3’,4,4’,5,5’,6
206	2,2’,3,3’,4,4’,5,5’,6
	Decachlorobiphenyl
209	2,2’,3,3’,4,4’,5,5’,6,6’

3. PBDEs (ng/g dry mass)

Analyte (IUPAC congener No)	Concentration*	Target S.D.**	N***
28	0.07	0.01	07
47	0.94	0.12	12
66	0.05	0.01	05
85	0.11	0.01	05
99	0.81	0.10	13
100	0.22	0.03	10
153	0.11	0.01	06
154	0.16	0.02	06
183	0.09	0.01	06
209	1.03	0.13	06

* Consensus value expressed on a dry mass basis;
** Target standard deviation set to 12.5%;
*** Number of laboratory means which were used for calculation of the assigned values.

Systematic numbering of PBDEs congeners

IUPAC No

Tribromodiphenyl

17 2,2',4
28 2,4,4'

Tetrabromodiphenyl

47 2,2',4,4'
49 2,2',4,5'
66 2,3',4,4'
71 2,3',4',6

Pentabromodiphenyl

85 2,2',3,4,4'
99 2,2',4,4',5
100 2,2',4,4',6
119 2,3',4,4',6

Hexabromodiphenyl

138 2,2',3,4,4',5'
153 2,2',4,4',5,5'
154 2,2',4,4',5,6'

Heptabromodiphenyl

183 2,2',3,4,4',5',6
184 2,2',3,4,4',6,6'

Octabromodiphenyl

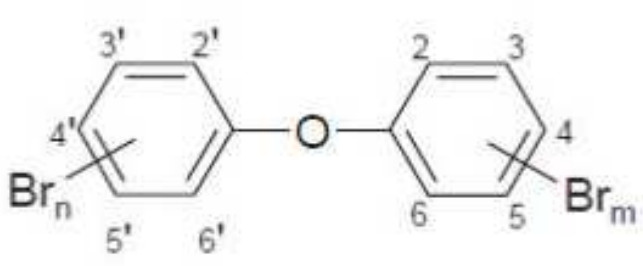
196 2,2',3,3',4,4',5,6'
197 2,2',3,3',4,4',6,6'
203 2,2',3,4,4',5,5',6

Nonabromodiphenyl

206 2,2',3,3',4,4',5,5',6
207 2,2',3,3',4,4',5,6,6'

Decabromobiphenyl

209 2,2',3,3',4,4',5,5',6,6'



4. Petroleum hydrocarbons (dry mass basis)

Analyte	Unit	Concentration *	Target S.D.**	N***
EOM	mg/g	36.3	4.5	21
UVF Chrysene eq.	µg/g	12.1	1.5	04
Total aliphatics	µg/g	244	30	09
Resolved aliphatics	µg/g	20.0	2.5	08
Unresolved aliphatics	µg/g	233	29	06
n-C_{17}	ng/g	338	42	14
Pristane	ng/g	66.7	8.3	11
n-C_{18}	ng/g	232	29	13
Phytane	ng/g	50.7	6.3	11
Σ *n*-alkanes (C_{14}-C_{34})	µg/g	3.16	0.40	12
Total aromatics	µg/g	5.17	0.65	08
Resolved aromatics	µg/g	0.55	0.07	12
Naphthalene	ng/g	15.3	1.9	32
1-methyl naphthalene	ng/g	4.98	0.62	04
Phenanthrene	ng/g	17.1	2.1	38
2-methyl phenanthrene	ng/g	17.6	2.2	06
1-methyl phenanthrene	ng/g	5.30	0.04	10
Anthracene	ng/g	5.70	0.71	20
Chrysene	ng/g	28.0	3.5	37
Fluorene	ng/g	2.62	0.33	13
Fluoranthene	ng/g	45.7	5.7	45
Pyrene	ng/g	39.1	4.9	43
Benzo[b]fluoranthene	ng/g	35.5	4.4	23
Benzo[k]fluoranthene	ng/g	14.5	1.8	21
Benz[a]anthracene	ng/g	19.0	2.4	37
Benzo[e]pyrene	ng/g	20.4	2.6	12
Benzo[a]pyrene	ng/g	17.2	2.1	38
Benzo[g,h,i]perylene	ng/g	18.1	2.3	34
Indeno[1,2,3-c,d]pyrene	ng/g	22.6	2.8	14
Dibenz[a,h]anthracene	ng/g	5.32	0.66	08
Acenaphthylene	ng/g	2.14	0.27	11
Acenaphthene	ng/g	2.18	0.27	13

* Consensus value expressed on a dry mass basis;
** Target standard deviation set to 12.5%;
*** Number of laboratory means which were used for calculation of the assigned values.

7.4. ASSIGNMENT OF CERTIFIED VALUES

The data for many of the analytes are sufficiently well grouped to permit the characterization of the biota sample as a certified reference material.

A summary of the results for chlorinated pesticides, PCBs, PBDEs and petroleum hydrocarbons is presented in Tables I.5.–I.8. of Annex I. These tables provide information of two types:

a) information on the reported results (units, number of laboratories, and the range of laboratory means); and

b) accepted results for certification (number of accepted laboratory means and range of the means, overall arithmetic mean and expanded uncertainty with coverage factor k=2 calculated according to the Evaluation of measurement data – Guide of the expression of uncertainty in measurement JCGM 100:2008 [4]).

8. DISCUSSION

8.1. PCBs AND ORGANOCHLORINE COMPOUNDS

In total, 50 laboratories reported data for 39 polychlorinated biphenyl congeners (Table I.2.), but not all PCB congener data sets were completed. The measurements obtained for each individual congener were very variable, likely due to the relatively low concentrations of these contaminants in the whole tissue and the high lipid content of the test material. The results, reported for the major components with assigned analyte concentrations higher than 1 ng g^{-1} (CB 99, 101, 118, 138, 149, 151, 153, 170, 174, 180, 183, 187, 194) exhibited a relative standard deviation (RSD) for the whole group of 9–169%. The highest RSDs were obtained for CBs 118 and 101 and the lowest for CB 174 with only 4 values reported. For the rest of the congeners with assigned values between 0.5 and 1 ng g^{-1} (CBs 28, 49, 52, 70, 95, 110, 128, 156, 177), the between-laboratory RSD ranged from 19 to 375%, but decreased to 135% when the laboratory 20 was removed. The situation somewhat improves, when only a few major CBs were selected. Few data ($n<6$) were also reported for the four most toxic PCB congeners (i.e. non-ortho substituted): CB 77, 81, 126 and 169. However, the reported data for the minor compounds CB 77 and 126 is very doubtful, due to the potential co-elutions with other more abundant congeners (CB 77/110 and 126/178) in the typical non-polar columns used by the laboratories 1, 10, 21, 38, 42, 49 by GC-ECD analysis, and especially for those using nitrogen as a carrier gas (laboratories 21, 62, 82). A previous isolation of the non-ortho PCB fraction from the ortho-substituted PCBs is required to determine accurate concentration levels of these coplanar PCBs.

For organochlorine pesticides (OCs), in total, 74 laboratories reported data: the number of analytes reported by the laboratories ranged from 2 to 56 (Table I.1.). Similarly to the PCB

data, the concentration levels for most of the OCs were < 1 ng g^{-1}. The results reported for the major components with assigned analyte concentrations higher than 1 ng g^{-1} (*pp'* DDE, *pp'* DDD, *pp'* DDT, heptachlor, endrin, α-endousulfan, β-endosulfan and endosulfan sulfate) exhibited a RSD for the whole group of 214–723%. The higher variability of the OCs compared with the PCBs might account for their lower concentration levels and the higher co-elution of interfering compounds due to the need of more polar solvents to remove the OCs from the liquid chromatographic clean-up columns. Hence, these polar solvents can also remove lipophilic materials which can subsequently interfere with the determination of the OCs by GC.

The treatment of the samples reported by participants is summarized in Table I.9. Similar procedures were followed for both PCBs and OC compounds. The extraction methods used were: Soxhlet with hexane, diethylether or mixtures of hexane/acetone, hexane/acetonitrile, pentane/methylene chloride, hexane/methylene chloride; sonication with hexane/acetone/toluene or hexane; pressurized liquid extraction (PLE) also known as pressurized solvent extraction (PSE); accelerated solvent extraction (ASE), or selected ASE with toluene, iso-hexane, hexane, cyclohexane/ethylacetate, methylene chloride/iso-hexane, acetone/hexane; microwave with hexane/acetone; headspace sorptive extraction (HSSE); column extraction with dichloromethane, hexane/ethyl acetate; matrix solid phase dispersion (MSPD); acid digestion followed by liquid-liquid extraction (LLE); glass column and solid phase microextraction. The clean-up methods reported from the participants included the use of one or two-step column chromatography using multilayer columns of silica, florisil, alumina, GPC, sulphuric acid treatment and acetonitrile partitioning.

Among the participants, 15 laboratories did not use any internal standard. Within the remaining participants, a wide variety of internal standards were used by GC-ECD: Mirex; tetrachloronaphtalene (TCN); octachloronapthalene; CBs 29, 30, 53, 65, 103, 112, 155, 166, 185, 198, 204, 207, 209; γ-HCH; ε-HCH; 2,4 DDD; DCBE 16 (dichlorobenzylhexadecyl ether); trifluraline; TCB; 4,4'-dibromooctafluorobiphenyl; tetrachloro-m-xylene (TCMX); $^{13}C_{12}$-DDD; endosulfan I-d_4; β-endosulfan; endosulfan epoxide; endosulfan sulfate; $^{13}C_{12}$-BDE-139 and methylbromophos. Other internal standards used by GC-MS included: phenanthrene-d_{10}; pyrene-d_{10}; chrysene-d_{12}; 2,4' DDT-d_8; CBs 30, 103, 185, 198; $^{13}C_{12}$-PCB 138; $^{13}C_{12}$-PCB 28; $^{13}C_{12}$-PCB 52; $^{13}C_{12}$-PCB 101; $^{13}C_{12}$-PCB 153; $^{13}C_{12}$-PCB 180; $^{13}C_{12}$-DDT; WP-LCS mixture (^{13}C labelled CBs 77, 81, 105, 114, 118, 123, 126, 156, 157, 167, 169 and 189); MBP-MXE mixture (^{13}C labelled CBs 28, 52, 101, 138, 153, 180 and 209) and TCMX.

The GC conditions reported by the participants are summarized in Table I.10. Most final measurements were produced by GC/ECD analysis (80%), 18% by GC/LRMS and 2 laboratories used GC/HRMS, one of which used negative chemical ionization mode. In one case, a multi-dimensional gas chromatography coupled to μ-electron capture detector (GCx

GC μECD) was used. Helium was the most used carrier gas, although hydrogen, nitrogen and argon/methane were also used. Most of the laboratories used splitless injection, but on-column, split and PTV injectors were also used.

One major problem associated with the disparity of the PCB results is certainly the lack of separation of several important isomers on the 5% phenyl-substituted methyl polysiloxane stationary phase commonly used in the GC determination of PCBs, such as: CBs 28/31; 60/56; 66/95; 76/70; 77/110; 90/101; 52/49/47; 87/85; 105/132/153/137; 110/151; 118/123/149; 156/171/202; 138/163/164/160; 157/201; 170/190; 180/193; 187/182/159 and 195/208. Improvements such as optimization of the temperature programme of the GC analysis, and/or the use of at least two columns with stationary phases of different polarity with minimum length of 50 m and maximum internal diameter of 0.25 mm is recommended, in order to reduce the risk of obtaining false positive data due to co-elution. The use of nitrogen as a carrier gas should also be circumvented. In general, any loss of resolution to gain analysis time should be avoided.

Another problem associated with the poor compatibility between the participants is likely due to the procedures used for the cleanup and isolation of the target compounds from the fatty extracts. Also, the choice of the internal standard might affect significantly the results. In this sense, the selected internal standards should not occur in the material, nor interfere with the target analytes. For that, the use of ^{13}C labelled internal standards (isotope-dilution technique) by GC/MS is a big asset. Co-extraction of interfering materials and contamination from glassware, reactives and laboratory atmosphere might also contribute to the high variability of the data, in particular, when the determinants are present at such low concentrations. Special care should be taken to optimize the operating conditions of the gas chromatograph/ECD combination. The ECD shows a non linear-response. Curve fitting in the same area of the concentration of the target PCBs and OCs is recommended for a proper calibration.

Overall, the compatibility between the participating laboratories was very poor, presumably due to the combination of high lipid content, low analyte concentrations and the complexity and variations of the analytical methods used by the participants. It is not easy to identify trends in this type of dataset because there are a number of parameters that vary from the identity of the participating laboratories, the concentrations of the determinants in the test material, and the complexity and variations of the analytical methods used by the participants.

8.2. POLYBROMINATED DIPHENYL ETHERS

In total, 14 laboratories reported data for polybrominated diphenyl ethers (Table I.3.). The few measurements obtained for each individual congener were very variable. The results reported for PBDE99, PBDE100 and PBDE154 were acceptable with a relative standard deviation (RSD) of 37–65%. For the rest of the reported major congeners (PBDE 28, PBDE 47, PBDE 66, PBDE 85, PBDE 153, PBDE 183 and PBDE 209), the RSDs were higher than 100%.

However, when the laboratory 90 was excluded, the RSDs were almost acceptable for most of the congeners, except BDE47 which exhibited a RSD of 107%. These high RSDs are partly due to the low concentrations of PBDEs (< 1 ng g^{-1}), which explains the difficulties of the laboratories in determining these PBDEs. Possible errors in the sample pretreatment and/or interference by other compounds/impurities might also account for the disagreement of the data. Obviously, the PBDE analysis includes a number of analytical difficulties, and in particular the higher brominated diphenylethers which may degrade at high temperature and are easily degraded by (UV) light.

The treatment of the samples reported by participants is summarized in Table I.11. The extraction methods used were: Soxhlet (3x), with hexane or mixtures of hexane/acetone; sonication (2x) with hexane/acetone/toluene or hexane; microwave (1x) with hexane/acetone; pressurized liquid extraction (PLE) also called pressurized solvent extraction (PSE); accelerated solvent extraction (ASE) or selected ASE (4x); headspace sorptive extraction (HSSE) (1x); and column extraction (1x) with dichloromethane.

The clean-up methods reported from participants included the use of one or two-step column chromatography using multilayer columns of silica, florisil, alumina and active carbon columns, GPC, and sulphuric acid treatment. A wide variety of internal standards were used: $^{13}C_{12}$-BDEs 28, 77, 47, 99, 139, 153, 154, 183, 197, 207, 209, PBDE 139, chlorobiphenyls (CBs) 185, 29,103, 200 and 204, and d-*pp'* DDD.

The GC conditions reported by the participants are summarized in Table I.12. Three laboratories used high resolution (HR) MS and the rest (10) used lower resolution (LR) MS. There were also 3 users of electron capture detection (ECD), two of which used LRMS for confirmation. Generaly, the results reported by HRMS for PBDEs 47 and 99 were not different from the results obtained by low resolution (LRMS). Non-polar (e.g. DB-5MS) or mid-polar (SGE-HT-8) phased columns were used for the separation of most of the organobromine compounds. Several participants used short length and thin-layer capillary columns (e.g. 4 and 15 m of column coated with 0.1 μm of DB-5MS), which are expected to prevent thermal breakdown of these compounds. Most of the participants used splitless injection, except for two laboratories using PTV: one using on-column injection and the other using split.

8.3. PETROLEUM HYDROCARBONS

In total, 46 laboratories reported data for petroleum hydrocarbons (Table I.4.), but not all data sets were completed. Techniques based upon both gas chromatography and high-performance liquid chromatography were used. Several labs reported GC data for aliphatic hydrocarbons including some individual *n*-alkanes (e.g. *n*-C_{17}, *n*-C_{18}), total *n*-alkanes ($\sum$ *n*-C_{14}-*n*-C_{34}), pristane and phytane. The ranges of values reported in the interlaboratory comparison study for these parameters (n<14) were found to be one to two orders of magnitude, indicating the

high interlaboratory variability of hydrocarbon determination in this biota matrix. The RSD including all laboratories ranged from 104 to 172%, but decreased to 70 to 109% when laboratory 7 was removed. The measurements obtained for each individual PAH compound were also very variable, likely due to the relatively low concentrations of these contaminants in the whole tissue and the high lipid content of the test material. The results reported for the major parent PAHs with assigned analyte concentrations higher than 15 ng g^{-1} (naphthalene, phenanthrene, chrysene, fluoranthene, pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, benz[a]anthracene, benzo[e]pyrene, benzo[a]pyrene, benzo[g,h,i]perylene and indeno[1,2,3-c,d]pyrene) exhibited a relative standard deviation (RSD) for the whole group ranging from 74 to 442%. The highest RSDs were obtained for benzo[a]pyrene and fluoranthene but decreased to <115% when the laboratory 25 was removed. The lowest RSD was obtained for benzo[b]fluoranthene with 23 values reported. For the rest of the PAH parent compounds with assigned values between 2 and 6 ng g^{-1} (anthracene, fluorene, dibenz[a,h]anthracene, acenaphtylene and acenaphthene) the between-laboratory RSD ranged from 102 to 204%, but decreased to 95% when the laboratories 21 and 12 were removed. Few data ($4<n<10$) were also reported for three alkylated PAHs (1-methylnaphthalene, 2-methylphenanthrene and 1-methylphenanthrene) exhibiting a RSD of 59–244% which decreased to 154% when laboratories 59 and 33 were removed.

The treatment of the samples reported by the participants is summarized in Table I.13. The extraction methods used were: Soxhlet, with methylene chloride, hexane, methanol or mixtures of hexane/methylene chloride, hexane/acetone, methylene chloride/acetone; sonication with methylene chloride, hexane, cyclohexane or mixtures of methylene chloride/acetone, hexane/acetone, hexane/acetone/toluene; microwave with methanol, methylene chloride, hexane/acetone; shaking with hexane; pressurized solvent extraction (PSE) or accelerated solvent extraction (ASE) with cyclohexane/ethyl acetate or hexane/acetone; homogenization with acetonitrile followed by liquid-liquid extraction (LLE) with hexane; saponification followed by LLE with hexane and solid phase microextraction.

Sample clean-up of the solvent extracts consisted in the use of one or two-step column chromatography using multilayer columns of silica, florisil, alumina, GPC, and alkaline saponification treatment. Several participants used also copper to remove elemental sulphur. Among the participants, the 10 laboratories mostly using HPLC and GC-FID did not use any internal standard. Within the rest of participants, a wide range of internal standards were used: perdeuterated PAHs, hexamehtylbenzene, cadalene, *n*-octadecene, *n*-C_{32}, ortho-terphenyl, 2-fluorobiphenyl, $C_{19}d_{40}$, $C_{32}d_{66}$, 2,4' DDT-d_8, picene, 2-methylchrysene, 6-methylchrysene, decene, 9,10-dihydroanthracene, *n*-hexadecene, *n*-eicosene, benz(a)anthracene, $^{13}C_{12}$-DDT and *n*-C_{21}.

The PAHs were determined by high performance liquid chromatography with fluorescence detection (HPLC-FLD or FL), HPLC with ultraviolet/diode array detection (HPLC-UV-

DAD), HPLC with UV fluorescence (UVF), GC-MS and GC-FID. The instrument type and GC conditions reported by the participants are summarized in Table I.14. Twelve laboratories used HPLC and the rest (37) used gas chromatography equipments. Analysis of PAHs by HPLC only provided results for the major parent PAHs, whereas GC-MS provided also data on alkyl-substituted PAH isomers. For the GC analyses, the non-polar (e.g. the 100% methylpolysiloxane) and the slightly polar (e.g. 5% phenyl methylpolysiloxane) phase were the commonly used phases for the separation of PAHs. A mid-polar (DB-35MS) phased column was also used by a participant. Most participants used splitless injection except for four laboratories using on-column injection, and six using split.

Overall, the comparability between the participating laboratories was very poor, presumably due to the combination of high lipid content, low analyte concentrations and the variations in the analytical methods used by the participants. Generaly, the results reported by HPLC for the parent PAHs compounds were not different from the results obtained by GC-MS. The difficulties in using both HPLC/UV and GC-FID might arise in this complex environmental matrix due to lipidic interferences and their lower discrimation compared to HPLC/UVF and specially GC-MS. Also, the choice of the internal standard might affect significantly the results, the use of fully deuterated analogues of the PAH compounds by GC-MS is recommended to significantly reduce errors, due to the volatility or discrimations relating to injection techniques. In this sense, cold-on column injection is recommended to improve resolution for the first-eluting, low MW compounds and reduces discrimation against the high MW compounds which is difficult to avoid when using splitless injection.

8.4. *z*-SCORES

Performance of the laboratories in terms of accuracy was assessed by *z*-scores, which have been calculated for each individual compound. The *z*-scores are presented in Annex II (Tables II.1.–II.4.) of this report. The performance is considered satisfactory if $|z| \leq 2$; $2 < |z| < 3$ indicate that the results are of questionable quality, while $|z| \geq 3$ indicate that the measurements are out of control. The general impression is that a very low number of laboratories have achieved satisfactory performance. Selected *z*-scores plots are given in Annex III (Figures III.1.–III.22.).

9. RECOMMENDATIONS

It is recommended for participants to review their data and score them by evaluating whether the mean value obtained for each compound has $|z|$ value lower than or equal to 2. This range is, of course, arbitrary and is only presented as a simple guideline for the user. The precision required for data depends upon its final application (e.g. long term trend data must be more precise than those used for hot spot pollution monitoring). Nevertheless, the use of this guideline will help to detect and correct the bias (i.e. from calibration error, contamination

and erroneous use of separation protocols), and to optimize data quality. The results indicate the need for the improvement of routine monitoring capabilities and for more interlaboratory comparisons for trace level of organic compounds in complex matrices. Most of the participating laboratories still have room to improve their QA/QC procedures. Due to the coelution of congeners with other compounds/impurities, a multi-column technique is required for complete separation of all the isomers of PCBs and PBDEs. The suggestions for better GC separation include: the optimization of the temperature programs; the use of a pressure programming and the use of a higher sample intake to enhance analyte dectectability. The use of proper internal standards is crucial with the the use of deuterated and ^{13}C labeled compounds being a major asset for GC-MS.

The low concentration levels of organic contaminants, in particular organochlorinated and PDBE compounds in this material, makes it suitable for comparison with biota samples from regions where the contaminant concentrations are expected to be low (0.1–5 ng g^{-1} dry mass). This material will extend the range of concentrations and matrices available for QC purposes. The laboratories' participation is encouraged for the next round of interlaboratory comparison in which a sediment sample from a medium polluted area will be examined.

Interlaboratory comparisons represent only one aspect of data QA and can only provide occasional indicators of data quality. Another valuable approach to QA is through the regular analysis of certified reference materials and monitoring the plotted resulting data on QC charts. This provides a continuous feedback to the analyst and is an essential tool for monitoring the quality of data and assuring accurate and comparable results in future exercises. Additional information on these procedures and on the IAEA/UNEP/IOC reference methods can be obtained from the following reference:

UNEP/IAEA/IOC, Guidelines for the use of reference methods in marine pollution studies, UNEP, Nairobi, 1990 (*Issued in draft*).

In addition, the participants are advised to consult the following recommended methods:

UNEP/IOC/IAEA/FAO, Sample work-up for the analysis of chlorinated hydrocarbons in the marine environment, Reference Methods for Marine Pollution Studies (RM) No 71, UNEP, Nairobi, Nov. 2011.

UNEP/IAEA/IOC/FAO, Determination of petroleum hydrocarbons in selected marine organisms, RM No 72, UNEP, Nairobi, 1996 (*Issued in draft*).

IOC/NOAA/IAEA/UNEP, Standards and reference materials for marine science, IOC Manuals and Guides 25, Revised edition, UNESCO, Paris, 1993.

These methods are available free of charge from IAEA-NAEL in Monaco.

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ANNEX I

DATA REPORT

TABLE I.1. – TABLE I.14.

TABLE I.1. RESULTS FOR CHLORINATED PESTICIDES IN THE IAEA-451 SAMPLE

Lab. Code No	EOM (mg/g)	HCB (ng/g)	α-HCH (ng/g)	β-HCH (ng/g)	Lindane (ng/g)	δ-HCH (ng/g)	*pp′* DDE (ng/g)	*pp′* DDD (ng/g)	*pp′* DDT (ng/g)	DDMU (ng/g)	*op* DDE (ng/g)	*op* DDD (ng/g)	*op* DDT (ng/g)	Heptachlor (ng/g)
1*	-	-	-	-	1.37	-	1.95	0.59	3.83	-	-	-	-	2.14
3*	65	0.15	-	0.19	0.067	-	0.73	0.47	0.083	0.25	0.25	0.24	0.25	0.060
4*	33.4	0.41	-	-	0.14	-	1.06	0.57	0.22	-	-	-	-	0.40
5	27.29	-	-	-	0.13	-	1.17	2.36	0.51	-	-	-	-	0.85
6	-	<1	-	-	<2	-	<2	<1	<2	-	-	-	-	<1
9	-	<5.0	-	-	<5.0	-	<5.0	<5.0	<5.0	-	-	-	-	<5.0
10*	51.7	0.35	-	-	0.27	-	0.28	0.36	1.15	-	-	-	-	0.145
12	-	-	-	-	-	-	38.82	14.68	-	-	25.69	19.69	-	-
13	-	1.2	-	-	-	-	-	-	3.4	-	-	-	-	-
14*	54.12	0.05	-	-	0.17	-	1.77	0.45	0.88	-	-	-	-	0.07
17*	25.7	<1	-	-	N.D.	-	1.9	1.1	<1	-	-	-	-	2.2
19	43.0	-	-	-	0.17	-	0.21	0.33	0.41	-	-	-	-	-
20*	56.5	-	28.7	29.0	8.6	<0.6	11.5	26.6	2.6	-	-	-	-	-
21*	24.4	1.3	1.07	-	-	3.70	16.89	-	5.99	-	-	-	-	-
25	100	-	-	-	2.231	-	-	-	15.342	-	-	-	-	-
26*	-	-	-	-	0.189	-	1.009	0.543	0.205	-	-	-	-	-
27*	49	0.23	0.47	-	4.59	-	0.23	0.10	0.11	-	-	-	-	2.62
28	39.3	<0.5	-	-	0.83	-	0.40	1.46	1.98	-	-	-	-	0.71
30	-	0.31	-	-	<0.17	-	0.48	<0.35	<0.80	-	-	-	-	<3.00
31	-	9.21	-	-	4.66	-	4.32	18.86	0.85	-	-	-	-	0.20
32*	45.7	-	-	-	-	-	-	-	-	-	-	-	-	-

* Laboratories using QA/QC procedures

TABLE I.1. RESULTS FOR CHLORINATED PESTICIDES IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	EOM (mg/g)	HCB (ng/g)	α-HCH (ng/g)	β-HCH (ng/g)	Lindane (ng/g)	δ-HCH (ng/g)	*pp'* DDE (ng/g)	*pp'* DDD (ng/g)	*pp'* DDT (ng/g)	DDMU (ng/g)	*op* DDE (ng/g)	*op* DDD (ng/g)	*op* DDT (ng/g)	Heptachlor (ng/g)
35	-	-	-	-	-	-	1.6	7.8	35.3	-	-	-	12.9	-
36	-	-	-	-	15.328	-	47.896	33.386	-	-	-	-	-	-
37	44	<0.25	-	-	<0.56	-	<0.30	<0.65	<0.42	-	-	-	-	-
38*	-	35.806	0.979	-	22.736	1.943	22.65	133.126	1.182	-	3.389	-	-	3.783
40	-	-	-	-	-	-	24800	4300	-	-	-	-	-	4000
41*	78.2	<1.27	<1.02	<5.25	<3.80	<2.21	<1.89	<2.60	<5.25	-	<5.07	<2.51	<4.03	<5.00
42	-	0.08	-	-	0.09	-	0.59	0.38	2.66	-	-	-	-	-
43	-	0.15	-	-	0.1	-	0.7	0.5	1.2	-	-	-	0.2	-
44	50	0.96	-	-	0.86	-	3.50	1.95	4.51	-	-	-	-	-
45*	17.5	-	-	-	0.6	-	0.3	0.07	0.4	-	-	-	-	-
46	-	<2	<2	<2	<2	<2	<2	<2	<2	-	<2	<2	<2	<2
47	-	13.1	1.8	0.3	1.7	-	14.9	4.5	26.9	-	-	-	-	3.0
48*	-	0.40	-	-	-	-	6.62	15.4	2.40	-	30.4	-	-	-
49*	-	0.11	<0.005	<0.005	0.20	<0.01	0.82	0.88	0.39	0.14	0.06	0.81	0.35	<0.005
50	-	-	0.25	-	0.55	-	3.07	1.46	0.43	-	-	-	-	3.61
51	34	<0.1	-	-	<0.1	-	1.0	<0.1	<0.1	-	-	-	-	<0.1
52*	60	-	-	-	-	-	0.36	0.13	<0.1	-	-	-	-	-
53*	56.9	0.4267	-	-	0.1807	-	0.6474	0.4240	3.0372	-	-	-	-	-

* Laboratories using QA/QC procedures

TABLE I.1. RESULTS FOR CHLORINATED PESTICIDES IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	EOM (mg/g)	HCB (ng/g)	α-HCH (ng/g)	β-HCH (ng/g)	Lindane (ng/g)	δ-HCH (ng/g)	*pp′* DDE (ng/g)	*pp′* DDD (ng/g)	*pp′* DDT (ng/g)	DDMU (ng/g)	*op* DDE (ng/g)	*op* DDD (ng/g)	*op* DDT (ng/g)	Heptachlor (ng/g)
54*	35.7	-	-	-	3.99	-	594.57	43.47	-	-	-	-	-	86.16
55	42.6	0.17	-	-	0.11	-	0.59	0.82	1.35	-	-	-	-	<0.01
56*	54.0	0.361	-	-	0.287	-	0.968	0.429	-	-	-	-	-	-
57	34.2	-	-	-	0.56	-	3.73	<18.30	0.61	-	-	-	-	1.67
58	26.7	-	2.640	-	0.342	-	-	-	-	-	-	-	-	1.202
59*	49.99	0.01	-	-	0.09	-	0.20	0.43	0.39	-	-	-	-	-
60	50	-	-	-	3.09	-	2.64	<D.L.	<D.L.	-	-	-	-	1.22
61	30.4	-	-	-	2.45	-	0.53	-	0.15	-	-	-	-	5.73
62*	32.45	-	-	-	-	-	-	-	-	-	-	-	-	-
63*	7.0	-	-	-	0.76	-	2.77	5.08	<1.5	-	-	-	-	5.50
65	42.5	0.05	0.09	-	0.25	-	0.66	0.65	0.95	-	-	-	-	-
66*	46.6	0.57	0.66	<0.5	0.81	-	2.19	0.98	1.42	-	-	-	-	2.7
68	32	-	-	-	-	-	-	-	-	-	-	-	-	-
69*	41.3	0.16	-	-	<0.3	-	1.12	<0.3	<0.3	-	-	-	-	-
71	-	<0.1	-	-	<0.1	-	4.15	1.62	6.24	-	-	-	-	<0.1
72*	30	0.469	-	-	0.148	-	2.704	6.63	5.23	-	-	-	-	0.100
73	53.183	N.D.	-	-	N.D.	-	N.D.	N.D.	N.D.	-	-	-	-	N.D.
74*	69	-	-	-	-	-	<0.069	<0.19	11.85	-	-	-	-	-
76*	48.78	<0.3	-	-	0.5	-	5.8	2.3	<0.2	-	-	-	-	<0.2
77*	-	0.05	-	-	0.07	-	0.55	0.59	0.07	-	0.19	0.09	0.34	0.03
78*	42.22	0.730	-	-	0.411	-	2.32	0.558	0.989	-	-	-	-	0.053

* Laboratories using QA/QC procedures

TABLE I.1. RESULTS FOR CHLORINATED PESTICIDES IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	EOM (mg/g)	HCB (ng/g)	α-HCH (ng/g)	β-HCH (ng/g)	Lindane (ng/g)	δ-HCH (ng/g)	*pp′* DDE (ng/g)	*pp′* DDD (ng/g)	*pp′* DDT (ng/g)	DDMU (ng/g)	*op* DDE (ng/g)	*op* DDD (ng/g)	*op* DDT (ng/g)	Heptachlor (ng/g)
79	-	-	-	-	N.D.	-	N.D.	N.D.	N.D.	-	-	-	-	N.D.
80	-	N.D.	-	-	N.D.	-	0.98	N.D.	0.6	-	-	-	-	N.D.
82	-	-	0.76	-	-	-	-	-	-	-	-	-	-	-
83*	-	-	-	-	1.67	-	1.77	1.70	15.93	-	-	-	-	7.02
85*	62.4	<0.77	0.808	-	<0.77	-	<0.77	<0.77	<0.77	-	-	-	-	-
86	36	-	-	47.4039	36.4721	-	53.2702	153.5971	61.3743	-	114.6175	130.4919	-	-
87*	61.99	-	0.40	0.87	3.88	-	0.65	0.19	0.22	-	-	-	-	-
88	-	-	-	-	-	-	-	-	-	-	4.2	-	-	-
89	-	-	-	-	-	-	0.52	0.65	0.23	-	-	-	-	-
90*	35.4	0.397	-	-	N.D.	-	1.04	0.598	1.51	-	-	-	-	N.D.
91*	35.82	-	-	-	N.D.	-	0.94	1.57	N.D.	-	-	-	-	2.00
92*	40.16	0.57	-	-	0.41	-	1.08	1.42	1.59	-	-	-	-	1.19
93	-	4.2	-	-	4.7	-	-	-	6.6	-	-	-	-	4.4
94*	-	0.28	-	-	0.20	-	4.39	-	-	-	-	-	-	0.37
No of results	45	30	12	5	44	2	56	47	45	2	8	5	5	29
Min. value	7	0.01	0.09	0.19	0.067	1.943	0.2	0.07	0.07	0.14	0.06	0.09	0.2	0.03
Max. value	100	35.806	28.7	47.4039	36.4721	3.7	24800	4300	61.3743	0.25	114.6175	130.4919	12.9	4000
Mean	44.4	2.41	3.22	15.6	2.89	2.82	459	102	5.18	0.20	22.3	30.3	2.81	143
Std. Dev.	16.4	6.92	8.06	21.7	6.68	1.24	3310	626	11.1	0.08	39.2	56.7	5.64	742
(%)	37	287	250	139	231	44	723	614	214	40	175	187	201	520

* Laboratories using QA/QC procedures

TABLE I.1. RESULTS FOR CHLORINATED PESTICIDES IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	Heptachlor Epoxide (ng/g)	Aldrin (ng/g)	Dieldrin (ng/g)	Endrin (ng/g)	α-Endosulf. (ng/g)	β-Endosulf. (ng/g)	Endosulf. Sulfate (ng/g)	α-Chlordane (ng/g)	γ-Chlordane (ng/g)	*cis*-Nonachlor (ng/g)	*trans*-Nonachlor (ng/g)	Mirex (ng/g)	Aroclor 1254 (ng/g)	Aroclor 1260 (ng/g)
1*	0.74	1.05	24.92	-	-	-	-	-	-	-	-	-	-	-
3*	-	-	2.8	-	-	-	-	0.55	0.35	0.067	0.10	-	13	51
4*	-	0.79	1.07	1.13	-	-	-	-	-	-	-	-	17.9	53.2
6	<1	<1	4.8	<3	-	-	-	<2	<1	-	-	-	-	-
9	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	-	-	-	-	-
10*	3.25	0.45	0.28	2.90	1.60	0.675	2.04	-	-	-	-	-	37.69	27.35
12	-	-	-	93.50	83.55	94.35	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	2.9	2.6	-	-	-	-	-	-
14*	-	0.06	0.80	4.63	-	-	-	-	-	-	-	-	30	163
17*	<1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	-	-	-	-	-	-	-
19	0.17	-	4.6	-	-	-	-	-	-	-	-	-	17.8	22.7
20*	-	<0.5	<0.7	<0.7	7.4	11.1	<2.0	-	-	-	-	-	-	-
21*	-	0.39	-	-	1.27	4.35	-	-	-	-	-	-	-	-
25	-	0.871	1.014	-	-	3.463	10.711	-	-	-	-	-	-	-
26*	-	-	-	-	-	-	-	0.523	0.316	-	-	-	-	-
27*	-	-	12.55	-	-	-	-	-	-	-	-	-	133.06	132.78
28	-	3.03	0.83	0.40	0.45	1.34	1.74	0.72	1.47	-	-	-	165.6	49.0
30	<0.50	<0.25	1.85	<0.60	-	-	-	0.31	<0.30	-	-	-	-	-
31	2.73	1.83	2.89	0.88	-	-	-	-	-	-	-	-	-	-
32*	-	-	-	-	-	-	-	-	-	-	-	-	8.20	52.99
36	-	-	-	-	142.502	-	-	-	-	-	-	-	-	-
37	-	<0.35	<0.74	<1.17	-	-	-	-	-	-	-	-	9.02	55.50
38*	0.618	11.989	1.564	-	-	-	-	-	-	-	-	-	-	-
40	13400	6590	1310	3720	49600	4390	20000	N.D.	N.D.	-	-	-	314000	-
41*	<5.49	<1.24	<2.23	<3.71	<3.81	<5.66	-	<2.79	<5.94	-	-	<5.83	-	-
43	-	-	-	-	-	-	-	0.1	0.3	-	0.12	-	-	-

* Laboratories using QA/QC procedures

TABLE I.1. RESULTS FOR CHLORINATED PESTICIDES IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	Heptachlor Epoxide (ng/g)	Aldrin (ng/g)	Dieldrin (ng/g)	Endrin (ng/g)	α-Endosulf. (ng/g)	β-Endosulf. (ng/g)	Endosulf. Sulfate (ng/g)	α-Chlordane (ng/g)	γ-Chlordane (ng/g)	*cis*-Nonachlor (ng/g)	*trans*-Nonachlor (ng/g)	Mirex (ng/g)	Aroclor 1254 (ng/g)	Aroclor 1260 (ng/g)
44	-	0.77	3.91	2.69	1.05	-	-	-	-	-	-	-	-	-
45*	-	-	-	-	-	-	-	-	-	-	-	-	20.8	16.8
46	<2	<2	< 2	<2	<2	< 2	-	<2	<2	<2	<2	<2	-	-
47	-	17.6	-	-	-	-	-	-	-	-	-	-	-	-
48*	-	-	7.75	-	-	-	-	-	-	-	-	-	-	-
49*	0.17	<0.01	1.76	<0.01	-	1.24	-	0.97	0.30	0.14	0.17	0.16	-	-
50	-	-	1.04	1.42	0.55	0.09	0.06	0.55	0.43	0.19	0.26	-	-	-
51	<0.1	<0.1	1.8	<0.1	<0.1	0.16	<0.1	0.4	0.3	-	-	-	16	96
53*	-	0.8711	4.6369	38.3417	-	-	-	-	-	-	-	-	-	-
54*	-	87.31	-	0.40	0.58	-	-	-	-	-	-	-	4790	2990
55	0.35	-	2.13	-	-	-	-	0.14	0.45	-	-	-	24.2	89.6
56*	-	0.217	1.336	-	-	-	-	1.000	0.539	-	-	-	-	-
57	3.91	<0.67	<12.10	<18.30	<18.30	<18.30	1.85	-	-	-	-	-	-	-
58	-	-	1.987	-	-	-	-	-	-	-	-	-	-	-
59*	-	0.15	0.21	6.14	0.75	2.03	-	-	0.09	-	-	-	9.60	43.0
60	2.57	1.69	1.75	8.09	2.36	<D.L.	1.38	-	-	-	-	-	-	-
61	1.76	1.52	1.42	4.12	0.36	-	0.11	-	0.55	-	-	-	-	-
63*	2.91	1.73	2.0	10.4	1.62	-	<2.0	1.8	2.86	-	-	-	-	-
65	-	-	-	-	-	-	-	-	-	-	0.21	-	-	-
66*	-	0.68	2.03	0.47	-	-	-	-	-	-	-	-	72.3	58.3
68	-	-	-	-	-	-	-	-	-	-	-	-	76.1	-

* Laboratories using QA/QC procedures

TABLE I.1. RESULTS FOR CHLORINATED PESTICIDES IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	Heptachlor Epoxide (ng/g)	Aldrin (ng/g)	Dieldrin (ng/g)	Endrin (ng/g)	α-Endosulf. (ng/g)	β-Endosulf. (ng/g)	Endosulf. Sulfate (ng/g)	α-Chlordane (ng/g)	γ-Chlordane (ng/g)	*cis*-Nonachlor (ng/g)	*trans*-Nonachlor (ng/g)	Mirex (ng/g)	Aroclor 1254 (ng/g)	Aroclor 1260 (ng/g)
69*	-	0.13	1.74	0.69	-	-	-	-	-	-	-	-	-	-
71	-	<0.1	-	26.45	<0.1	<0.1	-	-	-	-	-	-	-	-
72*	-	0.689	2.58	12.79	-	-	-	-	-	-	-	-	32.25	49.4
73	N.D.	N.D.	N.D.	N.D.	6	N.D.	N.D.	N.D.	-	-	-	-	-	-
74*	<0.015	-	2.551	-	<0.0097	<0.021	-	1.768	<0.043	-	-	-	-	-
76*	-	<0.2	<0.2	0.4	-	-	-	-	-	-	-	-	-	-
77*	0.12	-	-	-	-	-	-	0.30	0.23	-	0.10	-	-	-
78*	0.437	0.077	2.298	0.099	-	-	-	0.348	0.730	-	-	-	-	-
79	N.D.	N.D.	N.D.	-	N.D.	N.D.	N.D.	-	-	-	-	-	-	-
80	N.D.	N.D.	1.18	7.3	N.D.	N.D.	N.D.	N.D.	N.D.	-	-	-	N.D.	96.3
82	-	-	-	-	1.08	0.80	-	0.34	-	-	-	7.30	-	-
83*	-	-	-	-	-	-	-	0.88	-	-	-	8.76	-	-
85*	-	-	1.078	-	-	-	-	-	-	-	-	-	-	-
86	48.9102	31.9288	17.0627	88.9975	-	17.8886	56.8588	35.6994	-	-	-	-	-	-
87*	-	0.93	-	-	-	-	-	-	-	-	-	-	116.34	91.72
90*	0.473	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.316	0.622	-	-	-	-	-
91*	N.D.	0.23	N.D.	3.58	1.10	32.62	N.D.	-	-	-	-	-	N.D.	59.67
92*	-	0.27	-	-	-	-	-	-	-	-	-	-	-	-
93	-	7.8	2.8	18	-	-	-	-	-	-	-	-	-	-
94*	0.26	0.19	0.20	2.14	0.71	1.30	0.81	0.65	0.57	-	-	-	-	-
No of results	17	29	37	26	18	15	11	20	16	3	6	3	19	19
Min. value	0.12	0.06	0.21	0.099	0.36	0.09	0.06	0.1	0.09	0.067	0.1	0.16	8.2	16.8
Max. value	13400	6590	1310	3720	49600	4390	20000	35.6994	2.86	0.19	0.26	8.76	314000	2990
Mean	792	233	38.8	156	2770	304	1830	2.50	0.63	0.13	0.16	5.41	16800	221
Stand. Dev.	3250	1220	215	727	11700	1130	6030	7.84	0.67	0.06	0.07	4.60	72000	672
(%)	410	524	554	466	422	372	330	314	106	47	41	85	428	304

* Laboratories using QA/QC procedures

TABLE I.2. RESULTS FOR PCBS IN THE IAEA-451 SAMPLE.

Lab. Code No	PCB 8 (ng/g)	PCB 18 (ng/g)	PCB 19 (ng/g)	PCB 20 (ng/g)	PCB 22 (ng/g)	PCB 28 (ng/g)	PCB 31 (ng/g)	PCB 33 (ng/g)	PCB 37 (ng/g)	PCB 44 (ng/g)	PCB 47 (ng/g)	PCB 49 (ng/g)	PCB 52 (ng/g)	PCB 60 (ng/g)	PCB 66 (ng/g)
1*	-	-	-	0.37	-	0.92	0.47	-	-	0.39	-	-	1.14	0.22	-
3*	0.45	0.22	-	-	-	0.39	0.29	-	-	0.18	-	0.47	0.44	-	0.23
4*	-	-	-	-	-	0.87	-	-	-	-	-	-	1.36	-	-
5	-	-	-	-	-	8.16	-	-	-	-	-	-	8.22	-	-
9	-	-	-	-	-	<5.0	-	-	-	-	-	-	<5.0	-	-
10*	0.24	2.19	-	-	-	0.26	-	-	-	0.43	-	-	0.43	-	0.24
11	-	-	-	-	-	<D.L.	-	-	-	-	-	-	<D.L.	-	-
13	-	-	-	-	-	-	-	-	-	-	-	-	1.5	-	-
17*	-	-	-	-	-	<1	-	-	-	-	-	-	<1	-	-
18*	-	-	-	-	-	0.76	-	-	-	-	-	-	0.07	-	-
19	-	-	-	-	-	-	-	-	-	-	-	-	0.8	-	-
20*	-	119.7	-	-	-	-	-	-	-	-	-	-	88.3	-	-
21*	-	0.09	-	-	-	1.41	-	-	-	0.07	-	-	0.27	-	-
26*	-	-	-	-	-	-	-	-	-	-	-	-	0.159	-	-
27*	-	-	-	-	-	0.20	-	-	-	-	-	-	0.25	-	-
29	-	-	-	-	-	<5	-	-	-	-	-	-	<5	-	-
30	-	-	-	-	-	-	-	-	-	-	-	-	0.68	-	-
31	-	-	-	-	-	5.47	-	-	-	2.46	-	-	4.62	-	0.70
32*	-	-	-	-	-	-	-	-	-	-	-	-	0.56	-	-
34*	-	-	-	-	-	0.41	-	-	-	-	-	-	0.77	-	-
38*	4.537	-	-	-	-	6.243	-	-	-	16.240	-	-	0.842	-	0.261
41*	<3.26	<4.39	-	-	-	<4.82	<4.09	<2.54	-	<3.67	-	<2.90	<2.15	-	<3.06

* Laboratories using QA/QC procedures

TABLE I.2. RESULTS FOR PCBS IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	PCB 8 (ng/g)	PCB 18 (ng/g)	PCB 19 (ng/g)	PCB 20 (ng/g)	PCB 22 (ng/g)	PCB 28 (ng/g)	PCB 31 (ng/g)	PCB 33 (ng/g)	PCB 37 (ng/g)	PCB 44 (ng/g)	PCB 47 (ng/g)	PCB 49 (ng/g)	PCB 52 (ng/g)	PCB 60 (ng/g)	PCB 66 (ng/g)
42	-	-	-	-	-	-	-	-	-	-	-	-	1.88	-	-
43	-	-	-	-	0.4	1.5	-	0.9	0.1	0.3	-	1.1	0.8	-	-
45	-	-	-	-	-	0.2	-	-	-	-	-	-	0.3	-	-
46	<2	<2	-	-	-	<2	<2	-	-	<2	-	-	<2	-	<2
49*	10.9	<0.005	-	-	-	0.44	-	-	-	0.21	-	-	0.47	-	0.16
51	-	0.41	0.28	-	-	0.17	<0.3	-	-	-	-	-	-	-	0.40
52*	-	-	-	-	-	0.18	0.19	-	-	0.50	-	-	0.52	-	-
55	-	-	-	-	-	0.45	-	-	-	-	-	-	1.01	-	-
56*	-	-	-	-	-	0.442	0.064	-	-	-	-	-	-	-	-
58	-	-	-	-	-	1.624	-	-	-	-	-	-	3.320	-	-
60	-	-	-	-	-	<D.L.	-	-	-	-	-	-	<D.L.	-	-
62*	<D.L.	0.619	-	-	-	0.860	1.03	-	<D.L.	0.186	-	0.746	0.376	<D.L.	-
65	-	-	-	-	-	0.30	0.29	-	-	-	-	-	0.18	-	-
66*	3.6	2.32	-	-	-	<0.5	1.85	-	-	6.35	-	2.72	1.99	-	3.65
68	-	-	-	-	-	0.8	-	-	-	-	-	-	2.1	-	-
69*	-	-	-	-	-	0.44	-	-	-	-	-	-	0.46	-	-
71	-	-	-	-	-	2.19	-	-	-	-	-	-	<0.1	-	-
72*	-	-	-	-	-	0.645	-	-	-	-	-	-	1.765	-	-
75	-	-	-	-	-	-	-	-	-	-	-	-	0.40	-	-
77*	0.48	0.19	-	-	-	-	-	-	-	0.10	-	-	0.51	-	-
78*	-	-	-	-	-	1.980	-	-	-	-	-	-	1.719	-	-
82	-	-	-	-	-	0.31	0.32	-	-	-	-	-	-	-	0.62

* Laboratories using QA/QC procedures

TABLE I.2. RESULTS FOR PCBS IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	PCB 8 (ng/g)	PCB 18 (ng/g)	PCB 19 (ng/g)	PCB 20 (ng/g)	PCB 22 (ng/g)	PCB 28 (ng/g)	PCB 31 (ng/g)	PCB 33 (ng/g)	PCB 37 (ng/g)	PCB 44 (ng/g)	PCB 47 (ng/g)	PCB 49 (ng/g)	PCB 52 (ng/g)	PCB 60 (ng/g)	PCB 66 (ng/g)
83*	1.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-
85*	-	<0.77	-	-	-	<0.77	<0.77	-	-	<0.77	1.04	<0.77	0.85	-	0.77
87*	-	-	-	-	-	7.06	-	-	-	1.95	-	-	10.40	-	-
89	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
92*	-	-	-	-	-	1.87	-	-	-	-	-	-	0.85	-	-
94*	-	-	-	-	-	1.36	-	-	-	-	-	-	-	-	-
No of results	7	8	1	1	1	30	8	1	1	13	1	4	36	1	9
Min. value	0.24	0.09	0.28	0.37	0.4	0.17	0.064	0.9	0.1	0.07	1.04	0.47	0.07	0.22	0.16
Max. value	10.9	119.7	0.28	0.37	0.4	8.16	1.85	0.9	0.1	16.24	1.04	2.72	88.3	0.22	3.65
Average	3.06	15.7				1.60	0.56			2.26		1.26	3.90		0.78
Stand. Dev.	3.85	42.0				2.16	0.60			4.55		1.01	14.6		1.10
(%)	126	267				135	106			201		80	375		141

* Laboratories using QA/QC procedures

TABLE I.2. RESULTS FOR PCBS IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	PCB 70 (ng/g)	PCB 74 (ng/g)	PCB 77 (ng/g)	PCB 81 (ng/g)	PCB 84 (ng/g)	PCB 87 (ng/g)	PCB 95 (ng/g)	PCB 99 (ng/g)	PCB 101 (ng/g)	PCB 104 (ng/g)	PCB 105 (ng/g)	PCB 110 (ng/g)	PCB 112 (ng/g)	PCB 114 (ng/g)
1*	-	-	-	-	1.45	0.32	1.07	0.58	1.78	-	0.33	0.97	-	-
3*	-	-	-	-	-	0.24	0.52	-	1.8	-	0.54	0.78	-	-
4*	-	-	-	-	-	-	-	-	1.44	-	-	-	-	-
5	-	-	-	-	-	-	-	-	27.97	-	-	-	-	-
9	-	-	-	-	-	-	-	-	<5.0	-	-	-	-	-
10*	-	-	0.20	-	-	-	-	-	0.48	-	5.35	-	-	-
11	-	-	-	-	-	-	-	-	0.847	-	-	-	-	-
17*	-	-	-	-	-	-	-	-	1.2	-	-	-	-	-
18*	-	-	-	-	-	-	-	-	1.27	-	-	-	-	-
19	-	-	-	-	-	-	-	-	2.4	-	-	-	-	-
20*	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-
21*	-	-	30.15	-	-	-	-	-	6.65	-	-	-	-	-
22*	-	-	-	-	-	-	-	-	1.64	-	-	-	-	-
26*	-	-	-	-	-	-	-	-	0.934	-	0.100	-	-	-
27*	-	-	-	-	-	-	-	-	8.83	-	-	-	-	-
29	-	-	-	-	-	-	-	-	<5	-	-	-	-	-
30	-	-	-	-	-	-	-	1.62	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-	2.25	11.08	0.43	-	-	-
32*	-	-	-	-	-	-	-	-	1.88	-	-	1.30	-	-
34*	-	-	-	-	-	-	-	-	2.26	-	-	-	-	-
38*	-	-	3.627	-	-	-	-	-	3.839	5.796	-	-	-	-
41*	<2.34	<2.79	<1.67	<4.05	-	<2.53	<3.66	<3.34	<2.39	-	<3.54	<4.09	-	<4.10
42	-	-	8.69	-	-	-	-	-	3.48	-	4.06	-	-	-
43	0.6	-	-	-	-	0.1	0.6	1.3	1.6	-	0.2	0.8	-	-

TABLE I.2. RESULTS FOR PCBS IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	PCB 70 (ng/g)	PCB 74 (ng/g)	PCB 77 (ng/g)	PCB 81 (ng/g)	PCB 84 (ng/g)	PCB 87 (ng/g)	PCB 95 (ng/g)	PCB 99 (ng/g)	PCB 101 (ng/g)	PCB 104 (ng/g)	PCB 105 (ng/g)	PCB 110 (ng/g)	PCB 112 (ng/g)	PCB 114 (ng/g)
45	-	-	-	-	-	-	-	-	0.3	-	0.1	-	-	-
46	-	-	<2	<2	-	-	-	-	<2	-	<2	-	-	<2
49*	-	-	-	-	-	0.20	-	-	1.63	-	0.17	0.94	-	-
50	0.63	-	-	-	-	1.98	0.63	1.79	2.53	-	2.13	0.63	-	-
51	0.64	0.55	-	-	-	-	-	-	1.93	-	-	2.17	-	-
52*	-	-	-	-	-	-	-	-	2.34	-	-	-	-	-
55	-	-	-	-	-	-	-	-	1.98	-	0.26	-	-	-
56*	-	-	-	-	-	-	-	-	1.337	-	0.800	-	-	-
58	-	-	-	-	-	-	-	-	1.238	-	-	-	-	-
60	-	-	-	-	-	-	-	-	24.48	-	11.95	-	-	-
61	-	-	-	-	-	-	-	-	-	-	-	-	1.71	-
62*	<D.L.	-	0.477	0.591	-	1.17	-	-	1.73	-	0.903	-	-	0.351
65	-	-	-	-	-	-	-	-	1.17	-	0.31	-	-	-
66*	-	-	-	-	-	-	-	-	1.55	-	-	5.74	-	-
68	-	-	-	-	-	-	-	-	2.0	-	-	-	-	-
69*	-	-	-	-	-	-	-	-	1.92	-	0.59	-	-	-
71	-	-	-	-	-	-	-	-	11.32	-	-	-	-	-
72*	-	-	-	-	-	-	-	-	3.137	-	-	-	-	-
75	-	-	-	-	0.35	-	0.55	1.19	1.11	-	-	0.61	-	-
77*	-	-	-	-	-	0.21	-	-	1.40	-	-	0.60	-	-
78*	-	-	-	-	-	-	-	-	2.821	-	0.425	-	-	0.077
81	-	-	-	-	-	-	-	-	1.58	-	-	-	-	-

* Laboratories using QA/QC procedures

TABLE I.2. RESULTS FOR PCBS IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	PCB 70 (ng/g)	PCB 74 (ng/g)	PCB 77 (ng/g)	PCB 81 (ng/g)	PCB 84 (ng/g)	PCB 87 (ng/g)	PCB 95 (ng/g)	PCB 99 (ng/g)	PCB 101 (ng/g)	PCB 104 (ng/g)	PCB 105 (ng/g)	PCB 110 (ng/g)	PCB 112 (ng/g)	PCB 114 (ng/g)
82	-	-	0.87	-	-	-	0.58	0.84	1.09	-	-	-	-	-
83*	2.38	-	-	-	-	-	-	-	9.67	-	-	-	-	0.92
85*	-	-	-	-	-	-	-	-	2.20	-	<0.77	0.89	-	-
87*	4.77	-	-	-	-	1.87	-	-	2.35	-	-	4.17	-	-
89	-	-	-	-	-	-	0.83	1.11	1.47	-	-	0.69	-	-
90*	-	-	-	-	-	-	-	-	0.888	-	-	-	-	-
92*	-	-	-	-	-	-	-	-	1.67	-	-	-	-	-
94*	-	-	-	-	-	-	-	-	1.58	-	-	-	-	-
No of results	5	1	6	1	2	8	7	7	47	2	17	13	1	3
Min. value	0.6	0.55	0.2	0.591	0.35	0.1	0.52	0.58	0.3	5.796	0.1	0.6	1.71	0.077
Max. value	4.77	0.55	30.15	0.591	1.45	1.98	1.07	1.79	27.97	11.08	11.95	5.74	1.71	0.92
Average	1.80		7.34		0.90	0.76	0.68	1.20	3.42	8.44	1.69	1.56		0.45
Stand. Dev.	1.82		11.7		0.78	0.79	0.20	0.42	5.36	3.74	3.03	1.60		0.43
(%)	101		158		86	104	29	35	157	44	180	102		96

* Laboratories using QA/QC procedures

TABLE I.2. RESULTS FOR PCBS IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	PCB 118 (ng/g)	PCB 123 (ng/g)	PCB 126 (ng/g)	PCB 128 (ng/g)	PCB 132 (ng/g)	PCB 136 (ng/g)	PCB 138 (ng/g)	PCB 141 (ng/g)	PCB 143 (ng/g)	PCB 146 (ng/g)	PCB 149 (ng/g)	PCB 151 (ng/g)	PCB 153 (ng/g)
1*	0.56	-	3.37	0.75	-	0.88	3.75	0.68	-	-	1.01	0.69	7.01
3*	0.86	-	-	0.31	-	-	6.3	-	-	-	4.0	-	11
4*	2.31	-	-	-	-	-	4.59	-	-	-	-	-	7.62
5	-	-	-	-	-	-	64.18	-	-	-	-	-	87.50
9	-	-	-	-	-	-	<5.0	-	-	-	-	-	<5.0
10*	0.515	-	1.24	0.49	-	-	1.175	-	-	-	-	-	1.55
11	0.303	-	-	-	-	-	2.640	-	-	-	-	-	4.166
13	-	-	-	-	-	-	1.4	-	-	-	-	-	1.9
17*	<1	-	-	-	-	-	12.6	-	-	-	-	-	10.9
18*	0.98	-	-	-	-	-	6.87	-	-	-	-	-	6.86
19	2.4	-	-	-	-	-	5.0	-	-	-	-	-	7.8
20*	-	-	-	-	-	-	36.1	-	-	-	-	-	12.7
21*	-	-	0.65	-	-	-	12.90	-	-	-	-	-	20.43
22*	0.98	-	-	-	-	-	4.45	-	-	-	3.97	-	11.81
25	0.868	-	-	-	-	-	2.380	-	-	-	-	-	2.683
26*	0.332	-	-	-	-	-	4.190	-	-	-	2.510	-	8.708
27*	-	-	-	-	-	-	13.64	-	-	-	-	-	25.04
29	<5	-	-	-	-	-	<5	-	-	-	-	-	7.0
30	1.34	-	-	-	-	-	8.32	-	-	-	4.43	1.72	16.96
31	18.25	-	-	-	-	-	4.44	-	-	-	-	-	6.57
32*	0.72	-	-	-	-	-	4.69	-	-	-	-	-	9.60

* Laboratories using QA/QC procedures

TABLE I.2. RESULTS FOR PCBS IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	PCB 118 (ng/g)	PCB 123 (ng/g)	PCB 126 (ng/g)	PCB 128 (ng/g)	PCB 132 (ng/g)	PCB 136 (ng/g)	PCB 138 (ng/g)	PCB 141 (ng/g)	PCB 143 (ng/g)	PCB 146 (ng/g)	PCB 149 (ng/g)	PCB 151 (ng/g)	PCB 153 (ng/g)
34*	1.09	-	-	-	-	-	6.15	-	-	-	-	-	11.39
38*	-	-	-	1.458	-	-	4.093	-	-	-	-	-	6.841
41*	<2.79	<3.28	<3.54	<2.96	<6.68	-	6.26	<8.51	-	-	<4.47	<4.93	9.57
42	-	-	5.05	-	-	-	3.21	-	-	-	-	-	1.44
43	0.5	-	-	0.6	-	-	5.8	-	-	-	3.1	1.6	8.9
45	0.2	-	-	-	-	-	1.3	-	-	-	-	-	1.7
46	<2	<2	<2	<2	-	-	8	-	-	-	4	-	12
49*	1.00	-	-	0.54	-	-	7.76	-	-	-	-	-	14.1
50	1.63	-	-	1.14	8.86	-	5.21	-	-	-	5.53	2.09	8.86
51	0.70	-	-	-	-	-	-	-	-	-	-	-	14.10
52*	1.04	-	-	-	-	-	6.2	-	-	-	3.3	-	8.6
55	0.79	-	-	-	-	-	5.62	-	-	-	-	-	13.68
56*	0.881	-	-	0.476	-	-	3.883	-	-	-	2.373	-	11.551
57	-	-	-	-	-	-	12.93	-	-	-	-	-	17.88
58	1.539	-	-	-	-	-	1.460	-	-	-	-	-	2.604
60	1.11	-	-	-	-	-	10.76	-	-	-	-	-	20.58
61	-	-	-	-	-	-	18.61	-	-	-	-	-	3.15
62*	1.19	<D.L.	<D.L.	0.484	-	-	4.78	-	-	-	3.65	-	10.7
65	0.93	-	-	-	-	-	3.24	-	-	-	-	-	7.96
66*	4.33	-	-	-	-	-	4.79	-	-	-	3.31	-	7.09
68	3.2	-	-	-	-	-	6.0	-	-	-	-	-	7.7

* Laboratories using QA/QC procedures

TABLE I.2. RESULTS FOR PCBS IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	PCB 118 (ng/g)	PCB 123 (ng/g)	PCB 126 (ng/g)	PCB 128 (ng/g)	PCB 132 (ng/g)	PCB 136 (ng/g)	PCB 138 (ng/g)	PCB 141 (ng/g)	PCB 143 (ng/g)	PCB 146 (ng/g)	PCB 149 (ng/g)	PCB 151 (ng/g)	PCB 153 (ng/g)
69*	1.07	-	-	-	-	-	7.50	-	-	-	-	-	13.55
71	1.17	-	-	-	-	-	<0.1	-	-	-	-	-	3.38
72*	1.37	-	-	-	-	-	13.89	-	-	-	-	-	8.44
75	0.71	-	-	-	-	-	3.33	-	-	-	2.37	-	9.36
77*	0.96	-	-	0.45	-	-	5.11	-	-	-	-	-	9.80
78*	1.480	0.028	-	-	-	-	6.131	-	-	-	-	-	17.783
81	2.95	-	-	-	-	-	6.14	-	-	-	1.69	-	5.00
82	-	1.96	-	-	-	-	4.17	-	-	-	-	-	6.23
83*	-	-	-	-	-	-	2.73	-	-	-	-	-	4.68
85*	1.10	-	-	<0.77	-	-	6.47	<0.77	-	-	4.74	1.57	12.7
87*	1.22	-	-	1.84	-	-	8.14	-	8.19	-	<0.16	-	-
89	0.66	-	-	-	-	-	5.50	-	-	-	1.85	-	10.6
90*	0.447	-	-	-	-	-	1.72	-	-	1.08	1.76	0.604	5.03
92*	-	-	-	-	-	-	3.89	-	-	-	-	-	7.23
94*	3.60	-	-	-	-	-	3.17	-	-	-	-	-	9.49
No of results	40	2	4	11	1	1	53	1	1	1	17	6	55
Min. value	0.2	0.028	0.65	0.31	8.86	0.88	1.175	0.68	8.19	1.08	1.01	0.604	1.44
Max. value	18.25	1.96	5.05	1.84	8.86	0.88	64.18	0.68	8.19	1.08	5.53	2.09	87.5
Average	1.68	0.99	2.58	0.78			7.61				3.15	1.38	10.8
Stand. Dev.	2.84	1.37	2.02	0.49			9.63				1.23	0.60	11.7
(%)	169	137	78	63			127				39	43	109

* Laboratories using QA/QC procedures

TABLE I.2. RESULTS FOR PCBS IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	PCB 156 (ng/g)	PCB 157 (ng/g)	PCB 158 (ng/g)	PCB 160 (ng/g)	PCB 167 (ng/g)	PCB 169 (ng/g)	PCB 170 (ng/g)	PCB 171 (ng/g)	PCB 174 (ng/g)	PCB 177 (ng/g)	PCB 178 (ng/g)	PCB 180 (ng/g)	PCB 183 (ng/g)
1*	0.31	0.44	-	-	0.21	0.23	1.80	-	1.33	1.26	-	4.10	1.49
3*	0.32	-	-	-	-	-	3.1	-	1.3	0.94	-	7.2	1.9
4*	-	-	-	-	-	-	-	-	-	-	-	6.11	-
5	-	-	-	-	-	-	-	-	-	-	-	39.14	9.32
9	-	-	-	-	-	-	-	-	-	-	-	<5.0	-
10*	-	-	-	-	-	-	3.60	-	-	-	-	0.125	-
11	-	-	-	-	-	-	-	-	-	-	-	2.698	-
13	-	-	-	-	-	-	-	-	-	-	-	1.3	-
17*	-	-	-	-	-	-	-	-	-	-	-	8.9	-
18*	-	-	-	-	-	-	-	-	-	-	-	7.01	-
19	0.7	-	-	-	-	-	-	-	-	-	-	6.5	-
20*	-	-	-	-	-	-	-	-	-	-	-	7.9	-
21*	-	-	-	-	-	0.56	-	-	-	-	-	14.34	-
22*	-	-	-	-	-	-	4.92	-	-	-	-	8.20	-
25	-	-	-	-	-	-	-	-	-	-	-	5.120	-
26*	-	-	-	-	-	-	2.477	-	-	-	-	5.198	-
27*	-	-	-	-	-	-	-	-	-	-	-	8.1	-
29	-	-	-	-	-	-	-	-	-	-	-	< 5	-
30	-	-	-	-	-	-	3.92	-	-	-	-	9.00	2.90
31	-	-	-	-	-	-	-	-	-	-	-	4.61	-
32*	-	-	-	-	-	-	-	-	-	-	-	6.50	-

* Laboratories using QA/QC procedures

TABLE I.2. RESULTS FOR PCBS IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	PCB 156 (ng/g)	PCB 157 (ng/g)	PCB 158 (ng/g)	PCB 160 (ng/g)	PCB 167 (ng/g)	PCB 169 (ng/g)	PCB 170 (ng/g)	PCB 171 (ng/g)	PCB 174 (ng/g)	PCB 177 (ng/g)	PCB 178 (ng/g)	PCB 180 (ng/g)	PCB 183 (ng/g)
34*	-	-	-	-	-	-	-	-	-	-	-	8.10	-
38*	-	-	-	-	-	-	-	-	-	-	-	3.707	-
41*	<3.53	<2.23	<6.00	-	<4.60	<7.32	3.55	-	<2.30	<3.22	-	6.88	<7.72
42	-	-	-	-	-	-	3.55	-	-	-	-	3.14	-
43	1	0.5	0.4	-	0.5	-	2.9	-	-	1.1	0.3	6.8	1.2
45	0.2	-	-	-	-	-	0.3	-	-	-	-	0.9	-
46	<2	<2	-	-	<2	<2	4	-	-	-	-	8	-
49*	-	-	-	-	-	-	5.01	-	-	-	-	9.08	-
50	0.73	-	-	-	-	-	2.66	0.81	-	0.88	-	5.66	1.26
51	-	-	-	-	-	-	3.59	-	-	-	-	7.56	-
52*	-	-	-	-	-	-	2.2	-	-	-	-	1.5	-
55	0.33	0.19	-	-	0.27	-	-	-	-	-	-	7.60	-
56*	0.875	-	-	-	-	-	2.751	-	-	-	-	6.014	-
57	-	-	-	-	-	-	-	-	-	-	-	30.71	-
58	-	-	-	-	-	-	-	-	-	-	-	1.650	-
60	<D.L.	-	-	-	-	-	-	-	-	-	-	11.05	-
61	-	-	-	-	-	-	-	-	-	-	-	2.71	-
62*	0.845	<D.L.	-	-	0.360	<D.L.	3.49	-	-	-	-	6.29	-
65	0.37	-	-	-	-	-	-	-	-	-	-	4.52	-
66*	-	-	-	-	-	-	1.32	-	1.11	0.84	-	4.50	1.85

* Laboratories using QA/QC procedures

TABLE I.2. RESULTS FOR PCBS IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	PCB 156 (ng/g)	PCB 157 (ng/g)	PCB 158 (ng/g)	PCB 160 (ng/g)	PCB 167 (ng/g)	PCB 169 (ng/g)	PCB 170 (ng/g)	PCB 171 (ng/g)	PCB 174 (ng/g)	PCB 177 (ng/g)	PCB 178 (ng/g)	PCB 180 (ng/g)	PCB 183 (ng/g)
68	-	-	-	-	-	-	-	-	-	-	-	7.1	-
69*	0.32	-	-	-	-	-	-	-	-	-	-	8.70	-
71	-	-	-	-	-	-	-	-	-	-	-	5.25	-
72*	-	-	-	-	-	-	-	-	-	-	-	6.88	-
75	-	-	-	2.13	-	-	-	-	-	-	-	-	-
77*	-	-	-	-	-	-	2.78	-	-	-	-	5.71	-
78*	0.467	0.095	-	-	0.348	-	-	-	-	-	-	8.935	-
81	-	-	-	-	-	-	-	-	-	-	-	13.84	-
82	0.66	0.59	-	-	-	-	-	-	1.37	-	-	3.64	1.28
83*	-	-	-	-	-	-	2.36	-	-	-	-	2.75	2.43
85*	<0.77	-	<0.77	-	-	-	3.51	-	-	-	-	8.39	1.98
87*	0.85	-	-	-	-	-	2.85	-	-	-	-	6.73	<0.16
89	-	-	-	-	-	-	2.85	-	-	0.98	-	7.13	1.64
90*	-	-	-	-	-	-	1.69	-	-	0.683	-	-	0.874
94*	-	-	-	-	-	-	-	-	-	-	-	6.92	-
No of results	14	5	1	1	5	2	24	1	4	7	1	52	12
Min. value	0.2	0.095	0.4	2.13	0.21	0.23	0.3	0.81	1.11	0.683	0.3	0.125	0.874
Max. value	1	0.59	0.4	2.13	0.5	0.56	5.01	0.81	1.37	1.26	0.3	39.14	9.32
Average	0.57	0.36			0.34	0.40	2.97		1.28	0.95		7.32	2.34
Stand. Dev.	0.27	0.21			0.11	0.23	1.07		0.12	0.19		6.33	2.27
(%)	47	58			32	59	36		9	19		87	97

* Laboratories using QA/QC procedures

TABLE I.2. RESULTS FOR PCBS IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	PCB 187 (ng/g)	PCB 188 (ng/g)	PCB 189 (ng/g)	PCB 194 (ng/g)	PCB 195 (ng/g)	PCB 196 (ng/g)	PCB 199 (ng/g)	PCB 200 (ng/g)	PCB 201 (ng/g)	PCB 203 (ng/g)	PCB 205 (ng/g)	PCB 206 (ng/g)	PCB 209 (ng/g)
1*	1.23	-	0.27	1.08	0.46	0.98	-	-	0.80	-	-	-	-
3*	4.7	-	-	1.4	0.43	-	-	-	0.19	-	-	0.24	0.12
10*	-	-	-	-	0.27	-	-	-	-	-	-	0.21	0.36
17*	-	-	-	1.5	-	-	-	-	-	-	-	-	-
20*	-	-	-	<0.4	-	-	-	-	-	-	-	-	-
21*	-	-	-	4.30	-	-	-	-	-	-	-	-	-
22*	-	-	-	1.97	-	-	-	-	-	-	-	-	-
26*	3.664	-	-	1.433	-	-	-	-	-	-	-	-	-
30	4.40	-	-	2.40	-	-	-	-	-	-	-	-	-
38*	0.345	8.740	-	-	4.449	-	-	-	-	-	-	0.499	-
41*	<5.28	-	<3.03	<2.71	<1.72	-	<5.41	-	-	<3.58	-	<3.08	<4.95
42	2.10	-	-	-	0.28	-	-	-	-	-	-	0.15	-
43	3.8	1.5	0.2	1.6	-	-	0.8	-	-	-	-	0.5	-
45	-	-	0.4	-	-	-	-	-	-	-	-	-	-
46	5	-	<2	-	-	-	-	-	-	-	-	-	-
49*	5.06	-	-	-	0.58	-	-	0.15	-	-	-	0.25	<0.003
50	4.19	-	-	1.22	0.43	-	-	-	-	-	0.078	0.22	0.09
55	-	-	0.15	-	-	-	-	-	-	-	-	-	-
56*	0.605	-	-	-	-	-	-	-	-	-	-	-	-
62*	4.09	-	<D.L.	1.37	<D.L.	-	-	-	-	-	-	0.560	-

* Laboratories using QA/QC procedures

TABLE I.2. RESULTS FOR PCBS IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	PCB 187 (ng/g)	PCB 188 (ng/g)	PCB 189 (ng/g)	PCB 194 (ng/g)	PCB 195 (ng/g)	PCB 196 (ng/g)	PCB 199 (ng/g)	PCB 200 (ng/g)	PCB 201 (ng/g)	PCB 203 (ng/g)	PCB 205 (ng/g)	PCB 206 (ng/g)	PCB 209 (ng/g)
75	3.43	-	-	-	-	-	-	-	-	-	-	-	-
77*	3.92	-	-	1.59	-	-	-	-	-	-	-	-	-
78*	-	-	0.159	-	-	-	-	-	-	-	-	-	-
81	-	-	-	5.44	-	-	-	-	-	-	-	-	-
82	3.07	-	-	1.06	0.31	-	0.69	-	-	0.77	-	-	0.18
83*	1.79	-	-	0.58	-	-	-	-	-	-	-	-	-
85*	5.56	-	-	2.24	-	-	-	-	-	-	-	-	-
87*	4.23	-	-	1.08	0.48	-	-	-	-	-	-	0.28	<0.16
89	4.07	-	-	1.74	-	-	0.79	-	-	-	-	-	-
90*	2.14	-	-	0.636	-	-	-	-	-	-	-	-	-
No of results	20	2	5	19	9	1	3	1	2	1	1	9	4
Min. value	0.345	1.5	0.15	0.58	0.27	0.98	0.69	0.15	0.19	0.77	0.078	0.15	0.09
Max. value	5.56	8.74	0.4	5.44	4.449	0.98	0.8	0.15	0.8	0.77	0.078	0.56	0.36
Average	3.37	5.12	0.24	1.79	0.85		0.76		0.50			0.32	0.19
Stand. Dev.	1.51	5.12	0.10	1.19	1.35		0.06		0.43			0.15	0.12
(%)	45	100	44	67	158		8		87			47	64

* Laboratories using QA/QC procedures

TABLE I.3. RESULTS FOR POLYBROMINATED DIPHENYL ETHERS IN THE IAEA-451 SAMPLE

Lab. Code No	PBDE 17 (ng/g)	PBDE 28 (ng/g)	PBDE 47 (ng/g)	PBDE 49 (ng/g)	PBDE 66 (ng/g)	PBDE 71 (ng/g)	PBDE 85 (ng/g)	PBDE 99 (ng/g)	PBDE 100 (ng/g)	PBDE 119 (ng/g)	PBDE 138 (ng/g)	PBDE 153 (ng/g)	PBDE 154 (ng/g)
3*	-	-	0.41	0.035	-	-	-	0.54	0.12	-	-	-	-
17	-	<1	3.9	-	-	-	-	1.4	<1	-	-	<1	<1
18*	-	0.06	4.51	-	-	-	-	0.63	0.24	-	-	0.06	0.15
41*	-	<0.84	<1.12	-	-	-	-	<0.66	<1.18	-	-	<0.81	<0.86
43	0.025	0.016	1	0.059	0.030	0.011	0.089	1.2	0.270	<0.020	0.020	0.130	0.110
51	-	<1	<1	-	<1	-	<1	1.8	< 1	-	-	<1	<1
52*	-	<0.1	0.79	-	<0.1	-	<0.1	0.51	0.20	-	-	<0.1	<0.1
55	-	0.016	0.459	-	0.040	-	<0.020	0.564	0.115	-	-	0.086	0.055
56*	-	0.109	0.463	-	0.069	-	0.026	0.473	0.236	-	-	0.068	0.175
75	-	-	1.08	-	-	-	-	1.00	0.21	-	-	-	0.17
78*	0.055	0.055	1.572	0.093	0.045	-	0.081	2.198	0.534	0.021	-	0.155	0.203
85*	0.39	0.15	0.56	-	<0.15	-	0.29	0.52	0.35	-	<0.15	<0.15	<0.15
89	-	<0.02	0.30	-	-	-	-	0.33	0.05	-	-	<0.02	<0.02
90	-	0.512	4.20	-	0.551	-	0.564	2.13	N.D.	-	-	1.76	N.D.
No of results	3	7	12	3	5	1	5	13	10	1	1	6	6
Min. value	0.025	0.016	0.3	0.035	0.03	0.011	0.026	0.33	0.05	0.021	0.02	0.06	0.055
Max. value	0.39	0.512	4.51	0.093	0.551	0.011	0.564	2.198	0.534	0.021	0.02	1.76	0.203
Mean	0.16	0.13	1.60	0.062	0.15		0.21	1.02	0.23			0.38	0.14
Stand. Dev.	0.20	0.17	1.61	0.029	0.23		0.22	0.66	0.14			0.68	0.053
(%)	129	133	101	47	154		106	65	59			180	37

* Laboratories using QA/QC procedures

TABLE I.3. RESULTS FOR POLYBROMINATED DIPHENYL ETHERS IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	PBDE 183 (ng/g)	PBDE 184 (ng/g)	PBDE 196 (ng/g)	PBDE 197 (ng/g)	PBDE 203 (ng/g)	PBDE 206 (ng/g)	PBDE 207 (ng/g)	PBDE 209 (ng/g)
3*	-	-	-	-	-	-	-	-
17	<1	-	-	-	-	-	-	-
18*	0.15	-	-	-	-	-	-	-
41*	<0.64	-	-	-	-	-	-	-
43	0.034	0.0083	0.056	0.046	-	0.240	0.250	<3
51	<1	-	-	-	-	-	-	-
52*	<0.1	-	-	-	-	-	-	0.95
55	0.032	-	-	-	-	0.087	0.045	1.035
56*	0.111	-	-	-	-	-	-	0.568
75	-	-	-	-	-	-	-	-
78*	0.058	0.011	-	0.056	0.762	0.225	0.209	1.777
85*	<0.15	-	-	-	-	-	-	-
89	<0.02	-	0.04	0.05	-	0.10	0.13	0.81
90	6.72	-	-	-	-	-	-	13.5
No of results	6	2	2	3	1	4	4	6
Min. value	0.032	0.0083	0.04	0.046	0.762	0.087	0.045	0.568
Max. value	6.72	0.011	0.056	0.056	0.762	0.24	0.25	13.5
Mean	1.18	0.010	0.048	0.051		0.16	0.16	3.11
Stand. Dev.	2.71	0.002	0.011	0.005		0.081	0.091	5.11
(%)	229	20	24	10		49	57	164

* Laboratories using QA/QC procedures

TABLE I.4. RESULTS FOR PETROLEUM HYDROCARBONS IN THE IAEA-451 SAMPLE

Lab. Code No	EOM (mg/g)	PH Chrysene (µg/g)	PH ROPME (µg/g)	Total Aliphatics (µg/g)	Resolved Aliphatics (µg/g)	Unresolved Aliphatics (µg/g)	*n*-C_{17} (ng/g)	Pristane (ng/g)	*n*-C_{18} (ng/g)	Phytane (ng/g)	Σ *n*-alkanes C14-C34 (µg/g)
3*	43	15	175	243	20	223	385	68	282	77	3.7
7*	49.3	-	-	192.6	178.5	430.7	3644	386	1213	882	14.2
11	-	-	-	-	-	-	123.332	19.257	58.140	23.239	-
14*	52.4	-	-	-	-	-	109.5	76.0	135.3	35.06	-
17*	25.7	-	-	0.3229	-	-	193	10.1	99.2	20.6	0.3229
19	43.0	-	-	-	-	-	-	-	-	-	-
20*	56.5	-	-	240.7	55.7	185.0	927.8	-	373.6	-	6.4
21*	24.4	-	-	-	-	-	-	-	-	-	-
24*	5.203	30.147	-	-	-	-	355.0307	-	-	-	-
25	100	-	-	0.230	0.230	-	-	-	-	-	0.230
32*	45.7	-	-	-	-	-	-	-	-	-	-
33*	-	-	-	-	4.694	-	338.41	41.11	114.31	40.88	2.438
41*	78.2	-	-	252	19.0	266	415	98	166	35	2.75
54*	35.7	-	-	-	-	-	-	-	-	-	1.828
55	42.6	-	-	126.60	30.90	95.70	180	120	560	280	8.65
59*	8.21	-	-	3.07	-	-	410	20	280	80	1.61
61	30.4	-	-	-	-	-	-	-	-	-	-
63*	7.0	-	-	-	-	-	-	-	-	-	-
64	20.6	9.29	61.30	254.14	3.57	250.58	346	7	229	42	2.947

* Laboratories using QA/QC procedures

TABLE I.4. RESULTS FOR PETROLEUM HYDROCARBONS IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	EOM (mg/g)	PH Chrysene (µg/g)	PH ROPME (µg/g)	Total Aliphatics (µg/g)	Resolved Aliphatics (µg/g)	Unresolved Aliphatics (µg/g)	*n*-C_{17} (ng/g)	Pristane (ng/g)	*n*-C_{18} (ng/g)	Phytane (ng/g)	Σ *n*-alkanes C_{14}-C_{34} (µg/g)
67	-	0.79	-	-	-	-	-	-	-	-	-
70*	28	-	-	-	-	-	49	-	38.4	-	-
86	36	-	-	-	-	-	-	-	-	-	-
90*	35.4	-	-	-	-	-	701	273	979	114	16.2
91*	35.82	-	-	-	-	-	-	-	-	-	-
No of results	21	4	2	9	8	6	14	11	13	11	12
Min. value	5.203	0.79	61.3	0.23	0.23	95.7	49	7	38.4	20.6	0.23
Max. value	100	30.147	175	254.14	178.5	430.7	3644	386	1213	882	16.2
Mean	38.2	13.8	118	146	39.1	242	584	102	348	148	5.11
Stand. Dev.	22.4	12.4	80.4	116	59.2	111	912	121	364	254	5.30
(%)	58	90	68	79	151	46	156	119	105	172	104

* Laboratories using QA/QC procedures

TABLE I.4. RESULTS FOR PETROLEUM HYDROCARBONS IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	Total Aromatics (µg/g)	Resolved Aromatics (µg/g)	Unresolved Aromatics (µg/g)	Biphenyl (ng/g)	Naphthalene (ng/g)	1 methyl Naphthalene (ng/g)	2 methyl Naphthalene (ng/g)	2,6 Dimethyl Naphthalene (ng/g)	Phenanthrene (ng/g)	1 methyl Phenanthr. (ng/g)	2 methyl Phenanthr. (ng/g)
2	-	-	-	-	<0.03	-	-	-	0.01	-	-
3*	26.1	3.9	22.1	1.8	8.2	2.3	5.5	2.5	17	5.6	8.7
7*	403.2	401.2	352.4	-	518	-	-	-	71	40	87
8	N.D	N.D	-	-	N.D	-	-	-	N.D	N.D	N.D
11	-	-	-	-	<LOD	-	-	-	4.999	2.137	2.963
12	-	-	-	-	14.78	-	-	-	72.21	-	-
14*	-	-	-	-	10.33	-	-	-	N.D	-	-
15	-	-	-	-	-	-	-	-	16	-	-
16	-	0.89	-	-	34.50	-	-	-	35.03	-	-
17*	0.2845	0.2845	-	-	55.4	-	-	-	17.7	<1	< 1.0
19	-	-	-	-	-	-	-	-	16.5	-	-
20*	-	-	-	-	8.4	-	-	-	28.0	-	-
21*	-	-	-	-	37.44	-	-	-	10.17	-	-
23*	-	-	-	-	-	-	-	-	14.9	-	-
24*	-	-	-	-	0.51	4.596667	-	-	-	-	-
25	5.636	5.636	-	-	-	-	-	-	203	-	-
29	-	-	-	-	14	<10	<10	-	24	-	-
32*	-	-	-	-	8.90	-	-	-	4.00	-	-
33*	-	98.368	-	-	4.65	-	-	-	9.28	102.29	23.27
34*	-	-	-	-	10.3	-	-	-	15.85	-	-
39	-	-	-	-	17.38	-	-	-	-	-	-

* Laboratories using QA/QC procedures

TABLE I.4. RESULTS FOR PETROLEUM HYDROCARBONS IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	Total Aromatics (µg/g)	Resolved Aromatics (µg/g)	Unresolved Aromatics (µg/g)	Biphenyl (ng/g)	Naphthalene (ng/g)	1 methyl Naphthalene (ng/g)	2 methyl Naphthalene (ng/g)	2,6 Dimethyl Naphthalene (ng/g)	Phenanthrene (ng/g)	1 methyl Phenanthr. (ng/g)	2 methyl Phenanthr. (ng/g)
41*	0.261	0.247	<0.00536	5.05	36.4	5.37	5.13	-	14.7	<5.85	-
46	-	-	-	-	-	-	-	-	28.0	-	-
47	-	-	-	-	14.1	-	<1.0	-	12.2	-	-
48*	-	-	-	-	19.9	-	-	-	89.6	-	-
49*	-	-	-	1.37	33.92	10.15	13.10	2.64	11.35	3.58	-
50	-	-	-	-	-	-	-	-	26.48	-	-
54*	-	-	-	-	-	-	-	-	1.387	-	-
55	-	0.119	-	-	7.37	-	-	-	1.68	0.55	0.82
59*	6.67	-	-	-	30	-	-	-	-	620	4600
61	-	-	-	-	257.25	-	-	-	7.64	-	-
62*	-	-	-	-	42.6	-	-	-	25.0	-	-
63*	-	-	-	18.0	45.0	-	-	-	21.5	4.7	-
64	7.11	0.117	6.99	-	8	-	-	-	12	6	-
65	-	-	-	-	-	-	-	-	9.21	-	-
66*	-	-	-	-	8.09	-	-	-	52.2	-	-
70*	-	-	-	-	16.4	-	-	-	4.1	-	-
72	-	1.687	-	-	15.426	-	-	-	0.046	-	-
75	-	-	-	-	12.20	-	-	-	13.70	3.91	-

* Laboratories using QA/QC procedures

TABLE I.4. RESULTS FOR PETROLEUM HYDROCARBONS IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	Total Aromatics (µg/g)	Resolved Aromatics (µg/g)	Unresolved Aromatics (µg/g)	Biphenyl (ng/g)	Naphthalene (ng/g)	1 methyl Naphthalene (ng/g)	2 methyl Naphthalene (ng/g)	2,6 Dimethyl Naphthalene (ng/g)	Phenanthrene (ng/g)	1 methyl Phenanthr. (ng/g)	2 methyl Phenanthr. (ng/g)
80	-	-	-	-	11.35	-	-	-	29.93	-	-
81	-	-	-	-	-	-	-	-	28	<8	<13
84	0.00436	-	-	-	-	-	-	-	-	-	-
86	-	0.0177	-	-	0.1810	-	-	-	-	-	-
90*	-	0.348	-	-	86.7	-	-	-	34.8	-	-
91*	-	-	-	-	4.04	-	-	-	8.74	-	-
93*	0.32	0.32	-	-	-	-	-	-	-	-	-
No of results	9	13	3	4	32	4	3	2	38	10	6
Min. value	0.00436	0.0177	6.99	1.37	0.181	2.3	5.13	2.5	0.01	0.55	0.82
Max. value	403.2	401.2	352.4	18	518	10.15	13.1	2.64	203	620	4600
Mean	85.5	64.1	127	6.56	43.5	5.60	7.91	2.57	26.1	78.9	787
Stand. Dev.	158	135	195	7.80	97.9	3.30	4.50	0.10	35.7	193	1870
(%)	185	211	154	119	225	59	57	4	137	244	237

* Laboratories using QA/QC procedures

TABLE I.4. RESULTS FOR PETROLEUM HYDROCARBONS IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	Anthracene (ng/g)	Fluorene (ng/g)	Fluoranthene (ng/g)	Pyrene (ng/g)	1 methyl Pyrene (ng/g)	Chrysene (ng/g)	Triphenylene (ng/g)	Benz[a] Anthracene (ng/g)	Benzo[b] Fluorant. (ng/g)	Benzo[k] Fluorant. (ng/g)	Benzo[e] Pyrene (ng/g)
2	-	-	0.04	0.04	-	0.03	-	<0.01	-	-	-
3*	1.6	1.5	69	45	6.5	38	15	22	39	24	31
7*	-	-	153	210	-	12	-	14	-	-	-
8	-	-	N.D	N.D	-	N.D	-	N.D	-	-	N.D
11	-	-	16.338	14.805	-	11.477	-	6.608	-	-	18.185
12	145.63	-	51.82	45.56	-	-	-	104.65	-	-	-
14*	1.83	-	4.2	14.4	-	-	-	-	-	-	-
15	4.5	-	49	40	-	24	-	18	41	12	-
16	12.01	-	114.87	101.30	-	65.87	-	46.56	95.23	-	76.11
17*	-	-	49.9	36.6	-	35.5	-	18.2	-	-	30.2
19	-	-	106.5	45.2	-	26.9	-	15.6	23.6	17.9	-
20*	-	-	31.3	46.5	-	55.8	-	29.4	52.6	21.0	-
21*	106.53	5.22	4.25	9.63	-	-	-	-	12.84	-	-
23*	0.81	-	49.8	39.4	-	25.2	-	20.6	37.2	13.3	21.2
24*	-	4.13	20.07	21.38	-	22.22	-	21.475	57.40333	33.89667	-
25	-	-	1776	180	-	377	-	156	-	-	-
29	-	-	84	49	-	28	-	15	31	13	-
32*	2.46	-	28.76	25.04	-	19.17	-	13.78	53.05	17.48	-
33*	11.35	1.66	25.45	10.20	-	2.41	-	-	-	-	-
34*	-	-	52.65	42.10	-	35.95	-	18.85	-	-	26.25
39	11.02	-	50.79	47.61	-	31.40	-	15.25	66.27	33.15	-

* Laboratories using QA/QC procedures

TABLE I.4. RESULTS FOR PETROLEUM HYDROCARBONS IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	Anthracene (ng/g)	Fluorene (ng/g)	Fluoranthene (ng/g)	Pyrene (ng/g)	1 methyl Pyrene (ng/g)	Chrysene (ng/g)	Triphenylene (ng/g)	Benz[a] Anthracene (ng/g)	Benzo[b] Fluorant. (ng/g)	Benzo[k] Fluorant. (ng/g)	Benzo[e] Pyrene (ng/g)
41*	<3.46	<5.16	41.1	31.5	<5.08	30.3	-	10.7	12.8	8.50	11.3
46	<5	<10	60.7	71.2	-	30.6	-	21.2	34.8	17.7	-
47	<1.0	<1.0	10.8	32.4	-	9.6	-	20.1	4.2	5.2	-
48*	24.7	-	246	167	-	169	-	109	126	143	-
49*	2.96	1.76	49.61	39.88	-	25.90	-	19.16	43.83	11.17	20.47
50	-	28.65	62.18	48.60	-	34.90	-	22.7	-	-	-
54*	-	-	2.236	1.532	-	-	-	-	-	-	-
55	-	-	9.71	9.12	-	11.26	-	6.97	-	-	4.37
59*	-	-	40	1160	-	-	-	-	-	-	-
61	-	-	130.32	108.99	-	56.40	-	42.15	-	-	-
62*	3.79	3.57	61.5	54.3	-	33.1	-	29.8	68.9	16.8	-
63*	5.1	-	53.9	41.4	-	39.2	-	19.7	-	-	25.1
64	-	8	21	11	-	24	-	14	21	9	5
65	0.96	0.69	45.63	31.82	-	25.51	-	18.68	30.33	13.78	-
66*	2.58	10.47	56.9	39.1	-	48.5	-	36.3	29.8	27.0	-
70*	-	-	1.97	0.83	-	-	-	2	-	-	-
72	-	-	24.540	1.833	-	7.778	-	1.836	-	-	-
75	2.83	2.17	40.66	32.32	-	26.31	-	18.35	26.48	7.17	11.71
80	9.68	-	34.95	29.80	-	17.62	-	12.06	8.84	7.23	N.D.
81	14	<16	60	52	-	33	-	29	<30	<31	<31
84	-	-	2.1208	-	-	-	-	-	0.78	0.5236	-

* Laboratories using QA/QC procedures

TABLE I.4. RESULTS FOR PETROLEUM HYDROCARBONS IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	Anthracene (ng/g)	Fluorene (ng/g)	Fluoranthene (ng/g)	Pyrene (ng/g)	1 methyl Pyrene (ng/g)	Chrysene (ng/g)	Triphenylene (ng/g)	Benz[a] Anthracene (ng/g)	Benzo[b] Fluorant. (ng/g)	Benzo[k] Fluorant. (ng/g)	Benzo[e] Pyrene (ng/g)
86	5.6039	0.7237	0.9262	-	-	-	-	-	-	-	-
90*	-	-	47.2	34.4	-	26.0	-	13.1	-	-	-
91*	-	0.92	55.14	48.33	-	53.90	-	9.00	-	-	-
93*	-	-	77	98	-	25	-	34	-	-	-
No of results	20	13	45	43	1	37	1	37	23	21	12
Min. value	0.81	0.69	0.04	0.04	6.5	0.03	15	1.836	0.78	0.5236	4.37
Max. value	145.63	28.65	1776	1160	6.5	377	15	156	126	143	76.11
Mean	18.5	5.34	88.3	73.7		41.6		27.7	39.9	21.6	23.4
Stand. Dev.	37.8	7.61	261	176		63.0		31.1	29.4	29.1	18.9
(%)	204	142	296	238		151		112	74	135	81

TABLE I.4. RESULTS FOR PETROLEUM HYDROCARBONS IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	Benzo[a] Pyrene (ng/g)	Perylene (ng/g)	Benzo[g,h,i] Perylene (ng/g)	Indeno[1,2,3-c,d] Pyrene (ng/g)	Dibenz[a,h] Anthracene (ng/g)	Acenaphthylene (ng/g)	Acenaphthene (ng/g)	Dibenzothiophene (ng/g)
2	0.02	-	0.02	-	-	-	-	-
3*	32	8.3	27	33	6.4	0.69	0.64	1.0
7*	14	-	<10	-	-	-	-	-
8	N.D	-	N.D	-	-	-	-	-
11	12.335	-	9.864	-	-	-	-	-
12	-	-	-	-	-	37.63	9.27	-
15	22	-	20	30	-	-	-	-
16	63.73	-	52.80	-	25.20	-	3.69	-

* Laboratories using QA/QC procedures

TABLE I.4. RESULTS FOR PETROLEUM HYDROCARBONS IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	Benzo[a] Pyrene (ng/g)	Perylene (ng/g)	Benzo[g,h,i] Perylene (ng/g)	Indeno[1,2,3-c,d] Pyrene (ng/g)	Dibenz[a,h] Anthracene (ng/g)	Acenaphthylene (ng/g)	Acenaphthene (ng/g)	Dibenzothiophene (ng/g)
17*	17.7	-	23.3	-	-	-	-	-
19	20.4	-	27.5	-	4.2	-	-	-
20*	22.5	-	40.4	35.5	8.1	-	-	-
21*	5.95	-	-	-	-	-	27.85	-
23*	21.3	-	19.9	-	-	-	-	-
24*	23.36	-	-	-	-	-	1.61	-
25	1978	-	-	-	-	-	-	-
29	13	-	17	<10	<10	-	<10	-
32*	18.31	-	25.41	-	-	-	-	-
34*	21.0	-	21.6	-	-	-	-	-
39	21.05	-	21.55	-	-	-	-	-
41*	4.47	<2.03	9.7	12.3	<1.14	7.97	<5.90	<1.41
46	19.9	-	24.0	23.3	<5	<50	<50	-
47	11.4	-	11.4	-	<1.0	-	<1.0	-
48*	142	-	59.2	146	-	6.68	4.01	-
49*	20.09	4.69	18.03	19.08	5.63	2.02	1.11	-
50	21.45	-	25.6	24.3	-	-	-	-
54*	-	-	-	-	-	1.713	1.268	-
55	1.50	-	4.95	-	-	-	-	-
61	46.34	-	70.28	-	-	-	-	-

* Laboratories using QA/QC procedures

TABLE I.4. RESULTS FOR PETROLEUM HYDROCARBONS IN THE IAEA-451 SAMPLE (cont.)

Lab. Code No	Benzo[a] Pyrene (ng/g)	Perylene (ng/g)	Benzo[g,h,i] Perylene (ng/g)	Indeno[1,2,3-c,d] Pyrene (ng/g)	Dibenz[a,h] Anthracene (ng/g)	Acenaphthylene (ng/g)	Acenaphthene (ng/g)	Dibenzothiophene (ng/g)
62*	25.3	-	24.8	35.8	<D.L.	6.21	<D.L.	-
63*	14.1	-	10.9	-	-	-	9.0	-
64	7	-	2	10	5	-	-	-
65	18.37	-	17.00	24.46	3.03	1.26	0.17	-
66*	9.30	-	5.19	4.88	1.40	1.58	4.62	-
70*	14.8	-	51.8	-	-	-	-	-
72	6.453	-	0.313	-	-	-	-	-
75	9.86	-	6.32	-	-	-	-	-
80	N.D.	-	N.D.	-	-	-	-	-
81	<33	<17	<29	<25	<23	<15	<39	-
84	0.2558	-	0.6832	-	-	-	-	-
86	14.9427	-	1.6986	13.3586	-	-	0.9038	-
88	-	-	-	-	-	2.21	-	-
90*	12.1	-	13.1	-	-	-	-	-
91*	11.34	-	8.31	4.24	-	1.40	0.64	-
93*	21	-	65	-	-	-	-	-
No of results	38	2	34	14	8	11	13	1
Min. value	0.02	4.69	0.02	4.24	1.4	0.69	0.17	1.0
Max. value	1978	8.3	70.28	146	25.2	37.63	27.85	1.0
Mean	72.1	6.50	21.7	29.7	7.37	6.31	4.98	
Stand. Dev.	318	2.55	18.9	35.1	7.49	10.7	7.52	
(%)	442	39	87	118	102	170	151	

* Laboratories using QA/QC procedures

TABLE I.5. SUMMARY OF THE RESULTS FOR CHLORINATED PESTICIDES

Analyte	Unit	Reported results			Values of properties			
		No of lab. means	Mean	Range of lab. means	No of lab. means	Range of lab. means	Mean	Expanded uncertainty k=2
EOM	mg/g	45	44	7–100	25	32.5–53.2	42.2	4.4
HCB	ng/g	30	2.41	0.01–35.8	8	0.31–0.47	0.39	0.04
α-HCH	ng/g	12	3.22	0.09–28.7	4	0.66–0.98	0.78	0.14
γ-HCH (Lindane)	ng/g	44	2.89	0.07 – 36.5	4	0.50 – 0.60	0.56	0.05
pp' DDE	ng/g	56	459	0.2–24800	5	1.17–1.90	1.73	0.22
pp' DDD	ng/g	47	102	0.07–4300	3	0.88–1.10	0.99	0.22
pp' DDT	ng/g	45	5.18	0.07–61.4	7	1.15–1.59	1.34	0.22
Heptachlor	ng/g	29	143	0.03–4000	4	1.67–2.20	2.07	0.22
Aldrin	ng/g	29	233	0.06–6590	6	0.77–1.05	0.87	0.10
Dieldrin	ng/g	37	38.8	0.21–1310	11	1.56–2.30	1.88	0.16
α-Endosulfan	ng/g	18	2770	0.36–49600	6	1.05–1.62	1.20	0.20
α-Chlordane	ng/g	20	2.50	0.1–35.7	5	0.52–0.72	0.56	0.04
γ-Chlordane	ng/g	16	0.63	0.09–2.86	5	0.35–0.55	0.46	0.13
Aroclor 1260	ng/g	19	221	16.8–2990	8	49.0–59.7	53.2	4.0

TABLE I.6. SUMMARY OF THE RESULTS FOR PCB CONGENERS

Analyte	Unit	Reported results			Values of properties			
		No of lab. means	Mean	Range of lab. means	No of lab. means	Range of lab. means	Mean	Expanded uncertainty k=2
PCB 28	ng/g	30	1.60	0.17–8.16	5	0.76–0.92	0.85	0.09
PCB 31	ng/g	8	0.56	0.06–1.85	3	0.29–0.32	0.29	0.02
PCB 52	ng/g	36	3.90	0.07–88	8	0.68–1.00	0.82	0.04
PCB 95	ng/g	7	0.68	0.52–1.07	5	0.52–0.63	0.58	0.10
PCB 101	ng/g	47	3.42	0.3–28	21	1.40–2.26	1.74	0.14
PCB 105	ng/g	17	1.69	0.1–11.9	4	0.43–0.59	0.49	0.12
PCB 110	ng/g	13	1.56	0.6–5.74	5	0.78–0.97	0.88	0.13
PCB 118	ng/g	40	1.68	0.2–18.3	17	0.79–1.22	1.01	0.08
PCB 128	ng/g	11	0.78	0.31–1.84	6	0.45–0.60	0.49	0.04
PCB 138	ng/g	53	7.61	1.18–64.2	23	4.09–6.47	5.30	0.58
PCB 149	ng/g	17	3.15	1.01–5.53	6	2.51–3.97	3.33	0.42
PCB 153	ng/g	55	10.8	1.44–87.5	24	6.84–11.0	8.59	0.78
PCB 170	ng/g	24	2.97	0.3–5.01	15	2.36–3.60	3.05	0.40
PCB 174	ng/g	4	1.28	1.11–1.37	4	1.11–1.37	1.32	0.07
PCB 177	ng/g	7	0.95	0.68–1.26	5	0.84–1.10	0.94	0.10
PCB 180	ng/g	52	7.32	0.13–39.1	26	5.12–8.20	6.56	1.20
PCB 183	ng/g	12	2.34	0.87–9.32	5	1.49–1.98	1.82	0.22
PCB 187	ng/g	20	3.37	0.35–5.56	10	3.07–4.40	3.97	0.26
PCB 194	ng/g	19	1.79	0.58–5.44	9	1.22–1.74	1.45	0.09
PCB 195	ng/g	9	0.85	0.27–4.45	4	0.43–0.48	0.45	0.03
PCB 206	ng/g	9	0.32	0.15–0.56	5	0.21–0.28	0.24	0.03

TABLE I.7. SUMMARY OF THE RESULTS FOR POLYBROMINATED DIPHENYL ETHERS

Analyte	Unit	Reported results			Values of properties			
		No of lab. means	Mean	Range of lab. means	No of lab. Means	Range of lab. means	Mean	Expanded uncertainty k=2
PBDE 47	ng/g	12	1.60	0.3–4.51	3	0.79–1.08	0.99	0.16
PBDE 100	ng/g	10	0.23	0.05–0.53	5	0.20–0.27	0.23	0.04
PBDE 154	ng/g	6	0.14	0.055–0.20	5	0.11–0.20	0.17	0.03
PBDE 209	ng/g	6	3.11	0.57–13.5	3	0.81–1.04	0.94	0.18

TABLE I.8. SUMMARY OF THE RESULTS FOR PETROLEUM HYDROCARBONS

Analyte	Unit	Reported results			Values of properties			
		No of lab means.	Mean	Range of lab. means	No of lab. means	Range of lab. means	Mean	Expanded uncertainty k=2
EOM	mg/g	21	38.2	5.2–100	9	28.0–43.0	36.7	6.4
Total aliphatics	µg/g	9	146	0.23–254	5	193–254	244	34
Unresolved aliphatics	µg/g	6	242	95.7–431	4	185–266	237	44
n-C_{17}	ng/g	14	584	49–3644	6	338–415	373	44
Σ *n*-Alkanes: C_{14}-C_{34}	µg/g	12	5.11	0.23–16.2	4	2.44–3.70	2.85	0.48
Naphthalene	ng/g	32	43.5	0.18–518	7	12.2–17.4	14.8	1.2
Phenanthrene	ng/g	38	26.1	0.01–203	8	13.7–17.7	15.8	5.6
Anthracene	ng/g	20	18.5	0.81–146	3	4.50–5.60	5.07	1.10
Chrysene	ng/g	37	41.6	0.03–377	17	22.2–34.9	26.9	2.0
Fluoranthene	ng/g	45	88.3	0.04–1776	16	35.0–56.9	49.3	3.2
Pyrene	ng/g	43	73.7	0.04–1160	20	29.8–48.6	40.0	4.6
Benzo[b] Fluoranthene	ng/g	23	39.9	0.78–126	8	29.8–43.8	35.8	6.2
Benzo[k] Fluoranthene	ng/g	21	21.6	0.52–143	9	11.2–17.9	14.7	3.2
Benz[a] Anthracene	ng/g	37	27.7	1.84–156	16	15.0–22.7	19.2	1.3
Benzo[e] Pyrene	ng/g	12	23.4	4.37–76.1	4	18.2–25.1	20.8	2.8
Benzo[a] Pyrene	ng/g	38	72.1	0.02–1978	15	13.0–21.3	18.2	2.4
Benzo[g,h,i] Perylene	ng/g	34	21.7	0.02–70.3	7	17.0–21.6	19.5	2.4
Indeno[1,2,3-c,d] Pyrene	ng/g	14	29.7	4.24–146	4	19.1–24.5	23.8	1.2
Dibenz[a,h] Anthracene	ng/g	8	7.37	1.4–25.2	4	4.20–6.40	5.32	1.36
Acenaphthylene	ng/g	11	6.31	0.69–37.6	3	1.71–2.21	2.01	0.40

TABLE I.9. CHLORINATED COMPOUNDS AND PCBS - TREATMENT OF SAMPLES

Lab. code No	Moisture correction	Extraction procedure used			Internal standard	Clean-up procedure	Fractionation procedure	Method for confirmation
		Instrument	Solvent	Time				
1	No	Soxhlet	Hexane	16 hrs.	Mirex Octachloronaphthalene	Sulfuric Acid	Silica and Alumina	Std. retention times
3	Yes	Microwave	Hexane/Acetone (90:10)	30 min.	CBs 29, 198, ε-HCH, Endosulfan I-d_4	Florisil	Florisil 3 fractions	Use of 2 diff. columns Std. retention times
4	Yes	Soxhlet	Hexane	8 hrs.	CB 29,	Sulfuric Acid	Florisil	Standard
5	Yes	Soxhlet	Hexane/Acetone (3:1)	4 hrs.	None	Sulfuric Acid Silica	None	Std. retention times
6	Yes	Homogeneization C_{18} column	Acetonitrile Hex./Ethyl acetate (3:2)	-	Phenanthrene-d_{10} Pyrene-d_{10}, Chrysene-d_{12}	NH_2, Silica	None	Not indic.
9	No	MSPD (Celite 545)	Hexane,Acetone, Cyclohexane, DMSO	-	CB 209	Florisil	None	Use of 2 diff. columns
10	No	Soxhlet	Hexane	8 hrs.	2.4DDD, β-endosulfan	Florisil	Florisil 3 fractions	Std. retention times
11	Yes	PSE (110 °C)	Cyclohexane / Ethyl Acetate (2:1)	3x10 min.	CBs 65,166	GPC Bio Beads SX-3	Alumina	Std. retention times
12	Not indic.	Sonication	Hexane/Acetone (1:1)	2x30 min.	None	Florisil	Florisil	Not indic.
13	Yes	Sonication	Hexane/Acetone (1:1)	Not indic.	None	Florisil	None	Not indic.
14	Yes	Microwave	Hexane/Acetone (90:10)	Not indic.	CBs 29, 198, ε-HCH, Endosulfan I-d_4	Florisil	Florisil 3 fractions	Std. retention times

TABLE I.9. CHLORINATED COMPOUNDS AND PCBS - TREATMENT OF SAMPLES (cont.)

Lab. code No	Moisture correction	Extraction procedure used			Internal standard	Clean-up procedure	Fractionation procedure	Method for confirmation
		Instrument	Solvent	Time				
17	Yes	Sonication	Hex./Acetone/Toluene (2:1:1)	Not indic.	2,4'DDT-d_8, CBs 30, 185	GPC Florisil	GPC Bio Beads SX-3	Std. retention times, SIM
18	Not indic.	Selected ASE	$MeCl_2$/Iso-hexane (1:9)	2x5 min.	$^{13}C_{12}$-PCB 138	Acid-Silica	N.A.	Std. retention times, SIM
19	Yes	Soxhlet	Hexane	8 hrs.	CB 198	Sulfuric Acid	Florisil 3 fractions	Std. retention times
20	Yes	Microwave	Hexane/Acetone (1:1)	Not indic.	None	Florisil	Florisil 3 fractions	Not indic.
21	No	Sonication	Hexane	90 min.	Trichlorobiphenyl	Acid + Florisil	None	GC-MS
22	Yes	Soxhlet LLE	Hexane/Acetonitrile/ Diethyl-ether	Not indic.	$^{13}C_{12}$ CBs: 28,52,101,138,153,180	Acetonitrile partitioning Florisil	3 fractions	GC-MS
25	No	Soxhlet	Hexane	8 hrs.	None	Sulfuric Acid	Florisil 2 fractions	Std. retention times
26	Yes	Soxhlet	Pentane/$MeCl_2$	Not indic.	CB 155	Alumina	Silica	Column CPSIL 19CB
27	Yes	Soxhlet	Hexane	8 hrs.	CB 29, ε-HCH	Florisil	Florisil 2 fractions	Use of 2 diff. columns
28	Yes	LLE	Petroleum Benzene/ Acetonitrile	1 hr.	ε-HCH, Endosulfan I-d_4	Florisil	3 fractions	Std. retention times
29	No	Soxhlet	Hexane/Acetone (1:1)	5 hrs.	None	Florisil	None	Std. retention times, SIM

TABLE I.9. CHLORINATED COMPOUNDS AND PCBS - TREATMENT OF SAMPLES (cont.)

Lab. code No	Moisture correction	Extraction procedure used			Internal standard	Clean-up procedure	Fractionation procedure	Method for confirmation
		Instrument	Solvent	Time				
30	No	LLE + Sonication	Cyclohexane/Acetone (3:2)	Not indic.	CBs 29, 112, 207	Sulfuric Acid + GPC Bio Beads SX-3	None	Std. retention times
31	No	Sonication	Hexane/$MeCl_2$ (4:1)	24 hrs.	CB 29	Silica, Sulfuric acid, Florisil	Not indic.	Not indic.
32	Yes	Microwave	Hexane/Acetone (1:1)	Not indic.	CB 29	Copper + Sulfuric acid	Silica/Alumina Florisil 2 fractions	Std. retention times
34	No	ASE	Iso-Hexane	15 min.	DCBE 16	Alumina	Silica	GC-ECD
35	Not indic.	Not indic.	Not indicated	Not indic.	Not indic.	Not indic.	Not indic.	Not indic.
36	Yes	AOAC method 983.21	Petroleum ether, ethyl ether,ethyl acetate	Not indic.	None	Florisil	2 fractions	AOAC meth. 983.21
37	Yes	Soxhlet	Hexane	8 hrs.	Trifluraline	Sulfuric acid	Florisil 3 fractions	Std. retention times
38	Yes	Soxhlet	Diethyl-ether	Not indic.	TCB	Florisil	Florisil 2 fractions	EN 1528-1,2,3
40	No	Soxhlet	Hexane	6 hrs.	None	LC-18, Florisil	Not indic.	Std. retention times
41	No	Soxhlet	Hexane/$MeCl_2$ (1:1)	8 hrs.	CBs 103, 198	Alumina/Silica HPLC	None	Saponification
42	Yes	Sonication	Hexane	1 hr.	CBs 30, 209	Sulfuric acid	None	Ref. Methods UNEP

TABLE I.9. CHLORINATED COMPOUNDS AND PCBS - TREATMENT OF SAMPLES (cont.)

Lab. code No	Moisture correction	Extraction procedure used			Internal standard	Clean-up procedure	Fractionation procedure	Method for confirmation
		Instrument	Solvent	Time				
43	No	Digestion LLE	Hexane/$MeCl_2$ (75:25)	Not indic.	4,4'-Dibromoocta- fluorobiphenyl	Florisil	Florisil 2 fractions	Methods E3136, E3411
44	Yes	LLE method EN1528	Hexane/Acetone (3:1)	3x20 min.	None	Alumina	None	Std. retention times
45	Yes	Not indic.	Hexane	Not indic.	None	Sulfuric acid	None	Use of 2 diff. columns Std. retention times
46	Yes	Soxhlet	$MeCl_2$	Not indic.	None	Florisil	GPC	Not indic.
47	Yes	Sonication	Acetone/Hexane (1:4)	5 min. 2x3 min.	γ-HCH	Sulfuric acid	None	Std. retention times
48	Yes	Homogenization LLE	Actonitrile Hex./Ethyl acetate (3:2)	2x10 min.	$^{13}C_{12}$-DDT Phenanthrene-d_{10},Chrysene-d_{12}	NH_2, Silica	NH_2, Silica	Not indic.
49	Yes	Soxhlet	Hexane,$MeCl_2$	16 hrs.	Dibromooctafluorobiphenyl CBs 103,198	Silica/Alumina	HPLC	Std. retention times, SIM
50	No	Moopam 1999 IIIrd edition	Hexane/$MeCl_2$ (1:1)	Not indic.	Mirex	Silica/Alumina	Silica/Alumina 2 fractions	Std. retention times, SIM
51	No	Glass column	$MeCl_2$	45 min.	CBs 29, 155, 204 $^{13}C_{12}$ *pp'*DDD	GPC	Silica	Use of 2 diff. columns
52	Yes	Soxhlet	Hexane/Acetone (3:1)	3 hrs.	$^{13}C_{12}$ *pp'*DDT, $^{13}C_{12}$CB 101, $^{13}C_{12}$ CB 153	Multilayer column	None	Std. retention times
53	Yes	Soxhlet	Hexane	8 hrs.	CB 29	-	C18 3 fractions	Std. retention times

TABLE I.9. CHLORINATED COMPOUNDS AND PCBS - TREATMENT OF SAMPLES (cont.)

Lab. code No	Moisture correction	Extraction procedure used			Internal standard	Clean-up procedure	Fractionation procedure	Method for confirmation
		Instrument	Solvent	Time				
54	Yes	Soxhlet MOOPAM meth.	Hexane	Not indic.	Endosulfan epoxide	-	MOOPAM method	Std. retention times
55	Yes	PSE	Acetone/Hexane (1:1)	Not indic.	WP-LCS, MBP-MXE mixtures	Florisil/Silica	Florisil / Silica	Isotope dilution HRMS
56	Yes	ASE	Toluene	Not indic.	CB 185, TCN	GPC, Silica	None	Std. retention times
57	Yes	Soxhlet	Hexane	Not indic.	Endosulfan sulfate	Florisil	Florisil 3 fractions	IAEA-EL/MESL method
58	No	Solid/Liquid	Hexane/$MeCl_2$	Not indic.	None	Florisil, sulfuric acid	None	Std. retention times, GC-MS
59	No	Soxhlet	Hexane/$MeCl_2$ (1:1)	8 hrs.	CB 29, ε-HCH, Endosulfan I-d_4	Florisil	Florisil 3 fractions	Std. retention times
60	Yes	Soxhlet	Hexane/Acetone (3:1)	16 hrs.	CB 155	Alumina	Silica 2 fractions	Use of 2 diff. columns
61	No	ASE	Acetone/Hexane (1:1)	Not indic.	4,4'-Dibromooctafluorobiphenyl CBs 103,209	Silica	Silica 1 fraction	Not indic.
62	Yes	Soxhlet	Hexane/Acetone (1:1)	16 hrs.	TCMX	Sulfuric acid, copper	Silica / Florisil 1 fraction	Std. retention times
63	No	Soxhlet	$MeCl_2$/Acetone (1:1)	8 hrs.	CB 103, TCMX	Silica/Alumina	None	GC-MS/SIM
65	Not indic.	Not indic.	Cyclohexane - Isopropanol	Not indic.	TCN	Alumina	Silica	Not indic.

TABLE I.9. CHLORINATED COMPOUNDS AND PCBS - TREATMENT OF SAMPLES (cont.)

Lab. code No	Moisture correction	Extraction procedure used			Internal standard	Clean-up procedure	Fractionation procedure	Method for confirmation
		Instrument	Solvent	Time				
66	Yes	Soxhlet	Hexane, $MeCl_2$	8 hrs.	CB 29	Florisil	Florisil 3 fractions	Std. retention times
68	No	Sonication	Hexane/Acetone (1:1)	Not indic.	Mirex	Alumina	Silica	Use of 2 diff. columns
69	Yes	Soxhlet	Pentane/$MeCl_2$ (1:1)	Not indic.	CB 155	Alumina	Silica	GC-MS
71	Not indic.	Not indic.	Hexane	24 hrs.	None	Sulfuric Acid	None	Std. retention times
72	Yes	Soxhlet	Hexane	8 hrs.	CBs 29,198, ε-HCH, Endosulfan I-d_4	Sulfuric acid	Florisil 3 fractions	Std. retention times
73	Yes	Soxhlet	Hexane/Acetone (1:1)	8 hrs.	4,4'-Dibromobiphenyl	Florisil	2 fractions	Std. retention times
74	Yes	Soxhlet	Hexane,$MeCl_2$	2x6 hrs.	DBOFB	Florisil	Florisil 3 fractions	Not indic.
75	No	Sonication	Hexane	Not indic.	CBs 103,198	Silica/Alumina	None	GC-MS
76	No	Soxhlet	Hexane	8 hrs.	CB 29	Sulfuric acid	Florisil	GC-MS
77	No	Soxhlet	Hexane/Acetone (1:1)	8 hrs.	CBs 103,198 4,4'-Dibromooctafluorobiphenyl	Florisil	2 fractions	Std. retention times
78	Yes	Soxhlet	Hexane/Acetone (1:1)	24 hrs.	$^{13}C_{12}$OCs-Mix, $^{13}C_{12}$CBs-Mix,	GPC Silica/Alumina	None	Std. retention times, HRMS
79	Not indic.	Soxhlet	Hexane/Acetone (1:1)	Not indic.	None	Silica	None	Use of 2 diff. columns

TABLE I.9. CHLORINATED COMPOUNDS AND PCBS - TREATMENT OF SAMPLES (cont.)

Lab. code No	Moisture correction	Extraction procedure used			Internal standard	Clean-up procedure	Fractionation procedure	Method for confirmation
		Instrument	Solvent	Time				
80	No	Soxhlet	Hexane, $MeCl_2$	Not indic.	CBs 29, 198, ε-HCH, Endosulfan I-d_4	Florisil	Florisil 3 fractions	Medpol method for biota
81	Yes	Sonication	Hexane/Acetone (1:1)	6x15 min.	None	Florisil	None	Std. retention times
82	Yes	Soxhlet	Hexane/$MeCl_2$	10 hrs.	TCMX	Sulfuric acid	None	Std. retention times
83	Yes	Mixer	Hexane/$MeCl_2$ (1:1)	10 min.	TCMX	Sulfuric acid	None	Std. retention times
85	Yes	Soxhlet	Hexane/Acetone (1:1)	6 hrs	CB 53	Alumina	Silica	Std. retention times
86	Yes	Microwave	Hexane/Acetone (1:1)	20 min.	None	Silica/Florisil	None	Std. retention times, GCMS
87	Yes	ASE	Hexane	Not indic.	Mirex	Sulfuric acid	Florisil	Std. retention times
88	No	Homogenization LLE	Acetone, Hex./Ethyl acetate (3:2)	5 min.+ 10 min.	Not indic.	NH2 column	NH2 column	GC-MS/SIM
89	Yes	HSSE	Hexane/Acetone (1:1)	30 min.	$^{13}C_{12}$ BDE-139	GPC	Florisil	μECD and GC/MS
90	Yes	Homogenization LLE	Actonitrile Hex./Ethyl acetate (3:2)	Not indic.	3 deuterated PAHs	Silica/NH2 column	None	Std. retention times, GC-MS/SIM

TABLE I.9. CHLORINATED COMPOUNDS AND PCBS - TREATMENT OF SAMPLES (cont.)

Lab. code No	Moisture correction	Extraction procedure used			Internal standard	Clean-up procedure	Fractionation procedure	Method for confirmation
		Instrument	Solvent	Time				
91	No	Soxhlet	Hexane	8 hrs.	CB 29, Endosulfan I-d_4	Florisil	Florisil 3 fractions	-
92	Yes	Microwave	Hexane/Acetone (90:10)	30 min.	CB 29, ε-HCH	Sulfuric acid	Florisil 3 fractions	Std. retention times
93	Yes	Solid phase microextraction	Acetonitrile	Not indic.	Decachlorobiphenyl	Florisil	C-18	Standard addition
94	Yes	Soxhlet	Hexane	8 hrs.	Methyl Bromophos	GPC, Florisil	GPC, Florisil 3 fractions	Use of 2 diff. columns GCMS

TABLE I.10. GC CONDITIONS – CHLORINATED PESTICIDES AND PCBS

Lab. code No	Instrument type	Detector type	Injection technique	Injector temp. (°C)	Injection volume	Splitter Closing time
1	HP 6890	ECD-^{63}Ni	On-column	60 to 200	1 µl	-
3	HP 6890 Plus	ECD-^{63}Ni	Splitless	250	1 µl	0.8 min.
	HP 6890 Plus	ECD-^{63}Ni	Splitless	250	1 µl	1 min.
4	Agilent 6890N	ECD-^{63}Ni	Splitless	250	1.3–1.6 µl	0.8 min.
5	Varian 3800	ECD-^{63}Ni	Split	280	1 µl	Not indic.
6	GCMS	MS	Splitless	250	2 µl	Not indic.
9	AT 6890	ECD-^{63}Ni	Splitless	250	2µl	0.6 min.
10	Varian CP 3800	ECD-^{63}Ni	Splitless	250	1 µl	0.7 min.
11	Not indicated	ECD-^{63}Ni	Splitless	250	1 µl	0.8 min.
12	HPLC	UV-DAD	-	-	-	-
13	Varian 3800	ECD-^{63}Ni	Splitless	Not indic.	1 µl	Not indic.
14	Agilent 6890	ECD-^{63}Ni	Splitless	250	1 µl	Not indic.
17	Agilent 5975	MS	Puls.splitless	250	5 µl	1.5 min.
18	Agilent 5975C	MSD	Splitless	250	3 µl	Not indic.
19	Agilent 6890	ECD-^{63}Ni	Splitless	225	2 µl	Not indic.
20	Varian 3800	ECD-^{63}Ni	Autosampler	300	1 µl	-
21	Shimadzu 17A	ECD-^{63}Ni	Split	Programming	1 µl	-
22	Shimad.QP2010 plus	MS	Split	300	2 µl	1.5 min.
25	HP 6890	ECD-^{63}Ni	Split	260	0.8 µl	0.75 min.
26	Agilent 6890N	ECD-^{63}Ni	Splitless	275	1 µl	2 min.
27	Varian 3800	ECD-^{63}Ni	Splitless	250	2 µl	Not indic.
28	Varian CP 3800	ECD-^{63}Ni	Splitless	250	1 µl	-
29	Agilent 5973	MS	Splitless	230	1 µl	2 min.
30	Agilent 6890	ECD-^{63}Ni	Splitless	270	2 µl	Not indic.
31	HP 6890 Plus	ECD-^{63}Ni	Splitless	280	2 µl	2 min.
32	Carlo Erba 4160	ECD-^{63}Ni	Splitless	280	2 µl	0.7 min.
34	HP 6890	ECD-^{63}Ni	On-column	120	0.5 µl	-
35	Not indic.	Not indic.	Not indic.	Not indic.	Not indic.	Not indic.
36	Varian 3800	ECD-^{63}Ni	Splitless	270	1 µl	Not indic.
37	Dani-Master	ECD-^{63}Ni	Splitless	280	5 µl	Not indic.
38	HP 6890	ECD-^{63}Ni	Splitless	280	1 µl	0.75 min.
40	HP 6890	ECD-^{63}Ni	Split	250	1 µl	2 min.
41	OCs: Agilent 6890	ECD-^{63}Ni	Splitless	280	1 µl	1.25 min.
	PCBs: Agilent 5973N	MS	Splitless	280	1µl	1.25 min.

TABLE I.10. GC CONDITIONS – CHLORINATED PESTICIDES AND PCBS (cont.)

Lab. code No	Instrument type	Detector type	Injection technique	Injector temp. (°C)	Injection volume	Splitter closing time
42	HP 6890	ECD-^{63}Ni	Splitless	250	1 µl	Not indic.
43	GC x GC µECD	ECD-^{63}Ni	Splitless	250	1 µl	Not indic.
44	Agilent 6890N	ECD-^{63}Ni	Split	260	1 µl	Not indic.
45	ATI Unicam 610	ECD-^{63}Ni	On-column	250	5 µl	-
	ATI Unicam 610	ECD-^{63}Ni	On-column	250	5 µl	-
46	OCs: GC-ECD	ECD-^{63}Ni	Split	250	1µl	2 min.
	PCBs: GCMS	MS	Splitless	250	3 µl	Not indic.
47	Kristall 5000.1	ECD-^{63}Ni	Splitless	250	1 µl	-
48	Shimadzu QP2010	MS	Splitless	250	1 µl	Not indic.
49	Agilent	ECD-^{63}Ni	Splitless	275	2 µl	0.5 min.
50	OCs: Agilent	MS (NCI)	Splitless	265	1 µl	Not indic.
	PCBs: Agilent	MS (NCI)	Splitless	300	1 µl	Not indic.
51	Agilent 6890N	ECD-^{63}Ni	On-column	60	1 µl	-
52	Thermo E. Polaris Q	MS	PTV	70-270	2 µl	1 min.
53	Varian 3380	ECD-^{63}Ni	Split	250	2 µl	0.75 min.
54	Agilent 6890N	ECD-^{63}Ni	Splitless	300	5 µl	-
55	HRGC-HRMS	HRMS	Splitless	250	1.5 µl	1.5 min.
56	Agilent 6890	ECD-^{63}Ni	Splitless	250	2 µl	-
57	Varian 3800	ECD-^{63}Ni	Not indicated	250	1 µl	-
58	HP 6890	ECD-^{63}Ni	Splitless	350	1 µl	0.8 min.
59	Agilent 6890N	ECD-^{63}Ni	Splitless	290	1 µl	Not indic.
60	Agilent 6890N	ECD-^{63}Ni	Split	250	1 µl	2 min.
61	Shimadzu GC2010	ECD-^{63}Ni	Splitless	260	1µl	Not indic.
62	Agilent 6890N	ECD-^{63}Ni	Split	220	2 µl	2 min.
63	Shimadzu QP2010S	MSD	Splitless	270	1 µl	0.75 min.
65	GC	ECD-^{63}Ni	Splitless	Not indic.	Not indic.	Not indic.
66	Fisons 8560 Mega2	ECD-^{63}Ni	Splitless	190	2 µl	Not indic.
68	Agilent 6890N	ECD-^{63}Ni	Splitless	250	2 µl	0.5 min.
69	Perkin Elmer	ECD-^{63}Ni	Splitless	275	1 µl	Not indic.
71	Varian 3300	ECD-^{63}Ni	Splitless	270	1 µl	0.75 min.
72	Shimadzu GC2010	ECD-^{63}Ni	Splitless	280	1 µl	-
73	Shimadzu GC 17A	ECD-^{63}Ni	Splitless	260	1µl	2 min.
74	Agilent 6890N	ECD-^{63}Ni	Splitless	275	1 µl	Not indic.
75	Agilent 5975C	MS	Split	270	2 µl	1.5 min.

TABLE I.10. GC CONDITIONS – CHLORINATED PESTICIDES AND PCBS (cont.)

Lab. code No	Instrument type	Detector type	Injection technique	Injector temp. (°C)	Injection volume	Splitter closing time
76	Perkin E. Clarus500	ECD-^{63}Ni	Splitless	280	1 µl	-
77	HP 6890	ECD-^{63}Ni	Splitless	275	1 µl	0.75 min.
78	OCs: Thermo DFS	HRMS	Splitless	250	2 µl	1 min.
	PCBs:Micromass	HRMS	Splitless	280	2 µl	1 min.
79	Shimadzu GC2010	ECD-^{63}Ni	Splitless	320	1 µl	Not indic.
80	HP 5890	ECD-^{63}Ni	Splitless	250	1 µl	0.8 min.
81	Vega 6000 Series2	ECD-^{63}Ni	Splitless	250	1 µl	1.5 min.
82	Shimadzu 2010	ECD-^{63}Ni	Split	270	1 µl	-
83	GC	ECD-^{63}Ni	Splitless	280	2 µl	-
85	Agilent 6890	ECD-^{63}Ni	Splitless	270	1 µl	Not indic.
86	Varian 3800	ECD-^{63}Ni	Splitless	300	1 µl	Not indic.
87	Thermoquest 2000	ECD-^{63}Ni	On-column	RT	2 µl	-
88	Shimadzu QP2010	MS	Splitless	250	1 µl	Not indic.
89	Agilent	ECD-^{63}Ni	Splitless	260	2 µl	1 min.
90	GC/MSD	MSD	Splitless	280	2 µl	2 min.
91	HP 6890	ECD-^{63}Ni	Splitless	250	1 µl	0.8 min.
92	Agilent 6890	ECD-^{63}Ni	Splitless	250	1 µl	0.75 min.
93	Fisons 8130	ECD-^{63}Ni	Splitless	320	3 µl	Inf.
94	Agilent 6890	ECD-^{63}Ni	Splitless	240	1 µl	0.75 min.

TABLE I.10. GC CONDITIONS – CHLORINATED PESTICIDES AND PCBS (cont.)

Lab.	Carrier gas		Column			
code No	Type	Flow rate	Length	I. diameter	Phase	Film thickness
1	Helium	-	60 m	0.32 mm	DB-5, DB-5MS	0.25 µm
3	Helium	1.2 ml/min.	30 m	0.25 mm	HP-5	0.25 µm
	Helium	1.2 ml/min.	20 m	0.10 mm	DB-5	0.40 µm
4	Nitrogen	1 ml/min.	30 m	0.25 mm	HP-5MS	0.25 µm
5	Nitrogen	1 ml/min.	25 m	0.25mm	CPSIL-8CB	0.45 µm
6	Helium	43.8 ml/min.	30 m	0.32 mm	DB-5	0.25 µm
9	Helium	1.5 ml/min.	60 m	0.32 mm	HP-5MS, DB-1701	0.25 µm
10	Helium	1 ml/min.	30 m	0.32 mm	CPSIL-8CB/MS	0.25 µm
11	Helium	1.5 ml/min.	50 m	0.25 mm	CPSIL-8CB	0.25 µm
12	-	-	-	-	-	-
13	Helium	1.9 ml/min.	60 m	0.25 mm	RTX-5MS	0.25 µm
14	Helium	2 ml/min.	30 m	0.25 mm	DB-5MS	0.25 µm

TABLE I.10. GC CONDITIONS – CHLORINATED PESTICIDES AND PCBS (cont.)

Lab.	Carrier gas		Column			
code No	Type	Flow rate	Length	I. diameter	Phase	Film thickness
17	Helium	1 ml/min.	30 m	0.25 mm	HP-5MS	0.25 µm
18	Helium	1 ml/min.	30 m	0.25 mm	HP-5MS	0.25 µm
19	Helium	1 ml/min.	50 m	0.22 mm	BPX5	0.25 µm
20	Nitrogen	3 ml/min.	50 m	0.32 mm	CPSIL-8CB	1.2 µm
21	Nitrogen	3.4 ml/min.	60 m	0.25 mm	DB-5	1 µm
22	Helium	1.34 ml/min.	30 m	0.25 mm	SLB-5MS	0.25 µm
25	Helium	20 ml/min.	30 m	0.25 mm	HP-5	0.25 µm
26	Helium	Not indic.	50 m	0.25 mm	CPSIL-8CB	0.40 µm
27	Nitrogen	1.2 ml/min.	30 m	0.32 mm	RTX-5 , RTX-50	0.25 µm
28	Helium	4 ml/min.	50 m	0.25 mm	CPSIL-8CB	0.12 µm
29	Helium	2 ml/min.	60 m	0.25 mm	HP-1MS	0.25 µm
30	Hydrogen	1.5 ml/min.	60 m	0.25 mm	SPB-5	0.25 µm
31	Helium	19.8 ml/min.	25 m	0.2 mm	HP-5	0.33 µm
32	Hydrogen	2 ml/min.	15 m	0.15 mm	VF-5MS	0.15 µm
34	Hydrogen	2 ml/min.	60 m	0.25 mm	HP-5	0.25 µm
35	Not indic.	Not indic.	Not indic.	Not indic.	Not indic.	Not indic.
36	Nitrogen	28 ml/min.	30 m	0.25 mm	Not indic.	4.6 µm
37	Nitrogen	10 ml/min	30 m	0.53 mm	ZB-1701	1.50 µm
38	Helium	1.8 ml/min.	30 m	0.25 mm	HP-5MS	0.25 µm
40	Nitrogen	30 ml/min.	25 m	0.32 mm	HP-1	0.52 µm
41	Hydrogen	2 ml/min.	30 m	0.25 mm	HP-5MS	0.25 µm
	Helium	2 ml/min.	30 m	0.25 mm	HP-5MS	0.25 µm
42	Helium	25 ml/min.	30 m	0.25 mm	HP-1	0.25 µm
43	Helium	1.2 ml/min.	30 m	0.25 mm	DB + RTX-PCB	0.25 µm
44	Nitrogen	0.9 ml/min.	30 m	0.25 mm	HP-5MS	0.25 mm
45	Nitrogen	9.3 psi	30 m	0.25 mm	SPB-1701	0.25 µm
	Nitrogen	29 psi	60 m	0.25 mm	SPB-5	0.25 µm
46	Nitrogen	1 ml/min.	60 m	0.25 mm	DB-1701, DB-XLB	0.25µm
	Helium	1.2 ml/min.	60 m	0.25 mm	DB-XLB	0.25 µm
47	Nitrogen	3 ml/min.	30 m	0.53 mm	DB-608	0.5 µm
48	Helium	2 ml/min.	30 m	0.25 mm	DB-5MS	0.25 µm
49	Helium	1 ml/min.	30 m	0.25 mm	DB-5	0.25 µm
50	Helium	1.2 ml/min.	30 m	0.25 mm	HP-5MS	0.25 µm
	Helium	1.2 ml/min.	30 m	0.25 mm	HP-5MS	0.25 µm
51	Hydrogen	2.9 ml/min.	60 m	0.25 mm	DB-1, DB-5	0.25 µm

TABLE I.10. GC CONDITIONS – CHLORINATED PESTICIDES AND PCBS (cont.)

Lab.	Carrier gas		Column			
code No	Type	Flow rate	Length	I. diameter	Phase	Film thickness
52	Helium	1 ml/min.	60 m	0.25 mm	RTX-5MS	0.25 µm
53	Nitrogen	2 ml/min.	30 m	0.25 mm	DB-17	0.25 µm
54	Helium	1.5 ml/min.	30 m	0.32 mm	DB-5	0.25 µm
55	Helium	0.8 ml/min.	25 m	0.25 mm	SGE-HT8	0.25 µm
56	Helium	1.3 ml/min.	60 m	0.25 mm	DB-5, DB-1701	0.25 µm
57	Nitrogen	3 psi	30 m	0.53 mm	CPSIL-8CB	0.5 µm
58	Helium	1 ml/min.	25 m	0.20 mm	Ultra 2	0.33 µm
59	Nitrogen	8 ml/min.	29 m	0.32 mm	HP-5	0.25 µm
60	Nitrogen	0.6 ml/min.	30 m	0.32 mm	HP-5	0.25 µm
61	Nitrogen	2 ml/min.	30 m	0.25 mm	DB-5	0.25 µm
62	Nitrogen	0.7 ml/min.	60 m	0.25 mm	DB-XLB	0.25 µm
63	Helium	1.02 ml/min.	30 m	0.25 mm	HP-5MS	0.25 µm
65	Hydrogen	Not indic.	30 m	0.25 mm	HT8	Not indic.
66	Nitrogen	1.5 ml/min.	25 m	0.32 mm	5% diphenyl	1 µm
68	Nitrogen	30 ml/min.	30 m	0.32 mm	HP-5	0.25 µm
69	Helium	1 ml/min.	60 m	0.25 mm	TRB-5	0.4 µm
71	Nitrogen	Not indic.	30 m	0.25 mm	SPB-5	0.25 µm
72	Nitrogen	Not indic.	30 m	0.25 mm	ZB-5	0.25 µm
73	Nitrogen	1 ml/min.	30 m	0.25 mm	DB-5	0.25 µm
74	Nitrogen	1.1 ml/min.	30 m	0.25 mm	HP-5MS	0.25 µm
75	Helium	1 ml/min.	30 m	0.25 mm	DB-5MS	0.25 µm
76	Helium	1.5 ml/min.	30 m	0.25 mm	Elite 5MS	0.25 µm
77	Helium	1.7 ml/min.	30 m	0.25 mm	DB-5	0.25 µm
78	Helium	1 ml/min.	60 m	0.25 mm	BPX-DXN	0.25 µm
	Helium	1.5 ml/min.	60 m	0.25 mm	HT-8	0.25 µm
79	Nitrogen	0.9 ml/min.	30 m	0.32 mm	Zebron-1	0.50 µm
80	Helium	1.2 ml/min.	30 m	0.25 mm	MS-5	0.25 µm
81	Helium	160 KPa	60 m	0.25 mm	CPSIL-8CB MS	0.25 µm
82	Nitrogen	2 ml/min.	60 m	0.25 mm	DB-5	0.1 µm
83	Hydrogen	2.1465 ml/min.	30 m	0.25 mm	DB-5	1 µm
85	Hydrogen	1.6 ml/min.	50 m	0.2 mm	DB-5	0.33µm
86	Nitrogen	2 ml/min.	30 m	0.32 mm	CPSIL-8CB	0.25 µm
87	Hydrogen	4 ml/min.	30 m	0.25 mm	RTX-5MS	0.25 µm
88	Helium	61 ml/min.	30 m	0.32 mm	DB-1	0.25 µm

TABLE I.10. GC CONDITIONS – CHLORINATED PESTICIDES AND PCBS (cont.)

Lab.	Carrier gas		Column			
code No	Type	Flow rate	Length	I. diameter	Phase	Film thickness
89	Helium	1 ml/min.	30 m	0.25 mm	DB-1MS	0.25 µm
90	Helium	1.52 ml/min.	60 m	0.25 mm	DB-5MS	0.25µm
91	Nitrogen	1.2 ml/min.	30 m	0.25 µm	HP-5	Not indic.
92	Helium	2 ml/min.	30 m	0.32 mm	HP-5MS	0.25 µm
93	Argon/Methane	10 psi	30 m	0.32 mm	Rtx-5 Sil-MS	0.25 µm
94	Nitrogen	2 ml/min.	30 m	0.32 mm	Rtx-5MS, VF-35ms	0.25 µm

TABLE I.10. GC CONDITIONS – CHLORINATED PESTICIDES AND PCBS (cont.)

Lab.	Temperature programme (°C)										
code No	Init. temp (°C)	Isoth. (min.)	1st r.	to:	Isoth. (min.)	2nd r.	to:	Isoth. (min.)	3rd r.	to:	Isoth. (min.)
1	60	1	10	160	-	2	280	10	-	-	-
3	70	2.	3	260	25	-	-	-	-	-	-
	100	0.5	9	140	0.5	2	250	0.5	12	300	15
4	70	2	3	260	25	-	-	-	-	-	-
5	90	1	25	120	-	4	290	40	-	-	-
6	70	1	20	160	-	2	190	-	15	320	5
9	90	0.5	70	180	-	1.2	275	14.05	-	-	-
10	150	1	3	280	9	-	-	-	-	-	-
11	60	1	14	185	-	1.5	260	-	8	300	5
12	-	-	-	-	-	-	-	-	-	-	-
13	150	5	4	210	-	2	275	-	-	-	-
14	70	3	3	300	15	-	-	-	-	-	-
17	80	2	25	130	-	3	235	-	25	300	15
18	120	1	4	280	1	30	320	5.	-	-	-
19	60	3	20	180	1	5	250	3	10	270	50
20	150	5	5	300	5	-	-	-	-	-	-
21	45	0.5	35	240	9	5	280	13	10	310	30
22	100	1	30	180	2	10	300	2	-	-	-
25	90	2	30	180	-	1	200	-	10	300	6
26	90	3	30	215	30	5	275	35	-	-	-
27	60	1	3	250	15	-	-	-	-	-	-
28	185	1	5	230	20	-	-	-	-	-	-
29	70	2	15	210	1	6	250	1	15	280	25
30	90	2	25	180	2	1.5	220	2	3	275	15

TABLE I.10. GC CONDITIONS – CHLORINATED PESTICIDES AND PCBS (cont.)

Lab. code No	Temperature programme (°C)										
	Init. temp (°C)	Isoth. (min.)	1st r.	to :	Isoth. (min.)	2nd r.	to :	Isoth. (min.)	3rd r.	to :	Isoth. (min.)
31	60	4	20	200	-	4	280	-	10	300	5
32	80	1	9.5	280	4	-	-	-	-	-	-
34	80	1	3	280	12	-	-	-	-	-	-
35	Not indic.	-	-	-	-	-	-	-	-	-	-
36	100	1	10	240	15	-	-	-	-	-	-
37	150	2	3	250	25	-	-	-	-	-	-
38	70	2	20	160	-	6	260	-	10	300	-
40	175	2	10	275	-	-	-	-	-	-	-
41	75	3	15	150	-	2	260	-	20	300	10
	75	3	15	150	-	2	260	-	20	300	10
42	80	-	30	180	4.	25	220	-	10	260	5
43	80	2	10	160	-	4	280	5	-	-	-
44	150	5	10	300	2	-	-	-	-	-	-
45	110	-	4	240	50	-	-	-	-	-	-
	100	-	4	240	50	-	-	-	-	-	-
46	215	54	5	225	10	55	280	22	-	-	-
	80	2	25	180	4	5	255	15	15	300	12
47	180	5	15	220	10	10	260	8	-	-	-
48	70	1	20	160	-	2	190	-	15	300	5
49	100	1	5	140	1	1.5	250	1	10	300	10
50	90	1	15	160	2	20	170	-	-	-	-
	100	0.5	200	140	Not ind.	Not ind.	200	13	4	270	-
51	60	-	15	150	-	1	250	-	10	330	6
52	70	1	30	230	0.1	4	270	10	-	-	-
53	70	2	3	260	15	-	-	-	-	-	-
54	125	-	8	300	5	-	-	-	-	-	-
55	135	1.5	15	175	-	4	320	15	-	-	-
56	60	2	20	200	20	5	230	10	5	290	20
57	150	2	6	280	7	-	-	-	-	-	-
58	55	2	20	210	-	10	285	2	-	-	-
59	70	3	2.9	181	-	3	240	-	6	260	-
60	90	3	10	180	5	3	250	10	2	275	2
61	80	-	20	180	-	5	250	2	30	300	15.33
62	100	2	30	200	10	5	250	10	5	300	10
63	60	1	12	150	-	7	230	-	5	300	-

TABLE I.10. GC CONDITIONS – CHLORINATED PESTICIDES AND PCBS (cont.)

Lab. code No	Temperature programme (°C)										
	Init. temp (°C)	Isoth. (min.)	1st r.	to :	Isoth. (min.)	2nd r.	to :	Isoth. (min.)	3rd r.	to :	Isoth. (min.)
65	Not indic.	-	-	-	-	-	-	-	-	-	-
66	70	1	4	260	10	10	270	5	-	-	-
68	60	1	40	180	1	3	230	10	-	-	-
69	90	3	30	215	40	5	275	30	-	-	-
71	110	2	4	240	-	-	-	-	-	-	-
72	120	1	10	200	5	3	300	10	-	-	-
73	130	-	4	260	5	-	-	-	-	-	-
74	70	-	10	150	-	1.5	250	-	10	300	-
75	75	3	15	150	-	2	260	-	20	300	1
76	180	-	7	230	10	15	250	2	-	-	-
77	100	1	5	140	1	2	250	1	10	300	5
78	100	1	10	270	5	30	320	6	-	-	-
	120	-	20	180	-	2	260	-	5	300	4
79	205	-	2	235	4	2	280	-	-	-	-
80	70	2	3	260	30	-	-	-	-	-	-
81	90	1	40	210	0.5	5.6	230	10	5.6	275	18
82	80	1	25	205	15	17.5	240	-	2	290	10
83	70	1	40	170	-	1.5	240	-	-	300	11
85	90	2	15	165	-	2	285	23	-	-	-
86	180	2	1	210	-	15	310	-	-	-	-
87	60	2	20	140	3	2.5	270	12	-	-	-
88	70	1	20	160	-	2	190	-	15	320	10
89	80	2	20	160	10	2	260	10	-	-	-
90	110	1	25	210	-	3	310	-	5	320	10
91	70	2	3	260	25	-	-	-	-	-	-
92	70	2	25	150	-	3	200	-	8	280	10
93	120	5	4	210	-	10	320	10	-	-	-
94	70	2	25	150	-	3	200	-	8	280	10

TABLE I.10. GC CONDITIONS – CHLORINATED PESTICIDES AND PCBS (cont.)

Lab. code No	Detector temp. (°C)	Make-up gas	Make-up flow	Recorder/integrator
1	300	Nitrogen	Not indic.	HP Chemstation
3	300	Nitrogen	58.8 ml/min.	Agilent Chemstation
	310	Nitrogen	59.5 ml/min.	Agilent Chemstation
4	300	Nitrogen	60 ml/min.	Chemstation
5	300	Nitrogen	29 ml/min.	Galaxie Workstation
6	230	N.A.	N.A.	Not indic.
9	Not indic.	Nitrogen	45 ml/min.	PC
10	300	Nitrogen	30 ml/min.	Galaxie Workstation
11	310	Helium	50 ml/min.	Not indic.
12	-	-	-	-
13	Not indic.	Nitrogen	20 ml/min.	Star Chromato. Workstation
14	300	Nitrogen	60 ml/min.	Agilent Chemstation
17	Source: 230	N.A.	N.A.	MSD Chemstation
18	230	N.A.	N.A.	Agilent Chemstation/Xcalibur
19	325	Nitrogen	60 ml/min.	Not indic.
20	320	Nitrogen	25 ml/min.	Star Chromato. Workstation
21	315	Nitrogen	30 ml/min.	Jasco Borwin
22	250	N.A.	N.A.	Not indic.
25	320	Nitrogen	60 ml/min.	HP3396 series III
26	360	Not indic.	Not indic.	Not indic.
27	300	Nitrogen	25 ml/min.	Star Workstation
28	300	Nitrogen	25 ml/min.	Galaxie Workstation
29	Not indic.	N.A.	N.A.	Agilent Chemstation
30	300	Argon/Methane	60 ml/min.	Not indic.
31	320	Nitrogen	30 ml/min.	Chemstation
32	330	Nitrogen	35 ml/min.	Windows Chromcard
34	320	Nitrogen	30 ml/min.	Total Chrom Navigator
35	Not indic.	Not indic.	Not indic.	Not indic.
36	300	Nitrogen	28 ml/min.	Computer
37	300	Nitrogen	25 ml/min.	Clarity Chromato. software
38	Not indic.	Nitrogen	60 ml/min.	Not indic.
40	300	Nitrogen	60 ml/min.	HP Chemstation
41	320	Nitrogen	30 ml/min.	Agilent Chemstation
	Not indic.	Not indic.	Not indic.	Agilent Chemstation
42	300	Nitrogen	30 ml/min.	Not indic.

TABLE I.10. GC CONDITIONS – CHLORINATED PESTICIDES AND PCBS (cont.)

Lab. code No	Detector temp. (°C)	Make-up gas	Make-up flow	Recorder/integrator
43	300	Argon/Methane	150 ml/min.	Chromatog (Leco)
44	300	Nitrogen	45 ml/min.	Agilent Chemstation
45	270	Nitrogen	30 ml/min.	Not indic.
	270	Nitrogen	30 ml/min.	Not indic.
46	300	Nitrogen	60 ml/min.	Not indic.
	Not indic.	-	-	Not indic.
47	260	Nitrogen	30 ml/min.	Chromateck Analytic 2.5
48	270	N.A.	N.A.	Software computer
49	300	Argon/Methane	40 ml/min.	Agilent Chemstation
50	-	-	-	HP Chemstation
	-	-	-	HP Chemstation
51	330	Nitrogen	30 psig	Not indic.
52	-	-	-	Xcalibur 1.4
53	300	Nitrogen	28 ml/min.	Not indicated
54	300	Not indic.	100 ml/min.	Agilent Chemstation
55	290	-	-	Xcalibur
56	320	Argon/Methane	60 ml/min.	Not indic.
57	Not indic.	Not indic.	Not indic.	PC
58	Not indic.	Nitrogen	60 ml/min.	HP
59	300	Nitrogen	25 ml/min.	Chemstation
60	300	Nitrogen	30 ml/min.	Electronic
61	300	Not indic.	Not indic.	Not indic.
62	320	Nitrogen	80 ml/min.	Agilent Chemstation
63	Not indic.	Helium	Not indic.	Software ChemSolution
65	Not indic.	Argon/Methane	Not indic.	Not indic.
66	300	Nitrogen	60 ml/min.	Chrom-Card
68	350	Nitrogen	30 ml/min.	Agilent Chemstation
69	365	Nitrogen	50 ml/min.	Not indic.
71	350	Nitrogen	30 ml/min.	Unichrom 97
72	Not indic.	Nitrogen	30 ml/min.	Not indic.
73	300	Nitrogen	40 ml/min.	Shimadzu Class-VP
74	Not indic.	Nitrogen	40 ml/min.	Chemstation
75	Not indic.	N.A.	N.A.	Not indic.
76	330	Nitrogen	30 ml/min.	Total Chrom Navigator
77	300	Nitrogen	60 ml/min.	HP Chemstation

TABLE I.10. GC CONDITIONS – CHLORINATED PESTICIDES AND PCBS (cont.)

Lab. code No	Detector Temp. (°C)	Make-up gas	Make-up flow	Recorder/integrator
78	300	N.A.	N.A.	Computer inst. Software
	260	N.A.	N.A.	Computer inst. Software
79	320	Not indicated	30 ml/min.	Not indic.
80	300	Helium	60 ml/min.	Not indic.
81	320	Nitrogen	160 Kpa	Eurochrom
82	310	Nitrogen	45 ml/min.	Software GC Solution
83	320	Nitrogen	60 ml/min.	EZChrom Elite
85	300	Argon/Methane	Not indicated	Chemstation
86	320	Nitrogen	28 ml/min.	Star Chromato. Workstation
87	300	Argon/Methane	40 ml/min.	Chrom-Card
88	230	Helium	Not indicated	Not indic.
89	280	Nitrogen	59 ml/min.	Chemstation
90	280	N.A.	N.A.	Chemstation
91	300	Nitrogen	60 ml/min.	HP Chemstation
92	300	Nitrogen	60 ml/min.	Chemstation
93	340	Argon/Methane	32 psi	Clarity software
94	310	Nitrogen	60 ml/min.	Chemstation

TABLE I.11. POLYBROMINATED DIPHENYL ETHERS – TREATMENT OF SAMPLES

Lab. code No	Moisture correction	Extraction procedure used			Internal standard	Clean-up procedure	Fractionation procedure	Method for confirmation
		Instrument	Solvent	Time				
3	Yes	Microwave	Hexane/Acetone (90:10)	30 min.	$^{13}C_{12}$-BDE 77	Sulfuric acid	Alumina, Silica	Use of 2 diff.columns Std. ret. times, SIM
17	No	Sonication	Hex./Acetone/Toluene (2:1:1)	Not indic.	CB 185	GPC Florisil	GPC Bio Beads SX-3	Std. retention times, SIM
18	Not indic.	Selected ASE	$MeCl_2$/Iso-hexane (10:90)	2x5 min.	$^{13}C_{12}$-BDE 99	Acid-Silica	N.A.	Std. retention times, SIM
43	No	PLE	Hexane/$MeCl_2$ (50:50)	Not indic.	$^{13}C_{12}$-BDEs 28,47,99,154, 153,183,197,207,209	Silica multilayer col., carbon column	Silica multilayer col. carbon column	HRMS-EI Std. retention times
51	No	Column	$MeCl_2$	45 min.	CBs 29,155,204 d-*pp'*DDD	GPC	Silica	Use of 2 diff.columns
52	Yes	Soxhlet	Hexane/Acetone (3:1)	3 hrs.	$^{13}C_{12}$-BDEs 28,47,99,153, 154,183	Multilayer column Silica/Florisil	None	Std. retention times, MS/MS
55	Yes	PSE	Hexane/Acetone (1:1)	Not indic.	$^{13}C_{12}$-BDEs Mix	Multilayer column Silica/Florisil	Multilayer column Silica/Florisil	HRMS
56	Yes	ASE	Toluene	Not indic.	BDE 139	GPC, Silica	None	Std. retention times, SIM
75	No	Sonication	Hexane	Not indic.	CB 103	Silica/Alumina	None	Std. ret. times, SIM
78	Yes	Soxhlet	Hexane/Acetone (1:1)	24 hrs.	$^{13}C_{12}$-BDEs Mix	GPC , Silica Acid/Silica	None	Std. retention times, HRMS
85	Yes	Soxhlet	Hexane/Acetone (1:1)	6 hrs.	CB 200	Alumina	Silica	Std. retention times, SIM
89	Yes	HSSE	Hexane/Acetone (1:1)	30 min.	$^{13}C_{12}$-BDE 139	GPC Bio-Beads	Silica	Std. retention times, SIM
90	Yes	Homogenization LLE	Acetonitrile Hex./Ethyl acetate (3:2)	Not indic.	$^{13}C_{12}$-BDEs 28,47,99,100, 153,154,183	Silica/NH_2 column	None	GC-MS/SIM Isotope dil. int.std.

TABLE I.12. GC CONDITIONS - POLYBROMINATED DIPHENYL ETHERS

Lab. code No	Instrument type	Detector type	Injection technique	Injector temp. (°C)	Injection volume	Splitter time
3	HP 6890	ECD-^{63}Ni	Pulsed Splitless	250	1 µl	0.8 min.
	Agilent 5975	MSD	Pulsed Splitless	270	1 µl	0.8 min.
17	Agilent 5975	MS	Pulsed Splitless	250	5 µl	1.5 min.
18	Agilent 5975C	MSD	Splitless	300	3 µl	Not indic.
43	HP GC7890-Waters HRMS	HRMS	Splitless	270	0.5 µl	Not indic.
51	Agilent 6890N	ECD-^{63}Ni	On-column	60	1 µl	Not indic.
52	Thermo Electron Polaris Q	MS	PTV	80-270	2 µl	1 min.
	BDE209:Thermo Electron 2000	ECD-^{63}Ni	On-column	80	2 µl	-
55	Br_3-Br_7: Finnigan MAT 95XP	HRMS	Splitless	300	2 µl	-
	Br_7-Br_{10}:Finnigan MAT 95XP	HRMS	Splitless	300	2 µl	-
56	Agilent 5973	MSD	Pulsed Splitless	250	2 µl	-
75	Agilent 5975C	MS	Split	270	2 µl	1.5 min.
78	Thermo DFS	HRMS	PTV	120-300	1 µl	1 min.
85	Agilent GC-NCI MS	MSD	Splitless	270	2 µl	Not indic.
89	Agilent GC/MS	MSD	Pulsed Splitless	260	2 µl	1.5 min.
	Br_8-Br_{10}: Agilent GC/MS	MSD	Pulsed Splitless	260	2 µl	1.5 min.
90	Agilent 5975C	MSD	Pulsed Splitless	320	1 µl	2 min.

TABLE I.12. GC CONDITIONS - POLYBROMINATED DIPHENYL ETHERS (cont.)

Lab.	Carrier gas		Column			
code No	Type	Flow rate	Length	I. diameter	Phase	Film thickness
3	Helium	1.1 ml/min.	30 m	0.25 mm	HP - 5	0.25 µm
	Helium	1.6 ml/min.	30 m	0.25 mm	DB-XLBMS	0.25 µm
17	Helium	1 ml/min.	30 m	0.25 mm	HP - 5MS	0.25 µm
18	Helium	1 ml/min.	30 m	0.25 mm	HP - 5MS	0.25 µm
41	Helium	2 ml/min.	30 m	0.25 mm	HP-5MS	0.25 µm
43	Helium	0.9 ml/min.	15 m	0.25 mm	DB-5HT	0.10 µm
51	Hydrogen	2.9 ml/min.	60 m	0.25 mm	DB-1, DB-5	0.25 µm
52	Helium	1 ml/min.	60 m	0.25 mm	RTX-5MS	0.25 µm
	Helium	1.7 ml/min.	7 m	0.32 mm	RTX-5MS	0.32 µm
55	Helium	0.8 ml/min.	25 m	0.25 mm	SGE-HT8	0.25 µm
	Helium	1.1 ml/min.	4 m	0.25 mm	SGE-HT5	0.1 µm
56	Helium	2.7 ml/min.	30 m	0.25 mm	DB-5MS	0.25 µm
75	Helium	1 ml/min.	30 m	0.25 mm	DB-5MS	0.25 µm
78	Helium	1 ml/min.	15 m	0.25 mm	SolGel 1MS	0.1 µm
85	Helium	2 ml/min.	50 m	0.25 mm	DB-5	0.2 µm
89	Helium	1 ml/min.	30 m	0.25 mm	DB-1MS	0.25 µm
	Helium	1 ml/min.	15 m	0.25 mm	DB-1MS	0.1 µm
90	Hydrogen	1.01 ml/min.	15 m	0.25 mm	ZB-HT	0.25 µm

TABLE I.12. GC CONDITIONS - POLYBROMINATED DIPHENYL ETHERS (cont.)

Lab.	Temperature programme (°C)										
code No	Init.Temp (°C)	Isoth. (min.)	1st r.	to :	Isoth. (min.)	2nd r.	to :	Isoth. (min.)	3rd r.	to :	Isoth. (min.)
3	70	-	15	210	10	2	285	25	-	-	-
	130	1	12	154	-	2	210	-	3	295	15
17	80	2	25	130	-	3	235	-	25	300	15
18	70	1	30	170	-	8	300	5	-	-	-
41	75	3	15	150	-	2	260	-	20	300	10
43	110	-	40	200	-	10	330	5.5	-	-	-
51	60	-	15	150	-	1	250	-	10	330	6
52	80	1.5	30	220	0.1	4	280	25	-	-	-
	80	1	15	280	3	-	-	-	-	-	-
55	155	2	6	215	-	-	-	-	-	320	60
	145	2	8	220	-	-	-	-	-	320	20
56	60	2	20	120	4	10	300	28	-	-	-
75	100	1	15	150	-	5	260	-	10	300	15
78	100	1	10	300	5	-	-	-	-	-	-
85	90	2	30	200	-	2.5	295	31.33	-	-	-
89	80	2	10	215	-	3	270	-	-	-	-
	80	2	10	215	-	3	270	-	-	-	-
90	100	2	15	210	-	5	320	5	-	-	-

TABLE I.12. GC CONDITIONS - POLYBROMINATED DIPHENYL ETHERS (cont.)

Lab. code No	Detector temp. (°C)	Make-up gas	Make-up flow	Recorder/integrator
3	300	Nitrogen	60 ml/min.	Agilent Chemstation
	Source: 280	N.A.	N.A.	Agilent Chemstation
17	Source: 230	N.A.	N.A.	MSD Chemstation
18	230	N.A.	N.A.	Agilent Chemstation/XCalibur
41	Not indic.	Not indic.	Not indic.	Agilent Chemstation
43	280	None	-	Not indic.
51	330	Nitrogen	30 psig	Turbochrom
52	Source: 250	N.A.	N.A.	Xcalibur
	310	Nitrogen	30 ml/min.	Not indic.
55	330	N.A.	N.A.	Xcalibur
	330	N.A.	N.A.	Xcalibur
56	Source: 230	Ionis.gas: Methane	40%	Not indic.
75	Not indic.	N.A.	N.A.	Not indic.
78	300	N.A.	N.A.	Computer instr. Software
85	200	Ionis.gas: Methane	40 units	Chemstation
89	320	N.A.	N.A.	Chemstation
	320	N.A.	N.A.	Chemstation
90	Not indic.	N.A.	N.A.	Chemstation

TABLE I.13. PETROLEUM HYDROCARBONS – TREATMENT OF SAMPLES

Lab. code	Moisture No correction	Extraction procedure used			Internal standard	Clean-up procedure	Fractionation procedure	Method for confirmation
		Instrument	Solvent	Time				
2	No	Sonication	$MeCl_2$/Acetone	Not indic.	Not indic.	Alumina/Silica	Not indic.	HPLC-Fl HPLC-DAD
3	Yes	Microwave	Methanol	30 min.	4 deuterated compounds Hexamethylbenzene, Cadalene	Saponification with KOH	Silica/Alumina 2 fractions	Std. retention times, GC-MS/SIM
7	Yes	Ref.Method 20 UNEP	Hexane/$MeCl_2$ (1:1)	Not indic.	*n*-octadecene, ortho-terphenyl	Copper	Silica/Alumina 3 fractions	GC-MS, SIM
8	Yes	EPA 8100 method	$MeCl_2$	Not indic.	2-Fluorobiphenyl	EPA 3630C method Silica gel	GC	Std. retention times
11	Yes	PSE (110 °C)	Cyclohexane/ Ethyl Acetate (2:1)	3x10 min.	5 deuterated PAHs, $C_{16}d_{34}$, $C_{30}d_{62}$	GPC Bio-Beads S-X3	Alumina	Std. retention times, GC-MS
12	Not indic.	Sonication	Hexane/Acetone (1:1)	2x30 min.	Not indic.	Florisil	2 fractions	Not indic.
14	Yes	Microwave	Methanol	Not indic.	$C_{19}d_{40}$, $C_{32}d_{66}$, Naphthalene-d_8 Hexamethylbenzene, Cadalene	Yes	Silica/Alumina 2 fractions	Std. retention times
15	Yes	Sonication	$MeCl_2$	2x30 min.	6 deuterated PAHs	SPE-Silica	SPE-Silica	Std. retention times + MS spectra
16	Yes	Soxhlet	$MeCl_2$	24 hrs.	5 deuterated PAHs	Alumina	Silica/Alumina 2 fractions	GC-MS, SIM
17	Yes	Sonication	Hex./Acetone/Toluene (2:1:1)	Not indic.	2,4'DDT-d_8	GPC Florisil, silica gel	GPC Bio Beads SX-3	Std. retention times, SIM

TABLE I.13. PETROLEUM HYDROCARBONS – TREATMENT OF SAMPLES (cont.)

Lab. code	Moisture No correction	Extraction procedure used			Internal standard	Clean-up procedure	Fractionation procedure	Method for confirmation
		Instrument	Solvent	Time				
19	Yes	Soxhlet	Hexane	8 hrs.	Not indicated	Silica/Alumina	Silica/Alumina 2 fractions	Std. retention times
20	Yes	Microwave	$MeCl_2$	Not indic.	None	Silica	Silica 2 fractions	Not indic.
21	No	Sonication	Hexane	90 min.	Picene	Filtration	None	GC-MS
23	Yes	Soxhlet	Hexane/Acetone (3:1)	Not indic.	2 Methyl Chrysene	Alumina	Not indicated	Not indic.
24	No	MOOPAM method	Methanol, Hexane	Not indic.	Decene, 9,10 Dihydroanthracene	Silica/Alumina	Silica/Alumina 2 fractions	GC-MS
25	No	Soxhlet	Hexane/$MeCl_2$	8 hrs.	None	Silica/Alumina	Silica/Alumina 2 fractions	Std. retention times
29	No	Soxhlet	Hexane/Acetone (1:1)	5 hrs.	Phenanthrene-d_{10}, Pyrene-d_{10}	Florisil	None	Std. retention times, SIM
32	Yes	Microwave	Hexane/Acetone (1:1)	Not indic.	None	Copper	Silica/Alumina / Florisil 2 fractions	Std. retention times
33	Yes	Soxhlet Ref.Meth.20 UNEP	Methanol	8 hrs.	*n*-octadecene, *n*-C_{32} 9,10 Dihydroanthracene	Saponification with KOH	Silica/Alumina 2 fractions	Std. retention times
34	No	Saponification + LLE	Iso-Hexane	3hrs 45m	7 deuterated PAHs	HPLC	HPLC	GC-MSD
39	Not indic.	LLE	Methanol, Hexane	Not indic.	Acenaphthylene-d_{10}, Fluoranthene-d_{10}, Perylene-d_{12}	Saponification with KOH	Silica/Alumina 3 fractions	SIM

TABLE I.13. PETROLEUM HYDROCARBONS – TREATMENT OF SAMPLES (cont.)

Lab. code No	Moisture correction	Extraction procedure used			Internal standard	Clean-up procedure	Fractionation procedure	Method for confirmation
		Instrument	Solvent	Time				
41	No	Soxhlet	Hexane/$MeCl_2$ (1:1)	8 hrs.	*n*-hexadecene,*n*-eicosene, 5 deuterated PAHs	Silica/Alumina HPLC	Silica/Alumina 2 fractions	Std. retention times, SIM
46	Yes	Soxhlet	$MeCl_2$/Acetone	Not indic.	None	Alumina	GPC	Not indic.
47	Yes	Shaking	Hexane	3x20 min.	Benz[a]anthracene	None	None	Std. retention times
48	Yes	Homogenization LLE	Acetonitrile Hexane	2x10 min.	$^{13}C_{12}$-DDT Anthracene-d_{10}, Perylene-d_{12}	GPC Bio-Beads SX-3 Silica	GPC:2 fractions Silica: 2 fractions	Not indic.
49	Yes	Soxhlet	Hexane,$MeCl_2$	16 hrs.	5 deuterated PAHs	Silica/Alumina	HPLC	Std. retention times, SIM
50	No	Saponification	Cyclohexane, Methanol	Not indic.	Acenaphthene-d_{10}, Chrysene-d_{10} Phenanthrene-d_{10}, Perylene-d_{12}	Silica	1 fraction	Std. retention times, SIM
54	Yes	Soxhlet,Saponification MOOPAM method	Methanol, Hexane, $MeCl_2$	8 hrs + 2 hrs.	*n*-C21, Acenaphthene	-	Silica/Alumina 2 fractions	Std. retention times, SIM
55	No	Continuer flow extractor 90 °C	Toluene/Acetone (9:1)	Not indic.	Mixture Cil ES-2044	Multilayer column Alumina/Silica	Multilayer column 2 fractions	Std. retention times, MS
59	No	Soxhlet	Hexane/$MeCl_2$ (1:1)	8 hrs.	$C_{19}d_{40}$, $C_{32}d_{66}$ Cadalene	Silica/Alumina	Silica/Alumina 3 fractions	Std. retention times
61	No	ASE	Hexane/Acetone (1:1)	Not indic.	5 deuterated PAHs	Silica/Florisil	Silica/Florisil 1 fraction	Not indicated
62	Yes	Soxhlet	Hexane/Acetone (1:1)	24 hrs.	2-fluorobiphenyl	Copper	Silica/Alumina 1 fraction	Std. retention times, SIM

TABLE I.13. PETROLEUM HYDROCARBONS – TREATMENT OF SAMPLES (cont.)

Lab. code	Moisture No correction	Extraction procedure used			Internal standard	Clean-up procedure	Fractionation procedure	Method for confirmation
		Instrument	Solvent	Time				
63	No	Soxhlet	$MeCl_2$/Acetone (1:1)	8 hrs.	6 deuterated PAHs	Silica/Alumina	None	GC-MS/SIM
64	No	Soxhlet	Methanol	Not indic.	$C_{19}d_{40}$, $C_{32}d_{66}$, Hexamethylbenzene, Cadalene	Not indic.	Silica/Alumina	Std. retention times
65	Not indic.	Not indic.	Methanolic kali - Hexane	Not indic.	6 Me-Chrysene	Alumina	Not indicated	Not indic.
66	Yes	Soxhlet	Hexane/$MeCl_2$ (1:1)	8 hrs.	Pyrene d_{10}	Silica/Alumina	Silica/Alumina 2 fractions	Not indic.
67	Yes	Soxhlet	Hexane	Not indic.	None	Silica/Alumina	Silica/Alumina 3 fractions	-
70	No	Microwave	Methanol	Not indic.	$C_{32}d_{66}$, Cadalene	None	Silica/Alumina	GC-MS
72	No	Sonication, LLE	Cyclohexane, Methanol	Not indic.	None	Silica	HPLC	External standards
75	No	Sonication	Hexane	Not indic.	5 deuterated PAHs	Silica/Alumina	None	GC-MS/SIM
80	No	Sonication EPA3550 method	$MeCl_2$/Acetone (1:1)	Not indic.	None	None	None	EPA method 8270

TABLE I.13. PETROLEUM HYDROCARBONS – TREATMENT OF SAMPLES (cont.)

Lab. code No	Moisture correction	Extraction procedure used			Internal standard	Clean-up procedure	Fractionation procedure	Method for confirmation
		Instrument	Solvent	Time				
81	Yes	Sonication	Hexane/Acetone (1:1)	6x15 min.	None	Florisil	None	Std retention times, GC-MS
84	No	Saponification	Hexane	Not indic.	None	Florisil	None	Not indic.
86	Yes	Microwave	Hexane/Acetone (1:1)	20 min.	None	Silica	2 fractions	Std retention times, GCMS
88	No	Soxhlet	Hexane/Acetone (1:1)	6 hrs.	Not indic.	Silica	Silica	Std. retention times, GCMS
90	Yes	Homogenization LLE	Actonitrile Hex./Ethyl acetate (3:2)	Not indic.	Phenanthrene-d_{10}, Pyrene-d_{10} Chrysene-d_{12}	Silica/NH_2 column	None	Std. retention times, SIM
91	No	Soxhlet	Methanol	8 hrs.	Acenaphthene-d_{10}, Chrysene-d_{10} Phenanthrene-d_{10}	Silica/Alumina	Silica/Alumina 3 fractions	GC-MS/SIM
93	Yes	Solid phase microextraction	Acetonitrile	Not indic.	Anthracene	Florisil	C-18	Standard addition

TABLE I.14. INSTRUMENT TYPE AND GC CONDITIONS – PETROLEUM HYDROCARBONS

Lab. code No	Instrument type	Detector type	Injection technique	Injector temp. (°C)	Injection volume	Splitter closing time
2	HPLC	-	-	-	-	-
3	Aliph: Fisons 8000	FID	On-column	30	1 µl	N.A.
	Arom: Agilent 5975	MSD	Pulsed Splitless	270	1 µl	1 min.
7	Shimadzu QP5050A	MSD	Splitless	260	2 µl	2 min.
8	HP 5890	FID	Split	250	1 µl	2 min.
11	Not indicated	MS	Splitless	280	1 µl	0.8 min.
12	HPLC	UV-DAD	-	-	-	-
14	Chrompack CP900	FID	Splitless	270	1 µl	-
15	Agilent 5975B	MSD	Splitless	300	1 µl	-
16	Agilent 5975C	MSD	Pulsed Splitless	300	1 µl	-
17	Agilent 5975	MS	Pulsed Splitless	250	5 µl	1.5 min.
19	Varian HPLC	UVF	-	-	-	-
20	Aliph: Varian 3800	FID	AutoSampler	300	1 µl	Not indic.
	Arom: Varian HPLC	FLD	-	-	-	-
21	Shimadzu HPLC-10AD	UV	-	-	-	-
23	HPLC	Not indic.	-	-	-	-
24	Agilent 6890N GCT Micromass	MS	Splitless	290	1 µl	-
25	HP 5890	FID	Split	320	1 µl	0.75 min.
29	Agilent 5973	MS	Splitless	230	1 µl	2 min.
32	HPLC PE 200	Not indic.	-	-	-	-
33	HP 5890 series II	FID	Split	250	1 µl	1.5 min.
34	HP 5973	MSD	On-column	Track oven	1 µl	-
39	Agilent 6890	MSD	Splitless	250	1 µl	Not indic.
41	Aliph: Agilent 6890	FID	Splitless	300	1 µl	1.25 min.
	Arom: Agilent 5973N	MS	Splitless	300	1 µl	1.25 min.
46	HPLC	Fluorescence	-	-	-	-
47	HPLC PE 200	FLD	-	-	-	-
48	Shimadzu QP2010	MS	Splitless	300	1 µl	30 min.
49	Agilent	MS	Splitless	300	2 µl	1 min.
50	Agilent 5975	MSD	Splitless	290	2 µl	1 min.
54	Aliph: Agilent 6890N	FID	Splitless	300	1 µl	Not indic.
	Arom: Agilent 6873MS	MS	Splitless	310	3 µl	-
55	ThermoFinnigan Polaris Q	MS	Splitless	260	1 µl	0.5 min.

TABLE I.14. GC CONDITIONS – PETROLEUM HYDROCARBONS (cont.)

Lab. code No	Instrument type	Detector type	Injection technique	Injector temp. (°C)	Injection volume	Splitter closing time
59	Agilent 6890N	FID	Splitless	275	1 µl	Not indic.
61	Agilent 5975B	MSD	Splitless	280	1 µl	Not indic.
62	Agilent 5973N	MSD	Splitless	280	2 µl	0.75 min.
63	Shimadzu QP2010S	MSD	Splitless	Not indic.	1 µl	0.75 min.
64	Agilent 6890	FID	On-column	Track oven	1 µl	-
65	HPLC	Fluorescence	-	-	-	-
66	Fisons MD800	MS	On-column	-	0.2 µl	-
70	Agilent 5973	MSD	Splitless	270	1 µl	Not indic.
72	HPLC	FLD	-			
75	Agilent 5973	MS	Split	300	2 µl	1.5 min.
80	Agilent 6890N	MS	Splitless	250	1 µl	0.8 min.
81	Varian Saturn 2100T	MS	Split	310	1µl	2 min.
84	HPLC	FLD	-	-	-	-
86	Varian 3800	FID	Splitless	280	1 µl	Not indic.
88	Shimadzu QP2010	MS	Splitless	250	1 µl	Not indic.
90	Shimadzu QP2010	MS	Splitless	280	2 µl	2 min.
91	HP 6890	MS	Split	280	1 µl	Not indic.
93	HPLC Waters 600	Fluorescence	-	-	-	-

TABLE I.14. GC CONDITIONS – PETROLEUM HYDROCARBONS (cont.)

Lab.	Carrier gas		Column			
code No	Type	Flow rate	Length	I. diameter	Phase	Film thickness
3	Helium	1.9 ml/min.	30 m.	0.32 mm	HP-5 MS	0.25 µm
	Helium	1.6 ml/min.	30 m.	0.25 mm	DB-XLB MS	0.25 µm
7	Helium	1.3 ml/min.	30 m.	0.25 mm	ZB-1	0.25 µm
8	Helium	6 ml/min.	30 m.	0.53 mm	SPB	1.5 µm
11	Helium	0.6 ml/min.	20 m	0.18 mm	TRB-5MS	0.18 µm
14	Nitrogen	1.66 ml/min.	30 m	0.25 mm	DB-5MS	0.25 µm
15	Helium	1.5 ml/min.	30 m	0.25 mm	DB-5MS	0.25 µm
16	Helium	0.8 ml/min.	30 m	0.25 mm	HP-5MS	0.25 µm
17	Helium	1 ml/min.	30 m	0.25 mm	HP-5MS	0.25 µm
20	Nitrogen	3 ml/min.	15 m	0.25 mm	CPSIL-5CB	0.25 µm
24	Helium	Not indic.	30 m	0.25 mm	VF-5MS	0.25 µm
25	Helium	20 ml/min.	30 m	0.25 mm	HP-5	0.20 µm
29	Helium	2 ml/min.	60 m	0.25 mm	HP-1MS	0.25 µm

TABLE I.14. GC CONDITIONS – PETROLEUM HYDROCARBONS (cont.)

Lab.	Carrier gas		Column			
code No	Type	Flow rate	Length	I. diameter	Phase	Film thickness
33	Nitrogen	1 ml/min.	25 m	0.32 mm	HP Ultra2	0.17 µm
34	Helium	0.7 ml/min.	30 m	0.25 mm	HP-5MS	0.25 µm
39	Helium	1 ml/min.	25 m	0.25 mm	HP-5MS	0.25 µm
41	Hydrogen	2 ml/min.	30 m	0.25 mm	5% diphenyl	0.25 µm
	Helium	1.2 ml/min.	30 m	0.25 mm	5% diphenyl	0.25 µm
48	Helium	1 ml/min.	30 m	0.25 mm	DB-5MS	0.25 µm
49	Helium	1 ml/min.	30 m	0.25 mm	DB-5MS	0.25 µm
50	Helium	1.3 ml/min.	30 m	0.25 mm	HP 5MS	0.25 µm
54	Helium	1.5 ml/min.	30 m	0.32 mm	DB-5MS	0.25 µm
	Helium	1.2 ml/min.	30 m	0.32 mm	DB-35MS	0.25 µm
55	Helium	1 ml/min.	30 m	0.25 mm	BPX-5	0.25 µm
59	Nitrogen	8 ml/min.	29 m	0.32 mm	HP-5	0.25 µm
61	Helium	1 ml/min.	30 m	0.25 mm	DB-5MS	0.25 µm
62	Helium	1.2 ml/min.	30 m	0.25 mm	DB-5MS	0.25 µm
63	Helium	1.02 ml/min.	Not indic.	Not indic.	Not indic.	Not indic.
64	Helium	1 ml/min.	25 m	0.32 mm	Ultra-2	0.17 µm
66	Helium	1 ml/min.	30 m	0.326 mm	HP-5MS	0.25 µm
70	Helium	1 ml/min.	30 m	0.25 mm	HP-5MS	0.25 µm
75	Helium	0.7 ml/min.	30 m	0.25 mm	DB-5MS	0.25 µm
80	Helium	1.2 ml/min.	30 m	0.25 mm	DB-5MS	0.25 µm
81	Helium	2.2 ml/min.	60 m	0.25 mm	VF-5MS	0.25 µm
86	Nitrogen	2 ml/min.	30 m	0.32 mm	DB-5	0.25 µm
88	Helium	51.4 ml/min.	30 m	0.32 mm	DB-1	0.25 µm
90	Helium	0.98 ml/min.	30 m	0.32 mm	DB-5MS	0.25 µm
91	Helium	1.2 ml/min.	30 m	0.25 mm	HP-5MS	0.25 µm

TABLE I.14. GC CONDITIONS – PETROLEUM HYDROCARBONS (cont.)

Lab. code No	Temperature programme (°C)													
	Init. temp (° C)	Isoth. (min.)	1st r.	to :	Isoth. (min.)	2nd r.	to :	Isoth. (min.)	3rd r.	to :	Isoth. (min.)	4th r.	to :	Isoth. (min.)
3	60	-	3.5	300	22	-	-	-	-	-	-	-	-	-
	60	1	10	100	-	3.5	290	20	-	-	-	-	-	-
7	70	2	5	300	12	-	-	-	-	-	-	-	-	-
8	35	2	10	265	20	10	280	15	-	-	-	-	-	-
11	60	1	14	200	-	7.5	320	4	-	-	-	-	-	-
14	60	5	3	300	15	-	-	-	-	-	-	-	-	-
15	65	1	16	200	-	8	310	3	-	-	-	-	-	-
16	40	2	25	100	-	5	230	-	2	270	5	5	320	-
17	80	2	25	130	-	3	235	-	25	300	15	-	-	-
20	60	2	10	300	-	-	-	-	-	-	-	-	-	-
24	40	2	15	110	-	7	300	16	-	-	-	-	-	-
25	90	0.5	8	180	-	5	245	-	2	300	-	-	-	-
29	70	2	15	210	1	6	250	1	15	280	25	-	-	-
33	60	-	1	65	1	3	200	1	7	300	20	-	-	-
34	50	3	20	100	-	4	270	-	40	290	3	40	300	22
39	40	1	25	140	-	10	290	6	-	-	-	-	-	-
41	40	-	20	60	-	5	290	5	10	300	10	-	-	-
	40	-	20	60	-	5	290	5	10	300	10	-	-	-
48	70	1	30	150	-	4	310	-	-	-	-	-	-	-
49	60	2	6	300	13	-	-	-	-	-	-	-	-	-
50	45	1	10	290	5	-	-	-	-	-	-	-	-	-
54	60	-	8	300	10	-	-	-	-	-	-	-	-	-
	100	2	10	300	4	-	-	-	-	-	-	-	-	-

TABLE I.14. GC CONDITIONS – PETROLEUM HYDROCARBONS (cont.)

Lab. code No	Temperature programme (°C)													
	Init. temp (°C)	Isoth. (min.)	1st r.	to :	Isoth. (min.)	2nd r.	to :	Isoth. (min.)	3rd r.	to :	Isoth. (min.)	4th r.	to :	Isoth. (min.)
55	50	2	6	220	-	8	300	-	-	-	-	-	-	-
59	70	1	1.7	120	1	1.4	160	1	2.27	290	10	-	-	-
61	50	-	6	150	3	10	280	2	20	300	4.33	-	-	-
62	60	-	10	260	-	6	320	4	-	-	-	-	-	-
63	60	1	15	150	-	5	220	-	10	300	14	-	-	-
64	60	-	3	290	-	-	-	-	-	-	-	-	-	-
66	50	1	10	120	-	5	280	20	-	-	-	-	-	-
70	60	1	10	100	-	4	285	10	-	-	-	-	-	-
75	60	-	15	150	-	5	220	-	10	300	10	-	-	-
80	55	4	10	100	3	15	210	3	9	300	6.5	-	-	-
81	120	2	30	240	4	25	275	19	5	280	12	-	-	-
86	110	2	3	310	-	-	-	-	-	-	-	-	-	-
88	60	1	20	150	-	4	290	10	-	-	-	-	-	-
90	60	2	10	300	5	-	-	-	-	-	-	-	-	-
91	50	5	12	220	-	15	300	10	-	-	-	-	-	-

TABLE I.14. GC CONDITIONS – PETROLEUM HYDROCARBONS (cont.)

Lab. code No	Detector Temp. (°C)	Make-up gas	Make-up flow	Air flow	Hydrogen flow	Recorder/integrator
3	310	N.A.	N.A.	320 ml/min.	27 ml/min.	Agilent Chemstation
	Source: 230	N.A.	N.A.	N.A.	N.A.	Agilent Chemstation
7	290	N.A.	N.A.	N.A.	N.A.	Not indic.
8	340	Helium	10 psi	60 psi	12.5 psi	Not indic.
11	Not indicated	N.A.	N.A.	N.A.	N.A.	Not indic.
14	300	Nitrogen	21.5 ml/min.	250 ml/min.	30 ml/min.	CP Maitre Data Handling
15	Source: 250	N.A.	N.A.	N.A.	N.A.	MSD Chemstation
16	300	N.A.	N.A.	N.A.	N.A.	MSD Chemstation
17	Source: 230	N.A.	N.A.	N.A.	N.A.	MSD Chemstation
19	-	-	-	-	-	Integrator Varian 4270
20	340	Nitrogen	27 ml/min.	300 ml/min.	30 ml/min.	Star Chromat.Workstation
21	-	-	-	-	-	Jasco-Borwin
24	Source: 250	N.A.	N.A.	N.A.	N.A.	Not indic.
25	320	Nitrogen	30 ml/min.	300 ml/min.	30 ml/min.	HP 3396 series III
29	Not indicated	N.A.	N.A.	N.A.	N.A.	Agilent Chemstation
33	300	-	-	390 ml/min.	50 ml/min.	HP Chemstation
34	Source: 230	N.A.	N.A.	N.A.	N.A.	Agilent Chemstation
39	Not indicated	N.A.	N.A.	N.A.	N.A.	Not indic.
41	325	Nitrogen	30 ml/min.	350 ml/min.	30 ml/min.	Agilent Chemstation
	Not indicated	N.A.	N.A.	N.A.	N.A.	Agilent Chemstation
47	-	-	-	-	-	Total Chrom
48	300	N.A.	N.A.	N.A.	N.A.	Computer
49	280	N.A.	N.A.	N.A.	N.A.	Agilent Chemstation
50	Not indicated	N.A.	N.A.	N.A.	N.A.	HP Chemstation
54	300	Nitrogen	Not indic.	450 ml/min.	40 ml/min.	Agilent Chemstation
	150	N.A.	N.A.	N.A.	N.A.	Agilent Chemstation
55	260	N.A.	N.A.	N.A.	N.A.	Not indic.
59	300	Nitrogen	45 ml/min.	350 ml/min.	35 ml/min.	Chemstation
61	230	N.A.	N.A.	N.A.	N.A.	Not indic.
62	Not indicated	Helium	-	N.A.	N.A.	Chemstation
63	300	Not indic.	Not indic.	N.A.	N.A.	Soft. GCMS Solution
64	300	Nitrogen	30 ml/min.	300 ml/min.	30 ml/min.	Not indic.
66	Source: 230	N.A.	N.A.	N.A.	N.A.	Not indic.
70	Not indicated	N.A.	N.A.	N.A.	N.A.	Agilent Software
75	Not indicated	N.A.	N.A.	N.A.	N.A.	Not indic.
80	250	Helium	0.7 ml/min.	N.A.	N.A.	Chemstation
81	210	Helium	2.2 ml/min.	N.A.	N.A.	Saturn WS
86	310	Nitrogen	28 ml/min.	300 ml/min.	30 ml/min.	Star Chromat.Workstation
88	270	Helium	Not indic.	N.A.	N.A.	Not indic.
90	260	Not indic.	Not indic.	N.A.	N.A.	Not indic.
91	300	Helium	Not indic.	N.A.	N.A.	Chemstation
93	-	-	-	-	-	CSW32 Software

ANNEX II

z-SCORES

TABLE II.1. – TABLE II.4.

*TABLE II.1. *z*-SCORES: ASSESSMENT OF LABORATORY PERFORMANCE ON THE DETERMINATION OF ORGANOCHLORINE PESTICIDES

Lab. code No	1	3	4	5	6	10	12	13	14	17	19	20	21	25	26	27	28
EOM	-	4.07	-1.78	2.91	-	1.61	-	-	2.06	-3.20	0	2.50	-3.44	11	-	1.11	-0.68
HCB	-	-4.88	0.54	-	-	-0.71	-	17	-6.96	-	-	-	19	-	-	-3.21	-
α-HCH	-	-	-	-	-	-	-	-	-	-	-	280	2.73	-	-	-3.27	-
γ-HCH (Lindane)	11	-7.07	-6.08	-6.22	-	-4.32	-	-	-5.68	-	-5.68	110	-	22	-5.42	54	3.24
pp' DDE	2.20	-4.18	-2.46	-1.88	-	-6.54	195	-	1.25	1.93	-6.90	52	80	-	-2.72	-6.80	-5.91
pp' DDD	-3.73	-4.58	-3.87	8.91	-	-5.37	97	-	-4.73	-0.09	-5.59	180	-	-	-4.06	-7.23	2.49
pp' DDT	12	-7.51	-6.79	-5.26	-	-1.89	-	9.95	-3.31	-	-5.79	5.74	24	73	-6.87	-7.37	2.47
op DDE	-	-7.57	-	-	-	-	40	-	-	-	-	-	-	-	-	-	-
op DDT	-	-1.85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor	1.30	-7.74	-6.26	-4.30	-	-7.37	-	-	-7.70	1.56	-	-	-	-	-	3.39	-4.91
Hept. Epoxide	0.11	-	-	-	-	28	-	-	-	-	-6.15	-	-	-	-	-	-
Aldrin	0.42	-	-1.75	-	-	-4.58	-	-	-7.83	-	-	-	-5.08	-1.08	-	-	17
Dieldrin	92	3.20	-3.72	-	11	-6.88	-	-	-4.80	-	10	-	-	-3.94	-	42	-4.68
Endrin	-	-	-5.78	-	-	-2.83	150	-	0.05	-	-	-	-	-	-	-	-7.00
α-Endosulfan	-	-	-	-	-	1.81	510	-	-	-	-	38	-0.25	-	-	-	-5.37
β-Endosulfan	-	-	-	-	-	-6.01	290	-	-	-	-	27	5.47	2.70	-	-	-3.94
Endos. Sulfate	-	-	-	-	-	0.38	-	3.96	-	-	-	-	-	37	-	-	-0.88
α-Chlordane	-	-0.43	-	-	-	-	-	29	-	-	-	-	-	-	-0.81	-	2.00
γ-Chlordane	-	-1.71	-	-	-	-	-	-	-	-	-	-	-	-	-2.32	-	18
trans-Nonachlor	-	-2.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1254	-	-4.95	-3.81	-	-	0.79	-	-	-1.00	-	-3.84	-	-	-	-	23	31
Aroclor 1260	-	-1.54	-1.27	-	-	-4.54	-	-	13	-	-5.13	-	-	-	-	8.81	-1.80

*For TABLE II.1 – TABLE II.4:

$|z| \leq 2$: performance is acceptable
$2 < |z| < 3$: measurements are questionable
$|z| \geq 3$: measurements are inacceptable
- : no results
Shaded areas represent unacceptable results.

TABLE II.1. *z*-SCORES: ASSESSMENT OF LABORATORY PERFORMANCE ON THE DETERMINATION OF ORGANOCHLORINE PESTICIDES (cont.)

Lab. code No	30	31	32	35	36	37	38	40	41	42	43	44	45	47	48	49	50
EOM	-	-	0.50	-	-	0.18	-	-	6.52	-	-	1.30	-4.72	-	-	-	-
HCB	-1.54	180	-	-	-	-	740	-	-	-6.33	-4.88	12	-	265	-0.33	-5.71	-
α-HCH	-	-	-	-	-	-	1.82	-	-	-	-	-	-	10	-	-	-5.47
γ-HCH (Lindane)	-	55	-	-	200	-	300	-	-	-6.76	-6.62	3.65	0.14	15	-	-5.27	-0.54
pp' DDE	-5.49	15	-	0.37	240	-	110	130000	-	-4.91	-4.34	10	-6.43	70	27	-3.71	8.05
pp' DDD	-	130	-	48	230	-	940	31000	-	-5.23	-4.37	5.99	-7.44	24	100	-1.66	2.49
pp' DDT	-	-3.47	-	180	-	-	-1.73	-	-	6.05	-1.63	16	-5.84	130	4.68	-5.89	-5.68
op DDE	-	-	-	-	-	-	-1.76	-	-	-	-	-	-	-	48	-7.93	-
op DDT	-	-	-	310	-	-	-	-	-	-	-3.10	-	-	-	-	0.65	-
Heptachlor	-	-7.13	-	-	-	-	8.45	17000	-	-	-	-	-	5.04	-	-	7.69
Hept.Epoxide	-	22	-	-	-	-	-1.23	147000	-	-	-	-	-	-	-	-6.15	-
Aldrin	-	6.92	-	-	-	-	92	55000	-	-	-	-1.92	-	140	-	-	-
Dieldrin	-0.60	3.56	-	-	-	-	-1.74	5200	-	-	-	7.64	-	-	23	-0.96	-3.84
Endrin	-	-6.20	-	-	-	-	-	6200	-	-	-	-3.18	-	-	-	-	-5.30
α-Endosulfan	-	-	-	-	880	-	-	310000	-	-	-	-1.63	-	-	-	-	-4.75
β-Endosulfan	-	-	-	-	-	-	-	14000	-	-	-	-	-	-	-	-4.25	-7.84
Endos. Sulfate	-	-	-	-	-	-	-	83000	-	-	-	-	-	-	-	-	-7.87
α-Chlordane	-3.86	-	-	-	-	-	-	-	-	-	-6.86	-	-	-	-	5.57	-0.43
γ-Chlordane	-	-	-	-	-	-	-	-	-	-	-2.61	-	-	-	-	-2.61	-0.29
trans-Nonachlor	-	-	-	-	-	-	-	-	-	-	-1.50	-	-	-	-	1.00	5.50
Aroclor 1254	-	-	-6.07	-	-	-5.88	-	73000	-	-	-	-	-3.14	-	-	-	-
Aroclor 1260	-	-	-1.29	-	-	-0.98	-	-	-	-	-	-	-5.87	-	-	-	-

TABLE II.1. *z*-SCORES: ASSESSMENT OF LABORATORY PERFORMANCE ON THE DETERMINATION OF ORGANOCHLORINE PESTICIDES (cont.)

Lab. code No	51	52	53	54	55	56	57	58	59	60	61	62	63	65	66	68	69	71	72
EOM	-1.67	3.15	2.58	-1.35	-0.07	2.04	-1.63	-3.02	1.29	1.30	-2.33	-1.95	-6.67	-0.09	-0.67	-2.04	-0.31	-	-2.41
HCB	-	-	0.89	-	-4.46	-0.48	-	-	-7.80	-	-	-	-	-6.96	3.88	-	-4.67	-	1.77
α-HCH	-	-	-	-	-	-	-	18	-	-	-	-	-	-7.07	-1.37	-	-	-	-
γ-HCH (Lindane)	-	-	-5.53	46	-6.49	-4.09	-0.41	-3.35	-6.76	34	25	-	2.30	-4.59	2.98	-	-	-	-5.97
pp' DDE	-2.77	-6.12	-4.61	3100	-4.91	-2.94	12	-	-6.95	5.80	-5.23	-	6.48	-4.55	3.45	-	-2.14	14	6.14
pp' DDD	-	-7.01	-4.91	300	-2.08	-4.88	-	-	-4.87	-	-	-	28	-3.30	-	-	-	3.63	39
pp' DDT	-	-	8.04	-	-0.84	-	-4.74	-	-5.89	-	-7.16	-	-	-2.95	-0.47	-	-	25	20
op DDE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
op DDT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor	-	-	-	370	-	-	-0.74	-2.77	-	-2.69	17	-	16	-	3.74	-	-	-	-7.56
Hept. Epoxide	-	-	-	-	-4.17	-	35	-	-	20	11	-	24	-	-	-	-	-	-
Aldrin	-	-	-1.07	720	-	-6.53	-	-	-7.08	5.75	4.33	-	6.08	-	-2.67	-	-7.25	-	-2.59
Dieldrin	-0.80	-	11	-	0.52	-2.66	-	-0.05	-7.16	-1.00	-2.32	-	0	-	0.12	-	-1.04	-	2.32
Endrin	-	-	56	-7.00	-	-	-	-	2.57	5.82	-0.80	-	9.67	-	6.88	-	-6.52	36	14
α-Endosulfan	-	-	-	-4.56	-	-	-	-	-3.50	6.56	-5.94	-	1.94	-	-	-	-	-	-
β-Endosulfan	-7.63	-	-	-	-	-	-	-	-1.78	-	-	-	-	-	-	-	-	-	-
Endos. Sulfate	-	-	-	-	-	-	-0.42	-	-	-2.38	-7.67	-	-	-	-	-	-	-	-
α-Chlordane	-2.57	-	-	-	-6.29	6.00	-	-	-	-	-	-	17	-	-	-	-	-	-
γ-Chlordane	-2.61	-	-	-	0.07	1.66	-	-	-6.36	-	1.86	-	43	-	-	-	-	-	-
trans-Nonachlor	-	-	-	-	-	-	-	-	-	-	-	-	-	3.00	-	-	-	-	-
Aroclor 1254	-4.25	-	-	1100	-2.35	-	-	-	-5.74	-	-	-	-	-	8.84	9.72	-	-	-0.48
Aroclor 1260	4.15	-	-	370	3.34	-	-	-	-2.56	-	-	-	-	-	-0.62	-	-	-	-1.75

TABLE II.1. *z*-SCORES: ASSESSMENT OF LABORATORY PERFORMANCE ON THE DETERMINATION OF ORGANOCHLORINE PESTICIDES (cont.)

Lab. code No	73	74	76	77	78	80	82	83	85	86	87	88	89	90	91	92	93	94
EOM	1.89	4.81	1.07	-	-0.14	-	-	-	3.59	-1.30	3.52	-	-	-1.41	-1.33	-0.53	-	-
HCB	-	-	-	-6.96	7.21	-	-	-	-	-	-	-	-	0.27	-	3.88	80	-2.17
α-HCH	-	-	-	-	-	-	-0.37	-	0.11	-	-3.97	-	-	-	-	-	-	-
γ-HCH (Lindane)	-	-	-1.22	-7.03	-2.42	-	-	15	-	480	44	-	-	-	-	-2.43	56	-5.27
pp' DDE	-	-	22	-5.12	4.13	-2.88	-	1.25	-	270	-4.60	-	-5.28	-2.56	-3.09	-2.35	-	15
pp' DDD	-	-	8.49	-3.73	-3.96	-	-	4.20	-	1100	-6.59	-	-3.30	-3.67	3.27	-2.20	-	-
pp' DDT	-	54	-	-7.58	-2.74	-4.79	-	76	-	315	-6.79	-	-6.74	0	-	0.42	26	-
op DDE	-	-	-	-7.69	-	-	-	-	-	200	-	-0.26	-	-	-	-	-	-
op DDT	-	-	-	0.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor	-	-	-	-7.87	-7.77	-	-	23	-	-	-	-	-	-	0.69	-2.83	11	-6.39
Hept. Epoxide	-	-	-	-6.70	-3.22	-	-	-	-	530	-	-	-	2.82	-	-	-	-5.16
Aldrin	-	-	-	-	-7.69	-	-	-	-	260	-0.58	-	-	-	-6.42	-6.08	57	-6.75
Dieldrin	-	2.20	-	-	1.19	-3.28	-	-	-3.69	60	-	-	-	-	-	-	3.20	-7.20
Endrin	-	-	-7.00	-	-7.50	4.50	-	-	-	140	-	-	-	-	-1.70	-	22	-4.10
α-Endosulfan	29	-	-	-	-	-	-1.44	-	-	-	-	-	-	-	-1.31	-	-	-3.75
β-Endosulfan	-	-	-	-	-	-	-5.62	-	-	48	-	-	-	-	94	-	-	-4.06
Endos. Sulfate	-	-	-	-	-	-	-	-	-	230	-	-	-	-	-	-	-	-4.75
α-Chlordane	-	17	-	-4.00	-3.31	-	-3.43	4.29	-	500	-	-	-	-3.78	-	-	-	1.00
γ-Chlordane	-	-	-	-3.86	5.07	-	-	-	-	-	-	-	-	3.14	-	-	-	2.21
trans-Nonachlor	-	-	-	-2.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1254	-	-	-	-	-	-	-	-	-	-	19	-	-	-	-	-	-	-
Aroclor 1260	-	-	-	-	-	4.19	-	-	-	-	3.61	-	-	-	-0.45	-	-	-

TABLE II.2. *z*-SCORES: ASSESSMENT OF LABORATORY PERFORMANCE ON THE DETERMINATION OF PCB CONGENERS

Lab. code No	1	3	4	5	10	11	13	17	18	19	20	21	22
PCB 8	-	-5.50	-	-	-6.67	-	-	-	-	-	-	-	-
PCB 18	-	-4.99	-	-	22	-	-	-	-	-	1700	-6.79	-
PCB 28	0.49	-4.33	0.04	66	-5.51	-	-	-	-0.96	-	-	4.95	-
PCB 31	3.24	-1.05	-	-	-	-	-	-	-	-	-	-	-
PCB 44	-0.12	-4.32	-	-	0.68	-	-	-	-	-	-	-6.52	-
PCB 49	-	-3.94	-	-	-	-	-	-	-	-	-	-	-
PCB 52	2.59	-3.77	4.59	67	-3.87	-	5.68	-	-7.14	-0.50	790	-5.32	-
PCB 66	-	-3.88	-	-	-3.70	-	-	-	-	-	-	-	-
PCB 70	-	-	-	-	-	-	-	-	-	-	-	-	-
PCB 77	-	-	-	-	-7.32	-	-	-	-	-	-	89	-
PCB 87	0.37	-1.74		-	-	-	-	-	-	-	-	-	-
PCB 95	6.13	-1.11		-	-	-	-	-	-	-	-	-	-
PCB 99	-4.17	-	-	-	-	-	-	-	-	-	-	-	-
PCB 101	-0.22	-0.13	-1.70	110	-5.87	-4.27	-	-2.74	-2.44	2.48	-	21	-0.83
PCB 105	-2.58	0.87	-	-	-80	-	-	-	-	-	-	-	-
PCB 110	0.45	-1.27	-	-	-	-	-	-	-	-	-	-	-
PCB 118	-3.69	-1.38	9.77	-	-4.04	-5.67	-	-	-0.46	10	-	-	-0.46
PCB 128	2.77	-3.51	-	-	-0.94	-	-	-	-	-	-	-	-
PCB 138	-2.36	1.45	-1.11	87	-6.20	-4.01	-5.87	11	2.30	-0.49	46	11	-1.31

TABLE II.2. *z*-SCORES: ASSESSMENT OF LABORATORY PERFORMANCE ON THE DETERMINATION OF PCB CONGENERS (cont.)

Lab. code No	1	3	4	5	10	11	13	17	18	19	20	21	22
PCB 149	-5.43	2.05	-	-	-	-	-	-	-	-	-	-	1.98
PCB 151	-4.47	-	-	-	-	-	-	-	-	-	-	-	
PCB 153	-1.74	1.82	-1.20	70	-6.62	-4.28	-6.30	1.73	-1.88	-1.04	3.34	10	2.55
PCB 156	-3.63	-3.49	-	-	-	-	-	-	-	1.94	-	-	-
PCB 157	0.76	-	-	-	-	-	-	-	-	-	-	-	-
PCB 167	-2.98	-	-	-	-	-	-	-	-	-	-	-	-
PCB 170	-3.16	0.35	-	-	1.70	-	-	-	-	-	-	-	5.27
PCB 174	0.06	-0.13	-	-	-	-	-	-	-	-	-	-	-
PCB 177	2.67	0	-	-	-	-	-	-	-	-	-	-	-
PCB 180	-3.00	0.78	-0.55	40	-7.85	-4.71	-6.42	2.85	0.55	-0.07	1.63	9.49	2.00
PCB 183	-1.14	0.72	-	34	-	-	-	-	-	-	-	-	-
PCB 187	-5.34	2.04	-	-	-	-	-	-	-	-	-	-	-
PCB 189	2.39	-	-	-	-	-	-	-	-	-	-	-	-
PCB 194	-2.22	-0.44	-	-	-	-	-	0.11	-	-	-	16	2.72
PCB 195	0.64	0.08	-	-	-2.94	-	-	-	-	-	-	-	-
PCB 206	-	-0.53	-	-	-	-	-	-	-	-	-	-	-
PCB 209	-	-1.50	-	-	11	-	-	-	-	-	-	-	-

TABLE II.2. *z*-SCORES: ASSESSMENT OF LABORATORY PERFORMANCE ON THE DETERMINATION OF PCB CONGENERS (cont.)

Lab. code No	25	26	27	29	30	31	32	34	38	41	42	43	45	46
PCB 8	-	-	-	-	-	-	-	-	17	-	-	-	-	-
PCB 18	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCB 28	-	-	-6.05	-	-	42	-	-4.15	49	-	-	5.76	-6.05	-
PCB 31	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCB 44	-	-	-	-	-	41	-	-	320	-	-	-1.92	-	-
PCB 49	-	-	-	-	-	-	-	-	-	-	-	1.54	-	-
PCB 52	-	-6.33	-5.5	-	-1.59	34	-2.68	-0.77	-0.12	-	9.32	-0.50	-5.04	-
PCB 66	-	-	-	-	-	4.52	-	-	-3.32	-	-	-	-	-
PCB 70	-	-	-	-	-	-	-	-	-	-	-	-0.63	-	-
PCB 77	-	-	-	-	-	-	-	-	3.73	-	20	-	-	-
PCB 87	-	-	-	-	-	-	-	-	-	-	-	-5.42	-	-
PCB 95	-	-	-	-	-	-	-	-	-	-	-	-0.05	-	-
PCB 99	-	-	-	-	-2.76	-	-	-	-	-	-	0.63	-	-
PCB 101	-	-3.90	30	-	-	1.83	0.22	1.87	8.74	-	7.17	-1.00	-6.65	-
PCB 105	-	-6.34	-	-	-	-0.93	-	-	-	-	59	-4.71	-6.34	-
PCB 110	-	-	-	-	-	-	3.46	-	-	-	-	-1.09	-	-
PCB 118	-1.32	-5.45	-	-	2.31	130	-2.46	0.38	-	-	-	-4.15	-6.46	-
PCB 128	-	-	-	-	-	-	-	-	13	-	-	0.63	-	-
PCB 138	-4.40	-1.70	12	-	4.46	-1.33	-0.96	1.22	-1.85	1.39	-3.16	0.70	-6.01	3.99

TABLE II.2. *z*-SCORES: ASSESSMENT OF LABORATORY PERFORMANCE ON THE DETERMINATION OF PCB CONGENERS (cont.)

Lab. code / No	25	26	27	29	30	31	32	34	38	41	42	43	45	46
PCB 149	-	-1.68	-	-	3.13	-	-	-	-	-	-	-0.20	-	2.05
PCB 151	-	-	-	-	0.95	-	-	-	-	-	-	0.32	-	-
PCB 153	-5.60	-0.23	14	-1.75	7.14	-2.13	0.57	2.17	-1.89	0.55	-6.71	-0.05	-6.48	2.71
PCB 156	-	-	-	-	-	-	-	-	-	-	-	6.23	-5.20	-
PCB 157	-	-	-	-	-	-	-	-	-	-	-	1.96	-	-
PCB 167	-	-	-	-	-	-	-	-	-	-	-	3.93	-	-
PCB 170	-	-1.33	-	-	2.57	-	-	-	-	1.57	1.57	-0.19	-7.22	2.78
PCB 174	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCB 177	-	-	-	-	-	-	-	-	-	-	-	1.33	-	-
PCB 180	-1.76	-1.66	1.88	-	2.98	-2.38	-0.07	1.88	-3.48	0.39	-4.17	0.29	-6.90	1.76
PCB 183	-	-	-	-	5.27	-	-	-	-	-	-	-2.46	-	-
PCB 187	-	-0.17	-	-	1.40	-	-	-	-7.22	-	-3.49	0.13	-	2.68
PCB 189	-	-	-	-	-	-	-	-	-	-	-	-0.31	7.39	-
PCB 194	-	-0.26	-	-	5.11	-	-	-	-	-	-	0.67	-	-
PCB 195	-	-	-	-	-	-	-	-	76	-	-2.75	-	-	-
PCB 206	-	-	-	-	-	-	-	-	7.56	-	-3.34	7.59	-	-
PCB 209	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE II.2. *z*-SCORES: ASSESSMENT OF LABORATORY PERFORMANCE ON THE DETERMINATION OF PCB CONGENERS (cont.)

Lab. code / No	49	50	51	52	55	56	57	58	60	61	62	65	66	68
PCB 8	53	-	-	-	-	-	-	-	-	-	-	-	12	-
PCB 18	-	-	-2.35	-	-	-	-	-	-	-	0.56	-	24	-
PCB 28	-3.87	-	-6.33	-6.24	-3.78	-3.85	-	6.90	-	-	-0.05	-5.15	-	-0.60
PCB 31	-	-	-	-3.43	-	-6.43	-	-	-	-	17	-1.05	36	-
PCB 44	-3.72	-	-	2.08	-	-	-	-	-	-	-4.20	-	120	-
PCB 49	-	-	-	-	-	-	-	-	-	-	-1.54	-	15	-
PCB 52	-3.50	-	-	-3.05	1.41	-	-	22	-	-	-4.35	-6.14	10	11
PCB 66	-5.13	-	-0.84	-	-	-	-	-	-	-	-	-	57	-
PCB 70	-	-0.26	-0.14	-	-	-	-	-	-	-	-	-	-	-
PCB 77	-	-	-	-	-	-	-	-	-	-	-6.43	-	-	-
PCB 87	-2.79	44	-	-	-	-	-	-	-	-	23	-	-	-
PCB 95	-	0.34	-	-	-	-	-	-	-	-	-	-	-	-
PCB 99	-	3.89	-	-	-	-	-	-	-	-	-	-	-	-
PCB 101	-0.87	3.04	0.44	2.22	0.65	-2.14	-	-2.58	98	-	-0.43	-2.87	-1.22	0.74
PCB 105	-5.20	27	-	-	-3.72	5.13	-	-	190	-	6.82	-2.90	-	-
PCB 110	0.18	-2.64	11	-	-	-	-	-	-	-	-	-	44	-
PCB 118	-0.31	4.54	-2.62	0	-1.92	-1.22	-	3.84	0.54	-	1.15	-0.85	25	17
PCB 128	-0.23	8.34	-	-	-	-1.14	-	-	-	-	-1.03	-	-	-
PCB 138	3.63	-0.18	-	1.30	0.43	-2.16	11	-5.78	8.10	20	-0.82	-3.12	-0.81	1.00

TABLE II.2. *z*-SCORES: ASSESSMENT OF LABORATORY PERFORMANCE ON THE DETERMINATION OF PCB CONGENERS (cont.)

Lab. code No	49	50	51	52	55	56	57	58	60	61	62	65	66	68
PCB 149	-	5.88	-	0.30	-	-2.02	-	-	-	-	1.18	-	0.33	-
PCB 151	-	2.90	-	-	-	-	-	-	-	-	-	-	-	-
PCB 153	4.59	-0.09	4.59	-0.32	4.21	2.31	7.96	-5.68	10	-5.19	1.55	-0.89	-1.67	-1.13
PCB 156	-	2.37	-	-	-3.34	4.44	-	-	-	-	4.01	-2.77	-	-
PCB 157	-	-	-	-	-4.24	-	-	-	-	-	-	-	-	-
PCB 167	-	-	-	-	-1.55	-	-	-	-	-	0.60	-	-	-
PCB 170	5.51	-0.83	1.68	-2.08	-	-0.59	-	-	-	-	1.41	-	-4.46	-
PCB 174	-	-	-	-	-	-	-	-	-	-	-	-	-1.31	-
PCB 177	-	-0.50	-	-	-	-	-	-	-	-	-	-	-0.83	-
PCB 180	3.07	-1.10	1.22	-6.17	1.27	-0.67	29	-5.99	5.48	-4.70	-0.33	-2.49	-2.51	0.66
PCB 183	-	-2.18	-	-	-	-	-	-	-	-	-	-	0.50	-
PCB 187	2.81	0.96	-	-	-	-6.67	-	-	-	-	0.74	-	-	-
PCB 189	-	-	-	-	-2.23	-	-	-	-	-	-	-	-	-
PCB 194	-	-1.44	-	-0.44	-	-	-	-	-	-	-0.61	-	-	-
PCB 195	2.91	0.08	-	-	-	-	-	-	-	-	-	-	-	-
PCB 206	-0.22	-1.16	-	-	-	-	-	-	-	-	9.47	-	-	-
PCB 209	-	-3.00	-	-	-	-	-	-	-	-	-	-	-	-

TABLE II.2. *z*-SCORES: ASSESSMENT OF LABORATORY PERFORMANCE ON THE DETERMINATION OF PCB CONGENERS (cont.)

Lab. code / No	69	71	72	75	77	78	81	82	83	85	87	89	90	92	94
PCB 8	-	-	-	-	-5.33	-	-	-	-1.22	-	-	-	-	-	-
PCB 18	-	-	-	-	-5.40	-	-	-	-	-	-	-	-	-	-
PCB 28	-3.88	12	-2.01	-	-	10	-	-5.05	-	-	50	-	-	9.13	4.50
PCB 31	-	-	-	-	-	-	-	-0.33	-	-	-	-	-	-	-
PCB 44	-	-	-	-	-5.92	-	-	-	-	-	31	-	-	-	-
PCB 49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCB 52	-3.59	-	8.27	-4.14	-3.14	7.85	-	-	-	-0.05	86	-	-	-0.05	-
PCB 66	-	-	-	-	-	-	-	3.09	-	5.77	-	-	-	-	-
PCB 70	-	-	-	-	-	-	-	-	21	-	51	-	-	-	-
PCB 77	-	-	-	-	-	-	-	-5.16	-	-	-	-	-	-	-
PCB 87	-	-	-	-	-2.53	-	-	-	-	-	41	-	-	-	-
PCB 95	-	-	-	-0.71	-	-	-	-0.32	-	-	-	2.97	-	-	-
PCB 99	-	-	-	0.11	-	-	-	-2.44	-	-	-	-0.64	-	-	-
PCB 101	0.39	41	5.68	-3.13	-1.87	4.31	-1.09	-3.22	34	1.61	2.26	-1.57	-4.10	-0.70	-1.09
PCB 105	1.69	-	-	-	-	-1.02	-	-	-	-	-	-	-	-	-
PCB 110	-	-	-	-2.82	-2.91	-	-	-	-	-0.27	30	-2.09	-	-	-
PCB 118	0.23	1.00	2.54	-2.54	-0.62	3.38	15	-	-	0.46	1.38	-2.92	-4.56	-	20
PCB 128	-	-	-	-	-1.51	-	-	-	-	-	18	-	-	-	-
PCB 138	3.24	-	13	-2.98	-0.33	1.20	1.21	-1.73	-3.88	1.70	4.19	0.25	-5.39	-2.15	-3.22

TABLE II.2. *z*-SCORES: ASSESSMENT OF LABORATORY PERFORMANCE ON THE DETERMINATION OF PCB CONGENERS (cont.)

Lab. code No	69	71	72	75	77	78	81	82	83	85	87	89	90	92	94
PCB 149	-	-	-	-2.02	-	-	-3.73	-	-	3.90	-	-3.33	-3.55	-	-
PCB 151	-	-	-	-	-	-	-	-	-	0.16	-	-	-4.93	-	-
PCB 153	4.10	-4.98	-0.46	0.36	0.75	7.88	-3.54	-2.44	-3.82	3.34	-	1.46	-3.51	-1.54	0.47
PCB 156	-3.49	-	-	-	-	-1.39	-	1.37	-	-	4.09	-	-	-	-
PCB 157	-	-	-	-	-	-6.14	-	3.76	-	-	-	-	-	-	-
PCB 167	-	-	-	-	-	0.31	-	-	-	-	-	-	-	-	-
PCB 170	-	-	-	-	-0.51	-	-	-	-1.65	1.46	-0.32	-0.32	-3.46	-	-
PCB 174	-	-	-	-	-	-	-	0.31	-	-	-	-	-	-	-
PCB 177	-	-	-	-	-	-	-	-	-	-	-	0.33	-2.14	-	-
PCB 180	2.61	-1.60	0.39	-	-1.04	2.90	8.88	-3.56	-4.65	2.23	0.21	0.70	-	-	0.44
PCB 183	-	-	-	-	-	-	-	-2.09	3.14	1.09	-	-0.45	-3.94	-	-
PCB 187	-	-	-	-0.66	0.38	-	-	-1.43	-4.15	3.88	1.04	0.70	-3.40	-	-
PCB 189	-	-	-	-	-	-1.88	-	-	-	-	-	-	-	-	-
PCB 194	-	-	-	-	0.61	-	22	-2.33	-5.00	4.22	-2.22	1.44	-4.69	-	-
PCB 195	-	-	-	-	-	-	-	-2.19	-	-	1.02	-	-	-	-
PCB 206	-	-	-	-	-	-	-	-	-	-	0.72	-	-	-	-
PCB 209	-	-	-	-	-	-	-	1.50	-	-	-	-	-	-	-

TABLE II.3. *z*-SCORES: ASSESSMENT OF LABORATORY PERFORMANCE ON THE DETERMINATION OF POLYBROMODIPHENYL ETHERS

Lab. Code No	3	17	18	43	51	52	55	56	75	78	85	89	90
PBDE 28	-	-	-1.22	-6.11	-	-	-6.11	4.22	-	-1.78	8.78	-	49
PBDE 47	-4.42	25	30	0.50	-	-1.25	-4.01	-3.98	1.17	5.27	-3.17	-5.33	27
PBDE 66	-	-	-	-3.17	-	-	-1.50	3.33	-	-0.67	-	-	84
PBDE 85	-	-	-	-1.36	-	-	-	-5.86	-	-1.93	13	-	33
PBDE 99	-2.66	5.94	-1.76	3.94	9.94	-2.96	-2.42	-3.33	1.94	14	-2.86	-4.76	13
PBDE 100	-3.59	-	0.85	1.96	-	-0.63	-3.78	0.70	-0.26	12	4.93	-6.19	-
PBDE 153	-	-	-3.64	1.36	-	-	-1.79	-3.07	-	3.14	-	-	120
PBDE 154	-	-	-0.30	-2.30	-	-	-5.05	0.95	0.70	2.35	-	-	-
PBDE 183	-	-	5.45	-5.09	-	-	-5.27	1.91	-	-2.91	-	-	600
PBDE 209	-	-	-	-	-	-0.62	0.04	-3.55	-	5.75	-	-1.69	96

TABLE II.4. *z*-SCORES: ASSESSMENT OF LABORATORY PERFORMANCE ON THE DETERMINATION OF PETROLEUM HYDROCARBONS

Lab. Code No	2	3	7	8	11	12	14	15	16	17	19	20	21	23	24
EOM	-	1.49	2.88	-	-	-	3.56	-	-	-2.33	1.49	4.47	-2.62	-	-6.86
PH Chrysene	-	1.88	-	-	-	-	-	-	-	-	-	-	-	-	12
Total aliphatics	-	0.08	-1.59	-	-	-	-	-	-	-7.98	-	0.01	-	-	-
Resolv. aliphatics	-	0	63	-	-	-	-	-	-	-	-	14	-	-	-
Unresolv. aliphatics	-	-0.34	6.82	-	-	-	-	-	-	-	-	-1.66	-	-	-
n-C_{17}	-	1.12	79	-	-5.11	-	-5.44	-	-	-3.45	-	14	-	-	0.41
Pristane	-	0.16	38	-	-5.72	-	1.12	-	-	-6.82	-	-	-	-	-
n-C_{18}	-	1.72	34	-	-6.00	-	-3.33	-	-	-4.58	-	4.88	-	-	-
Phytane	-	4.17	130	-	-4.36	-	-2.48	-	-	-4.78	-	-	-	-	-
Σ *n*-Alkanes [C_{14}-C_{34}]	-	1.35	28	-	-	-	-	-	-	-7.09	-	8.10	-	-	-
Total aromatics	-	32	610	-	-	-	-	-	-	-7.52	-	-	--	-	-
Resolved aromatics	-	48	5700	-	-	-	-	-	4.86	-3.79	-	-	-	-	-
Naphthalene	-	-3.72	260	-	-	-0.29	-2.61	-	9.98	21	-	-3.62	12	-	-7.72
1-Methyl naphthalene	-	-4.32	-	-	-	-	-	-	-	-	-	-	-	-	-0.62
Fluorene	-	-3.39	-	-	-	-	-	-	-	-	-	-	7.88	-	4.58
Phenanthrene	-8.02	-0.04	25	-	-5.68	26	-	-0.51	8.42	0.29	-0.28	5.12	-3.25	-1.03	-

TABLE II.4. *z*-SCORES: ASSESSMENT OF LABORATORY PERFORMANCE ON THE DETERMINATION OF PETROLEUM HYDROCARBONS (cont.)

Lab. Code No	2	3	7	8	11	12	14	15	16	17	19	20	21	23	24
2-Methyl phenanthrene	-	-4.05	32	-	-6.65	-	-	-	-	-	-	-	-	-	-
1-Methyl phenanthrene	-	-7.50	870	-	-79	-	-	-	-	-	-	-	-	-	-
Anthracene	-	-5.78	-	-	-	200	-5.45	-1.69	8.89	-	-	-	140	-6.89	-
Chrysene	-7.98	2.87	-4.56	-	-4.71	-	-	-1.13	11	2.15	-0.30	7.95	-	-0.79	-1.64
Fluoranthene	-7.99	4.09	19	-	-5.14	1.08	-7.26	0.59	12	0.74	11	-2.52	-7.25	0.73	-4.48
Pyrene	-7.99	1.20	35	-	-4.97	1.32	-5.05	0.18	13	-0.52	1.24	1.51	-6.03	0.06	-3.63
Benzo[b]fluoranthene	-	0.79	-	-	-	-	-	1.24	13	-	-2.68	3.86	-5.10	0.39	4.94
Benzo[k]fluoranthene	-	5.20	-	-	-	-	-	-1.40	-	-	1.85	3.55	-	-0.68	11
Benz[a]anthracene	-	1.25	-2.08	-	-5.16	36	-	-0.42	11	-0.33	-1.42	4.33	-	0.67	1.03
Benzo[e]pyrene	-	4.08	-	-	-0.85	-	-	-	21	3.77	-	-	-	0.31	-
Benzo[a]pyrene	-8.00	6.94	-1.48	-	-2.25	-	-	2.27	22	0.26	1.52	2.50	-5.23	1.94	2.90
Benzo[g,h,i]perylene	-8.01	3.93	-	-	-3.65	-	-	0.83	15	2.29	4.15	9.86	-	0.79	-
Indeno[1,2,3-c,d]pyrene	-	3.71	-	-	-	-	-	2.64	-	-	-	4.61	-	-	-
Dibenz[a,h]anthracene	-	1.64	-	-	-	-	-	-	30	-	-1.70	4.21	-	-	-
Acenaphthylene	-	-5.37	-	-	-	130	-	-	-	-	-	-	-	-	-
Acenaphthene	-	-5.70	-	-	-	26	-	-	5.59	-	-	-	95	-	-2.11

TABLE II.4. *z*-SCORES: ASSESSMENT OF LABORATORY PERFORMANCE ON THE DETERMINATION OF PETROLEUM HYDROCARBONS (cont.)

Lab. Code No	25	29	32	33	34	39	41	46	47	48	49	50	54	55	59	61
EOM	14	-	2.08	-	-	-	9.26	-	-	-	-	-	-0.12	1.40	-6.19	-1.29
PH Chrysene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total aliphatics	-7.98	-	-	-	-	-	0.38	-	-	-	-	-	-	-3.78	-7.88	-
Resolved aliphatics	-7.91	-	-	-6.12	-	-	-0.40	-	-	-	-	-	-	4.36	-	-
Unresolv. aliphatics	-	-	-	-	-	-	1.14	-	-	-	-	-	-	-4.74	-	-
n-C_{17}	-	-	-	0.01	-	-	1.83	-	-	-	-	-	-	-3.76	1.71	-
Pristane	-	-	-	-3.08	-	-	3.77	-	-	-	-	-	-	6.42	-5.63	-
n-C_{18}	-	-	-	-4.06	-	-	-2.28	-	-	-	-	-	-	11	1.66	-
Phytane	-	-	-	-1.56	-	-	-2.49	-	-	-	-	-	-	36	4.65	-
Σ *n* Alkanes [C_{14}-C_{34}]	-7.33	-	-	-1.81	-	-	-1.03	-	-	-	-	-	-3.33	14	-3.88	-
Total aromatics	0.72	-	-	-	-	-	-7.55	-	-	-	-	-	-	-	2.31	-
Resolved aromatics	73	-	-	1400	-	-	-4.33	-	-	-	-	-	-	-6.16	-	-
Naphthalene	-	-0.70	-3.35	-5.57	-2.63	1.06	11	-	-0.65	2.38	9.68	-	-	-4.15	7.64	125
1-Methyl naphthalene	-	-	-	-	-	-	0.63	-	-	-	8.34	-	-	-	-	-
Fluorene	-	-	-	-2.91	-	-	-	-	-	-	-2.61	78	-	-	-	-
Phenanthrene	87	3.24	-6.15	-3.67	-0.58	-	-1.12	5.12	-2.30	34	-2.70	4.41	-7.37	-7.23	-	-4.44

TABLE II.4. *z*-SCORES: ASSESSMENT OF LABORATORY PERFORMANCE ON THE DETERMINATION OF PETROLEUM HYDROCARBONS (cont.)

Lab. Code No	25	29	32	33	34	39	41	46	47	48	49	50	54	55	59	61
2-Methyl phenanthrene	-	-	-	2.58	-	-	-	-	-	-	-	-	-	-7.63	2100	-
1-Methyl phenanthrene	-	-	-	2400	-	-	-	-	-	-	-43	-	-	-120	15000	-
Anthracene	-	-	-4.56	7.96	-	7.49	-	-	-	27	-3.86	-	-	-	-	-
Chrysene	100	0.01	-2.51	-7.30	2.28	0.98	0.67	0.75	-5.25	40	-0.59	1.98	-	-4.77	-	8.13
Fluoranthene	300	6.72	-2.96	-3.54	1.22	0.90	-0.80	2.63	-6.11	35	0.69	2.89	-7.61	-6.30	-0.99	15
Pyrene	29	2.02	-2.88	-5.91	0.61	1.74	-1.56	6.56	-1.37	26	0.16	1.94	-7.69	-6.14	230	14
Benzo[b]fluoranthene	-	-1.01	3.96	-	-	6.94	-5.11	-0.15	-7.04	20	1.88	-	-	-	-	-
Benzo[k]fluoranthene	-	-0.85	1.62	-	-	10	-3.32	1.74	-5.13	71	-1.85	-	-	-	-	-
Benz[a]anthracene	57	-1.67	-2.18	-	-0.06	-1.56	-3.46	-0.92	-0.46	38	0.07	1.55	-	-5.01	-	9.65
Benzo[e]pyrene	-	-	-	-	2.25	-	-3.50	-	-	-	0.03	-	-	-6.17	-	-
Benzo[a]pyrene	920	-1.94	0.54	-	1.80	1.82	-5.93	1.29	-2.69	58	1.37	2.01	-	-7.31	-	14
Benzo[g,h,i]perylene	-	-0.50	3.23	-	1.54	1.52	-3.73	2.60	-2.97	18	-0.04	3.31	-	-5.83	-	23
Indeno[1,2,3-c,d]pyrene	-	-	-	-	-	-	-3.68	0.25	-	44	-1.26	0.61	-	-	-	-
Dibenz[a,h]anthracene	-	-	-	-	-	-	-	-	-	-	0.47	-	-	-	-	-
Acenaphthylene	-	-	-	-	-	-	22	-	-	17	-0.44	-	-1.58	-	-	-
Acenaphthene	-	-	-	-	-	-	-	-	-	6.78	-3.96	-	-3.38	-	-	-

TABLE II.4. *z*-SCORES: ASSESSMENT OF LABORATORY PERFORMANCE ON THE DETERMINATION OF PETROLEUM HYDROCARBONS (cont.)

Lab. Code No	62	63	64	65	66	67	70	72	75	80	81	84	86	88	90	91	93
EOM	-	-6.46	-3.46	-	-	-	-1.82	-	-	-	-	-	-0.06	-	-0.19	-0.10	-
PH Chrysene	-	-	-1.88	-	-	-7.47	-	-	-	-	-	-	-	-	-	-	-
Total aliphatics	-	-	0.45	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Resolved aliphatics	-	-	-6.58	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unresolved aliphatics	-	-	0.61	-	-	-	-	-	-	-	-	-	-	-	-	-	-
n-C_{17}	-	-	0.19	-	-	-	-6.88	-	-	-	-	-	-	-	8.64	-	-
Pristane	-	-	-7.19	-	-	-	-	-	-	-	-	-	-	-	25	-	-
n-C_{18}	-	-	-0.10	-	-	-	-6.68	-	-	-	-	-	-	-	26	-	-
Phytane	-	-	-1.38	-	-	-	-	-	-	-	-	-	-	-	10	-	-
Σ *n* Alkanes[C_{14}-C_{34}]	-	-	-0.53	-	-	-	-	-	-	-	-	-	-	-	33	-	-
Total aromatics	-	-	2.98	-	-	-	-	-	-	-	-	-7.95	-	-	-	-	-7.46
Resolved aromatics	-	-	-6.19	-	-	-	-	16	-	-	-	-	-7.60	-	-2.89	-	-3.29
Naphthalene	14	15	-3.82	-	-3.78	-	0.55	0.04	-1.64	-2.08	-	-	-7.90	-	37	-5.89	-
1-Methyl naphthalene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	2.88	-	16	-5.85	24	-	-	-	-1.36	-	-	-	-5.75	-	-	-5.15	-
Phenanthrene	3.71	2.07	-2.39	-3.70	16	-	-6.10	-8.00	-1.59	6.03	5.12	-	-	-	8.32	-3.92	-

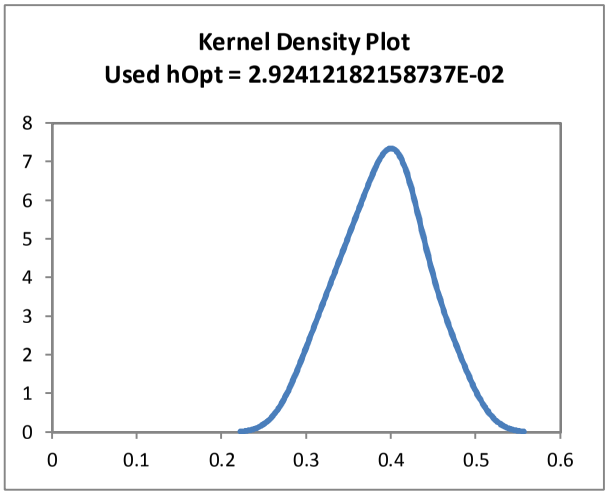
TABLE II.4. *z*-SCORES: ASSESSMENT OF LABORATORY PERFORMANCE ON THE DETERMINATION OF PETROLEUM HYDROCARBONS (cont.)

Lab. Code No	62	63	64	65	66	67	70	72	75	80	81	84	86	88	90	91	93
2-Methyl phenanthrene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-Methyl phenanthrene	-	-15	18	-	-	-	-	-	-35	-	-	-	-	-	-	-	-
Anthracene	-2.69	-0.85	-	-6.68	-4.40	-	-	-	-4.04	5.61	12	-	-0.14	-	-	-	-
Chrysene	1.47	3.21	-1.13	-0.70	5.87	-	-	-5.77	-0.47	-2.95	1.44	-	-	-	-0.56	7.41	-0.85
Fluoranthene	2.77	1.44	-4.32	-0.01	1.97	-	-7.65	-3.70	-0.88	-1.88	2.51	-7.63	-7.83	-	0.27	1.66	5.49
Pyrene	3.10	0.47	-5.75	-1.49	0	-	-7.83	-7.63	-1.39	-1.91	2.63	-	-	-	-0.97	1.88	12
Benzo[b]fluoranthene	7.53	-	-3.26	-1.16	-1.28	-	-	-	-2.03	-6.00	-	-7.82	-	-	-	-	-
Benzo[k]fluoranthene	1.24	-	-3.04	-0.42	6.85	-	-	-	-4.05	-4.02	-	-7.70	-	-	-	-	-
Benz[a]anthracene	4.50	0.29	-2.08	-0.13	7.21	-	-7.08	-7.15	-0.27	-2.89	4.17	-	-	-	-2.46	-4.17	6.25
Benzo[e]pyrene	-	1.81	-5.92	-	-	-	-	-	-3.34	-	-	-	-	-	-	-	-
Benzo[a]pyrene	3.81	-1.43	-4.74	0.57	-3.67	-	-1.10	-5.00	-3.41	-	-	-7.89	-1.03	-	-2.36	-2.72	1.80
Benzo[g,h,i]perylene	2.96	-3.20	-7.13	-0.50	-5.72	-	15	-7.88	-5.22	-	-	-7.72	-7.27	-	-2.22	-4.34	21
Indeno[1,2,3-c,d]pyrene	4.71	-	-4.50	0.66	-6.33	-	-	-	-	-	-	-	-3.30	-	-	-6.56	-
Dibenz[a,h]anthracene	-	-	-0.49	-3.47	-5.94	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	15	-	-	-3.26	-2.07	-	-	-	-	-	-	-	-	0.26	-	-2.74	-
Acenaphthene	-	25	-	-7.44	9.04	-	-	-	-	-	-	-	-4.73	-	-	-5.70	-

ANNEX III

GRAPHICAL PRESENTATION OF RESULTS

FIGURE III.1. – FIGURE III.22.



Summary of results

Assigned value	0.38 ng/g
Assimilated standard deviation	0.05 ng/g
Number of results	30
Minimum value	0.01
Maximum value	35.806
Mean	2.41
Standard deviation	6.92

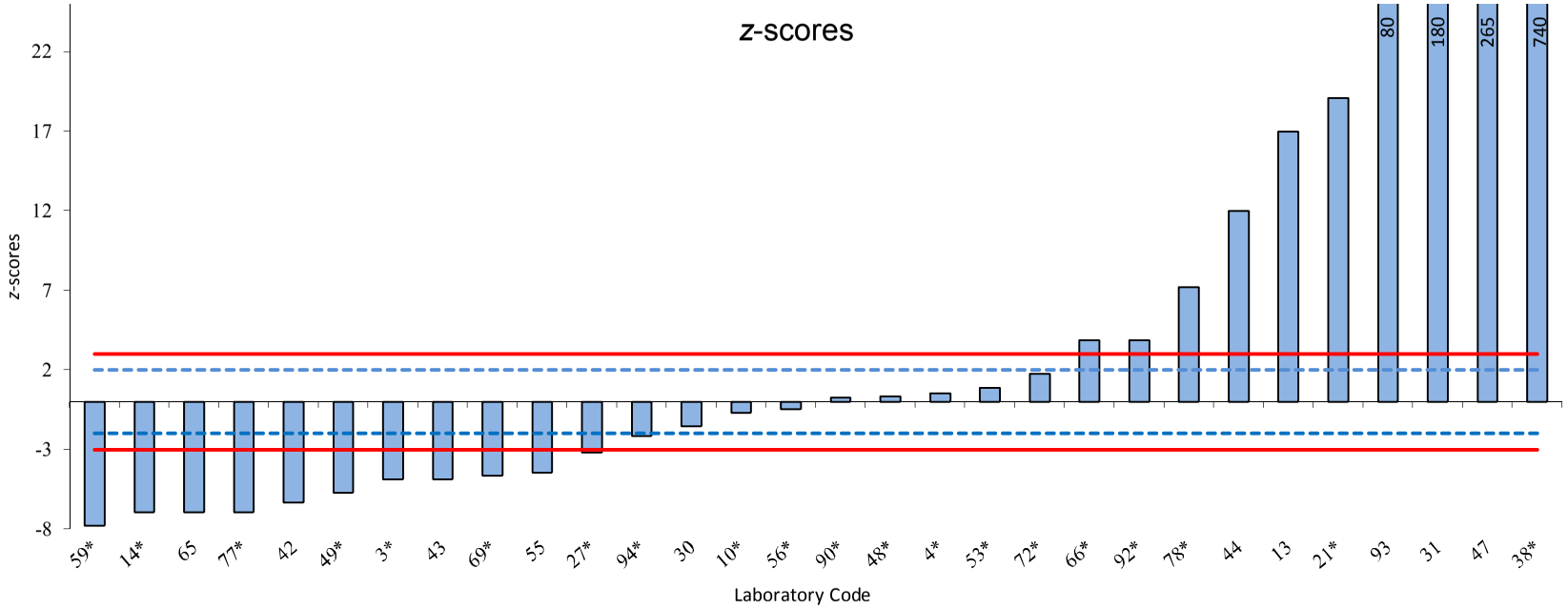
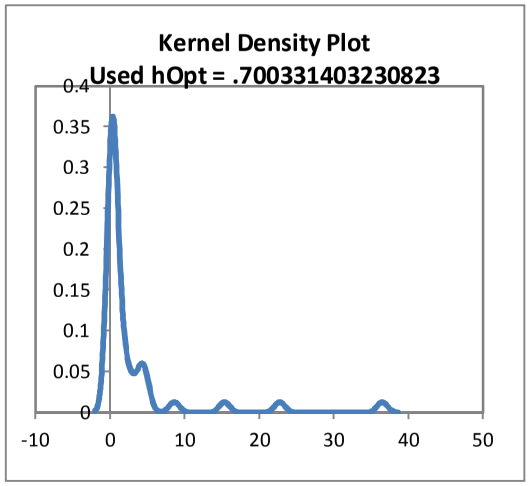


FIG. III.1. Performance evaluation of reported results for HCB in the IAEA-451 sample.



Summary of results

Assigned value	0.59 ng/g
Assimilated standard deviation	0.07 ng/g
Number of results	44
Minimum value	0.067
Maximum value	36.4721
Mean	2.89
Standard deviation	6.68

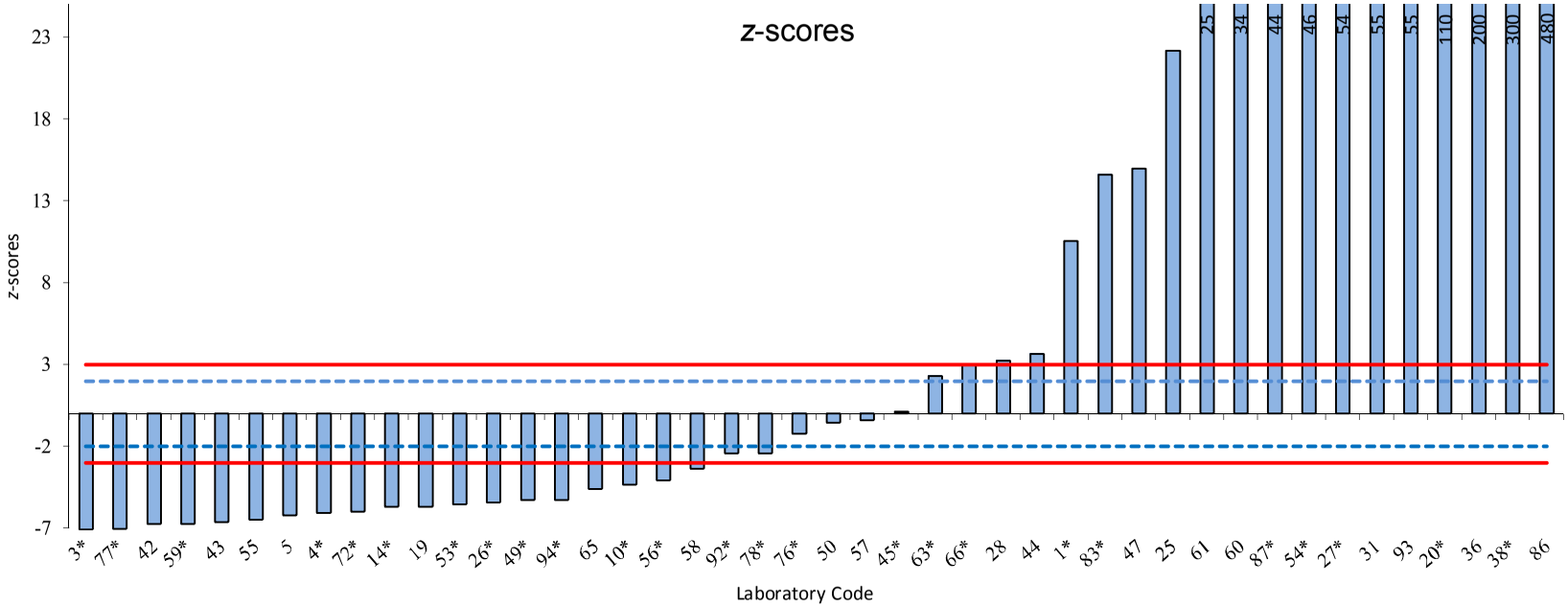
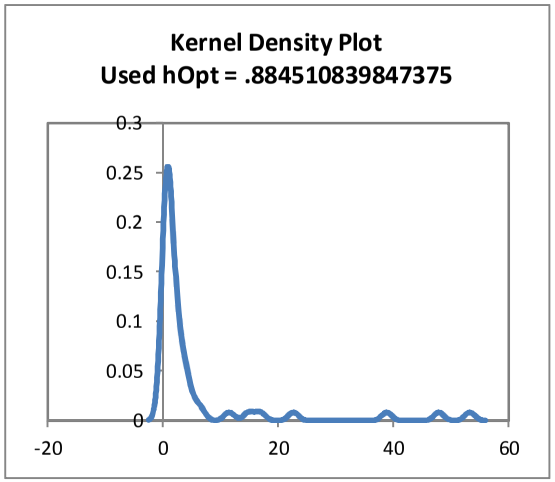


FIG. III.2. Performance evaluation of reported results for γ-HCH (Lindane) in the IAEA-451 sample.



Summary of results

Assigned value	1.53 ng/g
Assimilated standard deviation	0.19 ng/g
Number of results	56
Minimum value	0.2
Maximum value	24800
Mean	459
Standard deviation	3310

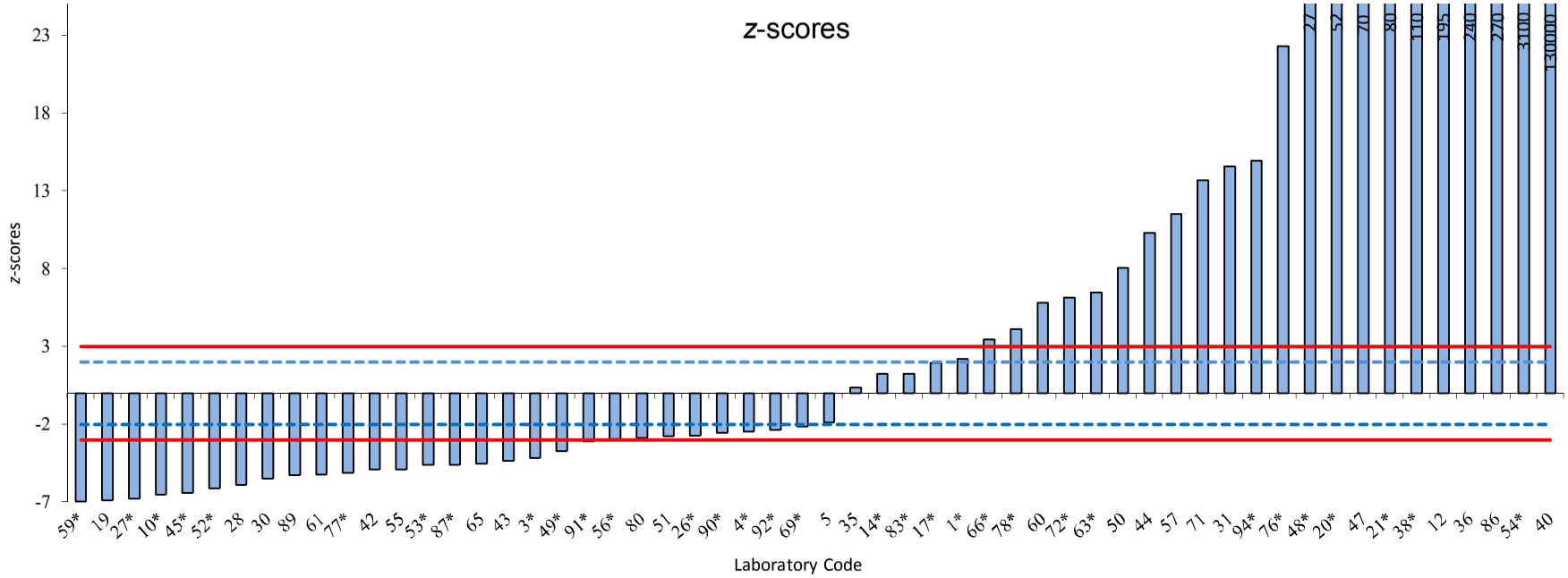
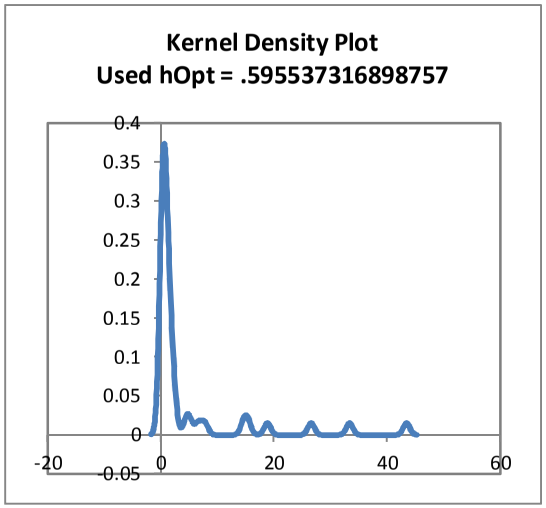


FIG. III.3. Performance evaluation of reported results for pp'DDE in the IAEA-451 sample.



Summary of results

Assigned value	1.11 ng/g
Assimilated standard deviation	0.14 ng/g
Number of results	47
Minimum value	0.07
Maximum value	4300
Mean	102
Standard deviation	630

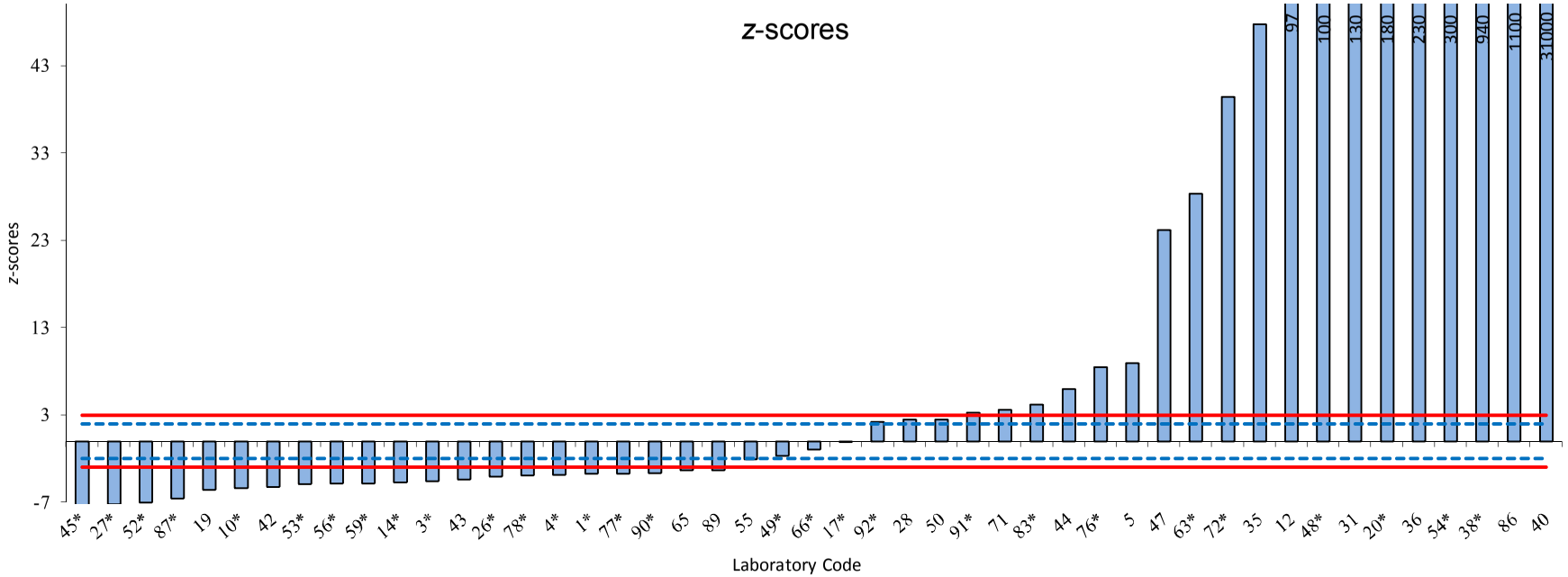
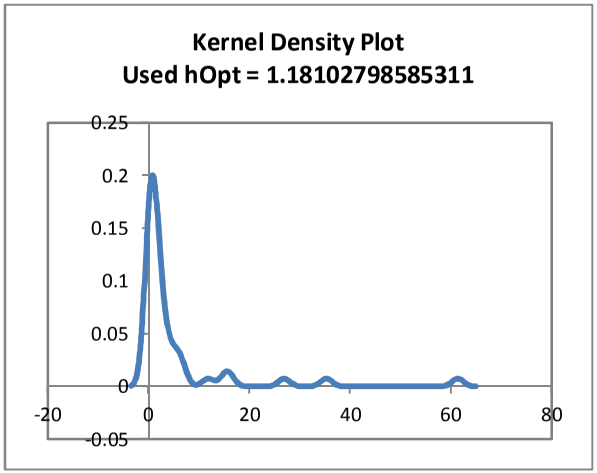


FIG. III.4. Performance evaluation of reported results for pp'DDD in the IAEA-451 sample.



Summary of results

Assigned value	1.51 ng/g
Assimilated standard deviation	0.19 ng/g
Number of results	45
Minimum value	0.07
Maximum value	61.3743
Mean	5.18
Standard deviation	11.1

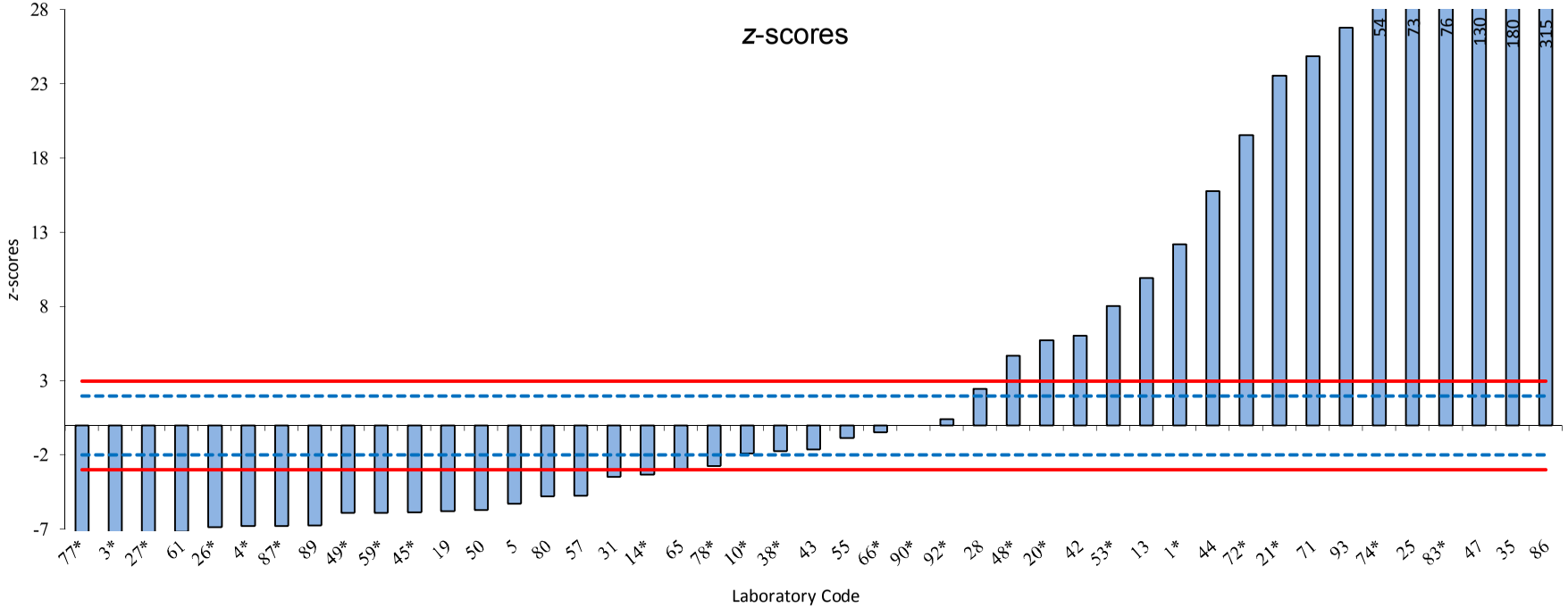
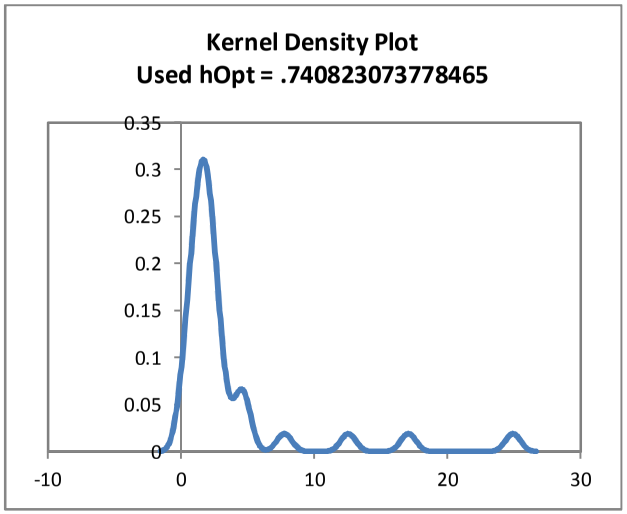


FIG. III.5. Performance evaluation of reported results for pp'DDT in the IAEA-451 sample.



Summary of results

Assigned value	2.00 ng/g
Assimilated standard deviation	0.25 ng/g
Number of results	37
Minimum value	0.2
Maximum value	1310
Mean	38.8
Standard deviation	215

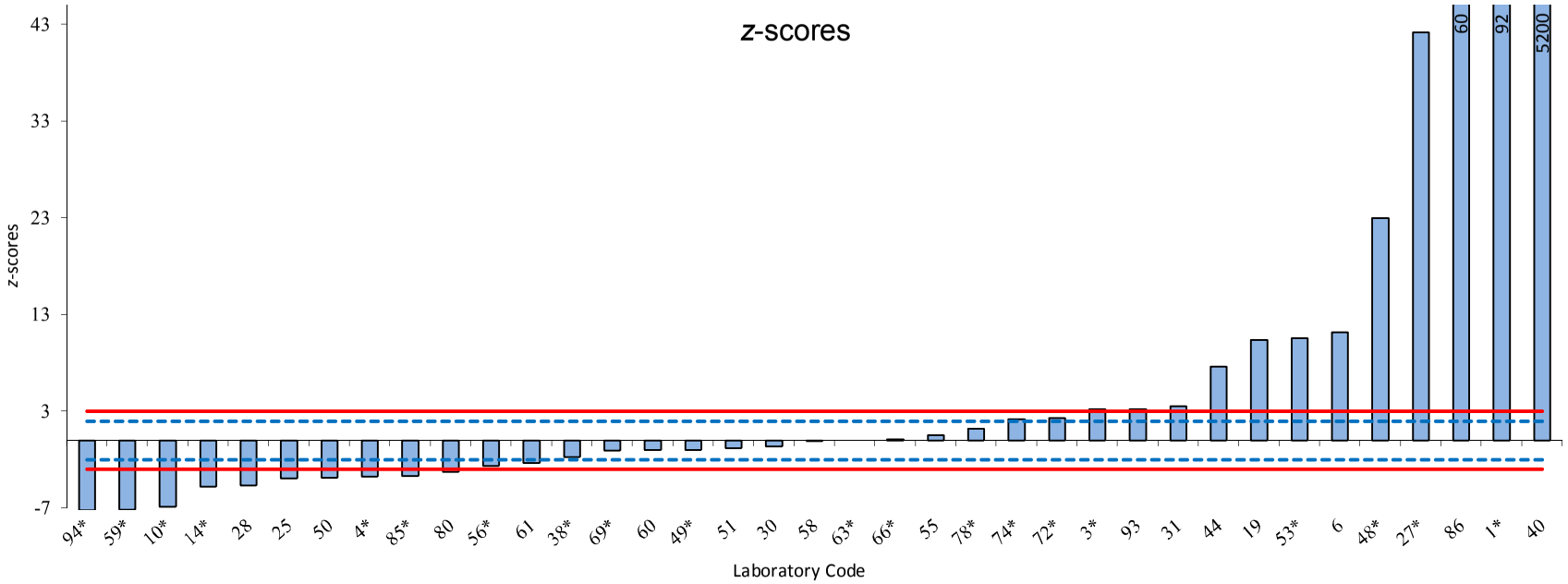
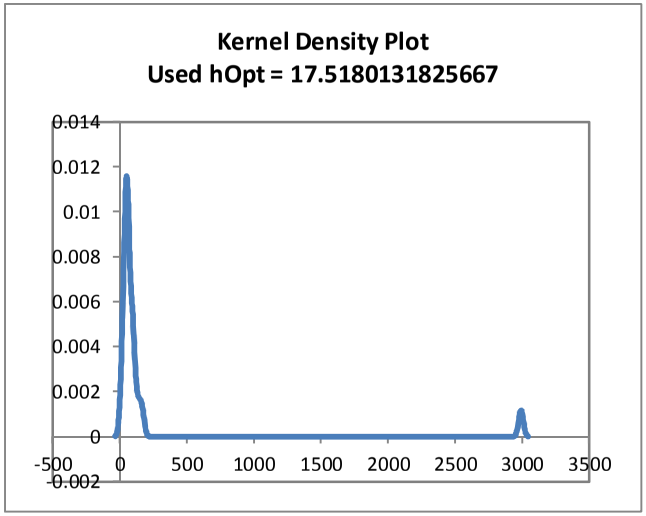


FIG. III.6. Performance evaluation of reported results for Dieldrin in the IAEA-451 sample.



Summary of results

Assigned value	63.2 ng/g
Assimilated standard deviation	7.9 ng/g
Number of results	19
Minimum value	16.8
Maximum value	2990
Mean	221
Standard deviation	670

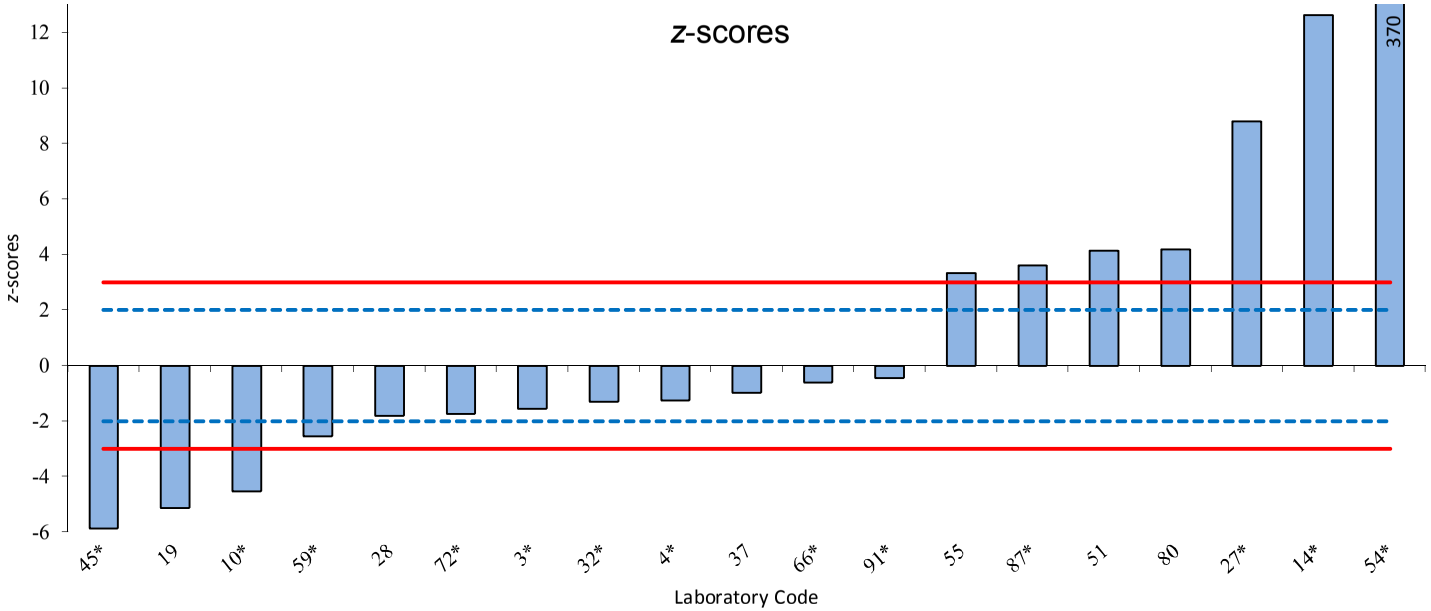
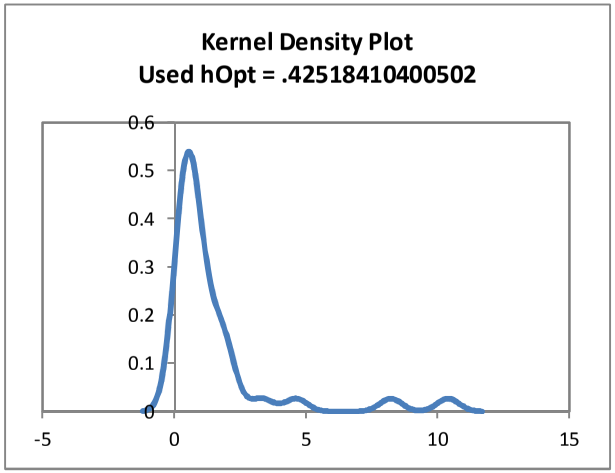


FIG. III.7. Performance evaluation of reported results for Aroclor 1260 in the IAEA-451 sample.



Summary of results

Assigned value	0.86 ng/g
Assimilated standard deviation	0.11 ng/g
Number of results	36
Minimum value	0.07
Maximum value	88.3
Mean	3.90
Standard deviation	14.6

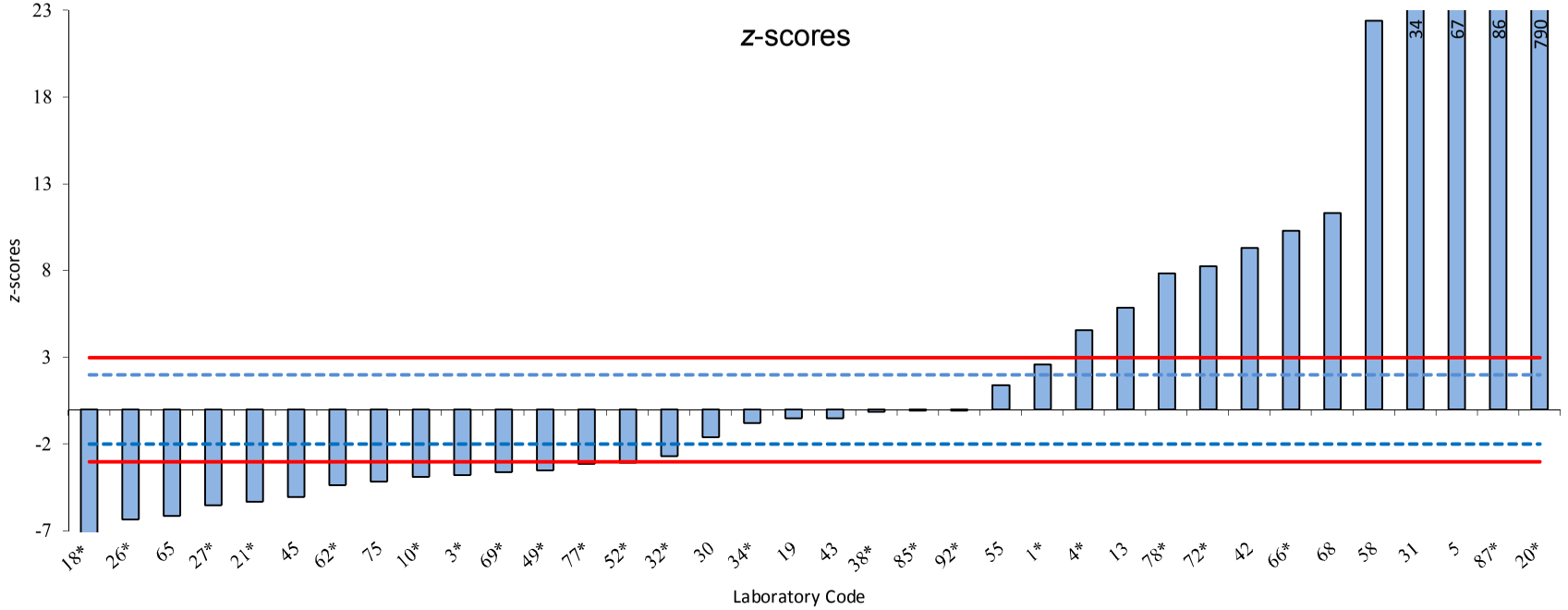
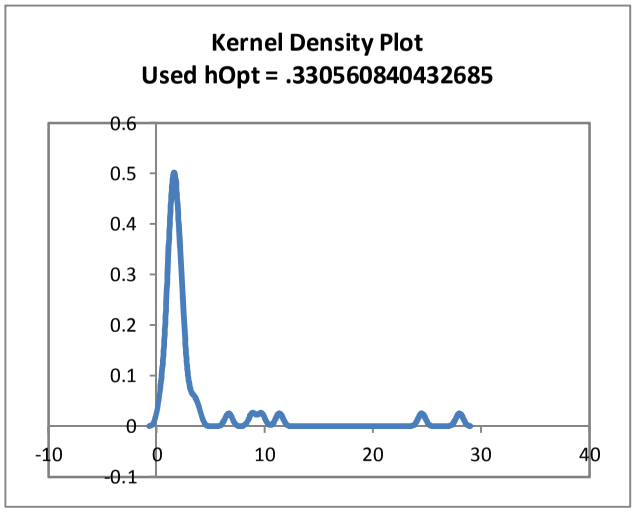


FIG. III.8. Performance evaluation of reported results for PCB 52 in the IAEA-451 sample.



Summary of results

Assigned value	1.83 ng/g
Assimilated standard deviation	0.23 ng/g
Number of results	47
Minimum value	0.3
Maximum value	27.97
Mean	3.42
Standard deviation	5.36

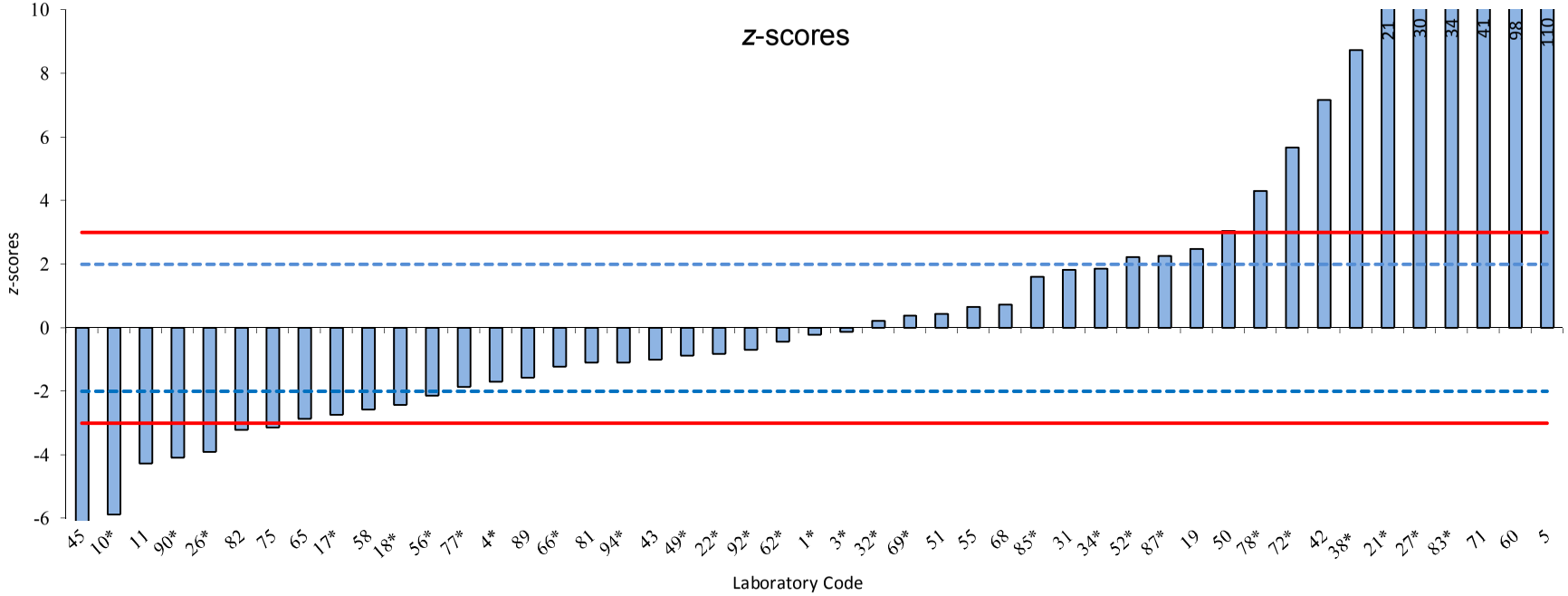
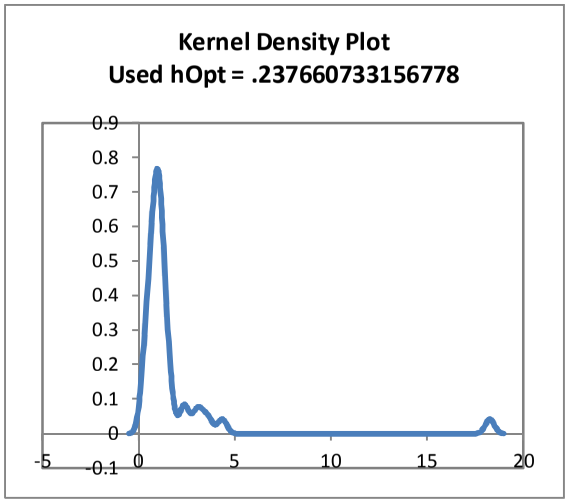


FIG. III.9. Performance evaluation of reported results for PCB 101 in the IAEA-451 sample.



Summary of results

Assigned value	1.04 ng/g
Assimilated standard deviation	0.13 ng/g
Number of results	40
Minimum value	0.2
Maximum value	18.25
Mean	1.68
Standard deviation	2.84

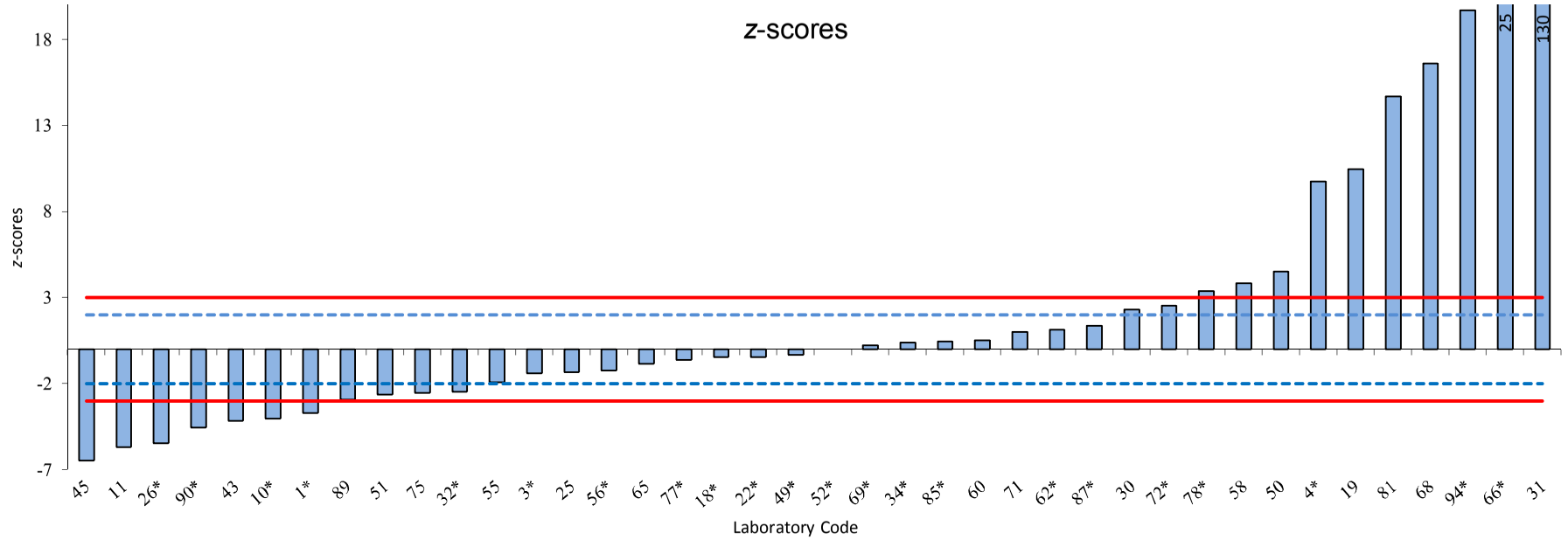
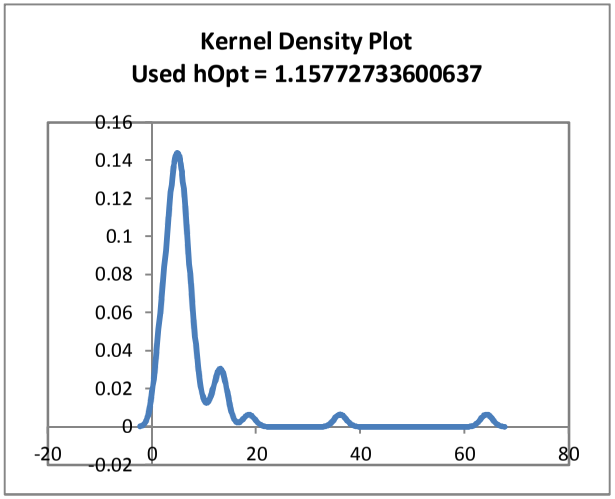


FIG. III.10. Performance evaluation of reported results for PCB 118 in the IAEA-451 sample.



Summary of results

Assigned value	5.33 ng/g
Assimilated standard deviation	0.67 ng/g
Number of results	53
Minimum value	1.175
Maximum value	64.18
Mean	7.61
Standard deviation	9.63

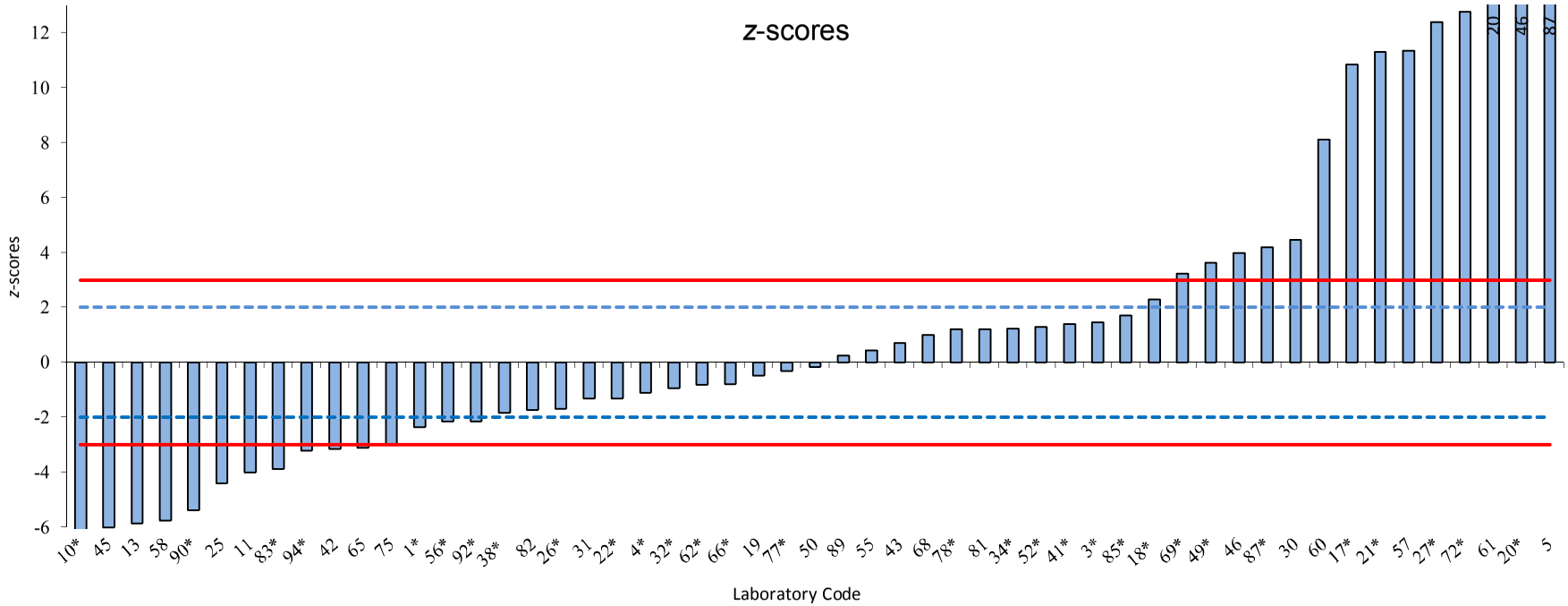
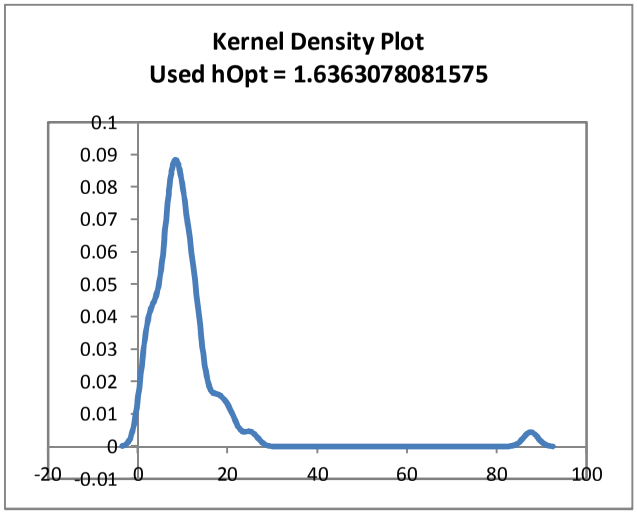


FIG. III.11. Performance evaluation of reported results for PCB 138 in the IAEA-451 sample.



Summary of results

Assigned value	8.96 ng/g
Assimilated standard deviation	1.12 ng/g
Number of results	55
Minimum value	1.44
Maximum value	87.5
Mean	10.8
Standard deviation	11.7

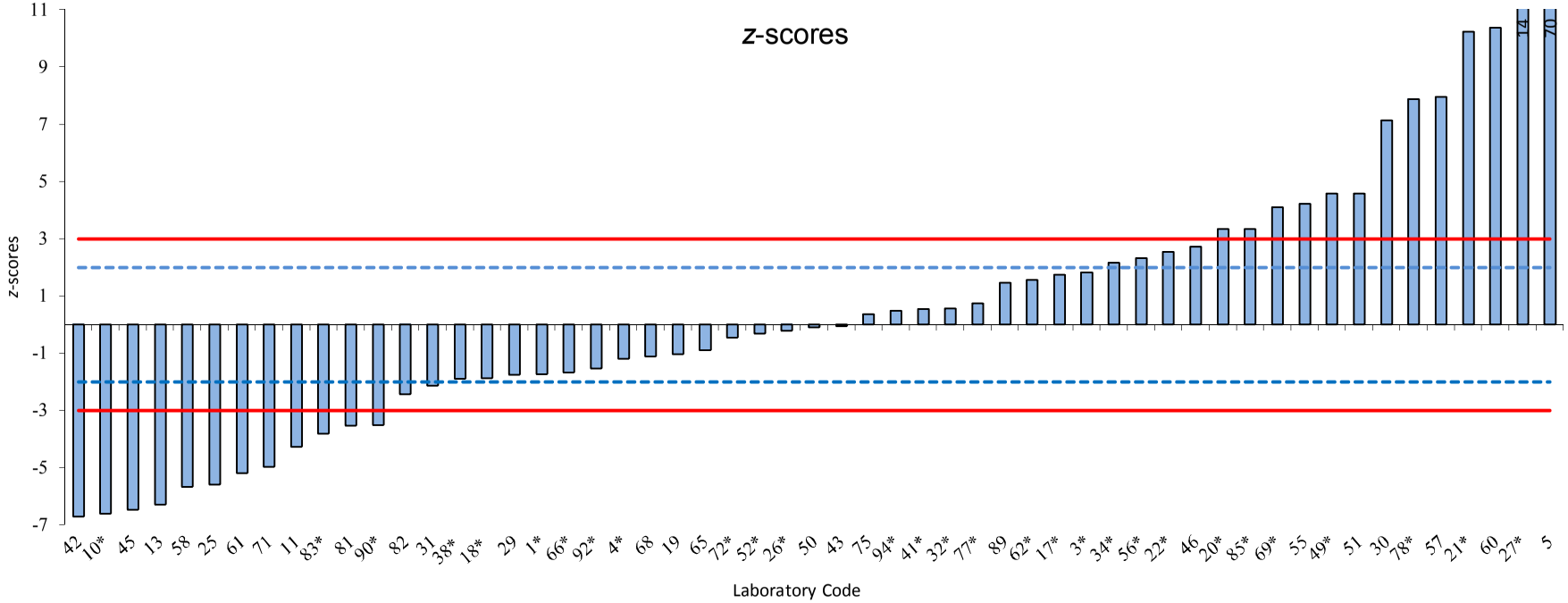
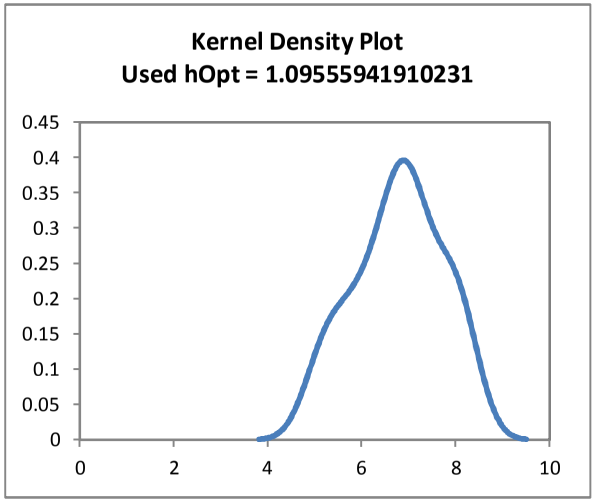


FIG. III.12. Performance evaluation of reported results for PCB 153 in the IAEA-451 sample.



Summary of results

Assigned value	6.56 ng/g
Assimilated standard deviation	0.82 ng/g
Number of results	52
Minimum value	0.125
Maximum value	39.14
Mean	7.32
Standard deviation	6.33

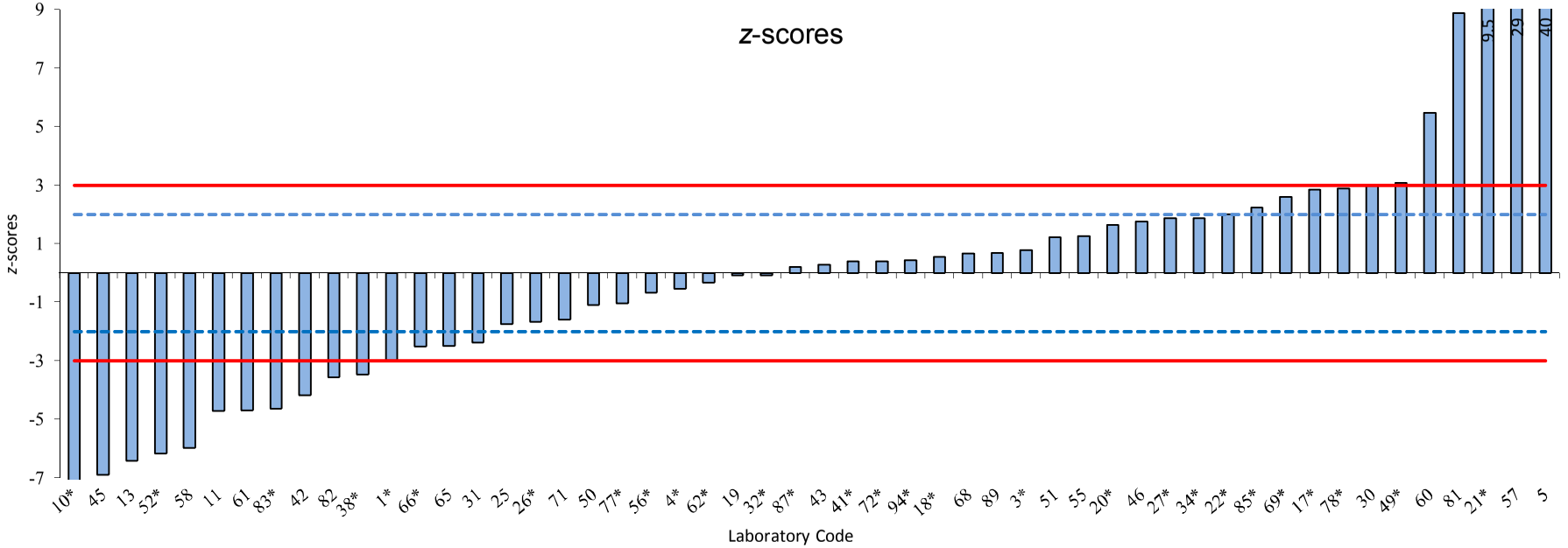
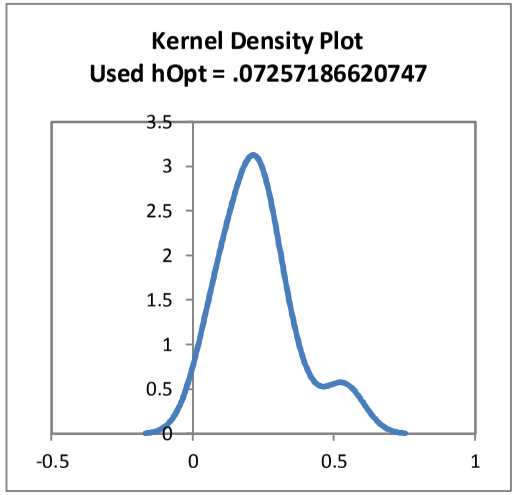


FIG. III.13. Performance evaluation of reported results for PCB 180 in the IAEA-451 sample.



Summary of results

Assigned value	0.22 ng/g
Assimilated standard deviation	0.03 ng/g
Number of results	10
Minimum value	0.05
Maximum value	0.534
Mean	0.23
Standard deviation	0.14

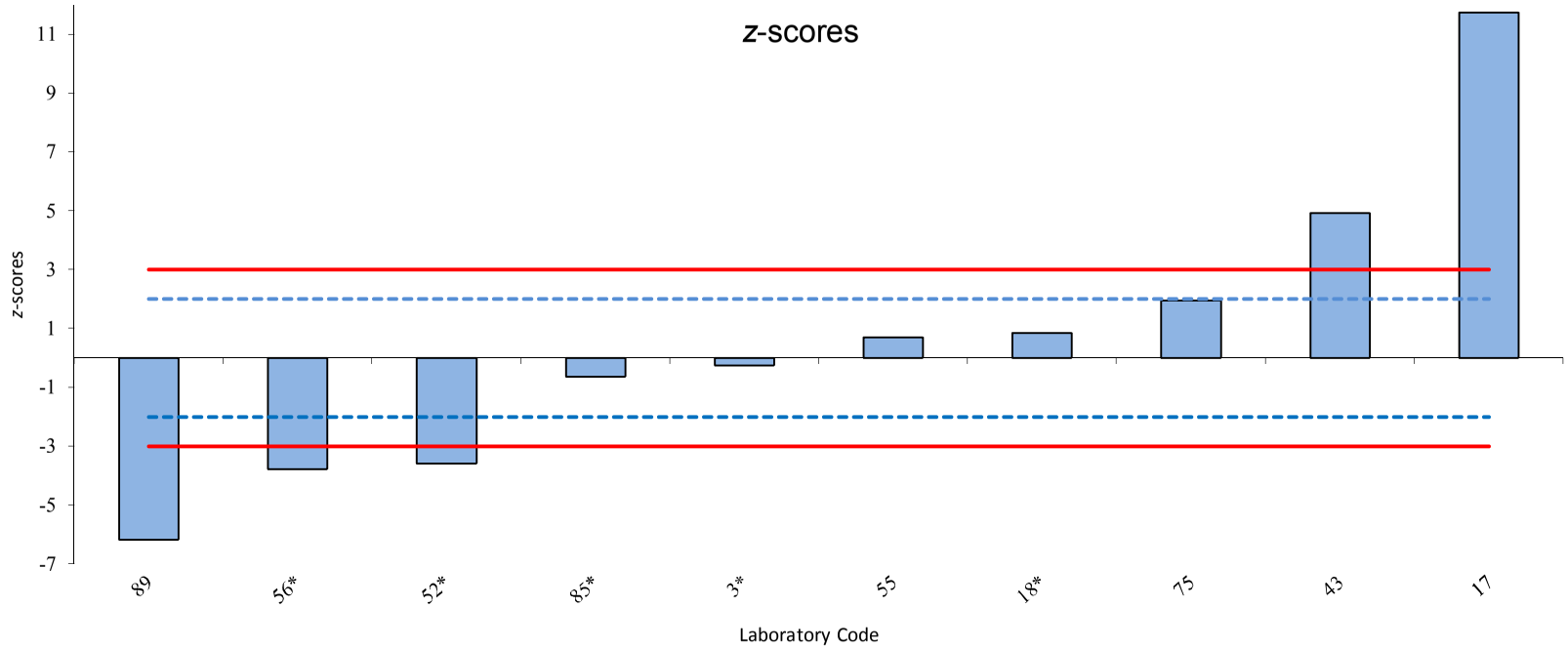
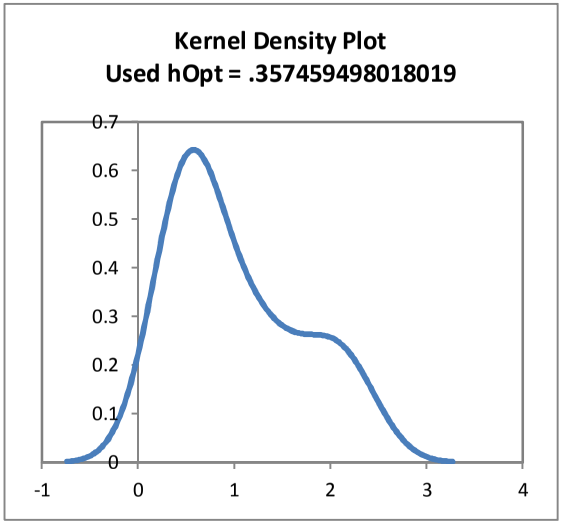


FIG. III.21. Performance evaluation of reported results for BDE100 in the IAEA-451 sample.



Summary of results

Assigned value	0.81 ng/g
Assimilated standard deviation	0.10 ng/g
Number of results	13
Minimum value	0.33
Maximum value	2.198
Mean	1.02
Standard deviation	0.66

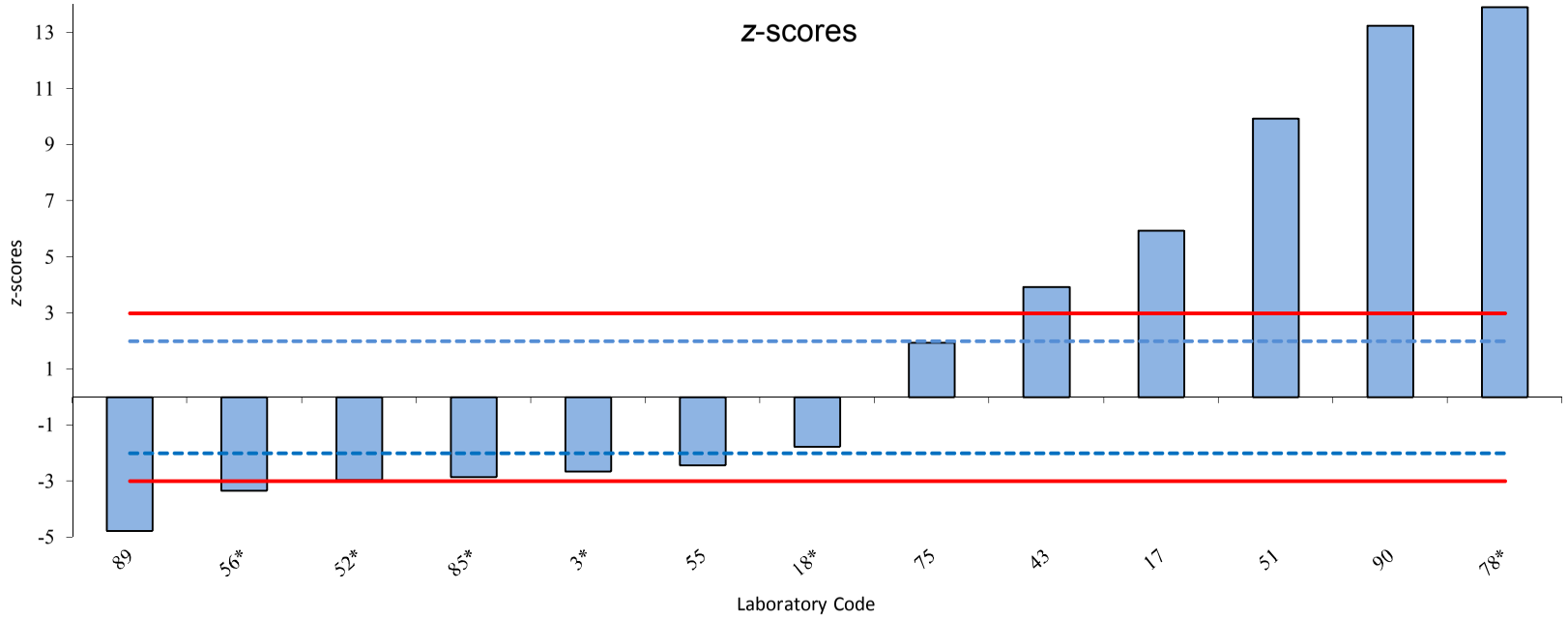
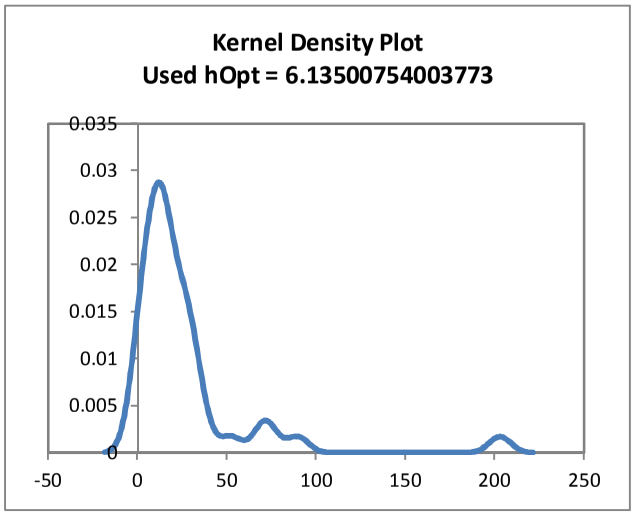


FIG. III.22. Performance evaluation of reported results for BDE99 in the IAEA-451 sample



Summary of results

Assigned value	17.1 ng/g
Assimilated standard deviation	2.1 ng/g
Number of results	38
Minimum value	0.01
Maximum value	203
Mean	26.1
Standard deviation	35.7

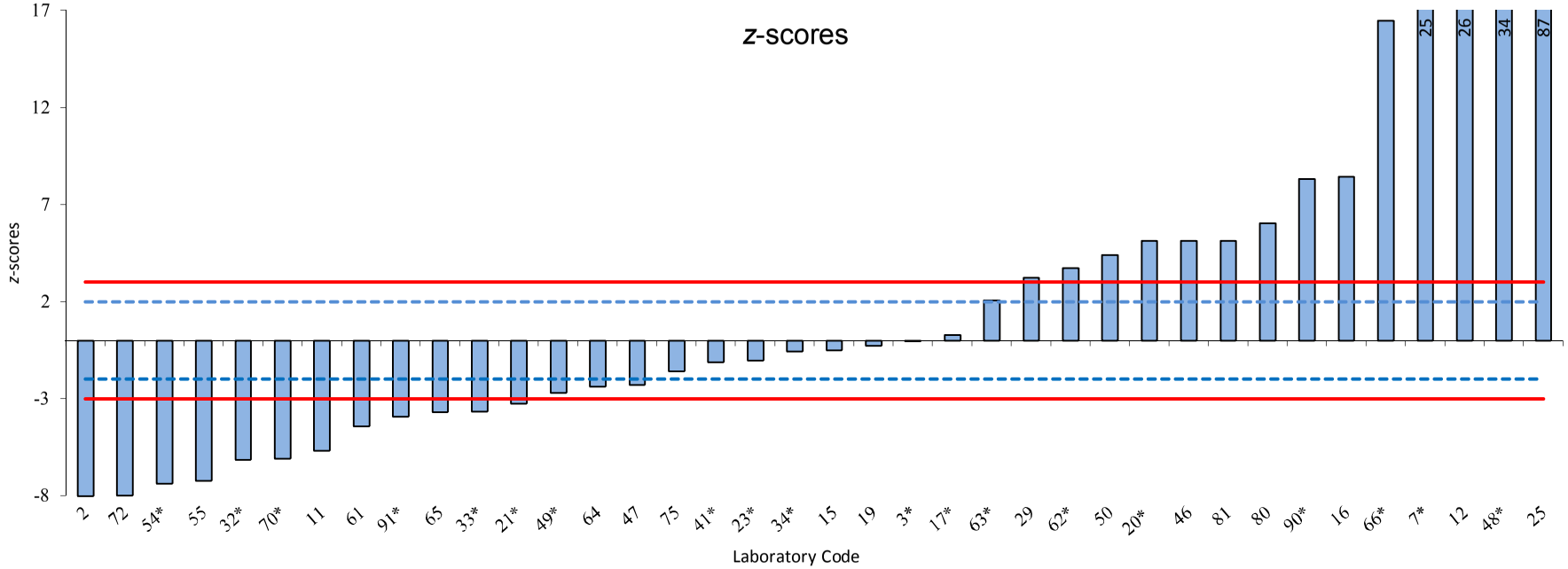
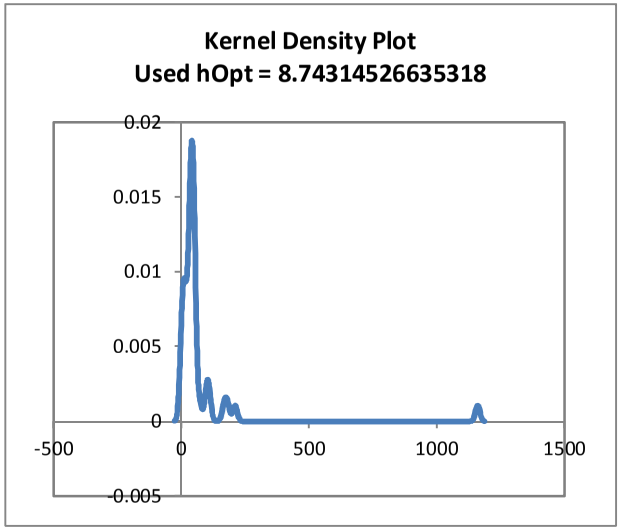


FIG. III.14. Performance evaluation of reported results for Phenanthrene in the IAEA-451 sample.



Summary of results

Assigned value	39.1 ng/g
Assimilated standard deviation	4.9 ng/g
Number of results	43
Minimum value	0.04
Maximum value	1160
Mean	73.7
Standard deviation	175

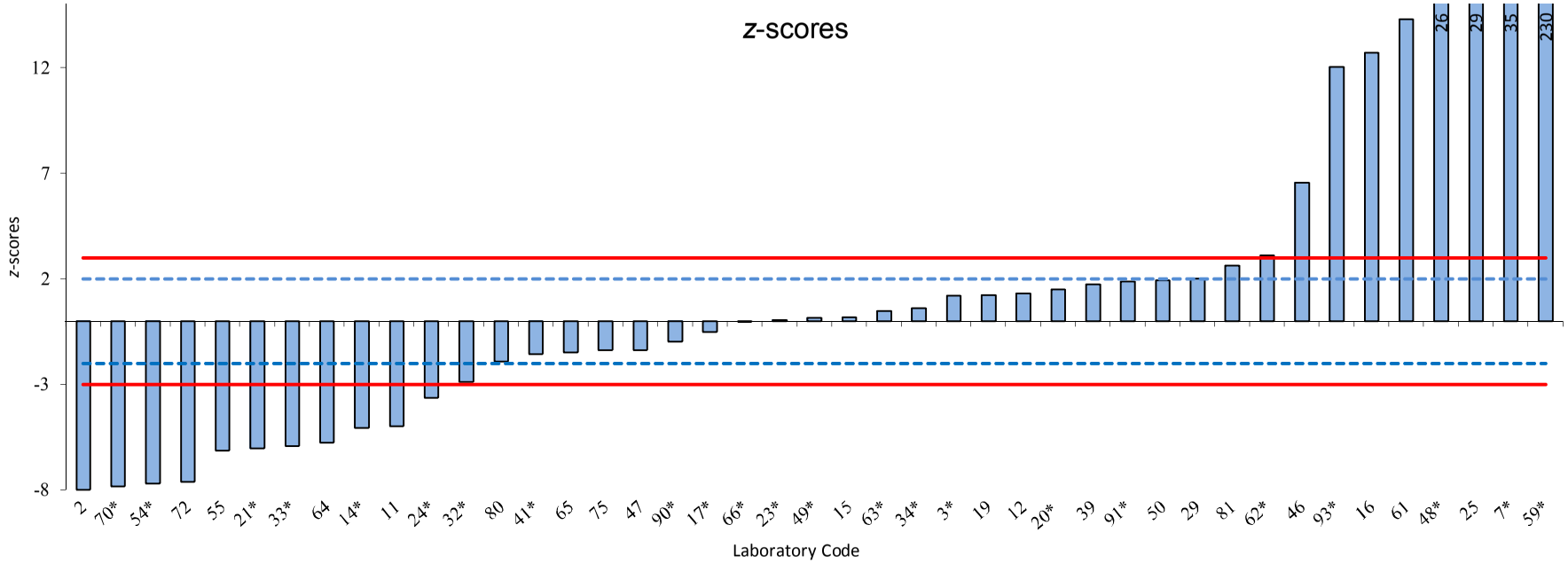
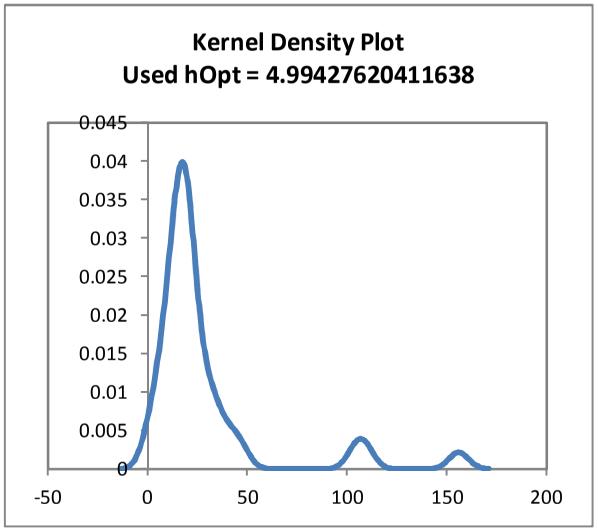


FIG. III.15. Performance evaluation of reported results for Pyrene in the IAEA-451 sample.



Summary of results

Assigned value	19.0 ng/g
Assimilated standard deviation	2.4 ng/g
Number of results	37
Minimum value	1.836
Maximum value	156
Mean	27.7
Standard deviation	31.1

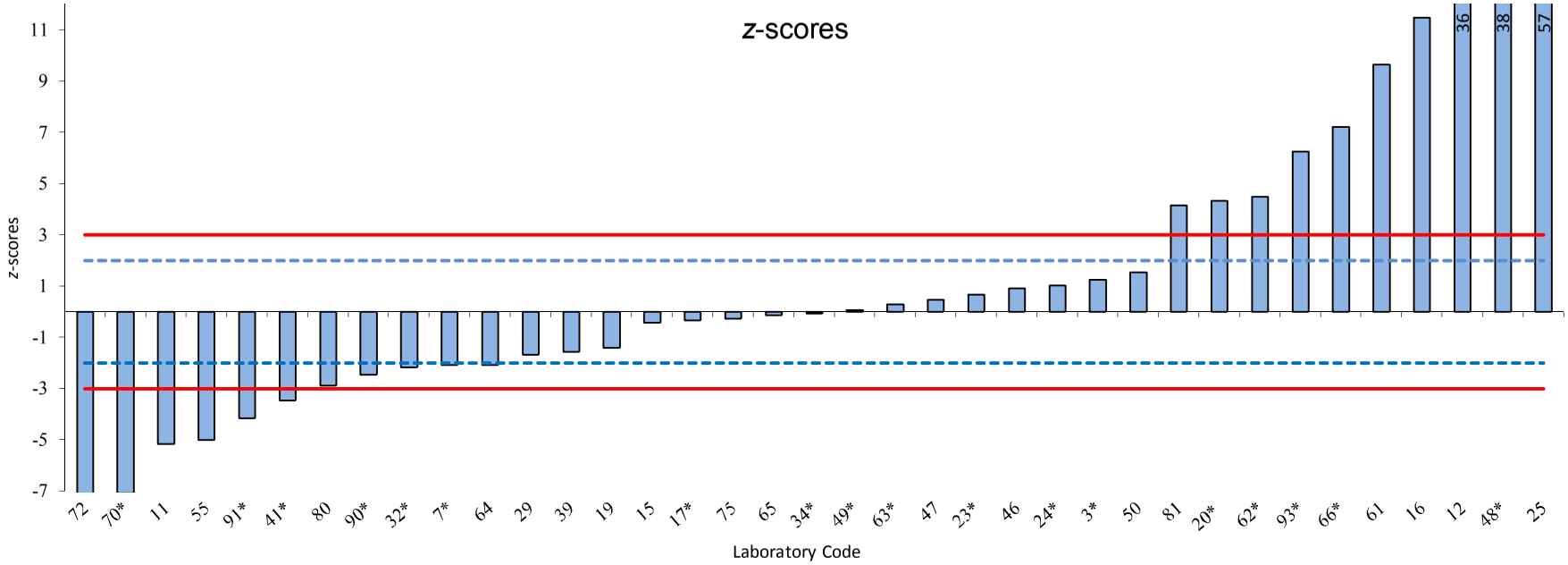
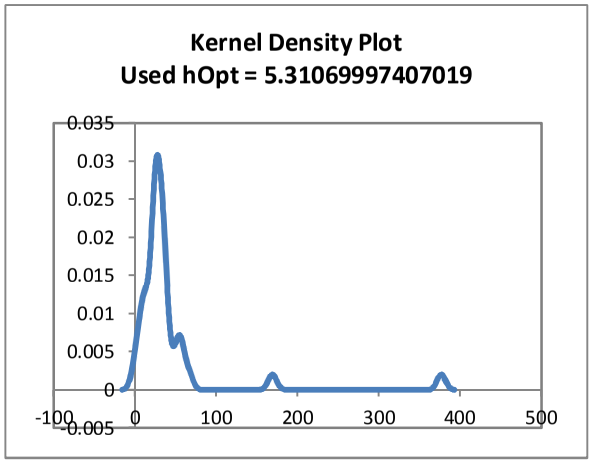


FIG. III.16. Performance evaluation of reported results for Benz[a]anthracene in the IAEA-451 sample.



Summary of results

Assigned value	28.0ng/g
Assimilated standard deviation	3.5 ng/g
Number of results	37
Minimum value	0.03
Maximum value	377
Mean	41.6
Standard deviation	63.0

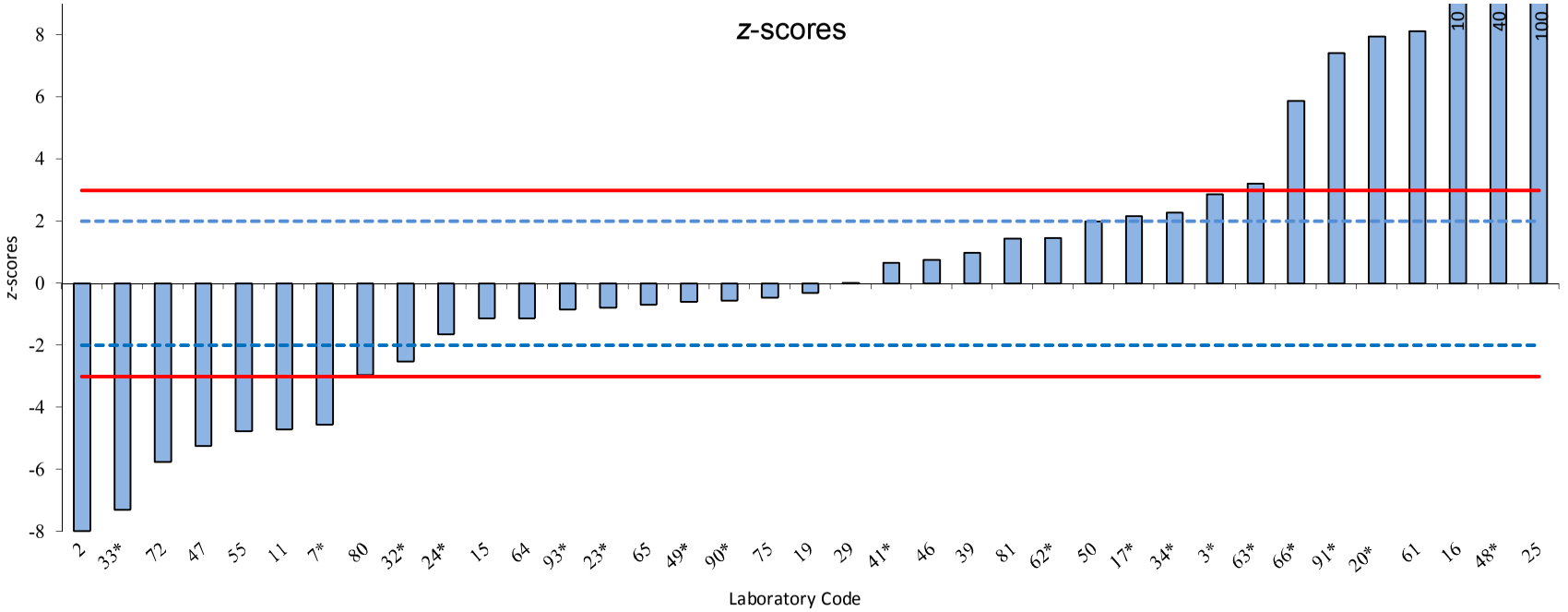
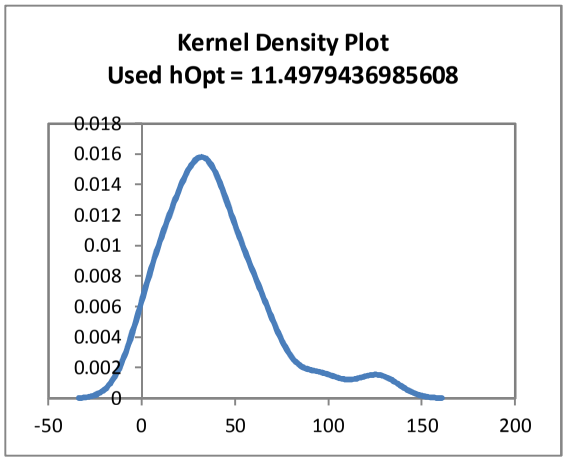


FIG. III.17. Performance evaluation of reported results for Chrysene in the IAEA-451 sample.



Summary of results

Assigned value	35.5 ng/g
Assimilated standard deviation	4.4 ng/g
Number of results	23
Minimum value	0.78
Maximum value	126
Mean	39.9
Standard deviation	29.4

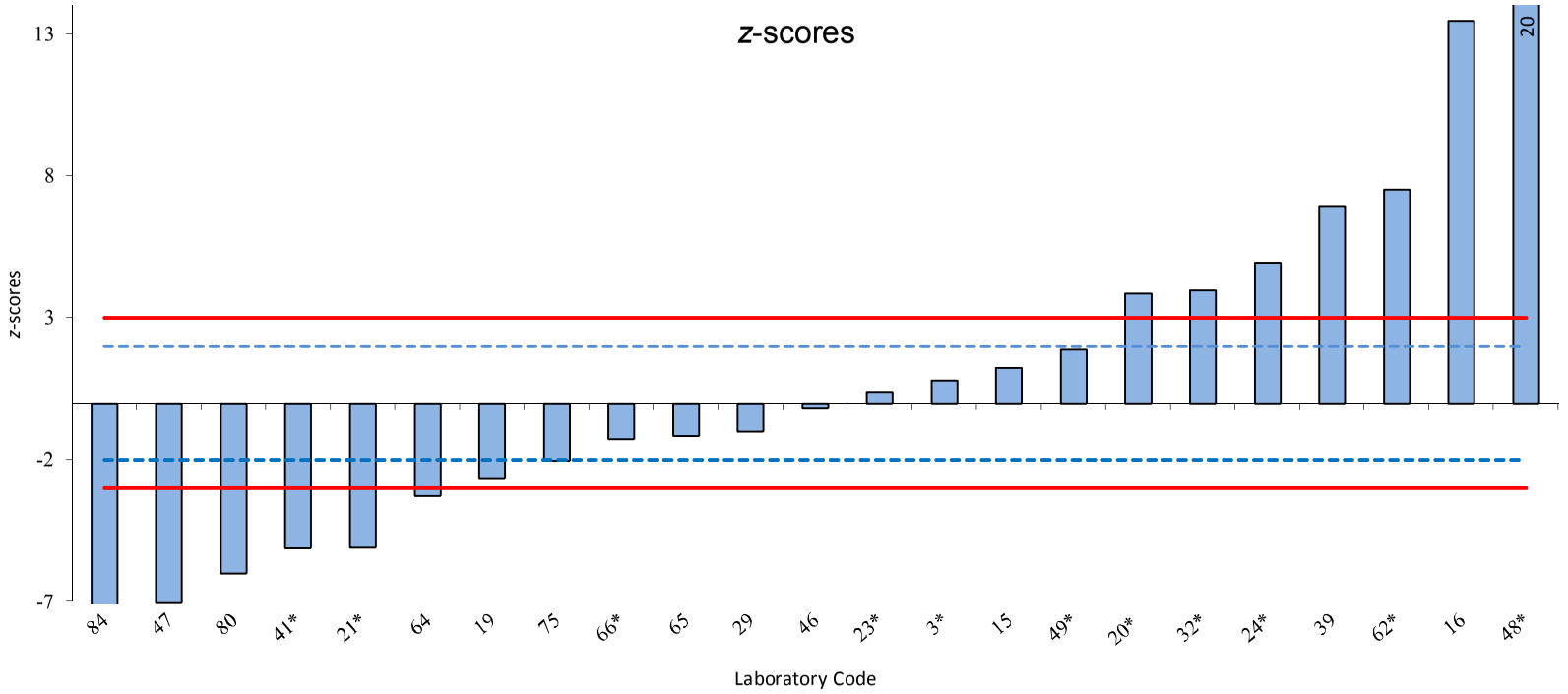
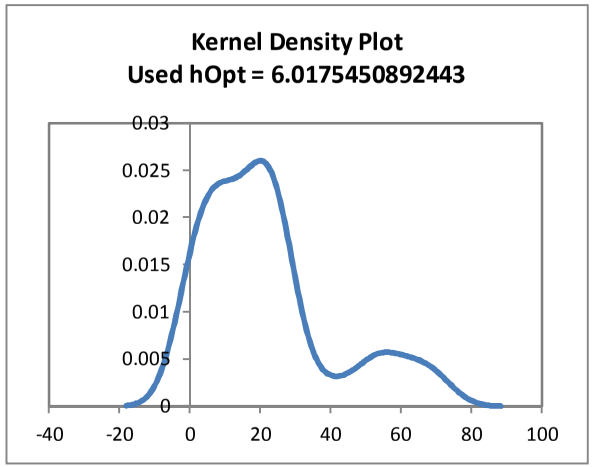


FIG. III.18. Performance evaluation of reported results for Benzo[b]fluoranthene in the IAEA-451 sample.



Summary of results

Assigned value	18.1 ng/g
Assimilated standard deviation	2.3 ng/g
Number of results	34
Minimum value	0.02
Maximum value	70.28
Mean	21.7
Standard deviation	18.9

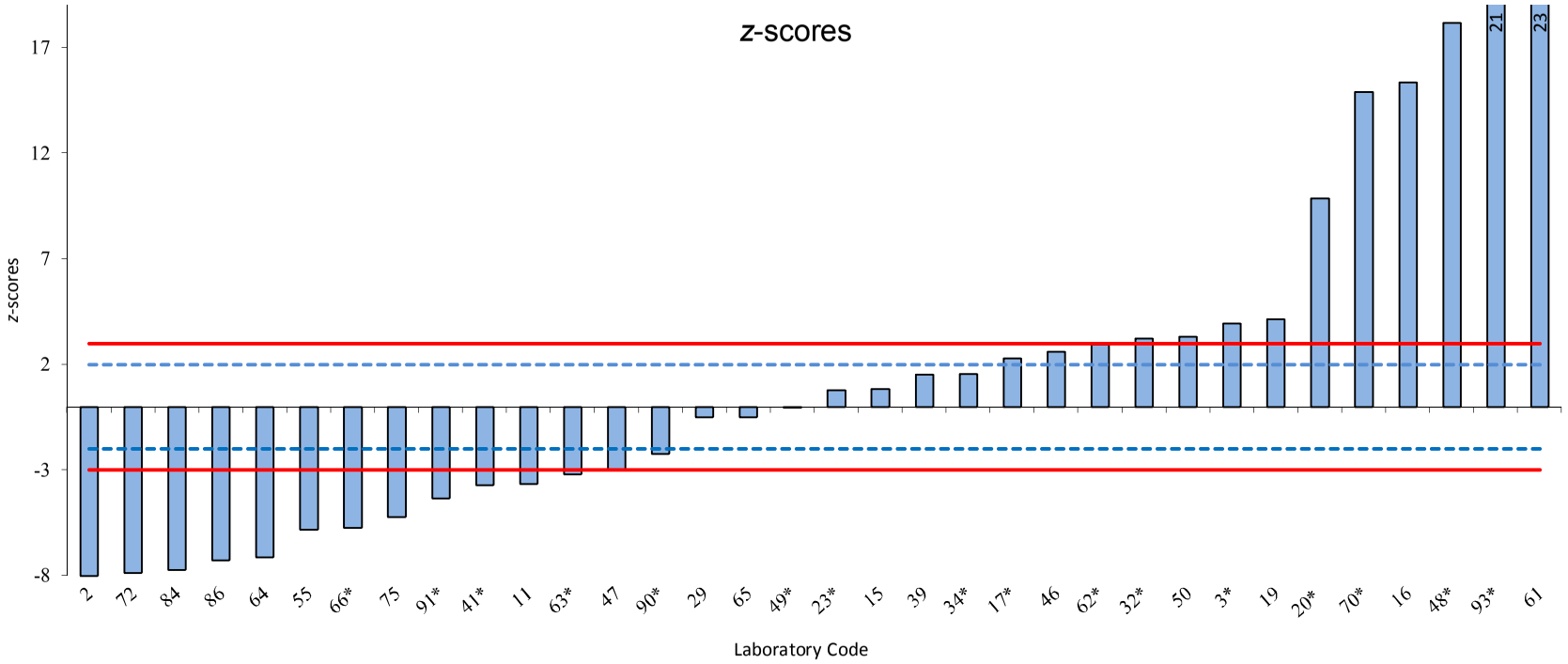
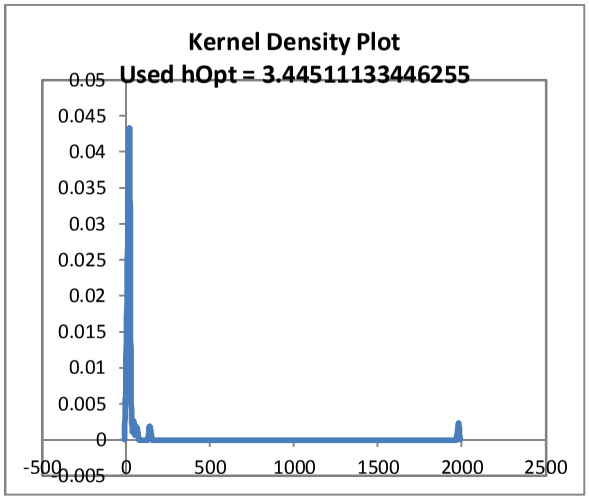


FIG. III.19. Performance evaluation of reported results for Benzo[g,h,i]perylene in the IAEA-451 sample.



Summary of results

Assigned value	17.2 ng/g
Assimilated standard deviation	2.1 ng/g
Number of results	38
Minimum value	0.02
Maximum value	19778
Mean	72.1
Standard deviation	318

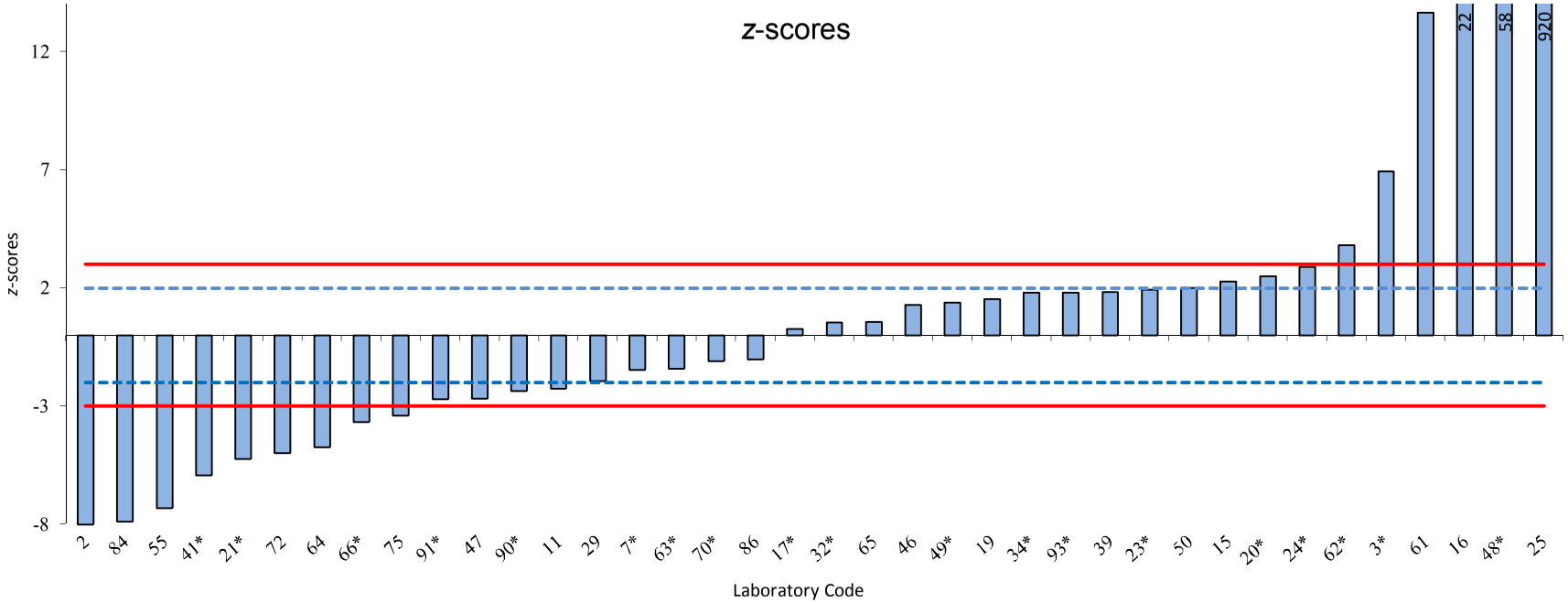


FIG. III.20. Performance evaluation of reported results for Benzo[a]pyrene in the IAEA-451 sample.

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