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**SUMMARY REPORT FOR UGLCC INTERLABORATORY
STUDIES ON THE ANALYSIS FOR CHLORINATED HYDROCARBONS
IN STANDARD SOLUTIONS, WATER AND SEDIMENT SAMPLES**

by

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and the Data Quality Management Work
Group

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MANAGEMENT PERSPECTIVE

The Upper Great Lakes Connecting Channels (UGLCC) have been designated as "Areas of Concern" by the International Joint Commission. A Canada-U.S. binational study involving the identification and assessment of the environmental impacts of toxic substances in those areas was initiated in late 1985. In order to assist participating analytical laboratories to generate reliable and accurate data during the study, a Data Quality Management Work Group was formed and 13 interlaboratory performance evaluation studies were initiated.

Final reports for the 13 interlaboratory studies have been completed. This report presents a summary of interlaboratory studies QM-1, QM-6 and QM-7 on the analysis for chlorinated hydrocarbons in standard solutions contained in ampules, water and sediments. The information contained in this report will assist project leaders, managers and users of UGLCC data in evaluating the performance of participating laboratories.

Dr. J. Lawrence
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PERSPECTIVE GESTION

La Commission mixte internationale a désigné "secteur préoccupant" les voies interlacustres des Grands lacs d'amont (Upper Great Lakes Connecting Channels). Une étude binationale Canada - États-Unis visant à déterminer et évaluer l'impact sur l'environnement des substances toxiques dans ce secteur a été entreprise à la fin de 1985. Afin d'assurer que les laboratoires d'analyse participants produisent des données précises et fiables, on a mis sur pied un groupe de travail de gestion de la qualité des données et treize études interlaboratoires d'évaluation de la performance ont été entreprises.

Les rapports finaux des 13 études interlaboratoires ont été déposés. Le présent rapport est un résumé des études interlaboratoires QM-1, QM-6 et QM-7 portant sur le dosage des hydrocarbures chlorés dans des solutions étalons contenues dans des ampoules et des échantillons d'eau et de sédiments. Les chefs de projet, les gestionnaires et les utilisateurs de données sur les voies interlacustres des Grands Lacs d'amont pourront utiliser l'information contenue dans le présent rapport pour évaluer la performance des laboratoires participants.

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ABSTRACT

In the early planning stages of the Upper Great Lakes Connecting Channels (UGLCC) Study, it was recognized that quality assurance/quality control (QA/QC) aspects would be crucial to the overall usefulness of the study results. In order to address this matter, a Data Quality Management Work Group was established and thirteen interlaboratory performance evaluation (PE) studies for inorganic and organic parameters were designed and conducted throughout the duration of the UGLCC study (1985 - 1987).

Final reports for the 13 interlaboratory studies have been completed. Results from interlaboratory PE studies QM-1, QM-6 and QM-7 on the analysis for chlorinated hydrocarbons in standard solutions contained in ampules, water and sediments are now integrated into this report. The information contained in this report will assist project leaders, managers and users of UGLCCS data in evaluating the performance of participating laboratories.

RÉSUMÉ

Il est apparu, dès les premiers stades de l'étude sur les voies interlacustres des Grands Lacs d'amont (Upper Great Lakes Connecting Channels Study), que l'aspect assurance et contrôle de la qualité était cruciale à l'utilité globale des résultats de l'étude. Un groupe de travail de gestion de la qualité des données a donc été créé et treize études interlaboratoires d'évaluation de la performance pour l'analyse des paramètres organiques et inorganiques ont été conçues et réalisées au cours de l'étude sur les voies interlacustres (1985-1987).

Les rapports finaux des treize études interlaboratoires ont été achevées. Les résultats des études d'évaluation de la performance QM-1, QM-6 et QM-7 sur le dosage des hydrocarbures chlorés dans des solutions étalons contenues dans des ampoules et des échantillons de sédiments et d'eau sont présentés ici. L'information que renferme le présent rapport permettra d'aider les chefs de projet, les gestionnaires et les utilisateurs de données sur les voies interlacustres à évaluer la performance des laboratoires participants.

1.0 INTRODUCTION

The Upper Great Lakes Connecting Channels Study (UGLCCS) was established to identify and deal with environmental problems associated with the St. Mary's, St. Clair and Detroit Rivers and Lake St. Clair. A three-year, binational study was started in late 1985 and involved Canadian and U.S. environmental and resource agencies.

In the early planning stages of the study, it was recognized that quality assurance/quality control (QA/QC) aspects would be crucial to the overall usefulness of the study results. In order to address this matter, a Data Quality Management Work Group (see Appendix I-A) was established and thirteen interlaboratory performance evaluation studies were conducted.

Thirteen individual final reports on the interlaboratory studies have been completed, as listed in Appendix I-B. This report is a summary of interlaboratory studies QM-1, QM-6 and QM-7 for chlorinated hydrocarbons (CHs) in standard solutions contained in ampules, water and sediments. The data accuracy and precision for individual laboratories are discussed as well as data addressing between-laboratory comparability drawn from various studies.

2.0 STUDY DESIGN

At the outset, the Data Quality Management Work Group considered that control of standards and the calibration process (1) were the two major sources of variation in results between different laboratories. Therefore, a series of check standards covering all of the UGLCCS parameters for which check standards were available was distributed to laboratories participating in the study.

Table 2.1 provides a listing of the samples distributed for these interlaboratory studies and the constituents to be analyzed covering 36 inorganic and 50 organic parameters. The participants in these studies included different governmental and private laboratories in both Canada and the U.S., and are enumerated in Table 2.2. The schedule of the QC studies are listed in Table 2.3.

Each study consisted of between four and eight samples which contained either standard solutions in ampules, surrogate spikes for water, or a limited number of reference materials derived from naturally contaminated samples. Test compounds were of fixed concentration for each sample, but levels were made to vary between samples by as much as two orders of magnitude. Most samples were sent out, together with blind duplicates, so that reproducibility could be assessed. All samples were well-characterized and their stability was verified in advance by in-house analyses. Sample stability was also assessed by re-using samples in various studies. This approach has been successfully employed in IJC and LRTAP interlaboratory studies (1,2).

These studies were designed and conducted under the direction of the QA Team of the Research and Applications Branch at the National Water Research Institute in Burlington.

3.0 DATA EVALUATION

In the past, a technique known as Youden ranking (3) was employed to determine bias in a laboratory's results. However, because of the small number of laboratories which provided data, this technique could not be used. As an alternative, each laboratory's result for a particular parameter in a given sample was treated as a 'recovery' and the design value for that parameter and sample was taken as the true value. Percent recoveries for

each sample and parameter combination were then calculated and compared to value ranges in the table listed below.

<u>Average or Individual % Recovery</u>	<u>Individual Result Designation (Flag)</u>	<u>Multiple Result Designation (Bias)</u>
≥ 150	Very high (VH)	Very High (VH)
149 - 125	High (H)	High (H)
124 - 76	Satisfactory (S)	Satisfactory (S)
75 - 51	Low (L)	Low (L)
≤ 50	Very low (VL)	Very Low (VL)

In addition to the flagging of individual sample results, bias was calculated as an average for all results in a study for the same parameter regardless of sample concentration and matrix. The same designation scheme was used for each individual parameter on all test results (see above).

Appendix II contains a summary of each laboratory's appraisal for flags and bias in various studies.

In these laboratory comparison studies, medians rather than means were used to evaluate the accuracy of interlaboratory results since there were relatively few data and the means were strongly influenced by outliers. For the evaluation of interlaboratory precision, mean and standard deviation were calculated after outliers were removed by using Grubb's test (4). Standard deviation (σ) and relative standard deviation (RSD) were calculated as follows:

$$\sigma = \sqrt{\sum(x_i - \bar{x})^2 / (n-1)} \quad \text{and} \quad \text{RSD, \%} = \sigma / \bar{x} \times 100$$

where x_i = individual result, \bar{x} = mean,
and n = number of individual results

4.0 **RESULTS AND DISCUSSION**4.1 Interlaboratory Comparability

Three studies contained samples which were used for CH analysis: QM-1 (January 24, 1986), QM-6 (February 28, 1986) and QM-7 (March 27, 1986). The participants in these studies are listed in Table 4.1.1. In addition to the standard solutions of CH contained in ampules used in all three studies; spiked water samples and sediment samples were used in study QM-7 and study QM-6, respectively.

Duplicate samples were included in all three studies to assess reproducibility within the same laboratory. Appendix III provides a summary of within-lab precision for the analysis of CHs in various studies.

For traceability of interlaboratory studies, several samples were used in studies QM-1, QM-6 and QM-7. Samples 110/111 in study QM-1, sample 607 in study QM-6 and samples 703/704 in study QM-7 were identical. In addition, samples 109/112 in study QM-1 and sample 605 in study QM-6 were also identical. A summary of the design values and interlaboratory medians for CHs in these samples is given in Tables 4.1.2a and 4.1.2b. Figures 4.1.1a and 4.1.1b present the percent recoveries of interlaboratory medians for CHs in these test samples.

In general, the results suggest that the interlaboratory performance of participating laboratories improved in most cases during the course of these studies. As can be seen from Figure 4.1.1a, two parameters (1,3,5-TCB and 1,2,4,5-TeCB) in sample 110 and three parameters (1,3,5-TCB, 1,2,4,5-TeCB and 1,2,3,4-TeCB) in sample 111 of study QM-1 were different by more than $\pm 25\%$ of the design values, while all CH parameters in sample 606 of study QM-6 and samples 703/704 of study QM-7 were satisfactory (within $\pm 25\%$

of the design values). Similarly, as shown in Figure 4.1.1b, four parameters (1,3,5-TCB, 1,2,3-TCB, 1,2,4,5-TeCB and 1,2,3,4-TeCB) in sample 109 and five parameters (1,3,5-TCB, 1,2,4-TCB, 1,2,4,5-TeCB and 1,2,3,4-TeCB) in sample 112 of study QM-1 were different by more than $\pm 25\%$ of the design values, while all CH parameters in sample 605 of study QM-6 were satisfactory.

The range and average values of percent recoveries of interlaboratory medians for CHs in various studies are summarized in Table 4.1.3. Figure 4.1.2 presents the condensed results of average recoveries of interlaboratory medians for all CH parameters. A comparison among studies QM-1, QM-6 and QM-7 for standard solutions in ampules, the results of nine out of 13 CHs in study QM-1 were satisfactory and four parameters (1,3,5-TCB, 1,2,3-TCB, 1,2,4,5-TeCB and 1,2,3,4-TeCB) were different by more than $\pm 25\%$ of the design values, while all results in studies QM-6 and QM-7 were satisfactory. It was obvious that better results were obtained for standard solutions in ampules in studies QM-6 and QM-7 than those obtained in study QM-1. In contrast, the interlaboratory results for spiked water samples in study QM-7 and sediment samples in QM-6 were less satisfactory than those results obtained for standard solutions in ampules in all three studies. Overall, only six parameters out of 13 CHs in spiked water samples and seven parameters out of 12 CHs in sediment samples were within $\pm 25\%$ of the design values. Low interlaboratory results for CHs in spiked water samples and sediment samples were presumably due to loss of CHs during sample preparation steps because of the high volatility of most CHs as well as high solubilities of some CHs in water.

The precision of interlaboratory results, expressed as RSDs, for CHs in various studies are summarized in Table 4.1.4. Figure 4.1.3 presents the condensed results of average RSDs for all 13 CH parameters. For standard solutions in ampules, better

interlaboratory results were obtained in studies QM-6 and QM-7 as compared with those were obtained in study QM-1. Only six out 13 CH parameters determined were less than $\pm 25\%$ average RSDs in study QM-1, while 11 out of 13 CHs and 9 out of 13 CHs determined were less than $\pm 25\%$ average RSDs in study QM-6 and study QM-7, respectively. For the spiked water samples and sediment samples, the interlaboratory results for the precision of CHs were less satisfactory. Only one out of 13 CHs and four out of 12 CHs results were less than $\pm 25\%$ average RSDs in study QM-7 and study QM-6, respectively.

4.2 Comparison of Laboratory Performance in Various Studies

The key step in evaluating laboratory data was the selection of an acceptance criterion. The acceptance criterion used for this report was the average of % bias and % flags within a study. This criterion was similar to that used by the LRTAP QA program for the evaluation of laboratories involved in the analyses of major ions, nutrients and physical parameters in surface waters (2). It provided a simple way to compare laboratory performance in various studies as shown below:

Average of Percent Bias

and Percent Flags

Comment

$\leq 25\%$	Satisfactory	(A)
26 - 50%	Moderate	(B)
$\geq 51\%$	Poor	(C)

An analysis of the data obtained in various studies for PAHs has been carried out using the criterion given above and the results are summarized in Table 4.2.1. In the calculation of No. of parameters biased and No. of results flagged in Table 4.2.1, a very high (VH) or very low (VL) bias was counted as one bias

while a high (H) or low (L) bias was counted as half a bias. Similarly, a VH or VL flag was counted as one flag while H or L flag was counted as half a flag. As shown in Table 4.2.1, only one laboratory (U086), which analyzed all the samples provided and most parameters requested, have consistently produced satisfactory results in all three studies. For the other laboratories, the interlaboratory CH results were in general less satisfactory than those generated in the OCs, PAHs and PCBs studies.

For the evaluation of the relative performance of participating laboratories, the results of each study were summarized in Tables 4.2.2a , 4.2.2.b and 4.2.2c, respectively. These tables provide useful information to project leaders, manager and users of data on the comparability of participating laboratories.

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TABLE 2.1
QC Study Parameters for UGLCC
Interlaboratory Performance Evaluation Studies

Study	Test Samples	Parameters	Substrate
QM-1	4 Ampules 4 Ampules 4 Ampules	Aroclors Chlorinated Insecticides Chlorinated Hydrocarbons	Std. Solutions Std. Solutions Std. Solutions
QM-2	4 Ampules	16 PAHs	Std. Solutions
QM-3	5 Sediments	10 Metals	Sediment CRM or RM
QM-4	4 Waters	23 Major Ions & Nutrients	Water CRM
QM-5	4 Waters	7 Metals	Water CRM
QM-6	4 Sediments 2 Ampules	Chlorinated Hydrocarbons Chlorinated Hydrocarbons	Sediment CRM or RM Std. Solutions
QM-7	2 Ampules 2 Ampules 4 Ampules	Aroclors Chlorinated Hydrocarbons Aroclors & Chlorinated Hydrocarbons	Std. Solutions Std. Solutions Spiking Solutions & Natural Water
QM-8	4 Ampules 4 Ampules	Chlorinated Insecticides Chlorinated Insecticides	Std. Solutions Spiking Solutions & Natural Water
QM-9	4 Waters	Mercury	Water CRM
QM-10	2 Ampules 4 Ampules	16 PAH 15 PAHs	Std. Solutions Spiking Solutions & Natural Waters
QM-11	4 Waters	Cyanide	Water CRM
QM-12	4 Waters	Total Phenol	Water CRM
QM-13	2 Ampules 2 Oils 2 Tissues	5 Chlorophenols	Std. Solutions Fish Oils Fish Tissues

TABLE 2.2
Participants in the UGLCCS Performance Evaluation Studies

U.S. Laboratories

The Bionetics Corporation, (U.S. Environmental Protection Agency - Great Lakes National Program Office), Chicago, Illinois, USA.
Clarkson University, (U.S. Environmental Protection Agency - Large Lakes Research Station, Gross Ile, Michigan), Potsdam, New York, USA.
Detroit Water and Sewerage Department - Analytical Laboratory, Detroit Michigan, USA.
Great Lakes Environmental Research Laboratory - National Oceanic and Atmospheric Administration, Ann Arbor, Michigan, USA.
Michigan Department of Public Health - Centre for Environmental Health Science - Epidemiological Studies Laboratory, Lansing, Michigan, USA.
Michigan Department of Natural Resources, Lansing, Michigan, USA.
Raytheon Service Corporation (U.S. Environmental Protection Agency - Large Lakes Research Station), Grosse Ile, Michigan, USA.
University of Michigan - Great Lakes Research Division, (U.S. Environmental Protection Agency - Great Lakes National Program Office and Great Lakes Environmental Research Laboratory - National Oceanic and Atmospheric Administration) Ann Arbor, Michigan, USA.
U.S. Army Corps of Engineers - Environmental Analysis Branch, Detroit, Michigan, USA.
U.S. Geological Survey - National Water Quality Laboratory, Arvada, Colorado, USA.

Canadian Laboratories

Barringer Magenta Limited, Rexdale, Ontario, Canada.
Beak Analytical Services, Mississauga, Ontario Canada.
Mann Testing Laboratories, Mississauga, Ontario, Canada
National Water Research Institute, Environmental Contaminants Division - Inorganics Section, Burlington, Ontario, Canada.
National Water Research Institute, Environmental Contaminants Division - Organics-Pathways Section, Burlington, Ontario, Canada.
National Water Research Institute - Environmental Contaminants Division - Organics-Properties Section, Burlington, Ontario, Canada.
Ontario Ministry of Environment, London, Ontario, Canada.
Ontario Ministry of Environment - Inorganic Trace Contaminants Waters Unit, Rexdale, Ontario, Canada.
Ontario Ministry of Environment - Trace Organics Section - Drinking Water, Rexdale, Ontario, Canada.
Ontario Ministry of Environment - Trace Organics Section - Sediment and Biota, Rexdale, Ontario, Canada.
Ontario Ministry of Environment - Trace Organics Section - Wastewater, Rexdale, Ontario, Canada.
Ontario Ministry of Environment - Water Quality Section, Rexdale, Ontario, Canada.
Ontario Ministry of Environment - Thunder Bay, Ontario, Canada.
Wastewater Technology Centre, (Conservation and Protection, Toronto), Burlington, Ontario, Canada.
National Water Quality Laboratory, Burlington, Ontario, Canada.
Zenon Environmental Inc., Burlington, Ontario, Canada.

TABLE 2.3
Interlaboratory Performance Evaluation or QC Studies
UGLCCS QC Study Schedules

Study No.	No. of Questionnaires	No. of Participants	Sent Out Date		Reporting Deadline	No. of Labs Reporting
			Questionnaires	Samples		
QM-1	45	16	Dec. 17/85	Jan. 24/86	Mar 20/86 Closed July 4/86	9
QM-2	45	16	Dec. 17/85	Jan. 24/86	Mar 20/86 Closed July 4/86	7
QM-3	45	15	Dec. 17/85	Jan. 24/86	Mar 20/86 Closed July 4/86	10
QM-4	50	13	Jan. 31/86	Feb. 28/86	Apr. 30/86 Closed Aug. 8/86	10
QM-5	50	14	Jan. 31/86	Feb. 28/86	Apr. 30/86 Closed Aug. 8/86	11
QM-6	50	12	Jan. 31/86	Feb. 28/86	Apr. 30/86 Closed Aug. 8/86	7
QM-7	55	16	Feb. 28/86	Mar. 27/86	May 15/86 Closed Sept 30/86	12
QM-8	55	14	Feb. 28/86	Mar. 27/86	May 15/86 Closed Sept 30/86	10
QM-9	55	12	Feb. 28/86	Mar. 27/86	May 27/86 Closed Sept 30/86	11
QM-10	59	14	Apr. 2/86	May 1/86	May 30/86 Closed Oct. 10/86	9
QM-11	59	10	Apr. 2/86	May 1/86	May 30/86 Closed Oct. 10/86	7
QM-12	59	10	Apr. 2/86	May 1/86	May 30/86 Closed Oct. 10/86	7
QM-13	55	6	May 9/86	Jun. 24/86	Aug. 1/86 Closed Oct. 17/86	2

TABLE 4.1.1

Participants in CHs Interlaboratory Performance Evaluation Studies

Laboratory Code	Study Number		
	QM-1	QM-6	QM-7
U001	X	X	X
U005	X	X	-
U009	X	X	-
U013	-	-	X
U014	X	X	X
U063	X	-	X
U072	X	X	X
U075	X	-	X
U077	-	-	X
U079	X	-	X
U086	X	X	X
U091	-	-	X
U092	-	-	X
U093	-	-	X

Note X: participated

-: did not participate

TABLE 4.1.2a

Interlaboratory Medians for CHs with Identical Samples

Parameter No.	Parameter	Design Value	QM-1		QM-6		QM-7	
			110	111	606	703	704	
pg/ μ L								
1	1,4-DCB	152	146.0 (96.1)	143.0 (94.1)	150 (98.7)	160 (105)	160 (105)	
2	1,3-DCB	143	134.0 (93.7)	131.0 (91.6)	130 (90.9)	130 (90.9)	140 (97.9)	
3	1,2-DCB	158	155.0 (98.1)	150.0 (94.9)	160 (101)	170 (108)	170 (108)	
4	1,3,5-TCB	32.0	23.7 (74.1)	23.5 (73.4)	25.5 (79.7)	25.6 (80.0)	27.0 (84.4)	
5	1,2,4-TCB	30.0	24.05 (80.2)	23.65 (78.8)	24.0 (80.0)	27.0 (90.0)	28.0 (93.3)	
6	1,2,3-TCB	31.2	24.4 (78.2)	24.1 (77.2)	26.5 (84.9)	28.5 (91.3)	29.0 (92.9)	
7	1,2,4,5-TeCB	15.1	8.5 (56.3)	9.04 (59.9)	13.0 (86.1)	12.5 (82.2)	13.0 (85.5)	
8	1,2,3,4-TeCB	14.7	11.1 (75.5)	11.0 (74.8)	13.5 (91.8)	14.0 (95.2)	15.0 (102)	
9	PeCB	14.8	12.67 (85.1)	12.1 (81.8)	13.5 (91.2)	14.0 (94.6)	14.0 (94.6)	
10	HCB	7.77	7.20 (92.7)	6.70 (86.2)	6.94 (89.3)	7.0 (90.1)	7.32 (94.2)	
11	HCE	6.02	5.50 (92.2)	5.50 (92.2)	5.60 (93.0)	6.00 (99.7)	6.00 (99.7)	
12	HCBD	7.42	7.10 (95.7)	6.80 (91.6)	6.60 (88.9)	8.00 (108)	8.00 (108)	
13	OCS	15.6	13.75 (88.1)	12.85 (94.5)	13.0 (83.3)	14.0 (89.7)	14.0 (89.7)	

Note: The numbers in parentheses are the percent recoveries of design values.

TABLE 4.1.2b

Interlaboratory Medians for CHs with Identical Samples

Parameter No.	Parameter	Design Value	QM-1		QM-6
			109	112	605
pg/ μ L					
1	1,4-DCB	1013	958.0 (94.6)	978.0 (96.5)	1000 (98.7)
2	1,3-DCB	952	890.5 (93.5)	903.0 (94.9)	1020 (107)
3	1,2-DCB	1050	1001.5 (95.4)	957.0 (91.1)	1200 (114)
4	1,3,5-TCB	213	152.0 (71.4)	142.5 (66.9)	187 (87.8)
5	1,2,4-TCB	200	183.5 (91.8)	146.0 (73.0)	203 (102)
6	1,2,3-TCB	208	155.0 (74.5)	144.0 (69.2)	180 (86.5)
7	1,2,4,5-TeCB	101	55.25 (54.7)	62.0 (61.4)	86.0 (85.1)
8	1,2,3,4-TeCB	97.9	70.1 (71.6)	67.45 (68.9)	89.0 (90.9)
9	PeCB	98.6	77.15 (78.2)	74.4 (75.5)	91.5 (92.8)
10	HCB	51.8	44.6 (86.1)	45.0 (86.9)	47.5 (91.7)
11	HCE	40.1	37.9 (94.5)	39.75 (99.1)	40.0 (99.8)
12	HCBD	49.5	46.6 (94.1)	46.8 (94.5)	47.0 (94.9)
13	OCS	104	85.75 (82.5)	89.5 (86.1)	84.5 (81.3)

Note: The numbers in parentheses are the percent recoveries of design values.

TABLE 4.1.3

Range and Average Values of Percent Recoveries for CHs.

Parameter No.	Parameter	QH-1 (ampules)			QH-6 (ampules)			QH-7 (ampules)			QH-6 (waters) (sediments)		
		Range	Average	Range	Average	Range	Average	Range	Average	Range	Average	Range	Average
1	1,4-OCB	94.1-96.5	95.3(4)	98.7-98.7	98.7(2)	105-105	105(2)	49.8-123	79.0(4)	103-169	136(4)		
2	1,3-OCB	91.6-94.9	93.4(4)	90.9-107	99.0(2)	90.9-97.9	94.4(2)	42.2-70.5	54.0(4)	60.3-111	83.2(4)		
3	1,2-OCB	91.1-98.1	94.9(4)	101-114	108(2)	108-108	108(2)	70.5-151	111(4)	113-230	172(4)		
4	1,3,5-TCB	66.9-74.1	71.5(4)	79.7-87.8	83.8(2)	80.0-84.4	82.2(2)	32.3-78.5	54.4(4)	63.3-77.6	71.1(4)		
5	1,2,4-TCB	73.0-91.8	81.0(4)	80.0-102	91.0(2)	90.0-93.3	91.7(2)	54.7-75.0	63.9(4)	78.1-137	107(4)		
6	1,2,3-TCB	69.2-78.2	74.8(4)	84.9-86.5	90.7(2)	91.3-92.9	92.1(2)	69.6-76.9	74.3(4)	62.5-80.0	71.3(4)		
7	1,2,4,5-TcB	54.7-61.4	58.1(4)	85.1-86.1	85.6(2)	82.2-85.5	83.9(2)	67.6-164	112(4)	66.1-89.3	79.1(4)		
8	1,2,3,4-TcB	68.9-75.5	72.7(4)	90.9-91.8	91.4(2)	95.2-102	98.6(2)	54.3-68.4	61.3(4)	56.1-82.2	69.6(4)		
9	PeCB	75.5-85.1	80.2(4)	91.2-92.8	92.0(2)	94.6-94.6	94.6(2)	76.5-87.0	79.5(4)	83.6-100	91.7(4)		
10	HCB	86.1-92.7	88.0(4)	89.3-91.7	90.5(2)	90.1-94.2	92.2(2)	76.4-92.3	83.6(4)	97.0-105	102(4)		
11	HCE	92.2-99.1	94.5(4)	93.0-99.8	96.4(2)	99.7-99.7	99.7(2)	54.5-63.6	58.7(4)	NC	NC		
12	HCBD	91.6-95.7	94.0(4)	88.9-94.9	91.9(2)	108-108	108(2)	44.0-50.5	45.9(4)	70.4-96.6	81.7(4)		
13	OCs	82.5-94.5	87.8(4)	81.3-83.3	82.3(2)	89.7-89.7	89.7(2)	82.7-98.1	93.3(4)	86.7-103	97.1(4)		

Note: The numbers in parentheses are the number of samples.

TABLE 4.1.4

Precision of Interlaboratory Results for CHs.

Parameter No.	Parameter	QM-1 (ampules)			QM-6 (ampules)			QM-7 (ampules)			QM-6 (waters) (sediments)		
		Range	Average	%	Range	Average	%	Range	Average	%	Range	Average	%
1	1,4-DCB	20.7-32.7	24.9(4)	19.6-26.5	23.1(2)	12.8-16.3	14.6(2)	40.7-98.3	60.5(4)	42.7-71.9	58.6(4)		
2	1,3-DCB	24.9-30.9	27.7(4)	16.8-28.3	22.6(2)	36.7-36.7	36.7(2)	6.7-62.3	40.4(4)	31.8-50.1	40.7(4)		
3	1,2-DCB	19.4-31.2	25.1(4)	24.5-28.8	26.7(2)	16.9-18.5	17.7(2)	42.3-92.3	66.6(4)	0.4-80.8	48.8(4)		
4	1,3,5-TCB	36.2-54.1	44.0(4)	15.7-19.9	17.8(2)	40.9-42.3	41.6(2)	44.4-83.2	59.4(4)	29.6-53.8	39.3(4)		
5	1,2,4-TCB	27.4-43.7	35.4(4)	27.5-30.1	28.8(2)	14.0-14.9	14.5(2)	19.4-40.1	30.1(4)	23.7-46.7	37.7(4)		
6	1,2,3-TCB	20.0-35.0	27.5(4)	17.8-25.6	21.7(2)	19.4-21.0	20.2(2)	15.4-52.0	30.6(4)	35.4-60.7	42.0(4)		
7	1,2,4,5-TecB	38.5-51.4	44.9(4)	18.9-22.4	20.7(2)	10.3-13.8	12.1(2)	20.6-71.6	44.8(4)	34.4	34.4(1)		
8	1,2,3,4-TecB	20.3-36.1	27.6(4)	21.0-24.0	22.5(2)	13.6-14.9	14.3(2)	16.1-35.1	22.9(4)	9.4-28.4	19.9(4)		
9	TecB	19.3-28.9	23.0(4)	16.2-17.3	16.8(2)	15.4-16.2	15.8(2)	19.0-46.3	30.9(4)	5.8-24.2	16.3(4)		
10	HCB	15.2-31.8	25.3(4)	17.9-18.0	18.0(2)	24.2-27.4	25.8(2)	33.0-68.1	50.8(4)	8.3-34.5	20.5(4)		
11	HCE	3.6-37.5	24.0(4)	13.7-27.2	20.5(2)	10.0-10.0	10.0(2)	38.1-65.7	53.4(4)	-	-		
12	HCBOD	28.5-33.1	31.3(4)	15.6-34.1	24.9(2)	10.1-11.4	10.8(2)	35.9-54.2	41.9(4)	4.1-29.3	14.3(4)		
13	OCS	10.1-24.3	16.9(4)	14.1-22.7	18.4(2)	25.5-26.2	25.9(2)	33.5-83.6	57.1(4)	18.6-36.9	25.6(4)		

Note: The numbers in parentheses are the number of samples.

TABLE 4.2.1

Comparisson of Laboratory Performance for CHS.

Lab. No.	Study No.	Matrix	Bias			Flags			Average of Biased and Flagged			Comment
			No. of Parameters Analyzed	No. of Parameters Biased	% of Parameters Biased	No. of Results Reported	No. of Results Flagged	% of Results Flagged	No. of Results Flagged	% Biased and Flagged		
U001	QM-1	Ampules	9	1.5	16.7	36	6.5	18.1	17.4	A		
	QM-6	Ampules	11	3.0	27.2	22	7.0	31.8	29.5	B		
	QM-7	Ampules	11	2.0	18.2	22	4.0	18.2	18.2	A		
	QM-7	Water	11	6.0	54.5	44	33.5	76.1	65.3	C		
	QM-6	Sediments	11	4.0	36.4	44	19.0	43.2	39.8	B		
U005	QM-1	Ampules	4	2.0	50.0	13	3.5	26.9	38.5	B		
	QM-6	Ampules	6	4.5	75.0	10	6.0	60.0	67.5	C		
	QM-6	Sediments	6	6.0	100	23	23.0	100	100	C		
U009	QM-1	Ampules	10	4.0	40.0	40	18.5	46.3	43.2	B		
	QM-6	Ampules	10	1.0	10.0	20	2.0	10.0	10.0	A		
	QM-6	Sediments	9	4.5	50.0	36	21.0	58.3	54.2	C		
U013	QM-7	Ampules	3	1.0	33.3	6	2.0	33.3	33.3	B		
	QM-7	Water	3	2.0	66.7	6	4.0	66.7	66.7	C		
U014	QM-1	Ampules	7	1.0	14.2	28	7.0	25.0	19.6	A		
	QM-6	Ampules	7	1.5	21.4	10	3.5	35.0	28.2	B		
	QM-7	Ampules	7	1.0	14.2	14	2.0	14.3	14.3	A		
	QM-7	Water	4	3.0	75.0	14	9.5	67.9	71.5	C		
	QM-6	Sediments	2	1.0	50.0	6	2.0	33.3	41.7	B		

TABLE 4.2.1 (continued)

Lab. No.	Study No.	Matrix	Bias			Flags			Average of % Biased and Flagged			Comment
			No. of Parameters Analyzed	No. of Parameters Biased	% of Parameters Biased	No. of Results Reported	No. of Results Flagged	% of Results Flagged	No. of Results Flagged	% of Results Flagged	No. of Results Flagged	
<u>U063</u>	QM-1	Ampules	10	2.5	25.0	30	11.5	38.3	31.7	B		
	QM-7	Ampules	11	6.5	59.1	22	13.0	59.1	59.1	C		
	QM-7	Water	11	11.0	100	42	35.0	83.3	91.7	C		
<u>U072</u>	QM-1	Ampules	13	0.0	0.0	52	0.5	1.0	0.5	A		
	QM-6	Ampules	13	0.0	0.0	26	0.0	0.0	0.0	A		
	QM-7	Ampules	13	0.0	0.0	26	0.0	0.0	0.0	A		
	QM-7	Water	6	3.5	58.3	18	11.0	61.1	59.7	C		
	QM-6	Sediments	5	1.0	20.0	18	4.0	22.2	21.2	A		
<u>U075</u>	QM-1	Ampules	2	0.0	0.0	8	0.0	0.0	0.0	A		
	QM-7	Ampules		NA		NA				A		
	QM-7	Water	2	2.0	100	8	8.0	100	100	C		
<u>U077</u>	QM-7	Ampules	1	0.0	0.0	2	0.0	0.0	0.0	A		
	QM-7	Water		0.0		4	0.5	12.5	6.3	A		
<u>U079</u>	QM-1	Ampules		NA		NA						
	QM-7	Ampules		NA		NA						
	QM-7	Water		NA		NA						

TABLE 4.2.1 (continued)

Lab. No.	Study No.	Matrix	Bias			Flags			Average of % Biased and Flagged			Comment
			No. of Parameters Analyzed	No. of Parameters Biased	% of Parameters Biased	No. of Results Reported	No. of Results Flagged	% of Results Flagged	No. of Results Flagged	% of Results Flagged	No. of Results Flagged	
<u>U063</u>	QM-1	Ampules	10	2.5	25.0	30	11.5	38.3	31.7	B		
	QM-7	Ampules	11	6.5	59.1	22	13.0	59.1	59.1	C		
	QM-7	Water	11	11.0	100	42	35.0	83.3	91.7	C		
<u>U072</u>	QM-1	Ampules	13	0.0	0.0	52	0.5	1.0	0.5	A		
	QM-6	Ampules	13	0.0	0.0	26	0.0	0.0	0.0	A		
	QM-7	Ampules	13	0.0	0.0	26	0.0	0.0	0.0	A		
<u>U075</u>	QM-7	Water	6	3.5	58.3	18	11.0	61.1	59.7	C		
	QM-7	Sediments	5	1.0	20.0	18	4.0	22.2	21.2	A		
	QM-1	Ampules	2	0.0	0.0	8	0.0	0.0	0.0	A		
<u>U077</u>	QM-7	Ampules	2	NA	NA	8	NA	NA	100	C		
	QM-7	Water	2	2.0	100	8	8.0	100	100			
	QM-7	Ampules	1	0.0	0.0	2	0.0	0.0	0.0	A		
<u>U079</u>	QM-1	Ampules	1	0.0	0.0	4	0.5	12.5	6.3	A		
	QM-7	Ampules	NA	NA	NA	NA	NA	NA	NA			
	QM-7	Water	NA	NA	NA	NA	NA	NA	NA			

TABLE 4.2.2a

**Summary of Relative Performance of Laboratories
for CHs in Ampules**

Lab Code	Average* Performance (%)	Number of Studies	Comment
U075**	0.0	1	A
U077**	0.0	1	A
U091**	0.0	1	A
U072	1.7	3	A
U093	15.0	1	A
U086	15.1	3	A
U092	20.0	1	A
U014	20.7	3	A
U001	21.7	3	A
U009	26.6	2	B
U013	33.3	1	B
U063	45.4	2	B
U005	53.0	2	C

Note: * Average Performance (%) is mean value for the average of % biased and % flagged obtained from QM-1, QM-6 and QM-7.

** Less than 4 parameters were analyzed.

TABLE 4.2.2b

**Summary of Relative Performance of Laboratories
for CHs in Water**

Lab Code	Average Performance (%)	Number of Studies	Comment
U077**	0.0	1	A
U086	24.1	1	A
U092	40.0	1	B
U072	59.7	1	C
U093	64.3	1	C
U001	65.3	1	C
U013**	66.7	1	C
U014**	71.5	1	C
U063	91.7	1	C
U075**	100	1	C

Note: ** Less than 4 parameters were analyzed.

TABLE 4.2.2c

**Summary of Relative Performance of Laboratories
for CHs in Sediments**

Lab Code	Average Performance (%)	Number of Studies	Comment
U086	14.1	1	A
U072	21.2	1	A
U001	39.8	1	B
U014**	41.7	1	B
U009	54.2	1	C
U005	100	1	C

Note: ** Less than 4 parameters were analyzed.

NOTE FOR FIGURES

Parameter No.	Parameter
----------------------	------------------

- | | |
|----|--------------|
| 1 | 1,4-DCB |
| 2 | 1,3-DCB |
| 3 | 1,2-DCB |
| 4 | 1,3,5-TCB |
| 5 | 1,2,4-TCB |
| 6 | 1,2,3-TCB |
| 7 | 1,2,4,5-TeCB |
| 8 | 1,2,3,4-TeCB |
| 9 | PeCB |
| 10 | HCB |
| 11 | HCE |
| 12 | HCBD |
| 13 | OCS |
-

Fig. 4.1.1a

Percent Recovery for CHs (Identical Samples)

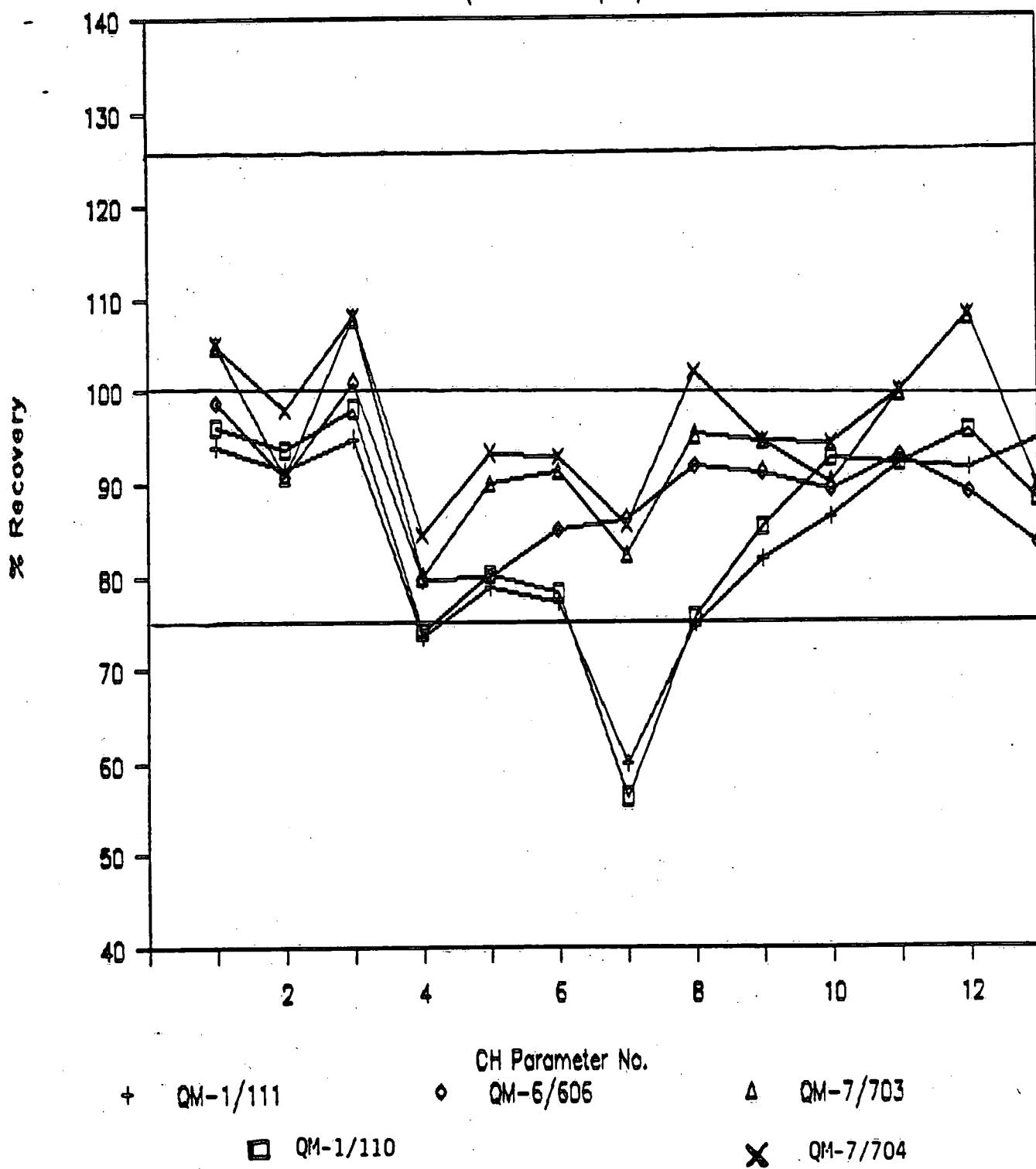


Fig. 4.1.1b Percent Recovery for CHs
(Identical Samples)

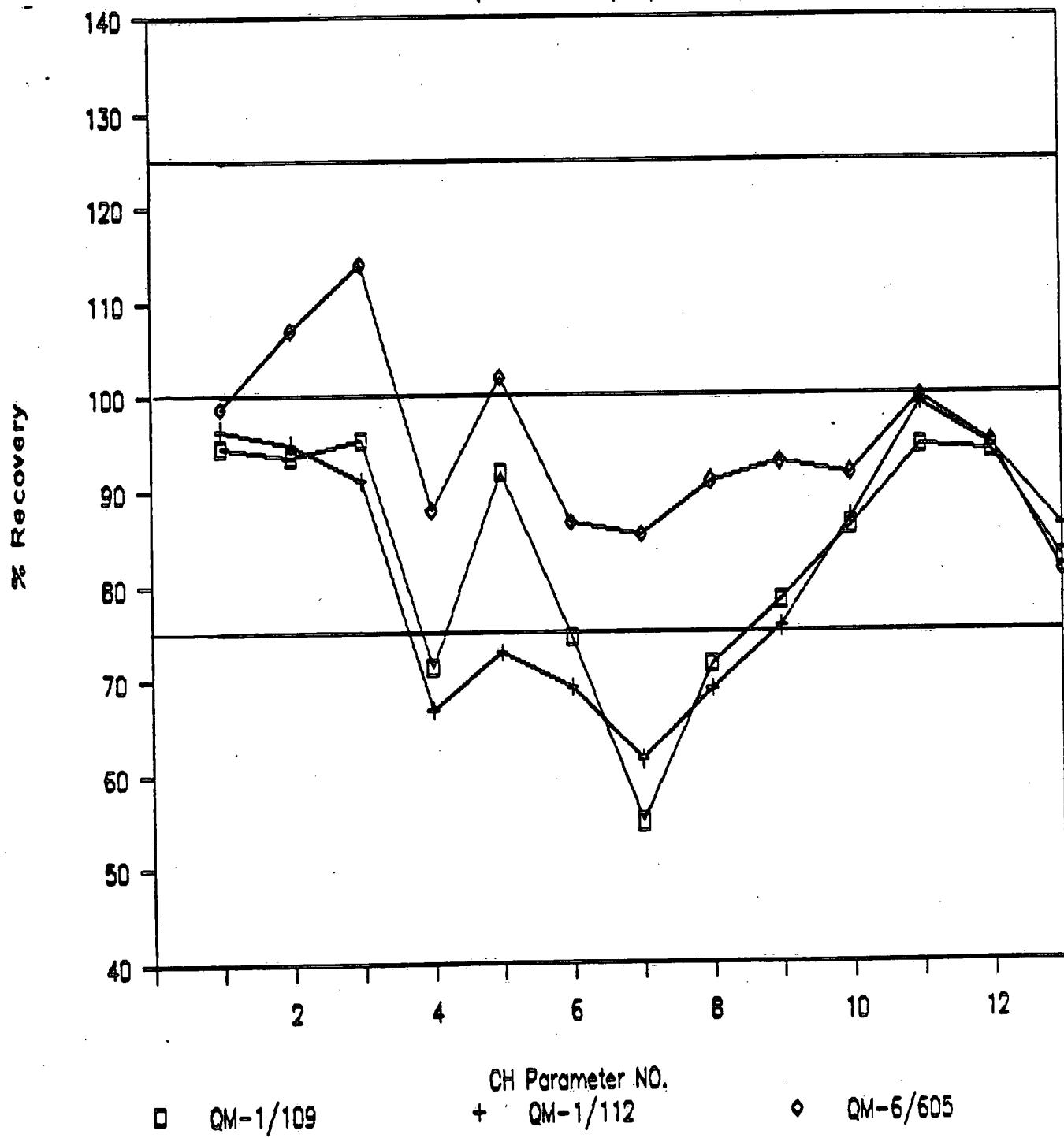


Fig. 4.1.2 Avg. Recovery (%) for CHs
 (Various Studies)

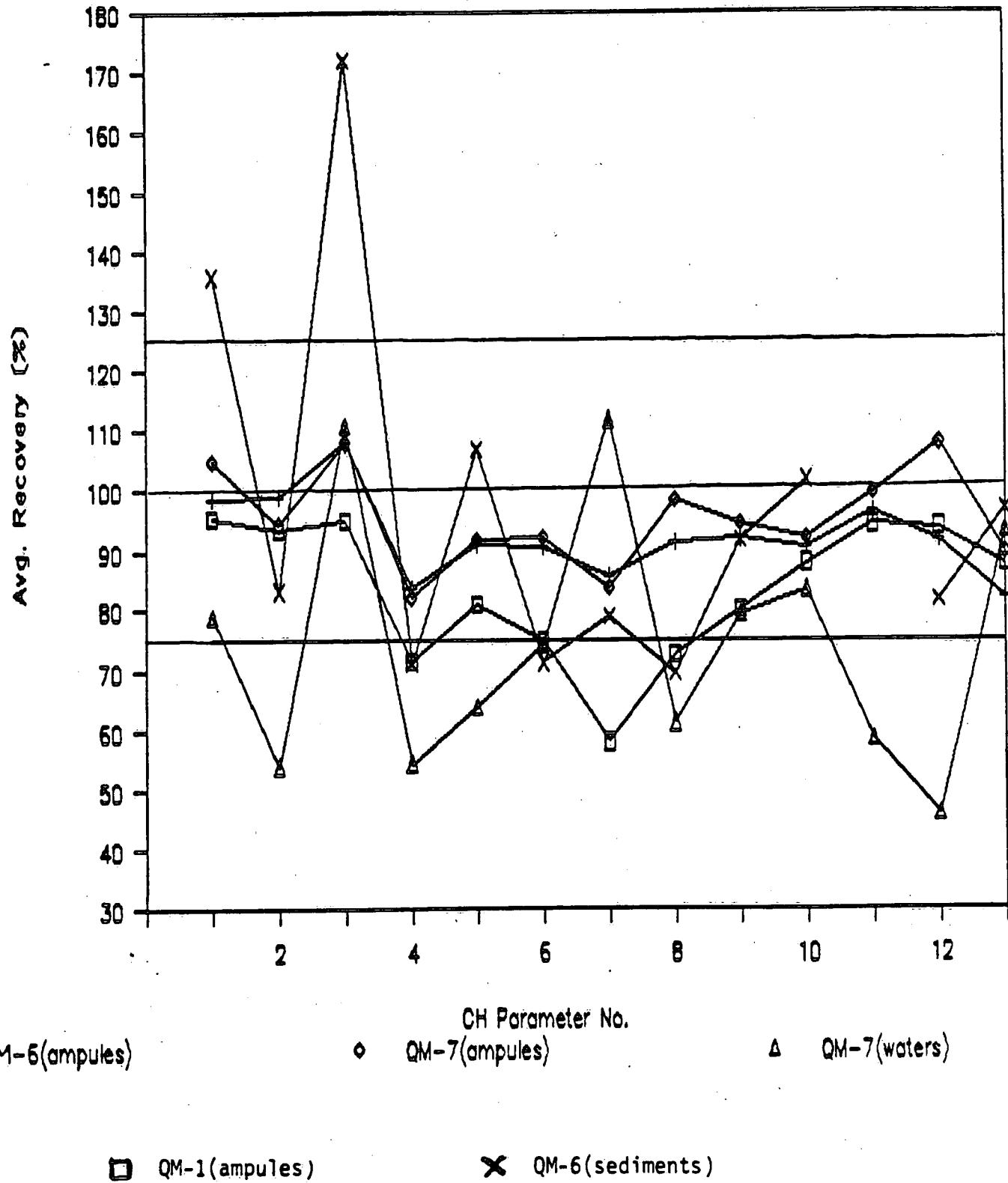
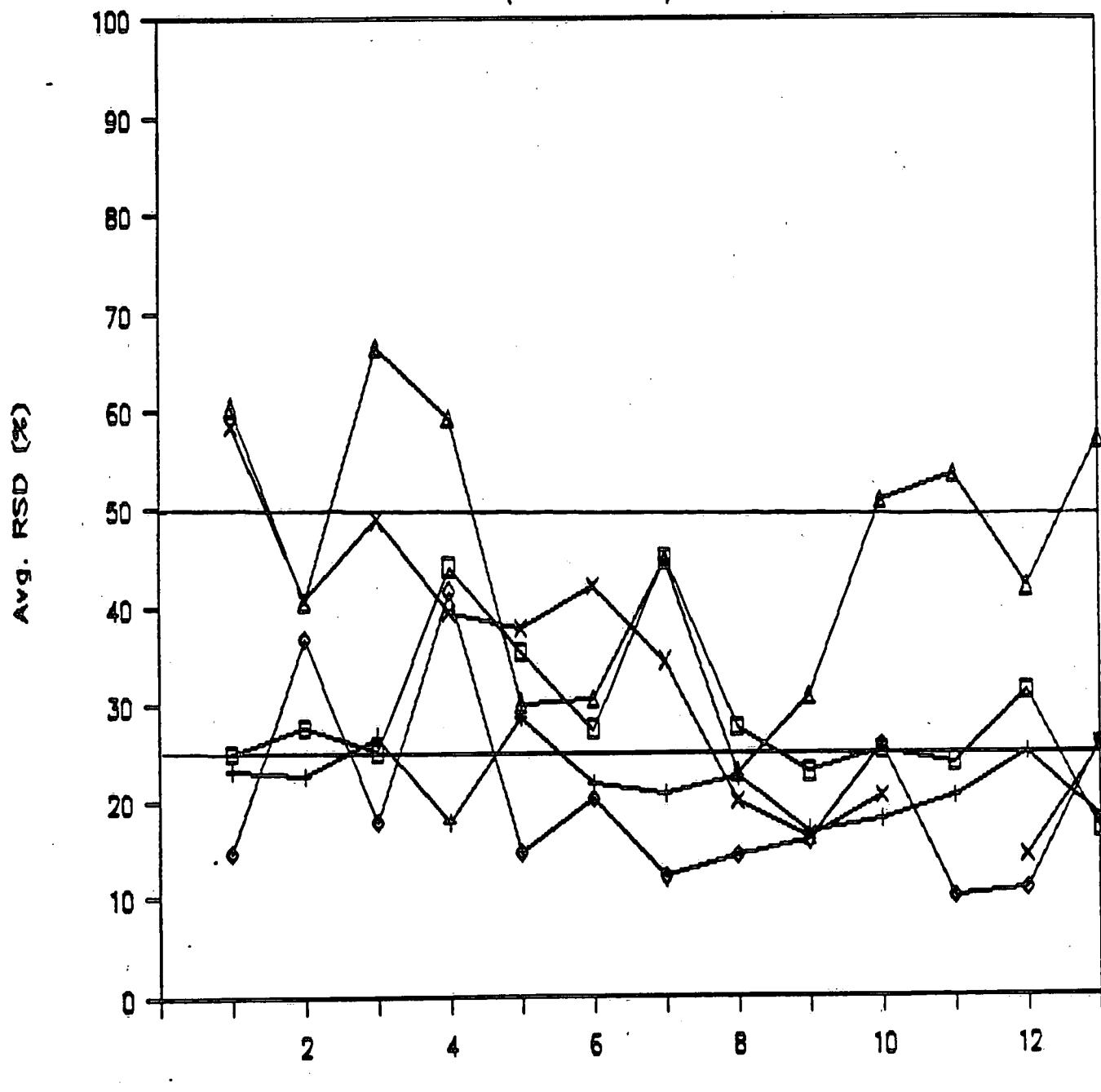


Fig. 4.1.3 Avg. RSD (%) for CHs
 (Various Studies)



CH Parameter No.

○ QM-7(ampules)

△ QM-7 (waters)

□ QM-1(ampules)

× QM-6(sediments)

+ QM-6(ampules)

APPENDIX I-A

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APPENDIX I-B

UGLCCS - FINAL REPORTS

<u>QM-</u> <u>#</u>	<u>TITLE OF FINAL REPORT</u>	<u>AUTHORS</u>
1	PCBs, OCs and CHs in Ampules	W. Horn, R. Szaviola and H.B. Lee and the QMVG
2	PAHs in Ampules	W. Horn, R. Szaviola and H.B. Lee and the QMVG
3	Trace Metals In Sediments	W. Horn, R. Szaviola and H.B. Lee and the QMVG
4	Major Ions In Surface Water	W.A. Horn, R. Szaviola and D. Takeuchi and the QMVG
4	Revised: Major Ions In Surface Water	W.A. Horn, R. Szaviola, D. Takeuchi and P.D. Leishman and the QMVG
5	Trace Metals In Surface Waters	W.A. Horn, D. Takeuchi and R. Szaviola and the QMVG
6	Chlorinated Hydrocarbons In Sediments And Ampules	H.B. Lee, D. Takeuchi and E. Kokotich and the QMVG
7	Chlorinated Hydrocarbons And PCBs In Ampules And Water	R. Szaviola, W. Horn and H.B. Lee and the QMVG
8	Organochlorines In Ampules And Water	R. Szaviola, W. Horn, P. Leishman and H.B. Lee and the QMVG
9	Total Mercury In Surface Water	R. Szaviola, W. Horn and D. Takeuchi and the QMVG
10	PAHs in Ampules and Water	W.C. Li, H.B. Lee and W.A. Horn and the QMVG
11	Total Cyanide In Water	W.C. Li, H.B. Lee and E. Kokotich and the QMVG
12	Total Phenol In Water	W.C. Li, H.B. Lee and E. Kokotich and the QMVG
13	Chlorophenols In Ampules, Fish Oils and Tissues	W.C. Li, R. Szaviola and H.B. Lee and the QMVG

APPENDIX II

**Lab-Specific Appraisal for
Bias and Flag Statements**

GLOSSARY OF TERMS

Codes

NA: not analyzed
NRA: not routinely analyzed
ND: not detected
NR: not resolved
NC: not calculated
LT: values reported as "less than"
VH: very high
H: high
L: low
VL: very low
S: satisfactory

II-A: BIAS

LAB-SPECIFIC APPRAISAL FOR BIAS STATEMENTS
(CHs)

Lab Code: U001

Parameter	QM-1 (ampules)		QM-6 (ampules)		QM-7 (ampules)	
	Avg. Rec.	Bias (%)	Avg. Rec.	Bias (%)	Avg. Rec.	Bias (%)
1,4-DCB	95.3	S	76.6	S	81.3	S
1,3-DCB	93.2	S	83.0	S	91.6	S
1,2-DCB	89.5	S	78.5	S	81.7	S
1,3,5-TCB	73.0	L	70.1	L	69.9	L
1,2,4-TCB	73.4	L	67.0	L	66.0	L
1,2,3-TCB	76.5	S	70.0	L	68.9	L
1,2,4,5-TeCB	NA	-	NA	-	NA	-
1,2,3,4-TeCB	72.6	L	67.1	L	70.8	L
PeCB	79.1	S	76.8	S	78.1	S
HCB	90.4	S	88.2	S	88.8	S
HCE	NA	-	NA	-	NA	-
HCBD	NA	-	68.9	L	81.3	S
OCS	NA	-	65.6	L	85.9	S

LAB-SPECIFIC APPRAISAL FOR BIAS STATEMENTS
(CHs)

Lab Code: U001(continued)

Parameter	QM-7 (waters)		QM-6 (sediments)	
	Avg. Rec.	Bias (%)	Avg. Rec.	Bias (%)
1,4-DCB	50.3	VL	54.4	L
1,3-DCB	44.6	VL	45.4	VL
1,2-DCB	90.8	S	102	S
1,3,5-TCB	104	S	51.2	L
1,2,4-TCB	52.8	L	55.4	L
1,2,3-TCB	53.4	L	52.9	L
1,2,4,5-TeCB	NA	-	NA	-
1,2,3,4-TeCB	50.4	VL	68.7	L
PeCB	51.4	L	90.5	S
HCB	83.1	S	125	H
HCE	NA	-	NA	-
HCBD	41.1	VL	78.4	S
OCS	68.0	L	79.3	S

LAB-SPECIFIC APPRAISAL FOR BIAS STATEMENTS
(CHs)

Lab Code: U005

Parameter	QM-1 (ampules)		QM-6 (ampules)		QM-6 (sediments)	
	Avg. Rec.	Bias (%)	Avg. Rec.	Bias (%)	Avg. Rec.	Bias (%)
1,4-DCB	74.4	L	125	H	>200	VH
1,3-DCB	75.4	L	128	H	>200	VH
1,2-DCB	72.6	L	130	H	>200	VH
1,3,5-TCB	NRA	-	NRA	-	NRA	-
1,2,4-TCB	125(T)	H	242	VH	>200	VH
1,2,3-TCB	NRA	-	NRA	-	NRA	-
1,2,4,5-TeCB	NRA	-	NRA	-	NRA	-
1,2,3,4-TeCB	NRA	-	NRA	-	NRA	-
PeCB	NRA	-	NRA	-	NRA	-
HCB	ND	-	NRA	-	>200	VH
HCE	ND	-	193(T)	VH	ND	-
HCBD	ND	-	ND	-	>200	VH
OCS	NRA	-	202(T)	VH	NRA	-

LAB-SPECIFIC APPRAISAL FOR BIAS STATEMENTS
(CHs)

Lab Code: U009

Parameter	QM-1 (ampules)		QM-6 (ampules)		QM-6 (sediments)	
	Avg.	Bias	Avg.	Bias	Avg.	Bias
	Rec.	(%)	Rec.	(%)	Rec.	(%)
1,4-DCB	NRA	-	NA	-	NA	-
1,3-DCB	NRA	-	NA	-	NA	-
1,2-DCB	NRA	-	NA	-	NA	-
1,3,5-TCB	27.5	VL	86.7	S	1.97(W)	VL
1,2,4-TCB	47.1	VL	86.3	S	1.04(W)	VL
1,2,3-TCB	61.3	L	92.1	S	16.5(W)	VL
1,2,4,5-TeCB	39.2	VL	73.4	L	0.94(W)	VL
1,2,3,4-TeCB	75.7	S	93.6	S	78.1	S
PeCB	78.6	S	97.0	S	112	S
HCB	76.7	S	64.1	L	80.6	S
HCE	82.6	S	123	S	NC	-
HCBD	86.3	S	94.6	S	70.4	L
OCS	72.3	L	79.8	S	124	S

**LAB-SPECIFIC APPRAISAL FOR BIAS STATEMENTS
(CHs)**

Lab Code: U013

Parameter	QM-7 (ampules)		QM-7 (waters)	
	Avg.	Bias	Avg.	Bias
	Rec.	(%)	Rec.	(%)
1,4-DCB	NA	-	NA	-
1,3-DCB	NA	-	NA	-
1,2-DCB	NA	-	NA	-
1,3,5-TCB	NA	-	NA	-
1,2,4-TCB	NA	-	NA	-
1,2,3-TCB	NA	-	NA	-
1,2,4,5-TeCB	NA	-	NA	-
1,2,3,4-TeCB	NA	-	NA	-
PeCB	105	S	70.4	L
HCB	95.3	S	58.7	L
HCE	NA	-	NA	-
HCBD	NA	-	NA	-
OCS	34.6	VL	23.1	VL

LAB-SPECIFIC APPRAISAL FOR BIAS STATEMENTS
(CHs)

Lab Code: U014

Parameter	QM-1 (ampules)		QM-6 (ampules)		QM-7 (ampules)	
	Avg.	Bias	Avg.	Bias	Avg.	Bias
	Rec.	(%)	Rec.	(%)	Rec.	(%)
1,4-DCB	124	S	116	S	118	S
1,3-DCB	121	S	107	S	154	VH
1,2-DCB	120	S	141	H	121	S
1,3,5-TCB	NA	-	NRA	-	NRA	-
1,2,4-TCB	108	S	122	S	91.7	S
1,2,3-TCB	NA	-	NRA	-	NRA	-
1,2,4,5-TeCB	NA	-	NRA	-	NRA	-
1,2,3,4-TeCB	NA	-	NRA	-	NRA	-
PeCB	NA	-	NRA	-	NRA	-
HCB	118	S	104	S	103	S
HCE	139	H	97.3	S	99.7	S
HCBD	138	H	166	VH	108	S
OCS	NA	-	NRA	-	NRA	-

LAB-SPECIFIC APPRAISAL FOR BIAS STATEMENTS
(CHs)

Lab Code: U014(continued)

Parameter	QM-7			QM-6		
	(waters)			(sediments)		
	Avg.	Bias	Rec.	Avg.	Bias	Rec.
	(%)			(%)		
1,4-DCB	LT	-		LT	-	
1,3-DCB	LT	-		LT	-	
1,2-DCB	LT	-		LT	-	
1,3,5-TCB	NA	-		NA	-	
1,2,4-TCB	50.0	VL		155	VH	
1,2,3-TCB	NA	-		NA	-	
1,2,4,5-TeCB	NA	-		NA	-	
1,2,3,4-TeCB	NA	-		NA	-	
PeCB	NA	-		NA	-	
HCB	88.7	S		109	S	
HCE	29.4	VL		NC	-	
HCBD	27.3	VL		LT	-	
OCS	NA	-		NA	-	

LAB-SPECIFIC APPRAISAL FOR BIAS STATEMENTS
(CHs)

Lab Code: U063

Parameter	QM-1 (ampules)		QM-7 (ampules)		QM-7 (waters)	
	Avg. Rec.	Bias (%)	Avg. Rec.	Bias (%)	Avg. Rec.	Bias (%)
1,4-DCB	85.0	S	113	S	165	VH
1,3-DCB	83.0	S	53.1	L	20.3	VL
1,2-DCB	113	S	>200	VH	910	VH
1,3,5-TCB	106	S	97.1	S	32.2	VL
1,2,4-TCB	99.9	S	100	S	48.9	VL
1,2,3-TCB	89.1	S	64.1	L	16.8	VL
1,2,4,5-TeCB	47.5	VL	NA	-	NR	-
1,2,3,4-TeCB	85.1	S	NA	-	NR	-
PeCB	> 200	VH	65.3	L	19.5	VL
HCB	56.0	L	45.9	VL	20.9	VL
HCE	NA	-	>200	VH	72.3	L
HCBD	NA	-	>200	VH	57.6	L
OCS	NA	-	>200	VH	166	VH

LAB-SPECIFIC APPRAISAL FOR BIAS STATEMENTS
(CHs)

Lab Code: U072

Parameter	QM-1 (ampules)		QM-6 (ampules)		QM-7 (ampules)	
	Avg.	Bias	Avg.	Bias	Avg.	Bias
	Rec.	(%)	Rec.	(%)	Rec.	(%)
1,4-DCB	109	S	108	S	95.4	S
1,3-DCB	99.7	S	104	S	94.4	S
1,2-DCB	103	S	108	S	98.0	S
1,3,5-TCB	111	S	105	S	99.9	S
1,2,4-TCB	118	S	110	S	100	S
1,2,3-TCB	111	S	115	S	101	S
1,2,4,5-TeCB	102	S	109	S	88.8	S
1,2,3,4-TeCB	113	S	117	S	98.7	S
PeCB	109	S	114	S	97.8	S
HCB	95.6	S	96.9	S	108	S
HCE	99.6	S	97.5	S	93.9	S
HCBD	102	S	102	S	98.4	S
OCS	97.9	S	93.0	S	103	S

LAB-SPECIFIC APPRAISAL FOR BIAS STATEMENTS
(CHs)

Lab Code: U072(continued)

Parameter	QM-7			QM-6		
	(waters)			(sediments)		
	Avg.	Bias		Avg.	Bias	
	Rec.	(%)		Rec.	(%)	
1,4-DCB	LT	-		LT	-	
1,3-DCB	LT	-		LT	-	
1,2-DCB	LT	-		LT	-	
1,3,5-TCB	LT	-		LT	-	
1,2,4-TCB	LT	-		LT	-	
1,2,3-TCB	LT	-		LT	-	
1,2,4,5-TeCB	LT	-	< 50	VL		
1,2,3,4-TeCB	65.4	L	LT	-		
PeCB	72.9	L	82.1	S		
HCB	56.4	L	88.2	S		
HCE	39.1	VL	NC	-		
HCBD	34.9	VL	78.4	S		
OCS	78.9	S	119	S		

LAB-SPECIFIC APPRAISAL FOR BIAS STATEMENTS
(CHs)

Lab Code: U075

Parameter	QM-1			QM-7	
	(ampules)			(waters)	
	Avg.	Bias	Rec.	Avg.	Bias
	(%)			(%)	
1,4-DCB	NA	-		NA	-
1,3-DCB	NA	-		NA	-
1,2-DCB	NA	-		NA	-
1,3,5-TCB	NA	-		NA	-
1,2,4-TCB	NA	-		NA	-
1,2,3-TCB	NA	-		NA	-
1,2,4,5-TeCB	NA	-		NA	-
1,2,3,4-TeCB	NA	-		NA	-
PeCB	NA	-		NA	-
HCB	86.5	S		226	VH
HCE	NA	-		NA	-
HCBD	NA	-		NA	-
OCS	94.8	S		347	VH

LAB-SPECIFIC APPRAISAL FOR BIAS STATEMENTS
(CHs)

Lab Code: U077

Parameter	QM-7			QM-7		
	(ampules)			(waters)		
	Avg.	Bias		Avg.	Bias	
	Rec.	(%)		Rec.	(%)	
1,4-DCB	NA	-		NA	-	
1,3-DCB	NA	-		NA	-	
1,2-DCB	NA	-		NA	-	
1,3,5-TCB	NA	-		NA	-	
1,2,4-TCB	NA	-		NA	-	
1,2,3-TCB	NA	-		NA	-	
1,2,4,5-TeCB	NA	-		NA	-	
1,2,3,4-TeCB	NA	-		NA	-	
PeCB	NA	-		NA	-	
HCB	NA	-		NA	-	
HCE	NA	-		NA	-	
HCBD	NA	-		NA	-	
OCS	96.2	S		115	S	

LAB-SPECIFIC APPRAISAL FOR BIAS STATEMENTS
(CHs)

Lab Code: U086

Parameter	QM-1 (ampules)		QM-6 (ampules)		QM-7 (ampules)	
	Avg.	Bias	Avg.	Bias	Avg.	Bias
	Rec.	(%)	Rec.	(%)	Rec.	(%)
1,4-DCB	65.6	L	81.3	S	105	S
1,3-DCB	61.6	L	79.8	S	97.9	S
1,2-DCB	64.6	L	79.7	S	108	S
1,3,5-TCB	64.9	L	80.6	S	98.5	S
1,2,4-TCB	61.3	L	80.0	S	93.3	S
1,2,3-TCB	63.3	L	79.3	S	88.8	S
1,2,4,5-TeCB	65.2	L	85.6	S	92.1	S
1,2,3,4-TeCB	61.6	L	89.2	S	95.2	S
PeCB	63.8	L	87.0	S	87.8	S
HCB	63.6	L	86.6	S	87.5	S
HCE	88.3	S	79.8	S	89.7	S
HCBD	66.2	L	87.3	S	95.0	S
OCS	73.8	L	94.4	S	89.7	S

LAB-SPECIFIC APPRAISAL FOR BIAS STATEMENTS
(CHs)

Lab Code: U086(continued)

Parameter	QM-7 (waters)		QM-6 (sediments)	
	Avg. Rec.	Bias (%)	Avg. Rec.	Bias (%)
1,4-DCB	82.5	S	136	H
1,3-DCB	68.9	L	83.2	S
1,2-DCB	76.7	S	245	VH
1,3,5-TCB	72.9	L	91.3	S
1,2,4-TCB	70.0	L	97.2	S
1,2,3-TCB	79.1	S	96.7	S
1,2,4,5-TeCB	76.9	S	83.2	S
1,2,3,4-TeCB	75.1	L	82.5	S
PeCB	83.4	S	90.9	S
HCB	85.8	S	99.4	S
HCE	63.7	L	NC	-
HCBD	62.6	L	81.8	S
OCS	84.6	S	78.0	S

LAB-SPECIFIC APPRAISAL FOR BIAS STATEMENTS
(CHs)

Lab Code: U091

Parameter	QM-7		
	(ampules)		(waters)
	Avg.	Bias	Avg.
	Rec.		Rec.
	(%)		(%)
1,4-DCB	NA	-	NA
1,3-DCB	NA	-	NA
1,2-DCB	NA	-	NA
1,3,5-TCB	NA	-	NA
1,2,4-TCB	NA	-	NA
1,2,3-TCB	NA	-	NA
1,2,4,5-TeCB	NA	-	NA
1,2,3,4-TeCB	NA	-	NA
PeCB	NA	-	NA
HCB	103	S	NA
HCE	NA	-	NA
HCBD	NA	-	NA
OCS	103	S	NA

LAB-SPECIFIC APPRAISAL FOR BIAS STATEMENTS
(CHs)

Lab Code: U092

Parameter	QM-7 (ampules)			QM-7 (waters)		
	Avg. Rec.	Bias	(%)	Avg. Rec.	Bias	(%)
1,4-DCB	NA	-		NA	-	
1,3-DCB	NA	-		NA	-	
1,2-DCB	NA	-		NA	-	
1,3,5-TCB	36.0	VL		31.8	VL	
1,2,4-TCB	100	S		91.0	S	
1,2,3-TCB	108	S		173	VH	
1,2,4,5-TeCB	72.4	L		149	H	
1,2,3,4-TeCB	98.6	S		64.3	L	
PeCB	94.6	S		99.6	S	
HCB	64.4	L		69.4	L	
HCE	116	S		87.8	S	
HCBD	108	S		68.4	L	
OCS	83.3	S		93.4	S	

LAB-SPECIFIC APPRAISAL FOR BIAS STATEMENTS
(CHs)

Lab Code: U093

Parameter	QM-7			QM-7		
	(ampules)		Rec.	(waters)		Bias
	Avg.	Bias		Avg.	Rec.	
	(%)			(%)		
1,4-DCB	NA	-		NA	-	
1,3-DCB	NA	-		NA	-	
1,2-DCB	NA	-		NA	-	
1,3,5-TCB	37.5	VL		27.1	VL	
1,2,4-TCB	83.3	S		66.6	L	
1,2,3-TCB	94.6	S		71.4	L	
1,2,4,5-TeCB	82.2	S		47.7	VL	
1,2,3,4-TeCB	102	S		55.2	L	
PeCB	101	S		89.4	S	
HCB	64.4	L		29.9	VL	
HCE	99.7	S		59.6	L	
HCBD	108	S		44.8	VL	
OCS	80.1	S		140	H	

II-B: FLAGS

LAB-SPECIFIC APPRAISAL FOR FLAG STATEMENTS
(CHs)

Lab Code: U001

Parameter	QM-1 (ampules)	QM-6 (ampules)	QM-7 (ampules)
1,4-DCB	S	1 L	S
1,3-DCB	S	S	S
1,2-DCB	S	1 L	S
1,3,5-TCB	4 L	2 L	2 L
1,2,4-TCB	4 L	2 L	2 L
1,2,3-TCB	1 L	2 L	2 L
1,2,4,5-TeCB	NA	NA	NA
1,2,3,4-TeCB	3 L	2 L	2 L
PeCB	1 L	S	S
HCB	S	S	S
HCE	NA	NA	NA
HCBD	NA	2 L	S
OCS	NA	2 L	S

LAB-SPECIFIC APPRAISAL FOR FLAG STATEMENTS
 (CHs)

Lab Code: U001(continued)

Parameter	QM-7 (waters)	QM-6 (sediments)
1,4-DCB	3 VL	3 L;1 VL
1,3-DCB	1 L;3 VL	2 L;2 VL
1,2-DCB	2 VH;2 VL	S
1,3,5-TCB	2 VH;2 VL	2 L;2 VL
1,2,4-TCB	2 L;2 VL	3 L;1 VL
1,2,3-TCB	4 VL	3 L;1 VL
1,2,4,5-TeCB	NA	NA
1,2,3,4-TeCB	1 L;3 VL	2 L;1 VL
PeCB	3 L;1 VL	1 L
HCB	2 L	NA
HCE	NA	2 VH
HCBD	1 L;3 VL	1 L
OCS	3 L	1 L

LAB-SPECIFIC APPRAISAL FOR FLAG STATEMENTS
(CHs)

Lab Code: U005

Parameter	QM-1 (ampules)	QM-6 (ampules)	QM-6 (sediments)
1,4-DCB	2 L	1 H	4 VH
1,3-DCB	2 L	1 H	4 VH
1,2-DCB	2 L	2 H	4 VH
1,3,5-TCB	NA	NA	NA
1,2,4-TCB	1 H	2 VH	4 VH
1,2,3-TCB	NA	NA	NA
1,2,4,5-TeCB	NA	NA	NA
1,2,3,4-TeCB	NA	NA	NA
PeCB	NA	NA	NA
HCB	ND	1 VH	4 VH
HCE	ND	ND	ND
HCBD	ND	1 VH	3 VH
OCS	NRA	NRA	S

LAB-SPECIFIC APPRAISAL FOR FLAG STATEMENTS
(CHs)

Lab Code: U009

Parameter	QM-1 (ampules)	QM-6 (ampules)	QM-6 (sediments)
1,4-DCB	NA	NA	NA
1,3-DCB	NA	NA	NA
1,2-DCB	NA	NA	NA
1,3,5-TCB	4 VL	S	4 VL
1,2,4-TCB	1 L;3 VL	S	4 VL
1,2,3-TCB	4 L	S	4 VL
1,2,4,5-TeCB	4 VL	1 L	4 VL
1,2,3,4-TeCB	2 L	S	2 L
PeCB	2 L	S	S
HCB	2 L	2 L	1 VL
HCE	1 L	1 H	NC
HCBD	S	S	2 L;1 VL
OCS	3 L	S	2 H

LAB-SPECIFIC APPRAISAL FOR FLAG STATEMENTS
(CHs)

Lab Code: U013

Parameter	QM-7 (ampules)	QM-7 (waters)
1,4-DCB	NA	NA
1,3-DCB	NA	NA
1,2-DCB	NA	NA
1,3,5-TCB	NA	NA
1,2,4-TCB	NA	NA
1,2,3-TCB	NA	NA
1,2,4,5-TeCB	NA	NA
1,2,3,4-TeCB	NA	NA
PeCB	S	2 L
HCB	S	2 L
HCE	NA	NA
HCBD	NA	NA
OCS	2 VL	2 VL

LAB-SPECIFIC APPRAISAL FOR FLAG STATEMENTS
(CHs)

Lab Code: U014

Parameter	QM-1 (ampules)	QM-6 (ampules)	QM-7 (ampules)
1,4-DCB	2 H	1 H	S
1,3-DCB	1 H	S	2 VH
1,2-DCB	S	1 VH;1 H	S
1,3,5-TCB	NA	NA	NA
1,2,4-TCB	S	1 H	S
1,2,3-TCB	NA	NA	NA
1,2,4,5-TeCB	NA	NA	NA
1,2,3,4-TeCB	NA	NA	NA
PeCB	NA	NA	NA
HCB	2 H	S	S
HCE	2 VH;1 H	S	S
HCBD	4 H	1 VH	S
OCS	NA	NA	NA

LAB-SPECIFIC APPRAISAL FOR FLAG STATEMENTS
(CHs)

Lab Code: U014(continued)

Parameter	QM-7 (waters)	QM-6 (sediments)
1,4-DCB	LT	LT
1,3-DCB	LT	LT
1,2-DCB	LT	LT
1,3,5-TCB	NA	NA
1,2,4-TCB	1 L;1 VL	2 VH
1,2,3-TCB	NA	NA
1,2,4,5-TeCB	NA	NA
1,2,3,4-TeCB	NA	NA
PeCB	NA	NA
HCB	S	S
HCE	4 VL	NC
HCBD	4 VL	LT
OCS	NA	NA

LAB-SPECIFIC APPRAISAL FOR FLAG STATEMENTS
(CHs)

Lab Code: U063

Parameter	QM-1 (ampules)	QM-7 (ampules)	QM-7 (waters)
1,4-DCB	S	S	2 VH;1 VL
1,3-DCB	2 L	2 L	2 VL
1,2-DCB	1 H	2 VH	4 VH
1,3,5-TCB	1 H	S	2 L;2 VL
1,2,4-TCB	1 H	S	1 L;2 VL
1,2,3-TCB	S	2 L	4 VL
1,2,4,5-TeCB	3 VL	NR	NR
1,2,3,4-TeCB	2 L	NR	NR
PeCB	3 VH	2 L	4 VL
HCB	2 VL	2 VL	1 L;3 VL
HCE	NA	2 VH	1 VH;1H;2 VL
HCBD	NA	2 VH	1 H;2 VL
OCS	NA	2 VH	2 VH;1 VL

LAB-SPECIFIC APPRAISAL FOR FLAG STATEMENTS
(CHs)

Lab Code: U072

Parameter	QM-1 (ampules)	QM-6 (ampules)	QM-7 (ampules)
1,4-DCB	S	S	S
1,3-DCB	S	S	S
1,2-DCB	S	S	S
1,3,5-TCB	S	S	S
1,2,4-TCB	L H	S	S
1,2,3-TCB	S	S	S
1,2,4,5-TeCB	S	S	S
1,2,3,4-TeCB	S	S	S
PeCB	S	S	S
HCB	S	S	S
HCE	S	S	S
HCBD	S	S	S
OCS	S	S	S

LAB-SPECIFIC APPRAISAL FOR FLAG STATEMENTS
(CHs)

Lab Code: U072(continued)

Parameter	QM-7 (waters)	QM-6 (sediments)
1,4-DCB	LT	LT
1,3-DCB	LT	LT
1,2-DCB	LT	LT
1,3,5-TCB	LT	LT
1,2,4-TCB	LT	LT
1,2,3-TCB	LT	LT
1,2,4,5-TeCB	LT	2 VL
1,2,3,4-TeCB	2 L	LT
PeCB	2 L	1 L
HCB	1 VL	S
HCE	4 VL	NC
HCBD	1 L;3 VL	1 L
OCS	1 L	1 VH

LAB-SPECIFIC APPRAISAL FOR FLAG STATEMENTS
(CHs)

Lab Code: U075

Parameter	QM-1 (ampules)	QM-7 (waters)
1,4-DCB	NA	NA
1,3-DCB	NA	NA
1,2-DCB	NA	NA
1,3,5-TCB	NA	NA
1,2,4-TCB	NA	NA
1,2,3-TCB	NA	NA
1,2,4,5-TeCB	NA	NA
1,2,3,4-TeCB	NA	NA
PeCB	NA	NA
HCB	S	4 VH
HCE	NA	NA
HCBD	NA	NA
OCS	S	4 VH

LAB-SPECIFIC APPRAISAL FOR FLAG STATEMENTS
(CHs)

Lab Code: U077

Parameter	QM-7 (ampules)	QM-7 (waters)
1,4-DCB	NA	NA
1,3-DCB	NA	NA
1,2-DCB	NA	NA
1,3,5-TCB	NA	NA
1,2,4-TCB	NA	NA
1,2,3-TCB	NA	NA
1,2,4,5-TeCB	NA	NA
1,2,3,4-TeCB	NA	NA
PeCB	NA	NA
HCB	NA	NA
HCE	NA	NA
HCBD	NA	NA
OCS	S	1 H

LAB-SPECIFIC APPRAISAL FOR FLAG STATEMENTS
(CHs)

Lab Code: U086

Parameter	QM-1 (ampules)	QM-6 (ampules)	QM-7 (ampules)
1,4-DCB	4 L	S	S
1,3-DCB	4 L	S	S
1,2-DCB	4 L	S	S
1,3,5-TCB	4 L	S	S
1,2,4-TCB	4 L	S	S
1,2,3-TCB	4 L	S	S
1,2,4,5-TeCB	4 L	S	S
1,2,3,4-TeCB	4 L	S	S
PeCB	4 L	S	S
HCB	4 L	S	S
HCE	S	S	S
HCBD	4 L	S	S
OCS	2 L	S	S

LAB-SPECIFIC APPRAISAL FOR FLAG STATEMENTS
(CHs)

Lab Code: U086(continued)

Parameter	QM-7 (waters)	QM-6 (sediments)
1,4-DCB	2 L	2 VH
1,3-DCB	4 L	2 L
1,2-DCB	2 L	2 VH; 2 H
1,3,5-TCB	2 L	S
1,2,4-TCB	4 L	S
1,2,3-TCB	1 L	S
1,2,4,5-TeCB	1 L	1 L
1,2,3,4-TeCB	2 L	S
PeCB	S	S
HCB	S	S
HCE	4 L	NC
HCBD	4 L	2 L
OCS	S	S

LAB-SPECIFIC APPRAISAL FOR FLAG STATEMENTS
(CHs)

Lab Code: U091

Parameter	QM-7 (ampules)
1,4-DCB	NA
1,3-DCB	NA
1,2-DCB	NA
1,3,5-TCB	NA
1,2,4-TCB	NA
1,2,3-TCB	NA
1,2,4,5-TeCB	NA
1,2,3,4-TeCB	NA
PeCB	NA
HCB	S
HCE	NA
HCBD	NA
OCS	S

LAB-SPECIFIC APPRAISAL FOR FLAG STATEMENTS
(CHs)

Lab Code: U092

Parameter	QM-7 (ampules)	QM-7 (waters)
1,4-DCB	NA	NA
1,3-DCB	NA	NA
1,2-DCB	NA	NA
1,3,5-TCB	2 VL	4 VL
1,2,4-TCB	S	1 H; 2 L
1,2,3-TCB	S	2 VH
1,2,4,5-TeCB	2 L	2 VH; 2 L
1,2,3,4-TeCB	S	2 VL
PeCB	S	S
HCB	2 L	1 L; 1 VL
HCE	S	1 L
HCBD	S	3 L
OCS	S	S

LAB-SPECIFIC APPRAISAL FOR FLAG STATEMENTS
(CHs)

Lab Code: U093

Parameter	QM-7 (ampules)	QM-7 (waters)
1,4-DCB	NA	NA
1,3-DCB	NA	NA
1,2-DCB	NA	NA
1,3,5-TCB	2 VL	4 VL
1,2,4-TCB	S	2 L;1 VL
1,2,3-TCB	S	3 L
1,2,4,5-TeCB	S	2 VL
1,2,3,4-TeCB	S	3 L;1 VL
PeCB	S	S
HCB	2 L	4 VL
HCE	S	1 L;2 VL
HCBD	S	4 VL
OCS	S	1 VH

APPENDIX III

Within-lab Precision

Within-lab Precision for CHs
(Avg. RSD)

Lab Code: U001

Parameter	QM-1 (Ampules)	QM-7 (Ampules)	QM-7 (Waters)	QM-6 (Sediments)
----- % -----				
1,4-DCB	1.6 (2)	2.8 (1)	21.7 (2)	9.3 (2)
1,3-DCB	1.7 (2)	2.2 (1)	29.3 (2)	8.3 (2)
1,2-DCB	1.7 (2)	2.2 (1)	9.5 (2)	13.1 (2)
1,3,5-TCB	1.1 (2)	6.5 (1)	14.9 (2)	12.0 (2)
1,2,4-TCB	1.3 (2)	7.9 (1)	12.5 (2)	17.1 (2)
1,2,3-TCB	1.2 (2)	7.1 (1)	15.0 (2)	14.0 (2)
1,2,4,5-TeCB	NA	NA	NA	NA
1,2,3,4-TeCB	1.4 (2)	2.7 (1)	15.9 (2)	19.1 (2)
PeCB	2.1 (2)	2.9 (1)	15.5 (2)	10.7 (2)
HCB	0.6 (2)	2.8 (1)	11.8 (2)	24.5 (2)
HCE	NA	NA	NA	NA
HCBD	NA	3.1 (1)	24.5 (2)	11.2 (2)
OCS	NA	2.1 (1)	18.5 (2)	11.0 (2)

Note: The numbers in parentheses are the number of duplicate pairs.

Within-lab Precision for CHs
(Avg. RSD)

Lab Code: U005

Parameter	QM-1 (Ampules)	QM-6 (Sediments)
----- % -----		
1,4-DCB	12.5 (2)	22.2 (2)
1,3-DCB	16.6 (2)	27.4 (2)
1,2-DCB	7.8 (2)	33.4 (2)
1,3,5-TCB	NA	NA
1,2,4-TCB	> 100 (1)	23.2 (2)
1,2,3-TCB	NA	NA
1,2,4,5-TeCB	NA	NA
1,2,3,4-TeCB	NA	NA
PeCB	NA	NA
HCB	ND	18.0 (2)
HCE	ND	ND
HCBD	ND	25.7 (1)
OCS	NA	NA

Note: The numbers in parentheses are the number of duplicate pairs.

Within-lab Precision for CHs
(Avg. RSD)

Lab Code: U009

Parameter	QM-1 (Ampules)	QM-6 (Sediments)
----- % -----		
1,4-DCB	NA	NA
1,3-DCB	NA	NA
1,2-DCB	NA	NA
1,3,5-TCB	6.6 (2)	0.0 (2)
1,2,4-TCB	8.9 (2)	0.0 (2)
1,2,3-TCB	10.0 (2)	0.0 (2)
1,2,4,5-TeCB	10.5 (2)	0.0 (2)
1,2,3,4-TeCB	6.8 (2)	23.6 (2)
PeCB	9.4 (2)	5.0 (2)
HCB	10.6 (2)	27.1 (2)
HCE	7.9 (2)	-
HCBD	7.6 (2)	31.9 (2)
OCS	11.9 (2)	7.3 (2)

Note: The numbers in parentheses are the number of duplicate pairs.

Within-lab Precision for CHs
(Avg. RSD)

Lab Code: U013

Parameter	QM-7 (Ampules)	QM-7 (Waters)	QM-6 (Sediments)
----- % -----			
1,4-DCB	NA	NA	LT
1,3-DCB	NA	NA	LT
1,2-DCB	NA	NA	LT
1,3,5-TCB	NA	NA	NA
1,2,4-TCB	NA	NA	0.1 (1)
1,2,3-TCB	NA	NA	NA
1,2,4,5-TeCB	NA	NA	NA
1,2,3,4-TeCB	NA	NA	NA
PeCB	4.7 (1)	2.0 (1)	NA
HCB	3.8 (1)	11.8 (1)	5.4 (2)
HCE	NA	NA	-
HCBD	NA	NA	LT
OCS	5.2 (1)	11.7 (1)	NA

Note: The numbers in parentheses are the number of duplicate pairs.

Within-lab Precision for CHs
(Avg. RSD)

Lab Code: U014

Parameter	QM-1 (Ampules)	QM-7 (Ampules)	QM-7 (Waters)	QM-6 (Sediments)
----- % -----				
1,4-DCB	1.9 (2)	0.0 (1)	LT	LT
1,3-DCB	4.0 (2)	0.0 (1)	LT	LT
1,2-DCB	3.0 (2)	0.6 (1)	LT	LT
1,3,5-TCB	NA	NA (1)	NA	LT
1,2,4-TCB	0.0 (2)	2.5 (1)	5.6 (1)	LT
1,2,3-TCB	NA	NA	NA	LT
1,2,4,5-TeCB	NA	NA	NA	> 100 (1)
1,2,3,4-TeCB	NA	NA	NA	LT
PeCB	NA	NA	NA	10.4 (2)
HCB	6.5 (2)	0.0 (1)	0.0 (2)	11.1 (2)
HCE	8.0 (2)	0.0 (1)	7.4 (2)	-
HCBD	0.0 (2)	0.0 (1)	14.5 (2)	7.5 (2)
OCS	NA	NA	NA	15.8 (2)

Note: The numbers in parentheses are the number of duplicate pairs.

Within-lab Precision for CHs
(Avg. RSD)

Lab Code: U063

Parameter	QM-1 (Ampules)	QM-7 (Ampules)	QM-7 (Waters)
% -----			
1,4-DCB	0.6 (1)	6.3 (1)	10.0 (1)
1,3-DCB	2.0 (1)	3.8 (1)	> 100 (1)
1,2-DCB	6.4 (1)	46.9 (1)	28.9 (2)
1,3,5-TCB	0.9 (1)	2.6 (1)	LT
1,2,4-TCB	1.7 (1)	2.3 (1)	95.2 (2)
1,2,3-TCB	4.0 (1)	2.8 (1)	> 100 (2)
1,2,4,5-TeCB	0.9 (1)	NR	NR
1,2,3,4-TeCB	2.2 (1)	NR	NR
PeCB	3.1 (1)	1.4 (1)	> 100 (2)
HCB	4.6 (1)	12.9 (1)	4.7 (1)
HCE	NA	2.7 (1)	> 100 (2)
HCBD	NA	3.7 (1)	> 100 (2)
OCS	NA	2.3 (1)	82.5 (2)

Note: The numbers in parentheses are the number of duplicate pairs.

Within-lab Precision for CHs
(Avg. RSD)

Lab Code: U072

Parameter	QM-1 (Ampules)	QM-7 (Ampules)	QM-7 (Waters)	QM-6 (Sediments)
----- % -----				
1,4-DCB	6.5 (2)	4.9 (1)	LT	LT
1,3-DCB	4.8 (2)	5.2 (1)	LT	LT
1,2-DCB	4.0 (2)	4.4 (1)	LT	LT
1,3,5-TCB	8.0 (2)	8.6 (1)	LT	LT
1,2,4-TCB	4.4 (2)	14.1 (1)	LT	LT
1,2,3-TCB	2.9 (2)	6.8 (1)	LT	LT
1,2,4,5-TeCB	3.4 (2)	15.8 (1)	LT	> 100 (1)
1,2,3,4-TeCB	4.6 (2)	14.8 (1)	LT	LT
PeCB	3.5 (2)	4.6 (1)	LT	10.4 (2)
HCB	2.2 (2)	7.2 (1)	52.3 (1)	11.2 (2)
HCE	2.5 (2)	1.3 (1)	17.3 (1)	-
HCBD	3.8 (2)	3.8 (1)	24.9 (1)	7.5 (2)
OCS	3.5 (2)	0.0 (1)	12.0 (2)	15.8 (2)

Note: The numbers in parentheses are the number of duplicate pairs.

Within-lab Precision for CHs
(Avg. RSD)

Lab Code: U075

Parameter	QM-1 (Ampules)	QM-7 (Ampules)	QM-7 (Waters)
----- % -----			
1,4-DCB	NA	NA	NA
1,3-DCB	NA	NA	NA
1,2-DCB	NA	NA	NA
1,3,5-TCB	NA	NA	NA
1,2,4-TCB	NA	NA	NA
1,2,3-TCB	NA	NA	NA
1,2,4,5-TeCB	NA	NA	NA
1,2,3,4-TeCB	NA	NA	NA
PeCB	NA	NA	NA
HCB	1.8 (2)	NA	6.7 (2)
HCE	NA	NA	NA
HCBD	NA	NA	NA
OCS	0.9 (2)	NA	1.6 (2)

Note: The numbers in parentheses are the number of duplicate pairs.

Within-lab Precision for CHs
(Avg. RSD)

Lab Code: U077

Parameter	QM-7 Ampules)	QM-7 Waters)
1,4-DCB	NA	NA
1,3-DCB	NA	NA
1,2-DCB	NA	NA
1,3,5-TCB	NA	NA
1,2,4-TCB	NA	NA
1,2,3-TCB	NA	NA
1,2,4,5-TeCB	NA	NA
1,2,3,4-TeCB	NA	NA
PeCB	NA	NA
HCB	NA	NA
HCE	NA	NA
HCBD	NA	NA
OCS	0.0 (1)	5.7 (2)

Note: The numbers in parentheses are the number of duplicate pairs.

Within-lab Precision for CHs
(Avg. RSD)

Lab Code: U086

Parameter	QM-1 (Ampules)	QM-7 (Ampules)	QM-7 (Waters)	QM-6 (Sediments)
----- % -----				
1,4-DCB	3.0 (2)	0.0 (1)	15.4 (2)	0.0 (2)
1,3-DCB	1.4 (2)	0.0 (1)	1.2 (2)	3.4 (2)
1,2-DCB	1.8 (2)	0.0 (1)	1.9 (2)	6.0 (2)
1,3,5-TCB	0.0 (2)	2.2 (1)	0.0 (2)	3.7 (2)
1,2,4-TCB	4.9 (2)	0.0 (1)	5.1 (2)	3.9 (2)
1,2,3-TCB	0.0 (2)	1.5 (1)	3.5 (2)	8.1 (2)
1,2,4,5-TeCB	4.0 (2)	0.0 (1)	2.8 (2)	4.6 (2)
1,2,3,4-TeCB	1.3 (2)	0.0 (1)	1.0 (2)	2.1 (2)
PeCB	0.7 (2)	0.0 (1)	0.0 (2)	6.6 (2)
HCB	1.3 (2)	0.0 (1)	4.9 (2)	7.9 (2)
HCE	1.0 (2)	0.0 (1)	2.1 (2)	-
HCBD	1.9 (2)	1.1 (1)	3.5 (2)	2.6 (2)
OCS	0.5 (2)	0.0 (1)	0.0 (2)	1.3 (2)

Note: The numbers in parentheses are the number of duplicate pairs.

Within-lab Precision for CHs
(Avg. RSD)

Lab Code: U091

Parameter	QM-7 (Ampules)	QM-7 Waters)
1,4-DCB	NA	NA
1,3-DCB	NA	NA
1,2-DCB	NA	NA
1,3,5-TCB	NA	NA
1,2,4-TCB	NA	NA
1,2,3-TCB	NA	NA
1,2,4,5-TeCB	NA	NA
1,2,3,4-TeCB	NA	NA
PeCB	NA	NA
HCB	0.0 (1)	NA
HCE	NA	NA
HCBD	NA	NA
OCS	0.0 (1)	NA

Note: The numbers in parentheses are the number of duplicate pairs.

Within-lab Precision for CHs
(Avg. RSD)

Lab Code: U092

Parameter	QM-7 (Ampules)	QM-7 (Waters)
----- % -----		
1,4-DCB	NA	NA
1,3-DCB	NA	NA
1,2-DCB	NA	NA
1,3,5-TCB	6.1 (1)	0.0 (1)
1,2,4-TCB	0.0 (1)	8.9 (2)
1,2,3-TCB	5.9 (1)	5.5 (2)
1,2,4,5-TeCB	0.0 (1)	8.2 (2)
1,2,3,4-TeCB	4.9 (1)	0.0 (2)
PeCB	0.0 (1)	0.0 (2)
HCB	0.0 (1)	10.6 (2)
HCE	0.0 (1)	16.2 (2)
HCBD	0.0 (1)	17.4 (2)
OCS	0.0 (1)	6.3 (2)

Note: The numbers in parentheses are the number of duplicate pairs.

Within-lab Precision for CHs
(Avg. RSD)

Lab Code: U093

Parameter	QM-7 (Ampules)	QM-7 (Waters)
1,4-DCB	NA	NA
1,3-DCB	NA	NA
1,2-DCB	NA	NA
1,3,5-TCB	0.0 (1)	13.1 (1)
1,2,4-TCB	0.0 (1)	28.3 (2)
1,2,3-TCB	2.4 (1)	5.7 (2)
1,2,4,5-TeCB	5.7 (1)	5.9 (2)
1,2,3,4-TeCB	0.0 (1)	16.6 (2)
PeCB	0.0 (1)	5.8 (2)
HCB	0.0 (1)	23.6 (2)
HCE	0.0 (1)	28.6 (2)
HCBD	0.0 (1)	6.7 (2)
OCS	5.6 (1)	40.1 (2)

Note: The numbers in parentheses are the number of duplicate pairs.