

**VALIDATION OF THE PRESERVATION TIME OF
ORGANOCHLOROPESTICIDES,
POLYCHLOROBIFENYLS AND
CHLOROBENZENES IN GROUNDWATER**

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SUMMARY

A part of the preservation times listed in environmental standards is not based on experimental data and/or research. A list of environmental analyses with a short preservation time, of which the impact of taking a new sample when the preservation time has elapsed is large, has been compiled. FeNeLab members have performed research into the preservation time under guidance of the SIKB into a number of analyses/matrices combinations. The experimental set-up has been laid out in the research program "Validatie van conserveringstermijnen van milieu monsters" (SIKB, april 2003). It is expected that extended preservation times can be established for a number of analyses/matrices combinations.

In this report the results of the validation of the preservation time of Organochloropesticides (OCP), Polychlorobifenyls (PCB) and Chlorobenzenes (CB) in two types of groundwater are given. This research is part of a larger study done by 4 environmental laboratories, all studying the preservation times of OCP, PCB and CB in different samples and matrices. The combined results will be presented to the "Centraal College van Deskundigen Bodembeheer" of the SIKB, in order to establish new preservation times as described in "SIKB-protocol 3001 conserveringsmethoden en conserveringstermijn van milieu monsters".

The results of this study indicate, that the preservation time of OCP, PCB and CB in groundwater is at least 7 days when the groundwater samples are stored between 1-5 °C.

1. INTRODUCTION

A part of the preservation time listed in environmental standards is not based on experimental data and/or research. A list of environmental analyses with a short preservation time, of which the impact of taking a new sample when the preservation time has elapsed is large, has been compiled. FeNeLab members have performed research into the preservation time under guidance of the SIKB into a number of analyses/matrices combinations. The experimental set-up has been laid out in the research program "Validatie van conserveringstermijnen van milieumonsters" (SIKB, april 2003). It is expected that extended preservation times can be established for a number of analyses/matrices combinations. In this report the results of the validation of the preservation time of Organochloropesticides (OCP), Polychlorobifenyls (PCB) and Chlorobenzenes (CB) in two type of groundwater are given. This research is part of a larger study done by 4 environmental laboratories, all studying the preservation times of OCP, PCB and CB in different matrices. The combined results will be presented to the "Centraal College van Deskundigen Bodembeheer" of the SIKB, in order to establish new preservation times as described in "SIKB-protocol 3001 conserveringsmethoden en conserveringstermijn van milieumonsters".

In this report the experimental set-up is briefly discussed in chapter 2. The details of the used groundwater and the treatment of the samples on day 0 together with a description of the analytical methods used are given in chapter 3 and 4. In chapter 5 the results of the study are presented and conclusions are given in chapter 6.

2. EXPERIMENTAL PROCEDURE

The experimental procedure is laid-out in the SIKB document “Onderzoeksprogramma validatie van conserveringstermijnen van milieumonsters” project 55, versie 1, 29 april 2003“. In the meeting of 8 april 2008 the experimental set-up of project 55 has been changed with regard to the measuring days. In this report the measurements take place on day 0, 1, 2, 4, 7, 10 and 14.

Two types of groundwater have been selected and these groundwater samples were spiked with OCP, PCB and CB at two different levels:

- Groundwater 1, Low level: 20 times the limit of detection (20xAG);
- Groundwater 2, High level: 200 times the limit of detection (200xAG),

where the limit of detection (AG) has been taken from Protocol 3120-1.

The groundwater samples were taken on day 0 and were divided into 250 ml samples, which were all spiked at the required level. In order to verify the homogeneity of the spiked groundwater samples on day 0, eight samples have been analyzed under repeatability conditions. On other measuring days 3 samples were measured. The samples were preserved by cooling them between 1 and 5 °C when not used (SIKB protocol 3001).

3. SAMPLE DESCRIPTION

In this reseach two types of groundwater have been used. The groundwater samples were analyzed before use and the results are given in attachment A. It is seen that both types of groundwater are free of OCP, PCB and CB.

4. DESCRIPTION OF METHODS

4.1. Sample pretreatment

The groundwater samples have been taken on day 0 and were divided into 250 ml samples, which all were spiked at the required level and stored between 1 and 5 °C when not used.

4.2. Analysis

The whole water sample is taken for the extraction and is analyzed with GC-MS. The analysis of OCP, PCB and CB is equivalent to NEN-EN-ISO 6468 and in accordance with performance sheet 3120-1. In attachment B the accreditation certificate for this analysis is given.

5. RESULTS

In attachment C the results are given for groundwater 1 spiked at low level, whereas in attachment E the results are given for groundwater 2 spiked at high level. The results are evaluated on basis of the z-scores, given in attachment D for groundwater 1 spiked at low level and attachment G for groundwater 2 spiked at high level. In table 1 the V_{cv} obtained during validation is compared with the V_{cv} of the control chart. The highest of these values is used for the calculation of the z-score. The standard deviation obtained on day 0 for both groundwater types used is comparable with these values. The preservation time ends, when a z-score < -2 has been reached.

Table 1: Overview of Vcw

Component	Vcw (%) control chart	Vcw (%) validation	Vcw (%) used in this study
135-trichloorbenzeen	16.9	21.6	21.6
124-trichloorbenzeen		22.7	22.7
123-trichloorbenzeen	20.6	20.7	20.7
Hexachloorbutadieen	23.1	21.2	23.1
1245/1235-tetraCB	18.2	18.1	18.2
1234-tetraCB	19.1	18.7	19.1
Pentachloorbenzeen	17.1	18.1	18.1
α -HCH		21.8	21.8
HCB		18.0	18.0
β -HCH		19.9	19.9
γ -HCH	13.7	19.0	19.0
δ -HCH	14.2	15.7	15.7
PCB-28	18.0	18.4	18.4
Heptachloor	18.7	17.4	18.7
PCB-52		19.6	19.6
Aldrin	16.5	20.4	20.4
Telodrin	14.0	21.1	21.1
Isodrin	16.6	23.0	23.0
Heptachloorepoxide	10.4	22.0	22.0
trs-heptacepo	16.3	18.4	18.4
γ -Chloordaan	10.2	19.2	19.2
o,p-DDE	17.0	20.7	20.7
PCB-101	15.5	17.7	17.7
α -Endosulfan		20.5	20.5
α -Chloordaan	10.1	20.3	20.3
p,p-DDE	19.4	18.1	19.4
Dieldrin	9.4	19.9	19.9
o,p-DDD	11.3	20.4	20.4
Endrin	15.4	20.6	20.6
β -Endosulfan	21.9	19.9	21.9
PCB-118	21.6	17.8	21.6
p,p-DDD	12.5	21.3	21.3
o,p-DDT	15.8	18.2	18.2
PCB-153	24.1	20.6	24.1
Endosulfan sulfaat	10.4	23.8	23.8
p,p-DDT	16.9	16.3	16.9
PCB-138	23.6	21.0	23.6
PCB-180	27.9	18.5	27.9

In table 2 the preservation times for the two groundwater types used are given. It is seen from the results in table 1, that the preservation time is 14 days for most components, when samples are stored between 1-5 °C, except for:

- Preservation time 10 days: Heptachloor

Table 2: Preservation times determined

Component	Preservation time (days)	
	Groundwater 1 Addition level low	Groundwater 2 Addition level high
135-trichloorbenzeen	14	14
124-trichloorbenzeen	14	14
123-trichloorbenzeen	14	14
Hexachloorbutadieen	14	14
1245/1235-tetraCB	14	14
1234-tetraCB	14	14
Pentachloorbenzeen	14	14
α-HCH	14	14
HCB	14	14
β-HCH	14	14
γ-HCH	14	14
δ-HCH	14	14
PCB-28	14	14
Heptachloor	14 ¹	10 ²
PCB-52	14	14
Aldrin	14	14
Telodrin	14	14
Isodrin	14	14
Heptachloorepoxide	14	14
trs-heptacepo	14	14
γ-Chloordaan	14	14
o,p-DDE	14	14
PCB-101	14	14
α-Endosulfan	14	14
α-Chloordaan	14	14
p,p-DDE	14	14
Dieldrin	14	14
o,p-DDD	14	14
Endrin	14 ³	14
β-Endosulfan	14	14
PCB-118	14	14

p,p-DDD	14	14
o,p-DDT	14	14
PCB-153	14	14
Endosulfan sulfaat	14	14
p,p-DDT	14	14
PCB-138	14	14
PCB-180	14	14

¹ On day 7 the z-score is higher than 2 and the relative recovery is 145.5%. This result is considered an outlier. The preservation time is 14 days.

² On day 11 the z-score is lower than 2 and the relative recovery is 57%. On day 14, however, the z-score is -0.4. It is not clear if the results of day 11 are to be considered an outlier. The preservation time is therefore set at 10 days.

³ The z-scores are higher than 2 for days 7 to 14 and the relative recovery is between 171.0 and 221.8%. The reason for these results is not known. As the relative recovery is high, the preservation time is set at 14 days.

6. CONCLUSIONS

The results of this study show, that the preservation time of groundwater samples is at least 7 days for all OCP, PCB and CB, when groundwater samples are stored between 1-5 °C before analysis. The standard deviations obtained in this study are comparable to those obtained in the method validation and control chart.

Attachment A: Characterization of ground waters used

		Groundwater 1	Groundwater 1	Groundwater 2	Groundwater 2
Certificate number		4258830	4392599	4252443	4392600
Na	mg/L	7	7.9	16	17
K	mg/L	0.75	0.63	1.1	0.85
Ca	mg/L	38	41	110	110
Mg	mg/L	2.4	2.3	7	6.5
Nitrate	mg N/L	<0.20	<0.20	<0.20	<0.20
Cyanide total	µg/L	<1.0	<1.0	<1.0	<1.0
pH		7.7	7.7	7.2	7.4
EC		170	170	570	550
Bromide	mg/L	<0.30	<0.30	<0.050	<0.30
Chloride	mg/L	7.9	8.1	53	54
Sulphate	mg/L	3.7	3.7	56	48
Aldrin	µg/L	<0.010	<0.010	<0.010	<0.010
CHLOORDAAN_S	µg/L	<0.020	<0.020	<0.020	<0.020
Dieldrin	µg/L	<0.010	<0.010	<0.010	<0.010
Endosulfaat	µg/L	<0.010	<0.010	<0.010	<0.010
Endrin	µg/L	<0.010	<0.010	<0.010	<0.010
HCB	µg/L	<0.010	<0.010	<0.010	<0.010
Heptachloor	µg/L	<0.010	<0.010	<0.010	<0.010
Heptaclepoxi	µg/L	<0.010	<0.010	<0.010	<0.010
Hexaclbutadi	µg/L	<0.010	<0.010	<0.010	<0.010
Isodrin	µg/L	<0.010	<0.010	<0.010	<0.010
Telodrin	µg/L	<0.010	<0.010	<0.010	<0.010
a-Chloordaan	µg/L	<0.010	<0.010	<0.010	<0.010
a-Endosulfan	µg/L	<0.010	<0.010	<0.010	<0.010
alfa-HCH	µg/L	<0.010	<0.010	<0.010	<0.010
b-Endosulfan	µg/L	<0.010	<0.010	<0.010	<0.010
beta-HCH	µg/L	<0.010	<0.010	<0.010	<0.010
delta-HCH	µg/L	<0.010	<0.010	<0.010	<0.010
g-Chloordaan	µg/L	<0.010	<0.010	<0.010	<0.010
gamma-HCH	µg/L	<0.010	<0.010	<0.010	<0.010
o,p-DDD	µg/L	<0.010	<0.010	<0.010	<0.010
o,p-DDE	µg/L	<0.010	<0.010	<0.010	<0.010

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o,p-DDT	µg/L	<0.010	<0.010	<0.010	<0.010
p,p-DDD	µg/L	<0.010	<0.010	<0.010	<0.010
p,p-DDE	µg/L	<0.010	<0.010	<0.010	<0.010
p,p-DDT	µg/L	<0.010	<0.010	<0.010	<0.010
PCB-101	µg/L	<0.010	<0.010	<0.010	<0.010
PCB-118	µg/L	<0.010	<0.010	<0.010	<0.010
PCB-138	µg/L	<0.010	<0.010	<0.010	<0.010
PCB-153	µg/L	<0.010	<0.010	<0.010	<0.010
PCB-180	µg/L	<0.010	<0.010	<0.010	<0.010
PCB-28	µg/L	<0.010	<0.010	<0.010	<0.010
PCB-52	µg/L	<0.010	<0.010	<0.010	<0.010

Attachment B: Accreditation certificate

Appendix to ISO/IEC 17025 accreditation certificate number: L 010

of **Eurofins Analytico B.V.**
Barneveld

Valid from: 25-02-2009 till 15-03-2014

Replaces appendix dated: 06-07-2008

Location Barneveld

Nr.	Material or product	Type of activity / investigation method	Internal reference number
AS3000; package 3120 (Laboratory analysis for soil, sediment and groundwater investigation; groundwater complementary package I)^(version 01-Oct-2008); complete package			
143	Groundwater	Determination of the content of polychlorinated biphenyls (PCB) and organochloropesticides (OCP); gas chromatography with mass spectrometry PCB 28 (2,4,4' trichlorobiphenyl), PCB 52 (2,5,2,5' tetrachlorobiphenyl), PCB 101 (2,4,5,2',5' pentachlorobiphenyl), PCB 118 (2,4,5,3',4' pentachlorobiphenyl), PCB 138 (2,3,4,2',4',5' hexachlorobiphenyl), PCB 153 (2,4,5,2',4',5' hexachlorobiphenyl), PCB 180 (2,3,4,5,2',4',5' heptachlorobiphenyl), sum of these seven PCB, α-hexachlorocyclohexane (α-HCH), β-hexachlorocyclohexane (β-HCH), γ-hexachlorocyclohexane (γ-HCH), δ-hexachlorocyclohexane (δ-HCH), sum of these four HCH's, aldrin, dieldrin, endrin, sum of these three "drin's", p,p'-DDE, o,p'-DDD, o,p'-DDT, p,p'-DDD, o,p'-DDE, p,p'-DDT, sum of these six DD's, heptachlor, α-endosulfan, cis-heptachlor epoxide, trans-heptachlor epoxide, sum of these two heptachlor epoxides, cis-chlorodane, trans-chlorodane and sum of these two chlorodanes	W0123 and W0260 in accordance with performance sheet 3120-1 and equivalent to NEN-EN-ISO 6468
144		Determination of the content of tri- and tetrachlorobenzenes, penta- and hexachlorobenzene; gas chromatography with mass spectrometry 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene, 1,3,5-trichlorobenzene, sum of these three trichlorobenzenes, 1,2,3,4-tetrachlorobenzene, 1,2,3,5-tetrachlorobenzene, 1,2,4,5-tetrachlorobenzene, sum of these three tetrachlorobenzenes, pentachlorobenzene and hexachlorobenzene	W0123 and W0260 in accordance with performance sheet 3120-2 and equivalent to NEN-EN-ISO 6468

Validation of the preservation time of OCP, PCB and CB in groundwater

Attachment C: Results groundwater 1, addition level low
Report form conservation OCB/PCB in groundwater

Name lab Eurofins Analytico
 datum aanvang 27-Apr-09
 Matrix addition level low

Days		0	1	2	4	7	10	14
Calendarday		27-Apr-09	28-Apr-09	29-Apr-09	01-May-09	04-May-09	07-May-09	11-May-09
Component	unit							
135-trichloorbenzeen	µg/L	34.2	31.7	33.9	28.9	38.8	38.6	39.1
RSD	%	11.4%	22.6%	20.1%	12.7%	4.7%	5.2%	5.0%
SR validatie		21.6%						
124-trichloorbenzeen	µg/L	43.0	38.2	41.0	38.2	45.5	46.0	47.4
RSD	%	10.3%	20.2%	18.5%	10.7%	2.9%	7.0%	4.3%
SR validatie		22.7%						
123-trichloorbenzeen	µg/L	35.9	32.6	36.2	32.6	39.8	39.9	39.8
RSD	%	11.2%	25.5%	21.1%	11.3%	1.3%	8.1%	4.8%
SR validatie		20.7%						
Hexachloorbutadieen	µg/L	31.7	29.5	32.1	27.7	35.7	37.0	36.7
RSD	%	10.1%	22.7%	20.1%	9.9%	1.4%	7.8%	7.1%
SR validatie		23.1%						
1245/1235-tetraCB	µg/L	71.4	65.1	68.7	68.6	82.5	82.2	82.5
RSD	%	10.3%	21.1%	19.3%	11.5%	3.4%	5.1%	9.3%
SR validatie		18.2%						
1234-tetraCB	µg/L	41.2	37.6	42.0	45.6	41.9	42.2	42.1
RSD	%	10.7%	21.5%	19.4%	11.9%	3.1%	6.7%	8.2%
SR validatie		19.1%						
Pentachloorbenzeen	µg/L	44.2	42.5	46.2	48.1	40.4	39.4	38.0
RSD	%	8.9%	21.6%	14.8%	14.7%	5.4%	7.4%	6.8%
SR validatie		18.1%						
α-HCH	µg/L	40.3	38.0	40.8	46.4	44.1	42.3	42.8
RSD	%	9.2%	19.3%	10.1%	10.0%	2.2%	10.1%	6.2%
SR validatie		21.8%						
HCB	µg/L	41.6	38.9	43.4	43.6	37.9	37.6	34.7
RSD	%	9.9%	19.0%	13.3%	10.3%	6.9%	7.2%	8.5%
SR validatie		18.0%						
β-HCH	µg/L	40.0	39.0	40.5	41.7	43.6	41.3	42.4
RSD	%	9.3%	17.1%	12.0%	12.2%	1.5%	4.4%	1.0%
SR validatie		19.9%						
γ-HCH	µg/L	37.3	35.5	37.8	38.2	45.2	42.1	42.0
RSD	%	9.0%	14.9%	10.4%	11.8%	1.9%	6.4%	6.1%
SR validatie		19.0%						
δ-HCH	µg/L	41.1	39.2	41.5	46.9	44.2	42.4	44.1
RSD	%	10.3%	18.3%	7.5%	4.9%	4.5%	7.1%	3.8%
SR validatie		15.7%						
PCB-28	µg/L	44.6	41.5	43.5	49.1	38.5	37.4	35.6
RSD	%	13.3%	16.2%	11.2%	11.2%	7.5%	4.2%	6.0%
SR validatie		18.4%						
Heptachloor	µg/L	31.7	27.4	31.7	25.6	46.1	42.6	36.8
RSD	%	10.9%	19.1%	10.9%	12.0%	7.5%	7.1%	12.3%
SR validatie		18.7%						
PCB-52	µg/L	36.7	34.2	36.7	38.0	37.5	36.7	38.8
RSD	%	10.0%	15.7%	10.1%	12.6%	7.7%	5.4%	3.4%
SR validatie		19.6%						
Aldrin	µg/L	30.5	28.0	31.0	26.7	39.7	38.1	36.4
RSD	%	10.0%	19.5%	10.0%	13.5%	7.6%	7.3%	5.4%
SR validatie		20.4%						
Telodrin	µg/L	30.8	28.3	29.5	24.9	40.8	38.1	35.0
RSD	%	9.6%	15.8%	11.4%	10.0%	6.8%	4.5%	9.1%
SR validatie		21.1%						
Isodrin	µg/L	29.3	26.3	29.2	25.1	39.6	38.8	33.9
RSD	%	10.1%	15.8%	14.7%	8.5%	6.4%	7.4%	7.3%
SR validatie		23.0%						

Validation of the preservation time of OCP, PCB and CB in groundwater

Report form conservation OCB/PCB in groundwater

Name lab Eurofins Analytico
 datum aanvang 27-Apr-09
 Matrix addition level low

Days		0	1	2	4	7	10	14
Calenderday		27-Apr-09	28-Apr-09	29-Apr-09	01-May-09	04-May-09	07-May-09	11-May-09
Component	unit							
Heptachloorepoxyde	µg/L	33.1	30.6	31.9	29.9	40.3	41.2	42.6
RSD	%	9.9%	19.4%	11.2%	15.3%	5.7%	7.1%	5.7%
SR validatie		22.0%						
trs-heptacepo	µg/L	31.9	30.8	31.8	29.2	43.7	39.3	40.8
RSD	%	9.5%	17.7%	9.7%	13.7%	7.3%	6.6%	2.4%
SR validatie		18.4%						
γ-Chloordaan	µg/L	32.7	30.0	32.7	31.5	39.5	40.9	39.3
RSD	%	10.6%	16.3%	12.5%	13.0%	6.2%	5.8%	2.6%
SR validatie		19.2%						
o,p-DDE	µg/L	36.5	34.5	36.5	37.0	39.1	37.5	35.4
RSD	%	9.5%	16.4%	11.7%	9.1%	6.6%	2.4%	1.8%
SR validatie		20.7%						
PCB-101	µg/L	37.2	34.0	37.2	38.4	38.1	35.3	33.6
RSD	%	11.0%	15.4%	12.5%	9.6%	4.2%	3.7%	6.3%
SR validatie		17.7%						
α-Endosulfan	µg/L	33.1	31.2	32.0	27.7	39.5	36.5	32.0
RSD	%	9.0%	21.3%	10.7%	8.7%	5.3%	2.5%	1.1%
SR validatie		20.5%						
α-Chloordaan	µg/L	32.9	29.7	32.8	29.4	39.8	38.7	37.6
RSD	%	10.7%	16.8%	9.8%	14.4%	4.8%	5.1%	2.7%
SR validatie		20.3%						
p,p-DDE	µg/L	38.0	36.5	38.5	38.7	37.3	35.7	30.8
RSD	%	12.5%	17.6%	8.6%	11.1%	5.4%	3.2%	8.7%
SR validatie		19.4%						
Dieldrin	µg/L	34.1	31.5	33.5	29.5	43.4	40.8	39.9
RSD	%	9.7%	15.6%	11.5%	11.1%	3.5%	3.7%	3.6%
SR validatie		19.9%						
o,p-DDD	µg/L	40.9	36.4	39.7	40.3	42.8	41.0	35.3
RSD	%	12.9%	15.3%	11.0%	8.6%	5.3%	5.8%	5.9%
SR validatie		20.4%						
Endrin	µg/L	34.1	30.7	36.4	33.0	75.6	68.1	58.3
RSD	%	11.4%	24.4%	11.1%	30.4%	10.6%	2.1%	0.0
SR validatie		20.6%						
β-Endosulfan	µg/L	40.1	34.3	36.7	33.9	37.2	32.5	26.6
RSD	%	12.4%	16.5%	10.5%	7.3%	1.9%	2.1%	6.9%
SR validatie		21.9%						
PCB-118	µg/L	41.2	39.5	42.7	44.5	38.7	34.8	28.7
RSD	%	12.7%	15.2%	12.6%	10.7%	6.3%	10.0%	10.9%
SR validatie		21.6%						
p,p-DDD	µg/L	45.8	40.0	43.6	48.0	43.6	39.5	34.5
RSD	%	11.9%	18.9%	9.5%	8.2%	5.6%	5.4%	7.0%
SR validatie		21.3%						
o,p-DDT	µg/L	38.9	33.1	39.0	35.9	38.8	35.9	30.3
RSD	%	11.1%	16.3%	12.1%	10.7%	6.9%	2.3%	5.3%
SR validatie		18.2%						
PCB-153	µg/L	38.4	35.2	38.1	37.6	36.7	34.5	28.7
RSD	%	12.7%	16.7%	11.3%	9.3%	4.1%	7.2%	10.1%
SR validatie		24.1%						
Endosulfan sulfaat	µg/L	44.3	41.4	42.3	45.3	45.6	43.2	42.5
RSD	%	9.9%	16.8%	9.8%	9.4%	2.8%	0.7%	2.3%
SR validatie		23.8%						
p,p-DDT	µg/L	40.9	37.5	46.6	48.9	41.1	36.2	30.3
RSD	%	11.5%	17.7%	9.2%	7.8%	6.8%	5.4%	5.7%
SR validatie		16.9%						
PCB-118	µg/L	37.4	36.0	38.1	39.2	36.8	35.8	30.4
RSD	%	12.6%	19.5%	14.6%	11.4%	5.3%	3.5%	6.1%
SR validatie		23.6%						
PCB-180	µg/L	37.0	34.2	35.0	35.8	35.5	34.3	29.1
RSD	%	11.7%	21.8%	6.7%	10.6%	6.5%	3.5%	1.7%
SR validatie		27.9%						

Validation of the preservation time of OCP, PCB and CB in groundwater

Attachment D: Results groundwater 1, addition level low, z-scores
Report form conservation OCB/PCB in groundwater

Name lab Eurofins Analytico
 Start date 27-Apr-09
 Matrix Groundwater 1, addition level low

Days		0	1	2	4	7	10	14
Calenderday		27-Apr-09	28-Apr-09	29-Apr-09	01-May-09	04-May-09	07-May-09	11-May-09
Component	unit							
135-trichloorbenzeen	µg/L	100.0%	92.6%	99.1%	84.5%	113.6%	113.0%	114.4%
RSD	%	11.4%	22.6%	20.1%	12.7%	4.7%	5.2%	5.0%
z score		0.0	-0.3	0.0	-0.7	0.6	0.6	0.7
124-trichloorbenzeen	µg/L	100.0%	89.0%	95.4%	88.9%	106.0%	107.0%	110.4%
RSD	%	10.3%	20.2%	18.5%	10.7%	2.9%	7.0%	4.3%
z score		0.0	-0.5	-0.2	-0.5	0.3	0.3	0.5
123-trichloorbenzeen	µg/L	100.0%	90.9%	100.9%	91.0%	110.9%	111.2%	110.9%
RSD	%	11.2%	25.5%	21.1%	11.3%	1.3%	8.1%	4.8%
z score		0.0	-0.4	0.0	-0.4	0.5	0.5	0.5
Hexachloorbutadieen	µg/L	100.0%	93.2%	101.5%	87.5%	112.8%	116.9%	116.0%
RSD	%	10.1%	22.7%	20.1%	9.9%	1.4%	7.8%	7.1%
z score		0.0	-0.3	0.1	-0.5	0.6	0.7	0.7
1245/1235-tetraCB	µg/L	100.0%	91.2%	96.3%	96.2%	115.6%	115.2%	115.6%
RSD	%	10.3%	21.1%	19.3%	11.5%	3.4%	5.1%	9.3%
z score		0.0	-0.5	-0.2	-0.2	0.9	0.8	0.9
1234-tetraCB	µg/L	100.0%	91.2%	102.0%	110.8%	101.8%	102.4%	102.3%
RSD	%	10.7%	21.5%	19.4%	11.9%	3.1%	6.7%	8.2%
z score		0.0	-0.5	0.1	0.6	0.1	0.1	0.1
Pentachloorbenzeen	µg/L	100.0%	96.1%	104.6%	109.0%	91.4%	89.3%	86.1%
RSD	%	8.9%	21.6%	14.8%	14.7%	5.4%	7.4%	6.8%
z score		0.0	-0.2	0.3	0.5	-0.5	-0.6	-0.8
α-HCH	µg/L	100.0%	94.1%	101.1%	114.9%	109.4%	104.9%	106.1%
RSD	%	9.2%	19.3%	10.1%	10.0%	2.2%	10.1%	6.2%
z score		0.0	-0.3	0.0	0.7	0.4	0.2	0.3
HCB	µg/L	100.0%	93.6%	104.4%	104.8%	91.1%	90.5%	83.5%
RSD	%	9.9%	19.0%	13.3%	10.3%	6.9%	7.2%	8.5%
z score		0.0	-0.4	0.2	0.3	-0.5	-0.5	-0.9
β-HCH	µg/L	100.0%	97.5%	101.3%	104.3%	109.2%	103.4%	106.0%
RSD	%	9.3%	17.1%	12.0%	12.2%	1.5%	4.4%	1.0%
z score		0.0	-0.1	0.1	0.2	0.5	0.2	0.3
γ-HCH	µg/L	100.0%	95.3%	101.5%	102.5%	121.2%	113.0%	112.9%
RSD	%	9.0%	14.9%	10.4%	11.8%	1.9%	6.4%	6.1%
z score		0.0	-0.2	0.1	0.1	1.1	0.7	0.7
δ-HCH	µg/L	100.0%	95.4%	101.0%	114.1%	107.6%	103.3%	107.4%
RSD	%	10.3%	18.3%	7.5%	4.9%	4.5%	7.1%	3.8%
z score		0.0	-0.3	0.1	0.9	0.5	0.2	0.5
PCB-28	µg/L	100.0%	93.1%	97.6%	110.1%	86.5%	84.1%	80.0%
RSD	%	13.3%	16.2%	11.2%	11.2%	7.5%	4.2%	6.0%
z score		0.0	-0.4	-0.1	0.5	-0.7	-0.9	-1.1
Heptachloor	µg/L	100.0%	86.5%	100.0%	80.7%	145.5%	134.4%	116.1%
RSD	%	10.9%	19.1%	10.9%	12.0%	7.5%	7.1%	12.3%
z score		0.0	-0.7	0.0	-1.0	2.4	1.8	0.9
PCB-52	µg/L	100.0%	93.2%	100.1%	103.5%	102.2%	100.0%	105.6%
RSD	%	10.0%	15.7%	10.1%	12.6%	7.7%	5.4%	3.4%
z score		0.0	-0.3	0.0	0.2	0.1	0.0	0.3
Aldrin	µg/L	100.0%	91.8%	101.5%	87.5%	130.2%	124.9%	119.2%
RSD	%	10.0%	19.5%	10.0%	13.5%	7.6%	7.3%	5.4%
z score		0.0	-0.4	0.1	-0.6	1.5	1.2	0.9
Telodrin	µg/L	100.0%	91.8%	95.8%	80.7%	132.4%	123.5%	113.6%
RSD	%	9.6%	15.8%	11.4%	10.0%	6.8%	4.5%	9.1%
z score		0.0	-0.4	-0.2	-0.9	1.5	1.1	0.6
Isodrin	µg/L	100.0%	89.9%	99.7%	85.6%	135.2%	132.4%	115.7%
RSD	%	10.1%	15.8%	14.7%	8.5%	6.4%	7.4%	7.3%
z score		0.0	-0.4	0.0	-0.6	1.5	1.4	0.7

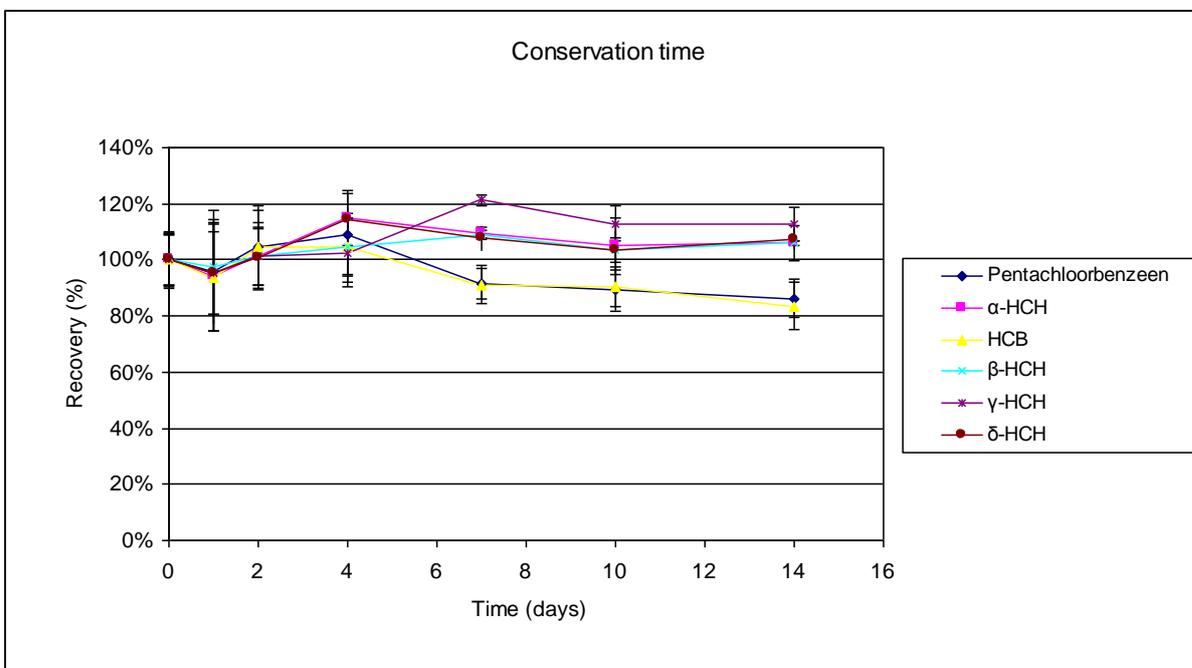
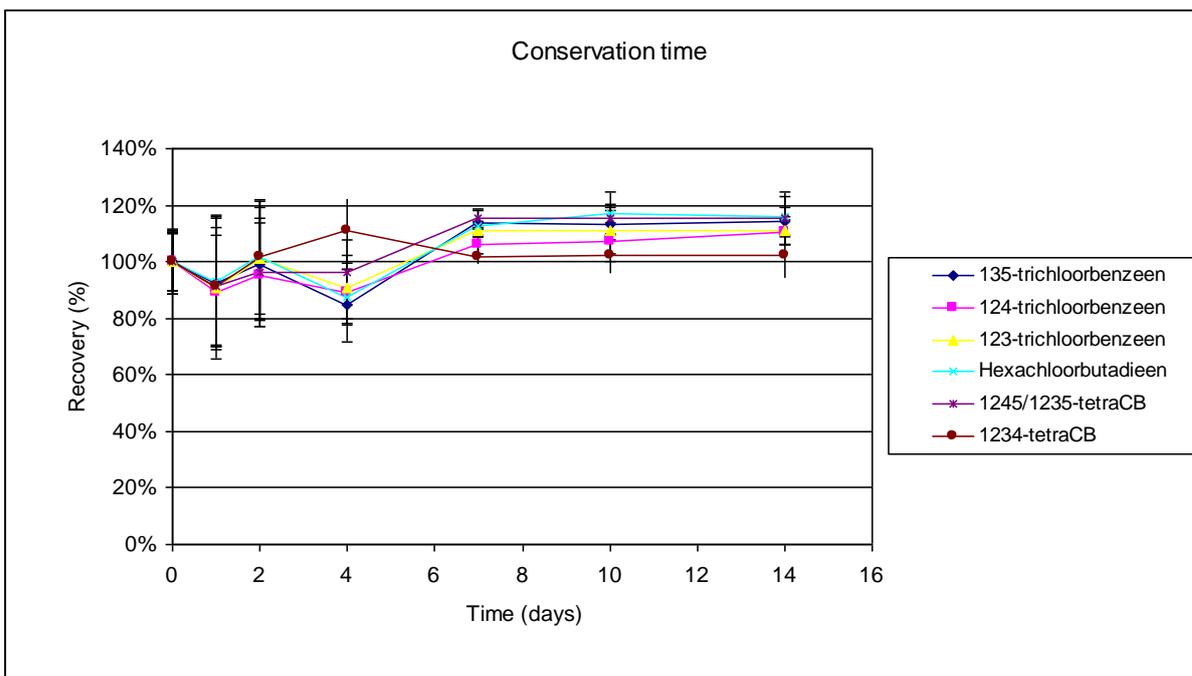
Validation of the preservation time of OCP, PCB and CB in groundwater

Report form conservation OCB/PCB in groundwater

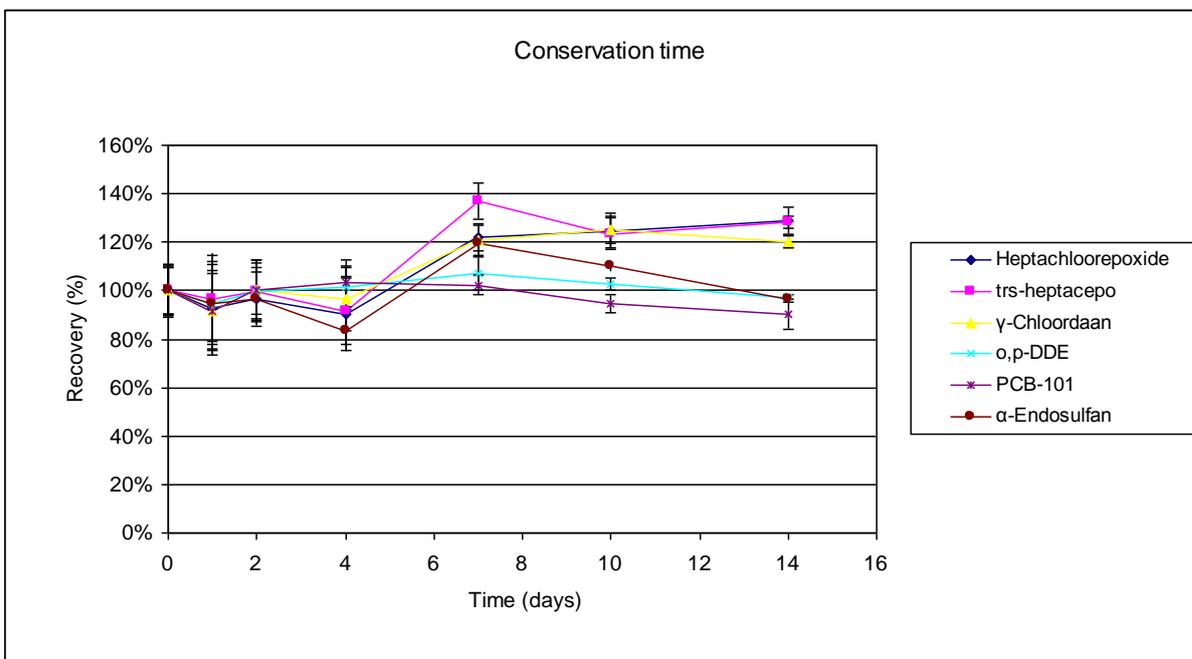
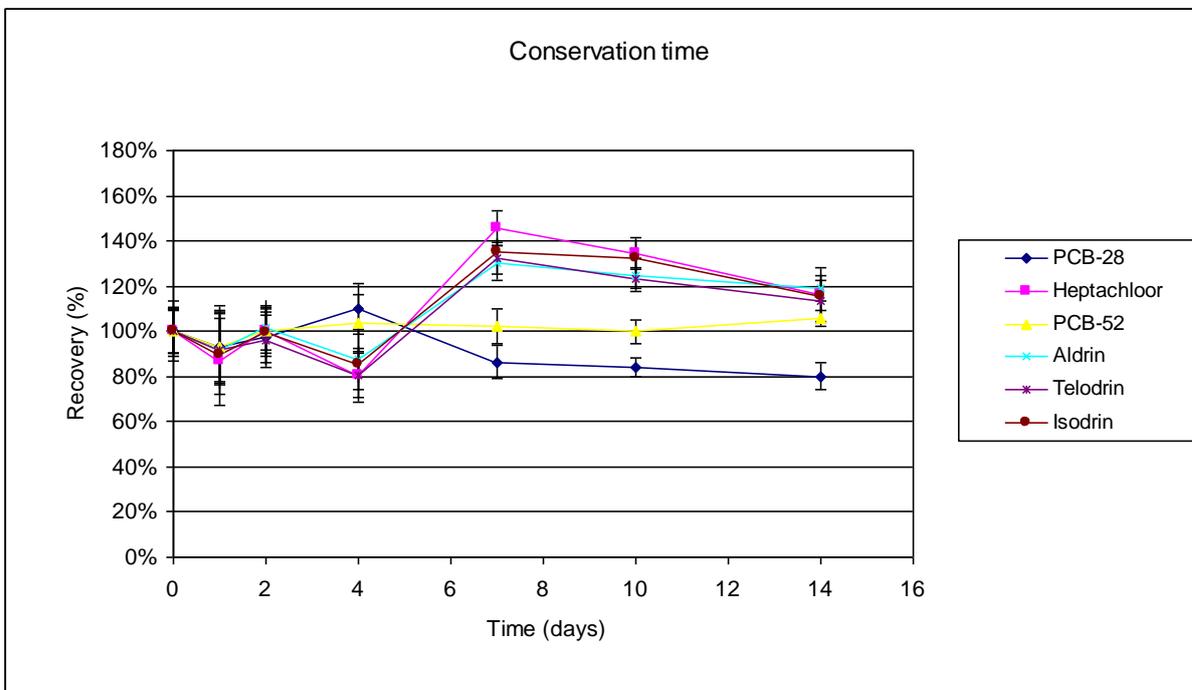
Name lab Eurofins Analytico
 Start date 27-Apr-09
 Matrix Groundwater 1, addition level low

Days		0	1	2	4	7	10	14
Calenderday		27-Apr-09	28-Apr-09	29-Apr-09	01-May-09	04-May-09	07-May-09	11-May-09
Component	unit							
Heptachloorepo	µg/L	100.0%	92.7%	96.5%	90.4%	121.9%	124.6%	128.9%
RSD	%	9.9%	19.4%	11.2%	15.3%	5.7%	7.1%	5.7%
z score		0.0	-0.3	-0.2	-0.4	1.0	1.1	1.3
trs-heptacepo	µg/L	100.0%	96.5%	99.7%	91.5%	136.9%	123.4%	128.1%
RSD	%	9.5%	17.7%	9.7%	13.7%	7.3%	6.6%	2.4%
z score		0.0	-0.2	0.0	-0.5	2.0	1.3	1.5
γ-Chloordaan	µg/L	100.0%	91.7%	100.0%	96.3%	120.9%	125.2%	120.3%
RSD	%	10.6%	16.3%	12.5%	13.0%	6.2%	5.8%	2.6%
z score		0.0	-0.4	0.0	-0.2	1.1	1.3	1.1
o,p-DDE	µg/L	100.0%	94.5%	99.9%	101.4%	107.0%	102.7%	96.8%
RSD	%	9.5%	16.4%	11.7%	9.1%	6.6%	2.4%	1.8%
z score		0.0	-0.3	0.0	0.1	0.3	0.1	-0.2
PCB-101	µg/L	100.0%	91.4%	100.0%	103.1%	102.3%	94.8%	90.3%
RSD	%	11.0%	15.4%	12.5%	9.6%	4.2%	3.7%	6.3%
z score		0.0	-0.5	0.0	0.2	0.1	-0.3	-0.5
α-Endosulfan	µg/L	100.0%	94.3%	96.7%	83.5%	119.3%	110.2%	96.5%
RSD	%	9.0%	21.3%	10.7%	8.7%	5.3%	2.5%	1.1%
z score		0.0	-0.3	-0.2	-0.8	0.9	0.5	-0.2
α-Chloordaan	µg/L	100.0%	90.2%	99.6%	89.4%	120.9%	117.6%	114.5%
RSD	%	10.7%	16.8%	9.8%	14.4%	4.8%	5.1%	2.7%
z score		0.0	-0.5	0.0	-0.5	1.0	0.9	0.7
p,p-DDE	µg/L	100.0%	96.0%	101.3%	101.8%	98.0%	93.9%	81.0%
RSD	%	12.5%	17.6%	8.6%	11.1%	5.4%	3.2%	8.7%
z score		0.0	-0.2	0.1	0.1	-0.1	-0.3	-1.0
Diendrin	µg/L	100.0%	92.3%	98.3%	86.6%	127.2%	119.7%	117.0%
RSD	%	9.7%	15.6%	11.5%	11.1%	3.5%	3.7%	3.6%
z score		0.0	-0.4	-0.1	-0.7	1.4	1.0	0.9
o,p-DDD	µg/L	100.0%	89.2%	97.3%	98.7%	104.8%	100.5%	86.4%
RSD	%	12.9%	15.3%	11.0%	8.6%	5.3%	5.8%	5.9%
z score		0.0	-0.5	-0.1	-0.1	0.2	0.0	-0.7
Endrin	µg/L	100.0%	90.1%	106.6%	96.9%	221.8%	199.6%	171.0%
RSD	%	11.4%	24.4%	11.1%	30.4%	10.6%	2.1%	3.8%
z score		0.0	-0.5	0.3	-0.2	5.9	4.8	3.4
β-Endosulfan	µg/L	100.0%	85.5%	91.5%	84.5%	92.7%	81.0%	66.2%
RSD	%	12.4%	16.5%	10.5%	7.3%	1.9%	2.1%	6.9%
z score		0.0	-0.7	-0.4	-0.7	-0.3	-0.9	-1.5
PCB-118	µg/L	100.0%	95.9%	103.5%	107.9%	93.9%	84.4%	69.6%
RSD	%	12.7%	15.2%	12.6%	10.7%	6.3%	10.0%	10.9%
z score		0.0	-0.2	0.2	0.4	-0.3	-0.7	-1.4
p,p-DDD	µg/L	100.0%	87.3%	95.2%	104.8%	95.2%	86.3%	75.3%
RSD	%	11.9%	18.9%	9.5%	8.2%	5.6%	5.4%	7.0%
z score		0.0	-0.6	-0.2	0.2	-0.2	-0.6	-1.2
o,p-DDT	µg/L	100.0%	85.1%	100.2%	92.3%	99.9%	92.3%	77.9%
RSD	%	11.1%	16.3%	12.1%	10.7%	6.9%	2.3%	5.3%
z score		0.0	-0.8	0.0	-0.4	0.0	-0.4	-1.2
PCB-153	µg/L	100.0%	91.8%	99.3%	97.9%	95.7%	89.9%	74.7%
RSD	%	12.7%	16.7%	11.3%	9.3%	4.1%	7.2%	10.1%
z score		0.0	-0.3	0.0	-0.1	-0.2	-0.4	-1.1
Endosulfan sulfaat	µg/L	100.0%	93.6%	95.6%	102.3%	103.0%	97.6%	96.1%
RSD	%	9.9%	16.8%	9.8%	9.4%	2.8%	0.7%	2.3%
z score		0.0	-0.3	-0.2	0.1	0.1	-0.1	-0.2
p,p-DDT	µg/L	100.0%	91.7%	114.0%	119.6%	100.6%	88.5%	74.3%
RSD	%	11.5%	17.7%	9.2%	7.8%	6.8%	5.4%	5.7%
z score		0.0	-0.5	0.8	1.2	0.0	-0.7	-1.5
PCB-118	µg/L	100.0%	96.4%	102.0%	104.8%	98.5%	95.9%	81.4%
RSD	%	12.6%	19.5%	14.6%	11.4%	5.3%	3.5%	6.1%
z score		0.0	-0.2	0.1	0.2	-0.1	-0.2	-0.8
PCB-180	µg/L	100.0%	92.5%	94.5%	96.6%	95.8%	92.6%	78.5%
RSD	%	11.7%	21.8%	6.7%	10.6%	6.5%	3.5%	1.7%
z score		0.0	-0.3	-0.2	-0.1	-0.1	-0.3	-0.8

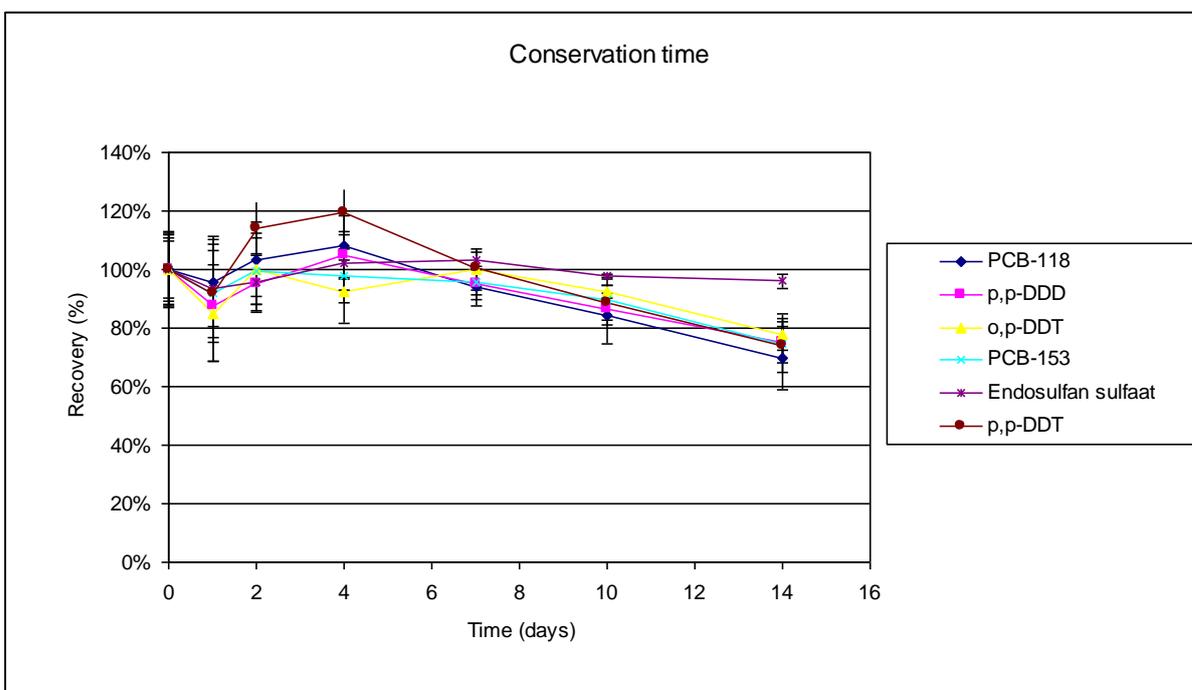
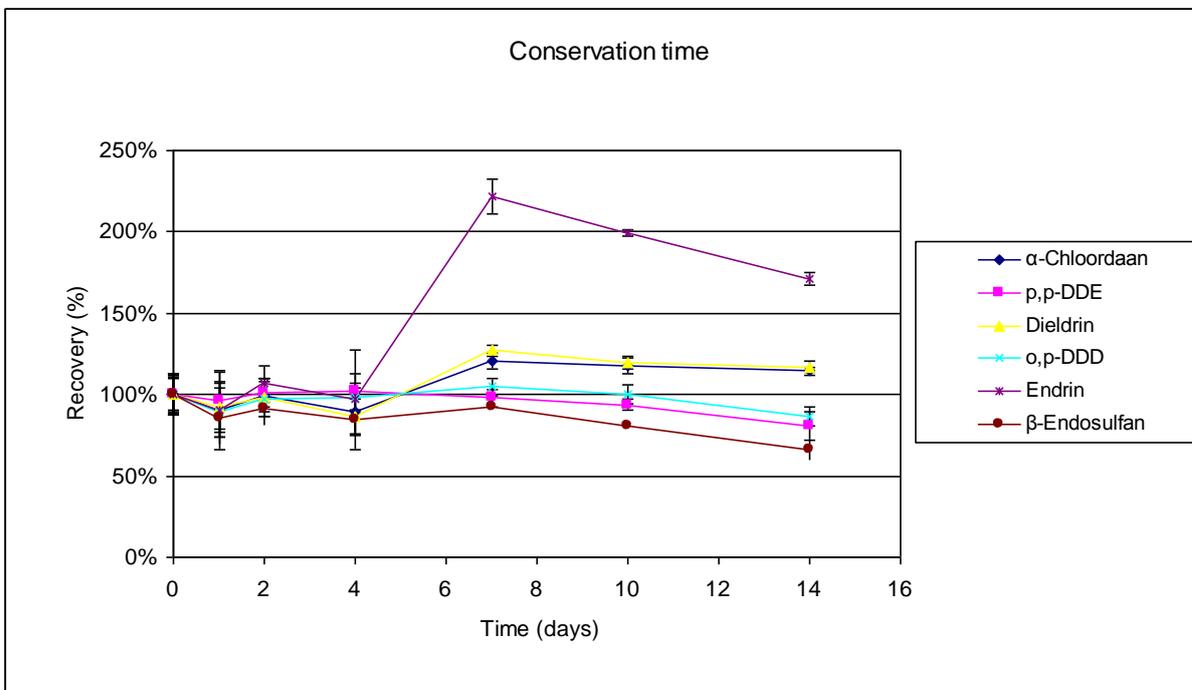
Attachment E: Graphs groundwater 1, addition level low

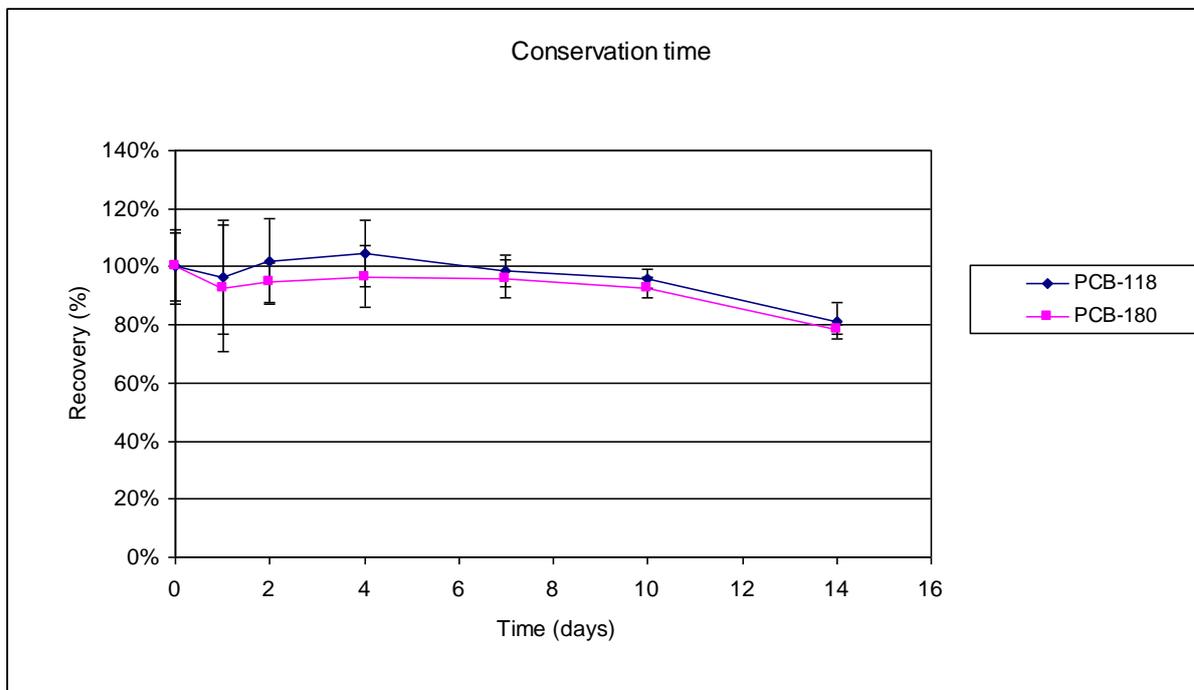


Validation of the preservation time of OCP, PCB and CB in groundwater



Validation of the preservation time of OCP, PCB and CB in groundwater





Validation of the preservation time of OCP, PCB and CB in groundwater

Attachment F: Results groundwater 2, addition level high
Report form conservation OCB/PCB in groundwater

Name lab Eurofins Analytico
Start date 20-Apr-09
Matrix Groundwater 2, addition level high

Days		0	1	2	4	7	9	11	14
Calendar day		20-Apr-09	21-Apr-09	22-Apr-09	24-Apr-09	27-Apr-09	29-Apr-09	01-May-09	04-May-09
Component	unit								
135-trichloorbenzeen	µg/L	386.4	328.4	423.8	343.7	384.9	362.1	346.0	402.9
RSD	%	15.2%	12.8%	7.2%	10.7%	10.2%	6.7%	3.0%	2.1%
SR validatie		21.6%							
124-trichloorbenzeen	µg/L	397.0	337.3	437.6	353.2	402.9	375.2	374.8	417.3
RSD	%	14.9%	15.6%	8.3%	11.7%	8.7%	9.4%	4.1%	3.1%
SR validatie		22.7%							
123-trichloorbenzeen	µg/L	409.4	347.3	432.2	364.7	399.8	389.5	390.3	424.4
RSD	%	14.7%	11.0%	7.4%	12.9%	9.7%	9.2%	3.6%	0.4%
SR validatie		20.7%							
Hexachloorbutadieen	µg/L	374.1	280.4	406.3	340.8	379.2	353.6	334.1	406.8
RSD	%	14.4%	19.5%	6.5%	11.5%	8.2%	6.5%	3.1%	2.6%
SR validatie		23.1%							
1245/1235-tetraCB	µg/L	424.9	327.4	434.7	363.6	398.5	380.5	350.5	450.9
RSD	%	19.9%	12.6%	7.1%	9.8%	8.2%	8.7%	1.3%	0.6%
SR validatie		18.2%							
1234-tetraCB	µg/L	429.3	370.2	437.7	405.2	473.1	458.6	443.5	446.3
RSD	%	20.2%	10.6%	8.6%	13.6%	6.1%	6.8%	3.9%	2.0%
SR validatie		19.1%							
Pentachloorbenzeen	µg/L	406.3	357.6	426.3	426.4	519.0	488.2	485.8	406.1
RSD	%	15.8%	15.8%	8.4%	10.1%	3.6%	7.3%	3.0%	2.7%
SR validatie		18.1%							
α-HCH	µg/L	429.7	382.0	469.9	402.9	459.7	445.7	472.4	462.9
RSD	%	16.3%	12.0%	7.9%	4.3%	7.2%	9.1%	2.6%	1.1%
SR validatie		21.8%							
HCB	µg/L	410.9	311.9	441.6	406.3	478.7	450.9	451.4	402.2
RSD	%	17.5%	17.9%	4.8%	7.7%	7.9%	7.0%	2.5%	1.6%
SR validatie		18.0%							
β-HCH	µg/L	360.8	368.8	435.7	449.6	465.3	480.3	503.8	425.1
RSD	%	11.6%	15.5%	4.6%	6.7%	9.0%	7.0%	2.6%	0.3%
SR validatie		19.9%							
γ-HCH	µg/L	433.7	379.2	464.7	388.5	424.5	414.2	418.8	467.1
RSD	%	16.4%	10.4%	6.6%	7.0%	8.7%	8.2%	4.8%	1.0%
SR validatie		19.0%							
δ-HCH	µg/L	375.4	382.1	447.9	469.9	489.0	498.6	547.3	420.4
RSD	%	12.3%	12.1%	4.6%	6.9%	5.8%	8.2%	5.5%	4.5%
SR validatie		15.7%							
PCB-28	µg/L	389.6	351.3	424.6	460.6	512.2	477.8	487.9	405.0
RSD	%	14.0%	15.2%	7.6%	9.6%	6.7%	7.0%	7.2%	4.2%
SR validatie		18.4%							
Heptachloor	µg/L	520.3	366.6	566.7	355.5	382.8	339.5	296.5	480.9
RSD	%	17.2%	21.0%	6.4%	7.2%	3.4%	6.0%	9.3%	4.4%
SR validatie		18.7%							
PCB-52	µg/L	352.9	304.8	430.0	384.0	426.1	367.2	374.7	347.6
RSD	%	10.8%	11.3%	6.1%	8.0%	5.4%	5.7%	7.2%	0.4%
SR validatie		19.6%							
Aldrin	µg/L	364.3	272.7	413.9	311.7	339.6	286.5	271.1	384.2
RSD	%	16.1%	16.2%	8.2%	8.4%	10.5%	1.3%	16.7%	3.0%
SR validatie		20.4%							
Telodrin	µg/L	412.0	295.4	483.2	308.0	343.4	305.4	280.9	378.9
RSD	%	15.4%	14.9%	2.1%	8.1%	6.1%	8.1%	4.2%	6.6%
SR validatie		21.1%							
Isodrin	µg/L	341.7	273.9	400.2	294.7	327.1	266.1	253.2	368.8
RSD	%	13.7%	15.4%	6.4%	6.5%	6.5%	1.5%	17.7%	3.1%
SR validatie		23.0%							

Validation of the preservation time of OCP, PCB and CB in groundwater

Report form conservation OCB/PCB in groundwater

Name lab Eurofins Analytico
 datum aanvang 20-Apr-09
 Matrix addition level high

Days		0	1	2	4	7	9	11	14
Calendarday		20-Apr-09	21-Apr-09	22-Apr-09	24-Apr-09	27-Apr-09	29-Apr-09	01-May-09	04-May-09
Component	unit								
Heptachloorepoxide	µg/L	416.1	351.4	483.5	348.2	384.1	344.4	326.2	442.1
RSD	%	8.1%	11.8%	4.3%	8.1%	9.4%	7.4%	2.5%	0.6%
SR validatie		22.0%							
trs-heptacepo	µg/L	356.8	310.4	439.8	334.8	347.9	334.0	326.8	437.3
RSD	%	7.9%	13.1%	4.5%	5.7%	5.6%	8.8%	3.8%	2.3%
SR validatie		18.4%							
γ-Chloordaen	µg/L	372.3	310.2	469.6	354.0	382.6	337.0	316.4	428.8
RSD	%	8.3%	14.3%	4.4%	9.2%	7.9%	4.0%	8.9%	1.0%
SR validatie		19.2%							
o,p-DDE	µg/L	296.2	314.1	379.3	377.5	404.1	341.2	339.1	345.1
RSD	%	6.7%	16.1%	5.1%	5.4%	9.3%	3.9%	15.1%	1.8%
SR validatie		20.7%							
PCB-101	µg/L	296.0	298.1	426.0	384.2	404.4	335.9	363.1	334.2
RSD	%	7.2%	8.5%	6.2%	7.8%	7.8%	2.1%	18.1%	1.3%
SR validatie		17.7%							
α-Endosulfan	µg/L	310.0	290.1	413.2	311.9	355.3	319.7	328.7	381.7
RSD	%	8.1%	13.4%	1.1%	9.7%	5.8%	6.2%	3.8%	4.6%
SR validatie		20.5%							
α-Chloordaen	µg/L	368.4	299.3	471.7	336.3	385.8	341.0	319.2	420.6
RSD	%	9.6%	11.3%	5.0%	4.7%	7.3%	3.7%	5.4%	4.3%
SR validatie		20.3%							
p,p-DDE	µg/L	263.7	313.4	372.7	383.7	406.5	351.1	337.4	318.4
RSD	%	8.5%	13.1%	7.2%	4.5%	10.2%	2.9%	20.6%	4.0%
SR validatie		19.4%							
Dieldrin	µg/L	330.5	317.2	437.7	336.9	373.7	359.9	336.8	412.9
RSD	%	5.6%	16.1%	3.2%	8.7%	6.3%	7.1%	2.4%	1.7%
SR validatie		19.9%							
o,p-DDD	µg/L	294.3	370.2	401.3	444.6	489.3	422.5	448.8	377.3
RSD	%	8.2%	11.6%	5.7%	5.9%	6.2%	6.4%	0.7%	4.2%
SR validatie		20.4%							
Endrin	µg/L	517.0	413.1	705.8	461.1	394.8	398.7	359.7	500.3
RSD	%	11.7%	7.8%	4.4%	3.0%	3.5%	7.0%	2.5%	11.4%
SR validatie		20.6%							
β-Endosulfan	µg/L	303.2	363.2	382.3	368.1	383.8	366.7	377.4	323.2
RSD	%	8.4%	10.2%	2.5%	6.8%	7.2%	7.6%	3.9%	2.1%
SR validatie		21.9%							
PCB-118	µg/L	280.5	331.6	414.6	441.5	449.0	369.0	401.1	305.5
RSD	%	9.0%	15.2%	7.5%	6.9%	8.7%	7.6%	17.2%	1.1%
SR validatie		21.6%							
p,p-DDD	µg/L	298.9	408.4	404.2	484.5	553.2	463.9	491.9	404.2
RSD	%	8.0%	10.7%	3.1%	3.2%	5.6%	4.7%	3.4%	1.1%
SR validatie		21.3%							
o,p-DDT	µg/L	353.9	392.3	458.7	436.5	469.5	390.7	363.4	354.3
RSD	%	12.3%	7.1%	5.7%	6.9%	10.2%	3.0%	15.9%	2.2%
SR validatie		18.2%							
PCB-153	µg/L	278.3	301.4	412.2	389.9	392.2	314.9	349.6	281.0
RSD	%	9.4%	16.7%	7.1%	6.6%	5.1%	7.2%	15.5%	3.4%
SR validatie		24.1%							
Endosulfan sulfaat	µg/L	380.4	450.7	472.0	458.4	502.3	488.9	497.2	436.4
RSD	%	7.0%	8.9%	2.4%	7.4%	8.9%	9.3%	3.0%	1.0%
SR validatie		23.8%							
p,p-DDT	µg/L	339.1	476.0	499.2	510.7	545.2	489.0	469.0	370.1
RSD	%	9.3%	13.1%	5.7%	5.9%	7.2%	3.2%	15.5%	4.8%
SR validatie		16.9%							
PCB-138	µg/L	309.0	305.7	428.2	394.0	401.7	321.1	362.1	306.1
RSD	%	9.7%	18.7%	8.9%	7.0%	8.7%	7.6%	17.7%	2.0%
SR validatie		23.6%							
PCB-180	µg/L	268.8	281.7	398.7	358.2	374.3	288.4	341.6	244.8
RSD	%	11.5%	11.4%	8.9%	4.8%	6.8%	15.5%	16.6%	5.3%
SR validatie		27.9%							

Validation of the preservation time of OCP, PCB and CB in groundwater

Attachment G: Results groundwater 2, addition level high, z-scores
Report form conservation OCB/PCB in groundwater

Name lab Eurofins Analytico
 Start date 20-Apr-09
 Matrix Groundwater 2, addition level high

Days		0	1	2	4	7	9	11	14
Calendar day		20-Apr-09	21-Apr-09	22-Apr-09	24-Apr-09	27-Apr-09	29-Apr-09	01-May-09	04-May-09
Component	unit								
135-trichloorbenzeen	µg/L	100.0%	85.0%	109.7%	89.0%	99.6%	93.7%	89.5%	104.3%
RSD	%	15.2%	12.8%	7.2%	10.7%	10.2%	6.7%	3.0%	2.1%
z score		0.0	-0.7	0.4	-0.5	0.0	-0.3	-0.5	0.2
124-trichloorbenzeen	µg/L	100.0%	85.0%	110.2%	89.0%	101.5%	94.5%	94.4%	105.1%
RSD	%	14.9%	15.6%	8.3%	11.7%	8.7%	9.4%	4.1%	3.1%
z score		0.0	-0.7	0.5	-0.5	0.1	-0.2	-0.2	0.2
123-trichloorbenzeen	µg/L	100.0%	84.8%	105.6%	89.1%	97.6%	95.1%	95.3%	103.7%
RSD	%	14.7%	11.0%	7.4%	12.9%	9.7%	9.2%	3.6%	0.4%
z score		0.0	-0.7	0.3	-0.5	-0.1	-0.2	-0.2	0.2
Hexachloorbutadieen	µg/L	100.0%	74.9%	108.6%	91.1%	101.4%	94.5%	89.3%	108.7%
RSD	%	14.4%	19.5%	6.5%	11.5%	8.2%	6.5%	3.1%	2.6%
z score		0.0	-1.1	0.4	-0.4	0.1	-0.2	-0.5	0.4
1245/1235-tetraCB	µg/L	100.0%	77.1%	102.3%	85.6%	93.8%	89.6%	82.5%	106.1%
RSD	%	19.9%	12.6%	7.1%	9.8%	8.2%	8.7%	1.3%	0.6%
z score		0.0	-1.3	0.1	-0.8	-0.3	-0.6	-1.0	0.3
1234-tetraCB	µg/L	100.0%	86.2%	102.0%	94.4%	110.2%	106.8%	103.3%	104.0%
RSD	%	20.2%	10.6%	8.6%	13.6%	6.1%	6.8%	3.9%	2.0%
z score		0.0	-0.7	0.1	-0.3	0.5	0.4	0.2	0.2
Pentachloorbenzeen	µg/L	100.0%	88.0%	104.9%	104.9%	127.7%	120.2%	119.6%	99.9%
RSD	%	15.8%	15.8%	8.4%	10.1%	3.6%	7.3%	3.0%	2.7%
z score		0.0	-0.7	0.3	0.3	1.5	1.1	1.1	0.0
α-HCH	µg/L	100.0%	88.9%	109.4%	93.8%	107.0%	103.7%	109.9%	107.7%
RSD	%	16.3%	12.0%	7.9%	4.3%	7.2%	9.1%	2.6%	1.1%
z score		0.0	-0.5	0.4	-0.3	0.3	0.2	0.5	0.4
HCb	µg/L	100.0%	75.9%	107.5%	98.9%	116.5%	109.7%	109.9%	97.9%
RSD	%	17.5%	17.9%	4.8%	7.7%	7.9%	7.0%	2.5%	1.6%
z score		0.0	-1.3	0.4	-0.1	0.9	0.5	0.5	-0.1
β-HCH	µg/L	100.0%	102.2%	120.8%	124.6%	129.0%	133.1%	139.6%	117.8%
RSD	%	11.6%	15.5%	4.6%	6.7%	9.0%	7.0%	2.6%	0.3%
z score		0.0	0.1	1.0	1.2	1.5	1.7	2.0	0.9
γ-HCH	µg/L	100.0%	87.4%	107.2%	89.6%	97.9%	95.5%	96.6%	107.7%
RSD	%	16.4%	10.4%	6.6%	7.0%	8.7%	8.2%	4.8%	1.0%
z score		0.0	-0.7	0.4	-0.5	-0.1	-0.2	-0.2	0.4
δ-HCH	µg/L	100.0%	101.8%	119.3%	125.2%	130.3%	132.8%	145.8%	112.0%
RSD	%	12.3%	12.1%	4.6%	6.9%	5.8%	8.2%	5.5%	4.5%
z score		0.0	0.1	1.2	1.6	1.9	2.1	2.9	0.8
PCB-28	µg/L	100.0%	90.2%	109.0%	118.2%	131.5%	122.6%	125.2%	104.0%
RSD	%	14.0%	15.2%	7.6%	9.6%	6.7%	7.0%	7.2%	4.2%
z score		0.0	-0.5	0.5	1.0	1.7	1.2	1.4	0.2
Heptachloor	µg/L	100.0%	70.5%	108.9%	68.3%	73.6%	65.2%	57.0%	92.4%
RSD	%	17.2%	21.0%	6.4%	7.2%	3.4%	6.0%	9.3%	4.4%
z score		0.0	-1.6	0.5	-1.7	-1.4	-1.9	-2.3	-0.4
PCB-52	µg/L	100.0%	86.4%	121.9%	108.8%	120.7%	104.0%	106.2%	98.5%
RSD	%	10.8%	11.3%	6.1%	8.0%	5.4%	5.7%	7.2%	0.4%
z score		0.0	-0.7	1.1	0.5	1.1	0.2	0.3	-0.1
Aldrin	µg/L	100.0%	74.9%	113.6%	85.6%	93.2%	78.7%	74.4%	105.5%
RSD	%	16.1%	16.2%	8.2%	8.4%	10.5%	1.3%	16.7%	3.0%
z score		0.0	-1.2	0.7	-0.7	-0.3	-1.0	-1.3	0.3
Telodrin	µg/L	100.0%	71.7%	117.3%	74.7%	83.3%	74.1%	68.2%	92.0%
RSD	%	15.4%	14.9%	2.1%	8.1%	6.1%	8.1%	4.2%	6.6%
z score		0.0	-1.3	0.8	-1.2	-0.8	-1.2	-1.5	-0.4
Isodrin	µg/L	100.0%	80.1%	117.1%	86.2%	95.7%	77.9%	74.1%	107.9%
RSD	%	13.7%	15.4%	6.4%	6.5%	6.5%	1.5%	17.7%	3.1%
z score		0.0	-0.9	0.7	-0.6	-0.2	-1.0	-1.1	0.3

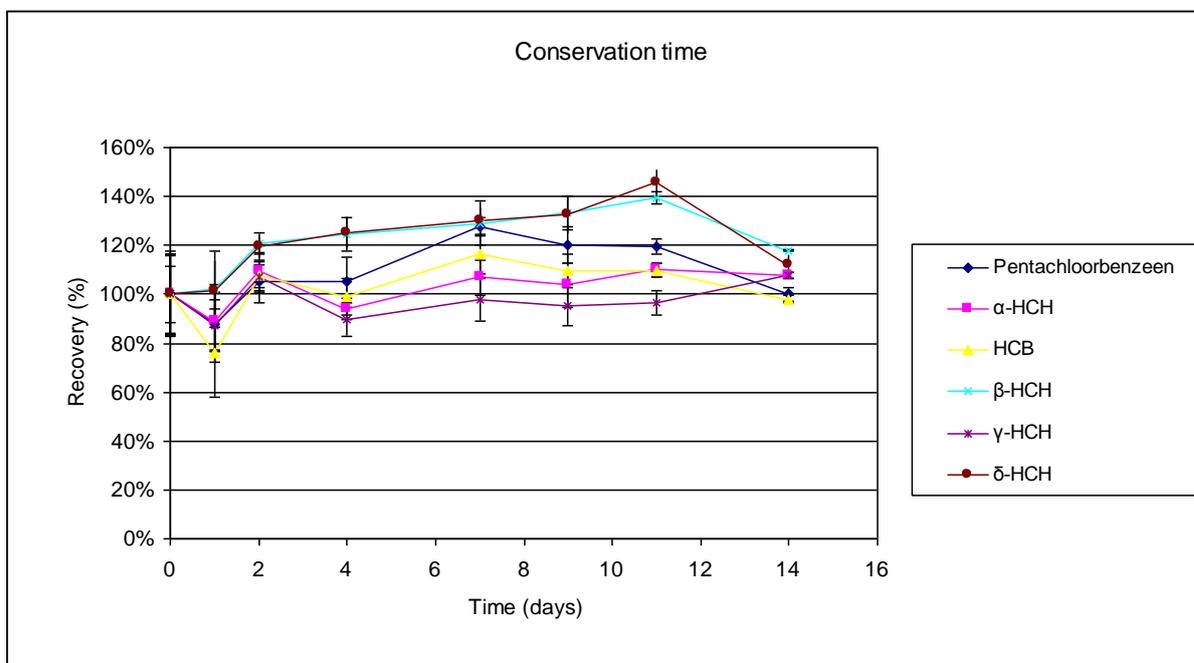
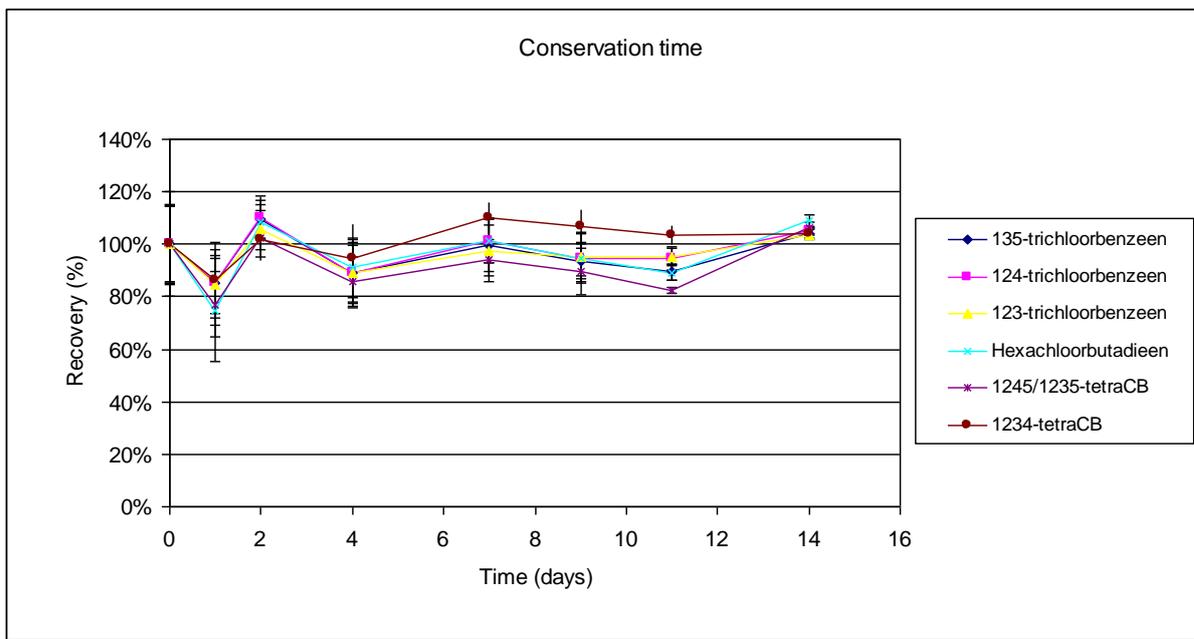
Validation of the preservation time of OCP, PCB and CB in groundwater

Report form conservation OCB/PCB in groundwater

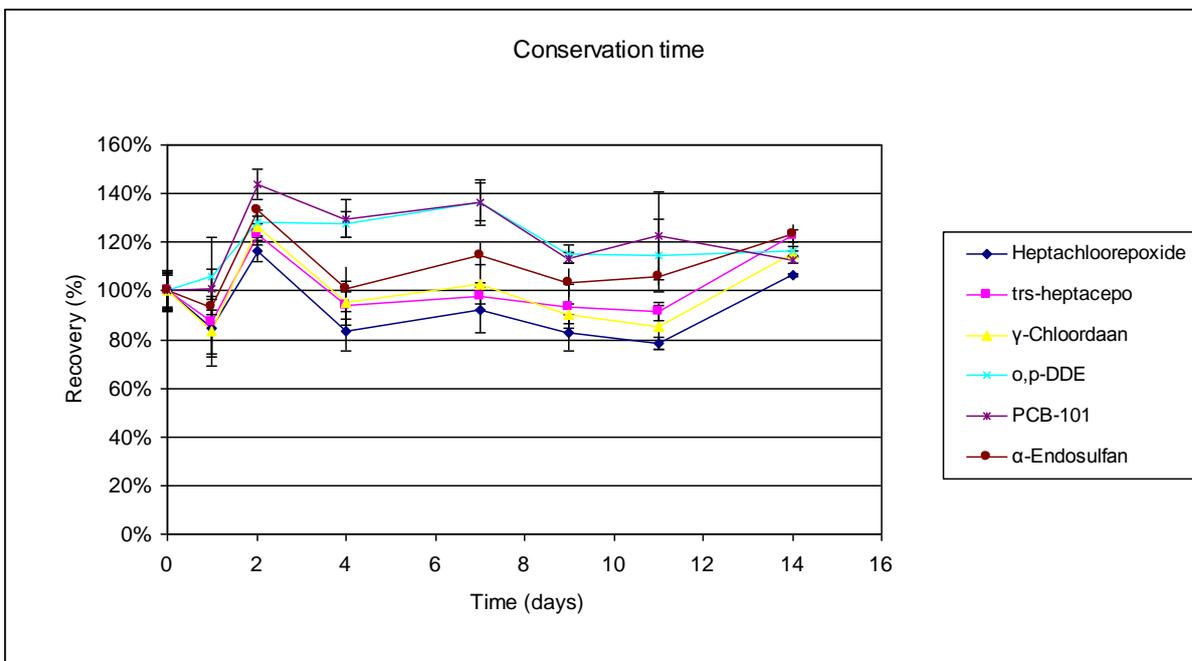
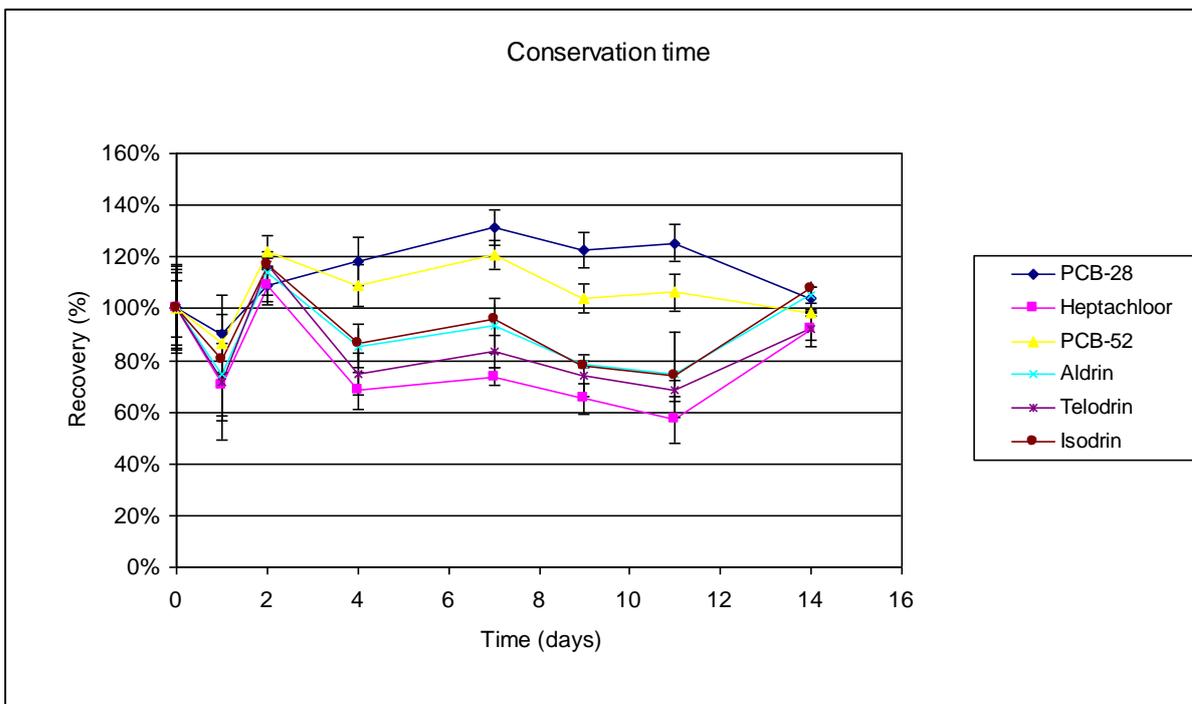
Name lab Eurofins Analytico
 datum aanvang 20-Apr-09
 Matrix addition level high

Days Calenderday Component	unit	0 20-Apr-09	1 21-Apr-09	2 22-Apr-09	4 24-Apr-09	7 27-Apr-09	9 29-Apr-09	11 01-May-09	14 04-May-09
Heptachloorepoxide	µg/L	100.0%	84.5%	116.2%	83.7%	92.3%	82.8%	78.4%	106.2%
RSD	%	8.1%	11.8%	4.3%	8.1%	9.4%	7.4%	2.5%	0.6%
z score		0.0	-0.7	0.7	-0.7	-0.4	-0.8	-1.0	0.3
trs-heptacepo	µg/L	100.0%	87.0%	123.3%	93.8%	97.5%	93.6%	91.6%	122.6%
RSD	%	7.9%	13.1%	4.5%	5.7%	5.6%	8.8%	3.8%	2.3%
z score		0.0	-0.7	1.3	-0.3	-0.1	-0.3	-0.5	1.2
γ-Chloordaan	µg/L	100.0%	83.3%	126.1%	95.1%	102.8%	90.5%	85.0%	115.2%
RSD	%	8.3%	14.3%	4.4%	9.2%	7.9%	4.0%	8.9%	1.0%
z score		0.0	-0.9	1.4	-0.3	0.1	-0.5	-0.8	0.8
α,p-DDE	µg/L	100.0%	106.1%	128.1%	127.4%	136.4%	115.2%	114.5%	116.5%
RSD	%	6.7%	16.1%	5.1%	5.4%	9.3%	3.9%	15.1%	1.8%
z score		0.0	0.3	1.4	1.3	1.8	0.7	0.7	0.8
PCB-101	µg/L	100.0%	100.7%	143.9%	129.8%	136.6%	113.5%	122.7%	112.9%
RSD	%	7.2%	8.5%	6.2%	7.8%	7.8%	2.1%	18.1%	1.3%
z score		0.0	0.0	2.5	1.7	2.1	0.8	1.3	0.7
α-Endosulfan	µg/L	100.0%	93.6%	133.3%	100.6%	114.6%	103.1%	106.0%	123.1%
RSD	%	8.1%	13.4%	1.1%	9.7%	5.8%	6.2%	3.8%	4.6%
z score		0.0	-0.3	1.6	0.0	0.7	0.2	0.3	1.1
α-Chloordaan	µg/L	100.0%	81.3%	128.1%	91.3%	104.7%	92.6%	86.6%	114.2%
RSD	%	9.6%	11.3%	5.0%	4.7%	7.3%	3.7%	5.4%	4.3%
z score		0.0	-0.9	1.4	-0.4	0.2	-0.4	-0.7	0.7
p,p-DDE	µg/L	100.0%	118.9%	141.3%	145.5%	154.2%	133.2%	128.0%	120.8%
RSD	%	8.5%	13.1%	7.2%	4.5%	10.2%	2.9%	20.6%	4.0%
z score		0.0	1.0	2.1	2.3	2.8	1.7	1.4	1.1
Dieldrin	µg/L	100.0%	96.0%	132.4%	101.9%	113.1%	108.9%	101.9%	124.9%
RSD	%	5.6%	16.1%	3.2%	8.7%	6.3%	7.1%	2.4%	1.7%
z score		0.0	-0.2	1.6	0.1	0.7	0.4	0.1	1.3
α,p-DDD	µg/L	100.0%	125.8%	136.4%	151.1%	166.3%	143.6%	152.5%	128.2%
RSD	%	8.2%	11.6%	5.7%	5.9%	6.2%	6.4%	0.7%	4.2%
z score		0.0	1.3	1.8	2.5	3.2	2.1	2.6	1.4
Endrin	µg/L	100.0%	79.9%	136.5%	89.2%	76.4%	77.1%	69.6%	96.8%
RSD	%	11.7%	7.8%	4.4%	3.0%	3.5%	7.0%	2.5%	11.4%
z score		0.0	-1.0	1.8	-0.5	-1.1	-1.1	-1.5	-0.2
β-Endosulfan	µg/L	100.0%	119.8%	126.1%	121.4%	126.6%	120.9%	124.4%	106.6%
RSD	%	8.4%	10.2%	2.5%	6.8%	7.2%	7.6%	3.9%	2.1%
z score		0.0	0.9	1.2	1.0	1.2	1.0	1.1	0.3
PCB-118	µg/L	100.0%	118.2%	147.8%	157.4%	160.1%	131.6%	143.0%	108.9%
RSD	%	9.0%	15.2%	7.5%	6.9%	8.7%	7.6%	17.2%	1.1%
z score		0.0	0.8	2.2	2.7	2.8	1.5	2.0	0.4
p,p-DDD	µg/L	100.0%	136.6%	135.2%	162.1%	185.1%	155.2%	164.6%	135.2%
RSD	%	8.0%	10.7%	3.1%	3.2%	5.6%	4.7%	3.4%	1.1%
z score		0.0	1.7	1.7	2.9	4.0	2.6	3.0	1.7
α,p-DDT	µg/L	100.0%	110.9%	129.6%	123.4%	132.7%	110.4%	102.7%	100.1%
RSD	%	12.3%	7.1%	5.7%	6.9%	10.2%	3.0%	15.9%	2.2%
z score		0.0	0.6	1.6	1.3	1.8	0.6	0.1	0.0
PCB-153	µg/L	100.0%	108.3%	148.1%	140.1%	140.9%	113.2%	125.6%	101.0%
RSD	%	9.4%	16.7%	7.1%	6.6%	5.1%	7.2%	15.5%	3.4%
z score		0.0	0.3	2.0	1.7	1.7	0.5	1.1	0.0
Endosulfan sulfaat	µg/L	100.0%	118.5%	124.1%	120.5%	132.0%	128.5%	130.7%	114.7%
RSD	%	7.0%	8.9%	2.4%	7.4%	8.9%	9.3%	3.0%	1.0%
z score		0.0	0.8	1.0	0.9	1.3	1.2	1.3	0.6
p,p-DDT	µg/L	100.0%	140.4%	147.2%	150.6%	160.8%	144.2%	138.3%	109.2%
RSD	%	9.3%	13.1%	5.7%	5.9%	7.2%	3.2%	15.5%	4.8%
z score		0.0	2.4	2.8	3.0	3.6	2.6	2.3	0.5
PCB-138	µg/L	100.0%	98.9%	138.6%	127.5%	130.0%	103.9%	117.2%	99.0%
RSD	%	9.7%	18.7%	8.9%	7.0%	8.7%	7.6%	17.7%	2.0%
z score		0.0	0.0	1.6	1.2	1.3	0.2	0.7	0.0
PCB-180	µg/L	100.0%	104.8%	148.3%	133.2%	139.2%	107.3%	127.0%	91.0%
RSD	%	11.5%	11.4%	8.9%	4.8%	6.8%	15.5%	16.6%	5.3%
z score		0.0	0.2	1.7	1.2	1.4	0.3	1.0	-0.3

Attachment H: Graphs groundwater 2, addition level high



Validation of the preservation time of OCP, PCB and CB in groundwater



Validation of the preservation time of OCP, PCB and CB in groundwater

